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1

EMPIRICAL RESULTS ON THE GEOMETRY OF CIRRUS BANDS AS
RELATED TO METEOROLOGICAL CONDITIONS

- Part II: Figures -

B Y

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Außenstelle Darmstadt

Technical Report No. 1

Prepared for the European Office of Aerospace Research of the
AIR FORCE CAMBRIDGE RESEARCH LABORATORIES
under
Contract AF 61(052)-620 *new*

April 1963

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- Part II: Figures -

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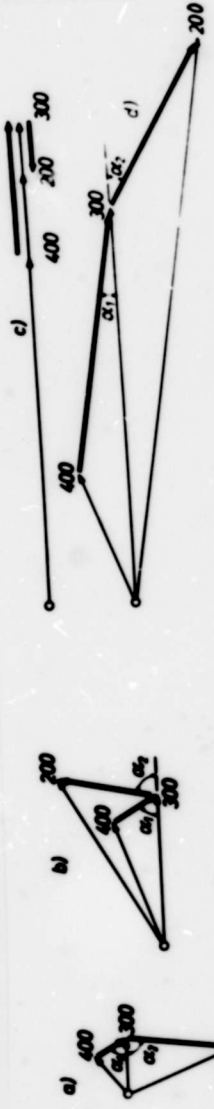
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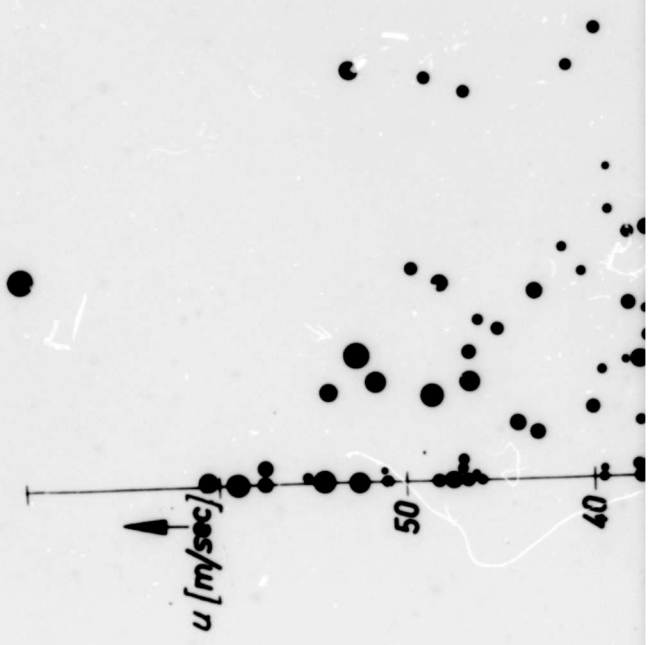
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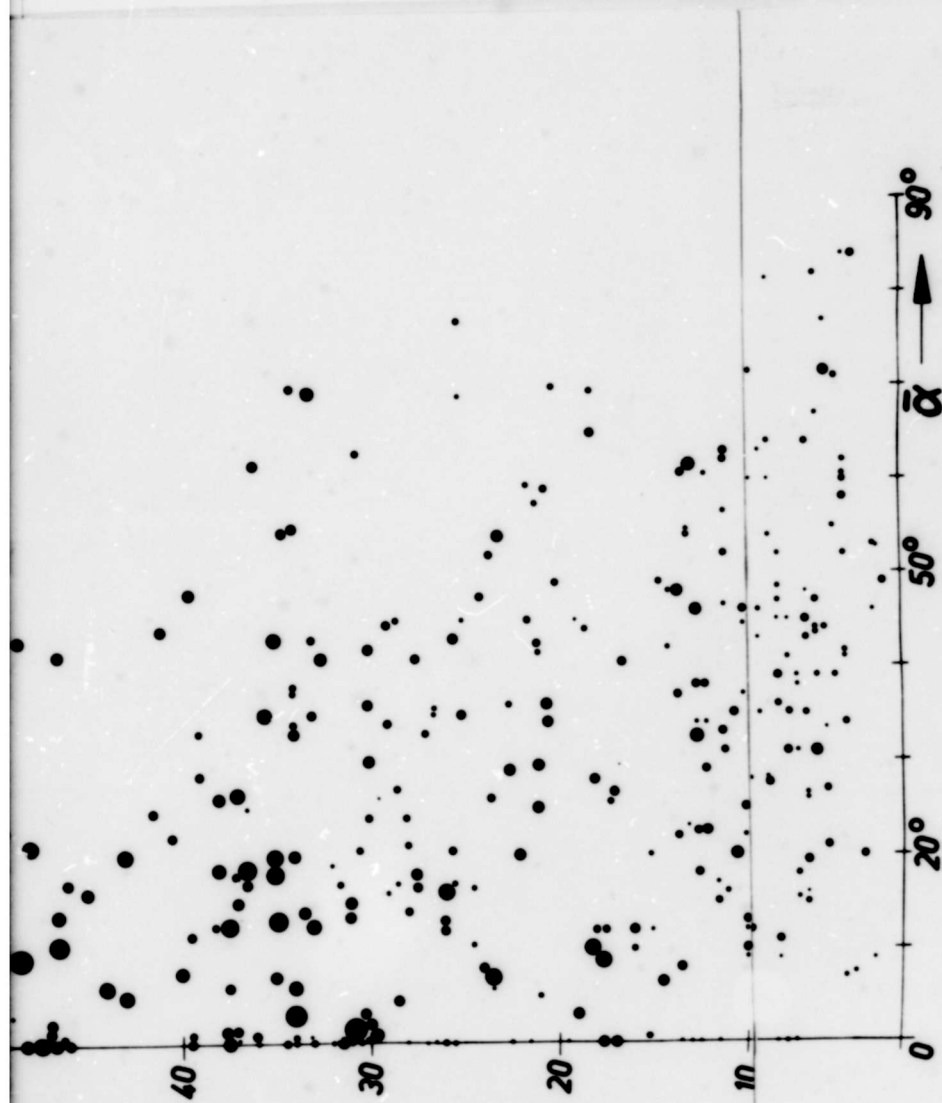
April 1963



1 Definition of α , and α_1 as acute angles between the 300 mb wind and the mean vertical shear between 400 and 300 mb, and 300 and 200 mb, respectively. Cases a and b prevail at calm, cases c and d prevail at strong winds.

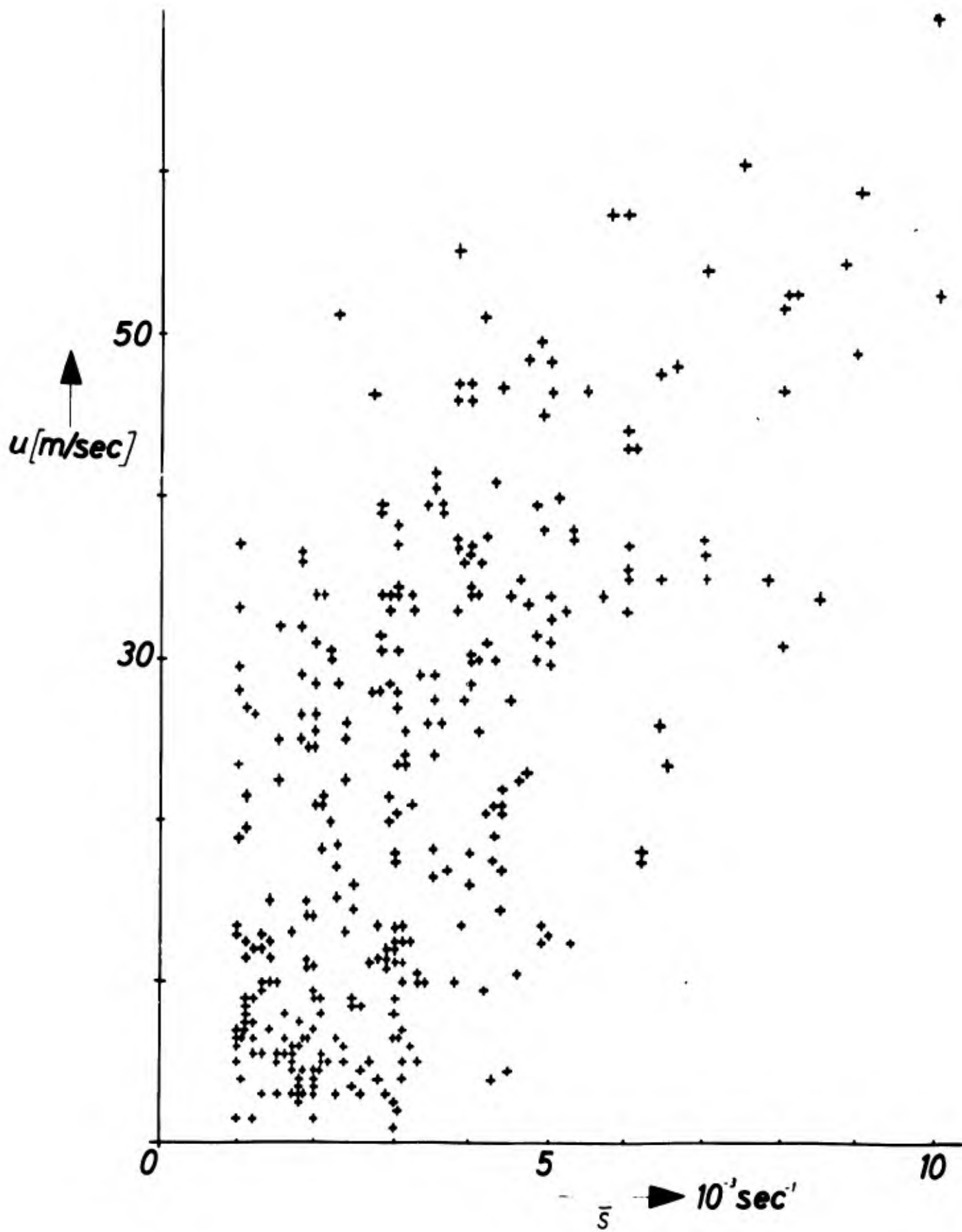
● $10 \cdot 10^3 \text{sec}^{-1}$
 . $1 \cdot 10^3 \text{sec}^{-1}$



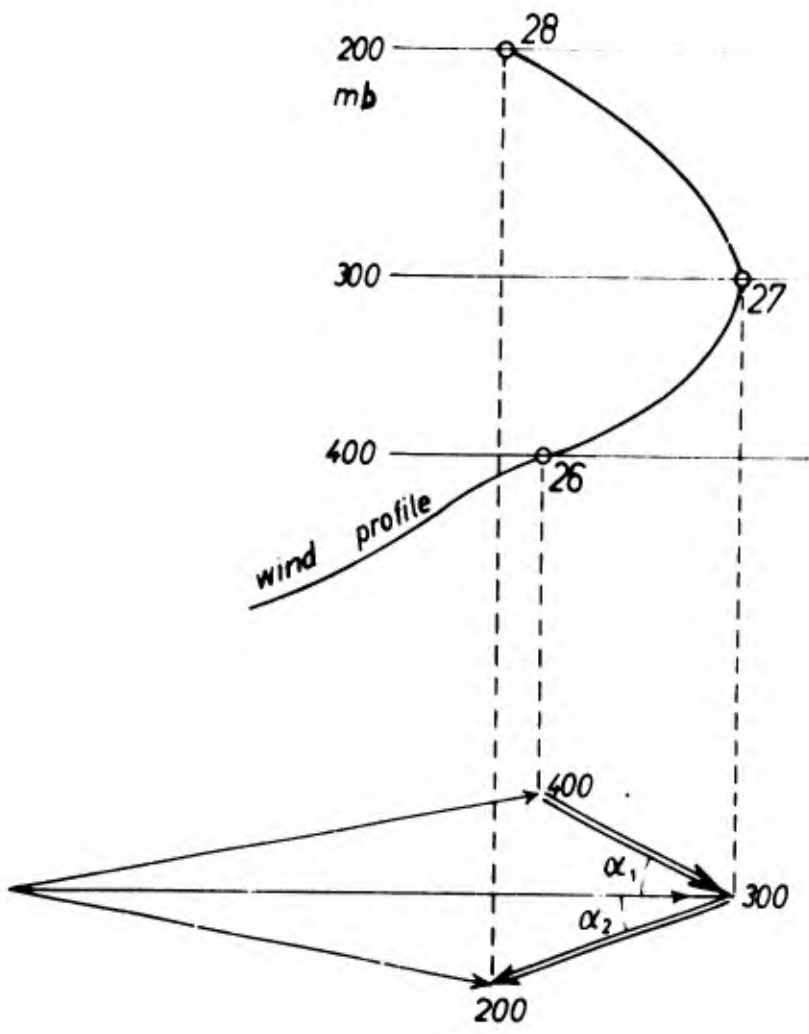


B

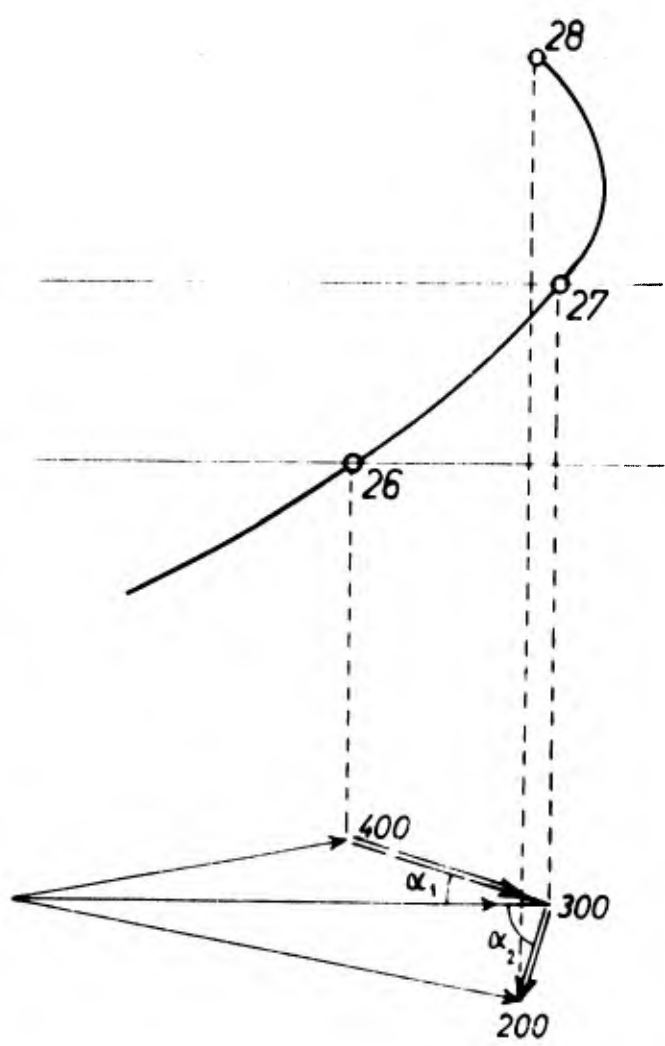
2 330 cases of $\bar{\alpha}$ versus 300 mb wind velocity. Vertical shear values proportional to dot diameters (for scale, see upper right) .



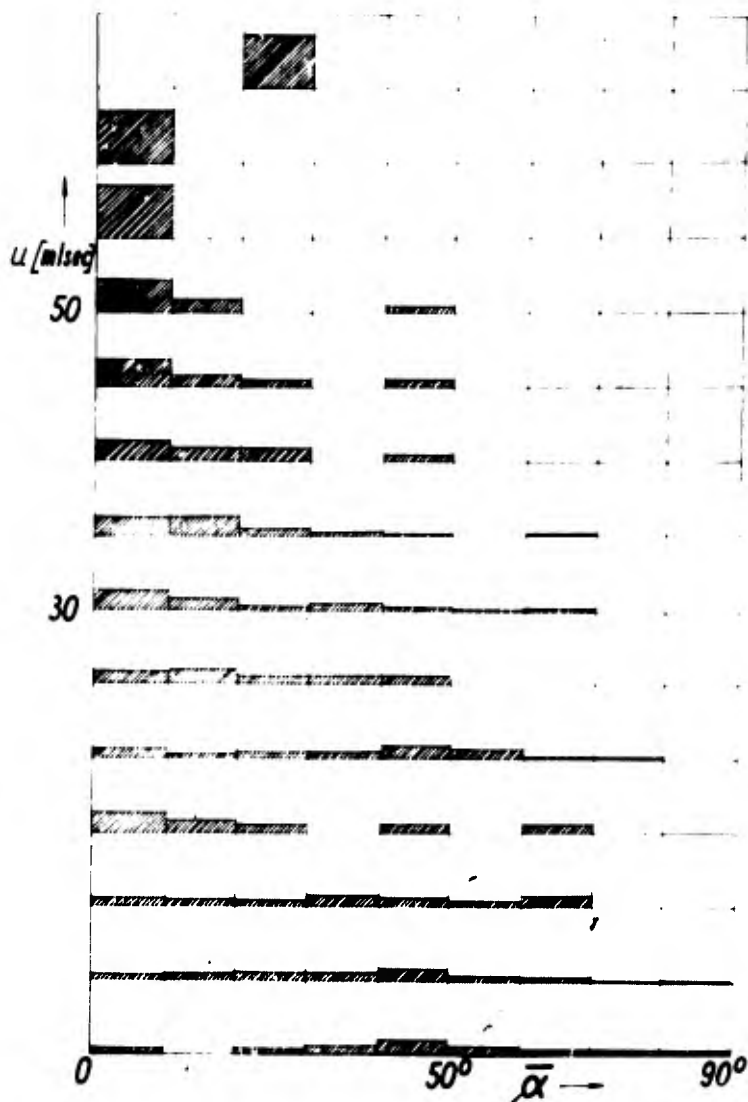
3 330 cases of wind shear values versus wind velocity (only 314 crosslets, due to coinciding points).



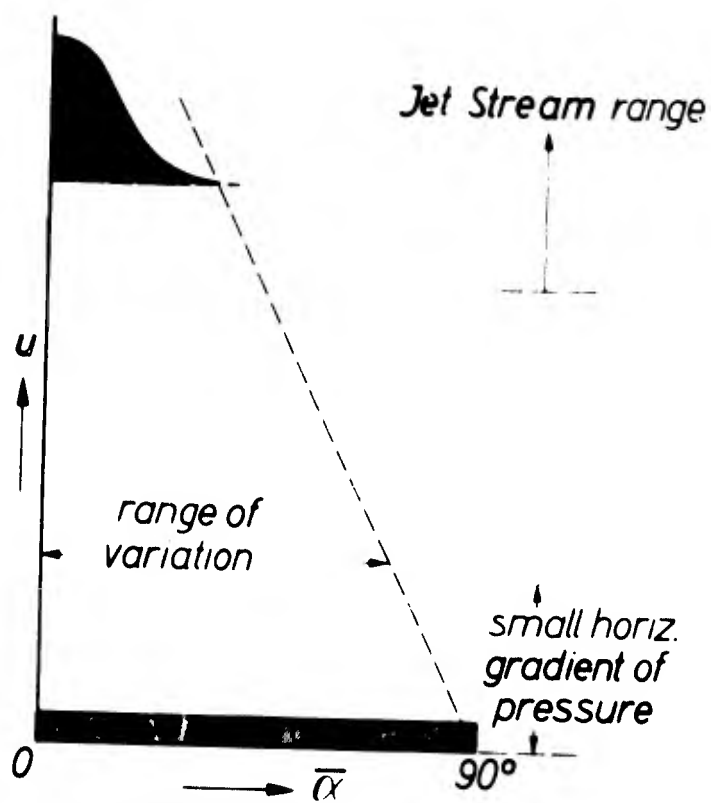
4 Wind profile and resulting α_1 and α_2 — it the wind maximum is at 300 mb.



5 Wind profile and resulting α_1 and α_2 , it the wind maximum is between marked millibar values.

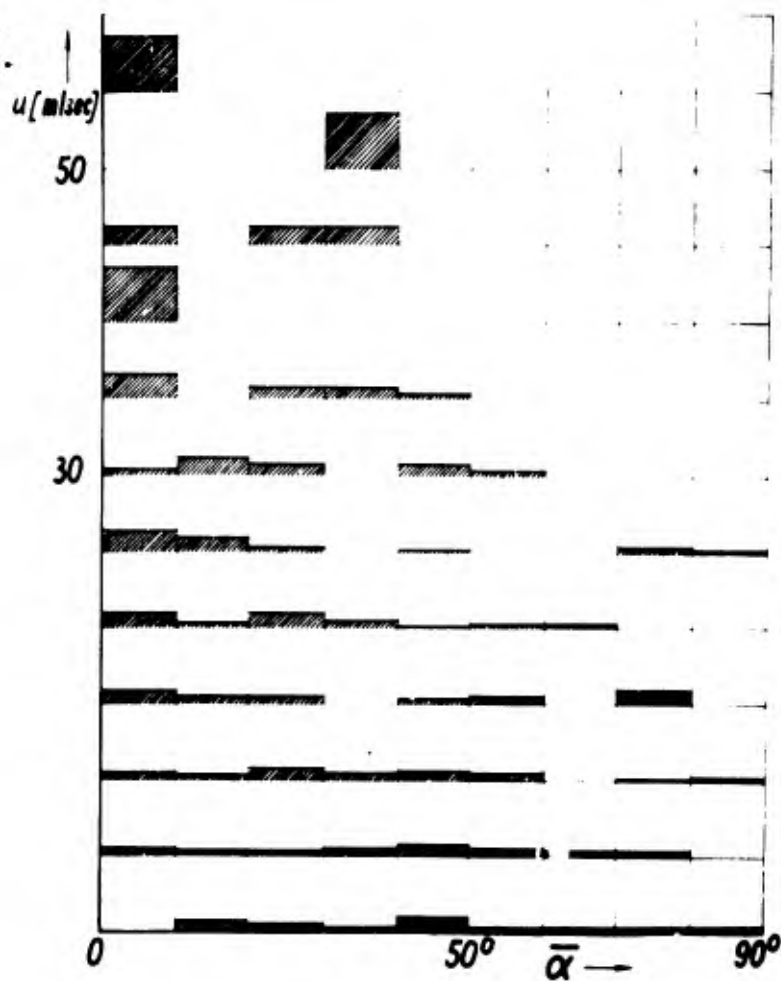


6 Relative frequencies of the points depicted in Fig. 2.

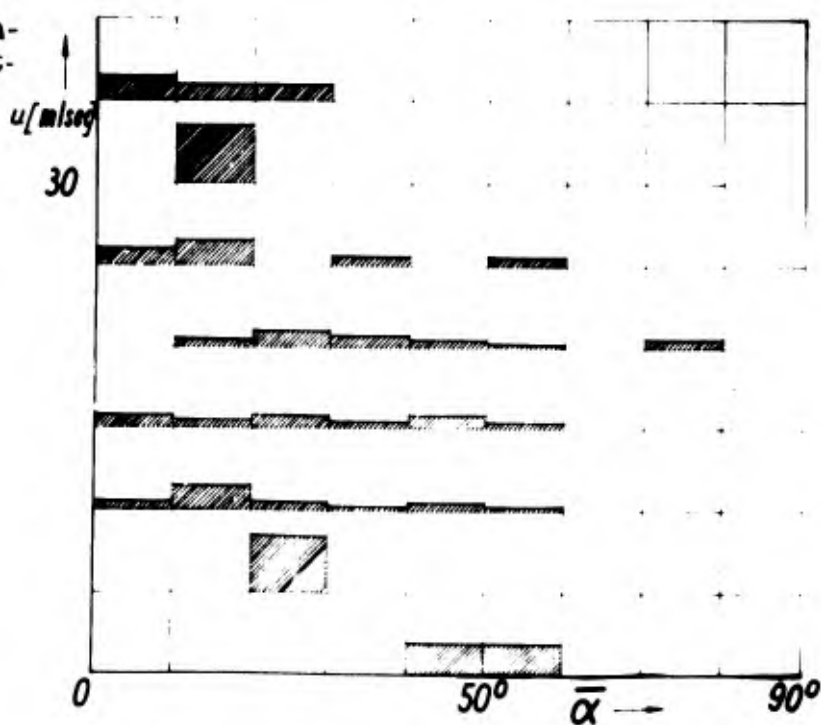


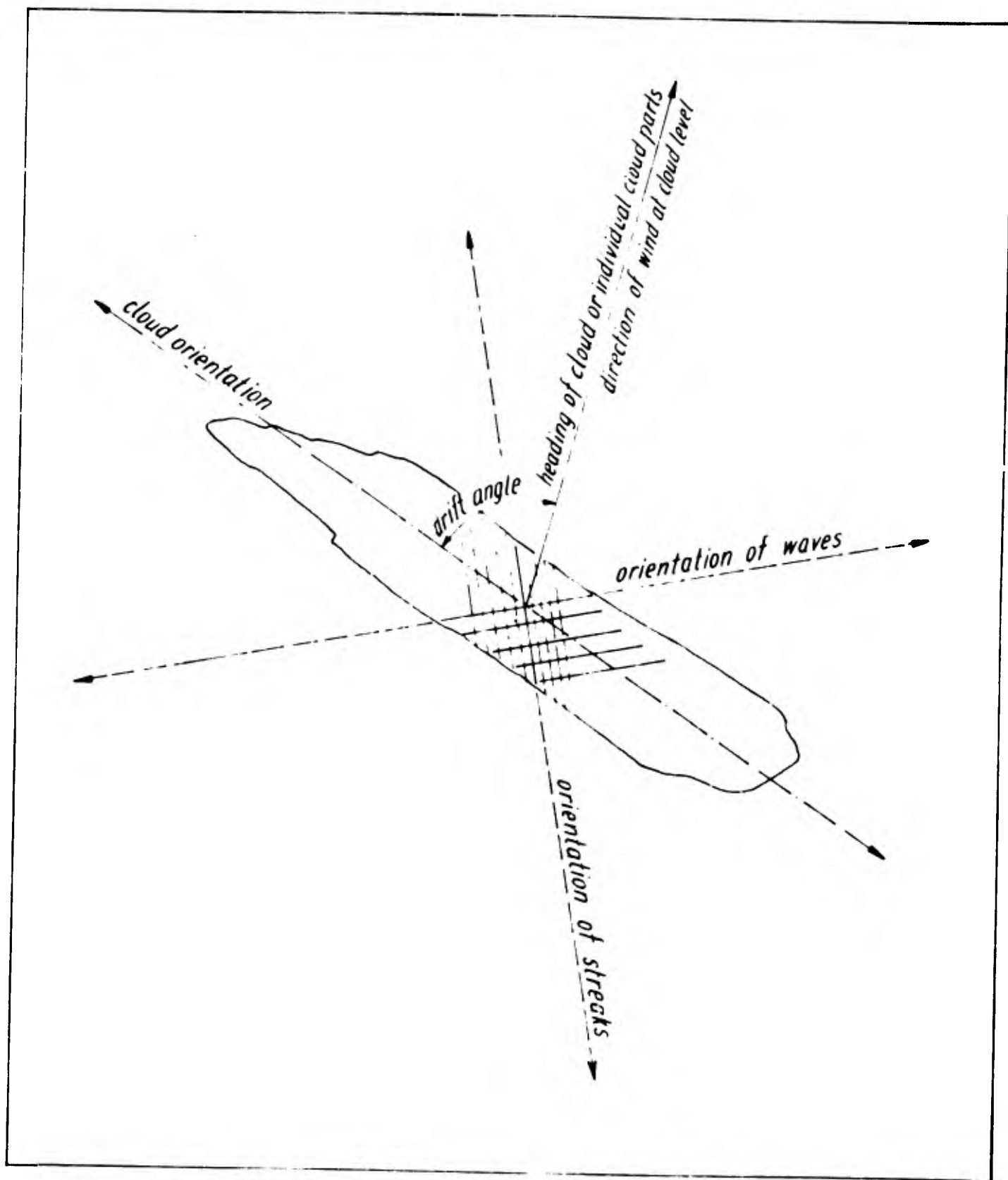
7 Anticipated relative frequency distribution of $\bar{\alpha}$. The relative frequency (hatched) is evenly distributed at calm air, but would obey a Gaussian distribution at rather great wind velocities (REUSS 1963 : Courtesy Akad. Verlagsgesellschaft).

8 Relative frequencies of fair weather period (92 days)

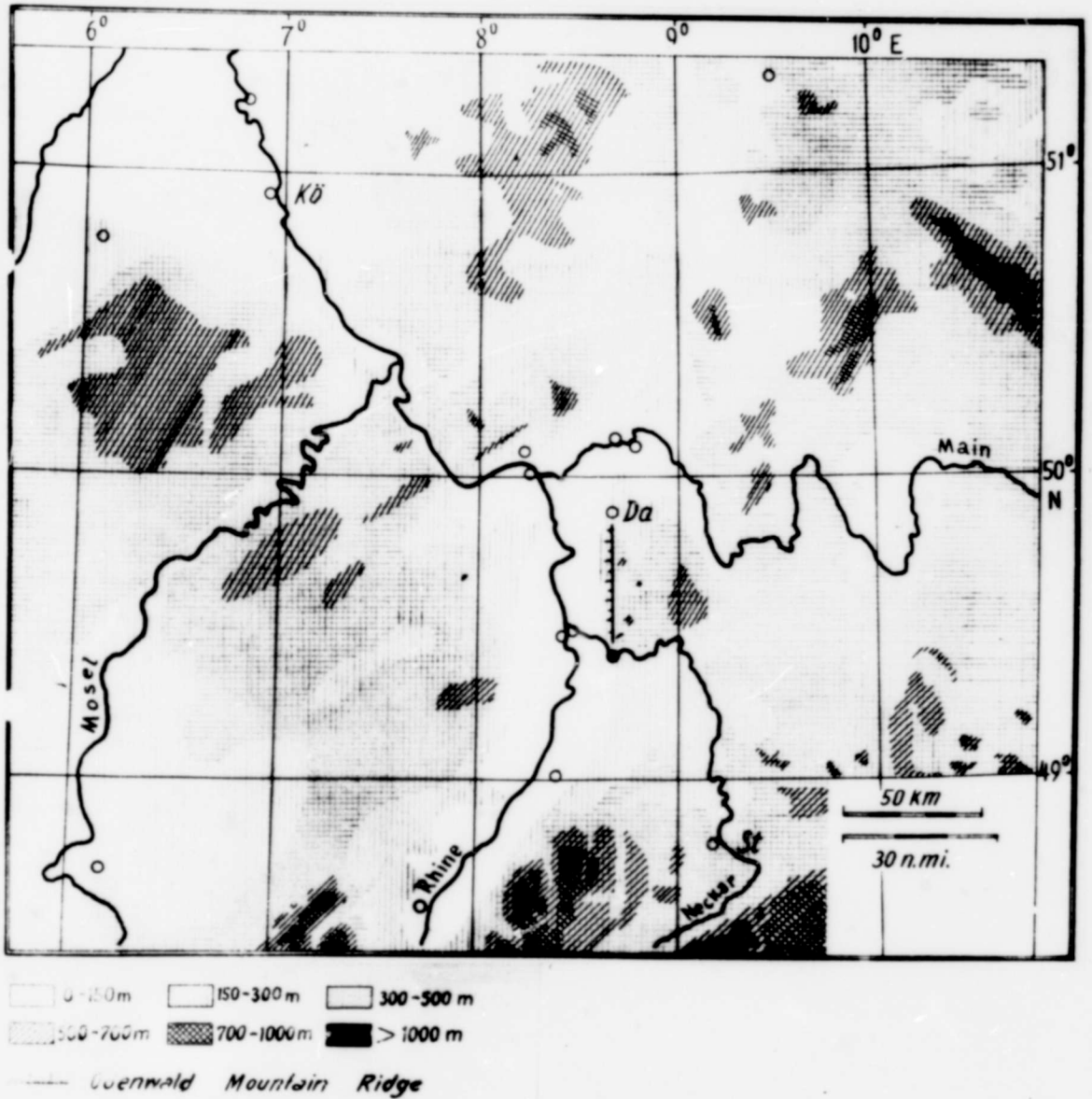


9 Relative frequencies of bad weather period (85 days)

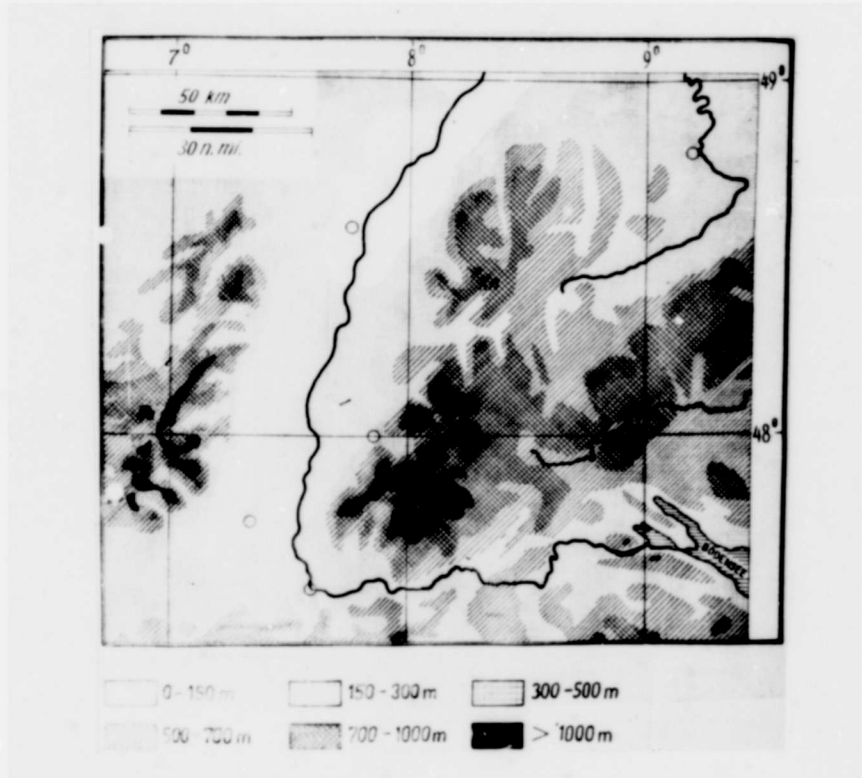




10 General representation of the geometrical features of clouds (schematic; H. KOSCHMIEDER 1963).

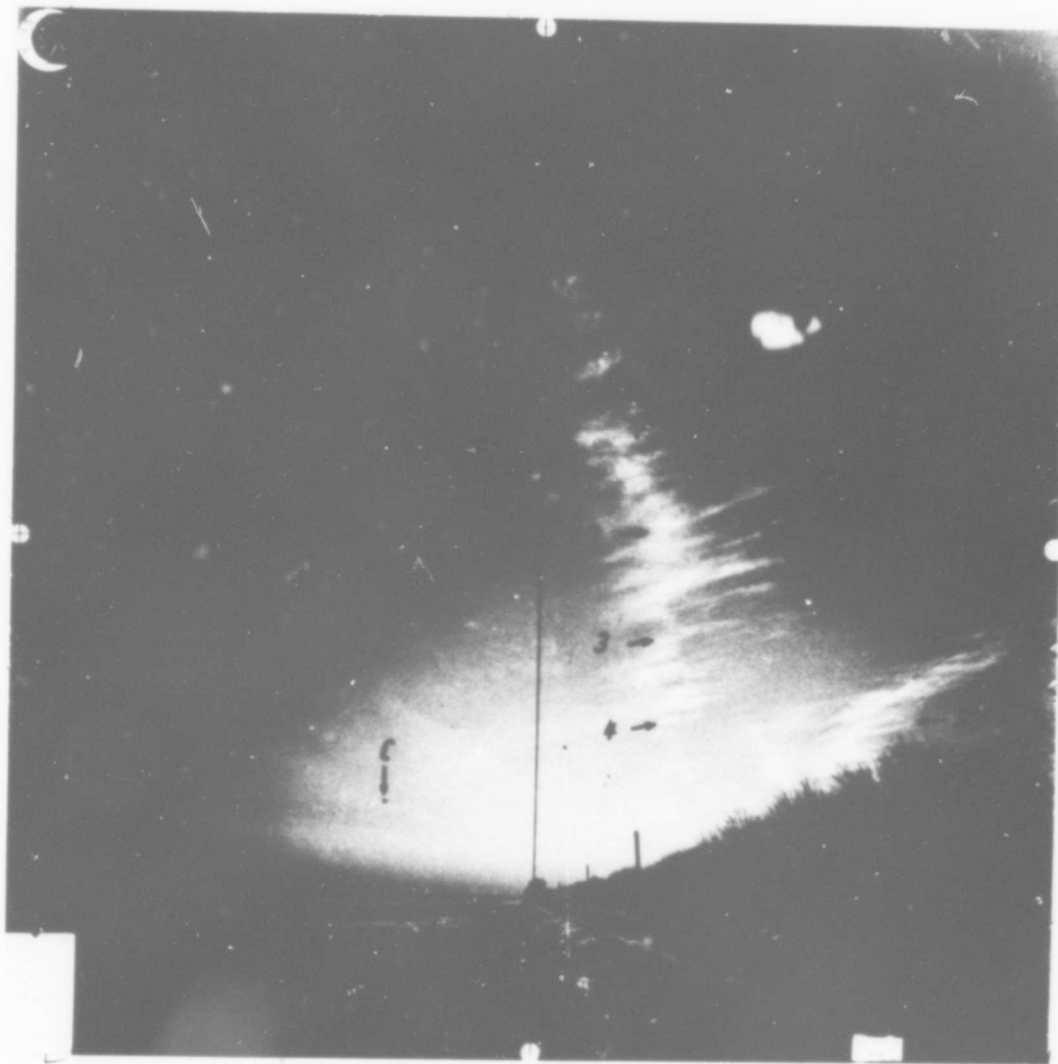


11 orography of the surrounding of Darmstadt



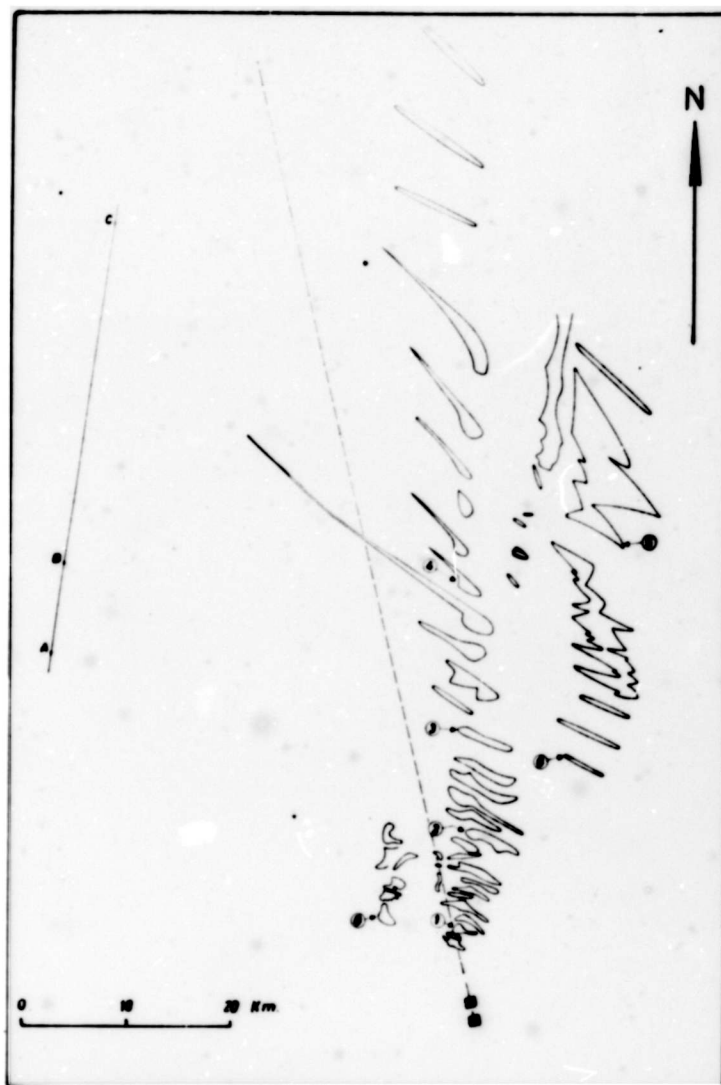
12 orography of the surrounding of Kniebis (Kn).

I : 2 March 1957



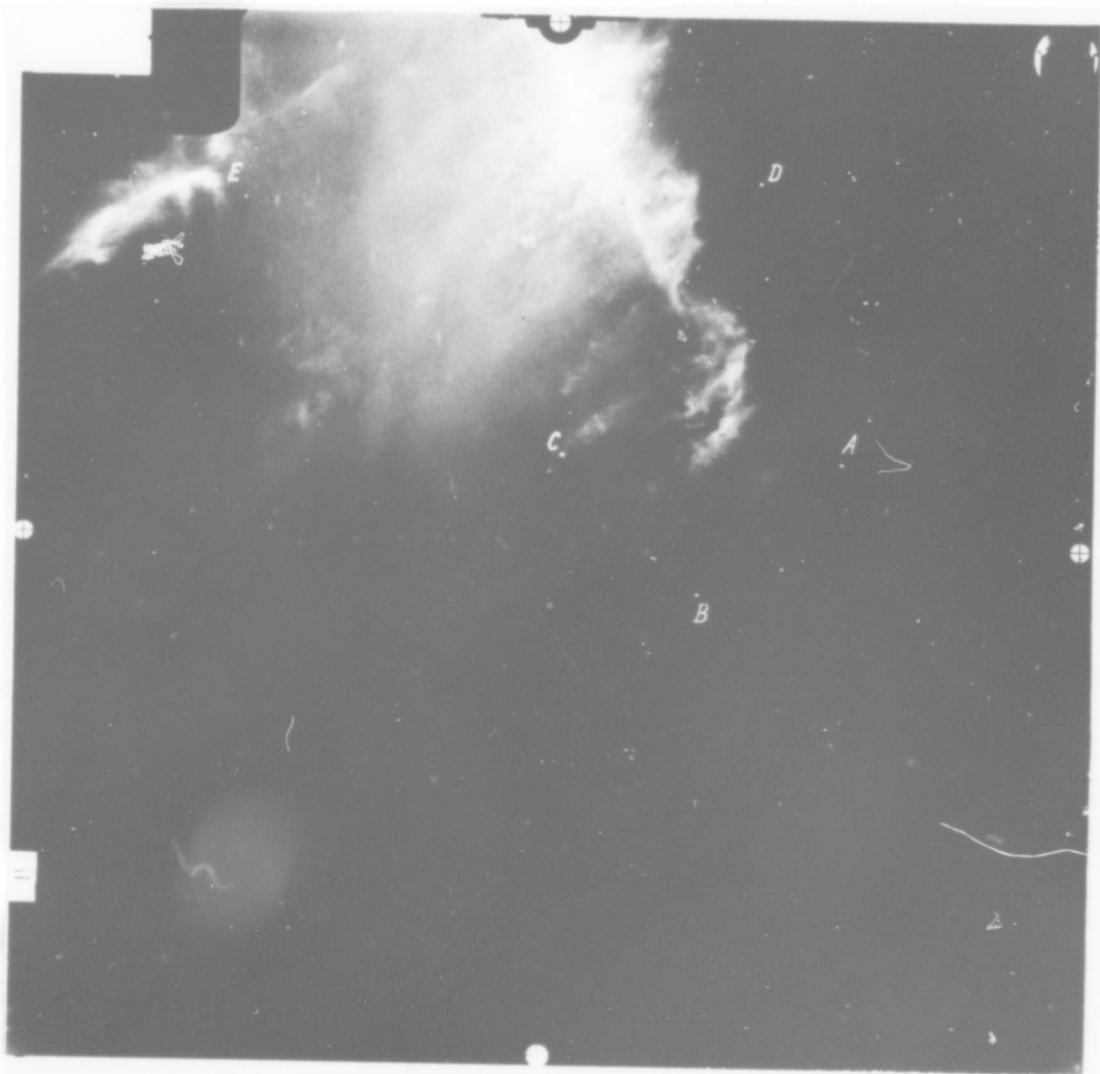
1 photograph from northern stereo camera, toward 350° ;
band approaching from N, at 11:55.

I : 2 March 1957



2 Plan of bands depicted in Fig. 1; points A B C; 0,1,2,3,4,5,6 for identification. Axis of taking dash-stippled.

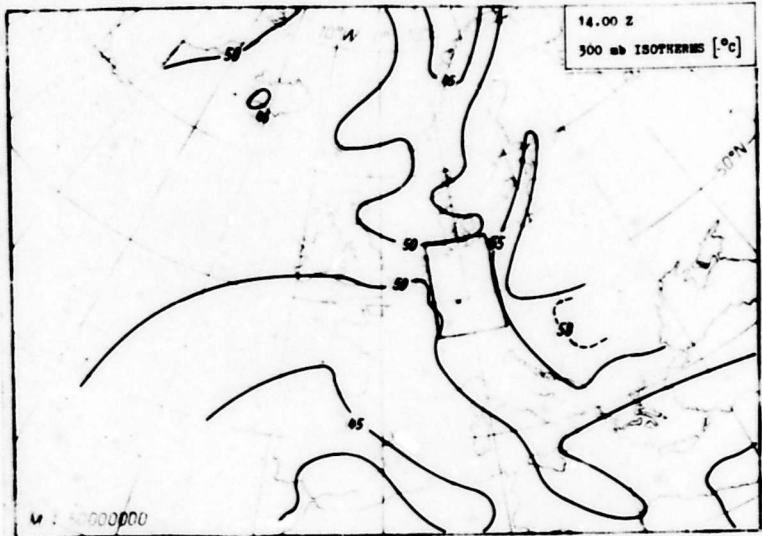
I : 2 March 1957



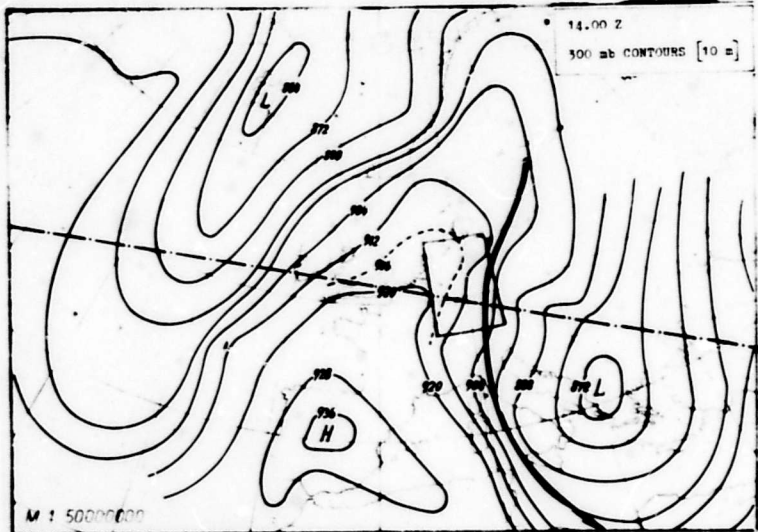
3 photograph of right (northern) camera, toward zenith, depicting portion of the band, at 12:27. Capital letters refer to Fig.4

I : 2 March 1957

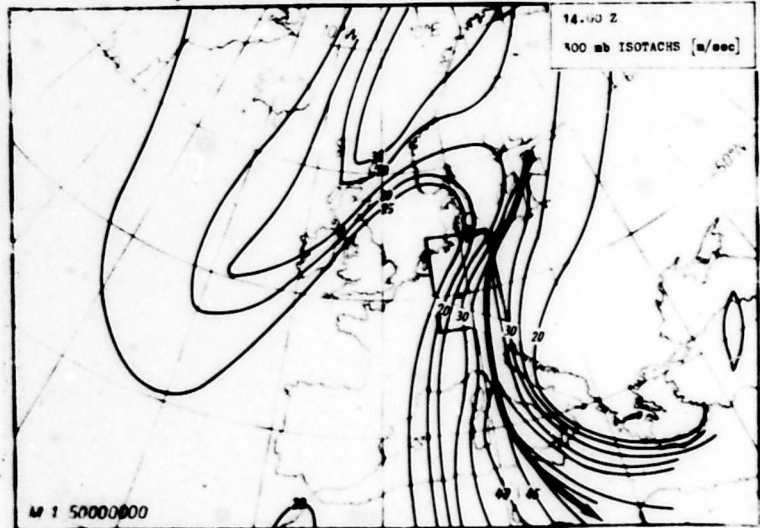
5 300 mb-isotherms over Europe. The rectangle marks the position of Figs. 9, 11; the dot near 10E, 50N marks the location of Darmstadt, which - except for cases VII, VIII, - is equal to the cloud positions.



6 300 mb contours over Europe. Rectangle and dot as in Fig. 5. Position of cross section Fig. 8 is dash-dotted.

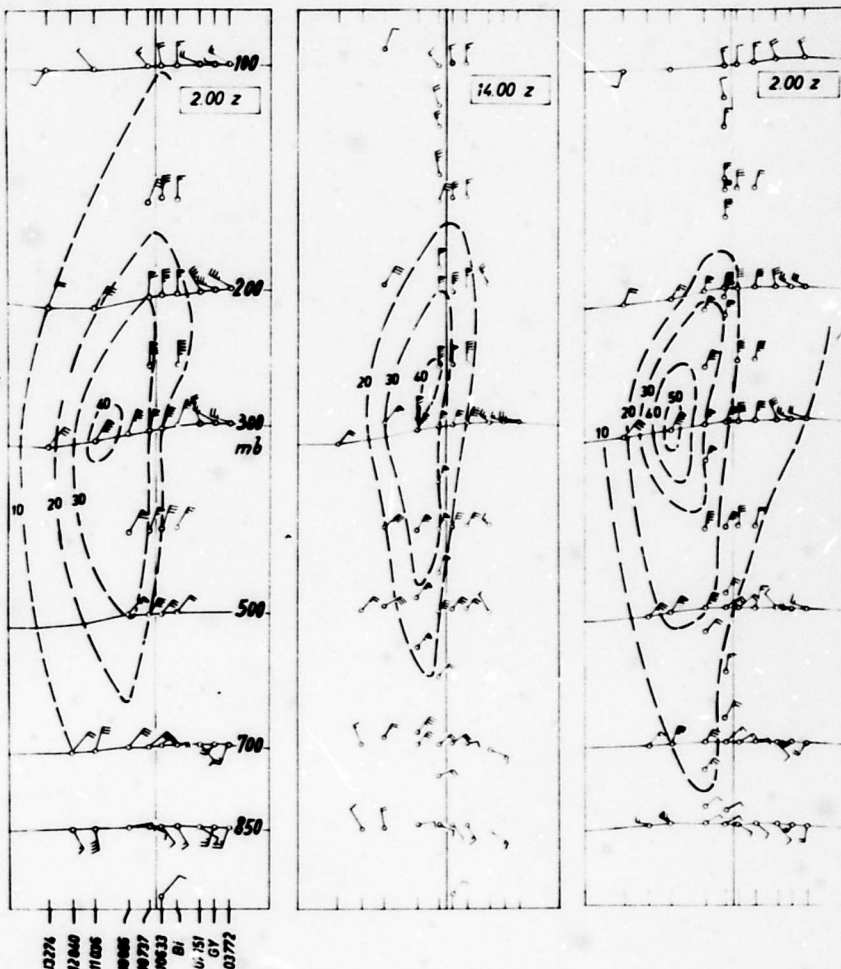


7 300 mb isotachs over Europe. Rectangle and dot as in Fig. 5. Jet Stream is marked by thick line.

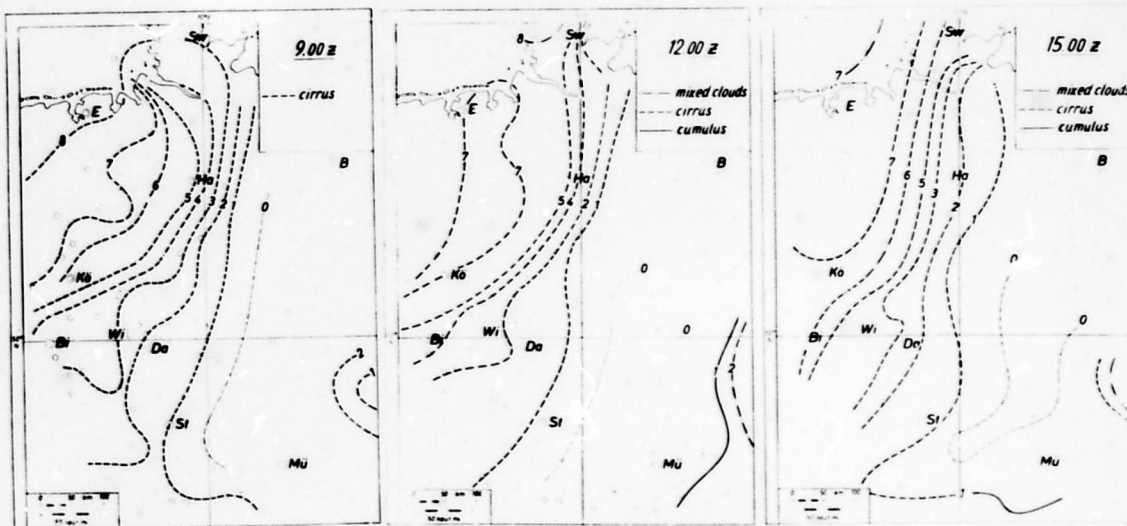


I: 2 March 1957

8 Vertical cross sections approximately at right angle to the wind, at 2 March, 2:00 (left), 14:00 (middle), 3 March, 2:00 (right) with isotachs [m/s]. The vertical line marks the position of Darmstadt, without additional denotation. In the scale of height, 1cm \approx 1.16 km; in the horizontal scale, 1cm \approx 600 km.

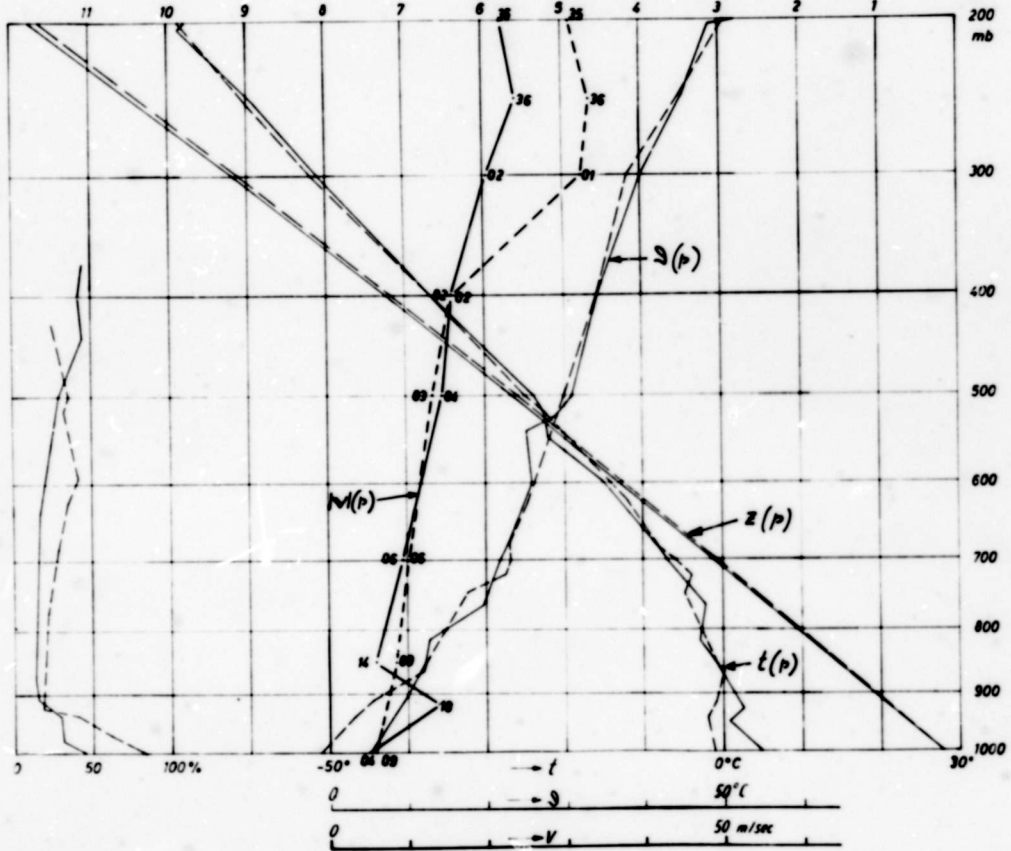


9 Cloud cover at 3 hour intervals; number 8 corresponds to 100% cloud cover.



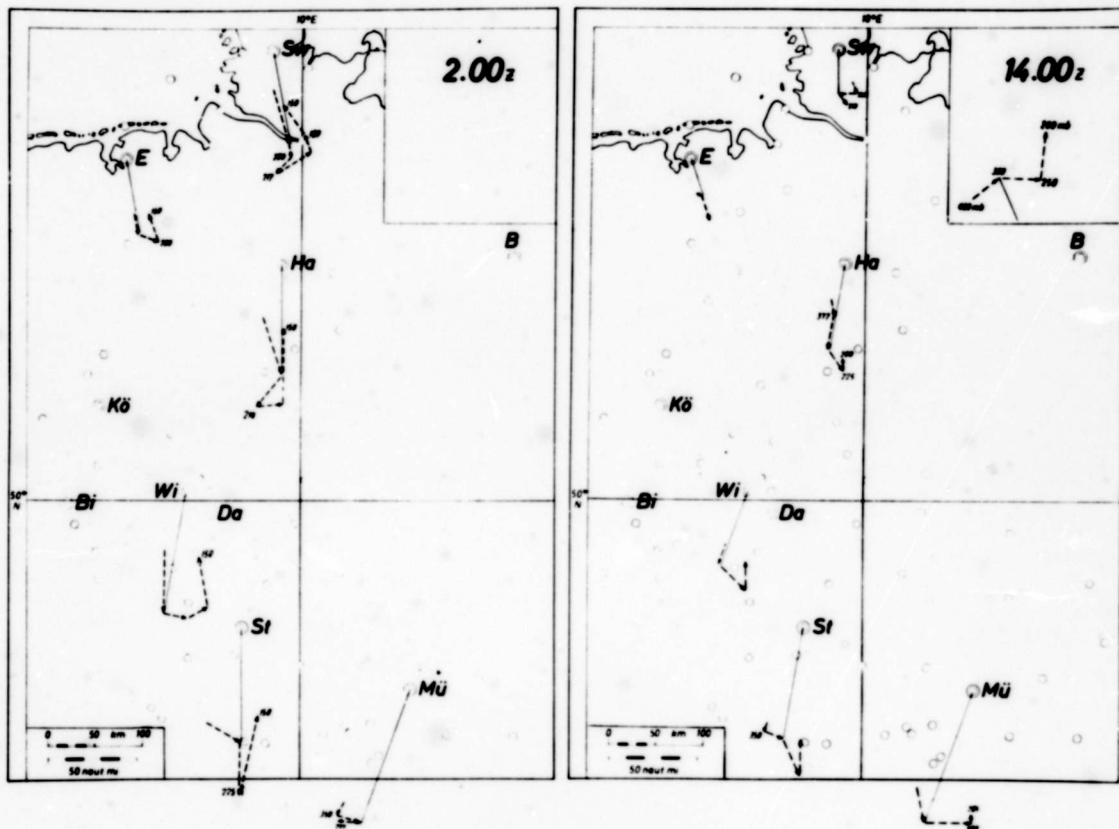
I : 2 March 1957

WIESBADEN 23 1957 --- 03h
--- 14h



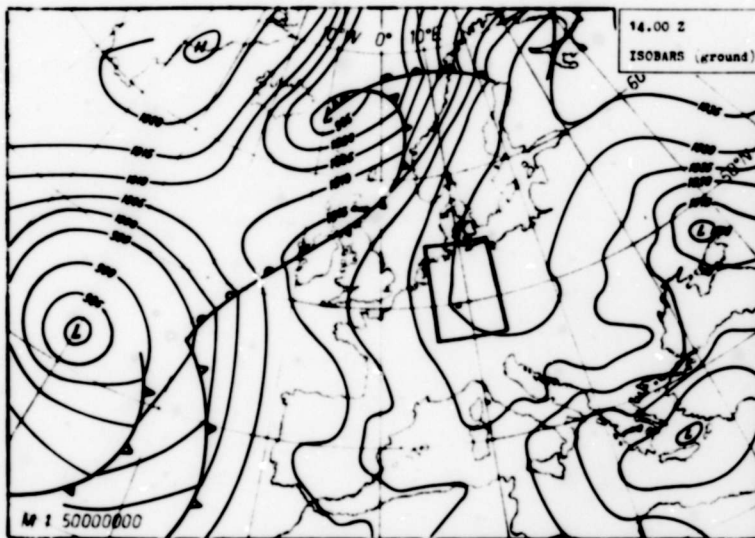
10 Pressure-altitude, pressure-temperature, pressure-potential temperature, relative humidity, and wind profile with inscribed wind direction in units of 10° ($09 \hat{=} \text{wind from E}$). Upper scale from left to right in [km]; lower scales contain temperature t , potential temperature Z and wind velocity v .

I : 2 March 1957



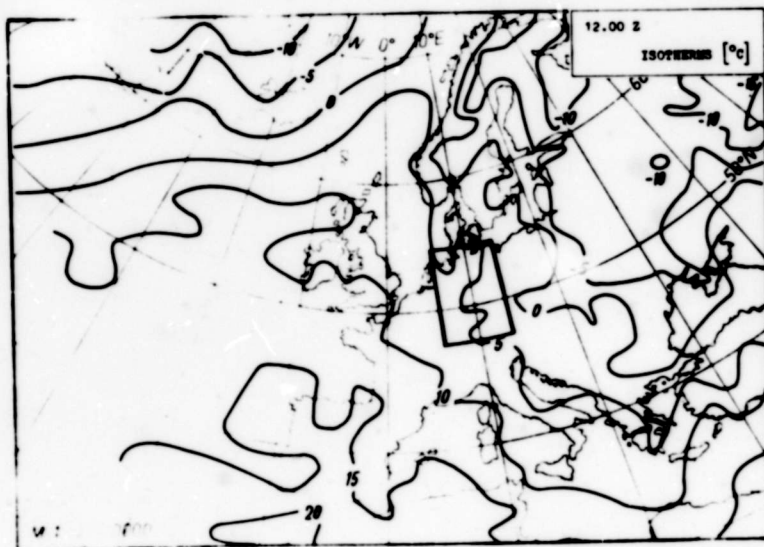
- 11 300 mb wind vectors (full straight line) and vertical shear vector directions (dashed), the succession of which, as a rule, is 400→300→250→200 mb. In cases of exceptions from this rule, the vectors are denoted by the mb value to which they belong. In the scale of wind velocity, 1cm \approx 16 m/sec.

I : 2 March 1957



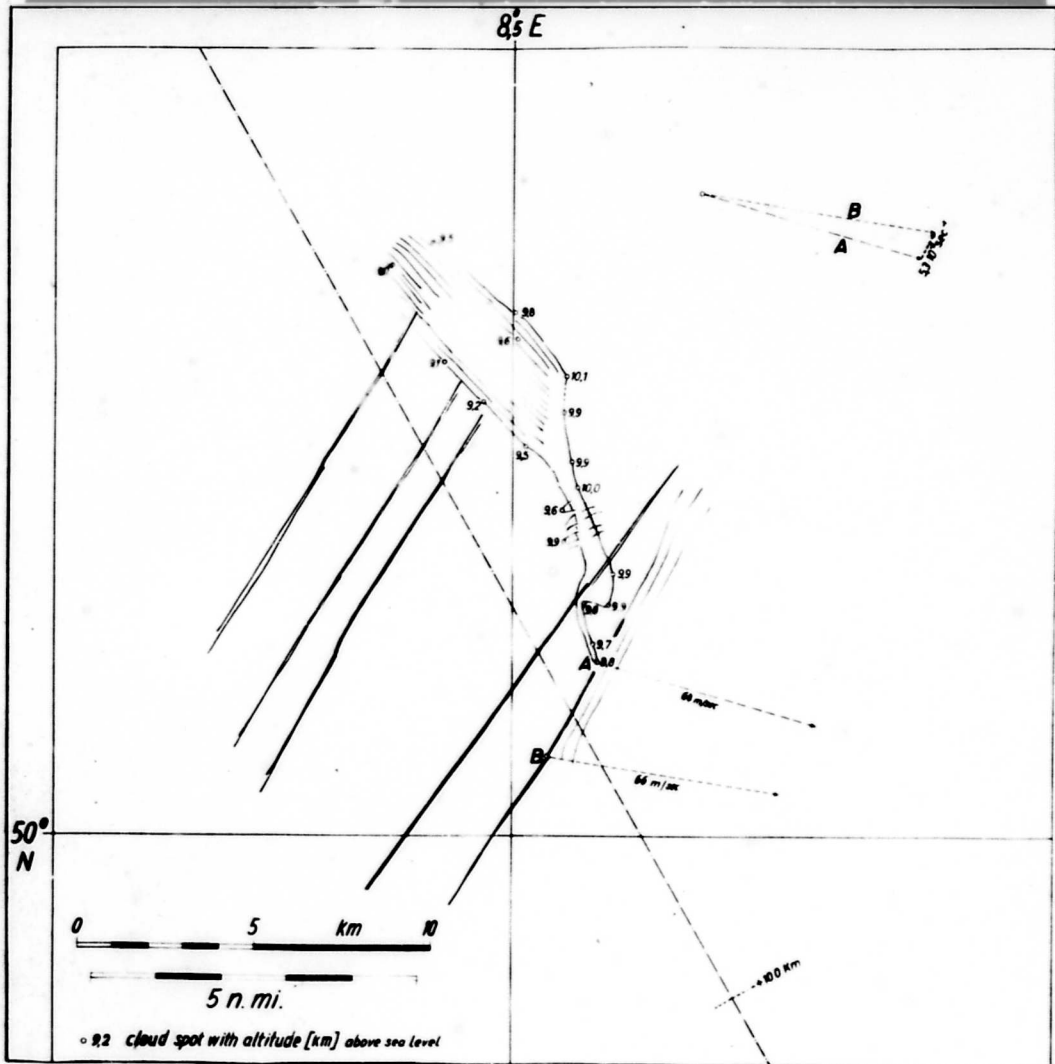
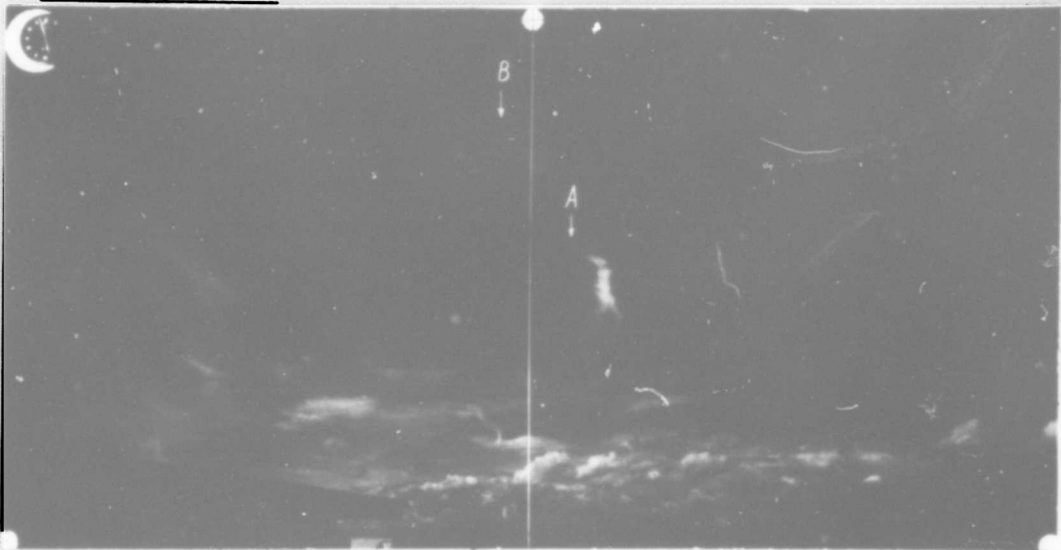
12 Surface isobars

13 Surface isotherms



II : 23 Sept 1957

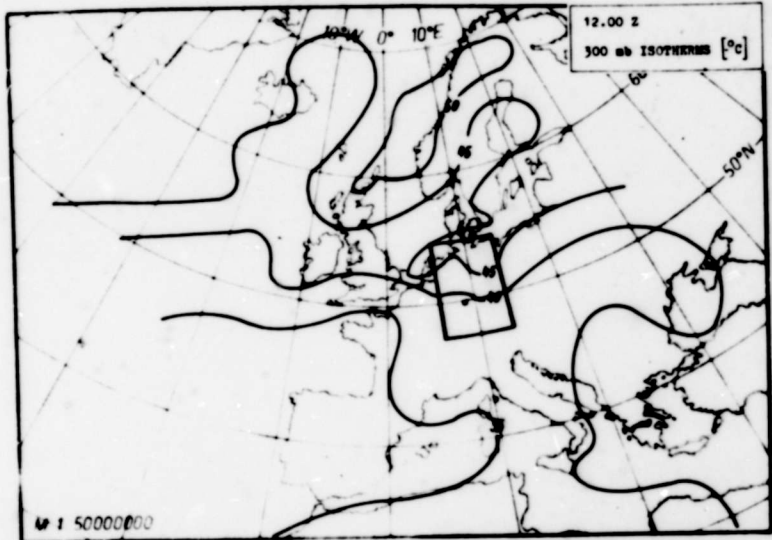
-19-



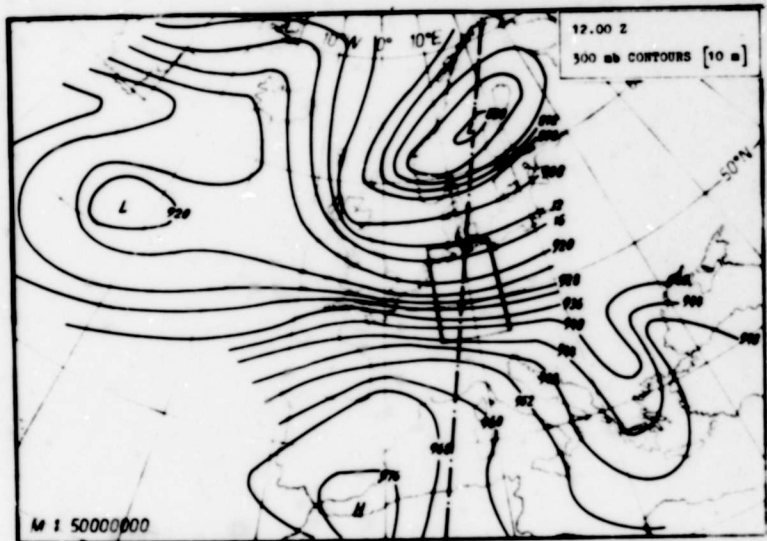
1 Photograph at left (western) camera toward NNW, depicting the cirrus mapped below, at 11:33.

II : 23 Sept 1957

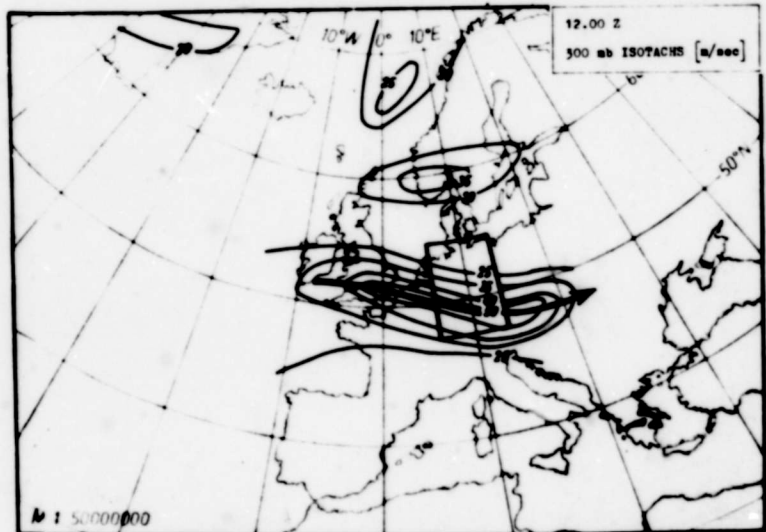
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3

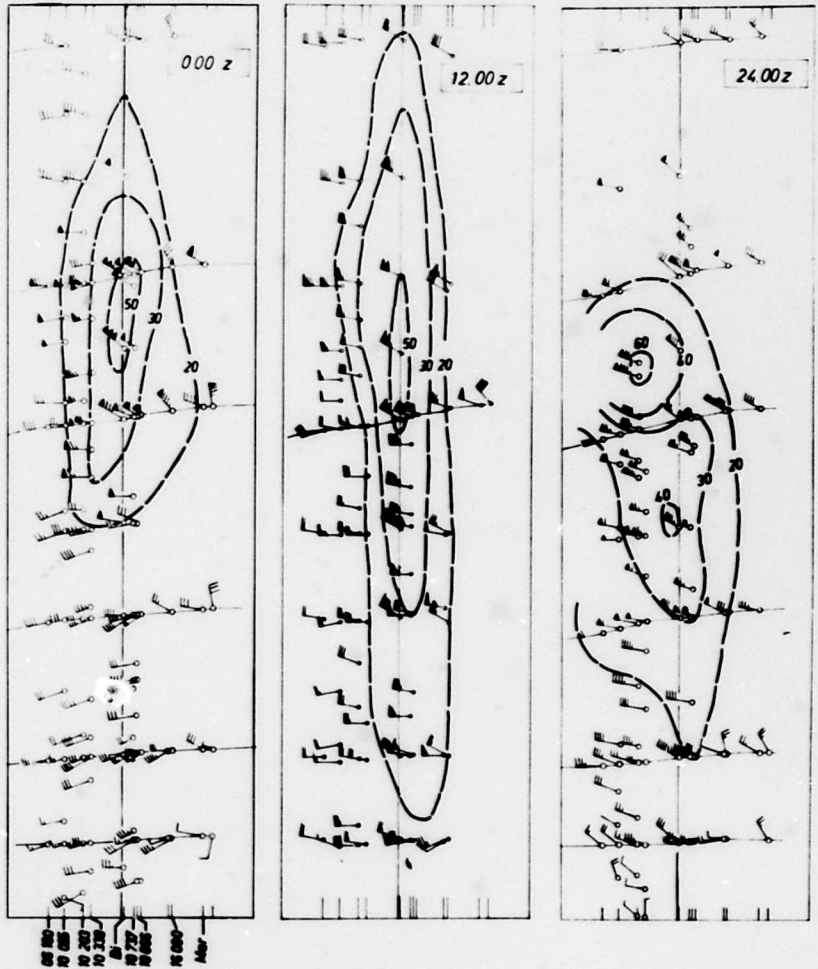


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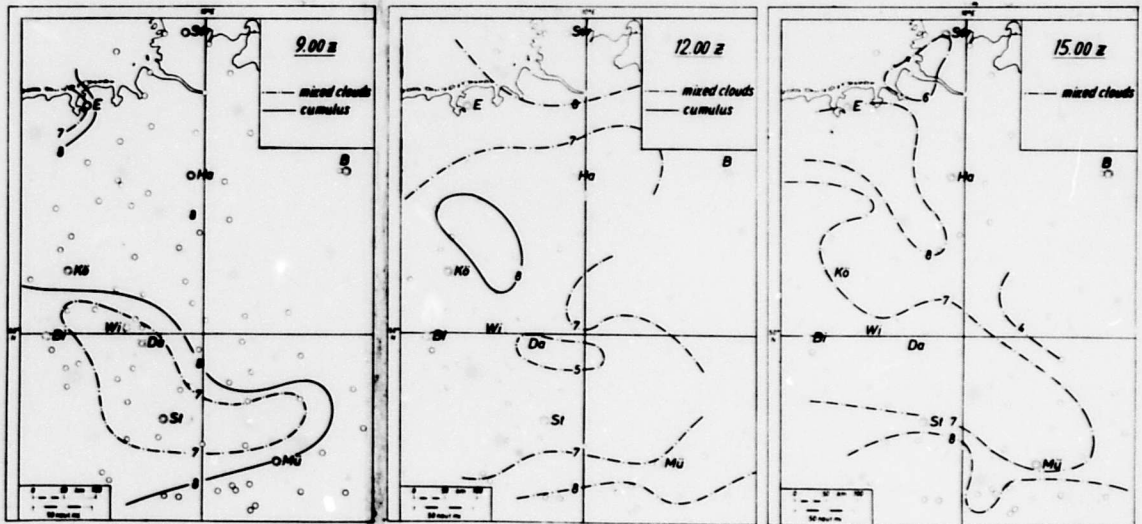


II: 23 Sept 1957

5



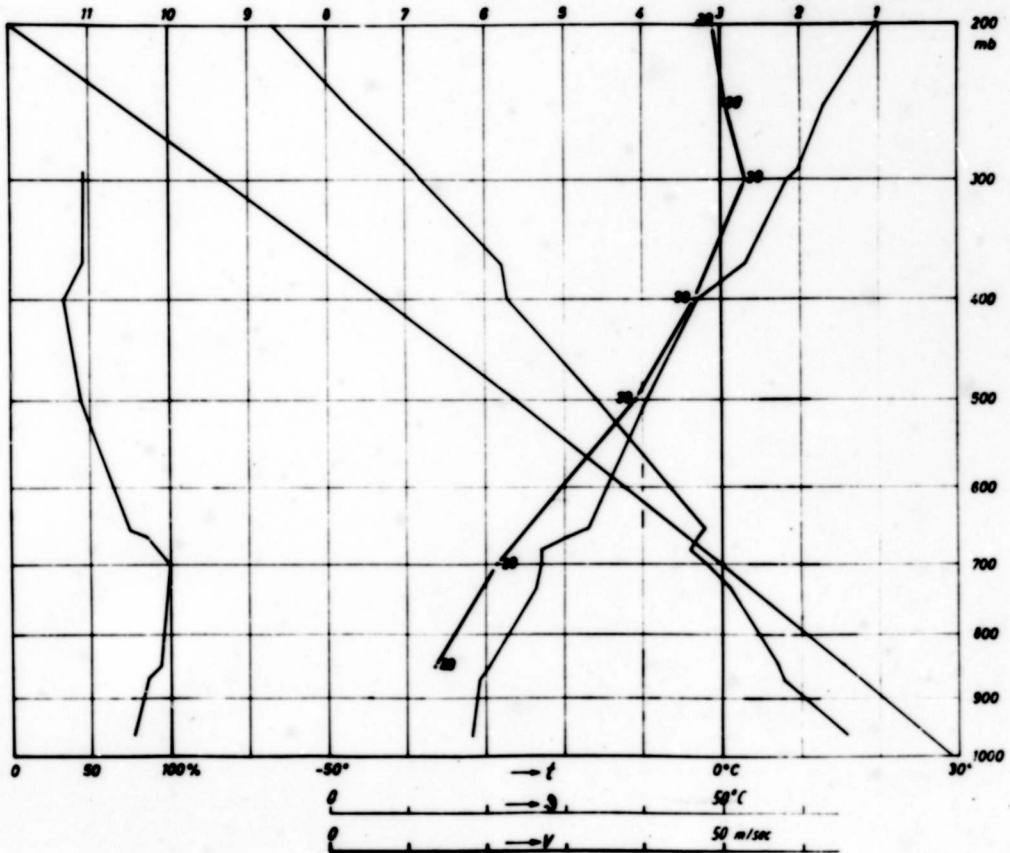
6



II : 23 Sept 1957

7

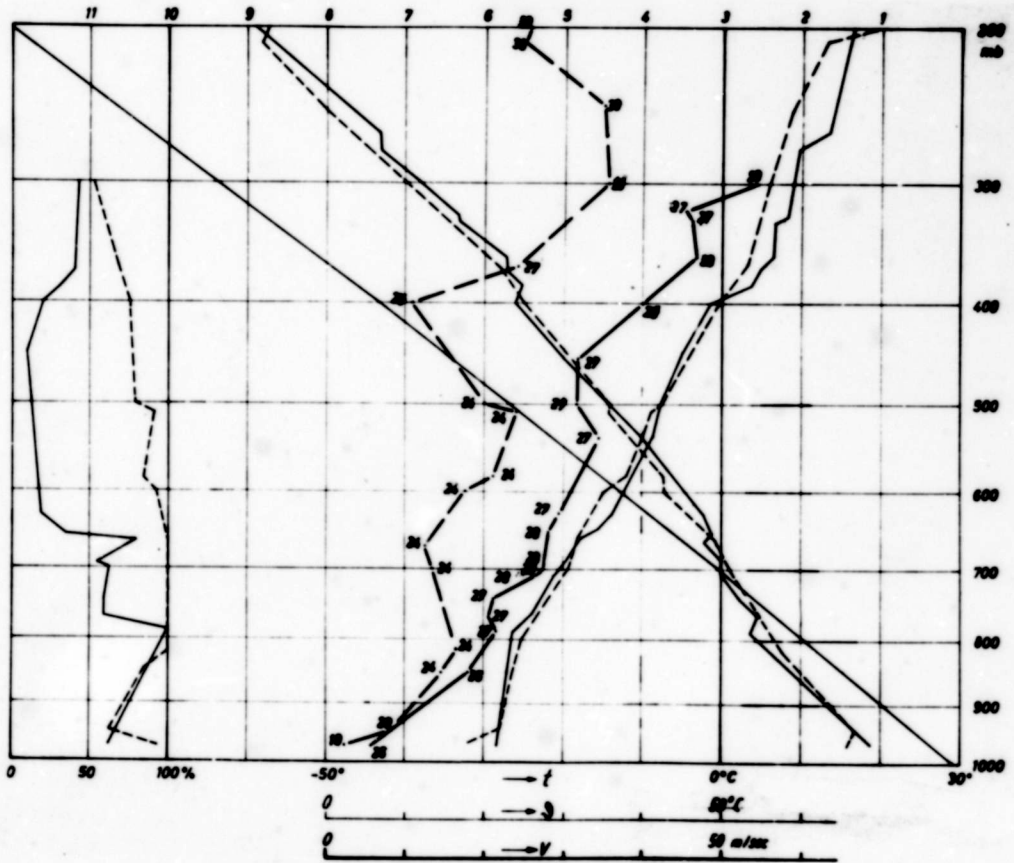
BITBURG 23 9 1957 — 11^h



II : 23 Sept 1957

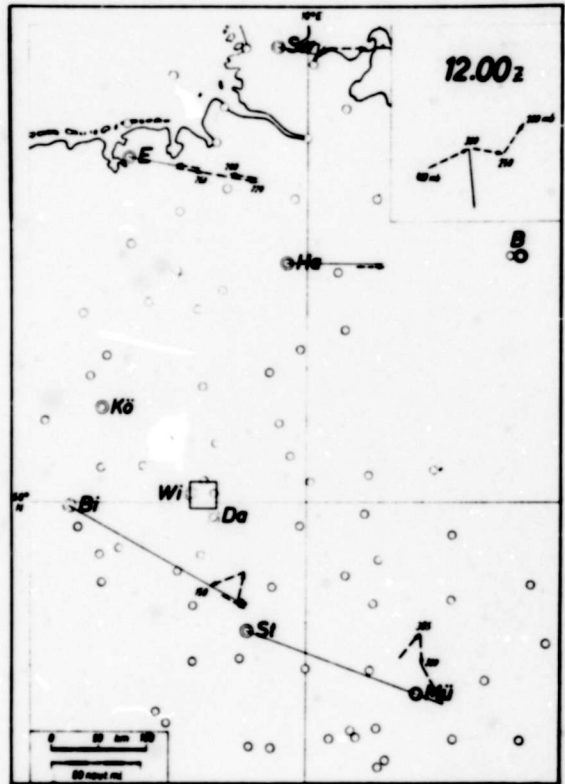
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STUTT GART 23.9.1957 --- 00h
— 12h

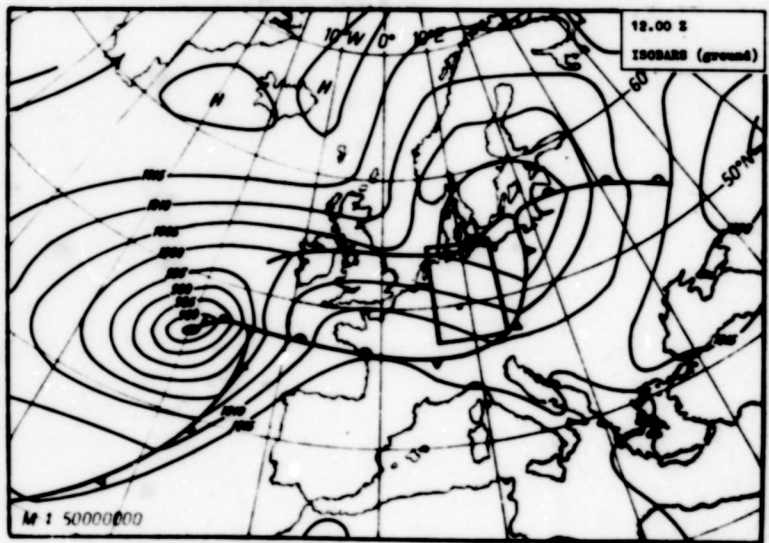


II : 23 Sept 1957

9



10



III : 5 Oct 1962



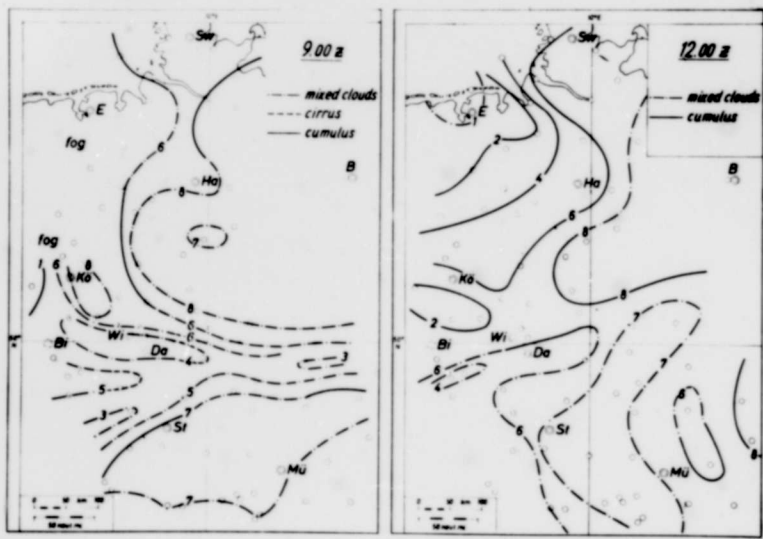
1 Photograph of left (western) camera toward zenith, depicting portion of the band mapped in Fig.2 (9:27).

III : 5 Oct 1962

6

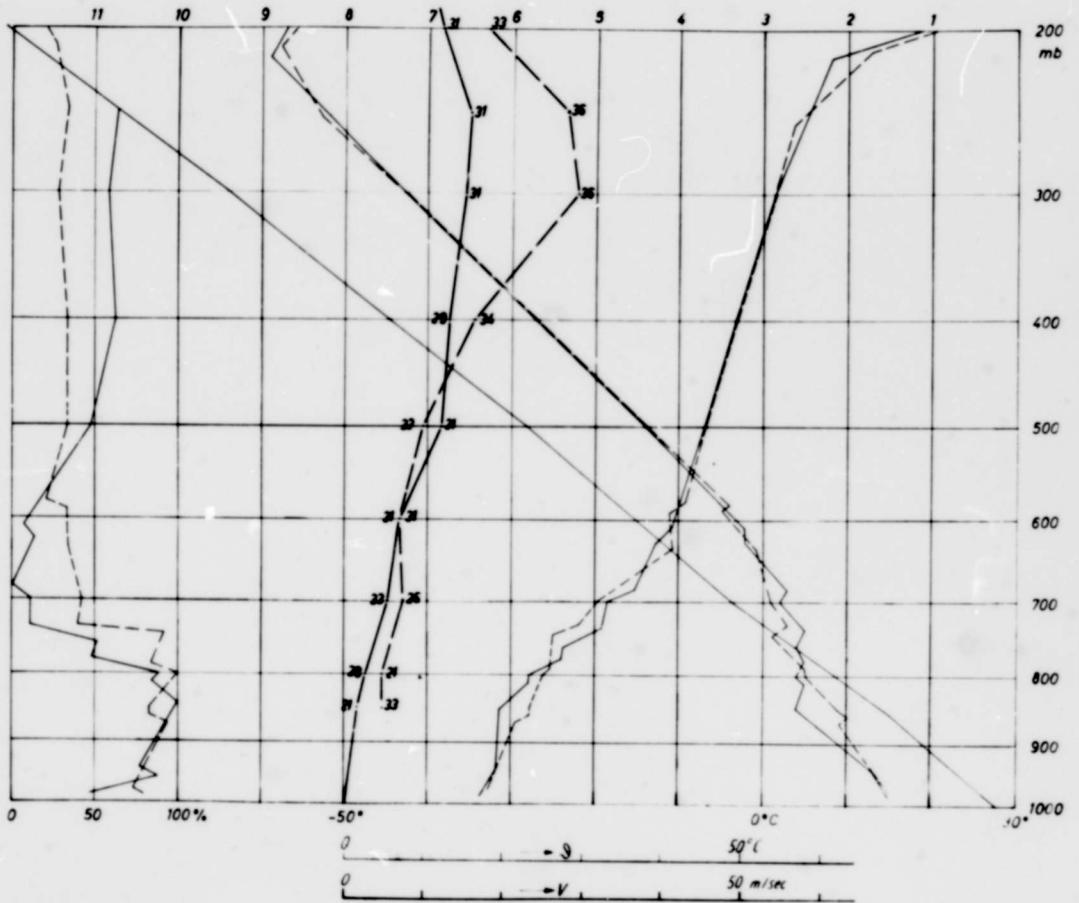


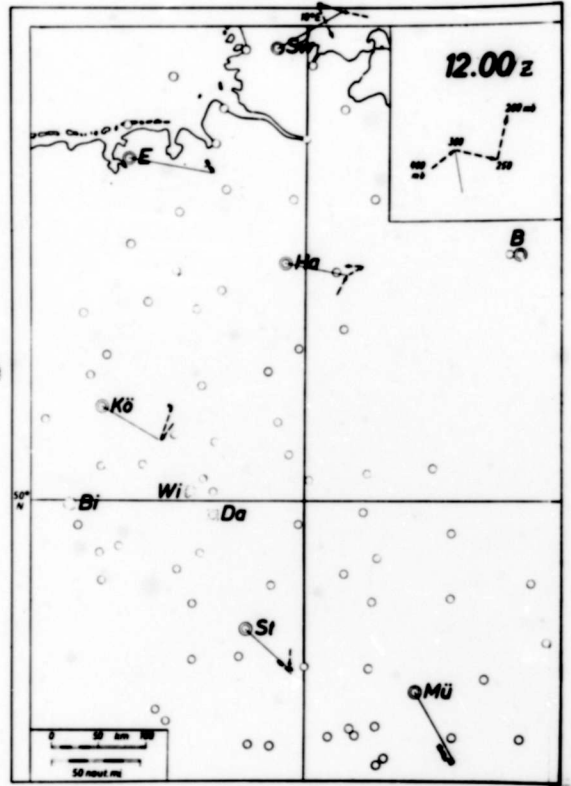
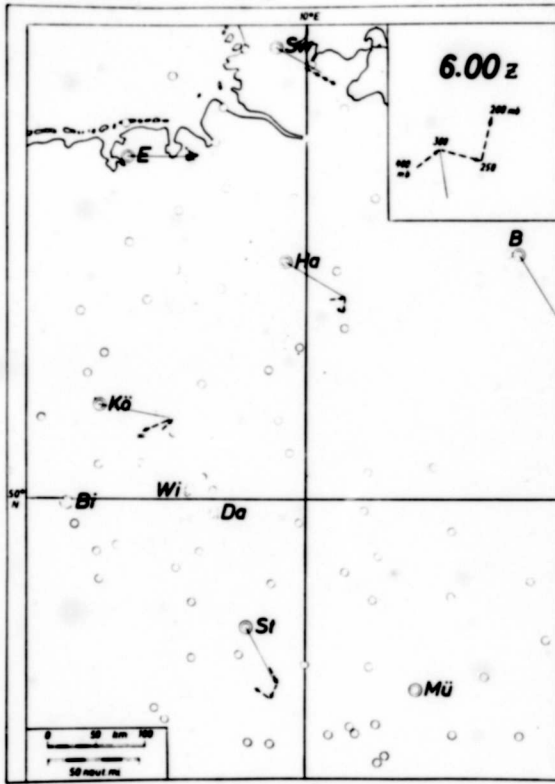
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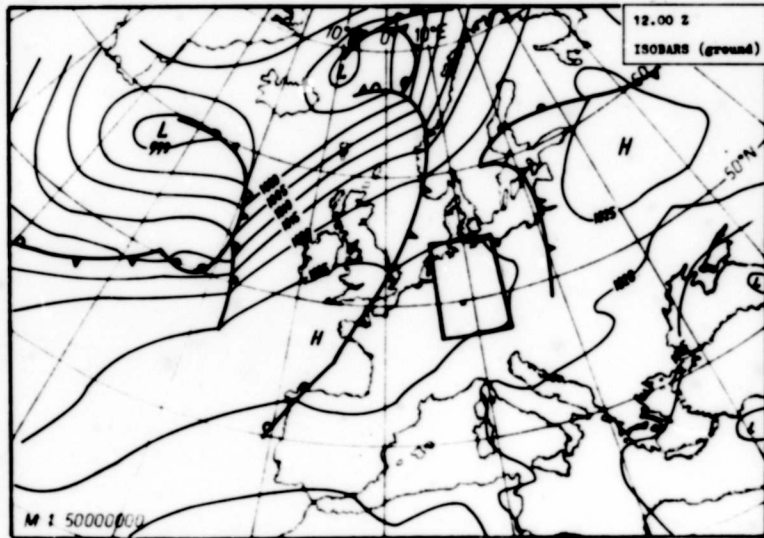
III : 5 Oct 1962

STUTT GART 5.10.1962 --- 0.0h
" " --- 12h

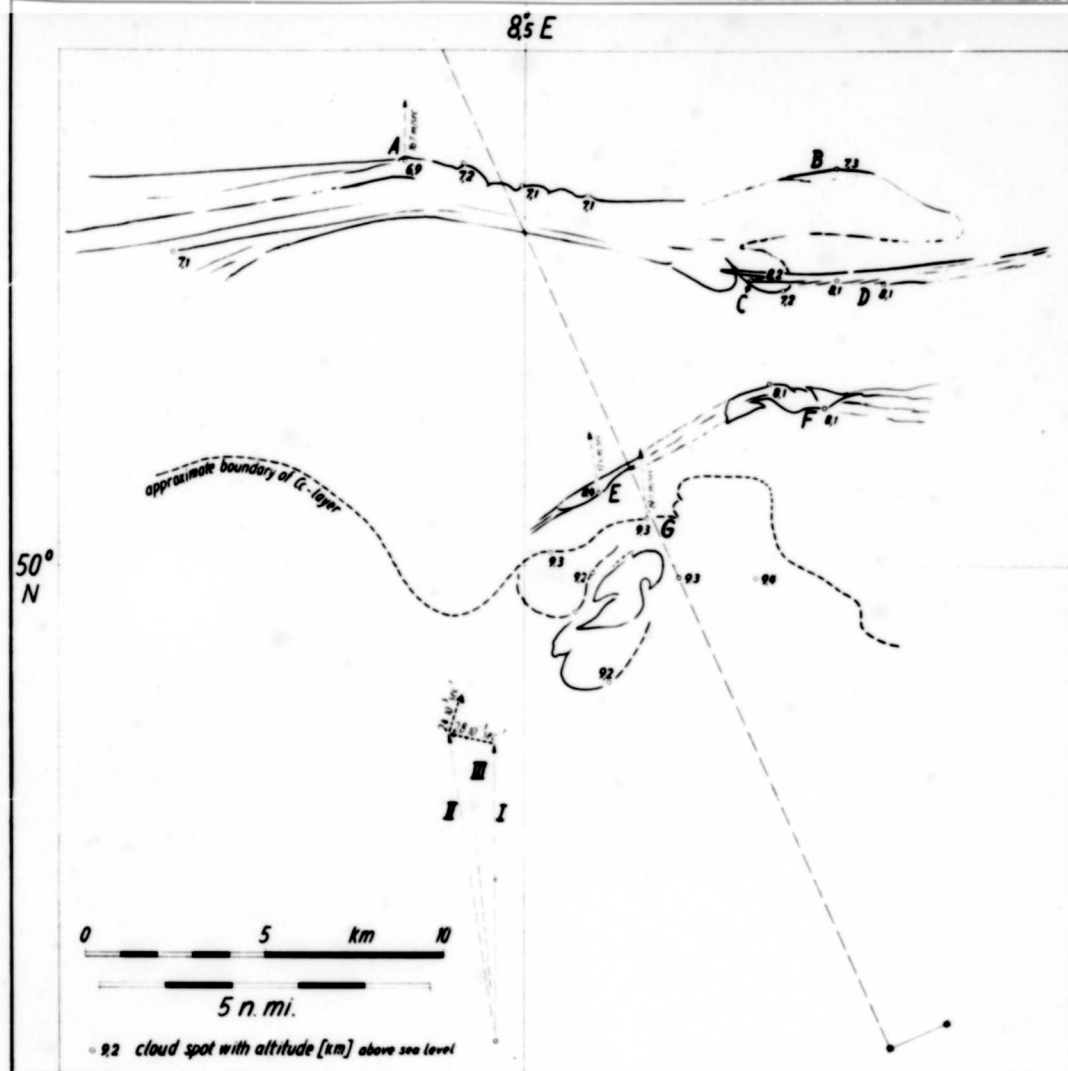




9



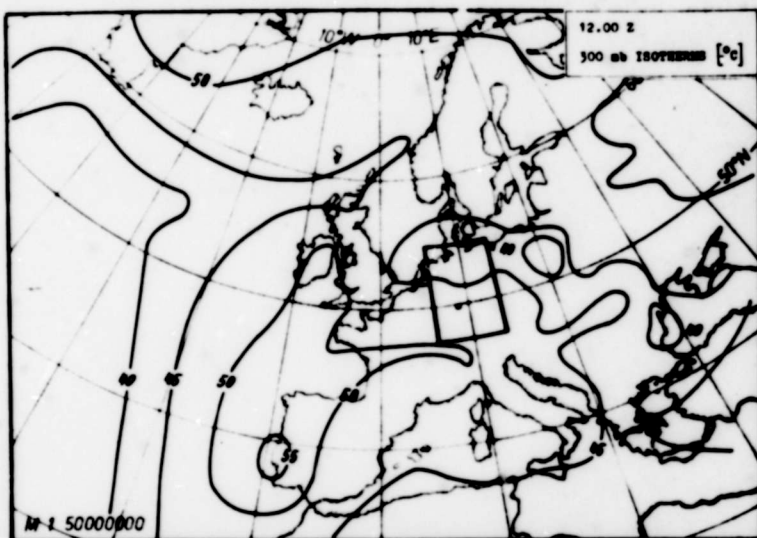
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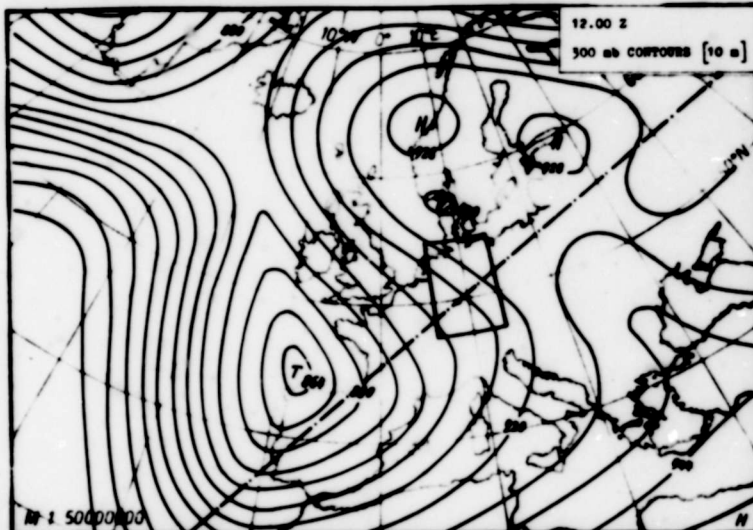
1 Photograph and plan; vertical fiducial line in the photograph marks the taking direction (dash-stippled in plan, starting at left camera of baseline, below right).

IV : 6 Nov 1962

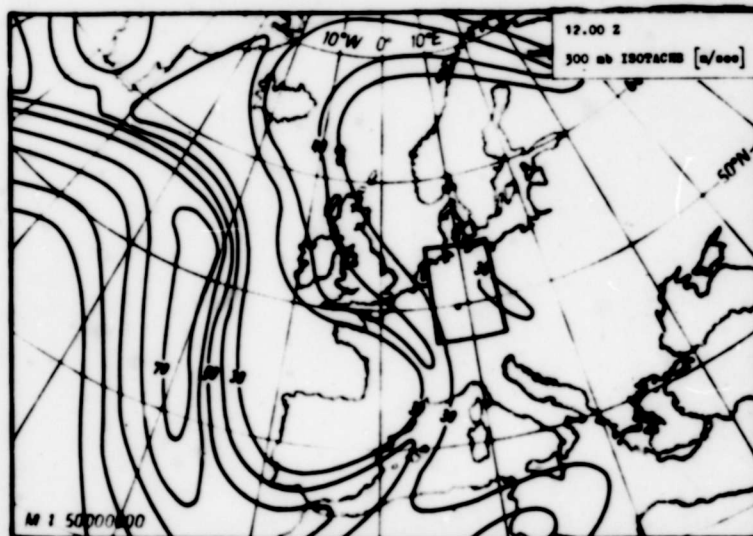
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3

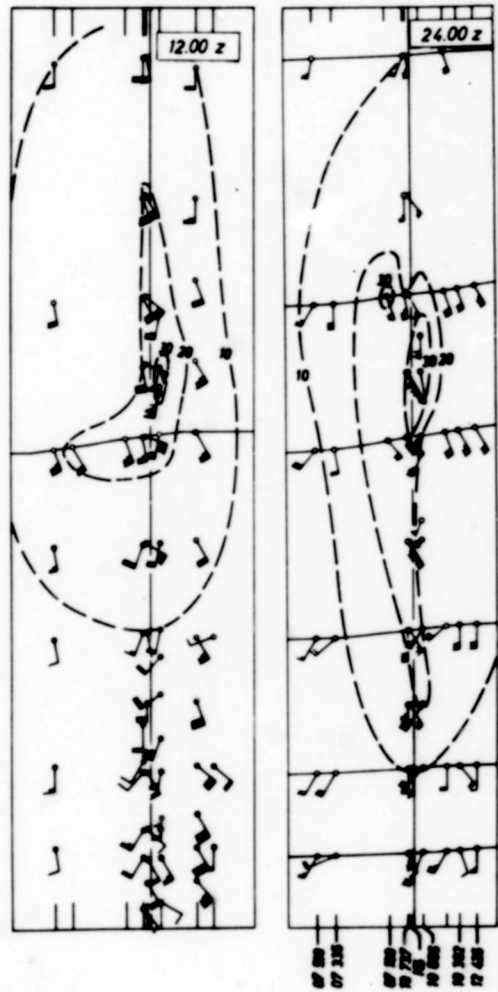


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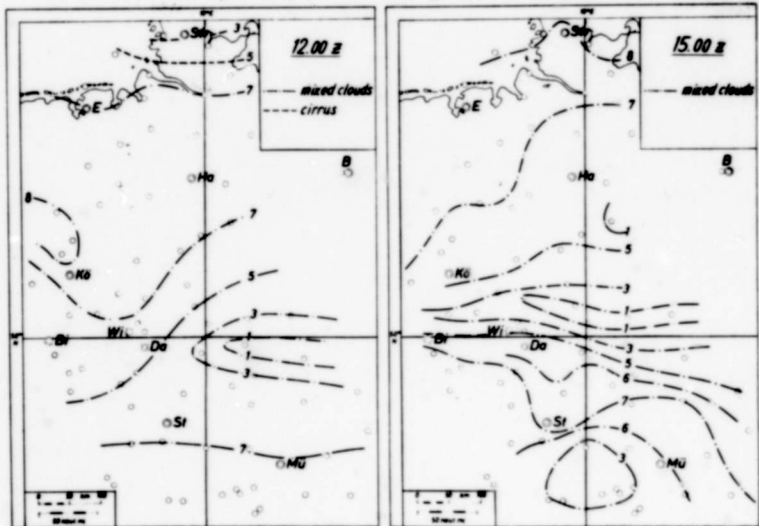


IV : 6 Nov 1962

5

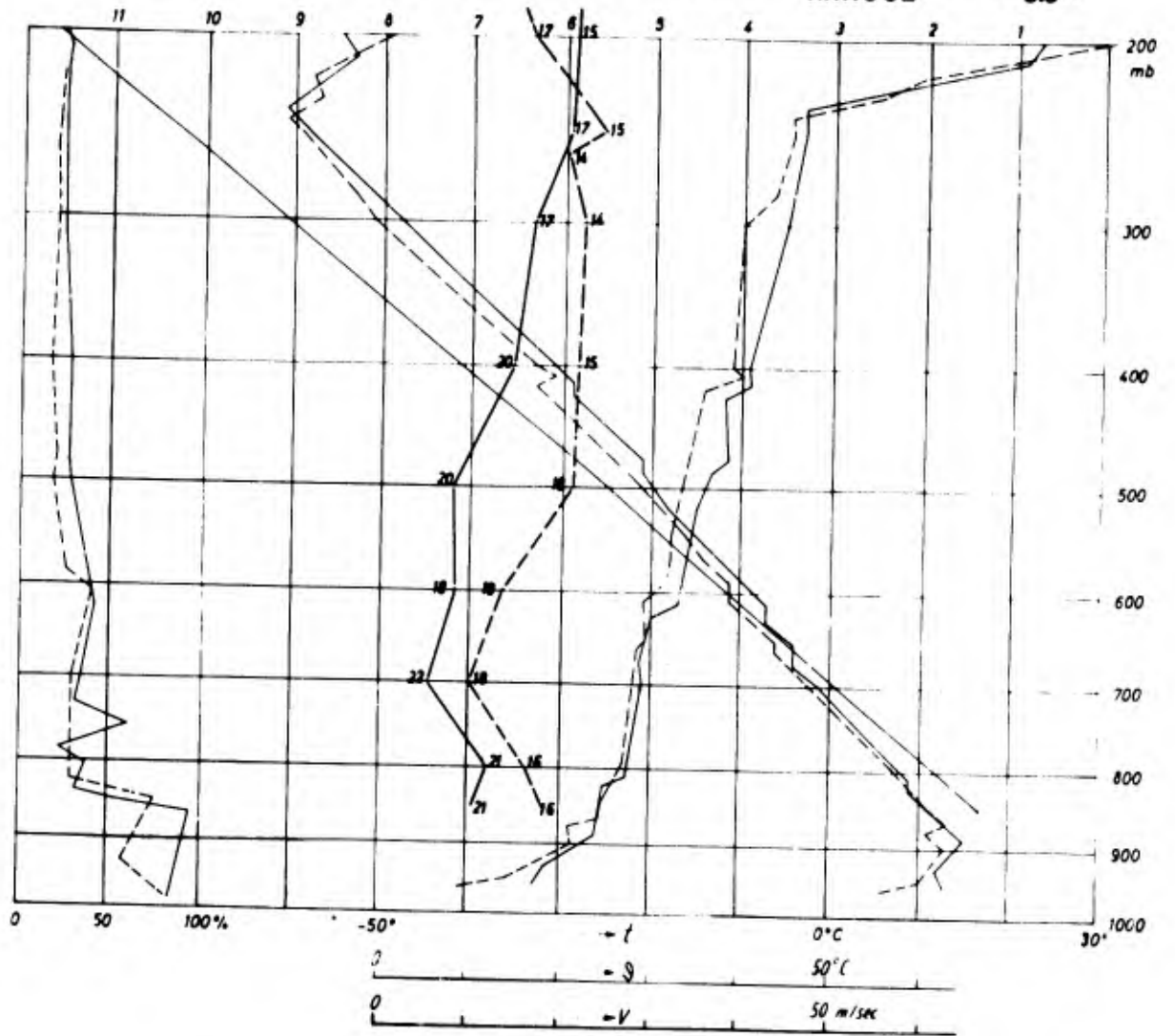


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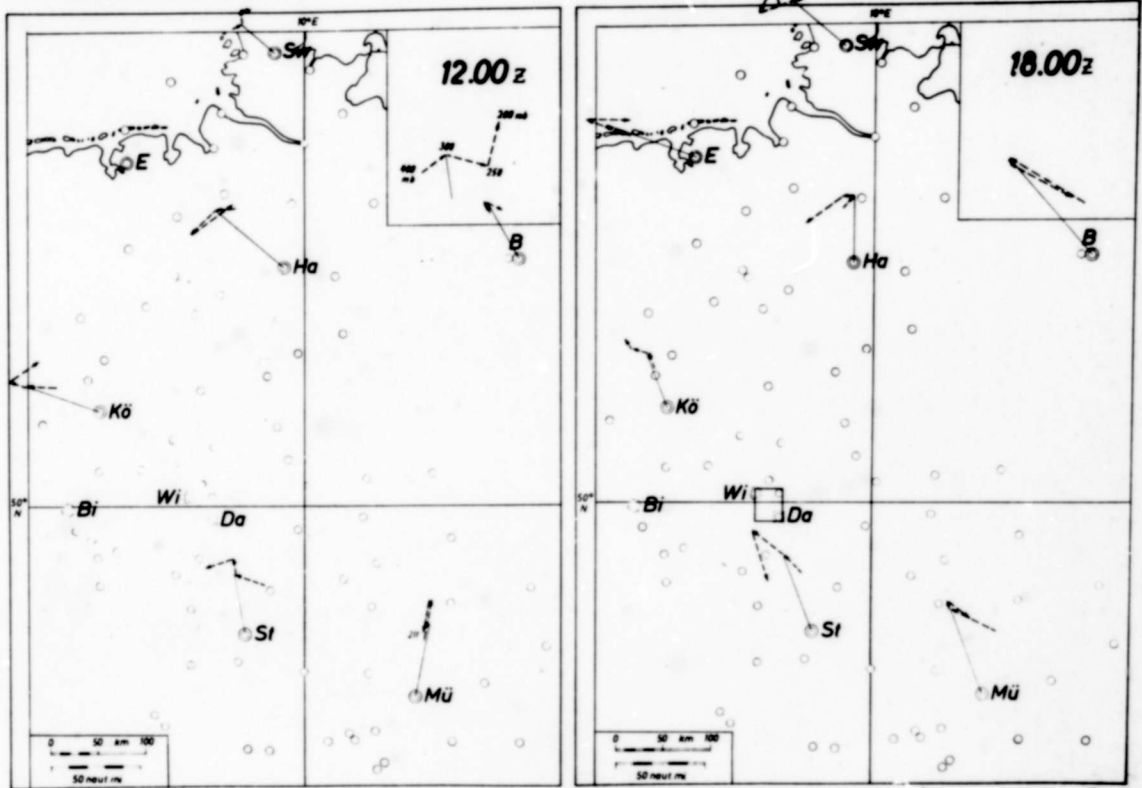


IV : 6 Nov 1962

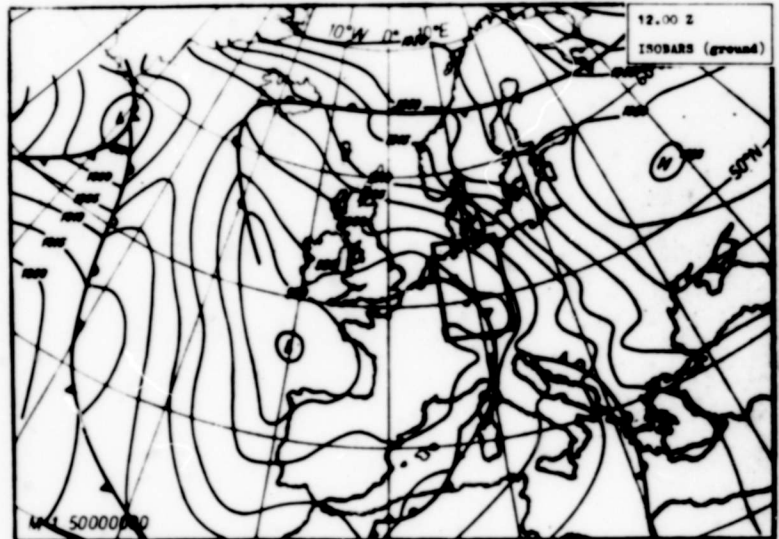
STUTT GART 6.11.1962 — 12h
7.11.1962 - - - 00h



IV : 6 Nov 1962

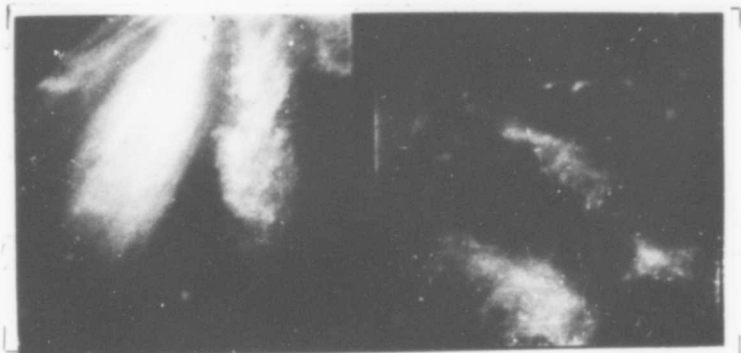


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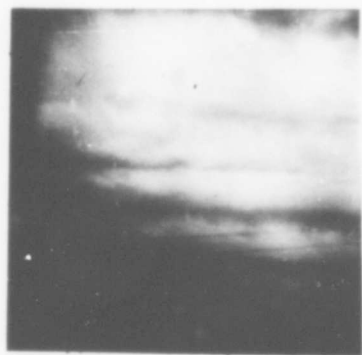


9

V: 7 Nov 1962



1 Photos approximately toward band orientation

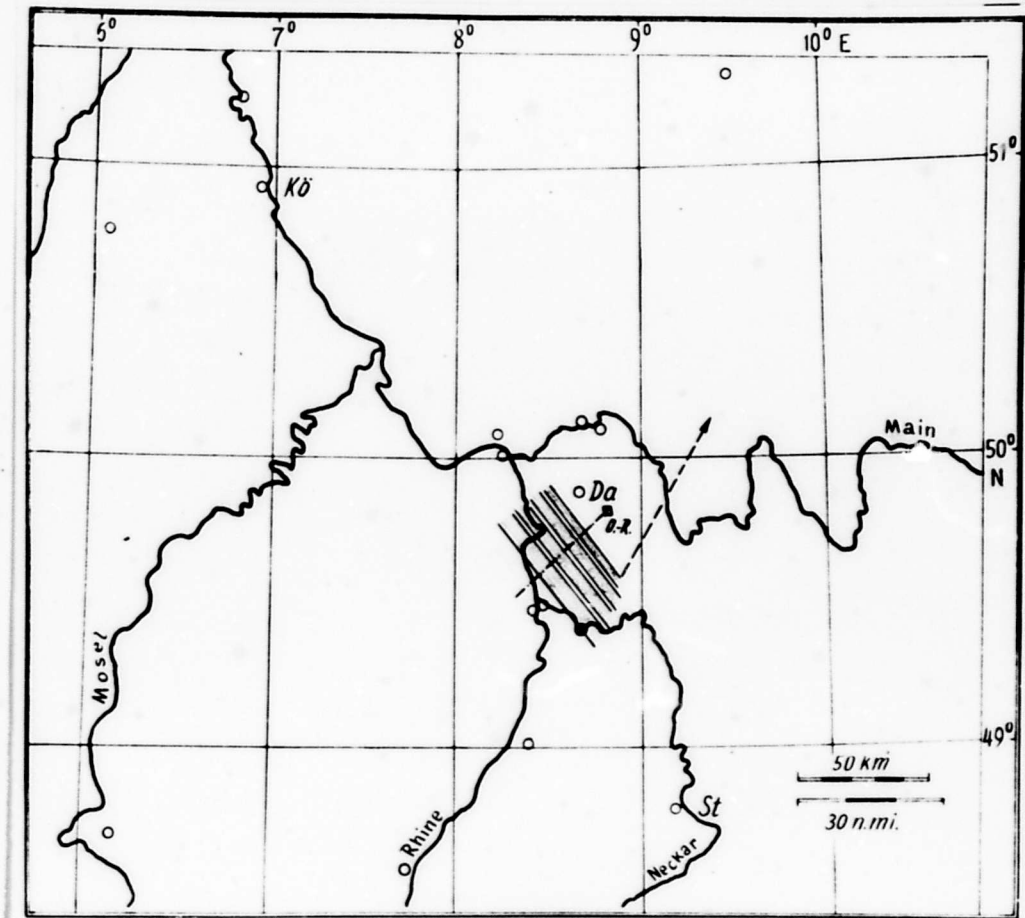


2 Photo toward SW



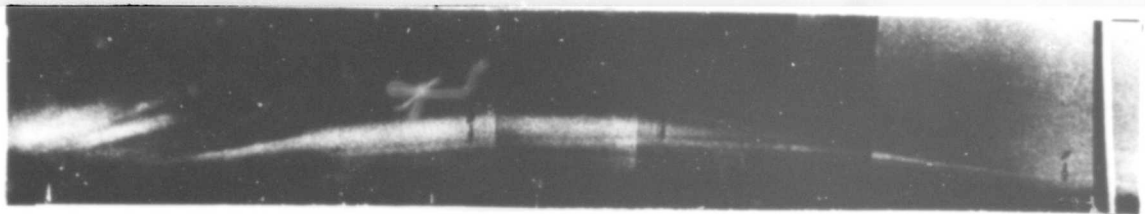
3 Photo toward W; picture horizon and fiducial line dash-stippled. Migration of bands within three minutes.

V : 7 Nov 1962

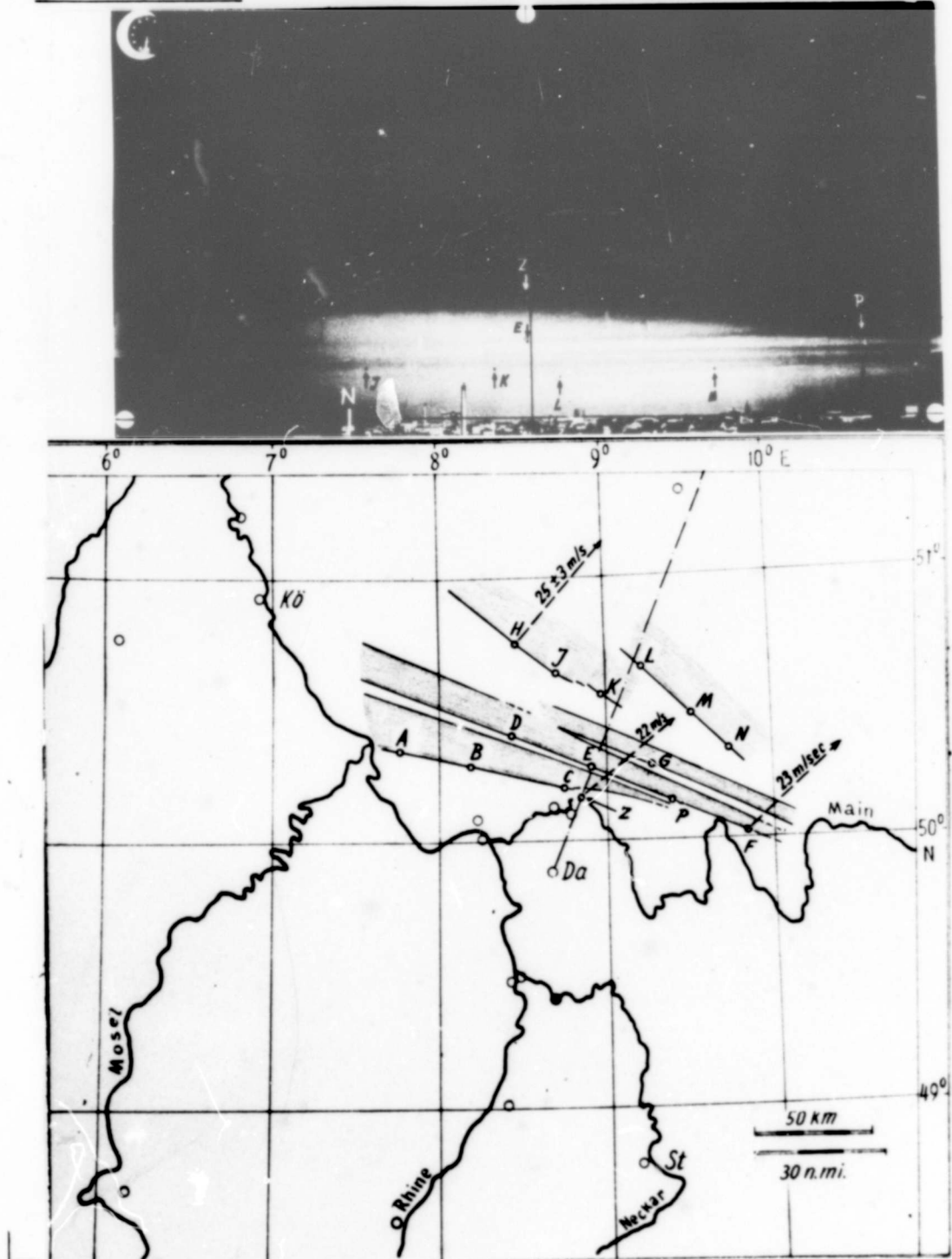


4 position of clouds, depicted in Fig.2; taking axis is dash-stippled

5 panorama view of cloud bands which are mapped in Fig. 6.



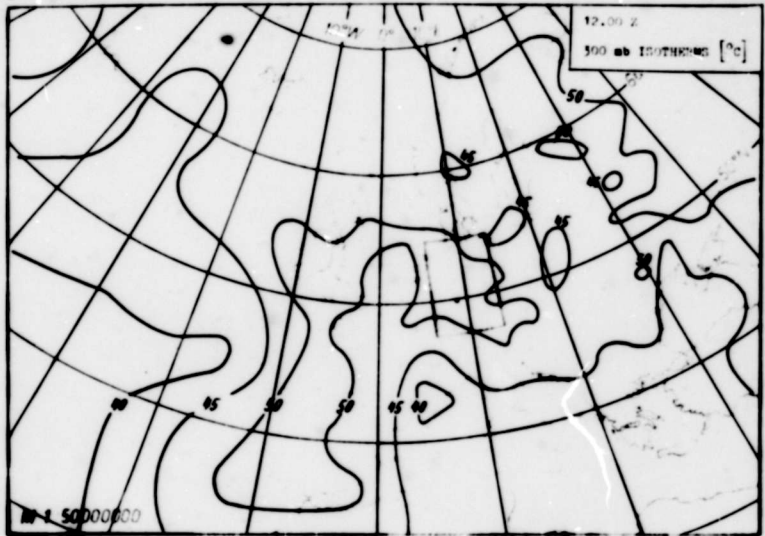
V : 7 Nov 1962



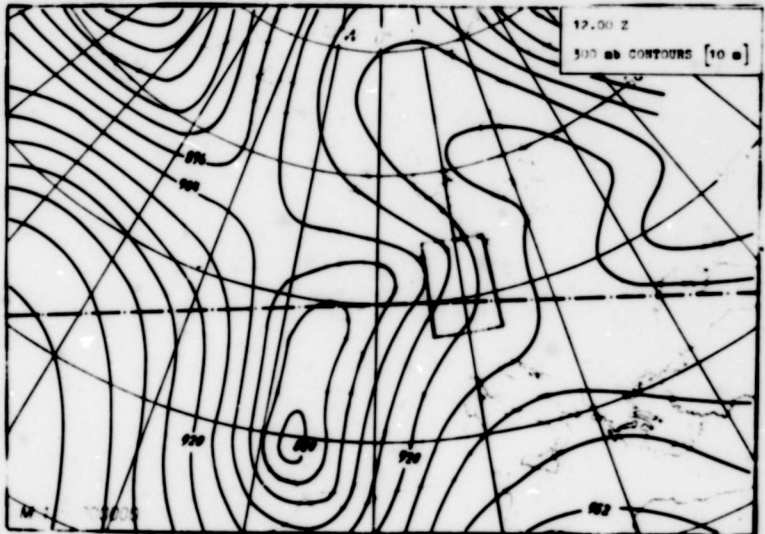
6 Left stereo camera photograph of bands and plan showing their position; taking direction represented by fiducial line in the photograph, dash-stippled in plan.

V : 7 Nov 1962

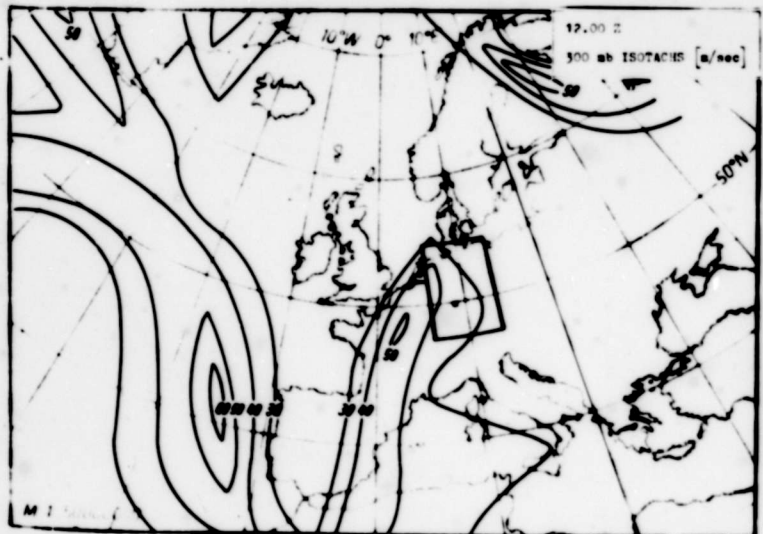
7



8



9

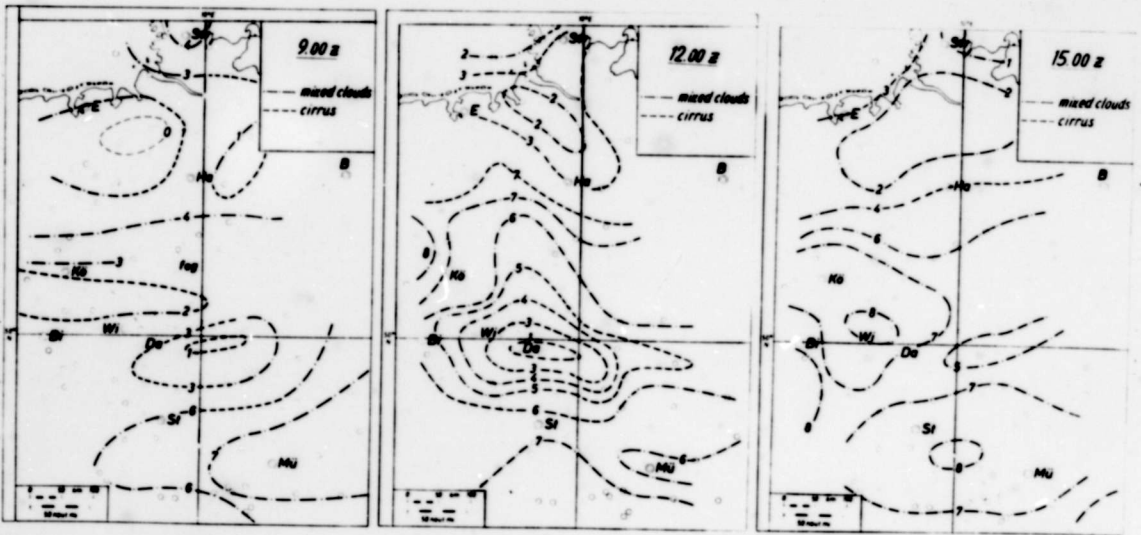


V : 7 Nov 1962

10

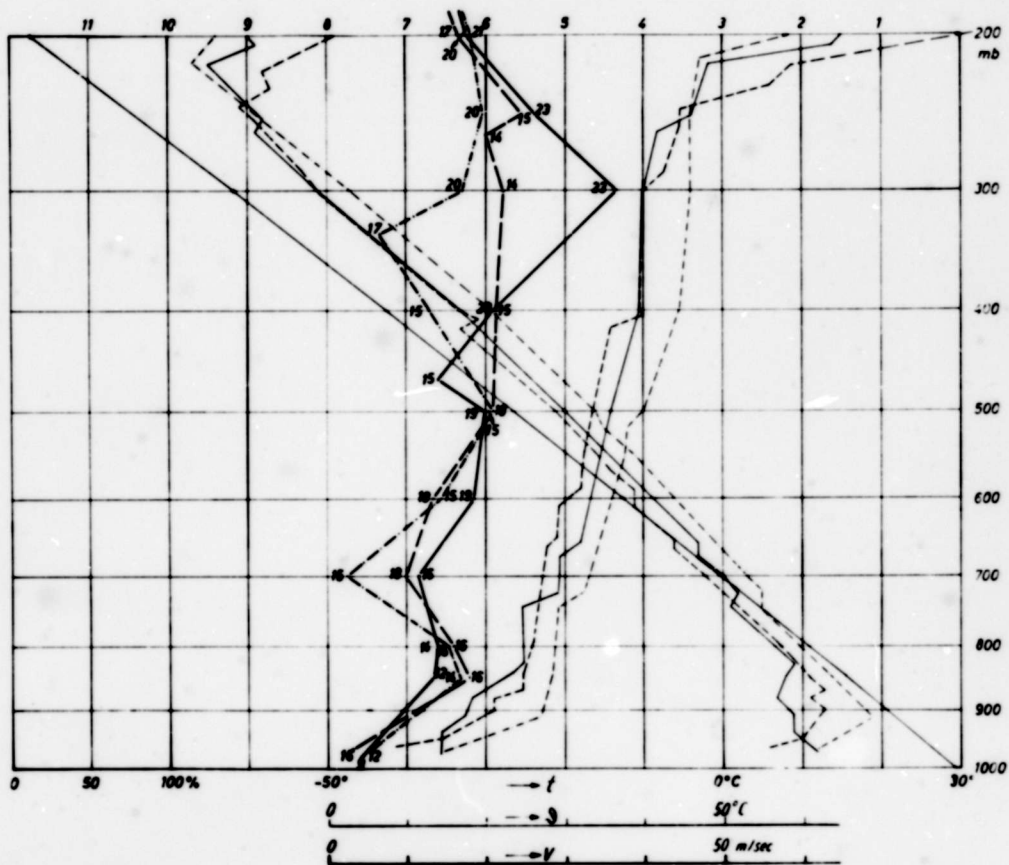


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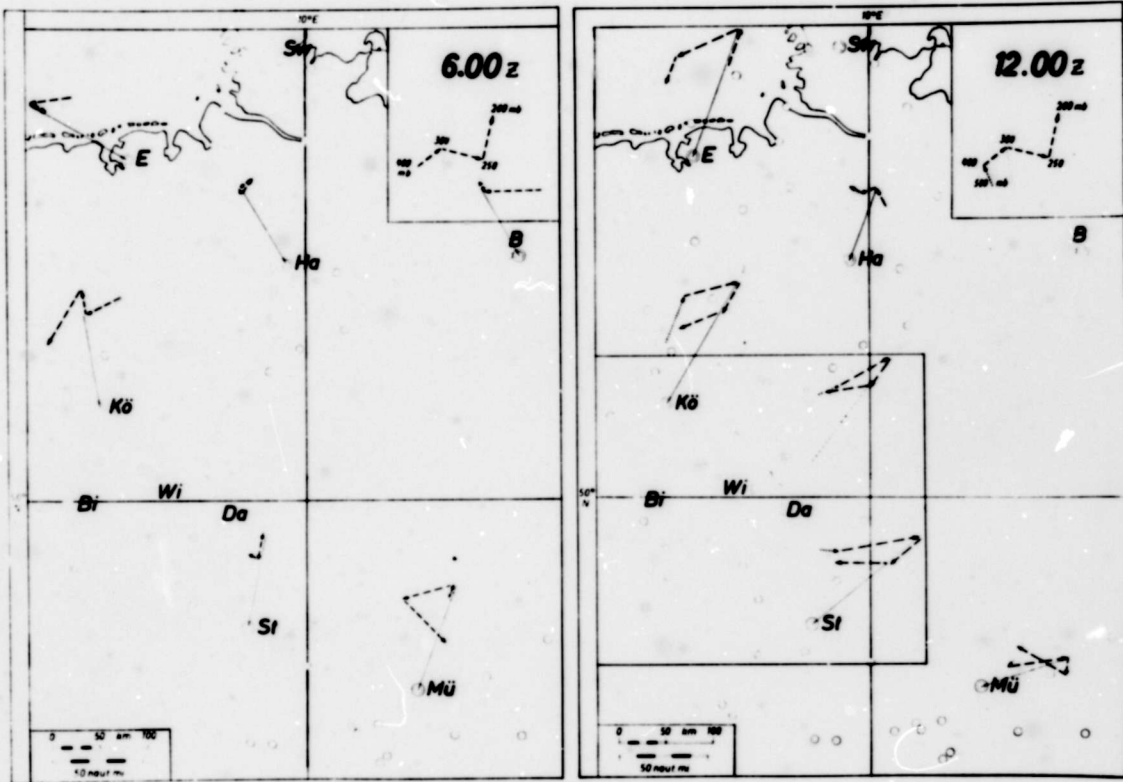


V : 7 Nov 1962

STUTTGART 7.11.1962
---00h
—12h
- - -24h



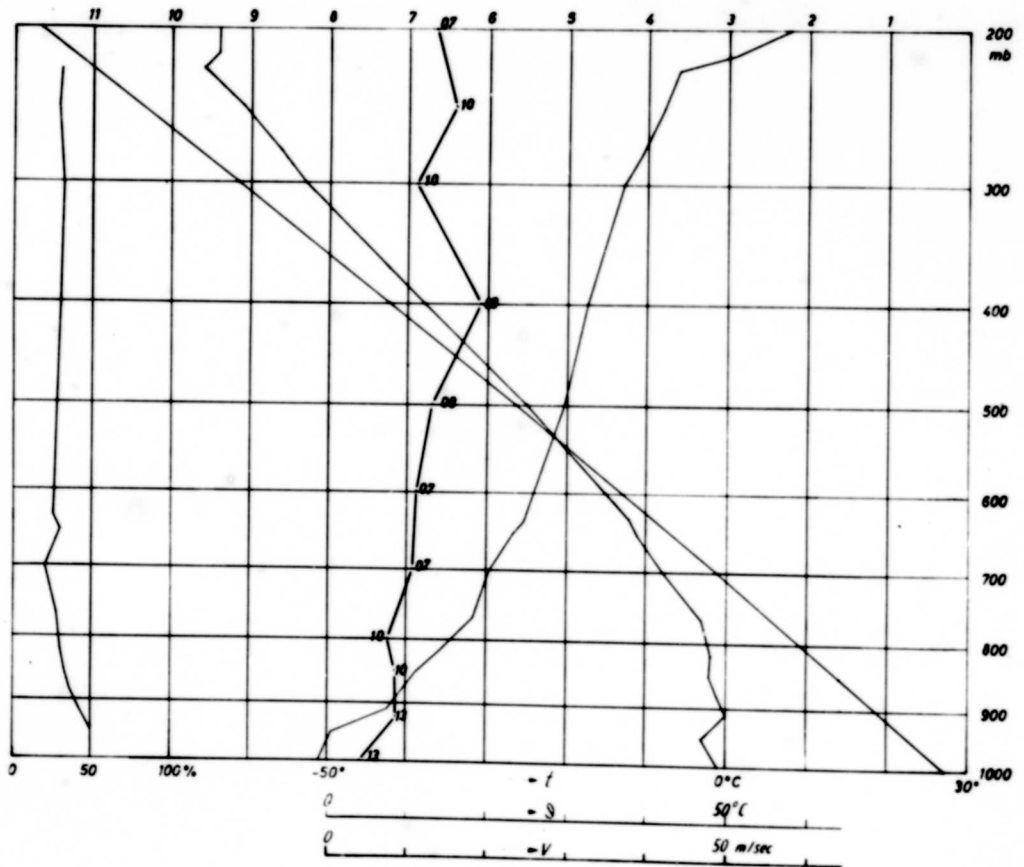
V : 7 Nov 1962



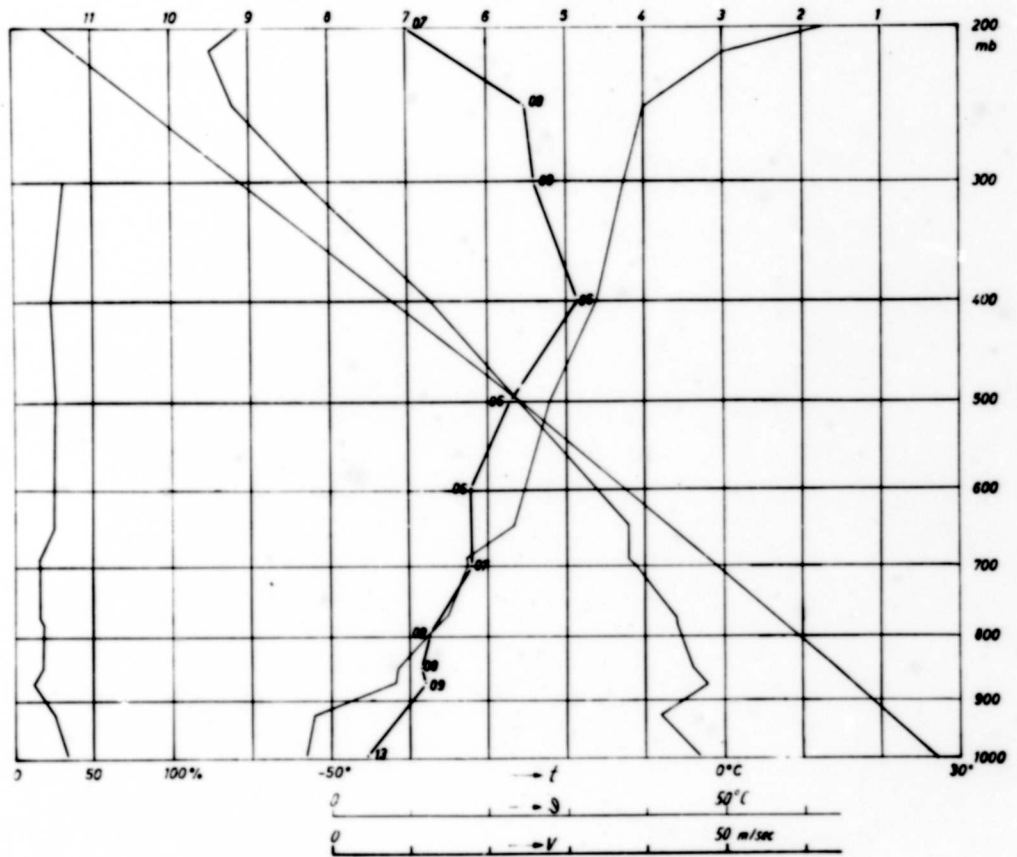
VI : 1 March 1963



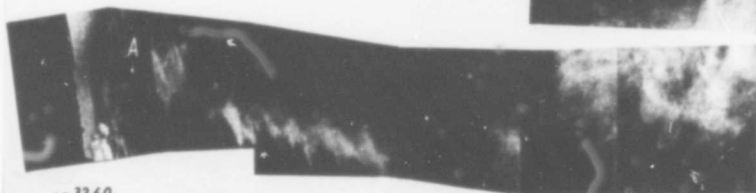
KÖLN 1.3.1963 — 12h



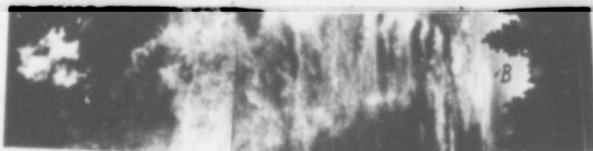
STUTTGART 1.3.1963 — 12^h



KNIEBIS . Wasserbehälter 31 August 1956

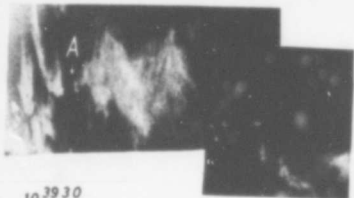


10 32 40



panorama I

10 38 30

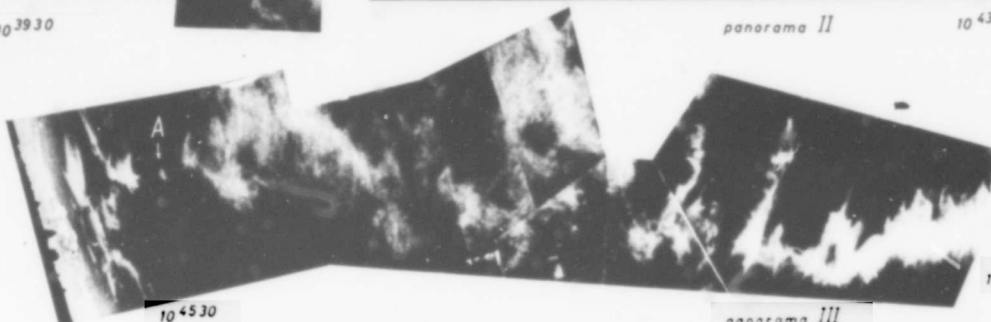


10 39 30



panorama II

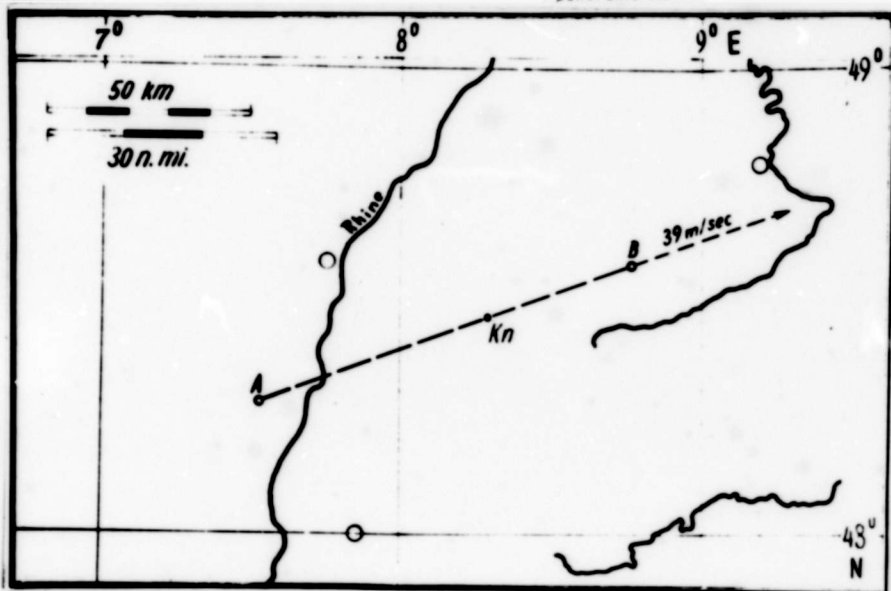
10 43 30



10 45 30

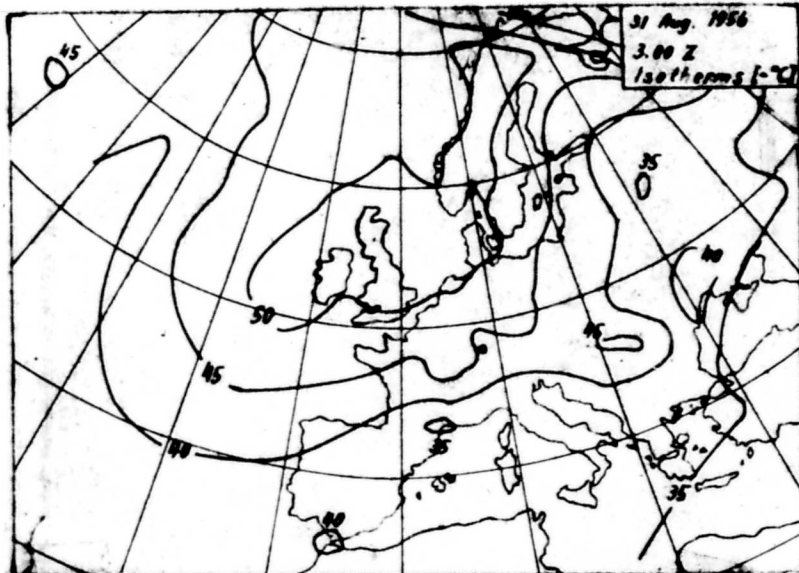
panorama III

10 47 30

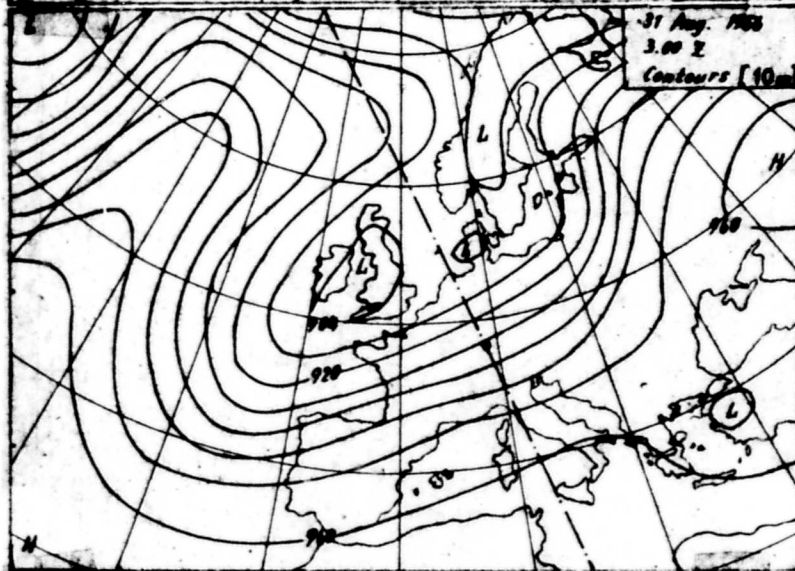


1 Three panoramas of cirrus band at consecutive times (CET!). Band schematically represented by its axis (long dashed) in plan. Photos taken in Kniebis (Kn) by KOSCHMIEDER.

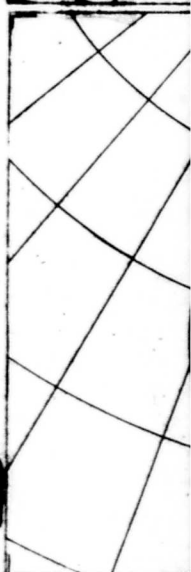
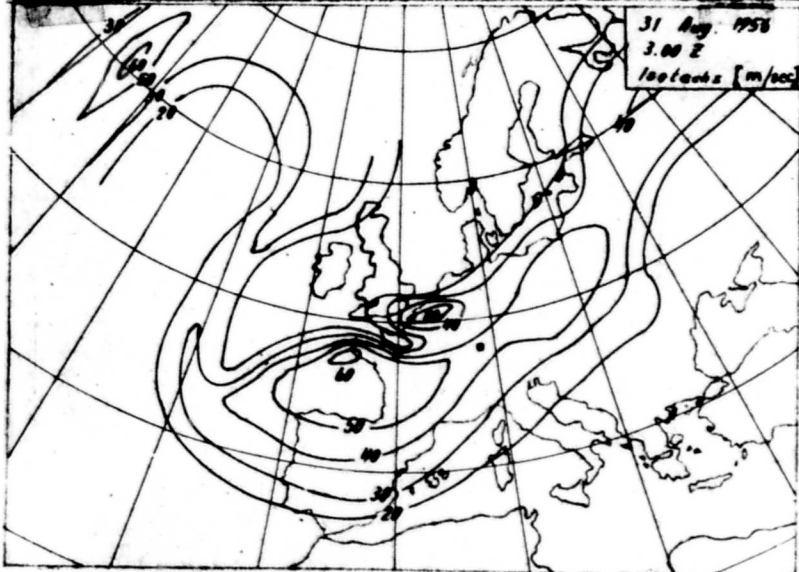
2a



3a

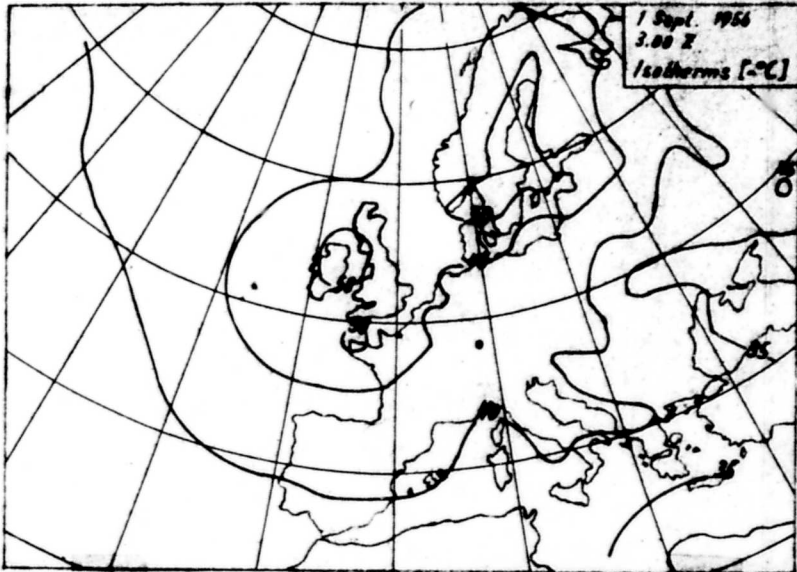


4a

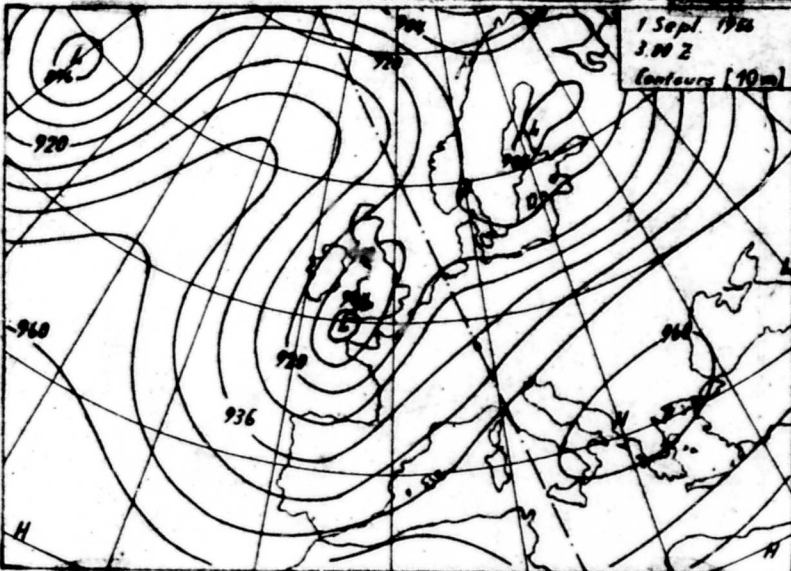


A

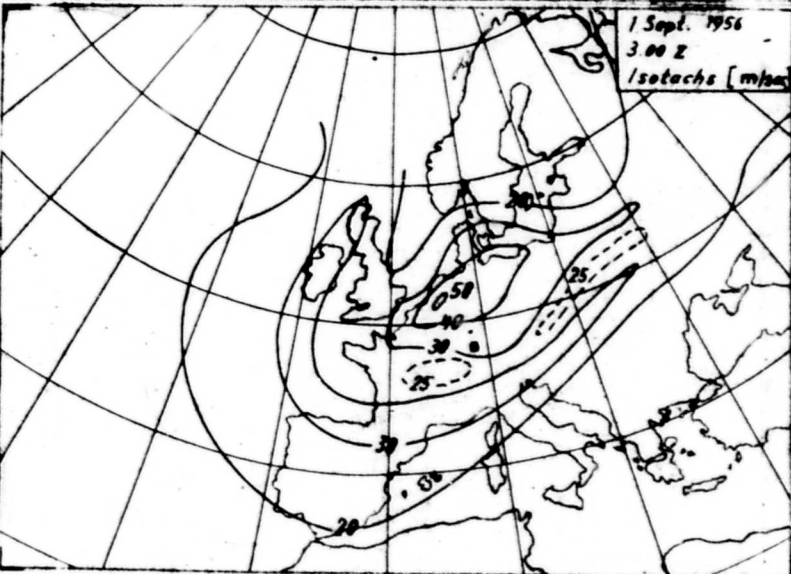
VII : 31 Aug 1956



2b



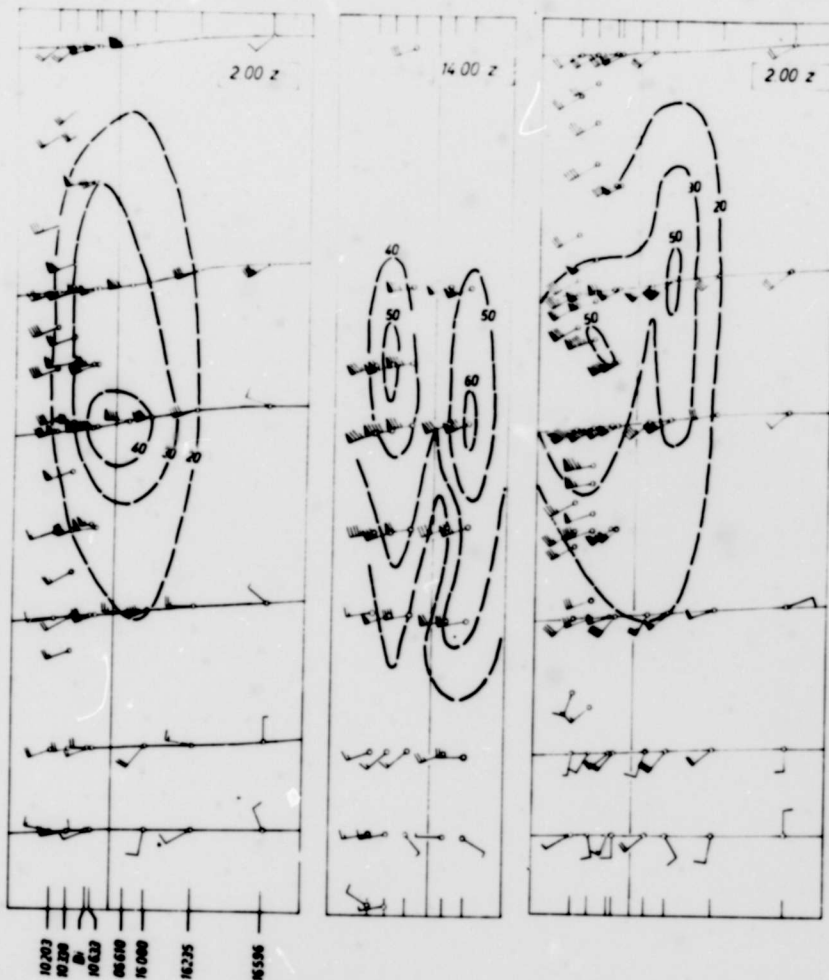
3b



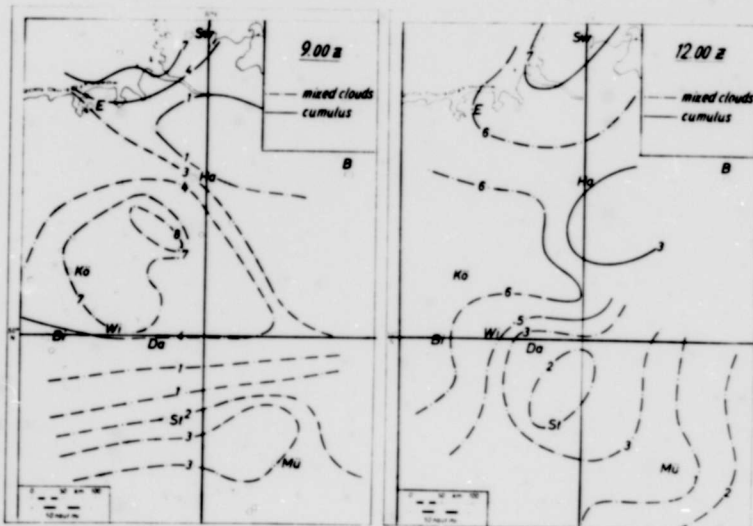
4b

B

VII : 31 Aug 1956



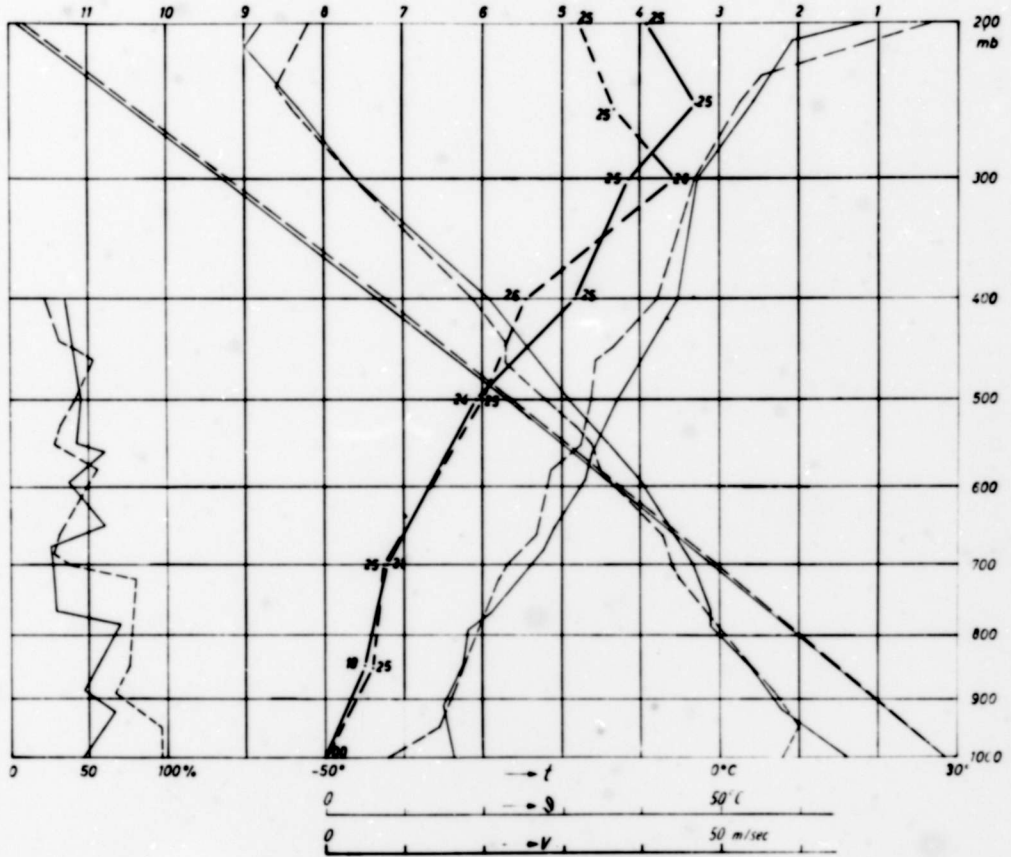
5



6

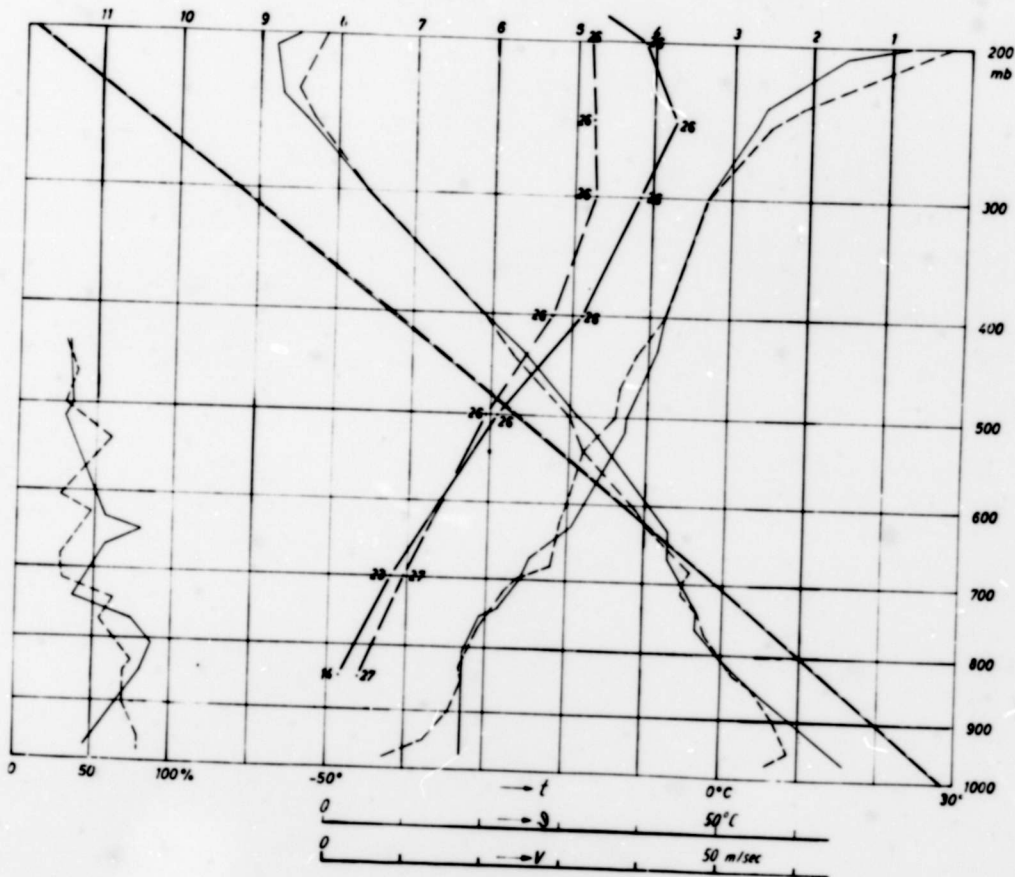
VII : 31 Aug 1956

WIESBADEN 31 8 1956 - - - 02h
— 14h



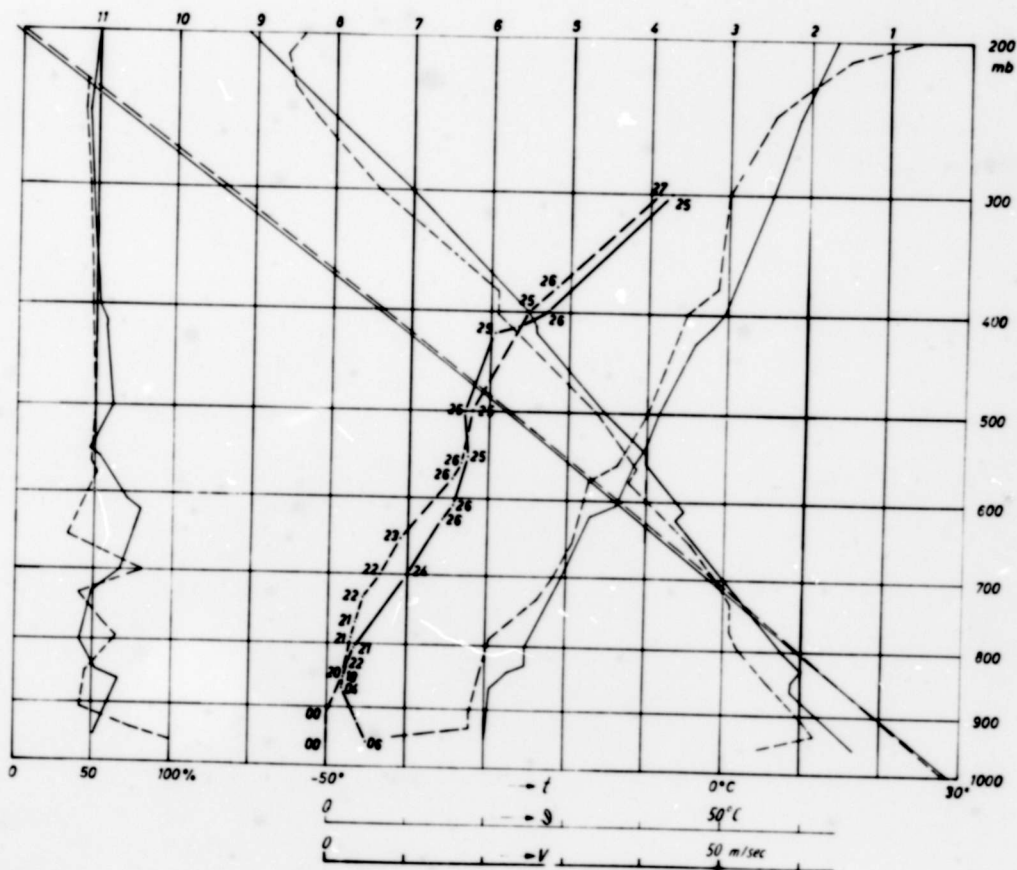
VII : 31 Aug 1956

BITBURG 31 8 1956 02h
 14h

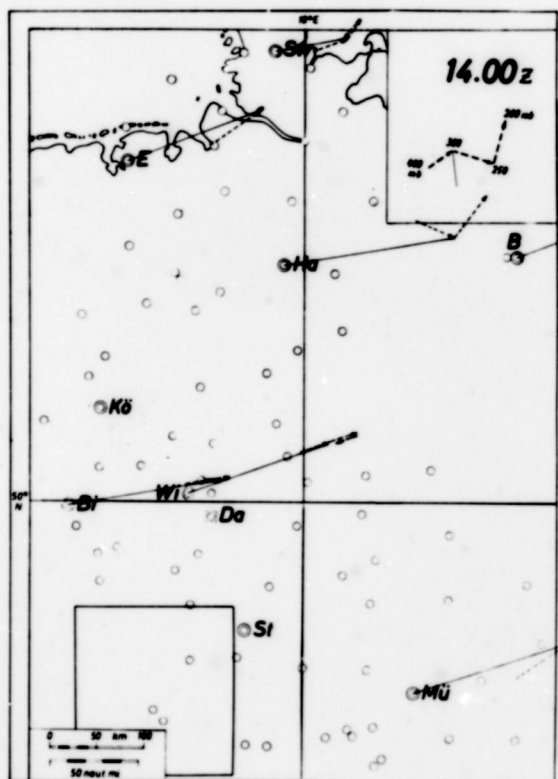
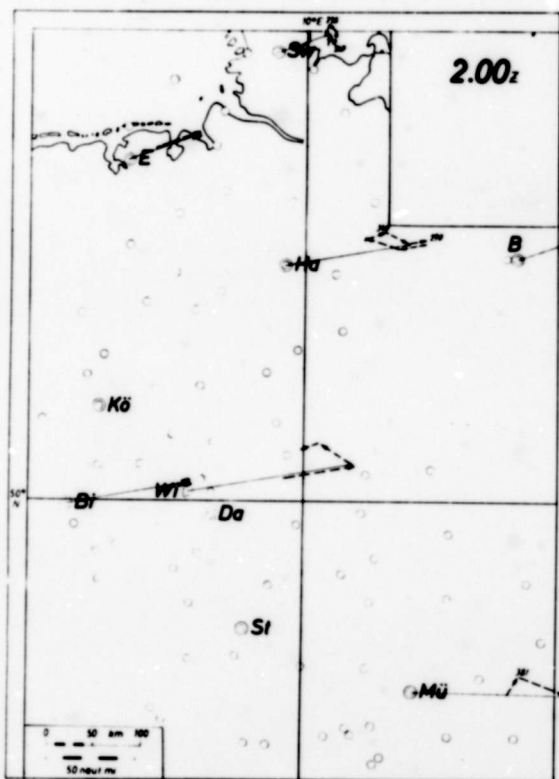


VII : 31 Aug 1956

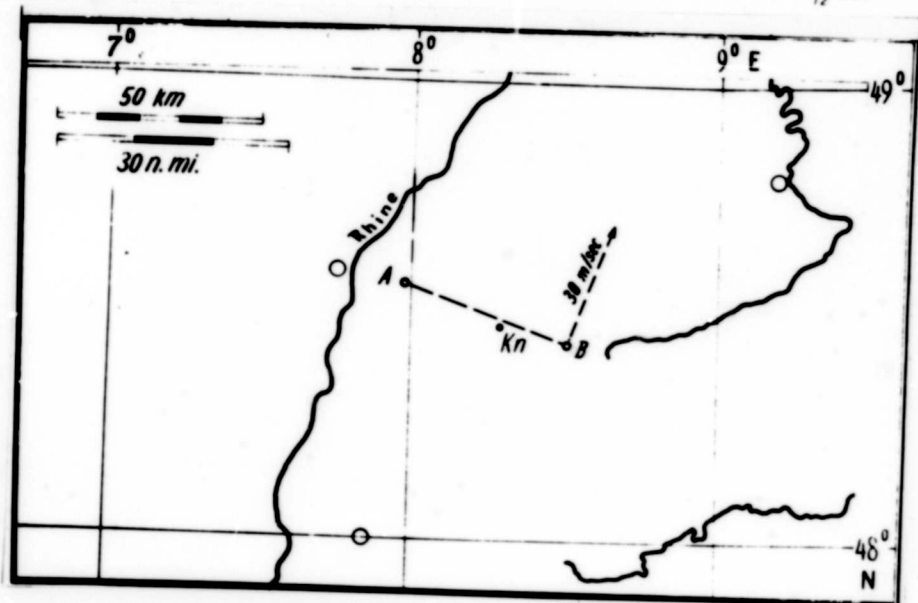
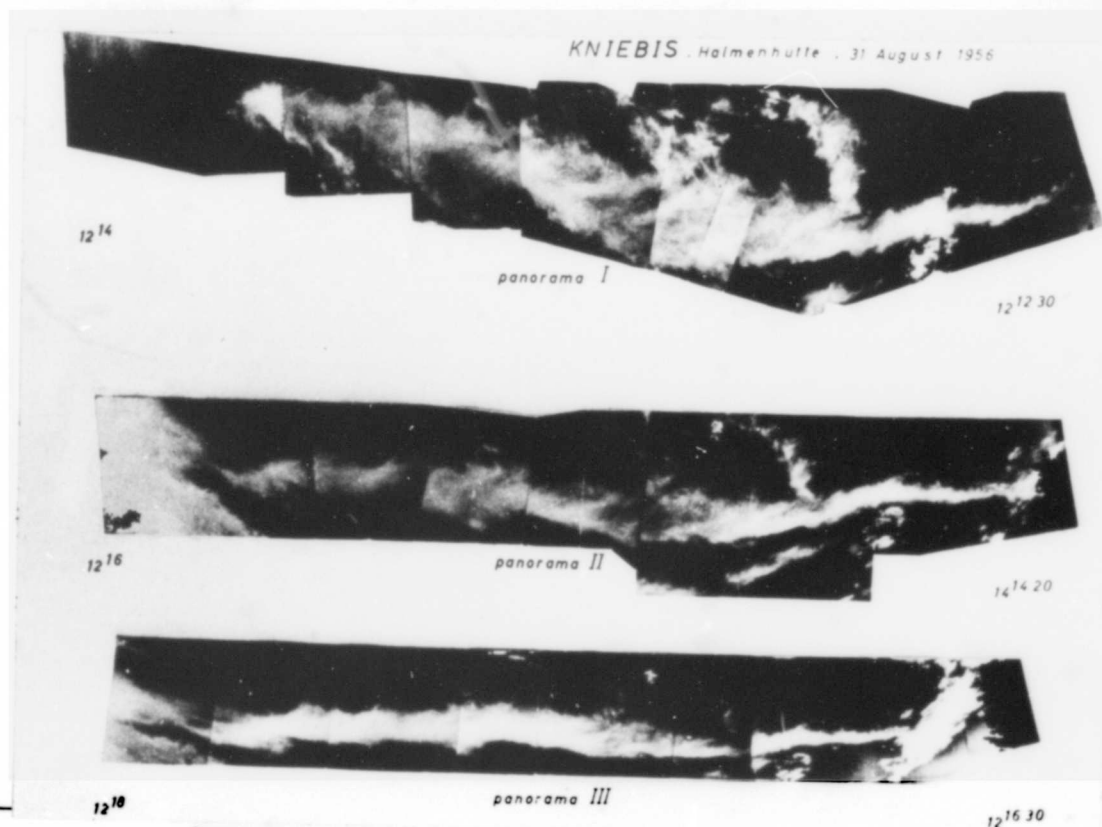
MÜNCHEN 31 8 1956 --- 02h
———— 14h



VII : 31 Aug 1956



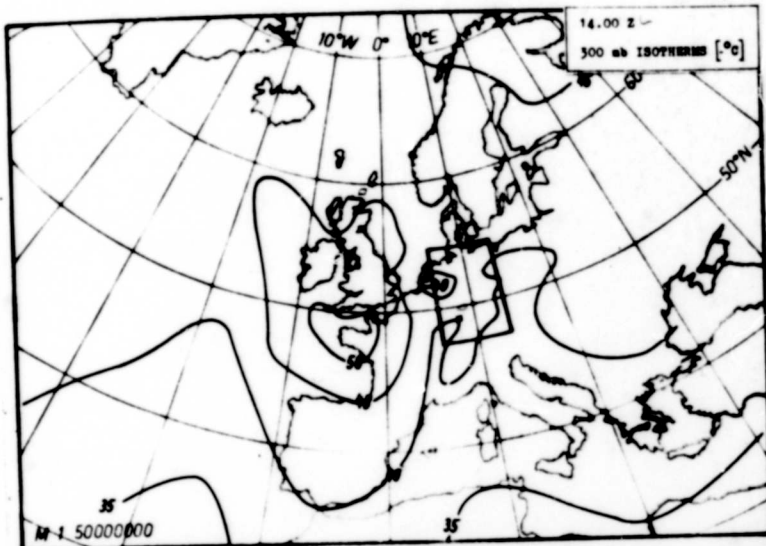
VIII : 2 Sept 1956



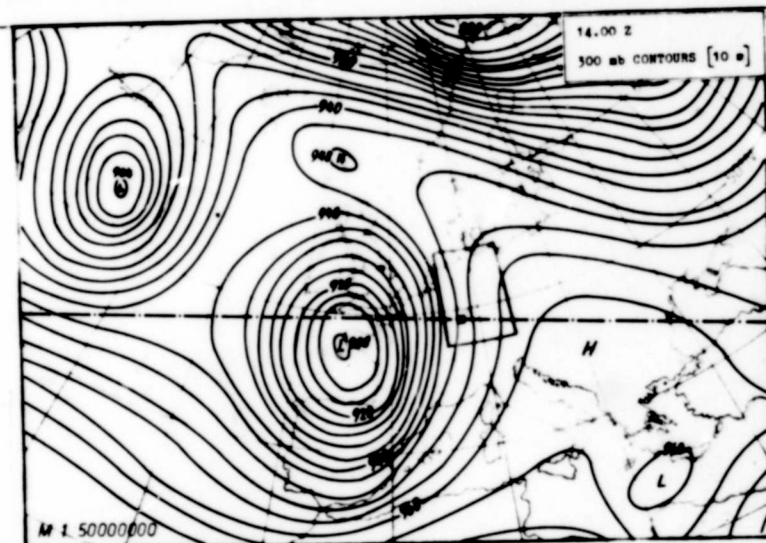
1 Three panoramas of cirrus band at consecutive times (CET!). Band schematically represented by its axis (long dashed) in plan. Photos taken in Kniebis (Kn) by KOSCHMIEDER.

VIII : 2 Sept. 1956

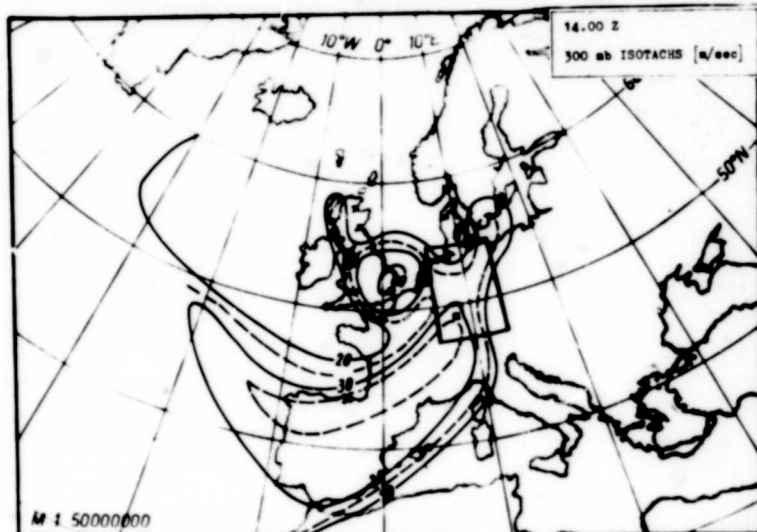
2



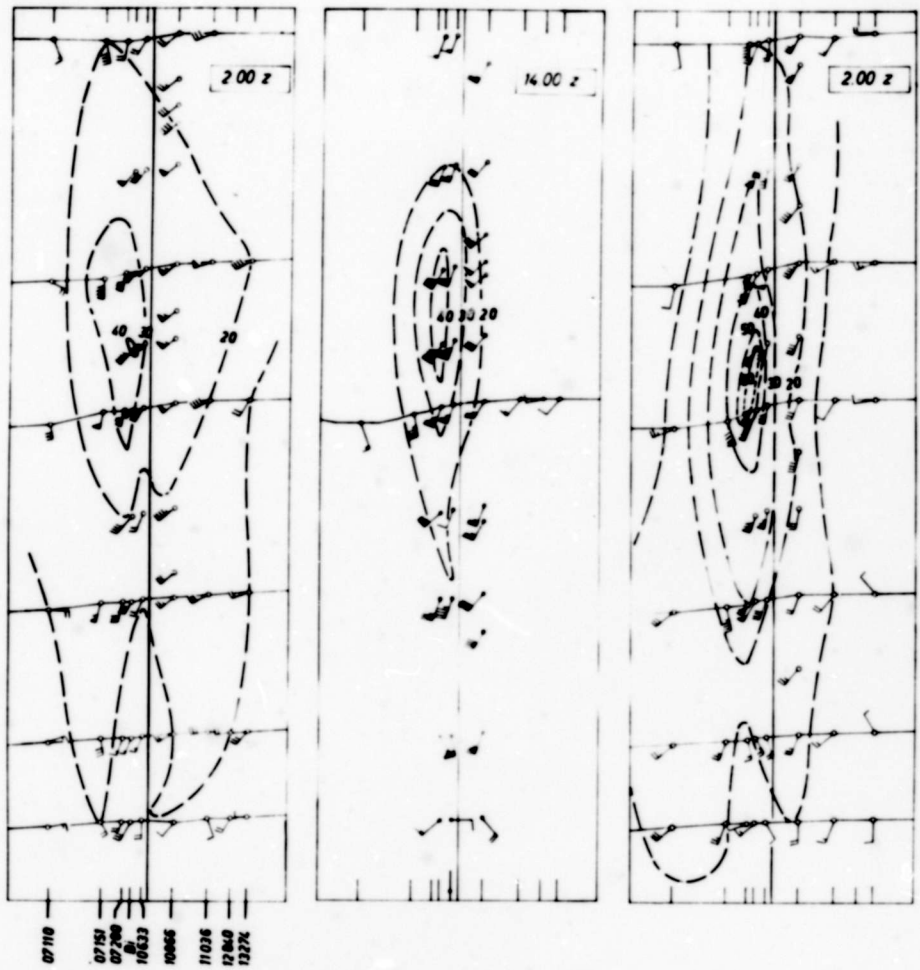
3



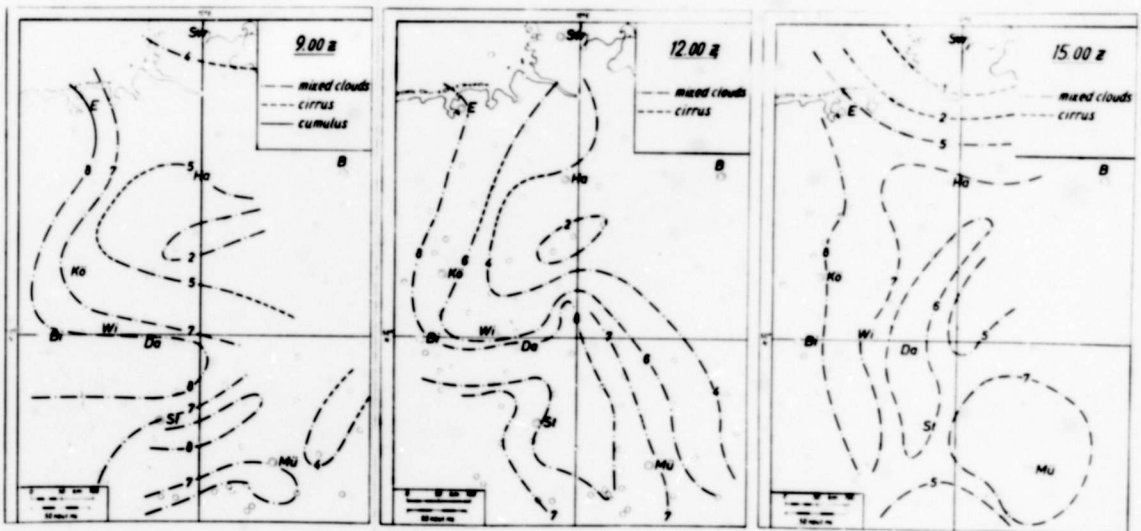
4



VIII : 2 Sept 1956



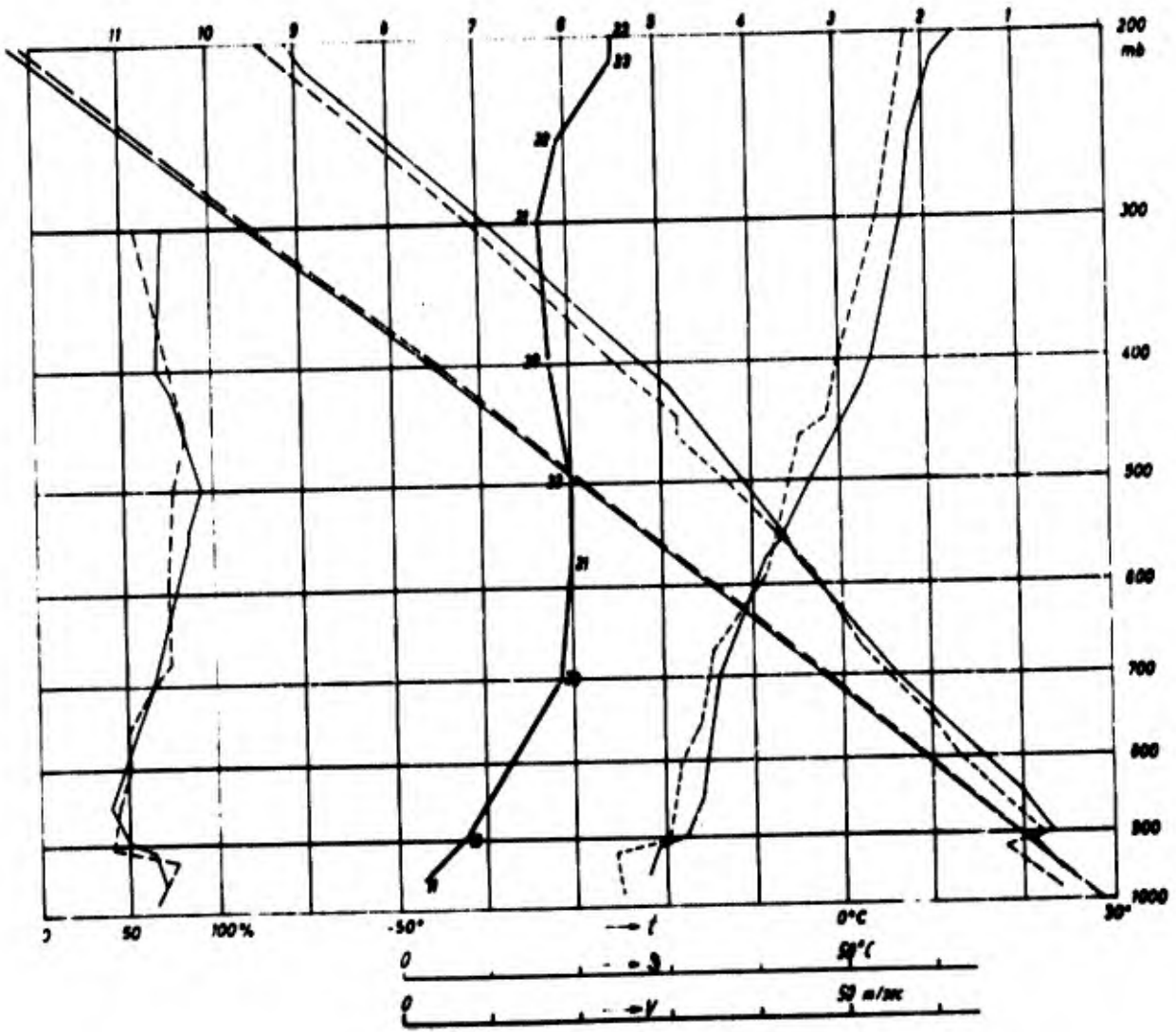
5



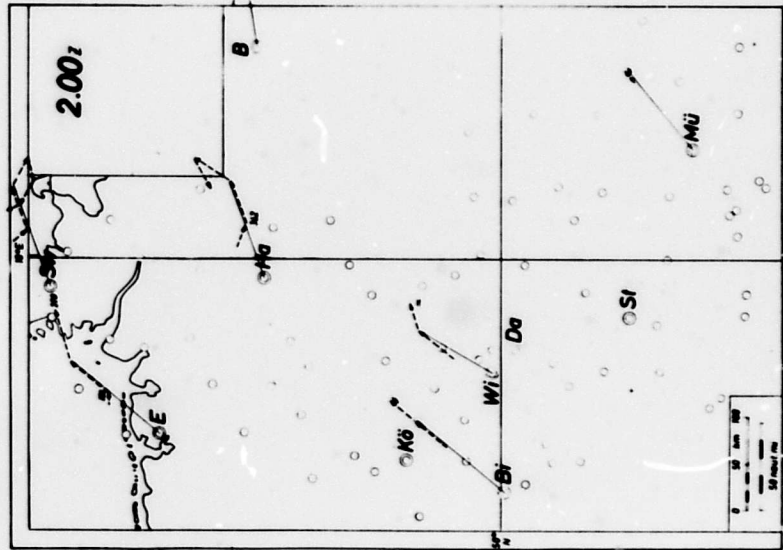
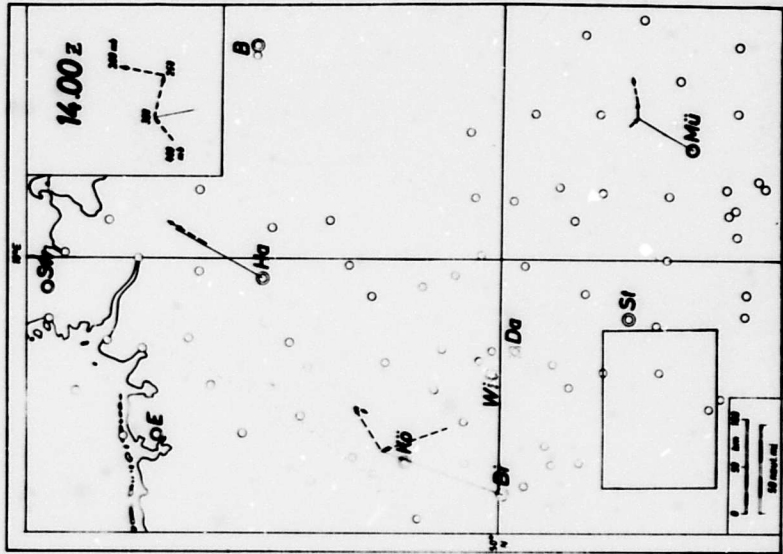
6

VIII : 2 Sept 1956

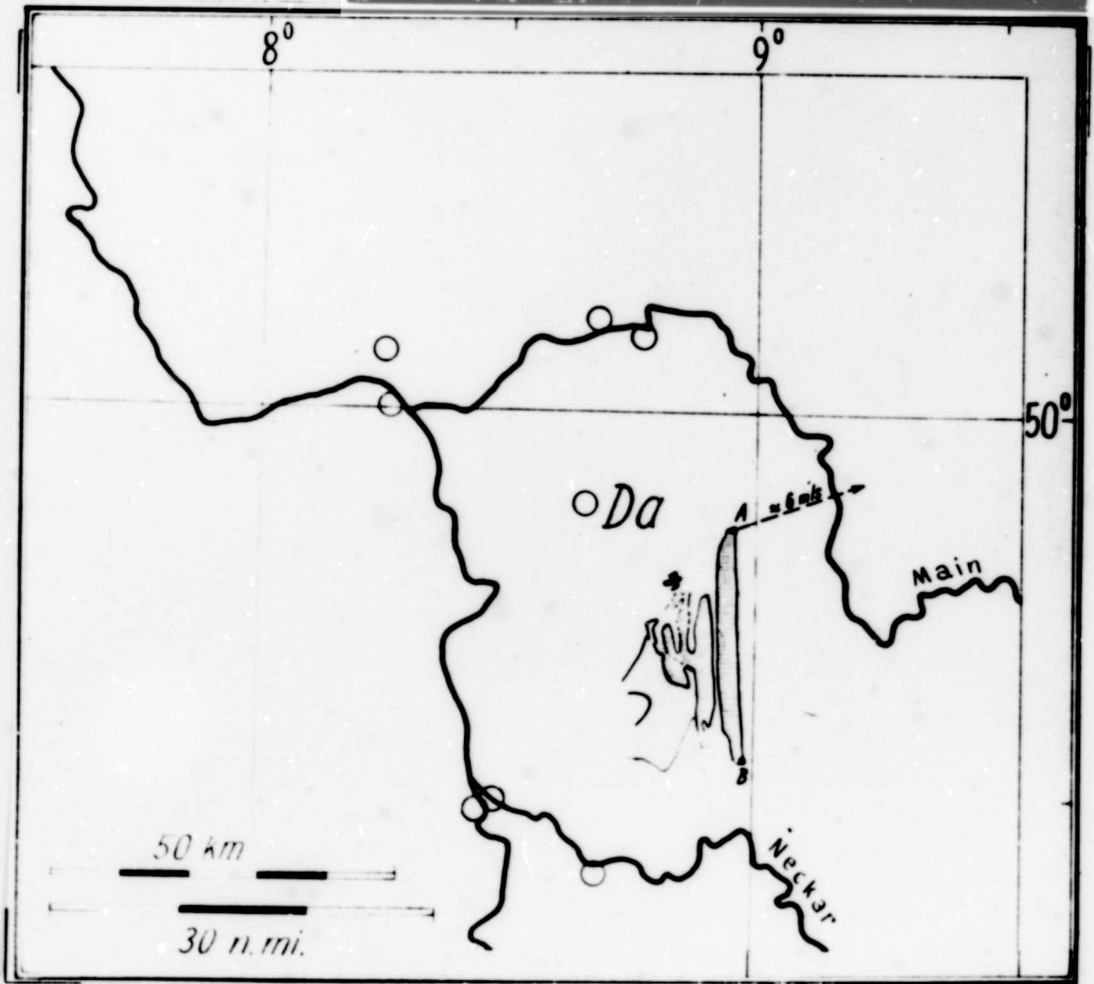
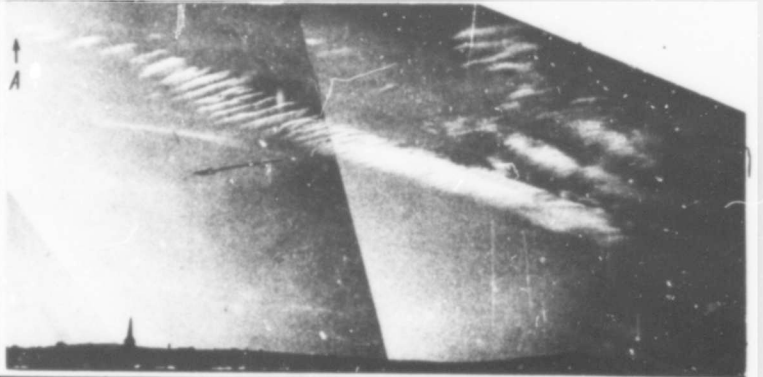
ERLANGEN -----
MÜNCHEN _____ 2.9.1956 14h



VIII : 2 Sept 1956



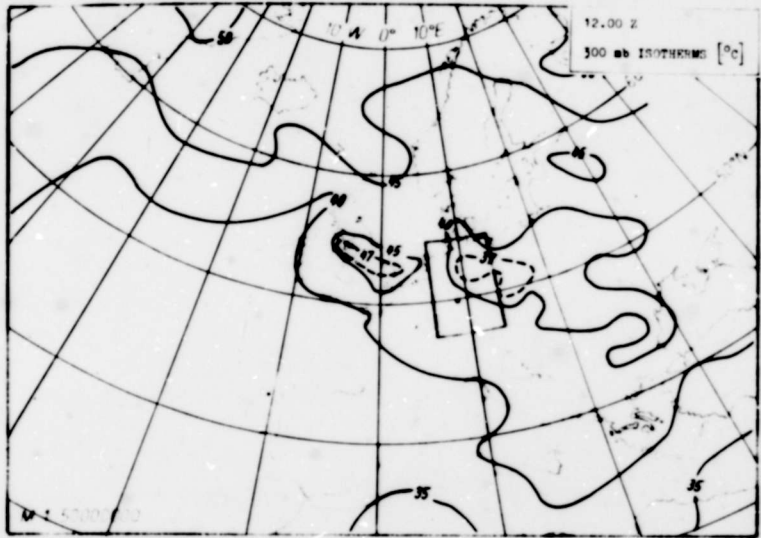
IX : 19 June 1962



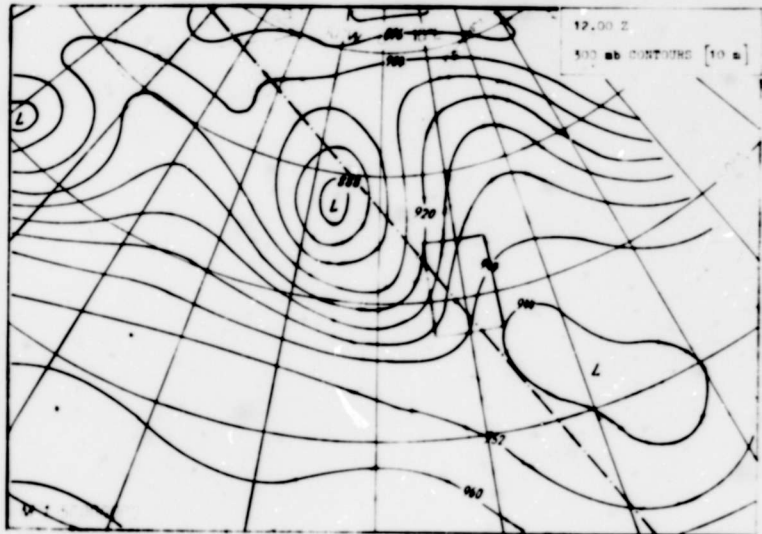
1 Wave trains, the N-S-orientation of which may be caused by the Odenwald mountain ridge (position see orographic map, Fig.11, page 8).

IX : 19 June 1962

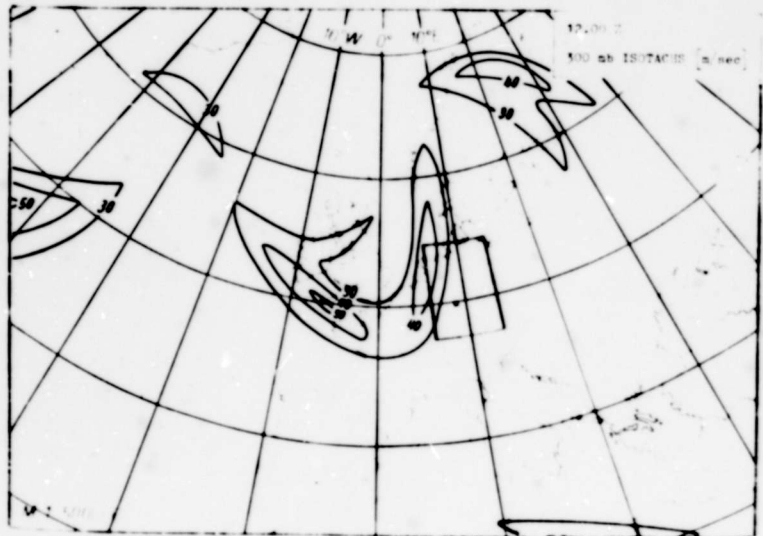
2



3

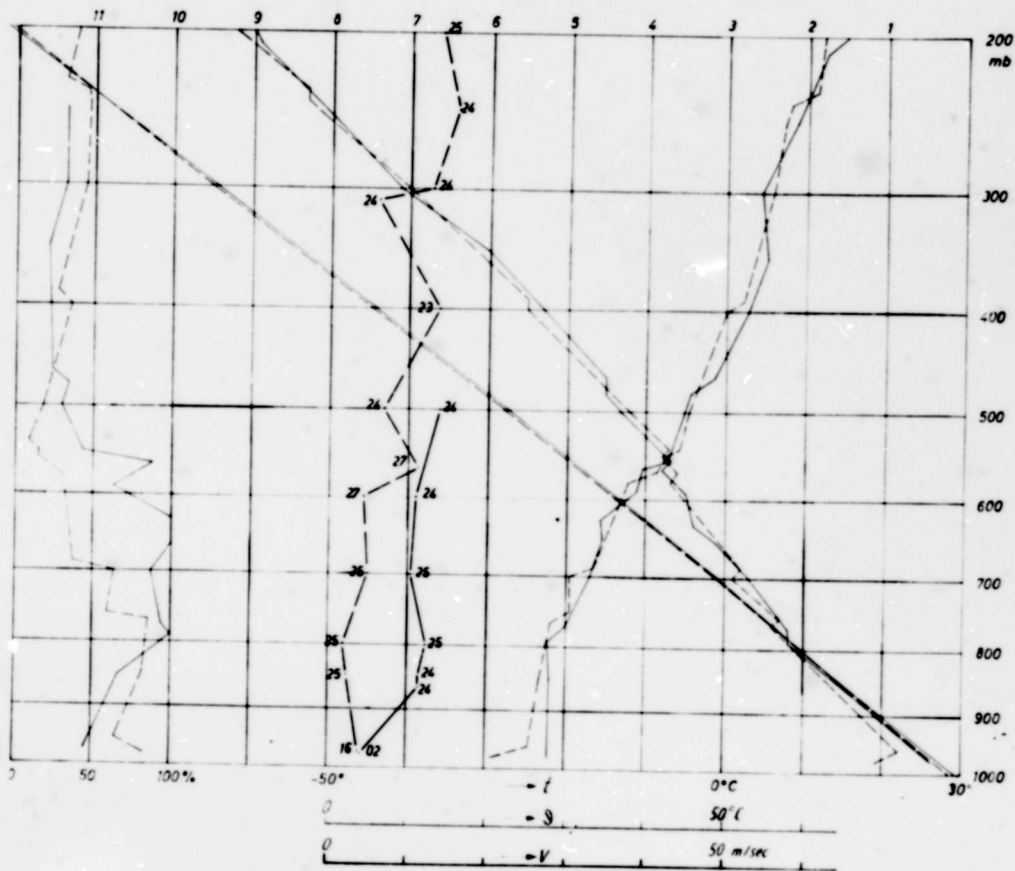


4

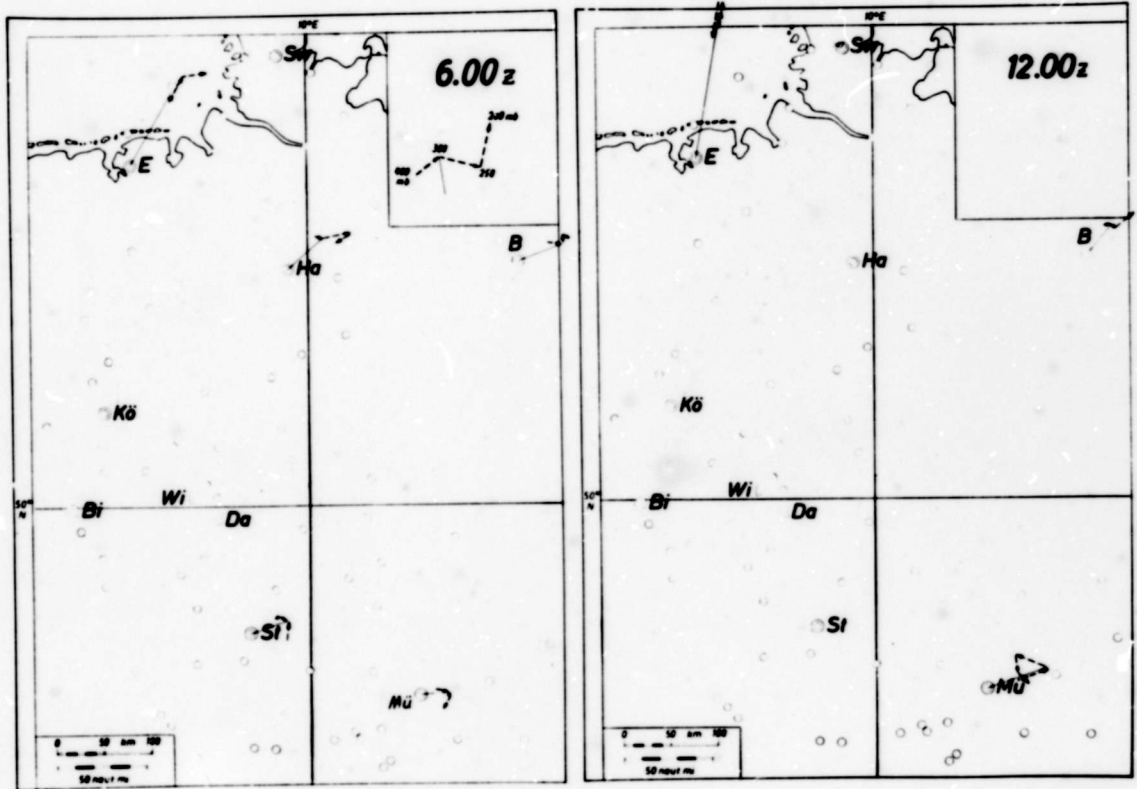


IX : 19 June 1962

STUTT GART 19.6.1962 ——— 12h
----- 00h



IX : 19 June 1962

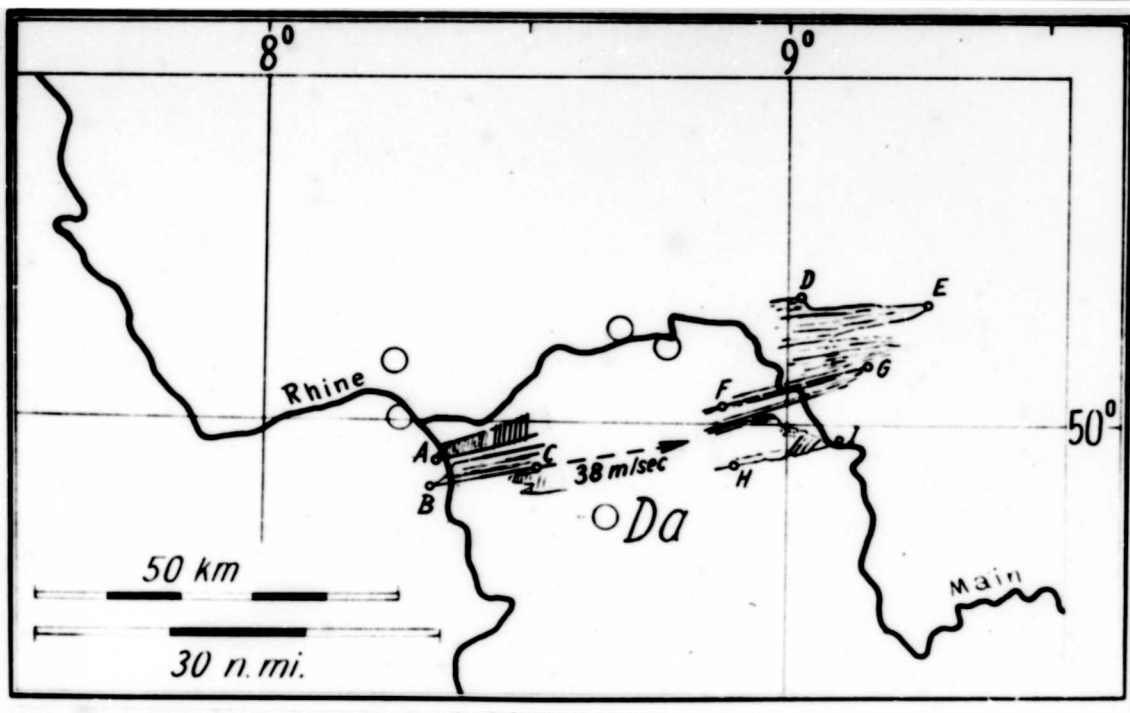
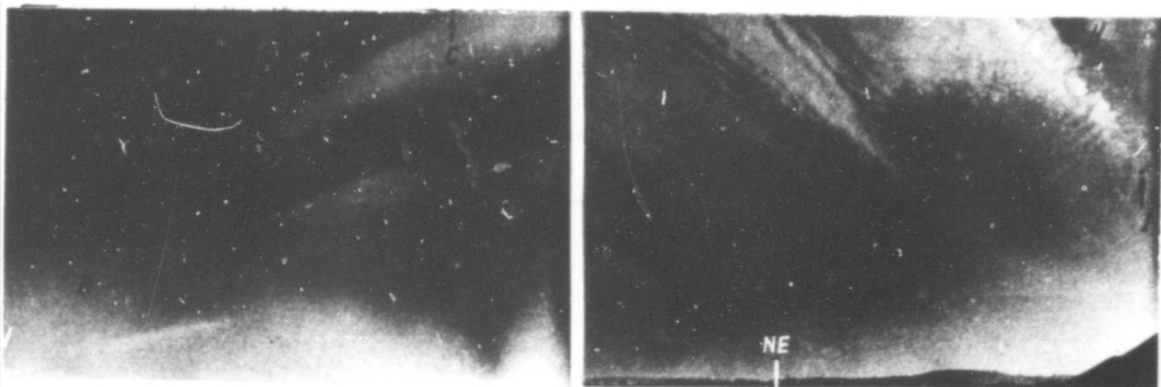


X : 12 Sept 1962



1 Migration of cloud point B within four minutes, with the streak entrance quasi stationary.

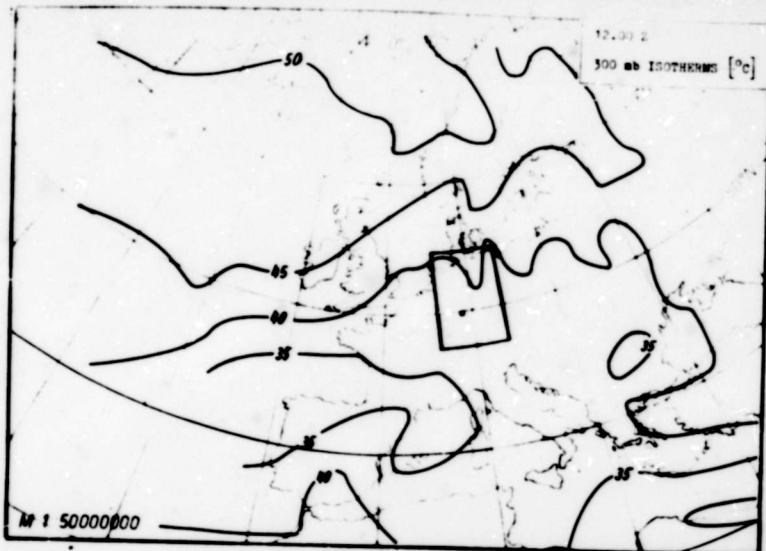
X : 12 Sept 1962



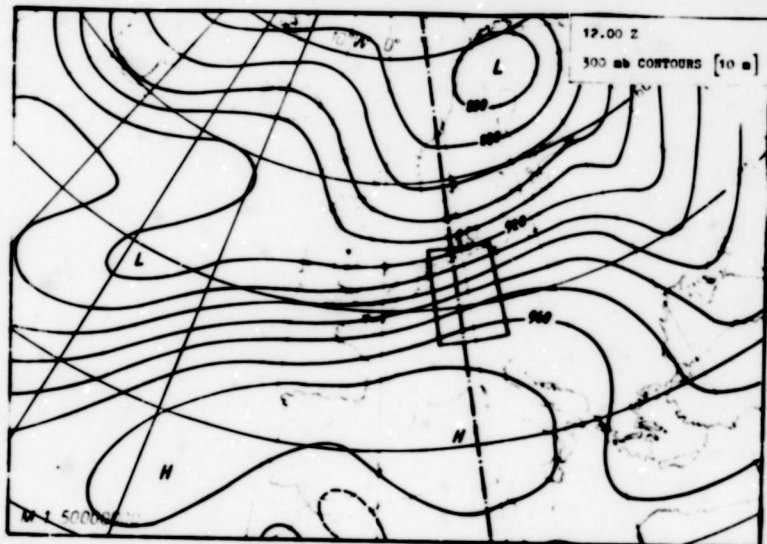
- 2 Quasi stationary streak "entrance" (upper left, A, B) and "exit" (upper right, E, G, I) about 60 km apart as on the plan below.

X : 12 Sept 1962

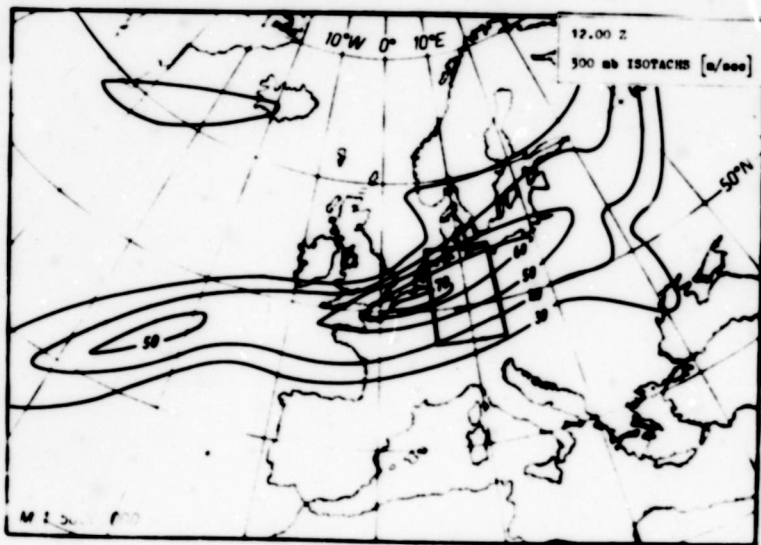
3



4

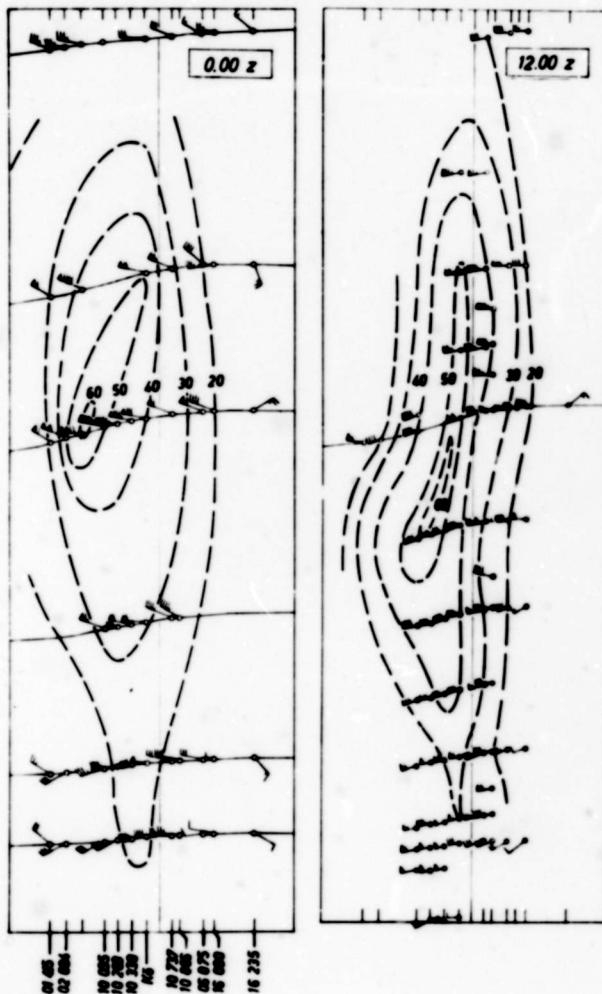


5



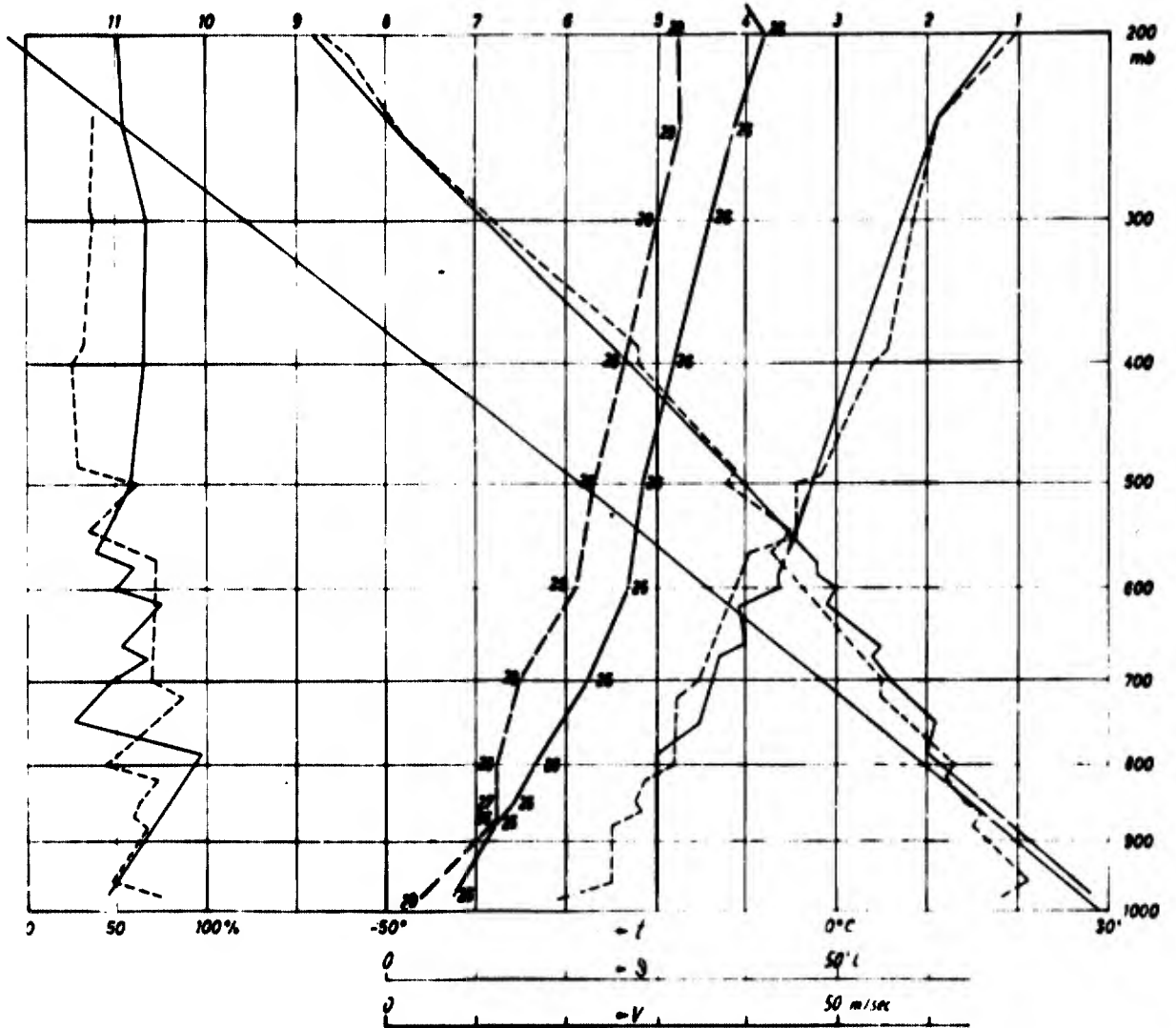
X: 12 Sept 1962

6

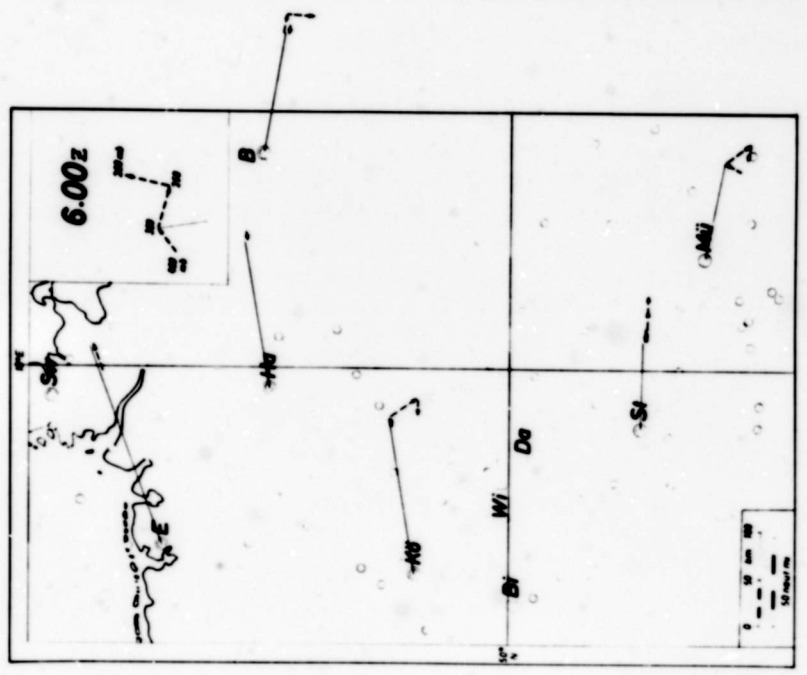
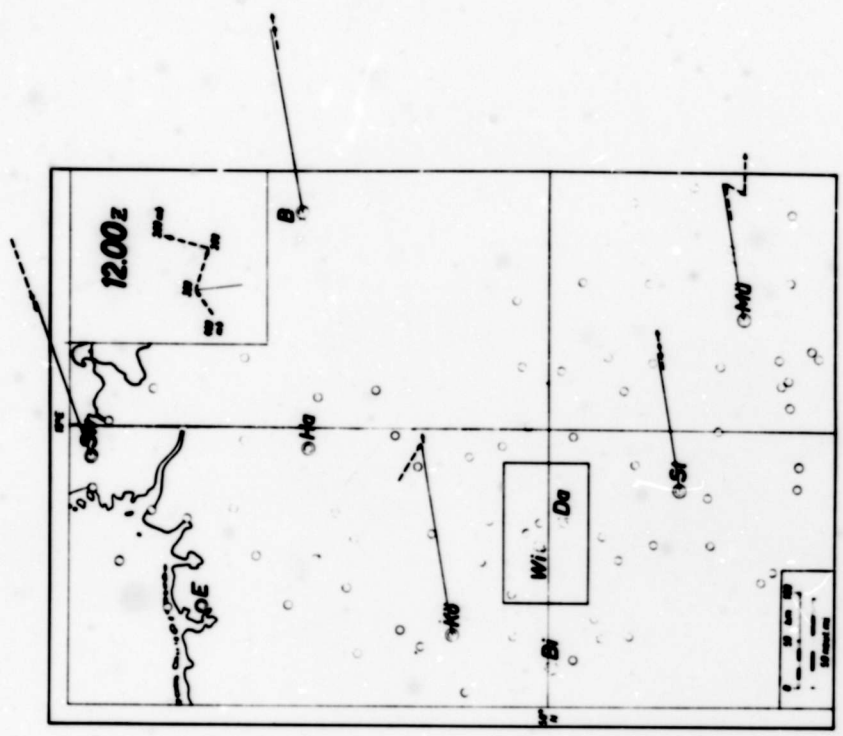


X : 12 Sept 1962

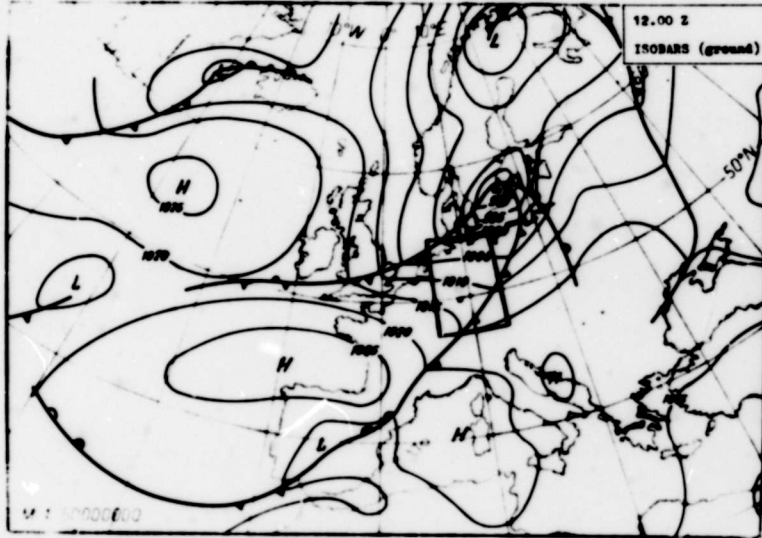
STUTT GART 12.9.1962 --- 0.0h
" " --- 12h



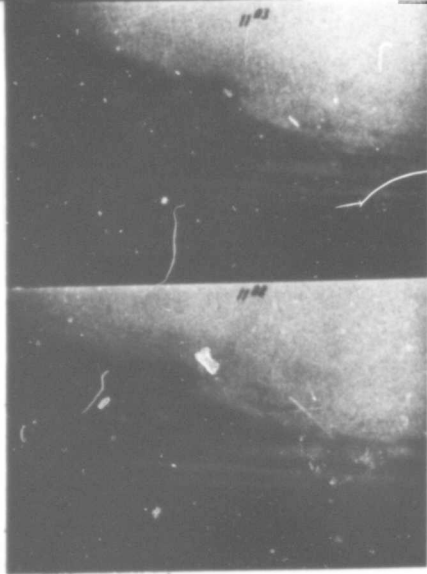
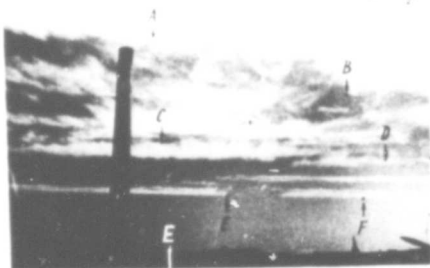
X : 12 Sept 1962



X: 12 Sept 1962

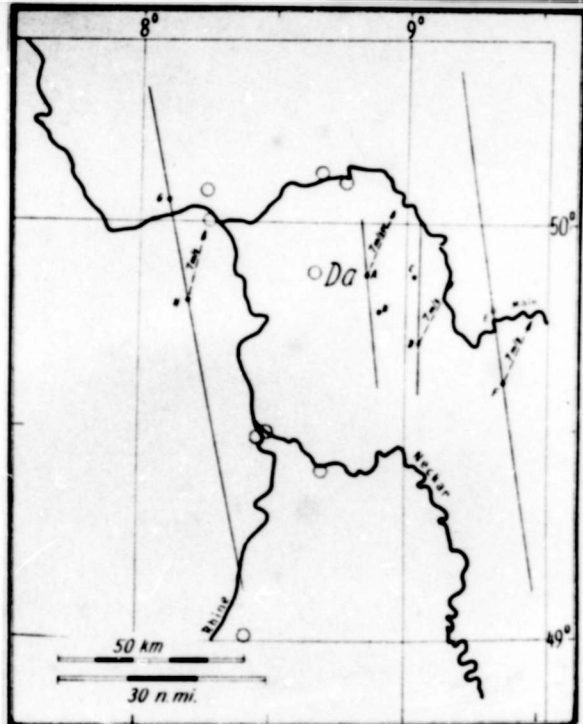
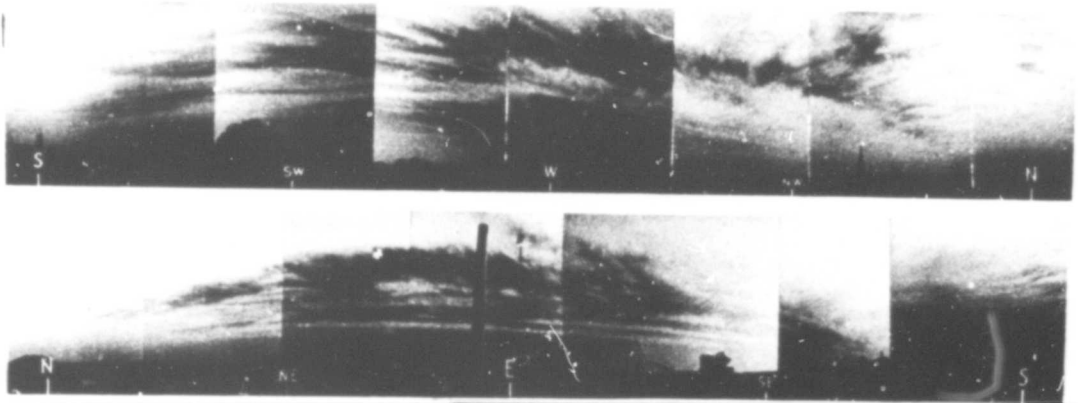


XI : 25 Sept 1962



1 Sequence of photos taken toward approximately ESE.

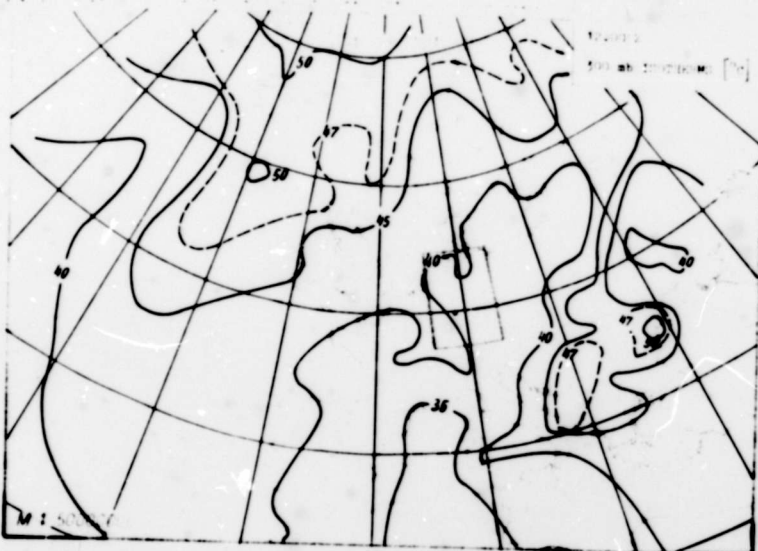
XI : 25 Sept 1962



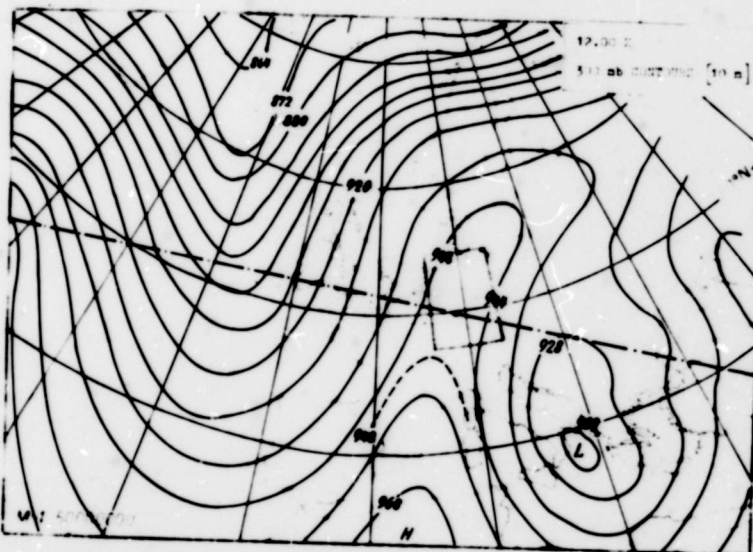
2 Panoramas of western and eastern lower hemisphere. Band points marked by capital letters mapped below.

XI : 25 Sept 1962

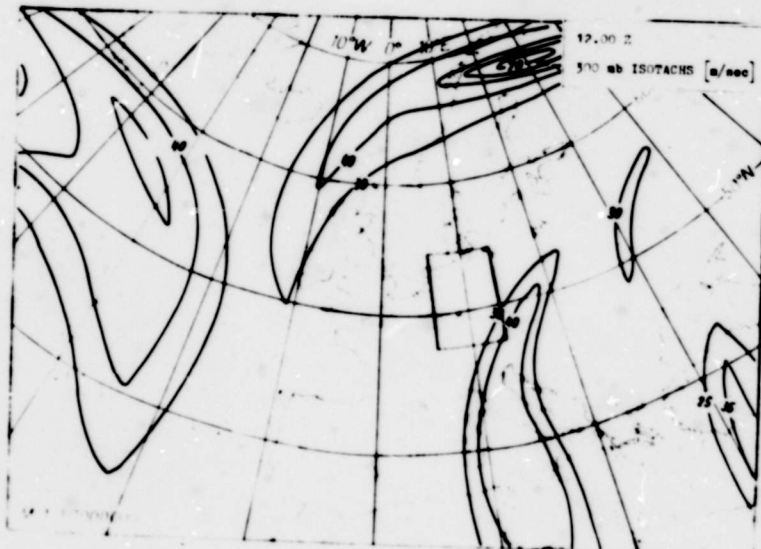
3



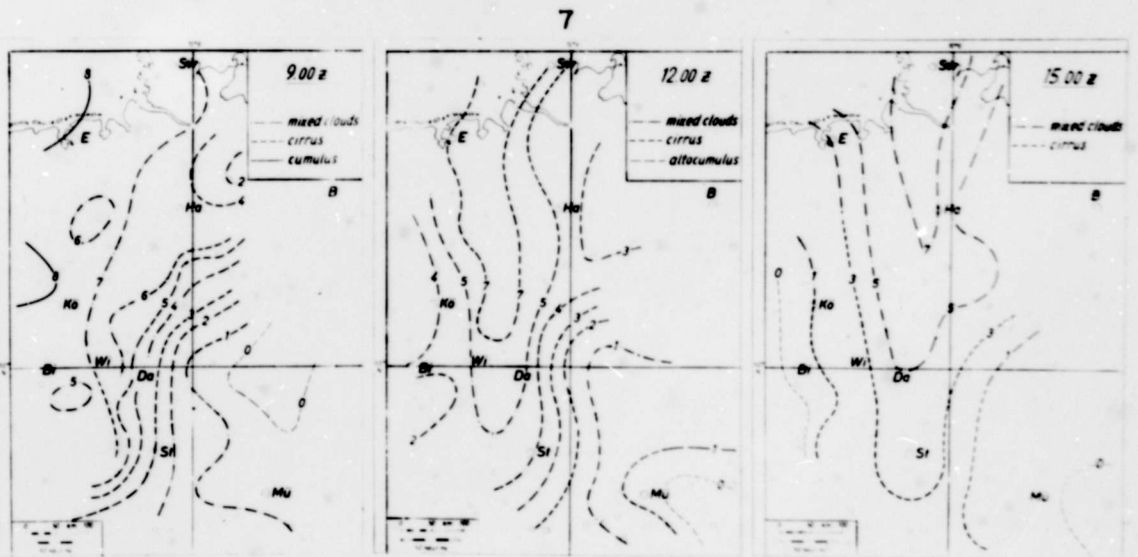
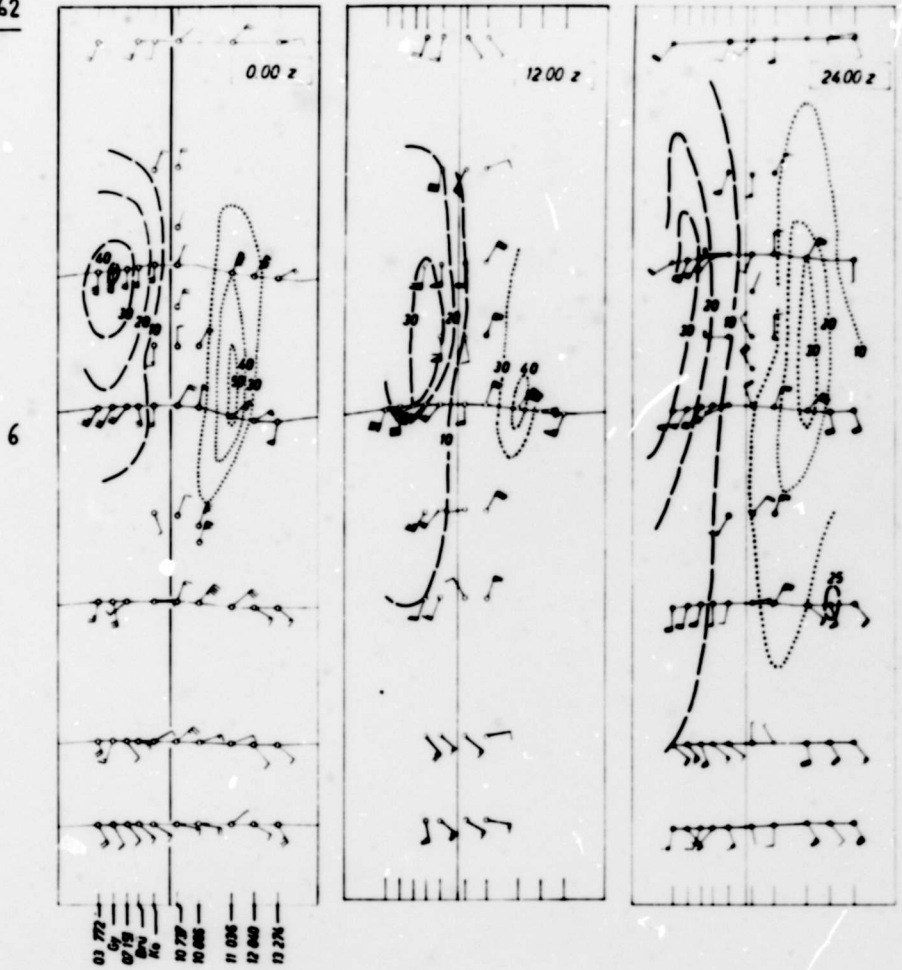
4



5

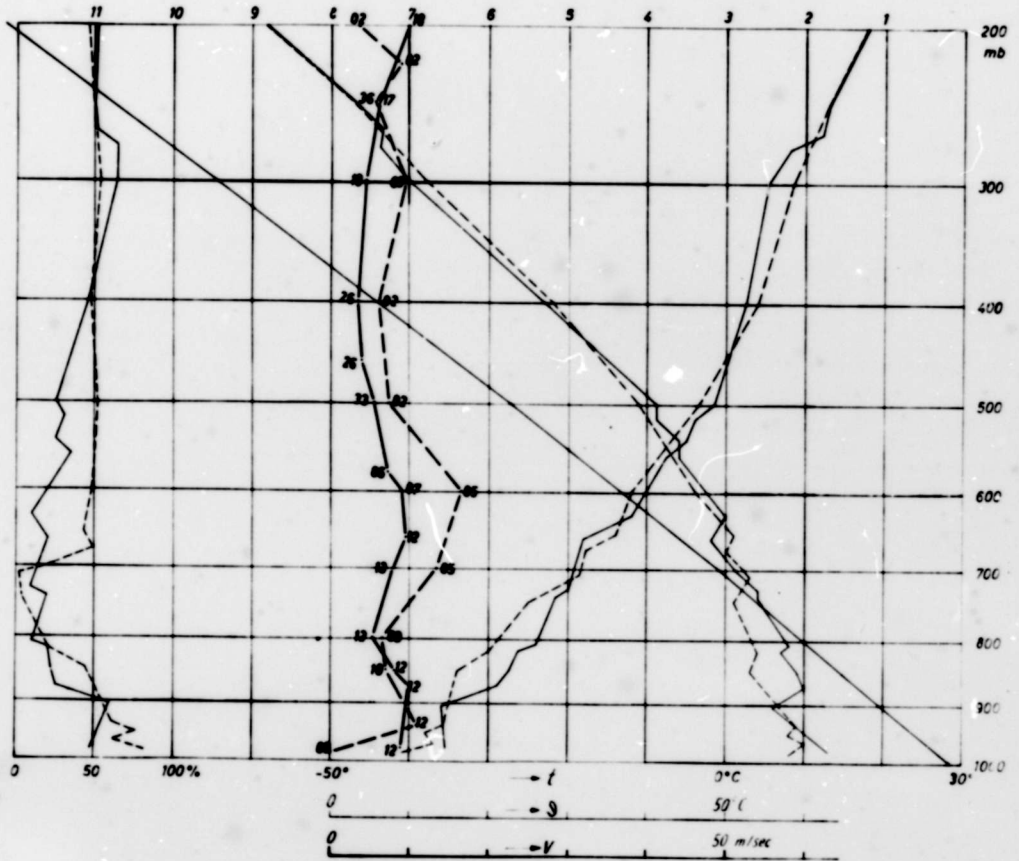


XI : 25 Sept 1962

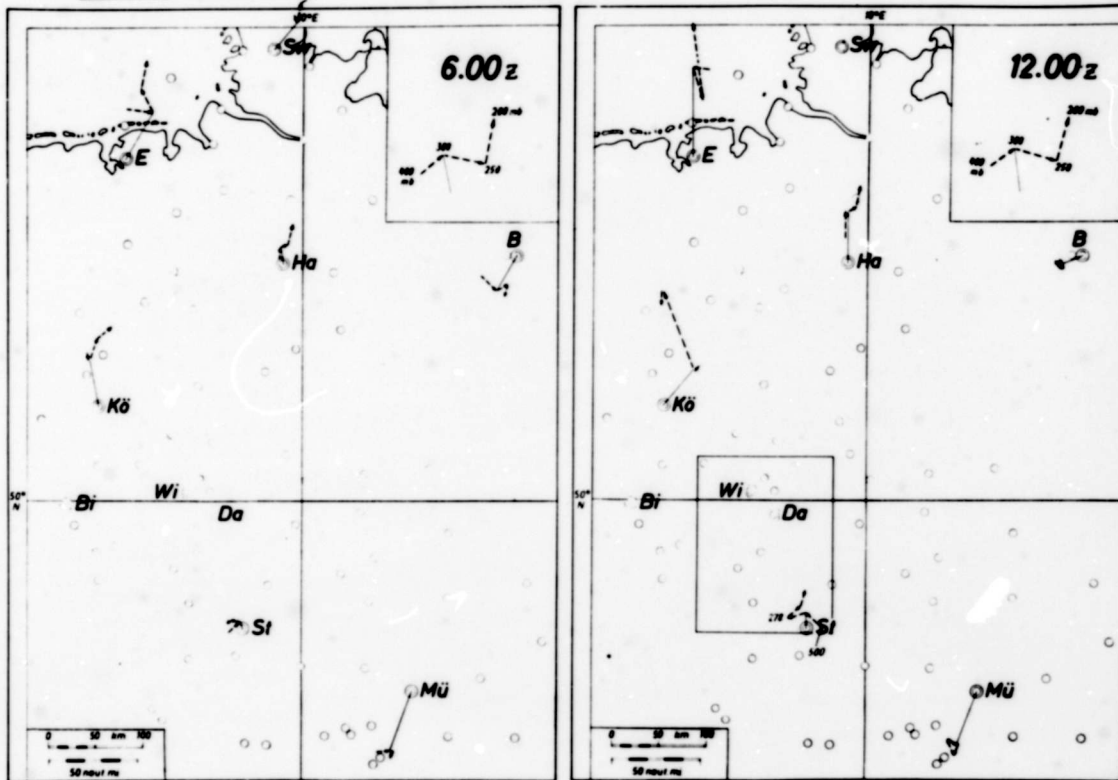


XI : 25 Sept 1962

STUTT GART 25.9.1962 ---00h
—12h

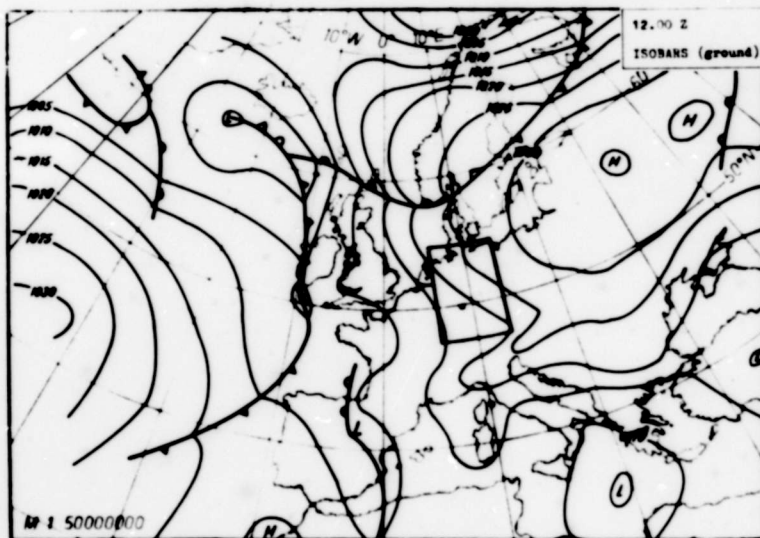


XI : 25 Sept 1962

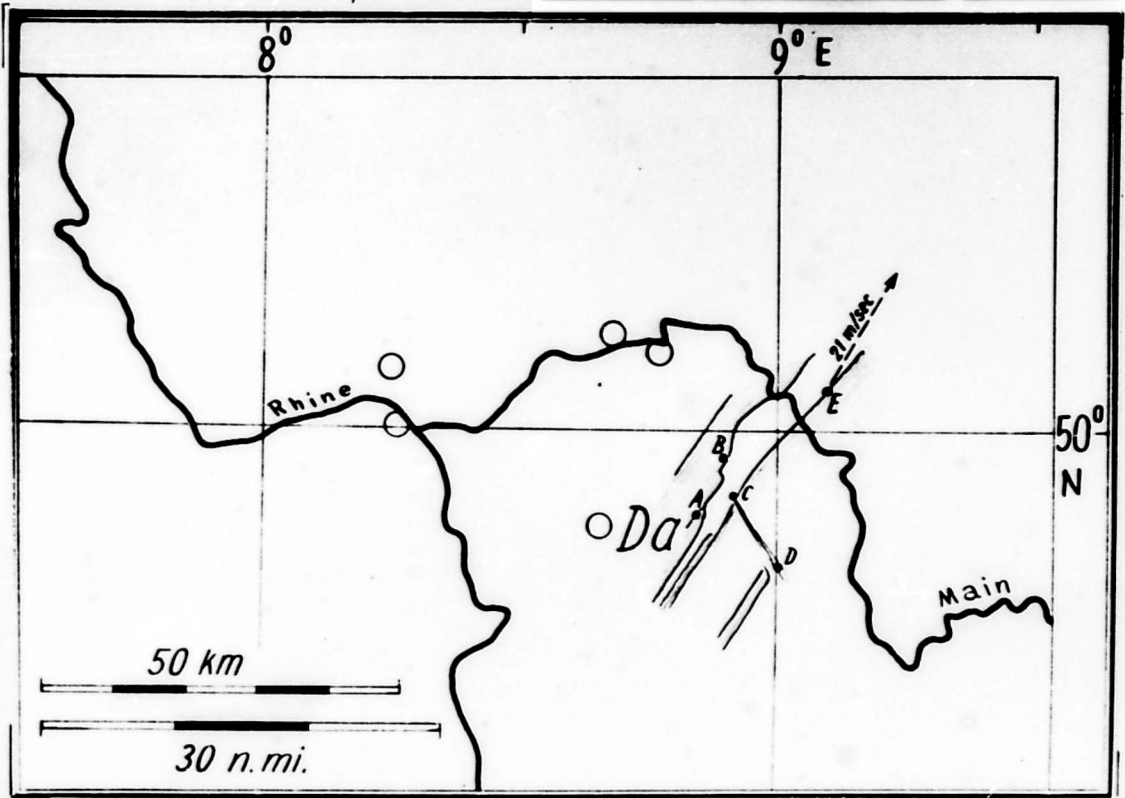
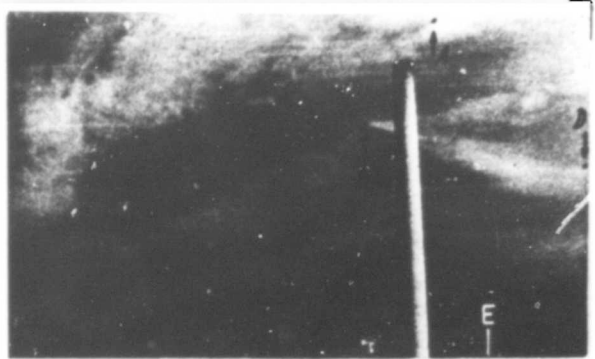


9

10



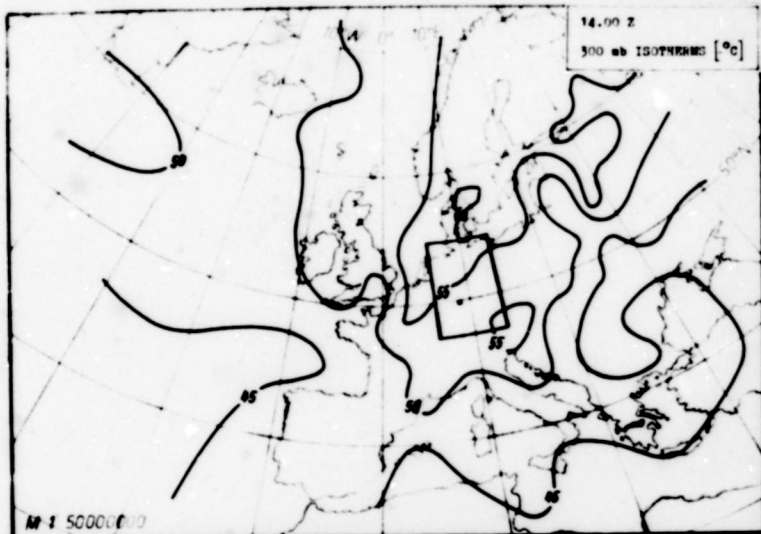
XII : 19 Nov 1962



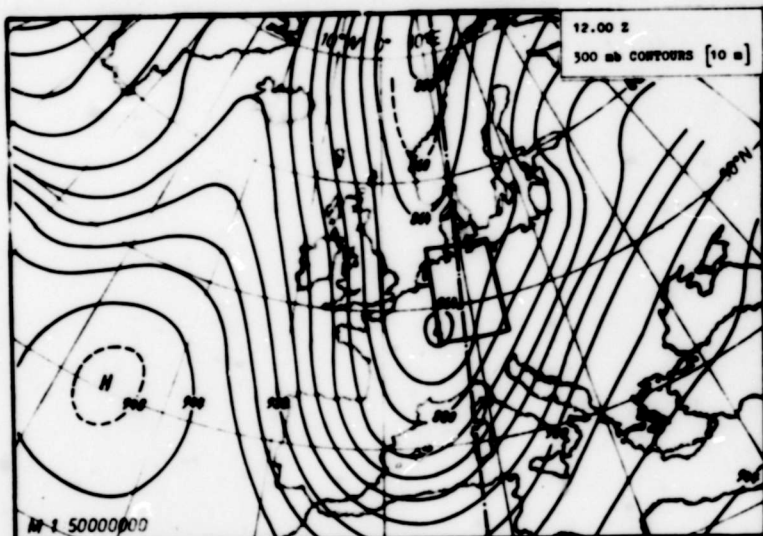
1 Edges of cirrus layers in the photograph and on plan at 13:15. CD = Fallstreifen.

XII : 19 Nov 1962

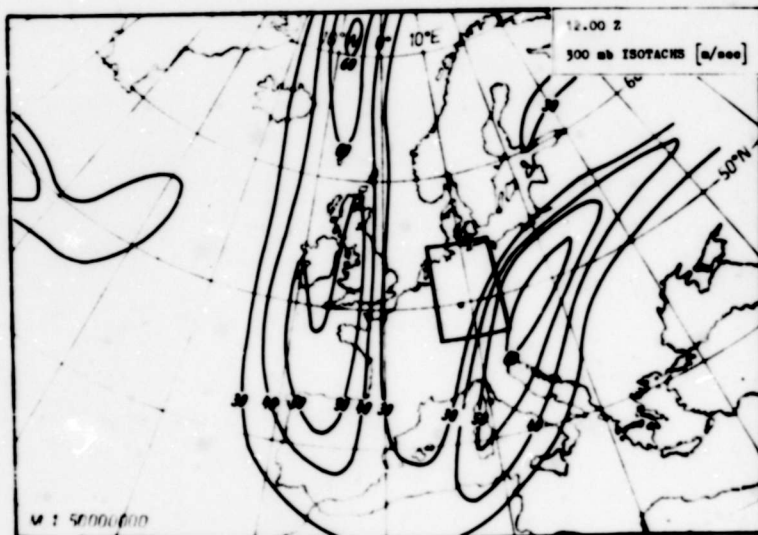
2

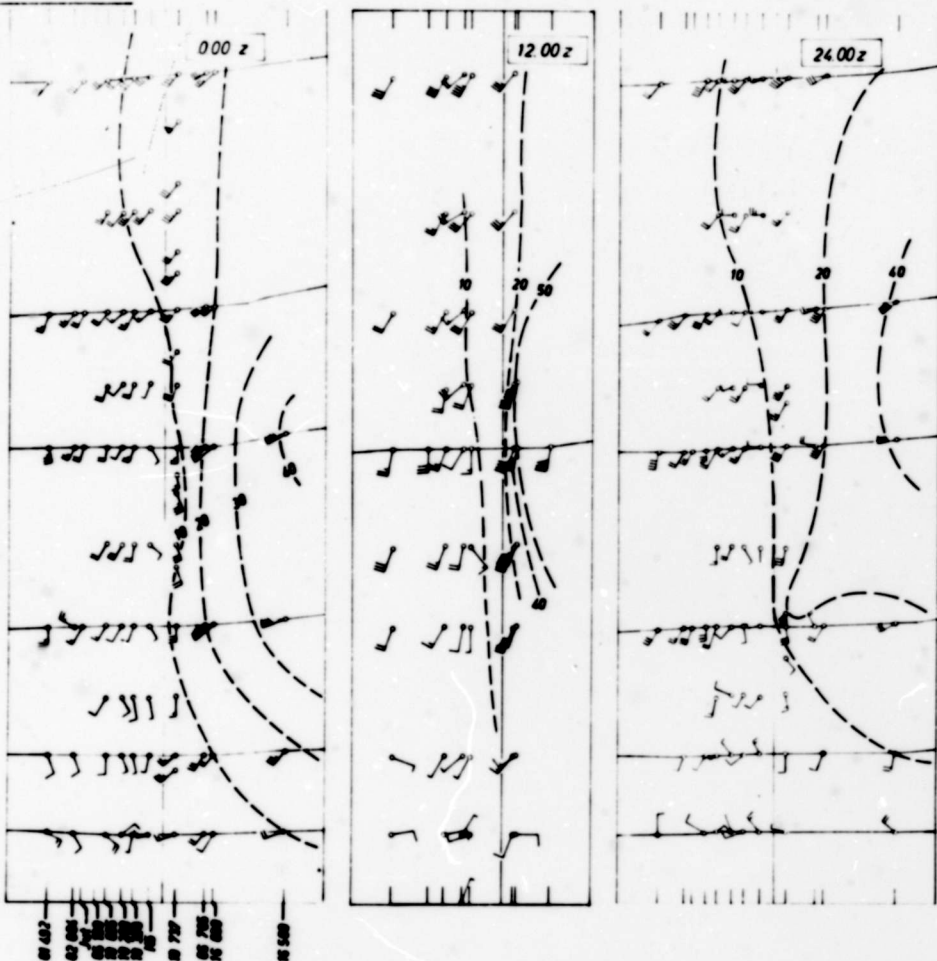


3

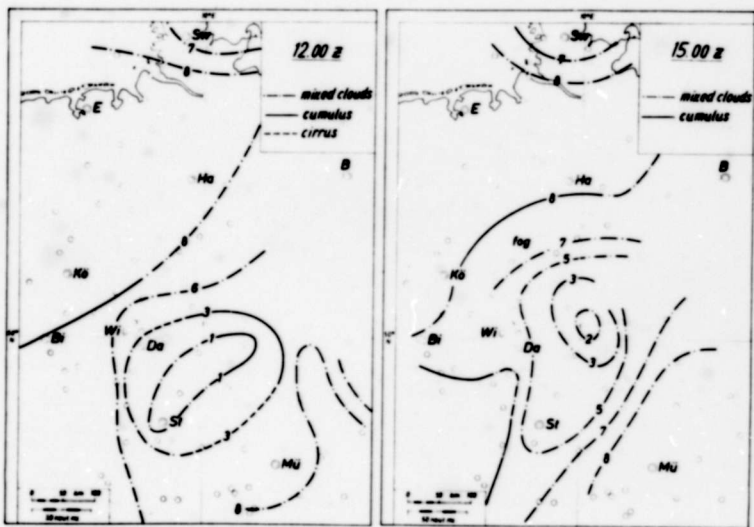


4





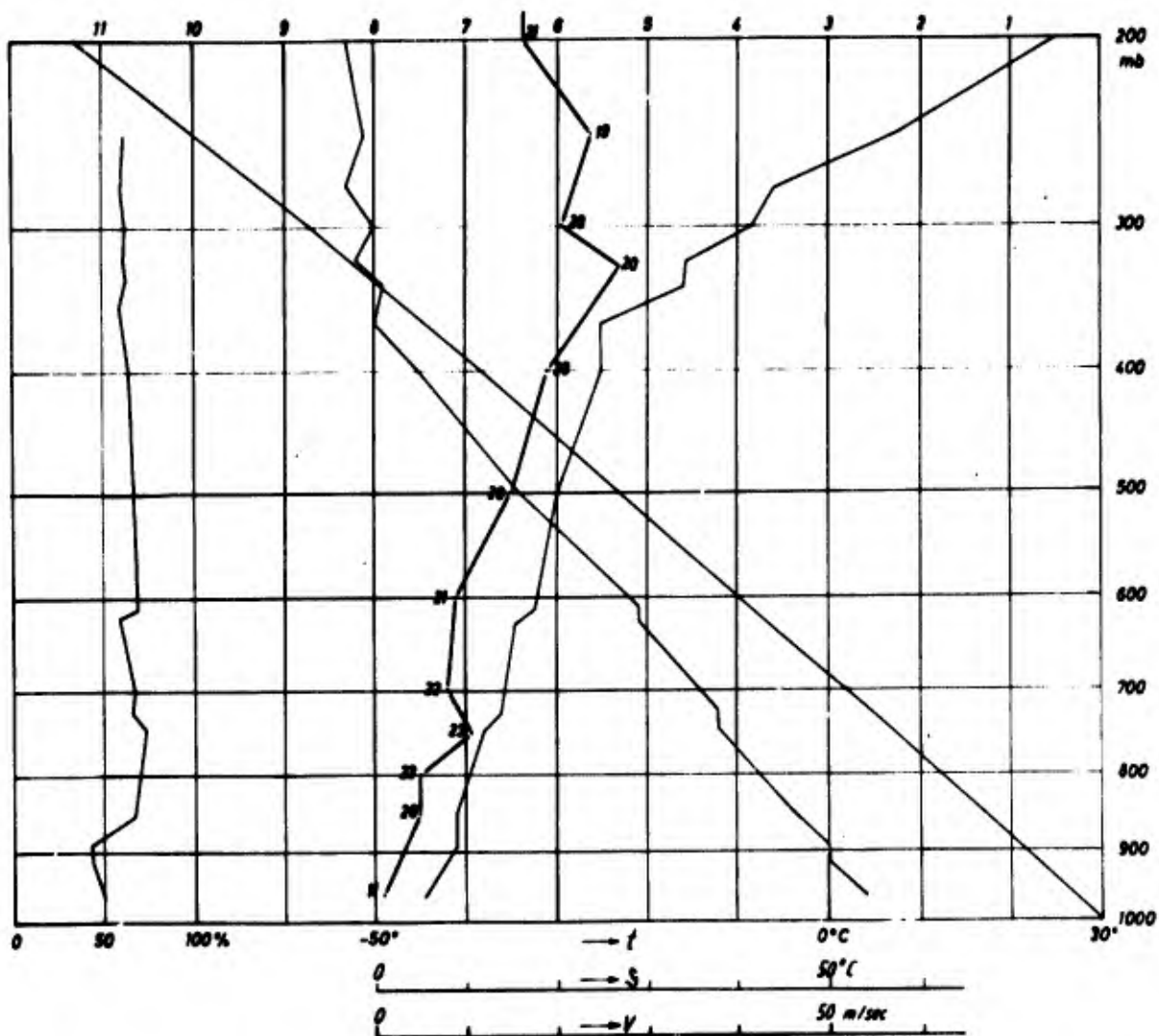
5



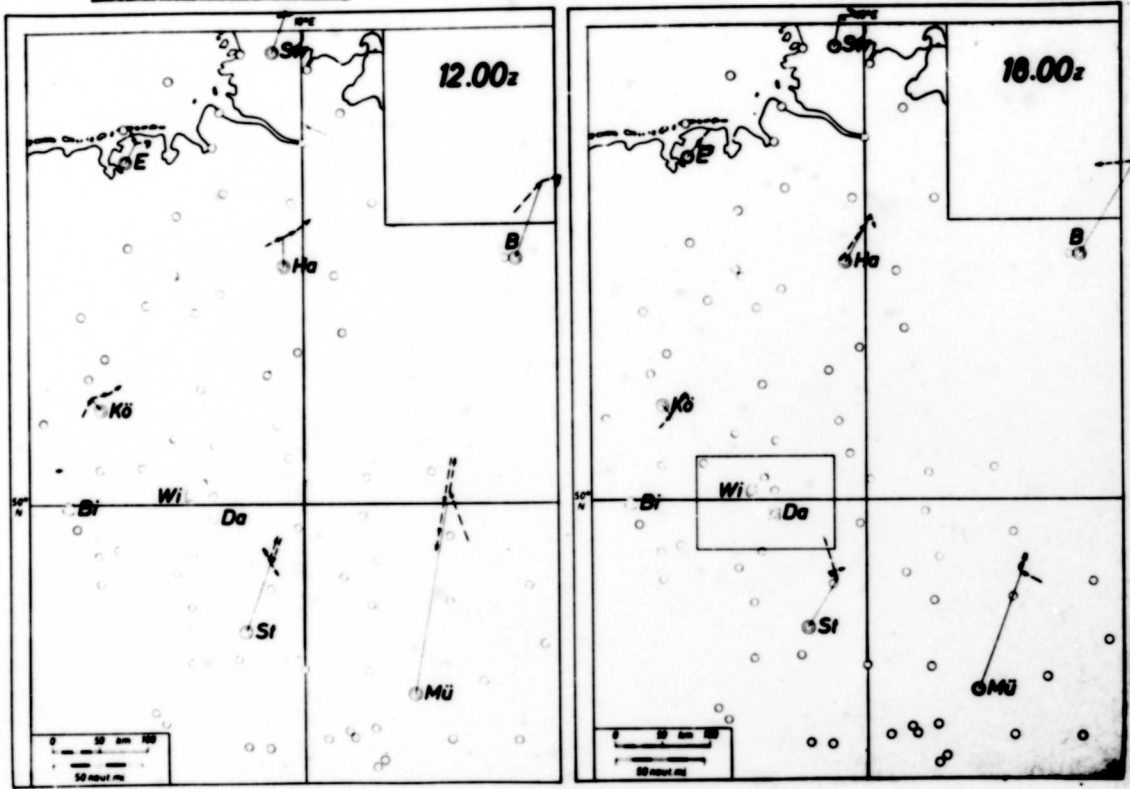
6

XII : 19 Nov 1962

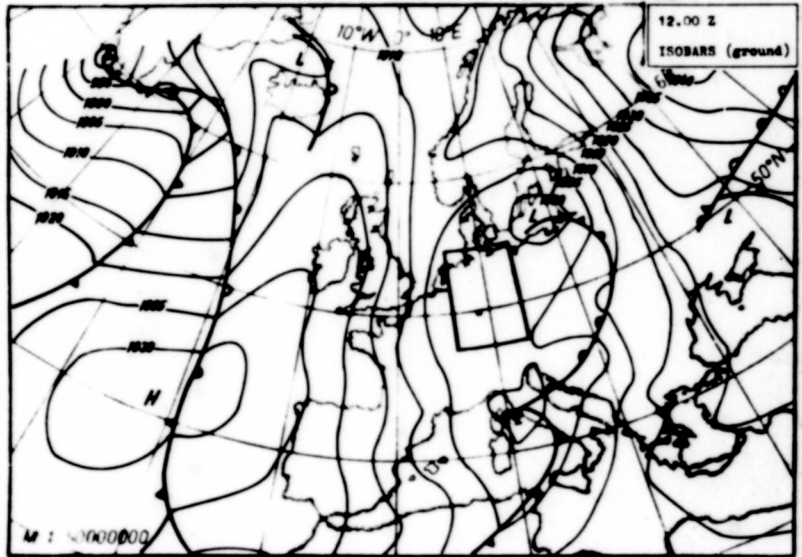
STUTTGART 19.11.1962 — 12^h



XII : 19 Nov 1962



8



9