

copy

2

FID-ID(RS)T-0793-89

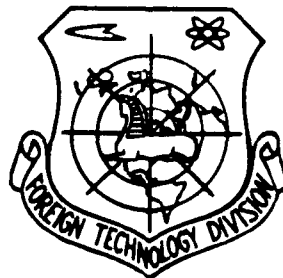
FOREIGN TECHNOLOGY DIVISION



FRONTAL CLOUDS AND FLIGHT CONDITIONS IN THEM

by

A.M. Baranov



1059
CO

Approved for public release;
Distribution unlimited.

AD-A214 250



89 10 31 014

U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	<i>А а</i>	A, a	Р р	<i>Р р</i>	R, r
Б б	<i>Б б</i>	B, b	С с	<i>С с</i>	S, s
В в	<i>В в</i>	V, v	Т т	<i>Т т</i>	T, t
Г г	<i>Г г</i>	G, g	У у	<i>У у</i>	U, u
Д д	<i>Д д</i>	D, d	Ф ф	<i>Ф ф</i>	F, f
Е е	<i>Е е</i>	Ye, ye; E, e*	Х х	<i>Х х</i>	Kh, kh
Ж ж	<i>Ж ж</i>	Zh, zh	Ц ц	<i>Ц ц</i>	Ts, ts
З з	<i>З з</i>	Z, z	Ч ч	<i>Ч ч</i>	Ch, ch
И и	<i>И и</i>	I, i	Ш ш	<i>Ш ш</i>	Sh, sh
Й й	<i>Й й</i>	Y, y	Щ щ	<i>Щ щ</i>	Shch, shch
К к	<i>К к</i>	K, k	Ъ ъ	<i>Ъ ъ</i>	"
Л л	<i>Л л</i>	L, l	Ы ы	<i>Ы ы</i>	Y, y
М м	<i>М м</i>	M, m	Ь ь	<i>Ь ь</i>	'
Н н	<i>Н н</i>	N, n	Э э	<i>Э э</i>	E, e
О о	<i>О о</i>	O, o	Ю ю	<i>Ю ю</i>	Yu, yu
П п	<i>П п</i>	P, p	Я я	<i>Я я</i>	Ya, ya

*ye initially, after vowels, and after ъ, ы; e elsewhere.
When written as ѐ in Russian, transliterate as yѐ or ѐ.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	\sinh^{-1}
cos	cos	ch	cosh	arc ch	\cosh^{-1}
tg	tan	th	tanh	arc th	\tanh^{-1}
ctg	cot	cth	coth	arc cth	\coth^{-1}
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian English

rot curl
lg log

GRAPHICS DISCLAIMER

All figures, graphics, tables, equations, etc. merged into this translation were extracted from the best quality copy available.

FRONTAL CLOUDS AND FLIGHT CONDITIONS IN THEM.

A. M. Baranov.

TABLE OF CONTENTS.

Preface ... 3.

Introduction ... 5.

Part 1. THREE-DIMENSIONAL STRUCTURE OF FRONTAL CLOUDS;

Chapter 1. From the History of the Development of Representations about the Three-Dimensional Structure of Frontal Clouds ... 9.

1. Representations About the Three-Dimensional Structure of Clouds, Which Preceded the Creation of the Frontological Method ... 9.

2. Initial Representations About the Three-Dimensional Structure of Frontal Clouds ... 14.

3. Further Development of Ideas About the Three-Dimensional Structure of Frontal Clouds ... 17.

4. Analysis of the Three-Dimensional Structure of Frontal Clouds with the Aid of Artificial Earth Satellites ... 27.

Chapter 2. Three-Dimensional Structure of the Clouds of Warm Front ... 32.

1. Height of Lower Cloud Base of Warm Front ... 32.
2. Height of the Upper Cloud Boundary of Warm Front ... 36.
3. Vertical Extent of the Clouds of Warm Front ... 43.
4. Stratification of the Clouds of Warm Front ... 48.
5. Thickness of Cloud Layers on Warm Front ...50.
6. Thickness of Cloudless Layers in the Cloud Systems of Warm Front ... 53.
7. Horizontal Extent of the Clouds of Warm Front ... 56.
8. High-level Cloud in the Zone of Warm Front ... 59.
9. Cumulonimbus Clouds in the Zone of Warm Front ... 80.
10. Special Feature of Upper Wind in the Zone of Warm Front ... 82.
11. Examples of the Three-Dimensional Structure of the Clouds of Warm Front ... 92.
12. Recommendations Regarding the Diagnosis of the Height of Cloudiness of the Warm Front ... 101.

Chapter 3. Three-Dimensional Structure of Cold-Front Clouds ... 118.

1. Height of Lower Cloud Base of Cold Fronts ... 118.
2. Height of the Upper Cloud Boundary of Cold Fronts ... 124.
3. Vertical Extent of Cold-Front Clouds ... 129.
4. Stratification of Cold-Front Clouds ... 133.
5. Thickness of Cloud Layers in the Zone of Cold Fronts ... 135.
6. Horizontal Extent of Cold-Front Clouds ... 137.

7. High-Level Cloud in the Zone of Cold Fronts ... 138.
8. Cumulonimbus Clouds in the Zone of Cold Fronts ... 140.
9. Example of the State of Cloudiness on Cold Front ... 143.
10. Some Recommendations for the Diagnosis of the
Three-Dimensional Structure of Cold-Front Clouds ... 148.

Chapter 4. Three-Dimensional Structure of the Clouds of Occluded Fronts ... 150.

1. Height of Lower Cloud Base of Occluded Fronts ... 150.
2. Height of the Upper Cloud Boundary of Occluded Fronts ... 153.
3. Vertical Extent of the Clouds of Occluded Fronts ... 157.
4. Stratification of the Clouds of Occluded Fronts ... 160.
5. Thickness of Cloud Layers and Cloudless Layers in the Zone of Occluded Fronts ... 161.
6. Horizontal Extent of the Clouds of Occluded Fronts ... 166.
7. High-Level Cloud in the Zone of Occluded Fronts ... 168.
8. Cumulonimbus Clouds in the Zone of Occluded Fronts ... 172.
9. Some Recommendations for the Diagnosis of Clouds of Occluded Fronts ... 173.

Chapter 5. Three-Dimensional Structure of the Clouds of Secondary Cold Fronts ... 174.

1. Contemporary Concepts About the Reasons for the Formation of Secondary Cold Fronts and Formation of Cloudiness in them ...
174.

2. Height of Lower Cloud Base at Secondary Cold Fronts ... 175.
3. Height of the Upper Cloud Boundary at Secondary Cold Fronts ... 178.
4. Vertical Extent of the Clouds of Secondary Cold Fronts ... 180.
5. Stratification of Clouds, the Thickness of Cloud Layers and Cloudless Layers in the Zone of Secondary Cold Fronts ... 181.
6. Horizontal Extent of the Clouds of Secondary Cold Fronts ... 183.
7. High-Level Cloud in the Zone of Secondary Cold Fronts ... 183.
8. Cumulonimbus Clouds in the Zone of Secondary Cold Fronts ... 185.

Part 2. Meteorological Flight Conditions in Frontal Clouds. *Keywords:*

Cumulonimbus clouds, Cumulus clouds, Fronts (Meteorology)

Chapter 6. Meteorological Flight Conditions in the Clouds of Warm Front ... 187.

1. Basic Factors, Which Determine Meteorological Flight Conditions in Clouds ... 187.
2. Value of Cloudiness for the Work of Aviation ... 188.
3. Repetition of Clouds at Different Heights in the Zone of Warm Front ... 192.
4. Visibility in the Clouds of Warm Front ... 195.
5. Turbulence in the Clouds of Warm Front ... 197.
6. Icing in the High-Level Clouds of Warm Front ... 199.
7. Electrification of Aircraft in High-Level Clouds of Warm Front ... 203.

→ Russian translation. (SLP)

Chapter 7. Meteorological Flight Conditions in the Clouds of
Primary and Secondary Cold Fronts and Occluded Fronts ... 204.

1. Meteorological Flight Conditions in Thick Cumulus and
Cumulonimbus Cold-Front Clouds ... 204.
2. Flight Conditions in the Zone of Thunderstorm Activity ...
208.
3. Recurrence of Clouds at Different Heights in the Zone of Cold
Fronts ... 210.
4. Recurrence of the Clouds of Secondary Cold Fronts at Different
heights ... 212.
5. Recommendation to Crews, Which Fly in the Zone of Thick
Cumulus, Cumulonimbus Clouds and in the Zone of Thunderstorm
Activity ... 213.
6. Meteorological Flight Conditions in the Clouds of Occluded
Fronts ... 215.

Conclusion ... 219.
Literature ... 225.

DISTRIBUTION LIST

DISTRIBUTION DIRECT TO RECIPIENT

<u>ORGANIZATION</u>	<u>MICROFICHE</u>
A205 DMAHTC	1
C509 BALLISTIC RES LAB	1
C510 R&T LABS/AVRADCOM	1
C513 ARADCOM	1
C535 ARADCOM/TSARCOM	1
C539 TRASANA	1
C591 FSTC	4
C619 MIA REDSTONE	1
D008 MISC	1
E053 HQ USAF/INET	1
E404 AEDC/DOF	1
E408 AFWL	1
E410 AD/INP	1
F429 SD/INP	1
P003 DOE/ISA/DDI	1
P050 CIA/OCR/AD/SD	2
AFIT/LIF	1
FTD	
CCV	1
MIA/PHS	1
LLYL/CONF 1-589	1
NASA/NST-44	1
NSA/TS15/TPL	2
ASD/FTD/TQEA	1
FSL/NIX-5	1
NOIC/OIC-9	1