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**AD-678 760**

**A DDC BIBLIOGRAPHY ON  
ATMOSPHERIC TURBULENCE**

**VOLUME I OF II VOLUMES**

**DDC-TAS-68-40**

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**September 1968**

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U N C L A S S I F I E D - U N L I M I T E D

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ATMOSPHERIC TURBULENCE

Volume I of II Volumes

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SEPTEMBER 1968

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U N C L A S S I F I E D - U N L I M I T E D

## P R E F A C E

This bibliography is a selection of references to reports on general and specific aspects of Atmospheric Turbulence. Abstracts of reports written before 1960 are not included.

Subject-oriented sections in the bibliography provide access to topics that have received particular attention: Clear Air Turbulence; Planetary Boundary Layer Turbulence; and Storm and Cloud Turbulence. Additional groups include abstracts of reports on spectral analysis methods, turbulent diffusion and dispersion, turbulence interaction with electromagnetic and acoustic waves, jet stream turbulence, and upper air turbulence. Entries are sequenced numerically within each section by AD number. A list of AD numbers at the end of a section refers to abstracts located in other parts of the bibliography that are related to the subject of the section.

Indexes of Subject, Personal Author, Corporate Source, Contract Number and Report Number are provided. An AD-pagination index is also included to facilitate reference selection through the other indexes.

This bibliography contains references to Unclassified reports with no distribution limitations. Another volume on

Atmospheric Turbulence, AD-844 020, contains references to  
Unclassified reports with specific distribution limitations.

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Administrator  
Defense Documentation Center



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## **I. GENERAL TURBULENCE STUDIES**

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-275 852

ARMY MISSILE COMMAND REDSTONE ARSENAL ALA  
ANALYSIS OF ATMOSPHERIC TURBULENCE FROM MISSILE  
FLIGHT WIND MEASUREMENTS

(U)

AUG 61 IV ESSENWANGER, OSKAR H. I  
REPT. NO. RR TR 61 7

UNCLASSIFIED REPORT

DESCRIPTORS: •ATMOSPHERE, •TURBULENCE, •WIND,  
ANALYSIS, ERRORS, FLIGHT TESTING, GUIDED MISSILES,  
INSTRUMENTATION, MEASUREMENT

(U)

THE SPLIT OF AN INSTANTANEOUS WIND PROFILE INTO ITS  
MEAN (QUASI-STEADY) PROFILE AND ITS NONSTATIONARY  
COMPONENTS IS DISCUSSED. IT IS SHOWN THAT TWO  
MATHEMATICAL CONDITIONS CAN BE ESTABLISHED FOR THIS  
SEPARATION PROCEDURE. FIRST, THE SUM OF THE  
REMAINING FLUCTUATIONS MUST BE ZERO, IF THE  
VARIATIONS REPRESENT TURBULENCE. SECONDLY, IT MAY  
BE POSTULATED THAT THE FIRST LAG CORRELATION BE  
POSITIVE, AND THE SECOND ONE NEGATIVE FOR A 22 POINT  
ANALYSIS. THE SEPARATION OF THE MEAN PROFILE FROM  
THE TURBULENT PART IS DEMONSTRATED ON HAND OF AN  
EXAMPLE FOR DATA OF THE JUPIYER MISSILE FLIGHT 30  
BETWEEN 400 AND 3000 M ALTITUDE FROM 12 M HEIGHT  
INTERVAL RECORDINGS. (AUTHOR)

(U)

UNCLASSIFIED

/A0392

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /A0392

AD-289 961

PRINCETON UNIV N J

A PRELIMINARY STUDY OF THE DYNAMIC STABILITY AND  
CONTROL RESPONSE DESIRED FOR V/STOL AIRCRAFT

(U)

IV            ELLIS, D. R. CARTER, G. A. I

UNCLASSIFIED REPORT

DESCRIPTORS:    •SHORT TAKE-OFF PLANES, •VERTICAL TAKE-  
OFF PLANES, ACCELERATION, AUTOMATIC, AUTOMATIC PILOTS,  
EQUATIONS, FEEDBACK, FLIGHT PATHS, FLIGHT SIMULATORS,  
GUSTS, HELICOPTERS, HOVERING, MATHEMATICAL ANALYSIS,  
MOTION, PITCH (MOTION), SIMULATION, STABILITY,  
STABILIZATION SYSTEMS, VELOCITY

(U)

LONGITUDINAL DYNAMICS AND CONTROL RESPONSE DESIRED FOR  
VTOL/STOL AIRCRAFT STABILIZED AUTOMATICALLY.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-403 114

ARMY MISSILE COMMAND REDSTONE ARSENAL ALA  
WIND, WIND SHEAR AND TURBULENCE REPRESENTATION FOR  
ATMOSPHERIC BALLISTICS, (U)

FEB 63 22P ESSENWANGER, OSKAR ;

REPT. NO. RR TR63 7

PROJ: 182 791910678

UNCLASSIFIED REPORT

DESCRIPTORS: \*WIND, \*ATMOSPHERIC MOTION,  
WIND DIRECTION INDICATORS, VELOCITY, TURBU  
LENCE, MEASUREMENT, DISTRIBUTION, METEOROLOG  
ICAL PARAMETERS, RADIOSONDES, HIGH ALTITUDE,  
SURFACE AREA, SHEAR STRESSES, ANALYSIS. (U)

FOUR TOPICS IN WIND ANALYSIS ARE BRIEFLY DIS  
CUSSED. RESEARCH ENDEAVORS TO TREAT THE VERTICAL  
VARIATION OF THE WIND PROFILE AS AN ENTITY CON  
SIDERING SIMULTANEOUS OCCURRENCES OF THE WIND VECTOR  
ARE DESCRIBED. THIS NEW APPROACH, THE SO-CALLED  
CHARACTERISTICS METHOD, EXHIBITS ADVANTAGES OVER  
OTHER METHODS. PROFILES WITH MAXIMUM SPEED VALUES  
IN THE FREQUENCY DISTRIBUTION OF HEIGHT LEVELS ARE  
ANALYZED AND TWO MAJOR TYPES ARE DISCUSSED.  
PRELIMINARY RESULTS OF THE INVESTIGATION OF THE  
WIND SHEAR PARAMETERS AS A FUNCTION OF THE SCALE OF  
DISTANCE DELINEATE THE DEFICIENCY OF DERIVING SHEAR  
PARAMETERS FROM SMOOTH RADIOSONDE RECORDS. THE  
FINAL TOPIC DEALS WITH THE ANALYSIS OF THE  
TURBULENCE PARAMETERS, AND THE SEPARATION OF THE  
WIND PROFILE FROM MISSILE FLIGHT RECORDINGS INTO  
STATIONARY AND NONSTATIONARY PARTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-409 898

TEXAS A AND M UNIV COLLEGE STATION

A STUDY OF SPATIAL VARIATIONS IN MICROMETEOROLOGICAL PARAMETERS.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

APR 63 56P CLAYTON, WILLIAM H.;

HISTRY, PURACHAND D.;

REPT. NO. 63 15F

CONTRACT: AF19 604 5527

PROJ: NOS. 7655 ,8604

TASK: NOS. 76551 ,86040

MONITOR: AFCRL 63 629

UNCLASSIFIED REPORT

DESCRIPTORS: (MICROMETEOROLOGY, METEOROLOGICAL PARAMETERS), (HEAT, CONVECTION), (TURBULENCE, ANALYSIS), EXPERIMENTAL DATA, WIND, ATMOSPHERIC TEMPERATURE, TEMPERATURE, ELECTROMAGNETIC WAVES, METEOROLOGICAL INSTRUMENTS, METEOROLOGICAL CHARTS, EVAPORATION, STABILITY, VELOCITY, TABLES, NUMERICAL ANALYSIS.

(U)

IDENTIFIERS: 1962, SPATIAL VARIATIONS.

(U)

A STUDY WAS MADE OF THE TURBULENT EXCHANGE COEFFICIENTS BASED ON ENERGY BALANCE AND MEAN FLOW PARAMETERS MEASURED AT PROJECT GREEN GLOW. IT REVEALS THAT THE RATIOS OF THE EXCHANGE COEFFICIENTS ARE FUNCTIONALLY RELATED TO THERMAL STABILITY, THEREBY CONTRADICTING THOSE POSTULATES WHICH HAVE ASSUMED CONSTANCY OF THE RATIOS FOR ALL STABILITY SITUATIONS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0352

AD-420 658

FOREIGN TECH DIV AIR FORCE SYSTEMS COMMAND WRIGHT-PATTERSON  
AFB OHIO

EFFECT OF ATMOSPHERIC TURBULENCE ON AN AIRPLANE WITH  
FLEXIBLE WINGS AT DIFFERENT SPEEDS OF FLIGHT.

SEP 62 15P ROZANOVSKIY, YU. M. 1

STRELKOV, S. P. 1

MONITOR: FTD TT62 750 1 2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. FROM IZVESTIYA AKADEMII  
NAUK SSSR, OTDELENIYE TEKHNIЧЕСКИХ НАУК,  
МЕХАНИКА I МАШИНОСТРОЕНИЕ, NR. 4, PP 3-10, 1959.

DESCRIPTORS: (\*WINGS, AEROELASTICITY), ATMOSPHERE,  
TURBULENCE, GUSTS, LIFT, AERODYNAMIC LOADING, FLUTTER,  
VIBRATION, OSCILLATION, AERODYNAMIC CHARACTERISTICS,  
MATHEMATICAL ANALYSIS, DIFFERENTIAL EQUATIONS,  
INTEGRAL EQUATIONS, MATRIX ALGEBRA, GUST LOADS,  
TORQUE, STATISTICAL ANALYSIS

(U)

IDENTIFIERS: 1959

(U)

A METHOD IS DESCRIBED THAT MAKES IT POSSIBLE TO  
OBTAIN SIMPLY THE STATISTICAL CHARACTERISTICS OF  
FORCED VIBRATIONS OF AN ELASTIC AIRPLANE WING UNDER  
THE ACTION OF ATMOSPHERIC TURBULENCE. WITH ITS HELP  
ONE CAN TAKE INTO ACCOUNT VIBRATIONS WITH DIFFERENT  
DEGREES OF FREEDOM. THE INCREASE IN THE NUMBER OF  
DEGREES OF FREEDOM PER UNIT LEADS TO AN INCREASE IN  
THE ORDER OF SOLVABLE SYSTEM OF ALGEBRAIC EQUATIONS  
BY TWO UNITS. THE STANDARD PROGRAM IT IS REQUIRES  
INSIGNIFICANT CHANGES INCREASING THE TIME FOR THE  
COMPUTATION BY A SMALL FACTOR. COMPARISON OF THE  
STATISTICAL CHARACTERISTICS OF VIBRATIONS OF ONE AND  
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CLOSE TO THE CRITICAL RATES OF FLUTTER WING TORSION  
SHOULD BE CONSIDERED IN COMPUTING THE JOINT BENDING-  
TORSIONAL VIBRATIONS OF THE WING. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0292

AD-420 012

CORNELL AERONAUTICAL LAB INC BUFFALO N Y  
FIXED-BASE SIMULATOR INVESTIGATION OF THE EFFECTS OF  
L ALPHA AND TRUE SPEED ON PILOT OPINION OF  
LONGITUDINAL FLYING QUALITIES, (U)

NOV 62 174P CHALK, CHARLES R. I

CONTRACT: AF33 657 7442

PROJ: 8219

TASK: 821905

MONITOR: ASD TDR62 299

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (AIRPLANES, ELEVATORS), (ELEVATORS,  
PILOTS), (PILOTS, REACTION (PSYCHOLOGY)), FLIGHT  
SIMULATORS, PERFORMANCE (ENGINEERING), FIGHTERS,  
BOMBERS, TURBULENCE, ACCELERATION, LIFT, TESTS, FLIGHT  
SPEEDS, SIMULATION, FUNCTIONS, GUSTS, ANGLE OF ATTACK (U)  
IDENTIFIERS: 1962, T-33 AIRCRAFT (U)

THE STUDY IS DIRECTED TOWARD INVESTIGATING THE  
EFFECTS ON PILOTS RATING OF LARGE VARIATIONS (L  
ALPHA) IN THE RELATIVE AMPLITUDE AND PHASE OF THE  
BASIC AIRPLANE RESPONSES TO ELEVATOR CONTROL. THE  
EFFECTS OF L ALPHA AND TRUE SPEED ON LONGITUDINAL  
FLYING QUALITIES, OPTIMUM CONTROL GAIN, AND NORMAL  
ACCELERATION RESPONSE TO TURBULENCE WERE INVESTIGATED  
IN A GROUND SIMULATOR. THE STEADY STATE RATIO OF  
NORMAL ACCELERATION TO ANGLE OF ATTACK WAS FOUND TO  
BE OF SIGNIFICANCE BOTH TO THE FLYING QUALITIES OF AN  
AIRPLANE AND TO THE OPTIMUM LONGITUDINAL CONTROL  
GAIN. NORMAL ACCELERATION RESPONSE TO ROUGH AIR WAS  
DEMONSTRATED TO BE PRIMARILY A FUNCTION OF L ALPHA  
AND THE SHORT PERIOD FREQUENCY AND DAMPING RATIO.  
(AUTHOR) (U)

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AD-422 054

FOREIGN TECH DIV AIR FORCE SYSTEMS COMMAND WRIGHT-PATTERSON  
AFB OHIO  
METEOROLOGY AND THE PILOT (LETCHIKU O METEOROLOGII),

(U)

DEC 62 395P KRAVCHENK, I. V. I  
MONITOR: FTD TY62 620

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. FROM VOYENNOYE IZDATEL'STVO  
MINISTERSTVA OBORONY, PP. 1-212, 1962.

DESCRIPTORS: (•METEOROLOGY, INSTRUCTION MANUALS),  
PILOTS, AIR MASS ANALYSIS, ATMOSPHERIC TEMPERATURE,  
BAROMETRIC PRESSURE, DENSITY, HUMIDITY, WIND, CLOUDS,  
ATMOSPHERIC PRECIPITATION, FOG, ANTICYCLONES,  
CYCLONES, WEATHER FORECASTING, ATMOSPHERIC MOTION,  
THUNDERSTORMS, LIGHTNING, ICE, ICE FORMATION  
INDICATORS, AERIAL RECONNAISSANCE, AIRCRAFT,  
AIRPLANES

(U)

IDENTIFIERS: 1962, USSR, AIRCRAFT ICING

(U)

CONTENTS: BASIC METEOROLOGICAL ELEMENTS;  
AIR MASSES, ATMOSPHERIC FRONTS, CYCLONES  
AND ANTICYCLONES; AIRFLOWS AND ATMOSPHERIC  
TURBULENCE; THUNDERSTORMS AND SQUALLS;  
AIRCRAFT ICING.

(U)

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AD-426 559

WEATHER BUREAU WASHINGTON D C

ON THE THEORY OF PRESSURE WAVES IN A BAROCLINIC  
ATMOSPHERE (K TEORI! VOLN DAVLENIIA V BAROKLINNOI  
ATMOSFERE),

(U)

MAR 62

20P

MASHKOVICH, S. A. 1

OGNEHOV, IRENE A. 1

MONITOR: WB DC

T98

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. FROM TRUDY TSENTRAL'NYI  
INSTITUT PROGNOZOV, MOSCOW, ISSUE NO. 111, PP. 12-  
28, 1961.

DESCRIPTORS: (1)ATMOSPHERIC MOTION, ANALYSIS), (1)AIR  
MASS ANALYSIS, ATMOSPHERE MODELS), BAROMETRIC  
PRESSURE, THEORY, ENERGY, TEMPERATURE, STABILITY,  
POLYNOMIALS, PROPAGATION, TURBULENCE, WAVE  
TRANSMISSION

(U)

IDENTIFIERS: 1962

(U)

THE DEVELOPMENT OF WAVES IMPOSED ON THE BAROCLINIC  
ZONAL FLOW IS INVESTIGATED. THE PROBLEM IS SOLVED  
WITH A NUMERICAL METHOD FOR FOUR AND TENLEVEL  
ATMOSPHERIC MODELS. THE RESULTS OBTAINED ARE USED  
FOR INVESTIGATING THE STABILITY OF MOTION, FOR  
DETERMINING THE CHARACTER OF WAVE EVOLUTION WITH A  
DIFFERENT VERTICAL STRUCTURE OF A DISTURBANCE AT AN  
INITIAL MOMENT, AND FOR THE EVALUATION OF  
TRANSFORMATION OF ENERGY. THE CALCULATED RESULTS  
DEMONSTRATE THE RELATIONSHIP BETWEEN THE STABILITY OF  
WAVES OF DIFFERENT MAGNITUDES ON THE VERTICAL  
VELOCITY PROFILE OF THE BASIC FLOW AND THE  
STRATIFICATION OF THE ATMOSPHERE. (AUTHOR)

(U)

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AD-602 998

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
LATERAL VIBRATIONS OF AN AIRCRAFT, CAUSED BY EFFECT  
OF WIND GUSTS, (U)

DEC 63    26P    DUBOV, A. S. ;  
MONITOR: FTD ;TT    MT63 118, 64 11969

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF GLAVNAYA  
GEOFIZICHESKAYA OBSERVATORIYA, LENINGRAD. TRUDY  
(USSR) 1959, NO. 98 160 P. 3-16.

DESCRIPTORS: (AIRCRAFT, VIBRATION), (GUST LOADS,  
AIRCRAFT), GUSTS, AERODYNAMIC LOADING, BOUNDARY LAYER,  
DIFFERENTIAL EQUATIONS, FUNCTIONS, MOMENTS, CENTER OF  
GRAVITY, ACCELERATION, USSR (U)

IN THE ARTICLE EQUATIONS ARE DEVELOPED  
ESTABLISHING THE CONNECTION BETWEEN LATERAL  
VIBRATIONS OF AIRCRAFT AND HORIZONTAL GUSTS.  
EQUATIONS ARE WRITTEN IN A GENERAL FORM TAKING INTO  
ACCOUNT POSSIBLE DIFFERENCES OF COMPONENTS OF WIND ON  
DIFFERENT SECTIONS OF THE BOUNDARY LAYER OF THE  
AIRCRAFT. THE SOLUTION IS INTRODUCED FOR THE  
PARTICULAR CASE, WHEN WIND CAN BE ASSIGNED ONE VALUE,  
BY AVERAGING ALL ALONG THE BOUNDARY LAYER OF THE  
AIRCRAFT. AN ANALYSIS OF THE EFFECT OF GUSTS OF  
DIFFERENT INTENSITIES ON THE SIDE ACCELERATION OF THE  
AIRCRAFT'S CENTER OF GRAVITY IS CONDUCTED. THE  
POSSIBILITY IS EXPLAINED OF SOLVING THE INVERSE  
PROBLEM - FINDING CHARACTERISTICS OF HORIZONTAL  
GUSTINESS OF THE WIND BY SIDE ACCELERATIONS OF  
AIRCRAFT. NUMERICAL CALCULATIONS WERE MADE FOR A  
'NORTHROP 2E' AIRCRAFT. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-609 709

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
NEWS OF ACADEMY OF SCIENCES USSR, TECHNOLOGY SECTION,  
MECHANICS AND MECHANICAL ENGINEERING, 1961, NO. 4:  
SELECTED ARTICLES, (U)

JAN 64 8P BABYKIN, V. V. ;  
ROMANOVSKII, YU. M. ; AMBARTSUMYAN, S. A. ;  
BAGDASARYAN, ZH. E. ; MISHENKOV, G. V. ;  
MONITOR: FTD ,TT MT69 1291 ,64 71296

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF AKADEMIYA  
NAUK SSSR, IZVESTIYA, MEKHANIKA I MASHINOSTROENIE,  
1961, NO. 4, P. 83-102.

DESCRIPTORS: (\*MECHANICS, REPORTS), (\*WINGS,  
FLUTTER), (\*SUPERSONIC FLOW, FLAT PLATE MODELS),  
(\*PANELS (STRUCTURAL), OSCILLATION), AIRCRAFT,  
AILERONS, FRICTION, ATMOSPHERIC MOTION, GUSTS,  
OSCILLATION, MODELS (SIMULATIONS), MATHEMATICAL  
ANALYSIS, STABILITY, RECTANGULAR BODIES, GASES,  
STRESSES, DIFFERENTIAL EQUATIONS, FUNCTIONS,  
ELASTICITY, LOADING (MECHANICS), CYLINDRICAL BODIES,  
USSR STRUCTURAL SHELLS (U)

CONTENTS: NONLINEAR FLUTTER OF WING OF  
AIRCRAFT DURING FLIGHT IN BUMPY AIR;  
STABILITY OF ORTHOTROPIC PLATES AROUND WHICH  
FLOWS A SUPERSONIC FLOW OF GAS; AND FORCED  
NONLINEAR OSCILLATIONS OF ELASTIC PANELS. (U)

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AD-607 624  
AEROSPACE CORP EL SEGUNDO CALIF  
HARMONIC GUST AERODYNAMIC INFLUENCE COEFFICIENTS FROM  
INCOMPRESSIBLE STRIP THEORY: ANALYTICAL DEVELOPMENT  
AND COMPUTATIONAL PROCEDURE, (U)  
SEP 62 108P    RODDEN, WILLIAM P. ;  
FARKAS, EDITH F. ; MALCOM, HEATHER A. ;  
REPT. NO. TDR-169(3230-1) TN-4  
CONTRACT: AFD4 695 169  
MONITOR: SSD ,    TDR62 87

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: LEGIBILITY OF THIS DOCUMENT IS IN PART  
UNSATISFACTORY. REPRODUCTION HAS BEEN MADE FROM BEST  
AVAILABLE COPY.

DESCRIPTORS: (•) SUBSONIC FLOW, AERODYNAMIC  
CHARACTERISTICS), (•) GUST, SUBSONIC CHARACTERISTICS),  
INCOMPRESSIBLE FLOW, TWO-DIMENSIONAL FLOW, AIRFOILS,  
OSCILLATION, MATHEMATICAL ANALYSIS, PROGRAMMING  
(COMPUTERS), PUNCHED CARDS (U)

A METHOD IS PRESENTED FOR COMPUTING THE AERODYNAMIC  
INFLUENCE COEFFICIENTS (AICS) FOR A SURFACE  
TRAVELING AT SUBSONIC SPEED THROUGH AN OSCILLATORY  
GUST FIELD. THE METHOD IS BASED ON A FUNDAMENTAL  
SOLUTION OF UNSTEADY FLOW THEORY THAT OF SEARS FOR  
A TWO-DIMENSIONAL AIRFOIL TRAVELING THROUGH A  
HARMONIC GUST FIELD IN AN INCOMPRESSIBLE FLUID.  
THE HARMONIC GUST AICS RELATE THE AERODYNAMIC  
CONTROL POINT FORCES TO THE SPANWISE VARIATION OF THE  
GUST AMPLITUDE. THE AEROSPACE IBM 7090  
COMPUTER PROGRAM NO. HMO2 PROVIDES THE GUST  
AICS IN PRINTED AND OPTIONAL PUNCHED CARD OUTPUT  
FORMATS. THE PROGRAM CAPACITY IS 100 SURFACE  
STRIPS AND 100 VALUES OF REDUCED VELOCITY.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-608 188

ARMY TRANSPORTATION RESEARCH COMMAND FORT EUSTIS VA  
SUPPLEMENTARY STUDY OF DESIGN FACTORS IN AIR DELIVERY  
FOR CV-7 CARIBOU AIRCRAFT, (U)

AUG 64 39P JONES, R. D. M. I

TASK: 1D647224D59806

MONITOR: TRECOM , TR64 46

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TRANSPORT PLANES, DESIGN),  
(•CONTAINERS, MOTION), CARGO, CARGO PARACHUTES, AIR  
DROP OPERATIONS, SHORT TAKE-OFF PLANES, FLOORS,  
FRICTION, STABILITY, LOADING (MECHANICS), VECTOR  
ANALYSIS, SAFETY, GUSTS, HANDLING, PROGRAMMING  
LANGUAGES (U)

IDENTIFIERS: V-2 AIRCRAFT, V-7 AIRCRAFT (U)

A STUDY WAS MADE OF THE EXTRACTION OF LOADS BY  
PARACHUTE FROM THE CV-7 CARIBOU AIRCRAFT. TWO  
FORTRAN PROGRAMS ARE INCLUDED TO SHOW THE  
CALCULATION OF THE MAXIMUM SAFE ENVELOPE FOR THE  
LOADS; VARIOUS CONDITIONS WITH A WIDE RANGE OF  
ADJUSTABLE PARAMETERS ARE CONSIDERED. IN THE  
PROGRAMS, THE PARAMETERS MAY BE SET AS DATA TO  
SIMULATE ANY VALUES, SUCH AS THOSE FOR THE EXTRACTIVE  
FORCE OF THE EJECTION PARACHUTE, FOR THE COEFFICIENT  
OF SLIDING FRICTION BETWEEN THE FLOOR AND THE LOAD,  
AND FOR THE LENGTH OF THE PALLET ON WHICH THE LOAD IS  
MOUNTED. THE CONCLUSIONS REACHED ARE NEGATIVE IN  
CHARACTER, BUT THEY CAN BE OF VALUE AS A BASIS FOR  
FURTHER STUDIES. THE LOAD TIPS SO LITTLE AT THE  
SILL OF THE FLOOR WITH THE RAMP UP THAT THE MAXIMUM  
SAFE ENVELOPE DEPARTS ONLY SLIGHTLY FROM THE  
RECTANGULAR FORM. IT IS BELIEVED THAT THE EFFECTS  
OF GUST DISTURBANCES AND OF POSSIBLE JAMMING IN THE  
RAIL RESTRAINT AND RELEASE SYSTEM SHOULD BE  
INVESTIGATED. SINCE, FROM TIME TO TIME, THESE  
INFLUENCES WILL CAUSE THE LOAD TO TIP THROUGH ANGLES  
OF INCLINATION OF A HIGHER ORDER OF MAGNITUDE THAN  
THOSE DUE TO DYNAMICAL CONSIDERATIONS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-614 016

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
EXPERIMENTAL PROGNOSSES OF AIRCRAFT BUMPINESS BY A  
DEFINED RICHARDSON CRITERION, (U)

MAR 65 12P ZAVARINA, M. V. ; EMEL'YANOVA, M.

Z. I

REPT. NO. FTD-TT-64-1022

MONITOR: TT , 65-61988

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF  
RUSSIAN MONO. MATERIALY NAUCHNOI KONFERENTSI PO  
AVIATIONNOI METEOROLOGII, N.P. 93-8 1963.

DESCRIPTORS: (•AIRCRAFT, STABILITY), (•ATMOSPHERIC  
MOTION, AERONAUTICS), FLIGHT, TROPOSPHERE,  
PROBABILITY, NUMERICAL METHODS AND PROCEDURES,  
IDENTIFICATION, USSR (U)

TRANSLATION OF RUSSIAN RESEARCH: EXPERIMENTAL  
PROGNOSSES OF AIRCRAFT BUMPINESS BY A DEFINED RICHARDSON  
CRITERION.



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-628 223 4/2  
DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF MISSILE AND  
SPACE SYSTEMS DIV  
ON THE EFFECTS OF THE VERTICAL WIND SHEAR ON THE  
DEVELOPMENT AND STRUCTURE OF CONVECTION, (U)  
66 22P JIN-PING, CHAO ILI-  
SHOO, CHENG I  
REPT. NO. DOUGLAS-PAPER-7683,  
MONITOR: TT, 66-60559

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF CHI HSIANG HSUEH PAO  
(CHINESE PEOPLE'S REPUBLIC) V29 N1 P94-102 FEB  
1969.

DESCRIPTORS: (CONVECTION(HEAT TRANSFER),  
WIND), (WIND, CONVECTION(HEAT TRANSFER)),  
ATMOSPHERIC MOTION, THERMODYNAMICS,  
METEOROLOGY (U)

IN THIS PAPER THE EFFECTS OF VERTICAL WIND SHEAR ON  
THE DEVELOPMENT AND THE STRUCTURE OF CONVECTION ARE  
INVESTIGATED THEORETICALLY. FIRSTLY, FROM THE  
CALCULATIONS OF PERTURBATION GROWTH RATE, THE  
RELATIVE IMPORTANCE OF THE VERTICAL WIND SHEAR  
COMPARED TO THE UNSTABLE STRATIFICATION IS DISCUSSED  
QUANTITATIVELY. SECONDLY, THE CIRCULATION OF  
CONVECTION AS SHOWN BY CALCULATION IS SIMILAR TO THAT  
FOUND IN THUNDERSTORM AND IN SHOWER CLOUD.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-636 620 4/2  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
ON THE CORRELATION OF WIND SPEED FLUCTUATIONS IN THE  
TURBULENT ATMOSPHERE. (U)  
APR 66 17P CHIA-I, CHEN ;  
REPT. NO. FTD-TT-65-607,  
MONITOR: TT 66-61931

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF CH'I HSIANG  
HSUEH PAO (CHINESE PEOPLE'S REPUBLIC) V33 N4  
P426-24 1962.

DESCRIPTORS: (GUSTS, MATHEMATICAL ANALYSIS),  
ATMOSPHERIC MOTION, WIND, VELOCITY, CORRELATION  
TECHNIQUES, CHINA (U)

AN APPROXIMATE FORMULA IS DERIVED FOR THE  
RELATIONSHIP BETWEEN WIND-SPEED FLUCTUATION  
CORRELATION, THE STANDARD DEVIATION, AND THE  
RESPECTIVE COMPONENTS OF THE WIND-SPEED FLUCTUATION  
FOR SMALL GUSTINESS. THE CALCULATION INDICATES  
THAT FOR THE GUSTINESS ORDINARILY ENCOUNTERED IN  
INVESTIGATION OF THE MICROSTRUCTURE OF ATMOSPHERIC  
TURBULENCE, THE CORRELATIONS OF THE STANDARD  
QUANTITIES AND THE EDDY COMPONENTS DO NOT DIFFER  
GREATLY. IT IS SHOWN THAT THE SPATIAL CORRELATION  
OF THE WIND SPEED FLUCTUATION CAN, IN APPROXIMATION,  
BE REPLACED BY THE TIME CORRELATION IF THE  
ATMOSPHERIC TURBULENCE IS OF SMALL MAGNITUDE. THE  
VALIDITY OF THE ADDITIONAL ASSUMPTIONS MADE REGARDING  
THE ATMOSPHERE IN THE DERIVATION OF THE FORMULA IS  
ALSO DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0352

AD-643 258 4/1 4/2  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
RELATIONSHIP BETWEEN THE RICHARDSON NUMBER AND  
ATMOSPHERIC TURBULENCE. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
OCT 66 VP GRUZINOVA, L. G. ISOTIEV, E. I.  
REPT. NO. T-R-613  
CONTRACT: AF 19(628)-3880  
MONITOR: TT 67-60156

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: K VOPROSU O SVIAZI CHISLA  
RICHARDSONA S ATMOSFERNOI TURBULENTNOSTI'IU, TRANS. OF  
SREDNEAZIATSKII NAUCHNOISSLEDOVATEL'SKII  
GIDROMETEOROLOGICHESKII INSTITUT. TRUDY (USSR)  
N19(24) P79-82 1964.

DESCRIPTORS: (\*ATMOSPHERIC MOTION, STABILITY),  
USSR, WIND, TEMPERATURE, METEOROLOGICAL  
PARAMETERS, WEATHER FORECASTING (U)  
IDENTIFIERS: RICHARDSON NUMBER (U)

THE PAPER PRESENTS DISTRIBUTIONS OF RICHARDSON  
NUMBERS IN ZONES WITH AND WITHOUT TURBULENCE, ON THE  
BASIS OF GUSTSONDE DATA. ANALYSIS OF THE RESULTING  
DISTRIBUTIONS SHOWED THERE IS NO UNEQUIVOCAL RELATION  
BETWEEN THE MEASURED TURBULENCE AND THE RICHARDSON  
NUMBER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /A0352

AD-645 089                      4/2  
WEATHER WING (1ST) SAN FRANCISCO CALIF DETACHMENT 1  
A PRELIMINARY ESTIMATE OF EXTREME WIND SPEEDS IN  
THAILAND. (U)  
DESCRIPTIVE NOTE: METEOROLOGICAL REPT. (FINAL),  
OCT 66    31P    ATKINSON, GARY D. ;  
REPT. NO. WW-1-TECHNICAL STUDY-3  
MONITOR: WW-1                      TS-3

UNCLASSIFIED REPORT

DESCRIPTORS: (•WIND, •THAILAND),  
(•METEOROLOGICAL PHENOMENA, THAILAND),  
PROBABILITY, STATISTICAL ANALYSIS, GUSTS (U)

ESTIMATES OF EXTREME WIND SPEEDS FOR VARIOUS  
CUMULATIVE PROBABILITIES OR RETURN PERIODS ARE MADE  
FOR 13 THAILAND STATIONS USING THE DOUBLE-  
EXPONENTIAL DISTRIBUTION ANNUAL PEAK WIND GUSTS  
FOR A 10 YEAR PERIOD, 1956-1965, ARE USED IN THE  
ANALYSIS. COMPARISON OF EXPECTED PEAK GUSTS ARE  
MADE BETWEEN STATIONS AND WITH STATIONS IN THE  
INTERIOR UNITED STATES. SEASONAL AND MONTHLY  
DIFFERENCES IN EXPECTED PEAK GUSTS ARE DISCUSSED.  
CORRECTION FACTORS FOR ELEVATION DIFFERENCES AND  
CONVERSION FACTORS TO DETERMINE SUSTAINED WINDS ARE  
PRESENTED. ALSO GIVEN IS THE DIRECTIONS AND  
OCCURRENCE TIMES OF EXTREME WINDS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-646 290 4/1  
UNIVERSITY OF WESTERN ONTARIO LONDON DEPT OF PHYSICS  
INTERNAL GRAVITY-SHEAR WAVES IN THE TROPOSPHERE. III.  
PERTURBATION OF SMOKE TRAILS, (U)  
JUN 66 6P NAITO, KEIKICHI (MAY, D. R. I  
CONTRACT: DRB-2401-12

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN CANADIAN JOURNAL OF  
PHYSICS V44 P2287-91 1966.  
SUPPLEMENTARY NOTE: SEE ALSO AD-646 291, AD-646  
292.

DESCRIPTORS: (•TROPOSPHERE, ATMOSPHERIC  
SOUNDING), (•ATMOSPHERIC MOTION, ATMOSPHERIC  
SOUNDING), TURBULENCE, SMOKE, GRAVITY, SHEAR  
STRESSES, MECHANICAL WAVES, CANADA (U)

EXPERIMENTAL OBSERVATIONS ON VERTICAL SMOKE TRAILS  
AND SMOKE PUFFS IN THE LOWER TROPOSPHERE HAVE SHOWN  
SEVERAL INTERESTING FEATURES OF THE SMALL-SCALE  
STRUCTURE OF THE AIR. THE PERTURBATION VELOCITIES  
OF WAVELENGTHS OF SEVERAL HUNDRED METERS HAVE  
RELATIVELY SIMPLE CONTOUR PATTERNS IN THE VERTICAL  
PLANE. ISOLATED DEFORMATIONS OF THE TRAILS OCCUR  
WITH SMALL, SEMICIRCULAR MOTIONS OF THE AIR. THE  
AIR MOTION IS TURBULENT AT HEIGHTS BELOW ABOUT 200 M,  
WHILE ABOVE THIS LEVEL IT IS PRINCIPALLY LAMINAR.  
PERTURBATIONS OF THE SMOKE TRAILS MAY BE ATTRIBUTED  
EITHER TO LARGE EDDIES OR TO INTERNAL WAVES, BUT THE  
THEORY OF INTERNAL WAVES AND THE EXPERIMENTAL  
OBSERVATIONS LEND GREATER SUPPORT TO THE INTERNAL-  
WAVE EXPLANATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0352

AD-646 291 4/1  
UNIVERSITY OF WESTERN ONTARIO LONDON DEPT OF PHYSICS  
INTERNAL GRAVITY-SHEAR WAVES IN THE TROPOSPHERE. II.  
WAVE AMPLITUDES, (U)  
JUN 64 12P NAITO, KEIKICHI ;  
CONTRACT: DRB-2801-12

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN CANADIAN JOURNAL OF  
PHYSICS V44 P2275-85 1966.  
SUPPLEMENTARY NOTE: SEE ALSO AD-646 292, AD-646  
290.

DESCRIPTORS: (\*TROPOSPHERE, \*ATMOSPHERIC  
MOTION), MECHANICAL WAVES, GRAVITY, SHEAR  
STRESSES, ATMOSPHERE MODELS, TURBULENCE,  
STABILITY, INTERFACES, CANADA (U)

INTERNAL WAVES IN A THREE-LAYER MODEL OF THE  
TROPOSPHERE ARE EXAMINED FOR AMPLITUDE OF THE  
PERTURBATIONS ABOUT EACH INTERFACE. THESE  
AMPLITUDES ARE SIGNIFICANT ONLY IN THE REGION OF EACH  
INTERFACE, EXCEPT AT THE LONGER WAVELENGTHS, WHERE  
THEIR INFLUENCE MAY EXTEND TO THE GROUND.  
IRREGULARITIES MAY OCCUR IN THE VERTICAL PROFILE OF  
PERTURBATION AMPLITUDE, FOR SOME COMBINATIONS OF  
WAVELENGTH AND INTERFACE SEPARATION. THE MOTION OF  
AIR PARTICLES AT THE INTERFACE IS CIRCULAR IN MANY  
CASES, AS IN DEEP-WATER WAVES. APPROXIMATE  
CONDITIONS FOR STABILITY OF INTERNAL WAVES ARE  
DERIVED FOR A MULTILAYER MODEL; AND IT IS SHOWN FROM  
THE ANALYSIS OF HEIGHT OSCILLATION OF THE INTERFACE  
THAT THE TENDENCY FOR ISOLATED ROLL MOTIONS TO  
DEVELOP INCREASES WITH DECREASING WAVELENGTH, EVEN  
WHEN THE ATMOSPHERIC STRATIFICATION IS STABLE.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-646 292 4/1  
UNIVERSITY OF WESTERN ONTARIO LONDON DEPT OF PHYSICS  
INTERNAL GRAVITY-SHEAR WAVES IN THE TROPOSPHERE. I.  
PHASE VELOCITIES, (U)  
JUN 66 16P NAITO, KEIKICHI I  
CONTRACT: DRB-2801-12

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN CANADIAN JOURNAL OF  
PHYSICS V44 P2299-72 1966.  
SUPPLEMENTARY NOTE: SEE ALSO AD-646 290, AD-646  
291.

DESCRIPTORS: (\*TROPOSPHERE, \*ATMOSPHERIC  
MOTION), VELOCITY, DENSITY, GRAVITY, SHEAR  
STRESSES, ATMOSPHERIC SOUNDING, TURBULENCE,  
CANADA (U)

THE THEORY OF INTERNAL GRAVITY-SHEAR WAVES IN THE  
TROPOSPHERE IS EXAMINED FOR TWO- AND THREE-LAYER  
MODELS OF AIR DENSITY AND HORIZONTAL VELOCITY. IT  
IS SHOWN THAT MODELS HAVING CONTINUITY IN AIR DENSITY  
ACROSS THE INTERNAL BOUNDARIES ARE NOT SATISFACTORY  
FOR ANALYSIS INVOLVING FIRST-ORDER PERTURBATIONS.  
THE COMPLEXITY OF THE ANALYSIS INCREASES RAPIDLY  
WITH THE INTRODUCTION OF A GRADIENT IN THE MODEL  
DENSITY, AND WITH ADDITIONAL LAYERS IN THE MODEL.  
THE PHASE VELOCITIES OF INTERNAL WAVES OF  
WAVELENGTH BETWEEN 100 M AND 10,000 M ARE CALCULATED  
FOR THREE SIMPLE MODELS; THE LONG-WAVELENGTH  
PREDICTIONS AGREE FAVORABLY WITH OBSERVATIONS BY  
GOSSARD AND MUNK. NO COMPARISON IS AVAILABLE  
FOR THE SHORTER WAVELENGTHS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0992

AD-691 046 4/1 20/4  
BROWN UNIV PROVIDENCE R 1 DEPT OF PHYSICS  
RESEARCH ON FLUID DYNAMICAL MODELS OF THE LARGE SCALE  
ATMOSPHERIC CIRCULATIONS. (U)  
DESCRIPTIVE NOTE: FINAL SCIENTIFIC REPT., 1 JAN 65-31  
MAR 67  
APR 67 94P SHYDER, HOWARD A. 1  
CONTRACT: AF 19(628)-4782  
PROJ: AF-8604  
TASK: 860404  
MONITOR: AFCRL 67-0166

UNCLASSIFIED REPORT

DESCRIPTORS: (•FLUID DYNAMIC PROPERTIES,  
ATMOSPHERE), (•ATMOSPHERE, •HYDRODYNAMICS),  
(•ATMOSPHERIC MOTION, FLUID DYNAMIC PROPERTIES),  
CONVECTION(HEAT TRANSFER), ATMOSPHERE MODELS,  
ATMOSPHERIC TIDES, RHEOLOGY, POLYMERS, COUETTE  
FLOW (U)

THE REPORT DESCRIBES THREE INVESTIGATIONS IN THE  
FIELD OF HYDRODYNAMIC STABILITY. THE PURPOSE OF  
THE EXPERIMENTS IS TO STUDY THE MECHANISMS WHICH  
OPERATE IN THE LARGE SCALE CIRCULATION OF THE  
ATMOSPHERE. IT IS GENERALLY ASSUMED THAT SECONDARY  
FLOWS IN THE FORM OF BAROCLINIC WAVES ARE THE PRIMARY  
CAUSE OF THE PROPAGATION OF ATMOSPHERIC DISTURBANCES.  
THESE WAVES MUST BE TREATED AS FINITE AMPLITUDE  
DISTURBANCES AND ACCORDINGLY THE USE OF NON-LINEAR  
ANALYSIS IS REQUIRED TO PREDICT THE PROPERTIES OF THE  
WAVES. PAST ATTEMPTS AT CALCULATING FINITE  
AMPLITUDE SECONDARY FLOWS HAVE NOT BEEN VERY  
SUCCESSFUL BUT RECENTLY STUART AND WATSON HAVE  
DEVELOPED A METHOD WHICH HAS PROVED TO BE RELIABLE.  
THE COMPUTATIONS FOR THE CASE OF ISOTHERMAL FLOW  
BETWEEN CONCENTRIC ROTATING CYLINDERS HAS BEEN  
CARRIED OUT USING THIS METHOD AND ONE OF THE  
INVESTIGATIONS DESCRIBED HERE IS AN EXPERIMENTAL  
VERIFICATION OF THE THEORETICAL PREDICTIONS. IT IS  
ALSO SHOWN THAT A LOGICAL EXTENSION OF THE THEORY  
REQUIRES THE EXISTENCE OF JETS AND SHOCK-LIKE  
STRUCTURE IN THE FLOW FIELD AND THESE FEATURES ARE  
DEMONSTRATED EXPERIMENTALLY. IN A SECOND  
INVESTIGATION IT IS SHOWN STRONGLY AFFECTED BY  
HORIZONTAL SHEAR. HORIZONTAL SHEAR HAS A STRONG  
STABILIZING EFFECT ON BAROCLINIC WAVES. THE THIRD  
SET OF EXPERIMENTS DEMONSTRATES THE STRONG  
STABILIZING ACTION OF HIGH POLYMER NON-NEWTONIAN  
FLUIDS. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0352

AD-652 928 22/2  
ADVISORY GROUP FOR AEROSPACE RESEARCH AND DEVELOPMENT  
PARIS (FRANCE)  
THE USE OF WIND SHEARS IN THE DESIGN OF AEROSPACE  
VEHICLES, (U)  
OCT 66 47P RYAN, ROBERT S. ;  
SCOGGINS, JAMES R. ;  
REPT. NO. AGARD-596

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: NATO FURNISHED. PRESENTED AT THE  
MEETING OF THE AGARD, STRUCTURES AND MATERIALS  
PANEL (23RD), PARIS (FRANCE), 4-11 OCT 66.

DESCRIPTORS: (LAUNCH VEHICLES(AEROSPACE),  
DESIGN), (WIND, SHEAR STRESSES),  
AEROSPACE CRAFT, GUST LOADS, AERODYNAMIC  
CHARACTERISTICS, TURBULENCE (U)  
IDENTIFIERS: SATURN(BOOSTER) (U)

THE RELATIVE INFLUENCE OF VARIOUS WIND PROFILE  
PROPERTIES AND DISTURBANCES ON LAUNCH VEHICLE FLIGHT  
DYNAMIC RESPONSE IS STUDIED. PARTICULAR EMPHASIS  
IS PLACED ON THE INFLUENCE OF WIND SHEARS AND  
TURBULENCE ON DYNAMIC RESPONSE DURING THE BOOST PHASE  
OF THE FLIGHT. FOUR HUNDRED AND SEVEN INDIVIDUAL  
DETAILED (JIMSPHERE) WIND PROFILES ARE THE  
PRIMARY WIND INPUTS FOR THIS ANALYSIS. TIME  
RESPONSE OF THE VEHICLE TO EACH PROFILE IS COMPUTED  
AND A STATISTICAL EVALUATION OF THE RESULTS MADE.  
RESULTS ARE OBTAINED FOR THE SATURN V SPACE  
VEHICLE AND CONCLUSIONS DRAWN AS TO THE RELATIVE  
INFLUENCE OF WIND SHEARS AND TURBULENCE VERSUS THE  
DEGREE OF REFINEMENT OF THE DYNAMIC MODEL OF THE  
SPACE VEHICLE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /A0392

AD-661 033            4/1            4/2  
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF  
METEOROLOGY  
ROUND HILL TURBULENCE MEASUREMENTS. VOLUME 1.  
EXPERIMENTAL TECHNIQUES, DATA-PROCESSING PROCEDURES,  
AND DATA TABULATIONS FOR RUNS 87A THROUGH 99A, (U)  
DEC 66 256P            CRAMER, H. E. ; RECORD, F.  
A. ITILLMAN, J. E. ;  
CONTRACT: DA-AMC-28-043-69-610  
PROJ: DA-1VO-14901-892A  
TASK: 1VO-14901-892A-08  
MONITOR: ECOM 69-610-VOL-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-661 034.

DESCRIPTORS: (•ATMOSPHERIC MOTION,  
MEASUREMENT), DATA, DATA PROCESSING SYSTEMS,  
STATISTICAL ANALYSIS, WIND, ATMOSPHERIC  
TEMPERATURE, HUMIDITY, ATMOSPHERE,  
METEOROLOGICAL PARAMETERS, POWER SPECTRA,  
ANALYSIS OF VARIANCE, TROPOSPHERE (U)

THE VOLUME DESCRIBES THE EXPERIMENTAL TECHNIQUES  
AND THE DATA-PROCESSING PROCEDURES EMPLOYED IN A  
PROGRAM OF TURBULENT STRUCTURE MEASUREMENTS CARRIED  
OUT AT THE ROUND HILL FIELD STATION. IT  
ALSO CONTAINS DATA SUMMARIES FOR 12 OF THE 76 FIELD  
EXPERIMENTS SELECTED FOR INCLUSION IN THIS REPORT.  
THE FIELD SITE AND THE EXPERIMENTAL PROCEDURES ARE  
DESCRIBED IN SECTION I. SECTIONS II AND  
III RESPECTIVELY CONTAIN DESCRIPTIONS OF THE DATA-  
ACQUISITION SYSTEM AND THE DATA-PROCESSING  
PROCEDURES. SECTION IV CONTAINS DATA SUMMARIES  
FOR RUNS 87A THROUGH 99A; DATA SUMMARIES FOR  
THE REMAINING FIELD EXPERIMENTS ARE PRESENTED IN  
VOLUMES II, III, IV, AND V. (AUTHGR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-661 039 4/1  
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF  
METEOROLOGY  
ROUND HILL TURBULENCE MEASUREMENTS- VOLUME II. DATA  
TABULATIONS FOR RUNS 96A THROUGH 104. (U)  
DEC 66 271P CRAMER, H. E. RECORD, F.  
A. ITILLMAN, J. E. I  
CONTRACT: DA-AMC-28-043-69-610  
PROJ: DA-1V0-14901892A  
TASK: 1V0-14901-892A-08  
MONITOR: ECOM 69-610-VOL-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME I, AD-661 039 AND  
VOLUME 2, AD-661 039.

DESCRIPTORS: (ATMOSPHERIC MOTION,  
MEASUREMENT), DATA, WIND, ATMOSPHERIC  
TEMPERATURE, STATISTICAL ANALYSIS, POWER SPECTRA,  
ANALYSIS OF VARIANCE, TROPOSPHERE (U)

THE VOLUME CONTAINS THE DATA SUMMARIES FOR RUNS  
96A THROUGH 104. VERTICAL PROFILES OF MEAN WIND  
SPEED AND AIR TEMPERATURE ARE PRESENTED IN SECTION  
I AND THE TURBULENCE STATISTICS ARE PRESENTED IN  
SECTION II. FOR A DESCRIPTION OF THE FIELD  
EXPERIMENTS AND THE DATA PROCESSING PROCEDURES,  
REFERENCE SHOULD BE MADE TO VOLUME I (AD-661  
039) OF THIS SERIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-661 039 4/1 4/2  
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF  
METEOROLOGY  
ROUND HILL TURBULENCE MEASUREMENTS. VOLUME III.  
DATA TABULATIONS FOR RUNS 32 THROUGH 66D. (U)  
DEC 66 299P CRAMER, K. E. RECORD, F.  
A. TILLMAN, J. E. I  
CONTRACT: DA-AMC-28-042-65-610  
PROJ: DA-1VO-14501-892A  
TASK: 1VO-14501-892A-08  
MONITOR: ECOM 65-610-VOL-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 2, AD-661 034, AND  
VOLUME 4, AD-661 036.

DESCRIPTORS: (ATMOSPHERIC MOTION,  
MEASUREMENT), DATA, WIND, ATMOSPHERIC  
TEMPERATURE, SOILS, TEMPERATURE, STATISTICAL  
ANALYSIS, POWER SPECTRA, ANALYSIS OF VARIANCE,  
TROPOSPHERE (U)

THE VOLUME CONTAINS THE DATA SUMMARIES FOR RUNS  
32 THROUGH 66D. VERTICAL PROFILES OF MEAN WIND  
SPEED, AIR TEMPERATURE, AND SOIL TEMPERATURE ARE  
PRESENTED IN SECTION I. SECTION I ALSO  
INCLUDES ESTIMATES OF TERMS OF THE HEAT-BUDGET  
EQUATION. TURBULENCE STATISTICS ARE PRESENTED IN  
SECTION II. FOR A DESCRIPTION OF THE FIELD  
EXPERIMENTS AND THE DATA-PROCESSING PROCEDURES,  
REFERENCE SHOULD BE MADE TO VOLUME I (AD-661  
033) OF THIS SERIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-661 036 4/1 4/2  
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF  
METEOROLOGY  
ROUND HILL TURBULENCE MEASUREMENTS. VOLUME IV. DATA  
TABULATIONS FOR RUNS 66E THROUGH 76B, (U)  
DEC 66 278P CRAMER, H. E. RECORD, F.  
A. STILLMAN, J. E. I  
CONTRACT: DA-AMC-29-042-69-610  
PROJ: DA-1V0-14901-893A  
TASK: 1V0-14901-893A-08  
MONITOR: ECOM 69-610-VOL-4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 3, AD-661 029 AND  
VOLUME 5, AD-661 037.

DESCRIPTORS: (ATMOSPHERIC MOTION,  
MEASUREMENT), DATA, WIND, ATMOSPHERIC  
TEMPERATURE, SOILS, TEMPERATURE, STATISTICAL  
ANALYSIS, POWER SPECTRA, ANALYSIS OF VARIANCE,  
TROPOSPHERE (U)

THE VOLUME CONTAINS THE DATA SUMMARIES FOR RUNS  
66E THROUGH 76B. VERTICAL PROFILES OF MEAN  
WIND SPEED, AIR TEMPERATURE, AND SOIL TEMPERATURE ARE  
PRESENTED IN SECTION I. SECTION I ALSO  
INCLUDES ESTIMATES OF TERMS OF THE HEAT-BUDGET  
EQUATION. TURBULENCE STATISTICS ARE PRESENTED IN  
SECTION II. FOR A DESCRIPTION OF THE FIELD  
EXPERIMENTS AND THE DATA-PROCESSING PROCEDURES,  
REFERENCE SHOULD BE MADE TO VOLUME I (AD-661  
033) OF THIS SERIES. (AUTHOR) (U)

UNCLASSIFIED

DUC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-661 027 4/1 4/2  
MASSACHUSETTS INST OF TECH CAMBRIDGE DEPT OF  
METEOROLOGY  
ROUND HILL TURBULENCE MEASUREMENTS. VOLUME V. DATA  
TABULATIONS FOR RUNS 78A THROUGH 89C. (U)  
DEC 66 207P CRAMER, H. E. ; RECORD, F.  
A. STILLMAN, J. E. ;  
CONTRACT: DA-AMC-28-042-65-610  
PROJ: DA-1V0-14501-8974  
TASK: 1V0-14501-897A-08  
MONITOR: ECOM 65-610-VOL-5

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO VOLUME 4, AD-661 026.

DESCRIPTORS: (•ATMOSPHERIC MOTION,  
MEASUREMENT), DATA, WIND, ATMOSPHERIC  
TEMPERATURE, SOILS, TEMPERATURE, STATISTICAL  
ANALYSIS, POWER SPECTRA, ANALYSIS OF VARIANCE,  
TROPOSPHERE (U)

THE VOLUME CONTAINS THE DATA SUMMARIES FOR RUNS  
78A THROUGH 89C. VERTICAL PROFILES OF MEAN  
WIND SPEED, AIR TEMPERATURE, AND SOIL TEMPERATURE ARE  
PRESENTED IN SECTION I. SECTION I ALSO  
INCLUDES ESTIMATES OF TERMS OF THE HEAT-BUDGET  
EQUATION. TURBULENCE STATISTICS ARE PRESENTED IN  
SECTION II. FOR A DESCRIPTION OF THE FIELD  
EXPERIMENTS AND THE DATA-PROCESSING PROCEDURES,  
REFERENCE SHOULD BE MADE TO VOLUME I (AD-661  
022) OF THIS SERIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0352

AD-666 229 4/2  
MIAMI UNIV FLA RADAR METEOROLOGICAL LAB  
PROCEEDINGS OF THE 1967 ARMY CONFERENCE ON TROPICAL  
METEOROLOGY, CORAL GABLES, FLORIDA 8-9 JUNE 1967. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JAN 68 258P HISER, HOMER W. ;  
GERRISH, HAROLD P. ;  
REPT. NO. 15  
CONTRACT: DAA807-67-C-0224  
PROJ: DA-IVO.14501.852A.09.07  
MONITOR: ECOM 0224-15

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO REPT. NO. 6, AD-611  
852.

DESCRIPTORS: (\*METEOROLOGY, SYMPOSIA),  
(\*METEOROLOGICAL PARAMETERS, \*TROPICAL REGIONS),  
RESEARCH PROGRAM ADMINISTRATION, SCIENTIFIC  
PERSONNEL, SCIENTIFIC RESEARCH, MILITARY  
REQUIREMENTS, RAINFALL, WIND, TORNADOES,  
CLOUDS, FOG, THUNDERSTORMS, WEATHER  
FORECASTING, METEOROLOGICAL SATELLITES, MARINE  
METEOROLOGY, ATMOSPHERIC MOTION, AIR MASS  
ANALYSIS, THERMODYNAMICS, MICROMETEOROLOGY,  
PANAMA, SOUTH AMERICA, FLORIDA, PACIFIC  
OCEAN ISLANDS, SOUTHEAST ASIA, FAR EAST (U)

THE PRIMARY INTEREST OF THE MEETING WAS IN THE  
REALM OF LOCAL, SMALL-SCALE METEOROLOGICAL PHENOMENA  
AND PROBLEMS IN THE TROPICS, SPECIFICALLY EXCLUDING  
HURRICANES AND TYPHOONS, ALTHOUGH THE PAPERS WERE NOT  
COMPLETELY LIMITED TO THOSE TOPICS. THE OBJECTIVE  
WAS TO LEARN AS MUCH AS POSSIBLE ABOUT THE RECENT  
RESULTS AND FUTURE RESEARCH PLANS OF THE U.S.  
ARMY CONTRACTORS IN TROPICAL METEOROLOGY AND TO  
BENEFIT BY THE EXPERIENCE AND SPECIAL KNOWLEDGE OF  
OTHER INVITED GUESTS FROM THE UNITED STATES AND  
ABROAD. TWENTY PAPERS WERE PRESENTED AT THE TWO-  
DAY MEETING. DISCUSSIONS OF THE PAPERS WERE  
RECORDED AND ARE INCLUDED IN THE REPORT.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /A0352

AD-669 078                    4/2  
ENVIRONMENTAL TECHNICAL APPLICATIONS CENTER (AIR FORCE)  
WASHINGTON D C  
LISTING OF AVAILABLE SEMINARS (AWS WINGS).                    (U)  
DESCRIPTIVE NOTE: TECHNICAL NOTE.  
MAY 68                    28P  
REPT. NO. ETAC-TN-68-1

UNCLASSIFIED REPORT

DESCRIPTORS: (WEATHER FORECASTING, SYMPOSIA),  
STORMS, METEOROLOGICAL CHARTS, INDEXES, EARLY  
WARNING SYSTEMS, MILITARY REQUIREMENTS, TROPICAL  
CYCLONES, METEOROLOGICAL SATELLITES, CLEAR AIR  
TURBULENCE, TORNADOES, ABSTRACTS, THUNDERSTORMS,  
METEOROLOGICAL RADAR                    (U)  
IDENTIFIERS: MOUNTAIN WAVES                    (U)

THE TECHNICAL NOTE FURNISHES A COMPLETE LISTING  
OF THE PREPARED TECHNICAL SEMINARS AT AWS WING  
HEADQUARTERS WHICH ARE AVAILABLE FOR LOAN TO ALL  
AWS UNITS FOR LOCAL PRESENTATION. THE LISTING  
INCLUDES THE SEMINAR SUBJECT, AUTHOR (WHERE  
AVAILABLE), NUMBER OF COPIES AVAILABLE, PERIOD OF  
LOAN, APPROXIMATE PRESENTATION TIME, TYPE OF  
ILLUSTRATIVE MATERIAL, AND A BRIEF SYNOPSIS OF THE  
SEMINAR MATERIAL. THE INFORMATION IS BASED ON AN  
ANNUAL REPORT FROM AWS WINGS. (AUTHOR)                    (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /A0392

AD-669 366 4/2  
WEATHER WING (1ST) SAN FRANCISCO CALIF 96552 SCIENTIFIC SERVICES  
OBJECTIVE METHOD TO FORECAST GUSTY SURFACE WINDS AT  
MACTAN AB, PHILIPPINES. (U)  
DESCRIPTIVE NOTE: METEOROLOGICAL REPT. (FINAL).  
MAY 68 12P  
MONITOR: 1NW TECHNICAL STUDY-18

UNCLASSIFIED REPORT

DESCRIPTORS: (MILITARY FACILITIES, WEATHER FORECASTING), (METEOROLOGICAL PARAMETERS, PHILIPPINES), WIND, SURFACE PROPERTIES, GUSTS, MEASUREMENT, WEATHER STATIONS, ANEMOMETERS, RUNWAYS, DIURNAL VARIATIONS, INTENSITY, TABLES, VELOCITY, PERIODIC VARIATIONS (U)

THE RELATIONSHIP BETWEEN THE MAXIMUM SURFACE WIND GUSTS AND THE MAXIMUM WIND SPEED IN THE LOWEST 10,000 FEET IS USED TO DEVELOP AN OBJECTIVE TECHNIQUE TO FORECAST SURFACE WIND GUSTS EQUAL TO OR EXCEEDING 20 KNOTS AT MACTAN AIR BASE. CONSIDERING ONLY THE DAYS WHEN GUSTY SURFACE WINDS ARE LIKELY, THE DEPENDENT SAMPLE SHOWS 73% CORRECT FORECASTS AND A HEIDKE SKILL SCORE OF 0.46. THE CORRESPONDING FIGURES FOR THE INDEPENDENT DATA ARE 69% AND 0.39. (AUTHOR) (U)

## II. SPECTRAL ANALYSIS

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /80792

AD-267 040

NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE  
POWER SPECTRUM ANALYSIS OF TURBULENT SURFACE WINDS  
OVER WATER UNDER INVERSION CONDITIONS

(U)

JUL 61    IV    PANDOLFO, JOSEPH;

CONTRACT: NONR28503

UNCLASSIFIED REPORT

DESCRIPTORS:    •METEOROLOGY, •SEA BREEZE,  
•SPECTROGRAPHIC ANALYSIS, •TEMPERATURE INVERSION,  
ATMOSPHERE, MEASUREMENT, MICROMETEOROLOGY, TABLES,  
TERRAIN, WIND

(U)

IDENTIFIERS:    LONG ISLAND SOUND

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80392

AD-271 082

ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY WHITE  
SANDS MISSILE RANGE N MEX  
LOW LEVEL WIND MEASUREMENTS FOR BALLISTIC  
APPLICATION (U)

IV SWANSON, ROBERT N. I

UNCLASSIFIED REPORT

DESCRIPTORS: •GUIDED MISSILE TRAJECTORIES, •GUIDED  
MISSILES, •TURBULENCE, •WIND, DRIFT, LAUNCHING,  
LAUNCHING SITES, MATHEMATICAL PREDICTION, MEASUREMENT,  
METEOROLOGY, STATISTICAL FUNCTIONS, SURFACE-TO-  
SURFACE, TAYLOR'S SERIES (U)

APPLICATION OF THE LOW LEVEL WIND TURBULENCE  
SPECTRUM TO THE BALLISTIC MISSILE PROBLEM WITH THE  
AID OF TAYLOR'S HYPOTHESIS IS DISCUSSED. RESULTS  
OF CROSS-SPECTRAL ANALYSIS ARE DISCUSSED WITH  
REFERENCE TO PREDICTING THE WIND AT THE LAUNCHER FROM  
A SENSOR AT SOME POINT IN SPACE AWAY FROM THE  
LAUNCHER. EXAMPLES OF SPECTRAL AND CROSS-SPECTRAL  
ESTIMATES ARE PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /80392

AD-274 494

MASSACHUSETTS INST OF TECH SOUTH DARTMOUTH ROUND HILL  
FIELD STATION

STUDIES OF THE SPECTRA OF THE VERTICAL FLUXES OF  
MOMENTUM, HEAT, AND MOISTURE IN THE ATMOSPHERIC  
BOUNDARY LAYER

(U)

IV                      CRAMER, HARRISON E.; RECORD, FRANK A.;  
TILLMAN, JAMES E.;

UNCLASSIFIED REPORT

DESCRIPTORS:    •ATMOSPHERE, •TURBULENCE, BOUNDARY  
LAYER, HYGROMETERS, MEASUREMENT, STATISTICAL ANALYSIS,  
TEMPERATURE, WATER VAPOR, WIND                      (U)

THE SPECTRA OF THE VERTICAL FLUXES OF MOMENTUM,  
HEAT AND WATER VAPOR IN THE ATMOSPHERIC BOUNDARY  
LAYER UNDER VARIOUS THERMAL STRATIFICATIONS AND  
SURFACE ROUGHNESS ARE PRESENTED.                      (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80392

AD-289 172

WHITE SANDS MISSILE RANGE N MEX

A SURVEY OF WIND PROFILE, WIND VARIABILITY, AND

ATMOSPHERIC SPECTRAL ANALYSIS STUDIES USING

METEOROLOGICAL TOWER SYSTEMS

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

MAY 62 26P TOURIN, MYRON H.;

REPT. NO. MM-441

UNCLASSIFIED REPORT

DESCRIPTORS: •WEATHER STATIONS, •WIND, ATMOSPHERICS,  
MEASUREMENT, SPECTROGRAPHIC ANALYSIS, TURBULENCE (U)

A SURVEY OF WIND PROFILE, WIND VARIABILITY, AND  
ATMOSPHERIC SPECTRAL ANALYSIS STUDIES USING METEOROLOGICAL  
TOWER SYSTEMS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /B0392

AD-403 014

LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY  
DIV

EXPERIMENTAL INVESTIGATIONS OF THE ENERGY SPECTRUM  
OF ATMOSPHERIC TURBULENCE.

(U)

MAY 63 14P

REPT. NO. T63 55

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. FROM SHUR, G. N.  
EKSPERIMENTAL'NYYE ISSLEDOVANIYA ENERGETICHESKOGO  
SPEKTRA ATMOS FERNOY TURBULENTNOSTI. IN:  
TSENTRAL'NAYA AEROLOGICHESKAYA OBSERVATORIYA. TRUDY,  
NO. 43, PP. 79-90, 1962.

DESCRIPTORS: •TURBULENCE, •ENERGY, DENSITY,  
FOURIER ANALYSIS, KINETIC THEORY, ATMOSPHERE,  
SPECTRA (VISIBLE + ULTRAVIOLET).

(U)

EXPERIMENTAL INVESTIGATION OF THE ENERGY SPECTRUM OF  
ATMOSPHERIC TURBULENCE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80392

AD-412 166

DOUGLAS AIRCRAFT CO INC LONG BEACH CALIF  
NB-660 HIGH ALTITUDE GUST SURVEY. VOLUME II. POWER  
SPECTRA. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

JUN 63 438P STROM, J.A. WEATHERMON, T.6.1

CONTRACT: AF22 614 7697

PROJ: 1447

MONITOR: ASD TOR62 149, 0A

UNCLASSIFIED REPORT

DESCRIPTORS: (GUSTS, HIGH ALTITUDE),  
(METEOROLOGY, TURBULENCE), THUNDERSTORMS,  
WIND, JET BOMBERS, VELOCITY, PENETRATION. (U)

IDENTIFIERS: 1962, B-66 AIRCRAFT. (U)

VOLUME II CONTAINS THE POWER SPECTRA PLOTS FOR  
VERTICAL, LATERAL AND FORWARD GUST VELOCITIES  
CORRECTED FOR AIRPLANE MOTION, FOLLOWED BY THE POWER  
SPECTRA PLOTS OF UNCORRECTED VERTICAL AND UNCORRECTED  
LATERAL GUST VELOCITIES. THE DATA PRESENTED WERE  
OBTAINED FROM 109 HIGH ALTITUDE STORM PENETRATIONS IN  
WHICH THE LENGTH OF RUNS VARIED UP TO 240 SECONDS.  
THE DATA WERE SAMPLED 25 TIMES PER SECOND AND THE  
AUTOCORRELATION FUNCTION WAS COMPUTED FOR 125 PHASE  
SHIFTS. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80392

AD-930 069

NEW YORK UNIV N Y

THE INTERPRETATION OF WAVE SPECTRA IN TERMS OF THE  
WIND PROFILE INSTEAD OF THE WIND MEASURED AT A  
CONSTANT HEIGHT, (U)

DEC 63 JSP

PIERSON, WILLARD J., JR.:

REPT. NO. G5L63 19

CONTRACT: N62706 1042

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (WIND, CURVED PROFILES), (WATER WAVES,  
WIND), OCEAN WAVES, THEORY, TURBULENCE, MEASUREMENT,  
FREQUENCY, FRICTION, VELOCITY, CALIBRATION,  
INSTRUMENTATION, RECORDING SYSTEMS, STRESSES, REYNOLDS  
NUMBER (U)

IDENTIFIERS: 1963 (U)

THE EFFECT OF THE VARIATION OF THE MEAN WIND WITH  
HEIGHT (AS A FUNCTION OF THE VARIOUSLY PROPOSED  
DRAG COEFFICIENTS) ON THE INTERPRETATION OF WAVE  
SPECTRA FOR FULLY DEVELOPED SEAS IS ANALYZED. IT  
IS FOUND THAT THIS EFFECT BRINGS THE RESULTS OF  
NEJMAN, WILSON, AND MOSKOWITZ AND PIERSON  
INTO CLOSER AGREEMENT. FURTHER IMPROVEMENT IN WAVE  
THEORY WILL DEPEND ON THE SOLUTION OF PROBLEMS IN  
TURBULENCE AND ON MORE PRECISE MEASUREMENTS OF WAVES  
AND WINDS AT SEA. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80992

AD-603 729

TECHNISCHE HOCHSCHULE DARMSTADT (GERMANY)

ON THE TWO-DIMENSIONAL SPECTRAL ANALYSIS OF KINETIC  
ENERGY OVER A CIRCUMPOLAR AREA OF A SPHERE. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE NO. 9,

DEC 62 48P MESINGER, F. I

CONTRACT: AF61 052 266

MONITOR: AFCRL , 64 248

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*WIND, ATMOSPHERIC MOTION),  
(\*TURBULENCE, ATMOSPHERIC MOTION), KINETIC THEORY,  
ONE-DIMENSIONAL FLOW, TWO DIMENSIONAL FLOW,  
SPECTROSCOPY, POLAR REGIONS, AIR, WEST GERMANY (U)

TWO POSSIBILITIES FOR THE TWO-DIMENSIONAL SPECTRAL  
ANALYSIS OF KINETIC ENERGY OF FLOW-FIELDS (ON  
SPHERICAL EARTH) ARE DISCUSSED: ONE USING THE  
ASSOCIATED LEGENDRE POLYNOMIALS FOR MERIDIONAL  
REPRESENTATION, AND THE OTHER THE SIN FUNCTIONS WITH  
A LATITUDE-DEPENDENT AMPLITUDE FACTOR. THE LATTER  
METHOD IS APPLIED TO THE ANALYSIS OF SOME 500 MB  
OBSERVED AND BAROTROPICALLY PREDICTED WIND FIELDS.  
THE OBTAINED TWO DIMENSIONAL AND RESULTING  
ONEDIMENSIONAL SPECTRAL DISTRIBUTIONS ARE DESCRIBED.  
A FAIR SIMILARITY IS OBSERVED BETWEEN THE  
MERIDIONAL SPECTRA OF ZONAL MOTION AND ZONAL SPECTRA  
OF MERIDIONAL MOTION, AND BETWEEN THE MERIDIONAL  
SPECTRA OF MERIDIONAL MOTION AND ZONAL SPECTRA OF  
ZONAL MOTION. DIFFERENCES IN TIME VARIATIONS OF  
OBSERVED AND PREDICTED SPECTRA ARE TREATED:  
PREDICTED SPECTRA SHOWED CONSIDERABLY SMALLER TIME  
VARIABILITY. DATA ON THE INFLUENCE OF THE  
VISCOSITY TERM ON THE SPECTRA ARE PRESENTED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /B0752

AD-608 251

PENNSYLVANIA STATE UNIV UNIVERSITY PARK COLL OF  
ENGINEERING AND ARCHITECTURE  
AIRBORNE INVESTIGATION OF ATMOSPHERIC  
TURBULENCE.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
SEP 64 66P PAYNE, FRED RAY I

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ATMOSPHERIC MOTION, MEASUREMENT),  
ANEMOMETERS, AIRBORNE, WIND, FLUID FLOW, SPECTROSCOPY,  
DATA, MATHEMATICAL ANALYSIS (U)

IN ATMOSPHERIC TURBULENCE A  $(-5/3)$  POWER LAW  
BEHAVIOR OF THE ENERGY SPECTRUM WAS SHOWN BY  
EXPERIMENT TO EXIST OVER A CONSIDERABLE RANGE OF WAVE  
NUMBERS. THIS RANGE CAN EXCEED THREE DECADES UNDER  
CONDITIONS OF INTENSE DISSIPATION. PROOF WAS GIVEN  
OF THE FEASIBILITY OF AIRBORNE HOT-WIRE ANEMOMETRY AS  
A NEW EXPERIMENTAL TECHNIQUE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80392

AD-623 900 4/2 14/2  
COLORADO STATE UNIV FORT COLLINS FLUID DYNAMICS AND  
DIFFUSION LAB  
LOCAL ISOTROPY IN WIND TUNNEL TURBULENCE. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
SEP 63 25P SANDBORN, V. A. MARSHALL, R.  
D. 3  
CONTRACT: DA-AMC-26-043-64-G9

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TURBULENT BOUNDARY LAYER, WIND  
TUNNELS), (•ATMOSPHERIC MOTION, ATMOSPHERE  
MODELS), FLAT PLATE MODELS, SPECTROSCOPY,  
AXIALLY SYMMETRIC FLOW, MICROMETEOROLOGY (U)

EXPERIMENTAL EVALUATION OF THE LONGITUDINAL  
TURBULENT SPECTRUM IN THE BOUNDARY LAYER OF A LONG  
TEST SECTION WIND-TUNNEL IS REPORTED. THE SPECTRA  
AGREE VERY CLOSE WITH SPECTRA REPORTED FOR WATER FLOW  
IN AN OCEAN TIDAL CHANNEL AND ALSO FOR AIR FLOW OVER  
THE SEA SURFACE. THE SPECTRA ALL AGREE WITH THE  
PREDICTIONS OF LOCAL ISOTROPY. THE DATA REPORTED  
WERE TAKEN IN A FLAT PLATE BOUNDARY LAYER AT A  
STATION 69 FEET FROM THE TUNNEL ENTRANCE. THE  
FREE-STREAM VELOCITY WAS 20 FEET PER SECOND. THESE  
FLAT PLATE BOUNDARY LAYER SPECTRA DIFFER GREATLY FROM  
PREVIOUS DATA REPORTED FOR FLOWS WITH MUCH SMALL  
LENGTH DIMENSIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /80352

AD-637 728            4/1            4/2  
REDSTONE SCIENTIFIC INFORMATION CENTER REDSTONE ARSENAL  
ALA  
THE SPECTRAL STRUCTURE OF TURBULENCE IN A FREE  
ATMOSPHERE BASED ON DATA OBTAINED BY AIRCRAFT. (U)  
JUN 66    18P            SHUR, G. N. 1  
REPT. NO. RSIC-543,  
MONITOR: TT            66-62126

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF TSENTKALNAYA  
AEROLOGICHESKAYA OBSERVATORIYA. TRUDY (USSR) N53  
P43-53 1964.

DESCRIPTORS: (\*GUSTS, FLUID MECHANICS), (\*CLEAR  
AIR TURBULENCE, FLUID MECHANICS), ATMOSPHERIC  
MOTION, ENERGY, ATMOSPHERIC SOUNDING, AIRPLANES,  
USSR (U)

ON THE BASIS OF THE ANALYSIS OF EXPERIMENTAL DATA  
ON TURBULENCE OBTAINED BY A TU-104 AIRCRAFT, THIS  
ARTICLE EXAMINES THE ENERGY SPECTRUM OF THE VERTICAL  
VELOCITY COMPONENT OF TURBULENT GUSTS IN A  
TEMPERATURE-STRATIFIED ATMOSPHERE. THE  
RELATIONSHIP BETWEEN THE SPECTRA OF THE VERTICAL AND  
HORIZONTAL COMPONENT IN A STABLY STRATIFIED  
ATMOSPHERE IS ALSO EXAMINED. THE MEASUREMENTS OF  
THE GUST LOADS IN A NARROW BAND OF FREQUENCIES  
(WAVE NUMBERS) MAKE IT POSSIBLE TO OBTAIN THE  
DISPERSIONS IN THE VELOCITIES OF GUSTS IN A WIDE  
RANGE OF SCALES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80392

AD-642 802 4/2 8/3  
BRITISH COLUMBIA UNIV VANCOUVER INST OF  
OCEANOGRAPHY  
SPECTRA OF VELOCITY AND TEMPERATURE FLUCTUATIONS IN  
THE ATMOSPHERIC BOUNDARY LAYER OVER THE SEA, (U)  
JAN 66 :JP POND, S. ; SMITH, S. D. ;  
HAMBLIN, P. F. ; BURLING, R. W. ;

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN JOURNAL OF ATMOSPHERIC  
SCIENCES V23 N4 P376-86 JUL 1966.

DESCRIPTORS: (•MARINE METEOROLOGY, BOUNDARY  
LAYER), (•WIND, VELOCITY), (•ATMOSPHERIC  
TEMPERATURE, MARINE METEOROLOGY), DISTRIBUTION,  
METEOROLOGICAL INSTRUMENTS, ANEMOMETERS,  
CALIBRATION, TURBULENCE, CANADA (U)

MEASUREMENTS OF THE SPECTRA OF FLUCTUATIONS IN WIND  
VELOCITY OVER THE SEA SENSED BY THREE BASICALLY  
DIFFERENT INSTRUMENTS ARE DESCRIBED. ONE  
COMPARISON SHOWS GOOD AGREEMENT BETWEEN SPECTRA FROM  
A THRUST ANEMOMETER AND CUP ANEMOMETERS. ANOTHER  
SHOWS THAT GREATLY IMPROVED PRECISION OF SPECTRA  
DERIVED FROM A HOT WIRE ANEMOMETER CAN BE GAINED BY  
CALIBRATING THE LOW FREQUENCY RESPONSE AGAINST  
SPECTRA FROM CUP ANEMOMETERS. THE MEASUREMENTS  
CONFIRM KOLMOGOROFF'S PREDICTION OF THE EXISTENCE  
OF A UNIVERSAL FORM OF THE SPECTRUM AT HIGH WAVE  
NUMBERS. THE SHAPE OF A SPECTRUM OF TEMPERATURE  
FLUCTUATIONS AGREES WITH THAT FOUND BY EARLIER  
WORKERS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80252

AD-642 774 1/1 1/2 4/1  
SYSTEMS ENGINEERING GROUP RESEARCH AND TECHNOLOGY DIV  
WRIGHT-PATTERSON AFB OHIO  
A SUMMARY OF SOME RECENT DEVELOPMENTS IN THE  
DESCRIPTION OF ATMOSPHERIC TURBULENCE USED FOR  
AIRCRAFT STRUCTURAL DESIGN. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT., 1 FEB-1 MAY 66,  
AUG 66 21P AUSTIN, WILLIAM HUGH I  
PROJ: AF-1469  
TASK: 14A902  
MONITOR: SEG TR-66-45

UNCLASSIFIED REPORT

DESCRIPTORS: (AIRCRAFT, STRUCTURES),  
(ATMOSPHERIC MOTION, AIRCRAFT), GUST LOADS,  
ACCELERATION, LOADING(MECHANICS), GUSTS,  
TURBULENCE, VELOCITY, AIRFRAMES, SYSTEMS  
ENGINEERING (U)

IN RECENT YEARS, AIRCRAFT STRUCTURES ENGINEERS HAVE COME TO RELY ON POWER SPECTRAL DENSITY CONCEPTS IN THE DESCRIPTION OF ATMOSPHERIC TURBULENCE USED IN STRUCTURES WORK. THIS IS PRIMARILY DUE TO A GROWING AWARENESS THAT THE SPECTRAL APPROACH IS FAR MORE REALISTIC THAN THE HERETOFORE USED 'DISCRETE GUST' CONCEPT. ALTHOUGH THERE IS A CONSIDERABLE DIFFERENCE OF OPINION AMONG VARIOUS INVESTIGATORS ON THE PRECISE MATHEMATICAL FORMS OF RELATIONS USED IN THE SPECTRAL APPROACH, IT APPEARS THAT THE APPROACH CAN BE USED WITH CONFIDENCE ON MOST PRESENT DAY AIRCRAFT AS LONG AS IT IS APPLIED IN A CONSISTENT FASHION. USING SPECTRAL TECHNIQUES, IT IS POSSIBLE TO CONVERT AIRCRAFT GUST ACCELERATION STATISTICS INTO A FORM THAT CAN BE USED BY ENGINEERS AS AN ACCURATE DESCRIPTION OF ATMOSPHERIC TURBULENCE FOR VARIOUS CLASSES OF AIRCRAFT. THESE TECHNIQUES HAVE BEEN APPLIED TO A VERY LARGE SAMPLE OF B-52 GUST ACCELERATION STATISTICS TAKEN DURING CRUISE OPERATIONS TO DEMONSTRATE THE PROCEDURE. IT IS NOTED THAT, EVEN IF THE MATHEMATICAL FORMS OF RELATIONS USED IN THE SPECTRAL PROCEDURE ARE CHANGED, CHANGES IN THE DESCRIPTION OF ATMOSPHERIC TURBULENCE CAN BE MADE RATHER EASILY. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80392

AD-648 444 4/2  
PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF  
METEOROLOGY  
WIND PROFILES, SPECTRA, AND CROSS-SPECTRA OVER  
HOMOGENEOUS TERRAIN. (U)  
DESCRIPTIVE NOTE: ANNUAL REPT. NO. 1, 1 JUN 65-31 MAY  
66,  
JUN 66 34P BLACKADAR, ALFRED K. ;  
CHAPLIN, ANTON S. ;  
CONTRACT: DA-28-043-AMC-01288(E)  
TASK: IV-014501B53A-10-12  
MONITOR: ECOM 01288-1

UNCLASSIFIED REPORT

DESCRIPTORS: (WIND, MATHEMATICAL MODELS),  
EQUATIONS OF MOTION, TERRAIN, SPECTROSCOPY,  
MATHEMATICAL ANALYSIS, STRESSES (U)

AN APPROXIMATE THEORY OF WIND PROFILES BELOW 200  
METERS IS DEVELOPED BASED ON PLANETARY BOUNDARY LAYER  
WIND MODELS BY SEVERAL AUTHORS. IN THE CASE OF  
NEUTRAL STRATIFICATION, THE THEORY HAS BEEN ADAPTED  
FOR FITTING OBSERVED PROFILES AND THE DERIVATION OF  
PARAMETERS. IN THE CASE OF DIABATIC STRATIFICATION  
THE GENERALIZED WIND PROFILE EQUATION CAN BE  
TRANSFORMED INTO THE SAME FORM AS THE KEYS  
EQUATION WHICH HAS BEEN USED HITHERTO IN LOWER  
LAYERS. A METHOD OF DETERMINING EDDY EXCHANGE  
COEFFICIENTS IS APPLIED TO A COMPOSITE WIND  
DISTRIBUTION AND PRELIMINARY VALUES ARE GIVEN IN  
TABULAR FORM. (AUTHOR) (U)



UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /80352

AD-667 361 20/4 1/1 4/1  
COLORADO STATE UNIV FORT COLLINS FLUID MECHANICS  
PROGRAM

A NUMERICAL EXPERIMENT ON A TURBULENCE MODEL. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
DEC 67 130P GIORGINI, ALDO I  
REF. NO. CER67-68AG49  
CONTRACT: DA-AMC-28-043-65-620  
PROJ: 2246

UNCLASSIFIED REPORT

DESCRIPTORS: (TURBULENCE, MATHEMATICAL  
MODELS), PARTIAL DIFFERENTIAL EQUATIONS, FOURIER  
ANALYSIS, INTEGRATION, EQUATIONS OF MOTION,  
SHOCK WAVES, DIGITAL COMPUTERS, CORRELATION  
TECHNIQUES, ATMOSPHERIC MOTION (U)  
IDENTIFIERS: CDC-6600, BURGERS' EQUATION,  
COMPUTER ANALYSIS (U)

BURGERS' EQUATION IS FOURIER-ANALYZED TO OBTAIN A  
SYSTEM OF A DISCRETE INFINITY OF EQUATIONS IN A  
DISCRETE INFINITY OF VARIABLES. THIS SYSTEM IS  
STUDIED NUMERICALLY AND THE RESPONSE TO RANDOM  
INITIAL CONDITIONS IS OBTAINED BY USE OF A CDC 6600  
DIGITAL COMPUTER. THE 60 REALIZATIONS OBTAINED  
WERE USED TO OBTAIN MEAN AMPLITUDES, AVERAGE ENERGY  
SPECTRA, SKEWNESS FACTORS, FLATNESS FACTORS, AND  
CORRELATION FUNCTIONS. (AUTHOR) (U)

REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN  
SECTION II BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY.  
THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

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278 428  
413 270  
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608 773  
614 460  
619 260  
622 899  
641 226  
648 723  
649 779  
659 430  
661 033  
667 739

### III. TURBULENT DIFFUSION AND DISPERSION

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0392

AD-411 901

TECHNISCHE HOCHSCHULE DARMSTADT (GERMANY)

THE EFFECT OF DEFORMATION IN THE WIND FIELD ON THE  
LARGE-SCALE HORIZONTAL DISPERSION OF CLUSTERS IN THE  
ATMOSPHERE. (U)

APR 62 49P DJURIC, D. I

REPT. NO. TN4

CONTRACT: AF61 092 366

MONITOR: AFCRL

REPT. 62 801

UNCLASSIFIED REPORT

DESCRIPTORS: (WIND, MOTION), (TURBULENCE,  
ATMOSPHERE), AIR, PARTICLES, FLUID FLOW,  
DIFFUSION, DEFORMATION, VORTICES,  
METEOROLOGICAL CHARTS, AIR MASS ANALYSIS. (U)

IDENTIFIERS: 1962. (U)

THE DEFORMATION OF AIR BODIES IN THE HORIZONTAL  
FLOW IS STUDIED IN ABSENCE OF SMALL-SCALE TURBULENT  
DIFFUSION. ON THE BASIS OF KINEMATIC MODELS,  
FORMULAS ARE EVALUATED WHICH SHOW THE INCREASE OF THE  
MEAN SQUARE DISTANCE OF MATERIAL PARTICLES FROM THE  
GRAVITY CENTER OF EACH CLUSTER OF PARTICLES. THE  
RESULTS ARE COMPARED WITH STATISTICS ON THE  
DISPERSION OF AIR TRAJECTORIES IN THE BAROTROPIC  
MODEL CORRESPONDING TO THE DEVELOPMENT OF THE FLOW ON  
THE NORTHERN HEMISPHERE IN A PERIOD OF 8 DAYS. THE  
PHENOMENON OF ARRANGEMENT OF MATERIAL BANDS ALONG THE  
CURRENTS IS EXPLAINED AS A PROPERTY OF FLUID MOTION.  
THE KNOWLEDGE OF THE DEFORMATION RENDERS IT POS-  
SIBLE TO GET A QUANTITATIVE EXPLANATION OF THAT  
PROCESS. (AUTHOR) (U)

UNCLASSIFIED

/C0392

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0392

AD-412 346  
RAND CORP SANTA MONICA CALIF  
TURBULENCE, DIFFUSION, AND GR (U)  
AUG 62 4P KELLOGG, W.W.1  
REPT. NO. P2774

UNCLASSIFIED REPORT

DESCRIPTORS: (•ATMOSPHERIC MOTION, HEAT),  
ATMOSPHERIC TIDES, WIND, TURBULENCE,  
DIFFUSION. (U)  
IDENTIFIERS: GRAVITY WAVES (ATMOSPHERE),  
1962. (U)

TURBULENCE, DIFFUSION, AND GRAVITY WAVES IN THE  
ATMOSPHERE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /C0392

AD-418 600

METEOROLOGY RESEARCH INC ALTADENA CALIF  
AIRCRAFT WAKES AND DIFFUSION ENHANCEMENT, PART  
B.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

MAY 63    14P    MITH, T.B.; ACCREADY, P.B.;

CONTRACT: DA42 007CML545

UNCLASSIFIED REPORT

DESCRIPTORS: (•WAKE, AIRCRAFT), (•CLOUDS,  
TURBULENCE), ATMOSPHERE MOTION, AERODYNAMIC  
CHARACTERISTICS, DIFFUSION, MOTION, WIND,  
EXPERIMENTAL DATA, SMOKES, VORTICES.

(U)

IDENTIFIERS: 1963.

(U)

AIRCRAFT WAKES AND DOWNWARD DIFFUSION ENHANCEMENT.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0392

AD-423 938

FUEL CELL RESEARCH STEERING COMMITTEE.

TURBULENT DISPERSION IN A PIPE FLOW.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

SEP 63 52P

BECKER, H. A.; ROSENSWEIG, R.

E. IGWOZDZ, J. R. :

CONTRACT: AF19 604 6181

PROJ: 8604

TASK: 86040

MONITOR: AFCRL

63 727

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TURBULENCE, DIFFUSION), (\*PIPES, FLUID FLOW), LIGHT TRANSMISSION, SCATTERING, GENERATORS, TRANSDUCERS, MEASUREMENT, SPECTRUM ANALYZERS, SHEAR STRESSES, PHOTOMULTIPLIERS, VELOCITY, SENSITIVITY, INJECTORS, FOG

(U)

IDENTIFIERS: 1963

(U)

TURBULENT DIFFUSION FROM A POINT SOURCE IN A PIPE FLOW HAS BEEN STUDIED. IT WAS DESIRED TO VERIFY RICHARDSON'S LAW AND TO EVALUATE THE PARAMETER B IN LIN'S DERIVATION OF THAT LAW. DIFFICULTIES WERE ENCOUNTERED AND THE DATA OBTAINED WERE INSUFFICIENT FOR THESE PURPOSES. A VERY CONSIDERABLE QUANTITY OF NOVEL AND USEFUL INFORMATION WAS NEVERTHELESS GATHERED. THE SCATTERED-LIGHT TECHNIQUE WAS USED TO MAP THE FIELDS OF POINT-CONCENTRATION FLUCTUATIONS AND OF THE MEAN CONCENTRATION IN THE DIFFUSION PLUME. THE RELATIVE INTENSITY OF THE POINT-CONCENTRATION FLUCTUATIONS WAS FOUND TO BE OF THE ORDER OF 100% ON THE PLUME AXES AND INCREASED TOWARD THE PLUME EDGES. THE PARAMETERS IN TAYLOR'S THEORY WERE EVALUATED; THE INTENSITY OF FLUCTUATIONS IN THE RADIAL COMPONENTS OF THE VELOCITY OF A DIFFUSING PARTICLE WAS ESTIMATED TO BE 2.84% OF THE CENTERLINE VELOCITY IN THE PIPE, AND THE LAGRANGIAN (SPATIAL) INTEGRAL SCALE WAS FOUND TO BE OF THE MAGNITUDE OF 8.3% OF THE PIPE RADIUS. THE VALUE RESULTING FOR THE TURBULENCE PECKET NUMBER (THE PRODUCT OF PIPE DIAMETER TIMES CENTERLINE VELOCITY DIVIDED BY TURBULENT DIFFUSIVITY) IS 852. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0392

AD-608 442

TECHNISCHE HOCHSCHULE DARMSTADT (GERMANY)  
RESEARCH IN ATMOSPHERIC MACROTURBULENCE.

(U)

DESCRIPTIVE NOTE: FINAL REPT.

JUN 64 194P WIPPERMANN, F. ;

CONTRACT: AF61 092 366

MONITOR: AFCRL , 64 867

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ATMOSPHERIC MOTION, SCIENTIFIC  
RESEARCH), (\*SCIENTIFIC RESEARCH, ATMOSPHERIC MOTION),  
ATMOSPHERE, TURBULENCE, METEOROLOGICAL PHENOMENA,  
DIFFUSION, WIND, AIR MASS ANALYSIS, DEFORMATION, FLUID  
MECHANICS, ENERGY, FOURIER ANALYSIS, SERIES,  
DIFFERENTIAL EQUATIONS, STOCHASTIC PROCESSES,  
TRANSPORT PROPERTIES, PARTICLES, TRAJECTORIES

(U)

IDENTIFIERS: MACROTURBULENCE

(U)

CONTENTS: ON THE EULEREAN AND LAGRANGEAN  
STATISTICS OF VERY LARGE-SCALE ATMOSPHERIC MOTIONS;  
SOME PROBLEMS OF ATMOSPHERIC DIFFUSION ON VERY  
LARGESCALE; THE EFFECT OF DEFORMATION IN THE WIND  
FIELD ON THE LARGE-SCALE HORIZONTAL DISPERSION OF  
CLUSTERS IN THE ATMOSPHERE; ON THE TWO DIMENSIONAL  
SPECTRAL ANALYSIS OF KINETIC ENERGY OVER A  
CIRCUMPOLAR AREA OF A SPHERE; ABOUT THE  
DIFFERENTIAL EQUATIONS OF PARTICLE DIFFUSION IN THE  
ATMOSPHERE CAUSED BY LARGE-SCALE TURBULENCE;  
REMARKS ON THE BEHAVIOR OF COMPUTED AIR  
TRAJECTORIES NEAR THE BOUNDARIES OF AN OCTAGONAL  
AREA.

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0352

AD-621 059 4/2  
EMMANUEL COLL BOSTON MASS ORIENTAL SCIENCE LIBRARY  
TURBULENT DIFFUSION FROM A CONTINUOUS POINT SOURCE IN  
THE PRESENCE OF VERTICAL ADVECTION. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
NOV 65 15P HSUI-CH'ING, LO ;  
REPT. NO. EMM-65-17,  
CONTRACT: AF 19(628)-5073,  
MONITOR: TT , 66-61008

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF CH'I HSIANG HSUEH  
PAO (CHINESE PEOPLE'S REPUBLIC) V33 N2 275-81  
1962.

DESCRIPTORS: (\*DIFFUSION, \*ATMOSPHERIC MOTION),  
TURBULENCE, ATMOSPHERE, TRANSPORT PROPERTIES,  
AEROSOLS, METEOROLOGY, CHINA (U)

THIS PAPER DISCUSSES THE PROBLEM OF DIFFUSION FROM  
AN UNSTEADY CONTINUOUS POINT SOURCE IN A TURBULENT  
ATMOSPHERE. THE INFLUENCE OF VERTICAL CURRENT, THE  
DEPOSITION OF THE DIFFUSING PARTICLES AND THE 'NET-  
CATCHING EFFECT' (ABSORPTION BY GROUND SURFACE)  
ARE CONSIDERED. THE THEORETICAL FORMULAS FOR THE  
EVALUATION OF THE CONCENTRATION FIELD ARE DERIVED.  
SEVERAL SAMPLE COMPUTATIONS ARE PRESENTED AND IT IS  
SHOWN THAT THERE IS GOOD AGREEMENT BETWEEN THE  
COMPUTED RESULTS AND OBSERVED DATA. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0392

AD-627 398 4/1  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
PARAMETERS OF TURBULENT ATMOSPHERES. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS.  
FEB 66 9P ZIMMERMAN, S. P. ;  
REPT. NO. AFCRL-ERP-208, AFCRL-66-488  
PROJ: AF-8605,  
TASK: 860510,

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF GEOPHYSICAL  
RESEARCH V71 N10 P2429-44 MAY 15 1966.  
SUPPLEMENTARY NOTE: REVISION OF MANUAL SUBMITTED 20 JAN  
65.

DESCRIPTORS: (\*ATMOSPHERIC MOTION, MATHEMATICAL  
ANALYSIS), (\*METEOROLOGICAL PARAMETERS,  
TURBULENCE), AIR MASS ANALYSIS, KINETIC ENERGY,  
TRACER STUDIES, VISCOSITY (U)

LARGE- AND SMALL-SCALE ATMOSPHERIC EDDY VELOCITIES  
AND SCALE LENGTHS ARE ESTIMATED USING PREVIOUSLY  
MEASURED VALUES OF THE RATE OF DISSIPATION OF  
TURBULENT KINETIC ENERGY AND THE SQUARE OF THE  
CONTAMINANT DISPERSION VELOCITY. THE ESTIMATED  
VALUES ARE BASED UPON THE ASSUMPTION THAT THE WAVE  
NUMBERS  $k$  DOMINATING THE DISPERSION ARE WITHIN THE  
'INERTIAL' SUBRANGE, WHERE THE RATE OF FLOW OF  
TURBULENT KINETIC ENERGY IS CONSERVED OVER THIS  
RANGE. ALSO ESTIMATED IS THE LARGE-SCALE EDDY  
REYNOLDS NUMBER (DEFINED HERE), WHICH IS SHOWN  
TO APPROACH UNITY AT THE LIMITING ALTITUDE OF  
ATMOSPHERIC TURBULENCE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0292

AD-648 439 4/2

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

SOME LAGRANGIAN PROPERTIES OF TURBULENCE DEDUCED FROM  
ATMOSPHERIC DIFFUSION EXPERIMENTS. (U)

DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPER,

APR 66 11P HAUGEN, DUANE A. ;

REPLY. NO. AFCRL-ERP-247, AFCRL-66-851

PROJ: AF-7655

TASK: 765501

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED  
METEOROLOGY V3 N5 P646-52 OCT 1966.

SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED 10  
JAN 66. DOCTORAL THESIS.

DESCRIPTORS: (•ATMOSPHERIC MOTION, DIFFUSION),  
TURBULENCE, TRACER STUDIES, INTEGRATION,  
SCALE, STATISTICAL ANALYSIS, METEOROLOGICAL  
PARAMETERS, APPROXIMATION(MATHEMATICS) (U)  
IDENTIFIERS: PRAIRIE GRASS PROJECT (U)

SELECTED PRAIRIE GRASS DIFFUSION EXPERIMENTS  
WERE ANALYZED TO DETERMINE THE SO-CALLED HAY-  
PASQUILL SCALE FACTOR RELATING LAGRANGIAN AND  
EULERIAN SCALES OF TURBULENCE. IT WAS FOUND THAT  
AN AVERAGE VALUE OF THE SCALE FACTOR EQUAL TO FOUR AS  
SUGGESTED BY HAY AND PASQUILL IS OBTAINED ONLY  
UNDER CONDITIONS CLOSELY APPROXIMATING STATIONARY  
PROCESSES. WHEN EXPERIMENTS CONDUCTED UNDER NON-  
STATIONARY AS WELL AS STATIONARY CONDITIONS ARE  
CONSIDERED, SIMPLE REGRESSION TECHNIQUES ARE MORE  
EFFICIENT THAN THE HAY-PASQUILL TECHNIQUE FOR  
PREDICTING THE LATERAL SPREAD OF THE DIFFUSING PLUME.  
LAGRANGIAN AUTOCORRELATIONS AND EDDY-WIND VARIANCES  
FOR THE CROSSWIND VELOCITY COMPONENT DEDUCED FROM THE  
DATA USING TAYLOR'S DIFFUSION EQUATION ARE COMPARED  
WITH CORRESPONDING EULERIAN QUANTITIES FOR  
EXPERIMENTS CONDUCTED UNDER THERMALLY STABLE  
CONDITIONS. IT IS SHOWN THAT THE LAGRANGIAN  
INTEGRAL SCALE OF TURBULENCE EXCEEDS THE EULERIAN  
SCALE AND THAT THE LAGRANGIAN AND EULERIAN  
VARIANCES ARE APPROXIMATELY EQUAL. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0392

AD-648 442 4/2  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
ON TURBULENT DIFFUSION IN AN ARBITRARILY STRATIFIED  
ATMOSPHERE. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS,  
MAR 66 IOP WIPPERMANN, F. K. ;  
REPT. NO. AFCRL-ERP-243, AFCRL-66-836  
PROJ: AF-7655  
TASK: 765501

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED  
METEOROLOGY V9 N3 P640-5 OCT 1966.  
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED /  
SEP 65.

DESCRIPTORS: (ATMOSPHERIC MOTION, DIFFUSION),  
TURBULENCE, NUMERICAL METHODS AND PROCEDURES,  
INTEGRAL EQUATIONS, PROBABILITY, WIND (U)

IN AN ATMOSPHERE WITH A VERTICALLY NON-UNIFORM  
STRATIFICATION THE VERTICAL CONCENTRATION PROFILE IN  
THE LEE OF A CONTINUOUS POINT SOURCE CAN BE OBTAINED  
BY A RANDOM-WALK METHOD, WHERE THE VERTICAL STEP  
LENGTH FOR THE JUMPING PARTICLES VARIES ACCORDING TO  
THE STRATIFICATION. AS USUAL, ONLY THE FORM OF THE  
DISTRIBUTION IS OBTAINED BY SUCH A FICKIAN  
DIFFUSION PROCESS, THE ENTERING PARAMETERS BEING  
TAKEN FROM OBSERVATIONS (DIFFUSION EXPERIMENTS).  
AN EXAMPLE WAS COMPUTED SHOWING THE VERTICAL  
CONCENTRATION PROFILES VARYING WITH TIME DOWNWIND  
FROM SOURCES AT TWO DIFFERENT HEIGHTS IN AN ACTUAL  
CASE DURING THE DESTRUCTION OF AN INVERSION.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0392

AD-693 019 20/4 4/1  
ARMY ELECTRONICS COMMAND FORT HUACHUCA ARIZ RESEARCH  
DIV  
DERIVATION OF HYPERBOLIC TURBULENT DIFFUSION  
EQUATION. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAR 67 25P MEYERS, RONALD E. ;  
PROJ: DA-1VO-14901-B92A  
TASK: 1VO-14901-B92A-08  
MONITOR: ECOM 6026

UNCLASSIFIED REPORT

DESCRIPTORS: (•ATMOSPHERIC MOTION, TURBULENCE),  
(•THREE-DIMENSIONAL FLOW, PARTIAL DIFFERENTIAL  
EQUATIONS), PARTICLES, WIND, VELOCITY,  
DIFFUSION, ANISOTROPY, ATMOSPHERE MODELS,  
NUMERICAL METHODS AND PROCEDURES (U)

A THREE DIMENSIONAL HYPERBOLIC DIFFERENTIAL  
EQUATION BASED ON FINITE CORRELATED PARTICLE  
VELOCITIES IS DERIVED WHICH IS APPROPRIATE TO  
MODELING ANISOTROPIC TURBULENT DIFFUSION IN THE  
ATMOSPHERE. CAUCHY INITIAL DATA, THE MEAN WIND,  
THE REYNOLDS STRESS TENSOR, AND A TYPICAL FREQUENCY  
OF PULSATION ARE REQUIRED FOR COMPLETE SOLUTION.  
THE OUTLINES OF PLUMES AND PUFFS MAY BE OBTAINED  
WITH ONLY KNOWLEDGE OF THE REYNOLDS STRESS TENSOR  
AND MEAN WIND VELOCITY. THE CLASSICAL PARABOLIC  
DIFFUSION EQUATIONS ARE A LIMITING FORM OF THIS  
HYPERBOLIC MODEL. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /C0392

AD-667 920 4/2 4/1 13/2  
ATMOSPHERIC SCIENCES LAB WHITE SANDS MISSILE RANGE N  
MEX  
PREDICTING DIFFUSION OF ATMOSPHERIC CONTAMINANTS BY  
CONSIDERATION OF TURBULENT CHARACTERISTICS OF  
WSMR, (U)  
JAN 68 40P HANSEN, FRANK V. I  
TASK: 17014901892A-10  
MONITOR: ECOM 9170

UNCLASSIFIED REPORT

DESCRIPTORS: (•ATMOSPHERIC MOTIO , INTENSITY),  
(•AIR POLLUTION, PREDICTIONS),  
MICROMETEOROLOGY, GUIDED MISSILE RANGES,  
TURBULENT BOUNDARY LAYER, METEOROLOGICAL  
PARAMETERS, REGRESSION ANALYSIS, MATHEMATICAL  
MODELS, DIFFUSION, TOXICITY, PROPELLANTS,  
TABLES, NEW MEXICO (U)

THE RELATIONSHIPS BETWEEN THE TURBULENT INTENSITIES  
ABOUT THE MEAN FLOW IN THE LOWEST LAYERS OF THE  
ATMOSPHERE AT WHITE SANDS MISSILE RANGE,  
NEW MEXICO, AND CLIMATOLOGICAL DATA ARE DISCUSSED  
IN TERMS OF PREDICTING THE DIFFUSION OF CONTAMINANTS  
INTO THE ATMOSPHERE. IF THE TURBULENT FLUCTUATIONS  
OBSERVED IN THE LOWER PORTION OF THE BOUNDARY LAYER  
ARE CONSIDERED REPRESENTATIVE, THEN CORRELATIONS WITH  
CLIMATOLOGICAL SUMMARIES MAY BE USED AS A RUDIMENTARY  
ESTIMATOR FOR ESTIMATING THE DIFFUSION POWER OF THE  
ATMOSPHERE. A SIMPLE EMPIRICAL DIFFUSION MODEL FOR  
GENERAL USE IS ALSO GIVEN. (AUTHOR) (U)

REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN  
SECTION III BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY.  
THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

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633 841  
634 305  
635 919  
637 728  
641 330  
643 689  
655 368  
668 255

IV. TURBULENCE INTERACTION WITH ELECTROMAGNETIC  
AND ACOUSTIC WAVES



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /00392

AD-258 529

AIR WEATHER SERVICE SCOTT AFB ILL  
THE METEOROLOGICAL FACTORS AFFECTING PHOTO-GRAPHIC  
RECONNAISSANCE FROM VERY HIGH ALTITUDES (U)  
MAY 61    IV    JOHANNESSEN, KARL R.;  
REPT. NO. TR154

UNCLASSIFIED REPORT

DESCRIPTORS:    •AERIAL PHOTOGRAPHY, •CLIMATOLOGY,  
AERIAL RECONNAISSANCE, AEROSOLS, BRIGHTNESS, CLOUDS,  
HIGH ALTITUDE, OPTICAL ANALYSIS, PARTICLES,  
TURBULENCE, VISIBILITY (U)

SUCCESSFUL MISSIONS OF PHOTOGRAPHIC MAPPING AND  
PHOTOGRAPHIC RECONNAISSANCE FROM THE AIR REQUIRE A  
MINIMUM OF CLOUD COVER. CLOUD-COVER FORECASTS ARE  
OBTAINED PRIOR TO EACH MISSION. FOR PHOTOGRAPHY  
FROM VERY HIGH ALTITUDES WITH HIGHRESOLUTION CAMERA  
SYSTEMS, THE EFFECTS OF OTHER OBSCURING FACTORS  
BESIDES CLOUDS MUST BE CONSIDERED. DUST AND OTHER  
AEROSOLS SUSPENDED IN THE ATMOSPHERE REDUCE THE  
BRIGHTNESS CONTRAST OF GROUND TARGETS. SHIMMERING  
DUE TO OPTICAL TURBULENCE MAY DISTORT DETAILS AND  
PREVENT TARGET RECOGNITION. A BRIEF SURVEY IS GIVEN  
OF THE OBSCURING FACTORS AFFECTING PHOTOGRAPHY FROM  
VERY HIGH ALTITUDES. NUMERICAL DATA ON AEROSOLS AND  
OPTICAL TURBULENCE ARE INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-274 254

MIDWEST RESEARCH INST KANSAS CITY MO

INVESTIGATION OF TECHNIQUES FOR REMOTE MEASUREMENT OF  
ATMOSPHERIC WIND FIELDS. (U)

DESCRIPTIVE NOTE: REPT. NO. 2, 19 OCT 61-14 FEB 62 ON  
PHASE 2: ANALYSIS,

FEB 62 77P

FETTER, R. W. ; SMITH, P. L.

, JR.;

CONTRACT: DA36-039-SC-87293

UNCLASSIFIED REPORT

DESCRIPTORS: •ACOUSTIC DETECTORS , •DOPPLER SYSTEMS  
, •INFRARED TRACKING , •TRACKING , •WIND , AIR , BUBBLES  
, FEASIBILITY STUDIES , HEAT , INSTRUMENTATION  
, MEASUREMENT , RADAR , TURBULENCE (M)

ANALYSES WERE MADE TO DETERMINE THE FEASIBILITY OF  
THREE PROPOSED METHODS OF REMOTE WIND MEASUREMENT  
USING (1) SCATTERING FROM NATURAL ATMOSPHERIC  
TURBULENCE; (2) ELECTROMAGNETIC SCATTERING FROM  
ACOUSTIC WAVES; AND (3) INFRARED TRACKING OF AN  
ARTIFICIALLY HEATED VOLUME OF AIR (BUBBLE).

USE OF NATURAL TURBULENCE AS A SENSOR WILL REQUIRE  
(1) ADDITIONAL DATA ON DISTRIBUTION AND  
CHARACTERISTICS OF TURBULENCE FROM GROUND LEVEL TO  
ONE MILE ALTITUDE, (2) CORRELATION OF TURBULENCE  
MOTION AND WIND, AND (3) RADAR STATE-OF-THE-ART  
IMPROVEMENT TO PROVIDE CONSISTENT DETECTION AND  
MEASUREMENT. REMOTE WIND MEASUREMENTS BY MICROWAVE  
REFLECTION FROM ACOUSTIC WAVES HAVE BEEN  
DEMONSTRATED, BUT ADDITIONAL EXPERIMENTAL DATA ARE  
NEEDED TO DETERMINE MAXIMUM USABLE RANGE AND THE  
EFFECTS OF TURBULENCE ON THE ACOUSTIC WAVES.  
REMOTE GENERATION OF A HEATED BUBBLE OF AIR DOES  
NOT APPEAR FEASIBLE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-286 049

ARMY RESEARCH OFFICE WASHINGTON D C  
EFFECTS OF AIR TURBULENCE UPON PROPAGATION OF  
LIGHT

(U)

DEC 62 IV STRAUB, HARALD W. J

UNCLASSIFIED REPORT

DESCRIPTORS: \*LIGHT, \*TURBULENCE, ATMOSPHERE, MOTION  
PICTURE PHOTOGRAPHY, PHOTOGRAPHIC ANALYSIS,  
PROPAGATION

(U)

SHADOW PATTERNS OF TURBULENT AIR LAYERS 1.0 AND 2.2  
MILES THICK WERE PHOTOGRAPHED AT NEAR-GROUND LEVEL.  
THEY INDICATE A DYNAMIC RANGE OF 1000 TO 1 OF THE  
FLUX DENSITY IN ADJACENT AREAS OF ABOUT 1 TO 4 INCHES  
ACROSS. A MOVING PICTURE DEMONSTRATING THE  
PHENOMENON WAS SHOWN. THE BENDING BEAM PHENOMENON  
IS DESCRIBED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-429 820  
REDSTONE SCIENTIFIC INFORMATION CENTER REDSTONE ARSENAL  
ALA  
INFLUENCE OF ATMOSPHERIC TURBULENCE ON THE AUDIBILITY  
OF SOUNDS IN THE ATMOSPHERE. (U)  
JAN 64 9P BAZILEVICH, V. V. ;  
BAKER, TR. BY INGEBORG V. ;  
MONITOR: RSIC 121

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. FROM TRUDY GLAVNOI  
GEOFIZICHESKOI OBSERVATORII, 72, PP. 90-93, 1958.

DESCRIPTORS: (\*ATMOSPHERIC MOTION, SOUND  
TRANSMISSION), (\*SOUND TRANSMISSION, ATMOSPHERIC  
MOTION), TURBULENCE, SOUND, ATTENUATION, SOUND  
SIGNALS, ATMOSPHERIC REFRACTION (U)  
IDENTIFIERS: 1964 (U)

INFLUENCE OF ATMOSPHERIC TURBULENCE ON THE AUDIBILITY OF  
SOUND IN THE ATMOSPHERE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00352

AD-455 968

ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY WHITE  
SANDS MISSILE RANGE N MEX

A MEASUREMENT OF THE EFFECT OF ATMOSPHERIC TURBULENCE  
ON THE COHERENT PROPERTIES OF A SOUND WAVE. (U)

JAN 65 28P COFFMAN, JOHN W. I

REPT. NO. 254

PROJ: 1L013001A91A

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ATMOSPHERIC MOTION, SOUND), (\*SOUND,  
ATMOSPHERIC MOTION), TURBULENCE, MEASUREMENT,  
BANDWIDTH, BAND-PASS FILTERS, ELECTROMAGNETIC WAVES,  
DIFFRACTION GRATING, ATTENUATION, INTENSITY, ACOUSTIC  
PROPERTIES (U)  
IDENTIFIERS: ACOUSTIC DIFFRACTION GRATING (U)

THIS REPORT DESCRIBES AN EXPERIMENT TO MEASURE WITH  
AN ACOUSTIC DIFFRACTION GRATING THE FLUCTUATIONS OF A  
SOUND WAVE DUE TO ATMOSPHERIC TURBULENCE. THE  
GRATING CORRESPONDS TO A BANDPASS FILTER WITH A  
BANDWIDTH OF 10-(2) CM-(1) IN WAVE NUMBER.  
THE MEASUREMENT IS RELATED TO THE SCATTERING OF  
ELECTROMAGNETIC ENERGY BY PERIODIC SOUND WAVES, AN  
EFFECT UPON WHICH THE EMAC PROBE DEPENDS.  
MEASUREMENTS WERE MADE AT AN ACOUSTIC WAVE LENGTH  
OF 3.48 CM. UNDER THE CONDITIONS OF THE TESTS,  
TURBULENCE WAS FOUND TO HAVE NO EFFECT ON THE SOUND  
WAVE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /00352

AD-468 153

IIT RESEARCH INST CHICAGO ILL

ANALYSIS OF OPTICAL WAVEFRONT DISTORTIONS CAUSED BY  
THE ATMOSPHERE. (U)

DESCRIPTIVE NOTE: INTERIM TECHNICAL REPT., 21 APR-20  
JUL 65,

JUL 65    54P    MONTGOMERY, ANTHONY J. I

REPT. NO. IITRI-A6121-6

CONTRACT: AF33 615 2429

PROJ: A6121

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•INTERFEROMETERS, DESIGN),  
(•ATMOSPHERIC MOTION, OPTICAL ANALYSIS), AIR  
MASS ANALYSIS, TURBULENCE, OPTICAL PROPERTIES,  
DISTORTION, LASERS, INSTRUMENTATION,  
MEASUREMENT, SENSITIVITY, INTENSITY (U)

IDENTIFIERS: POINTING INTERFEROMETERS (U)

IN ORDER TO OBTAIN THE OPTIMUM DESIGN OF A  
WAVEFRONT SHEARING INTERFEROMETER TO MEASURE OPTICAL  
WAVEFRONT DISTORTIONS CAUSED BY THE ATMOSPHERE, SOME  
PRELIMINARY EXPERIMENTS USING A POINTING  
INTERFEROMETER HAVE BEEN CONSIDERED. USE OF A  
POINTING INTERFEROMETER WOULD ENABLE THE SHAPE OF  
WAVEFRONT ALONG THE LINE OF FLIGHT TO BE DETERMINED.  
A POINTING INTERFEROMETER, WHICH AT A LATER DATE  
COULD BE MODIFIED VERY SIMPLY TO MEASURE WAVEFRONT  
DISTORTION, HAS BEEN CONSTRUCTED AND PRELIMINARY  
MEASUREMENTS INDICATE THAT THE TECHNIQUE COULD BE  
USED TO MEASURE CHANGES IN ORIENTATION OF THE  
WAVEFRONT OF LESS THAN ONE ARC SECOND. THE  
CONSTRUCTION OF A POINTING INTERFEROMETER FOR USE IN  
FLIGHT TESTS APPEARS TO BE FEASIBLE.

INTERFEROGRAMS OF WAVEFRONT DISTORTION, CAUSED BY  
ARTIFICIALLY PRODUCED LOCAL AIR TURBULENCE, INDICATE  
THAT DISTORTION IS ABSENT OVER SOME SHORT TIME  
INTERVALS. THE WAVEFRONT DISTORTION IS ALSO SHOWN  
TO BE MUCH GREATER WHEN THE REGION OF TURBULENCE IS  
IN THE VICINITY OF THE INTERFEROMETER AS COMPARED TO  
NEAR THE SOURCE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-468 153

IIT RESEARCH INST CHICAGO ILL

ANALYSIS OF OPTICAL WAVEFRONT DISTORTIONS CAUSED BY  
THE ATMOSPHERE. (U)

DESCRIPTIVE NOTE: INTERIM TECHNICAL REPT., 21 APR-20

JUL 65,

JUL 65

54P

MONTGOMERY, ANTHONY J. I

REPT. NO. IITRI-A6121-6

CONTRACT: AF33 615 2429

PROJ: A6121

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*INTERFEROMETERS, DESIGN),  
(\*ATMOSPHERIC MOTION, OPTICAL ANALYSIS), AIR  
MASS ANALYSIS, TURBULENCE, OPTICAL PROPERTIES,  
DISTORTION, LASERS, INSTRUMENTATION,  
MEASUREMENT, SENSITIVITY, INTENSITY (U)

IDENTIFIERS: POINTING INTERFEROMETERS (U)

IN ORDER TO OBTAIN THE OPTIMUM DESIGN OF A  
WAVEFRONT SHEARING INTERFEROMETER TO MEASURE OPTICAL  
WAVEFRONT DISTORTIONS CAUSED BY THE ATMOSPHERE, SOME  
PRELIMINARY EXPERIMENTS USING A POINTING  
INTERFEROMETER HAVE BEEN CONSIDERED. USE OF A  
POINTING INTERFEROMETER WOULD ENABLE THE SHAPE OF  
WAVEFRONT ALONG THE LINE OF FLIGHT TO BE DETERMINED.  
A POINTING INTERFEROMETER, WHICH AT A LATER DATE  
COULD BE MODIFIED VERY SIMPLY TO MEASURE WAVEFRONT  
DISTORTION, HAS BEEN CONSTRUCTED AND PRELIMINARY  
MEASUREMENTS INDICATE THAT THE TECHNIQUE COULD BE  
USED TO MEASURE CHANGES IN ORIENTATION OF THE  
WAVEFRONT OF LESS THAN ONE ARC SECOND. THE  
CONSTRUCTION OF A POINTING INTERFEROMETER FOR USE IN  
FLIGHT TESTS APPEARS TO BE FEASIBLE.

INTERFEROGRAMS OF WAVEFRONT DISTORTION, CAUSED BY  
ARTIFICIALLY PRODUCED LOCAL AIR TURBULENCE, INDICATE  
THAT DISTORTION IS ABSENT OVER SOME SHORT TIME  
INTERVALS. THE WAVEFRONT DISTORTION IS ALSO SHOWN  
TO BE MUCH GREATER WHEN THE REGION OF TURBULENCE IS  
IN THE VICINITY OF THE INTERFEROMETER AS COMPARED TO  
NEAR THE SOURCE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-600 442

HARRY DIAMOND LABS WASHINGTON D C  
THE TATARSKIAN CORRELATION FUNCTION FOR ARBITRARY  
TURBULENCE CONDITIONS, (U)

MAR 64 17P BRINKS, W. J. :

PROJ: 1A012001A029 ,A0214

MONITOR: TR1209

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ELECTROMAGNETIC WAVES, PROPAGATION),  
(\*ATMOSPHERIC MOTION, DISTRIBUTION), (\*STATISTICAL  
FUNCTIONS, CORRELATION TECHNIQUES), INTEGRALS,  
NUMERICAL ANALYSIS (U)

IN TATARSKI'S THEORY OF WAVE PROPAGATION THROUGH  
A TURBULENT MEDIUM, A CERTAIN INTRACTABLE INTEGRAL  
HAS BEEN EVALUATED NUMERICALLY. THIS ALLOWS THE  
COMPUTATION OF THE CROSS-CORRELATION OF THE  
LOGARITHMIC AMPLITUDE FLUCTUATIONS AT TWO SPACED  
RECEIVERS, FOR ANY ARBITRARY TURBULENCE DISTRIBUTION  
ALONG THE PROPAGATION PATH. THE QUESTION OF  
OBTAINING THE TURBULENCE DISTRIBUTION FROM A KNOWN  
CROSS CORRELATION FUNCTION, IS ALSO TREATED.  
(AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /DD392

AD-602 392

PUERTO RICO UNIV MAYAGUEZ COLL OF AGRICULTURE AND  
MECHANIC ARTS

STUDY OF IONOSPHERIC WINDS. ADDITIONAL DATA ON THE  
DETERMINATION OF IONOSPHERIC DRIFTS AND TURBULENCE  
FROM RADIO FADING RECORDS. (U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 6 (FINAL),

JUL 62 278P WIEWALL, MIGUEL, JR.

CONTRACT: AF19 604 2026

PROJ: 7662

TASK: 766204

MONITOR: AFCRL , 62 291

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*IONOSPHERE, WIND), (\*WIND,  
IONOSPHERE), DRIFT, TURBULENCE, MEASUREMENT, RADIO  
WAVES, ATTENUATION, ANTENNAS, ANTENNA CONFIGURATIONS,  
PUERTO RICO, TABLES, EXPERIMENTAL DATA, GEOPHYSICS (U)

ADDITIONAL DATA IS HEREIN PRESENTED ON IONOSPHERIC  
DRIFTS AND TURBULENCE OVER MAYAGUEZ, PUERTO  
RICO DURING THE YEAR 1959. A NEW TYPE OF  
RECEIVING ANTENNA SYSTEM IS USED AND A ROUGH  
COMPARISON WITH RESULTS OBTAINED WITH THE OLD SYSTEM  
IS GIVEN. A NEW CONCEPT IN THE COMPUTATIONS IS  
ALSO TRIED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /D0352

AD-606 702

HARRY DIAMOND LABS WASHINGTON D C

A PRACTICAL DETERMINATION OF LOGARITHMIC AMPLITUDE  
TIME SPECTRUM UNDER ARBITRARY TURBULENCE, (U)

JUL 64 26P BRINKSKS, WALTER J. I

MONITOR: HDL , TRI241

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ELECTROMAGNETIC WAVES, PROPAGATION),  
(\*ATMOSPHERIC MOTION, ELECTROMAGNETIC WAVES),  
TURBULENCE, HARMONIC ANALYSIS, AMPLITUDE MODULATION,  
SPECIAL FUNCTIONS (MATHEMATICAL), NUMERICAL METHOD AND  
PROCEDURES (U)

IDENTIFIERS: AMPLITUDE TIME SPECTRUM (U)

THIS REPORT PRESENTS A METHOD FOR CALCULATING THE  
TIME SPECTRUM OF THE LOGARITHMIC-AMPLITUDE  
FLUCTUATIONS OF AN ELECTROMAGNETIC WAVE PROPAGATING  
THROUGH A TURBULENT ATMOSPHERE, WHEN THE TURBULENCE  
IS A GIVEN FUNCTION OF POSITION OVER THE RADIATION  
PATH. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /00352

AD-614 680

MANCHESTER UNIV (ENGLAND) DEPT OF ASTRONOMY  
TURBULENCE AND RESOLUTION IN ASTRONOMICAL  
PHOTOGRAPHY,

(U)

JAN 64    72P    EDGAR, ROGER F. ;

REPT. NO.    TN-4

CONTRACT:    AF61 052 496

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS:    (•ASTRONOMY, PHOTOGRAPHIC IMAGES),  
                  (•PHOTOGRAPHIC IMAGES, RESOLUTION), (•ATMOSPHERIC  
                  MOTION, TURBULENCE), (•RESOLUTION, TURBULENCE),  
                  REFRACTIVE INDEX, OPTICAL PROPERTIES, PHOTOGRAPHIC  
                  GRAIN, PHOTOGRAPHIC EMULSION

(U)

A METHOD IS OUTLINED OF STUDYING, INDIVIDUALLY AND  
COLLECTIVELY, ALL THE EFFECTS WHICH INFLUENCE THE  
RESOLUTION OF AN ASTRONOMICAL TELESCOPE USED TO  
PHOTOGRAPH CELESTIAL OBJECTS. A METHOD OF  
OPTIMISING THE RESOLUTION IS CONSIDERED. (AUTHOR:

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /D0252

AD-620 296

WISCONSIN UNIV MADISON

INTERRELATION OF IONOSPHERIC SPORADIC E WITH  
THUNDERSTORMS AND JET STREAMS.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,

65 42F DAMON, THOMAS DELCYD I

CONTRACT: AF33 608 1122

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LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF  
REQUESTED BY USERS OF DDC. COPY IS AVAILABLE FOR PUBLIC  
SALE.

DESCRIPTORS: (•IONOSPHERIC DISTURBANCES,  
THUNDERSTORMS), (•THUNDERSTORMS, IONOSPHERIC  
DISTURBANCES), (•JET STREAMS(METEOROLOGY),  
IONOSPHERIC DISTURBANCES), ELECTRON DENSITY,  
IONOSPHERE, ATMOSPHERIC SOUNDING, IONOSPHERIC  
PROPAGATION, RADIO WAVES, RADIOFREQUENCY  
INTERFERENCE, GEOPHYSICS

(U)

REPORTS OF THE OCCURRENCE OF IONOSPHERIC SPORADIC  
E CLOUDS FROM RADIO AMATEURS OPERATING ON A  
FREQUENCY NEAR FIFTY MEGAHERTZ ARE ANALYZED ON A  
SYNOPTIC SCALE AND COMPARED WITH THE OCCURRENCE OF  
THUNDERSTORMS AND OF JET STREAMS. A MECHANISM IS  
SUGGESTED FOR THE OBSERVED INTERRELATION BETWEEN ES  
AND THUNDERSTORMS. NO DEFINITE CONCLUSION IS DRAWN  
CONCERNING THE POSSIBLE RELATIONSHIP BETWEEN ES AND  
JET STREAMS. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-627 290 17/8 20/6 4/1  
WHITE SANDS MISSILE RANGE N MEX  
EFFECTS OF ATMOSPHERIC TURBULENCE ON OPTICAL  
INSTRUMENTATION, (U)  
JUL 61 17P BECKER, RANDOLPH A. I  
REPT. NO. RID-O-TM-61-9

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ATMOSPHERIC MOTION, OPTICAL  
PHENOMENA), (•OPTICAL PHENOMENA, ATMOSPHERIC  
MOTION), OPTICAL EQUIPMENT, OPTICAL TRACKING,  
OPTICAL IMAGES, DISTORTION, ATMOSPHERIC  
REFRACTION, MICROMETEOROLOGY, GUIDED MISSILE  
RANGES, NEW MEXICO (U)

THE RESULTS OF RESEARCH ON OPTICAL TURBULENCE AT  
WHITE SANDS MISSILE RANGE ARE PRESENTED.  
IT HAS BEEN SHOWN THAT ELEVATING CAMERA STATIONS 33  
FEET ABOVE GROUND LEVEL CAN YIELD NEARLY A THREEFOLD  
INCREASE IN OPTICAL RESOLUTION DURING PERIODS OF  
ATMOSPHERIC TURBULENCE. EARLY RESEARCH POSTULATED  
THE EXISTENCE OF THERMAL-INDUCED AIR-LENSES AS THE  
CAUSE OF OPTICAL TURBULENCE EFFECTS. RECENT  
RESEARCH HAS SHOWN THAT AIR-LENSES CAN ACCOUNT FOR  
MOST OF THE OBSERVED EFFECTS. THE 'PRISM' CONCEPT  
OF TURBULENCE APPEARS TO BE UNNECESSARY FOR  
EXPLAINING TURBULENCE-INDUCED IMAGE MOTION. THE  
DEPENDENCE OF THE OPTICAL EFFECTS OF TURBULENCE UPON  
EXPOSURE TIME AND APERTURE SIZE IS DISCUSSED  
QUALITATIVELY. THE SOURCE OF OPTICAL TURBULENCE IN  
THE ATMOSPHERE AND A METHOD OF MEASURING THE  
TURBULENCE-GENERATING POTENTIAL OF VARIOUS TERRAIN  
SURFACES ARE DESCRIBED ON THE BASIS OF  
MICROMETEOROLOGY. THIS RESEARCH HAS BEEN LIMITED TO  
AN INVESTIGATION OF OPTICAL TURBULENCE DURING THE  
PERIOD FROM SUNRISE TO SUNSET. HOWEVER, MANY OF  
THE RESULTS APPLY TO THE NIGHTTIME TURBULENCE  
ENCOUNTERED BY ASTRONOMERS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /DD392

AD-628 971 4/1 20/14  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
THE RELATION BETWEEN THE THERMODYNAMIC STATE OF THE  
ATMOSPHERE AND RADAR ECHOES FROM A CLEAR SKY. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
DEC 65 10P SALMAN, E. M. IBRYLEV, G. B. I  
REPT. NO. 7-R-970,  
CONTRACT: AF 19(628)-3880,  
MONITOR: TT , 66-60676

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: O SVIAZI MEZHDU THERMODINAMICHESKIM  
SOSTOIANIEM ATMOSFERY I RADIOLOKATSIONNYMI  
OTRAZHENIAMI OT IASNOGO NEBA. TRANS. OF GLAVNAYA  
GEOFIZICHESKAYA OBSERVATORIYA, LENINGRAD. TRUDY  
(USSR) N199 P89-8 1964.

DESCRIPTORS: (\*RADAR ECHO AREAS,  
CONVECTION(ATMOSPHERIC)),  
(\*CONVECTION(ATMOSPHERIC), RADAR ECHO AREAS),  
CLEAR AIR TURBULENCE, THERMODYNAMICS,  
ATMOSPHERIC SOUNDING, USSR (U)

AN ANALYSIS OF THE RESULTS OF AEROLOGICAL AND  
METEOROLOGICAL OBSERVATIONS SHOWS THAT A DISCRETE-  
COHERENT RADAR ECHO IS FOUND IN THERMAL CONVECTION.  
A CORRELATION IS NOTED BETWEEN THE MAXIMUM HEIGHT  
OF OCCURRENCE OF THIS RADAR ECHO AND THE BUOYANCY ON  
DAYS WITH FREE CONVECTION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00292

AD-628 974 4/2

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
THE COORDINATE-DOPPLER METHOD OF WIND  
OBSERVATION.

(U)

DESCRIPTIVE NOTE: RESEARCH TRANSLATION,

DEC 65 10P GORELIK, A. G. IKOSTAREV, V. V.

ICHERNIKOV, A. A. :

REPT. NO. T-R-512,

CONTRACT: AF 19(628)-2880,

MONITOR: TT , 66-60679

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: KOORDINATNODOPPLEROVSKII METOD  
VETROVYKH NAVLIUDENII, TRANS. OF TSENTRALNAYA  
AEROLOGICHESKAYA OBSERVATORIYA. TRUDY (USSR) N37  
P19-22 1964.

DESCRIPTORS: (•RADIOSONDES, DOPPLER EFFECT),  
(•DOPPLER EFFECT, RADIOSONDES), (•WIND,  
MEASUREMENT), ATMOSPHERIC MOTION, ATMOSPHERIC  
SOUNDING, USSR

(U)

THE PAPER DEALS WITH A NEW RAWIN METHOD WHICH  
DIFFERS FROM THOSE USED EARLIER IN THAT IT PERMITS  
MEASUREMENT OF BOTH THE MEAN WIND SPEED AND THE  
TURBULENCE PARAMETERS AT VARIOUS LEVELS. THE  
ERRORS OF THE METHOD ARE EVALUATED AND A BLOCK  
DIAGRAM OF THE APPARATUS IS DESCRIBED. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-640 610 4/1  
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS  
LAB  
JOINT RADAR AND AEROLOGICAL OBSERVATIONS IN THE LOWER  
1.9-KM LAYER OF THE ATMOSPHERE, (U)  
AUG 66 24P BRYLEV, G. B. IVASILCHENKO, I. V.  
ISELITSKAYA, V. I. FEDEROV, A. A. I  
REPT. NO. TG-230-T496,  
CONTRACT: N0W-62-0609,  
MONITOR: TT 66-61159

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF GLAVNAYA GEOPHIZICHESKAYA  
OBSERVATORIIA, Leningrad. TRUDY (USSR), N172 P76-87  
1969.

DESCRIPTORS: (\*TROPOSPHERE, ATMOSPHERIC MOTION),  
(\*ATMOSPHERIC MOTION, \*RADAR REFLECTIONS),  
METEOROLOGICAL RADAR, METEOROLOGICAL PARAMETERS,  
CONVECTION(ATMOSPHERIC), USSR (U)

THE RESULTS OF JOINT RADAR AND AEROLOGICAL  
OBSERVATIONS IN THE LOWER 1.9-KM LAYER OF THE  
ATMOSPHERE ARE EXAMINED. A CONNECTION BETWEEN  
CLEARSKY RADAR RETURNS AND CONVECTIVE AND TURBULENT  
MOTION IN THE ATMOSPHERE IS DEMONSTRATED.  
(AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-641 226 4/1  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
AN ANALYSIS OF SONIC ANEMOMETER MEASUREMENTS FROM THE  
CEDAR HILL TOWER. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS,  
AUG 66 163P KAIMAL, J. CHANDRAN ;  
REPT. NO. AFCRL-ERP-219, AFCRL-66-942  
PROJ: AF-7699,  
TASK: 769902.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ANEMOMETERS, •ATMOSPHERIC MOTION),  
MEASUREMENT, VELOCITY, TABLES, TEXAS,  
ACOUSTIC EQUIPMENT (U)

IN A FIELD PROGRAM CONDUCTED DURING THE SUMMER OF  
1963, SONIC ANEMOMETERS WERE OPERATED AT FOUR LEVELS  
ON A 1400-FT TOWER TO OBTAIN MEASUREMENTS OF THE  
VERTICAL VELOCITY FLUCTUATIONS UNDER DIFFERENT  
STABILITY CONDITIONS. THIS REPORT PROVIDES A  
DETAILED DESCRIPTION OF THE INSTRUMENTATION, DATA  
REDUCTION AND ANALYSIS TECHNIQUE, AND A COMPLETE  
LISTING OF THE PROCESSED SPECTRAL DATA. THE  
RESULTS FOR FOUR RUNS REPRESENTING DIFFERENT BUT  
TYPICAL CONDITIONS ARE ANALYZED AND INTERPRETED.  
THE MAIN CONCLUSION DRAWN FROM THIS STUDY IS THAT  
SIMPLIFIED CONCEPTS USED FOR DESCRIBING THE VERTICAL  
STRUCTURE OF TURBULENCE NEAR THE GROUND DO NOT APPLY  
TO HEIGHTS ABOVE 150 FT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /D0392

AD-645 724 20/14

HARRY DIAMOND LABS WASHINGTON D C  
A GUIDE FOR TURBULENT ATMOSPHERE PROPAGATION  
EXPERIMENTS, (U)

OCT 66 19P BRINKS, WALTER J. ;

REPT. NO. HDL-TM-66-16

PROJ: DA-1N222901A207 ,HDL-16100

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ATMOSPHERIC MOTION,  
\*PROPAGATION), DATA, WAVE TRANSMISSION,  
ELECTROMAGNETIC WAVES, TEST METHODS (U)

THE THEORETICAL WORK OF MAJOR IMPACT IN THE FIELD  
OF ELECTROMAGNETIC PROPAGATION THROUGH A TURBULENT  
MEDIUM HAS BEEN DONE BY V. I. TATARSKI AND HIS  
FOLLOWERS. EXPERIMENTAL RESEARCH IS NEEDED TO  
CLARIFY THE ROLE OF SOME OF THE QUANTITIES AND  
CONCEPTS CONTAINED THEREIN. THIS REPORT GIVES THE  
CRITERIA REQUIRED OF EXPERIMENTAL WORK IN ORDER THAT  
IT BE RELEVANT TO THE THEORY OF TATARSKI, AND THAT  
THE EXPERIMENTS BOTH COMPLEMENT THE THEORY AND FIND A  
LOGICAL BASIS IN IT. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-691 483 4/1  
LOWELL TECHNOLOGICAL INST RESEARCH FOUNDATION MASS  
INVESTIGATION OF THE TURBULENT STRUCTURE AND DRIFT  
MOTIONS IN THE IONOSPHERE. (U)  
DESCRIPTIVE NOTE: FINAL REPT., 1 FEB 66-31 JAN 67,  
APR 67 22P GORMAN, JAMES E. I  
BIBL, KLAUS IOLSON, KIRTLAND H. I  
REPT. NO. LTIRF-269/1P  
CONTRACT: AF 19(628)-9676  
PROJ: AF-7663  
TASK: 766304  
MONITOR: AFCRL 67-0188

UNCLASSIFIED REPORT

DESCRIPTORS: (\*IONOSPHERE, \*ATMOSPHERIC  
MOTION), (\*ATMOSPHERIC SOUNDING, IONOSPHERE),  
PULSE TRANSMITTERS, PULSE ANALYZERS, LOOP  
ANTENNAS, IONOSPHERIC DISTURBANCES, IONOSPHERIC  
PROPAGATION, PHASE MEASUREMENT, ATTENUATION,  
RADIO EQUIPMENT (U)

FOR TWO YEARS THE IONOSPHERIC DRIFT SYSTEM AT  
BILLERICA, MASSACHUSETTS, HAS BEEN IN FULL  
OPERATION, INCLUDING AMPLITUDE AND PHASE MEASUREMENTS  
OF PULSE SOUNDINGS AT 2.25 MHZ. A COMPLETE  
TECHNICAL DESCRIPTION OF THE SYSTEM IS GIVEN IN AD-  
649 030. DURING 1966 LOCKING OF THE PHASE  
REFERENCE TO ONE ANTENNA WAS IMPROVED. WE CHANGED  
TO RECORDING OF THE ABSOLUTE PHASE OF ONE ANTENNA AND  
THE RELATIVE PHASES OF THE REMAINING TWO. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-657 808 17/9 4/2  
NORTHEASTERN UNIV BOSTON MASS DEPT OF ELECTRICAL  
ENGINEERING  
SOME OBSERVATIONS PERTINENT TO THE THEORY OF RADAR  
SCATTERING BY CLOUDS. (U)  
MAY 66 SSP RAEMER, HAROLD R. I  
REPT. NO. SCIENTIFIC-1  
CONTRACT: AF 19(628)-4956  
PROJ: AF-6672, AF-8620  
TASK: 667201, 862004  
MONITOR: AFRL 64-900

UNCLASSIFIED REPORT

DESCRIPTORS: (\*RADAR SIGNALS, SCATTERING),  
(\*METEOROLOGICAL RADAR, \*CLOUDS), THEORY,  
ELECTROMAGNETISM, METEOROLOGY, PROBABILITY (U)

VARIOUS ASPECTS OF THE THEORY OF RADAR SCATTERING  
BY CLOUDS ARE DELINEATED. IT IS DEMONSTRATED THAT  
VARIOUS WAYS OF VIEWING SINGLE SCATTERING BY PARTICLE  
AGGREGATES (I.E. SUMMATION, SIEGERT-GOLDSTEIN,  
TURBULENT SCATTER) ARE IN FACT THEORETICALLY  
EQUIVALENT. OTHER TOPICS DISCUSSED ARE: EFFECTS  
OF RECEIVER BANDWIDTH, SOME POINTS ABOUT THE  
STATISTICS OF PARTICLE SCATTERING, AND A THEORY  
ADVANCED BY D. ATLAS TO EXPLAIN DISCREPANCIES OF  
8-10 DB BETWEEN THEORETICAL AND OBSERVED CLOUD ECHO  
INTENSITIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-699 907 4/1

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
EFFECT OF SYNOPTIC FRONTS ON THE QUALITY OF  
IMAGES, (U)

APR 67 18P KUCHEROV, N. I. ;  
REPT. NO. FTD-MT-66-604  
MONITOR: TT 67-63124

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF MONO.  
VLIYANIE SINOPTICHESKIKH FRONTOV NA KACHESTVO  
IZOBRAZHENII, MOSCOW, 1969 P49-59.

DESCRIPTORS: (\*ATMOSPHERICS, \*ATMOSPHERIC  
MOTION), ASTRONOMICAL OBSERVATORIES, ATMOSPHERIC  
REFRACTION, REFRACTIVE INDEX, OPTICS, WEATHER,  
TEMPERATURE, STABILITY, USSR (U)

A COMPARISON OF OPTICAL INSTABILITY OF THE  
ATMOSPHERE (BY MEANS OF THE TURBULENCE ANGLE) AND  
THE MEAN SQUARE AMPLITUDE OF LIGHT TREMOR OF A STAR  
SHOWS A CONSIDERABLE DIFFERENCE FOR DIFFERENT  
OBSERVATORIES. IT IS SUGGESTED THAT THE VARIATION  
IS DUE TO WEATHER FRONTS. OBSERVATIONS SHOW THAT  
THE IMAGE IS GOOD (I.E., THE ANGLE OF TURBULENCE IS  
SMALL AND STABLE) WHEN FRONTAL ACTIVITY IS ABSENT;  
THE IMAGE WORSENS WHEN A FRONTAL ZONE APPROACHES; AND  
THE IMAGE IMPROVES AS THE FRONTAL ZONE RECEDES.  
OBSERVATIONS WERE MADE AT CHAPAL, KRASNYYE  
GOR, AND PRIVETNOYE DURING 1961-62, AND 79% OF  
THE OBSERVATIONS ATTEST TO THE ABOVE-STATED  
RELATIONSHIP. OF THE REMAINING 21%, 15% SHOW A  
GOOD IMAGE DESPITE THE PRESENCE OF A FRONT OR A POOR  
IMAGE THOUGH NO FRONT APPEARED TO BE PRESENT; 10%  
WERE DOUBTFUL EXAMPLES BECAUSE OF UNCERTAIN SYNOPTIC  
ANALYSIS. IT IS POINTED OUT THAT THE SYNOPTIC  
FRONTS WERE CHIEFLY COLD FRONTS. TURBULENT  
MOVEMENTS NEAR THE SURFACE OF A WARM FRONT ARE LESS  
WELL DEFINED THAN IN THE ZONE OF A COLD FRONT BECAUSE  
OF THE VERY SMALL SLOPE OF WARM FRONTS AND OF SMALLER  
HORIZONTAL TEMPERATURE GRADIENTS. THE AUTHOR  
BELIEVES THAT THE STATISTICALLY DEMONSTRATED  
RELATIONSHIP SHEDS LIGHT ON MANY PROPERTIES OF  
ASTROCLIMATE, AND HE SUGGESTS THAT IT OFFERS SOME  
PROMISE FOR LOCATING FUTURE ASTRONOMICAL  
OBSERVATORIES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00352

AD-665 371 4/1

BALLISTIC RESEARCH LABS ABERDEEN PROVING GROUND MD  
MEASUREMENT OF THE REFRACTIVE INDEX STRUCTURE  
COEFFICIENT CN. (U)

DESCRIPTIVE NOTE: MEMORANDUM REPT.,

DEC 67 24P WRIGHT, NEAL J. ;

SCHUTZ, RONALD J. ;

REPT. NO. BRL-MR-1885

PROJ: RDT/E-1T014501A21C

UNCLASSIFIED REPORT

DESCRIPTORS: (•CLEAR AIR TURBULENCE, OPTICAL  
PROPERTIES), (•OPTICAL PROPERTIES, REFRACTIVE  
INDEX), ATMOSPHERIC REFRACTION, TEMPERATURE,  
MONOCHROMATIC LIGHT, LASERS, GUIDED MISSILES.  
GUIDANCE, COMMUNICATION SYSTEMS (U)

IDENTIFIERS: REFRACTIVE INDEX STRUCTURE  
COEFFICIENTS (U)

THE REFRACTIVE INDEX STRUCTURE COEFFICIENT, CN,  
IS AN IMPORTANT PARAMETER FOR OPTICAL PROPAGATION IN  
THE ATMOSPHERE. A THEORETICAL DISCUSSION OF  
STRUCTURE FUNCTIONS IS PRESENTED TO SHOW THE ORIGIN  
OF THE REFRACTIVE INDEX AND TEMPERATURE STRUCTURE  
FUNCTIONS. THE EQUIPMENT USED TO MEASURE  
FLUCTUATIONS IN THE ATMOSPHERE IS DISCUSSED, AND THE  
CALCULATION OF THE REFRACTIVE INDEX STRUCTURE  
COEFFICIENT FROM THESE THERMAL MEASUREMENTS IS SHOWN.  
THE DETAILS OF THE EXPERIMENTAL EVALUATION OF CN  
AND THE RESULTS OF CN CALCULATIONS ARE ALSO  
INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /D0352

AD-669 038 4/2 4/1  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
RADAR INVESTIGATION OF DYNAMIC PROCESSES IN THE  
ATMOSPHERE (RADIOLOKATSIONNOE ISSLEDOVANIE  
DINAMICHESKIKH PROTSESSOV V ATMOSFERE). (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
JAN 68 17P GORELIK, A. G. ;  
MELNICHUK, YU. V. ;  
REPT. NO. T-R-667  
CONTRACT: AF 19(628)-3880

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF VSESOUZNOE NAUCHNOE  
METEOROLOGICHESKOE SOVESHCHANIE. TRUDY (USSR), V5  
P318-25 1963, BY GEORGE E. BRADY, JR.

DESCRIPTORS: (•METEOROLOGICAL RADAR, USSR),  
ATMOSPHERE, MICROMETEOROLOGY, CLOUDS,  
ATMOSPHERIC PRECIPITATION, RADAR REFLECTIONS,  
SCATTERING, INTENSITY, WIND, STATISTICAL  
FUNCTIONS, VELOCITY, ATMOSPHERIC MOTION, RADIO  
WAVES, INTERACTIONS, TURBULENCE (U)  
IDENTIFIERS: TRANSLATIONS (U)

THE RADAR METHODS EMPLOYED AT PRESENT FOR  
METEOROLOGICAL PURPOSES ARE BASED ON THE RELATION  
BETWEEN THE MEAN POWER OF THE REFLECTED SIGNAL AND  
THE MICROSTRUCTURE OF THE REFLECTING OBJECT. THESE  
METHODS HAVE BEEN QUITE FRUITFUL FOR REMOTE  
MEASUREMENT OF PRECIPITATION INTENSITY AS WELL AS FOR  
SOLVING PROBLEMS RELATED TO THE STRUCTURE OF  
PRECIPITATION ETC. HOWEVER, RADAR METHODS CAN BE  
VERY USEFUL NOT ONLY FOR STUDYING THE MICROSTRUCTURE  
OF CLOUDS AND PRECIPITATION, BUT ALSO FOR  
INVESTIGATING THE DYNAMIC PROCESSES OCCURRING IN THE  
FREE ATMOSPHERE. THE PRESENT PAPER IS DEVOTED TO  
THE DEVELOPMENT OF METHODS WHICH PERMIT THE  
STATISTICAL CHARACTERISTICS OF THE REFLECTED SIGNAL  
TO BE RELATED TO PARAMETERS THAT CHARACTERIZE THE  
DYNAMIC STATE OF THE ATMOSPHERE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /00392

AD-669 180 4/2

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
RADAR CHARACTERISTICS OF CLOUDS AS A FUNCTION OF  
THEIR EDDY AND ELECTRIC STATE (SVYAZ  
RADIOLOKATSIONNYKH KHKAKTERISTIK OBLAKOV S IKH  
TURBULENTNYH I ELEKTRICHESKIM SOSTOYANIEM), (U)

OCT 69 12P GASHINA, S. B. I  
IMYANITOV, I. M. IKAMALDINA, I. I. ISALMAN, E.  
M. ICHUBARINA, E. V. I

REPT. NO. T-R-528

CONTRACT: AF 19(628)-2880

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF GLAVNAYA GEOFIZICHESKAYA  
OBSERVATORIYA, LENINGRAD. TRUDY (USSR) N173 P58-62  
1965, BY STUART W. KELLOGG.

DESCRIPTORS: (\*CLOUDS, USSR), METEOROLOGICAL  
RADAR, ELECTRIC FIELDS, TURBULENCE,  
REFLECTIVITY, CHARGED PARTICLES, RADAR  
REFLECTIONS, INTENSITY, THUNDERSTORMS,  
CONVECTION(ATMOSPHERIC), ELECTRICAL  
PROPERTIES, AIRCRAFT, DAMAGE (U)

IDENTIFIERS: TRANSLATIONS (U)

THE RADAR REFLECTIVITY IS EXAMINED IN RELATION TO  
THE TURBULENT AND ELECTRIC STATE OF VARIOUS TYPES OF  
CLOUDS. THE MEAN STATISTICAL DATA ARE ANALYZED.  
IT IS SHOWN THAT THE MAGNITUDE OF THE REFLECTIVITY  
OF CONVECTIVE CLOUDS CAN BE USED AS AN INDIRECT  
CRITERION OF THE DEGREE OF TURBULENCE AND THE  
THUNDERSTORM DANGER OF THE CLOUD. (AUTHOR) (U)



REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN SECTION IV BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY. THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

AD NUMBER

254 827  
256 867  
261 713  
263 384  
265 317  
266 154  
276 116  
413 058  
432 066  
433 632  
433 911  
435 006  
621 586  
629 008  
630 553  
631 967  
634 886  
635 030  
635 317  
636 325  
641 837  
643 554  
648 723  
649 779  
649 876  
666 800  
668 080  
819 533

V. PLANETARY BOUNDARY LAYER  
TURBULENCE: GENERAL STUDIES

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-275 337

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
THE STATIONARY DISTRIBUTION OF WIND, TEMPERATURE AND  
TURBULENT EXCHANGE IN THE BOUNDARY LAYER OF THE  
ATMOSPHERE UNDER VARIOUS STABILITY CONDITIONS (U)

DEC 61 IV TSEITIN, G.KH.; ORLENKO, L.R.  
REPT. NO. T R 387  
CONTRACT: AF19 604 6112

UNCLASSIFIED REPORT

DESCRIPTORS: \*ATMOSPHERE, \*STABILITY, \*TURBULENT  
BOUNDARY LAYER, BOUNDARY LAYER, ENERGY, EQUATIONS,  
TEMPERATURE, TURBULENCE, VELOCITY, WIND (U)

A METHOD IS GIVEN FOR SOLVING THE PROBLEM OF THE  
STATIONARY STRUCTURE OF THE BOUNDARY LAYER OF THE  
ATMOSPHERE AS A FUNCTION OF THE STATE OF THERMAL  
STABILITY IN ITS SURFACE LAYER. FORMULAS ARE  
OBTAINED TO DETERMINE THE VERTICAL PROFILES OF  
TEMPERATURE, WIND VELOCITY, AND THE COEFFICIENT OF  
TURBULENT DIFFUSION THROUGHOUT THE BOUNDARY LAYER, A  
DETERMINATION ACCORDING TO THE TEMPERATURE GRADIENT  
AND THE GEOSTROPHIC WIND VELOCITY AT THE UPPER LIMITS  
OF THE BOUNDARY LAYER AND ACCORDING TO THE KNOWN  
ROUGHNESS OF THE UNDERLYING SURFACE.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-278 428

BROOKHAVEN NATIONAL LAB UPTON N Y

A STUDY OF THE WIND PROFILE IN THE LOWEST 400 FEET OF  
THE ATMOSPHERE (U)

MAR 62

1V

SINGER, IRVING A. INAGLE, CONSTANCE M. I

REPT. NO. 718 T 294

UNCLASSIFIED REPORT

DESCRIPTORS: CLOUDS, GUSTS, MEASUREMENT, STATISTICAL  
ANALYSIS, TEMPERATURE, TIME (U)

A DETAILED STUDY OF THE PREDICTABILITY OF THE SCALAR HORIZONTAL WIND SPEED AT AN UPPER ELEVATION FROM WIND DATA OBTAINED AT LOWER REFERENCE HEIGHTS OVER VARYING AVERAGING LENGTHS IS SUMMARIZED. TO STUDY THIS PREDICTABILITY, SEVERAL MATHEMATICAL MODELS WERE DEVELOPED. THE FIRST, OR 'SIMPLE' MODEL WAS ACHIEVED BY MULTIPLYING THE REFERENCE SPEED BY A CONSTANT TO OBTAIN THE CORRESPONDING AVERAGE AT THE HIGHER ELEVATION. THIS FORM WAS SUGGESTED BY THE POWER LAW DESCRIBING THE VARIATION OF THE MEAN WIND SPEED WITH HEIGHT. THE SIMPLE MODEL, WHICH EMPLOYS SPECTRAL AND CROSS-SPECTRAL COMPUTATION, WAS USED TO EVALUATE THE MEAN SQUARE ERROR OVER VARIOUS AVERAGING LENGTHS. THE SECOND OR 'MEAN' MODEL HAS THE SAME GENERAL FORM AS THE FIRST, BUT THE MEAN VALUE OF THE WIND SPEED AT ALL LEVELS IS SUBTRACTED FROM THE ACTUAL WIND SPEED PRIOR TO COMPUTATION OF THE MEAN SQUARE ERROR. THE FINAL MODEL PRODUCES THE BEST POSSIBLE PREDICTOR USING LINEAR METHODS. THIS 'BEST POSSIBLE' MODEL, ALTHOUGH NOT APPLICABLE UNDER ACTUAL CONDITIONS, PROVIDES A BENCHMARK WITH WHICH THE MEAN SQUARE ERRORS FROM OTHER LINEAR MODELS CAN BE COMPARED. SUCH COMPARISON CLEARLY INDICATES THAT THE MEAN MODEL IS AN EXCELLENT APPROXIMATION TO THE BEST POSSIBLE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /E0392

AD-283 922

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
AN OPERATIONAL METHOD OF CALCULATING THE WIND PROFILE  
IN THE BOUNDARY LAYER (U)

DEC 61    IV

REPT. NO.    T R 281

CONTRACT:    AF19 604 6112

UNCLASSIFIED REPORT

DESCRIPTORS:    \*ATMOSPHERE, \*WIND, BAROMETRIC PRESSURE,  
BOUNDARY LAYER (U)

DURING THE STATIONARY STATE THE VELOCITY AND DIRECTION OF THE WIND AT ALL HEIGHTS ARE DETERMINED BY THE PRESSURE GRADIENT, BY THE FORCE OF TURBULENT FRICTION, AND BY THE DEVIATING FORCE OF THE EARTH'S ROTATION. USING THE DEPENDENCE OF TURBULENT FRICTION ON TEMPERATURE STRATIFICATION, THE WIND VELOCITY AND SURFACE ROUGHNESS WERE DETERMINED FROM THE SOLUTION OF THE DYNAMIC EQUATIONS OF THE VALUES OF THE WIND VECTOR AT DIFFERENT HEIGHTS. IT IS NATURAL THAT THE WIND PROFILE DEPENDS ON THERMAL STRATIFICATION, THE VALUE OF THE GRADIENT WIND WHICH IS PROPORTIONAL TO THE HORIZONTAL GRADIENT OF PRESSURE AND ROUGHNESS. A TABLE IS GIVEN TO CALCULATE THE PROFILE OF WIND VELOCITY ACCORDING TO DATA ON THE WIND AT ONE LEVEL OR ON THE BASIS OF THE VALUE OF THE GRADIENT WIND. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-289 766

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
THE STATEMENT OF THE PROBLEM OF THE STATIONARY  
STRUCTURE OF THE BOUNDARY LAYER OF THE ATMOSPHERE (U)

NOV 61 IV LAIKHTMAN, D.L.I

REPT. NO. T R 378

CONTRACT: AF19 604 6113

UNCLASSIFIED REPORT

DESCRIPTORS: •ATMOSPHERE, •TURBULENCE, HEAT TRANSFER,  
HUMIDITY, MATHEMATICAL ANALYSIS, TEMPERATURE,  
WIND (U)

THE OVERALL PROBLEM OF THE DISTRIBUTION OF WIND,  
TEMPERATURE, HUMIDITY AND OF THE TURBULENCE  
COEFFICIENT IN THE BOUNDARY LAYER OF THE ATMOSPHERE  
UNDER STATIONARY CONDITIONS IS MATHEMATICALLY  
FORMULATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /E0392

AD-413 098

STOCKHOLM UNIV (SWEDEN) INTERNATIONAL METEOROLOGICAL  
INST

RESEARCH IN NUMERICAL ANALYSIS AND  
FORECASTING.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT., (FINAL).

MAY 63    22P

CONTRACT: AF61 092 346

MONITOR: AFCRL    63 826

UNCLASSIFIED REPORT

DESCRIPTORS: (•WEATHER FORECASTING, NUMERICAL  
ANALYSIS), (•ATMOSPHERIC MOTION, SHEAR  
STRESSES), (•WIND, FRICTION), TROPOSPHERE,  
WEATHER STATIONS, DATA, METEOROLOGICAL CHARTS,  
ANALYSIS, ERRORS, SURFACE TEMPERATURE,  
BAROMETRIC PRESSURE, DRAG, VISCOSITY, HEATING,  
ATMOSPHERIC TIDES, GAS FLOW, AIR.  
IDENTIFIERS: 1962, SWEDEN, GRAPHS.

(U)

(U)

OBSERVATIONAL DATA HAVE BEEN USED IN STUDIES OF  
FRICTION AND FRICTIONAL DISSIPATION IN THE  
ATMOSPHERE. DATA FROM AEROLOGICAL STATIONS IN  
SOUTHERN U.S. DURING SUITABLE WEATHER CONDITIONS  
WERE USED FOR VERTICAL INTEGRATION IN THE EQUATIONS  
OF MOTION IN ORDER TO DETERMINE STRESSES IN THE  
LOWEST TWO KILOMETERS OF THE ATMOSPHERE. DATA FROM  
THE DENSE RADIO-WIND NETWORK OVER THE BRITISH  
ISLES WERE USED IN ORDER TO STUDY THE FRICTIONAL  
DISSIPATION WITHIN A LIMITED AREA AND TO DETERMINE  
CHARACTERISTIC VALUES FOR THE CROSS ISOBARIC ANGLE,  
FOR THE RATIO OF THE WIND AT ANEOMETER LEVEL AND  
GEOSTROPHIC SURFACE WIND, FOR THE GEOSTROPHIC DRAG  
COEFFICIENT AND FOR THE EDDY VISCOSITY IN THEIR  
DEPENDENCE OF SURFACE ROUGHNESS. ON THE ASSUMPTION  
THAT ZONAL AVERAGES OF THIRD ORDER PERTURBATION  
QUANTITIES CAN BE NEGLECTED, IT IS SHOWN THAT ONE CAN  
DERIVE A COMPLETE SET OF EQUATIONS FOR PREDICTION IN  
BAROTROPIC FLOW. IT IS SHOWN THAT A CONSIDERABLE  
SIMPLIFICATION CAN BE OBTAINED IF ONE CONSIDERS A  
QUASI LINEARIZED SYSTEM, WHICH WITH REGARD TO THE  
STATISTICAL QUANTITIES IS EQUIVALENT TO THE FIRST  
SYSTEM. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /EO392

AD-410 903

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

AN ANALYSIS OF SOME WIND PROFILES IN THE ATMOS  
PHERIC FRICTION LAYER, (U)

AUG 63 17P TAYLOR, R.J.I

PROJ: 7695

MONITOR: AFCL 63 861

UNCLASSIFIED REPORT

DESCRIPTORS: (WIND, STATISTICAL ANALYSIS),  
TURBULENT BOUNDARY LAYER, ATMOSPHERIC MOTION. (U)

IDENTIFIERS: FRICTION LAYER, GEOSTROPHIC WIND,  
THERMAL WIND. (U)

IN THE LAYER OF ATMOSPHERE BETWEEN THE SURFACE AND  
A LEVEL WHERE THE WIND IS CLOSE TO THE GEO STROPHIC  
(THE 'FRICTION LAYER'), THE ASSUMPTION IS  
COMMONLY MADE THAT THE SHEARING STRESS AND VELOCITY  
GRADIENT ARE PARALLEL. THEORETICAL REA SONS ARE  
ADVANCED TO INDICATE THAT THIS ASSUMP TION IS  
PROBABLY NOT VALID AND SOME ANALYSES OF OBSERVED WIND  
PROFILES MADE ON THIS ASSUMPTION ARE SHOWN TO YIELD  
UNREALISTIC RESULTS. ALTHOUGH THE ANALYSES ARE OPEN  
TO SOME CRITICISM ON THE BASIS OF INSTRUMENTAL  
INACCURACY AND LACK OF HORIZONTAL UNIFORMITY OF THE  
OBSERVING SITE, THE GENERAL CONCLUSION IS REACHED  
THAT PARAL LELISM OF STRESS AND VELOCITY GRADIENT  
CANNOT, IN OUR PRESENT STATE OF KNOWLEDGE, BE RELIED  
UPON. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-429 496

WISCONSIN UNIV MADISON  
STUDIES OF THE EFFECTS OF VARIATIONS IN BOUNDARY  
CONDITIONS ON THE ATMOSPHERIC BOUNDARY LAYER. (U)  
DESCRIPTIVE NOTE: ANNUAL REPT., 63,  
NOV 63 197P LETTAU, HEINZ H. ;  
DELAND, RAYMOND J. ; KEARNS, JOHN P. ;  
KUNG, ERNEST C. ; SLOTTA, LARRY S. ;  
CONTRACT: DA26 029AMC00878  
TASK: 1AO 110018021 08

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•CLIMATOLOGY, BOUNDARY LAYER),  
(•TEMPERATURE, MEASUREMENT), (•TURBULENT BOUNDARY  
LAYER, ANALYSIS), WIND, STRESSES, FLUID FLOW,  
CALIBRATION, DETECTORS, METEOROLOGY, ATMOSPHERE (U)  
IDENTIFIERS: 1962 (U)

TA FROM TWO CLASSICAL FLAT PLATE BOUNDARY LAYER  
EXPERIMENTS WERE USED TO DETERMINE VALUES OF  
KARMAN'S CONSTANT THROUGH THE APPROACH OF A  
LIMITING WALL CONDITION FOR AN EXPLICIT FUNCTION  
DESCRIBED BY FLOW STRUCTURE. THE CONSTANT WAS  
FOUND TO VARY WITH REYNOLDS NUMBERS. A  
THEORETICAL MODEL OF THE ATMOSPHERIC BOUNDARY LAYER  
WAS USED TO MAKE A SURVEY OF THE AERODYNAMIC  
ROUGHNESS OF NATURAL SURFACES OF THE NORTHERN  
HEMISPHERE AND TO COMPUTE THE DISTRIBUTION AND  
SEASONAL VARIATIONS OF GEOSTROPHIC DRAG COEFFICIENTS  
AND ENERGY DISSIPATION. TEMPERATURE SPECTRA WERE  
MEASURED OVER AN EXPERIMENTAL FIELD OF BUSHEL BASKETS  
SET ON THE ICE SURFACE OF LAKE MENDOTA, AND ALSO  
OVER THE NATURAL ICE SURFACE. COMPARISON OF THE  
SPECTRA SHOWED THE EFFECTS OF TURBULENCE GENERATED BY  
THE FIELD AS A WHOLE AND BY THE SPACING OF THE  
BASKETS. THE EXPERIMENTAL FIELD OF BUSHEL BASKETS  
AND A SMALL ARTIFICIAL FOREST WERE USED IN STUDIES OF  
WIND PROFILE MODIFICATION. DETERMINATIONS WERE  
MADE OF THE EFFECT OF OBSTACLE ALBEDO AND SOLAR  
HEATING ON MOMENTUM TRANSFER AND OF THE MOMENTUM  
BUDGET OVER THE ARTIFICIAL FOREST. CHARACTERISTIC  
EQUATIONS OF KATABATIC FLOW FOR HEIGHT-DEPENDENT EDDY  
DIFFUSIVITY WERE DERIVED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-46: 108

LIBRARY OF CONGRESS WASHINGTON D C AEROSPACE TECHNOLOGY  
DIV

SOVIET MICROMETEOROLOGY (BOUNDARY LAYER, TURBULENCE,  
AEROSOLS, AIR POLLUTION, STAGNANT WEATHER  
CONDITIONS). (U)

DESCRIPTIVE NOTE: COMPILATION OF ABSTRACTS ON SURVEYS OF  
SOVIET-BLOC SCIENTIFIC AND TECHNICAL LITERATURE.

APR 65 65P

REPT. NO. ATD-P-65-18

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*MICROMETEOROLOGY, ABSTRACTS), (\*USSR,  
MICROMETEOROLOGY), BOUNDARY LAYER, TURBULENCE,  
AEROSOLS, AIR POLLUTION, WEATHER FORECASTING, FOG,  
CLOUDS, INSTRUMENTATION, ATMOSPHERIC CONDENSATION,  
METEOROLOGICAL PARAMETERS, WIND, VELOCITY, ATMOSPHERIC  
TEMPERATURE (U)

IN THE EARLY STAGES OF PREPARING THIS REPORT, SOME  
OF THE ABSTRACTS WERE SELECTED AND TRANSLATED FROM  
REFERATIVNYY ZHURNAL. GEOFIZIKA (LIBRARY OF  
CONGRESS CALL NO. QC801.R44), AND COVERED  
ISSUES NOS. 10-12 OF 1963, AND 1, 2, AND 3 OF 1964.  
AFTER THIS PERIOD, ITEMS WERE SELECTED FROM CURRENT  
ORIGINAL SOURCES. FOR CONVENIENCE, THE DATA HAVE  
BEEN GROUPED UNDER FIVE PRINCIPAL SUBJECT HEADINGS:  
(1) GENERAL PAPERS DEALING WITH CONFERENCES,  
SCIENTIFIC ORGANIZATIONS, GENERAL MONOGRAPHS COVERING  
SEVERAL SUBJECTS, ETC.; (2) AEROSOLS - NATURAL  
AND ARTIFICIAL; (3) STAGNANT WEATHER CONDITIONS;  
(4) AIR POLLUTION; AND (5) BOUNDARY LAYER  
TURBULENCE. CERTAIN ARTICLES CONTAIN INFORMATION  
ON, OR APPLY TO MORE THAN ONE SUBJECT; FOR EXAMPLE,  
DATA ON AEROSOLS MAY BE INCLUDED IN ARTICLES ON  
'STAGNANT WEATHER CONDITIONS' OR ON 'TURBULENCE'.  
IN SUCH CASES, ITEMS HAVE BEEN ASSIGNED TO SUBJECTS  
MOST EMPHASIZED BY THE AUTHOR. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-611 101

PACIFIC MISSILE RANGE POINT MUGU CALIF  
TURBULENCE CRITERIA DERIVED FROM CONVENTIONAL  
ATMOSPHERIC MEASUREMENTS,

(U)

FEB 65 11F WOLF, M. A. ;

REPT. NO. PMR-TM-65-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ATMOSPHERIC MOTION, DETERMINATION),  
(•METEOROLOGY, ATMOSPHERIC MOTION), CORRELATION  
TECHNIQUES, MEASUREMENT, WIND, ATMOSPHERIC  
TEMPERATURE, KINETIC THEORY, STABILITY, TEXAS

(U)

MEASUREMENTS OF WIND SPEEDS AND TEMPERATURES FROM  
THE TELEVISION TOWER AT CEDAR HILL, TEXAS, ARE  
USED IN THE EVALUATION OF THREE CRITERIA OF  
TURBULENCE. EXPRESSIONS ARE DERIVED WHICH RELATE  
THESE CALCULATED VALUES TO AVERAGE TURBULENCE VALUES  
DETERMINED FROM MEASUREMENTS OF THE VERTICAL  
COMPONENT OF TURBULENCE AT FIVE LEVELS ON THE TOWER.  
THE CLOSEST CORRELATION BETWEEN TURBULENCE AND THE  
CALCULATED CRITERIA IS ACHIEVED WITH A NONDIMENSIONAL  
CRITERION WHICH IS INTRODUCED IN THE STUDY. IT IS  
SUGGESTED THAT THE EXPRESSION, RELATING TURBULENCE  
AND THE N CRITERION, WILL HAVE APPLICATION TO OTHER  
GEOGRAPHICAL AREAS, PROVIDED THAT LOCAL EFFECTS ARE  
REFLECTED IN THE KINETIC ENERGY GRADIENT TERM.  
EXTENSION OF THE N CRITERION TO CLEAR AIR  
TURBULENCE IS CONSIDERED FEASIBLE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /EO352

AD-611 312

TEXAS A AND M UNIV COLLEGE STATION DEPT OF OCEANOGRAPHY  
AND METEOROLOGY

MESOSCALE CIRCULATION OF THE ATMOSPHERIC BOUNDARY  
LAYER. PART I. (U)

DESCRIPTIVE NOTE: FINAL REPT., PT. I,

JAN 65 129P

BRUNDIDGE, KENNETH C. ;

BENIURA, HIDEO ;

CONTRACT: AF19 604 7455

PROJ: 7655 ,270

TASK: 765501

MONITOR: AFCRL , 65-63 P1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: MASTERS' THESES.

DESCRIPTORS: (\*AIR MASS ANALYSIS, MICROMETEOROLOGY),  
(\*ATMOSPHERIC MOTION, AIR MASS ANALYSIS),  
(\*MICROMETEOROLOGY, AIR MASS ANALYSIS), FLUID FLOW,  
ATMOSPHERE, BOUNDARY LAYER, MEASUREMENT,  
METEOROLOGICAL INSTRUMENTS, TOWERS, TEXAS,  
METEOROLOGICAL PARAMETERS (U)

RESULTS ARE GIVEN OF RESEARCH CONDUCTED IN THREE  
MAJOR AREAS: (1) THE TEMPERATURE AND WIND  
STRUCTURE OF COLD FRONTS. (2) DETERMINATION OF  
THE EDDY HEAT COEFFICIENT UNDER FAIR-WEATHER  
CONDITIONS, AND (3) THE DETERMINATION OF THE EDDY  
HEAT COEFFICIENT IN FRONTAL ZONES. THE  
INVESTIGATIONS WERE BASED UPON DATA COLLECTED ON THE  
1420-FT. KRLD-WFAA TRANSMITTER TOWER AT CEDAR  
HILL, TEXAS. THIS VOLUME PERTAINS ONLY TO THE  
FIRST AREA. THIS SECTION DEALS SPECIFICALLY WITH  
THE STRUCTURE OF COLD FRONTS. BY MAKING SUITABLE  
ASSUMPTIONS IT WAS POSSIBLE TO DETERMINE THE MOTION  
OF THE AIR RELATIVE TO THE THERMAL FIELDS OF THE  
FRONTS. THE RESULTS INDICATED CONSIDERABLE CROSS-  
ISENTROPIC MOTION. IN TURN, THESE RESULTS IMPLIED,  
AS EXTREME POSSIBILITIES, THAT EITHER THE TEMPERATURE  
STRUCTURE OF THE FRONTS WAS UNDERGOING RADICAL CHANGE  
AS A RESULT OF THE PARTICLES FOLLOWING AN ADIABATIC  
PROCESS OR, THE TEMPERATURE STRUCTURE WAS  
CONSERVATIVE AND THE PARTICLES WERE UNDERGOING  
NONADIABATIC PROCESSES. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /E0352

AD-612 121

ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY FORT  
HUACHUCA ARIZ

NUMERICAL SOLUTION OF THE DISTRIBUTION OF WIND AND  
TURBULENCE IN THE PLANETARY BOUNDARY LAYER. (U)

62    16P    APPLEBY, J. F. JOHNSTEDE, W. D. 1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ALSO INCLUDED IN PROCEEDINGS OF THE  
1964 ARMY SCIENCE CONFERENCE, UNITED STATES  
MILITARY ACADEMY, WEST POINT, N. Y. 17-19 JUN  
1964, VOLUME 1, AD-611 432.

DESCRIPTORS: (•WIND, BOUNDARY LAYER), (•TURBULENCE,  
AIR MASS ANALYSIS), (•AIR MASS ANALYSIS, BOUNDARY  
LAYER), ATMOSPHERE MODELS, MATHEMATICAL MODELS,  
MICROMETEOROLOGY (U)

METEOROLOGY IS SUBDIVIDED ACCORDING TO THE SCALES  
OF MICROMETEOROLOGY, MESOMETEOROLOGY AND  
MACROMETEOROLOGY. THIS DIVISION APPEARS REAL SINCE  
RESEARCH INTERESTS AND SUCCESSES HAVE BEEN WIDELY  
SEPARATED. IF MESO-SCALE PHENOMENA ARE REGARDED AS  
PERTURBATIONS WITHIN THE MACROSCALE, TWO ELEMENTS CAN  
BE SELECTED TO CHARACTERIZE THE DIVISIONS. THESE  
WOULD BE THE LOGARITHMIC WIND PROFILE TO CHARACTERIZE  
MICROMETEOROLOGY AND THE GEOSTROPHIC WIND TO  
CHARACTERIZE THE OTHERS. THE PURPOSE OF THIS  
REPORT IS TO PRESENT A HYPOTHESIS WHICH UNIFIES THESE  
TWO CONCEPTS. THE MODEL RESULTING FROM THE  
HYPOTHESIS IS SOLVED AND THE RESULTS ARE PRESENTED IN  
A FORM USABLE FOR MANY SITUATIONS WHERE IT IS  
NECESSARY TO PREDICT THE VERTICAL DISTRIBUTION OF THE  
WIND AND TURBULENCE CHARACTERISTICS WITHIN THE  
PLANETARY BOUNDARY LAYER. THE TREATMENT WILL BE  
LIMITED TO THE BAROTROPIC, ADIABATIC, STEADY STATE  
CASE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-622 899

PENNSYLVANIA STATE UNIV UNIVERSITY PARK DEPT OF  
METEOROLOGY

FLUX OF HEAT AND MOMENTUM IN THE PLANETARY BOUNDARY  
LAYER OF THE ATMOSPHERE. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 APR-30 JUN 65,

JUL 65 196P BLACKADAR, ALFRED K. ;

PANOFSKY, HANS A. IBERMAN, STEPHEN ICHING, JASON  
K. S. ; HESS, G. DALE ;

CONTRACT: AF19 604 6641

PROJ: 8604

TASK: 860401

MONITOR: AFRL , 65-521

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ATMOSPHERIC MOTION, BOUNDARY  
LAYER), (\*BOUNDARY LAYER, ATMOSPHERIC MOTION),  
WIND, HEAT TRANSFER, MOMENTUM, ENERGY,  
ATMOSPHERIC TEMPERATURE, METEOROLOGICAL PARAMETERS (U)

A SINGLE-LAYER THEORY IS PRESENTED FOR THE WIND  
DISTRIBUTION IN BAROCLINIC NEUTRAL AND UNSTABLE  
BOUNDARY LAYERS. THE THEORY PREDICTS THE STRESS OF  
THE WIND ON THE GROUND FROM LARGE SCALE GEOPHYSICAL  
PARAMETERS. A RE-ANALYSIS OF OBSERVATIONS MADE BY  
SWINBANK CONFIRMS THE VALIDITY OF THE KEYPS WIND  
PROFILE THEORY. THE EFFECTS OF A CHANGE OF  
ROUGHNESS ON THE WIND PROFILE HAVE BEEN EXTENDED TO  
ADIABATIC SURFACE LAYERS. ALSO A STUDY OF THE  
TURBULENT ENERGY BUDGET SHOWED SIGNIFICANT  
DIFFERENCES BETWEEN THE RATE OF PRODUCTION AND RATE  
OF DISSIPATION IN THE VICINITY OF A LARGE CHANGE OF  
TERRAIN ROUGHNESS. A GRAPHICAL PROCEDURE FOR  
ESTIMATING THE SPECTRUM OF THE LONGITUDINAL WIND  
COMPONENT FROM THE HEIGHT, MEAN WIND SPEED, SURFACE  
ROUGHNESS, AND STABILITY HAS BEEN DEVELOPED FROM  
OBSERVED SPECTRA AT MANY LOCATIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-627 901 4/2  
COLORADO STATE UNIV FORT COLLINS FLUID DYNAMICS AND  
DIFFUSION LAB  
MEASUREMENTS IN A THERMAL BOUNDARY LAYER. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
SEP 69 36P SANDBORN, V. A. ; LIU, C. Y. ;  
TAO, M. C. ;  
CONTRACT: DA-AMC-28-042-64-G9

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•TURBULENT BOUNDARY LAYER, WIND  
TUNNELS), (•ATMOSPHERIC TEMPERATURE,  
MEASUREMENT), (•ATMOSPHERIC MOTION,  
MEASUREMENT), PARTIAL DIFFERENTIAL EQUATIONS,  
MICROMETEOROLOGY, FLAT PLATE MODELS, VELOCITY,  
DENSITY (U)

A PROBLEM ENCOUNTERED IN THE FLOW OF ATMOSPHERIC  
WINDS OVER THE EARTH SURFACE IS THAT OF COLD AIR OVER  
A WARM BOUNDARY. THE STUDY IS A PART OF A LONG  
RANGE PROGRAM DIRECTED TOWARD UNDERSTANDING SUCH  
FLOWS. AN EXPLORATORY SET OF MEASUREMENTS IN THE  
BOUNDARY LAYER OVER A HEATED, SMOOTH, FLAT PLATE ARE  
REPORTED. THE BOUNDARY WALL WAS MAINTAINED AT  
APPROXIMATELY 85F AND THE FREE STREAM AIR  
TEMPERATURE WAS APPROXIMATELY 40F. THE FREE STREAM  
VELOCITY WAS 20 FEET PER SECOND. MEASUREMENTS OF  
THE MEAN TEMPERATURE, DENSITY AND VELOCITY  
DISTRIBUTIONS ARE GIVEN IN BOTH TABULAR AND GRAPHIC  
DATA. DATA ON THE FLUCTUATING TEMPERATURE,  
LONGITUDINAL VELOCITY AND VELOCITY TEMPERATURE  
CORRELATION ARE ALSO PRESENTED. THE DATA WERE  
TAKEN AS AN EXPLORATORY STUDY TO FIRST DETERMINE THE  
MAGNITUDE OF THE MEAN AND TURBULENT TERMS IN THE  
BOUNDARY LAYER. SECONDLY, THE PRESENT EXPERIMENT  
INDICATED THE PROBLEMS TO BE OVERCOME IN MEASURING  
THE THERMAL BOUNDARY LAYER. THE REPORT IS INTENDED  
AS A DATA REPORT ON THE MEASUREMENTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-622 902 4/2  
COLORADO STATE UNIV FORT COLLINS FLUID DYNAMICS AND  
DIFFUSION LAB  
A THREE-DIMENSIONAL SINGLE ROUGHNESS ELEMENT IN A  
TURBULENT BOUNDARY LAYER, (U)  
SEP 68 21P TIELEMAN, H. W. ; SANDBORN, V.  
A. I  
CONTRACT: DA-AMC-28-047-64-G9

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TURBULENT BOUNDARY LAYER,  
ROUGHNESS), (\*ATMOSPHERIC MOTION, ROUGHNESS),  
FLAT PLATE MODELS, MICROMETEOROLOGY, PRESSURE,  
VELOCITY, SPHERES, BUILDINGS, THREE-  
DIMENSIONAL FLOW, WIND TUNNELS (U)

AN INVESTIGATION OF THE INFLUENCE OF A SINGLE  
ROUGHNESS ELEMENT (SPHERE) IN A TURBULENT  
BOUNDARY LAYER OF A SMOOTH FLAT PLATE IS REPORTED.  
THE PRESSURE DISTRIBUTION AROUND THE SURFACE OF THE  
SPHERE WAS MEASURED. INTEGRATION OF THE PRESSURE  
DISTRIBUTION WAS USED TO COMPUTE THE DRAG AND LIFT  
FORCES ON THE ELEMENT. MEASUREMENTS OF THE MEAN  
AND TURBULENT VELOCITY DISTRIBUTIONS IN THE BOUNDARY-  
LAYER BEHIND THE SPHERE WERE MADE. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-625 599 1/2 1/2  
SYSTEMS TECHNOLOGY INC HAWTHORNE CALIF  
AN ANALYTICAL STUDY OF V/STOL HANDLING QUALITIES IN  
HOVER AND TRANSITION. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
OCT 65 172P STAPLEFORD, R. L. IWOLKOVITCH, J.  
MAGDALENO, R. E. ISHORTWELL, C. P. IJOHNSON, W. A. I

REPT. NO. TR-140-1  
CONTRACT: AF33(615)-1200  
PROJ: AF-8219  
TASK: A21909  
MONITOR: AFFDL , TR-65-73

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (CONVERTIBLE PLANES, HANDLING),  
(SHORT TAKE-OFF PLANES, HANDLING), (VERTICAL  
TAKE-OFF PLANES, HANDLING), GUSTS, HOVERING,  
PILOTS, CONTROL, DAMPING, HELICOPTERS, TILT  
WINGS, GEOMETRIC FORMS (U)

THE HOVER ANALYSIS CONSIDERS PILOT ATTITUDE AND  
POSITION CONTROL TASKS IN THE PRESENCE OF HORIZONTAL  
GUSTS. THE EFFECTS OF EACH OF THE STABILITY  
DERIVATIVES ON THE DIFFICULTY OF THE CONTROL TASKS  
AND ON THE CLOSED-LOOP GUST RESPONSES ARE DETERMINED.  
IT IS CLEARLY SHOWN THAT THE HANDLING QUALITIES  
STUDIES OF CONTROL SENSITIVITY AND ANGULAR DAMPING  
MUST CONSIDER THE INFLUENCES OF  $M_{SUB} U$  (OR  $L_{SUB} V$ )  
AND SHOULD INCLUDE GUST INPUTS. THESE  
CONCLUSIONS ARE SUBSTANTIATED BY PREVIOUS VARIABLE-  
STABILITY-HELICOPTER EXPERIMENTS. THE EFFECTS OF  
VEHICLE SIZE AND GEOMETRY ARE INVESTIGATED BY SEVERAL  
APPROACHES. THE KEY RESULT OF INCREASING SIZE IS  
FOUND TO BE A REDUCTION IN  $M_{SUB} U$  AND  $L_{SUB} V$   
WHICH CAN, IN TURN, LOWER THE REQUIREMENTS FOR  
CONTROL POWER AND DAMPING. THE HANDLING QUALITIES  
DURING TRANSITION OF TWO VEHICLES, A TILT DUCT AND A  
TILT WING, WHICH WERE PREVIOUSLY TESTED ON A  
SIMULATOR ARE ANALYZED. IT IS SHOWN THAT BOTH TRIM  
CONTROL AND PERTURBATIONS ABOUT THE TRIM CONDITIONS  
MUST BE CONSIDERED. IN FACT, PART OF THE INCREASED  
DIFFICULTY IN LANDING TRANSITIONS, IN COMPARISON WITH  
TAKEOFF TRANSITIONS, IS DUE TO MORE DIFFICULT TRIM  
CONTROL; THE MUCH MORE STRINGENT POSITION CONTROL  
REQUIREMENTS IN LANDING ARE ALSO A CONTRIBUTING  
FACTOR. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-626 630 4/2  
WASHINGTON UNIV SEATTLE DEPT OF ATMOSPHERIC SCIENCES  
TRANSFORMATION OF THE ATMOSPHERIC BOUNDARY LAYER OVER  
INHOMOGENEOUS SURFACES, (U)  
OCT 69 74P MIYAKE, MIKIO I  
REPT. NO. SCIENTIFIC-6  
CONTRACT: NONR-477(24)  
PROJ: NR-207-292

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ATMOSPHERIC MOTION, TURBULENT  
BOUNDARY LAYER), (\*TURBULENT BOUNDARY LAYER,  
ATMOSPHERIC MOTION), WIND, BOUNDARY LAYER,  
THERMODYNAMICS, METEOROLOGY, ARCTIC OCEAN (U)

A SURVEY IS GIVEN OF PREVIOUS THEORETICAL  
INVESTIGATIONS OF THE DEVELOPMENT OF AN INTERNAL  
BOUNDARY LAYER IN TURBULENT FLOW OVER A SURFACE OF  
VARIABLE ROUGHNESS. ON THE BASIS OF MONIN AND  
KAZANSKI'S PLUME PROPAGATION CONCEPT, A NEW FORMULA  
IS DERIVED WHICH PREDICTS THE GROWTH OF THE INTERNAL  
BOUNDARY LAYER UNDER DIABATIC CONDITIONS. WIND AND  
TEMPERATURE PROFILES OBSERVED IN AIR FLOWING ACROSS  
AN ARTIFICIAL POND ON THE SURFACE OF A SHEET OF SEA  
ICE (NEAR POINT BARROW, ALASKA) ARE USED TO  
TEST THE NEW MODEL, AND IT IS FOUND TO GIVE AT LEAST  
A QUALITATIVE PREDICTION OF THE FEATURES OF THE  
INTERNAL BOUNDARY LAYER. THE DIRECTION IN WHICH  
FURTHER REFINEMENT OF THE THEORY SEEMS PROMISING IS  
INDICATED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /EO392

AD-641 960 4/2 16/1  
ATMOSPHERIC SCIENCES LAB WHITE SANDS MISSILE RANGE N  
MEX  
THE RICHARDSON NUMBER IN THE PLANETARY BOUNDARY  
LAYER, (U)  
MAY 66 JJP HANSEN, FRANK V. I  
TASK: 1V014901B52A-10  
MONITOR: ECOM 9093

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ATMOSPHERIC MOTION, \*GUIDED  
MISSILE RANGES), NUMERICAL METHODS AND PROCEDURES,  
WIND, BOUNDARY LAYER, ATMOSPHERIC TEMPERATURE,  
STABILITY, MICROMETEOROLOGY (U)

DETERMINATION OF THE STABILITY REGIME IS A BASIC  
APPROACH IN ANY INVESTIGATION OF ATMOSPHERIC  
TURBULENCE. THE ESTABLISHMENT OF STABILITY  
CRITERIA IN THE BOUNDARY LAYER IS USUALLY  
ACCOMPLISHED BY USE OF THE NONDIMENSIONAL  
RICHARDSON NUMBER. THE COMPUTATION OF ACCURATE  
RICHARDSON NUMBERS IS SHOWN TO BE ADVERSELY  
AFFECTED BY A NUMBER OF FACTORS INCLUDING THE CHOICE  
OF VERTICAL GRADIENTS, THE TERRAIN, SPACING OF  
INSTRUMENTS, AND HETEROGENEOUS PROFILES OF WIND AND  
TEMPERATURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-692 016 4/2 12/1  
ARMY ELECTRONICS COMMAND FORT HUACHUCA ARIZ RESEARCH  
DIV  
THE DISTRIBUTION OF EDDY VELOCITIES AND TEMPERATURE  
FLUCTUATIONS IN THE FIRST 100 METERS. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAY 67 67P PRIES, THOMAS M. I  
APPLEBY, JAMES F. I  
PROJ: DA-1V0-14901-892A  
TASK: 1V0-14901-892A-08  
MONITOR: ECOM 6027

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ATMOSPHERIC MOTION, \*STATISTICAL  
TESTS), WIND, SAMPLING, STABILITY,  
ATMOSPHERIC TEMPERATURE, TURBULENCE,  
PROBABILITY, EXPERIMENTAL DATA (U)

PRACTICAL PROBLEMS DEALING WITH ATMOSPHERIC  
TURBULENCE CAN BE SIMPLIFIED BY RELATING FLUCTUATION  
VALUES TO A GAUSSIAN DISTRIBUTION. THIS IS VERY  
USEFUL, SINCE IT SPECIFIES CHARACTERISTICS OF THE  
EDDY VELOCITY DISTRIBUTIONS. FRAGMENTARY STUDIES  
HAVE GIVEN SOME EVIDENCE TO SUPPORT THE GAUSSIAN  
HYPOTHESIS, BUT TO OUR KNOWLEDGE THIS IS THE FIRST  
ATTEMPT TO EXAMINE THE DISTRIBUTIONS OF THE  
FLUCTUATION COMPONENTS FOR A LARGE DATA SAMPLE (125  
ONE-HOUR RUNS). THE PURPOSE OF THE STUDY IS TO  
DETERMINE THE DEVIATIONS OF THE OBSERVED DISTRIBUTION  
FROM A NORMAL DISTRIBUTION AND TO ATTEMPT TO  
DETERMINE IF THESE DEPARTURES CAN BE RELATED TO  
ATMOSPHERIC STABILITY SURFACE ROUGHNESS, AND HEIGHT  
ABOVE THE SURFACE. IN ADDITION, EACH SAMPLE WAS  
TESTED TO DETERMINE THE PROBABILITY OF ITS COMING  
FROM A NORMAL DISTRIBUTION. RESULTS ARE IN GENERAL  
AGREEMENT WITH PREVIOUS INVESTIGATIONS. LOW  
FREQUENCY TRENDS OVER HOUR PERIODS TEND TO INCREASE  
THE DEPARTURES FROM A NORMAL DISTRIBUTION.  
TREATING THE PROBABILITY DISTRIBUTIONS OF THE WIND  
COMPONENTS AS BEING NORMALLY DISTRIBUTED APPEARS  
JUSTIFIED OVER MODERATE RANGES OF STABILITY (Z/L  
BETWEEN -.200 AND +.200). (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-661 022 4/1 20/4  
WEATHER BUREAU WASHINGTON D C  
THE PROBLEM OF DETERMINING THE EDDY VISCOSITY  
COEFFICIENT FOR THE BOUNDARY LAYER OF THE  
ATMOSPHERE,

(U)

JAN 61 10P TKACHENKO, A. V. :

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY ARMY ELECTRONIC  
PROVING GROUND, FORT HUACHUCA, ARIZ. TRANS. OF  
GLAVNAYA GEOFIZICHESKAYA OBSERVATORIIYA, LENINGRAD.  
TRUDY (USSR) N60(122) P92-9 1956.

DESCRIPTORS: (•ATMOSPHERIC MOTION, BOUNDARY  
LAYER), MATHEMATICAL ANALYSIS, WIND, EQUATIONS  
OF MOTION, VELOCITY, ACCURACY, TURBULENCE,  
USSR

(U)

D. L. LAIKHTMAN IN HIS WORK PRESENTED A NEW  
METHOD OF DETERMINING THE EDDY VISCOSITY COEFFICIENT,  
K, IN THE BOUNDARY LAYER OF THE ATMOSPHERE FROM  
OBSERVATIONS ON THE VERTICAL WIND PROFILE. AS M.  
P. CHURINOVA'S COMPARATIVE EXPERIMENTAL  
VERIFICATIONS OF THE VARIOUS METHODS USED IN  
DETERMINING K HAVE DEMONSTRATED, LAIKHTMAN'S METHOD  
IS THE SIMPLEST AND THE MOST ACCURATE. IT MUST BE  
NOTED, HOWEVER, THAT THE SCHEME OF THE CALCULATIONS  
USED BY CHURINOVA IS STILL FAIRLY COMPLEX AND VERY  
TIME-CONSUMING. THIS DISADVANTAGE CAN BE AVOIDED  
IF THE CALCULATIONS ARE MADE GRAPHICALLY BY MEANS OF  
A SPECIAL NOMOGRAM. IN CONNECTION WITH THIS, THE  
POSSIBLE METHODS OF DETERMINING GRAPHICALLY THE EDDY  
VISCOSITY COEFFICIENT FROM OBSERVATIONS ON VERTICAL  
WIND PROFILES ARE DISCUSSED IN THE PRESENT WORK.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AC-634 203 20/4 4/2 1/1  
FORT DETRICK FREDERICK MD  
CONCERNING SIMILARITY ANALYSIS BASED ON THE USE OF  
GOVERNING EQUATIONS AND BOUNDARY CONDITIONS AND  
LONG'S METHOD OF GENERALIZED DIMENSIONAL ANALYSIS. (U)  
DESCRIPTIVE NOTE: REVISED ED.,  
AUG 67 12P CALDER, KENNETH L. 1

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF  
ATMOSPHERIC SCIENCES V24 N6 P616-26 NOV 1967.  
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT RECEIVED 20  
MAR 67.

DESCRIPTORS: (\*ATMOSPHERIC MOTION, \*TURBULENT  
BOUNDARY LAYER), (\*LAMINAR FLOW, MATHEMATICAL  
ANALYSIS), PARTIAL DIFFERENTIAL EQUATIONS,  
BOUNDARY VALUE PROBLEMS, FLAT PLATE MODELS,  
LAMINAR BOUNDARY LAYER, NAVIER-STOKES EQUATIONS,  
HEAT TRANSFER, TEMPERATURE, VISCOSITY,  
CONDUCTION(HEAT TRANSFER),  
TRANSFORMATIONS(MATHEMATICS), JET MIXING FLOW,  
DISKS, PRANDTL NUMBER, WIND (U)  
IDENTIFIERS: DIMENSIONAL ANALYSIS (U)

LONG HAS ILLUSTRATED THE INCREASED POWER FOR FLUID  
MECHANICS OF A GENERALIZED TYPE OF DIMENSIONAL  
ANALYSIS BASED ON CONSIDERATION OF THE KNOWN  
MATHEMATICAL FORM OF THE GOVERNING EQUATIONS AND  
BOUNDARY CONDITIONS. IT IS SHOWN THAT LONG'S  
METHOD IS MATHEMATICALLY EQUIVALENT TO AN ANALYSIS OF  
THE TRANSFORMATIONAL PROPERTIES OF THE GOVERNING  
EQUATIONS AND BOUNDARY CONDITIONS UNDER A PARTICULAR  
CLASS OF SIMPLE LINEAR TRANSFORMATIONS OF THE  
VARIABLES OF THE PROBLEM, AND THAT SIMILARITY RESULTS  
OBTAINED BY HIS METHOD MAY ALSO BE DERIVED DIRECTLY  
BY A PURELY MATHEMATICAL TECHNIQUE THAT AVOIDS  
REFERENCE TO THE CONCEPTS OF DIMENSIONAL ANALYSIS AND  
THE BUCKINGHAM II-THEOREM. APPLICATION OF THIS  
TRANSFORMATION TECHNIQUE IS ILLUSTRATED BY SEVERAL  
EXAMPLES. CONSIDERATION OF A RECENT ATTEMPT BY  
BERNSTEIN TO APPLY LONG'S PROCEDURE TO THE  
PROBLEM OF THE WIND DISTRIBUTION IN THE TURBULENT  
PLANETARY BOUNDARY LAYER INDICATES THAT THIS  
APPLICATION IS NOT VALID. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-665 207 20/4 4/1 8/3 1/1  
NATIONAL ACADEMY OF SCIENCES - NATIONAL RESEARCH COUNCIL  
WASHINGTON D C  
BOUNDARY LAYERS AND TURBULENCE, (U)  
SEP 66 325P BOWDEN, K. F. ; FRENKIEL, F.  
N. ITANI, I. ;  
CONTRACT: AF 49(638)-1716  
PROJ: AF-9781  
TASK: 978101  
MONITOR: AFOSR 68-0285

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN VARIOUS JOURNALS.  
SUPPLEMENTARY NOTE: PROCEEDINGS OF AN INTERNATIONAL  
SYMPOSIUM ON BOUNDARY LAYERS AND TURBULENCE  
INCLUDING GEOPHYSICAL APPLICATIONS SPONSORED JOINTLY BY  
THE INTERNATIONAL UNION OF GEODESY AND GEOPHYSICS  
AND THE INTERNATIONAL UNION OF THEORETICAL AND  
APPLIED MECHANICS HELD IN KYOTO, JAPAN, 19-24  
SEPTEMBER 1966.

DESCRIPTORS: (\*BOUNDARY LAYER, SYMPOSIA),  
(\*TURBULENCE, SYMPOSIA), ATMOSPHERIC MOTION,  
TURBULENT BOUNDARY LAYER, BOUNDARY LAYER  
TRANSITION, LAMINAR FLOW, VORTICES, DRAG,  
WALLS, WAKE, COUETTE FLOW, FLOW SEPARATION,  
FLOW FIELDS, CYLINDRICAL BODIES, WIND,  
THERMODYNAMICS, SHEAR STRESSES, GAS FLOW,  
FLUID DYNAMIC PROPERTIES, AERODYNAMIC  
CHARACTERISTICS, ABSTRACTS (U)  
IDENTIFIERS: SHEAR FLOW, AIR-WATER  
INTERACTIONS (U)

THE 62 FULL PAGES INCLUDED IN THE VOLUME EMPHASIZE  
UNDERSTANDING OF THE MECHANICS OF BOUNDARY LAYERS AND  
OTHER TURBULENT SHEAR FLOWS RATHER THAN PRACTICAL  
APPLICATIONS OR MERE EXPERIMENTAL DATA WITHOUT  
CRITICAL EVALUATION. WITHIN THIS LIMITATION A  
LARGE VARIETY OF TOPICS, RELATED TO THE DETAILED  
STRUCTURE OF SUCH FLOWS, WAS CONSIDERED TO BE  
APPROPRIATE SUCH AS LAMINAR INSTABILITY AND  
TRANSITION TO TURBULENCE, THE MECHANICS OF THE AIR-  
WATER INTERFACE, TURBULENCE IN ROTATING SYSTEMS OR IN  
THE PRESENCE OF GRAVITY, TURBULENT TRANSFER  
PROCESSES, AND THE GEOPHYSICAL ASPECTS OF TURBULENCE.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /E0392

AD-667 399

4/1

4/2

COLORADO STATE UNIV FORT COLLINS FLUID MECHANICS  
PROGRAM

HOT-WIRE MEASUREMENTS OF TURBULENCE IN A THERMALLY  
STRATIFIED FLOW.

DESCRIPTIVE NOTE: RESEARCH MEMO.,

(U)

FEB 68

32P

ARYA, S. P. S. IPLATE, E.

J. 1

REPT. NO. RM-11, CEM67-68SPSA-EJP11

CONTRACT: DA-ANC-28-043-65-620

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-691 497.

DESCRIPTORS: (•ATMOSPHERIC MOTION,  
MEASUREMENT), THERMODYNAMICS, TURBULENCE,  
ANEMOMETERS, CALIBRATION, BOUNDARY LAYER, HEAT  
FLUX, VELOCITY, INTENSITY, WIRE, COMPRESSIBLE  
FLOW

IDENTIFIERS: STRATIFIED FLUIDS

(U)

(U)

A TECHNIQUE IS DESCRIBED IN DETAIL FOR MEASUREMENTS  
OF TURBULENT FLUXES AND INTENSITIES IN A THERMALLY  
STRATIFIED BOUNDARY LAYER. IT IS A MODIFICATION OF  
A PROCEDURE FIRST SUGGESTED BY KOVASZNAV AND  
FURTHER ELABORATED BY MORKOVIN FOR DETERMINING  
TURBULENCE IN COMPRESSIBLE FLUID FLOWS. THE  
RESULTS ARE FOUND TO BE CONSISTENT, BUT THE TECHNIQUE  
IS ELABORATE AND TIME CONSUMING. (AUTHOR)

(U)



REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN  
SECTION V BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY.  
THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

AD NUMBER

274 254  
274 494  
275 852  
286 049  
289 132  
631 967  
640 610  
646 250  
654 993  
667 920

**VI. PLANETARY BOUNDARY LAYER  
TURBULENCE: SURFACE LAYER**

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0392

AD-262 328

NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF  
RATIOS OF GEOSTROPHIC DRAG COEFFICIENTS IN THE (U)  
SURFACE LAYER UNDER VARIOUS STABILITY CONDITIONS  
DEC 61 IV SOEWARSO,

UNCLASSIFIED REPORT

DESCRIPTORS: •ATMOSPHERE, •TURBULENT BOUNDARY LAYER,  
•WIND, BOUNDARY LAYER, DRAG, MATHEMATICAL ANALYSIS,  
METEOROLOGY, SHEAR STRESSES, STABILITY, TABLES, (U)  
TURBULENCE

THE RATIO OF GEOSTROPHIC DRAG COEFFICIENTS  $C/C(A)$  UNDER VARIOUS STABILITY CONDITIONS IS  
OBTAINED AS A FUNCTION OF RICHARDSON NUMBER. A  
DRAG COEFFICIENT  $C(F)$  IS DEFINED IN RELATION TO  
THE MECHANICAL MIXING LENGTH, AND ITS RATIO TO THE  
ACTUAL DRAG COEFFICIENT  $C$  IS RELATED TO THE  
RICHARDSON NUMBER. BY USING OBSERVATIONAL RECENT  
DATA ON THE NORMALIZED LOGARITHMIC WIND SHEAR OF  
MONIN-OBUKHOV ONE CAN OBTAIN  $(F)/C(A)$ .  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0252

AD-415 680

111 RESEARCH INST CHICAGO ILL

ANALYSIS OF CONVECTION COLUMN ABOVE A FIRE  
STORM.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

JUN 63 56P

NIELSEN, H.J. ITAO, IANG I

GOLF, LUDWIG I

PROJ: A6004

UNCLASSIFIED REPORT

DESCRIPTORS: (\*STORMS, FIRES), (\*FIRES),  
CIVIL DEFENSE SYSTEMS, ENVIRONMENTAL TESTS,  
ANALYSIS, VELOCITY, TEMPERATURE, CONVECTION,  
COMPUTERS.

(U)

IDENTIFIERS: 1963.

(U)

TO DETERMINE THE ENVIRONMENTAL CONDITIONS WITHIN A FIRE  
STORM, AN ANALYTICAL MODEL WAS DEVELOPED WHICH  
DESCRIBES THE VARIATIONS WITH ALTITUDE OF VELOCITY,  
TEMPERATURE, AND GAS COMPOSITION WITHIN THE  
CONVECTION COLUMN OVER A BURNING AREA. THE  
ANALYSIS IS BASED ON AN INTEGRAL METHOD AND REPRESENTS  
AN EXTENSION OF PREVIOUS ANALYSES OF BOUYANT  
PLUMES TO INCLUDE THE EFFECTS OF COMBUSTION AND  
COMPOSITION VARIATIONS WITHIN THE COLUMN, AND RADIATION  
LOSSES FROM THE HOT GASES. COMPUTER SOLUTIONS ARE  
PRESENTED SHOWING THE EFFECTS ON THE COLUMN OF  
BURNING AREA, ENTRAINMENT COEFFICIENT, LAPSE RATE OF  
THE ATMOSPHERE, AND FUEL SUPPLY RATE. THE NATURE  
OF THE ANALYSIS MAKES THE RESULTS INAPPLICABLE TO  
PREDICTION OF CONDITIONS AT GROUND LEVEL. REFINEMENTS  
ARE SUGGESTED FOR EXTENSION OF THE RANGE OF  
VALIDITY TO GROUND LEVEL. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /F0392

AD-422 705

ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY FORT  
HUACHUCA ARIZ

MODEL FOR WIND FLOW IN AN IDEALIZED VEGETATIVE  
CANOPY. (U)

DESCRIPTIVE NOTE: RESEARCH STUDY,

JUN 63    29P    CIONCO, R. M. JOHNSTEDE, W. D.

APPLEBY, J. F.

MONITOR: AERDAA

MET7 63

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (WIND, PLANTS (BOTANY)), TROPOSPHERE,  
GAS FLOW, TURBULENCE, BOUNDARY LAYER, REYNOLDS  
NUMBER, MICROMETEOROLOGY (U)

IDENTIFIERS: 1963, VEGETATIVE CANOPY (U)

A MATHEMATICAL MODEL OF AIR FLOW IN AN IDEALIZED  
VEGETATIVE CANOPY IS DESCRIBED. THE IDEAL MODEL IS  
APPLIED TO THE REAL CANOPIES USING THE LIMITED CANOPY  
WIND PROFILE DATA THAT WAS AVAILABLE. IT IS SHOWN  
THAT IN GENERAL THE TURBULENT TRANSFER WITHIN THE  
REAL VEGETATIVE CANOPIES IS NOT IDEAL. OF THOSE  
CANOPIES INVESTIGATED, MATURE CORN MOST NEARLY  
RESEMBLED THE IDEAL CONCEPT, WHILE ALFALFA WAS THE  
CROP LEAST IN AGREEMENT WITH THE IDEAL MODEL.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0392

AD-424 160

AGRICULTURAL RESEARCH SERVICE ITHACA N Y  
ESTIMATION OF TURBULENT EXCHANGE WITHIN A CORN CROP  
CANOPY AT ELLIS HOLLOW, N. Y., 1961. (U)

DESCRIPTIVE NOTE: INTERIM REPT.,

IV WRIGHT, J. L. ILEMON, E. R. ;

REPT. NO. 42 7 ,RR366

TASK: DA2A99 27 005 08

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON THE ENERGY BUDGET AT  
THE EARTH'S SURFACE. IN COOPERATION WITH NEW YORK  
STATE COLL. OF AGRICULTURE, CORNELL U., ITHACA,  
N. Y.

DESCRIPTORS: (•TURBULENCE, PLANTS (BOTANY)), CORN,  
GAS FLOW, SHEAR STRESSES, WIND, CARBON DIOXIDE,  
MEASUREMENT, STATISTICAL ANALYSIS (U)

IDENTIFIERS: 1962, TRANSFER COEFFICIENT, PLANT  
CANOPY, TURBULENT EXCHANGE (U)

TWO DAYS OF HEATED THERMOCOUPLE AND CUP ANEMOMETER  
DATA, AND ONE DAY OF CARBON DIOXIDE DATA TAKEN AT  
SEVERAL LEVELS WITHIN AND ABOVE A CORN CROP ARE  
ASSEMBLED. VERTICAL TRANSFER COEFFICIENTS ARE  
DETERMINED BY THE ANALYSIS OF WIND SPEED FLUCTUATIONS  
USING SELECTED 30-SECOND PERIODS OF "SEMI-STEADY" WIND  
TRACE ASSUMING ISOTROPY. THESE ARE COMPARED WITH  
THOSE OBTAINED USING THE LOGARITHMIC PROFILE METHOD,  
THE FLUCTUATION METHOD GIVING VALUES SEVERAL TIMES  
LARGER. A POSSIBLE EXPLANATION IS THAT THE  
ASSUMPTION OF ISOTROPY IS NOT JUSTIFIED. THE  
TRANSFER RATES OF CARBON DIOXIDE AS CALCULATED FROM  
THE EXCHANGE COEFFICIENTS AND CARBON PROFILES ARE  
PRESENTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /FD992

AD-441 016

MASSACHUSETTS INST OF TECH CAMBRIDGE  
STRUCTURE OF ATMOSPHERIC TURBULENCE IN THE SURFACE  
LAYER,

(U)

JUN 64 196P DERRICKSON, ROBERT ARMSTRONG  
, JR.;

UNCLASSIFIED REPORT

DISTRIBUTION: MICROFICHE ONLY AFTER ORIGINAL COPIES  
EXHAUSTED.

SUPPLEMENTARY NOTE: DOCTORAL THESIS.

DESCRIPTORS: (ATMOSPHERIC MOTION, TURBULENCE), SHEAR  
STRESSES, BOUNDARY LAYER, WIND, ENERGY, HEAT  
TRANSFER

(U)

IDENTIFIERS: POWER SPECTRA, POWER DENSITY  
SPECTRA

(U)

POWER SPECTRA AND COSPECTRA OF THE ORTHOGONAL  
VELOCITY COMPONENTS AND TEMPERATURE FOR TWENTY ONE-  
HOUR RUNS AT 16 AND 40 METERS HEIGHT ARE ANALYZED.  
USING A VARIETY OF NORMALIZATIONS AND COORDINATE  
SYSTEMS. THE DEPENDABILITY OF THE DATA,  
PARTICULARLY IN THE LOW FREQUENCY RANGE UNDER  
CONVECTIVE CONDITIONS, IS CONSIDERED. USING THREE  
SEPARATE CRITERIA, THE ISOTROPIC RANGE IN THE  
ATMOSPHERIC SURFACE LAYER IS DEFINED. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0392

AD-605 927

AGRICULTURAL RESEARCH SERVICE ITHACA N Y  
THE ENERGY BUDGET AT THE EARTH'S SURFACE, PART  
II.

(U)

DESCRIPTIVE NOTE: PRODUCTION RESEARCH REPT.,

SEP 62 54P LEMCH, EDGAR R. I

MONITOR: USDA, PRR72

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (+TURBULENT BOUNDARY LAYER, TERRAIN),  
(+MATHEMATICAL MODELS, MICROMETEOROLOGY), (+TERRAIN,  
TURBULENT BOUNDARY LAYER), (+MICROMETEOROLOGY,  
TURBULENT BOUNDARY LAYER), TURBULENCES, FLUID DYNAMIC  
PROPERTIES, THEORY, EXPERIMENTAL DATA, WIND,  
ATMOSPHERIC MOTION, CARBON DIOXIDE, CONVECTION,  
ENERGY, SURFACE PROPERTIES, EARTH, PHOTOSYNTHESIS,  
HEAT TRANSFER, PLANTS (BOTANY)

(U)

IDENTIFIERS: VEGETATION CANOPY, WIND PROFILES,  
SEMI-RIGID VEGETATION, ELASTIC VEGETATION,  
VEGETATION

(U)

THIS REPORT PRESENTS IN PART THE RESULTS OF  
RESEARCH CONDUCTED WITH THE PARTICULAR OBJECTIVE OF  
EVALUATING THE AERODYNAMIC SURFACE ROUGHNESS AND  
RELATING IT TO THE ELASTIC AND GEOMETRIC  
CHARACTERISTICS OF THE SURFACE COVER. THEORETICAL  
AND EXPERIMENTAL INVESTIGATIONS OF THE TURBULENT  
TRANSFER CHARACTERISTICS OF THE AIR-STREAM NEAR THE  
GROUND ARE REPORTED. IT IS SHOWN THAT THE SURFACE  
BOUNDARY LAYER MUST BE DIVIDED INTO TWO REGIONS:  
THE FREESTREAM ABOVE THE SURFACE WHERE THE VARIOUS  
FORMS OF TURBULENT TRANSFER ARE NEARLY INDEPENDENT OF  
HEIGHT, AND THE AIRSTREAM WITHIN THE VEGETATIVE  
CANOPY WHERE SOURCES AND SINKS ARE PRESENT.  
SEVERAL THEORETICAL MODELS FOR CANOPY FLOW ARE  
REPORTED AND COMPARED WITH OBSERVATIONS. A  
NUMERICAL METHOD FOR DETERMINING THE AERODYNAMIC  
CHARACTERISTICS AND THEIR STANDARD ERRORS IN THE  
FREESTREAM IS DESCRIBED. EXPERIMENTAL RESULTS FOR  
FREESTREAM AND CANOPY FLOW ARE REPORTED. IT IS  
CONCLUDED THAT CANOPY FLOW IS FULLY TURBULENT AND  
THAT THE OBSERVATIONS SATISFY BEST A THEORETICAL  
MODEL IN WHICH THE MIXING LENGTH IS A FUNCTION OF  
HEIGHT ABOVE THE GROUND SURFACE. EXPERIMENTAL DATA  
SHOW THAT THE AERODYNAMIC SURFACE ROUGHNESS VARIES  
WITH THE WINDSPEED AND THE VARIATIONS DEPEND UPON THE  
GEOMETRIC AND ELASTIC CHARACTERISTICS OF THE  
VEGETATION. (AUTHOR)

(U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-610 119

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
STRUCTURE OF THE SURFACE BOUNDARY LAYER UNDER  
CONDITIONS OF TURBULENCE, (U)

MAR 64 12P ZILITINKEVICH, S. S. ;

REPT. NO. AMMETSOC-T-R-427

CONTRACT: AF19 628 2880

MONITOR: TT , 65 60829

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: STROENIE PRIZENNOGO SLOYA  
ATMOSFERY PRI NESTATSIONARNYKH USLOVIYAKH, TRANS. OF  
METEOROLOGIYA I GIDROLOGIYA (USSR) 1963, NO. 1, P. 21-  
27.

DESCRIPTORS: (\*MICROMETEOROLOGY, ATMOSPHERIC MOTION),  
(\*ATMOSPHERIC MOTION, MICROMETEOROLOGY), (\*TURBULENT  
BOUNDARY LAYER, MICROMETEOROLOGY), EARTH, ATMOSPHERE,  
SURFACE AREA, BOUNDARY LAYER, WIND, VELOCITY,  
TEMPERATURE, HUMIDITY, BOUNDARY VALUE PROBLEMS,  
METEOROLOGY, USSR (U)

TURBULENCE AS THE BASIC FACTOR WHICH DETERMINES THE  
VERTICAL DISTRIBUTION OF A NUMBER OF METEOROLOGICAL  
ELEMENTS IN THE SURFACE BOUNDARY LAYER OF THE  
ATMOSPHERE IS EXAMINED THE RELATION OF THE PROFILE  
OF SUCH FACTORS AS WIND SPEED, TEMPERATURE, AND  
SPECIFIC HUMIDITY TO THE HEIGHT VARIATION OF THE  
TURBULENT TRANSFER COEFFICIENT IS ALSO CONSIDERED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0252

AD-619 260

EMMANUEL COLL BOSTON MASS RESEARCH LANGUAGE CENTER

ACTA METEOROLOGICA SINICA, VOL. 24, NO. 2, 1964:

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REPT. NO. E-TC-CH-65-20

CONTRACT: AF19 628 5073

MONITOR: TT , 65-62897

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: ABSTRACT TRANS. OF CH'I HSIANG

HSUEH PAO (CHINESE PEOPLE'S REPUBLIC) V24 N2

P127-252 1964.

DESCRIPTORS: (•METEOROLOGY, CHINA), AIR MASS  
ANALYSIS, ASIA, ATMOSPHERE, SOLAR RADIATION,  
JET STREAMS(METEOROLOGY), WEATHER FORECASTING,  
TERRAIN, ATMOSPHERIC MOTION, TURBULENCE

(U)

CONTENTS: SPECTRAL ANALYSIS OF THE MONTHLY 500-  
MB CIRCULATION INDEXES OVER ASIA; A COMPARISON OF  
SEVERAL RADIATION CHARTS; THE BUDGET OF ATMOSPHERIC  
RADIATION ENERGY OVER EASTERN ASIA AND THE BUDGET  
OF SOLAR RADIATION ENERGY OF THE EARTH AND THE  
ATMOSPHERE; A STUDY OF THE RETREAT OF THE WEST  
PACIFIC SUBTROPICAL HIGH DURING 4 - 12 AUGUST  
1958; AN ANALYSIS OF THE 500MB CIRCULATION IN THE  
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PERIOD; A PROGRAM LIBRARY FOR NUMERICAL WEATHER  
PREDICTION; THE INFLUENCE OF LARGE MOUNTAIN BARRIERS  
ON THE DISPLACEMENT OF BAROTROPIC DISTURBANCES; A  
PRELIMINARY STUDY OF THE INSTABILITY OF THE WAVES  
ALONG THE INTERTROPICAL CONVERGENCE ZONE; THE  
TURBULENCE IN THE SURFACE LAYER OF THE ATMOSPHERE  
UNDER DIFFERENT THERMAL STRATIFICATIONS; A DYNAMIC  
ANALYSIS OF THE DEVELOPMENT OF CUMULONIMBUS INCUS;  
AND A PRELIMINARY STUDY OF THE FORMATION OF PRESSURE  
JUMPS BY SMALL MOUNTAIN BARRIERS USING A TWO-LAYER  
MODEL.

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-625 621 4/2  
ARMY BIOLOGICAL LABS FREDERICK MD  
THE STRUCTURE OF THE FIELDS OF WIND VELOCITY AND  
TEMPERATURE IN THE SURFACE LAYER OF THE  
ATMOSPHERE, (U)

65 30P MOHIN, A. S. ;  
REPT. NO. TRANSLATION-1044  
MONITOR: TT , 66-60108

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF AKADEMIYA NAUK SSSR.  
INSTITUT FIZIKI ATMOSFERY. TRUDY N4 P5-20 1962.

DESCRIPTORS: (\*MICROMETEOROLOGY, ATMOSPHERIC  
MOTION), (\*ATMOSPHERIC MOTION,  
MICROMETEOROLOGY), ATMOSPHERE, BOUNDARY LAYER,  
TURBULENCE, SURFACE AREA, EARTH (PLANET),  
METEOROLOGY, USSR (U)

THIS REVIEW CONSIDERS THE CURRENTLY AVAILABLE  
THEORETICAL AND EMPIRICAL KNOWLEDGE CONCERNING THE  
WIND VELOCITY AND TEMPERATURE FIELDS IN THE SURFACE  
LAYER OF THE ATMOSPHERE. ATTENTION IS CONCENTRATED  
ON THOSE CHARACTERISTICS THAT CAN BE MEASURED  
DIRECTLY. THE SURFACE LAYER WILL DENOTE THAT LOWER  
LAYER OF THE ATMOSPHERE -- HAVING A THICKNESS OF A  
FEW TENS OF METERS -- IN WHICH THE EFFECT OF THE  
CORIOLIS FORCE CAN BE NEGLECTED. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-628 972 4/2

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
NON-STATIONARY TURBULENT REGIME IN THE SURFACE LAYER  
OF THE ATMOSPHERE. (U)

DESCRIPTIVE NOTE: RESEARCH TRANSLATION,

DEC 65 21P ZILITINKEVICH, S. S. ;

REPT. NO. T-R-487,

CONTRACT: AF 19(628)-3880,

MONITOR: TT , 66-60677

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: NESTATSIONARNYI TURBULENTNYI  
REZHIM V PRIZEMNOM SLOE ATMOSFERY, TRANS. OF  
GLAVNAYA GEOFIZICHESKAYA OBSERVATORIYA, LENINGRAD.  
TRUDY (USSR) N127 P3-12 1962.

DESCRIPTORS: (•ATMOSPHERIC MOTION,  
MICROMETEOROLOGY), (•MICROMETEOROLOGY,  
ATMOSPHERIC MOTION), ATMOSPHERIC TEMPERATURE,  
WIND, USSR, WEATHER FORECASTING, DIFFERENTIAL  
EQUATIONS (U)

REGULARITIES IN THE VERTICAL DISTRIBUTION OF WIND  
AND TEMPERATURE ARE ASCERTAINED FOR NON-STATIONARY  
CONDITIONS : A REGION OF SMALL VALUES OF  
DIMENSIONLESS HEIGHT. THE PROBLEM OF THE QUASI-  
STATIONARY TRANSFORMATION OF THE TEMPERATURE FIELD IS  
STUDIED AS A FUNCTION OF CHANGES IN THE SHORTWAVE  
INSOLATION. THE RELATIONSHIPS OBTAINED CAN BE USED  
IN FORECASTING. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-625 621 4/2  
ARMY BIOLOGICAL LABS FREDERICK MD  
THE STRUCTURE OF THE FIELDS OF WIND VELOCITY AND  
TEMPERATURE IN THE SURFACE LAYER OF THE  
ATMOSPHERE, (U)  
65 JOP MONIN, A. S. ;  
REPT. NO. TRANSLATION-1044  
MONITOR: TT , 66-60108

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF AKADEMIYA NAUK SSSR.  
INSTITUT FIZIKI ATMOSFERY. TRUDY N4 P5-20 1962.

DESCRIPTORS: (\*MICROMETEOROLOGY, ATMOSPHERIC  
MOTION), (\*ATMOSPHERIC MOTION,  
MICROMETEOROLOGY), ATMOSPHERE, BOUNDARY LAYER,  
TURBULENCE, SURFACE AREA, EARTH (PLANET),  
METEOROLOGY, USSR (U)

THIS REVIEW CONSIDERS THE CURRENTLY AVAILABLE  
THEORETICAL AND EMPIRICAL KNOWLEDGE CONCERNING THE  
WIND VELOCITY AND TEMPERATURE FIELDS IN THE SURFACE  
LAYER OF THE ATMOSPHERE. ATTENTION IS CONCENTRATED  
ON THOSE CHARACTERISTICS THAT CAN BE MEASURED  
DIRECTLY. THE SURFACE LAYER WILL DENOTE THAT LOWER  
LAYER OF THE ATMOSPHERE -- HAVING A THICKNESS OF A  
FEW TENS OF METERS -- IN WHICH THE EFFECT OF THE  
CORIOLIS FORCE CAN BE NEGLECTED. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-628 972 4/2  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
NON-STATIONARY TURBULENT REGIME IN THE SURFACE LAYER  
OF THE ATMOSPHERE. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
DEC 65 21P ZILITINKEVICH, S. S. ;  
REPT. NO. T-R-487,  
CONTRACT: AF 19(628)-3080,  
MONITOR: TT , 66-60677

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: NESTATSIONARNYI TURBULENTNYI  
REZHIM V PRIZEMNOM SLOE ATMOSFERE, TRANS. OF  
GLAVNAYA GEOFIZICHESKAYA OBSERVATORIYA, LENINGRAD.  
TRUDY (USSR) N127 P3-13 1962.

DESCRIPTORS: (\*ATMOSPHERIC MOTION,  
MICROMETEOROLOGY), (\*MICROMETEOROLOGY,  
ATMOSPHERIC MOTION), ATMOSPHERIC TEMPERATURE,  
WIND, USSR, WEATHER FORECASTING, DIFFERENTIAL  
EQUATIONS (U)

REGULARITIES IN THE VERTICAL DISTRIBUTION OF WIND  
AND TEMPERATURE ARE ASCERTAINED FOR NON-STATIONARY  
CONDITIONS IN A REGION OF SMALL VALUES OF  
DIMENSIONLESS HEIGHT. THE PROBLEM OF THE QUASI-  
STATIONARY TRANSFORMATION OF THE TEMPERATURE FIELD IS  
STUDIED AS A FUNCTION OF CHANGES IN THE SHORTWAVE  
INSOLATION. THE RELATIONSHIPS OBTAINED CAN BE USED  
IN FORECASTING. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-631 058 4/2  
EMMANUEL COLL BOSTON MASS ORIENTAL SCIENCE LIBRARY  
THE EFFECTS OF THERMAL STRATIFICATION ON THE  
TURBULENT EXCHANGE IN A DIABATIC SURFACE LAYER. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
NOV 65 30P TSUNG-SHIAN, SU ;  
REPT. NO. EMM-65-42,  
CONTRACT: AF 19(628)-5073,  
MONITOR: TT , 66-61007

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF CH'I HSIANG HSUEH  
FAO (CHINESE PEOPLE'S REPUBLIC) V33 N4 P425-48  
1963.

DESCRIPTORS: (\*ATMOSPHERIC MOTION,  
\*THERMODYNAMICS), METEOROLOGY, BOUNDARY LAYER,  
TURBULENCE, CHINA (U)

THIS PAPER STUDIES THE EFFECTS OF STRATIFICATION ON  
THE TURBULENT EXCHANGE IN THE SURFACE LAYER OF THE  
ATMOSPHERE USING THE SIMILARITY THEORY AND  
DIMENSIONAL ANALYSIS. USING RECENTLY PUBLISHED  
DATA, THE MAGNITUDES OF THE EMPIRICAL COEFFICIENT D  
IN THE GENERAL FUNCTION OF TURBULENT EXCHANGE ARE  
CALCULATED. A SCHEME OF TRANSITION FROM FORCED TO  
FREE CONVECTION SHOWING A RATHER SMOOTH CHARACTER IS  
DEVELOPED. BASED ON THE CHARACTERISTIC LENGTH L  
SUB R1, THE AUTHOR SETS UP A TURBULENT EXCHANGE  
MODEL FOR A DIABATIC SURFACE LAYER. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-631 060 4/2

EMMANUEL COLL BOSTON MASS ORIENTAL SCIENCE LIBRARY  
TURBULENCE IN THE SURFACE LAYER OF A STRATIFIED  
ATMOSPHERE.

(U)

DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
NOV 65 21P TSUNG-SHIAN, SU ;  
REPT. NO. EMM-65-41,  
CONTRACT: AF 19(628)-5073,  
MONITOR: TT , 66-61009

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF CH'I HSIANG HSUEH  
PAO (CHINESE PEOPLE'S REPUBLIC) V29 N2 P73-82  
1958.

DESCRIPTORS: (•TURBULENT BOUNDARY LAYER,  
•ATMOSPHERIC MOTION), THERMODYNAMICS,  
MICROMETEOROLOGY, ATMOSPHERE, METEOROLOGY,  
CHINA

(U)

THIS PAPER DISCUSSES TURBULENT EXCHANGE IN THE  
SURFACE LAYER OF A STRATIFIED ATMOSPHERE. FIRST,  
CONSIDERING THE EFFECT OF THERMAL STRATIFICATION ON  
TURBULENCE, A NEW FORM OF FUNCTION OF THE  
RICHARDSON NUMBER IS DERIVED FROM THE ENERGY  
BALANCE EQUATION OF A TURBULENT ATMOSPHERE.  
SECONDLY, A REASONABLE FUNCTION IS PROPOSED  
DESCRIBING THE VERTICAL DISTRIBUTION OF ELEMENTS IN  
THE STRATIFIED ATMOSPHERIC SURFACE LAYER. SEVERAL  
GRAPHS ARE ALSO GIVEN WHICH MAKE AN ACCURATE  
CALCULATION OF THE TURBULENT CHARACTERISTIC VALUES  
POSSIBLE, SUCH AS TURBULENT EXCHANGE BASED ON THE  
OBSERVED DATA. SOME COMPUTATIONS BASED ON OBSERVED  
DATA ARE FURNISHED FOR COMPARISON WITH OTHERS. IT  
IS SHOWN THAT THE TREATMENT IN THIS PAPER IS  
REASONABLE AND THE RESULTS ARE BETTER THAN THOSE OF  
MONIN AND OBUKHOV. (AUTHOR)

(U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0392

AD-622 293 20/4 4/2  
COLORADO STATE UNIV FORT COLLINS FLUID DYNAMICS AND  
DIFFUSION LAB  
METEOROLOGICAL-TOWER INDUCED WIND-FIELD PERTURBATIONS  
(SUPPLEMENT). (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAY 66 14P HSI, G. ; CERMAK, J. E. ;  
REPT. NO. CER66GH-JEC26,  
CONTRACT: DA-AMC-28-042-69-G20,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-622 946.

DESCRIPTORS: (\*WEATHER STATIONS, TOWERS),  
(\*TOWERS, AERODYNAMICS), (\*WIND,  
MICROMETEOROLOGY), ATMOSPHERE, GAS FLOW,  
STRUCTURES, PERTURBATION THEORY, ANEMOMETERS,  
FLUID MECHANICS (U)

THE SPECIFIC OBJECTIVES OF THIS SUPPLEMENTARY  
INVESTIGATION ARE: (1) TO STUDY THE MEAN WIND  
PATTERN IN THE NEIGHBORHOOD OF A METEOROLOGICAL TOWER  
SUBJECTED TO THE SAME MEAN AMBIENT WIND VELOCITY BUT  
AT DIFFERENT TURBULENCE LEVELS TO DETERMINE THE  
EFFECT OF TURBULENCE ON THIS MEAN WIND VELOCITY  
PATTERN; (2) TO ACQUIRE MEASUREMENTS OF WIND  
SPEED AT THE ANEMOMETER POSITION (BOOM MOUNTED)  
FOR ALL POSSIBLE WIND DIRECTIONS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0392

AD-634 668 4/2

ARMY ELECTRONICS COMMAND FORT HUACHUCA ARIZ RESEARCH  
DIV

A MATHEMATICAL MODEL FOR AIR FLOW IN A VEGETATIVE  
CANOPY.

(U)

JUN 66 15P CIONCO, RONALD M. I

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PRESENTED AT THE ARMY SCIENCE  
CONFERENCE (1966), U. S. MILITARY ACADEMY, WEST  
POINT, N. Y., 14-17 JUNE 1966. COMPLETE PROCEEDINGS  
AVAILABLE IN TWO UNCLASSIFIED VOLUMES AS AD-634 615 AND  
AD-634 616 AND ONE CLASSIFIED VOLUME AVAILABLE TO  
QUALIFIED DDC USERS.

DESCRIPTORS: (MICROMETEOROLOGY, ATMOSPHERIC  
MOTION), TERRAIN, PLANTS(BOTANY), WIND,  
AERODYNAMICS, MATHEMATICAL MODELS

(U)

THE USUAL CONCEPT OF SURFACE ROUGHNESS AND ZERO  
PLANE DISPLACEMENT BREAKS DOWN WHEN ONE CONSIDERS A  
VEGETATIVE CANOPY AS THE LOWER BOUNDARY FOR THE  
PLANETARY BOUNDARY LAYER. THE ROUGHNESS OF MANY  
VEGETATIVE CANOPIES DERIVED FROM THE LOG LAW CHANGES  
WITH WIND SPEED AS DO THE ZERO-PLANE DISPLACEMENTS.  
IDEALLY ONE WOULD LIKE TO EXPRESS THE AERODYNAMIC  
ROUGHNESS OF VEGETATION IN TERMS OF ITS HEIGHT,  
DENSITY, AND DRAG CHARACTERISTICS. RESTRICTING  
CONSIDERATIONS TO THE TURBULENT TRANSFER OF MOMENTUM,  
A MODEL WAS DEVELOPED THAT WILL PREDICT THE CANOPY  
WIND PROFILE WITHIN SEMI-RIGID CANOPIES. FOR THE  
PURPOSE OF THIS REPORT, A CANOPY IS DEFINED AS THAT  
LAYER SPANNING THE REGION FROM THE GROUND SURFACE TO  
THE TOP OF THE PLANT.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0392

AD-635 919 4/2 20/4  
COLORADO STATE UNIV FORT COLLINS FLUID DYNAMICS AND  
DIFFUSION LAB  
TURBULENT DIFFUSION IN A SIMULATED VEGETATIVE  
COVER. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.

MAY 66 166P YANO, MOTOAKI I  
REPT. NO. CER66MY25,  
CONTRACT: DA-AMC-28-043-23-620,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ATMOSPHERIC MOTION, \*DIFFUSION),  
TERRAIN MODELS, SIMULATION, WIND TUNNELS,  
ROUGHNESS, WAKE, SURFACES, FACTOR ANALYSIS,  
SHEAR STRESSES, PLANTS(BOTANY) (U)

THE STUDY OF THE TURBULENT DIFFUSION OVER A ROUGH  
SURFACE IN THE WIND TUNNEL WAS UTILIZED WITH THE  
CONCEPT OF MOMENTUM DEFECT SUPER-POSITION IN THE  
WAKES OF AN ARRAY OF ROUGHNESS ELEMENTS. BASED ON  
THIS CONCEPT, THE CHARACTERISTICS OF EACH FACTOR OF  
TURBULENT DIFFUSION ARE ANALYZED AND THE RESULTS ARE  
CONFIRMED EXPERIMENTALLY. FROM AGREEMENT BETWEEN  
THEORY AND EXPERIMENT, THE CONCEPT, THE TURBULENT  
SHEAR FLOW CONSISTS OF THE COMBINATION OF THE  
INDIVIDUAL WAKE FLOWS, IS CONFIRMED. (AUTHOR)

(U)

108

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/F0392

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0392

AD-627 414 4/2  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
TURBULENCE ASSOCIATED WITH TEMPERATURE STRATIFICATION  
OF THE ATMOSPHERE NEAR THE GROUND. (U)  
MAR 66 29P PEI-MIEN, PAK :  
REPT. NO. FTD-TT-65-608,  
MONITOR: TT 66-62092

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED TRANS. OF CH'I HSIANG  
HSUEH PAO (CHINESE PEOPLE'S REPUBLIC) V24 N2  
P211-24 1964.

DESCRIPTORS: (\*ATMOSPHERIC MOTION, \*ATMOSPHERIC  
TEMPERATURE), TURBULENCE,  
CONVECTION(ATMOSPHERIC), MOISTURE, MOMENTUM,  
CHINA (U)

ON THE BASIS OF DETAILED PHYSICAL ANALYSIS WITH THE  
AID OF DIMENSION THEORY, THE PAPER MAKES AN ATTEMPT  
TO DISCUSS, IN GENERAL TERMS, CERTAIN ASPECTS OF  
TURBULENCE WITH VARIOUS TYPES OF STRATIFICATION.  
THE TENDENCY TO TRANSIT FROM A STATE OF FORCED  
CONVECTION TO FREE CONVECTION IS ASSUMED TO BE  
CONTINUOUS. IN THE CASE OF LIMIT STABILITY, THE  
HYPOTHESIS IS ADVANCED THAT THE TURBULENT STATE IS  
INDEPENDENT OF THE DYNAMIC FACTOR. A DIMENSIONLESS  
UNIVERSAL FUNCTION THAT SATISFIES THE REQUIREMENTS OF  
PHYSICAL ANALYSIS IS DERIVED. NUMERICAL VALUES OF  
THE PARAMETERS APPEARING IN THE FUNCTION WERE  
DETERMINED FROM OBSERVATIONAL DATA. METHODS ARE  
GIVEN FOR DETERMINING THE TURBULENCE COEFFICIENT AND  
THE FLOWS OF HEAT, MOISTURE AND MOMENTUM FROM  
GRADIENT OBSERVATION DATA; A PROCEDURE IS SUGGESTED  
FOR PRACTICAL APPLICATION OF THE METHOD SET FORTH.  
THE FORMULAS PROPOSED WERE CHECKED AGAINST  
OBSERVATIONAL MATERIAL FROM VARIOUS SOURCES.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-640 343 4/1  
ARMY BIOLOGICAL LABS FREDERICK MD  
CONCERNING THE SIMILARITY THEORY OF A. S. MONIN AND  
A. M. OBUKHOV FOR THE TURBULENT STRUCTURE OF THE  
THERMALLY STRATIFIED SURFACE LAYER OF THE  
ATMOSPHERE, (U)

JUN 65 7P CALDER, K. L. ;

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN QUARTERLY JOURNAL OF  
THE ROYAL METEOROLOGICAL SOCIETY V92 N391 P141-6  
JAN 1966.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ATMOSPHERIC MOTION, THEORY),  
TURBULENCE, EQUATIONS OF MOTION, THERMAL  
PROPERTIES (U)

THE PAPER CONSIDERS THE THEORETICAL BASIS OF THE  
MONIN-OBUKHOV SIMILARITY THEORY FOR THE  
TURBULENT, THERMALLY STRATIFIED, SURFACE LAYER OF THE  
ATMOSPHERE. IT IS SHOWN THAT THE CLASSICAL FORM OF  
THE SIMILARITY THEORY CANNOT BE APPLIED LEGITIMATELY  
TO THE VARIANCES OF THE HORIZONTAL COMPONENTS OF THE  
WIND VELOCITY FLUCTUATION. THIS LIMITATION OF THE  
THEORY HAS RECENTLY BEEN SUSPECTED ON THE BASIS OF  
OBSERVATIONAL DATA, ALTHOUGH ITS THEORETICAL  
DEMONSTRATION EMPHASIZES THE NEED FOR CAUTION WHEN  
ATTEMPTING TO APPLY SIMILARITY THEORY TO OTHER  
CHARACTERISTICS OF THE SURFACE LAYER TURBULENCE THAT  
ARE CURRENTLY OF INTEREST. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /F0352

AD-640 628                      4/2  
MASSACHUSETTS INST OF TECH CAMERIDGE DEPT OF  
METEOROLOGY  
WIND TUNNEL MEASUREMENTS OF THE WIND DISTURBANCE  
FIELD OF A MODEL OF THE BUZZARDS BAY ENTRANCE LIGHT  
TOWER, (U)  
SEP 66            19P            MOLLO-CHRISTENSON, E. L. ;  
SEEHOLTZ, J. R. ;  
CONTRACT: N140(122)774268,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•LIGHTHOUSES, •WIND), BAYS, WIND  
TUNNELS, MODELS(SIMULATIONS), MASSACHUSETTS,  
TURBULENCE, INTERFERENCE, SEAS (U)

WIND TUNNEL MODEL TESTS WERE CARRIED OUT TO MEASURE  
THE WIND INTERFERENCE CREATED BY THE BUZZARDS BAY  
ENTRANCE LIGHT TOWER IN THE ATMOSPHERIC  
BOUNDARY LAYER. TUNNEL MEASUREMENTS OF WIND  
PROFILE WERE CARRIED OUT AT CERTAIN POSITIONS IN THE  
VICINITY OF THE TOWER FOR SEVERAL WIND DIRECTIONS.  
THE RESULTS INDICATE THAT AT A DISTANCE OF 50 FEET  
FROM THE TOWER THE WIND VELOCITY PROFILE MAY CHANGE  
ABOUT SIX PERCENT, AND LARGER CHANGES ARE OBSERVED IN  
CERTAIN SPECIAL CASES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-645 852 4/2  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
SOME RESULTS OF EXPERIMENTAL INVESTIGATION OF THE  
STRUCTURAL CHARACTERISTICS OF AIR FLOW IN THE SURFACE  
BOUNDARY LAYER OF THE ATMOSPHERE, (U)  
JUL 66 19P GALADZHII, N. M. ;  
KONSTANTINOV, A. R. ; BELOUSOV, V. V. ;  
REPT. NO. FTD-TT-65-2036  
MONITOR: TT 67-60509

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNEDITED ROUGH DRAFT TRANS. OF  
UKRAINSKII NAUCHNOISSLEDOVATELSKII GIDRO-  
METEOROLOGICHESKII INSTITUT. TRUDY (USSR), N41 P87-  
94 1964.

DESCRIPTORS: (\*ATMOSPHERIC MOTION, BOUNDARY  
LAYER), ATMOSPHERE, ATMOSPHERIC TEMPERATURE,  
ALTITUDE, USSR (U)

RESULTS ARE PRESENTED OF THE INVESTIGATION OF SOME  
STRUCTURAL CHARACTERISTICS OF TURBULENT AIR FLOWS IN  
THE SURFACE LAYER. AN EXPOSITION IS GIVEN OF THE  
DEPENDENCES OF THE STRUCTURAL CHARACTERISTICS OF  
TURBULENCE AND THE COEFFICIENT OF THE TURBULENT  
EXCHANGE ON THE TEMPERATURE STRATIFICATION OF THE  
ATMOSPHERE AND ON THE ALTITUDE ABOVE THE UNDERLYING  
SURFACE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0392

AD-646 700 4/2

ATMOSPHERIC SCIENCES LAB WHITE SANDS MISSILE RANGE N  
MEX

A TABULAR PRESENTATION OF THE SURFACE BOUNDARY LAYER  
MODELS OF WEBB, BUSINGER, AND PANOFKY. (U)

DESCRIPTIVE NOTE: DATA REPT.,

JAN 67 151P HANSEN, FRANK V. I

TASK: DA-1V014901B53A-10

MONITOR: ECOM 5104

UNCLASSIFIED REPORT

DESCRIPTORS: (•BOUNDARY LAYER, •ATMOSPHERIC  
MOTION), WIND, ATMOSPHERIC TEMPERATURE, TABLES,  
STABILITY, NUMERICAL ANALYSIS, SURFACES (U)

THREE HYPOTHESES FOR A DIABATIC SURFACE BOUNDARY  
LAYER WERE EXAMINED (AS A FUNCTION OF THE GRADIENT  
RICHARDSON NUMBER) BY NUMERICAL INTEGRATION  
METHODS. THE MODELS ARE PRESENTED IN TABULAR FORM  
IN TERMS OF DIABATIC WIND INFLUENCE FUNCTION, THE  
GRADIENT STABILITY RATIO AND A UNIVERSAL FUNCTION  
THAT CORRECTS FOR THERMAL STRATIFICATION IN UNSTABLE  
AIR. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-654 993 4/1 20/4  
ATMOSPHERIC SCIENCES LAB WHITE SANDS MISSILE RANGE N  
MEX  
SPACIAL AND TEMPORAL DISTRIBUTION OF THE GRADIENT  
RICHARDSON NUMBER IN THE SURFACE AND PLANETARY  
LAYERS, (U)

MAY 67 JOP HANSEN, FRANK V. J  
TASK: DA-1V014501857A-10  
MONITOR: ECOM 5123

UNCLASSIFIED REPORT

DESCRIPTORS: (ATMOSPHERIC MOTION, TURBULENCE),  
BOUNDARY LAYER, STABILITY, WIND, ATMOSPHERIC  
TEMPERATURE, MATHEMATICAL ANALYSIS (U)  
IDENTIFIERS: RICHARDSON NUMBER (U)

THE RICHARDSON NUMBER (RI) AS A FUNCTION OF  
HEIGHT, TIME AND STABILITY CLASSIFICATION METHOD HAS  
BEEN INVESTIGATED BY THE USE OF WIND AND TEMPERATURE  
PROFILES OBSERVED IN THE SURFACE AND PLANETARY  
BOUNDARY LAYERS. IT WAS FOUND THAT A REFERENCE  
HEIGHT OF THREE TO SIX METERS ABOVE THE SURFACE  
PROVIDES THE BEST ESTIMATE OF THE RICHARDSON NUMBER  
IN RESPECT TO THE ENERGY BALANCE OF THE AIR-EARTH  
INTERFACE. FURTHER INVESTIGATION REVEALED THAT  
NEARLY ALL BOUNDARY LAYER PROCESSES CAN BE RELATED TO  
THE RICHARDSON NUMBER INCLUDING A HYPOTHESIS IN THE  
FORM OF WIND AND TEMPERATURE PROFILES FOR A DIABATIC  
SURFACE BOUNDARY LAYER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SERIAL CONTROL NO. /F0352

AD-667 075 4/2  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
THE ROLE OF PRESSURE GRADIENT IN THE DEVELOPMENT OF A  
BREEZE. (U)  
NOV 67 15P DYUBYUK, A. F. ;SEZNEV, T.  
B. ;  
REPT. NO. FTD-MT-24-203-67

## UNCLASSIFIED REPORT

**SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF  
METEOROLOGIYA I GIDROLOGIYA (USSR) N7 P11-8 1962.**

DESCRIPTORS: (•METEOROLOGY, SEA BREEZE),  
FLUID MECHANICS, WIND, PRODUCTION, BAROMETRIC  
PRESSURE, MATHEMATICAL ANALYSIS, EQUATIONS OF  
MOTION, PERIODIC VARIATIONS, FRICTION,  
TURBULENCE, USSR (U)  
IDENTIFIERS: TRANSLATIONS, PRESSURE GRADIENTS (U)

THE PROBLEM OF RELATIONSHIP BETWEEN THE PRESSURE GRADIENT AND BREEZE DEVELOPMENT IS EXPLORED. FORMULAS ARE PRESENTED DESCRIBING EACH PHASE IN THE DEVELOPMENT OF THIS PHENOMENON. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /F0352

AD-668 255 20/4 2/6  
COLORADO STATE UNIV FORT COLLINS FLUID MECHANICS  
PROGRAM  
A LABORATORY STUDY ON THE DRAG FORCE DISTRIBUTION  
WITHIN MODEL FOREST CANOPIES IN TURBULENT SHEAR  
FLOW, (U)

MAR 68 72P HSI, G. ; NATH, J. H. ;  
REPT. NO. CER67-68GH-JHN50  
CONTRACT: DA-AMC-28-042-63-G20  
PROJ: 2246

UNCLASSIFIED REPORT

DESCRIPTORS: (\*WIND, TREES), (\*TREES,  
DRAG), AERODYNAMIC CHARACTERISTICS, DIFFUSION,  
FLUID FLOW, AGRICULTURE, TURBULENT BOUNDARY  
LAYER, WIND TUNNEL MODELS, MODEL TESTS,  
CONFIGURATION, STRAIN GAGES, DYNAMOMETERS,  
TEST METHODS, SIMULATION, FORCE(MECHANICS),  
CORRELATION TECHNIQUES (L)

IDENTIFIERS: SHEAR FLOW, CANOPY FIELDS(FLOW),  
\*AGRICULTURAL AERODYNAMICS, (U)  
GRAPHS(CHARTS)

THE OBJECTIVE OF THIS STUDY WAS TO DETERMINE  
DISTRIBUTION OF THE TREE DRAG FORCE WITHIN VARIOUS  
MODEL FOREST CANOPIES SUBJECTED TO VARIOUS AMBIENT  
WIND CONDITIONS. ULTIMATELY THIS INFORMATION MAY  
BE RELATED TO DIFFUSION WITHIN THE FOREST CANOPY.  
THE INFLUENCE ON INDIVIDUAL TREE DRAG DUE TO  
NEIGHBORING TREES WAS INVESTIGATED BY ARRANGING THE  
TREES IN VARIOUS CONFIGURATIONS OF COLUMNS AND ROWS,  
THE COLUMNS BEING PARALLEL TO THE AMBIENT WIND AND  
THE ROWS BEING PERPENDICULAR. TWO TREE SPACINGS  
FOR THE COLUMNS AND ROWS WERE INVESTIGATED.  
FURTHERMORE, A LARGE FOREST CANOPY FIELD WAS  
INVESTIGATED THAT COVERED AN AREA OF TWENTY-ONE  
SQUARE METERS. FOR THIS ARRANGEMENT IT WAS  
DETERMINED THAT THE TREE DRAG FIELD CAN BE CLASSIFIED  
INTO TWO ZONES - AN INITIAL ZONE AND A STEADY DECAY  
ZONE. IN ORDER TO STUDY THE INFLUENCE OF THE  
BOUNDARY LAYER DEVELOPMENT ON TREE DRAG, THE VARIOUS  
ARRANGEMENTS OF TREES WERE TESTED UNDER A THIN  
BOUNDARY LAYER CONDITION AND UNDER A THICK BOUNDARY  
LAYER CONDITION. IN THE COURSE OF THIS STUDY A  
STRAIN GAGE FORCE DYNAMOMETER WAS DEVELOPED THAT CAN  
RELIABLY MEASURE A DRAG FORCE AS SMALL AS 0.1 GRAM ON  
A MODEL TREE. (AUTHOR) (U)

REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN  
SECTION VI BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY.  
THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

AD NUMBER

275 337  
283 533  
413 058  
429 496  
460 727  
611 337  
622 899  
623 901  
626 630  
646 251  
650 258  
653 016  
659 907  
666 707  
667 920

VII. PLANETARY BOUNDARY LAYER  
TURBULENCE: LOW LEVEL

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /60392

AD-262 098

NAVAL AIR ENGINEERING CENTER PHILADELPHIA PA AERONAUTICAL  
STRUCTURES LAB

LOW ALTITUDE GUST DATA OBTAINED IN FLEET  
AIRCRAFT

(U)

JUL 61 1V ROESER, ERWIN P.;  
REPT. NO. 1041

UNCLASSIFIED REPORT

DESCRIPTORS: \*AIRCRAFT, \*ATTACK BOMBERS, \*GUSTS,  
\*LOAD DISTRIBUTION, \*TURBULENCE, AERODYNAMIC  
CHARACTERISTICS, ANTISPASMODIC AGENTS, LOW-ALTITUDE  
BOMBING, METEOROLOGY, NAVAL AIRCRAFT, STATISTICAL  
ANALYSIS

(U)

IDENTIFIERS: A-2 AIRCRAFT

(U)

A STATISTICAL ANALYSIS IS PRESENTED OF GUST  
ENVIRONMENT BASED UPON RECORDED EXPERIENCE OF FLEET  
AIRCRAFT ON ROUTINE, LOW-ALTITUDE TRAINING FLIGHTS.  
DISCRETE GUST DATA ARE ALSO PRESENTED AS  
PROBABILITY DENSITY DISTRIBUTIONS OF THE ROOTMEAN-  
SQUARE GUST VELOCITY. ON THE BASIS OF DATA  
GATHERED TO DATE, CORRELATION OF ATMOSPHERIC  
TURBULENCE WITH TOPOGRAPHY AND METEOROLOGICAL DATA  
HAS BEEN LIMITED TO COMPARING FLIGHTS OVER TWO  
GEOGRAPHICAL AREAS. DEFINITE GUST-ENVIRONMENT  
PATTERNS ARE EVIDENT. COLD, WINTER DAYS WITH  
UNLIMITED CEILING, PERMITTING MAXIMUM SOLAR  
RADIATION, APPEAR TO PRODUCE INTENSE TURBULENCE ON  
THE CROSS-COUNTRY FLIGHTS IN THE SOUTHEASTERN  
UNITED STATES. LOW-ALTITUDE GUST INTENSITY AND  
FREQUENCY IS A FUNCTION OF AMBIENT TEMPERATURE OVER  
FLAT DESERT TERRAIN ON DAYS OF UNLIMITED CEILING AND  
19-MILE VISIBILITY. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /G0352

AD-275 106

ARMY SIGNAL RADIO PROPAGATION AGENCY WHITE SANDS MISSILE  
RANGE N MEX

LOW LEVEL TURBULENCE CHARACTERISTICS AT WHITE SANDS  
MISSILE RANGE (U)

APR 62 1V TOURIN, MYRON H.; HOIDALE, M. MCLARDIE;  
REPT. NO. TM MM 421

UNCLASSIFIED REPORT

DESCRIPTORS: •TURBULENCE, •WIND, STATISTICAL  
ANALYSIS, TABLES (U)

IDENTIFIERS: NEW MEXICO (U)

THREE-BLADED AEROVAN WINDMILL AT WHITE SANDS MISSILE RANGE, ARIZONA, USED TO DETERMINE  
LOCAL TURBULENCE CHARACTERISTICS. VARIATIONS OF  
THE STANDARD DEVIATION OF WIND DIRECTION, SIGMA A  
CLASSIFIED BY SEASON, TIME OF DAY, AND HEIGHT ABOVE  
GROUND ARE ANALYZED. A RELATIONSHIP BETWEEN SIGMA  
A AND MEAN WIND SPEED IS SHOWN. THE  
VERTICAL CHARACTERISTICS OF SIGMA A ARE DISCUSSED.  
OTHER TURBULENCE CHARACTERISTICS, INTENSITY OF  
TURBULENCE, AND ITS VERTICAL BEHAVIOR ARE ALSO  
DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /G0352

AD-281 862

NAVAL AIR TEST CENTER PATUXENT RIVER MD  
OPTIMUM WIND-OVER-DECK FOR SHIPBOARD RECOVERY  
OPERATIONS WITH CARRIER BASED AIRPLANES. (U)

DESCRIPTIVE NOTE: FINAL REPT. NO. 2,

JUN 62 62P DECKER, R. M. ;

CASTRUCCIO, N. A. ;

REPT. NO. FT-2222-176

UNCLASSIFIED REPORT

DESCRIPTORS: \*CARRIER LANDINGS, \*WIND, AIRCRAFT  
CARRIERS, AVIATION SAFETY, EFFECTIVENESS, JET BOMBERS,  
JET FIGHTERS, NAVAL AIRCRAFT, NAVAL OPERATIONS,  
OPERATIONS RESEARCH, TRANSPORT PLANES (U)

IDENTIFIERS: A-3 AIRCRAFT, A-4 AIRCRAFT, F-  
8 AIRCRAFT, F-3 AIRCRAFT, F-86 AIRCRAFT,  
C-1 AIRCRAFT (U)

A STUDY WAS MADE OF THE EFFECT OF AIRFLOW  
DISTURBANCE AFT OF THE RAMP AND IN THE LANDING AREA  
ON THE PILOT'S ABILITY MAKE A PRECISE CARRIER FINAL  
APPROACH AND LANDING. TESTS CONDUCTED ON BOARD  
USS MIDWAY (CVA-41), USS RANGER (CVA-61),  
USS CORAL SEA (CVA-43) AND USS SARATOGA (CVA-  
60) DETERMINED THAT, FROM THE PILOT'S VIEWPOINT, A  
WIND-OVER-DECK (WOD) OF 25 KT FOR JET AND 15  
KT FOR PROPELLER AIRPLANES IS OPTIMUM. THE  
DETERMINATION OF AN OPTIMUM WOD WAS PREDICATED UPON  
OPERATIONAL FEASIBILITY AS WELL AS PILOT  
CONSIDERATIONS. A 25 KT WOD, IN COMPARISON WITH A  
35 KT WOD, ACCRUED THE FOLLOWING ADVANTAGES FOR JET  
AIRPLANES: LESS DEMANDING ON THE PILOT;  
REDUCTION IN LANDING GEAR LOADS; IMPROVED APPROACH  
AIRSPEED CONTROL; LESS DEVIATION IN ALIGNMENT; AND  
INCREASED JET RECOVERY FLEXIBILITY. THE INCREASED  
CLOSURE RATE OF A REDUCED WOD RESULTED IN THE  
FOLLOWING DISADVANTAGES: EARLIER WAVE-OFF  
INITIATION; SLIGHTLY DEGRADED LANDING DISPERSION; AND  
INCREASED BOLTER RATE. BASED ON ARRESTING GEAR  
AND/OR AIRPLANE LIMITS, FLEET CAPABILITY FOR  
UTILIZING A REDUCED WOD WAS DETERMINED.  
(AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /60352

AD-297 945

AUTONETICS DOWNEY CALIF

ANNOTATED BIBLIOGRAPHY OF LITERATURE CONCERNING GUST  
ALLEVIATION TECHNIQUES, LOW-ALTITUDE ATMOSPHERIC  
TURBULENCE, AND RELATED TOPICS (U)

FEB 63 IV BRYCE, BARBARA ANN

REPT. NO. EM 1163 104

UNCLASSIFIED REPORT

DESCRIPTORS: \*BIBLIOGRAPHIES, \*GUST LOADS, AIRCRAFT,  
AIRPLANES, ATMOSPHERIC MOTION, GUSTS, JET PLANES (U)

ANNOTATED BIBLIOGRAPHY OF LITERATURE CONCERNING GUST  
ALLEVIATION TECHNIQUES, LOW-ALTITUDE ATMOSPHERE  
TURBULENCE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /60352

AD-403 365

CORNELL AERONAUTICAL LAB INC BUFFALO N Y  
THE EFFECTS OF ATMOSPHERIC TURBULENCE UPON FLIGHT  
AT LOW ALTITUDE AND HIGH SPEED, (U)

OCT 61 IV BREUHAUS, W.O. I  
REPT. NO. FDM325

UNCLASSIFIED REPORT

DESCRIPTORS: •JET FIGHTERS, •JET BOMBERS, LOW  
ALTITUDE, TURBULENCE, NAVAL AIRCRAFT, ATTACK  
BOMBERS, AERODYNAMIC CHARACTERISTICS, GUSTS,  
GUST LOADS, FATIGUE (MECHANICS), TERRAIN  
AVOIDANCE, TRANSONIC CHARACTERISTICS. (U)

IDENTIFIERS: A-6 AIRCRAFT, GUST  
ALLEVIATION. (U)

CONTENTS: AIRCRAFT PERFORMANCE REQUIREMENTS FOR  
LOW ALTITUDE FLIGHT THE RESPONSE OF AN AIRCRAFT  
TO ATMOSPHERIC TURBULENCE PROBABILITY OF  
ENCOUNTERING TURBULENCE AT LOW ALTITUDES  
VARIATION OF TURBULENCE EXPECTANCY EFFECT OF  
TURBULENCE-INDUCED MOTIONS UPON THE CREW  
SYNTHESIS OF PRECEDING SECTIONS GUST ALLEVIATION  
AND LOAD ALLEVIATION STRUCTURAL FATIGUE (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /60392

AD-422 775

TRAVELERS RESEARCH CENTER INC HARTFORD CONN  
THEORETICAL AND SYNOPTIC STUDIES OF LOW-LEVEL  
TROPICAL PERTURBATIONS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

OCT 63 87P ARNASON, GEIRMUNDUR ;

HAGE, KEITH D. HOWE, GEORGE M. ;

REPT. NO. 7051 97

CONTRACT: CWB10499

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ATMOSPHERIC MOTION, TROPICAL REGIONS),  
TROPICAL CYCLONES, WIND, ATMOSPHERIC TEMPERATURE,  
BOUNDARY LAYER, FLUID DYNAMIC PROPERTIES,  
PERTURBATION THEORY, METEOROLOGICAL PARAMETERS,  
TABLES, PARTIAL DIFFERENTIAL EQUATIONS, TROPOSPHERE (U)  
IDENTIFIERS: 1963, CORIOLIS PARAMETER, BAROCLINIC  
FLOW (U)

THIS STUDY DEALS THEORETICALLY WITH (A) THE  
EFFECT OF A VARIABLE CORIOLIS PARAMETER ON THE  
PROPAGATION AND GROWTH OF SMALL PERTURBATIONS IN A  
UNIFORMLY MOVING, STATICALLY UNSTABLE ATMOSPHERE AND  
(B) THE STABILITY PROPERTIES OF SMALL  
PERTURBATIONS IN A STATICALLY UNSTABLE BAROCLINIC  
ZONAL FLOW. A VARIABLE CORIOLIS PARAMETER RESULTS  
IN (A) SPEEDS OF PROPAGATION THAT, DEPENDING ON  
STATIC STABILITY AND LATITUDE, MAY BE EITHER WESTWARD  
OR EASTWARD RELATIVE TO THE BASIC FLOW AND (B) AN  
INCREASE IN SCALE OF marginally UNSTABLE  
PERTURBATIONS. PERTURBATIONS THAT DEVELOP IN A  
STATICALLY UNSTABLE BAROCLINIC FLOW ARE MUCH LARGER  
THAN THOSE THAT DEVELOP IN A UNIFORMLY MOVING  
ATMOSPHERE AND RANGE FROM A FEW HUNDREDS TO A FEW  
THOUSANDS OF KILOMETERS. SHORT WAVES, UNSTABLE IN A  
RESTING ATMOSPHERE, APPEAR UNABLE TO FEED ON THE  
POTENTIAL ENERGY OF BASIC FLOW. THE INCOMPLETE  
SYNOPTIC PART DEALS WITH A MODESTLY INTENSE LOW-LEVEL  
PERTURBATION. TENTATIVE RESULTS SHOW IT TO BE  
EMBEDDED IN A CONDITIONALLY UNSTABLE, SLIGHTLY  
BAROCLINIC EASTERLY FLOW, TO HAVE A WAVELENGTH OF  
ABOUT 1600 KM, AND TO BE MOVING FASTER THAN THE FLOW  
IN WHICH IT IS EMBEDDED. THE RATIO OF ITS GREATEST  
HORIZONTAL WIND DIVERGENCE TO ITS GREATEST RELATIVE  
VORTICITY IS ABOUT 0.9. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /60392

AD-423 632

RADIO CORP OF AMERICA BURLINGTON MASS DEFENSE ELECTRONIC  
PRODUCTS

STUDY OF TACTICAL ARMY AIRCRAFT (TAALS). TASK 1  
ATMOSPHERIC STUDIES. (U)

DESCRIPTIVE NOTE: REPT. NO. 2 (FINAL),

JAN 64 56P ECKHARDT, H. D. INEWELL, J. S.

CONTRACT: DA26 029AMC03267E

PROJ: 1G6 20801A127 03

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SUPPLEMENT TO QUARTERLY PROGRESS REPT.  
NO. 2, 1 NOV 63-31 JAN 64, AD-423 631.

DESCRIPTORS: (•ATMOSPHERE, SCIENTIFIC RESEARCH),  
MATHEMATICAL MODELS, SOUND TRANSMISSION,  
ELECTROMAGNETIC WAVES, SIGNALS, METEOROLOGICAL  
PARAMETERS, ARMY AIRCRAFT, SNOW, RAINFALL, FOG,  
ATMOSPHERIC REFRACTION, WIND, TURBULENCE (U)

IDENTIFIERS: 1964, PRECIPITATION (U)

MODELS OF SEVERE ATMOSPHERIC CONDITIONS IN THE  
LOWEST 200 FEET OF THE ATMOSPHERE WERE DEVISED AND  
TABULATED. THESE MODELS WERE CHOSEN AS REPRESENTING  
THE MOST SEVERE CONDITIONS WITH REGARD TO SONIC,  
ELECTROMAGNETIC, AND NUCLEAR SIGNAL TRANSMISSION,  
WHICH ARE LIKELY TO BE ENCOUNTERED IN THE TACTICAL  
OPERATION OF ARMY AIRCRAFT. THESE MODELS WERE  
DEVISED FOLLOWING AN INTENSIVE LITERATURE SURVEY OF  
RECORD PRECIPITATION AND OTHER METEOROLOGICAL  
CONDITIONS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /60392

AD-609 941

AUTONETICS ANAHEIM CALIF

GUST ALLEVIATION FEASIBILITY STUDY.

(U)

DESCRIPTIVE NOTE: FINAL REPT.

APR 64 256P

BALDUCCI, JOHN D. ; ADAMS, F.

LEROY ; SCHWARTZBERG, MILTON A. ;

CONTRACT: DA44 177AMC898T

PROJ: 1D171201D 159

MONITOR: TRECOM , TRJ4-1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*GUST LOADS, CONTROL SYSTEMS),  
(\*AERODYNAMIC CONTROL SURFACES, FEASIBILITY STUDIES),  
AERODYNAMIC LOADING, GUSTS, ATMOSPHERIC MOTION,  
VARIABLE-SWEEP WINGS, FLAPS, ELEVATORS, LIFT,  
STABILITY, COSTS, WEIGHT, PILOTS, PERFORMANCE (HUMAN) (U)

THE REPORT, BASED ON A DETAILED ANALYTICAL EFFORT, PROVIDES A REALISTIC APPRAISAL OF THE CAPABILITIES OF KNOWN GUST ALLEVIATION SYSTEMS AND DETERMINES THE FEASIBILITY OF UTILIZING THESE SYSTEMS IN FUTURE AIRCRAFT INTENDED FOR SUSTAINED LOW LEVEL, HIGH-SUBSONIC-SPEED OPERATIONS. GUST ALLEVIATION SYSTEMS ARE DEFINED AS METHODS WHICH INTENTIONALLY OR INCIDENTALLY REDUCE VERTICAL AIRCRAFT LOADING RESULTING FROM ATMOSPHERIC TURBULENCE. THE STUDY CONSIDERS A NUMBER OF PROPOSED SYSTEMS AND THEORETICAL TECHNIQUES. THE SYSTEMS FALL INTO ONE OF TWO BROAD CATEGORIES: FEEDBACK CONTROL, TERMED ACTIVE ALLEVIATION AND AIRCRAFT GEOMETRY ALTERATION, TERMED PASSIVE ALLEVIATION. EVALUATION CRITERIA INCLUDE ALLEVIATION CAPABILITY, PILOT TOLERANCE AND ENDURANCE, STABILITY, CONTROL, PERFORMANCE, STRUCTURAL EFFECTS, WEIGHT, COST, RELIABILITY, AND FAIL-SAFETY. IT IS CONCLUDED THAT EITHER A NORMAL ACCELERATION FEEDBACK SYSTEM CONTROLLING FLAPS AND ELEVATORS OR A VARIABLE SWEEP WING DESIGN OFFERS THE MOST ATTRACTIVE METHOD OF OBTAINING DESIRABLE ALLEVIATION. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /60352

AD-611 209

WISCONSIN UNIV MADISON DEPT OF METEOROLOGY  
STUDIES OF THE EFFECTS OF VARIATIONS IN BOUNDARY  
CONDITIONS ON THE ATMOSPHERIC BOUNDARY LAYER. (U)

DESCRIPTIVE NOTE: ANNUAL REPT. NO. 2,

DEC 64 128P    LETTAU, HEINZ H. ;

STEARNS, CHARLES R. ; SUPER, ARLIN B. ; TURNER, JOHN  
C. ;

CONTRACT: DA26 039AMC00878

TASK: 1A0 110018021 08

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO 429 496

DESCRIPTORS: (\*CLIMATOLOGY, BOUNDARY LAYER),  
(\*MICROMETEOROLOGY, ATMOSPHERIC MOTION), (\*WIND,  
METEOROLOGICAL PHENOMENA), (\*TURBULENT BOUNDARY LAYER,  
ANALYSIS), JET STREAMS, STRESSES, WATER, AIR,  
SURFACES, ICE, SOLAR RADIATION, LAKES (U)

IDENTIFIERS: WIND PROFILES (U)

CONTENTS: PRELIMINARY RESULTS OF AIR MASS  
MODIFICATION STUDY OVER LAKE MENDOTA, BY ARLIN  
B. SUPER; A THERMAL RESPONSE EXPERIMENT ON LAKE  
ICE, BY JOHN COLIN TURNER; REPORT ON WIND  
PROFILE MODIFICATION EXPERIMENTS USING FIELDS OF  
CHRISTMAS TREES ON THE ICE OF LAKE MENDOTA, BY  
CHARLES STEARNS; PRELIMINARY NOTE ON THE EFFECT  
OF TERRAIN-SLOPE ON LOW-LEVEL JETS AND THERMAL WINDS  
IN THE PLANETARY BOUNDARY LAYER, BY H. LETTAU. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /60292

AD-614 460

SYSTEMS ENGINEERING GROUP WRIGHT-PATTERSON AFB OHIO  
ENVIRONMENTAL CONDITIONS TO BE CONSIDERED IN THE  
STRUCTURAL DESIGN OF AIRCRAFT REQUIRED TO OPERATE AT  
LOW LEVELS. (U)

DESCRIPTIVE NOTE: REPT. FOR JUN-DEC 64,  
JAN 65 26P AUSTIN, WILLIAM H. , JR. I  
REPT. NO. TR-65-4

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*AIRCRAFT, LOW ALTITUDE), (\*LOW  
ALTITUDE, FLIGHT), (\*TURBULENCE, LOW ALTITUDE), LOW-  
ALTITUDE BOMBING, GUST LOADS, STRUCTURAL PROPERTIES,  
GUSTS, TERRAIN, FLIGHT PATHS, MATHEMATICAL ANALYSIS,  
FUNCTIONS, PROBABILITY, TABLES, DESIGN (U)

ONE OF THE GREATEST PROBLEMS FACING STRUCTURAL  
ENGINEERS AT THE PRESENT TIME IS A PROPER DEFINITION  
OF THE TURBULENCE ENVIRONMENT AT LOW LEVEL. THE  
POWER SPECTRAL DENSITY APPROACH IS CONSIDERED TO BE  
THE MOST REASONABLE TO USE IN DEFINING THIS  
ENVIRONMENT. PRESENTLY PUBLISHED DATA, WHILE IN  
POWER SPECTRAL FORM, DO NOT APPEAR TO BE ADEQUATE.  
BECAUSE A CRITICAL NEED FOR LOW-LEVEL DESIGN  
CRITERIA EXISTS, LOW-LEVEL POWER SPECTRAL EXCEEDANCE  
CURVES HAVE BEEN DERIVED FROM A B-56 LOW-LEVEL GUST  
STUDY, AN F-106 LOW-LEVEL HIGH-INTENSITY GUST  
PROGRAM, AND B-52 FLEET SERVICE EXPERIENCE.  
THESE DATA INDICATE THAT LOW-LEVEL LATERAL  
TURBULENCE IS FROM 15 TO 30 PERCENT MORE SEVERE THAN  
VERTICAL TURBULENCE. MUCH ADDITIONAL EFFORT IS  
REQUIRED IN THE AREA OF LOW-LEVEL TURBULENCE BEFORE  
STRUCTURAL ENGINEERS CAN HAVE COMPLETE CONFIDENCE IN  
THEIR LOW-LEVEL TURBULENCE DESIGN CRITERIA.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 760392

AD-635 318 4/2  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
TEMPERATURE, HUMIDITY, AND WIND VARIATIONS DURING  
DISSIPATION OF A LOW-LEVEL JET. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS.  
OCT 65 12P IZUMI, YUTAKA IBROWN, HENRY  
A. ;  
REPT. NO. AFCRL-ERP-190, AFCRL-66-307  
PROJ: AF-7655,  
TASK: 765501,

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED  
METEOROLOGY V5 N1 P36-42 FEB 1966.  
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED 2  
JUL 65.

DESCRIPTORS: (MICROMETEOROLOGY, ATMOSPHERIC  
MOTION), METEOROLOGICAL PARAMETERS, PERIODIC  
VARIATIONS, JET STREAMS: METEOROLOGY (U)  
IDENTIFIERS: MESOMETEOROLOGY (U)

THE TIME AND HEIGHT VARIATIONS OF TEMPERATURE, WIND  
SPEED, AND MOISTURE CONTENT OBSERVED AT THE CEDAR  
HILL TOWER DURING THE DISSIPATION OF A LOW-LEVEL  
JET ON THE MORNING OF 14 MAY 1962 ARE PRESENTED AND  
DISCUSSED. THREE DISTINCT STAGES OF SIGNIFICANT  
VARIATIONS OCCUR BEFORE SUNRISE AT THE UPPER LEVELS  
OF THE TOWER. THE THREE STAGES ARE: 1) A  
PERIOD OF AN ABRUPT AND SIMULTANEOUS WARMING AND  
DRYING; 2) A PERIOD OF STEADY TEMPERATURE, MIXING  
RATIO, AND WIND SPEED; AND 3) A PERIOD OF  
PRONOUNCED DECREASES IN TEMPERATURE AND WIND SPEED  
AND A MARKED INCREASE IN MIXING RATIO THAT OCCUR  
PROGRESSIVELY LATER WITH INCREASING HEIGHT. IT IS  
PROPOSED THAT THESE VARIATIONS ARE PRODUCED BY  
HORIZONTAL AND VERTICAL ADVECTION AND BY TURBULENT  
MIXING. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /60392

AD-659 430 4/2 8/6  
PENNSYLVANIA STATE UNIV UNIVERSITY PARK  
PROPERTIES OF WIND AND TEMPERATURE AT ROUND HILL,  
SOUTH DARTMOUTH, MASS. (U)  
DESCRIPTIVE NOTE: FINAL REPT. 15 JUL 66-14 JUL 67,  
AUG 67 110P PANOFKY, H. A. ; BUSCH, N. ;  
PRASAD, B. ; HANNA, S. ; PETERSON, E. ;  
CONTRACT: DAAB07-67-C-0039  
PROJ: DA-1V0-14901597A-08  
MONITOR: ECOM 0035-F

UNCLASSIFIED REPORT

DESCRIPTORS: (\*MASSACHUSETTS, \*CLIMATOLOGY),  
(\*WIND, MASSACHUSETTS), (\*ATMOSPHERIC  
TEMPERATURE, MASSACHUSETTS), TERRAIN,  
TURBULENCE, METEOROLOGICAL PARAMETERS,  
STABILITY, MATHEMATICAL ANALYSIS (U)

THE UNUSUALLY COMPLETE LOW-LEVEL METEOROLOGICAL  
DATA AT SOUTH DARTMOUTH, MASS. HAVE BEEN  
ANALYZED. THE RESULTS CONFIRM ISOTROPY AT HIGH  
FREQUENCIES, SHOW THAT SPECTRA AND COSPECTRA CAN BE  
ESTIMATED BY NUMERICAL SIMILARITY-TYPE EXPRESSIONS,  
AND THAT THE NONDIMENSIONAL WIND SHEAR IN  
ACCELERATING AIR IS SIGNIFICANTLY LESS THAN THAT IN  
AIR IN EQUILIBRIUM. ESTIMATION PROCEDURES FOR  
FLUCTUATION STATISTICS ARE DEVELOPED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /60392

AD-661 028 4/2  
WEATHER BUREAU WASHINGTON D C  
WIND OVER A CITY,  
MAY 61 7P ARIEL, N. Z. I  
KLYUCHNIKOVA, L. A. I

(U)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY ARMY ELECTRONIC  
PROVING GROUND, FORT HUACHUCA, ARIZ. TRANS. OF  
GLAVNAYA GEOFIZICHESKAYA OBSERVATORIYA, LENINGRAD.  
TRUDY (USSR) N94(196) P29-32 1960.

DESCRIPTORS: (WIND, URBAN AREAS), BOUNDARY  
LAYER, DIURNAL VARIATIONS, TERRAIN, MATHEMATICAL  
ANALYSIS, USSR

(U)

THE REPORT ANALYZES OBSERVATIONAL WIND SPEED DATA  
FROM TELEVISION TOWERS IN KIEV AND LENINGRAD.  
THE DIURNAL COURSE OF MEAN VERTICAL WIND SPEED  
PROFILES, UP TO A HEIGHT OF 100 m IS PRESENTED.  
THE ROUGHNESS LENGTH AND THE ANGLE OF THE CHANGE IN  
WIND DIRECTION WITH HEIGHT OVER A CITY IS OBTAINED. (U)

REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN  
SECTION VII BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY.  
THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

AD NUMBER

271 082  
602 540  
602 959  
641 923  
643 360  
650 258

VIII. PLANETARY BOUNDARY LAYER  
TURBULENCE: OVER WATER

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0392

AD-603 848

NATIONAL ENGINEERING SCIENCE CO WASHINGTON D C  
THE ASH WEDNESDAY EAST COAST STORM, MARCH 5-8, 1962.  
A HINDCAST OF EVENTS, CAUSES, AND EFFECTS, (U)  
JUL 64 57P BRETSCHNEIDER, CHARLES L. I

CONTRACT: NONR4177 00

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PAPER PRESENTED AT CONFERENCE ON  
COASTAL ENGINEERING (9TH), LISBON, PORTUGAL,  
JUNE 1964.

DESCRIPTORS: (\*STORMS, SEACOAST), (\*SEACOAST,  
STORMS), WIND, OCEAN WAVES, TIDES, EROSION, BEACHES,  
CONFIGURATION, HYDROGRAPHIC SURVEYING, MARINE  
METEOROLOGY, OCEANOLOGY, DATA, GRAPHICS (U)

HINDCASTS WERE MADE FOR WINDS, WAVES AND TIDES FOR  
SEVERAL EAST COAST LOCATIONS FOR THE STORM OF 5-8  
MARCH 1962. A LIMITED AMOUNT OF RECORDED DATA  
AND A CONSIDERABLE AMOUNT OF OTHER OBSERVATIONS WERE  
AVAILABLE FROM NEAR-BY AND REMOTE STATIONS. THE  
DATA WERE ANALYZED FOR CORRELATION OF 'CALIBRATION'  
PURPOSES IN ORDER TO IMPROVE THE 'STATE OF THE ART'  
OF WAVE AND STORM SURGE HINDCASTING FOR LOCATIONS  
WHERE RECORDED DATA WERE NOT AVAILABLE. WIND  
RECORDS WERE ANALYZED TO OBTAIN SUSTAINED WIND  
SPEEDS, AVERAGE GUST FACTORS, AND PROBABILITY  
DISTRIBUTION OF GUST FACTORS. ISOBARIC PATTERNS  
WERE USED TO DETERMINE SUSTAINED WIND SPEEDS OVER THE  
WATER FETCH FOR DEEP AND SHALLOW WATER WAVES AND  
STORM SURGE HINDCASTS. WAVE RUN-UP CALCULATIONS  
WERE MADE TO DETERMINE THE WAVE ACTIVITY ON THE BEACH  
AND THE DUNES AND WERE USED TO ESTIMATE THE PROBABLE  
RATE OF BEACH EROSION AND DUNE EVOLUTION. THE OFF-  
WATER WIND SPEEDS WERE MODIFIED TO DETERMINE WIND  
SPEEDS OVER THE BEACH AND OVER THE TOP OF THE DUNES.  
FINALLY, BY SUMMARIZING THE TIME-HISTORY OF THE  
VARIOUS METEOROLOGICAL, OCEANOGRAPHIC, AND COASTAL  
ENGINEERING EVENTS, A VERY INTERESTING SCIENTIFIC AND  
ENGINEERING EVALUATION OF THE CAUSES AND EFFECTS CAN  
BE MADE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0392

AD-619 909

NAVAL POSTGRADUATE SCHOOL MONTEREY CALIF  
STORMS CAUSING HARBOR AND SHORELINE DAMAGE THROUGH  
WIND AND WAVES NEAR MONTEREY, CALIFORNIA. (U)

DESCRIPTIVE NOTE: MASTER'S THESIS,  
62 186P BIXBY, HARRY L. ,JR.;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: AVAILABLE COPY WILL NOT PERMIT FULLY  
LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF  
REQUESTED BY USERS OF DDC. COPY IS AVAILABLE FOR PUBLIC  
SALE.

DESCRIPTORS: (•STORMS, MARINE METEOROLOGY),  
(•WEATHER FORECASTING, STORMS), (•MARINE  
METEOROLOGY, STORMS), HARBORS, SEACOAST,  
BEACHES, DAMAGE, FLOODS, EROSION, WIND,  
WATER WAVES, HYDRODYNAMICS, MARINE GEOLOGY,  
CALIFORNIA, OCEANOLOGY (U)

IN ORDER TO GAIN INFORMATION ABOUT THESE STORMS  
THAT MIGHT LEAD TO FORECASTING TECHNIQUES, A COMPLETE  
LIST OF SUCH STORMS FOR THE 50-YEAR PERIOD FROM 1910  
TO 1960 WAS MADE THROUGH A SEARCH OF LOCAL NEWSPAPER  
FILES. THE MOST SIGNIFICANT STORMS, THEIR  
FREQUENCY OF OCCURRENCE, THE SYNOPTIC SITUATIONS WITH  
WHICH THEY WERE ASSOCIATED, AND THE HINDCASTED SEA  
CONDITION THAT ACCOMPANIED THEM ARE DESCRIBED. TWO  
GENERAL TYPES OF DAMAGING STORMS WERE FOUND TO  
EXIST: ONE OCCURRING OFFSHORE IN THE OPEN OCEAN  
AND CAUSING SHORELINE EROSION AND FLOODING BY THE  
ACTION OF SEA AND SWELL; THE OTHER, A LOCAL WINDSTORM  
SWEEPING ACROSS MONTEREY BAY AND CAUSING DAMAGE  
TO VESSELS IN THE HARBOR MAINLY BY THE COMBINED  
EFFECTS OF STRONG GUSTY WINDS AND SHORT-PERIOD SEAS  
GENERATED IN THE BAY. WAVE HINDCASTS WERE MADE TO  
FACILITATE COMPARISONS OF STORM INTENSITIES WITHIN  
EACH OF THE TWO TYPES OF STORMS. THESE  
COMPARISONS, IN TERMS OF THE INTENSITY OF WAVE  
CONDITIONS, WERE MADE USING A QUANTITY CALLED  
DAMAGE POTENTIAL, A FUNCTION OF THE SIZE AND  
DURATION OF THE STORM WAVES. SYNOPTIC SITUATIONS  
WITH WHICH THESE STORMS WERE ASSOCIATED WERE  
CLASSIFIED BY A WEATHER-TYPING SYSTEM. ALL STORMS  
WERE FOUND TO BE ASSOCIATED WITH ONE OF THREE  
PRINCIPAL TYPES. THE POSSIBILITY OF AN OBJECTIVE-  
TYPE FORECASTING TECHNIQUE FOR THE WINDSTORMS IS  
DISCUSSED. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0392

AD-623 229

NAVAL RESEARCH LAB WASHINGTON D C

TURBULENT WATER FLOW PATTERNS RESULTING FROM WIND  
STRESS ON THE OCEAN, (U)

69 20P WILLIAMS, KINGSLEY G. ;

REPT. NO. NRL MEMO. REPT. 1692

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: ((OCEAN CURRENTS, WIND)), ((WIND,  
OCEAN CURRENTS)), OCEANS, SURFACE PROPERTIES,  
FLUID FLOW, FLOW VISUALIZATION, ALUMINUM,  
POWDERS, CONFIGURATION, TURBULENCE (U)

THE DISTRIBUTION OF ALUMINUM POWDER ON THE SEA  
SURFACE AS A RESULT OF FLOW ARISING FROM WIND STRESS  
INDICATES AN INCREASING ORDERLINESS OF DISTRIBUTION  
WITH TIME. MOST OF THE POWDER TENDS TO COLLECT  
INTO WELL DEFINED STREAKS ORIENTED IN THE DIRECTION  
OF THE WIND. CHARACTERISTIC SPACINGS OBSERVED WERE  
ABOUT 15 FEET, THOUGH INDICATIONS OF LARGER SPACINGS  
WERE ALSO OBSERVED. THE BEHAVIOR OF THE POWDER  
POINTS TOWARD A TURBULENT SYSTEM IN WHICH CELL  
DIMENSIONS ARE RANDOMLY DISTRIBUTED EXCEPT FOR A  
PARTICULAR SPATIAL FREQUENCY WHICH SEEMS TO BE  
SELECTIVELY STABILIZED. ON THE BASIS OF THESE  
RESULTS, ADDITIONAL EXPERIMENTS ARE BEING PLANNED TO  
CLARIFY THE RELATIONSHIPS BETWEEN THE OBSERVED  
PATTERNS, WIND VELOCITY, VARIATION OF MEAN WATER  
VELOCITY AND DIRECTION WITH DEPTH AND WINDROW  
SPACINGS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0392

AD-623 811 8/3  
NAVAL OCEANOGRAPHIC OFFICE WASHINGTON D C  
STATIONARY WIND-DRIVEN CURRENTS IN THE NONHOMOGENEOUS  
OCEAN OF VARIABLE DEPTH, (U)  
65 24P FOMIN, L. M. I  
REPT. NO. TRANS-297  
MONITOR: TT , 65-64960

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: STATIONARNYE VETROVYE TECHENIYA V  
NEODNORODNOM OKEANE PEREMENNOI GLUBINY, TRANS. OF  
AKADEMIYA NAUK SSSR. INSTITUT OKEANOLOGII.  
TRUDY, V60 P29-45 1962.

DESCRIPTORS: (OCEAN CURRENTS, WIND), (WIND,  
OCEAN CURRENTS), MARINE METEOROLOGY,  
HYDRODYNAMICS, MARINE GEOPHYSICS, USSR (U)

THE THEORETICAL BASIS OF A COMPUTATION METHOD FOR  
STEADY WIND-DRIVEN CURRENT VELOCITIES (THE DEEP  
OCEAN WITH COMPLEX BOTTOM TOPOGRAPHY) IS DISCUSSED  
IN THIS PAPER. THE VALUE OF THE WATER TRANSPORT  
DEPENDS ON THE VORTICITY OF SHEARING STRESS OF THE  
WIND AND ON THE BOTTOM SLOPE. WAYS OF TRANSITION  
FROM WATER TRANSPORT TO THE CURRENT VELOCITIES IN THE  
INDIVIDUAL LAYERS ARE CONSIDERED (A) WHEN THE  
WATER DENSITY DISTRIBUTION IS KNOWN AND (B) WHEN  
THE WATER MASS STRUCTURE CORRESPONDS TO THE GIVEN  
MODEL. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0392

AD-631 014 8/2 4/2 20/4  
JOHNS HOPKINS UNIV SILVER SPRING MD APPLIED PHYSICS  
LAB  
ON THE CALCULATION OF WIND WAVE ELEMENTS IN THE CASE  
OF A VARIABLE WIND, (U)  
MAR 66 12P BROVikov, I. S. I  
REPT. NO. TG-220-T471,  
CONTRACT: N0W-62-0604-C,  
MONITOR: TT , 66-60998

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF GOSUDARSTVENNYI  
OKEANOGRAFICHESKII INSTITUT. TRUDY (USSR) N28 P2-10  
1957.

DESCRIPTORS: (\*OCEAN WAVES, \*WIND), MARINE  
METEOROLOGY, WATER WAVES, HYDRODYNAMICS,  
MATHEMATICAL ANALYSIS, USSR (U)

IN COMPUTING THE ELEMENTS OF WIND WAVES FOR  
VARIABLE WINDS IT IS ASSUMED THAT THE WIND ENERGY  
TRANSMITTED BY A WAVE SURFACE ON A SEA IS  
PROPORTIONAL TO THE SQUARE OF THE WIND VELOCITY. A  
PART OF THE ENERGY MAINTAINS WIND WAVES AND THEIR  
DEVELOPMENT, ANOTHER PART IS DISSIPATED BECAUSE OF  
VISCOSITY AND TURBULENT MOTION. THE COMPUTATION OF  
ENERGY DISPERSION IS DETERMINED BY MEANS OF A FORMULA  
OF THE SEMI-EMPIRICAL THEORY OF TURBULENCE. FROM  
THE INTENSITY OF DISSIPATED ENERGY AND THE EXPRESSION  
FOR WIND ENERGY TRANSMITTED BY THE WAVE SURFACE THE  
ENERGY BALANCE EQUATION IS FORMULATED AND SOLVED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0392

AD-641 330 8/2 4/2  
RAND CORP SANTA MONICA CALIF  
A NUMERICAL STUDY OF THE WIND-DRIVEN TRANSIENT  
CIRCULATION IN A HOMOGENEOUS OCEAN, (U)  
OCT 66 75P GATES, W. L. I  
REPT. NO. P-2455

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PREPARED FOR PUBLICATION IN DEEP-  
SEA RESEARCH AND OCEANOGRAPHIC ABSTRACTS.

DESCRIPTORS: (\*NUMERICAL ANALYSIS, \*OCEAN  
WAVES), (\*ATMOSPHERIC MOTION, OCEAN WAVES),  
EQUATIONS OF MOTION (U)

THE PRIMITIVE HYDROSTATIC EQUATIONS FOR A  
HOMOGENEOUS INCOMPRESSIBLE OCEAN ARE FORMULATED IN  
TERMS OF THE VERTICALLY INTEGRATED FLOW AND A  
VARIABLE FREE WATER SURFACE. A RECTANGULAR OCEAN  
4000 KM BY 5920 KM WITH A UNIFORM UNDISTURBED DEPTH  
OF 400 M IS CONSIDERED ON A BETA-PLANE, WITH A  
LATERAL BOUNDARY CONDITION OF ZERO SLIP. FROM AN  
INITIAL STATE OF REST, THE DEVELOPMENT OF THE  
CIRCULATION AND DEFORMATION OF THE FREE SURFACE IS  
FOLLOWED FOR 60 DAYS WITH A SPACE-STAGGERED FINITE-  
DIFFERENCE GRID OF 80 KM MESH SIZE. FOR AN ASSUMED  
WIND STRESS VARYING ONLY AS THE COSINE OF THE NORTH-  
SOUTH COORDINATE WITH MAXIMA AT THE NORTHERN AND  
SOUTHERN BOUNDARIES, A GENERALLY CLOCKWISE OCEAN  
CIRCULATION IS ESTABLISHED IN THE FIRST FEW DAYS, AND  
PERSISTS THROUGHOUT THE CALCULATION. A PILING OF  
WATER OF THE ORDER OF 1 M OCCURS NEAR THE WESTERN  
OCEAN SHORE, AND IS IN APPROXIMATE GEOSTROPHIC  
EQUILIBRIUM WITH AN INTENSE NORTHWARD BOUNDARY  
CURRENT (WHOSE SPEED IS OF THE ORDER OF 1 M SEC-1)  
AND A WEAKER OFFSHORE SOUTHWARD COUNTERCURRENT.  
FRICTIONAL DISSIPATION IS ASSUMED IN THE FORM OF  
LATERAL EDDY DIFFUSION, WITH A CONSTANT COEFFICIENT  
OF 10 TO THE 8TH 50 CM SEC-1. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0352

AD-642 767 8/2 4/2  
AEROSPACE RESEARCH LABS OFFICE OF AEROSPACE RESEARCH  
WRIGHT-PATTERSON AFB OHIO  
CORRELATION OF SOME LABORATORY EXPERIMENTS IN TWO-  
PHASE FLOW WITH PHENOMENA AT THE AIR-SEA INTERFACE, (U)  
AUG 66 46P PINCHAK, ALFRED C. I  
REPT. NO. ARL-66-0159  
PROJ: AF-7116

UNCLASSIFIED REPORT

DESCRIPTORS: (\*OCEAN WAVES, ATMOSPHERIC MOTION),  
(\*TWO-PHASE FLOW, \*ATMOSPHERIC MOTION), MARINE  
METEOROLOGY, SHEAR STRESSES, OCEAN CURRENTS,  
TURBULENT BOUNDARY LAYER, SURFACES, DROPS,  
VELOCITY (U)  
IDENTIFIERS: ENTRAINMENT (U)

RESULTS OF LABORATORY EXPERIMENTS DEALING WITH WAVE  
FORMATION AND DROPLET ENTRAINMENT IN TWO-PHASE FLOW  
SYSTEMS ARE PRESENTED HERE. DATA CONCERNING THE  
EFFECTIVE INTERFACIAL SHEAR STRESS BETWEEN THE GAS  
AND LIQUID ARE GIVEN AND COMPARED WITH SIMILAR AIR-  
SEA DATA. BY MEANS OF AN EXTRAPOLATION TECHNIQUE,  
THE CRITICAL VELOCITY FOR DROPLET ENTRAINMENT IN  
LABORATORY EXPERIMENTS IS RELATED TO THE  
CORRESPONDING CRITICAL VELOCITY IN THE AIR-SEA CASE.  
ANALYSIS OF A SIMPLIFIED MODEL OF THE ENTRAINMENT  
PROCESS INDICATES A REDUCTION IN THE EFFECTIVE  
INTERFACIAL SHEAR STRESS WITH INCREASING ENTRAINMENT.  
HOWEVER, THE STRESS REDUCTION IS LESS THAN IN  
DIRECT PROPORTION TO THE AMOUNT OF ENTRAINMENT.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0392

AD-647 178 13/10  
STEVENS INST OF TECH HOBOKEN N J DAVIDSON LAB  
LOW-SPEED CONTROLLABILITY OF SHIPS IN WIND. (U)  
OCT 66 63P EDA, MARUZO I  
REPT. NO. 1162  
CONTRACT: MONR-263(63)  
PROJ: S-R009-01-01, DL-2942/070  
TASK: 102

UNCLASSIFIED REPORT

DESCRIPTORS: (SHIPS, CONTROL), (WIND, SHIPS), STABILITY, EQUATIONS OF MOTION, MANEUVERABILITY, GUST LOADS, FORCE(MECHANICS), STEERING, YAW, VELOCITY (U)

AERODYNAMIC AND HYDRODYNAMIC DATA FOR THE MARINER-CLASS VESSEL WERE USED TO FORMULATE A MATHEMATICAL MODEL REPRESENTING THE DYNAMIC BEHAVIOR OF SHIPS IN WIND. A DIGITAL COMPUTER WAS USED TO SOLVE THE EIGENVALUES OF THE SYSTEM. PERTURBATION EQUATIONS WERE LINEARIZED, WITH RESPECT TO EQUILIBRIUM CONDITIONS, FROM NON-LINEAR EQUATIONS OF MOTION. IN ADDITION, SHIP-TRAJECTORY IN CERTAIN WIND CONDITIONS WAS EXAMINED BY MEANS OF NUMERICAL SOLUTIONS OF THE NON-LINEAR EQUATIONS OF MOTION. RESULTS INDICATE THAT THE SHIP IN BOW WIND TENDS, EVEN WITHOUT AN AUTOPILOT SYSTEM, TO MAINTAIN ITS ORIGINAL COURSE - WITH PERTURBATION IN YAW INDUCING YAW OSCILLATIONS, THE CONVERGENCE OF WHICH DEPENDS UPON THE MAGNITUDE OF RELATIVE WIND VELOCITY. IT IS SHOWN THAT BEAM WIND CREATES GREATER DIFFICULTIES. ALTHOUGH THE USE OF AN ADEQUATE AUTOPILOT INCREASES THE REGION OF STABILITY IN WIND OF CERTAIN VELOCITIES (EXCEPTING IN SOME CONDITIONS OF RELATIVELY STRONG BEAM WIND), AN INCREASE IN RUDDER SIZE IS SHOWN TO IMPROVE CONTROLLABILITY IN WIND, SIGNIFICANTLY. COMPUTATIONS WITH AND WITHOUT THE ASSUMPTION OF CONSTANT LONGITUDINAL SPEED INDICATE THAT THE EFFECT OF SURGE MOTION ON YAW AND SWAY RESPONSES IN WIND IS IMPORTANT, ESPECIALLY IN BEAM WIND. (AUTHOR) (U)

UNCLASSIFIED

/H0392

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /MO352

AD-659 178 8/2 4/2  
HYDRONAUTICS INC LAUREL MD  
LABORATORY STUDIES OF WIND-WAVE INTERACTIONS. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JUN 67 68F WU, JIN ;  
REPT. NO. TR-221-13  
CONTRACT: NONR-2628(00)  
PROJ: NR-220-016

UNCLASSIFIED REPORT

DESCRIPTORS: (\*WIND, \*OCEAN WAVES), (\*MARINE  
METEOROLOGY, INTERACTIONS), VELOCITY, BOUNDARY  
LAYER, SURFACE ROUGHNESS, STRESSES, WATER WAVES,  
OCEAN CURRENTS, DRAG (U)

IT IS CONFIRMED THAT THE VELOCITY DISTRIBUTION  
ESSENTIALLY FOLLOWS THE LOGARITHMIC LAW NEAR THE  
WATER SURFACE AND THE VELOCITY-DEFECT LAW TOWARD THE  
OUTER EDGE OF THE BOUNDARY LAYER. CALCULATED FROM  
THESE DISTRIBUTIONS, THE WIND STRESSES AND SURFACE  
ROUGHNESSES ARE DIVIDED INTO TWO GROUPS SEPARATED BY  
THE OCCURRENCE OF WAVE-BREAKING PHENOMENON. FOR  
SUFFICIENTLY LOW WIND VELOCITY,  $U$ , THE SURFACE  
ROUGHNESS IS DICTATED BY RIPPLES AND THE WIND-STRESS  
COEFFICIENT VARIES WITH  $U$  TO THE  $-1/2$  POWER. THE  
AVERAGE HEIGHT OF THE BASIC GRAVITY WAVE IS  
PROPORTIONAL TO THE SURFACE ROUGHNESS AT HIGHER WIND  
VELOCITIES; THE STRESS COEFFICIENT IS THEN  
PROPORTIONAL TO  $U$ . IN ADDITION, IT IS FOUND THAT  
THE CHARNOCK'S EXPRESSION HOLDS ONLY AT HIGH WIND  
VELOCITIES, AND THAT THE CONSTANT OF PROPORTIONALITY  
DETERMINED FROM THE EXPERIMENT CORRELATES VERY WELL  
WITH THE FIELD OBSERVATIONS. FINALLY, THE WIND-  
STRESS COEFFICIENT IS SHOWN TO BE LARGER THAN THE  
FRICTION COEFFICIENT FOR TURBULENT FLOW ALONG A SOLID  
ROUGH SURFACE; THE DIFFERENCE IS SHOWN TO BE THE WAVE  
DRAG OF THE WIND OVER THE WATER SURFACE.

(AUTHOR)

(U)

UNCLASSIFIED

/MO352

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0392

AD-660 984 4/1  
WEATHER BUREAU WASHINGTON D C  
CONCERNING THE INTENSITY OF TURBULENT EXCHANGE OVER A  
WATER SURFACE, (U)  
MAR 60 4P LAIKHTAN, D. L. I  
ORLENKO, G. P. I  
MONITOR: TT 61-12817

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY ARMY ELECTRONIC  
PROVING GROUND, FORT HUACHUCA, ARIZ. TRANS. OF  
GLAVNAYA GEOFIZICHESKAYA OBSERVATORIYA, LENINGRAD.  
TRUDY (USSR) N60(122) P51-2 1956.

DESCRIPTORS: (•ATMOSPHERIC MOTION, MATHEMATICAL  
ANALYSIS), WATER, HEAT, WIND, VELOCITY,  
TEMPERATURE, HEAT FLUX, SURFACE PROPERTIES,  
USSR (U)

THE CONSIDERABLE NUMBER OF PHYSICAL PROCESSES WHICH  
TAKE PLACE OVER A WATER SURFACE AND WHICH ARE THE  
RESULT OF THE INTERACTION BETWEEN THE WATER AND THE  
ATMOSPHERE, TO A GREAT DEGREE IS DETERMINED BY THE  
INTENSITY OF THE TURBULENT MIXING OVER WATER.  
SUCH, FOR EXAMPLE, ARE THE PROCESSES OF HEAT  
EXCHANGE AND MOISTURE EXCHANGE BETWEEN THE WATER AND  
THE ATMOSPHERE, DRIFT CURRENTS, AND OTHERS.  
DESPITE THE GREAT SIGNIFICANCE OF THESE PROCESSES  
FOR VARIOUS BRANCHES OF THE NATIONAL ECONOMY,  
TURBULENCE OVER SEAS HAS BEEN INVESTIGATED RELATIVELY  
LITTLE. BELOW ARE PRESENTED CERTAIN RESULTS WHICH  
ARE A DEFINITE CONTRIBUTION TO EXISTING DATA ON  
TURBULENCE OVER A WATER SURFACE. THE MOST  
IMPORTANT CHARACTERISTIC OF TURBULENCE OVER A WATER  
SURFACE IS THE COEFFICIENT OF TURBULENCE IN THE  
VERTICAL. AS IS GENERALLY KNOWN, THIS COEFFICIENT  
APPLIES TO FORMULAS FOR THE CALCULATION OF HEAT AND  
MOISTURE FLUXES, MOMENTUM, AND OTHER FACTORS. BY  
HAVING AVAILABLE IN EACH OF THE EXPERIMENTS, DATA ON  
THE TEMPERATURE LAPSE RATE AND THE WIND SPEED IT IS  
POSSIBLE TO DETERMINE THE RELATIONSHIP BETWEEN THE  
TURBULENCE COEFFICIENT AND THE USUAL METEOROLOGICAL  
CHARACTERISTICS OVER A WATER SURFACE. OF SUCH A  
TYPE WERE THE DATA OF 54 EXPERIMENTS WHICH WERE  
PROCESSED AND ANALYZED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0352

AD-664 242 8/3 4/1

OREGON STATE UNIV CORVALLIS DEPT OF OCEANOGRAPHY  
INSTITUTE OF ATMOSPHERIC PHYSICS, ACADEMY OF  
SCIENCES, USSR. (U)

DESCRIPTIVE NOTE: SPECIAL REPT.,

DEC 67 28P POND, G. STEPHEN I  
REPT. NO. SR-1

UNCLASSIFIED REPORT

DESCRIPTORS: (\*OCEANOLOGY, USSR), (\*ATMOSPHERIC  
MOTION, USSR), UNIVERSITIES, INTERACTIONS,  
METEOROLOGICAL INSTRUMENTS, AIRCRAFT,  
MEASUREMENT, OCEAN WAVES, WIND, AIR MASS  
ANALYSIS, INSTRUMENTATION, ANEMOMETERS,  
BIBLIOGRAPHIES, USSR, OREGON (U)

IDENTIFIERS: ATMOSPHERIC PHYSICS, AIR/SEA  
INTERFACES (U)

THE STUDY, DONE BY OREGON STATE UNIVERSITY,  
CONTAINS A COLLECTION OF INFORMATION TAKEN WHILE  
VISITING THE INSTITUTE OF ATMOSPHERIC PHYSICS  
IN USSR. BRIEF VISITS WERE MADE TO THE  
INSTITUTE OF OCEANOLOGY, ACADEMY OF SCIENCES  
IN MOSCOW, TO SOME DEPARTMENTS OF MOSCOW STATE  
UNIVERSITY, AND TO ONE DEPARTMENT OF THE  
INSTITUTE OF OCEANOLOGY LOCATED IN LENINGRAD.  
MOST OF THE REPORT IS ON THE WORK DONE IN  
TURBULENCE WITH EMPHASIS ON AIR-SEA INTERACTION.  
THE AIR-SEA INTERACTION WORK IS DONE JOINTLY BY THE  
INSTITUTES OF ATMOSPHERIC PHYSICS AND  
OCEANOLOGY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0352

AD-667 739 4/2 8/3  
MICHIGAN UNIV ANN ARBOR DEPT OF MATHEMATICS  
AN INVESTIGATION OF THE STRUCTURE OF TURBULENCE OVER  
WATER SURFACE WAVES. (U)  
DESCRIPTIVE NOTE: PROGRESS REPT.,  
MAR 68 41P PORTMAN, DONALD J. ;  
DAVIDSON, KENNETH L. ;  
REPT. NO. 08849-1-P  
CONTRACT: N00014-67-A0181  
PROJ: ORA-08849, NR-083-224

UNCLASSIFIED REPORT

DESCRIPTORS: (\*MARINE METEOROLOGY, \*ATMOSPHERIC  
MOTION), TURBULENCE, OCEAN WAVES, WATER WAVES,  
SURFACE PROPERTIES, WIND, ANEMOMETERS,  
INTERFACES, RECORDING SYSTEMS, TRANSPORT  
PROPERTIES, THERMOMETERS, THERMOCOUPLES, POWER  
SPECTRA, SENSORS, TEST METHODS (U)  
IDENTIFIERS: \*AIR-WATER INTERACTIONS (U)

A HOT-WIRE ANEMOMETER SYSTEM, A FAST RESPONSE  
RESISTANCE WIRE THERMOMETER AND A THERMOCOUPLE  
CIRCUIT WERE USED IN AN ATTEMPT TO MEASURE THE  
STRUCTURE OF TURBULENCE, THE TURBULENT FLUXES OF HEAT  
AND MOMENTUM AND THE MEAN VERTICAL TEMPERATURE  
DIFFERENCE OVER OCEAN WAVES. TO STUDY DATA  
RELIABILITY (1) THE RECORDED INFORMATION WAS  
CONVERTED TO VOLTAGE ANALOGS AND RECORDED ON A PAPER  
CHART AND (2) SPECTRAL ANALYSES WERE MADE FOR ALL  
CHANNELS OF INFORMATION FOR A REPRESENTATIVE SIX  
MINUTE INTERVAL. IT WAS FOUND THAT A HIGH NOISE  
LEVEL WAS PRESENT IN ALL RECORDINGS AND THAT IT COULD  
BE ACCOUNTED FOR BY VOLTAGE AND FREQUENCY  
FLUCTUATIONS IN THE POWER SUPPLIED FOR THE MAGNETIC  
TAPE RECORDER. THE NOISE LEVEL MASKED THE  
TEMPERATURE MEASUREMENT OUTPUTS WHICH, APPARENTLY,  
WERE VERY SMALL BECAUSE OF THE NEARLY NEUTRAL THERMAL  
STRATIFICATION DURING THE EXPERIMENTS. ON THE  
BASIS OF THE PRELIMINARY ANALYSES IT APPEARS THAT  
MEANINGFUL VELOCITY SPECTRA AND CROSS SPECTRA FOR  
FREQUENCIES LESS THAN 1.5 HZ MAY BE COMPUTED FROM  
THE RECORDINGS; HIGHER FREQUENCY INFORMATION IS  
PROBABLY OBSCURED BY THE HIGH NOISE LEVEL.  
(AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0392

AD-667 836 20/4 8/3  
STANFORD UNIV CALIF DEPT OF CIVIL ENGINEERING  
AN EXPERIMENTAL INVESTIGATION OF THE STRUCTURE OF A  
TURBULENT WIND OVER WATER WAVES. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
MAR 68 117P KARAKI, SUZUMU; HSU, EN YUN  
;  
REPT. NO. TR-88  
CONTRACT: NONR-225(71), NSF-GK-736  
PROJ: NR-062-320

UNCLASSIFIED REPORT

DESCRIPTORS: (\*WIND, \*TURBULENCE),  
(\*TURBULENT BOUNDARY LAYER, \*WATER WAVES),  
STRESSES, FLOW FIELDS, PRESSURE, SURFACE  
PROPERTIES, EQUATIONS OF MOTION, VELOCITY, GAS  
FLOW, ENERGY, ROUGHNESS, THICKNESS,  
MATHEMATICAL ANALYSIS, PHASE SHIFT,  
LABORATORIES, RESPONSE (U)  
IDENTIFIERS: AIR-WATER INTERACTIONS (U)

THIS INVESTIGATION PRESENTS EXPERIMENTAL RESULTS FROM A STUDY OF THE STRUCTURE OF A TURBULENT BOUNDARY LAYER DEVELOPED BY AIR FLOW OVER WATER WAVES IN A LAB WIND-WAVE CHANNEL. IT WAS DEMONSTRATED THAT THE SHEARED FLOW REGION IS TWO-LAYERED, SIMILAR TO ROUGH WALL BOUNDARY LAYERS. THE INNER LAYER, ADJACENT TO THE WALL, IS DESCRIBABLE BY THE 'LAW OF THE WALL' AND THE OUTER FLOW BY THE 'DEFECT LAW.' THE DATA WERE TAKEN IN TWO-DIMENSIONAL FLOW WITH SMALL FAVORABLE PRESSURE GRADIENTS. THE FIRST PART OF THE TWO-PART INVESTIGATION INVOLVED AIR FLOW OVER AN INITIALLY STILL WATER SURFACE ON WHICH WAVES DEVELOPED IN RESPONSE TO WIND EXCITATION. IN THE SECOND PART, AIR WAS PASSED OVER WATER WAVES OF A SINGLE FREQUENCY AND VARIED AMPLITUDE. THE RESULTS INDICATED THAT WITHIN THE RANGE OF THIS STUDY THE WATER SURFACE CAN BE CLASSED AS AERODYNAMICALLY ROUGH AT WIND SPEEDS GREATER THAN 12 FPS AND THE FLOW STRUCTURE OF THE BOUNDARY LAYER CORRESPONDS TO THAT OVER A ROUGH WALL. THE VELOCITY DECREMENT DUE TO SURFACE ROUGHNESS IS SHOWN TO BE A FUNCTION OF THE LOCAL ROOT-MEAN-SQUARE WAVE HEIGHT. THE EFFECT OF WAVE-INDUCED FLUCTUATIONS IN THE AIR IS LIMITED TO A VERY CLOSE NEIGHBORHOOD OF THE WAVY SURFACE. FOR THE SPECIFIC COMBINATION OF WIND AND WAVE SPEEDS OF THIS STUDY IT WAS FOUND THAT WHILE THE AMPLITUDES OF THE HORIZONTAL COMPONENTS OF THE FLUCTUATION DECREASED WITH INCREASING ELEVATION, THE VERTICAL COMPONENT INCREASED. (AUTHOR) (U)

REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN  
SECTION VIII BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY.  
THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

AD NUMBER

263 040  
430 065  
430 424  
460 727  
623 900  
626 630  
642 802  
665 207

**IX. PLANETARY BOUNDARY LAYER  
TURBULENCE: OVER TERRAIN**

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10352

AD-265 258

NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE  
LOCAL WIND CIRCULATIONS

(U)

JUN 61 IV HALITSKY, JAMES;

CONTRACT: DA36 0295C84939

UNCLASSIFIED REPORT

DESCRIPTORS: \*MOUNTAINS, \*TERRAIN MODELS, \*WIND,  
ATMOSPHERE, FLUID MECHANICS, GAS FLOW, HYDRODYNAMICS,  
TABLES, TURBULENCE, WAKE

(U)

IDENTIFIERS: NEW YORK

(U)

EXPERIMENTS PERFORMED AT BEAR MOUNTAIN PROVIDE  
DATA FROM HIGH T E FIELDS OF MEAN FLOW AND  
TURBULENCE NEAR THE GROUND IN THE LEE OF THE MOUNTAIN  
ERE DELINE D. A MODEL OF THE WIND STRUCTURE WAS  
DEVELOPED WHICH AGREES WELL WITH THE OBSERVED DATA.  
THE MODEL IS USEFUL IN UNDERSTANDING THE MECHANISM  
WHICH GENERATES THE OBSERVED TURBULENCE AND IN  
ISOLATING TURBULENCE PHENOMENA ATTRIBUTABLE ONLY TO  
THE MOUNTAIN FROM TURBULENCE GENERATED BY ADJACENT  
MOUNTAINS. COMPARISON OF OBSERVED DATA WITH FLOW  
AROUND FLAT PLATES IN A WIND TUNNEL INDICATES THE  
POSSIBILITY OF A REGION OF HIGH TURBULENCE ABOVE AND  
DOWNWIND OF THE MOUNTAIN TOP. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10392

AD-279 611

NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE  
LOCAL WIND CIRCULATIONS. VOLUME II. STUDIES OF THE  
FIELD OF TURBULENCE IN THE LEE OF MOUNTAIN RIDGES AND  
TREE LINES (U)

SEP 61 IV DAVIDSON, BENIHALITSKY, JAMES I  
CONTRACT: DA26 0295C84929

UNCLASSIFIED REPORT

DESCRIPTORS: •MOUNTAINS, •TREES, •WIND, ATMOSPHERE,  
BALLOONS, FLUID MECHANICS, THEODOLITES, TRACKING,  
TURBULENCE (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /10392

AD-292 699

WASHINGTON UNIV SEATTLE

PART A: ON VALLEY AND MOUNTAIN WINDS III. PART B:

VALLEY WIND THEORY

IV

THYER, NORMAN; BUETTNER, K. J. F. 1

(U)

UNCLASSIFIED REPORT

DESCRIPTORS:    •ATMOSPHERICS, •WIND, DIURNAL  
VARIATIONS, MEASUREMENT, METEOROLOGICAL BALLOONS,  
MOUNTAINS, THEODOLITES, VELOCITY

(U)

THE CIRCULATION OF AIR IN AND NEAR VALLEYS AND  
MOUNTAINS. OBSERVATIONS WERE MADE PRIMARILY IN THE  
SUMMER MONTHS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10392

AD-926 681

ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY WHITE  
SANDS MISSILE RANGE N MEX  
TURBULENCE CHARACTERISTICS OF THE FIRST 62 METERS  
OF THE ATMOSPHERE. (U)

DEC 67 49P HANSEN, FRANK V. I

TASK: IAD 110018021 10

MONITOR: AERDA 100

UNCLASSIFIED REPORT

DESCRIPTORS: (ATMOSPHERIC MOTION, TURBU  
LENCE), (EARTH, TURBULENT BOUNDARY LAYER),  
WIND, METEOROLOGICAL PARAMETERS, SHEAR  
STRESSES, FRICTION, VELOCITY, DRAG, STABILITY,  
TEMPERATURE, METEOROLOGY, LOW ALTITUDE. (U)  
IDENTIFIERS: 1963. (U)

TURBULENCE CHARACTERISTICS OF THE FIRST 62 METERS OF  
THE ATMOSPHERE IN THE VICINITY OF THE U. S. ARMY  
ELECTRONICS RESEARCH AND DEVELOPMENT  
ACTIVITY'S METEOROLOGICAL RESEARCH TOWER ARE  
ESTABLISHED FOR NEUTRAL CONDITIONS. THE ASSUMP  
TION WAS MADE THAT THE ROUGHNESS LENGTH IS A  
CONSTANT, BUT DEPENDENT UPON DIRECTION, FETCH, AND THE  
HEIGHT OF THE ROUGHNESS ELEMENTS. DATA ARE  
PRESENTED FOR FIVE RECORDING PERIODS DURING THE LATE  
WINTER AND EARLY SPRING OF 1958 AND 1961.  
COMPUTATIONS OF THE BASIC WIND PROFILE AND  
TURBULENCE PARAMETERS ARE PRESENTED IN TABULAR FORM.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 710352

AD-430 424

REDSTONE SCIENTIFIC INFORMATION CENTER REDSTONE ARSENAL  
ALA

THE EFFECTS OF MOUNTAINS ON AIR CURRENTS. (U)

FEB 64 26P GAZZOLA, ADRIANO

MONITOR: RSIC 131

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. FROM RIVISTA DI  
METEOROLOGIA AERONAUTICA, NO. 1, 1963.

DESCRIPTORS: (•ATMOSPHERIC MOTION, MOUNTAINS),  
(•ATMOSPHERIC MOTION, THEORY), WIND, THEORY,  
METEOROLOGY, CUMULUS CLOUDS, CIRRUS CLOUDS, LAMINAR  
FLOW, TURBULENCE, STRATUS CLOUDS, HYDRODYNAMICS,  
MOTION, MATHEMATICAL MODELS, NUMERICAL ANALYSIS,  
OSCILLATION, STRATOSPHERE, TROPOSPHERE (U)

IDENTIFIERS: 1963, ITALY, OROGRAPHIC CLOUDS, STAU  
CLOUDS, LENTICULAR CLOUDS, ROTOR PHENOMENA, FOEHNS (U)

A BRIEF DISCUSSION IS PRESENTED ABOUT THE STATE OF  
ART OF RESEARCH ON OROGRAPHIC WAVES. ANALOGY IS  
MADE TO WATER WAVES. OROGRAPHIC CLOUDS ARE  
DESCRIBED, AND THE 'ROTOR' PHENOMENA IS EXPLAINED.  
NOTES ARE MADE ON THE THEORY OF WAVE MOTION UNDER  
IDEAL CONDITIONS AND IN THE DIFFERENT ATMOSPHERIC  
LAYERS. (AUTHOR) (U)

UNCLASSIFIED

710352



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10352

AD-601 401

EMMANUEL COLL BOSTON MASS RESEARCH LANGUAGE CENTER  
ACTA METEOROLOGICA SINICA, 1962, VOL. 22, NO. 2:  
TABLE OF CONTENTS AND ABSTRACTS .

(U)

APR 64 IV

REPT. NO. 64 18

CONTRACT: AF19 628 2869

MONITOR: TT,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*METEOROLOGY, BIBLIOGRAPHIES),  
(\*BIBLIOGRAPHIES, METEOROLOGY), ATMOSPHERIC MOTION,  
ATMOSPHERE, RAINFALL, ANTICYCLONES, CLOUDS,  
TROPOSPHERE, WIND, ABSTRACTS, CHINA

(U)

ABSTRACTS OF THE FOLLOWING ARTICLES ARE GIVEN:  
THE PROCESSES OF ADAPTATION AND EVOLUTION OF  
ATMOSPHERIC MOTIONS (II) - NONLINEAR CASES,  
PRELIMINARY RESEARCH OF CONVECTIVE HEAT TRANSFER IN  
THE LOWER ATMOSPHERIC LAYER, THE EFFECT OF  
OROGRAPHY ON THE WIND FIELD AND PRESSURE IN A  
TURBULENT ATMOSPHERE, AN ANALYSIS OF THE FORMATION  
OF SHEAR LINES IN WINTER OVER THE EASTERN BORDER OF  
THE PLATEAU IN CHINA, A STUDY OF THE LONGITUDINAL  
MOVEMENT OF SUBTROPICAL ANTICYCLONES AND ITS  
FORECASTING, THE SPECTRA OF LARGE SCALE ATMOSPHERIC  
FLOW AT 100 MB (1 JANUARY TO FEBRUARY 1962),  
THE LONG WAVE OF THE SUBTROPICAL JET OVER ASIA IN  
SUMMER, THE ACCURACY OF THE MEAN MONTHLY  
TEMPERATURE, A PRELIMINARY STUDY ON THE  
CHARACTERISTICS AND EVOLUTION OF MEAN MONTHLY  
CIRCULATION AT 500 MB OVER THE NORTHERN HEMISPHERE  
(I) - ZONAL INDEX, THE TURBULENT DIFFUSION OF A  
CONTINUOUS POINT SOURCE IN THE PRESENCE OF VERTICAL  
ADVECTION, THE POSSIBILITIES OF ARTIFICIALLY  
INFLUENCING CLOUDS TO INCREASE PRECIPITATION  
(3) - THE KINETICS OF DISTILLATION IN A SUPERCOOLED  
SYSTEM, AND THE INFLUENCE OF RAINFALL ON THE YIELD  
OF WINTER WHEAT IN NORTHERN CHINA.

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /10352

AD-602 959

ARMY ELECTRONICS RESEARCH AND DEVELOPMENT ACTIVITY WHITE  
SANDS MISSILE RANGE N MEX

OROGRAPHIC EFFECTS ON WIND VARIABILITY, (U)

JUL 64 26P HORN, JAMES D. ;

TRAWLE, ELMER J. ;

TASK: IAD 14501853A10

MONITOR: ERDA , 157

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*WIND, LOW ALTITUDE), (\*MOUNTAINS,  
WIND), TERRAIN, METEOROLOGICAL PARAMETERS, ATMOSPHERIC  
MOTION, METEOROLOGICAL INSTRUMENTS, NEW MEXICO (U)

ONE ASPECT OF INVESTIGATING THE WIND STRUCTURE OF  
THE TULAROSA BASIN IS THE EXAMINATION OF THE  
EFFECTS OF NEARBY MOUNTAIN RANGES ON PERTURBATIONS IN  
THE WIND FIELD. CHARTS OF STANDARD DEVIATION OF  
LOW-LEVEL WIND SPEED AND DIRECTION AS A FUNCTION OF  
MEAN WIND SPEED AND MEAN WIND DIRECTION WERE ANALYZED.  
A RELATION BETWEEN THESE VALUES AND TERRAIN  
FEATURES SUCH AS CANYONS AND MOUNTAIN BARRIERS IS  
SUGGESTED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10352

AD-605 268

PENNSYLVANIA STATE UNIV UNIVERSITY PARK MINERAL INDUSTRIES  
EXPERIMENT STATION

CHANGE OF TERRAIN ROUGHNESS AND THE WIND  
PROFILE.

(U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT. NO. 2,

APR 64 8P PANOFKY, H. A. TOWNSEND, A.

A. 1

CONTRACT: AF19 604 6641

PROJ: 8604

TASK: 860401

MONITOR: AFCRL , 64 402

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PUB. IN THE QUARTERLY JOURNAL OF  
THE ROYAL METEOROLOGICAL SOCIETY 1964, APR, V. 90,  
NO. 384, P. 147-155.

DESCRIPTORS: (\*WIND, TERRAIN), (\*TERRAIN, ATMOSPHERIC  
MOTION), THEORY, SURFACE PROPERTIES, TURBULENT  
BOUNDARY LAYER

(U)

A THEORY IS CONSTRUCTED TO DESCRIBE THE  
DISTRIBUTION OF WIND WITH HEIGHT IN HYDROSTATICALLY  
NEUTRAL AIR FOLLOWING A SUDDEN CHANGE IN TERRAIN  
ROUGHNESS. THE AGREEMENT WITH MEASUREMENTS MADE AT  
A VARIETY OF LOCATIONS IS SATISFACTORY. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10392

AD-611 313

TEXAS A AND M UNIV COLLEGE STATION DEPT OF OCEANOGRAPHY  
AND METEOROLOGY

MESOSCALE CIRCULATIONS OF THE ATMOSPHERIC BOUNDARY  
LAYER. PART II. (U)

DESCRIPTIVE NOTE: FINAL REPT., PT. 2,

JAN 65 227P BRUNDIDGE, KENNETH C. ;

WONG, EUGENE YOU JUNE ; RYAN, BILL CHATTEN ;

CONLAN, EDWARD FRANCIS ;

CONTRACT: AF19 604 7455

PROJ: 7655 ,270

TASK: 765501

MONITOR: AFCRL , 65-63 P2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: MASTERS' THESES. SEE ALSO AD-611  
312.

DESCRIPTORS: (\*AIR MASS ANALYSIS, MICROMETEOROLOGY),

(\*ATMOSPHERIC MOTION, AIR MASS ANALYSIS),

(\*MICROMETEOROLOGY, AIR MASS ANALYSIS), FLUID FLOW,

ATMOSPHERE, BOUNDARY LAYER, HEAT TRANSFER

COEFFICIENTS, MEASUREMENT, METEOROLOGICAL INSTRUMENTS,

TOWERS, TEXAS, METEOROLOGICAL PARAMETERS (U)

RESULTS ARE GIVEN OF RESEARCH CONDUCTED IN THREE  
MAJOR AREAS: (1) THE TEMPERATURE AND WIND  
STRUCTURE OF COLD FRONTS, (2) DETERMINATION OF  
THE EDDY HEAT COEFFICIENT UNDER FAIR-WEATHER  
CONDITIONS, AND (3) THE DETERMINATION OF THE EDDY  
HEAT COEFFICIENT IN FRONTAL ZONES. THE  
INVESTIGATIONS WERE BASED UPON DATA COLLECTED ON THE  
1420-FT. KRLDFAA TRANSMITTER TOWER AT CEDAR  
HILL, TEXAS. THIS VOLUME PERTAINS ONLY TO  
AREAS TWO AND THREE. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /10752

AD-617 761

PRINCETON UNIV N J DEPT OF AEROSPACE AND MECHANICAL  
SCIENCES

SOME EFFECTS OF ATMOSPHERIC DISTURBANCES ON AN OPEN  
RETURN LOW SPEED WIND TUNNEL. (U)

JUL 64    77P    GACH, ALAIN ;

REPT. NO. 700

CONTRACT: AF33 657 12174

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*WIND TUNNELS, ATMOSPHERIC MOTION),  
(\*ATMOSPHERIC MOTION, WIND TUNNELS), OPERATION,  
VARIABLE-PITCH PROPELLERS, EFFECTIVENESS (U)

THIS REPORT IS CONCERNED WITH THE INFLUENCE OF  
ATMOSPHERIC DISTURBANCES ON AN OPEN CIRCUIT WIND  
TUNNEL, AND IN PARTICULAR THE CHANGES IN TUNNEL  
VELOCITY CAUSED BY EXTERNAL WIND. BOTH ANALYTICAL  
AND EXPERIMENTAL STUDIES HAVE BEEN PERFORMED,  
CONSIDERING FIRST A STEADY WIND, AND THEN PERIODIC  
GUSTS. THE POSSIBILITY OF CANCELLING ANY CHANGE IN  
TUNNEL VELOCITY BY MEANS OF AN AUTOMATIC VARIABLE  
PITCH PROPELLER HAS BEEN INVESTIGATED. THIS WOULD  
IMPROVE THE OPERATION OF THE WIND TUNNEL IN THE  
PRESENCE OF GUSTS OR WINDS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10392

AD-620 388

OKLAHOMA UNIV NORMAN

A STUDY OF OROGRAPHICALLY DISTURBED FLOW.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,

65 49P EMODI, GEORGE P. P. ;

CONTRACT: AF33 608 1096

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TERRAIN, ATMOSPHERIC MOTION),  
(\*MOUNTAINS, GAS FLOW), (\*ATMOSPHERIC MOTION,  
VORTICES), REYNOLDS NUMBER, TURBULENCE,  
CLOUDS, BOUNDARY LAYER, WIND, ATMOSPHERE

(U)

OROGRAPHICALLY DISTURBED FLOW.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10392

AD-633 841 8/13 8/10 4/2  
HYDRAULIC ENGINEERING LAB UNIV OF CALIFORNIA BERKELEY  
A FUNCTION FOR SAND MOVEMENT BY WIND. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JAN 65 103P KADIB, A. A. ;  
REPT. NO. HEL-2-12,  
CONTRACT: DA-49-053-CIVENG-63-4,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SAND, EROSION), (\*WIND,  
\*EROSION), (\*SOIL MECHANICS, EROSION),  
TRANSPORT PROPERTIES, SEDIMENTATION, FLUID FLOW,  
AIR, WATER, HYDRODYNAMICS, BEACHES,  
SEACOAST (U)

A METHOD FOR CALCULATING THE RATE OF TRANSPORT WAS DEVELOPED. THIS METHOD WAS BASED ON EXPERIENCE GAINED IN THE FIELD OF SEDIMENT MOTION IN RIVERS AND ALL AVAILABLE FIELD AND WIND TUNNEL DATA ON THE SUBJECT. IT HAS BEEN FOUND THAT THE BASIC FORCES CAUSING THE SEDIMENT MOTION ARE THOSE OF THE AVERAGE LIFT L AND THE FLUCTUATING PART L CAUSED BY THE TURBULENCE. ANOTHER FACTOR CONTRIBUTING TO THE MOTION IN THE CASE OF WIND IS THE EFFECT OF IMPACT, CAUSED BY THE PARTICLE IN SALTATION, IN DISTURBING THE BED SURFACE. THE EFFECT OF IMPACT WAS FOUND TO BE A FUNCTION OF THE MAIN FORCES CAUSING THE MOTION AND THEREFORE IT WAS INTRODUCED AS A CORRECTION FOR THE MEAN LIFT FORCE CAUSED BY THE DISTORTION OF THE FLUID FIELD AROUND THE BED PARTICLES. IT HAS BEEN FOUND THAT THE BASIC PRINCIPLES GOVERNING THE RATE OF SEDIMENT TRANSPORT BY WATER AND AIR ARE THE SAME. THE ONLY DIFFERENCE WAS FOUND TO BE THE EFFECT OF SALTATION ON DISTURBING THE BED SURFACE IN THE CASE OF AIR. THE RESULTS OF THIS STUDY ARE REPRESENTED AS A THEORETICAL RELATION BETWEEN THE FLOW INTENSITY AND THE INTENSITY OF SEDIMENT LOAD. THE EFFECT OF PARTICLE HIDDING IN THE LAMINAR SUB-LAYER WAS COMBINED WITH THE IMPACT CORRECTION TO GIVE A FINAL WIND CORRECTION WHICH PROVED TO BE A FUNCTION OF THE PARAMETER DESCRIBING THE RATIO BETWEEN THE SUBMERGED WEIGHT OF THE PARTICLE AND THE MEAN LIFT FORCE. THE METHOD IS APPLICABLE FOR CALCULATING THE RATE OF SAND TRANSPORT UNDER A WIDE RANGE OF WIND VELOCITIES AND FOR SAND SIZES RANGING FROM A 0.149 MM TO 1.00 MM. APPLICATION OF THE DERIVED METHOD FOR CALCULATING SAND TRANSPORT BY WIND FROM NATURAL BEACHES IS GIVEN. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10352

AD-624 877 4/2  
WISCONSIN UNIV MADISON  
WINDSPEED ON MOUNTAINS. (U)  
DESCRIPTIVE NOTE: FINAL REPT., FEB 64-NOV 65,  
JAN 66 87P WAHL, EBERHARD W. I  
CONTRACT: AF 19(628)-3873,  
PROJ: AF-8624,  
TASK: 862402,  
MONITOR: AFCRL 66-280

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*WIND, MOUNTAINS),  
(\*MICROMETEOROLOGY, \*MOUNTAINS), ATMOSPHERIC  
MOTION, VELOCITY, TERRAIN, WEST GERMANY,  
CORRELATION TECHNIQUES, METEOROLOGY (U)

BASED ON DATA FROM SIX GERMAN MOUNTAIN  
OBSERVATORIES, THE BEHAVIOR OF WINDSPEED  
DISTRIBUTIONS ON TOP OF MOUNTAIN SUMMITS HAS BEEN  
INVESTIGATED. RELATIONSHIPS HAVE BEEN ESTABLISHED  
LINKING THE OCCURRENCE OF WINDS ON THE MOUNTAIN TO  
THE SIMULTANEOUSLY OBSERVED FLOW IN THE FREE  
ATMOSPHERE AT SUMMIT HEIGHT IN THE VICINITY. SINCE  
THE WINDSPEED DATA CAN BE REPRESENTED SATISFACTORILY  
BY MEANS OF DOUBLE EXPONENTIAL DISTRIBUTION  
FUNCTIONS, A METHOD OF ESTIMATING THE OCCURRENCE OF  
HIGH WINDSPEEDS BASED ON THESE DISTRIBUTIONS HAS BEEN  
DEVELOPED. (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10392

AD-643 360 4/1 1/2 4/1  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
PROGRAM AND TECHNIQUES OF ATMOSPHERIC TURBULENCE  
RESEARCH ON MOUNTAINOUS HELICOPTER ROUTES. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
OCT 66 28P VORONTSOV, P. A. I  
REPT. NO. T-R-630  
CONTRACT: AF 19(628)-3880  
MONITOR: TT 67-60155

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: PROGRAMMA I METODIKA ISSLEDOVANIYA  
ATMOSFERNOI TURBULENTNOSTI NA GORNYKH VERTOLETNYKH  
TRASSAKH, TRANS. OF GLAVNAYA GEOFIZICHESKAYA  
OBSERVATORIYA, LENINGRAD. TRUDY (USSR) N171 P20-31  
1965.

DESCRIPTORS: (\*ATMOSPHERIC MOTION, MOUNTAINS),  
(\*HELICOPTERS, AIR TRAFFIC), USSR, METEOROLOGICAL  
PARAMETERS, METEOROLOGICAL INSTRUMENTS, AIRBORNE,  
WEATHER FORECASTING (U)

A STUDY WAS MADE: (A) TO GENERALIZE THE  
AVAILABLE EXPERIENCE IN AVIATION WEATHER FORECASTING  
FOR HELICOPTER FLIGHTS, (B) TO STUDY ATMOSPHERIC  
TURBULENCE ON MOUNTAINOUS ROUTES WITH SPECIALLY  
EQUIPPED HELICOPTERS AND AIRPLANES AND WITH PASSENGER  
HELICOPTERS, (C) TO DISCUSS FLIGHT CONDITIONS ON  
A GIVEN ROUTE WITH THE FLIGHT PERSONNEL, AND (D)  
TO HAVE THE FORECASTERS OF THE AVIATION WEATHER  
STATIONS SERVICING HELICOPTER FLIGHTS ENGAGE IN A  
STUDY OF THE FLIGHT CONDITIONS ON THE ROUTE AND IN A  
REFINEMENT OF THE EXISTING OPERATING INSTRUCTIONS ON  
THE FORECASTING OF BUFFETING. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /10252

AD-642 689                      4/2

COLORADO STATE UNIV FORT COLLINS FLUID DYNAMICS AND  
DIFFUSION LAB

SIMULATION OF WIND FIELDS OVER POINT ARGUELLO,  
CALIFORNIA, BY WIND-TUNNEL FLOW OVER A TOPOGRAPHIC  
MODEL, (U)

DESCRIPTIVE NOTE: FINAL TECHNICAL REPT.,

NOV 66       88P       CERMAK, J. E. ; PETERKA, JON I

REPT. NO. CER65JEC-JAP64

CONTRACT: N123(61756)24261A

PROJ: 2226

UNCLASSIFIED REPORT

DESCRIPTORS: (WIND, SIMULATION), TERRAIN  
MODELS, ATMOSPHERE MODELS, FLOW FIELDS,  
ATMOSPHERIC TEMPERATURE, VELOCITY, LAMINAR FLOW,  
TURBULENCE, CONVECTION(ATMOSPHERIC), WIND  
TUNNELS, CALIFORNIA (U)

STABLY STRATIFIED FLOW OVER A 1:12,000 SCALE  
MODEL AT POINT ARGUELLO, CALIFORNIA WAS  
STUDIED. MEAN TEMPERATURE, MEAN VELOCITY AND MEAN  
CONCENTRATION DISTRIBUTIONS OBTAINED FOR THE  
LABORATORY FLOW WERE COMPARED WITH AVAILABLE FIELD  
DATA COLLECTED AT THE SITE. THESE COMPARISONS  
REVEALED THAT THE GEOMETRICAL, DYNAMIC AND THERMAL  
SIMILARITY WERE SUFFICIENTLY ACHIEVED TO GIVE SIMILAR  
MEAN FLOW PATTERNS, TEMPERATURE DISTRIBUTIONS AND  
CONCENTRATION DECAY RATES FOR DIFFUSING TRACERS.  
THE DATA REVEALED THAT A LAMINAR LABORATORY FLOW  
MAY BE USED TO SIMULATE A TURBULENT FIELD FLOW UNDER  
CONDITIONS OF STABLE THERMAL STRATIFICATION AND  
COMPLEX TERRAIN. IN SUCH FLOW CONDITIONS,  
DIFFUSION IS DOMINATED BY CONVECTIVE DISPERSION.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10392

AD-644 821 4/2  
ATMOSPHERIC SCIENCES LAB WHITE SANDS MISSILE RANGE N  
MEX  
THE LATERAL INTENSITY OF TURBULENCE AS A FUNCTION OF  
STABILITY, (U)  
NOV 66 JIP HANSEN, FRANK V. I  
TASK: DA-1V014901092A-10  
MONITOR: ECOM 8092

UNCLASSIFIED REPORT

DESCRIPTORS: (ATMOSPHERIC MOTION, STABILITY),  
INTENSITY, TURBULENCE, TERRAIN (U)

THE LATERAL INTENSITY OF TURBULENCE WITH RESPECT TO  
STABILITY WAS EXAMINED. IT WAS FOUND THAT THE  
INTENSITY OF TURBULENCE OVER AN EXTREMELY ROUGH  
NONUNIFORM TERRAIN WAS GREATER THAN OVER A UNIFORM  
TERRAIN BUT THAT THE HETEROGENEOUS SURFACE HAD NO  
OTHER EFFECT ON THE MAGNITUDE OF THE FLUCTUATIONS.  
THE STABILITY OF THE ATMOSPHERE WAS FOUND TO HAVE  
THE GREATEST EFFECT ON THE LATERAL COMPONENT OF  
TURBULENCE WITH THE STANDARD DEVIATION OF WIND  
DIRECTION BEING EXTREMELY SENSITIVE TO CHANGES IN  
STABILITY. THE INVESTIGATION ALSO PROVIDED AN  
INSIGHT TO THE VARIATION OF THE ABSOLUTE VALUE OF THE  
RICHARDSON NUMBER WITH HEIGHT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10392

AD-660 979 4/1 4/2  
WEATHER BUREAU WASHINGTON D C  
ON THE HEAT BALANCE OF THE KARA-KUL' LAKE (OZPRO)  
VALLEY (IN THE EAST PAMIRS, SOVIET CENTRAL ASIA,  
USSR), (U)  
MAR 60 9P ZUEV, M. V. I  
MONITOR: TT 61-12818

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY ARMY ELECTRONIC  
PROVING GROUND, FORT HUACHUCA, ARIZ. TRANS. OF  
MONO. SOVREMENNYE PROBLEMY METEOROLOGII PRIZEMNOGO  
SLOYA VOZDUKHA. SBORNIK STATEI, LENINGRAD, 1958  
P61-6.

DESCRIPTORS: (•ATMOSPHERIC MOTION, THERMAL  
CONDUCTIVITY); (•SOILS, THERMAL CONDUCTIVITY),  
SOLAR RADIATION, EVAPORATION, WIND,  
ATMOSPHERIC TEMPERATURE, HUMIDITY, PERIODIC  
VARIATIONS, USSR (U)

MOUNTAINOUS REGIONS WHICH OCCUPY A RATHER LARGE  
AREA IN SOVIET CENTRAL ASIA, SIGNIFICANTLY  
INFLUENCE PROCESSES DETERMINING ONE TYPE OR ANOTHER  
OF THE PHYSICAL STATE OF THE ATMOSPHERE. THE MOST  
IMPORTANT OF THESE PROCESSES ARE THE EXCHANGES OF  
HEAT AND MOISTURE BETWEEN THE ACTIVE SURFACE AND THE  
ATMOSPHERE. THE OBSERVATIONS WERE MADE IN THE  
PROXIMITY OF THE METEOROLOGICAL STATION OVER A LEVEL  
PLOT WITH RUBBLY-SANDY SOIL ALONG THE EASTERN SHORE  
LINE ABOUT 700 TO 800 METERS FROM THE LAKE AND AT AN  
ELEVATION OF 3990 METERS ABOVE SEA LEVEL. THE  
OBSERVATION PROGRAM INCLUDED MEASUREMENTS OF THE  
TOTAL (OR GLOBAL), THE DIFFUSE, AND DIRECT SOLAR  
RADIATIONS; THE RADIATION BALANCE; TURBULENT HEAT  
EXCHANGE; THE AIR TEMPERATURE AND AIR HUMIDITY UP TO  
A HEIGHT OF 200 CM.; SOIL TEMPERATURES FROM THE  
SURFACE TO THE 20-CM. DEPTH; AND THE (RECORDING  
OF) WIND SPEEDS IN THE LOWEST 9-METER LAYER OF THE  
ATMOSPHERE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10352

AD-661 024 4/2  
WEATHER BUREAU WASHINGTON D C  
RADIATION REGIME OF NORTHERN AND SOUTHERN SLOPES (IN  
THE USSR) IN RELATION TO GEOGRAPHICAL LATITUDE, (U)  
JUL 61 25P ZAKHAROVA, A. F. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY ARMY ELECTRONIC  
PROVING GROUND, FORT HUACHUCA, ARIZ. TRANS. OF  
LENINGRAD UNIV. UCHENYE ZAPISKI (USSR) N269 P24-49  
1959.

DESCRIPTORS: (\*CLIMATOLOGY, SOLAR RADIATION),  
HEAT, TURBULENCE, WIND, INTENSITY, CLOUDS,  
TERRAIN, PERIODIC VARIATIONS, MOUNTAINS,  
USSR (U)

IN NATURE, LEVEL LAND SURFACES ARE BY FAR MORE  
INFREQUENTLY ENCOUNTERED THAN SURFACES SLOPING AT  
VARIOUS ANGLES TOWARD DIFFERENT DIRECTIONS. THESE  
CIRCUMSTANCES IN COMBINATION WITH THE GREAT  
DIFFERENCE IN THE DURATION OF SUNSHINE FROM ONE  
REGION TO ANOTHER PRODUCE COMPLEX AND VARIEGATED  
SLOPE RADIATION REGIMES WHICH IN TURN HAVE MANY  
CONSEQUENCES. SLOPE RADIATION REGIMES ARE  
REFLECTED IN THE HEAT BALANCE, THE TURBULENT  
EXCHANGE, THE FORMATION OF LOCAL WINDS AND OF OTHER  
ELEMENTS IN LOCAL CLIMATE. OF ALL THE NONLEVEL  
AREAS OF THE EARTH'S SURFACE, THE MOST IMPORTANT FROM  
A PRACTICAL STANDPOINT ARE AREAS HAVING RELATIVELY  
SMALL SLOPES, OR SLOPES MOST EXTENSIVELY USED IN THE  
NATIONAL ECONOMY. IN THE PRESENT WORK, THE RESULTS  
OF CALCULATING THE HOURLY INTENSITIES OF SOLAR  
RADIATION ON NORTHERN AND SOUTHERN SLOPES WITH  
STEEPNESSES OF 10, 20, 30 AND 40 DEGREES AT LATITUDES  
42, 50, 60 AND 70 DEGREES N. HAVE BEEN USED.  
THESE CALCULATED VALUES ARE FOR POINTS WHICH ARE  
REPRESENTATIVE FOR A MAJOR PORTION OF THE USSR.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10352

AD-664 062 4/2

EMMANUEL COLL BOSTON MASS ORIENTAL SCIENCE LIBRARY  
AN INVESTIGATION ON THE PREDICTION OF STRONG WINDS  
ASSOCIATED WITH COLD FRONTS IN THE YUPEH REGION  
(NORTHERN HONAN) IN SPRING. (U)

DESCRIPTIVE NOTE: RESEARCH TRANSLATION,

SEP 67 28P ZHU,ZHONG-JI ;HU,XUE-MEI ;

CHEN,ZENG-FU ;JI,NAI-FU ;XU,HONG-WEN ;

REPT. NO. EMM-66-140

CONTRACT: AF 19(628)-5073

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF CH'I HSIANG HSUEH  
PAO (CHINESE PEOPLE'S REPUBLIC) V25 N2 P128-47  
1965.

DESCRIPTORS: (\*WIND, CHINA), (\*AIR MASS  
ANALYSIS, CHINA), BAROMETRIC PRESSURE,  
ATMOSPHERIC MOTION, WEATHER FORECASTING,  
TURBULENCE, TROPICAL CYCLONES, METEOROLOGICAL  
CHARTS, PERIODIC VARIATIONS (U)

IDENTIFIERS: SPRING(SEASON), COLD FRONTS,  
HONAN(CHINA) (U)

THIS PAPER PRESENTS AN ANALYSIS OF THE OCCURRENCE  
OF STRONG WINDS OVER THE REGION OF KAIFENG,  
CHENGCHOW AND HSINHSIANG IN HONAN PROVINCE  
WITH RESPECT TO OROGRAPHIC CONDITIONS. THE EFFECT  
OF PRESSURE GRADIENT, THE CHARACTERISTICS OF THE LOW-  
LEVEL FRONTAL ZONE AND THE TURBULENT EXCHANGE ON WIND  
SPEED AND THE RELATIONSHIP BETWEEN THE FLOW PATTERN  
AHEAD OF THE FRONT AND THE WIND SPEED BEHIND IT WERE  
ALSO DISCUSSED. THE SYNOPTIC SITUATIONS ASSOCIATED  
WITH THE OCCURRENCE OF STRONG WINDS ACCOMPANYING A  
COLD FRONT OVER THE YUPEH REGION WERE CLASSIFIED  
INTO THREE MAIN TYPES, W, N AND E, AND OTHER  
SUBSIDIARY CATEGORIES ON THE BASIS OF SYNOPTIC  
CLIMATOLOGY AND THE TRAJECTORIES OF THE COLD AIR.  
THE CHARACTERISTICS OF EACH TYPE OF STRONG WINDS  
AND THE EVOLUTION OF THE ASSOCIATED SYNOPTIC PROCESS  
WERE STUDIED IN DETAIL FOR THE FORMULATION OF AN  
EMPIRICAL METHOD TO FORECAST THE OCCURRENCE OF STRONG  
WINDS. THE METHOD EVOLVED WAS THEN TESTED FOR THE  
REGION UNDER OPERATIONAL CONDITIONS DURING MARCH -  
MAY 1964, AND THE ACCURACIES WERE FOUND TO BE  
87.5% FOR TYPE W, 91.7% FOR TYPE N AND  
40% FOR TYPE E. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /10392

AD-464 172 4/2 1/1  
COLORADO STATE UNIV FORT COLLINS FLUID MECHANICS  
PROGRAM

SIMULATION OF MOUNTAIN LEE WAVES IN A WIND  
TUNNEL.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
DEC 67 173P LIN, J. T. BINDER, G. J.

REPT. NO. CER67-68JTL-GJB24  
CONTRACT: DA-AMC-28-043-65-G20  
PROJ: DA-2246

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CLEAR AIR TURBULENCE,  
SIMULATION), (\*ATMOSPHERE MODELS, \*WIND),  
MICROMETEOROLOGY, MOUNTAINS, WIND TUNNEL MODELS,  
AVIATION ACCIDENTS, ALL-WEATHER AVIATION,  
PERTURBATION THEORY, ANEMOMETERS, FLOW  
VISUALIZATION, AVIATION SAFETY

(U)

IDENTIFIERS: WAVE PROFILES, FROUDE NUMBER,  
MOUNTAIN LEE WAVES

(U)

MOUNTAIN LEE-WAVES WERE SIMULATED IN A WIND TUNNEL WHERE THE DENSITY STRATIFICATION WAS PRODUCED BY HEATING THE AMBIENT AIR AND COOLING THE LOWER BOUNDARY. THE FLOW PATTERNS WERE VISUALIZED WITH SMOKE AND WERE ALSO DETERMINED FROM MAPPING OF THE TEMPERATURE FIELDS MEASURED POINT BY POINT WITH THERMOCOUPLES AND PLATINUM RESISTANCE THERMOMETERS. THE MAGNITUDES OF THE VELOCITIES WERE MEASURED WITH A CONSTANT TEMPERATURE HOT-WIRE ANEMOMETER. SINCE THIS INSTRUMENT IS ALSO TEMPERATURE SENSITIVE THE COMPENSATION OF THIS EFFECT AT VERY LOW VELOCITIES (THE ACTUAL VELOCITIES WERE ABOUT 0.5 FT/SEC) WAS EXPERIMENTALLY DETERMINED. THE FLOW WAS COMPOSED OF TWO LAYERS OF WHICH THE LOWER ONE (THICKNESS 7-8 IN.) HAD THE LARGE STABILITY. THE FROUDE NUMBER WAS CALCULATED ON THE BASIS OF THE HEIGHT, STABILITY AND AVERAGE VELOCITY IN THE LOWER LAYER. TWO BELL-SHAPED MODEL MOUNTAINS OF THE SAME HEIGHT (4 IN.) BUT OF DIFFERENT HORIZONTAL SCALES WERE USED. THIS SIMULATION EXPERIMENT REPRODUCED ALL THE MAIN FEATURES OF MOUNTAIN LEE-WAVES, NAMELY THE WAVE PROFILE, THE ROTOR BELOW THE CREST OF THE FIRST WAVE, THE STRONG VELOCITY INCREASE ON THE LEE SLOPE (1.5-1.8 TIMES THE AVERAGE UPSTREAM VELOCITY). STRONG TURBULENCE WAS FOUND IN THE UPPER PART OF THE ROTOR. THE WAVE LENGTH AT A FIXED ELEVATION OF THE LEE-WAVES WAS FOUND TO INCREASE LINEARLY WITH FROUDE NUMBER; THE AMPLITUDES DID ALSO INCREASE

(U)

REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN SECTION IX BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY. THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

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622 899  
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636 325  
637 883  
641 226  
641 560  
648 444  
660 966  
662 367  
667 222  
668 255  
669 078  
819 533



X. CLEAR AIR TURBULENCE (CAT)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0352

AD-274 269

COLORADO STATE UNIV FORT COLLINS

THE NATURE OF CLEAR-AIR TURBULENCE (CAT). (U)

DESCRIPTIVE NOTE: SCIENTIFIC INTERIM REPT.,

FEB 62 24P REITER,ELMAR R. ;

HAYMAN,ROBERT W. ;

REPT. NO. ASTP-28

CONTRACT: N189(188)-538-28A

UNCLASSIFIED REPORT

DESCRIPTORS: \*AERIAL CAMERAS ,\*AIRCRAFT ,\*CLOUDS  
,\*TURBULENCE ,AERIAL PHOTOGRAPHY ,CONFIGURATION  
,FLIGHT PATHS ,GUST LOADS ,MAPPING (M)

THIS REPORT INCLUDES: A PHOTOGRAMMETRIC STUDY  
OF CLOUD STRUCTURE ASSOCIATED WITH CLEAR-  
AIR TURBULENCE. SCIENTIFIC INTERIM TECHNICAL  
REPT., PT. 1, BY ROBERT W. HAYMAN. FEB 62.  
ON THE NATURE OF CLEAR-AIR TURBULENCE  
(CAT). SCIENTIFIC INTERIM REPT., PT. 2, BY ELMAR  
R. REITER. FEB 62. THE APPLICATION OF TESTED  
PHOTOGRAMMETRIC PRINCIPLES TO THE STUDY OF CLOUD  
CONFIGURATIONS APPEARS TO BE A MOST PRACTICAL METHOD  
OF DEFINING A TRANSIENT AND COMPLEX SYSTEM.  
RELATIVE ACCURACIES OF THE PHOTOGRAMMETRIC METHODS  
SEEM TO BE WELL WITHIN THE REQUIREMENTS OF  
DIMENSIONAL DEFINITION. ABSOLUTE ACCURACY OF THE  
SYSTEMS PROBABLY WARRANTS FURTHER REFINEMENT. COST  
OF THESE EVALUATION PROCEDURES, EXCLUSIVE OF  
DEVELOPMENT, ARE LOW ENOUGH TO ALLOW THE CONTINUED  
APPLICATION OF THE PHOTOGRAMMETRIC APPROACH TO  
PROBLEMS OF THIS NATURE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0292

AD-274 276

COLORADO STATE UNIV FORT COLLINS

A CASE STUDY OF SEVERE CLEAR-AIR TURBULENCE

(U)

MAR 62

IV

REITER,ELMAR R.I

REPT. NO. AS TP 20

CONTRACT: N189 188 55120

MONITOR: NWRP 15-0262-057

UNCLASSIFIED REPORT

DESCRIPTORS: •AVIATION ACCIDENTS, •JET STREAMS  
(METEOROLOGY), •TURBULENCE, ATMOSPHERE, GRAVITY,  
TEMPERATURE, WIND

(U)

ON JANUARY 19, 1961, 1816 MST (JANUARY 20,  
0116 GCT), A B-52 AIRCRAFT WAS LOST IN SEVERE  
CLEARAIR TURBULENCE (CAT) OVER NORTHWESTERN NEW  
MEXICO. THE WEATHER CONDITIONS IN THE UPPER  
TROPOSPHERE AND LOWER STRATOSPHERE AT THE TIME OF THE  
ACCIDENT ARE DESCRIBED. A WORKING HYPOTHESIS ON  
THE FORMATION OF CAT PROPOSED IN PREVIOUS PAPERS IS  
IN GOOD AGREEMENT WITH THE DATA PRESENTED.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-289 290

COLORADO STATE UNIV FORT COLLINS

THE ATMOSPHERIC MICRO-STRUCTURE AND ITS BEARING ON  
CLEAR-AIR TURBULENCE (CAT)

(U)

OCT 62 IV REITER,ELMAR R.I

REPT. NO. CER62ERR62

CONTRACT: N189 188 99120

UNCLASSIFIED REPORT

DESCRIPTIONS: •TURBULENCE, ATMOSPHERE, CIRRUS CLOUDS,  
PHOTOGRAPHIC ANALYSIS

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-409 799

COLORADO STATE UNIV FORT COLLINS  
NATURE AND OBSERVATION OF HIGH-LEVEL TURBULENCE  
ESPECIALLY IN CLEAR AIR, (U)

DEC 62 22P REITER, ELHAR R. I

REPT. NO. TP-41

CONTRACT: N189 188 99120

MONITOR: NWRP 19 1262 071

UNCLASSIFIED REPORT

DESCRIPTORS: •ATMOSPHERIC MOTION, •TURBULENCE,  
AIRCRAFT, CONVECTION, GRAVITY, PATTERN  
RECOGNITION, WIND, VERTICAL GUST RECORDER,  
TEMPERATURE, STABILITY, VORTICES, GUIDED MIS  
SILE TRAJECTORIES, FLIGHT PATHS, FLIGHT CONTROL  
SYSTEMS, WIND DIRECTION INDICATORS, MEASURE  
MENT, CLOUDS, PRESSURE, ATMOSPHERE, BALLOONS,  
CORRELATION TECHNIQUES. (U)

IDENTIFIERS: CAT, CLEAR-AIR TURBULENCE. (U)

THIS IS A 'STATE-OF-THE-ART' REPORT ON CLEAR AIR  
TURBULENCE (CAT) RESEARCH. KNOWLEDGE OF MICRO-  
STRUCTURAL DETAILS OF FLOW PATTERNS IN THE FREE  
ATMOSPHERE IS OF IMPORTANCE TO AIRCRAFT AND MISSILE  
DESIGNERS. IT ALSO IS OF INTEREST IN CONSIDERING  
PASSENGER COMFORT. THERE MAY BE AT LEAST THREE  
DIFFERENT CAUSES FOR BUMPINESS EXPERIENCED BY AN  
AIRCRAFT FLYING HORIZONTALLY: CONVECTIVE CURRENTS,  
GRAVITY WAVES ON INTERFACES, AND TEMPERATURE  
DISCONTINUITIES INTERCEPTED BY A SUPERSONIC  
AIRCRAFT. FOR VERTICAL TAKE-OFF VEHICLES  
EXCESSIVE SHEARS OF ALTERNATING SIGN IN THE VERTICAL  
WIND OR MOMENTUM PROFILES SHOULD BE CONSIDERED AS  
POSSIBLE SOURCES OF VIBRATION. SO FAR,  
OBSERVATIONS OF HIGH-LEVEL TURBULENCE HAVE BEEN MADE  
BY AIRCRAFT AND BY BALLOON-BORNE GUST SONDES.  
ESPECIALLY AIRCRAFT MEASUREMENTS PRESENT A PROBLEM  
INASMUCH AS THE RESPONSE CHARACTERISTICS OF THE  
VEHICLE USUALLY MAKE IT DIFFICULT TO EVALUATE THE  
ACTUAL ATMOSPHERIC GUST INPUT. WITH OUR PRESENT  
THEORETICAL MODELLING CAPABILITIES WE MAY BE ABLE TO  
STUDY WAVE PERTURBATIONS IN THE FREE ATMOSPHERE FROM  
DETAILED MEASUREMENTS OF WIND AND TEMPERATURE  
PROFILES. SUCH MEASUREMENTS WILL HAVE TO BE ORDERS  
OF MAGNITUDE MORE ACCURATE HOWEVER, THAN THE ONES  
PROVIDED BY THE SYNOPTIC RAWINSONDE AND RADIOSONDE  
NETWORK. (AUTHOR) (U)

UNCLASSIFIED

DGC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 7J0392

AD-411 248

STANFORD RESEARCH INST MENLO PARK CALIF  
THE DETAILED STRUCTURE OF THE ATMOSPHERE IN REGIONS  
OF CLEAR-AIR TURBULENCE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

MAY 62 62P ENDLICH, ROY M. I

CONTRACT: CNO10224

PROJ: 409F

UNCLASSIFIED REPORT

DESCRIPTORS: (ATMOSPHERE, TURBULENCE),  
(WIND, JET STREAMS (METEOROLOGY)), AIR  
MASS ANALYSIS, STRATOSPHERE, MEASUREMENT, AIR  
CRAFT, PARACHUTE DESCENTS, TEMPERATURE, VELOC  
ITY, VORTICES, FLIGHT. (U)

IDENTIFIERS: 1962, RAWINSONDE, WIND SHEAR. (U)

THE STRUCTURE OF THE ATMOSPHERE IN REGIONS OF  
CLEAR-AIR TURBULENCE IS INVESTIGATED BY MEANS OF  
AIRCRAFT OBSERVATIONS OF WIND AND TEMPERATURE IN  
COMBINATION WITH OBJECTIVE AND SUBJECTIVE TURBULENCE  
RECORDS. THE DETAILED FIELDS OF HORIZONTAL AND  
VERTICAL WIND SHEAR, STABILITY, THERMAL ADVECTION,  
AND RICHARDSON NUMBER ARE DESCRIBED FOR THREE  
DIFFERENT PATTERNS OF FLOW, VIZ., A SHARP TROUGH, AN  
ANTICYCLONIC JET STREAM, AND AN INTENSE STRAIGHT JET.  
SEVERE TURBULENCE (EQUIVALENT IN INTENSITY TO  
THAT MEASURED BY THE SAME AIRCRAFT IN A MATURE  
THUNDERSTORM) WAS FOUND IN THE FORMER TWO CASES,  
AND MODERATE TURBULENCE IN THE LATTER CASE. IN THE  
TROUGH, THE MAIN TURBULENT REGION LAY ALONG THE UPPER  
BOUNDARY OF A THERMALLY STABLE LAYER (JET FRONT),  
WHICH LAY IN CYCLONIC WIND SHEAR ON THE LOW PRESSURE  
SIDE OF THE JET CORE. THE TURBULENT REGION WAS  
ASSOCIATED WITH STRONG THERMAL ADVECTION (WINDS  
BACKING WITH HEIGHT) AS WELL AS WITH PROMINENT  
HORIZONTAL AND VERTICAL WIND SHEAR. A BRIEF  
DISCUSSION IS INCLUDED CONCERNING METHODS OF  
PROCESSING STANDARD RAWINSONDE DATA INTO FORMS  
APPLICABLE TO TURBULENCE ANALYSIS. (AUTHOR) (U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0252

AD-412 448

TRAVELERS RESEARCH CENTER INC HARTFORD CONN  
TITLE-DISCRIMINANT ANALYSIS OF CLEAR-AIR  
TURBULENCE,

(U)

OCT 62 25P BALL, JOHN T.  
REPT. NO. 7044 421

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TURBULENCE, ANALYSIS), (\*METEOR  
OLOGICAL PHENOMENA, ATMOSPHERE MOTION),  
RADIOSONDES, FLUID FLOW, WIND, STABILITY,  
ATMOSPHERIC TEMPERATURE, SHEAR STRESSES,  
WEATHER FORECASTING, STATISTICAL ANALYSIS, DATA  
PROCESSING SYSTEMS, METEOROLOGICAL PARAMETERS,  
CLOUDS, CIRRUS CLOUDS.

(U)

IDENTIFIERS: 1962.

(U)

SCREENING MULTIPLE-DISCRIMINATE ANALYSIS (MDA) IS  
USED TO SELECT SPECIFIERS FOR OBJECTIVELY ANALYZING  
CLEAR-AIR TURBULENCE (CAT) WITH THE AID OF AN  
ELECTRONIC COMPUTER. THE DATA CONSIST OF A SPECIAL  
5-DAY COLLECTION OF COMMERCIAL AND MILITARY AIRCRAFT  
REPORTS OF INTENSITIES OF CAT AND NO CAT MADE BY  
THE WEATHER BUREAU. IN THE ANALYSIS, VOLUMES  
OF SPACE ARE CLASSIFIED WITH REGARD TO CAT  
INTENSITY FOR 6-HR INTERVALS. THE VARIABLES USED  
TO SPECIFY THESE CLASSIFICATIONS ARE OBTAINED FROM 6-  
AND 12-HOURLY RADIOSONDE OBSERVATIONS AND UPPER-LEVEL  
CHARTS. THESE INCLUDE STANDARD FLOW, SHEAR, AND  
STABILITY PARAMETERS, BOTH AT THE TIME OF OCCURRENCE  
AND FOR 6 HR PRIOR TO THE OCCURRENCE. THE MDA  
PROGRAM SELECTED THE HEIGHT OF THE MAXIMUM WIND  
LEVEL AND THE HORIZONTAL TEMPERATURE GRADIENT AS THE  
TWO SPECIFIERS BEST ABLE TO DISCRIMINATE BETWEEN  
CATEGORIES OF CAT. THE SIGNIFICANCE OF THE  
SELECTION OF THESE SPECIFIERS IN THE LIGHT OF THE  
DATA SAMPLE USED IS DISCUSSED, AND RECOMMENDATIONS  
ARE MADE FOR FURTHER WORK IN TURBULENCE, BOTH IN  
RESEARCH AND ENGINEERING AREAS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0352

AD-414 355

COLORADO STATE UNIV FORT COLLINS

OCCURRENCE AND CAUSES OF HIGH-LEVEL TURBULENCE. (U)

DESCRIPTIVE NOTE: FINAL REPT., 15 JUNE 61-15 JULY 62.

JUL 62 7P

REPT. NO. TECHNICAL PAPER NO. 45

CONTRACT: N189 188 55120A

MONITOR: NWRP 15 0762 076

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TURBULENCE, TROPOSPHERE),  
TROPOSPHERE, STRATOSPHERE, CIRRUS CLOUDS,  
PHOTOGRAPHIC ANALYSIS, JET STREAMS (METEOROL  
OGY), WIND.

(U)

IDENTIFIERS: CLEAR-AIR TURBULENCE.

(U)

THE PROJECT HAS BEEN ORGANIZED IN THREE PHASES:

(1) PHOTOGRAPHIC FIELD MEASUREMENT PROGRAM,  
(2) AIRCRAFT MEASUREMENTS, AND (3) SYNOPTIC  
AND THEORETICAL STUDIES ON CLEAR-AIR TURBULENCE  
(CAT) AND ATMOSPHERIC MESOSTRUCTURE. THE RE  
SEARCH RESULTS OF THIS PROJECT HAVE BEEN PUB LISHED  
PREVIOUSLY. THE FINDINGS ARE SUMMARIZED AND  
RECOMMENDATIONS AS TO APPLICATION OF RESULTS AND  
AREAS OF FUTURE RESEARCH ARE GIVEN. (AUTHOR)

(U)



UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 7J0392

AD-426 812

PENNSYLVANIA STATE UNIV UNIVERSITY PARK

PHYSICAL MECHANISMS OF CLEAR-AIR TURBULENCE, (U)

AUG 63 20P PANOFKY, H.A. MCLEAN, J.C. I

REPT. NO. SR1

CONTRACT: CUB1029

UNCLASSIFIED REPORT

DESCRIPTORS: (\*AIR, TURBULENCE), (\*WIND,  
AIR MASS ANALYSIS), TEMPERATURE, SHEAR  
STRESSES, VORTICES, HEAT TRANSFER. (U)

IDENTIFIERS: 1963, CAT, RICHARDSON NUMBERS. (U)

AN ATTEMPT WAS MADE TO TEST THE HYPOTHESIS THAT  
REPORTS OF CLEAR-AIR TURBULENCE (CAT) ON MARCH  
14-15, 1962, WERE ASSOCIATED WITH NARROW LAYERS  
(UPPER FRONTS) IN WHICH THE RICHARDSON NUMBERS  
ARE SMALL. THE TEST WAS CARRIED OUT WITH THE AID  
OF ORIGINAL SOUNDINGS OF TEMPERATURE AND WIND. THE  
DATA DID NOT CONTRADICT THE HYPOTHESIS, AS MANY  
REPORTS OF CAT WERE MADE IN SLOPING PAROCLINIC OR  
ADIABATIC LAYERS. IN ANY CASE, THE RICHARDSON  
NUMBERS WERE GENERALLY LOW. COMPLETE CONFIRMATION  
AND ESTABLISHMENT OF A FIRM 'CRITICAL' RICHARDSON  
NUMBER REQUIRES BETTER VERTICAL RESOLUTION OF WIND.  
AN INDEX OF CAT INTENSITY WHICH SHOULD BE  
PROPORTIONAL TO THE ENERGY OF CAT IS DERIVED FROM  
THE EDDY ENERGY EQUATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-427 027

REDSTONE SCIENTIFIC INFORMATION CENTER REDSTONE ARSENAL  
ALA

ON THE FORECASTING OF CLEAR AIR TURBULENCE, (U)

DEC 62 22P SUGIMOTO, Y. IONO, K. I

MONITOR: RSIC 115

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. FROM JOURNAL OF  
METEOROLOGICAL RESEARCH, NO. 14, PP. 80-92, 1962.

DESCRIPTORS: (•TURBULENCE, WEATHER FORECASTING), AIR  
MASS ANALYSIS, JET PLANES, DISTRIBUTION, PRESSURE (U)

IDENTIFIERS: 1962, CLEAR AIR TURBULENCE, JET  
CURRENTS, JPRS (U)

ON THE FORECASTING OF CLEAR AIR TURBULENCE.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-421 946

AIR WEATHER SERVICE SCOTT AFB ILL

CLEAR AIR TURBULENCE,

APR 61 19P THOMPSON, CARROLL G. ;

(U)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ATMOSPHERIC MOTION, TURBULENCE),  
WEATHER FORECASTING, SHEAR STRESSES, AIR MASS  
ANALYSIS

(U)

IDENTIFIERS: 1961

(U)

FREQUENCY OF OCCURRENCE, DISTRIBUTION, AND THE  
DYNAMIC PARAMETERS MOST OFTEN CONSIDERED IN  
CONNECTION WITH CLEAR AIR TURBULENCE ARE EXAMINED.  
THE RATE OF GROWTH OF TURBULENCE IS COMPUTED WITH  
HYPOTHETICAL VALUES OF VERTICAL SHEAR, HORIZONTAL  
SHEAR, AND GROWTH OF TURBULENT ENERGY WITH GRAVITY  
WAVES ASSUMED AS PRIMARY SOURCES OF TURBULENT  
ENERGY. A FORECAST SCHEME, AS PROPOSED IN A  
REFERENCED PUBLICATION, IS INCLUDED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-432 468

STANFORD RESEARCH INST MENLO PARK CALIF

THE DISTRIBUTION OF CLEAR AIR TURBULENCE REPORTS AND  
CLOUD PATTERNS AS SEEN IN SATELLITE PHOTOGRAPHS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

JAN 64 51P SEREBRENY, SIDNEY M. :

WIEGMAN, ELDON J. :

CONTRACT: CMB-10481

PROJ: SRI-4279

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: UNCLASSIFIED REPORT

DESCRIPTORS: (ATMOSPHERIC MOTION, TURBULENCE),  
METEOROLOGICAL SATELLITES, PHOTOGRAPHIC ANALYSIS,  
CLOUDS, CLOUD COVER, BAROMETRIC PRESSURE, AIR MASS  
ANALYSIS, VORTICES, PATTERN RECOGNITION, CYCLONES,  
METEOROLOGICAL CHARTS (U)

IDENTIFIERS: 1964, CLEAR AIR TURBULENCE, TIROS (U)

SELECTED COMBAR REPORTS OF CLEAR AIR TURBULENCE  
FOR TEN DAYS FROM APRIL AND MAY 1960 ARE STUDIED  
IN ASSOCIATION WITH THE CLOUD DISTRIBUTION SHOWN BY  
TIROS I DURING THIS PERIOD. CHARACTERISTIC CLOUD  
PATTERNS ACCOMPANY CERTAIN TYPES OF WEATHER SYSTEMS,  
PARTICULARLY LOW PRESSURE VORTICES, AND OFTEN  
DELINEATE, RATHER WELL, THE LOCATION OF JET STREAMS  
AND TROPOPAUSES (WHICH ARE KNOWN TO BE ASSOCIATED  
WITH CLEAR AIR TURBULENCE OCCURRENCES) ABOUT THESE  
WEATHER SYSTEMS. AS A CONSEQUENCE, SATELLITE  
PHOTOGRAPHS OF LOW PRESSURE VORTICES MAY PROVIDE A  
USEFUL SUPPLEMENTAL TOOL IN ESTABLISHING THE AREAL  
DISTRIBUTION OF CLEAR AIR TURBULENCE RISK DURING  
VARIOUS STAGES OF CYCLONE DEVELOPMENT. SCHEMATIC  
REPRESENTATIONS OF THE TYPICAL CLOUD PATTERNS DURING  
THREE STAGES OF CYCLONE DEVELOPMENT ARE PRESENTED.  
FOUR CASE HISTORIES ARE INCLUDED AS CHARACTERISTIC  
EXAMPLES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-603 970

STANFORD RESEARCH INST MENLO PARK CALIF  
CLEAR-AIR TURBULENCE AND ITS ANALYSIS BY USE OF  
RAWINSONDE DATA. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

JUN 64 65P ENDLICH, R. M. IMANCUSO, R. L.

1  
CONTRACT: CWB10624

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TURBULENCE, ATMOSPHERIC MOTION),  
(\*ATMOSPHERIC MOTION, TURBULENCE), TERRAIN, JET  
STREAMS (METEOROLOGY), WIND, FLUID DYNAMIC PROBLEMS,  
MEASUREMENT, RADIOSONDES, FLIGHT PATHS, JET PLANES,  
METEOROLOGICAL CHARTS (U)

THIS INVESTIGATION OF CLEAR-AIR TURBULENCE HAS SEVERAL PARTS. THE FIRST SECTION REVIEWS SELECTED ASPECTS OF TURBULENCE, AND EMPHASIZES THE LARGE SIZE AND PERSISTENT NATURE OF CERTAIN AREAS OF MODERATE OR SEVERE TURBULENCE. THE NEXT SECTION IS AN INVESTIGATION OF TURBULENCE IN PRONOUNCED JET STREAM FLOW OVER MOUNTAINS. IN ORDER TO TEST THE UTILITY OF STANDARD UPPER-AIR DATA IN TURBULENCE ANALYSIS, VALUES OF RICHARDSON'S NUMBER AND THE TURBULENCE INDEX WERE DETERMINED BY ELECTRONIC COMPUTER IN EIGHT LAYERS BETWEEN 900 AND 190 MB AT ALL RAWINSONDE STATIONS IN THE UNITED STATES DURING THE PERIOD 12-24 MARCH 1962. THESE VALUES ARE COMPARED WITH TURBULENCE REPORTS MADE BY PILOTS OF JET AIRCRAFT AND COLLECTED BY THE CLEAR-AIR TURBULENCE PROJECT. SEVERAL MAPS ARE PRESENTED THAT ILLUSTRATE SUBSTANTIAL AGREEMENT OF COMPUTED QUANTITIES WITH THE TURBULENCE REPORTS. STANDARD STATISTICAL TESTS SHOW THAT BOTH THE RI AND TI NUMBERS HAVE DEFINITE SKILL IN TURBULENCE ANALYSIS, AND THAT COMBINED USE OF THE TWO NUMBERS IS MORE ACCURATE THAN USE OF EITHER ONE SEPARATELY. SUGGESTIONS ARE GIVEN FOR FURTHER IMPROVEMENT OF CRITERIA FOR ANALYZING TURBULENCE. EXPERIMENTS IN GRIDPOINT ANALYSIS OF TURBULENCE AND IN OBJECTIVE TURBULENCE FORECASTING ARE RECOMMENDED. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /J0392

AD-612 691

AIR FORCE CAMBRIDGE RESEARCH LABS L 6 HANSCOM FIELD  
MASS

AN INVESTIGATION INTO THE USE OF TEMPERATURE  
GRADIENTS AS AN IN-FLIGHT WARNING OF IMPENDING CLEAR-  
AIR TURBULENCE. (U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT.,  
FEB 65 20P MCLEAN, GEORGE J  
REPT. NO. ERP-85 , AFCRL-65-117  
PROJ: 6020  
TASK: 6020 04

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•ATMOSPHERIC TEMPERATURE, TURBULENCE),  
(•TURBULENCE, AVIATION SAFETY), (•ALL-WEATHER  
AVIATION, TURBULENCE), (•WEATHER FORECASTING, ALL-  
WEATHER AVIATION), JET STREAMS (METEOROLOGY), FLIGHT  
PATHS, BUFFETING, ATMOSPHERIC SOUNDING, AIRCRAFT,  
TEMPERATURE SENSITIVE ELEMENTS, AIR MASS ANALYSIS,  
EXPERIMENTAL DATA, TABLES (U)  
IDENTIFIERS: CLEAR-AIR TURBULENCE (U)

THIS PAPER DISCUSSES A STUDY THAT WAS UNDERTAKEN TO  
INVESTIGATE THE TECHNIQUE OF USING IN-FLIGHT  
TEMPERATURE GRADIENTS TO FORECAST IMPENDING CLEAR-AIR  
TURBULENCE (CAT) AND SOME RECENT STUDIES CONCERNING  
THE RELATIONSHIP BETWEEN JET STREAM WINDS AND  
TURBULENCE. RESULTS OF THE STUDY INDICATE THAT A  
HORIZONTAL TEMPERATURE GRADIENT OBSERVED IN FLIGHT BY  
DIRECT SENSING METHODS IS NOT A CONCLUSIVE INDICATOR  
OF IMPENDING TURBULENCE. HOWEVER, AN IMPROVED  
INFLIGHT INDICATOR OF CAT IS NEEDED. IF WINDS  
OBTAINED FROM RAWINSONDES WERE TO BE COMPUTED AT  
2000-FT INTERVALS (OR LESS) AT THE TIME OF THE  
ORIGINAL REDUCTION OF DATA BY OPERATIONAL UNITS, THE  
MAXIMUM VALUES OF AV. WIND SPEED (CHANGE OF WIND  
DIRECTION/CHANGE OF HEIGHT) COULD EASILY BE  
COMPUTED, CODED, AND TRANSMITTED AS PART OF THE  
STANDARD UPPER-AIR CODE TRANSMISSION IN THE SAME WAY  
AS OTHER SPECIAL PARAMETERS. IF THE VALUE OF AV.  
WIND SPEED (CHANGE OF WIND DIRECTION/ CHANGE OF  
HEIGHT) OVER 2000-FT LAYERS COULD BE COMPUTED AS  
DESCRIBED BY KRONFACH (J. APPL. METEOROLOGY  
3:119-125 (1964) AND INCLUDED IN THE PARAMETERS  
ANALYZED BY THE NATIONAL METEOROLOGICAL CENTER,  
SUITLAND, MARYLAND, THE WRITERS FEEL THAT A  
SUBSTANTIAL IMPROVEMENT COULD BE MADE TO CAT  
FORECASTS USING RAWINSONDE DATA. (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0352

AD-616 347

LITTON SYSTEMS INC MINNEAPOLIS MINN APPLIED SCIENCE  
DIV

TESTING AND FURTHER DEVELOPMENT OF AN ELECTRONIC  
CLOUD DETECTOR. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

OCT 64 61P RUHNKE,LOTHAR H. ;

REPT. NO. ASD-2639

CONTRACT: AF19 628 3894

PROJ: 6670

TASK: 667001

MONITOR: AFCRL , 64-869

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LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF  
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SALE.

DESCRIPTORS: (\*METEOROLOGICAL INSTRUMENTS,  
PROBES(ELECTROMAGNETIC)), (\*RADIOSONDES,  
TESTS), (\*CLOUDS, PROBES(ELECTROMAGNETIC)),  
ELECTROSTATICS, DIPOLE ANTENNAS, ATMOSPHERIC  
ELECTRICITY, ELECTROMETERS, TRANSDUCERS,  
CIRCUITS, ATMOSPHERIC MOTION, ELECTRIC FIELDS,  
METEOROLOGICAL BALLOONS (U)

IDENTIFIERS: CLOUD DETECTORS (U)

AN ELECTROSTATIC SENSOR FOR USE ON WEATHER  
RADIOSONDE HAS BEEN DESIGNED TO DETECT BOUNDARIES OF  
STRATIFIED CLOUDS. A VERTICAL DIPOLE ANTENNA  
SENSES THE DISPLACEMENT CURRENT DUE TO THE VERTICAL  
VELOCITY OF THE BALLOON AND THE CHANGE OF THE  
ATMOSPHERIC ELECTRIC FIELD AT CLOUD BOUNDARIES.  
THE ELECTRONIC CIRCUITRY CONSISTS OF A SOLID-STATE  
ELECTROMETER WITH 10 TO THE 10TH POWER OHM INPUT  
RESISTANCE ACTING AS A VOLTAGE RESISTANCE TRANSDUCER.  
THE CIRCUIT IS SIMPLE AND INEXPENSIVE; IT CONTAINS  
NO BATTERIES OR COMPONENTS WITH LIMITED SHELF LIFE.  
A MANNED HOT-AIR BALLOON WAS EMPLOYED SEVERAL TIMES  
TO CORRELATE VISUAL AND ELECTRICAL OBSERVATIONS.  
TURBULENCE IN CLEAR AIR PRODUCES ELECTRIC FIELD  
FLUCTUATIONS, WHICH, TO A MINOR DEGREE, AFFECT THE  
RECORDINGS. OF CONCERN ALSO WERE UNDULATION  
MOVEMENTS OF NEOPRENE BALLOONS WITH SHORT LEADER  
LINES. FLIGHT RESULTS SHOW GOOD AGREEMENT WITH  
VISUAL OBSERVATIONS AND WEATHER BUREAU REPORTS.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-629 309 4/1  
STANFORD RESEARCH INST MENLO PARK CALIF  
CORRELATION BETWEEN CLEAR-AIR TURBULENCE AND AIRCRAFT  
ELECTRICAL ACTIVITY. (U)  
DESCRIPTIVE NOTE: FINAL REPT., OCT 63-AUG 65,  
OCT 65 76P NANEVICZ, JOSEPH E. ;  
VANCE, EDWARD F. ; SEREBRENY, SIDNEY M. ;  
CONTRACT: AF19(628)-2208  
PROJ: 6020 , SRI-4690  
TASK: 602003  
MONITOR: AFCRL , 65-614

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CLEAR AIR TURBULENCE, ELECTRICAL  
PROPERTIES), (\*AIRCRAFT, STATIC ELECTRICITY),  
(\*STATIC ELECTRICITY, AIRCRAFT), STATIC  
DISCHARGERS, ELECTRIC DISCHARGES, ELECTRICAL  
CORONA, METEOROLOGICAL PARAMETERS, FLIGHT PATHS,  
CORRELATION TECHNIQUES (U)

THE RESULTS OF A COOPERATIVE EFFORT BY STANFORD  
RESEARCH INSTITUTE, UNITED AIR LINES, AND  
AIR FORCE CAMBRIDGE RESEARCH LABORATORIES  
TO DETERMINE THE CORRELATION BETWEEN REGIONS OF  
CLEAR-AIR TURBULENCE (CAT) AND AIRCRAFT ELECTRICAL  
ACTIVITY ARE DESCRIBED. CORONA DISCHARGES FROM  
PRECIPITATION STATIC DISCHARGERS ON DC-8 AIRCRAFT  
WERE MONITORED AND CORRELATED WITH CAT ENCOUNTERS.  
A SIGNIFICANT CORRELATION WAS FOUND TO EXIST  
BETWEEN CAT ENCOUNTERS AND PERIODS OF ELECTRICAL  
DISCHARGE. IT IS SUGGESTED THAT THESE ELECTRICAL  
DISCHARGES MAY BE CAUSED BY ELECTRIC FIELDS IN THE  
REGION OF CLEAR-AIR TURBULENCE, PARTICULATE MATTER IN  
THE REGION THAT CHARGES THE AIRCRAFT, OR A  
COMBINATION OF BOTH. A METEOROLOGICAL ANALYSIS WAS  
MADE OF THE REGIONS WHERE TURBULENCE ASSOCIATED WITH  
ELECTRICAL ACTIVITY WAS OBSERVED. THIS ANALYSIS  
INDICATED THAT THE CAT INCIDENTS WERE ASSOCIATED  
WITH JET STREAMS. (AUTHOR) (U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 7J0292

AD-620 552 1/2 17/9  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
PASSIVE-REFLECTOR EXPERIMENTS IN RADAR MEASUREMENT OF  
THE TURBULENCE OF THE CLEAR SKY. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
JAN 66 16P SMIRNOVA, G. A. 1  
REPT. NO. T-R-517,  
CONTRACT: AF 19(628)-3880,  
MONITOR: TT, 66-60829

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: OPYTY RADIOLOKATSIONNOGO  
IZMERENIYA TURBULENTNOSTI IASNOGO NEBA S  
POMOSHCHIU PASSIVNYKH OTRAZHATELEI, TRANS. OF  
TSENTRALNAYA AEROLOGICHESKAYA OBSERVATORIYA. TRUDY  
(USSR) N57 P72-6 1964.

DESCRIPTORS: (\*CLEAR AIR TURBULENCE, \*RADAR  
SCANNING), (\*METEOROLOGICAL RADAR, CLEAR AIR  
TURBULENCE), ATMOSPHERIC MOTION, RADAR REFLECTORS,  
RADAR TRACKING, RADAR ECHO AREAS, CORRELATION  
TECHNIQUES, PASSIVE, USSR (U)

SOME RESULTS OF RADAR INVESTIGATION OF THE  
ATMOSPHERIC TURBULENCE OF THE CLEAR SKY ARE PRESENTED  
AND COMPARED WITH DATA FROM AIRCRAFT OBSERVATIONS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-631 967 4/2 17/9  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
JOINT RADAR AND AEROLOGICAL OBSERVATIONS IN THE LOWER  
1.5 KM OF THE ATMOSPHERE. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
MAR 66 26P BRYLEV, G. B. IVASILCHENKO, I. V.  
ISELITSKAYA, V. I. IFEDOROV, A. A. I  
REPT. NO. T-R-922,  
CONTRACT: AF 19(528)-3880,  
MONITOR: TT , 66-61159

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SOVMESTNE RADIOLOKATSIONNE I  
AEROLOGICHESKIE NABLIUDENIYA V NIZHNEM 1.5-KM SLOE  
ATMOSFERY, TRANS. OF GLAVNAYA GEOFIZICHESKAYA  
OBSERVATORIYA, Leningrad. TRUDY (USSR) N173 P76-90  
1965.

DESCRIPTORS: (•METEOROLOGICAL RADAR, CLEAR AIR  
TURBULENCE), (•CLEAR AIR TURBULENCE, RADAR ECHO  
AREAS), (•RADAR SCANNING, CLEAR AIR TURBULENCE),  
(•ATMOSPHERIC SOUNDING, METEOROLOGICAL RADAR),  
METEOROLOGICAL PARAMETERS, ELECTRONIC RECORDING  
SYSTEMS, METEOROLOGICAL INSTRUMENTS, METEOROLOGY,  
USSR (U)

THE RESULTS OF JOINT RADAR AND AEROLOGICAL  
OBSERVATIONS IN THE LOWER 1.5 KM OF THE ATMOSPHERE  
ARE DISCUSSED, AND A CONNECTION IS INDICATED BETWEEN  
RADAR ECHOES FROM A CLEAR SKY AND CONVECTIVE AND  
TURBULENT MOTIONS IN THE ATMOSPHERE. (AUTHOR)

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-632 827 4/1  
DEPARTMENT OF THE AIR FORCE WASHINGTON D C  
CLEAR AIR TURBULENCE MEETING, 19, 20 AUGUST  
1964.

64 81P

(U)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (C) CLEAR AIR TURBULENCE, SYMPOSIA,  
METEOROLOGICAL PARAMETERS, DETERMINATION,  
MANAGEMENT PLANNING, WEATHER FORECASTING, WIND,  
AIRCRAFT, HAZARDS

(U)

THE PURPOSE OF MEETING IS (A) TO HAVE A FREE  
AND COMPLETE EXCHANGE OF INFORMATION AMONG ALL  
AGENCIES INVOLVED IN RESEARCH AND STUDY IN THE  
FORECASTING AND DETECTION OF CLEAR AIR  
TURBULENCE. (B) TO REVIEW CURRENT AND PLANNED  
PROGRAMS TO DETERMINE IF THERE IS SUFFICIENT EFFORT  
IN EACH AREA. (C) TO DETERMINE AREAS WHERE  
EFFORTS SHOULD BE BETTER COORDINATED AND/OR  
CONSOLIDATED. THERE IS NOT AT THIS TIME A FULLY  
PROVEN 'INDICATOR' OF CAT. MOST OF THE EFFORTS  
DESCRIBED ARE DIRECTED AT DETERMINING IF A GIVEN  
PARAMETER CAN PROVIDE SUCH INDICATION.

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-634 886 17/9 20/5 4/2  
SPACE AND INFORMATION SYSTEMS DIV NORTH AMERICAN AVIATION  
INC DOWNEY CALIF  
DESIGN STUDY OF LASER RADAR FOR DETECTION OF CLEAR  
AIR TURBULENCE. (U)  
DESCRIPTIVE NOTE: FINAL REPT. 1 APR 65-15 APR 66,  
JUN 66 170P BREECE, R. C. ; FRIED, D. L. ;  
MUNICK, R. J. ;  
REPT. NO. SID-66-450,  
CONTRACT: AF 19(628)-5135,  
PROJ: AF-6020, AF-6670  
TASK: 602003, 667007  
MONITOR: AFCRL 66-334

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•CLEAR AIR TURBULENCE, RADAR  
SCANNING), (•DOPPLER RADAR, •LASERS),  
(•METEOROLOGICAL RADAR, LASERS), AEROSOLS,  
LIGHT, BACKSCATTERING, DEMODULATORS,  
PHOTOTUBES, AIRCRAFT EQUIPMENT (U)

THE OBJECTIVE OF THE RESEARCH WAS TO PERFORM A  
DESIGN STUDY AND FEASIBILITY DEMONSTRATION OF A  
DOPPLER LASER RADAR SYSTEM FOR USE IN DETECTION OF  
CLEAR AIR TURBULENCE. BOTH CW AND PULSED RADAR  
TECHNIQUES WERE INVESTIGATED TO DETERMINE  
APPLICABILITY TO ANALYSIS OF LASER LIGHT  
BACKSCATTERED FROM ATMOSPHERIC MOLECULES AND AEROSOL  
PARTICLES IN ORDER TO MEASURE MACROSCOPIC MOTION OF  
THE AIR. IT WAS DESIRED TO DETECT WIND GUSTS IN  
EXCESS OF 25 FEET PER SECOND WHILE OPERATING IN A JET  
AIRCRAFT AT AN ALTITUDE OF APPROXIMATELY 30,000 FEET.  
THE PROGRAM INCLUDED ANALYSIS OF DESIGN  
REQUIREMENTS, ANALYSIS OF LIGHT SCATTERING BY THE  
ATMOSPHERE, A DESIGN TRADE-OFF STUDY, AND AN  
EXPERIMENTAL DEMONSTRATION. IT WAS CONCLUDED THAT,  
IF PARTICULATE MATTER EXISTS AT FLIGHT ALTITUDES IN  
SUFFICIENT CONCENTRATION AND IF ADVANCES IN THE LASER  
STATE OF THE ART PERMIT FABRICATION OF A LASER WITH  
THE REQUIRED PERFORMANCE, A SYSTEM WITH A RANGE OF UP  
TO 50 NAUTICAL MILES IS FEASIBLE. THE ANALYSIS  
SHOWED THAT THE SYSTEM MUST DEPEND ON SCATTERING FROM  
AEROSOL PARTICLES AND THAT A PULSED SYSTEM HAS  
SIGNIFICANT ADVANTAGES OVER A CW SYSTEM. A  
SYSTEM CONCEPT IS DESCRIBED WHICH EMPLOYS DETECTION  
OF BEAT FREQUENCIES IN THE OUTPUT CURRENT OF A  
PHOTODETECTOR RESULTING FROM PHOTO-MIXING OF THE  
BACKSCATTERED LIGHT FROM TWO LASER PULSES  
ILLUMINATING SEPARATED VOLUMES OF AIR. AN (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-639 030 17/9 4/2 1/2  
MICHIGAN UNIV ANN ARBOR  
AIRBORNE INVESTIGATIONS OF CLEAR AIR TURBULENCE WITH  
OPTICAL RADAR. (U)  
DESCRIPTIVE NOTE: PROGRESS REPT.,  
DEC 65 175P FRANKEN, P. A. ; JENNEY, J. A. ;  
RANK, D. M. ;  
CONTRACT: NONR-1224(91),

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CLEAR AIR TURBULENCE, RADAR  
SCANNING), (\*OPDAR, \*METEOROLOGICAL RADAR),  
(\*ALL-WEATHER AVIATION, CLEAR AIR TURBULENCE)  
AIRBORNE, FLIGHT INSTRUMENTS, LASERS, RADAR  
EQUIPMENT, RADAR ECHO AREAS, AEROSOLS,  
ATMOSPHERIC MOTION, FLIGHT TESTING, AVIATION  
SAFETY (U)

THE PROGRAM WAS INITIATED TO EXPLORE THE  
POSSIBILITY THAT CHARACTERISTIC OPTICAL RADAR ECHOES  
MIGHT ACTUALLY BE CORRELATED WITH CLEAR AIR  
TURBULENCE. A LIGHT TWIN ENGINE AIRPLANE WAS  
EQUIPPED WITH A LASER RADAR AND ANCILLARY EQUIPMENT  
FOR MONITORING ACCELERATION, TEMPERATURE VARIATIONS,  
AND RELEVANT METEOROLOGICAL DATA. THE DESIGN OF  
THIS EQUIPMENT AND THE DEVELOPMENT OF THE FLIGHT  
PROGRAMS WAS PREDICATED ON THEORETICAL CONSIDERATIONS  
OF OPTICAL SCATTERING FROM PARTICULATE MATTER.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-629 317 4/1 17/9  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
MULTIWAVELENGTH BACKSCATTER FROM THE CLEAR  
ATMOSPHERE. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS.  
DEC 65 2DP HARDY, KENNETH R. I  
ATLAS, DAVID IGLOVER, KENNETH M. I  
REPT. NO. AFCRL-ERP-191, AFCRL-66-700  
PROJ: AF-6672;  
TASK: 667205,

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF GEOPHYSICAL  
RESEARCH V71 N6 P1927-52 MAR 15 1966.  
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED 16  
OCT 65.

DESCRIPTORS: (•CLEAR AIR TURBULENCE, •RADAR ECHO  
AREAS), (•METEOROLOGICAL RADAR, CLEAR AIR  
TURBULENCE), RADAR SCANNING, METEOROLOGICAL  
PARAMETERS, INSECTS, SPECTRUM SIGNATURES, RADAR  
REFLECTIONS, BACKSCATTERING (U)

SIMULTANEOUS EXPERIMENTS HAVE BEEN CONDUCTED WITH  
ULTRASENSITIVE RADARS AT 3.2-, 10.7-, AND 71.9-CM  
WAVELENGTHS TO OBSERVE 'ANGEL' ECHOES FROM APPARENTLY  
CLEAR AIR AND TO DIAGNOSE THE SCATTERING MECHANISM.  
TWO TYPES OF ECHO LAYERS HAVE BEEN FOUND. TYPE I  
ECHO LAYERS APPEAR INCOHERENT AT LONG RANGES OR WITH  
WIDE BEAMS BUT ARE SEEN TO BE COMPOSED OF DISCRETE  
COHERENT ECHOES WHEN VIEWED WITH HIGH RESOLUTION.  
THE CROSS SECTIONS OF THE DISCRETE TARGETS VARY  
ROUGHLY BETWEEN THE INVERSE FIRST AND SECOND POWER OF  
WAVELENGTH BETWEEN 3 AND 10 CM AND BETWEEN THE  
INVERSE THIRD AND FOURTH POWER BETWEEN 10 AND 71 CM.  
BOTH THE MAGNITUDE OF THE CROSS SECTIONS AND THE  
WAVELENGTH DEPENDENCE ARE CONSISTENT WITH THE  
HYPOTHESIS THAT THE TARGETS ARE LARGE INSECTS.  
TYPE II ECHO LAYERS ARE COMPOSED OF INCOHERENT  
ECHOES AT ALL RANGES, SHOW LITTLE OR NO WAVELENGTH  
DEPENDENCE, AND ARE GENERALLY UNDETECTABLE AT 3 CM.  
THIS TYPE OF LAYER IS ATTRIBUTED TO REFRACTIVE  
INDEX FLUCTUATIONS WHICH ARE MAXIMIZED NEAR STABLE  
LAYERS-LAYERS OF MAXIMUM GRADIENT IN REFRACTIVITY.  
THEIR REFLECTIVITIES ARE CONSISTENT WITH MEAN-  
SQUARE FLUCTUATIONS IN REFRACTIVITY MEASURED DIRECTLY  
IN SIMILAR LAYERS AND WITH THAT DEDUCED FROM FORWARD-  
SCATTER MEASUREMENTS. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-636 090 4/1 4/2 20/3  
HONEYWELL INC ST PAUL MINN SYSTEMS AND RESEARCH DIV  
STUDY OF LOW FREQUENCY ELECTRICAL CHARACTERISTICS OF  
CLEAR AIR TURBULENCE AND STORM FRONT CENTERS. (U)  
DESCRIPTIVE NOTE: FINAL REPT., 19 MAR-19 SEP 69.  
FEB 66 120P TENBROEK, HENRY W. ;  
SEASHORE, CHARLES R. ;  
REPT. NO. 12011-FR-1,  
CONTRACT: AF 19(628)-9060,  
PROJ: AF-6020,  
TASK: 602003,  
MONITOR: AFCRL 66-240

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CLEAR AIR TURBULENCE,  
\*ELECTROSTATIC FIELDS), (\*ATMOSPHERIC ELECTRICITY,  
CLEAR AIR TURBULENCE), ATMOSPHERIC SOUNDING,  
PROBES (ELECTROMAGNETIC), STORMS, CUMULUS  
CLOUDS, LOW FREQUENCY, ELECTRICAL PROPERTIES (U)

THIS REPORT COVERS WORK DONE IN INVESTIGATING THE  
LOW FREQUENCY ELECTROSTATIC FIELD CHARACTERISTICS OF  
CLEAR AIR TURBULENCE AND STORM FRONT REGIONS. THE  
GENERAL THEORY DESCRIBING THE FIELD SENSING ANTENNAS  
IS PRESENTED IN ADDITION TO THE PRACTICAL ASPECTS OF  
THOSE ANTENNAS ACTUALLY UTILIZED IN THE PROGRAM.  
THE ELECTRONIC INSTRUMENTATION USED IN DATA  
GATHERING FLIGHTS AND SUBSEQUENT DATA REDUCTION IS  
DESCRIBED AND THE DATA FROM ONE RIDGELINE TURBULENCE  
ENCOUNTER AND THREE STORM FRONT FLIGHTS IS ANALYZED  
WITH RESPECT TO FREQUENCY CONTENT IN DECADE  
BANDWIDTHS FROM 0.1 TO 10,000 CPS. RESULTS FROM THE  
TURBULENCE FLIGHT REVEAL SIGNALS DUE TO THE  
TURBULENCE WHICH DIFFER FROM PRE- AND POST-ENCOUNTER  
NORMS AND PRESENT THE POSSIBILITY OF ANTICIPATING THE  
ENCOUNTER. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. 7J0392

AD-626 225 4/1 17/9 17/8  
HONEYWELL INC ROSEVILLE MINN SYSTEMS AND RESEARCH  
CENTER  
STUDY OF TECHNIQUES FOR DETECTION AND MEASUREMENT OF  
CLEAR AIR TURBULENCE. (U)  
DESCRIPTIVE NOTE: FINAL REPT., 19 NOV 62-30 OCT 65.  
JAN 66 125P ZIRKLE JR, RAYMOND E. I  
REPT. NO. 1940-FRI,  
CONTRACT: AF 19(628)-2276,  
PROJ: AF-6670,  
TASK: 667007,  
MONITOR: AFCRL 66-115

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CLEAR AIR TURBULENCE, RADAR  
TRACKING), (\*OPDAR, \*METEOROLOGICAL RADAR),  
ATMOSPHERIC MOTION, OPTICAL TRACKING, LASERS,  
BACKSCATTERING, DOPPLER EFFECT, CORRELATION  
TECHNIQUES (U)

TWO GENERAL WAYS IN WHICH LASER OPTICAL RADAR  
(OPTAR) MIGHT BE USEFUL FOR CLEAR AIR TURBULENCE  
DETECTION WERE EXAMINED. THE FIRST METHOD INVOLVES  
SPECTRAL ANALYSIS OF DOPPLER-SHIFTED LIGHT,  
BACKSCATTERED BY MOVING PARTICLES, TO PROVIDE  
MEASURES OF AVERAGE AND GUST SPECTRUM VELOCITY  
COMPONENTS. THE SECOND METHOD INVOLVES THE MAPPING  
OF PARTICLE FORMATIONS ARRAYED IN THE ATMOSPHERE BY  
CORRELATES OF ROUGH FLYING CONDITIONS SUCH AS WIND  
SHEAR, THE JET STREAM, MOUNTAIN WAVES, ETC.  
CALCULATIONS SHOW THAT THE PARTICULATE MATTER OF  
THE TROPOSPHERE WHICH DOMINATES OPTICAL BACKSCATTER  
IS DYNAMICALLY SUITABLE FOR THE MAPPING OF WIND  
MOTIONS CONSISTENT WITH ANTICIPATED REQUIREMENTS OF  
CAT DETECTION. EXPERIMENTS BY OTHER GROUPS HAVE  
SHOWN THAT LASER DOPPLER METHODS CAN MEASURE PARTICLE  
VELOCITIES IN THE LABORATORY. EXPERIMENTAL  
EXTENSIONS OF THESE TECHNIQUES WILL BE NEEDED TO  
APPLY THE CONCEPT TO AIRCRAFT. AN EXPERIMENTAL  
PROGRAM WITH PULSED RUBY LASER OPTARS WAS CONDUCTED.  
PARTICLE ARRAYS WERE DETECTED IN BOTH LABORATORY  
AND FIELD ENVIRONMENTS, BUT NO EVIDENCE WAS OBTAINED  
INDICATING A CORRELATION WITH TURBULENT CONDITIONS.  
LABORATORY TURBULENCE-GENERATED REFRACTIVE INDEX  
CHANGES WERE MUCH HIGHER THAN THOSE ENCOUNTERED IN  
THE ATMOSPHERE. FIELD TESTS AT ROLLINSVILLE,  
COLORADO WERE INCONCLUSIVE DUE TO POOR WEATHER  
CONDITIONS. MANY CLOUD RETURNS WERE OBTAINED, BUT  
THEY WERE NOT RELATED TO MOUNTAIN WAVES OR (U)

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7J0392



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DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /J0392

AD-640 379                      4/2                      1/2  
ROYAL AIRCRAFT ESTABLISHMENT FARNBOROUGH (ENGLAND)  
PROJECT TOPCAT: SUMMARY OF METEOROLOGICAL  
OBSERVATIONS AND AIRCRAFT MEASUREMENTS DURING ROUTINE  
FLIGHTS IN THE AUSTRALIAN JET STREAM. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT.,  
APR 66 103P                      WELLS, E. W. I  
REPT. NO. TR-66122,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•JET STREAMS(METEOROLOGY),  
METEOROLOGICAL PARAMETERS), (•CLEAR AIR TURBULENCE,  
•AUSTRALIA), FLIGHT PATHS, WIND, ATMOSPHERIC  
TEMPERATURE, METEOROLOGICAL INSTRUMENTS, GREAT  
BRITAIN (U)  
IDENTIFIERS: TOPCAT PROJECT (U)

A NUMBER OF FLIGHTS WERE MADE OVER SET TRACKS AND  
HEIGHTS TO MEASURE CLEAR AIR TURBULENCE IN THE  
VICINITY OF THE FLINDERS RANGES IN SOUTH  
AUSTRALIA. DETAILS OF THE METEOROLOGICAL  
OBSERVATIONS AND FLIGHT PATHS, AND MEASUREMENTS OF  
WIND, TEMPERATURE AND TURBULENCE OBTAINED FROM THE  
AIRCRAFT INSTRUMENTATION ARE PRESENTED. WIND AND  
TEMPERATURE GRADIENTS WERE DERIVED FOR CROSS SECTIONS  
ON THE UPWIND AND DOWNWIND SIDES OF THE RANGES AND  
A COMPARISON MADE OF THE INTENSITY OF TURBULENCE  
BETWEEN THE TWO SIDES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-641 923 9/1  
AIR FORCE SYSTEMS COMMAND WASHINGTON D C  
PROCEEDINGS OF THE ANNUAL AIR FORCE SCIENCE AND  
ENGINEERING SYMPOSIUM (12TH), 27-28-29 SEPTEMBER  
1966, ARNOLD ENGINEERING DEVELOPMENT CENTER, ARNOLD  
AIR FORCE STATION, TENNESSEE. VOLUME III.  
UNCLASSIFIED, UNCONTROLLED DISTRIBUTION VOLUME OF  
UNPRESENTED PAPERS. (U)  
SEP 66 319P

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-641 921, AD-641  
922.

DESCRIPTORS: (\*SYMPOSIA, \*AIR FORCE RESEARCH),  
SCIENTIFIC RESEARCH, ENGINEERING, MAGNETS,  
TELEMETER SYSTEMS, ATTITUDE CONTROL SYSTEMS,  
ALTIMETERS, SPACE BIOLOGY, CLEAR AIR  
TURBULENCE (U)

CONTENTS: OPTIMUM MAGNETS FOR MHD  
GENERATORS; AUTOMATION IN THE NEW EASTERN  
TEST RANGE CENTRAL TELEMETRY STATION  
(TEL-IV); CONTROL LOGIC FOR ATTITUDE  
CONTROL OF A SPACE VEHICLE; USAF IMPROVED  
ALTIMETRY SYSTEMS; THUNDERSTORM LIGHTNING;  
BIOASTRONAUTICS LABORATORY RESEARCH TOOL;  
GEMINI LAUNCH VEHICLE PILOT SAFETY  
PROGRAM; SIMULATION OF LOW ALTITUDE CLEAR  
AIR TURBULENCE FOR AUTOMATIC FLIGHT CONTROL  
DESIGN; EVALUATION OF THE ACCELEROCARDIOGRAPH  
AS AN INSTRUMENT FOR MEASUREMENT OF  
PHYSIOLOGICAL PARAMETERS; ELECTROMAGNETIC  
PULSE (EMP) GENERATION AND MEASUREMENT. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-643 994 4/2 1/2  
EASTERN AIR LINES INC MIAMI FLA METEOROLOGY DEPT  
FLIGHT OBSERVATIONS OF ATMOSPHERIC TURBULENCE. (U)  
DESCRIPTIVE NOTE: FINAL REPT.,  
JUN 66 94P KADLEC, PAUL W. I  
CONTRACT: FA-66-WA-1449  
MONITOR: FAA-RD 66-72

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ATMOSPHERIC MOTION, \*AVIATION  
SAFETY), SCINTILLATION COUNTERS, VORTICES,  
AIRBORNE, VISUAL INSPECTION, METEOROLOGY,  
METEOROLOGICAL PARAMETERS (U)

RECOGNIZING IMPENDING FLIGHT CONDITIONS FROM THE  
OBSERVATION OF SKY CONDITIONS AND COCKPIT INSTRUMENTS  
CAN ASSIST FLIGHT CREWS IN DETERMINING THE  
APPROPRIATE COURSE OF ACTION TO INSURE A SAFE AND  
COMFORTABLE FLIGHT. A SUMMARY OF OBSERVATIONS IS  
PROVIDED FROM THE ANALYSIS OF DATA COLLECTED ON 943  
FLIGHTS BY A RESEARCH METEOROLOGIST RIDING IN THE  
COCKPIT OF AIRLINE AND MILITARY JET AIRCRAFT.  
FLIGHT CONDITIONS IN CLEAR SKIES MAY OFTEN BE  
ANTICIPATED WHEN RELATED TO CERTAIN TROPOPAUSE AND  
JET STREAM CONFIGURATIONS. THREE CLOUD PATTERN  
MODELS ARE DESCRIBED THAT ASSOCIATE CIRRUS FORMED BY  
JET STREAMS WITH AREAS OF OCCURRENCE OF SIGNIFICANT  
TURBULENCE. A REFINEMENT IN THE THEORY THAT  
ATMOSPHERIC TEMPERATURE CHANGES MAY INDICATE CLEAR  
AIR TURBULENCE INDICATES THAT A RATE OF TEMPERATURE  
CHANGE OF 1.0C PER MINUTE WITH A TOTAL CHANGE OF  
2.0C IS THE MOST EFFECTIVE COMBINATION FOR  
DETECTING IMPENDING SIGNIFICANT TURBULENCE. CLEAR  
AIR VORTICES THAT FORM BELOW THE BASE OF SEVERE  
THUNDERSTORMS MAY PRODUCE TURBULENCE CAPABLE OF  
UPSETTING MULTI-ENGINE JET AIRCRAFT. THE FORMATION  
OF THESE VORTICES OCCURS IN THE PRECIPITATION-FREE  
AREA OF THE THUNDERSTORM. AN AIRBORNE PORTABLE  
SCINTILLOMETER WAS FLIGHT TESTED TO DETERMINE THE  
FEASIBILITY OF DETECTING CLEAR AIR TURBULENCE BY  
MEANS OF AIRCRAFT OPTICAL OBSERVATIONS. THE  
EQUIPMENT AND OBSERVATIONAL PROCEDURES USED IN  
COLLECTING DATA FOR ANALYSIS ARE ALSO DESCRIBED.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-648 610 4/1 4/2  
WEATHER BUREAU SILVER SPRING MD TECHNIQUES DEVELOPMENT  
LAB  
ANALYSIS OF CLEAR AIR TURBULENCE DURING SELECTED 9-  
DAY DATA PERIODS. (U)  
DESCRIPTIVE NOTE: FINAL REPT.,  
DEC 66 77P COLSON, DEVER I  
PROJ: FAA-150-929-09A  
MONITOR: FAA RD-66-79

UNCLASSIFIED REPORT

DESCRIPTORS: (•CLEAR AIR TURBULENCE,  
PROBABILITY), DISTRIBUTION, WEATHER  
FORECASTING, DATA, STATISTICAL ANALYSIS,  
ALTITUDE, SHEAR STRESSES (U)

CLEAR AIR TURBULENCE DATA WERE COLLECTED FROM TWO  
OF THE FOUR WORLD-WIDE REPORTING PERIODS SET UP BY  
THE INTERNATIONAL CIVIL AVIATION ORGANIZATION  
(ICAO). THE OCCURRENCES AND NON-OCCURRENCES OF  
TURBULENCE WERE SUMMARIZED WITH RESPECT TO TIME  
PERIODS, ALTITUDES, AND GEOGRAPHICAL LOCATIONS.  
THESE DATA WERE ANALYZED IN RELATION TO ASSOCIATED  
METEOROLOGICAL PARAMETERS AND LARGE-SCALE SYNOPTIC  
PATTERNS. SPECIAL ATTENTION WAS GIVEN TO AREAS  
WITH AT LEAST 25 PERCENT PROBABILITY OF MODERATE OR  
GREATER TURBULENCE. VERTICAL WIND SHEAR APPEARED  
TO BE AN IMPORTANT PARAMETER ALONG WITH 12-HOUR  
CHANGES IN WIND SPEED, VERTICAL WIND SHEAR, AND  
HORIZONTAL WIND SHEAR. THE SYNOPTIC PATTERNS ON  
THE MEAN 300-MB CHARTS AND THE INDIVIDUAL 300-MB  
CHARTS WERE DISCUSSED IN RELATION TO THE  
PROBABILITIES OF MODERATE OR GREATER TURBULENCE.  
THE FOLLOWING FORECAST CRITERIA WERE SUGGESTED:  
MODERATE OR GREATER TURBULENCE WILL BE FOUND (1)  
WITHIN 150 KILES OF A JET STREAM WITH AT LEAST A 100-  
KNOT MAXIMUM WIND SPEED IF THE VERTICAL WIND SHEAR IS  
AT LEAST 4 KNOTS PER 1000 FEET, OR (2) WITHIN 150  
MILES OF A SHARP TROUGH LINE WITH A MARKED HORIZONTAL  
WIND SHEAR ACROSS THE TROUGH LINE. (AUTHOR) (U)

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DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0292

AD-648 722 4/1 17/9 4/2  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
OPTIMIZING THE RADAR DETECTION OF CLEAR AIR  
TURBULENCE. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS,  
APR 64 15P ATLAS, DAVID THARDY, KENNETH  
R. INAI TO, KEIKICHI I  
REPT. NO. AFCRL-ERP-248, AFCRL-66-859  
PROJ: AF-0000, AF-6672  
TASK: 000099, 667209

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF APPLIED  
METEOROLOGY V9 N4 P490-60 AUG 1966.  
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED 4  
FEB 66.

DESCRIPTORS: (CLEAR AIR TURBULENCE,  
OPTIMIZATION), (RADAR REFLECTIONS,  
METEOROLOGICAL PHENOMENA), ATMOSPHERIC MOTION,  
TURBULENCE, RADAR ECHO AREAS, REFRACTION,  
SCATTERING, DETECTION (U)

A GENERAL ANALYSIS IS MADE OF THE TURBULENT  
REFRACTIVITY SPECTRUM IN AND BEYOND THE LIMITING  
MICROSCALE AND A RELATION DERIVED FOR ITS SCATTERING  
REFLECTIVITY IN EITHER THE BACK OR BISTATIC  
DIRECTIONS. RADAR REFLECTIVITY IS COMPUTED AS A  
FUNCTION OF WAVELENGTH FOR REGIONS OF CAT. THE  
RESULTS ARE COMPARED TO THE MINIMUM DETECTABLE  
REFLECTIVITY OF AIRBORNE RADARS HAVING OPTIMUM STATE  
OF THE ART CHARACTERISTICS AT EACH WAVELENGTH. IT  
IS SHOWN THAT THE BEST RADARS NOW FEASIBLE CAN BARELY  
DETECT THE MOST REFLECTIVE CAT AT 10 NM (I.E.,  
1 MINUTE WARNING). A 20-DB IMPROVEMENT IN  
SENSITIVITY IS REQUIRED FOR DETECTION OF MOST CAT,  
WHICH APPEARS TO BE JUST ATTAINABLE BY PRE-DETECTION  
INTEGRATION. THE OPTIMUM WAVELENGTH TO IMPLEMENT  
IS 9-6 CM. THE BEST RADAR AT THIS WAVELENGTH WILL  
ALSO DETECT CIRRUS CLOUDS RELIABLY. WHETHER  
DETECTING CLOUDS OR CHAFF A MEASURE OF THE ECHO  
FLUCTUATION (OR DOPPLER) SPECTRUM IS REQUIRED  
TO IDENTIFY THE INTENSITY OF CAT. HOWEVER, IN  
THE CASE OF HIGH ALTITUDE CLEAR AIR ECHOES, THERE IS  
AN INDICATION THAT THE REFLECTIVITY IN EXCESS OF SOME  
MINIMUM THRESHOLD VALUE IS A SIGN OF SOME DEGREE OF  
MECHANICAL TURBULENCE. IT IS ALSO DEMONSTRATED  
THAT A GROUND-BASED FORWARD-SCATTER LINK HOLDS GREAT  
PROMISE FOR RELIABLE CAT DETECTION. A TENTATIVE  
QUANTITATIVE CLASSIFICATION OF CAT SEVERITY IS ALSO  
PROPOSED.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-654 267 4/1 4/2  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
MESOSCALE STRUCTURE OF THE ATMOSPHERE IN REGIONS OF  
CLEAR-AIR TURBULENCE. VOLUME I. (U)  
DESCRIPTIVE NOTE: AIR FORCE SURVEYS IN GEOPHYSICS  
NO. 190,  
APR 67 93P PENN, SAMUEL IPISINSKI, THOMAS  
A. I  
REPT. NO. AFCRL-67-0119  
PROJ: AF-8628  
TASK: 862810

UNCLASSIFIED REPORT

DESCRIPTORS: (•CLEAR AIR TURBULENCE,  
METEOROLOGICAL PARAMETERS), WIND, ATMOSPHERIC  
TEMPERATURE, OZONE, TROPOSPHERE, STRATOSPHERE,  
ANALYSIS, ATMOSPHERIC SOUNDING, METEOROLOGICAL  
CHARTS, CLOUD COVER (U)  
IDENTIFIERS: RICHARDSON CRITERION (U)

THE MESOSCALE STRUCTURE OF THE ATMOSPHERE IN  
REGIONS OF CLEAR-AIR TURBULENCE (CAT) IS  
INVESTIGATED BY MEANS OF AIRCRAFT OBSERVATIONS OF  
WIND, TEMPERATURE, AND OZONE OBTAINED IN THE UPPER  
TROPOSPHERE AND IN THE LOWER STRATOSPHERE.  
ANALYSIS FROM FIVE CAT MISSIONS ARE SHOWN,  
INCLUDING VERTICAL CROSS SECTIONS NORMAL TO FLOW  
PATTERNS AND ALSO DETAILED VERTICAL 'SOUNDINGS' OF  
WIND, TEMPERATURE, AND THE RICHARDSON NUMBER. A  
VERIFICATION IS OBTAINED AT INTERVALS OF 1000 FT  
BETWEEN THE OCCURRENCE OF CAT AND A RICHARDSON  
CRITERION OF 0.9. OVER 70 PERCENT OF THE 149 CAT  
CASES ARE CORRECTLY SPECIFIED BY THE CRITERION.  
(AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0352

AD-658 875 4/1  
HONEYWELL INC ST PAUL MINN RESEARCH DEPT  
LOW FREQUENCY ELECTRIC FIELD CHARACTERISTICS OF CLEAR  
AIR TURBULENCE. (U)  
DESCRIPTIVE NOTE: FINAL REPT. 15 MAR 66-15 JUL 67.  
JUL 67 157P TENBROEK, H. W. ;  
SEASHORE, C. R. ;  
REPT. NO. 12037-FRI  
CONTRACT: AF 19(628)-5983  
PROJ: AF-6020  
TASK: 62003  
MONITOR: AFCRL 67-0497

UNCLASSIFIED REPORT

DESCRIPTORS: (•ATMOSPHERIC MOTION, ELECTRIC  
FIELDS), ELECTROSTATIC PRECIPITATION, AIRBORNE,  
SENSORS, MEASUREMENT, EXTREMELY LOW FREQUENCY,  
DETECTION (U)

THE REPORT COVERS WORK DONE TO INVESTIGATE THE LOW-FREQUENCY ELECTRIC FIELD CHARACTERISTICS OF CLEAR AIR TURBULENCE. A DESCRIPTION IS GIVEN OF THE ELECTRIC FIELD SENSING SYSTEM DESIGNED AND CONSTRUCTED BY HONEYWELL AND INSTALLED IN FIVE NORTHWEST AIRLINES 720B PASSENGER JETS. THE EQUIPMENT WAS USED TO GATHER EXPERIMENTAL DATA ON THE CORRELATION OF ELECTRIC FIELD ACTIVITY WITH CAT, WHEN ENCOUNTERED, DURING THE SCHEDULED FLIGHTS OF THESE AIRCRAFT IN THE PERIOD BETWEEN OCTOBER 1966 AND JUNE 1967 (A TOTAL FLIGHT TIME FOR ALL FIVE CAT UNITS OF APPROXIMATELY 4200 HOURS). IN THIS PERIOD, A TOTAL OF 2,320 HOURS OF RECORDED ELECTRIC FIELD DATA WAS OBTAINED, DURING WHICH 131 PILOT-INDICATED ENCOUNTERS WITH CAT OCCURRED. AN INVESTIGATION OF THE CORRELATION OF THESE ENCOUNTERS WITH THE RECORDED DATA IS PRESENTED, AND THE EFFECTS OF VARIOUS NOISE SOURCES ON SYSTEM OPERATION ARE DISCUSSED. THE RESULTS OF THE DATA-TAKING PROGRAM INDICATE THAT SIGNIFICANT ELECTRICAL ACTIVITY OCCURRED PRIOR TO AND DURING 51.5 PERCENT OF THOSE PILOT-INDICATED CAT ENCOUNTERS EXHIBITING G-ACTIVITY GREATER THAN PLUS OR MINUS .03 G. METEOROLOGICAL ANALYSES OF WEATHER CONDITIONS IN THE VICINITY OF THE ENCOUNTERS, USEFUL IN DIFFERENTIATING BETWEEN THE TYPES OF CAT ENCOUNTERED AND IN SUBSTANTIATING PILOT-INDICATED EVENTS, COULD NOT BE PERFORMED WITHIN THE SCOPE OF THE PROGRAM. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /J0352

AD-664 721                    4/1  
STANFORD RESEARCH INST MENLO PARK CALIF  
FORECASTING CLEAR-AIR TURBULENCE BY COMPUTER  
TECHNIQUES.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,  
SEP 67 92P                    ENDLICH, ROY M. ;  
MANCUSO, ROBERT L. ;  
CONTRACT: FA-66-WA-1442  
PROJ: FAA-153-002-D1A, SRI-5728  
MONITOR: FAA                    RD-67-65

UNCLASSIFIED REPORT

DESCRIPTORS: (•UPPER ATMOSPHERE, TURBULENCE),  
(•METEOROLOGICAL PARAMETERS, COMPUTERS),  
(•CLEAR AIR TURBULENCE, WEATHER FORECASTING),  
WIND, ATMOSPHERIC TEMPERATURE, PREDICTIONS,  
DEFORMATION, AIRCRAFT, MEASUREMENT, ALTITUDE,  
PILOTS, HUMIDITY, FLUID FLOW, MATHEMATICAL  
ANALYSIS, ATMOSPHERIC MOTION, PROBABILITY,  
MATHEMATICAL MODELS, CORRELATION TECHNIQUES,  
TABLES

(U)

IDENTIFIERS: MOUNTAIN WAVES, SHEAR WAVES

(U)

PILOT REPORTS OF CLEAR-AIR TURBULENCE FROM FOUR  
SPECIAL FIVE-DAY REPORTING PERIODS ARE USED TO  
INVESTIGATE RELATIONSHIPS BETWEEN TURBULENCE  
PROBABILITY AND METEOROLOGICAL FACTORS. THE  
METEOROLOGICAL ANALYSES ARE MADE BY COMPUTER ON A 2.5  
DEGREES LATITUDE/LONGITUDE GRID, ON THE BASIS OF  
STANDARD UPPER-AIR OBSERVATIONS. ANALYSES ARE MADE  
FOR THE UNITED STATES FOR ALTITUDE LAYERS 50 MB  
(APPROXIMATELY 4000 FT) THICK. TEMPERATURE  
ANALYSES INTERPRETED AS THERMAL WIND SHEAR ARE USED  
TO COMPENSATE FOR WIND OBSERVATIONS MISSING IN HIGH-  
SPEED PORTIONS OF THE FLOW. THE BEST  
METEOROLOGICAL INDICATORS OF TURBULENCE ARE THOSE  
RELATED TO THE WIND FIELD. THESE INDICATORS ARE  
VERTICAL VECTOR WIND SHEAR, DEFORMATION, AND  
DIVERGENCE. THE ANALYSIS FOR TURBULENCE IS MADE  
FROM METEOROLOGICAL FACTORS AND PILOT REPORTS IN  
TERMS OF THE PROBABILITY OF ENCOUNTERING SIGNIFICANT  
TURBULENCE (GREATER THAN LIGHT INTENSITY) DURING  
FLIGHT SEGMENTS 100 NAUTICAL MILES LONG. NUMERICAL  
FORECASTS OF UPPER WINDS ARE PREPARED FOR THE  
TURBULENCE-REPORTING PERIODS ON THE BASIS OF  
ADVECTION AND GEOSTROPHIC DEPARTURES. THE  
DEPARTURES ARE EVALUATED DIRECTLY FROM THE WIND  
ANALYSES BY USE OF THE BALANCE EQUATION. THE  
ADVECTION USES UPSTREAM SPACE DIFFERENCES AND IS  
TESTED IN BOTH EXPLICIT AND IMPLICIT FORMS.

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-666 800 9/2 4/1 4/2 17/2.1  
20/4 19/7

INSTITUTE FOR DEFENSE ANALYSES ARLINGTON VA  
PROCEEDINGS OF THE OAR RESEARCH APPLICATIONS  
CONFERENCE, 21 MARCH 1968. VOLUME 1.

(U)

MAR 68 394P

MONITOR: OAR 68-0001-VOL-1

UNCLASSIFIED REPORT

DESCRIPTORS: (\*AIR FORCE RESEARCH, \*SYMPOSIA),  
GUIDED MISSILES, AIRCRAFT DEFENSE SYSTEMS,  
DISPLAY SYSTEMS, PLASMA MEDIUM, MICROORGANISMS,  
GAS CHROMATOGRAPHY, TACTICAL WARFARE, CLEAR AIR  
TURBULENCE, METEOROLOGICAL RADAR, SUPERCONDUCTORS,  
ATMOSPHERE ENTRY, RADIO COMMUNICATION SYSTEMS,  
AERODYNAMICS, WIND TUNNELS, SOLAR DISTURBANCES,  
LASERS, WEATHER FORECASTING  
IDENTIFIERS: GAS DYNAMICS

(U)

(U)

THE SCIENTIFIC PAPERS PUBLISHED IN THIS DOCUMENT  
ILLUSTRATE SOME OF THE WAYS IN WHICH THE RESULTS OF  
OAR RESEARCH CAN BE APPLIED TO THE SOLUTION OF  
TECHNOLOGICAL PROBLEMS. THE PAPERS ARE:

'PRINCIPLES AND APPLICATIONS OF THE PLASMA  
DISPLAY PANEL' BY D. L. BITZER AND H.  
G. SLOTTOW; 'DETECTION AND IDENTIFICATION OF  
MICROORGANISMS BY GAS CHROMATOGRAPHY' BY J.  
R. GOULD; 'THE OPTIMAL SOLUTION OF A  
TACTICAL PURSUIT-EVASION PROBLEM' BY R.  
F. VACHINO, D. H. DEDDOES, J. F.  
SCHAEFER, AND G. COOK; 'RADAR INVESTIGATION  
OF CLEAR-AIR TURBULENCE' BY K. R. HARDY;  
'REENTRY COMMUNICATION STUDIES AND RECENT  
FLIGHT TEST RESULTS' BY J. L. POIRIER;  
'AN INVESTIGATION OF HYPERSONIC AERODYNAMICS  
AT HIGH ALTITUDES' BY S. M. BOGDONOFF;  
'POLYGONAL AND SWEPT-BACK PLATES WITH CUT-  
OUTS AND COLUMN SUPPORTS' BY P. M.  
QUINLAN; 'OBSERVATION AND FORECASTING OF  
SOLAR PROTON EVENTS' BY J. P. CASTELLI;  
'SUPERCONDUCTING METALLURGY' BY B. T.  
MATTHIAS; 'HIGH ENERGY DENSITY  
ELECTROCHEMICAL CELLS' BY L. A. KING, A.  
D. BROWN, JR., AND F. H. FRAYER;  
'LASERS FROM II-VI COMPOUNDS' BY D. C.  
REYNOLDS; 'ELECTRON BEAM FLUORESCENCE  
STUDIES AND THEIR APPLICATION TO GAS DYNAMIC  
RESEARCH' BY E. P. MUNTZ; 'ESTIMATING THE  
DATE OF ONSET OF THE RAINY SEASON IN  
SOUTHERN SOUTH VIETNAM' BY I. A. LUND

(U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-667 222 4/1  
CALIFORNIA UNIV LOS ANGELES DEPT OF METEOROLOGY  
OBSERVATIONS OF STRATOSPHERIC CLEAR-AIR TURBULENCE  
AND MOUNTAIN WAVES OVER THE SIERRA NEVADA MOUNTAINS:  
AN ANALYSIS OF THE U-2 FLIGHTS OF 12-14 MAY, 1964. (U)  
DESCRIPTIVE NOTE: FINAL REPT. 14 JUN 64-14 SEP 67.  
DEC 67 92P HELVEY, ROGER A. I  
CONTRACT: AF 19(628)-4146  
PROJ: AF-8604  
TASK: 860402  
MONITOR: AFCRL 68-0001

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON 'MESO-SCALE  
CALCULATIONS' PROJECT.

DESCRIPTORS: (1) CLEAR AIR TURBULENCE,  
STRATOSPHERE), ALTITUDE, MOUNTAINS,  
ATMOSPHERIC SOUNDING, TEMPERATURE, MOTION,  
WIND, METEOROLOGICAL PHENOMENA, CLOUDS, AERIAL  
PHOTOGRAPHS, MATHEMATICAL ANALYSIS, CALIFORNIA,  
NEVADA, UTILITY PLANES, HIGH ALTITUDE (U)  
IDENTIFIERS: MOUNTAIN WAVES, WU-2A AIRCRAFT,  
HICAT, WEATHER AIRCRAFT, U-2 AIRCRAFT (U)

DATA OBTAINED FROM A SPECIALLY-INSTRUMENTED U-2  
AIRCRAFT HAVE BEEN USED TO RELATE CLEAR-AIR  
TURBULENCE WITH MOUNTAIN WAVE STRUCTURE, OBSERVED  
DURING TWO RESEARCH FLIGHTS IN THE STRATOSPHERE OVER  
THE SIERRA NEVADA MOUNTAINS ON 12 AND 14 MAY,  
1964. THE SEVERAL CASES OF SEVERE TURBULENCE  
ENCOUNTERED TOOK PLACE IN REGIONS IMMEDIATELY  
DOWNSTREAM OF WAVE TROUGHS, IN AREA OF DECREASED  
STATIC STABILITY AND SLOWER WIND SPEEDS ASSOCIATED  
WITH THE PREVAILING UPWIND TILT OF THE WAVES. AN  
EXPRESSION FOR THE RICHARDSON NUMBER IS OBTAINED  
WHICH INCORPORATES MODIFICATIONS IMPOSED UPON FLOW  
THROUGH STATIONARY DISTURBANCES SUCH AS MOUNTAIN  
WAVES. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-667 791 4/1 5/2  
NATIONAL AVIATION FACILITIES EXPERIMENTAL CENTER ATLANTIC  
CITY N J  
CLEAR AIR TURBULENCE: A BIBLIOGRAPHY 1950-1967. (U)  
DESCRIPTIVE NOTE: FINAL REPT.,  
MAR 68 82P BULFORD, DOROTHY E. I  
REPT. NO. NA-68-17

UNCLASSIFIED REPORT

DESCRIPTORS: (•CLEAR AIR TURBULENCE,  
BIBLIOGRAPHIES), ATMOSPHERIC MOTION,  
TURBULENCE, AVIATION SAFETY, JET  
STREAMS(METEOROLOGY), HIGH ALTITUDE, AIR MASS  
ANALYSIS, REPORTS, DETECTION, RADAR SCANNING,  
PREDICTIONS, WEATHER FORECASTING (U)  
IDENTIFIERS: CAT (U)

CLEAR AIR TURBULENCE ENCOUNTERS CAN OCCUR  
UNEXPECTEDLY WITHOUT ANY VISUAL EVIDENCE OR WARNING.  
AS OPERATIONS OF HIGHER ALTITUDE AIRCRAFT INCREASE,  
THE PHENOMENON IS ENCOUNTERED MORE OFTEN. CLEAR  
AIR TURBULENCE IS DEFINED AS 'ALL TURBULENCE IN THE  
FREE ATMOSPHERE OF INTEREST IN AEROSPACE OPERATIONS  
THAT IS NOT IN OR ADJACENT TO VISIBLE CONVECTIVE  
ACTIVITY (THIS INCLUDES TURBULENCE FOUND IN CIRRUS  
CLOUDS NOT IN OR ADJACENT TO VISIBLE CONVECTIVE  
ACTIVITY).' THIS BIBLIOGRAPHY CONSISTS OF 578  
REFERENCES TO TECHNICAL REPORTS, ARTICLES IN  
PERIODICALS, AND BOOKS PUBLISHED DURING THE PAST 17  
YEARS. REFERENCES ABOUT OTHER FORMS OF TURBULENCE  
SUCH AS THAT OCCURRING WITH STORMS AND AIRPLANE WAKE  
VORTICES ARE NOT INCLUDED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-668 080 4/1 9/2  
DEPARTMENT OF THE AIR FORCE WASHINGTON D C  
CLEAR AIR TURBULENCE MEETING, 26-27 APRIL 1965,  
SPONSORED BY: UNITED STATES AIRFORCE. (U)  
65 282P

UNCLASSIFIED REPORT

DESCRIPTORS: (•CLEAR AIR TURBULENCE, SYMPOSIA),  
REPORTS, AERODYNAMIC LOADING, SCINTILLATION,  
WEATHER FORECASTING, WARNING SYSTEMS,  
CLIMATOLOGY, TROPOPAUSE, ANISOTROPY, TERRAIN,  
LASERS, TEMPERATURE, ELECTRIC FIELDS,  
TURBULENT BOUNDARY LAYER, JET  
STREAMS(METEOROLOGY), SHEAR STRESSES,  
RADIOSONDES, VISCOSITY, MICROSTRUCTURE, RADAR  
SCANNING, BACKSCATTERING, AIR MASS ANALYSIS,  
DATA PROCESSING SYSTEMS (U)  
IDENTIFIERS: GRAPHS(CHARTS), WIND SHEAR (U)

CLEAR AIR TURBULENCE IS RECOGNIZED AS ONE OF THE  
UNSOLVED PROBLEMS IN AVIATION METEOROLOGY. WHILE  
THE INTENSITY OF THIS HIGH LEVEL OR WIND SHEAR  
TURBULENCE IS NOT AS SEVERE AS THUNDERSTORM  
TURBULENCE, IT CAN RESULT IN INJURIES TO PASSENGERS  
AND CREW, POSSIBLE LOSS OF CONTROL OF THE AIRCRAFT,  
AND IN SOME EXTREME CASES SOME ACTUAL DAMAGE TO THE  
AIRCRAFT. THE HIGH LEVEL TURBULENCE ENCOUNTERS ARE  
ALL THE MORE DANGEROUS BECAUSE THEY USUALLY OCCUR  
WITHOUT ANY VISUAL WARNING. WORK ON THIS PROBLEM  
CAN BE DIVIDED INTO FOUR MAIN CATEGORIES: DATA  
COLLECTION AND ANALYSIS, THEORETICAL STUDIES,  
DEVELOPMENT OF FORECAST TECHNIQUES, AND DETECTION OR  
WARNING DEVICES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /J0392

AD-819 522 4/1 14/2  
NATIONAL AERONAUTICAL ESTABLISHMENT OTTAWA (ONTARIO)  
FLIGHT RESEARCH SECTION  
FLIGHT EVALUATION OF AN INFRARED SPECTROMETER AS A  
CLEAR AIR TURBULENCE DETECTOR, (U)  
MAY 67 84P MATHER, G. K. I  
MONITOR: NAE, FAA-ND LR-477,66-70

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CLEAR AIR TURBULENCE, \*INFRARED  
SPECTROSCOPY), DETECTION, FLIGHT TESTING,  
CANADA, AIR MASS ANALYSIS, TURBULENCE,  
MOUNTAINS, ATMOSPHERE, ATMOSPHERIC TEMPERATURE,  
TEST METHODS, SPECTROMETERS, SPECIFICATIONS,  
SPECTRUM SIGNATURES, INFRARED DETECTORS (U)  
IDENTIFIERS: T-33 AIRCRAFT, MOUNTAIN WAVES (U)

A PROTOTYPE OF THE BARNES INFRARED SPECTROMETER  
PROPOSED AS A CLEAR AIR TURBULENCE DETECTOR HAS  
UNDERGONE INITIAL FLIGHT TESTS WHILE MOUNTED ON THE  
CANADIAN NATIONAL AERONAUTICAL ESTABLISHMENT  
T-33 TURBULENCE RESEARCH AIRCRAFT. ADVANCE  
WARNING OF UP TO 8.9 NAUTICAL MILES BEFORE  
INTERCEPTION OF HORIZONTAL ATMOSPHERIC TEMPERATURE  
VARIATIONS WERE RECORDED. A HIGH CORRELATION  
BETWEEN TEMPERATURE VARIATIONS AND MOUNTAIN WAVES  
AND/OR TURBULENCE WAS FOUND DURING THE TESTS. THE  
NECESSITY OF PITCH STABILIZING SUCH A DEVICE AGAINST  
SPURIOUS AIRCRAFT ATTITUDE CHANGES HAS BEEN  
DEMONSTRATED. (AUTHOR) (U)

REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN  
SECTION X BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY.  
THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

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254 827  
466 804  
608 773  
611 101  
628 971  
637 728  
664 172  
665 371  
669 078

## XI. JET STREAM TURBULENCE

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /K0392

AD-298 298

HELPAK INC WATERTOWN MASS

ANALYSIS OF MESOSCALE STRUCTURE IN ANTICYCLONIC JET-  
STREAM FLOW (U)

APR 61 IV TWITCHELL, PAUL F. I

CONTRACT: AF19 604 6122

MONITOR: AFCL 493

UNCLASSIFIED REPORT

DESCRIPTORS: \*ANTICYCLONES, \*JET STREAMS  
(METEOROLOGY), \*VELOCITY, AIRCRAFT, BLOOD  
TRANSFUSIONS, FLIGHT, MEASUREMENT, METEOROLOGICAL  
CHARTS, RECORDING SYSTEMS, UPPER ATMOSPHERE, WIND (U)

THIS ANALYSIS WAS CONDUCTED TO GAIN SCIENTIFIC  
KNOWLEDGE ABOUT CERTAIN ATMOSPHERIC PHENOMENA  
ASSOCIATED WITH THE JET STREAM AND TO PRESENT THE  
FINDINGS IN A MANNER WHICH WILL ENCOURAGE FURTHER  
RESEARCH. DATA OBTAINED PRIMARILY FROM FOUR  
PROJECT JET STREAM AIRCRAFT FLIGHTS IN UPPER-  
AIR RIDGES LOCATED OVER NORTHEASTERN UNITED  
STATES WERE EVALUATED. RIDGE JET-STREAM  
CHARACTERISTICS ARE ILLUSTRATED AND DISCUSSED; AND A  
COMPOSITE CROSS SECTION OF THE FOUR FLIGHTS IS  
PRESENTED. WIND MEASUREMENTS MADE BY THE AIRCRAFT  
ARE COMPARED WITH GEOSTROPHIC AND GRADIENT WINDS  
COMPUTED FROM UPPER-AIR CHARTS AND THE GEOSTROPHIC  
AND GRADIENT WIND DEPARTURES SO DETERMINED ARE  
PRESENTED. GRADIENT WINDS WERE FOUND BETTER THAN  
THE GEOSTROPHIC AS AN APPROXIMATION TO OBSERVED WINDS  
IN THE VICINITY OF AN ANTICYCLONIC JET STREAM. THE  
STATISTICAL SIGNIFICANCE OF THE DEPARTURES IS  
DISCUSSED. CONCLUSIONS AND RECOMMENDATIONS INCLUDE  
SUGGESTIONS FOR FURTHER DEVELOPMENT OF CATEGORIZING  
TURBULENCE WITH SPECIFIC ATMOSPHERIC CONDITIONS.  
ALSO RECOMMENDED IS THE APPLICATION OF OBJECTIVE  
STATISTICAL TECHNIQUES FOR FORECASTING THE  
PROBABILITY OF TURBULENCE OCCURRENCES UNDER GIVEN  
CONDITIONS. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /K0392

AD-239 986

AIR FORCE CAMBRIDGE RESEARCH LABS L 6 HANSCOM FIELD  
MASS

INSTABILITY AND VERTICAL MOTIONS IN THE JET  
STREAM

(U)

MAY 61

IV

KUETTNER, JOACHIM P. INCLEAN, GEORGE

S.1

REPT. NO. 473

MONITOR: AFCL 473

UNCLASSIFIED REPORT

DESCRIPTORS: \*JET STREAMS (METEOROLOGY), AIRCRAFT,  
CIRRUS CLOUDS, FLIGHT PATHS, METEOROLOGY, TURBULENCE,  
VELOCITY, VERTICAL GUST RECORDERS, WIND (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /K0392

AD-269 712

RAND CORP SANTA MONICA CALIF

THE EFFECT OF SURFACE TEMPERATURE VARIATIONS ON THE  
POLAR NIGHT JET

(U)

IV LEOVY, C. I

UNCLASSIFIED REPORT

DESCRIPTORS: \*JET STREAMS (METEOROLOGY); ATMOSPHERE  
MODELS; HEATING; INTEGRAL TRANSFORMS; OZONE; PARTIAL  
DIFFERENTIAL EQUATIONS; PERTURBATION THEORY;  
STRATOSPHERE

(U)

THE POSSIBILITY OF DIFFERENTIAL HEATING IN THE  
OZONE LAYER DUE TO DIFFERENCES IN GROUND AND LOWER  
TROPOSPHERE TEMPERATURES AS A MECHANISM FOR PRODUCING  
THE OBSERVED STATIONARY PERTURBATIONS OF THE POLAR  
NIGHT JET WAS EXAMINED. IT IS FOUND THAT THIS  
MECHANISM IS NOT LIKELY TO BE THE CAUSE OF THE  
DISTURBANCES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /K0392

AD-290 901

WHITE SANDS MISSILE RANGE N MEX

WIND SHEAR IN THE JET STREAM AT WHITE SANDS MISSILE  
RANGE (U)

NOV 62

1V

ARMENDARIZ, MANUEL; FISHER, EMMIT

SERNA, JUANA

REPT. NO. TR SELWS M 13

UNCLASSIFIED REPORT

DESCRIPTORS: •JET STREAMS (METEOROLOGY), •SHEAR  
STRESSES, •WIND, METEOROLOGY (U)

IDENTIFIERS: NEW MEXICO (U)

A DISCUSSION OF WIND SHEAR IN THE JET STREAM OVER  
WHITE SANDS MISSILE RANGE, NEW MEXICO IS  
PRESENTED. WIND DATA COLLECTED UTILIZING THE GMD-  
1 SYSTEM ARE USED TO CALCULATE VECTORIAL WIND  
SHEAR. THE MAXIMUM JET WIND SPEED COULD NOT BE  
SIGNIFICANTLY CORRELATED TO THE MAXIMUM WIND SHEAR  
FOR ANY PARTICULAR OBSERVATION. MEAN VECTORIAL  
WIND SHEAR AND STANDARD DEVIATION FOR EACH THOUSAND  
FEET OF HEIGHT IN THE JET STREAM ARE INCLUDED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /K0352

AD-413 493

EASTERN AIR LINES INC MIAMI FLA

AN IN-FLIGHT STUDY OF THE RELATION BETWEEN JET  
STREAMS, CIRRUS, AND WIND SHEAR TURBULENCE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

JUN 63 48P KADLEC, PAUL W.:

CONTRACT: CWB 10356

UNCLASSIFIED REPORT

DESCRIPTORS: (WIND, HIGH ALTITUDE), CIRRUS  
CLOUDS, JET STREAMS (METEOROLOGY), TURBULENCE,  
TEMPERATURE. (U)

IDENTIFIERS: 1963. (U)

AN ANALYSIS OF DATA FROM 414 WEATHER RESEARCH  
FLIGHTS INDICATES A RELATIONSHIP BETWEEN CIRRUS  
CLOUDS ASSOCIATED WITH JET STREAMS AND THE OC  
CURRENCE OF WIND SHEAR TURBULENCE. THESE DATA WERE  
OBTAINED WHILE FLYING AS A CREW MEMBER ON EASTERN  
AIR LINES JET AIRCRAFT FROM DECEMBER 1960 TO  
MAY 1963. DETAILED HORIZONTAL AND VERTICAL  
CROSS-SECTIONS FOR EACH FLIGHT AND COLORED SLIDES OF  
CIRRUS CLOUD FORMATIONS TOGETHER WITH THE  
CORRESPONDING SURFACE AND UPPER AIR DATA WERE  
ANALYZED. FOUR CLOUD PATTERN MODELS HAVE BEEN  
DEVELOPED TO DESCRIBE THE AREAS OF OCCURRENCE,  
THICKNESS AND HORIZONTAL EXTENT OF CIRRUS THAT HAVE  
BEEN FOUND TO PRODUCE SIGNIFICANT TURBU LENCE. THE  
POLAR AND SUBTROPICAL JET STREAMS HAVE BEEN  
CLASSIFIED BY TYPE AND CONFIGURATION TO AID IN  
DETERMINING THE AREAS AND INTENSITY OF TURBULENCE IN  
THE CIRRUS. A FIFTH JET STREAM MODEL INDICATES  
THOSE SITUATIONS IN WHICH CIRRUS DOES NOT FORM.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /K0392

AD-466 804

IIT RESEARCH INST CHICAGO ILL TECHNOLOGY CENTER  
EDDY FORMATION AND DECAY ON FREE STREAM  
BOUNDARIES.

(U)

DESCRIPTIVE NOTE: FINAL REPT., 1 JUL 61-1 AUG 62,  
JUL 62 59P ASH, J. E. I

CONTRACT: DALL 0221RD3989

PROJ: 4290

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*JET STREAMS(METEOROLOGY),  
NONLINEAR DIFFERENTIAL EQUATIONS), PARTIAL  
DIFFERENTIAL EQUATIONS, STABILITY, ATMOSPHERIC  
MOTION, TURBULENCE, REYNOLDS NUMBER, FOURIER  
ANALYSIS, SERIES. MATHEMATICAL ANALYSIS

(U)

IDENTIFIERS: CLEAR AIR TURBULENCE, CAT (CLEAR AIR  
TURBULENCE), EDDY CURRENTS

(U)

EQUATIONS ARE FORMULATED FOR THE GROWTH OF  
HYDRODYNAMIC DISTURBANCES IN A JET STREAM. THE  
NON-LINEAR INTERACTIONS OF FINITE AMPLITUDE  
DISTURBANCES ARE EXAMINED, USING THE NAVIERSTOKES  
EQUATIONS. THE JET STREAM IS REPRESENTED AS A  
PARALLEL SHEAR FLOW, AND THE POSSIBLE EXISTENCE OF A  
DOMINANT DISTURBANCE MODE IS CONSIDERED. A SET OF  
ORDINARY LINEAR DIFFERENTIAL EQUATIONS ARE DEVELOPED  
TO PROVIDE A METHOD FOR THE COMPUTATION OF THE  
SPATIAL GROWTH OF FINITE THREE-DIMENSIONAL  
DISTURBANCES DESCRIBING THE CHARACTERISTICS OF SUCH  
POSSIBLE DOMINANT MODES WHICH MIGHT BE PERTINENT TO  
THE STABILITY, CONTROL, AND STRUCTURAL RESPONSE OF  
MISSILES ENCOUNTERING ATMOSPHERIC DISTURBANCES IN JET  
STREAMS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /K0392

AD-608 773

STANFORD RESEARCH INST MENLO PARK CALIF  
STUDIES OF THE CLIMATOLOGY OF WINDS, TEMPERATURE, AND  
TURBULENCE IN JET STREAMS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

OCT 64    71P    ENDLICH, R. M. MCLEAN, G. S. :

CONTRACT: AF19 628 3304

PROJ: 8624 ,4689

TASK: 862402

MONITOR: AFCRL ,            64 834

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•JET STREAMS (METEOROLOGY),  
CLIMATOLOGY), (•CLIMATOLOGY, JET STREAMS  
(METEOROLOGY)), ATMOSPHERIC TEMPERATURE, ATMOSPHERIC  
MOTION, TURBULENCE, WIND, NUMERICAL METHODS AND  
PROCEDURES, STATISTICAL FUNCTIONS, METEOROLOGY,  
REPORTS (U)

THIS REPORT CONSISTS OF THREE SEPARATE PAPERS  
CONCERNED WITH THE CLIMATOLOGY OF JET STREAMS AND  
CLEAR-AIR TURBULENCE. THE FIRST PAPER IS ENTITLED  
'JET-STREAM STRUCTURE OVER THE CENTRAL  
UNITED STATES DETERMINED FROM AIRCRAFT  
OBSERVATIONS.' IN THIS STUDY, EMPIRICAL MODELS  
OF JET STREAMS ARE FOUND TO AGREE WELL WITH PREVIOUS  
MODELS BASED ON DATA FROM OTHER REGIONS OF THE MID-  
LATITUDES. ALSO, WE FOUND THAT VARIATIONS IN THE  
SPEED FIELD WITH SEASON AND WITH POSITION IN THE  
UPPER FLOW PATTERN WERE RATHER SMALL, SO THAT A  
SINGLE MODEL DESCRIBES THE JET STREAM ADEQUATELY.  
THE SECOND PAPER IS ENTITLED 'EMPIRICAL  
RELATIONSHIPS BETWEEN GUST INTENSITY IN  
CLEAR-AIR TURBULENCE AND CERTAIN  
METEOROLOGICAL QUANTITIES.' THIS PAPER PROVIDES  
DATA OF A TYPE THAT HAS NOT BEEN AVAILABLE  
PREVIOUSLY, HAVING APPLICATIONS TO AIRCRAFT AND  
MISSILE DESIGN, AND TO THE DETERMINATION OF WORLD-  
WIDE TURBULENCE STATISTICS. THE THIRD PAPER IS  
ENTITLED 'SOME AUTOCORRELATIONS AND SPECTRA OF  
WIND AND TEMPERATURE IN JET STREAMS.'  
CORRELATIONS WERE COMPUTED FOR PATHS ORIENTED  
ACROSS JET STREAMS AND ALONG JET STREAMS. IN ALL  
CASES, THE AUTOCORRELATIONS DECREASED TO ZERO WITHIN  
25 TO 40 PERCENT OF THE PATH LENGTH, INDICATING THAT  
THE DISTANCE CONSIDERED (LENGTH OF THE DATA  
SAMPLE) IS IMPORTANT IN DETERMINING THE SHAPE OF  
THE AUTOCORRELATION FUNCTION. SPECTRAL  
COMPUTATIONS SHOWED THAT ONLY A SMALL PORTION OF THE (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /K0792

AD-612 366

FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
ATMOSPHERIC TURBULENCE AND THE STABILITY OF  
FLIGHTS IN ZONE OF TROPOPAUSE AND JET STREAMS, (U)

FEB 65 45P GEL'INGOL'TS, N. F. 1

REPT. NO. FTD-MT-64-297

MONITOR: TT , 65-61808

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: EDITED MACHINE TRANS. OF  
GIDROMETEOROLOGICHESKII INSTITUT, Leningrad.  
TRUDY (USSR) 1963, NO. 19, P. 3-70.

DESCRIPTORS: (\*ATMOSPHERIC MOTION, AERONAUTICS),  
(\*ALLWEATHER AVIATION, FLIGHT PATHS), (\*BUFFETING,  
AIRCRAFT), (\*AERONAUTICS, ATMOSPHERIC MOTION),  
ATMOSPHERIC SOUNDING, METEOROLOGY, USSR, TROPOPAUSE,  
JET STREAMS (METEOROLOGY) (U)

IN THE ARTICLE AN ANALYSIS IS MADE OF  
ATMOSPHERIC TURBULENCE, EXPERIENCED BY AN AIRCRAFT  
BOTH AS BUMPS AND BUMPY AIR. THERE IS ASCERTAINED  
THE GENERAL CONDITIONS AND DISTRIBUTION OF TURBULENCE  
ALOFT, THE RELATIONSHIP BETWEEN PREVAILING AND  
MAXIMUM OVERLOADS AFFECTING AN AIRCRAFT, AND THE  
FREQUENCY OF OVERLOADS THERE IS INVESTIGATED  
DEPENDENCE OF TURBULENCE ON GEOGRAPHIC CONDITIONS ON  
THE STRATIFICATION, TYPE AND SLOPE OF TROPOPAUSE,  
WIND SPEEDS AND JET STREAMS, SYNOPTIC SITUATION, AND  
CLOUDINESS. FLIGHTS OF IL-28 SOUNDING AIRCRAFT  
ARE USED IN REGIONS OF SOUTHEASTERN KAZAKHSTAN.  
THE RANGE OF THE INVESTIGATED HEIGHTS IS 8 TO 12  
KM. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /K0392

AD-634 154 4/2 1/2  
STANFORD RESEARCH INST MENLO PARK CALIF  
TECHNIQUES FOR DETERMINING A WORLD-WIDE CLIMATOLOGY  
OF TURBULENCE THROUGH USE OF METEOROLOGICAL DATA. (U)  
DESCRIPTIVE NOTE: INTERIM SCIENTIFIC REPT.,  
MAY 66 65P ENDLICH, R. M. ;MANCUSO, R.  
L. DAVIES, J. W. ;  
REPT. NO. SCIENTIFIC-1,  
CONTRACT: AF 19(628)-5173,  
PROJ: AF-8624, SRI-5521  
TASK: 862402,  
MONITOR: AFCRL 66-355

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ALL-WEATHER AVIATION, CLEAR AIR  
TURBULENCE), (\*CLEAR AIR TURBULENCE,  
\*CLIMATOLOGY), (\*JET STREAMS(METEOROLOGY),  
CLIMATOLOGY), CORRELATION TECHNIQUES, ATMOSPHERIC  
MOTION, MICROMETEOROLOGY, MOUNTAINS,  
METEOROLOGICAL PARAMETERS, ATMOSPHERIC SOUNDING,  
METEOROLOGICAL BALLOONS, CIVIL AVIATION,  
PILOTS (U)

THIS REPORT CONSISTS OF AN INTRODUCTORY PORTION  
FOLLOWED BY SEPARATE SECTIONS CONCERNED WITH AIRCRAFT  
OBSERVATIONS OF JET-STREAM AND MOUNTAIN-WAVE  
TURBULENCE, STATISTICAL RELATIONSHIPS BETWEEN AIRLINE  
PILOTS' REPORTS OF TURBULENCE AND CONCURRENT  
METEOROLOGICAL CONDITIONS, AND THE FEASIBILITY OF  
MEASURING TURBULENCE FROM RISING BALLOONS TRACKED BY  
FPS-16 MISSILE-TRACKING RADAR. THE AIRCRAFT DATA  
SHOW THAT TURBULENCE CORRELATES WELL WITH THE  
HORIZONTAL WIND DIRECTION SHEAR MEASURED ON THE  
MESOSCALE. RECENT AIRCRAFT DATA ALSO RE-EMPHASIZE  
THE HAZARDS TO AIRCRAFT THAT EXIST IN MOUNTAIN-WAVE  
TURBULENCE. A PICTORIAL MODEL OF THE MOUNTAIN WAVE  
IS PRESENTED SHOWING THE USUAL TURBULENT LAYERS AND  
OTHER PROMINENT FEATURES. A NUMBER OF  
METEOROLOGICAL QUANTITIES WERE CORRELATED WITH  
FREQUENCIES OF TURBULENCE DETERMINED FROM PILOT  
REPORTS. THE PRODUCT OF VERTICAL VECTOR WIND SHEAR  
AND HORIZONTAL RESULTANT DEFORMATION GAVE A  
CORRELATION OF 0.45--THE HIGHEST VALUE FOUND SO FAR  
FROM DATA OF THIS TYPE. CONTINGENCY TABLES OF  
TURBULENCE FREQUENCY AS A FUNCTION OF VERTICAL SHEAR  
AND LAPSE RATE INDICATE THAT LAPSE RATE IS NOT  
SIGNIFICANT IN THE MANNER INDICATED BY RICHARDSON'S  
NUMBER. FROM METEOROLOGICAL DATA AND EMPIRICAL  
EQUATIONS, EXPECTED FREQUENCIES OF TURBULENCE OVER (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /K0392

AD-649 357 4/2

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
IGY AND IGC DATA ON VERTICAL WIND SHEARS IN JET  
STREAMS OVER THE SOUTHERN USSR. (U)

DESCRIPTIVE NOTE: RESEARCH TRANSLATION,

OCT 66 19P BURKOVA, M. V. ILEVINA, P. Z. I

REPT. NO. T-R-612

CONTRACT: AF 19(628)-3880

MONITOR: TT 67-60161

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: VERTIKALNYE SDVIGI VETRA V  
STRUINYKH TECHENIYAKH NAD YUGOM SSSR PO MATERIALAM  
MGG I MGS, TRANS. OF SREDNEAZIATSKII NAUCHNO-  
ISSLEDOVATEL'SKII GIDROMETEOROLOGICHESKII INSTITUT.  
TRUDY (USSR) N19(24) P26-27 1964.

DESCRIPTORS: (\*JET STREAMS(METEOROLOGY),  
METEOROLOGICAL PARAMETERS), USSR, WIND, SHEAR  
STRESSES, VELOCITY (U)

THE PAPER EXAMINES STUDIES OF VERTICAL WIND SHEARS  
IN ARCTIC-FRONT, POLAR-FRONT, AND SUBTROPICAL JET  
STREAMS MADE IN WINTER AND SUMMER IN THE PERIOD 1957  
THROUGH 1959. CALCULATIONS ARE MADE OF THE  
DISTRIBUTION OF FREQUENCIES OF VARIOUS GRADATIONS OF  
VERTICAL WIND SHEARS ABOVE AND BELOW JET STREAMS AND  
THE RELATIONS BETWEEN THE WIND FORCE ON THE JET-  
STREAM AXIS AND THE VERTICAL WIND SHEARS ARE PLOTTED.  
(AUTHOR) (U)

REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN  
SECTION XI BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY.  
THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

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| 643 | 554 |

## XII. STORM AND CLOUD TURBULENCE

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-254 827

AIR WEATHER SERVICE SCOTT AFB ILL

PROJECT TORNADO-SFERICS

(U)

60 IV

REPT. NO. 4WGP 109 2 7

UNCLASSIFIED REPORT

DESCRIPTORS: \*METEOROLOGICAL RADAR, \*RADAR ECHO  
AREAS, \*TORNADOES, ATMOSPHERICS, METEOROLOGY, PLOTTING  
BOARDS, RADAR NAVIGATION, RADAR TRACKING, STORMS,  
TROPICAL CYCLONES

(U)

IDENTIFIERS: AN/FMD-1, AN/FMS-2, AN/GRD-1

(U)

RESULTS OF THE 1960 PROJECT TORNADO-SFERICS  
ARE PRESENTED. THE AN/FMS-2 SFERICS EQUIPMENT WAS  
OPERATED FOR THE FIRST FULL SEVERE WEATHER SEASON.  
DESCRIPTIONS OF THE EQUIPMENT AND METHODS OF  
OPERATION AND CALIBRATION ARE PRESENTED. ANALYSES  
TO ILLUSTRATE THE EFFECTIVENESS OF THE SYSTEM IN  
DETECTING WEATHER PHENOMENA ARE DISCUSSED. CASE  
STUDIES ARE PRESENTED TO SHOW THE CORRELATION OF  
SFERICS FIXES AS DETECTED BY THE SYSTEM WITH SEVERE  
WEATHER ACTIVITY. RESULTS INDICATED THAT FIXES FROM  
AZIMUTHS OF FOUR OR MORE DETECTION STATIONS ARE  
RELIABLE INDICATORS OF THUNDERSTORM ACTIVITY, BUT NOT  
ALL THUNDERSTORMS ARE DETECTED BY THE SFERICS NET.  
PREDICTIONS OF SEVERE WEATHER ACTIVITY FROM SFERICS  
FIXES ALONE ARE NOT RELIABLE. SFERICS OBSERVATIONS  
ARE BEST USED IN CONJUNCTION WITH RADAR REPORTS.  
EARLY MORNING COMPARISON OF COUNTS OF SFERICS  
SIGNALS PER UNIT TIME AT THE THREE DETECTION  
FREQUENCIES CAN PROVIDE AN INDICATION FOR THE AMOUNT  
OF SEVERE WEATHER ACTIVITY WHICH CAN BE EXPECTED  
LATER IN THE DAY. COMPARISON OF SFERICS FIXES WITH  
CLEAR AIR TURBULENCE SHOWED ONLY NEGATIVE RESULTS,  
EXCEPT FOR ONE CASE OF A POSITIVE CORRELATION OF  
SFERICS, CLEAR AIR TURBULENCE, AND A HURRICANE TRACK  
48 HR LATER. THERE WAS GOOD CORRELATION OF SFERICS  
FIXES WITH THE BRIGHT AREAS IN TIROS CLOUD  
PHOTOGRAPHS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-296 867

TEXAS A AND M UNIV COLLEGE STATION  
SOME EFFECTS OF RANGE UPON AN/CPS-9 RADAR  
REFLECTIVITIES IN THUNDERSTORMS

(U)

JAN 61 1V SANFORD, TOM E. I

REPT. NO. SR2

CONTRACT: AF17 604 6126

MONITOR: AFRL 226

UNCLASSIFIED REPORT

DESCRIPTORS: \*METEOROLOGICAL RADAR, \*RADAR SIGNALS,  
\*SNOW REMOVAL, \*STORMS, CUMULONIMBUS CLOUDS,  
METEOROLOGY, RADAR ECHO AREAS, RADAR REFLECTIONS,  
RANGES (DISTANCE), REFLECTION

(U)

IDENTIFIERS: AN/CPS-9

(U)

ECHO HEIGHT AND RADAR REFLECTIVITY MEASUREMENTS  
WERE OBTAINED FOR CENTRAL AND SOUTHEAST TEXAS  
THUNDERSTORMS. STORMS WERE CLASSIFIED INTO FIVE  
CATEGORIES ACCORDING TO THE SEVERITY OF SURFACE  
WEATHER REPORTED BY COOPERATIVE OBSERVERS, U. S.  
WEATHER BUREAU SEVERE STORM SUMMARIES, AND  
NEWSPAPER CLIPPINGS. MEDIAN PROFILES OF THE  
REFLECTIVITIES WERE CONSTRUCTED, AND COMPARISONS WERE  
MADE BETWEEN REFLECTIVITIES MEASURED AT VARIOUS  
RANGES. REGRESSION CURVES WERE OBTAINED WHICH  
RELATE THE PRODUCT OF THE ATTENUATION AND BEAM  
FILLING FACTORS TO THE TARGET DISTANCE FROM THE  
RADAR. RESULTS INDICATE THAT ATTENUATION OF 3.2-  
CM RADIATION AND BEAM FILLING ARE IMPORTANT FACTORS  
IN THE RADAR EQUATION AND CANNOT BE IGNORED EVEN AT  
CLOSE RANGE WHEN ACCURATE MEASUREMENTS ARE REQUIRED.  
THE SIGNAL DEPLETION TERM APPEARS MORE IMPORTANT  
THAN THE BEAM FILLING FACTOR IN POWER ATTENUATION  
RESULTING FROM INCREASED RANGE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-297 796

JOHNS HOPKINS UNIV BALTIMORE MD

A VORTEX IN AN INFINITE VISCOUS FLUID

(U)

JUN 61

IV

LONG, ROBERT R.

REPT. NO. TR11

CONTRACT: NONR24821

UNCLASSIFIED REPORT

DESCRIPTORS: \*VORTICES, ATMOSPHERE, DIFFERENTIAL  
EQUATIONS, LIQUIDS, MATHEMATICAL ANALYSIS, THEORY,  
TORNADOES, VISCOSITY

(U)

A SOLUTION IS GIVEN FOR A VISCOUS VORTEX IN AN INFINITE LIQUID. SIMILARITY ARGUMENTS LEAD TO A REDUCTION OF THE EQUATIONS OF MOTION TO A SET OF ORDINARY DIFFERENTIAL EQUATIONS. THESE ARE INTEGRATED NUMERICALLY. A UNIFORM FEATURE IS THE CONSTANT CIRCULATION,  $K$ , OUTSIDE THE VORTEX CORE, WHICH IS ALSO A VISCOUS BOUNDARY LAYER. THE CIRCULATION DECREASES MONOTONICALLY TOWARD THE AXIS. THE AXIAL VELOCITY PROFILES AND THE RADIAL VELOCITY PROFILES HAVE SEVERAL CHARACTERISTIC SHAPES, DEPENDING ON THE VALUE OF THE NON-DIMENSIONAL MOMENTUM TRANSFER,  $M$ . THE SOLUTION HAS A SINGULAR POINT ON THE AXIS OF THE VORTEX. THE RADIUS OF THE CORE INCREASES LINEARLY WITH DISTANCE ALONG THE AXIS FROM THE SINGULARITY, AND, AT A GIVEN DISTANCE, IS PROPORTIONAL TO THE COEFFICIENT OF VISCOSITY AND INVERSELY PROPORTIONAL TO  $K$ . FINALLY A DISCUSSION IS GIVEN TO INDICATE THAT INTENSE VORTICES ABOVE A PLATE, LIKE THE CONFINED EXPERIMENTAL VORTEX, OR ABOVE THE GROUND, LIKE THE ATMOSPHERIC TORNADO AND DUST WHIRL, WILL NOT RESEMBLE THE THEORETICAL VORTEX EXCEPT, POSSIBLY, FAR ABOVE THE PLATE.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-298 549

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

A STUDY OF THE PULSATING GROWTH OF CUMULUS  
CLOUDS

(U)

DEC 60 IV ANDERSON, CHARLES E. I

REPT. NO. TR 60 417

MONITOR: AFRL TR 60 417

UNCLASSIFIED REPORT

DESCRIPTORS: \*CONVECTION, \*CUMULUS CLOUDS, AERIAL  
PHOTOGRAPHY, AIR, AIR MASS ANALYSIS, CLOUDS, GROWTH,  
MAPPING, STATISTICAL ANALYSIS, TURBULENCE (U)

THE GROWTH OF FIVE CUMULUS CONGESTUS CLOUDS OVER  
THE SANTA CATALINA MOUNTAINS NEAR TUCSON,  
ARIZONA, WAS SUBJECTED TO DETAILED EXAMINATION BY  
MEANS OF PHOTOGRAMMETRIC AND STATISTICAL ANALYSIS.  
THESE CLOUDS WERE FOUND TO EXHIBIT A PULSATING FORM  
OF CELLULAR CONVECTION AS THEY GREW UPWARD. ONCE  
MAXIMUM HEIGHT WAS ACHIEVED, THE CIRCULATION BECAME A  
LINEARLY-INCREASING FUNCTION OF TIME. THE  
PULSATATIONS WERE FOUND TO BE RELATED TO THE BUOYANCY-  
RESTORING FORCE OF THE STATICALLY STABLE AIR WITH  
FREQUENCIES NEAR 10 MINUTES. HIGHER FREQUENCIES  
WERE FOUND NEAR ONE TO TWO MINUTES WHICH COULD NOT BE  
DEFINITELY ACCOUNTED FOR BY CONVENTIONAL TURBULENCE  
THEORY. OVERALL ACCELERATION OF THE MOTION WAS  
SHOWN TO BE CAUSED BY AN UNDERLYING FLOW WHICH  
RESPONDED TO THE MEAN STATE OF THE CLOUD COLUMN. A  
PHYSICAL MODEL IS PROPOSED FOR THE CIRCULATION OF A  
GROWING CUMULUS IN WHICH TWO CELLS ARE ACTING  
CONCURRENTLY, YET INDEPENDENTLY, ALONG THE SAME  
VERTICAL AXIS. THE CORRECT TIME BEHAVIOR IS SHOWN  
TO RESULT FROM APPLYING BJERKNES' CIRCULATION  
THEOREM, MODIFIED TO INCLUDE ENTRAINMENT AND MIXING.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0392

AD-260 408

WEATHER WING (2ND) NEW YORK 09332

TECHNICAL BULLETIN

MAY 61        IV

(U)

UNCLASSIFIED REPORT

DESCRIPTORS:    •METEOROLOGY, •STORMS, •WEATHER  
FORECASTING, CUMULONIMBUS CLOUDS, GUSTS, HAIL,  
NUMERICAL METHODS AND PROCEDURES

(U)

IDENTIFIERS:    GREAT BRITAIN, MEDITERRANEAN SEA

(U)

CONTENTS: THUNDERSTORMS IN GREAT BRITAIN  
SEVERE WEATHER ASSOCIATED WITH THUNDERSTORMS  
FORECASTING STRONG WINDS AT SCULTHORPE, ENGLAND  
HORIZONTAL WEATHER DEPICTION NEPHANALYSIS AN  
OPERATION EVALUATION OF SOME JOINT NUMERICAL  
WEATHER PREDICTION UNIT PRODUCTS MEDITERRANEAN  
METEOROLOGY

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-269 029

MASSACHUSETTS INST OF TECH CAMBRIDGE

RESEARCH DIRECTED TOWARD THE INVESTIGATION OF RADAR  
TECHNIQUES FOR SEVERE STORM IDENTIFICATION AND THE  
MEASUREMENT OF PRECIPITATION GROWTH (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 JULY 57-30 JUNE 60.

AUG 61 57P AUSTIN, PAULINE M. I

CONTRACT: AF19 604 2291

MONITOR: AFCRL 826

UNCLASSIFIED REPORT

DESCRIPTORS: •IDENTIFICATION, •METEOROLOGICAL RADAR,  
•STORMS, ATMOSPHERIC PRECIPITATION, CHEMICAL  
PRECIPITATION, DETECTION, EFFECTIVENESS, HAIL,  
INTENSITY, MEASUREMENT, METEOROLOGY, RADAR (U)  
IDENTIFIERS: ANGELS (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0392

AD-262 384

AIR WEATHER SERVICE SCOTT AFB ILL  
THE ASSOCIATION OF THIN LINE RADAR ECHOES TO GUST  
FRONTS (U)

JUN 61        IV        RAMSAY, ALLAN C. J  
REPT. NO. 4WGP 105 10 1

UNCLASSIFIED REPORT

DESCRIPTORS:    •AIR MASS ANALYSIS, •RADAR ECHO AREAS,  
•WEATHER FORECASTING, CUMULONIMBUS CLOUDS, GUSTS,  
METEOROLOGICAL RADAR, MOISTURE, RADAR, STORMS (U)

RADAR OBSERVATIONS OF TWO THIN-LINE ECHOES ARE  
PRESENTED AS OBSERVED AT MAXWELL AIR FORCE  
BASE, ALABAMA IN JUNE, 1960. THEIR  
RELATIONSHIP TO THE OCCURRENCE OF FIRST GUSTS FROM  
AIR-MASS THUNDERSTORMS IS SHOWN. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-264 587

AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
SELECTIONS FROM INTERDEPARTMENTAL CONFERENCE ON THE  
PROBLEMS OF INVESTIGATING CLOUDS, PRECIPITATION AND  
THUNDERSTORM ELECTRICITY (U)

MAY 61 IV

REPT. NO. T RC 20

CONTRACT: AF19 604 6112

UNCLASSIFIED REPORT

DESCRIPTORS: •AIR MASS ANALYSIS, •ATMOSPHERIC  
PRECIPITATION, •CHEMICAL PRECIPITATION, •CUMULUS  
CLOUDS, •STRATUS CLOUDS, •WEATHER FORECASTING,  
ATMOSPHERIC ELECTRICITY, CLIMATOLOGY, CLOUDS,  
CONVECTION, CUMULONIMBUS CLOUDS, JET STREAMS  
(METEOROLOGY), TECHNOLOGICAL INTELLIGENCE,  
TRANSLATIONS, TURBULENCE (U)

IDENTIFIERS: USSR (U)

CONTENTS: SOME RESULTS OF AN INVESTIGATION OF  
INTRA-AIR MASS CLOUDS ROLE OF VERTICAL CURRENTS  
AND TURBULENT MIXING IN THE FORMATION AND EVOLUTION  
OF STRATIFORM CLOUDS EXPERIMENT IN FORECASTING  
THE CONCENTRATION OF INTRA-AIRMASS CUMULUS CLOUDS  
THE PROBLEM OF FORECASTING THE CONCENTRATION OF  
INTRA-AIRMASS CONVECTIVE CLOUDS OBSERVATIONS OF JET  
STREAM CLOUDS IN THE MOSCOW REGION THE PROBLEM  
OF FORECASTING CLOUDINESS: PRESENT STATUS AND  
LEADING INVESTIGATIONS CLOUD SYSTEMS OF THE BLACK  
SEA SOME PROBLEMS OF THE SPECTRAL TRANSPARENCY OF  
CLOUDS AND FOGS (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-266 154

STANFORD RESEARCH INST MENLO PARK CALIF  
HIGH ALTITUDE WEATHER HAZARDS TO FLIGHT  
IV NAGLE, ROLAND E. J

(U)

CONTRACT: AF19 604 7397

MONITOR: AFCRL 654

UNCLASSIFIED REPORT

DESCRIPTORS: •AVIATION ACCIDENTS, •METEOROLOGY,  
•STORMS, AIRPLANES, ANALYSIS, ATMOSPHERE, HAZARDS,  
HIGH ALTITUDE, JET STREAMS (METEOROLOGY), RADAR, RADAR  
REFLECTIONS, REDUCTION, WIND (U)

RADAR-MET OROLOGICAL ANALYSES WERE CONDUCTED ON 14  
ACCIDENTS INVOLVING DAMAGE OR DESTRUCTION OF AIRCRAFT  
IN SEVERE THUNDERSTORMS AT ALTITUDES ABOVE 25,000  
FEET. IT WAS FOUND THAT RADAR ECHOES FROM  
CONVECTIVE STORMS IN WHICH VIOLENT CONDITIONS ALOFT  
WERE KNOWN TO EXIST HAVE DESTRUCTIVE CHARACTERISTICS.  
RELATIONSHIPS WERE FOUND BETWEEN THE SURFACE AND  
UPPER AIR PATTERNS AND LOCATIONS OF THE ACCIDENTS.  
A CLOSE CORRESPONDENCE WAS FOUND BETWEEN AREAS OF  
VIOLENT CONVECTION ALOFT AND STRONG WIND IN PARTICULAR  
MULTIPLE-CELL-STREAM CONFIGURATIONS AT AND ABOVE THE  
500 MILLIBAR PRESSURE LEVEL. EIGHT ACCIDENTS IN  
WHICH THE AIRCRAFT WAS DESTROYED, BUT FOR WHICH RADAR  
DATA WERE NOT AVAILABLE, WERE USED TO CHECK THE  
FINDINGS. IN 7 OF THESE CASES, AGREEMENT WAS  
EXCELLENT. A METHOD FOR DELINEATING AREAS OF  
POTENTIALLY HAZARDOUS FLIGHT CONDITIONS IS SUGGESTED  
AN OPERATIONAL PROGRAM FOR IN-FLIGHT AVOIDANCE OF  
SEVERE WEATHER IS ALSO DESCRIBED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0392

AD-275 568

CHICAGO UNIV ILL

MESOMETEOROLOGICAL STUDY OF SELECTED AREAS IN THE  
UNITED STATES

(U)

FEB 62

IV

BROWN, HENRY A. | BONNER, WILLIAM

CONTRACT: DA36 0295C88932

UNCLASSIFIED REPORT

DESCRIPTORS:    •ATMOSPHERE, •METEOROLOGY, •STORMS,  
•WEATHER FORECASTING, ATMOSPHERIC PRECIPITATION,  
CHEMICAL PRECIPITATION, HUMIDITY, PRESSURE, SURFACE  
PROPERTIES, TEMPERATURE, WIND

(U)

IDENTIFIERS:    ARIZONA, NEW JERSEY, OKLAHOMA, TEXAS

(U)

ANALYSIS OF THE SQUALL LINE THAT DEVELOPED AND  
MOVED OVER THE TEXAS-OKLAHOMA SEVERE LOCAL  
STORMS NETWORK ON JUNE 23, 1957 REVEALED THE  
ORIGIN AND LIFE HISTORY OF THE MESOSYSTEM.  
ORIGINALLY A POST-COLD FRONTAL SYSTEM, IT GREW  
RAPIDLY IN SIZE AND INTENSITY AND FINALLY EXTENDED  
BEYOND THE COLD FRONT INTO THE WARM SECTOR. IN  
ADDITION TO THE CUSTOMARY PHENOMENA THAT ACCOMPANY A  
SQUALL LINE, ANOTHER FEATURE, THE HUMIDITY DIP, WAS  
NOTED. THIS FEATURE PREVIOUSLY DISCUSSED AS A  
MICROSCALE FEATURE, HAD MESOSCALE DIMENSIONS. THE  
ASSOCIATION OF THE HUMIDITY DIP WITH OTHER METEOROLOGICAL  
VARIABLES IS EXAMINED. THE POSSIBLE ORIGINS ARE  
CONSIDERED. THE IMPLICATIONS OF THE PRESENCE OF THE  
HUMIDITY DIP ON LIFE CYCLE, MOISTURE AND ENERGY BUDGETS,  
AND COLD AIR PRODUCTION OF THE SQUALL LINE ARE  
DISCUSSED. FIELD OPERATION PLANS ARE DETAILED TO  
OBTAIN MORE COMPREHENSIVE DATA ON THE MOISTURE AND  
TEMPERATURE FIELDS PRECEDING, DURING AND FOLLOWING  
SQUALL LINE - HUMIDITY DIP PASSAGE. THE PLANS ARE  
BASED ON THE UTILIZATION OF THE CEDAR HILLS  
TELEVISION TOWER (1420 FEET) FOR DETERMINATION OF  
CONTINUOUS MEASUREMENTS AT A NUMBER OF LEVELS.  
HORIZONTAL SURFACE VARIATIONS WILL BE OBTAINED FROM  
A MICRONETWORK AND MESONETWORK SURROUNDING THE TOWER.

(AUTHOR)

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /LD352

AD-276 116

ILLINOIS STATE WATER SURVEY URBANA  
RESEARCH CONCERNING ANALYSIS OF SEVERE THUNDER-  
STORMS

( U )

IV WILK, K.E.:

UNCLASSIFIED REPORT

DESCRIPTORS: CUMULONIMBUS CLOUDS, RADAR, MEASUREMENT, METEOROLOGICAL RADAR, STORMS, VELOCITY (U)  
IDENTIFIERS: TIROS (U)

THE SCALES OF SEVERE THUNDERSTORM PHENOMENA IN THE  
MIDWEST ARE DESCRIBED AND THE TIME AND SPACE  
RESOLUTION OF OBSERVATIONAL DATA USED IN THE  
INVESTIGATION OF SEVERE LOCAL STORMS IN ILLINOIS IS  
DISCUSSED. A DETAILED ANALYSIS OF RADAR, TIROS  
I, AND SYNOPTIC DATA ACQUIRED FOR THE SPECIFIC STORM  
OF 16 MAY 1960 SHOWS THE COMPLETE STORM SYSTEM  
CONTAINS SEVERAL DISTINCT THUNDERSTORM COMPLEXES.  
RADAR ECHO COMPOSITES, WHICH WERE CONSTRUCTED FOR 4  
STANDARD PRESSURE LEVELS FOR THIS STORM SYSTEM,  
DISCLOSED THAT ONLY ONE OR TWO MAJOR THUNDERSTORMS  
WITHIN A COMPLEX WERE RESPONSIBLE FOR THE OBSERVED  
SEVERE WEATHER. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-281 788

TECHNICAL OPERATIONS INC BURLINGTON MASS

DISPERSAL OF SUPERCOOLED FOG AND STRATUS CLOUDS, (U)

MAR 62 197P EDDY :ALAN IVICKERS,WILLIAM

1

REPT. NO. TO-862-17

CONTRACT: AF19 604 8049

PROJ: 6697

MONITOR: AFCRL 62 689

UNCLASSIFIED REPORT

DESCRIPTORS: \*CLOUDS, \*SCATTERING, CARBON DIOXIDE,  
FOG, ICE, SEEDS, SOLIDIFIED GASES, STRATUS CLOUDS,  
TURBULENCE, WATER (U)

RESULTS ARE PRESENTED OF AN EXPERIMENTAL STUDY OF THE DISSIPATION OF SUPERCOOLED FOG AND STRATIFORM CLOUDS BY AN AIRBORNE DRY-ICE DISPENSER. THE ULTIMATE PURPOSE IS TO PROVIDE THE AIR FORCE WITH AN OPERATIONAL CAPABILITY OF DISSIPATING SUPERCOOLED CLOUDS BY DISPENSING DRY-ICE PELLETS MADE ON BOARD THE SEEDING AIRCRAFT AND DISPENSED AT WILL TO CREATE HOLES IN THE CLOUD LAYER OF SPECIFIC SIZE FOR PARTICULAR MISSIONS. EXPERIMENTS ARE DESIGNED, FLOWN, AND ANALYSED TO DETERMINE WHAT VARIABLES, EITHER CONTROLLABLE OR UNCONTROLLABLE, ARE INFLUENCING THE EXPERIMENTS AND WHICH OF THESE VARIABLES MUST BE CONSIDERED IN THE DESIGN OF EQUIPMENT. THE FINAL RESULTS INDICATE THAT CLOUD LIQUID-WATER CONTENT AND TURBULENCE ARE TWO UNCONTROLLABLE VARIABLES INFLUENCING THE EXPERIMENT. THE TRIAL RANGE USED FOR CONTROLLABLE VARIABLES WAS HIGHER THAN THE CRITICAL MINIMUMS SOUGHT. THE EXPERIMENTS SHOW THAT A SIMPLE EMERGENCY DISPENSER FOR ALL AIRCRAFT APPEARS FEASIBLE FOR CLOUD DECKS LESS THAN 1,000 FEET THICK. A MORE SOPHISTICATED MODEL WITH A SINGLE SIZE PELLET-MAKING ABILITY AND 300-LB LIQUID CO2 CAPACITY SHOULD BE DESIGNED FOR AIRPORT DUTY AIRCRAFT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-282 770

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

VERTICAL VELOCITIES OBTAINED FROM AIRCRAFT  
ACCELEROMETER MEASUREMENTS IN A SEVERE THUNDERSTORM (U)

MAY 62 IV CARLSON, TOBY N.; GLASS, MORTON;  
REPT. NO. 62 499

UNCLASSIFIED REPORT

DESCRIPTORS: \*CUMULONIMBUS CLOUDS, \*GUST LOADS, \*JET  
TRAINING PLANES, \*VERTICAL GUST RECORDERS,  
ACCELEROMETERS, MEASUREMENT, STORMS (U)  
IDENTIFIERS: ARIZONA, T-33 AIRCRAFT (U)

A PENETRATIVE FLIGHT BY A T-33 AIRCRAFT WAS MADE  
THROUGH A LARGE THUNDERSTORM ON 26 JULY 1960 OVER  
NORTHERN ARIZONA. FROM INSTRUMENTS RECORDING  
AIRPLANE ACCELERATION, GUST LOADS, PITCH  
ANGLE, PRECISE MEASURE (1 F / C) YIELDED A  
VERTICAL VELOCITY EVERY 60 FT OF FLIGHT PATH.  
CALCULATED VELOCITIES DIFFERED FROM THE TRUE  
MOTIONS BY A CONSTANT OF INTEGRATION. EVALUATING  
THE CONSTANT BY ALTERNATE PROCEDURES PRODUCED TWO  
VELOCITY DISTRIBUTIONS, DIFFERING FROM EACH OTHER BY  
A CONSTANT. (AU HOR) AD-28277 DMS \*\*  
VERTICAL VELOCITIES OBTAINED FROM AIRCRAFT  
ACCELEROMETER MEASUREMENTS IN SEVERE  
THUNDERSTORM. (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-284 812

AIR FORCE CAMBRIDGE RESEARCH LABS L 6 HANSCOM FIELD  
MASS

RADAR MEASUREMENTS OF SEVERE STORMS IN NEW  
ENGLAND

(U)

IV AUSTIN, PAULINE M. I

UNCLASSIFIED REPORT

DESCRIPTORS: \*RADAR, \*STORMS, \*WEATHER FORECASTING,  
MAIL, INSTRUMENTATION, MEASUREMENT, NUMERICAL  
ANALYSIS, REFLECTION, STATISTICAL ANALYSIS

(U)

TWO INVESTIGATIONS CONCERNING SEVERE STORMS ARE PRESENTED. BASIC DATA FOR BOTH ARE ISO-ECHO CONTOURS OF THE AVERAGED, RANGE-CORRECTED SIGNAL, PHOTOGRAPHED FROM THE PPI OF A 10-CM RADAR. THESE QUANTITATIVE MEASUREMENTS AT A WAVELENGTH UNAFFECTED BY RAIN ATTENUATION ARE PARTICULARLY SUITABLE FOR THE STUDY OF SEVERE STORMS. A NUMERICAL INVESTIGATION OF NEW ENGLAND SQUALL LINES WAS UNDERTAKEN TO PROVIDE A QUANTITATIVE DESCRIPTION WHICH CAN BE USED FOR STATISTICAL ANALYSIS AND AS A BASIS FOR FORMULATING AND TESTING DYNAMIC MODELS. EIGHT SQUALL LINES ARE ANALYZED AND THREE CHARTS ARE PLOTTED FOR EACH ONE: A TOTAL INTENSITY CHART WHICH SHOWS THE RATE AT WHICH WATER IS BEING PRECIPITATED IN THE WHOLE LINE AS A FUNCTION OF TIME; A SPACE COMPOSITE SHOWING THE DISTRIBUTION OF RAIN IN A MOVING GRID ATTACHED TO THE SQUALL LINE; A TIME-SPACE COMPOSITE SHOWING THE DISTRIBUTION OF RAIN ALONG THE LINE AS A FUNCTION OF TIME. THE USE OF A COORDINATE SYSTEM ATTACHED TO THE LINE PERMITTED INVESTIGATION OF CHANGES IN INTERNAL STRUCTURE WHILE ELIMINATING EFFECTS PRODUCED BY THE MOTION OF THE LINE AS A WHOLE. THE TIME SCALE WAS ROUGHLY THE SAME FOR ALL THE LINES AS WERE THE MOTIONS AND ORIENTATION WITH RESPECT TO THE PREVAILING WIND. STRONG SIMILARITIES IN INTERNAL STRUCTURE WERE NOTED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-287 104

MICHIGAN UNIV ANN ARBOR COLL OF ENGINEERING  
AGGLOMERATION OF CLOUD PARTICLES AND PROJECT MI-CUE  
PARTICIPATION (U)

JUN 62 IV DINGLE, A. NELSON  
REPT. NO. 62 10020390 9 F  
CONTRACT: AF19 604 6142  
MONITOR: AFCRL 62 1002

UNCLASSIFIED REPORT

DESCRIPTORS: \*ARTIFICIAL PRECIPITATION, \*ATMOSPHERE  
MODELS, \*CLOUDS, \*TURBULENCE, \*VORTEX GENERATORS,  
DATA, DROPS, ELECTRONIC EQUIPMENT, MEASUREMENT,  
METEOROLOGY, SPECTROSCOPY, TABLES, TEST METHODS (U)

THE SEVERAL COMPONENTS NECESSARY TO CONDUCT  
EXPERIMENTAL OBSERVATIONS OF THE COALESCENCE OF  
CLOUD DROPLETS UNDER THE INFLUENCE OF AN INTRODUCED  
VORTEX WERE DEVELOPED. THESE COMPONENTS INCLUDE A  
LABORATORY CLOUD BOX (VERTICAL LOWSPEED TUNNEL),  
A VORTEX-GENERATING MECHANISM CONSISTING OF AN  
AIRFOIL AND A PROPULSION DEVICE, AND A TELEMICRO  
CAMERA CAPABLE OF 9X MAGNIFICATION OF OBJECTS 8 IN.  
FROM THE CAMERA OBJECTIVE. ANALYSIS OF THE EFFECTS  
OF A MODEL VORTEX UPON A POPULATION OF DROPS WAS DONE  
BY MEANS OF ELECTRONIC ANALOG TECHNIQUES, AND THESE  
SUPPORT THE HYPOTHESIS THAT A SINGLE VORTEX TENDS TO  
CAUSE DROPS TO BECOME CONCENTRATED IN A CONCENTRIC  
BAND. THE LIKELIHOOD OF COLLISIONS IS THUS  
INCREASED. RADAR STUDIES OF CHAFF DROPS IN  
PROJECT MI-CUE, 1959, SHOW THAT IN ONE ISOLATED  
CASE, A CIRCULATION DID OCCUR. FURTHER EXPERIMENTS  
ALONG THESE LINES ARE RECOMMENDED. DATA COLLECTED  
AT FLAGSTAFF UNDER PROJECT MI-CUE, 1961, ARE  
CURRENTLY UNDER ANALYSIS. THE DATA LOGS FOR THE  
RAINDROP-SIZE SPECTROMETER, THE TWO-THEODOLITE  
PIBALS, AND THE APQ-40 RADAR ARE INCLUDED. IN  
ADDITION THE RESULTS OF BASIC COMPUTATIONS ON THE  
RAINDROP-SIZE AND THE PIBALS ARE REPORTED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0352

AD-289 313  
METEOROLOGY RESEARCH INC PASADENA CALIF  
STUDY AND MODIFICATION OF CONVECTIVE STORMS (U)  
SEP 62    IV    MACCREADY, P.B. JR. SMITH, T.B. I  
LOCKHART, T.J. I  
REPT. NO. 62 IR 54  
CONTRACT: DA36 0295C89066

UNCLASSIFIED REPORT

DESCRIPTORS:    •CONVECTION, •CUMULUS CLOUDS, •STORMS,  
AIRCRAFT, ANALYSIS, FLIGHT PATHS, METEOROLOGICAL  
INSTRUMENTS, METEOROLOGICAL RADAR, PHYSICAL  
PROPERTIES (U)

METEOROLOGICAL RADAR STUDY ON MODIFICATION OF  
CONVECTIVE STORMS FROM AIRCRAFT.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-290 399

ARMY ELECTRONICS LABS FORT MONMOUTH N J

THE LANGUAGE OF HAILSTORMS AND HAILSTONES (U)

MAY 62 IV WEICKMANN, HELMUT K.;

REPT. NO. TR2277

UNCLASSIFIED REPORT

DESCRIPTORS: •HAIL, •STORMS, CLOUDS, CONVECTION,  
WATER, WIND (U)

THE BASIC INGREDIENTS OF HAILSTORMS SUCH AS HEIGHT OF STORM, INFRARED COOLING OF THE UPPER PARTS OF THE ANVIL, STRUCTURE AND PROPERTIES OF THE UPDRAFTS, INFLUENCE OF GLACIATION AND WATER STORAGE ON THE BUOYANCY, AND THE OVER-ALL AIR CONSUMPTION IN A HAILSTORM ARE DISCUSSED. SOME FUNDAMENTAL DIFFERENCES BETWEEN SYMMETRICAL AND ASYMMETRICAL STORMS ARE RELATED, WITH SPECIAL CONSIDERATION OF THE MECHANISM AND OF THE CONSEQUENCES OF SHEARING OFF THE UPPER PARTS OF A STORM IN A STRONG WIND SHEAR OR JET STREAM. CERTAIN PROPERTIES OF HAILSTONES--THEIR SHAPE AND INTERNAL STRUCTURE--WHICH MAY SERVE AS CLUES TO THEIR LIFE HISTORY IN THE STORM ARE CONSIDERED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-298 951

IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON  
(ENGLAND)

CUMULONIMBUS CONVECTION IN SHEAR

(U)

NOV 62 IV GREEN, J.S.A. I PEARCE, R.P.I

REPT. NO. TSN12

MONITOR: AFCRL 63 257

UNCLASSIFIED REPORT

DESCRIPTORS: \*CONVECTION, \*CUMULONIMBUS CLOUDS,  
ATMOSPHERIC PRECIPITATION, GAS FLOW, HEAT TRANSFER,  
THUNDERSTORMS

(U)

STEADY, FRICTIONLESS, FINITE-AMPLITUDE CONVECTION IN AN  
OPEN SYSTEM, ASSOCIATED WITH A MODEL OF  
CUMULONIMBUS DYNAMICS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0352

AD-403 509

AIR WEATHER SERVICE SCOTT AFB ILL  
FORECASTING BLOWING DUST AT GEORGE AFB,  
CALIFORNIA,  
MAR 63        8P        BICKETT, KENNETH W. I

(U)

UNCLASSIFIED REPORT

DESCRIPTORS:    \*WEATHER FORECASTING, \*DUST  
                 STORMS, \*VISIBILITY, \*WIND, VELOCITY.  
IDENTIFIERS:    CALIFORNIA.

(U)

(U)

THE MAIN FACTORS IN CAUSING BLOWING DUST AT GEORGE AFB ARE THE COMBINATION OF STEADY WIND SPEED AND GUSTS, WITH STEADY WIND SPEED AS THE MAIN FACTOR. WHEN THE STEADY WIND SPEED REACHES ITS CRITICAL VALUE THE LOOSE DUST LYING ON THE DESERT FLOOR WILL BE LIFTED TO A HEIGHT SUFFICIENT TO RESTRICT THE VISIBILITY. THESE VALUES ARE: 17 KNOTS FOR A NORTHERLY WIND, 26 KNOTS FOR A SOUTHERLY WIND, AND 25 KNOTS FOR A WESTERLY WIND. THE CRITICAL VALUE INCREASES TO 30 KNOTS DURING THE MONTHS APRIL THROUGH SEPTEMBER FOR A SOUTHERLY WIND, AND FROM JUNE THROUGH SEPTEMBER FOR A WESTERLY WIND. THIS IS A RESULT OF THE "BAKING ACTION" OF THE DESERT FLOOR BY THE SUN AND THE INCREASE IN DESERT FOLIAGE. GUSTS ALONE WITHOUT A SUFFICIENTLY STRONG STEADY WIND, WILL ONLY LIFT THE DUST A FEW FEET ABOVE THE GROUND, IT WILL THEN SETTLE ON THE LEE SIDE OF THE BRUSH. AFTER THE DUST HAS BEEN LIFTED BY THE STEADY WIND THE GUSTS LIFT LARGER QUANTITIES OF DUST INTO THE ATMOSPHERE AND FORCE IT TO GREATER HEIGHTS. THE PRINCIPAL SOURCE REGIONS FOR BLOWING DUST ARE: THE AREA IN THE VICINITY OF THE MOUTH OF CAJON PASS (TO THE SOUTH), THE DRY LAKE BEDS AND MESA BETWEEN GEORGE AFB AND PALMDALE (TO THE WEST), AND THE MOJAVE RIVER VALLEY (TO THE NORTH). THE MAIN DIFFICULTY IN FORECASTING BLOWING DUST AT GEORGE AFB IS WHETHER THE MAIN BODY OF DUST WILL BE CARRIED THROUGH GEORGE AFB OR ON THE OUTER PERIMETERS. WITH A SOUTH WIND, THE AIR IS FUNNELLED THROUGH CAJON PASS AND FANNED OUT OVER THE DESERT, WHILE THE CENTER OF THE STREAM MOVES NORTHWARD THROUGH APPLE VALLEY. THE PREDOMINATE DUST LAYER TRAVELS WITH THE MAIN STREAM, WITH GEORGE AFB LYING ON THE OUTER FRINGES. BLOWING DUST IS NOT A PROBLEM DURING THE SUMMER MONTHS WITH A SOUTH WIND, EXCEPT WHEN ASSOCIATED WITH THUNDERSTORMS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-408 888

JOINT PUBLICATIONS RESEARCH SERVICE WASHINGTON D C  
HYDRODYNAMIC CALCULATION OF THE OROGRAPHIC  
CLOUDINESS IN A STABLE AND UNSTABLE ATMOSPHERE, (U)

MAY 63 8P ZEITUNYAN, KH.N.I

REPT. NO. 19119

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF AKADEMIYA NAUK SSSR.  
DOKLADY, 1963, V. 148, NO. 3, PP. 985-988. ALSO FROM  
OTS FOR S.50 AS REPT. 63-21791.

DESCRIPTORS: (\*ATMOSPHERE), STRATIFICATION,  
STABILITY, (\*CLOUDS), (\*ATMOSPHERIC MOTION),  
(\*TERRAIN), NUMERICAL ANALYSIS. (U)

IDENTIFIERS: JPRS. (U)

THE PURPOSE OF THE WORK IS TO SURVEY THE CHAR  
ACTERISTICS THAT ARISE IN CONDITIONS OF UNSTABLE  
STRATIFICATION AND TO GIVE A COMPARISON BETWEEN  
STABLE AND UNSTABLE CASES. WE WILL SUPPOSE THAT  
THE SPEED OF THE BASIC MOTION ( $Z$  SUB 1) IS  
DIRECTED ALONG THE HORIZONTAL AXIS  $X$  SUB 1 WHERE AT  
FIRST THE SPEED AND THE TEMPERATURE OF THE  
BASIC PRIMARY MOTION WILL NOT IN ANY WAY LIMITED IN  
THEIR DEPENDENCE ON THE HEIGHT  $Z$  SUB 1.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0392

AD-410 489

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO  
AIRBORNE INSTRUMENTATION SYSTEM FOR MEASURING  
METEOROLOGICAL PHENOMENA INSIDE THUNDERSTORMS. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

MAY 63 59P ROYS, GEORGE P.;

PROJ: 8620

TASK: TASKS 862001 ,862005

MONITOR: ASD TDR63 221

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON THUNDERSTORM ELECTRICITY  
AND CLOUD STRUCTURE DYNAMICS.

DESCRIPTORS: (•METEOROLOGICAL PHENOMENA, MEASUREMENT), (•METEOROLOGICAL INSTRUMENTS, AIRBORNE), (•THUNDERSTORMS, SCIENTIFIC RESEARCH), OPERATION, DESIGN, WATER, ELECTRIC FIELDS, HAIL, RLDS, METEOROLOGICAL PARAMETERS, WIND, ACCELERATION, GUSTS, ATMOSPHERIC TEMPERATURE, BAROMETRIC PRESSURE, DAMAGE, AIRCRAFT, PHOTOGRAPHS, CAMERAS, PRESSURE GAGES, STATIC DISCHARGERS, TEST EQUIPMENT (ELECTRONICS), OSCILLOGRAPHS, ANTENNAS, WIRE. (U)

IDENTIFIERS: 1963. (U)

EQUIPMENT TO MEASURE METEOROLOGICAL PHENOMENA INSIDE THUNDERSTORMS WAS DESIGNED, FABRICATED, INSTALLED, AND OPERATED IN TWO JET AIRCRAFT IN CONJUNCTION WITH THE NATIONAL SEVERE STORM PROJECT IN OKLAHOMA CITY, OKLAHOMA.

DEVICES WHICH WERE USED FOR THE FIRST TIME IN THIS ENVIRONMENT WERE THOSE TO CONTINUOUSLY MEASURE LIQUID WATER CONTENT, ELECTRIC FIELD STRENGTH, AND HAIL MASS, AND TO PHOTOGRAPH CLOUD PARTICLES.

OTHER PARAMETERS RECORDED WERE NORMAL ACCELERATION, VERTICAL GUST VELOCITY, TEMPERATURE, AND DIFFERENTIAL STATIC PRESSURE. THE DATA COLLECTED DURING THE ASD FLIGHT TEST PROGRAM ARE ARCHIVED WITH THE U.S. WEATHER BUREAU AND CAN BE OBTAINED THROUGH THE NATIONAL SEVERE STORM PROJECT.

(AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0292

AD-910 911

METEOROLOGY RESEARCH INC PASADENA CALIF

STUDY AND MODIFICATION OF CONVECTION STORMS. (U)

DESCRIPTIVE NOTE: FINAL REPT., 1 APR 62-30 MAR 63.

MAR 63 79P SMITH, T. B. TODD, C. J. ;

CHIEN, CHEN-WU ; WOODWARD, BETSY ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*METEOROLOGY, CLOUDS), (\*STORMS, CONVECTION), METEOROLOGICAL PHENOMENA, METEOROLOGICAL CHARTS, SILVER COMPOUNDS, IODIDES, CUMULUS CLOUDS, AIRBORNE, MEASUREMENT, AIRCRAFT, PARTICLE SIZE, MOUNTAINS, WAKE, WIND, HEAT, BUOYANCY, AERIAL CAMERAS, TURBULENCE, HUMIDITY, TEMPERATURE, WATER VAPOR, PHOTOGRAPHS, RADAR (U)

IDENTIFIERS: 1963, CLOUD SEEDING, DRY ICE, BATON PROJECT, PANTOGRAPH (U)

THE DEVELOPMENT OF FIELD RESEARCH AND ANALYSIS TECHNIQUES AND A BASIC RESEARCH INVESTIGATION OF CLOUD PHYSICS, CLOUD DYNAMICS, AND RELATED CLOUD MODIFICATION ARE REPORTED. THE OVER-ALL FIELD RESEARCH SYSTEM, THE INSTRUMENTATION DETAILS, DATA HANDLING AND ANALYSIS METHODS, AND THE RESEARCH RESULTS OF THE VARIOUS STUDIES WHICH GO TO MAKE UP THE WHOLE PROGRAM ARE DESCRIBED. THE SUB-CLOUD LAYER AND REPRESENTATIVE CUMULUS CLOUDS OF ALL SIZES WERE INVESTIGATED USING A COORDINATED SYSTEM OF TWO INSTRUMENTED AIRCRAFT, TWO GROUND RADARS, AND A GROUND NETWORK. THERE WERE CASES OF SMALL AND LARGE CLOUD SEEDING BY DR. ICE DROPS AND BY SILVER IODIDE FROM GROUND AND FROM AN ADDITIONAL AIRCRAFT. THE INVESTIGATIONS WERE COORDINATED WITH THE STUDIES OF USAERDL, WHICH USED THREE AIRCRAFT, A LIMITED GROUND NETWORK, AND SEVERAL LIGHTNING STUDY STATIONS, FOR PROBING LIGHTNING DEVELOPMENT AND CHARACTERISTICS, IN MEASURED GROUND TEMPERATURES, CONDENSATION NUCLEI AND SEEDING WITH CONDENSATION NUCLEI APPARATUS AND CHAFF. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-410 578

COLORADO STATE UNIV FORT COLLINS  
CUMULUS CONVECTION AND OROGRAPHIC CONVECTION  
CELLS.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT. NO. 2, 1 DEC 62-31

MAY 63,

MAY 63 10P RIEHL, HERBERT J

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (CUMULUS CLOUDS, CONVECTION), (STORMS,  
RAINFALL), (METEOROLOGICAL PHENOMENA, TROPICAL  
REGIONS), PERIODIC VARIATIONS, CLOUDS, METEOROLOGICAL  
RADAR, METEOROLOGICAL SATELLITES, WIND, DIURNAL  
VARIATIONS, TABLES, DYNAMICS, ENERGY, METEOROLOGICAL  
BALLOONS, WEATHER STATIONS

(U)

IDENTIFIERS: 1963, ASIA, MONSOONS

(U)

INITIAL RESEARCH IN REGARD TO SOUTHEAST ASIA  
REGIONS IS DESCRIBED UNDER THREE TOPICS: (1)  
DYNAMICS AND ENERGETICS OF STATIONARY MONSOON  
SYSTEMS; (2) DAY-TO-DAY VARIATIONS IN THE  
ASIATIC SUMMER MONSOON SEASON; AND (3) ONSET OF  
THE ASIATIC SUMMER MONSOON. DAILY VARIATIONS OF  
WIND STRUCTURE, RAINFALL, ETC. IN THE ASIATIC  
SUMMER MONSOON SEASON ARE SUPERIMPOSED ON A VERY  
STRONG QUASI-STATIONARY CIRCULATION WHICH IS MUCH  
MORE PERSISTENT THAN FOUND, FOR INSTANCE, IN THE  
ATLANTIC OR PACIFIC TRADE REGIONS. TENTATIVE  
CALENDAR DATES FOR THE COMMENCEMENT OF THE SW  
MONSOON FOR SEVERAL PILOT BALLOON STATIONS IN  
SOUTHEAST ASIA WERE DETERMINED FOR THE YEARS  
1926-1941, INCLUSIVE.

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-412 403

HAWAII INST OF GEOPHYSICS HONOLULU  
TROPICAL CYCLONES OF THE EASTERN NORTH PACIFIC AS  
REVEALED BY TIROS OBSERVATIONS, (U)

MAY 63 39P SADLER, JAMES C. I

RL 1. NO. SCIENTIFIC REPT. NO. 41

CONTRACT: AF19 604 6196

PROJ: 6698

TASK: 669802

MONITOR: AFCL

63 493

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TROPICAL CYCLONES, OCEANS),  
(\*METEOROLOGICAL SATELLITES, PHOTOGRAPHIC  
ANALYSIS), SURFACE TEMPERATURES, INTENSITY,  
METEOROLOGY, SHEAR STRESSES, TROPOSPHERE,  
DATA, STORMS, HURRICANE TRACKING, TROPICAL  
REGIONS, PHOTOGRAPHS, MAPPING. (U)

IDENTIFIERS: 1963, PACIFIC OCEAN, TIROS. (U)

PHOTOGRAPHIC DATA FROM TIROS SATELLITES INDICATE  
THE FREQUENCY OF TROPICAL CYCLONES OF TROPICAL STORM  
AND HURRICANE INTENSITY, TO BE SOME THREE TIMES  
GREATER THAN THE FREQUENCY DETERMINED BY CONVENTIONAL  
METEOROLOGICAL DATA IN THE EASTERN NORTH PACIFIC.  
THE SEA SURFACE TEMPERATURES EXERT AN INFLUENCE ON  
THE SIZE, INTENSITY AND TRACK OF THE CYCLONES BUT THE  
DOMINANT INFLUENCE WHICH PREVENTS A LARGE NUMBER OF  
CYCLONES FROM BEING EXPORTED INTO THE CENTRAL  
PACIFIC WITH HURRICANE FORCE WINDS IS THE  
'KILLING' EFFECT OF EXTREME VERTICAL SHEAR AS THE  
CYCLONES PASS THROUGH THE UPPER TROPOSPHERIC RIDGE  
LINE. TIROS DATA ARE PRESENTED TO ILLUSTRATE THE EFFECTS  
OF THESE INFLUENCES, SEPARATELY AND IN  
COMBINATION, ON THE LIFE HISTORY OF EASTERN PACIFIC  
TROPICAL CYCLONES. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0792

AD-417 036

ARMY NATICK LABS MASS

A STUDY OF WINDBORNE SAND AND DUST IN DESERT AREAS,

(U)

AUG 62 41P CLEMENTS, THOMAS I

STONE, RICHARD O. IMANN, JOHN F.;

EYHANN, JAMES L.;

MONITOR: ANL TECHNICAL REPT. NO. 58

UNCLASSIFIED REPORT

DESCRIPTORS: (DUST STORMS, DUSTS), SANDS,  
WIND, STORMS, CLIMATOLOGY.

(U)

IDENTIFIERS: 1962.

(U)

SEVERE SAND AND DUST STORMS OCCUR AT A RATE OF LESS THAN 2 PER YEAR ON THE AVERAGE IN THE DESERT AREAS OF SOUTHWESTERN UNITED STATES. LESS SEVERE STORMS AVERAGE ABOUT 4 PER YEAR. MOST STORMS OCCUR IN LATE WINTER OR SPRING AND LAST FOR A PERIOD OF 1 TO 3 DAYS. STORM INCIDENCE IS HIGHER IN DESERT AREAS THAT HAVE BEEN DISTURBED BY MAN'S ACTIVITIES, SUCH AS AGRICULTURE OR LARGE-SCALE MILITARY MANEUVERS. DURING A STORM, SAND AND DUST IN MILITARILY SIGNIFICANT AMOUNTS ARE CARRIED A FEW MILES AT MOST, BUT GENERALLY ONLY A FEW HUNDREDS OR THOUSANDS OF FEET. WIND-DRIVEN SAND IS CARRIED MOSTLY WITHIN 2 FEET OF THE GROUND, WITH 6 FEET AS A MAXIMUM HEIGHT IN ALL BUT EXTREMELY HIGH WINDS. CRITICAL PICK-UP VELOCITIES OF WINDS VARY ACCORDING TO THE TYPE OF DESERT SURFACE, THE GRAIN SIZE AND COHERENCY OF THE SURFACE MATERIALS, AND WHETHER OR NOT THE SURFACE HAS BEEN DISTURBED ARTIFICIALLY. IN DUNE AREAS, WINDS OF 10 TO 15 MILES PER HOUR WILL INHIBIT MOVEMENT, AND ON OTHER SANDY TERRAIN, WINDS OF 20 MILES PER HOUR WILL BE NECESSARY FOR THIS. FINE MATERIALS ON DESERT FLATS WILL BE SET IN MOTION AT 20 TO 25 MILES PER HOUR, AND ON ALLUVIAL FANS AND PLAYAS AT 30 TO 35 MILES PER HOUR. NO WIND-BLOWN MATERIAL WILL BE DERIVED FROM DESERT PAVEMENTS UNLESS THE SURFACE HAS BEEN BROKEN, AND ON ALL OTHER ABOVE-MENTIONED TYPES, DISTURBING THE SURFACE WILL LOWER CRITICAL PICK-UP VELOCITIES BY AS MUCH AS 5 MILES PER HOUR. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-422 591

CHICAGO UNIV ILL

AN INVESTIGATION OF THE STRUCTURE OF CLOUD AND  
WEATHER SYSTEMS ASSOCIATED WITH CYCLONES IN THE  
UNITED STATES, (U)

SEP 63 126P PETTERSSSEN, SVERRE ;

REPT. NO. 11

CONTRACT: AF19 604 7220

PROJ: 8641

TASK: 86410

MONITOR: AFCRL 63 716

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CYCLONES, ATMOSPHERIC MOTION), (\*AIR  
MASS ANALYSIS, CLOUDS), METEOROLOGICAL PHENOMENA,  
MODELS (SIMULATIONS), BAROMETRIC PRESSURE, ATMOSPHERIC  
PRECIPITATION, TURBULENCE, RAINFALL, METEOROLOGICAL  
SATELLITES (U)

IDENTIFIERS: 1963 (U)

SEVEN DIFFERENT SYNOPTIC SITUATIONS IN THE UNITED  
STATES HAVE BEEN ANALYZED, PARTICULARLY WITH A VIEW  
TO OBTAINING DETAILED DESCRIPTIONS OF VERTICAL  
STRUCTURES AND EVOLUTIONARY ASPECTS OF CLOUD SYSTEMS  
ASSOCIATED WITH EXTRATROPICAL CYCLONES. SUBSTANTIAL  
DIFFERENCES WERE FOUND AMONGST THE STORMS  
INVESTIGATED AND AGREEMENT WITH THE CLOUD STRUCTURES  
OF THE CLASSICAL CYCLONE MODELS WAS GENERALLY POOR.  
ATTEMPTS AT GENERALIZING THE RESULTS OF THE  
ANALYSES INTO MODEL STRUCTURES PROVED UNPROFITABLE ON  
ACCOUNT OF LARGE VARIABILITY WITHIN THE RELATIVELY  
SMALL SAMPLE OF CASES. THE PRESENT PAPER,  
THEREFORE, DESCRIBES EACH CASE AS AN INDIVIDUAL  
OCCURRENCE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-426 875

ARACON GEOPHYSICS CO CONCORD MASS  
FLEET APPLICATIONS METEOROLOGICAL OPERATIONAL  
SATELLITES (TROPICS-EASTERLY WAVES).

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

DEC 63 45P HERRITT, EARL S.

REPT. NO. ARA F9252 2

CONTRACT: N189 188 56897A

UNCLASSIFIED REPORT

DESCRIPTORS: (•METEOROLOGICAL SATELLITES,  
WEATHER STATIONS), (•WEATHER FORECASTING,  
METEOROLOGICAL SATELLITES), (•CLOUDS, PATTERN  
RECOGNITION), (ATMOSPHERIC MOTION), ATMOSPHERE  
MODELS, TROPOSPHERE, CLOUD COVER, AIR MASS  
ANALYSIS, VORTICES, TROPICAL CYCLONES, UPPER  
ATMOSPHERE, MEASUREMENT, CLIMATOLOGY, PHOTO  
GRAMMETRY, PHOTOGRAPHIC RECONNAISSANCE.

(U)

IDENTIFIERS: 1963, EASTERLY PERTURBATIONS, TIROS,  
SPACE PHOTOGRAPHY.

(U)

ANALYSES OF TROPICAL PERTURBATIONS IN THE  
ATLANTIC REGION (COMMONLY REFERRED TO AS  
EASTERLY WAVES), UTILIZING OBSERVATIONS FROM  
METEOROLOGICAL SATELLITES, REVEAL THAT FIVE  
DISTINCTLY DIFFERENT CLOUD DISTRIBUTIONS OCCUR.  
THESE PATTERNS ARE BOTH LINEAR (SIMILAR TO THE  
CLASSIC RIEHL MODEL OF THE EASTERLY WAVE) AND  
VORTICAL. THE VORTICAL PATTERNS APPEAR MOST  
FREQUENTLY AND ARE OFTEN RELATED TO A CLOSED  
CYCLONIC CIRCULATION IN THE MID-TROPOSPHERE.  
CALCULATIONS OF THE HORIZONTAL AND VERTICAL  
DISTRIBUTION OF DIVERGENCE AND VORTICITY WHICH ARE  
INDICATIVE OF A MID-TROPOSPHERE CIRCULATION IN AN  
INTENSE DISTURBANCE ARE SHOWN. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-432 066

WEATHER BUREAU WASHINGTON D C

SEVERE STORM DETECTION AND CIRCUMNAVIGATION.

(U)

DESCRIPTIVE NOTE: FINAL REPT. FOR JUNE 62.

472P LEE, JEAN T. }

NEWTON, CHESTER W. {FRANKHAUSER, JAMES }

CONTRACT: FAA/ARDS-A-176

PROJ: 206 4 1R , 206 4 4R

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*STORMS, RADAR ECHO AREAS),  
THUNDERSTORMS, TURBULENCE, DOPPLER RADAR, WIND, AIR  
TRAFFIC, WEATHER FORECASTING

(U)

IDENTIFIERS: 1962

(U)

CONTENTS: THUNDERSTORM TURBULENCE MEASUREMENTS  
BY AIR-CRAFT AND CONCURRENT RADAR ECHO EVALUATIONS;  
INVESTIGATION OF SEVERE STORMS WITH PULSE DOPPLER  
RADAR; 500-KC./SEC. (PERICS STUDIES IN SEVERE STORMS;  
MOVEMENTS AND PATTERNS OF DEVELOPMENT OF  
THUNDERSTORMS; SOME RELATIONS BETWEEN THUNDERSTORM  
RADAR ECHOES AND SURFACE WIND FIELDS; ON VECTORING  
AIRCRAFT THROUGH THUNDERSTORMS; AND ANALYSIS OF THE  
SEVERE WEATHER FACTOR IN AUTOMATIC CONTROL OF AIR  
ROUTE TRAFFIC. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0352

AD-433 911

WEATHER BUREAU WASHINGTON D C

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION PROJECT

NO. R-55.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

AUG 63    26P    LEE, J. T. :

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON NATIONAL SEVERE STORMS  
PROJECT.

DESCRIPTORS: (•STORMS, RADAR ECHO AREAS), (•FLIGHT  
PATHS, THUNDERSTORMS), METEOROLOGICAL PARAMETERS,  
TURBULENCE, ATMOSPHERIC MOTION, AIR TRAFFIC, AIRCRAFT,  
PENETRATION, GUST LOADS

(U)

IDENTIFIERS: 1963

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-425 006

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO  
INSTRUMENTATION AND OPERATIONS FOR GATHERING  
THUNDERSTORM DATA WITH AN F-100F AIRCRAFT DURING THE  
1962 NATIONAL SEVERE STORM PROJECT, (U)  
FEB 64 25P UNDERWOOD, E. B. I

PROJ: 804A

TASK: 8620602

MONITOR: ASD TDR64 77

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•THUNDERSTORMS, INSTRUMENTATION),  
METEOROLOGICAL PHENOMENA, OPERATION, AIRCRAFT  
EQUIPMENT, RESEARCH PLANES, MEASUREMENT, DESIGN,  
PRESSURE, TEMPERATURE, WATER, ICE FORMATION  
INDICATORS, GUSTS, ACCELERATION, VELOCITY, ELECTRIC  
FIELDS (U)  
IDENTIFIERS: 1964, CHAFF (U)

EQUIPMENT TO MEASURE METEOROLOGICAL PHENOMENA  
INSIDE THUNDERSTORMS WAS DESIGNED, FABRICATED,  
INSTALLED, AND OPERATED IN AN F-100F JET FIGHTER  
AIRCRAFT, AND CHAFF WAS DROPPED INTO STORMS FOR STUDY  
BY GROUND RADAR FROM AN RB-47 JET BOMBER AIRCRAFT,  
IN CONJUNCTION WITH THE NATIONAL SEVERE STORM  
PROJECT NEAR OKLAHOMA CITY, OKLAHOMA.  
DEVICES WHICH WERE USED FOR THE FIRST TIME IN THIS  
ENVIRONMENT WERE THOSE USED TO MEASURE CONTINUOUSLY  
DIFFERENTIAL STATIC PRESSURE AND LIQUID WATER  
TEMPERATURE, AND TO DETERMINE THE PRESENCE OF ICE  
CRYSTALS AND ICING CONDITIONS. OTHER PARAMETERS  
RECORDED WERE NORMAL ACCELERATION, VERTICAL GUST  
VELOCITY, FREE AIR TEMPERATURE, LIQUID WATER CONTENT,  
ELECTRIC FIELD STRENGTH, HAIL MASS, AND STATIC  
DISCHARGE CURRENT. THE DATA COLLECTED DURING THE  
ASD FLIGHT TEST PROGRAM IS ARCHIVED WITH THE U. S.  
WEATHER BUREAU, AND CAN BE OBTAINED THROUGH THE  
NATIONAL SEVERE STORM PROJECT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-442 519

METEOROLOGY RESEARCH INC ALTADENA CALIF  
STUDY AND MODIFICATION OF CONVECTIVE STORMS. PART  
B.

(U)

DESCRIPTIVE NOTE: REPT. NO. 4B (FINAL), 1 APR 63-31  
MAR 64,

MAR 64 512P MACCREADY, P. B. , JR. ;

SMITH, T. B. ; TODD, C. J. ; WEINSTEIN, A. ;

REPT. NO. 164FR144

CONTRACT: DA36 039SC89066

PROJ: DA99 27 005 06, ARPA ORDER 265 62

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*CLOUDS, SCIENTIFIC RESEARCH),  
(\*ARTIFICIAL PRECIPITATION, SCIENTIFIC RESEARCH),  
(\*ATMOSPHERIC MOTION, CONVECTION), ARIZONA, STORMS,  
WAKE, RAINDROPS, CLOUD COVER, RADAR ECHO AREAS,  
ATMOSPHERIC ELECTRICITY, CUMULUS CLOUDS

(U)

IDENTIFIERS: CONVECTIVE STORMS, RADAR ANGELS

(U)

RESEARCH AND ANALYSIS TECHNIQUES AND ANALYSES IN A  
BASIC RESEARCH PROGRAM OF CLOUD PHYSICS, CLOUD  
DYNAMICS, AND CLOUD MODIFICATION FOR CONVECTIVE  
CLOUDS AT FLAGSTAFF, ARIZONA ARE REPORTED.  
DURING THE FIELD PROGRAM THE SUB-CLOUD LAYER AND  
REPRESENTATIVE CUMULUS CLOUDS OF ALL SIZES WERE  
PROBED AND STUDIED USING A COORDINATED SYSTEM OF AN  
INSTRUMENTED, SUPERCHARGED, TWIN ENGINED AIRCRAFT,  
GROUND RADARS FOR TRACKING AND METEOROLOGICAL  
STUDIES, AND A GROUND NETWORK OF CAMERAS AND OTHER  
INSTRUMENTS. SEEDING WAS PERFORMED FROM A SECOND  
AIRCRAFT, PRIMARILY THE RELEASE OF SILVER IODIDE  
PARTICLES FROM EITHER A CONTINUOUS BURNER OR  
PYROTECHNIC AERIAL DEVICES. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-448 067

NAVAL AIR DEVELOPMENT CENTER JOHNSVILLE PA AVIATION  
MEDICAL ACCELERATION LAB  
SIMULATION AND EFFECTS OF SEVERE TURBULENCE ON JET  
AIRLINE PILOTS. (U)

AUG 64 9P RAGLAND, STUART, JR. I  
CHAMBERS, RANDALL M. I CROSBIE, RICHARD J. I  
HITCHCOCK, LLOYD, JR. I

REPT. NO. 6411

MONITOR: NAVMED

NR005 13 0005 101 .R1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ATMOSPHERIC MOTION, AVIATION  
ACCIDENTS), (\*PILOTS, PSYCHOMOTOR TESTS), TURBULENCE,  
JET TRANSPORT PLANES, PERFORMANCE TESTS, REACTION  
(PSYCHOLOGY), SIMULATION, ILLUSIONS, ANALYSIS OF  
VARIANCE, AVIATION MEDICINE, THUNDERSTORMS, PITCH  
(MOTION), ROLL, PERCEPTION, VISION, ACCELERATION,  
COMMERCIAL PLANES, CENTRIFUGES (U)

IDENTIFIERS: BOEING 720-AIRCRAFT (U)

THE AMAL HUMAN CENTRIFUGE WAS USED TO SIMULATE  
AIR TURBULENCE CONDITIONS WHICH HAD BEEN RECORDED ON  
A BOEING 720-B AIRCRAFT DURING SEVERE TURBULENCE  
IN THE CIRRUS PORTION OF A THUNDERSTORM.  
TECHNIQUES FOR SIMULATING THESE CONDITIONS ON THE  
HUMAN CENTRIFUGE ARE REPORTED, AND THE  
EFFECTIVENESS OF THESE SIMULATIONS IS EVALUATED.  
TEN COMMERCIAL AIRLINE PILOTS, AND FIVE OTHER  
VOLUNTEERS FLEW THESE SIMULATIONS, AND THE RESULTS OF  
THEIR EVALUATIONS OF THE CENTRIFUGE SIMULATIONS ARE  
REPORTED. SIGNIFICANT EFFECTS ON SOME ASPECTS OF  
PILOTING PERFORMANCE ARE REPORTED. EFFECTS ON  
PITCH AND ROLL ERROR PERFORMANCE, AND ON CONTROL  
STICK REVERSALS, ARE EVALUATED. THE EFFECTS ON  
VISUAL PERFORMANCE, AND KINESTHETIC SENSATIONS ARE  
REPORTED BY THE PILOTS, ARE DISCUSSED. IT IS  
CONCLUDED THAT THE HUMAN CENTRIFUGE AND ITS COMPUTER  
CONTROL IS AN EFFECTIVE SYSTEM FOR SIMULATING THE  
TURBULENCE ENVIRONMENT. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0392

AD-602 540

CHICAGO UNIV ILL

THUNDERSTORMS AND THE LOW-LEVEL JET.

(U)

DESCRIPTIVE NOTE: RESEARCH PAPER NO. 22 (FINAL),

OCT 69    30P    BONNER, WILLIAM D. }

CONTRACT: DA26 039SC88922

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPT. ON MESOMETEOROLOGY PROJ.

DESCRIPTORS: (•THUNDERSTORMS, JET STREAMS  
(METEOROLOGY); (•JET STREAMS (METEOROLOGY),  
THUNDERSTORMS), WEATHER FORECASTING, AIR MASS  
ANALYSIS, METEOROLOGICAL PARAMETERS, CORRELATION  
TECHNIQUES, MICROMETEOROLOGY, KANSAS, OKLAHOMA,  
MISSOURI, NEBRASKA

(U)

THE RELATIONSHIP BETWEEN THE LOW-LEVEL JET AND  
THUNDERSTORM ACTIVITY IN THE SOUTH-CENTRAL UNITED  
STATES IS EXAMINED THROUGH MESOANALYSIS OF SURFACE  
DATA FROM WEATHER BUREAU AND NSSP STATIONS.  
SEPARATE SQUALL SYSTEMS WERE FOUND TO MOVE THROUGH  
KANSAS AND OKLAHOMA DURING THE NIGHT; THE SYSTEMS  
IN KANSAS PERSISTED, WHILE THOSE IN OKLAHOMA DIED  
OUT. THE REASON FOR THIS SEEMED TO BE ASSOCIATED  
WITH THE VERTICAL VELOCITY FIELDS AT LOW LEVELS.  
IT IS POSTULATED THAT THE ORIENTATION OF  
THUNDERSTORMS WITH RESPECT TO THE JET MAXIMUM MAY BE  
AN IMPORTANT FACTOR IN DETERMINING WHETHER OR NOT  
THEY WILL SURVIVE FOR ANY APPRECIABLE PERIOD OF TIME.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-609 032

LITTON SYSTEMS INC MINNEAPOLIS MINN

900-KC ELECTROMAGNETIC NOISE PULSE MEASUREMENTS OF  
SELECTED VERTICALLY CONVECTING CLOUD DEVELOPMENT. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

FEB 64 238P KOHL, DOUGLAS A. ;

CONTRACT: AF19 628 2781

PROJ: 8620

TASK: 862001

MONITOR: AFCRL 64 333

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (CUMULONIMBUS CLOUDS, ATMOSPHERICS),  
(ATMOSPHERICS, CUMULONIMBUS CLOUDS), THUNDERSTORMS,  
CONVECTION, CLOUDS, ATMOSPHERIC ELECTRICITY,  
ELECTROMAGNETIC PULSES, NOISE, MEDIUM FREQUENCY,  
NARROWBAND, MEASUREMENT, ELECTRONIC EQUIPMENT,  
METEOROLOGICAL RADAR, DATA, GRAPHICS, METEOROLOGY (U)

GROUND-BASED, 900-KC (KILOCYCLES PER SECOND)  
NARROW BAND DETECTION MEASUREMENTS WERE MADE OF  
RADIATED ELECTRICAL NOISE PRODUCED IN CUMULIFORM  
CLOUD DEVELOPMENTS. THE 900-KC DATA OBTAINED WITH  
THREE DIFFERENT KINDS OF INSTRUMENTS ARE PRESENTED  
ALONG WITH RELEVANT CONDENSATIONS OF WEATHER STATION  
DATA, STORM DATA, PHOTOGRAPHIC DATA, 10-CM  
WEATHER RADAR DATA, AND PENETRATION AIRCRAFT PILOT  
REPORT DATA. ALTHOUGH ANALYSIS UTILIZING AIRCRAFT  
INSTRUMENTATION DATA HAS NOT BEEN COMPLETED, AN  
INTIMATE RELATION BETWEEN 900-KC 'SPHERICS' AND  
CONVECTIVE CLOUD ACTIVITY IS APPARENT. THE  
FORMATION OF A SPHERICS PULSE AMPLITUDE DISTRIBUTION  
INDEX, WHICH PROVED TO BE RELATED TO THE RAPIDITY  
OF VERTICAL CLOUD GROWTH, STRONGLY SUGGESTS A  
PROPORTIONALITY TO AIRMASS INSTABILITY. THE  
SPHERICS PULSE COUNT RATE WAS FOUND TO BE RELATED TO  
STORM INTENSITY AND THE TOTAL NUMBER OF PULSES  
PROPORTIONAL TO STORM SIZE. ADJACENT STORMS WERE  
OBSERVED, ON OCCASION, TO REMAIN DISTINCTLY DIFFERENT  
THROUGHOUT THEIR LIFE CYCLES AS MEASURED BY SPHERICS  
AND OTHER DESCRIPTORS. FINALLY, STORM COMPLEXES  
WERE OCCASIONALLY FOUND TO EXIST IN A STEADY STATE  
FOR LONG PERIODS WHILE CONTINUOUSLY DISPLAYING BOTH  
LARGE RADAR REFLECTIVITIES AND ELECTRIFICATION.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0292

AD-602 089

IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON  
(ENGLAND)

RESEARCH ON CHARACTERISTICS AND EFFECTS OF SEVERE  
STORMS. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR APR 59-APR 64.

MAY 64 15P

CONTRACT: AF61 052 254

PROJ: 8620

TASK: 86204

MONITOR: AFCRL , 64 521

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•HAIL, THUNDERSTORMS), (•CUMULONIMBUS  
CLOUDS, CONVECTION), (•THUNDERSTORMS, HAIL),  
METEOROLOGICAL RADAR, ICE, GROWTH, DENSITY, WIND,  
SHEAR STRESSES, AIR MASS ANALYSIS, GREAT BRITAIN,  
ATMOSPHERIC PRECIPITATION, RADAR ECHO AREAS,  
CALIBRATION, METEOROLOGY (U)  
IDENTIFIERS: RIME (U)

THE CHIEF RESULTS OF THE WORK ARE AS FOLLOWS:  
MEASUREMENT OF AIR DRAG AND FALLSPEEDS OF ARTIFICIAL  
HAILSTONES. DERIVATION OF AN EMPIRICAL LAW OF RIME  
DENSITY. STUDIES OF INTERNAL STRUCTURE OF RIME AND  
HAIL. ESTABLISHMENT OF A SIMPLE CALIBRATION  
PROCEDURE FOR METEOROLOGICAL RADARS. MEASUREMENT OF  
RADAR REFLECTIVITY OF PERSPEX AND ICE SPHERES.  
DISCOVERY OF STRONG EFFECT OF SURFACE WETTING.  
COLLECTION OF RADAR AND OTHER DATA ON A SEVERE  
HAILSTORM IN UNPRECEDENTED DETAIL, LEADING TO  
DEFINITION OF NEW RADAR ECHO FEATURES (WALL,  
FORWARD OVERHANG, ECHO-FREE VAULT, DOME) AND TO A  
NEW DYNAMICAL MODEL OF CUMULONIMBUS, IN WHICH  
VERTICAL WIND SHEAR AND PRECIPITATION ARE ESSENTIAL  
FEATURES. A NEW THEORY OF THE GROWTH OF LARGE  
HAIL, NOT CALLING UPON SPECIAL EMBRYOS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-610 488

ARMY ELECTRONICS COMMAND FORT MONMOUTH N J  
UNIQUE DAMAGE PATTERNS CAUSED BY A TORNADO IN DENSE  
WOODLANDS. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

SEP 64 12P BUDNEY, LAURENCE J. I

REPT. NO. ECOM-TR-2909

TASK: 1V014901892A09

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*TORNADOES, DAMAGE), STORMS, FORESTRY,  
PENNSYLVANIA, AERIAL PHOTOGRAPHS, TREES,  
CONFIGURATION, PHOTOGRAPHIC ANALYSIS, METEOROLOGY (U)

STORM DAMAGE INFLICTED BY A TORNADO ON AN AREA IN  
PENNSYLVANIA WAS PHOTOGRAPHED FROM THE AIR.  
DRAWINGS MADE OF THESE PHOTOGRAPHS REPRESENT THE  
TYPES OF DAMAGE PATTERNS CAUSED BY THE TORNADO.  
THE DAMAGE PATTERNS DERIVED FROM THE FALLEN TREES  
INDICATE CONVERGENCE TOWARDS A LINE ALONG THE  
PROPAGATION OF THE TORNADO AND ROTATION OF WINDS.  
COMBINING THESE TWO WIND-FIELD CHARACTERISTICS  
GIVES A PICTURE OF THE TORNADO AS A VERY STRONG  
UPDRAFT SURROUNDED BY SPIRALING CONVERGENT WINDS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-611 022

EMMANUEL COLL BOSTON MASS RESEARCH LANGUAGE CENTER

A THEORETICAL MODEL OF A CUMULUS CLOUD, (U)

DEC 63 IIP GUTHMAN, L. N. 1

REPT. NO. E-T-R-64-15

CONTRACT: AF19 628 3869

MONITOR: TT , 65-61684

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TEORETICHESKAYA MODEL KUCHEVOGO  
OBLAKA, TRANS. OF AKADEMIYA NAUK SSSR. DOKLADY,  
1957, V. 112, NO. 6, P. 1022-1026.

DESCRIPTORS: (CUMULUS CLOUDS, MATHEMATICAL MODELS),  
WIND, CONVECTION, ATMOSPHERIC MOTION, USSR (U)

A MATHEMATICAL MODEL IS DERIVED FOR THE PLANE  
STATIONARY PROBLEM OF ORDERED THERMAL CONVECTION  
CAUSED BY THE VERTICAL INSTABILITY OF THE ATMOSPHERE.  
WITH THE ASSUMPTION THAT THERE IS NO GENERAL AIR  
MOVEMENT. THE HYDRODYNAMIC PATTERNS CORRESPONDING  
TO THE SOLUTION OBTAINED ARE REGARDED AS RESEMBLING A  
CUMULUS CLOUD. A SPECIFIC EXAMPLE IS CALCULATED AS  
AN ILLUSTRATION OF THIS CONCLUSION. IN THE COMPUTED  
LINES OF FLOW, THE CLOUD BASE LIES AT THE LEVEL OF  
CONDENSATION; THE SIDE BOUNDARY IS DRAWN ALONG THE  
ISOLINE  $w = 0.1$  M/SEC (WHERE  $w$  IS THE VERTICAL  
COMPONENT OF THE WIND VELOCITY), THE UPPER BOUNDARY  
CORRESPONDS TO THE ISOLINE  $w = 0$ . THE UPPER PORTION  
OF THE CLOUD RESEMBLES AN ANVIL, AND THE ANVIL DOES  
NOT OBTAIN WHEN THERE IS WEAKER INVERSION. (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-611 118

EMMANUEL COLL BOSTON MASS RESEARCH LANGUAGE CENTER  
MOTION OF WATER DROPLETS IN TURBULENT CLOUDS, (U)  
MAR 64 10P PANCSEV, S. I

REPT. NO. E-T-R-64-22

CONTRACT: AF19 628 3869

MONITOR: TT , 65-61722

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: DVIZHENIE VODYANYKH KAPEL' V  
TURBULENTMYKH OBLAKAKH, TRANS. OF IDOJARAS  
(HUNGARY) 1960, V. 64, NO. 5, P. 276-280.

DESCRIPTORS: (\*CLOUDS, MOISTURE), (\*FLUID MECHANICS,  
CLOUDS), (\*COAGULATION, DROPS), ATMOSPHERIC MOTION,  
CONVECTION, NUMERICAL ANALYSIS, MOTION, VELOCITY,  
HUNGARY (U)  
IDENTIFIERS: EQUATIONS OF MOTION (U)

THE AUTHOR DEALS WITH THE COAGULATION OF WATER  
DROPLETS STREAMING IN TURBULENT AIR CURRENTS. THE  
ESSENTIAL PROBLEM IS TO DETERMINE TO WHAT EXTENT  
STREAMING WATER DROPLETS ARE CARRIED BY TURBULENT  
PULSATIONS. THE VELOCITY-INCREASING EFFECT OF THE  
PULSATIONS IS PROVED NUMERICALLY. THIS RESULT  
IMPLIES THAT THE PROBABILITY FOR COLLISIONS IS ALSO  
INCREASED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-611 337

WASHINGTON UNIV SEATTLE DEPT OF ATMOSPHERIC SCIENCES  
PRELIMINARY STUDIES OF FORMATION AND STABILITY OF  
CONCENTRATED VORTICES NEAR THE GROUND. (U)

DESCRIPTIVE NOTE: SCIENTIFIC REPT.,

DEC 64 35P BERGMAN, K. H. ; TURNER, J. A.

IBUSINGER, J. A. ;

CONTRACT: DA AMC26 039 6361

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*VORTICES, ATMOSPHERIC MOTION),  
(\*ATMOSPHERIC MOTION, VORTICES), STABILITY, BOUNDARY  
LAYER, PERTURBATION THEORY, MODELS (SIMULATIONS),  
MATHEMATICAL ANALYSIS, TORNAOES (U)

THE REPORT SUMMARIZES THE PRESENT STATUS OF A  
CONTINUING INVESTIGATION INTO THE MYSTERIES OF THE  
SMALL-SCALE ATMOSPHERIC VORTEX, USUALLY KNOWN AS THE  
'DUST DEVIL' OR 'WHIRLWIND'. MANY OF THE BASIC  
CONCEPTS OF VORTEX FLOW PRESENTED APPLY TO THE  
LARGER-SCALE TORNAO AS WELL. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-615 749

AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO  
1964 ROUGH RIDER SUMMARY OF PARAMETERS RECORDED, TEST  
INSTRUMENTATION, FLIGHT OPERATIONS AND AIRCRAFT  
DAMAGE. (U)

DESCRIPTIVE NOTE: REPT. FOR 28 APR-20 AUG 64,  
APR 65 48P MILLER, EDWARD I

REPT. NO. TR-65-1  
PROJ: 804A8620 603

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•THUNDERSTORMS, RESEARCH PLANES),  
(•RESEARCH PLANES, FLIGHT TESTING), (•METEOROLOGICAL  
INSTRUMENTS, RESEARCH PLANES), FLIGHT, DAMAGE, AIR,  
TEMPERATURE, FIGHTERS (U)  
IDENTIFIERS: F-100 AIRCRAFT (U)

VARIOUS TYPES OF INSTRUMENTATION WERE INSTALLED IN  
A STANDARD F-100F FIGHTER AIRCRAFT. THIS  
AIRCRAFT WAS USED TO PENETRATE THUNDERSTORMS AROUND  
TINKER AFB, OKLAHOMA AND PATRICK AFB,  
FLORIDAA. THE DATA RECEIVED FROM THE TEST  
INSTRUMENTATION WAS USED TO OBTAIN LIQUID WATER  
TEMPERATURE, FREE AIR TEMPERATURE, ALTITUDE,  
AIRSPEED, NORMAL ACCELERATION, VERTICAL GUST VELOCITY  
AND ELECTRIC FIELD INTENSITY IN AND AROUND  
THUNDERSTORMS. LIGHTNING STUDY EQUIPMENT WAS ALSO  
INSTALLED IN WING AND CENTER LINE TANKS MOUNTED ON  
THE F-100F AIRCRAFT. THE REPORT BRIEFLY  
DISCUSSES THE PRINCIPLE OF OPERATION AND DEGREE OF  
ACCURACY OF THE ABOVE MENTIONED INSTRUMENTATION.  
THE REPORT ALSO COVERS FLIGHT OPERATIONS, AIRCRAFT  
DAMAGE AND A LIST OF IMPROVEMENTS SUGGESTED AT THIS  
TIME AS A RESULT OF STUDIES OF THE RECORDED  
INFORMATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-616 094

MCGILL UNIV MONTREAL (QUEBEC) STORMY WEATHER GROUP  
TWO STUDIES OF CONVECTION. A MODEL OF CONVECTION  
WITH ENTRAINMENT AND PRECIPITATION. HIGH RADAR ECHOES  
FROM ALBERTA THUNDERSTORMS, (U)

OCT 64 139P SRIVASTAVA, R. C. HENRY, C. D. :

REPT. NO. MW-38

CONTRACT: AF19 628 249

PROJ: 8620

TASK: 862004

MONITOR: AFCRL , 65-10

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•CONVECTION, CUMULUS CLOUDS),  
(•THUNDERSTORMS, RADAR ECHO AREAS),  
METEOROLOGICAL PHENOMENA, CANADA, ATMOSPHERIC  
PRECIPITATION, METEOROLOGICAL RADAR (U)

TWO STUDIES OF CONVECTION. A MODEL OF CONVECTION WITH  
ENTRAINMENT AND PRECIPITATION. HIGH RADAR ECHOES FROM  
ALBERTA THUNDERSTORMS.

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-618 949

SAINT LOUIS UNIV MO

THE SHELL STRUCTURE OF THE VISIBLE TORNADO  
VORTEX.

(U)

DESCRIPTIVE NOTE: MASTER'S THESIS,

69 94P DEVINE, JAMES C. I

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: AVAILABLE COPY WILL NOT PERMIT FULLY  
LEGIBLE REPRODUCTION. REPRODUCTION WILL BE MADE IF  
REQUESTED BY USERS OF DDC. COPY IS AVAILABLE FOR PUBLIC  
SALE.

DESCRIPTORS: (\*TORNADOES, VORTICES),

(\*METEOROLOGICAL PARAMETERS, TORNADOES), MODEL  
THEORY, PHOTOGRAPHIC ANALYSIS, PRESSURE, FLUID  
MECHANICS

(U)

IDENTIFIERS: THESES

(U)

THE TORNADO IS THE SMALLEST YET MOST DESTRUCTIVE OF  
ALL STORMS. ITS SMALL SIZE, INTENSITY, AND  
INFREQUENCY REDUCE CONSIDERABLY THE OPPORTUNITY TO  
OBTAIN USEFUL DATA ON THE REGION INSIDE OF THE  
VISIBLE FUNNEL. THE CLOSEST APPROACH TO A  
RECORDING INSTRUMENT IN REPORTS STUDIED BY THE WRITER  
WAS THREE HUNDRED METERS. THE LACK OF INFORMATION  
REGARDING THE FUNNEL REGION HAS SERIOUSLY HANDICAPPED  
THE UNDERSTANDING OF THE TORNADO STRUCTURE. IN  
THIS STUDY, A FIRST APPROXIMATE MODEL WAS DEVELOPED,  
PRINCIPALLY GEOMETRICALLY AND KINEMATICALLY, TO  
DEMONSTRATE THE REASONABLE EXISTENCE OF THE 'SHELL  
STRUCTURE' OBSERVED IN THE INITIAL DEVELOPING STAGES  
OF TORNADOES AND WATERSPOUTS. THIS FEATURE WAS  
SHOWN TO RESULT FROM A NARROW RADIAL ZONE OF  
SUBCONDENSATION PRESSURE BOUNDED BY THE INNER RADIUS  
BY CONTACT WITH DRY AIR IN THE CORE OF THE FUNNEL.  
RELATING THE PARAMETERS TO OBSERVATIONS FROM  
NATURE, IT WAS DEVELOPED THAT ONLY LOW LEVEL FLOW OF  
AN INITIAL DEPTH OF ABOUT SIXTY METERS OR LESS SHOULD  
BE CONSIDERED AS CONTRIBUTING TO THE TOTAL INFLOW  
FROM THE OUTER REGION. IT WAS FURTHER SHOWN THAT  
THE RADIAL DISTANCE FROM WHICH A TORNADO DRAWS ITS  
EXTERNAL SUPPORT IS SMALL, ABOUT ONE-HALF MILE OR  
LESS.

(U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-621 986

NATIONAL SEVERE STORMS LAB NORMAN OKLA  
PAPERS ON WEATHER RADAR, ATMOSPHERIC TURBULENCE,  
SPHERICS AND DATA PROCESSING. (U)

DESCRIPTIVE NOTE: TECHNICAL NOTE,

AUG 65 144P CLARK, CHARLES G. ;

COBB, WILLIAM E. ; DOOLEY, J. T. ; GRAY, KATHRYN C. ;

HERRMANN, WILLIAM E. ;

REPT. NO. NSSL-24

MONITOR: WB, DC , TN-3

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•METEOROLOGICAL RADAR, REPORTS),  
(•ATMOSPHERIC MOTION, REPORTS), (•ATMOSPHERICS,  
REPORTS), (•DATA PROCESSING SYSTEMS, WEATHER  
FORECASTING), HAIL, WATER, ICE, THUNDERSTORMS,  
LIGHTNING, RADAR ECHO AREAS, WEATHER STATIONS,  
METEOROLOGY (U)

IDENTIFIERS: SEVERE STORMS PROJECT (U)

CONTENTS: WSR-97 REFLECTIVITY MEASUREMENTS AND  
HAIL OBSERVATIONS; THUNDERSTORM TURBULENCE AND  
RADAR ECHOES; 1964 DATA STUDIES; CIRCULARLY  
POLARIZABLE RADAR AND HAIL DETECTION; WAVE LENGTH  
DEPENDENCE OF THE RADAR REFLECTIVITY OF WATER AND ICE  
SPHERES; SPHERICS RECEPTION AT 900 KC./SEC.,  
RADAR ECHOES, AND SEVERE WEATHER; LOCATING AND  
TRACKING AREAS OF LIGHTNING; NSSL RADAR HYDROLOGY  
PROGRAM; COMPUTER PROGRAM FOR CALCULATING AVERAGE  
LENGTHS OF WEATHER RADAR ECHOES AND PATTERN  
BANDWIDTH; DATA PROCESSING AT NSSL IN 1964;  
RADAR DATA ACQUISITION TECHNIQUES; AND NSSL  
MESOSCALE NETWORK OF SURFACE STATIONS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-622 663

IMPERIAL COLL OF SCIENCE AND TECHNOLOGY LONDON (ENGLAND)  
DEPT OF METEOROLOGY  
RESEARCH ON CHARACTERISTICS AND EFFECTS OF SEVERE  
STORMS. (U)

DESCRIPTIVE NOTE: ANNUAL SUMMARY REPT. NO. 1,  
AUG 69 170P CARLSON, T. N. BLUDMAN, F. H. I  
GREEN, J. S. A. MCILVEEN, J. F. R. I  
CONTRACT: AF EOAR69-60  
MONITOR: AFCLRL, 69-770

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*STORMS, AIR MASS ANALYSIS), (\*AIR  
MASS ANALYSIS, STORMS), ATMOSPHERIC MOTION,  
METEOROLOGICAL PARAMETERS, HAIL, TORNADOES,  
THUNDERSTORMS, WEATHER FORECASTING (U)

IN THE FIRST PART OF THIS REPORT AN EXAMINATION IS  
MADE OF THE LARGE-SCALE CONDITIONS UNDER WHICH SEVERE  
LOCAL STORMS DEVELOP. DETAILED CASE-STUDIES HAVE  
BEEN MADE IN RESPECT OF SIX SITUATIONS, FIVE OF WHICH  
ARE DESCRIBED HERE. IN TWO OF THESE, OVER  
WESTERN EUROPE, SEVERE HAILSTORMS OCCURRED, ONE  
WITH TORNADOES, AND IN ANOTHER STORMS FAILED TO  
DEVELOP. IN THE OTHER TWO SITUATIONS, TORNADIC  
HAILSTORMS DEVELOPED OVER AND NEAR THE STATE OF  
OKLAHOMA. IT IS CONCLUDED THAT THE OCCURRENCE OF  
THE MOST INTENSE STORMS DEPENDS UPON A FAVOURABLE  
COMBINATION OF GEOGRAPHICAL AND LARGE-SCALE  
ATMOSPHERIC FLOW FEATURES. IN THE SEVERAL CASE  
STUDIES THE TECHNIQUE OF ANALYSIS USED ISENTROPIC  
CHARTS SHOWING THE FLOW RELATIVE TO A LARGE-SCALE  
MOTION SYSTEM, ASSUMED TO BE IN A STEADY STATE. IN  
THE SECOND PART OF THE REPORT THIS TECHNIQUE IS  
DISCUSSED AND SHOWN TO HAVE SOME ADVANTAGES OVER  
CONVENTIONAL METHODS, SUFFICIENT TO JUSTIFY ITS  
FURTHER EXAMINATION. (AUTHOR) (U)

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DDC REPORT BIBLIOGRAPHY      SEARCH CONTROL NO. /L0392

AD-623 787                      4/2

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

A FAMILY OUTBREAK OF SEVERE LOCAL STORMS. A  
COMPREHENSIVE STUDY OF THE STORMS IN OKLAHOMA ON 26  
MAY 1963, PART I. (U)

DESCRIPTIVE NOTE: SPECIAL REPT.,

SEP 65 347P                      BROWNING, KEITH A. ;

FUJITA, TETSUYA ;

PROJ: AF-8620

TASK: 862004

MONITOR: AFCRL, AFCRL                      65-695 (1), SR-22

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (1) STORMS, OKLAHOMA), (1) AIR MASS  
ANALYSIS, STORMS), TORNADOES, HAIL, WEATHER  
STATIONS, METEOROLOGICAL RADAR, PHOTOGRAPHIC  
TECHNIQUES, ATMOSPHERICS, RADIOACTIVE FALLOUT,  
ATMOSPHERIC MOTION, MATHEMATICAL MODELS,  
WEATHER FORECASTING (U)

THIS MONOGRAPH IS A CASE STUDY OF AN OUTBREAK OF  
SEVERE LOCAL STORMS THAT PRODUCED SEVERAL TORNADOES  
AND EXTENSIVE LARGE HAIL IN OKLAHOMA ON 26 MAY  
1963. SEVERAL AUTHORS HAVE COMBINED TO DESCRIBE  
THE ORGANIZATION, STRUCTURE, AND EVOLUTION OF THESE  
STORMS FROM A NUMBER OF POINTS OF VIEW. THE STORMS  
ARE ANALYZED ON FOUR DIFFERENT SIZE SCALES: (1)  
AS PRODUCTS OF THEIR LARGE-SCALE ENVIRONMENT,  
(2) AS MEMBERS OF A MESOSCALE SYSTEM OR FAMILY  
UNIT, (3) AS INDIVIDUAL EVOLVING CELLS, AND  
(4) AS TORNADO AND HAIL FACTORIES, WITH THE  
EMPHASIS ON THE TORNADOES AND THE HAILSTONES  
THEMSELVES. DATA ARE OBTAINED FROM CONVENTIONAL  
SYNOPTIC AND MESOSYNOPTIC NETWORKS, VISUAL AND  
PHOTOGRAPHIC OBSERVATIONS, SURFACE WEATHER SURVEYS,  
WEATHER RADARS, SPHERICS DETECTORS, BALLOON TRACKS,  
RADIOACTIVITY MEASUREMENTS IN PRECIPITATION, AND  
HAILSTONE THIN SECTIONS. SIMPLE MODELS ARE  
PRESENTED DESCRIBING THE AIRFLOW, STRUCTURE AND LIFE  
CYCLE OF INDIVIDUAL SEVERE LOCAL STORMS. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-629 008 4/2  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
SPECIAL FEATURES OF THE RADAR CHARACTERISTICS OF  
THUNDERSTORM CLOUDS. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
DEC 65 17P GASHINA, S. B. ISALMAN, E. M.  
1  
REPT. NO. T-R-939,  
CONTRACT: AF 19(628)-7880,  
MONITOR: TT , 66-60682

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: OSOBENNOSTI RADIOLOKATSIONNYKH  
KHARAKTERISTIK GROZOVYKH OBLAKOV, TRANS. OF  
GLAVNAYA GEOFIZICHESKAYA OBSERVATORIYA, LENINGRAD.  
TRUDY (USSR) N173 P19-29 1965.

DESCRIPTORS: (\*CUMULONIMBUS CLOUDS, RADAR ECHO  
AREAS), (\*THUNDERSTORMS, RADAR ECHO AREAS),  
(\*METEOROLOGICAL RADAR, THUNDERSTORMS), (\*RADAR  
ECHO AREAS, THUNDERSTORMS), WEATHER FORECASTING,  
METEOROLOGICAL PHENOMENA, USSR (U)

THE ARTICLE TREATS THE PROBLEM OF IDENTIFICATION OF  
REGIONS WITH INTENSE THUNDERSTORM ACTIVITY AGAINST  
THE BACKGROUND OF THE GENERAL FIELD OF CUMULONIMBUS  
CLOUDS. THE RADAR CRITERIA OF THUNDERSTORM CLOUDS  
ARE INDICATED WITH ALLOWANCE FOR THE DYNAMICS OF  
THEIR DEVELOPMENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-630 660 4/2  
DOUGLAS AIRCRAFT CO INC SANTA MONICA CALIF MISSILE AND  
SPACE SYSTEMS DIV  
THE EVOLUTION OF CUMULUS CLOUDS: A NUMERICAL  
SIMULATION AND ITS COMPARISON AGAINST  
OBSERVATIONS. (U)  
DESCRIPTIVE NOTE: FINAL REPT.,  
MAR 66 149P MURRAY, F. W. MOLLINDEN, A.  
R. I  
REPT. NO. SM-49272,  
CONTRACT: NONR-4719(00)(X)

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (CUMULUS CLOUDS, MATHEMATICAL  
MODELS), TROPICAL REGIONS, HYDRODYNAMICS,  
THERMODYNAMICS, METEOROLOGICAL PARAMETERS,  
PROGRAMMING (COMPUTERS), ATMOSPHERIC SOUNDING,  
THEORY, CORRELATION TECHNIQUES (U)

ATMOSPHERIC THERMAL CONVECTION ON THE CUMULUS SCALE  
IS INVESTIGATED BY NUMERICAL SOLUTION OF THE  
APPROPRIATE EQUATIONS OF HYDRODYNAMICS AND  
THERMODYNAMICS. INITIAL CONDITIONS ARE BASED ON  
REAL OR SYNTHETIC ATMOSPHERIC SOUNDINGS. THE ONE  
CASE OF SYNTHETIC DATA STUDIED WAS INCLUDED TO  
COMPARE THE MODEL WITH A PREVIOUS SIMPLER MODEL.  
THE OTHER CASES ARE BASED ON ACTUAL TROPICAL  
MARITIME SOUNDINGS, TWO OF WHICH CORRESPOND WITH  
CONDITIONS STUDIED BY THE NAVAL RESEARCH  
LABORATORY BY MEANS OF INSTRUMENTED AIRCRAFT.  
THE SIMULATED CLOUDS ARE FOUND TO AGREE IN MANY  
RESPECTS WITH THE REAL CLOUDS, AND IN THOSE DETAILS  
IN WHICH THEY DISAGREE POSSIBLE EXPLANATIONS IN TERMS  
OF LIMITATIONS OF THE MODEL AND OF TECHNIQUES OF  
AERIAL OBSERVATION ARE DISCUSSED. AMONG THE  
FEATURES DISCUSSED IN SOME DETAIL ARE EDDY TRANSFER  
MECHANISM AND THE EFFECTS OF MULTIPLE IMPULSES.  
RECOMMENDATIONS ARE MADE FOR FURTHER IMPROVEMENT TO  
THE MODEL AND FOR ADDITIONAL FIELD OBSERVATIONS.  
IT IS CONCLUDED THAT THIS TYPE OF NUMERICAL STUDY  
COMBINED WITH AERIAL OBSERVATION OF REAL CLOUDS  
OFFERS A VERY EFFECTIVE METHOD FOR THE STUDY OF  
CUMULUS DYNAMICS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-621 022 4/2  
EMMANUEL COLL BOSTON MASS ORIENTAL SCIENCE LIBRARY  
A STUDY OF THE MICROPHYSICAL MECHANISM OF WARM-CLOUD  
PRECIPITATION, (U)  
64 4P HSIU-CHI, CHOU I  
REPT. NO. TRANS-EMH-65-51(A),  
CONTRACT: AF 19(628)-9073,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANSLATED SUMMARY AND TABLE OF  
CONTENTS APPEARING IN THE MONOGRAPH. REPRINTED FROM THE  
SCIENCE PRESS, PEKING (CHINA). 1964. 105P.

DESCRIPTORS: (\*CLOUDS, \*ATMOSPHERIC  
PRECIPITATION), (\*CHINA, METEOROLOGY),  
CLIMATOLOGY (U)

THIS MONOGRAPH ON MODERN METEOROLOGY CONTAINS A  
SUMMARY OF THE RESULTS OF A STUDY OF THE  
MICROPHYSICAL MECHANISM OF WARM-CLOUD PRECIPITATION  
IN CHINA DURING THE PAST THREE YEARS. INCLUDED  
IS A CRITICAL SURVEY OF THE RELATED TOPICS  
INVESTIGATED IN OTHER COUNTRIES. THE MONOGRAPH  
BEGINS WITH A DISCUSSION OF THE CHARACTERISTICS OF  
THE STOCHASTIC GROWTH OF CLOUD DROPLETS, FOLLOWED BY  
A REVIEW OF THE THEORIES OF CLOUD-DROPLET GROWTH.  
THE EFFECT OF A FLUCTUATING HUMIDITY DISTRIBUTION  
ON CONDENSATION GROWTH, THE COLLISION AND COALESCENCE  
GROWTH IN A FLUCTUATING DENSITY FIELD, A TURBULENCE  
FIELD AND DUE TO FLUCTUATING VERTICAL CURRENT, AND  
THE MECHANISM FOR CLOUD DROPLET ELECTRIFICATION  
TOGETHER WITH THE EFFECT OF ELECTRIC CHARGE ON  
COLLISION AND COALESCENCE GROWTH ARE EXAMINED. ON  
THE BASIS OF THE RESULTS OBTAINED, A MORE GENERAL  
STATISTICAL THEORY OF WARM-CLOUD PRECIPITATION IS  
PROPOSED. THIS THEORY, WHEN COMPARED WITH THE PAST  
THEORY OF GRAVITATIONAL COLLISION AND COALESCENCE,  
PERMITS A MORE OBJECTIVE GENERALIZATION OF FACTS.  
THE CONCEPT OF STOCHASTIC PROCESS INTRODUCED IN  
THIS THEORY CAN ALSO BE EXTENDED TO THE STUDY OF THE  
MICROPHYSICAL PROCESSES OF COOL-CLOUD PRECIPITATION.  
THE THEORETICAL ANALYSIS OF THESE PROBLEMS OFFERS A  
NEW APPROACH TO THE UNDERSTANDING AND FURTHER STUDY  
OF THE MICROPHYSICAL PROCESSES OF CLOUD AND FOG  
PRECIPITATION. (TRANSLATOR) (U)

UNCLASSIFIED

DOC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-621 085 4/2  
COLORADO STATE UNIV FORT COLLINS DEPT OF ATMOSPHERIC  
SCIENCE  
SOUTHEAST ASIA MONSOON STUDY. (U)  
DESCRIPTIVE NOTE: TECHNICAL REPT. NO. 2, 1 SEP-31 DEC  
69.  
FEB 66 38P RIEHL, HERBERT I  
CONTRACT: DA-28-042-AMC-01202(E),  
PROJ: 28042-MC-00812(E), DA-140-14901-B-52A-09

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*SOUTHEAST ASIA, \*CLIMATOLOGY),  
(\*TROPICAL CYCLONES, SOUTHEAST ASIA), AIR MASS  
ANALYSIS, METEOROLOGY (U)  
IDENTIFIERS: MONSOON (U)

THE OBJECTIVE OF THIS PROGRAM HAS BEEN TO  
INVESTIGATE THE FOLLOWING ASPECTS OF THIS SEASONAL  
REVERSAL: (1) DEFINITION OF THE ONSET OF THE  
SUMMER MONSOON OVER SOUTHEAST ASIA AND  
STATISTICAL ANALYSIS OF ONSETS; (2) ROLE OF THE  
TROPICAL CYCLONE DURING THE ONSETS; (3) SEASONAL  
CHANGES OF UPPER-AIR CURRENTS OVER ASIA AND THE  
DIFFERENCES WHICH MAY EXIST BETWEEN LATE AND EARLY  
ONSET YEARS; (4) INFLUENCE OF SEASONAL HEATING  
AND CHANGES IN THERMODYNAMIC STRUCTURE OF THE  
ATMOSPHERE OVER SOUTHERN ASIA DURING ONSETS.  
(5) RETARDATION OF THE MONSOON OVER INDIA AS  
COMPARED WITH SOUTHEAST ASIA. GENERALLY, THREE  
TYPES OF SYNOPTIC DISTURBANCES CAN BE FOUND OVER  
SOUTHEAST ASIA. THE WARM CORE CASE HAS BEEN  
DESCRIBED IN THIS SERIES OF TECHNICAL REPORTS  
(1); THE COLD CORE CASE WILL BE STUDIED NEXT.  
THE THIRD CASE, THE EQUATORIAL SHEARLINE  
(EQUATORIAL CONVERGENCE ZONE) IS THE OBJECT OF  
THIS STUDY. ITS PURPOSE IS TO DETERMINE THE  
AVERAGE FIELD OF MOTION AND THE DISTRIBUTION OF  
PRECIPITATION ON A CROSS-SECTION NORMAL TO THE  
SHEARLINE. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-671 113 4/2  
EMMANUEL COLL BOSTON MASS ORIENTAL SCIENCE LIBRARY  
A DYNAMIC ANALYSIS OF THE DEVELOPMENT OF CUMULONIMBUS  
INCUS. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
FEB 66 20P SHING-SHENG, LI JIH-  
PING, CHAO IYIIN-CHYAU, HWU ;  
REPT. NO. EMM-65-36,  
CONTRACT: AF 19(628)-5073,  
MONITOR: TT , 66-61022

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF CH' I HSIANG HSUEH  
PAO (CHINESE PEOPLE'S REPUBLIC) V34 N2 P225-32  
1964.

DESCRIPTORS: (\*CUMULONIMBUS CLOUDS, DYNAMICS),  
MATHEMATICAL MODELS, NONLINEAR DIFFERENTIAL  
EQUATIONS, THERMODYNAMICS, METEOROLOGY, CHINA (U)  
IDENTIFIERS: CUMULONIMBUS INCUS (U)

THIS PAPER ANALYZES THE DEVELOPMENT OF THE  
CUMULONIMBUS INCUS USING AN APPROXIMATE SOLUTION OF  
THE NON-LINEAR DIFFERENTIAL EQUATIONS OF CUMULUS  
DYNAMICS IN WHICH THE LATENT HEAT OF CONDENSATION IS  
CONSIDERED. IT IS SHOWN THAT THE INCUS STRUCTURE  
IS A NECESSARY CONSEQUENCE OF A STRONG CUMULUS  
DEVELOPMENT. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0352

AD-621 966            4/2            17/9  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
SOME RESULTS OF RADAR OBSERVATIONS OF THE DEVELOPMENT  
OF CU CONG CLOUDS AND THE RESULTS OF  
MODIFICATION. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
MAR 66 27P            BOROVNIKOV, A. M. ; KOSTAREV, V.  
V. ; SHUPIATSKII, A. B. ;  
REPT. NO. T-R-510,  
CONTRACT: AF 19(628)-2880,  
MONITOR: TT ,            66-61158

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: NEKOTORE REZULTATY  
RADIOLOKATSIONNYKH NABLIUDENII EVOLIUTSII MOSHCHNO-  
KUCHEVYKH OBLAKOV I REZULTATOV VOZDEISTVIYA, TRANS.  
OF TSENTRALNAYA AEROLOGICHESKAYA OBSERVATORIYA.  
TRUDY (USSR) N57 P24-40 1964.

DESCRIPTORS: (\*METEOROLOGICAL RADAR, CLOUDS),  
(\*CLOUDS, RADAR SCANNING), (\*THUNDERSTORMS,  
RADAR SCANNING), RADAR ECHO AREAS, CUMULONIMBUS  
CLOUDS, HAIL, REDUCTION, METEOROLOGY, USSR (U)

THE APPARATUS AND METHODS FOR RADAR OBSERVATIONS OF  
THE DEVELOPMENT OF CU CONG AND CB CLOUDS ARE  
DISCUSSED. ANALYSIS OF THE OBSERVATIONAL DATA  
PROVIDED PRELIMINARY INDICATIONS OF THE HAIL CONTENT  
OF CB CLOUDS, AND SOME CRITERIA ARE PROPOSED FOR  
DETERMINING THE EFFECT OF ARTIFICIAL MODIFICATION  
AIMED AT PREVENTING HAIL DAMAGE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0292

AD-622 016 4/2

METEOROLOGY RESEARCH INC ALTADENA CALIF  
ANALYSIS OF FLAGSTAFF DATA.

(U)

DESCRIPTIVE NOTE: REPT. NO. 4, 1 NOV 64-31 DEC 65  
(FINAL).

APR 66 48P MACCREADY, PAUL B. , JR. I  
SMITH, THEODORE B. I WEINSTEIN, ALAN I. I  
CONTRACT: DA-28-042-AMC-00406(E),  
PROJ: DA-1VO-14501-B-52A-06,  
MONITOR: ECOM , 00406-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-627 147.

DESCRIPTORS: (\*CLOUDS, PHASE STUDIES),  
(\*RAINDROPS, NUCLEATION), (\*STORMS,  
DYNAMICS), METEOROLOGICAL INSTRUMENTS, WATER  
VAPOR, CONVECTION(ATMOSPHERIC), ATMOSPHERIC  
CONDENSATION, METEOROLOGICAL PHENOMENA,  
METEOROLOGICAL PARAMETERS, SCIENTIFIC RESEARCH,  
ARIZONA

(U)

IDENTIFIERS: FLAGSTAFF NETWORK

(U)

THE CONTINUOUS PARTICLE COLLECTOR PROVED CAPABLE OF  
YIELDING QUANTITATIVE DROPLET DISTRIBUTION DATA AND  
QUALITATIVE INFORMATION ON LARGER HYDROMETEORS. IN  
THE FLAGSTAFF CONVECTIVE CLOUDS THE DROPLET  
CONCENTRATIONS WERE HIGH, 400 TO 2000 PER CC NEAR  
CLOUD BASE, AND SOME CORRELATION WAS NOTED VERSUS  
UPCURRENT STRENGTH. DRIZZLE-SIZE DROPS GREW IN THE  
CLOUD CORES BY COALESCENCE, STARTING FROM LARGE  
DROPLETS (SUBSTANTIALLY LARGER THAN THE SMALL-  
DROPLET POPULATION) WHICH WERE PRESENT EVEN AT  
CLOUD BASE IN CONCENTRATIONS OF 20 PER LITER. A  
POSSIBLE SOURCE OF SUCH LARGE DROPLETS IS CONSIDERED  
TO BE GIANT SALT PARTICLES, PERHAPS AUGMENTED FROM A  
MARITIME CONDENSATION NUCLEI DISTRIBUTION BY  
COALESCENCE EFFECTS IN PREVIOUS CLOUDS. THE GROWTH  
RATE OF DROPLETS ON SUCH NUCLEI IS CALCULATED FOR  
SEVERAL PARCEL ASCENT RATES. GRAUPEL WAS  
ENCOUNTERED REGULARLY AT -5 AND -6C, MOSTLY OUTSIDE  
CELL CORES, SUGGESTING THE RAPID FREEZING AND RIMMING  
OF THE DRIZZLE-SIZE DROPS. THE PRINCIPLES OF CLOUD  
MODIFICATION TECHNIQUES ARE CONSIDERED. THEY SHOW  
THAT THE TRANSITORY SEEDING METHODS USED IN 1962 AND  
1963 WOULD NOT BE EXPECTED TO SHOW LARGE EFFECTS, AND  
SO TECHNIQUES ARE SUGGESTED WHICH CONSIDER DIFFUSION  
EFFECTS AND CLOUD SEEDABILITY (ESPECIALLY BUOYANCY  
ASPECTS). (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0392

AD-622 610                    4/2                    1/3  
AERONAUTICAL SYSTEMS DIV WRIGHT-PATTERSON AFB OHIO DEPUTY  
FOR FLIGHT TEST  
PROJECT ROUGH RIDER, 1969, PHASE I - PHASE II.                    (U)  
DESCRIPTIVE NOTE: FINAL SUMMARY REPT. APR-AUG 69,  
MAR 66 72P                    MILLER, EDWARD I  
PROJ: AF-8620(609),  
MONITOR: ASD ;                    TR-66-2

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•THUNDERSTORMS, •RESEARCH  
AIRCRAFT), METEOROLOGICAL PHENOMENA, STORMS,  
PENETRATION, FLIGHT PATHS, AIRCRAFT, DAMAGE,  
AIRBORNE, METEOROLOGICAL INSTRUMENTS,  
METEOROLOGICAL PARAMETERS, ALL-WEATHER  
AVIATION                    (U)  
IDENTIFIERS: ROUGH RIDER PROJECT, F-100F  
AIRCRAFT                    (U)

THIS REPORT STATES THE OBJECTIVES OF PROJECT  
ROUGH RIDER AS WELL AS DISCUSSES THE TEST  
INSTRUMENTATION USED ON THE PENETRATION F-100F  
AIRCRAFT. OTHER TOPICS COVERED ARE FLIGHT  
OPERATIONS, AIRCRAFT DAMAGE, LOCATION OF ARCHIVED  
DATA, AND CONCLUSIONS AND RECOMMENDATIONS FOR FUTURE  
THUNDERSTORM PENETRATIONS. THIS REPORT IS  
DOCUMENTARY OR HISTORICAL IN NATURE AND GIVES AN  
OVERALL PICTURE OF PROJECT ROUGH RIDER 1969,  
BUT NOT A DETAILED ANALYSIS OF THE ACCUMULATED DATA.  
THE VARIOUS SOURCES FROM WHICH SUCH ANALYSES CAN BE  
OBTAINED ARE REFERENCED IN THIS REPORT. (AUTHOR)

(U)



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DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-632 668 4/7  
PENNSYLVANIA STATE UNIV UNIVERSITY PARK  
RESEARCH IN FOUR-DIMENSIONAL DIAGNOSIS OF CYCLONIC  
STORM CLOUD SYSTEMS. (U)  
DESCRIPTIVE NOTE: SCIENTIFIC REPT.,  
JAN 66 62P DANIELSEN, EDWIN F. I  
REPT. NO. SCIENTIFIC-1,  
CONTRACT: AF 19(628)-4762,  
PROJ: AF-6698,  
TASK: 669802,  
MONITOR: AFCRL , 66-30

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*AIR MASS ANALYSIS, \*STORMS),  
(\*WEATHER FORECASTING, NUMERICAL METHODS +  
PROCEDURES), CYCLONES, CLOUDS, ATMOSPHERIC  
PRECIPITATION, ATMOSPHERIC MOTION, MATHEMATICAL  
PREDICTION (U)

THE RAPIDLY DEVELOPING STORM OF 28-30 NOVEMBER  
1963 IS SELECTED TO ESTABLISH TECHNIQUES FOR TESTING  
THE RELIABILITY OF VARIOUS DIAGNOSTIC PROCEDURES.  
THE METHOD OF CONSTRUCTING ISENTROPIC TRAJECTORIES  
IS DISCUSSED AND THE RESULTS OF APPLYING THESE  
TRAJECTORIES TO DETERMINE AVERAGE VERTICAL MOTIONS  
AND RELATIVE HUMIDITIES ARE PRESENTED. THESE  
RESULTS WHICH APPLY AT THE MID-TIME BETWEEN THE  
STANDARD RADIOSONDE RELEASES PERMIT COMPARISONS TO  
BOTH THE OBSERVED CLOUDS AND PRECIPITATION.  
SPECIAL INTERMEDIATE SOUNDINGS ARE AVAILABLE WHICH  
PROVIDE A DIRECT CHECK ON THE ADVECTED MOISTURE AND  
AN INDIRECT CHECK ON THE TRAJECTORIES. COMPARISONS  
ARE ALSO MADE WITH MACHINE CALCULATED INSTANTANEOUS  
VERTICAL MOTIONS. IN GENERAL, IT IS FOUND THAT THE  
TRAJECTORY METHOD PROVIDE THE GREATEST RESOLUTION AND  
CLOSEST AGREEMENT WITH THE REPORTED CLOUDS AND  
PRECIPITATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-674 709 4/2  
CHICAGO UNIV ILL DEPT OF THE GEOPHYSICAL SCIENCES  
MESOMETEOROLOGICAL STUDIES. (U)  
DESCRIPTIVE NOTE: FINAL REPT., 1 FEB 68-31 JAN 66.  
APR 66 110P BROWN, ROGER A. 1  
CONTRACT: AF 19(628)-4807,CWB-WBG-41  
PROJ: AF-8620,  
TASK: 862002,  
MONITOR: AFCRL 66-338

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: GRANT CWB-WBG-70.

DESCRIPTORS: (•CUMULONIMBUS CLOUDS, •ATMOSPHERIC  
MOTION), (•THUNDERSTORMS, DYNAMICS),  
METEOROLOGICAL PARAMETERS, AIR MASS ANALYSIS,  
PHOTOGRAMMETRY, MATHEMATICAL MODELS (U)  
IDENTIFIERS: MESOMETEOROLOGY PROJECT (U)

THE REPORT CONSISTS OF THREE SEPARATE REPORTS ON  
MESOMETEOROLOGICAL STUDIES. TWO OF THE REPORTS  
MAKE USE OF DATA GATHERED OVER THE FLAGSTAFF  
MESOMETEOROLOGICAL NETWORK DURING THE SUMMERS OF 1960  
AND 1961. THE GROWTH RATE OF OROGRAPHIC  
CUMULONIMBI WAS DETERMINED BY BOTH SURFACE AND AERIAL  
PHOTOGRAMMETRY. A SET OF EQUATIONS WERE DEVELOPED  
FOR COMPUTING EDDY VISCOSITY AND DIFFUSION  
COEFFICIENTS WITHIN ROTATING AND NONROTATING  
CONVECTIVE CURRENTS. ENERGY COMPUTATIONS WERE MADE  
FOR BOTH CUMULI AND CUMULONIMBI. THE THIRD REPORT  
SUMMARIZES THE VARIOUS EXPLANATIONS FOR THE HIGH  
PRESSURE BENEATH THUNDERSTORMS AND PRESENTS ONE MORE  
CONTRIBUTION TO THE CONTROVERSY. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-639 069 4/2  
ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS  
A PHOTOGRAMMETRIC STUDY OF THE INITIATION OF CUMULUS  
CLOUDS OVER MOUNTAINOUS TERRAIN. (U)  
JUN 69 11P ORVILLE, HAROLD D. I  
CONTRACT: NONR-2179(03),

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN JOURNAL OF THE  
ATMOSPHERIC SCIENCES, V22 N6 P700-9 NOV 1969.  
SUPPLEMENTARY NOTE:

DESCRIPTORS: (CUMULUS CLOUDS, MOUNTAINS),  
(MICROMETEOROLOGY, MOUNTAINS), CLOUDS,  
PHOTOGRAMMETRY, STEREOSCOPIC PHOTOGRAPHY,  
METEOROLOGICAL PHENOMENA (U)

THE INITIATION OF CUMULUS CLOUDS OVER MOUNTAINOUS  
TERRAIN IS INVESTIGATED PHOTOGRAMMETRICALLY.  
STEREO PAIRS TAKEN AT ONE- AND TWO-MINUTE INTERVALS  
ARE ANALYZED FOR FOUR DAYS OF CUMULUS INITIATION OVER  
THE SANTA CATALINA MOUNTAINS, NORTHEAST OF  
TUCSON, ARIZONA. CHARTS OF GROWTH RATES, CLOUD  
POSITION, AND TRACINGS OF CLOUDS OVER THE MOUNTAIN  
RIDGES ARE PRESENTED. THE ENVIRONMENTAL  
CONDITIONS, REPRESENTED BY THE TUCSON RADIOSONDE  
AND RAWIN SOUNDINGS, ARE RELATED TO THE GROWTH  
CHARACTERISTICS. TWO DAYS WITH EASTERLY COMPONENTS  
IN THE WIND AND TWO WITH WESTERLY COMPONENTS ARE  
ANALYZED. THE GROWTH CHARACTERISTICS CAN BE VASTLY  
DIFFERENT, DEPENDING UPON THE WATER VAPOR CONTENT OF  
THE AIR AND THE AMBIENT WINDS. THERE IS NO OBVIOUS  
EFFECT OF THE LAPSE RATE ON THE INITIAL GROWTH RATES.  
THE CLOUDS FORM OVER THE PRINCIPAL MOUNTAIN RIDGES  
WITH THEIR BASE TOPOGRAPHY IN GENERAL AGREEMENT WITH  
THE RIDGE TOPOGRAPHY ON THREE OF THE FOUR DAYS.  
THE AMBIENT WINDS DETERMINE THE POSITION OF THE  
CLOUDS WITH RESPECT TO THE RIDGE LINE. THE DAYS  
WITH FAIRLY STRONG WINDS SHOW EVIDENCE OF CLOUD  
FORMATION IN SUSPECTED LEE WAVES. THE GROWTHS IN  
THE WAVES ARE MORE VIGOROUS AND EXTEND TO GREATER  
HEIGHTS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-639 070 4/2 4/1  
ARIZONA UNIV TUCSON INST OF ATMOSPHERIC PHYSICS  
A NUMERICAL STUDY OF THE INITIATION OF CUMULUS CLOUDS  
OVER MOUNTAINOUS TERRAIN. (U)  
JUN 69 16P ORVILLE, HAROLD D. I  
CONTRACT: NONR-2173(03),

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN JOURNAL OF ATMOSPHERIC  
SCIENCES, V22 N6 P684-99 NOV 1969.  
SUPPLEMENTARY NOTE:

DESCRIPTORS: (•CUMULUS CLOUDS, •MOUNTAINS),  
(•MICROMETEOROLOGY, MOUNTAINS), METEOROLOGICAL  
PARAMETERS, MATHEMATICAL MODELS (U)

THE INITIATION OF CUMULUS CLOUDS OVER MOUNTAINOUS  
TERRAIN IS INVESTIGATED BY MEANS OF A NUMERICAL  
MODEL. TWO-DIMENSIONAL MOTION IS SIMULATED OVER A  
MOUNTAIN AND VALLEY. CHANGES AT THE MOUNTAIN  
SURFACE OF BOTH TEMPERATURE AND WATER VAPOR INITIATE  
THE MOTION. THE EQUATIONS ARE SIMILAR TO OGURA'S  
(1963) BUT INCLUDE AN EXTRA BUOYANCY TERM DUE TO  
WATER VAPOR. FIVE CASES HAVE BEEN NUMERICALLY  
INTEGRATED. CASES 1 AND 4 ARE INCLUDED TO  
DEMONSTRATE THE DYNAMIC EFFECT OF WATER VAPOR BY  
COMPARISON WITH A PREVIOUSLY INTEGRATED 'DRY MODEL.'  
CASE 1, WHICH ALLOWS EVAPORATION AT THE MOUNTAIN  
SURFACE, CAUSES THE UPSLOPE MOTION TO DEVELOP AT A 20  
PER CENT FASTER RATE THAN THE DRY CASE. CASE 4,  
WHICH ALLOWS NO EVAPORATION AT THE SURFACE, AUGMENTS  
THE MOTION OVER THAT OF THE DRY CASE BY APPROXIMATELY  
10 PER CENT. A COMPARISON OF THE RESULTS WITH  
BRAHAM AND DRAGINIS' (1960) OBSERVATION OF  
POTENTIAL TEMPERATURE AND WATER VAPOR OVER THE  
SANTA CATALINAS SHOWS SOME SIMILARITIES BUT  
INDICATES THAT THE NUMERICAL MODEL HAS EDDY MIXING  
EFFECTS THAT ARE TOO SMALL. CASE 2 IS INCLUDED TO  
MODEL CLOUD INITIATION ON A TYPICAL TUCSON SUMMER  
DAY WITH RAIN IN THE MOUNTAINS. THE INITIAL  
ENVIRONMENTAL STABILITY IS GREATER THAN IN CASE 1  
(2.8/KM POTENTIAL TEMPERATURE CHANGE COMPARED TO  
1.0C/KM FOR CASE 1), BUT THE WATER VAPOR  
CONTENT IN CASE 2 IS GREATER. THE EFFECT IS TO  
SLOW THE DEVELOPMENT OF THE SLOPE WINDS AND THE  
DEVELOPMENT OF THE CLOUD. CLOUD INITIATION OCCURS  
AFTER APPROXIMATELY TWO HOURS FROM THE ASSUMED  
INITIAL EQUILIBRIUM CONDITIONS. THE CLOUD  
DEVELOPMENT EXTENDS OVER 30 MIN. THE POSITION OF  
THE STREAM FUNCTION CENTER WITH RESPECT TO THE CLOUD  
OUTLINE IS CRUCIAL TO THE SHAPE AND EVOLUTION OF THE  
CLOUD. (AUTHOR)

(U)

UNCLASSIFIED

ODC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-627 728 20/4 4/2  
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS  
THE CONSTRAINTS IMPOSED ON TORNADO-LIKE VORTICES BY  
THE TOP AND BOTTOM BOUNDARY CONDITIONS. (U)  
DESCRIPTIVE NOTE: REVISED ED.  
DEC 69 JOP TURNER, J. S. I  
REPT. NO. WHOI-REF-66-49,  
CONTRACT: NONR-2196(00), NSF-6P-217  
PROJ: NR-082-004,

UNCLASSIFIED REPORT

AVAILABILITY: PUBLISHED IN JOURNAL OF FLUID  
MECHANICS V29 PT2 P277-400 1966.  
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT RECEIVED 20  
JUN 69.

DESCRIPTORS: (\*TORNADOES, SIMULATION),  
(\*VORTICES, TORNADOES), BOUNDARY LAYER, FLUID  
MECHANICS, THEORY, EXPERIMENTAL DATA (U)

A LABORATORY MODEL OF A TORNADO VORTEX WAS  
PRODUCED, INCORPORATING TWO FEATURES WHICH ARE  
BELIEVED TO BE IMPORTANT TO THE UNDERSTANDING OF THE  
ATMOSPHERIC PHENOMENON, BUT WHICH HAVE BEEN LARGELY  
IGNORED IN PREVIOUS STUDIES. FIRST, IT WAS SHOWN  
THAT A VORTEX CAN BE DRIVEN FROM ABOVE BY A MECHANISM  
ANALOGOUS TO CONVECTION IN A CLOUD, AND THAT DENSITY  
DIFFERENCES WITHIN THE FUNNEL ITSELF ARE NOT  
ESSENTIAL. ASSOCIATED WITH THIS MECHANISM OF  
FORMATION IS A CIRCULATION IN THE VERTICAL, WITH AN  
UPFLOW IN THE CENTRE SURROUNDED BY A COMPENSATING  
ANNULAR DOWNFLOW. SECONDLY, THE BOTTOM BOUNDARY IS  
SEEN TO HAVE A STRONG INFLUENCE ON THE VORTEX, SINCE  
THE DOWN AND UP FLOWS ARE LINKED THERE BY A RAPID  
RADIAL INFLOW IN A THIN BOUNDARY LAYER. AN  
APPROXIMATE THEORETICAL DESCRIPTION OF SUCH A VORTEX  
IS PROPOSED. THE INTERIOR AND BOUNDARY LAYER FLOWS  
ARE FIRST EXAMINED SEPARATELY, AND THEN A CONDITION  
IS SOUGHT WHICH MAKES THE TWO SOLUTIONS CONSISTENT.  
THE STARTING-POINT OF THE THEORY IS THE ASSUMPTION  
OF A FORM OF STREAM FUNCTION WHICH DESCRIBES A  
CIRCULATION IN THE VERTICAL HAVING THE ESSENTIAL  
FEATURES OF THAT OBSERVED. THE RESULT OF THE  
MATCHING PROCEDURE IS TO FIX BOTH THE FORM OF THE  
TANGENTIAL VELOCITY PROFILE, AND THE RELATIVE  
MAGNITUDES OF THE THREE COMPONENTS OF VELOCITY.  
THESE DEDUCTIONS ARE NOT CRITICALLY DEPENDENT ON  
THE ASSUMED FORM OF THE MOTION IN THE VERTICAL, AND  
ARE IN GOOD AGREEMENT WITH THE FIRST MEASUREMENTS IN  
THE LABORATORY VORTICES, THOUGH THE QUANTITATIVE  
EXPERIMENTAL RESULTS ARE NOT EMPHASIZED HERE.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-627 883 4/2  
CHICAGO UNIV ILL SATELLITE AND MESOMETEOROLOGY RESEARCH  
PROJECT  
THREE-DIMENSIONAL GROWTH CHARACTERISTICS OF AN  
OROGRAPHIC THUNDERSTORM SYSTEM. (U)  
MAY 66 SOP BROWN, RODGER A. I  
REPT. NO. SHRP-RP-61,  
CONTRACT: AF 19(628)-4807, CNB-WB6-70

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (•THUNDERSTORMS, DYNAMICS),  
ARIZONA, MOUNTAINS, STORMS, CLOUDS, AERIAL  
PHOTOGRAPHS, PHOTOGRAMMETRY, STEREOSCOPIC  
PHOTOGRAPHY (U)

A THUNDERSTORM, WHICH DEVELOPED OVER THE SAN FRANCISCO PEAKS NEAR FLAGSTAFF, ARIZONA ON 1 AUGUST 1961, IS STUDIED WITH THE USE OF SURFACE STEREO-PAIR AND AERIAL PHOTOGRAPHS. THE PHOTOGRAPHS ARE USED TO INVESTIGATE BOTH THE VERTICAL GROWTH RATE OF THE TOPS OF NUMEROUS CLOUD ELEMENTS AND THE RATE OF INCREASE OF MASS WITHIN THE ENTIRE CLOUD SYSTEM. PHOTOGRAPHIC EVIDENCE OF THE UNIQUE CLOUD FEATURE WHICH SIGNIFIES THE TRANSITION FROM A CUMULUS CONGESTUS INTO A CUMULONIMBUS IS PRESENTED.

ANALYSES OF SURFACE DATA FROM THE MESOMETEOROLOGICAL NETWORK AROUND THE PEAKS REVEAL THAT THE PRECIPITATION AREA REMAINED NEAR THE LEeward SLOPES AS THE MOUNTAIN-ANCHORED CLOUD MASS EXTENDED TO THE NORTH. BASED ON THIS AND PREVIOUS STUDIES, THE ENERGY AVAILABLE FOR THE GROWTH OF CUMULI AND CUMULONIMBI ARE DETERMINED; VALUES OF THE ORDER OF 10 TO THE 22ND POWER ERGS FOR CUMULONIMBI AGREE WITH VALUES OBTAINED BY BRAHAM (J. METEOR, 9:227-242 (1952)), WHO USED AN ENTIRELY DIFFERENT APPROACH. THE APPENDIX CONTAINS A DETAILED DESCRIPTION OF THE PHOTOGRAMMETRIC TECHNIQUES USED TO OBTAIN MEASUREMENTS FROM THE CLOUDS SEEN IN THE AERIAL PHOTOGRAPHS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-629 676 4/1  
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS  
CUMULUS CONVECTION AND ITS INTERACTION WITH LARGER  
SCALES OF MOTION, (U)  
SEP 66 15P LEVINE, JOSEPH I  
REPT. NO. REF-66-49,  
CONTRACT: NSF-GP-1491,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-629 677.

DESCRIPTORS: (\*CUMULUS CLOUDS,  
CONVECTION(ATMOSPHERIC)), WIND, DATA,  
METEOROLOGICAL PARAMETERS, MOISTURE, PARTICLE  
SIZE, VELOCITY, DROPS (U)  
IDENTIFIERS: STORMFURY 1968 OPERATION (U)

AN OUTLINE OF WORK DONE AT THE WOODS HOLE  
OCEANOGRAPHIC INSTITUTION WITH NATIONAL  
SCIENCE FOUNDATION SUPPORT SINCE 1963 ON CUMULUS  
CONVECTION AS RELATED TO LARGER SCALE ATMOSPHERIC  
MOTIONS IS GIVEN. IN ADDITION A PRELIMINARY  
ANALYSIS OF THE MESO-SCALE WIND FIELD AS DERIVED FROM  
AIRCRAFT DOPPLER WIND OBSERVATION TAKEN DURING ONE  
DAY OF THE STORMFURY 1968 OPERATION IS DESCRIBED.  
SUCH FACTS AS SCALE AND MAGNITUDE OF MESO-SCALE  
DIVERGENCE AND VERTICAL VELOCITY IN THE TRADES ARE  
INFERRED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-629 677 4/1  
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS  
DATA REDUCTION OF STORMFURY 1969 CLOUD OBSERVATIONS  
MADE FROM RESEARCH FLIGHT FACILITY AIRCRAFT. (U)  
DESCRIPTIVE NOTE: FINAL REPT.,  
SEP 66 21P LEVINE, JOSEPH I  
REPT. NO. REF-66-90,  
CONTRACT: C9B-11299.

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-629 676.

DESCRIPTORS: (CUMULUS CLOUDS,  
CONVECTION(ATMOSPHERIC)), WIND, DATA,  
METEOROLOGICAL PARAMETERS, MOISTURE, PARTICLE  
SIZE, VELOCITY, REDUCTION, DROPS (U)  
IDENTIFIERS: STORMFURY 1969 OPERATION (U)

THE DATA REDUCTION PROCEDURES USED ON THE  
OBSERVATIONS OBTAINED FROM THE ESSA RESEARCH  
FLIGHT FACILITY AIRCRAFT DURING THE STORMFURY  
1969 OPERATION IS DESCRIBED. THE RESULTS TO BE  
OBTAINED EVENTUALLY ARE CLOUD LIQUID WATER CONTENT,  
VOLUME MEDIAN DROP SIZE, TURBULENT VERTICAL VELOCITY,  
AND BUOYANCY FLUCTUATIONS IN CLOUD PASSES MADE BY THE  
AIRCRAFT. (AUTHOR) (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-639 896 4/2  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
WIND CONDITIONS IN SITUATIONS OF PATTERNFORM AND NON-  
PATTERNFORM CUMULUS CONVECTION. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS,  
JUN 65 16P PLANK, VERNON G. ;  
REPT. NO. AFCRL-ERP-206, AFCRL-66-417  
PROJ: AF-8620,  
TASK: 862006

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN TELLUS V18 N1 P1-12 1966.

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*WIND, CUMULUS CLOUDS), (\*CUMULUS  
CLOUDS, CONVECTION(ATMOSPHERIC)), FLORIDA (U)

COMPARISONS WERE MADE BETWEEN THE WIND AND WIND  
SHEAR PROFILES PERTAINING TO PATTERNFORM (CLOUDS IN  
ROWS) AND NON-PATTERNFORM CUMULUS CONVECTION. NO  
UNIQUE OR CONSISTENT DIFFERENCES WERE FOUND. THE  
DIRECTIONAL CORRESPONDENCE OF THE CUMULUS ROWS AND  
WIND WAS ALSO INVESTIGATED. THE ROWS WERE FOUND TO  
BE MOST FREQUENTLY ORIENTED ABOUT 2 DEG. TO THE LEFT  
OF THE SURFACE WIND AND ABOUT 15 DEG. TO THE LEFT OF  
THE WIND AT THE CLOUD BASE LEVEL. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-641 837 4/2  
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION BOULDER COLO  
INST FOR TELECOMMUNICATION SCIENCES/AERONOMY  
INFRASONIC OBSERVATION OF A SEVERE WEATHER  
SYSTEM. (U)

DESCRIPTIVE NOTE: REVISED ED.,  
MAR 66 4P GOERKE, V. H. ; WOODWARD, M. W. ;

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN MONTHLY WEATHER  
REVIEW V94 N6 P295-8 JUN 1966.  
SUPPLEMENTARY NOTE: REVISION OF MANUSCRIPT SUBMITTED DEC  
10, 1965.

DESCRIPTORS: (•STORMS, ATMOSPHERIC SOUNDING),  
IONOSPHERE, PRESSURE, MECHANICAL WAVES, LEADING  
EDGE, EXTREMELY LOW FREQUENCY (U)

THE COHERENT ATMOSPHERIC PRESSURE WAVES TRAVELING  
AT SONIC VELOCITIES FROM A SQUALL LINE STORM 20-75  
KM. DISTANT WERE OBSERVED IN DETAIL FOR A PERIOD OF  
100 MIN. THE MEASUREMENTS INDICATE THAT THE  
INFRASONIC WAVE WAS GENERATED IN OR NEAR THE LEADING  
EDGE OF THE STORM. INFRASONIC WAVES WERE NOT  
OBSERVED FROM FUNNEL CLOUDS OR FROM THE HEAVY RAIN  
CLOUDS ACCOMPANYING THE STORM FRONT.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-642 377 4/2  
EMMANUEL COLL BOSTON MASS ORIENTAL SCIENCE LIBRARY  
PROBLEMS ON THE MACROSCOPIC CHARACTERISTICS OF  
CONVECTIVE CLOUDS IN CHINA. (U)  
65 3P  
REPT. NO. EMM-66-101(A)  
CONTRACT: AF 19(628)-5073

UNCLASSIFIED REPORT

DESCRIPTORS: (\*CLOUDS,  
CONVECTION(ATMOSPHERIC)), CHINA,  
METEOROLOGICAL PARAMETERS, STATISTICAL ANALYSIS,  
ATMOSPHERE, RADAR ECHO AREAS, DROPS,  
RAINDROPS (U)

THE MONOGRAPH PRESENTS A GENERAL SUMMARY OF FIELD  
OBSERVATIONS ON CONVECTIVE CLOUDS MADE IN CERTAIN  
LOCALITIES IN CHINA DURING THE SUMMER MONTHS OF  
1960 - 1962. THE MAIN SUBJECTS INCLUDED ARE RADAR  
STUDIES OF THE CHARACTERISTICS OF THE STRUCTURE,  
DEVELOPMENT AND MOVEMENT OF THUNDER-CLOUDS AND LOCAL  
CUMULUS CONGESTUS WITH SYNTHETIC ANALYSES OF RESULTS  
FROM INDIVIDUAL CASES, DISCUSSIONS OF THE OBSERVED  
CHARACTERISTICS OF CONVECTIVE CLOUDS (INCLUDING  
OROGRAPHIC CLOUDS, ISOLATED CUMULUS CLOUDS AND  
THUNDER-CLOUDS) AT THEIR VARIOUS STAGES OF  
DEVELOPMENT, STATISTICAL ANALYSES OF OBSERVATIONS OF  
CONVECTIVE CLOUDS OVER VARIOUS LOCALITIES AND STUDIES  
OF THE RELATIONSHIP BETWEEN ATMOSPHERIC  
STRATIFICATION ASSOCIATED WITH THE DEVELOPMENT OF  
CONVECTIVE CLOUDS AND THE FIELD OF VERTICAL MOTION.  
THESE STUDIES PROVIDE A VALUABLE CONTRIBUTION  
TOWARD THE UNDERSTANDING OF THE STRUCTURE AND  
PROCESSES OF CONVECTIVE CLOUDS IN CHINA.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0392

AD-644 899                      4/2  
NATIONAL SEVERE STORMS LAB NORMAN OKLA  
NOTES ON THUNDERSTORM MOTIONS, HEIGHTS, AND  
CIRCULATIONS. (U)  
DESCRIPTIVE NOTE: TECHNICAL MEMO.,  
NOV 66 56P                      HAROLD, T. W. ; ROACH, W. T. ;  
WILK, KENNETH E. ;  
REPT. NO. NSSL-29

UNCLASSIFIED REPORT

DESCRIPTORS: (•THUNDERSTORMS, ATMOSPHERIC  
MOTION), METEOROLOGY, WEATHER FORECASTING,  
METEOROLOGICAL RADAR, METEOROLOGICAL CHARTS,  
CLOUDS, AERIAL PHOTOGRAPHY (U)

CONTENTS: A NOTE ON THE DEVELOPMENT AND MOVEMENT  
OF STORMS OVER OKLAHOMA ON MAY 27, 1963; MOTION  
AND INTENSITY CHARACTERISTICS OF THE SEVERE  
THUNDERSTORMS OF APRIL 3, 1964; AN ANALYSIS OF  
EIGHT FLIGHTS BY U-2 AIRCRAFT OVER SEVERE STORMS IN  
OKLAHOMA. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-648 987 4/2  
PENNSYLVANIA STATE UNIV UNIVERSITY PARK  
RESEARCH IN FOUR-DIMENSIONAL DIAGNOSIS OF CYCLONIC  
STORM CLOUD SYSTEMS, (U)  
NOV 66 62P DANIELSEN, E. F. I  
REPT. NO. SCIENTIFIC-2  
CONTRACT: AF 19(628)-4762  
PROJ: AF-6698  
TASK: 669802  
MONITOR: AFCRL 66-849

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-A32 668.

DESCRIPTORS: (\*CYCLONES, ATMOSPHERIC MOTION),  
(\*STORMS, ATMOSPHERIC PRECIPITATION), WIND,  
VELOCITY, CLOUDS, MOTION, COMPUTERS,  
TRAJECTORIES, METEOROLOGICAL PHENOMENA,  
METEOROLOGICAL CHARTS (U)

THE ISENTROPIC TRAJECTORY METHOD WHICH PROVIDES  
HIGH RESOLUTION FIELDS OF VERTICAL MOTIONS AND THE  
HISTORY OF THE AIR'S THREE DIMENSIONAL MOTION HAS  
BEEN ADAPTED FOR A HIGH SPEED COMPUTER. GRID POINT  
VALUES OF THE MONTGOMERY STREAM FUNCTION AND  
PRESSURE ON THE ISENTROPIC SURFACE ARE READ FROM HAND  
ANALYSES. ALL REMAINING OPERATIONS ARE PERFORMED  
BY THE COMPUTER WHICH INCLUDE: AN ITERATIVE  
SOLUTION OF THE BALANCE EQUATION, COMPUTATIONS OF THE  
PATH OF EACH TRAJECTORY FROM THE MONTGOMERY  
STREAM FUNCTION AND THE BALANCED WIND VECTORS,  
CONTOURING OF THE STREAM FUNCTION, ISOTACHS AND  
TRAJECTORIES, COMPUTATION AND PLOTTING OF THE  
VERTICAL VELOCITIES. THE METHOD OF SOLVING THE  
BALANCE EQUATION AND THE TRAJECTORY METHOD ARE  
DISCUSSED. COMPARISONS BETWEEN MACHINE AND HAND  
COMPUTED TRAJECTORIES AND VERTICAL MOTIONS ARE  
INCLUDED FOR THE NOVEMBER STORM WHICH WAS DISCUSSED  
IN SCIENTIFIC REPORT NO. 1. A COMPLETE  
DIAGNOSIS OF A MARCH STORM AND A PARTIAL DIAGNOSIS  
OF AN APRIL STORM ARE ALSO PRESENTED AND DISCUSSED.  
THE VERTICAL VELOCITIES ARE WELL CORRELATED WITH  
THE CLOUDS, PRECIPITATION REGIONS AND RATES OF  
CYCLOGENESIS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0252

AD-649 169 20/4 4/2  
WOODS HOLE OCEANOGRAPHIC INSTITUTION MASS  
JETS AND PLUMES WITH NEGATIVE OR REVERSING  
BUOYANCY, (U)

FEB 66 18P TURNER, J. S. I  
REPT. NO. WHOI-REF-67-8  
CONTRACT: NONR-2196(00)  
PROJ: NR-082-004

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN JOURNAL OF FLUID  
MECHANICS V26 PT4 P779-92 1966.

DESCRIPTORS: (•TURBULENCE, •BUOYANCY),  
(•ENVIRONMENTAL TESTS, ATMOSPHERIC MOTION),  
CUMULUS CLOUDS, CONVECTION(ATMOSPHERIC),  
METEOROLOGICAL PHENOMENA, EXPERIMENTAL DESIGN,  
LABORATORIES, EVAPORATION, LIQUIDS, DENSITY,  
JETS, SALTS, NONLINEAR SYSTEMS (U)

THE MOTION OF TURBULENT JETS OF HEAVY SALT SOLUTION  
INJECTED UPWARDS INTO A TANK OF FRESH WATER HAS BEEN  
COMPARED WITH THAT OF PLUMES WHICH ARE INITIALLY  
BUOYANT BUT BECOME HEAVY AS THEY MIX WITH THE  
ENVIRONMENT. THE REVERSAL OF BUOYANCY IN THE  
LATTER CASE IS PRODUCED BY USING FLUIDS HAVING A NON-  
LINEAR DENSITY CHANGE ON MIXING, A LABORATORY  
ANALOGUE OF THE DENSITY CHANGES OCCURRING AT THE TOP  
OF A CUMULUS CLOUD DUE TO EVAPORATION. THE  
BEHAVIOUR IN THE TWO CASES IS QUITE DIFFERENT; SALT  
JETS REACH A STEADY HEIGHT ABOUT WHICH ONLY SMALL  
FLUCTUATIONS OCCUR, WHILE THE PLUMES WITH REVERSING  
BUOYANCY EXHIBIT VIOLENT REGULAR OSCILLATIONS.  
THIS PHENOMENON, WHICH IS CLEARLY A PROPERTY OF THE  
'EVAPORATION' AND NOT JUST OF THE GEOMETRY, IS  
SUGGESTED AS A LIKELY EXPLANATION OF THE OBSERVED  
OSCILLATION OF THE TOPS OF CUMULUS TOWERS.  
DIMENSIONAL ARGUMENTS HAVE BEEN USED TO RELATE THE  
EXPERIMENTAL RESULTS TO THE VOLUME, MOMENTUM AND  
BUOYANCY FLUXES AT THE SOURCE. AN APPLICATION OF  
ONE OF THE DEDUCED RELATIONS TO THE ATMOSPHERE GIVES  
REALISTIC PERIODS FOR THE CLOUD-TOP OSCILLATIONS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-649 779 4/2 17/9  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
A PRELIMINARY REPORT ON DOPPLER RADAR OBSERVATION OF  
TURBULENCE IN A THUNDERSTORM. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS,  
JAN 67 24P DONALDSON, RALPH J. , JR;  
REPT. NO. AFCRL-ERP-259, AFCRL-67-0019  
PROJ: AF-6672  
TASK: 667209

UNCLASSIFIED REPORT

DESCRIPTORS: (•THUNDERSTORMS, DOPPLER RADAR),  
(•DOPPLER RADAR, METEOROLOGICAL PHENOMENA),  
TURBULENCE, VELOCITY, PARTICLE SIZE,  
ATMOSPHERIC PRECIPITATION, RAINDROPS, AZIMUTH,  
MAIL (U)

VERTICAL-INCIDENCE OBSERVATIONS BY DOPPLER RADAR  
OF VELOCITIES IN A THUNDERSTORM REVEAL SOME REGIONS  
IN WHICH THE SPREAD OF VELOCITIES IS UNUSUALLY BROAD.  
THE WIDTHS OF THE VERTICAL VELOCITY SPECTRA ARE  
GENERALLY GREATEST ALONG THE EDGES OF A MAJOR  
UPDRAFT, WHERE THE MAXIMUM SHEAR IN UPDRAFT SPEED  
ALSO OCCURS. THE OBSERVATIONS INDICATE THAT  
TURBULENCE IS AN IMPORTANT CAUSE OF THE ABNORMALLY  
WIDE VELOCITY SPECTRA, AND SUGGEST THE UTILITY OF  
DOPPLER RADAR MEASUREMENTS OF THE VERTICAL VELOCITY  
SPECTRUM AS AN INDICATOR OF SEVERE CLOUDY-AIR  
TURBULENCE. FURTHERMORE, VERTICAL VELOCITY SPECTRA  
IN THE MORE CONVECTIVE REGIONS OF THUNDERSTORMS,  
WHERE THEY MAY BE SERIOUSLY AFFECTED BY TURBULENCE  
AND WIND SHEAR, PROBABLY GIVE AN EXAGGERATED PICTURE  
OF THE PARTICLE SIZE DISTRIBUTION. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0792

AD-649 826 4/2  
MIAMI UNIV FLA RADAR METEOROLOGICAL LAB  
MESOSCALE STUDIES OF INSTABILITY PATTERNS AND WINDS  
IN THE TROPICS. (U)  
DESCRIPTIVE NOTE: SEMI-ANNUAL REPT. NO. 12, 1 JUN-21  
DEC 66,  
MAR 67 41P GERRISH, HAROLD P. I  
REPT. NO. ML-67088  
CONTRACT: DA-28-043-AMC-00442(E)  
PROJ: DA-1V0-14501-B53A09.07  
MONITOR: ECOM 00442-2

UNCLASSIFIED REPORT

DESCRIPTORS: (•STORMS, FLORIDA), (•WIND,  
TROPICAL REGIONS), ATMOSPHERIC PRECIPITATION,  
METEOROLOGICAL PHENOMENA, RAINFALL, WATER VAPOR,  
MOISTURE, METEOROLOGICAL PARAMETERS,  
METEOROLOGICAL RADAR, WEATHER FORECASTING (U)

THE REPORT SUMMARIZES ADDITIONAL WORK ON THE  
EXTREMELY HEAVY SOUTH FLORIDA RAINSTORM THAT  
PRODUCED MORE THAN TWENTY-ONE INCHES OF RAIN IN  
TWELVE HOURS ON 14 OCTOBER 1965. ALTHOUGH A  
TREMENDOUS AMOUNT OF MOISTURE CONVERGED INTO THE AREA  
AT 850 MB WITH RELATIVELY LARGE VERTICAL MOTIONS AND  
ATTENDING DIVERGENCE ALOFT, REPEATED ATTENTION WAS  
ALSO DRAWN TO THAT PART OF THE ATMOSPHERE NEAR THE  
MELTING LEVEL. MOISTURE ANALYSIS REVEALED THAT THE  
TRANSPORT OF WATER VAPOR IN THE 700-800 MB LAYER WAS  
IMPORTANT FOR THE TIMING AND PERHAPS SEVERITY OF THE  
EVENT. A MOIST TONGUE AT THIS LEVEL COULD BE  
TRACKED INTO THE AREA FROM THE WESTERN CARIBBEAN.  
A RADAR ANALYSIS OF THE STORM WAS MADE USING BOTH  
NON-CONTOURED AND CONTOURED RADAR DATA. IT WAS  
OBSERVED THAT ENHANCED ANALYSIS AND FORECAST  
CAPABILITY RESULTED FROM THE USE OF CONTOURED VIDEO.  
WITHOUT IT, SMALL-SCALE ORGANIZATION AND LOCATION  
OF THE HEAVIEST RAIN WOULD NEVER HAVE BEEN REALIZED.  
FREQUENCY DISTRIBUTIONS OF VIDEO CONTOURED BY 24 DB  
ATTENUATION CORRELATED EXTREMELY WELL WITH THE  
ISOHYETAL ANALYSIS. A QUANTIZED WARNING SYSTEM WAS  
SUGGESTED TO ASSIST THE FORECASTER IN HEAVY RAINFALL  
SITUATIONS. AN EVENING RADAR 'ANGEL' PATTERN WAS  
FOUND TO BE USEFUL IN CHARACTER-TYPING THE  
ATMOSPHERE. IT WAS OBSERVED THAT RAINFALL THE NEXT  
DAY WAS INVERSELY PROPORTIONAL TO RADIUS OF THE  
PATTERN. WHEN THIS PARTICULAR PATTERN FORMED,  
LINES OF WEATHER MOVING TOWARD MIAMI WOULD TEND TO  
BREAK UP THERE. A SYNOPSIS OF SOUTH FLORIDA  
'ANGELS' OBSERVED FROM A REVIEW OF 7000 FT OF RADAR (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-649 876 4/2 17/9  
AIR FORCE CAMBRIDGE RESEARCH LABS L 6 HANSCOM FIELD  
MASS

THE BALANCE LEVEL IN CONVECTIVE STORMS. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS,  
JUN 66 21P ATLAS, DAVID I  
REPT. NO. AFCRL-ERP-262, AFCRL-67-0113  
PROJ: AF-6672  
TASK: 667209

UNCLASSIFIED REPORT  
AVAILABILITY: PUBLISHED IN JOURNAL OF  
ATMOSPHERIC SCIENCES V29 N6 P629-81 NOV 1966.

DESCRIPTORS: (\*DOPPLER RADAR, \*STORMS),  
CONVECTION(ATMOSPHERIC), REFLECTIVITY,  
PARTICLE SPECTRA, PARTICLES, VELOCITY,  
ATMOSPHERIC PRECIPITATION (U)

DOPPLER RADAR OBSERVATIONS OF CONVECTIVE STORMS AT  
VERTICAL INCIDENCE SHOW A HEIGHT AT WHICH THE MEAN  
REFLECTIVITY-WEIGHTED PARTICLE VELOCITY RELATIVE TO  
THE GROUND IS ZERO, I.E., THE PARTICLES ARE JUST  
BALANCED BY THE UPDRAFT. THIS HEIGHT IS DEFINED AS  
THE 'BALANCE LEVEL' OR BL. WHILE A TRANSIENT BL  
MAY APPEAR AT ANY HEIGHT IN THE STORM, A STEADY OR  
QUASI-STEADY BL IS FOUND TO EXIST ONLY NEAR MAXIMA  
IN THE UPDRAFT PROFILE. SUCH MAXIMA PROVIDE A  
MEANS OF SEPARATING THE PARTICLE SIZE SPECTRUM INTO  
RISING AND FALLING GROUPS OF COMPARABLE REFLECTIVITY  
AT A DISCRETE HEIGHT. TWO BL'S HAVE BEEN  
IDENTIFIED, ONE AT A PRIMARY UPDRAFT MAXIMUM NEAR THE  
STORM TOP AND THE OTHER AT A SECONDARY MAXIMUM LOWER  
DOWN. THE CONTINUED EXISTENCE OF THE LOWER BL  
DEPENDS UPON WHETHER OR NOT THE GROUP OF RISING  
PARTICLES, WHICH GROW FURTHER IN THE UPDRAFT ABOVE  
THE SECONDARY MAXIMUM, TURN DOWNWARD AND FALL BACK  
THROUGH THE BL WITH FALL SPEEDS GREATLY IN EXCESS  
OF THE ASSOCIATED UPDRAFT SPEED THERE. UNDER  
CONDITIONS OF STRONG SHEAR ALOFT, SUCH PARTICLES DO  
NOT RETURN WITHIN THE STORM CORE AND SO THE LOWER BL  
MAY PERSIST. THE DISCUSSION ALSO TREATS: THE  
LOCATION OF THE LOW LEVEL ROOTS OF UPDRAFTS IN A LINE  
OF CONVECTIVE CELLS, THE NATURE OF FIRST ECHOES AND  
THEIR RELATION TO THE BALANCE LEVEL, AND THE REGION  
OF TRAILING STRATIFORM PRECIPITATION. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-680 257 4/2  
WEATHER WING (1ST) SAN FRANCISCO CALIF DETACHMENT 1  
THUNDERSTORMS IN SOUTHEAST ASIA. (U)  
DESCRIPTIVE NOTE: METEOROLOGICAL REPT. (FINAL),  
MAR 67 60P ATKINSON, GARY D. 1  
MONITOR: WW-1 TECHNICAL STUDY-11

UNCLASSIFIED REPORT

DESCRIPTORS: (•THUNDERSTORMS, •SOUTHEAST  
ASIA), CLIMATOLOGY, TROPICAL REGIONS,  
PERIODIC VARIATIONS, TABLES, METEOROLOGICAL  
CHARTS, DIURNAL VARIATIONS, METEOROLOGICAL  
PARAMETERS (U)

THE STUDY PRESENTS A COMPREHENSIVE SURVEY OF  
THUNDERSTORMS IN SOUTHEAST ASIA (REPUBLIC OF  
VIETNAM, CAMBODIA, THAILAND, LAOS AND NORTH  
VIETNAM). VARIOUS SOUTHEAST ASIAN DATA  
SOURCES ARE USED, AND THE RELIABILITY OF THESE  
SOURCES AS WELL AS THE DIFFICULTIES INVOLVED IN  
OBTAINING RELIABLE THUNDERSTORM DATA ARE DISCUSSED.  
THE MONTHLY AND ANNUAL FREQUENCIES OF THUNDERSTORM  
DAYS FOR 83 STATIONS IN SOUTHEAST ASIA ARE GIVEN  
IN BOTH TABLE AND ISOLINE-MAP FORMS. YEAR TO YEAR  
VARIATIONS IN THE NUMBERS OF THUNDERSTORMS OBSERVED  
MONTHLY AND ANNUALLY ARE DISCUSSED. THE DURATION  
AND DIURNAL VARIATION OF THUNDERSTORMS ARE ALSO  
CONSIDERED. A THUNDERSTORM PERSISTENCY MODEL WAS  
DEVELOPED FROM TEN YEARS OF DAILY THUNDERSTORM  
RECORDS FOR SELECTED THAILAND STATIONS. THE  
REPORT SHOWS HOW THE LOCAL THUNDERSTORM CLIMATOLOGY  
CAN BE APPROXIMATED FOR A SOUTHEAST ASIAN  
LOCATION WHERE NO DATA ARE AVAILABLE. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-690 258 4/2  
WEATHER SQUADRON (20TH) SAN FRANCISCO CALIF 96929  
SCIENTIFIC SERVICES  
TYPHOON WEATHER MODELS. KADENA AB, OKINAWA. (U)  
DESCRIPTIVE NOTE: FINAL REPT.,  
APR 67 24P ATKINSON, GARY D. 1  
PENLAND, MIRAM E. 1  
REPT. NO. TECHNICAL STUDY-12

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-690 257.

DESCRIPTORS: (\*TROPICAL CYCLONES, \*ATMOSPHERE  
MODELS), (\*ATMOSPHERIC MOTION, \*WEATHER  
FORECASTING), WIND, VELOCITY, INTENSITY,  
CLIMATOLOGY, VISIBILITY, ATMOSPHERIC  
PRECIPITATION, RYUKYU ISLANDS (U)

SYNOPTIC MODELS ARE DEVELOPED TO RELATE THE MAXIMUM  
SURFACE WIND GUSTS, LOWEST FLYING WEATHER CONDITIONS,  
AND SIX-HOUR RAINFALL AMOUNTS AT KADENA AB,  
OKINAWA TO THE POSITIONS AND INTENSITIES OF  
TYPHOONS. BOTH THE MEAN AND 900 HIGHEST VALUES  
ARE GIVEN FOR THE WIND SPEEDS AND RAINFALL AMOUNTS.  
INDEPENDENT TESTING INDICATES THAT THESE MODELS CAN  
BE USED TO PREPARE REALISTIC AND CONSISTENT TERMINAL  
FORECASTS OF TYPHOON PRODUCED WEATHER AT  
KADENA. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-652 849 4/1 4/2 20/4 20/13  
WASHINGTON UNIV SEATTLE DEPT OF ATMOSPHERIC SCIENCES  
CONVECTIVE ELEMENTS. (U)  
DESCRIPTIVE NOTE: FINAL REPT.,  
APR 67 BDP BERGMAN, K. H. BUSINGER, J.  
A. IMIYAKE, M. TURNER, J. A. I  
CONTRACT: DA-AMC-36-039-62-G-1  
MONITOR: ECOM 02961-F

UNCLASSIFIED REPORT

DESCRIPTORS: (CONVECTION (ATMOSPHERIC), HEAT  
TRANSFER), (ATMOSPHERE MODELS, FLUID FLOW),  
STABILITY, TORNADOES, ANEMOMETERS,  
METEOROLOGICAL INSTRUMENTS, HEAT FLUX, VORTICES,  
ATMOSPHERIC TEMPERATURE, MATHEMATICAL ANALYSIS (U)

CONTENTS: DESIGN OF A SIMPLE HEAT FLUX METER;  
ON THE DIRECT DETERMINATION OF THE VERTICAL HEAT  
FLUX; SOME CHARACTERISTICS OF CONCENTRATED  
CONVECTIVE VORTICES; INVESTIGATION OF A PARTICULAR  
MODE OF INSTABILITY FOR AN IDEALIZED VORTEX MODEL. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-655 368

4/2

EMMANUEL COLL BOSTON MASS ORIENTAL SCIENCE LIBRARY  
MARKOV PROCESS IN THE CONTINUOUS GROWTH OF CLOUD  
DROPS UNDER CONDITIONS OF SMALL-SCALE FLUCTUATIONS  
AND ITS EFFECT ON THE DEVELOPMENT OF CUMULONIMBUS, (U)

JUN 67 19P CH'ING-FANG, HSU IKUEI-

CH'EN, LI ICHING-SUNG, WEN I

REPT. NO. EMM-67-135

CONTRACT: AF 19(628)-9973

MONITOR: TT 67-62280

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF CH'I HSIANG HSUEH  
PAO (CHINESE PEOPLE'S REPUBLIC), V36 N2 P242-8  
1966.

DESCRIPTORS: (\*STATISTICAL PROCESSES,  
\*CUMULONIMBUS CLOUDS), (\*RAINDROPS, STOCHASTIC  
PROCESSES), ATMOSPHERIC CONDENSATION, MOISTURE,  
GRAVITY, DIFFUSION, CUMULUS CLOUDS,  
PROBABILITY, ICE, CRYSTALS, WATER VAPOR (U)

WHEN THE SCALE OF FLUCTUATION IS RELATIVELY SMALL,  
THE CONTINUOUS STOCHASTIC GROWTH OF CLOUD DROPLETS  
MAY BE TREATED AS A DIFFUSION PROBLEM IN AN R-SPACE  
WHERE R DENOTES THE DROP RADIUS. NOT ONLY IS THE  
INFLUENCE OF THIS TYPE OF FLUCTUATION VERY PRONOUNCED  
IN WARM CUMULUS, BUT IS ALSO SIGNIFICANT IN  
CUMULONIMBUS CONTAINING ICE CRYSTALS.

OBSERVATIONAL EVIDENCE HAS ALREADY SHOWN THAT  
DURING THE DEVELOPMENT OF CUMULONIMBUS IN MIDDLE  
LATITUDES, A LARGE NUMBER OF PRECIPITATION ELEMENTS  
HAS ALREADY FORMED IN THE WARM CLOUD STAGE OFTEN  
BEFORE THE ONSET OF CRYSTALLIZATION. FOR SUCH  
LARGE DROPS, THE AVERAGE RATE OF GROWTH IS GREATER BY  
COALESCENCE THAN BY THE ICE-CRYSTAL PROCESS.  
CONSEQUENTLY, THE APPEARANCE OF ICE CRYSTALS AT THE  
LATER STAGE AND THE ASSOCIATED PROCESS OF  
SUBLIMATION-CONDENSATION TRANSFER MAY NOT BE SO  
IMPORTANT. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-659 726 4/2  
MIAMI UNIV FLA RADAR METEOROLOGICAL LAB  
MESOSCALE STUDIES OF INSTABILITY PATTERNS AND WINDS  
IN THE TROPICS. (U)  
DESCRIPTIVE NOTE: REPT. NO. 14, 1 JUN 65-31 MAY 67  
(FINAL),  
SEP 67 82P GERRISH, HAROLD P. ;  
REPT. NO. 8188-6, ML-67275  
CONTRACT: DA-28-043-AMC-00443(E)  
PROJ: DA-1VO-14501-853A-09-07  
MONITOR: ECOM 00443-F

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SEE ALSO AD-629 952.

DESCRIPTORS: (\*METEOROLOGY, \*TROPICAL REGIONS),  
(\*RADAR ECHO AREAS, METEOROLOGY), WIND,  
METEOROLOGICAL RADAR, CLIMATOLOGY, RAINFALL,  
MOISTURE, TORNADOES, CLOUDS, WATER VAPOR,  
ATMOSPHERIC REFRACTION, METEOROLOGICAL PARAMETERS,  
ATMOSPHERIC PRECIPITATION (U)

RAINFALL RATES IN EASTERLY WAVE AND AIR MASS  
SHOWERS AT THE UNIVERSITY OF MIAMI ARE STUDIED  
USING RAINDROP CAMERA DATA COLLECTED FOR THE  
ILLINOIS STATE WATER SURVEY IN 1957-58. IT  
IS OBSERVED THAT THE FIRST MINUTES OF AIR MASS RAIN  
ARE TYPICALLY HEAVIER THAN EASTERLY WAVE RAIN. TWO  
SEVERE RAINSTORMS IN SOUTH FLORIDA ARE DISCUSSED  
AND ANALYTICAL TECHNIQUES ARE APPRAISED. A REVISED  
CLIMATOLOGY OF TORNADOES AND WATERSPOUTS IN THIS AREA  
IS PRESENTED AND DISCUSSED. REVIEW OF THE  
PERTINENT SYNOPTIC MAPS SUBSTANTIATES THAT THE BULK  
OF THIS TYPE OF ACTIVITY OCCURS IN UNSUSPICIOUS  
SUMMER TRADE-WIND OR RIDGE PATTERNS AT THE SURFACE  
WITH THE JET STREAM WELL REMOVED FROM THE AREA.  
RADAR SIGNATURES ARE STUDIED AND ILLUSTRATED.  
SOME TORNADOES AND WATERSPOUTS IN SOUTH FLORIDA  
ARE OBSERVED TO BE ASSOCIATED WITH INTERSECTING 'FINE  
LINES' FROM CONVECTION. THIS IS VISUALIZED AS A  
NEW APPLICATION OF THE EARLIER PRESSURE-JUMP  
THEORIES. HERE THE PISTON MECHANISM IS CONVECTION  
ITSELF AND THE LEADING EDGE OF THE COLD OUTFLOW ACTS  
LIKE A RAPIDLY MOVING COLD FRONT. REFRACTIVE  
CONDITIONS ASSOCIATED WITH TORNADOES, WATERSPOUTS AND  
HAIL ARE ALSO DESCRIBED, AND MEAN TEMPERATURE  
SOUNDINGS ARE ILLUSTRATED FOR THESE EVENTS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-660 092 4/2

AIR WEATHER SERVICE SCOTT AFB ILL  
NOTES ON ANALYSIS AND SEVERE-STORM FORECASTING  
PROCEDURES OF THE MILITARY WEATHER WARNING  
CENTER.

(U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,  
JUL 67 151P MILLER, ROBERT C. ;  
REPT. NO. AWS-TR-200

UNCLASSIFIED REPORT

DESCRIPTORS: (•WEATHER FORECASTING, STORMS),  
(•WEATHER STATIONS, ARMED FORCES OPERATIONS),  
AIR MASS ANALYSIS, INTENSITY, WIND,  
THUNDERSTORMS, HAIL, MOISTURE, TORNADOES,  
SURFACE TEMPERATURES, THICKNESS, METEOROLOGICAL  
PARAMETERS, STABILITY, MAPS

(U)

THE COLLECTION OF NOTES DISCUSSES THE VARIOUS TYPES  
OF SEVERE-WEATHER AIR MASSES, HOW SEVERE WEATHER  
SYSTEMS FORM, WHICH PARAMETERS BEST DEFINE THE  
EXISTENCE AND INTENSITY OF SEVERE WEATHER, AND HOW TO  
USE LOCAL INFORMATION TO BETTER FORECAST THE  
OCCURRENCE OF PHENOMENA AT INDIVIDUAL STATIONS.  
SPECIFICALLY, WIND GUST AND HAIL-SIZE FORECASTING  
TECHNIQUES AND THE USEFULNESS OF VARIOUS STABILITY  
INDEXES ARE PRESENTED. ALSO, A CHAPTER ON SEVERE  
WEATHER IN TROPICAL AIR MASSES IS INCLUDED.  
FINALLY, A NUMBER OF DETAILED CASE STUDIES ARE IN  
THE REPORT TO HELP THE READER VISUALIZE HOW  
FORECASTING CONCEPTS ARE APPLIED, AND TO EMPHASIZE  
THE IMPORTANCE OF FORECASTING EXPERIENCE.

(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /L0352

AD-660 966                    4/2                    8/6  
WEATHER BUREAU WASHINGTON D C  
MAPS OF THE GEOGRAPHIC DISTRIBUTION OF THE NUMBER OF  
THUNDERSTORM DAYS IN THE USSR, (U)  
OCT 60    30P                    ARKHIPOVA, E. P. I  
REPT. NO. WB/T-14  
MONITOR: TT                    63-11697

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY AIR WEATHER SERVICE  
CLIMATIC CENTER, WASHINGTON, D. C. TRANS. OF  
GLAVNAYA GEOFIZICHESKAYA OBSERVATORIYA, LENINGRAD.  
TRUDY (USSR) N74 P41-60 1957.

DESCRIPTORS: (\*METEOROLOGICAL CHARTS,  
THUNDERSTORMS), (\*THUNDERSTORMS, USSR),  
WEATHER STATIONS, MOUNTAINS, TERRAIN,  
SEACOAST, PLATEAUS, DESERTS, METEOROLOGICAL  
PHENOMENA (U)

CHARTS WERE PREPARED OF THE MEAN NUMBER OF DAYS  
WITH NEAR OR DISTANT THUNDERSTORMS PER YEAR AND FOR  
THE FOUR MONTHS OF THE WARM PERIOD - MAY TO  
AUGUST DURING WHICH THUNDERSTORM ACTIVITY IS MOST  
PRONOUNCED. IN ADDITION, FOR THE CHARACTERISTICS  
OF THE ANNUAL COURSE AND DURATION OF THE THUNDERSTORM  
PERIOD, DIAGRAMS OF THE MEAN AND MAXIMUM MONTHLY  
NUMBER OF THUNDERSTORMS WERE PREPARED FOR A NUMBER OF  
STATIONS. THE CHARTS WERE COMPILED CHIEFLY  
ACCORDING TO THE NUMBER OF THUNDERSTORM DAYS IN THE  
DATA OF THE CLIMATIC HANDBOOKS OF THE USSR  
(KLIMATICHESKIE SPRAVOCHNIKI SSSR). IN THE  
PREPARATION OF THE MAPS OF THE NUMBER OF DAYS WITH  
THUNDERSTORMS, USE WAS MADE OF DATA FROM ABOUT 21000  
METEOROLOGICAL STATIONS WITH VARYING LENGTHS OF  
OBSERVATIONAL RECORDS WITHIN THE PERIOD 1891-1948.  
AS A RULE, DATA FROM STATIONS HAVING AT LEAST 10 TO  
15 YEARS OF OBSERVATION WERE USED. IN REGIONS OF  
INADEQUATE THUNDERSTORM DATA COVERAGE, ESPECIALLY IN  
MOUNTAINOUS REGIONS, STATION RECORDS WITH  
OBSERVATIONAL PERIODS OF LESS THAN 10 YEARS WERE  
EMPLOYED, IN ORDER TO APPROXIMATE THE ORDER OF  
MAGNITUDE OF THE NUMBER OF THUNDERSTORM DAYS. (U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-660 976 4/2  
WEATHER BUREAU WASHINGTON D C  
AN OUTLINE OF THE FORMATION OF LOW CLOUDS AND FOG  
OWING TO RADIATIONAL COOLING, (U)  
NOV 61 10P KOSHELENKO, I. V. I  
MONITOR: TT 62-12911

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY ARMY ELECTRONIC  
PROVING GROUND, FORT HUACHUCA, ARIZ. TRANS. OF  
UKRAINSKII NAUCHNO-ISSLEDOVATELSKII  
GIDROMETEOROLOGICHESKII INSTITUT. TRUDY (USSR) V21  
P16-22 1960.

DESCRIPTORS: (\*CLOUD COVER, FOG), (\*FOG,  
THERMAL RADIATION), THERMAL PROPERTIES,  
DIURNAL VARIATIONS, HUMIDITY, ATMOSPHERIC  
TEMPERATURE, SNOW, USSR (U)

IT IS WELL KNOWN THAT LOW AIR-MASS STRATUS TYPE  
CLOUDINESS FORMS, IN THE SAME WAY AS ADVECTION FOG,  
AS A RULE, IN STABLE WARM MOIST AIR DURING ITS  
TRANSPORT OVER THE COLD UNDERLYING SURFACE. BUT AT  
TIMES SUCH CLOUDINESS OR FOG DEVELOPS IN THE ABSENCE  
OF WARM ADVECTION WHEN THE NECESSARY SATURATION IS  
ATTAINED BY MEANS OF RADIATIONAL COOLING AND  
TURBULENT MIXING. THE IMPORTANT ROLE OF  
RADIATIONAL COOLING IN THE FORMATION OF LOW  
CLOUDINESS IS SPOKEN FOR BY THE FACT THAT IT HAS A  
SUFFICIENTLY WELL EXPRESSED DIURNAL COURSE WITH A  
MAXIMUM FREQUENCY IN THE MORNING HOURS. IN A  
PREVIOUS REPORT A METHOD WAS PROPOSED FOR AN  
APPROXIMATE CALCULATION OF THE RADIATIONAL FACTOR IN  
FORECASTING AND IN THE DIAGNOSIS OF ADVECTION FOG AND  
LOW CLOUDINESS. IT WAS SHOWN IN THIS WORK, THAT IN  
THE ABSENCE OF WARM ADVECTION AND MOISTURE AND WITH  
INTENSITY OF TURBULENCE, WHICH DOES NOT CHANGE WITH  
TIME, THE FORMATION OF LOW CLOUDINESS DUE TO THE  
INFLUENCE OF RADIATIONAL COOLING IS POSSIBLE. IN  
THIS ARTICLE SOME SUPPLEMENTARY DATA ARE PRESENTED,  
VERIFYING AND REFINING THE STATUS IN THE PREVIOUS  
REPORT. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0352

AD-660 999 4/2  
WEATHER BUREAU WASHINGTON D C  
THE DISTRIBUTION OF MOISTURE CONTENT IN WARM FRONTAL  
CLOUDS, (U)  
APR 62 14P BURKOVSKAYA, S. N. ;

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: SPONSORED BY ARMY ELECTRONIC  
PROVING GROUND, FORT HUACHUCA, ARIZONA. TRANS.  
OF TSENTRALNAYA AEROLOGICHESKAYA OBSERVATORIIYA.  
TRUDY (USSR) N28 P58-69 1960.

DESCRIPTORS: (\*MOISTURE, CLOUDS), (\*CLOUDS,  
\*AIR MASS ANALYSIS), WATER VAPOR, TURBULENCE,  
CUMULONIMBUS CLOUDS, ATMOSPHERIC SOUNDING,  
USSR (U)

THE ARTICLE DISCUSSES DATA TAKEN DURING TWO SUMMERS  
OF OBSERVATIONS OF MOISTURE CONTENT IN WARM FRONTAL  
CLOUDS. THE DATA WERE TAKEN AT THREE AIRPLANE  
SOUNDING STATIONS OF THE HYDROMETEOROLOGICAL  
SERVICE (RIGA, LENINGRAD, MOSCOW). (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0292

AD-661 598 4/2  
ATMOSPHERIC RESEARCH AND DEVELOPMENT CORP KANSAS CITY  
MO  
THUNDERSTORM PENETRATIONS OF THE TROPOPAUSE, A  
CLIMATOLOGY AND A METHOD OF ESTIMATION. (U)  
DESCRIPTIVE NOTE: FINAL REPT. AUG 65-JUL 67,  
AUG 67 87P LONG, MICHAEL J. I  
CONTRACT: AF 19(628)-5189  
PROJ: AF-8624  
TASK: 862401  
MONITOR: AFRL 67-0471

UNCLASSIFIED REPORT

DESCRIPTORS: (\*TROPOPAUSE, PENETRATION),  
(\*THUNDERSTORMS, TROPOPAUSE),  
(\*CONVECTION(ATHOSPHERIC), TROPOPAUSE),  
(\*CLIMATOLOGY, NORTH AMERICA),  
METEOROLOGICAL RADAR, WEATHER STATIONS,  
ATMOSPHERIC SOUNDING, METEOROLOGICAL PARAMETERS,  
COMPUTER PROGRAMS (U)

DATA SOURCES FOR RADAR MEASUREMENT OF THUNDERSTORM  
PENETRATIONS OF THE TROPOPAUSE LEVEL OUTSIDE THE  
UNITED STATES ARE LISTED, AND A CLIMATOLOGY FOR  
NORTH AMERICA IS PRESENTED. IMPORTANT FEATURES  
ARE A DOUBLE MAXIMUM OVER CENTRAL AND SOUTHERN  
UNITED STATES, A DECREASE IN PENETRATIONS AROUND  
THE GREAT LAKES, AND A FEW PENETRATIONS NORTH OF 90  
N. ALTHOUGH FEW PENETRATIONS WERE FOUND OUTSIDE  
NORTH AMERICA, NORTHEASTERN CHINA IS LISTED AS  
THE NEXT MOST LIKELY AREA FOR LARGE NUMBERS OF  
PENETRATIONS. TWO STUDIES SUGGEST THAT THE SOLE  
USE OF LOW LEVEL MOISTURE OR THE MAXIMUM AMOUNT OF  
ENERGY AVAILABLE TO A STORM WILL NOT BE SUCCESSFUL IN  
ESTIMATING PENETRATION AMOUNTS. AN EQUATION OF THE  
FORM  $Y = A(1 - e^{-BX})$  WAS FOUND TO FIT  
THE CUMULATIVE DISTRIBUTION OF PENETRATIONS AT TEN  
UNITED STATES STATIONS. A METHOD OF ESTIMATING  
THE CUMULATIVE FREQUENCY DISTRIBUTION OF PENETRATIONS  
BASED ON A DETERMINATION OF THE HIGHEST PENETRATION  
AND THE ABOVE EQUATION GAVE GOOD RESULTS. A  
COMPUTER PROGRAM IS INCLUDED WHICH WILL DETERMINE THE  
HIGHEST PENETRATION LIKELY FROM A SOUNDING.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-662 367 4/2  
CHICAGO UNIV ILL SATELLITE AND MESOMETEROLOGY RESEARCH  
PROJECT  
MESOSCALE ASPECTS OF OROGRAPHIC INFLUENCES ON FLOW  
AND PRECIPITATION PATTERNS, (U)  
JUN 67 24P FUJITA, TETSUYA I  
REPT. NO. SHRP-RP-67  
CONTRACT: AF 19(604)-7259, CMB-WBG-34

UNCLASSIFIED REPORT

DESCRIPTORS: (•METEOROLOGY, CLOUDS),  
(•CLOUDS, ATMOSPHERIC PRECIPITATION),  
RAINFALL, MOUNTAINS, TERRAIN, FLOW FIELDS,  
WIND, VELOCITY, THUNDERSTORMS,  
CONVECTION(ATMOSPHERIC), ATMOSPHERIC MOTION,  
CUMULUS CLOUDS, SATELLITES(ARTIFICIAL),  
PHOTOGRAPHS, HUMIDITY (U)

SINCE HORIZONTAL DIMENSIONS OF OROGRAPHY IN  
RELATION TO CLOUD FORMATION AND DEVELOPMENT ARE  
MOSTLY IN THE MESOSCALE, WE USUALLY OBSERVE MESOSCALE  
NEPHSYSTEMS IN AREAS WITH TOPOGRAPHIC INFLUENCES.  
IN ADDITION TO THEIR BARRIER EFFECTS, MOUNTAINS  
DURING THE DAYTIME ACT AS EFFECTIVE HIGH-LEVEL HEAT  
SOURCES OR AS CLOUD GENERATORS. AT NIGHT, HOWEVER,  
THEY SUPPRESS THE CLOUD FORMATION AND ACT AS CLOUD  
DISSIPATORS. WHEN THESE EFFECTS ARE COMBINED WITH  
THE HEIGHT OF THE CONVECTIVE CLOUD BASE, WHICH COULD  
BE EITHER HIGHER OR LOWER THAN THAT OF THE MOUNTAINS,  
THE PATTERNS OF OROGRAPHIC NEPH SYSTEMS AND  
PRECIPITATION ARE QUITE COMPLICATED. BY USING  
ACTUAL CASES OF CLOUD AND PRECIPITATION MEASUREMENTS,  
DETAILED CLIMATOLOGICAL AND MESOSYNOPTIC PATTERNS OF  
CLOUDS AND PRECIPITATION ARE DISCUSSED.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-666 707 4/2  
WEATHER WING (7TH) KANSAS CITY MO DETACHMENT 42  
LOW LEVEL THICKNESS CHARTS, (U)  
JAN 68 12P UMPENHOUR, CHARLES M. ;

UNCLASSIFIED REPORT

DESCRIPTORS: (WEATHER FORECASTING,  
METEOROLOGICAL CHARTS), THICKNESS, JET  
STREAMS(METEOROLOGY), TEMPERATURE, BAROMETRIC  
PRESSURE, THUNDERSTORMS, ATMOSPHERIC  
PRECIPITATION, PERIODIC VARIATIONS, SNOW,  
DISTRIBUTION, VOLUME, SURFACE TEMPERATURES,  
PREDICTIONS (U)  
IDENTIFIERS: THICKNESS(METEOROLOGY) (U)

THE STUDY DISCUSSES LOW LEVEL THICKNESS CHARTS FROM  
PLOTING AND ANALYSIS PROCEDURES THROUGH SOME  
PROGNOSTIC SUGGESTION. INCLUDED IN THE STUDY ARE  
AIDS TO FORECASTING THE TYPE OF PRECIPITATION,  
SNOWFALL AMOUNTS AND AREAS, TEMPERATURE,  
THUNDERSTORMS, AND GUSTY SURFACE WINDS.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-667 403 4/2 17/9  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
SOME RESULTS OF RADAR INVESTIGATIONS OF THE VERTICAL  
STRUCTURE OF SHOWERS AND THUNDERSTORMS. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION.  
DEC 67 15P SALMAN, E. M. IZHUPAKHIN, K.  
S. I  
REPT. NO. T-R-522  
CONTRACT: AF 19(628)-2880

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF GLAVNAYA GEOFIZICHESKAYA  
OBSERVATORIYA, LENINGRAD. TRUDY (USSR) N159 P59-64  
1964, TR. BY GEORGE E. BRADY, JR.

DESCRIPTORS: (•THUNDERSTORMS, USSR),  
(•RAINFALL, METEOROLOGICAL RADAR), ATMOSPHERIC  
PRECIPITATION, CUMULONIMBUS CLOUDS, INTENSITY,  
ELECTRICAL PROPERTIES, RADAR ECHO AREAS,  
MEASUREMENT, REFLECTIVITY, DISTRIBUTION,  
WEATHER STATIONS, STATISTICAL ANALYSIS,  
TABLES (U)  
IDENTIFIERS: TRANSLATIONS (U)

THE GENERAL LAWS OF THE VERTICAL STRUCTURE OF  
SHOWERS AND THUNDERSTORMS, INVESTIGATED BY RADAR  
DURING THE SUMMER OF 1962, ARE EXAMINED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /L0392

AD-667 910 4/2 4/1  
AMERICAN METEOROLOGICAL SOCIETY BOSTON MASS  
DISSIPATION OF STRATUS CLOUDS IN A TURBULENT  
ATMOSPHERE. (U)  
DESCRIPTIVE NOTE: RESEARCH TRANSLATION,  
JAN 68 18P SHULEPOV, YU. V. IBUIKOV, M.  
V. 1  
REPT. NO. T-R-956  
CONTRACT: AF 19(628)-2880

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF UKRAINSKII NAUCHNO-  
ISSLEDOVATELSKII GIDRO-METEOROLOGICHESKII INSTITUT.  
TRUDY (USSR) N48 P2-12 1965, TR. BY DAVID KRAUS.

DESCRIPTORS: (\*STRATUS CLOUDS, SCATTERING),  
(\*ATMOSPHERIC MOTION, STRATUS CLOUDS),  
EVAPORATION, RAINDROPS, PHYSICAL PROPERTIES,  
COLLOIDS, MATHEMATICAL ANALYSIS, PARTICLE SIZE,  
DISTRIBUTION, WATER, USSR (U)  
IDENTIFIERS: TRANSLATIONS (U)

THE REPORT CONTAINS THE HORIZONTAL DISSIPATION OF A  
SPATIALLY HOMOGENEOUS STRATUS CLOUD IN A TURBULENT  
ATMOSPHERE, IN WHICH ISOTHERMY, AN INVERSION IN THE  
SUPRA-CLOUD LAYER, AND DOWNDRAFTS ARE PRESENT; THE  
TIME REQUIRED FOR TOTAL DISSIPATION OF THE CLOUD IS  
COMPUTED. (AUTHOR) (U)

REFERENCES LISTED BELOW ARE RELATED TO THE SUBJECTS INCLUDED IN  
SECTION XII BUT ARE LOCATED IN OTHER SECTIONS OF THIS BIBLIOGRAPHY.  
THE AD-PAGINATION INDEX DISPLAYS THE PAGE NUMBER OF EACH REFERENCE.

AD NUMBER

274 89  
289 350  
412 328  
413 166  
413 270  
413 493  
415 680  
418 600  
603 848  
616 347  
620 396  
628 223  
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643 554  
648 723  
655 020  
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666 229  
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669 078  
669 120



### XIII. UPPER AIR TURBULENCE

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0352

AD-255 660

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

WINDS AND CIRCULATIONS IN THE MESOSPHERE

(U)

FEB 61

!V

KEEGAN, THOMAS J. I

REPT. NO. 244

MONITOR: AFCRL 244

UNCLASSIFIED REPORT

DESCRIPTORS: •SOUNDING ROCKETS, •UPPER ATMOSPHERE,  
•WIND, DIURNAL VARIATIONS, METEOROLOGICAL BALLOONS,  
METEOROLOGY

(U)

IDENTIFIERS: NORTH AMERICA

(U)

SOME PRELIMINARY ANALYSIS ARE PRESENTED OF THE WINDS AND CIRCULATIONS IN THE MESOSPHERE BASED UPON THE FIRST YEAR OF DATA COLLECTED BY THE METEOROLOGICAL ROCKET NETWORK. DIFFERENCES BETWEEN WINDS DETERMINED FROM RADAR TARGETS RELEASED BY ROCKETS AND THOSE FROM THE CONVENTIONAL BALLOON TECHNIQUE ARE DISCUSSED BRIEFLY. THE UPPER ATMOSPHERE, METEOROLOGICAL DATA, •SOUNDING ROCKETS, DIURNAL VARIATIONS, NORTH AMERICA, •WIND. OPEN-ENDED TERMS: MESOSPHERE. SOME PRELIMINARY ANALYSIS ARE PRESENTED OF THE WINDS AND CIRCULATIONS IN THE MESOSPHERE BASED UPON THE FIRST YEAR OF DATA COLLECTED BY THE METEOROLOGICAL ROCKET NETWORK. DIFFERENCES BETWEEN WINDS DETERMINED FROM RADAR TARGETS RELEASED BY ROCKETS AND THOSE FROM THE CONVENTIONAL BALLOON TECHNIQUE ARE DISCUSSED BRIEFLY. THE SCALE OF SEASONAL, DAILY, AND VERTICAL WIND VARIATIONS IS ILLUSTRATED BY WIND PROFILES AND TIME CROSS-SECTIONS. THEY DEMONSTRATE CLEARLY THE SEASONAL REVERSAL OF MESOSPHERIC WINDS AND THE EXISTENCE OF LARGE, WIND-SPEED VARIATIONS OVER PERIODS OF ONLY SEVERAL DAYS. THEY ALSO REVEAL THAT VERTICAL WIND SHEARS OF 0.020 PER SEC, AND PROBABLY GREATER, EXIST AT ABOUT 180,000 FT. A RELATIONSHIP IS INDICATED BETWEEN MESOSPHERIC CIRCULATION CHANGES AND SUBSEQUENT TROPOSPHERIC CIRCULATION CHANGES. EXAMPLES ARE SHOWN OF THE CIRCULATION OVER NORTH AMERICA IN SPRING AND SUMMER AT HEIGHTS UP TO 180,000 FT. ANALYSIS OF ROCKET WIND-DATA INDICATES THAT THE TECHNIQUES ARE SOUND AND THAT MUCH CAN BE LEARNED BY MORE INTENSIVE ANALYSIS. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0352

AD-261 713

NEW YORK UNIV N Y SCHOOL OF ENGINEERING AND SCIENCE  
WIND VARIABILITY IN THE MESOSPHERE AS DETERMINED BY  
THE TRACKING OF FALLING OBJECTS. AN EVALUATION AND  
PRELIMINARY RESULTS (U)

MAY 61

1V

BRUCH, ALVAN; MORGAN, GRIFFITH M. JR.;

CONTRACT: AF19 604 6193

MONITOR: AFCRL 660

UNCLASSIFIED REPORT

DESCRIPTORS: •PERIODIC VARIATIONS, •RADAR TRACKING,  
•WIND, FALLING BODIES, HARMONIC ANALYSIS, METEOROLOGY,  
PARACHUTES, RADAR CONFUSION REFLECTORS, RADAR TARGETS,  
UPPER ATMOSPHERE, WIND DIRECTION INDICATORS (U)

OBSERVATIONS OF WINDS IN THE MESOSPHERE, OBTAINED BY  
RADAR TRACKING OF TARGETS, ARE ANALYZED TO GIVE  
MONTHLY AND SEASONAL MEAN VALUES AT VARIOUS ALTITUDES  
AT EACH OBSERVATION STATION, SEASONAL STANDARD  
DEVIATIONS OF THE MEAN, ROOT-MEAN-SQUARE AVERAGES OF  
WIND CHANGE AT A FIXED POINT IN SELECTED TIME  
INTERVALS, THE FIRST HARMONIC OF THE ANNUAL MARCH OF  
THE EAST-WEST COMPONENT, FREQUENCY DISTRIBUTIONS OF  
VERTICAL WIND SHEARS, AND ESTIMATES OF VERTICAL  
VELOCITIES. THE EXPERIMENTAL DESIGN OF THE  
OBSERVATIONS IS DISCUSSED AT LENGTH AND ERROR AND  
BIAS ARE ESTIMATED. ALTHOUGH THE MEAN VALUES SHOW  
CONSISTENCY, THE STANDARD DEVIATIONS SHOW LOW  
STATISTICAL SIGNIFICANCE. EVIDENCE IS FOUND  
CASTING SOME DOUBT ON THE ACCURACY OF OBSERVATIONS  
WHERE CHAFF IS THE RADAR TARGET. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0392

AD-265 317

UNITED RESEARCH INC CAMBRIDGE MASS

TURBULENCE MEASUREMENTS AT HIGH ALTITUDES BY SECOND-  
DIFFERENCE INTERFEROMETRY (U)

JUN 61

IV

BATTEAN, DWIGHT W.; BELING, THOMAS E.;

CONTRACT: DA36 0295C84962

UNCLASSIFIED REPORT

DESCRIPTORS: •ATMOSPHERE, •RADAR TRACKING, •RADIO  
INTERFEROMETERS, •TURBULENCE, DIPOLE ANTENNAS, HIGH  
ALTITUDE, MEASUREMENT, PARABOLIC ANTENNAS, PHASE  
DETECTORS, PHASE MEASUREMENT, RADAR REFLECTORS, RADAR  
TARGETS, STRATOSPHERE (U)

IDENTIFIERS: AN/MPQ-10 (U)

A BRIEF STATEMENT OF CONTRACT OBJECTIVES AND  
CURRENT STATUS ARE GIVEN. A SIMPLIFIED ANALYSIS IS  
GIVEN LEADING TO A SIMPLE FORMULA WHICH IS USEFUL FOR  
ANALYZING DATA. THIS FORMULA IS SUITABLE FOR HAND  
COMPUTATION IN THE TWO TARGET CASE, BUT, WITH A  
MULTIPLICITY OF TARGETS, DATA MUST BE FURTHER  
PROCESSED BEFORE USEFUL RESULTS ARE OBTAINED.  
MODIFICATIONS TO RECEIVING SYSTEMS ARE DESCRIBED.  
RESULTS OF A FULLY INSTRUMENTED TWO-TARGET TEST ARE  
DESCRIBED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0392

AD-281 703

ARMY SIGNAL RADIO PROPAGATION AGENCY WHITE SANDS MISSILE  
RANGE N MEX

ACOUSTIC COMPONENT OF TURBULENCE, (U)

JUL 62 19P WEBB, WILLIS L. I

REPT. NO. TR MM 496

UNCLASSIFIED REPORT

DESCRIPTORS: •FLUID FLOW, •TURBULENCE, ATMOSPHERE,  
DRAG, FLIGHT PATHS, HIGH ALTITUDE, LIFT, PERTURBATION  
THEORY, THERMODYNAMICS (U)

THE INTIMATE RELATIONSHIP BETWEEN THE LOCAL SPEED OF SOUND OF A FLIGHT ENVIRONMENT AND THE LIFT AND/OR DRAG ON A VEHICLE IS DISCUSSED. THE FACT THAT THIS PARAMETER WILL BECOME INCREASINGLY SIGNIFICANT AS THE SPEED INCREASES IS POINTED OUT. IN ADDITION, IT IS NOTED THAT THE USUAL SOURCE OF FLIGHT BUMPINESS, WIND VARIATIONS, TENDS TO BECOME LESS EFFECTIVE AS THE SPEED INCREASES. EXAMPLES OF THE SONIC GRADIENTS WHICH HAVE THUS FAR BEEN OBSERVED IN THE HIGH ALTITUDE REGIONS OF THE EARTH'S ATMOSPHERE ARE PRESENTED, AND THE CIRCUMSTANCES UNDER WHICH SUCH GRADIENTS WOULD BE MOST EFFECTIVE IN PERTURBATING A PARTICULAR FLIGHT PATH ARE DESCRIBED. IT IS CONCLUDED THAT THE VARIABLE VEHICLE LOADS IMPOSED BY ATMOSPHERIC STRUCTURE ARE COMPOSED OF FLOW AND THERMODYNAMIC COMPONENTS, AND THAT BOTH OF THESE ATMOSPHERIC PARAMETERS MUST BE STUDIED IN THE LIGHT OF OUR EXPANDING SPEED AND SPATIAL ACTIVITIES.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY    SEARCH CONTROL NO. /M0352

AD-286 064

ARMY RESEARCH OFFICE WASHINGTON D C  
WINDS AND ATMOSPHERIC TURBULENCE AT VERY HIGH  
ALTITUDES

(U)

DEC 62        IV        LOWENTHAL, MARVIN J.

UNCLASSIFIED REPORT

DESCRIPTORS:    •WIND, CONDENSATION TRAILS, HIGH  
ALTITUDE, MEASUREMENT, PHOTOGRAPHIC ANALYSIS,  
ROCKETS

(U)

STUDIES OF ATMOSPHERIC TURBULENCE IN THE 40 - 70 KM  
LEVELS WERE CONDUCTED BY MEANS OF MULTIPLE ROCKET  
FIRINGS AT CAPE CANAVERAL AT INTERVALS OF 15 TO  
75 MINUTES. FROM THESE DATA SHORT TERM WIND  
VARIABILITIES WERE COMPUTED. ALTHOUGH THE MAXIMUM  
WIND OCCURRED NEAR 50 KM, THE WIND SPEED VARIATIONS  
INCREASED CONTINUOUSLY REACHING A MAXIMUM OF 8 MPS AT  
64 KMS. LITTLE VARIATION IN WIND DIRECTION IS  
NOTED UP TO 45 KM WITH LARGE CHANGES THEREAFTER.  
(AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0392

AD-412 328

DOUGLAS AIRCRAFT CO INC LONG BEACH CALIF  
NB-66B HIGH ALTITUDE GUST SURVEY: TIME  
SERIES.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

JUN 63 192P STROM, J.A., WEATHERMON, AND  
T.G.;

REPT. NO. LB31236

CONTRACT: AF33 616 7647

PROJ: 1447

MONITOR: ASD TDR63 145, VOL. 2,

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON HIGH LEVEL  
TURBULENCE.

DESCRIPTORS: (GUSTS, VELOCITY), (WIND,  
TIME), (METEOROLOGICAL PARAMETERS, PERIODIC  
VARIATIONS), TURBULENCE, HIGH ALTITUDE, PENE-  
TRATION, THUNDERSTORMS, EXPERIMENTAL DATA,  
MEASUREMENT, RECORDS, RECORDING PAPER.

(U)

IDENTIFIERS: 1963, GRAPHS.

(U)

TIME SERIES PLOTS FOR VERTICAL, LATERAL, FORWARD  
AND DERIVED GUST VELOCITIES ARE PRESENTED. TIME  
SERIES PLOTS FOR TRUE AIRSPEED, PRESSURE ALTITUDE,  
OUTSIDE AIR TEMPERATURE AND NORMAL ACCELERATION  
(MEASURED AT THE RADOME) FOR 14 OF THE MORE  
SEVERE PENETRATIONS ARE ALSO PRESENTED. (AUTHOR)

(U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0392

AD-413 270

DOUGLAS AIRCRAFT CO INC LONG BEACH CALIF  
NB-66B HIGH ALTITUDE GUST SURVEY: TECHNICAL  
ANALYSIS.

(U)

DESCRIPTIVE NOTE: FINAL REPT.,

JUN 63 259P STROM, J.A.; WEATHERMON, T.G. I

CONTRACT: AF33 616 7647

PROJ: 1447

MONITOR: ASD TDR63 145, VOL. 1

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: REPORT ON HIGH LEVEL TURBULENCE.

DESCRIPTORS: (\*STORMS, EXPERIMENTAL DATA),  
(\*WIND, VELOCITY), (\*THUNDERSTORMS, AIRCRAFT),  
(\*GUSTS, METEOROLOGICAL PARAMETERS), HIGH  
ALTITUDE, PENETRATION, METEOROLOGICAL PHENOM  
ENA, METEOROLOGICAL INSTRUMENTS, METEOROLOGICAL  
RADAR, TURBULENCE, DATA, INSTRUMENTATION.

(U)

IDENTIFIERS: 1963, B-66 AIRCRAFT.

(U)

INTRODUCTORY AND EXPLANATORY INFORMATION ARE GIVEN  
PERTAINING TO THE QUANTITATIVE DATA GATHERED WITH A  
GUST MEASURING NB-66B AIRCRAFT DURING HIGH  
ALTITUDE STORM PENETRATIONS MADE AS A PART OF THE  
1961 NATIONAL SEVERE STORMS PROJECT. THE  
DATA PRESENTED INCLUDE POWER SPECTRUM PLOTS OF THE  
THREE AXES GUST VELOCITIES AND FREQUENCY  
DISTRIBUTIONS OF THE PEAKS. (AUTHOR)

(U)



UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /H0392

AD-917 441

AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS

MESOSPHERIC WINDS FROM 23 SUCCESSIVE HOURLY  
SOUNDINGS,

JUL 67 81P ENHARD, ROBERT W. IRIGHT, JOHN

8.8

PROJ: 6682

MONITOR: AFCL

63 836

UNCLASSIFIED REPORT

DESCRIPTORS: (\*ATMOSPHERE, SOUNDING ROCKETS),  
(\*ATMOSPHERIC SOUNDING, WIND), (\*ATMOSPHERIC  
TIDES, MEASUREMENT), METEOROLOGICAL RADAR,  
RADAR TRACKING, BALLOONS, ATMOSPHERE MODELS,  
VELOCITY, DIURNAL VARIATIONS, STRATOSPHERE,  
EXPERIMENTAL DATA, ERRORS, TABLES, SPHERES,  
FALLING BODIES, HARMONIC ANALYSIS, OSCILLA  
TION, METEOROLOGICAL BALLOONS, METEOROLOGICAL  
PHENOMENA.

IDENTIFIERS: 1967, AN/FPS-16, MESOSPHERE,  
OZONOSPHERE, HODOGRAPHS.

WIND INFORMATION BETWEEN 30 AND 70 KM WAS OBTAINED  
FROM 23 SUCCESSIVE HOURLY ROCKET SOUNDINGS. THE  
SENSOR WAS A 1-M MYLAR BALLOON (ROBIN) TRACKED BY  
FPS-16 RADAR. EQUATIONS FOR THE COMPONENT WIND  
SPEED ARE DEVELOPED FROM THE BASIC EQUATIONS OF  
MOTION OF THE BALLOON AND APPROPRIATE  
SIMPLIFICATIONS. THE BALLOON VELOCITIES AND  
ACCELERATIONS FROM WHICH WINDS ARE DERIVED ARE  
OBTAINED BY LINEAR SMOOTHING TECHNIQUES APPLIED TO  
RADAR-OBSERVED POSITION AND DERIVED VELOCITY DATA.  
THE SMOOTHING TECHNIQUE IS DESCRIBED IN DETAIL.  
THIS DATA REDUCTION PROCESS YIELDS WIND WITH AN RMS  
VECTOR ERROR OF 2 MPS AT THE TOP OF THE SOUNDING,  
DECREASING AS THE BALLOON FALLS SO THAT A  
REPRESENTATIVE VALUE IS ABOUT 1 KT. THE ERRORS  
INCREASE IN THE CASE OF AN UNINFLATED BALLOON TO 5  
MPS MAXIMUM AND 5 KT FOR THE REPRESENTATIVE VALUE.  
THE VARIANCE OF THE OBSERVED WINDS IS LARGELY  
ACCOUNTED FOR BY DIURNAL AND SEMIDIURNAL  
OSCILLATIONS. THE AMPLITUDE OF THE OSCILLATIONS  
INCREASES WITH ALTITUDE AND IS GREATER FOR THE  
DIURNAL THAN FOR THE SEMIDIURNAL OSCILLATION.  
THESE OSCILLATIONS RESULT IN A GREATER LAG  
VARIABILITY OF WIND AT 8 TO 12 HR THAN AT 24 HR LAG.  
COMPARISON OF THE RESIDUAL VARIANCE AT SEVERAL  
LEVELS SUGGESTS THE EXISTENCE OF A TURBULENT ZONE IN  
THE UPPER OZONOSPHERE. (AUTHOR)

(U)

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UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0392

AD-420 978

CHICAGO UNIV ILL

STUDY OF THE LARGE-SCALE CIRCULATION OF THE EARTH'S  
ATMOSPHERE. (U)

DESCRIPTIVE NOTE: FINAL REPT.,

AUG 62 39P LIPPS, FRANK B. ;

CONTRACT. AF19 604 7266

PROJ: 8604

MONITOR: AFCRL 43 872

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (1) ATMOSPHERIC MOTION, TROPOSPHERE),  
PARTIAL DIFFERENTIAL EQUATIONS, JET STREAMS  
(METEOROLOGY), STRATOSPHERE, FLUID DYNAMIC PROPERTIES,  
EARTH, ROTATION, TURBULENCE, VORTICES, WIND, POLAR  
REGIONS (U)

IDENTIFIERS: 1962, GULFSTREAM (U)

SOME STUDIES OF THE DYNAMICS OF MOTION IN THE UPPER  
ATMOSPHERE ARE ANALYZED. THE ANALYSIS IS CONCERNED  
MAINLY WITH BAROTROPIC STABILITY THEORY. IT IS  
SHOWN THAT DIVERGENCE TENDS TO STABILIZE A WEST WIND  
ZONAL FLOW. IT IS ALSO SHOWN THAT UNSTABLE  
DISTURBANCES SUPERIMPOSED ON AN ASYMMETRIC JET CAN  
TRANSFER MOMENTUM NORTHWARD ACROSS THE JET. THE  
MECHANICS OF THE BREAKDOWN OF THE POLAR NIGHT JET IS  
BRIEFLY DISCUSSED. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0392

AD-607 089

GEORGIA INST OF TECH ATLANTA ENGINEERING EXPERIMENT  
STATION

STUDY OF PHOTOCHEMISTRY, PHYSICAL STATE AND MOTION OF  
THE UPPER ATMOSPHERE. (U)

DESCRIPTIVE NOTE: FINAL REPT. FOR 1 AUG 62-31 JUL 64,

JUL 64 72P EDWARDS, HOWARD D. I

CONTRACT: AF 19(628)-3205, NSG 30463

PROJ: 4984, ARPA ORDER 42

TASK: 498401

MONITOR: AFCRL , 64 700

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE:

DESCRIPTORS: (\*ATMOSPHERIC MOTION, UPPER ATMOSPHERE),  
(\*UPPER ATMOSPHERE, TURBULENCE), (\*GUIDED MISSILES,  
CONDENSATION TRAILS), WIND, ATMOSPHERIC TIDES,  
PHYSICAL PROPERTIES, AEROSOLS, DIFFUSION, GUIDED  
MISSILE TRACKING SYSTEMS (U)

THE UPPER ATMOSPHERE PARAMETERS WHICH ARE DISCUSSED  
ARE VERTICAL AUTOCORRELATION SCALE OF THE MEAN WINDS,  
MOTION SPECTRUM SCALE OF THE MEAN WINDS, MOTION  
SPECTRUM OF THE TURBULENT WINDS, MIXING LENGTH SCALE,  
SCALE OF THE SMALLEST EDDIES, CORRELATION SCALES OF  
THE TURBULENT VELOCITIES, DISSIPATION LENGTH  
PARAMETER FROM TURBULENT WINDS, GLOBULE SIZE SCALES  
AND CUTOFF ALTITUDE, TIME SCALES OF MOTION, ENERGY  
BALANCE OF THE MOTION, AND CRITERIA FOR THE ONSET OF  
TURBULENCE. THE UPPER ATMOSPHERE MOTIONS SUCH AS  
ARE REPORTED WILL 'RESHAPE' MISSILE TRAILS INTO  
SIMILAR CONFIGURATIONS. HENCE FROM THE DETAILED  
KNOWLEDGE OF THE CHARACTERISTICS WHICH MISSILE TRAILS  
WILL TAKE IN THE UPPER ATMOSPHERE, IT SHOULD BE LESS  
DIFFICULT TO DEVELOP APPARATUS FOR CONTROLLING AND/OR  
DETECTING MISSILE TRAILS. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0352

AD-649 345 4/2

AIR WEATHER SERVICE SCOTT AFB ILL

WIND SHEAR AND TURBULENCE OVER SELECTED STATIONS OF  
THE AIR FORCE WESTERN TEST RANGE. (U)

DESCRIPTIVE NOTE: TECHNICAL REPT.,

DEC 66 31P MITCHELL, LLOYD V. I

REPT. NO. AWS-TR-189

UNCLASSIFIED REPORT

DESCRIPTORS: (+GUIDED MISSILE RANGES,  
METEOROLOGICAL PARAMETERS), (+WIND, GUIDED  
MISSILE RANGES), (+ATMOSPHERIC MOTION, GUIDED  
MISSILE RANGES), TURBULENCE, DISTRIBUTION,  
PACIFIC OCEAN, MARINE METEOROLOGY, ATMOSPHERIC  
SOUNDING (U)

THE REPORT PRESENTS WIND-SHEAR DATA FOR THREE AREAS  
OF THE AIR FORCE WESTERN TEST RANGE  
(AFWTR) AND TURBULENCE DATA, WHICH ARE APPLICABLE  
TO AFWTR, FOR PORTIONS OF THE NORTHERN  
HEMISPHERE. A METHOD IS DESCRIBED AND USED FOR  
ESTIMATING THE MEANS AND STANDARD DEVIATIONS OF WIND  
SHEARS FOR SMALLER LAYERS USING WIND-SHEAR DATA  
MEASURED THROUGH THICKER LAYERS. ESTIMATES OF  
TURBULENCE FREQUENCY AND INTENSITY ARE PRESENTED  
BASED UPON THE RELATIONSHIP BETWEEN WIND SHEAR AND  
TURBULENCE. MEAN WIND SHEAR AND WIND SHEAR  
VARIABILITY MAXIMA OCCUR AT APPROXIMATELY 40,000,  
55,000, 120,000 AND 220,000 FEET WITH MINIMA AT  
100,000 AND 150,000 FEET. TURBULENCE FREQUENCY AND  
INTENSITY MAXIMA OCCUR NEAR 30,000, 120,000, AND  
220,000 FEET WITH MINIMA NEAR 45,000, 120,000, AND  
150,000 FEET. (AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0392

AD-654 686 4/1  
AIR FORCE CAMBRIDGE RESEARCH LABS L G HANSCOM FIELD  
MASS  
MEASUREMENTS OF TIDAL OSCILLATIONS ABOVE 120  
KILOMETERS. (U)  
DESCRIPTIVE NOTE: ENVIRONMENTAL RESEARCH PAPERS NO. 266.  
APR 67 18P ZIMMERMAN, S. P. MARCOS, F.  
A. 1  
REPT. NO. AFCRL-67-0121  
PROJ: AF-8609  
TASK: 860910

UNCLASSIFIED REPORT

DESCRIPTORS: (•ATMOSPHERIC TIDES,  
•OSCILLATION), MEASUREMENT, ALTITUDE, UPPER  
ATMOSPHERE, WIND, PARTIAL DIFFERENTIAL EQUATIONS,  
MOLECULAR PROPERTIES, DIFFUSION, PRESSURE,  
DIURNAL VARIATIONS, SOLAR WIND, THERMAL  
PROPERTIES, PERIODIC VARIATIONS MOTION,  
VELOCITY, GRAVITY (U)

STUDIES OF THE ALTITUDE VARIATIONS OF UPPER  
ATMOSPHERIC WINDS INDICATE OSCILLATORY COMPONENTS OF  
THE HORIZONTAL WIND MOTION IN THE VERTICAL PLANE.  
THE SMALLER SCALES OF THESE OSCILLATORY MOTIONS  
HAVE BEEN SHOWN TO BE THE LENGTHS PREDICTED BY THE  
THEORY OF THE VISCOUS LIMITED INTERNAL GRAVITY WAVES.  
MEASUREMENTS OF THE LARGE SCALES IN THE 120 TO 180  
KM ALTITUDE RANGE HAVE SHOWN A MARKED CORRELATION TO  
THE PRESSURE SCALE HEIGHT. ANALYSIS OF THESE  
LARGE-SCALE VERTICAL WAVELENGTHS INDICATES THAT THE  
EQUIVALENT DEPTH (H) OF THE ATMOSPHERE  
CORRESPONDS TO TWO OF THE EIGENMODES OF EARTH'S  
ATMOSPHERE OR MODEL ATMOSPHERE OF THE SOLAR  
SEMIDIURNAL TIDE PREDICTED BY THE LAPLACE TIDAL  
EQUATION. THESE ARE, RESPECTIVELY, THE (2, 4)  
MODE WHICH APPEARS TO DOMINATE IN THE SUMMER, AND THE  
(2, 6) MODE WHICH IS DOMINANT IN THE WINTER.  
(AUTHOR) (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0392

AD-655 020 4/1 1/1  
FOREIGN TECHNOLOGY DIV WRIGHT-PATTERSON AFB OHIO  
CENTRAL AEROLOGICAL OBSERVATORY. TRANSACTIONS: NO.  
53 1964. SELECTED ARTICLES. (U)  
MAY 67 52P  
REPT. NO. FTD-MT-65-204  
MONITOR: TT 67-62279

UNCLASSIFIED REPORT

SUPPLEMENTARY NOTE: TRANS. OF TSENTRALNAYA  
AEROLOGICHESKAYA OBSERVATORIYA. TRUDY (USSR) N53  
P21-24, 91-100 1964. EDITED MACHINE.

DESCRIPTORS: (\*WIND, TROPOSPHERE),  
(\*TURBULENCE, CUMULONIMBUS CLOUDS),  
(\*AIRCRAFT, FLIGHT), METEOROLOGICAL  
PARAMETERS, WIND-DIRECTION INDICATORS, ATMOSPHERIC  
TEMPERATURE, AERONAUTICS (U)

CONTENTS: CERTAIN RESULTS OF INVESTIGATIONS OF  
THE MESO- AND MICROSTRUCTURE OF THE WIND FIELD AT  
HEIGHTS OF 6-12 KM; AND TURBULENCE WHICH INDUCES  
AIRCRAFT BUFFETING IN THE ZONE OF CUMULONIMBUS  
CLOUDS. (U)

UNCLASSIFIED

DDC REPORT BIBLIOGRAPHY SEARCH CONTROL NO. /M0292

AD-657 021 4/2

HAWAII INST OF GEOPHYSICS HONOLULU

THE TROPICAL UPPER TROPOSPHERIC TROUGH AS A SECONDARY  
SOURCE OF TYPHOONS AND A PRIMARY SOURCE OF TRADEWIND  
DISTURBANCES. (U)

DESCRIPTIVE NOTE: FINAL REPT. 1 FEB 64-31 JAN 67,

JUL 67 52P SADLER, JAMES C. I

REPT. NO. HIG-67-12

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SURFACE AND 290 MB ANALYSES FOR A 9-DAY SUMMER  
PERIOD OVER THE NORTH PACIFIC, TOGETHER WITH  
SATELLITE PHOTOGRAPHS, ARE SHOWN TO ILLUSTRATE  
(1) THE DEVELOPMENT OF A TYPHOON AND A TROPICAL  
STORM FROM CYCLONIC CELLS IN THE TROPICAL UPPER  
TROPOSPHERIC TROUGH, AND (2) THE DOMINANCE OF THE  
TROUGH IN PRODUCING TRADEWIND WEATHER.

(AUTHOR)

(U)

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