

Appendix A

MAPS AND SATELLITE IMAGES

THE OBSERVATORY LOCATION

This appendix contains a number of maps and satellite images to assist in orienting the reader to the geographical area where these studies were performed and to assist in the interpretation of results. Figure A.1 shows the overall location of Thule Air Base. The laboratory there is ideally suited to the collection of data on the Arctic atmosphere can supplement data collected in other parts of the Arctic (e.g. the CMDL laboratory in Barrow, Alaska) and Norwegian laboratories on Svalbard.

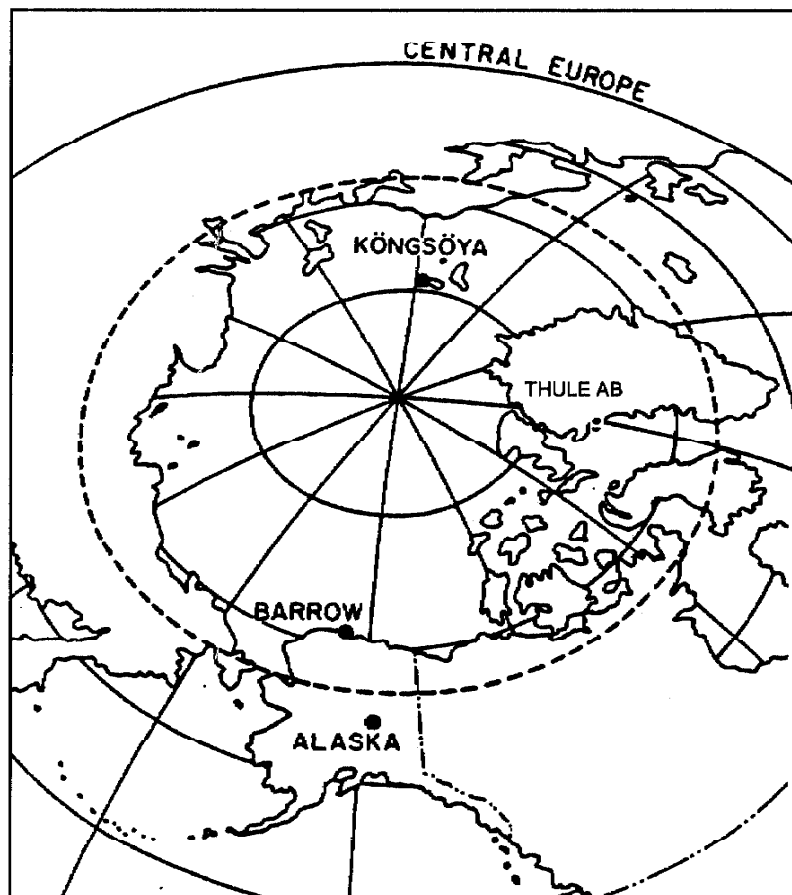


Figure A.1: *Thule Air Base is located in Northern Greenland about half way between the Arctic Circle and the North Pole.*

The English place name Thule Air Base is slightly misleading because Thule, Greenland, locally called Quaanaq, is about 100 kilometers further to the north. Thule Air Base is located several kilometers southeast of the Dundas Mountain area

in a location known locally as Pituffik. Figure A.2 on the pages which follow shows a 50 by 30 kilometer region near Pituffik. The observation laboratory is located on South Mountain about two kilometers southwest of the runway and can be found on the map by looking for the navigation aid marked "TACAN Thule". This tactical air navigation transmitter is no longer in operation, and other installations on South Mountain are primarily used for the reception of various communications, surveillance and navigation information. Transmitting facilities are primarily located on North Mountain to the north of the Thule Air Base area.

SATELLITE IMAGES

When examining the satellite photographs on the following pages, note that the Thule Air Base area can be located on the western coast just below the middle left portion of the images, where Wolstenholme Fjord and Saunders Island (in the absence of excessive cloud cover) can be picked out by a sharp-eyed observer. The images were supplied by Tromsø Satellite Station in northern Norway which provided the following information about the image source [*Tromsø, 1999*]. The images were recorded by the NOAA AVHRR/3 (Advanced Very High Resolution Radiometer) system aboard the NOAA-15 satellite (launched in May 1998).

This radiation detection imager is designed for remote cloud cover and surface temperature observation, and the system uses six detectors to collect data in radiation bands from about 580 nm to 12.5 μm . The images to the left on the following pages are taken with radiation in the 580-680 nm (red) spectral region while the images at the right are taken with radiation long wave infrared radiation around 10.3-11.2 μm . The scanning radiometer images have a nadir resolution of about 1.09 kilometers, and the images shown in this appendix represent a geographical area of about 1000 x 1000 kilometers.

The reader may wish to peruse the images from May-August and notice the change in the ice pack near the coast west of Thule Air Base. The black regions are areas of open water, and these regions expand during May-July permitting access to Thule Air Base by sea for transportation of heavy equipment, fuel oil and other bulky supplies. This access window closes in the early autumn.

WEATHER MAPS

When evaluating selected days for atmospheric aerosol it can be instructive to have weather maps available. To illustrate this maps are provided in this appendix for eight of the representative days. The maps are valid for 12:00 GMT, corresponding to morning at Thule Air Base. Here is a brief evaluation of the weather situation on some of the days selected for analysis:

15 May 1999: Weak low pressure area (1005 hPa) SW of Pituffik, weak high over Peary Land (1030 hPa). Weak low pressure system east of Danmarkshavn with associated frontal systems. Strong low pressure system (980 hPa) south of Cape Farewell. Light breeze from SE at the TAB laboratory.

25 May 1999: High pressure system (1025 hPa) over Pituffik, weak low (1010 hPa) over Peary Land. Very stable weather situation, nearly calm at TAB laboratory. Expect a good day for measurements.

5 June 1999: Strong low pressure system (990 hPa) SW of Nuuk. Low (995 hPa) over the North Pole. Light breeze over Pituffik from NNE.

20 June 1999: Strong low pressure system SW of Nuuk with associated frontal systems. Low pressure over Pituffik with fronts. Wind from W and N.

29 June 1999: High pressure (1020 hPa) over Baffin Land. Stable weather at Pituffik with light wind from W. Should be a good day for data collection.

6 July 1999: Weak low pressure system in Pituffik area with no significant high or low pressure systems. Wind from N or NE. Should be a good day.

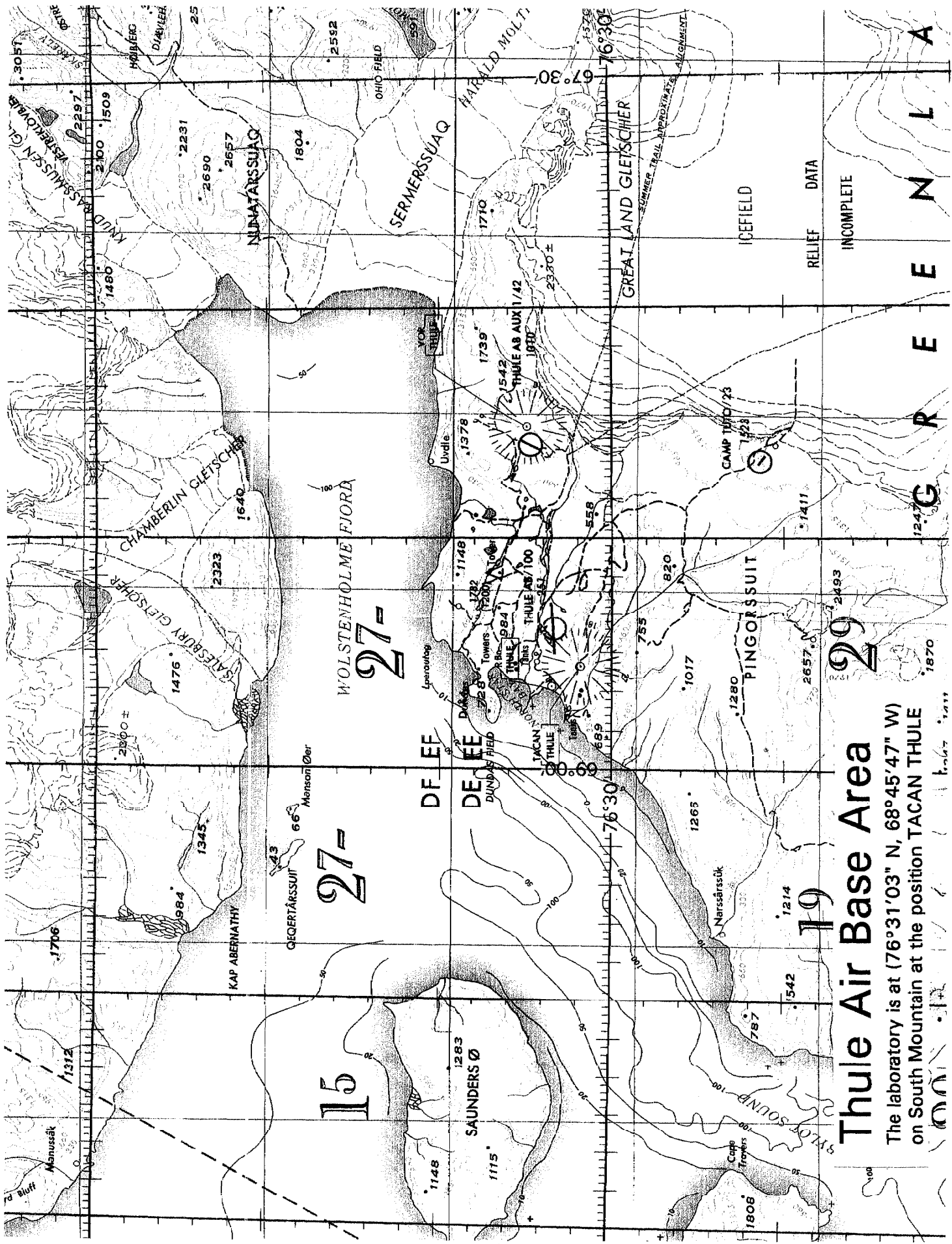
24 July 1999: High pressure over Baffin Land, low pressure over Cape Farewell with fronts. Stable weather in NW Greenland. Exceptionally good day for measurements. See Figures 6.7-6.10 in Chapter 6.

31 July 1999: Strong high pressure system over the North Pole. Weak low east of Danmarkshavn. Easterly wind over Pituffik. Should be a good measurement day.

It should be noted that no dramatic aerosol events were observed during this measurement season, so that weather maps and satellite images were not as crucial to data interpretation as they could have been, should an unusual aerosol incursion have been detected. The weather maps suggested that May 25th and July 24th should be particularly stable and therefore well suited for closer examination.



AVHRR Satellite Images, Thule Air Base, 15 May 1999

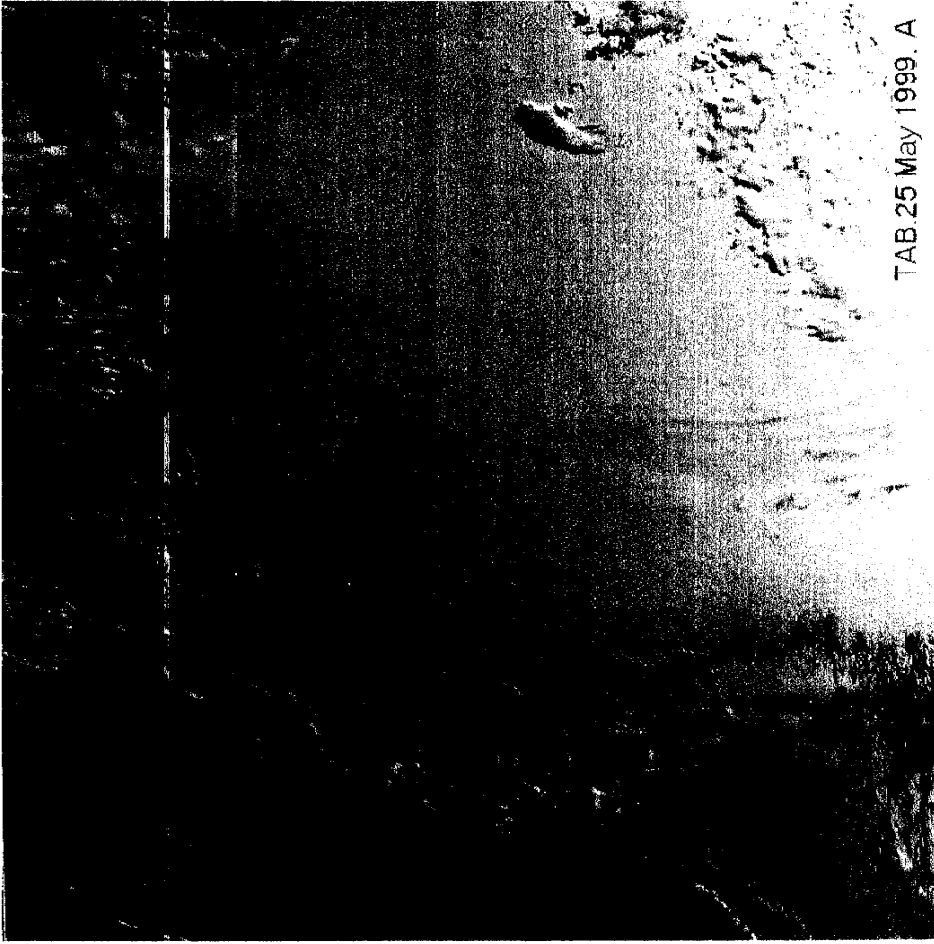


Thule Air Base Area

The laboratory is at (76°31'03" N, 68°45'47" W)
on South Mountain at the position TACAN THULE

RELIEF DATA
INCOMPLETE

E E E R E N L A



TAB.25 May 1999. A

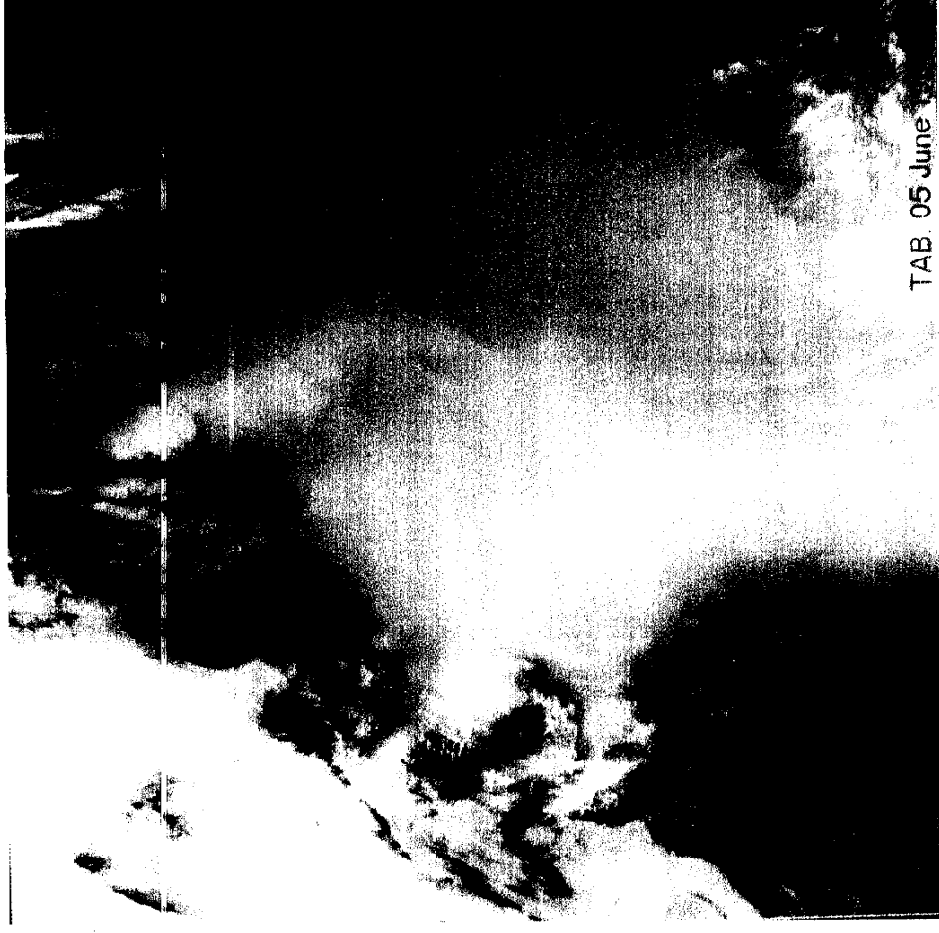


TAB.25 May 1999. B

AVHRR Satellite Images, Thule Air Base, 25 May 1999



TAB. 05 June 1999. A



TAB. 05 June

AVHRR Satellite Images, Thule Air Base, 05 Jun 1999

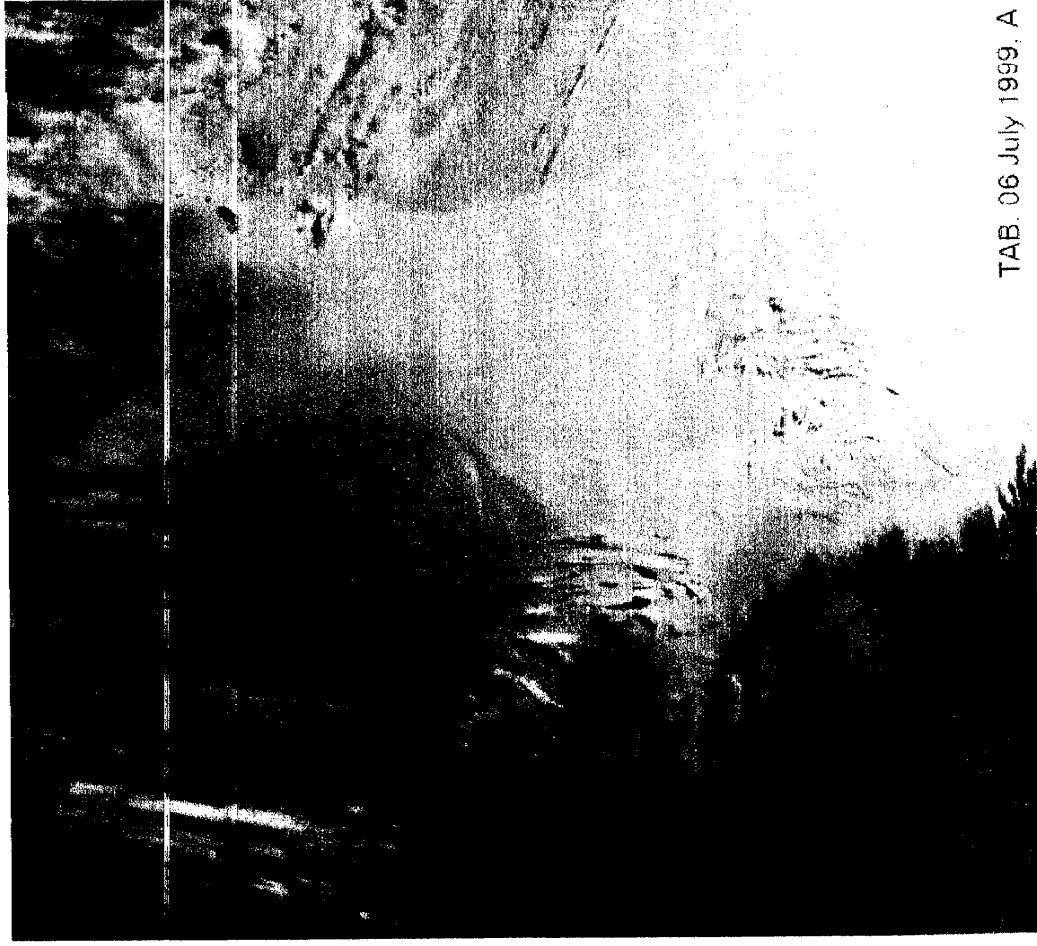


TAB. 20 June 1999. A

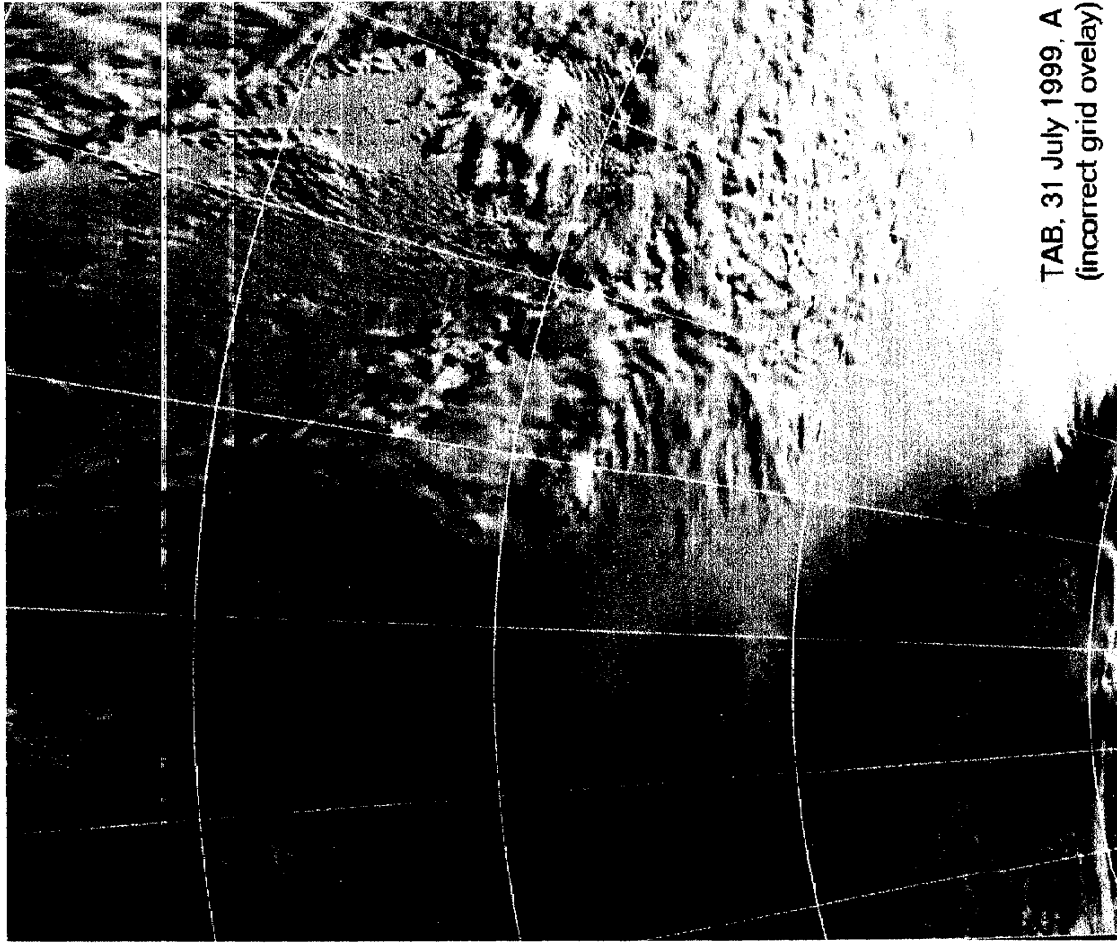


TAB. 20 June 1999. F

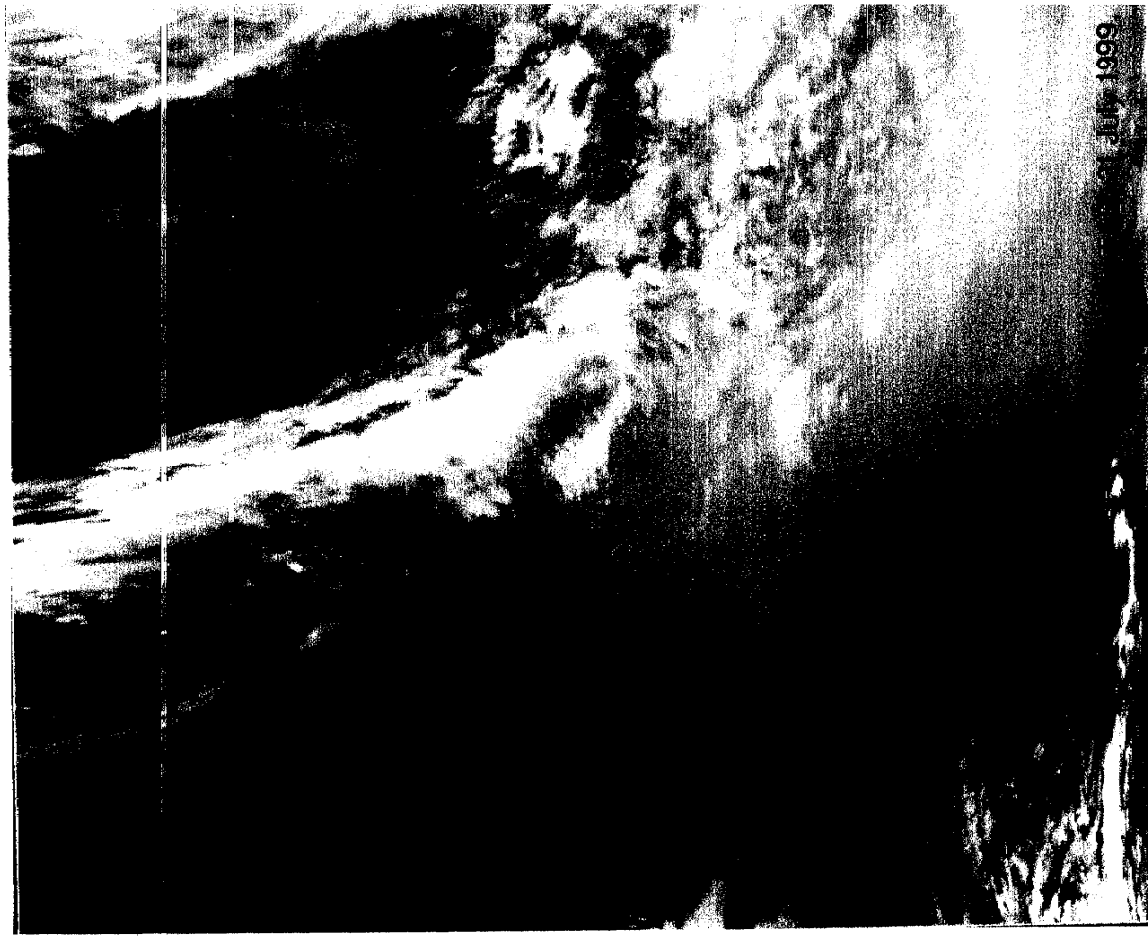
AVHRR Satellite Images, Thule Air Base, 20 Jun 1999



AVHRR Satellite Images, Thule Air Base, 06 Jul 1999

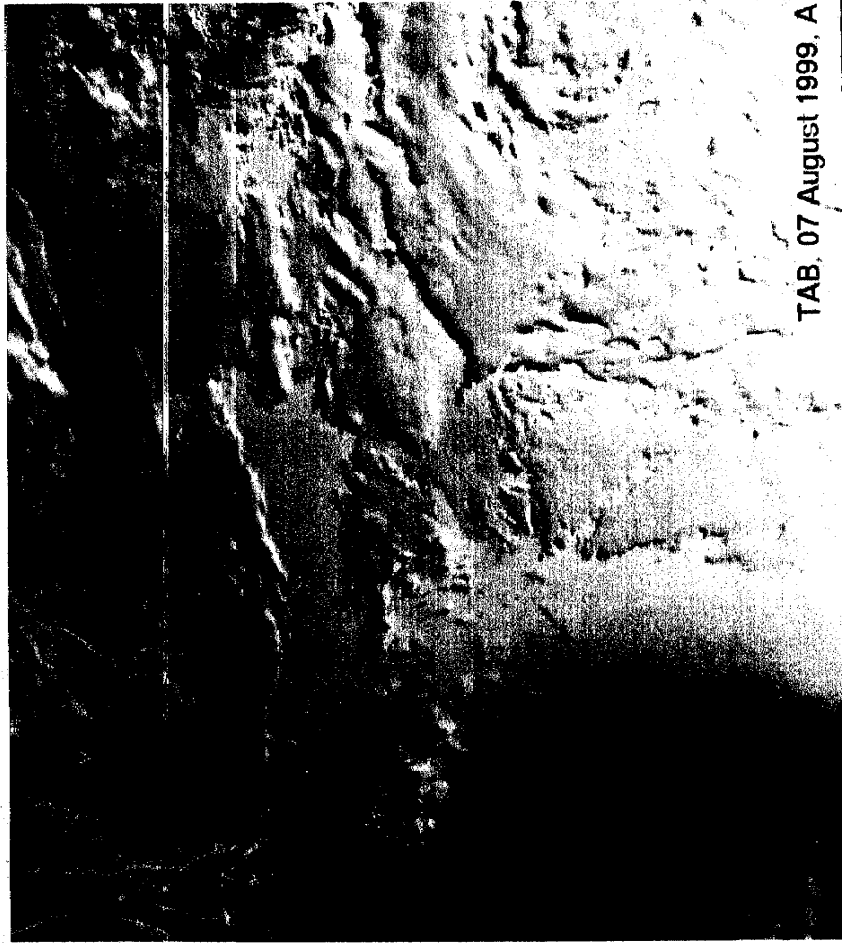


TAB, 31 July 1999, A
(incorrect grid overlay)



31 Jul 1999

AVHRR Satellite Images, Thule Air Base, 31 Jul 1999



TAB. 07 August 1999. A



TAB. 07 August 1999. B

AVHRR Satellite Images, Thule Air Base, 07 Aug 1999

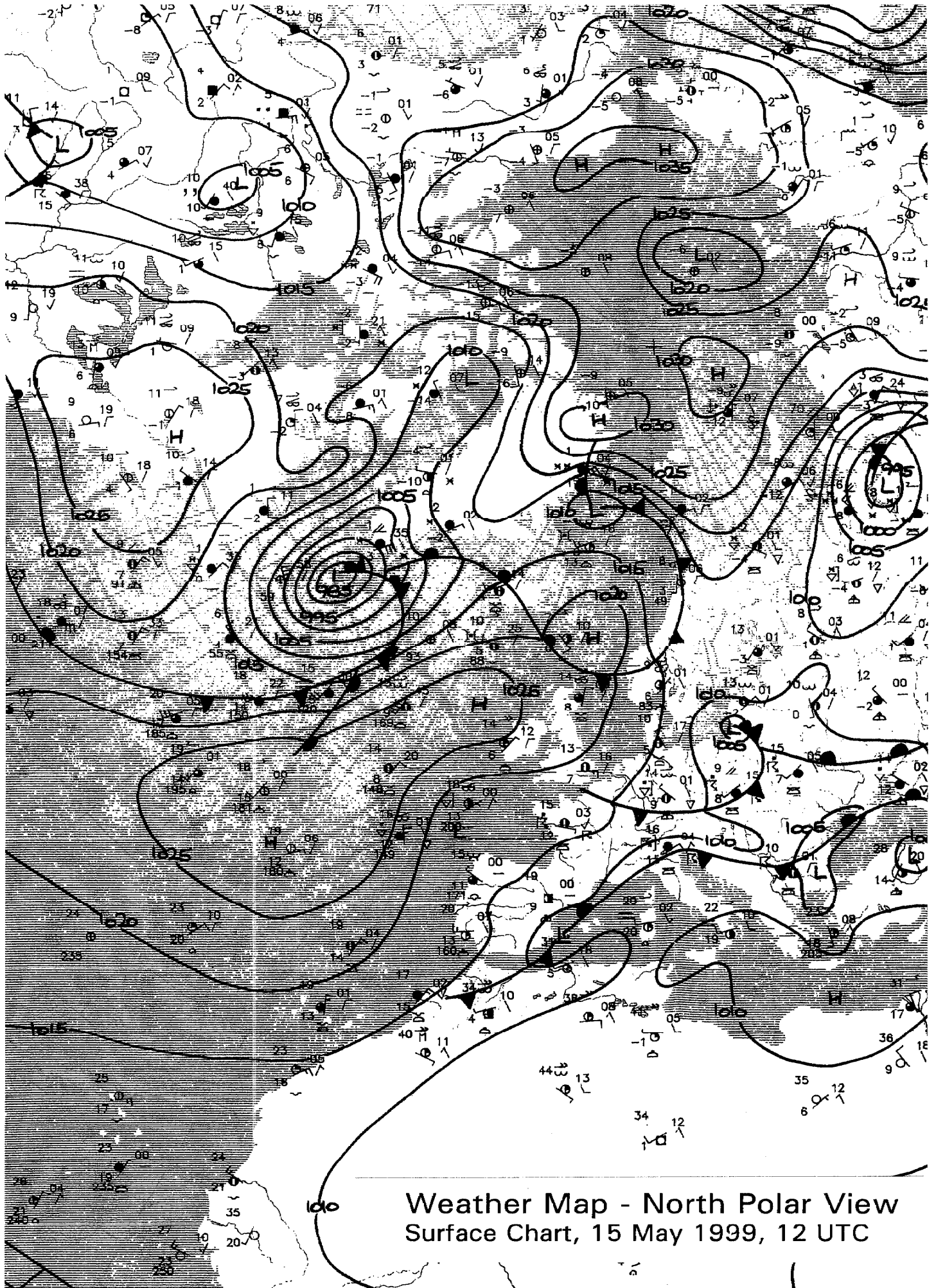


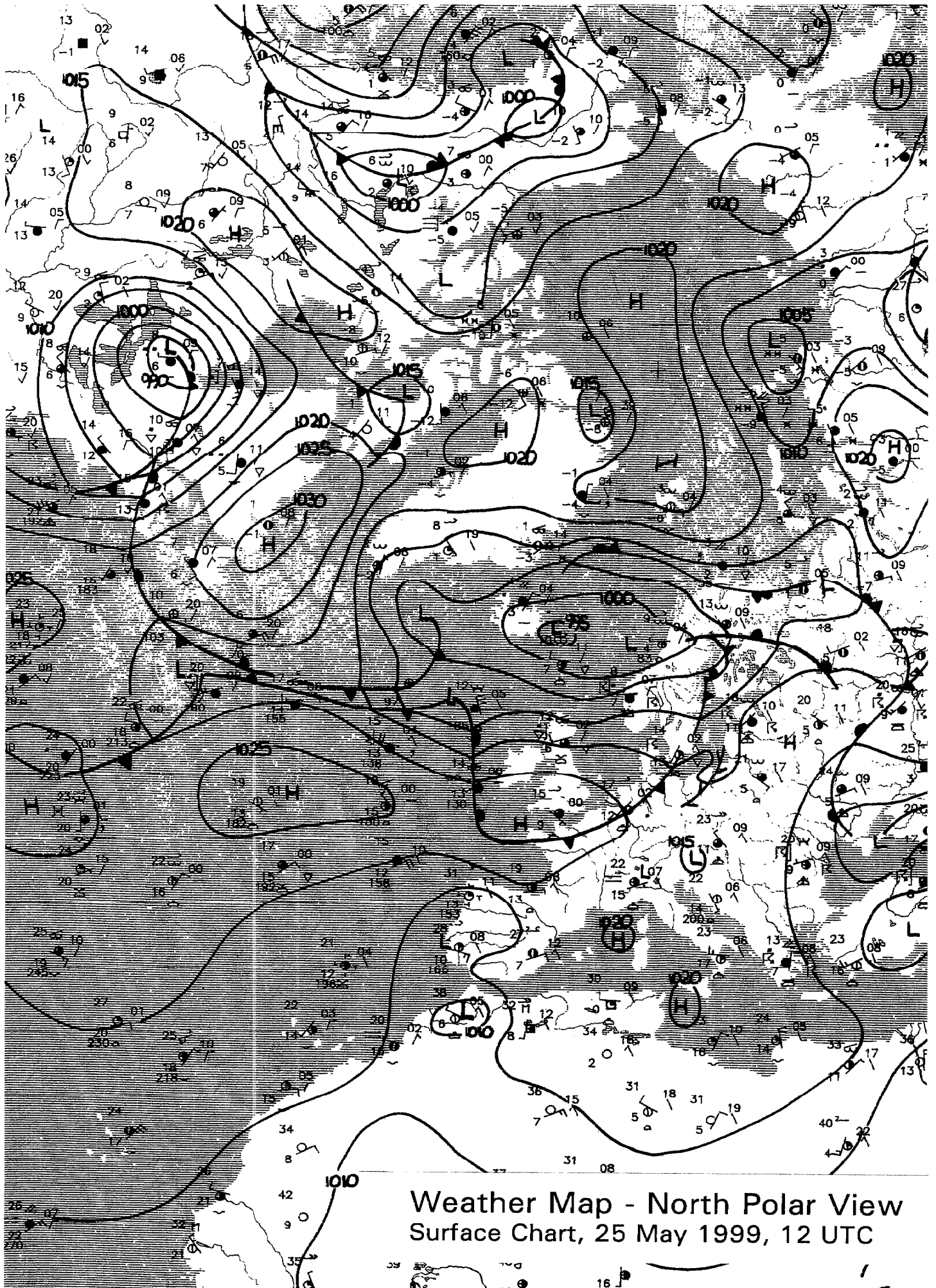
TAB, 22 August 1999, A



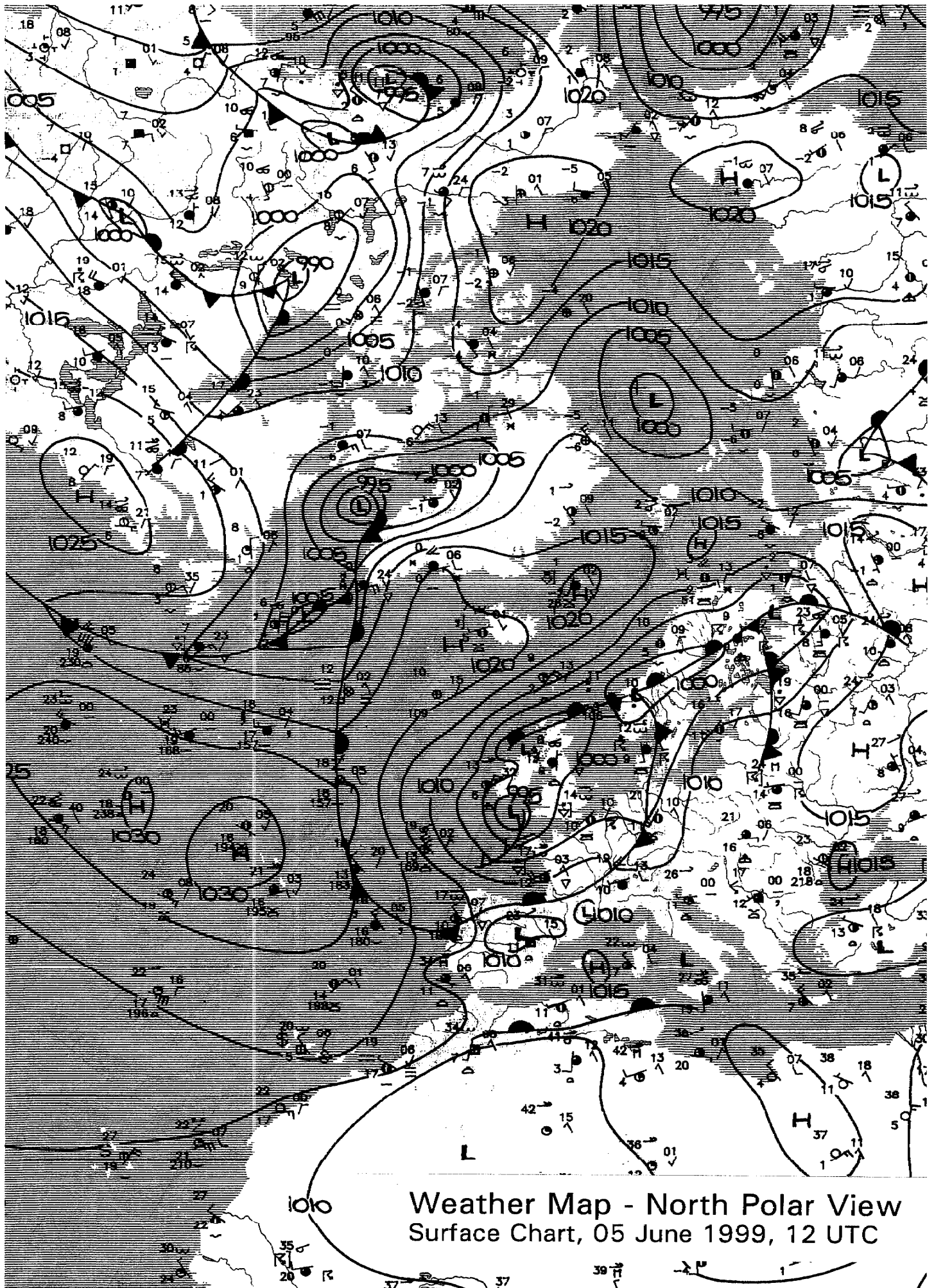
TAB, 22 August 1999, B

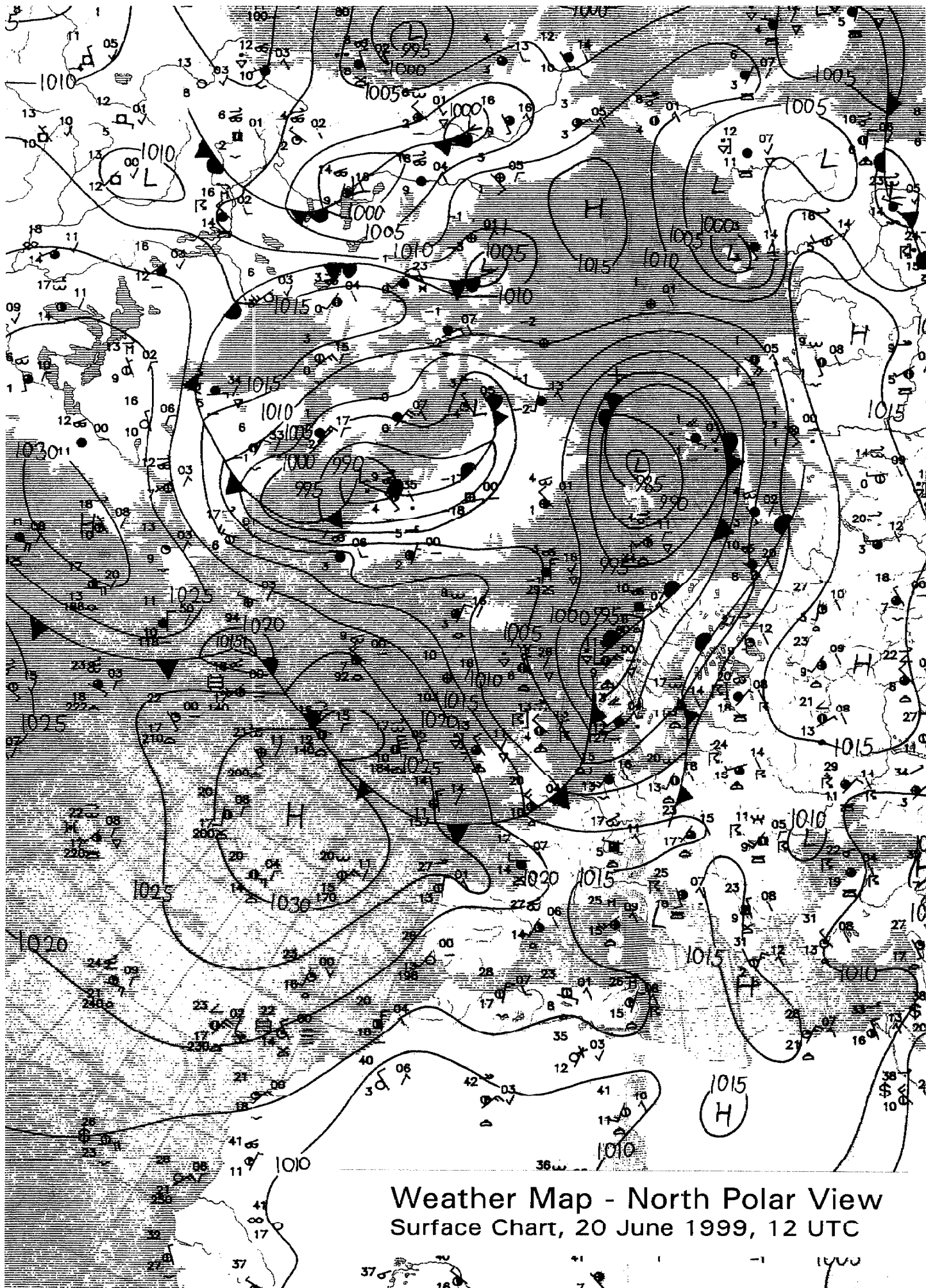
AVHRR Satellite Images, Thule Air Base, 22 Aug 1999





Weather Map - North Polar View
Surface Chart, 25 May 1999, 12 UTC





Weather Map - North Polar View
Surface Chart, 20 June 1999, 12 UTC

