

PACIFIC REGION TECHNICAL NOTES

85-001

May 16, 1985

Report on the Storm of 25-26 April 1985
Over the Northern Coastal Waters of
British Columbia

David McCulloch, Meteorologist
Pacific Weather Centre, Vancouver, B.C.

INTRODUCTION

On 25 April 1985, storm force winds developed over the waters in and around Hecate Strait, resulting in 3 deaths and the loss of up to 7 vessels. This paper briefly examines the synoptic situation surrounding the development and intensification of the low pressure system, and the manner in which the Pacific Weather Centre (PWC) responded to this system. A more comprehensive discussion of this storm is presented in PWC ODIT Internal Report 85-022.

SYNOPTIC SUMMARY

At 25/00Z, a 1002 mb low was near 48N/158W. The geostrophic wind in the northeast quadrant of the low, ahead of the warm front was about 35 kts. Although the April 25/00Z upper air charts showed no short term potential for development for the surface low, satellite imagery and AIREPs indicated otherwise. A moderate short wave inferred by satellite imagery, a strong jet of 150 to 180 knots (AIREPs), plus the existence of very cold air (516 dam thickness over the Aleutians) provided support for a moderate development in the short to medium term.

By 02Z, satellite imagery gave strong evidence of the development of a mid-level trough, and by 06Z the surface low had deepened by 4 mb (to 998 mb).

On the surface, there were two reports of moderate rain ahead of the warm front and one report of heavy rain near the warm front. This infers a good supply of latent heat being released into the warm air.

By 25/12Z, the low had deepened a further 5 mb (to 993 mb). Buoy 6004 (51N/136W) indicated a falling tendency of 7.2 mb/3 hours of which roughly 4 mb could be attributed to the motion of the low, and the remainder due to the intensification of the low.

Warm air advection was evident in the downstream ridge as it had built northwards by 3 latitude degrees (from 52-55 degrees north latitude) over the 12 hour period ending at 25/12Z. By 25/16Z, satellite imagery had indicated the likelihood of a closed circulation in the mid-level's.

On the 25/18Z surface analysis, the low had moved to 54N/145W and had deepened to 990 mb. Some intensification of the low was evident as there was one more isobar within 600 km of the low than on the 25/12Z analysis. There were also two more reports of moderate rain in vicinity of the warm front.

On the 26/00Z surface chart, the low had dropped to 980 mb with the addition of 3 isobars within 600 km of the low, over the previous 6 hour period. The first report of storm force winds was at Cape St. James at 25/23Z. A copy of the surface and 500 mb charts valid 26/00Z is supplied in Appendix IV.

As the 500 mb flow remained strong westerly, warm air was continually and rapidly advected over the B.C. coastal areas at the mid to high levels. At 26/00Z, the rather thick mixing zone stretched from 600 to 840 mb at Annette. Also, a low level jet of 40 to 60 knots was noted on the hodographs of Port Hardy and Annette. This low level jet is likely to have formed as the Coast Range mountains kept the main area of pressure falls on the windward side of the mountains.

The strongest sustained wind measured over the inner north coastal waters between 25/18Z and 26/12Z (see Appendix I) was 55 knots at the Ivory lighthouse (26/07Z).

OPERATIONAL PROBLEMS

After 25/18Z, most lighthouse weather reports normally transmitted to PWC by the Coast Guard at Prince Rupert were not transmitted due to Search and Rescue commitments. Some data from 15-17Z was lost when the teletype queue was killed prior to 18Z.

The satellite system had a hardware failure which resulted in intermittent picture reception from 25/11Z to 25/1830Z. This had little impact on the forecasting of the storm as the pictures that were received were supplemented by those on the GOES TAP.

LEAD TIME

With reference to the map and tables in Appendix II, it can be seen that gale and storm force winds generally spread across the regions from west to east over a period of some 3 to 7 hours. A minimum of 18 hours warning was provided for the onset of the gales, and 6 to 13 hours warning was provided for the storm force winds.

SUMMARY

Storm force winds developed ahead of the warm front, with a large part of the intensification of the flow likely due to the latent heat release into the warm air ahead of the warm front. Also, coastal convergence and the upslope against the Coast Range mountains would have increased the precipitation (and hence the latent heat release) into the warm air.

The development of the storm and its associated winds were consistently forecast by the Pacific Weather Centre. Gale warnings were issued at least 18 hours in advance and the storm warnings were issued 6 to 13 hours in advance.

Proper interpretation of satellite imagery was critical to an understanding of the development of the low pressure centre.

Rescue priorities at the Prince Rupert Coast Guard station prevented the normal relay of lighthouse weather information to the Pacific Weather Centre. This severely limited the Weather Centre's ability to monitor the onset of gales and storm force winds in Dixon Entrance, and to a lesser extent, in Hecate Strait.

There were also some operational problems with satellite reception and the national teletype circuit, but these are considered to have had little impact on the forecasting of the storm.

The numerical prognoses did fairly well on forecasting the position of the low, and the gradient between the low and the mainland coast. Their forecasts of the depth of the low, however, left a lot to be desired, and may have been due to problems resolving some upper air features due to limited data over the Pacific Ocean.

Surface data was also in short supply as indicated in Appendix III. One cannot have a lot of confidence in an analysis with little supporting data; confidence that is necessary in performing a prognosis, on which forecasts and warnings are based.

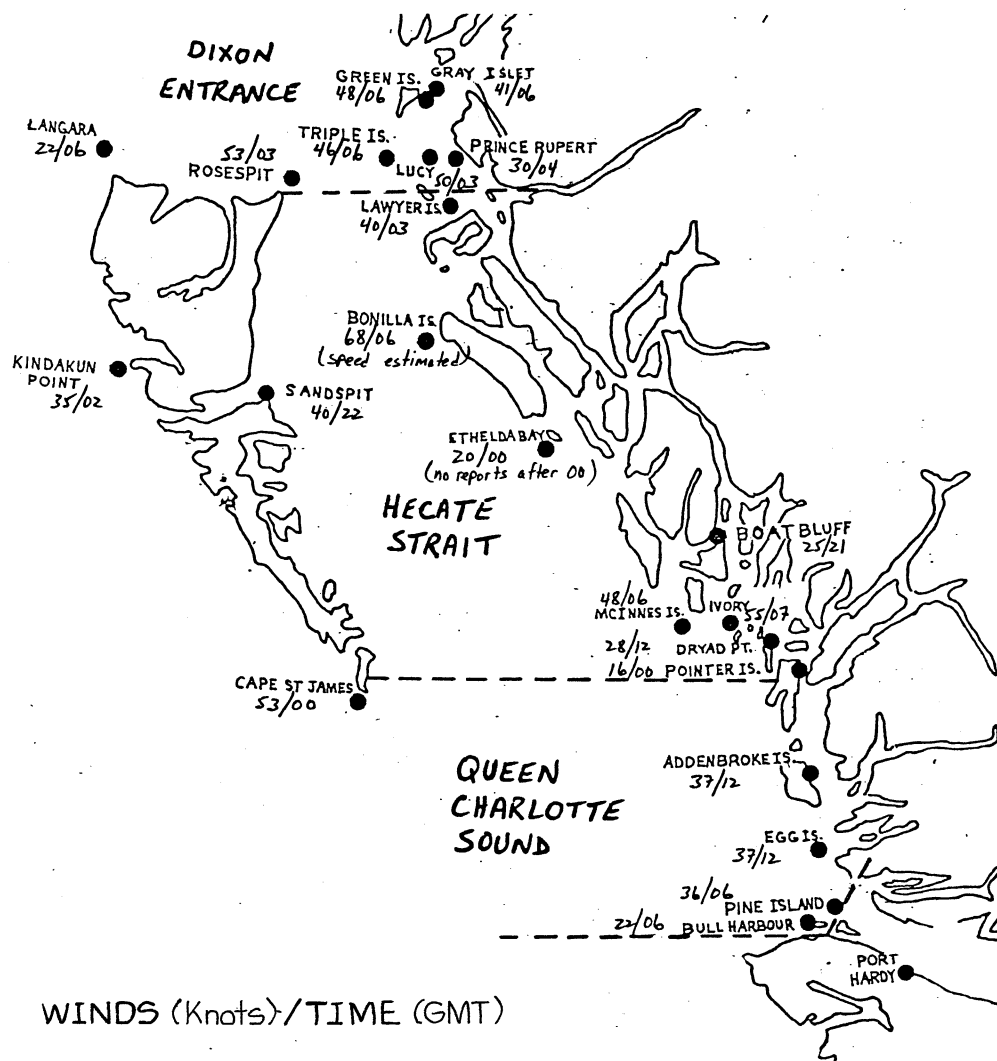
ACKNOWLEDGEMENTS

I would like to acknowledge the valuable insights into the satellite signature of this storm and the constructive criticisms provided by Mr. Morin of the Pacific Weather Centre.

REFERENCES

McCulloch, David, The Storm of 25-26 April 1985, Over the Northern Coastal Waters of British Columbia, (Technical Version), Pacific Weather Centre ODIT Internal Report 85-022, May 14, 1985.

McCulloch, David, The storm of 25-26 April 1985, Over the Northern Coastal Waters of British Columbia, (Non-Technical Version), Pacific Weather Centre, ODIT Internal Report 85-023, May 16, 1985.



APPENDIX I (a)
 MAXIMUM SUSTAINED WIND
 From 25 April 1800 GMT to 26 April 1200 GMT

APPENDIX I (b)

MAXIMUM SUSTAINED WINDS FROM 25/18 GMT to 26/12 GMT
by FORECAST REGION

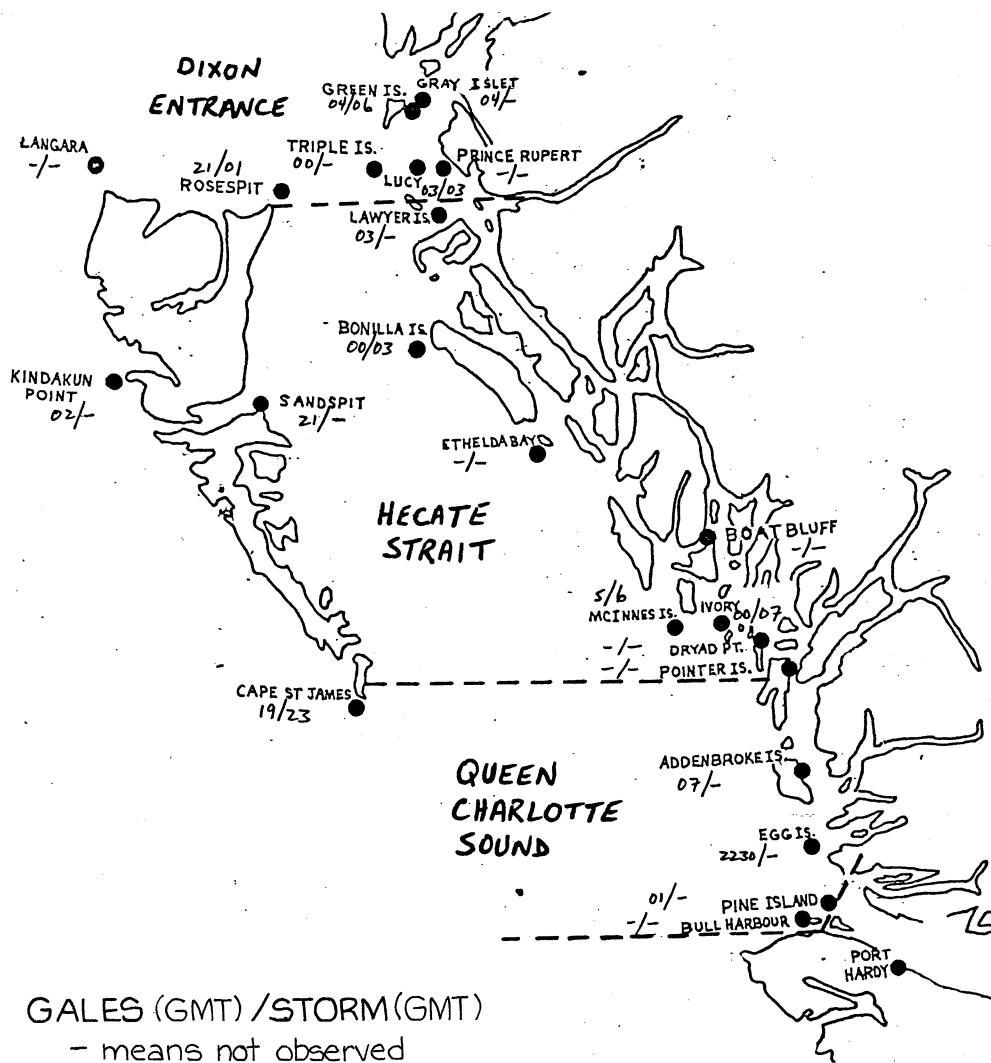
REGION	MAXIMUM WIND	TIME (GMT) (day/hour)	REMARKS
DIXON ENTRANCE			
Annette (Alaska)	32	26/06	hourly
Green	48	26/06	
Grey Islet	41	26/06	hourly, automatic station
Lucy	50	26/03	
Rosespit	53	26/03	hourly, automatic
Prince Rupert	30	26/04	hourly
Triple Island	46	26/06	
HECATE STRAIT			
Boat Bluff	25	25/21	
Bonilla	68	26/06	see 1 below
Dryad	28	26/12	
Ethelda	20	26/00	hourly 16-00 GMT
Ivory	55	26/07	see 2 below
Lawyer	40	26/03	
McInnes	48	26/06	see 2 below
Pointer	16	26/00	most reports missing
Sandspit	40	25/22	hourly
QUEEN CHARLOTTE SOUND			
Addenbroke	37	26/12	
Bull Harbour	22	26/06	
Cape St. James	53	26/00	hourly
Egg Island	37	26/12	
Pine Island	36	26/06	

REMARKS:

1. Bonilla- wind speeds estimated after 2100 GMT
2. 3 hourly 15-00 GMT then 6 hourly

NOTES:

- a. All stations report every 3 hours unless noted
- b. Most lighthouses do not report from 07-11 GMT



APPENDIX II (a)
 TIME OF ONSET OF GALES AND STORM FORCE WINDS

APPENDIX II (b)

REGION	onset gales	advance notice
Dixon Entrance	21-03Z	20-26 hours
Hecate Strait	21-00Z	20-23
Queen Charlotte Sound	19-23Z	18-22

REGION	onset storms	advance notice
Dixon Entrance	01-03Z	8-10 hours
Hecate Strait	23-06Z	6-13
Queen Charlotte Sound	23-06Z	6-13

NOTE: The area of concern in each region extends from the mainland coast to the Charlottes.

APPENDIX II (c)

SUMMARY of FORECASTS and WARNINGS for
DIXON ENTRANCE, HECATE STRAIT, QUEEN CHARLOTTE SOUND
issued by
THE PACIFIC WEATHER CENTRE

TIME (GMT) (day/hour)	REMARKS
25/0045	gale warning issued for Thursday afternoon for Hecate Strait, Dixon Entrance and Queen Charlotte Sound. Winds forecast 30 to 40 knots.
25/0215	regular issue of marine forecasts FPCN20 continues gale warning
25/1200	storm warning issued for West Coast Charlottes- an area adjacent to the regions of interest.
25/1215	regular issue of FPCN20 indicates gales 35 to 45 knots for the regions of interest during the afternoon.
25/1700	storm warning issued for Hecate Strait, Dixon Entrance, Queen Charlotte Sound, and two other regions. (gales 35 to 45 knots occasionally rising to storm force 50 knots)
25/1815	regular issue FPCN20- continues storm warnings. Transmission of the FPCN20 delayed about 1 hour to 25/1909 due to computer problems.
26/0215	regular issued FPCN20- continues storm warning with gales 35-45 kts rising occasionally to 55 kts.

APPENDIX III

TABLES OF EXTREMES, TIME WIND DROPPED BELOW GALE AND STORM FORCE CRITERIA, AND DATA DENSITY

I. Largest Reported Seas

REGION	HEIGHT	TIME day/hour	PLACE
Dixon Entrance	10 feet	26/06 GMT	Green
Hecate Strait	15	26/06	McInnes
Queen Charlotte Sound	23	26/12	Pine

II. Strongest Mean Sustained Winds

REGION	SPEED	TIME	PLACE
Dixon Entrance	53 kts	26/03 GMT	Rosespit
Hecate Strait	55	26/07	Ivory
Queen Charlotte Sound	53	26/00	Cape St. James

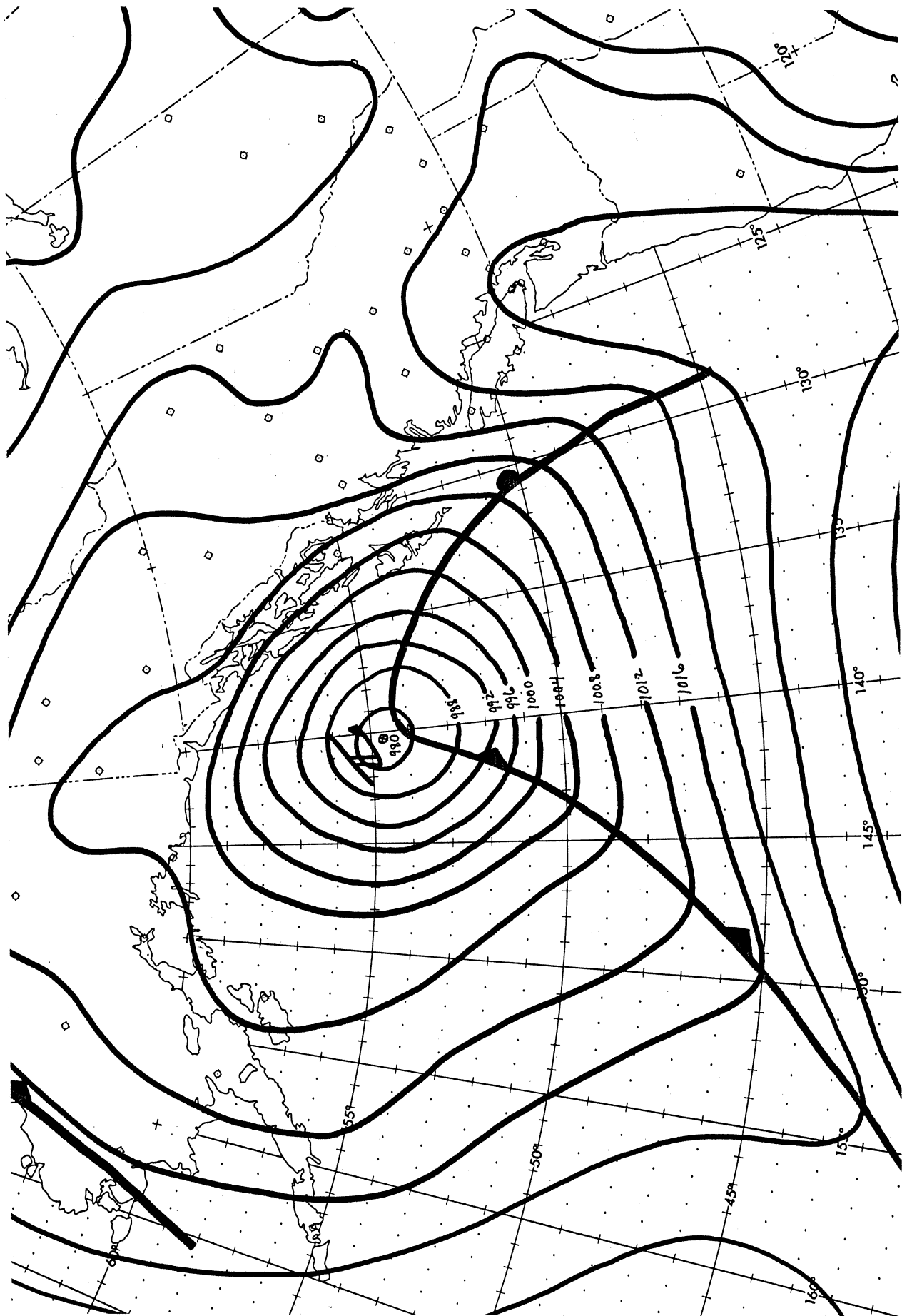
III. Time Wind Dropped Below Gale and Storm Force (26 April 1985)

REGION	Gales ended	Storms ended *
Dixon Entrance	18-21 GMT	before 12 GMT
Hecate Strait	15-21	before 12
Queen Charlotte Sound	15-21	before 12

* uncertain due to insufficient reports overnight.

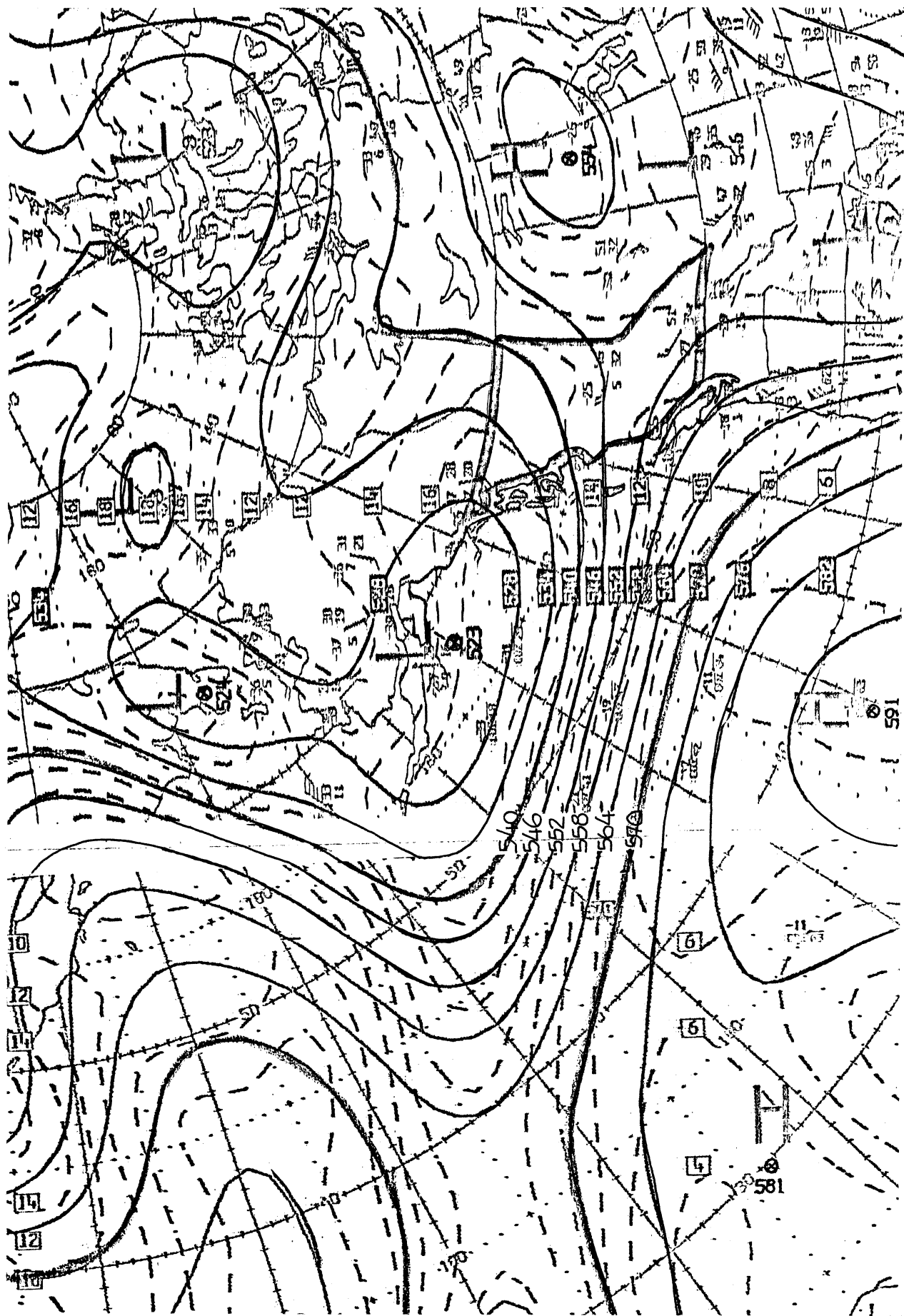
IV. Data Density

TIME (day/hour)	No. of data points around the low within a given radius	
	250 km	500 km
24/18	2	4
25/00	3	6
25/06	1	5
25/12	1	2
25/18	3	8
26/00	4	16



APPENDIX IV (a)

SURFACE ANALYSIS APRIL 26, 1985 0000Z



APPENDIX IV (b)
500MB ANALYSIS APRIL 26, 1985 0000Z