



Exceptional weather events

Type of event:

Prolonged and Heavy Rainfall

Date:

November 1980

METEOROLOGICAL SERVICE



INTERNAL MEMORANDUM 95/81

**THE PROLONGED AND HEAVY RAINFALL
IN THE WEST AND SOUTHWEST OF IRELAND
ON 1st AND 2nd NOVEMBER 1980**

**By
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UDC
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GLASNEVIN HILL, DUBLIN 9
MAY 1981

The Prolonged and Heavy Rainfall in the west and southwest of Ireland on 1st and 2nd November 1980.

157.1 mm of rain was recorded at Valentia during the first two days of November, the highest ever recorded there in any two day period. The mean monthly value for November is 144 mm (mean 1941-1970). The bulk of this rainfall 154.2 mm, fell in the 36 hours from 05 hours 1/11/1980 to 17 hours 2/11/1980.

Figure 1. shows rainfall amounts (mm) from 09 hours 1/11/1980 to 09 hours 3/11/1980.

Figure 2. gives the two-day rainfall with a return period of five years.

Synoptic Situation.

0000 GMT. 1/11/1980 (Fig. 3)

Ireland was under the influence of a mild southerly airflow. A slow moving front with waves, and its associated trough were approaching the country from the west. An anticyclone was well established over Northern Europe.

0000 G.M.T. 2/11/1980 (Fig. 4)

The front had now moved in over Ireland and was affecting the northwest, west and southwest. A shallow low was situated to the south of the country.

0000 G.M.T. 3/11/1980 (Fig.5)

The front had moved back westward again. A ridge of high pressure, linking the anticyclone over Northern Europe, was intensifying over Ireland.

500 mb Level (Fig. 6)

0000 G.M.T. 1/11/1980

A strong southwesterly airflow was established over Ireland.

0000 G.M.T. 2/11/1980 (Fig. 7)

Winds over the country had backed southerly and moderated somewhat.

0000 G.M.T. 3/11/1980 (Fig. 8)

At this stage winds had become light and variable.

Freezing Levels. (Fig. 9)

There was a marked inflow of cold air at ship R with the passage of the cold front. Freezing levels over Ireland were lowered marginally.

At 1200 2/11/1980 there was an inflow of warm air over Ireland from the southeast, as indicated by the rise in the freezing level at Aldergrove. The rise in the freezing level over Valentia was much less pronounced.

By 0000 3/11/1980 Ireland was under the influence of the colder anticyclonic airflow and freezing levels were falling.

Radar Observations

A sequence of eight Radar Observations from Shannon Airport is shown on figures 10 and 11. The eight observations were taken at six hour intervals from 03 hours 1/11/1980 to 21 hours 2/11/1980.

Cloud tops extended up to 25,000 feet on a number of the observations and echoes were still visible with an attenuation of 34.3 db

Flooding

Severe flooding was reported in parts of the southwest and west.

A comparison of actual rainfall figures for this two day period, 1st and 2nd of November, and two day rainfall with a return period of five years, shows a marked similarity over most areas of the southwest and west. However, the rainfall in Valentia was much more extreme and for the type of rainfall, experienced in the 36 hours (05 hours 1/11/1980 to 17 hours 2/11/1980), a return period of the order 500 to 1,000 years would be expected.

Fig. 12 gives the hourly rainfall amounts in millimetres.

Rainfall figures from other locations in the southwest were examined to determine their rarities. Figure 13 lists stations with large rainfall amounts on 1st November (i.e. 09 hours 1/11/80 - 09 hours 2/11/80). Return periods for these 1 day values are also shown. Caragh (Oolagh) is the only other station which has a return period of the same order of magnitude as Valentia. In fact, the rarity of the event is much lower elsewhere.

It must be pointed out that the duration of some of these falls may not be exactly 1 day, thus introducing a degree of error into the calculations.

Other Extreme Rainfalls of Note:

Total Precipitation in 24 hours

184.2 mm, 11th June 1963, Mount Merrion Dublin. This was recorded during a thunderstorm.

Total Precipitation in 48 hours

210.4 mm, 8th-9th November 1941, at Killarney (Muckross Forest), Co. Kerry. This rainfall was associated with a depression.

Killarney (Muckross Forest) ceased operation in 1976, but rainfall figures on the 1st and 2nd of November 1980 were less than 100 mm at other stations in the vicinity.

The 210.4 mm at Killarney also has a return period of the same order of magnitude as that of the falls in Valentia, November 1980. But as we are describing an event unique to one particular location Valentia itself, this fall of 210.4 mm at Killarney does not detract from the unique event at Valentia.

Conclusion

The main reason for the prolonged and heavy rainfall at Valentia was the fact that an active front was over the area for nearly 48 hours. This can be verified simply by glancing at the radar observations. Warm moist Atlantic air converged with the colder Continental airflow and the line of convergence remained quasi-stationary during the 48 hour period.

RAINFALL AMOUNT IN MILLIMETRES

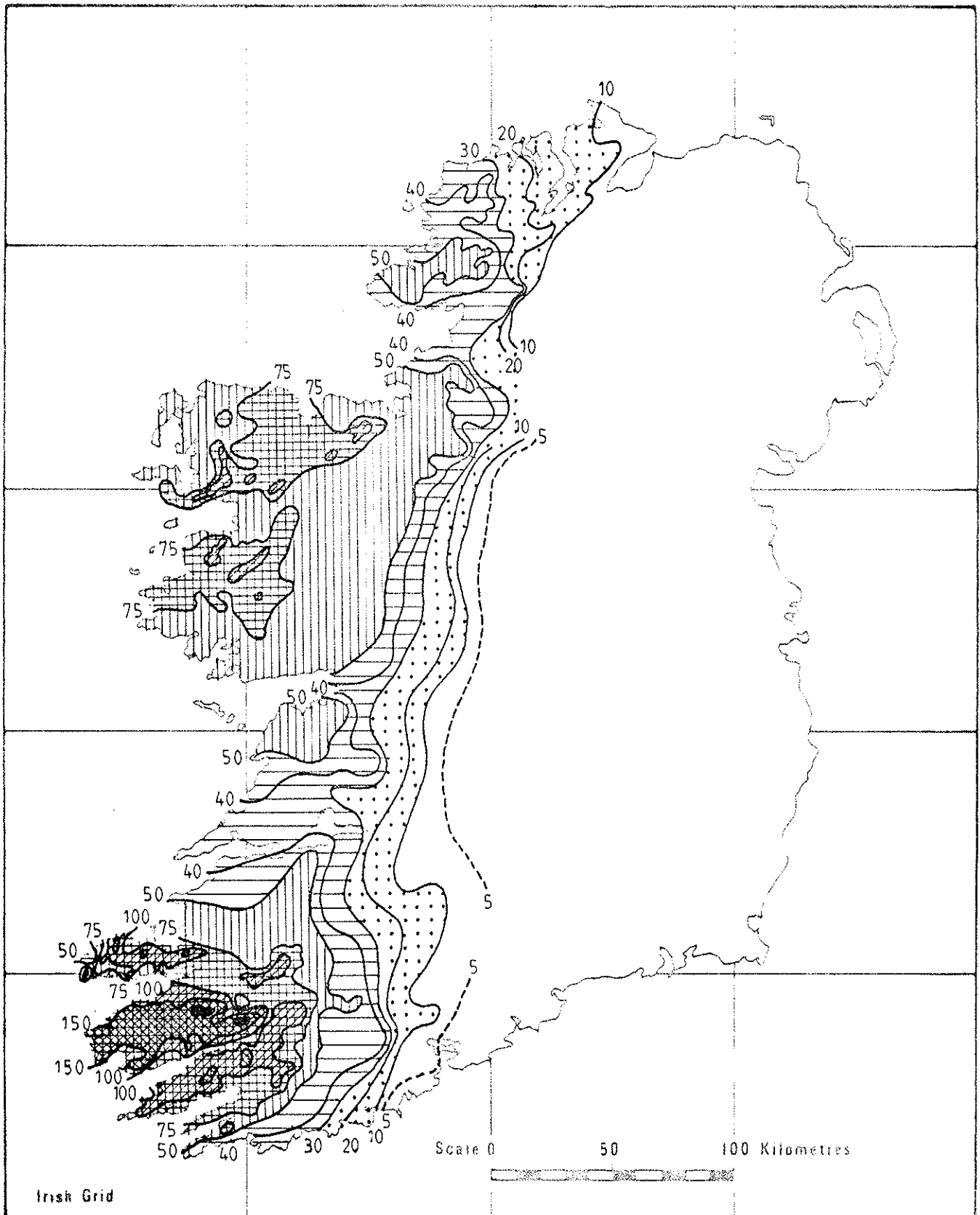
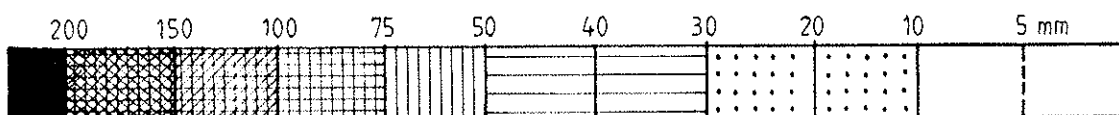


Fig. 1. Rainfall Amounts (mm) OF HR 1/11/1980 - OF HR 3/11/1980.



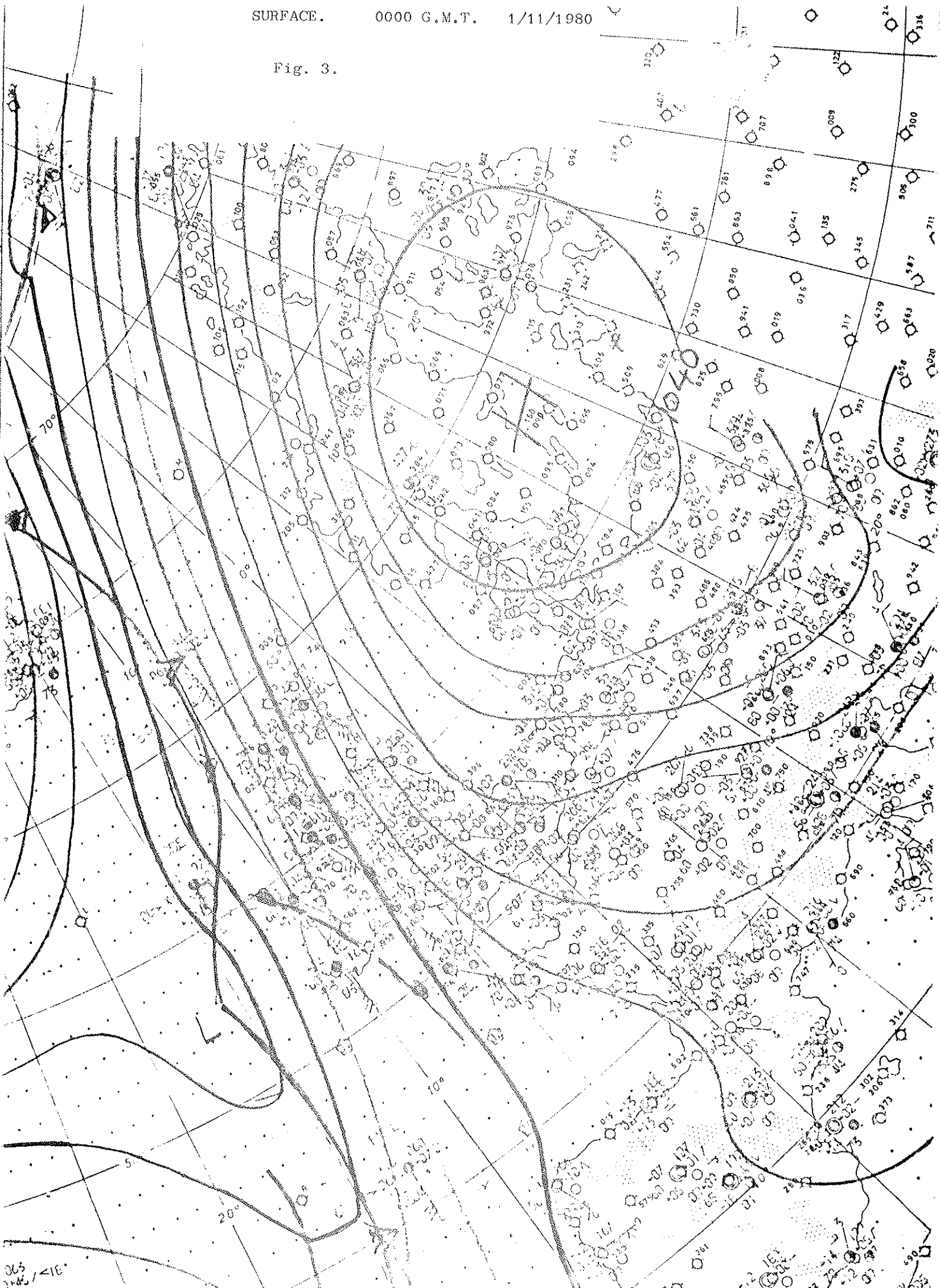


: Two - day rainfall (mm) with return period five years.
[M5(2d)]

Fig. 2.

SURFACE. 0000 G.M.T. 1/11/1980

Fig. 3.



2/11/1980

SURFACE 0000 G.M.T 2/11/1980

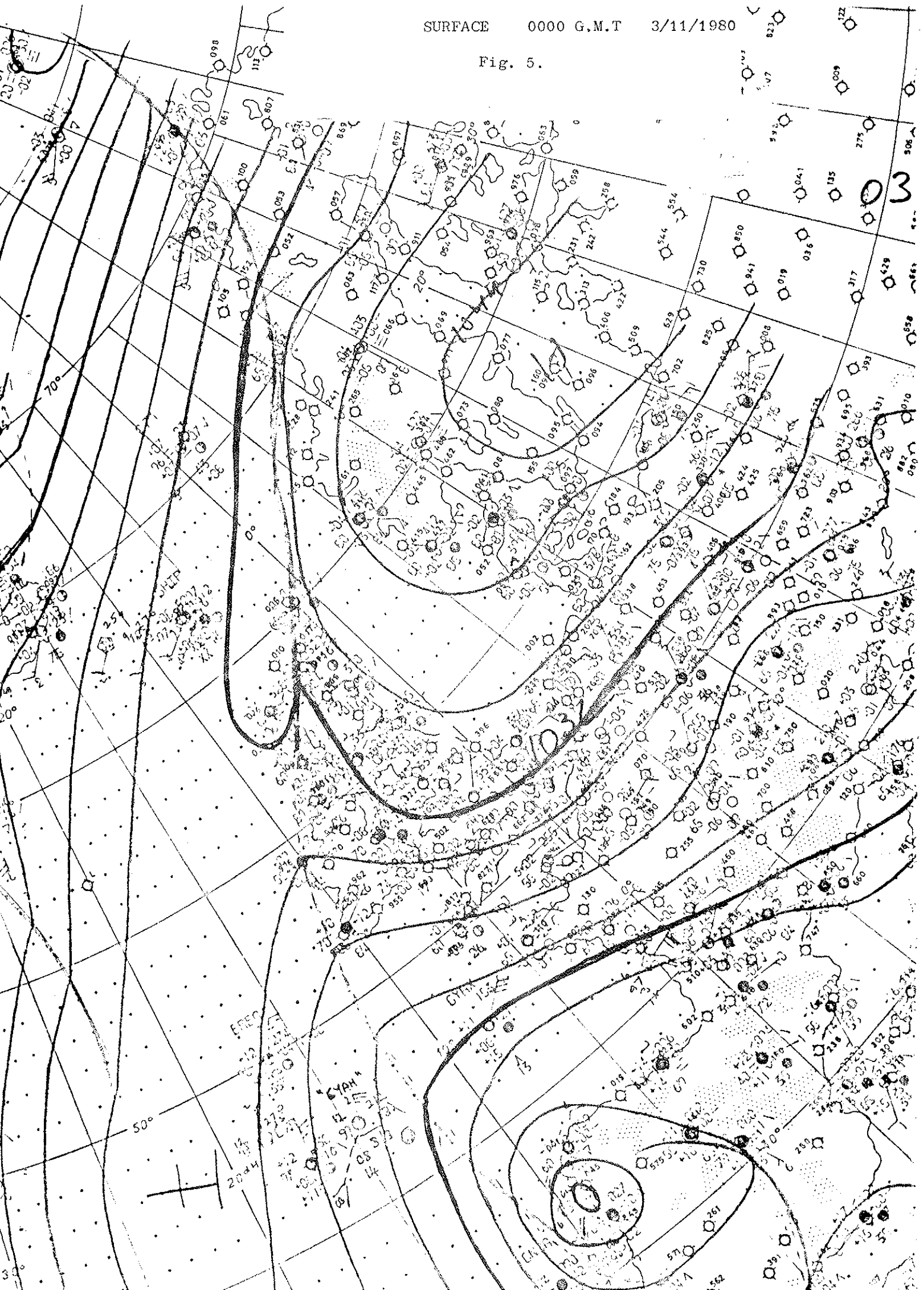
Fig. 4.

SURFACE

0000 G.M.T

3/11/1980

Fig. 5.

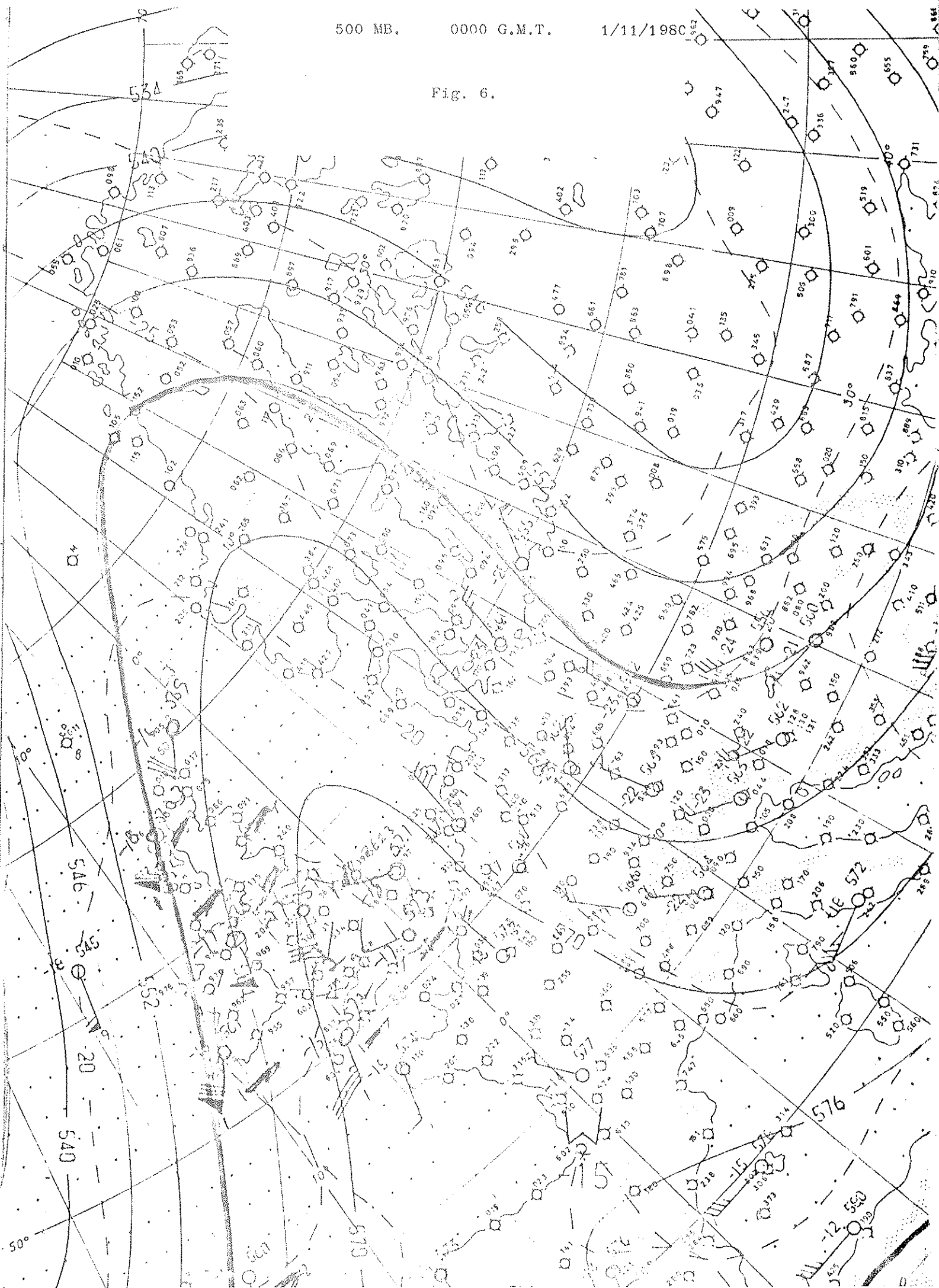


500 MB.

0000 G.M.T.

1/11/1980

Fig. 6.

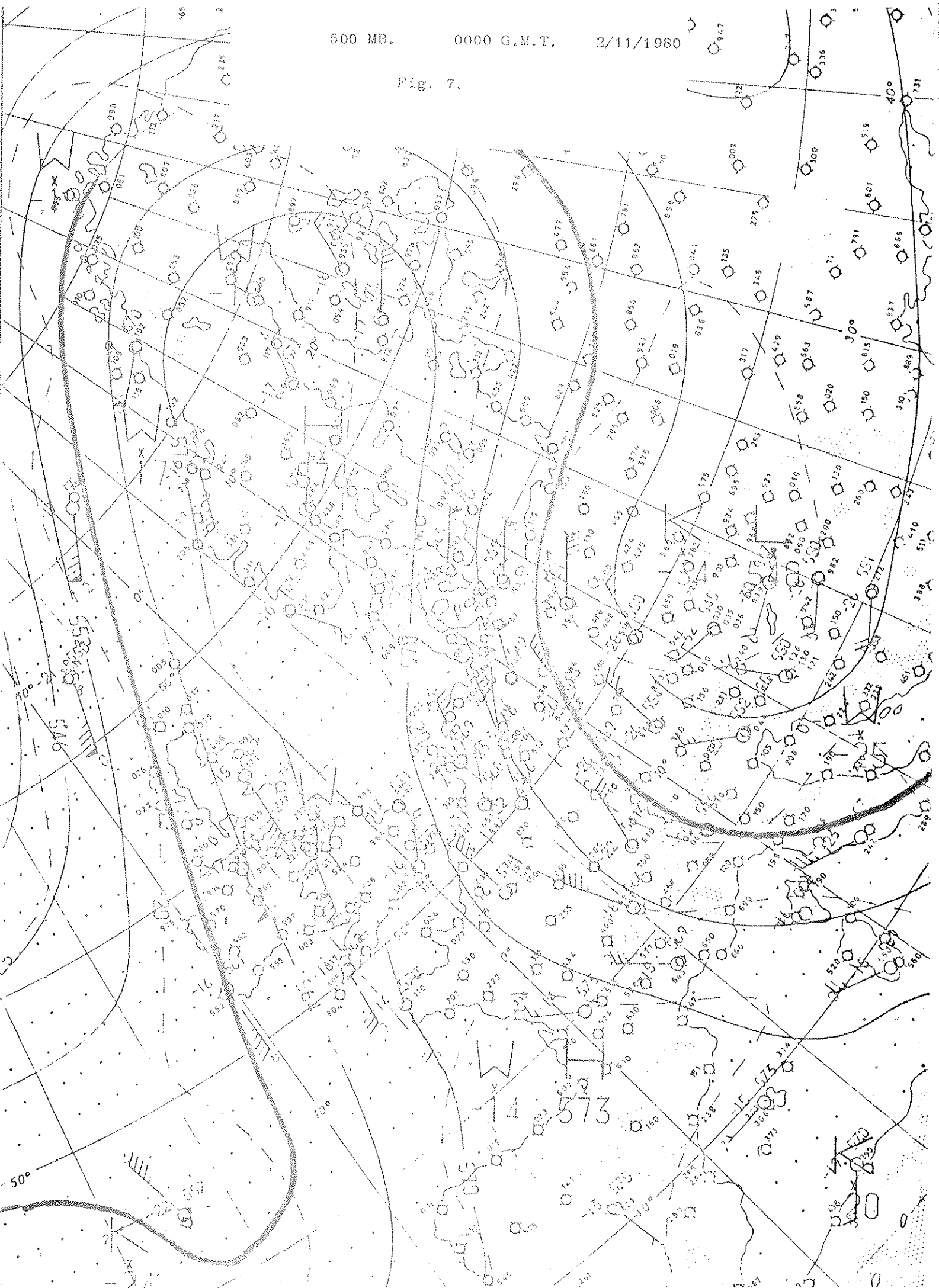


500 MB.

0000 G.M.T.

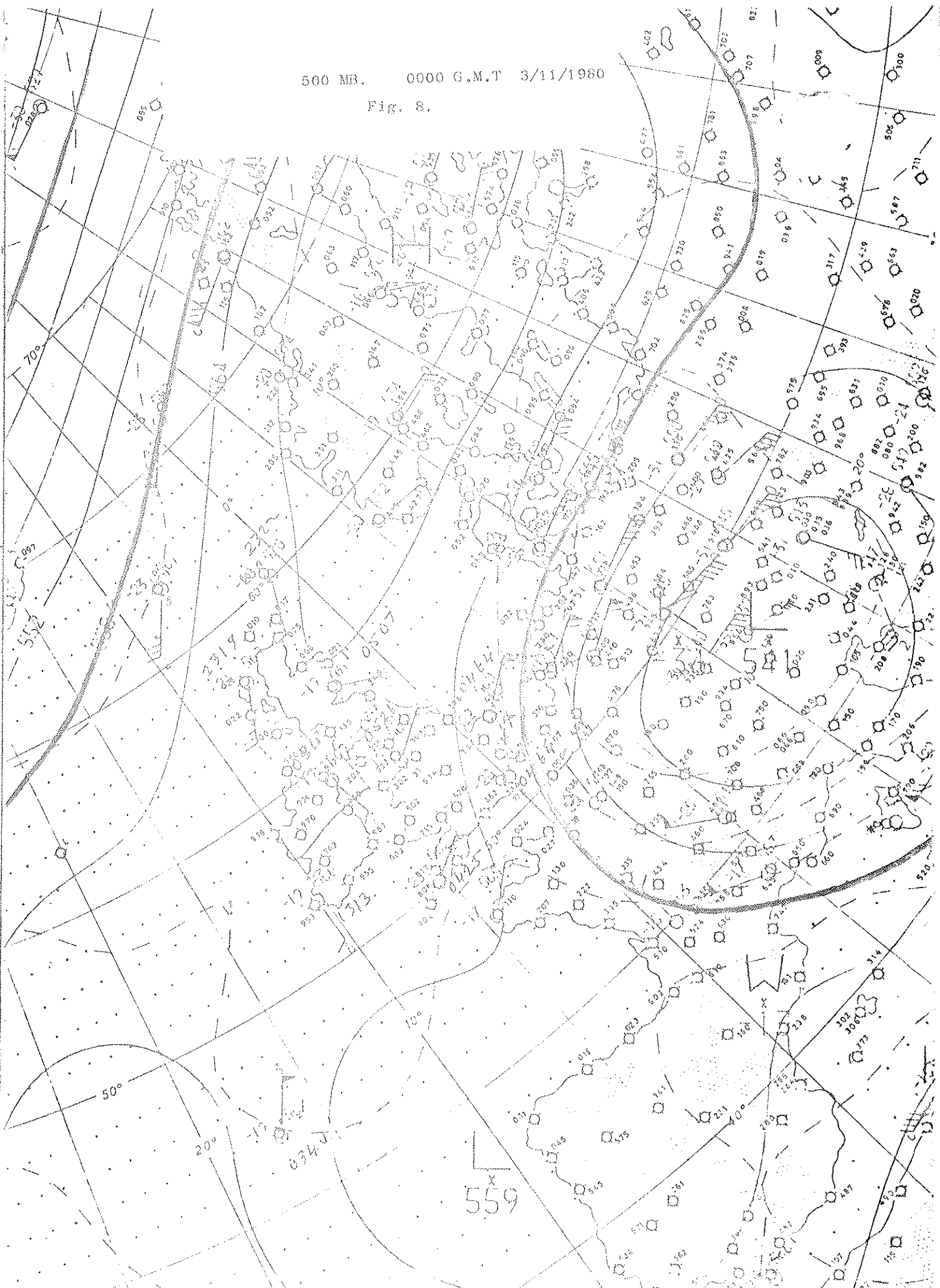
2/11/1980

Fig. 7.



500 MB. 0000 G.M.T 3/11/1980

Fig. 8.



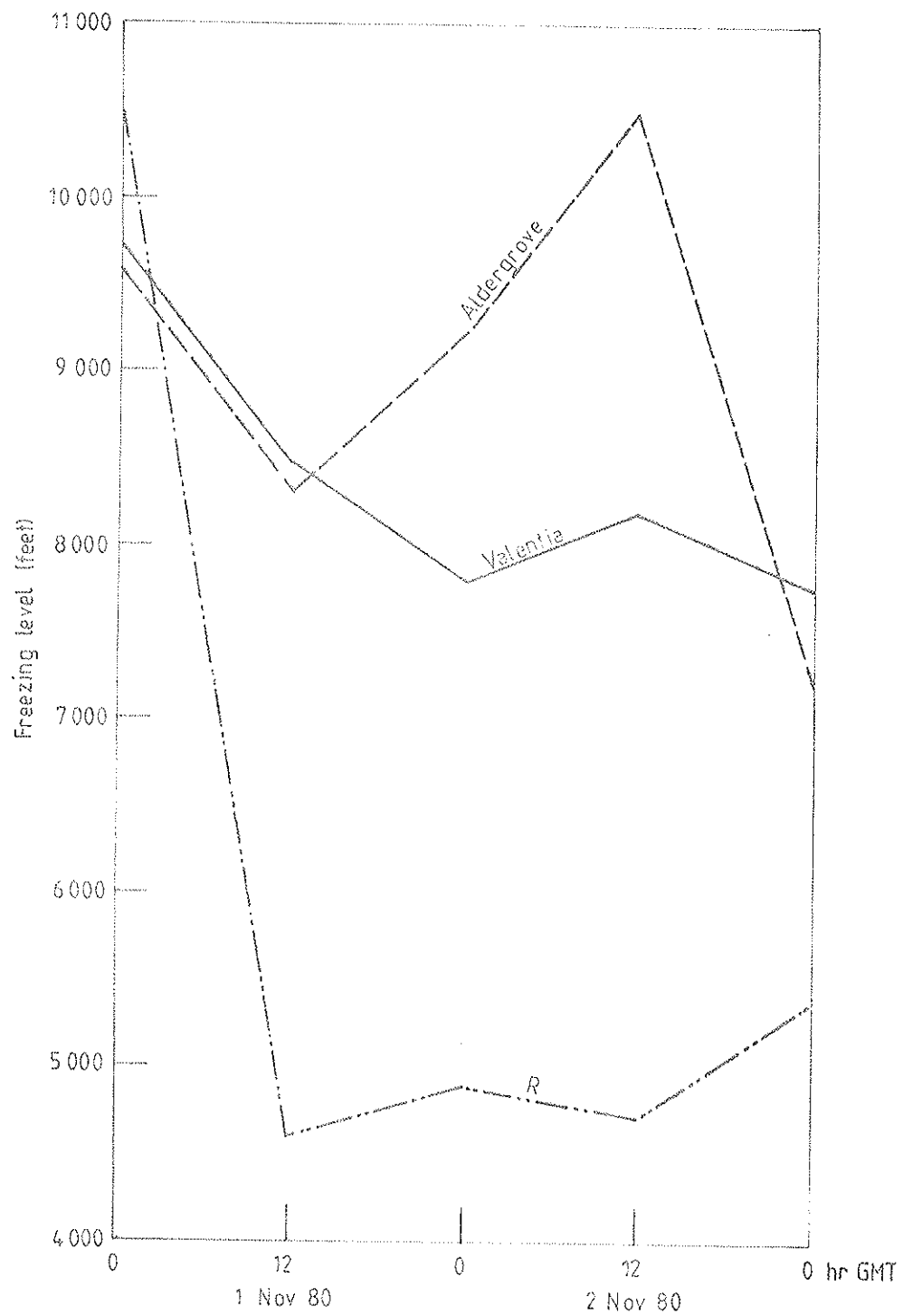


Fig. 9 Freezing levels at Aldergrove, Valentia, Ship R, 1st, and End November 1980.

SHANNON RADAR OBSERVATIONS

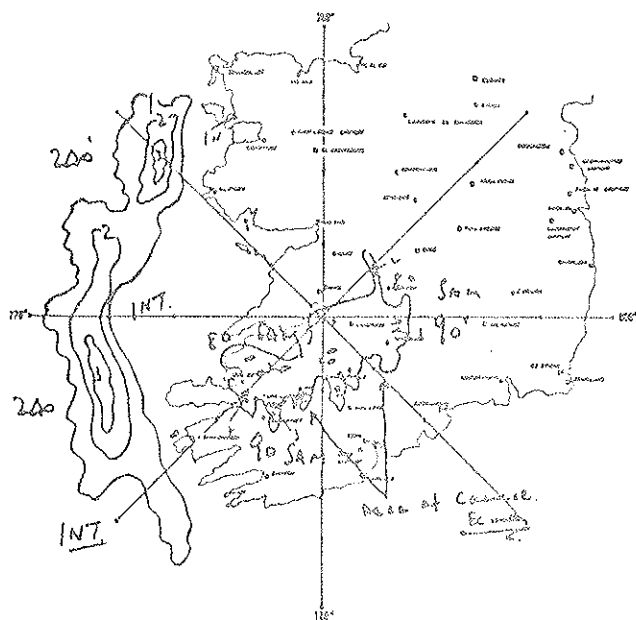
200 km
range at 50 km intervals

Date 16 Nov 1980
Time 0900-0930 GMT

Range 200 km
Markers at 50 km intervals

SHANNON RADAR OBSERVATIONS

Date 16 Nov 1980
Time 0930-1000 GMT



AKS
4517 Total 240/0
16 from 230 dB @ 400 km
TOPS IN 100% OF FEET

RECEIVER ATTENUATION FROM OPTIMUM
Contour 1 0 dB
2 6 dB
3 12 dB
4 18 dB
5 24 dB
6 30 dB

Observer J. J.

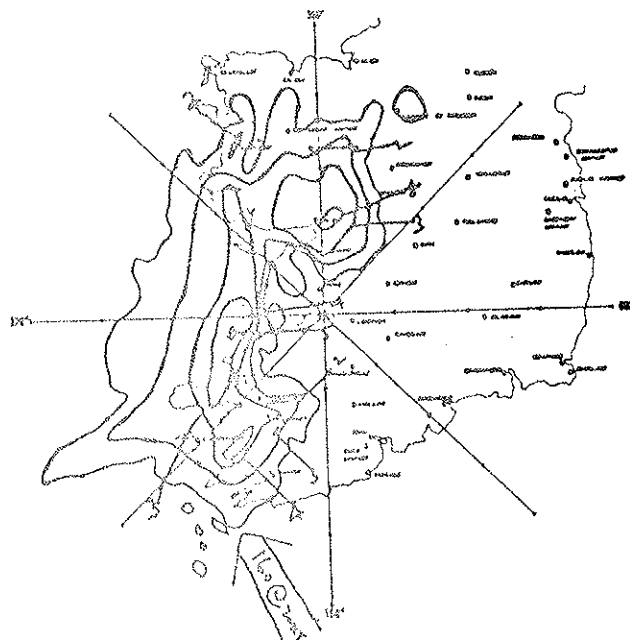
SHANNON RADAR OBSERVATIONS

200 km
range at 50 km intervals

Date 16 Nov 80
Time 1510 GMT

Range 200 km
Markers at 50 km intervals

Date 16 Nov 80
Time 2100 GMT



REMARKS

RECEIVER ATTENUATION FROM OPTIMUM
Contour 1 0 dB
2 6 dB
3 12 dB
4 18 dB
5 24 dB
6 30 dB

ECHO TOPS IN 100% OF FEET

250

Observer J. J.

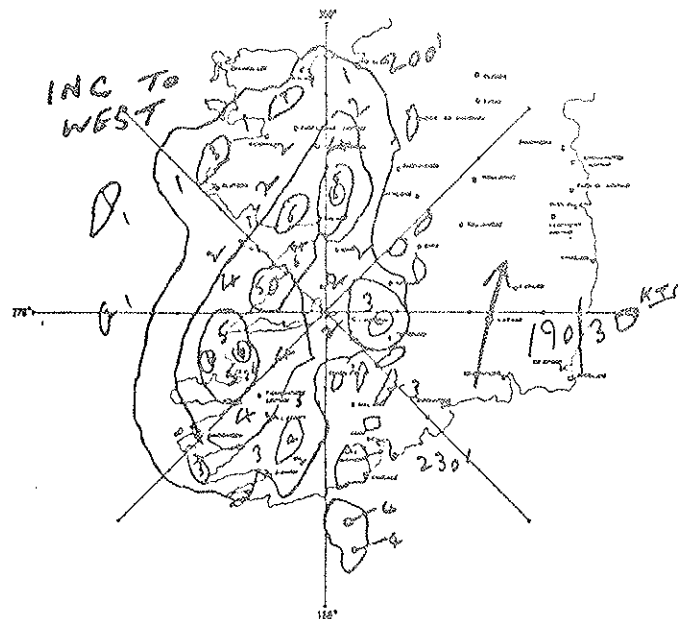
SHANNON RADAR OBSERVATIONS

200 km
range at 50 km intervals

Date 16 Nov 80
Time 1510 GMT

Range 200 km
Markers at 50 km intervals

Date 16 Nov 80
Time 2100 GMT

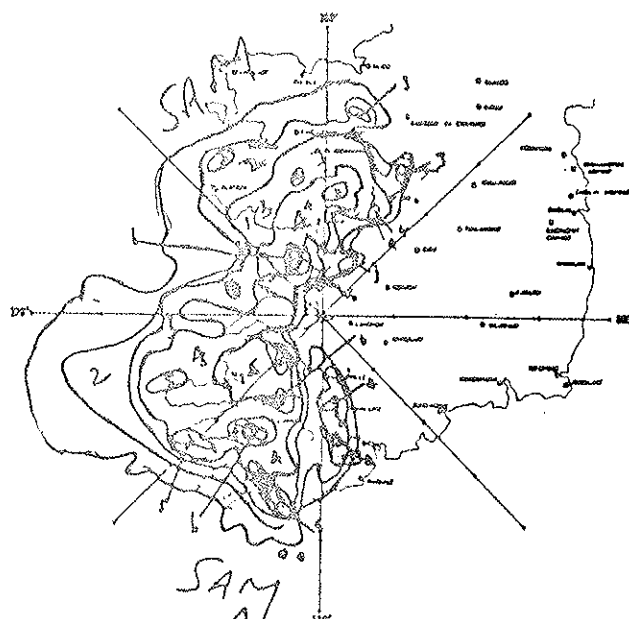


REMARKS:

RECEIVER ATTENUATION FROM OPTIMUM
Contour 1 0 dB
2 6 dB
3 12 dB
4 18 dB
5 24 dB
6 30 dB

ECHO TOPS IN 100% OF FEET

190/230

Observer J. J.

RECEIVER ATTENUATION FROM OPTIMUM
Contour 1 0 dB
2 6 dB
3 12 dB
4 18 dB
5 24 dB
6 30 dB

ECHO TOPS IN 100% OF FEET

200

Observer J. J.

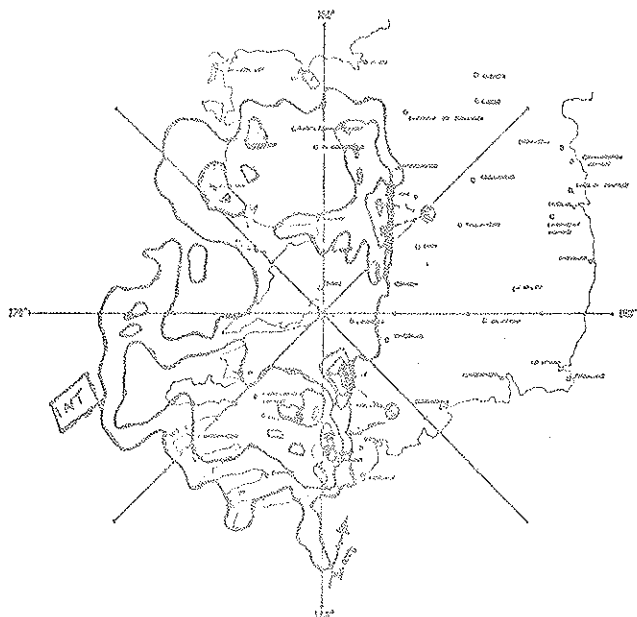
SHANNON RADAR OBSERVATIONS

Range 200 km
Markers at 50 km intervals

Date 2 Nov 1980
Time 0230 GMT

Range 200 km
Markers at 50 km intervals

Date 2/11/80
Time 1830 GMT



REMARKS

RECEIVER ATTENUATION FROM OPTIMUM		
Contour		dB
1		0
2	158	0
3	204	0
4	276	0
5		0
6		0

ECHO TOPS IN 100% OF FEET

Observer No. 230

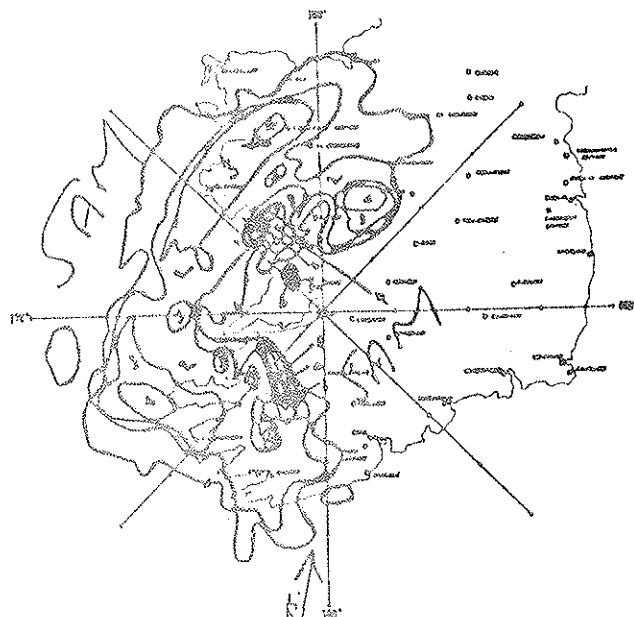
SHANNON RADAR OBSERVATIONS

Range 200 km
Markers at 50 km intervals

Date 2 Nov 1980
Time 1530 GMT

Range 200 km
Markers at 50 km intervals

Date 2 Nov 1980
Time 2100 GMT



REMARKS

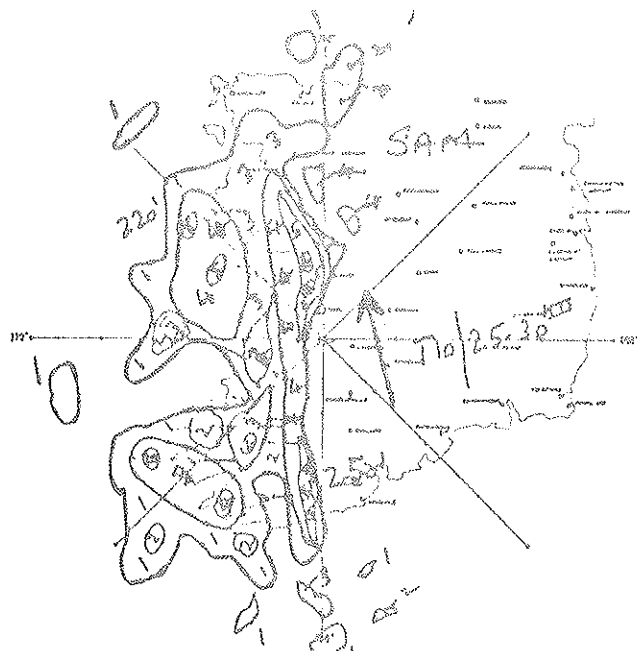
RECEIVER ATTENUATION FROM OPTIMUM		
Contour		dB
1		0
2	158	0
3	204	0
4	276	0
5		0
6		0

ECHO TOPS IN 100% OF FEET

To 260

Observer

SHANNON RADAR OBSERVATIONS



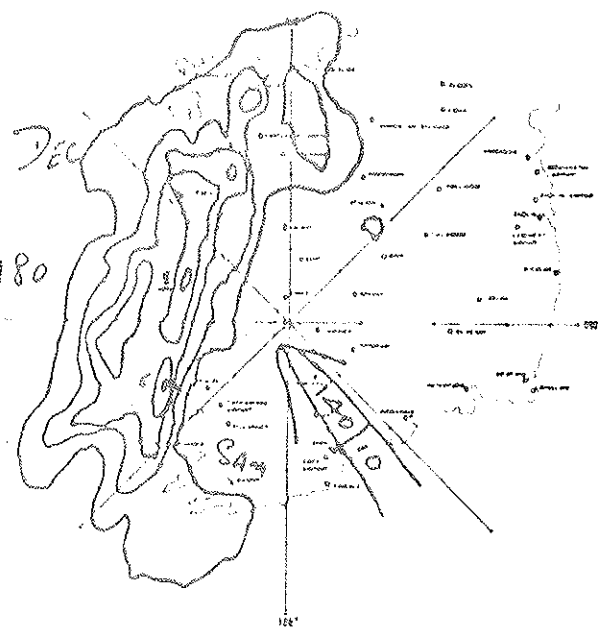
REMARKS

RECEIVER ATTENUATION FROM OPTIMUM		
Contour		dB
1		0
2	158	0
3	204	0
4	276	0
5		0
6		0

ECHO TOPS IN 100% OF FEET

210/250

Observer 21



REMARKS

RECEIVER ATTENUATION FROM OPTIMUM		
Contour		dB
1		0
2	158	0
3	204	0
4	276	0
5		0
6		0

ECHO TOPS IN 100% OF FEET

Observer

VALENTIA OBSERVATORY

NOVEMBER

1980

RAINFALL AMOUNTS IN MILLIMETRES AND TENTHS DECIMAL POINT OMITTED

HOUR GMT.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	AMT. 0-24H	DUR. 0-24H	M
1	T	T		T	T	16	15	27	85	70	47	28	21	32	44R	47	17	19	59	54	51	73	75	86	866	185		
2	69	80R	34	38	49	37	29	32	34	33	44	63	43	34	35	14	08	08	T	01	20	T	T	T	705	192		
3	T	T	T	T	T	T	T	T	T										T	T	T	T	T	T	T	T		
4	T	T	T	T	T	T	T	T	T																T	T		
5																												
6																												
7																												
8	T	01	T	T	T	T	T	T	03	01	T	T	T	T	T	T	T	01	01	01					05	21		
9																												
10																												
11	T	T	T	T	T	T	T	T																				
12	T	T	T	T	T	T	T	T																				
13	T	T	T	T	T	T	T	T																				
14	67	66R	78	32	34	11	12	17	12	03	T	T	01	T	T	04	T	T	T	T	08	T	T	16R	334	87		
15	T			02	13	22	02	02	34	41	03					04	T	02	T	T	20	10R	T	01	155	66		
16																												
17	T																											
18																												
19	01	04	02	01	01	01	01	T	01	T	01	01	05	09	03	10	T	01	03	09	06R	06	04	02	72	112		
20	T	06	04	T	27	16	14	20	17	05															129	74		
21																									132	126		
22	T	03	03	11	10	13	24	16	21R	07	02	05	01	07	01	01												
23																												
24	13	T			T						01	07	14	01	T										05	08		
25	T	T			02				14R	01	06	07	14	01	T										18	09		
26	01	T	T		06R	06	01	T	T		02	T	07	02	07	01	03	T	11	04	06	T	T	02	66	37		
27	T	T	03	T	05	T	07R	01	04	T	T														41	23		
28	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	29	19		
29	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T	T			
30	T	T																							T			
TOTAL	151	157	124	076	148	119	094	123	220	175	109	103	097	108	112	086	041	043	074	093	133	125	100	113	2724	1067		

R-HOUR WITH MAX RATE 2MM/HR OR MORE. S-SUM OF TRACES. X-MAX OF ROW OR COLUMN

Fig 12.

Rainfall Stations reporting over 100 mms of rain between 09 hours
1/11/80 - 09 hours 2/11/80.

Location	Amount (mms)	Return Period (of the order)
Caragh (Oolagh)	131.7	500 years
Derreen	118.9	50 years
Valentia	115.7	500 years
Lisivigeen	107.5	100 years
Sheen Falls	106.5	50 years
Gortdromakiery	104.5	20 years.

Fig. 13.