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A GUIDE TO SATELLITE CLOUD PHOTO INTERPRETATION

by

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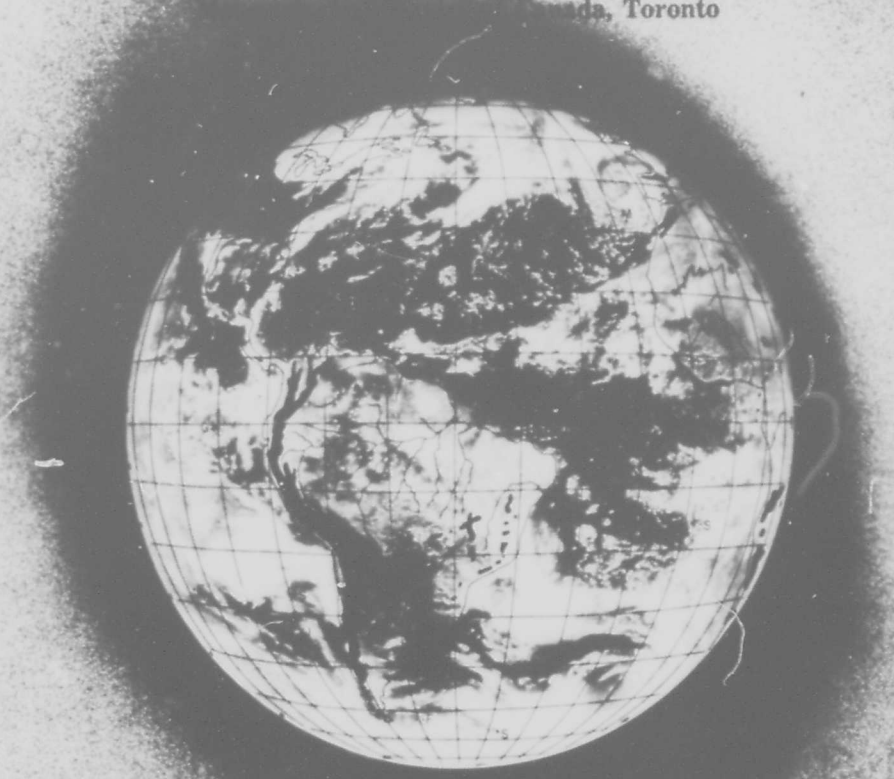

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January 1968

APPEARANCE OF CLOUDS FROM SATELLITE ALTITUDES

CLOUD TYPE	SIZE	SHAPE (ORGANIZATION)	SHADOW	TONE (BRIGHTNESS)	T
CIRRUS **CIRROSTRATUS** (F:G-34,4263) (F:D-10,5657) (N:14,2073)	TYPICAL LENGTHS OF ORGANIZED BANDS HUNDREDS OF MILES, WIDTHS OF SINGLE BANDS MAY BE 25-50 MILES, EXTENSIVE LAYERS OF CIRROSTRATUS MAY ALSO COVER LARGE AREAS	LONG BANDS, PARALLEL TO UPPER TROPOSPHERIC WINDS, OFTEN HAVING SHARPLY DEFINED LEFT BOUNDARY, RELATIVE TO AN OBSERVER FACING DOWNWIND; RIGHT BOUNDARY SOMETIMES WELL-DEFINED, BUT IS MORE FREQUENTLY INDISTINGUISHABLE WHEN IT APPEARS OVER A MIDDLE CLOUD LAYER	NORMALLY PRESENT AS A DARK LINE ALONG ONE EDGE, MOST NOTICEABLE WHEN SHADOW IS CAST ON A LOWER CLOUD LAYER OR A SMOOTH SURFACE WITH HIGH REFLECTIVITY	TYPICALLY LIGHT GREY, BUT TONE IS DEPENDENT ON SUN ANGLE, TRANSLUCENT, LOWER CLOUDS AND GEOGRAPHICAL FEATURES ARE USUALLY ONLY PARTLY OBSCURED BY CIRRIFORM CLOUD	CIRROSTRAT UNIFORM TEX TENDS TO BE CLOUD BANDS TO THE WIND STRUCTURE
ANVIL CIRRUS **(DETACHED FROM** **CUMULONIMBUS)** (F:M-2,3662) (N:23,4064)	MAY BE QUITE EXTENSIVE, COVERING AREAS AROUND FIVE HUNDRED MILES OR MORE IN LENGTH AND WIDTH	CHAOTIC APPEARANCE WITH ALIGNMENT OF CLOUD STREAKS PARALLEL TO UPPER TROPOSPHERIC WINDS, DIFF. SE OF POORLY-DEFINED EDGES	ONLY DETECTABLE WHEN CLOUD LAYERS ARE SUFFICIENTLY THICK AND SHADOW FALLS ON AN ILLUMINATED LOWER CLOUD LAYER OR BRIGHTLY REFLECTIVE LAND OR WATER SURFACE	LIGHT GREY OR WHITE, DEPENDING ON CLOUD THICKNESS AND SUN ANGLE	FIBROUS WITH OR MORE UNIF DENSE CIRRUS CONCENTRATE AREA
ALTOSTRATUS **ALTOCUMULUS** (F:A-22,5056) (F:C-2,5250) (N:6,4666)	EXTENSIVE SHEETS OR BANDS COVERING AREAS TENS TO HUNDREDS OF THOUSANDS OF SQUARE MILES; BANDS MAY BE TWO OR THREE HUNDRED MILES ACROSS	ORGANIZED INTO VORTICES, BANDS, LINES OR LARGE COMMA SHAPED AREAS ASSOCIATED WITH CYCLONES AND FRONTS, CHARACTERIZED BY PERSISTENCE IN FORM OVER PERIODS OF 12-24 HOURS OR MORE, SINCE CLOUD IS ASSOCIATED WITH SYNOPTIC SCALE MOTION SYSTEMS; USUALLY WELL-DEFINED BOUNDARIES	OFTEN PRESENT ALONG ONE EDGE, SHADOW ENHANCED IF IT APPEARS ON A LAYER OF LOWER CLOUD	VERY WHITE; ONE OF THE TWO BRIGHTEST CLOUD FORMS, THE OTHER BEING CUMULONIMBUS DUE TO GREAT VERTICAL DEPTH OF CLOUD WHITEST CLOUD LAYERS ARE OFTEN ASSOCIATED WITH NIMBOSTRATUS AND PRECIPITATION AT THE GROUND	STRATIFORM C TOP SURFACE H TEXTURE IF CO ARE PRESENT CLOUD IS NOT S IN TEXTURE W RESULT OF SHA OR THICKNESS
WAVE CLOUDS **CIRRUS** **ALTOCUMULUS** **STRATOCUMULUS** (N:17,7050) (N:34,8265)	NARROW PARALLEL BANDS OF THE ORDER OF TEN TO A HUNDRED MILES IN LENGTH; UNIFORM SPACING OF CLOUD BANDS IS CHARACTERISTIC OF THESE CLOUD FORMS	UNIFORMLY SPACED, PARALLEL BANDS, MORE OR LESS PERPENDICULAR TO THE WIND DIRECTION AT CLOUD LEVEL; MOST OFTEN FOUND LEE OF HILLS AND MOUNTAINS NOTABLE EXAMPLES APPEAR OVER THE ROCKIES, APPALACHIANS, LABRADOR, AND OTHER RANGES	NOT USUALLY DISCERNIBLE	GREY, OCCASIONALLY WHITE, DEPENDING ON SUN ANGLE AND VERTICAL THICKNESS OF CLOUD	CONTINUOUS C PARALLEL BA VERMICULATE
CUMULUS **TOWERING CUMULUS** (F:G-34,2056) (F:H-6,6060) (N:42,4844)	INDIVIDUAL CUMULUS CLOUD CELLS ARE NORMALLY TOO SMALL TO BE DISCERNIBLE AT 800 MILES RATHER WHAT APPEARS SIMILAR TO INDIVIDUAL CUMULI AS SEEN FROM THE GROUND ARE GROUPS OF CLOUDS HAVING A REGULAR ORGANIZATION OR PATTERN NOT NORMALLY DETECTABLE FROM SURFACE OBSERVATIONS, DIMENSIONS OF CLOUD GROUPS 3 TO 10 MILES	WITH LIGHT WINDS, CLOUD GROUPS PRESENT A UNIFORM CELLULAR PATTERN OR MAY BE ORGANIZED IN SINGLE OR PARALLEL STREETS, STRAIGHT OR GENTLY CURVED, GENERALLY PARALLEL TO THE WINDS OCCASIONALLY, HOLLOW POLYGONAL CELLS, CRESCENTS OR SOLID CELLS WILL APPEAR IN THE OVERALL PATTERN, USUALLY LUMPY APPEARANCE	USUALLY PRESENT WITH TOWERING CUMULUS, DISTINCTIVE SHADOWS ON DOWN SUN SIDE, SHADOWS NOT SO EVIDENT WITH SMALLER CLOUDS OR CLOUD GROUPS	BROKEN DARK GREY, GREY OR WHITE, DEPENDING ON DIMENSIONS AND THICKNESS OF CLOUD GROUPS AS SEEN FROM SATELLITE ALTITUDES, SMALLER CLOUD GROUPS ARE DARKER IN TONE, WHILE CUMULUS CELLS SMALLER THAN THE THRESHOLD RESOLUTION OF THE CAMERA (2 MILES) WILL NOT BE VISIBLE IF SEPARATION IS GREATER THAN 2 MILES, AREAS OF SMALL CUMULUS WILL APPEAR IN BROKEN GREY TONE	NON-UNIFORM, PATTERN OF W DARK GREY, OF REGULARITY SHADOWS, HOL MAY BE PRESE CELLS
CUMULONIMBUS (F:Na-18,3064) (F:M-2,3163) (N:23,1357)	INDIVIDUAL ISOLATED CUMULONIMBUS CLOUDS ARE OF THE ORDER OF TENS OF MILES IN DIAMETER, COMBINED CLUSTERS OF SUCH CLOUD MAY PRESENT A PATTERN AS LARGE AS A HUNDRED MILES ACROSS DUE TO MERGING OF CIRRUS ANVILS	ISOLATED CELLS HAVE SHARPLY DEFINED EDGES ON ONE SIDE WITH CIRRUS ANVIL SPREADING OUT ON THE OPPOSITE SIDE IN THE PRESENCE OF PRONOUNCED WIND SHEAR; OTHERWISE THEY APPEAR AS ISOLATED, WHITE, NEARLY CIRCULAR CELLS	SHADOWS USUALLY PRESENT AND WELL DEFINED WITH CUMULONIMBUS	VERY WHITE, PARTICULARLY TOPS HAVE CHARACTERISTIC BRIGHTNESS	UNIFORM TEXT DEFINED EDGE CIRRUS PLUM QUITE DIFFUS CELLS
STRATOCUMULUS (F:L-2,2550) (N:31,5070) (N:32,5050)	APPARENT SIZE OF CELLS 2-10 MILES ALTHOUGH LAYERS WILL HAVE NO DISTINCTIVE SIZE	STREETS OR BANDS ALIGNED WITH THE BOUNDARY LAYER WINDS, OR EXTENSIVE AREAS WITH WELL-DEFINED BOUNDARIES	SHADOWS MAY SHOW STRIATIONS ALONG THE WIND	SMALL CLOUD GROUPS ARE MOSTLY GREY OVER LAND, THICK OVERCAST STRATOCUMULUS LAYERS OVER OCEANS OFTEN APPEAR WHITE DUE TO CONTRAST IN REFLECTIVITY	OVERCAST STR CLOUD LAYERS HOLLOWS WI CENTERS
STRATUS (F:K-2,4060) (F:K-6,4060) (N:34,3570)	VARIABLE	VARIABLE, EXCEPT WHEN STRATUS CLOUD IS LOWER THAN SURROUNDING TERRAIN, IN WHICH CASE IT ASSUMES THE SHAPE OF A VALLEY, MOUNTAIN, OR COAST LINE, ETC. BOUNDARY WELL-DEFINED BUT MAY HAVE A RAGGED EDGE	NORMALLY NOT DISCERNIBLE, BUT PRESENCE IS DEPENDENT ON HEIGHT OF STRATUS LAYER ABOVE GROUND	WHITE OR GREY, DEPENDING ON VERTICAL CLOUD THICKNESS AND SUN ANGLE	UNIFORM
FOG (N:35,4345)	VARIABLE.	VARIABLE, IRREGULAR, BUT IN THE CASE OF FOG OVER BODIES OF WATER, SHAPE CONFORMS TO THAT OF SURROUNDING LAND, BOUNDARIES SHARPLY-DEFINED AND MAY BE THE ONLY DISTINGUISHING CHARACTERISTIC FROM STRATUS	NORMALLY NOT DISCERNIBLE	WHITE OR GREY, DEPENDING ON THICKNESS OF FOG LAYER AND SUN ANGLE; NORMALLY IF DEPTH OF FOG LAYER EXCEEDS 1000 FT IT APPEARS WHITE	VERY UNIFOR

TEXTURE	CLOUD TYPE	TENTATIVE CLOUD IDENTIFICATION BY PHOTO INTERPRETATION TECHNIQUES	DIRECT EVIDENCE TO CONFIRM TENTATIVE INTERPRETATION	
CIRROSTRATUS NORMALLY HAS A UNIFORM TEXTURE, WHILE CIRRUS TENDS TO BE MORE FIBROUS, CLOUD BANDS PERPENDICULAR TO THE WIND INDICATES WAVE STRUCTURE	CIRRUS CIRROSTRATUS	CIRRUS CAN ALMOST ALWAYS BE POSITIVELY IDENTIFIED BY PHOTO INTERPRETATION TECHNIQUES. CIRROSTRATUS MAY BE DISTINGUISHED FROM STRATUS AND FOG BY ITS CHARACTERISTIC TRANSLUCENCE	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 ORIENTATION 2 OCCURRENCE CLOUD EDGE 3 POSITIVE THIS IS NOT OF CIRRIFORM ADVECTION A
FIBROUS WITH NUMEROUS STREAKS, OR MORE UNIFORM TEXTURE WHEN DENSE CIRRUS LAYERS ARE CONCENTRATED WITHIN A SMALL AREA	ANVIL CIRRUS (DETACHED FROM CUMULONIMBUS)	CAN BE POSITIVELY IDENTIFIED BY PHOTO INTERPRETATION TECHNIQUES	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 ORIENTATION 2 SHOWALTER FROM CLOUD
STRATIFORM CLOUD WITH UNIFORM TOP SURFACE HAS UNIFORM TEXTURE. IF CONVECTIVE CLOUDS ARE PRESENT ON THE MIDDLE CLOUD IS NOT SOLID, VARIATIONS IN TEXTURE WILL APPEAR AS A RESULT OF SHADOWS, BREAKS, OR THICKNESS VARIATIONS	ALTOSTRATUS ALTOCUMULUS	CAN USUALLY BE IDENTIFIED BY ITS SIZE, SHAPE, VERY BRIGHT TONE AND UNIFORM TEXTURE. ALTHOUGH OVERCAST LAYERS OF STRATOCUMULUS IN AREAS OF HIGH REFLECTIVITY MAY HAVE A SIMILAR APPEARANCE. OTHER EVIDENCE WILL HELP TO DISTINGUISH THE TWO. WHEN IT OCCURS OVER AN EXTENSIVE ICE FIELD, THERE ARE GENERALLY PRONOUNCED SHADOWS	1 SURFACE OBSERVATIONS WITHIN OR NEAR OUTER BOUNDARY OF MIDDLE CLOUD LAYER 2 AIRCRAFT OBSERVATIONS 3 RADAR OBSERVATIONS OF PRECIPITATION OVER EXTENSIVE AREA	1 OCCURRENCE 2 CLOUD CONFI 3 CLOUD CONFI MOTION SHA 4 CLOUD PATTE LINE AT 700 5 COINCIDENCE 6 DEW POINT 7 CLOUD AREA FRONTAL 8 COINCIDENCE HODOGRAPH
CONTINUOUS OR BROKEN PARALLEL BANDS; MAY BE VERMICULATED	WAVE CLOUDS CIRRUS ALTOCUMULUS STRATOCUMULUS	WAVE CLOUDS AS A CLASS ARE CONCLUSIVELY IDENTIFIED BY APPEARANCE AND ORGANIZATION. HOWEVER, CLOUD GENERALLY CAN ONLY BE DISTINGUISHED BY APPEAL TO DIRECT OBSERVATIONS OR INDIRECT SUPPORTING EVIDENCE	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 OCCURRENCE OR OTHER 2 CIRRUS WAVE 3 ALTOCUMULUS 4 STRATOCUMU TRANSVERSE 5 LIFTING LAYER OF TU
NON-UNIFORM, ALTERNATING PATTERN OF WHITE, GREY AND DARK GREY, OFTEN HAVING GREAT REGULARITY DUE TO CONTAINED SHADOWS, HOLLOW CENTERS MAY BE PRESENT IN A RING OF CELLS	CUMULUS TOWERING CUMULUS	THESE CONVECTIVE CLOUD FORMS CAN NORMALLY BE IDENTIFIED DIRECTLY BY SIZE, SHAPE, SHADOW, TONE, TEXTURE AND PATTERN	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 OCCURRENCE TEPHIGRAMS 2 INFERRED TEMPERATUR 3 LIKELY OCCU HEATING OVER THE
UNIFORM TEXTURE, SHARPLY DEFINED EDGES, ALTHOUGH CIRRUS PLUMES ARE OFTEN QUITE DIFFUSE BEYOND MAIN CELLS	CUMULONIMBUS	POSITIVE IDENTIFICATION OF CUMULONIMBUS CLOUDS IS NORMALLY POSSIBLE BECAUSE OF THEIR CHARACTERISTIC SIZE, SHAPE, PRONOUNCED SHADOW, VERY BRIGHT TONE AND TEXTURE. HOWEVER, OTHER CLOUD AREAS OF SIMILAR DIMENSIONS AND PATTERN OR EVEN SMALL LAKES IN SUN GLINT MAY BE MISINTERPRETED AS CUMULONIMBUS BECAUSE OF ENHANCED BRIGHTNESS	1 SURFACE OBSERVATIONS 2 RADAR OBSERVATIONS 3 AIRCRAFT OBSERVATIONS	1 CLOUDS 2 UNSTABLE IN CLOUD 3 ALIGNMENT 4 CYCLONIC 5 OCCURRENC 6 EVIDENCE 7 EVIDENCE MOISTURE DEVELOPME
OVERCAST STRATOCUMULUS CLOUD LAYERS OFTEN SHOW HOLLOWS WITH DIFFUSE CENTERS	STRATOCUMULUS	CAN USUALLY BE IDENTIFIED BY TONE, ORGANIZATION AND TEXTURE, HOWEVER EXTENSIVE LAYERS OF OVERCAST STRATOCUMULUS CLOUDS OVER OCEANS MAY APPEAR SIMILAR TO MIDDLE CLOUD, HENCE THEIR DIFFERENTIATION MAY ONLY BE POSSIBLE BY REFERRING TO OTHER EVIDENCE	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 ALIGNMENT LAYER WIND 2 SURFACE WITH LOW 3 OCCURRENC 4 CLOUDS CLOUD STR OF FRONTAL
UNIFORM	STRATUS	CANNOT NORMALLY BE DISTINGUISHED FROM FOG BY APPEARANCE ALONE, ALTHOUGH PICTURES HAVING GOOD DEFINITION AND TONAL RANGE SHOW BOUNDARIES OF STRATUS LAYERS TO BE MORE DIFFUSE THAN FOG BOUNDARIES. CLOUD SHADOW ALSO A DISTINGUISHING CHARACTERISTIC, MAY CONFORM TO TERRAIN FEATURES	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 SURFACE 2 OCCURRENC 3 EVIDENCE SURFACE 4 ABSENCE OR DESCEN
VERY UNIFORM	FOG	CANNOT NORMALLY BE DISTINGUISHED FROM STRATUS BY APPEARANCE ALONE, ALTHOUGH SHARP BOUNDARIES AND ABSENCE OF SHADOW ARE USEFUL CHARACTERISTICS TO LOOK FOR. USUALLY CONFORMS TO SHAPE OF TERRAIN	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 SURFACE 2 SURFACE RADIATION 3 SURFACE WATER OR 4 PRONOUNCE UPSLOPE FO 5 IN CASE OF APPRECIABL 6 IN CASE OF WITH SUR

A PROCEDURE FOR SATELLITE CLOUD PHOTO INTERPRETATION

D TYPE	TENTATIVE CLOUD IDENTIFICATION BY PHOTO INTERPRETATION TECHNIQUES	DIRECT EVIDENCE TO CONFIRM TENTATIVE INTERPRETATION	INDIRECT SUPPORTING EVIDENCE
RRUS STRATUS	CIRRUS CAN ALMOST ALWAYS BE POSITIVELY IDENTIFIED BY PHOTO INTERPRETATION TECHNIQUES CIRROSTRATUS MAY BE DISTINGUISHED FROM STRATUS AND FOG BY ITS CHARACTERISTIC TRANSLUCENCE	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 ORIENTATION OF CLOUD STREAKS GENERALLY PARALLEL TO 500 MB WINDS 2 OCCURRENCE OF JET STREAM CORE PARALLEL AND TO THE LEFT OF CLOUD EDGE, RELATIVE TO DOWNWIND DIRECTION 3 POSITIVE VORTICITY ADVECTION AT 500 MB WHERE CLOUD OCCURS, ALTHOUGH THIS IS NOT NECESSARILY CONCLUSIVE EVIDENCE SINCE ONLY 85 PERCENT OF CIRRIFORM CLOUDS OCCURS IN AREAS OF POSITIVE VORTICITY ADVECTION AT 500 MB
CIRRUS HED FROM LONIMBUS)	CAN BE POSITIVELY IDENTIFIED BY PHOTO INTERPRETATION TECHNIQUES	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 ORIENTATION OF CLOUD STREAKS GENERALLY PARALLEL TO 300 MB WINDS 2 SHOWALTER STABILITY INDICES LESS THAN +2 WITHIN OR UPSTREAM FROM CLOUD AREA
TRATUS UMULUS	CAN USUALLY BE IDENTIFIED BY ITS SIZE, SHAPE, VERY BRIGHT TONE AND UNIFORM TEXTURE ALTHOUGH OVERCAST LAYERS OF STRATOCUMULUS IN AREAS OF HIGH REFLECTIVITY MAY HAVE A SIMILAR APPEARANCE, OTHER EVIDENCE WILL HELP TO DISTINGUISH THE TWO, WHEN IT OCCURS OVER AN EXTENSIVE ICE FIELD, THERE ARE GENERALLY PRONOUNCED SHADOWS	1 SURFACE OBSERVATIONS WITHIN OR NEAR OUTER BOUNDARY OF MIDDLE CLOUD LAYER 2 AIRCRAFT OBSERVATIONS 3 RADAR OBSERVATIONS OF PRECIPITATION OVER EXTENSIVE AREA	1 OCCURRENCE OF EXTENSIVE PRECIPITATION WITHIN AREA OF CLOUD 2 CLOUD COINCIDES WITH MAIN ISOTHERM RIBBONS AT 850 MB AND 700 MB 3 CLOUD COINCIDENT WITH AREAS OF LARGE SCALE ASCENT ON VERTICAL MOTION CHARTS 4 CLOUD PATTERN OCCURS BETWEEN TROUGH LINE AND DOWNSTREAM RIDGE LINE AT 700 MB OR 500 MB 5 COINCIDENCE OF CLOUD AND POSITIVE VORTICITY ADVECTION AT 500 MB 6 DEW POINT DEPRESSIONS LESS THAN 2°C IN LAYER 850 MB TO 600 MB 7 CLOUD AREA OCCURS BETWEEN 850 MB AND 600 MB FRONTAL CONTOURS ON FRONTAL CONTOUR CHART 8 COINCIDENCE OF CLOUD WITH ISOSTERIC MOTION INFERRED FROM WINDSHEAR HODOGRAPHS
CLOUDS RRUS CUMULUS OCUMULUS	WAVE CLOUDS AS A CLASS ARE CONCLUSIVELY IDENTIFIED BY APPEARANCE AND ORGANIZATION, HOWEVER, CLOUD GENERALLY CAN ONLY BE DISTINGUISHED BY APPEAL TO DIRECT OBSERVATIONS OR INDIRECT SUPPORTING EVIDENCE	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 OCCURRENCE OF WAVE CLOUDS OVER OR DOWNWIND FROM MOUNTAIN RANGE, OR OTHER HIGH TERRAIN FEATURES 2 CIRRUS WAVE CLOUDS WILL BE FOUND TO BE TRANSVERSE TO THE 300 MB WIND DIRECTION 3 ALTOCUMULUS WAVE CLOUDS WILL BE TRANSVERSE TO THE 700 MB WIND DIRECTION 4 STRATOCUMULUS WAVE CLOUDS ARE DISTINGUISHED BY CLOUD BANDS TRANSVERSE TO THE BOUNDARY LAYER WIND 5 LIFTING CONDENSATION LEVEL OF SURFACE AIR LIKELY OCCURRING WITHIN LAYER OF TURBULENT MIXING WILL CONFIRM STRATOCUMULUS TYPE
MULUS G CUMULUS	THESE CONVECTIVE CLOUDFORMS CAN NORMALLY BE IDENTIFIED DIRECTLY BY SIZE, SHAPE, SHADOW, TONE, TEXTURE AND PATTERN	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 OCCURRENCE OF INSTABILITY IN LOWER TROPOSPHERE AS DEDUCED FROM TEPHIGRAMS 2 INFERRED INSTABILITY FROM INTERPOLATED SURFACE, 850 MB AND 700 MB TEMPERATURES IN CLOUD AREA 3 LIKELY OCCURRENCE OF STRONG SURFACE RADIATIONAL HEATING OR HEATING OVER RELATIVELY WARM LAND OR WATER SURFACE, NOTABLY OVER THE GULF STREAM
LONIMBUS	POSITIVE IDENTIFICATION OF CUMULONIMBUS CLOUDS IS NORMALLY POSSIBLE BECAUSE OF THEIR CHARACTERISTIC SIZE, SHAPE, PRONOUNCED SHADOW, VERY BRIGHT TONE AND TEXTURE. HOWEVER, OTHER CLOUD AREAS OF SIMILAR DIMENSIONS AND PATTERN OR EVEN SMALL LAKES IN SUN GLINT MAY BE MISINTERPRETED AS CUMULONIMBUS BECAUSE OF ENHANCED BRIGHTNESS	1 SURFACE OBSERVATIONS 2 RADAR OBSERVATIONS 3 AIRCRAFT OBSERVATIONS	1 CLOUDS APPEAR IN UNSTABLE AREAS ON STABILITY INDEX CHARTS 2 UNSTABLE AIRMASS CHARACTERISTICS, AS INFERRED BY TEPHIGRAM ANALYSIS IN CLOUD AREA 3 ALIGNMENT OF CLOUDS WITH SURFACE OR UPPER LEVEL FRONTS 4 CYCLONIC CURVATURE OF MEAN SEA LEVEL ISOBARS IN CLOUD AREA 5 OCCURRENCE OF CLOUDS IN FORWARD PART OF UPPER WAVE TROUGH 6 EVIDENCE OF STRONG SURFACE HEATING 7 EVIDENCE OF DIFFERENTIAL ADVECTIONAL COOLING OR DIFFERENTIAL MOISTURE ADVECTION PATTERNS FAVOURABLE TO CUMULONIMBUS DEVELOPMENT
OCUMULUS	CAN USUALLY BE IDENTIFIED BY TONE, ORGANIZATION AND TEXTURE, HOWEVER EXTENSIVE LAYERS OF OVERCAST STRATOCUMULUS CLOUDS OVER OCEANS MAY APPEAR SIMILAR TO MIDDLE CLOUD, HENCE THEIR DIFFERENTIATION MAY ONLY BE POSSIBLE BY REFERRING TO OTHER EVIDENCE	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 ALIGNMENT OF CLOUD STREETS IN GENERAL DIRECTION OF THE BOUNDARY LAYER WINDS 2 SURFACE WIND SPEEDS GREATER THAN 10 TO 15 MILES PER HOUR TOGETHER WITH LOW LIFTING CONDENSATION LEVEL IN CLOUD AREA 3 OCCURRENCE OF A LOW LEVEL TURBULENCE INVERSION IN CLOUD AREA 4 CLOUDS OCCUR IN COLD AIR MASS TO REAR OF SURFACE COLD FRONT WITH CLOUD STREETS BEARING AN APPRECIABLE ANGLE TO THE ALIGNMENT OF FRONTAL CLOUD
RATUS	CANNOT NORMALLY BE DISTINGUISHED FROM FOG BY APPEARANCE ALONE, ALTHOUGH PICTURES HAVING GOOD DEFINITION AND TONAL RANGE SHOW BOUNDARIES OF STRATUS LAYERS TO BE MORE DIFFUSE THAN FOG BOUNDARIES, CLOUD SHADOW ALSO A DISTINGUISHING CHARACTERISTIC, MAY CONFORM TO TERRAIN FEATURES	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 SURFACE WINDS IN 5-12 MPH RANGE WITH LOW LIFTING CONDENSATION LEVEL 2 OCCURRENCE OF A LOW LEVEL TURBULENCE INVERSION IN CLOUD AREA 3 EVIDENCE OF SURFACE COOLING BY RADIATION, MOTION OVER COLDER SURFACE OR UPSLOPE MOTION 4 ABSENCE OF MIDDLE CLOUD, i.e. LOW MOISTURE CONTENT IN MIDDLE LEVELS OR DESCENDING MOTION
FOG	CANNOT NORMALLY BE DISTINGUISHED FROM STRATUS BY APPEARANCE ALONE, ALTHOUGH SHARP BOUNDARIES AND ABSENCE OF SHADOW ARE USEFUL CHARACTERISTICS TO LOOK FOR, USUALLY CONFORMS TO SHAPE OF TERRAIN	1 SURFACE OBSERVATIONS 2 AIRCRAFT OBSERVATIONS	1 SURFACE TEMPERATURE AND DEW POINT EQUAL IN CLOUD AREA 2 SURFACE WINDS LESS THAN 5 MPH IN CLOUD AREA, AND EVIDENCE OF RADIATIONAL COOLING IN CASE OF RADIATION FOG 3 SURFACE AIR MOTION CONDUCIVE TO ADVECTIONAL COOLING OVER COLDER LAND, WATER OR SNOW SURFACE 4 PRONOUNCED UPSLOPE MOTION WITH LIGHT OR EVEN MODERATE WINDS IN CASE OF UPSLOPE FOG 5 IN CASE OF ARCTIC SEA SMOKE, EVIDENCE OF SURFACE AIR TEMPERATURES APPRECIABLY LOWER THAN WATER TEMPS WITH OFFSHORE FLOW 6 IN CASE OF LOW TEMPERATURE FOG, OCCURRENCE OF FOG NEAR INHABITED AREA WITH SURFACE TEMPERATURES BELOW -50 DEGREES F

REMARKS

The two tables on the inside have been assembled to serve as a handy desk-top guide for interpreting satellite cloud photographs. The left-hand portion provides a brief description of the appearance of clouds as seen from altitudes on the order of 800 miles, in terms of such well-known characteristics of photographic images as size, shadow, tone, texture and pattern. The right-hand side of the guide treats the meteorological interpretation of satellite photographs from the well-established approach used in the photo-interpretation field, namely, convergence of evidence. This approach can be thought of as consisting of three parts:

1. Tentative cloud identification by photo-interpretation techniques;

2. Direct evidence to confirm tentative interpretation;

3. Indirect supporting evidence.

By recognizing clouds from their size, shape, shadow, tone, texture and pattern, an experienced analyst can be fairly certain of what clouds exist most of the time (since the atmosphere tends to reproduce similar cloud patterns under similar circumstances). However, the type of cloud form cannot always be uniquely resolved by this method, because different cloud types may often appear alike. Thus, it is often necessary to examine other evidence to arrive at the most probable answer.

For example, the ability to distinguish stratus from fog, or stratocumulus from altocumulus, is facilitated by comparison with conventional meteorological observations when these are available. When not available, a situation which occurs over about seventy percent of the earth's surface, resort should be made to continuity and indirect indications from flow patterns. Hence, whereas a stratocumulus overcast in sun glint will often have an appearance similar to that of an altostratus layer, an inspection of the 700-mb. chart with respect to the well-known relationship between organized middle cloud layers and the 700-mb. trough-ridge pattern, may indicate which is more likely.

This guide has been keyed to two recent publications, NWRF 33-0667-125, *Photographs from Meteorological Satellites*, June 1967 and Project FAMOS, Research Report (4-67), *Guide for Interpretation of Satellite Photography and Nephanalyses*, August 1967, so as to provide a visual reference for each cloud type. The key is listed in the Cloud Type column of the left-hand table - "Appearance of Clouds from Satellite Altitudes." For example, F:G-34,4263 in the cirrus-cirrostratus row refers to a picture feature contained in the FAMOS report on page G-34, and located on that page at point 42,63 according to the standard GeoRef code (i.e., near 42/100 of the total distance from the left-hand border of the page to the right-hand page border, perforations excepted, and near 63/100 of the total distance above the bottom of the page). Similarly, N:14,2073 refers to a picture feature contained on page 14 of the NWRF publication, and located on that page at GeoRef point 20,73 (i.e., near 20/100 of the total text width from the left-hand edge of the text and near 73/100 of the total distance above the bottom of the page).