

DUPLICATE ALSO

0352



Central Forecasting Monitoring Note No.21
Monitoring Statistics for SATEMs and SATOBs

March 1994 - May 1994

By

J.R.Leighton

June 1994

Central Forecasting Division
Meteorological Office
London Road
Bracknell
Berkshire
RG12 2SZ

ORGS UKMO C

National Meteorological Library
FitzRoy Road, Exeter, Devon. EX1 3PB

to quote from it should be obtained from
the Division.

Contents

1. Introduction

2. Temperatures

2.1 SATEMs

2.2 TEMPs

2.3 AIREPs

2.4 LASS

3. Winds

3.1 SATOBs

3.2 TEMPs/PILOTs

3.3 AIREPs

4. Summary

Figures

Temperatures

1-7 SATEMs

8-13 TEMPs

14-15 AIREPs

16-18 LASS

Winds

19-28 SATOBs

29-32 TEMPs/PILOTs

33-35 AIREPs

1 Introduction

This monitoring note continues a series of monitoring results from SATEMs and SATOBs. This note covers the quarterly period March 1994 - May 1994.

Results for SATEMs (500 km resolution) and SATOBs, as in previous monitoring notes, have been compared with similar statistics for TEMPs/PILOTs, AIREPs and LASS (Local Area Sounding System) observations. The background field used to infer the quality of the observations is a T+6 hour forecast from the operational global model.

Only significant features are commented upon for each chart and comparisons will be made with the previous Central Forecasting Monitoring Note No. 19, "Monitoring Statistics For SATEMs and SATOBs (December 1993- February 1994)", referred to as P1.

2 Temperatures

Notes:-

1. SATEM data are not used below 100 hPa over land, nor below 850 hPa over sea north of 30°S.
2. LASS data continued to be discarded from the analysis during this period.
3. The bands used for TEMPs are not the same as those used for SATEMs due to the form of the data archive.

2.1 SATEMs (figs 1 - 7)

Compared with P1, mean O-B temperature differences in the layer 850-1000 hPa (figure 1) are generally more positive this quarter in the Northern Hemisphere and Tropics and generally lower or more negative in the Southern Hemisphere.

RMS O-B temperature differences in the 850-1000 hPa layer (figure 2) are significantly higher this quarter along the Antarctic coast with peak differences of 6.3°C around 150°W, 6.9°C around 70°W and 7.3°C around 170°E. Elsewhere the differences are generally slightly lower.

Mean O-B temperature differences in the 100-300 hPa layer (figure 3) are significantly more negative in the Antarctic region, notably between 50°E and 160°E with corresponding high RMS O-B temperature differences (figure 4). Mean O-B temperature differences are somewhat higher this quarter in the Western Pacific.

The high values of mean O-B temperature in the 30-50 hPa layer (figure 5) found in P1 over Nigeria and northern Siberia are no longer evident this quarter, however there remain high values around Indonesia.

2.2 TEMPs (figs 8 - 13)

The large negative O-B temperature differences in the 801-1000 hPa layer (figure 8) found in P1 over Chile, Central America and Nigeria, remain this quarter. In addition there are large positive biases over Western Australia. The large biases found in P1 over areas north of the Hudson Bay, South Africa, west of the Caspian Sea, Tibet and central Australia have decreased.

Compared with P1 there has been a general positive shift in O-B temperature differences in the 101-300 hPa (figure 10) over North America and north-east Asia and a negative shift over southern South America and South Africa.

Comparing with P1 there has been a general positive shift in the O-B temperature differences between 11-100 hPa (figure 12) over N.America and north-east Asia.

2.3 AIREPs (figs 14 - 15)

The mean O-B temperature differences between 101-300 hPa for AIREPs (figure 14) show that positive bias in the Hudson Bay region has reduced slightly as has the negative bias over Tasmania. Biases over central Africa have increased this quarter.

RMS O-B temperature differences in the 101-300 hPa layer (figure 15) show generally lower values in the north-east Pacific and central Canada compared with P1.

2.4 LASS (figs 16 - 18)

Compared with P1, the mean O-B temperature differences for LASS data at the 850 hPa level (figure 16) show large positive biases over western and southern Greenland and lower biases over eastern Greenland. Biases in the remaining areas have reduced nearer to zero except over Finland, Poland and areas around Newfoundland.

The small biases found in recent reports in the 250-150 hPa band of LASS data (figure 17) continue this quarter with an improvement over Newfoundland and a deterioration over western Greenland.

Following the negative swing found in P1 for LASS mean O-B temperature differences in the 50-30 hPa band (figure 18) there has been a positive swing with the result of large positive biases over the whole area of LASS coverage with the strongest biases in the west of the region.

3 Winds

Notes:-

1. Throughout the period of this report, SATOBs from the following platforms were discarded from model assimilations:-

	GMS	Meteosat	GOES	INSAT
90°N - 20°N	above 500 hPa	above 500 hPa over land	above 500 hPa over land	All
20°N - 20°S	None	None	None	All
20°S - 90°S	above 500 hPa	above 500 hPa over land	above 500 hPa over land	All -

2. Water Vapour SATOBs from METEOSAT are neither used by the model, nor included in the statistics in this report.

3.1 SATOBs (figs 19 - 28)

The high mean O-B speed differences between 701-1000 hPa (figure 21) along the W.African coast, the Arabian Sea, the Southern Indian Ocean and Western Australia found in previous quarters remains. A strong negative bias over an area encompassing Ecuador, Peru and west Brazil also remains. In addition there are large positive biases over Indonesia and China. All these areas are associated with large RMS O-B vector differences (figure 22).

As in P1 and previous quarters the mean O-B vector wind differences in the band 101-400 hPa (figure 25) show a strong meridional component in the tropics. This feature has been found in monthly statistics generated by ourselves and other monitoring centres but there is no evidence of this signal in monthly AIREP vector wind difference charts.

Mean O-B speed differences in the band 101-400 hPa (figure 26) show there to be large negative differences over areas of the north Pacific, North America, Eastern Europe, Saudi Arabia, Argentina and Tasmania and large positive differences over areas of the North Pacific, mid-Atlantic, Arabian Sea, Indian Ocean, off the Chile coast and the south-east Pacific.

3.2 TEMPs/PILOTs (figs 29 - 32)

Mean O-B speed differences between 701-1000 hPa (figure 29) show large negative differences over Hawaii, S. America, Greenland, southern Indian Ocean and New Zealand as in P1. The large positive biases in the area over Antarctica noted in P1 have reduced somewhat but two areas of high positive bias are evident, probably due to individual stations - 89512 and 89571.

The large positive bias found in P1 for the mean O-B speed differences 101-400 hPa band (figure 31) over Hawaii, central China and south of Japan have markedly reduced although those over the area south of Japan remain rather high. Also there are large positive biases over Tahiti, Brazil, Chile and eastern China.

3.3 AIREPs (figs 33 - 35)

As in previous reports there are generally positive mean O-B speed - differences in the band 101-400 hPa (figure 33) over all areas of data coverage with maxima of 5.1 m s^{-1} in the Bering Sea, 4.5 m s^{-1} over Brazil, 3.8 m s^{-1} off Angola and 4.8 m s^{-1} off Madagascar. There are some areas of negative bias, notably southern Polynesia and Tasmania. As in P1 all these areas have very low data volumes (figure 35)

4. Summary

SATEMs

Comparing the low level SATEMs (850-1000 hPa) (figure 1) with the TEMPs in a similar height band (figure 8) shows there are significant differences over the eastern seaboard of Canada, the Pacific coast of Mexico, parts of Argentina and areas over West Africa and the Himalayas.

In the layer 100-300 hPa (figures 3 and 10) the differences are in poorer agreement compared with P1, in particular west of Mexico, Chile, West Africa and areas in and around the Mediterranean.

Aircraft reports from the upper level (101-300 hPa) (figure 14) show lower differences compared with the SATEMs (figure 3) over most areas except eastern Canada and most of the African continent.

At the highest levels the SATEM (30-50 hPa) (figure 5) and TEMP (11-100 hPa) (figure 12) are in generally poor agreement, as in P1, in mean O-B temperature differences, with the SATEMs having rather higher differences.

SATOBs

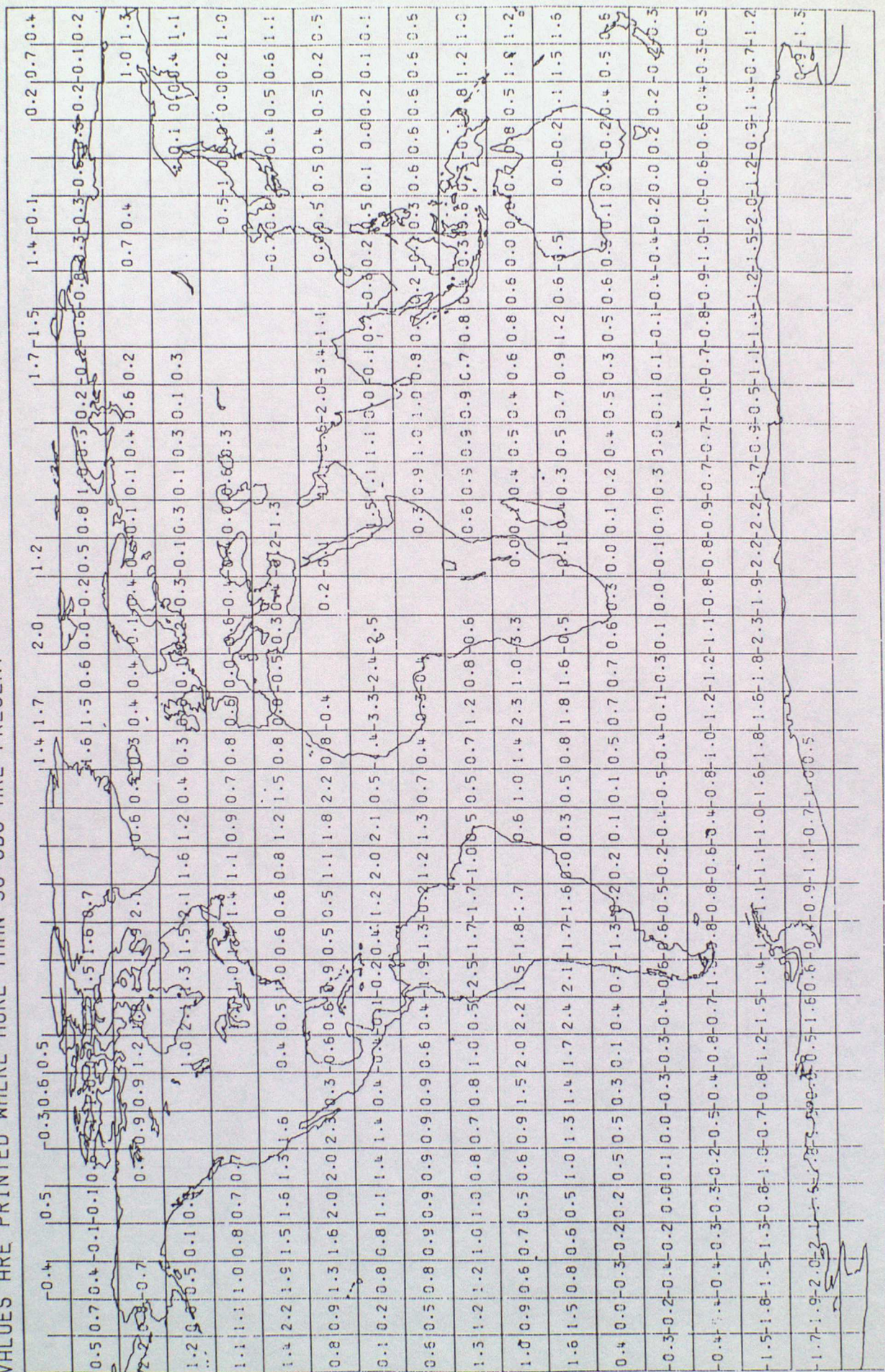
INSAT O-B vector wind differences in both bands covered in the report are very high, so rejection of all INSAT SATOB data remains justified.

SATOBs from Meteosat, GOES and GMS continue to compare well with the background field in the lowest band. As noted in P1 GOES and METEOSAT over land, in the upper levels of the extra-tropics and GMS extra-tropical data are under consideration for inclusion in model data assimilation.

In the upper band there is a strong divergent pattern in the mean O-B vector wind differences in the tropics. This is apparently in the opposite sense to what might be expected since the model is considered to have an overactive Hadley circulation. These differences are also found in monitoring statistics from other centres. One possible explanation may lie with the sampling problem inherent in SATOB data. Cloud-track winds can only be obtained in cloudy areas, which normally implies ascending air. In the tropics, therefore, the observations will be produced in areas of enhanced outflow at upper levels, whereas, the model background field will be representative of the average conditions.

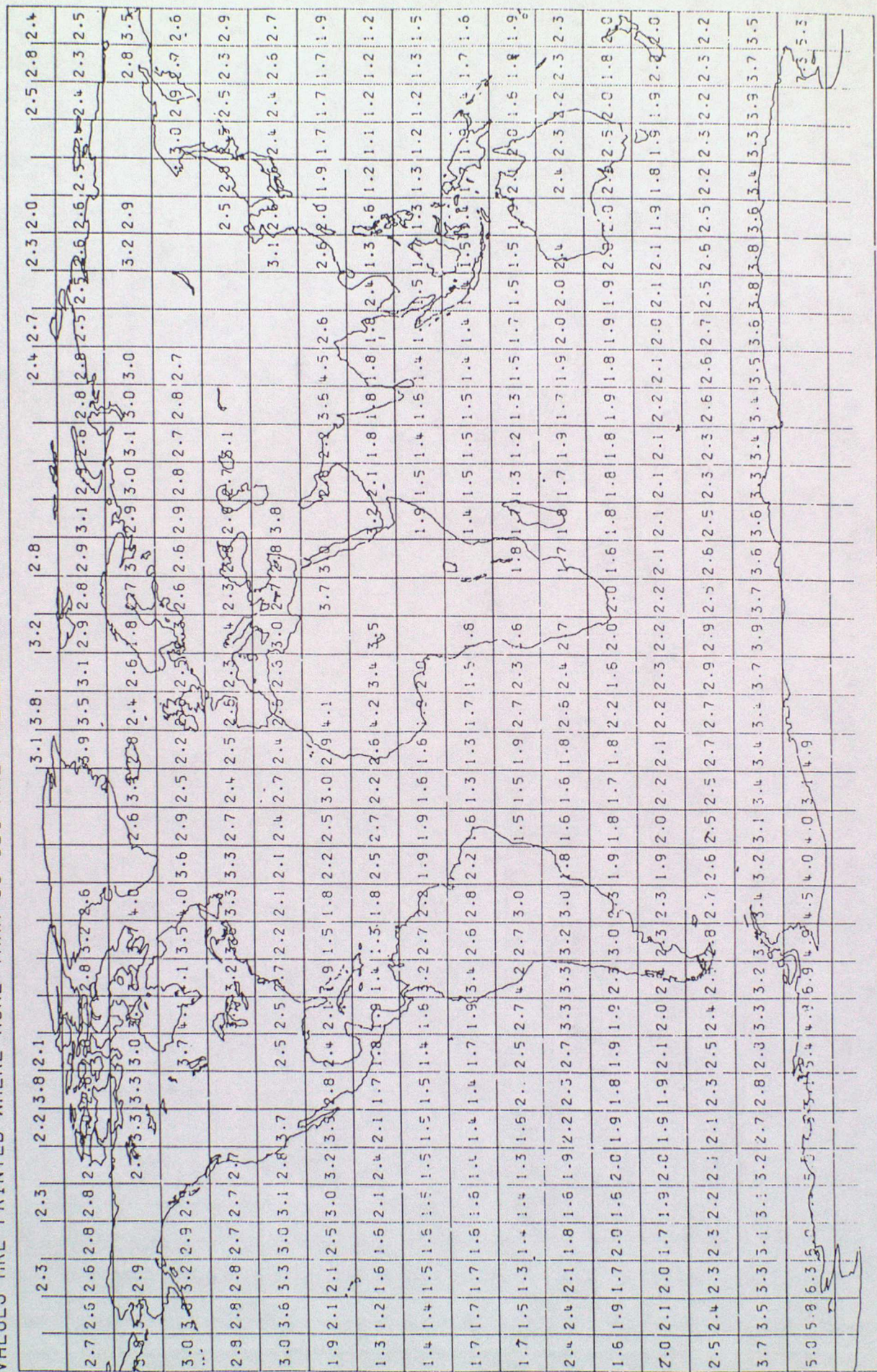
500 KM SATEMS : MEAN O-B TEMPERATURE DIFFERENCES (DEG C) : 850 TO 1000 HPA
 MARCH 1994 - MAY 1994
 NOAA-11 AND NOAA-12 STATISTICS COMBINED
 VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT

FIGURE 1



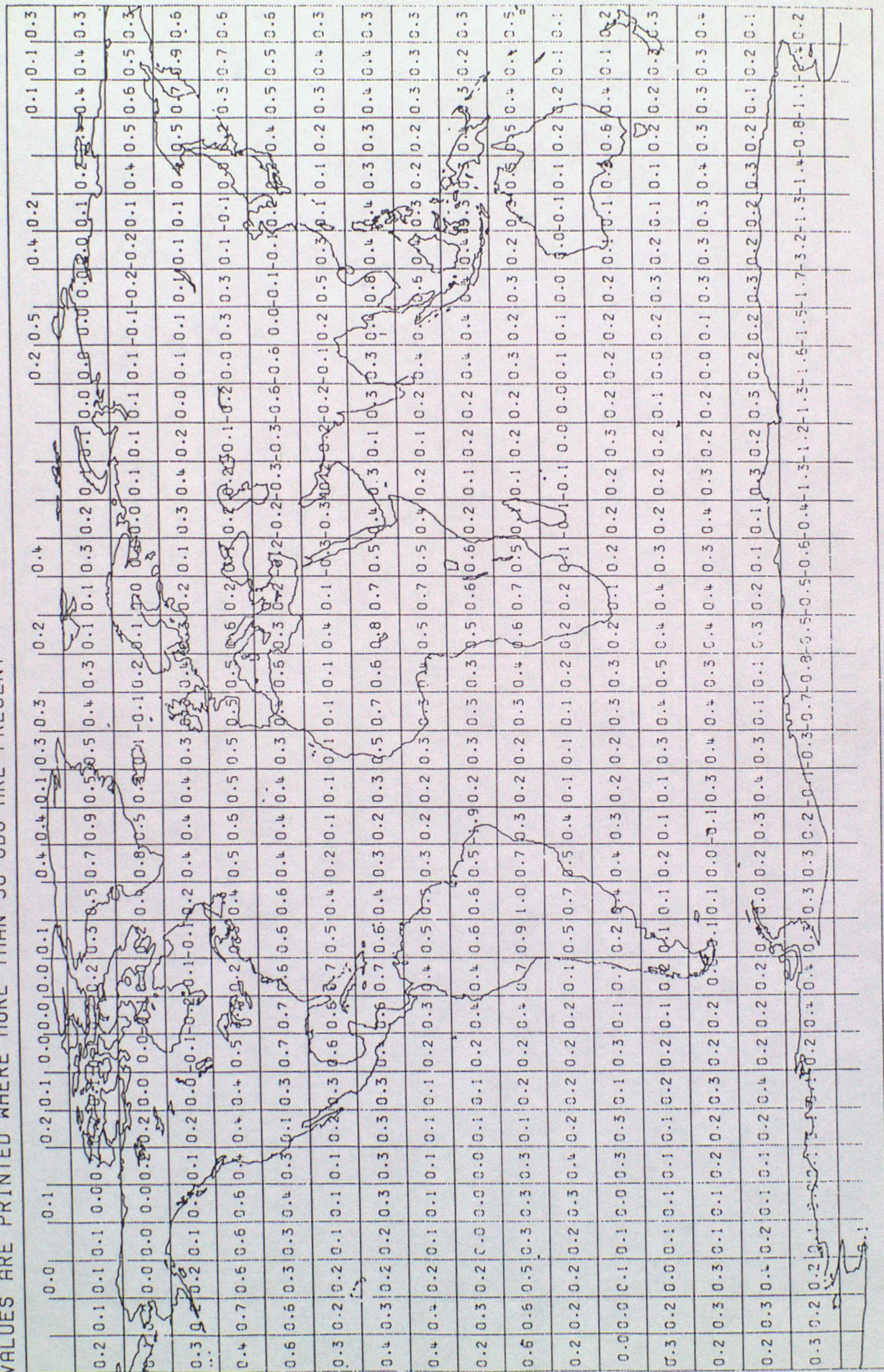
NOAA-11 AND NOAA-12 STATISTICS COMBINED

VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT



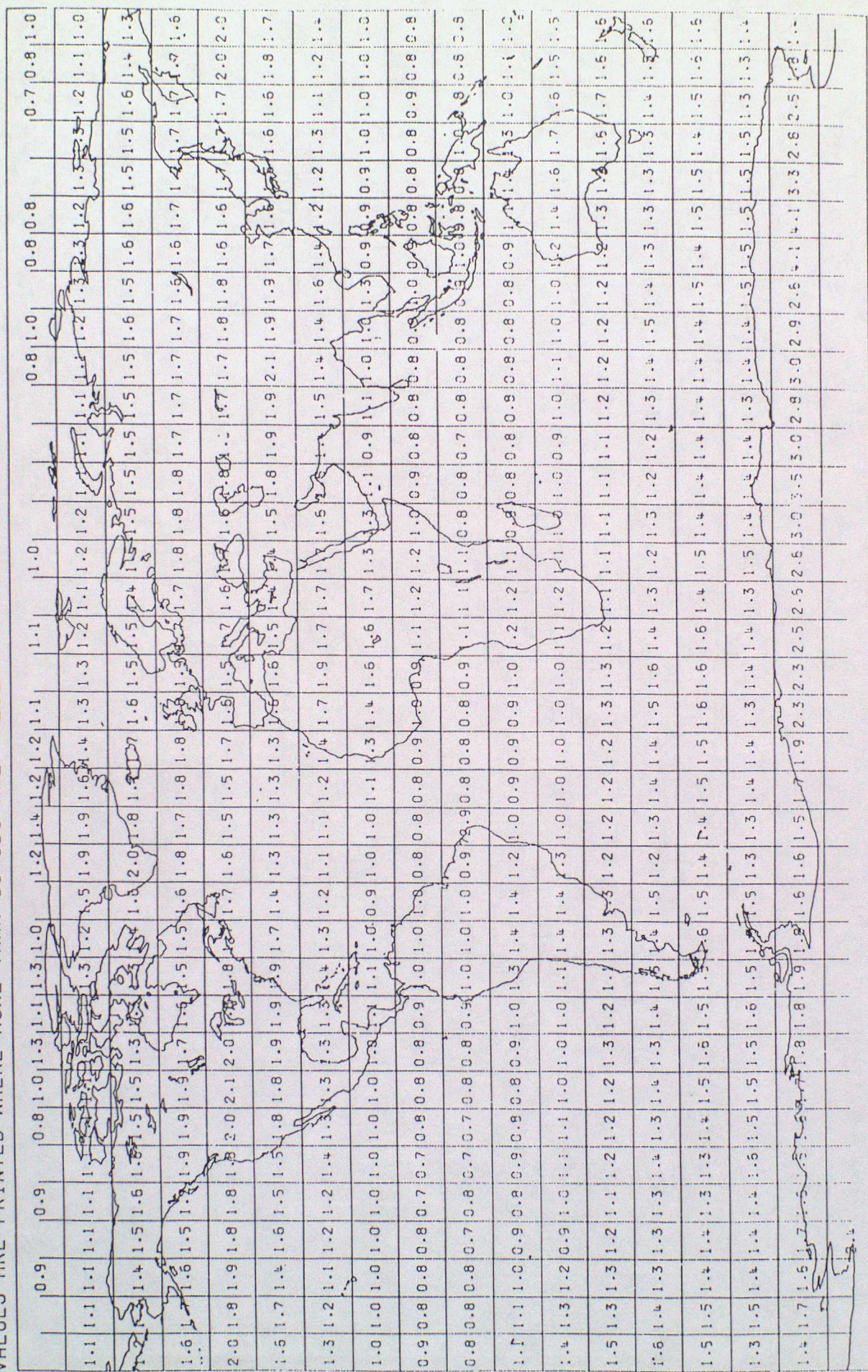
500 KM SATEMS : MEAN O-B TEMPERATURE DIFFERENCES (DEG C) : 100 TO 300 HPA
 MARCH 1994 - MAY 1994
 NOAA-11 AND NOAA-12 STATISTICS COMBINED
 VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT

FIGURE 3

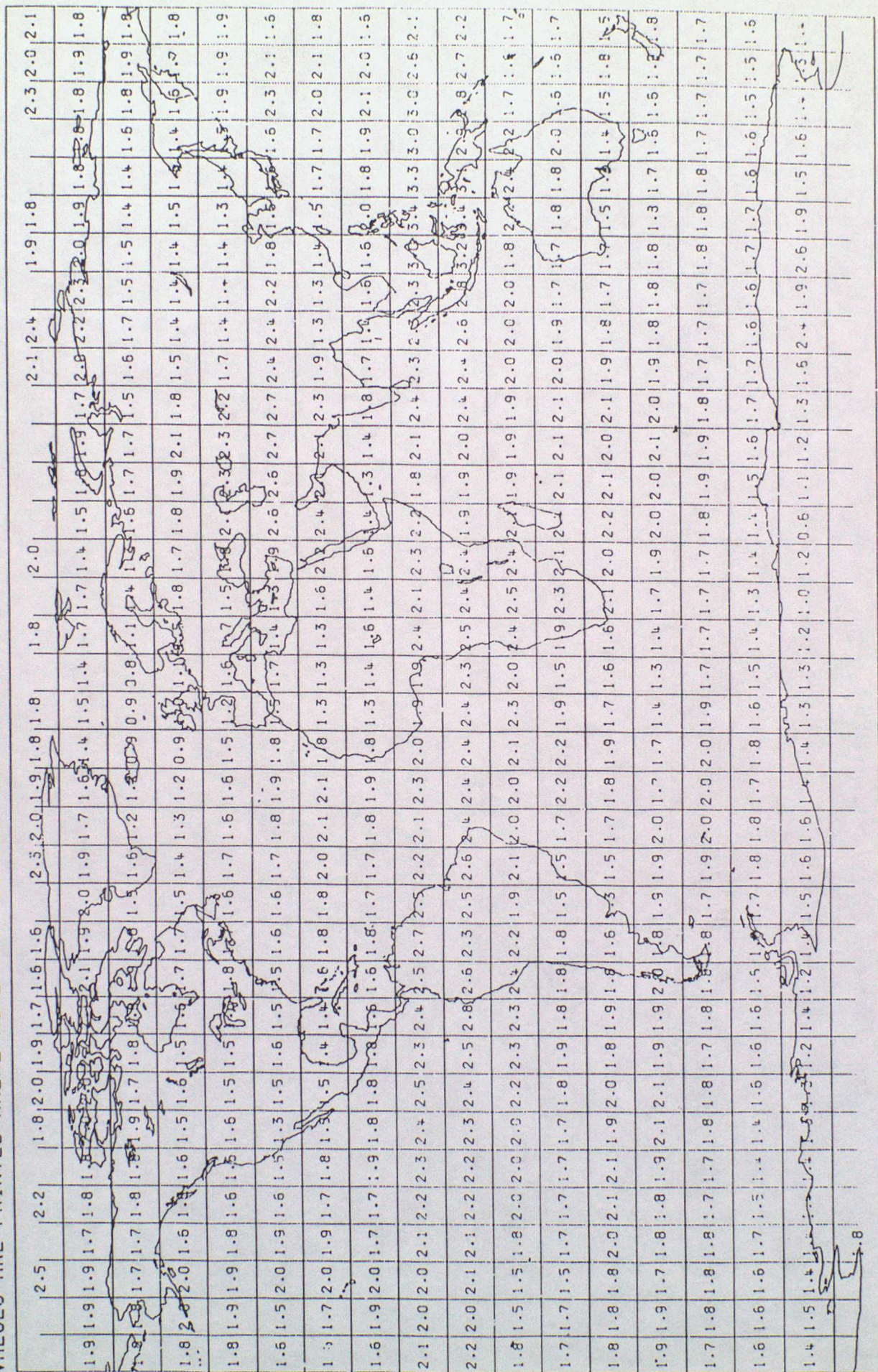


MARCH 1994 - MAY 1994

VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT



500 KM SATEMS : MEAN O-B TEMPERATURE DIFFERENCES (DEG C) : 30 TO 50 HPA
 MARCH 1994 - MAY 1994
 NOAA-11 AND NOAA-12 STATISTICS COMBINED
 VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT



500 KM SATEMS : RMS O-B TEMPERATURE DIFFERENCES (DEG C) : 30 TO 50 HPA
 MARCH 1994 - MAY 1994
 NOAA-11 AND NOAA-12 STATISTICS COMBINED
 VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT

FIGURE 6

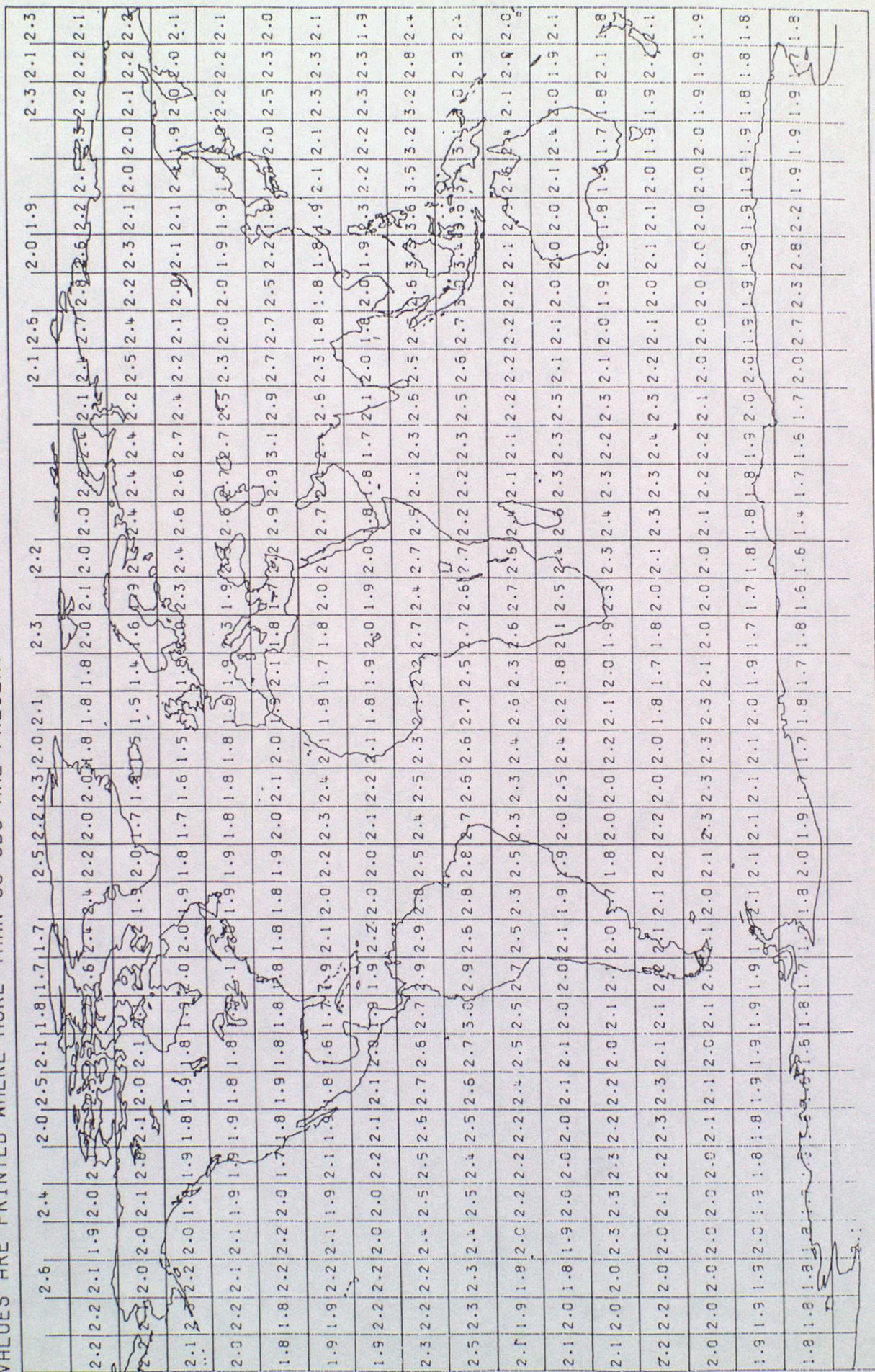
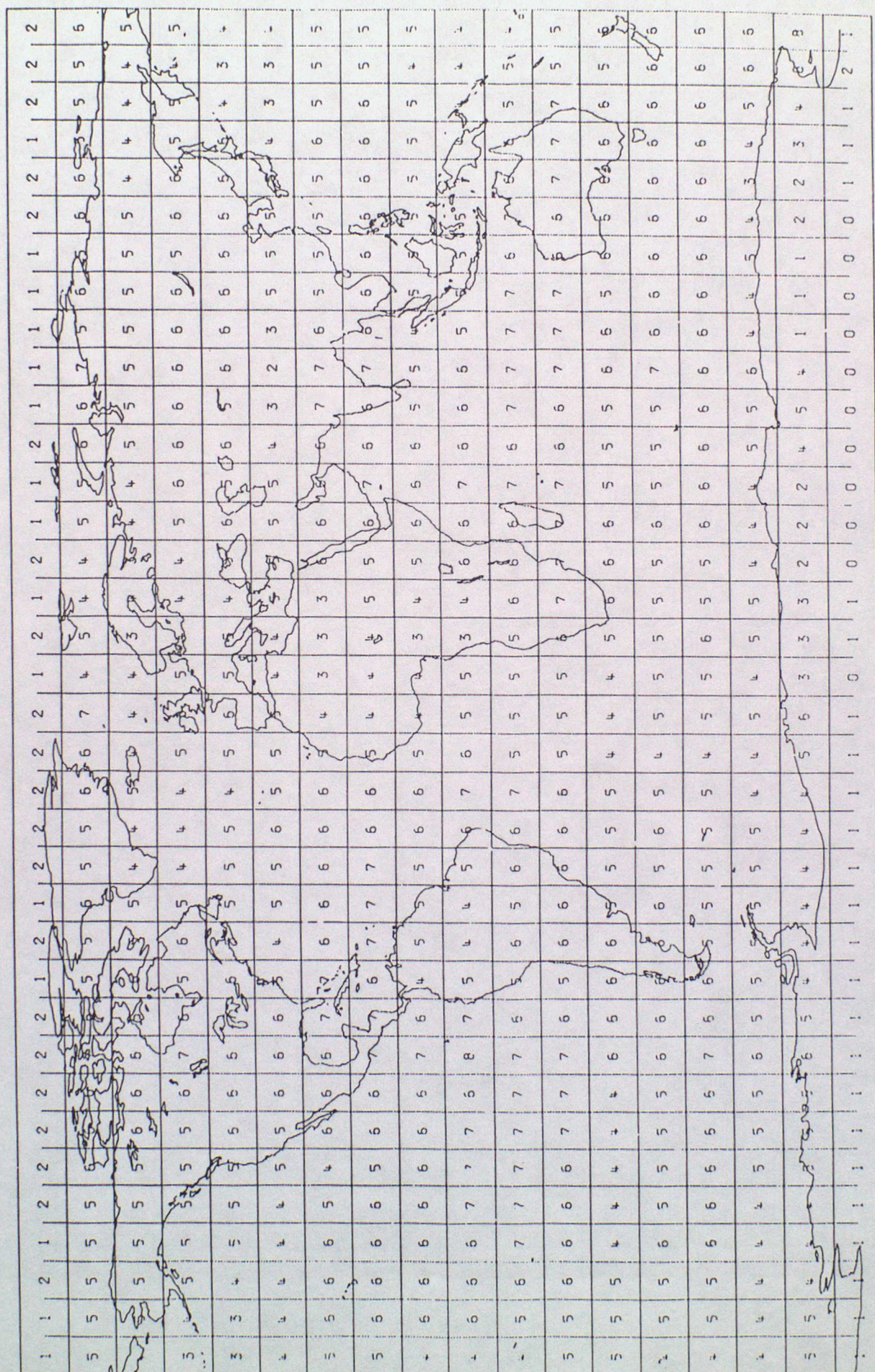
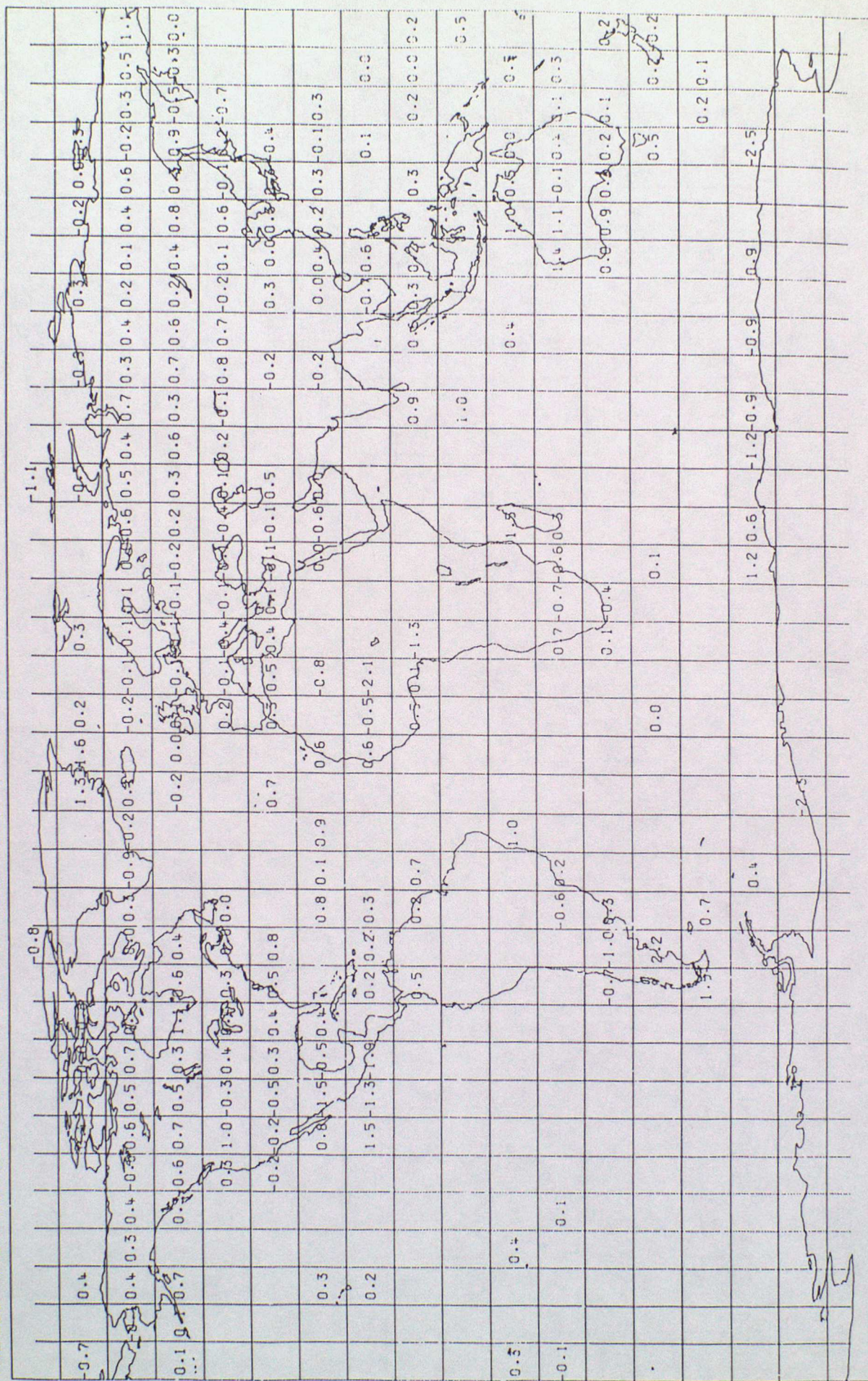


FIGURE 7



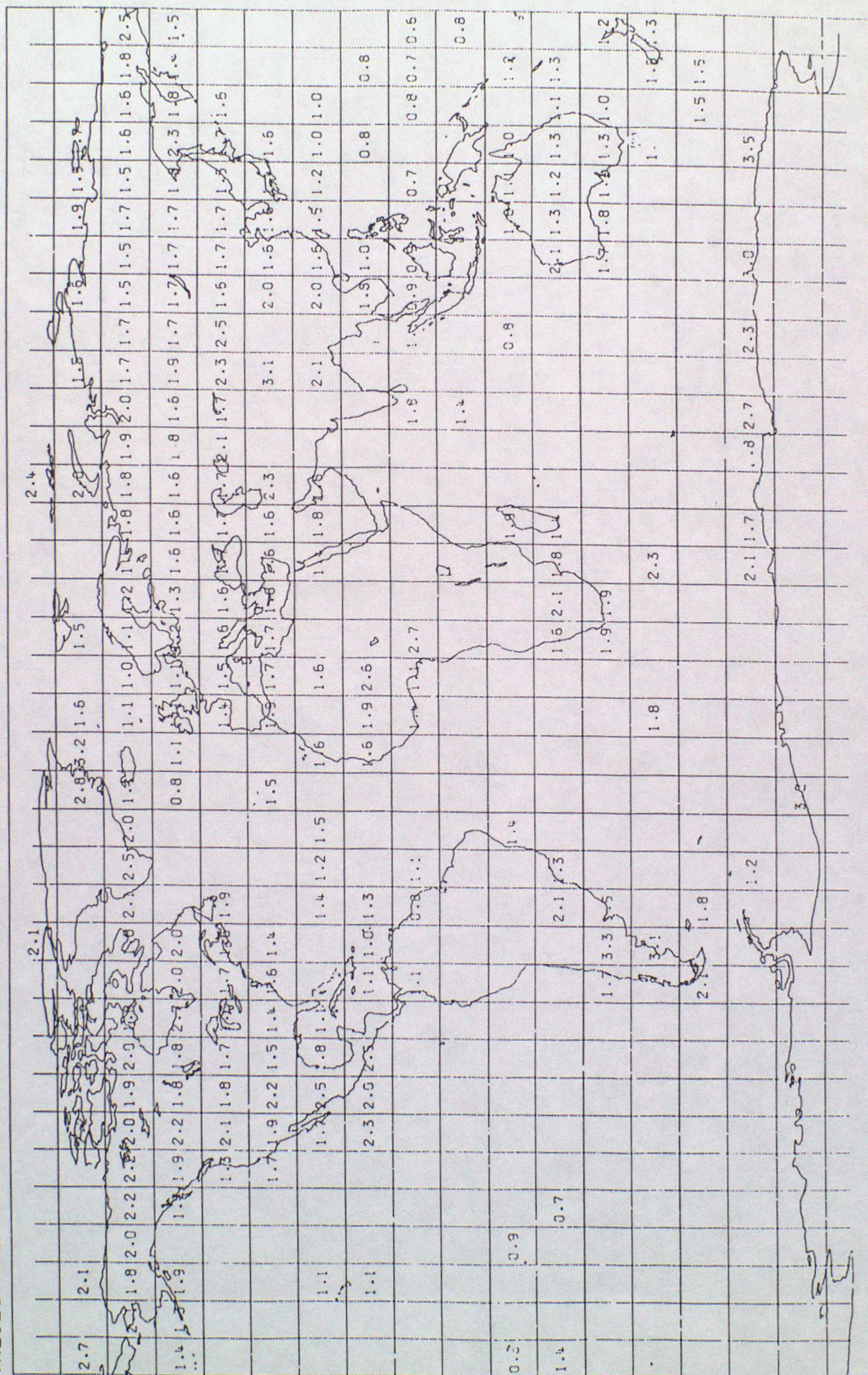
SONDES : 0-8 TEMPERATURE DIFFERENCES (DEG C) 801 TO 1000 HPA
 MARCH 1994 - MAY 1994
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE MORE THAN 100 OBS ARE PRESENT

FIGURE 8



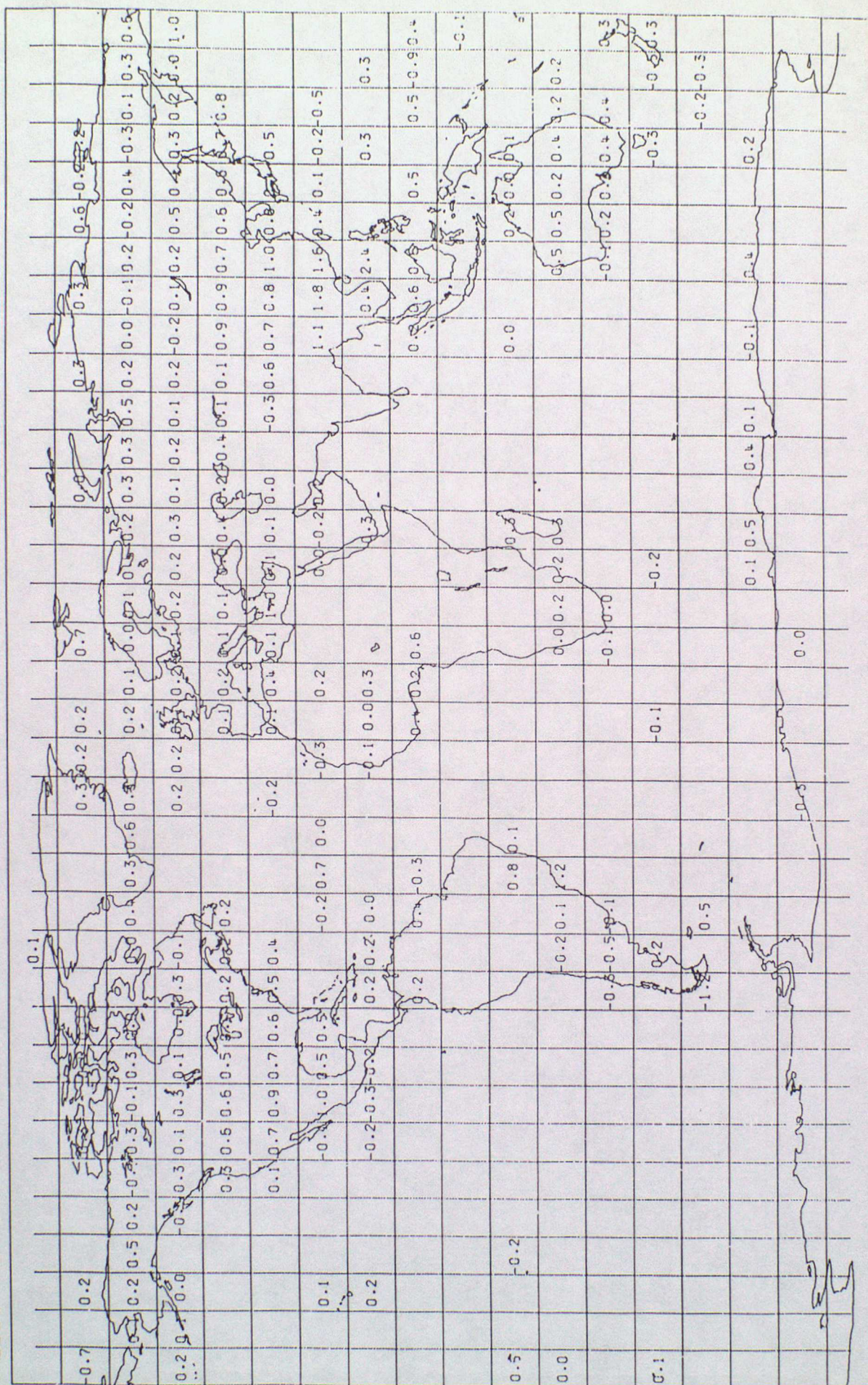
SONDES : RMS 0-8 TEMPERATURE DIFFERENCES (DEG C) 801 TO 1000 HPA
 MARCH 1994 - MAY 1994
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE MORE THAN 100 OBS ARE PRESENT

FIGURE 9



SONDES : 0-B TEMPERATURE DIFFERENCES (DEG C) 101 TO 300 HPA
 MARCH 1994 - MAY 1994
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE MORE THAN 100 OBS ARE PRESENT

FIGURE 10

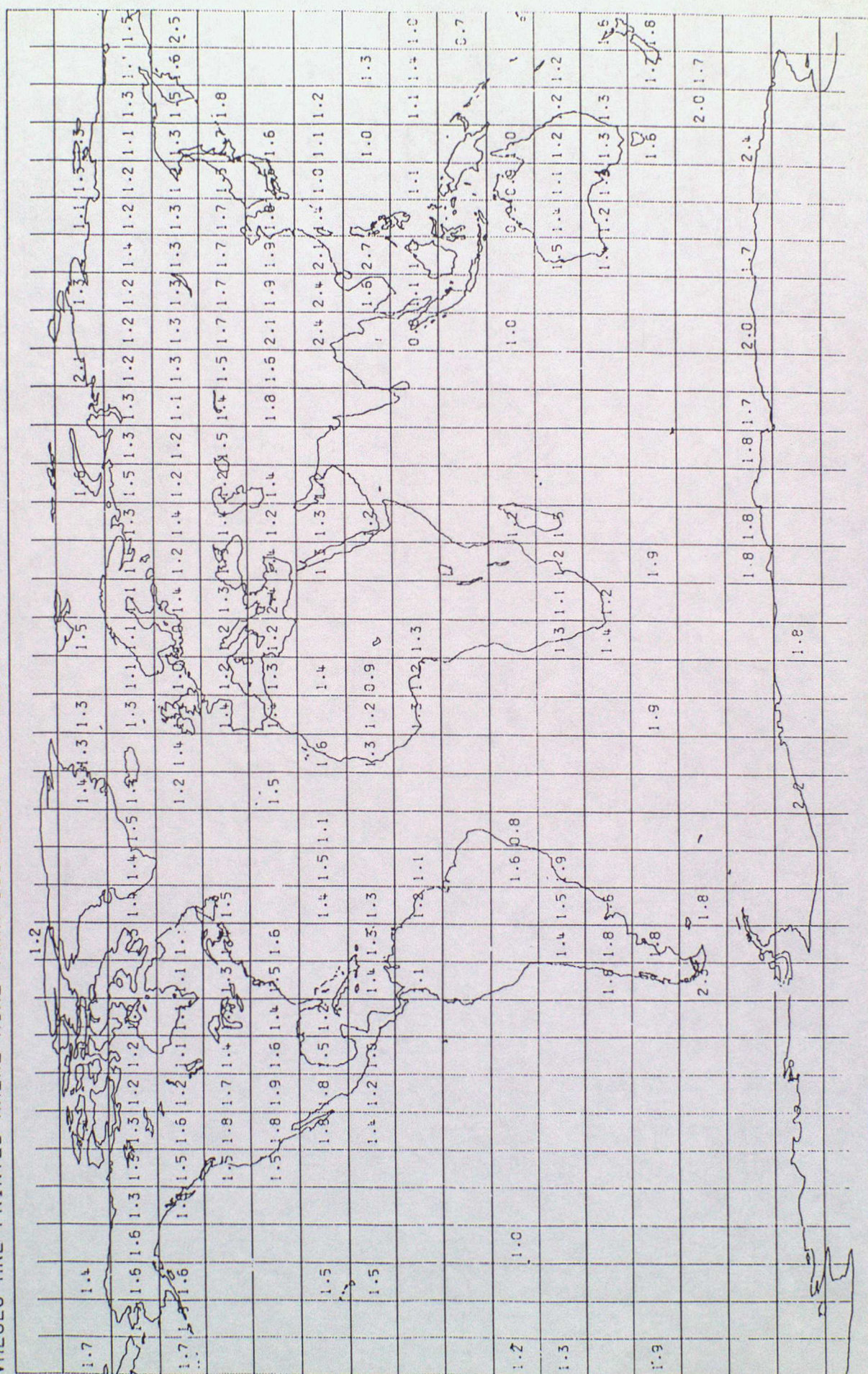


MARCH 1994 - MAY 1994

QUALITY CONTROL APPLIED

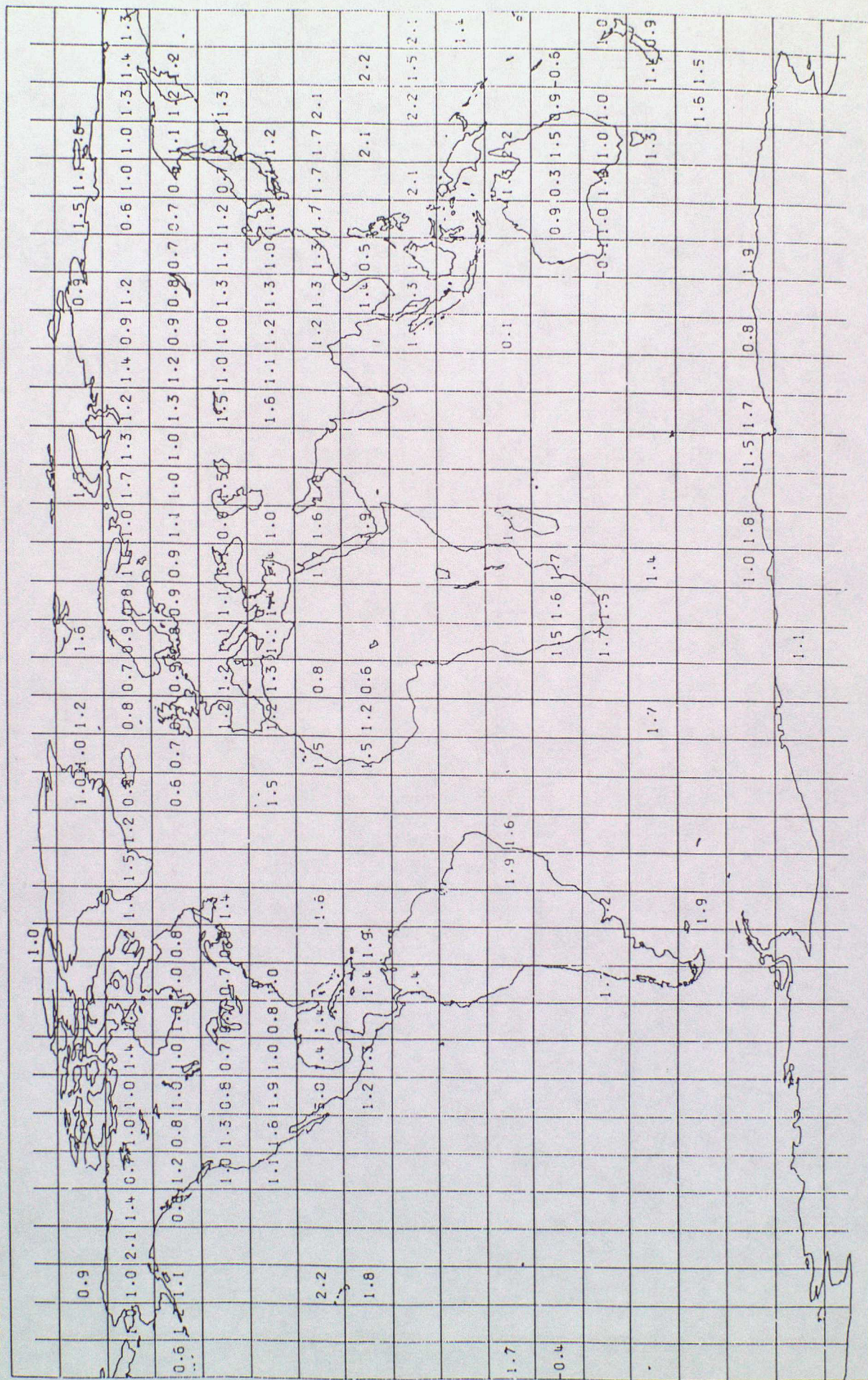
VALUES ARE PRINTED WHERE MORE THAN 100 OBS ARE PRESENT

FIGURE 11



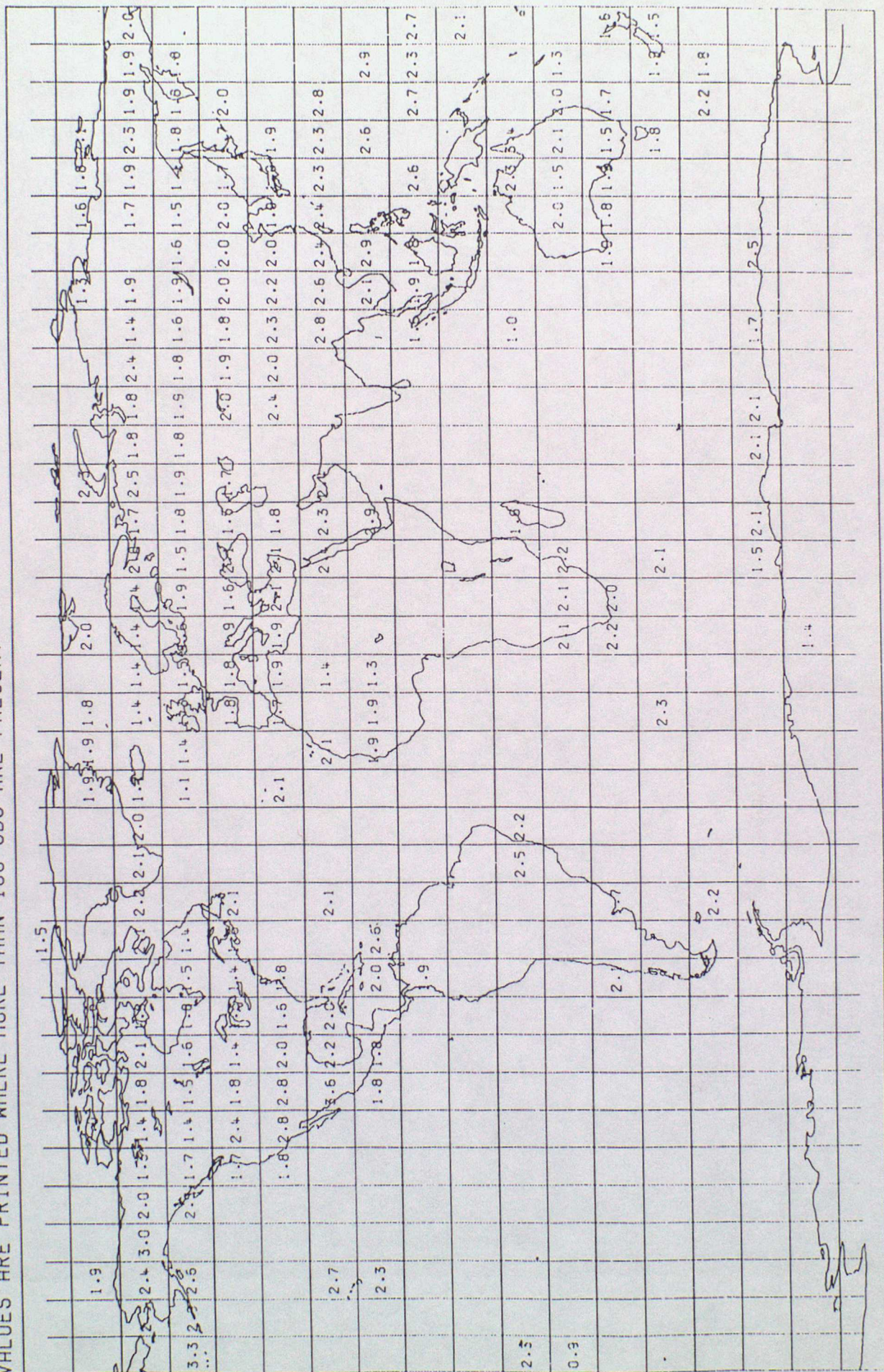
SONDES : 0-B TEMPERATURE DIFFERENCES (DEG C) 11 TO 100 HPA
 MARCH 1994 - MAY 1994
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE MORE THAN 100 OBS ARE PRESENT

FIGURE 12



SONDES : RMS 0-B TEMPERATURE DIFFERENCES (DEG C) 11 TO 100 HPA
 MARCH 1994 - MAY 1994
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE MORE THAN 100 OBS ARE PRESENT

FIGURE 13

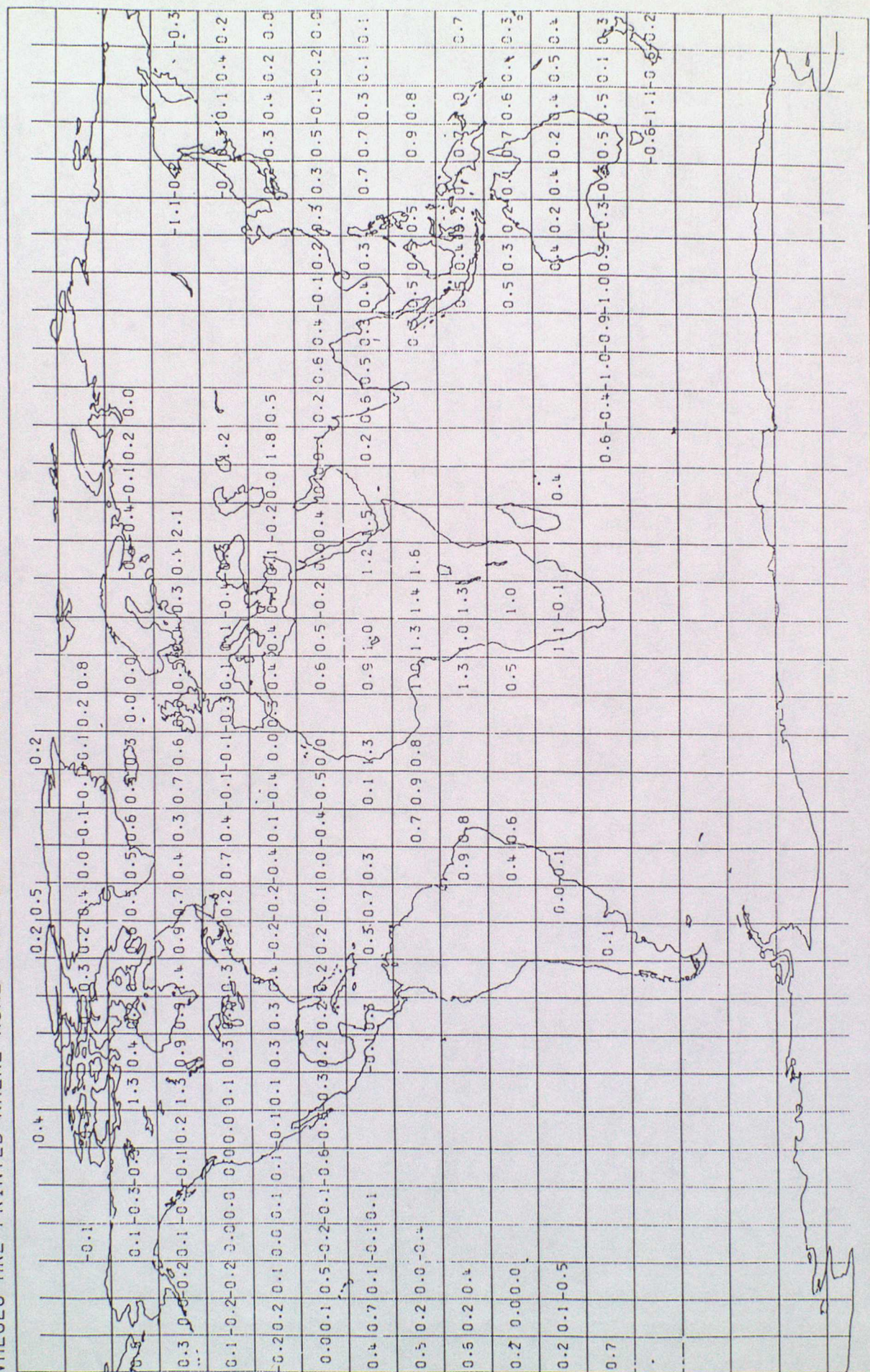


AIRCRAFT REPORTS: MEAN O-B TEMPERATURES BETWEEN 101 AND 300 HPA

MARCH 1994 - MAY 1994. UNITS DEG C

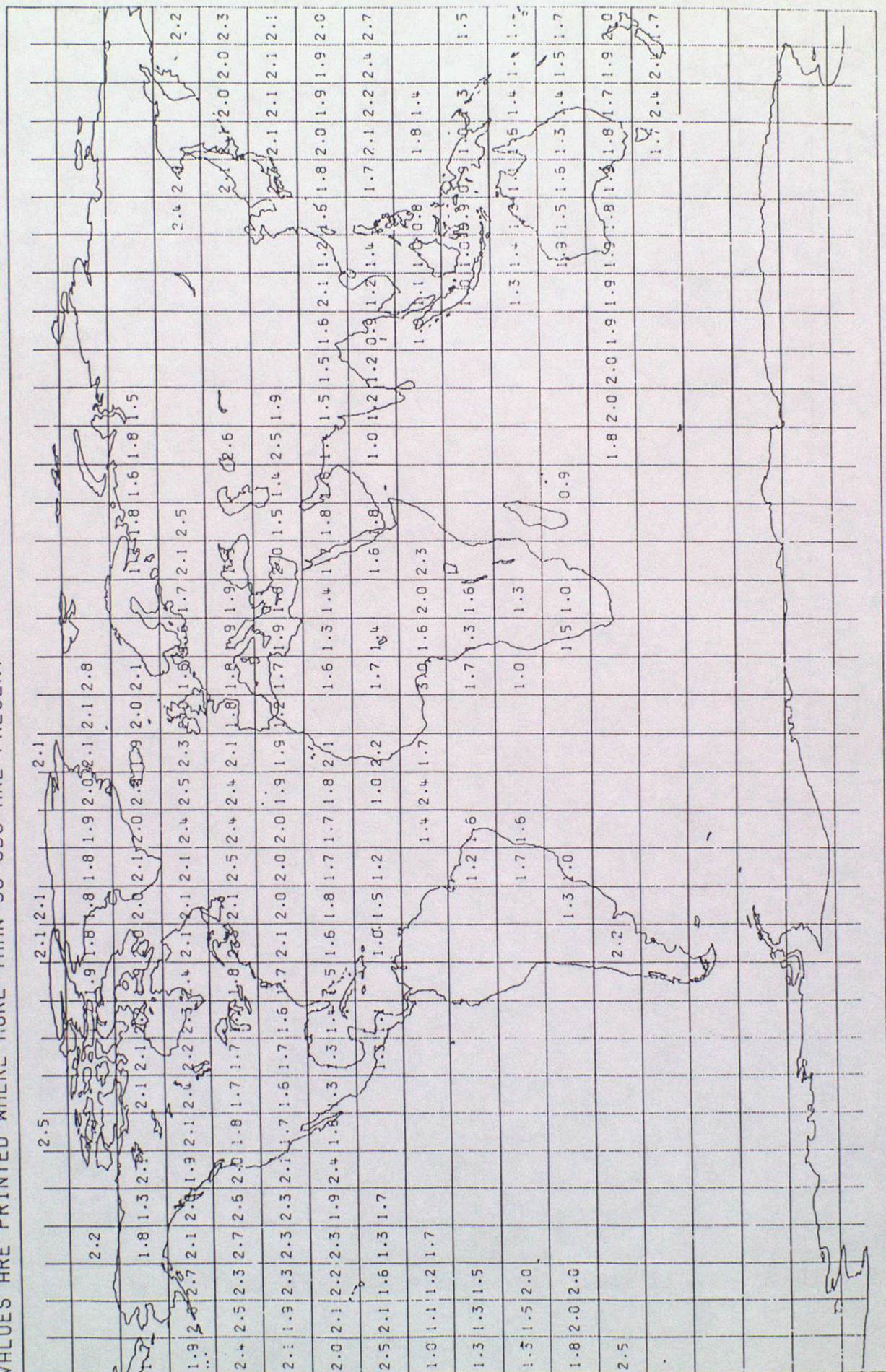
OBSERVATIONS WITH O-B GREATER THAN 10 DEG C EXCLUDED
VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT

FIGURE 14



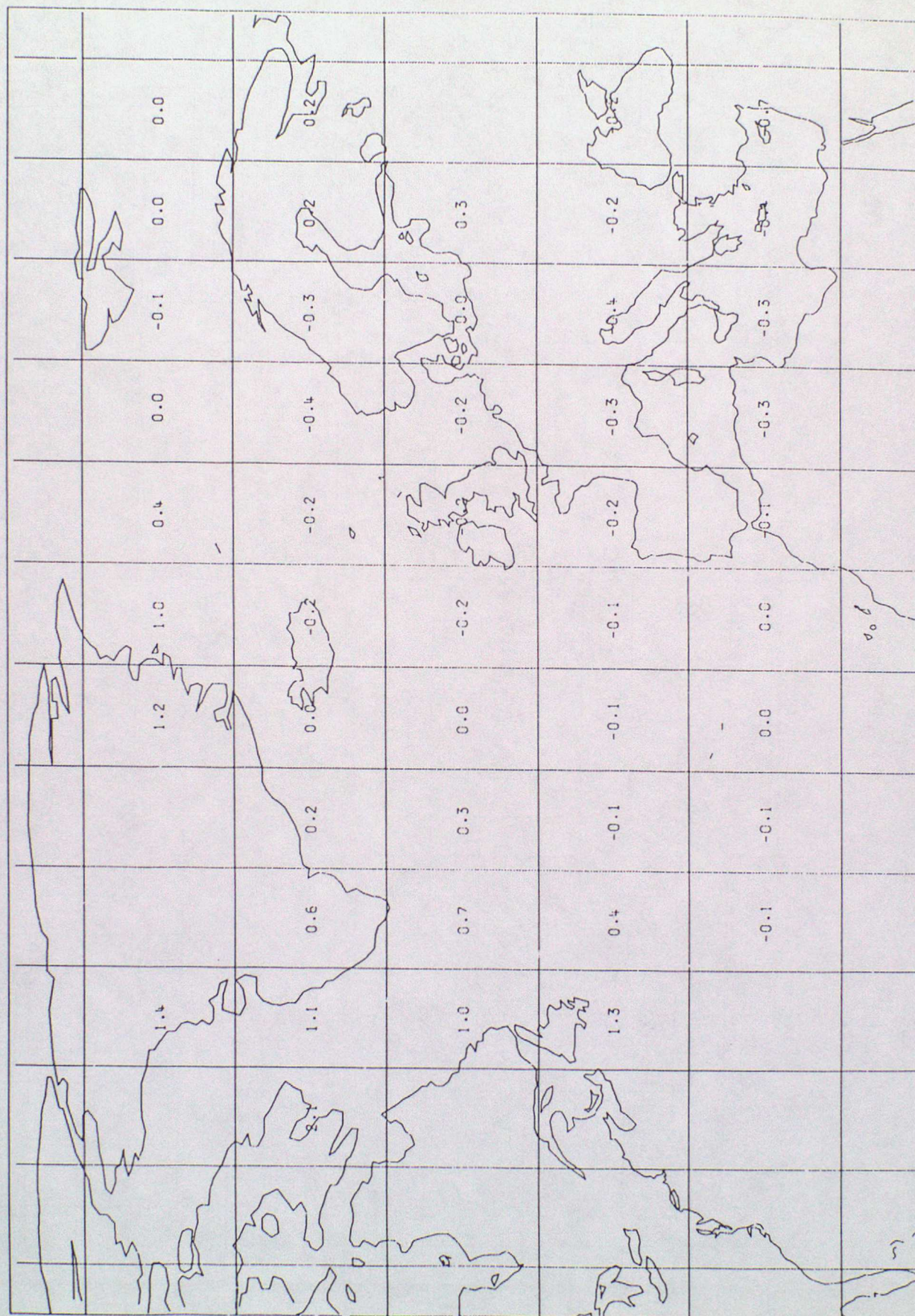
AIRCRAFT REPORTS: RMS O-B TEMPERATURES BETWEEN 101 AND 300 HPA
 MARCH 1994 - MAY 1994. UNITS DEG C
 OBSERVATIONS WITH O-B GREATER THAN 10 DEG C EXCLUDED
 VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT

FIGURE 15



LASS : MEAN O-B TEMPERATURE DIFFERENCES (DEG C) AT 850 HPA
 MARCH 1994 - MAY 1994
 OBSERVATIONS FROM NOAA-11 AND NOAA-12
 VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT

FIGURE 16



LASS : MEAN O-B TEMPERATURE DIFFERENCES (DEG C) 50 TO 30 HPA
 MARCH 1994 - MAY 1994

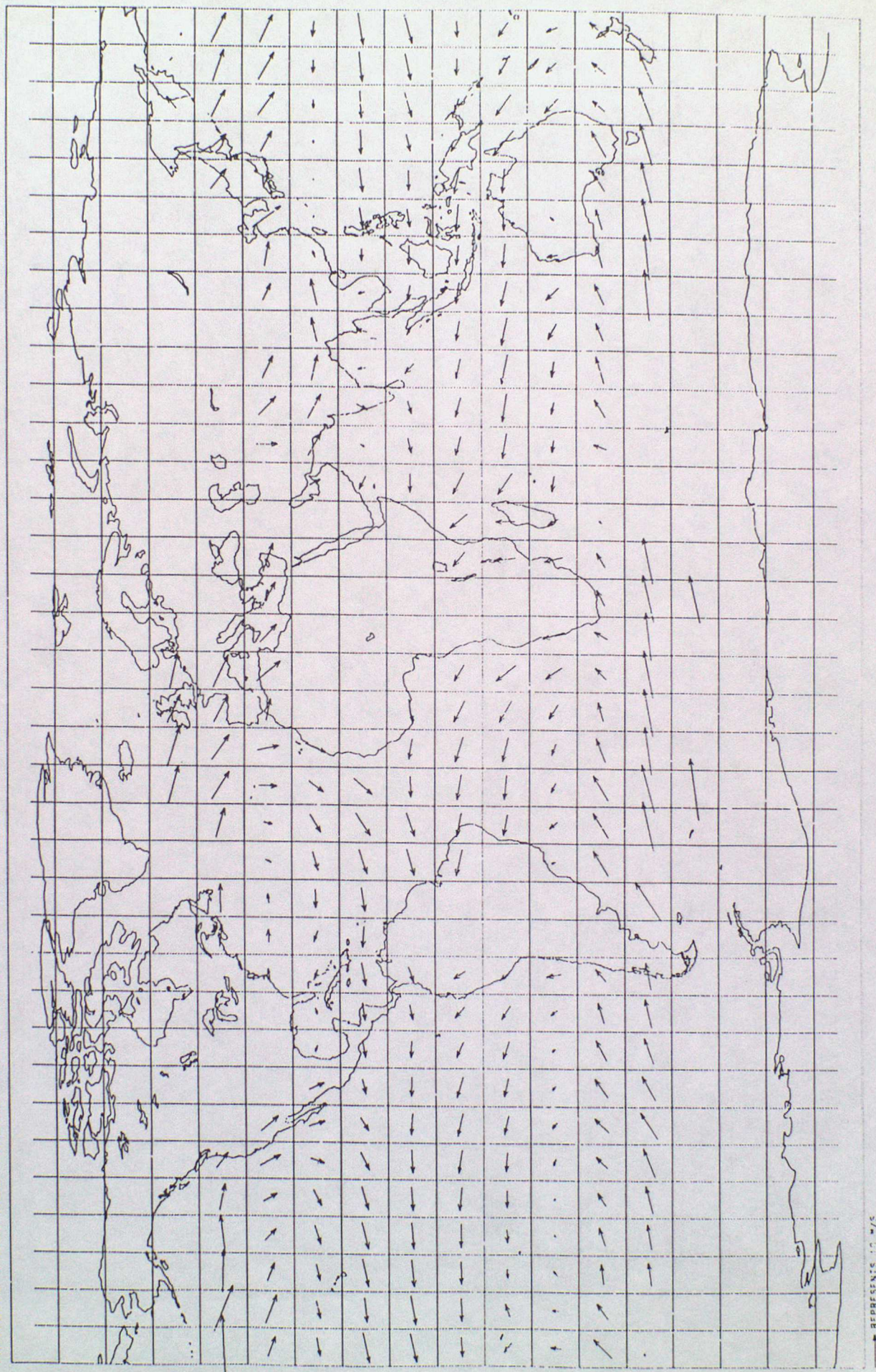
FIGURE 18

OBSERVATIONS FROM NOAA-11 AND NOAA-12
 VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT



SATOB VECTOR MEAN WINDS BETWEEN 701-1000 HPA
MARCH 1994 - MAY 1994
ALL OBSERVATIONS
ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT

FIGURE 19



SATOB O-B VECTOR WIND DIFFERENCES BETWEEN 701-1000 HPA
MARCH 1994 - MAY 1994
ALL OBSERVATIONS
ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT

FIGURE 20

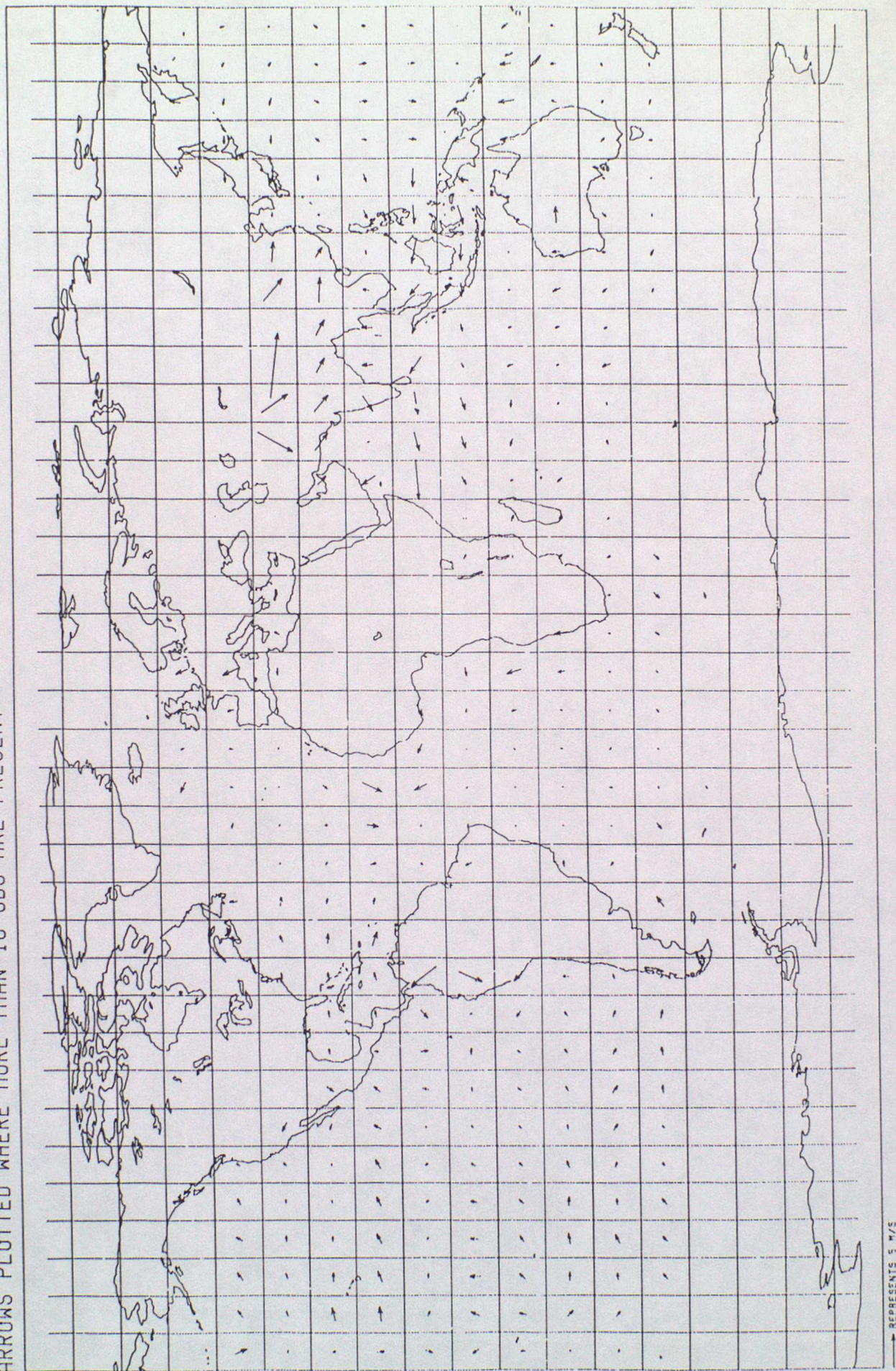


FIGURE 22

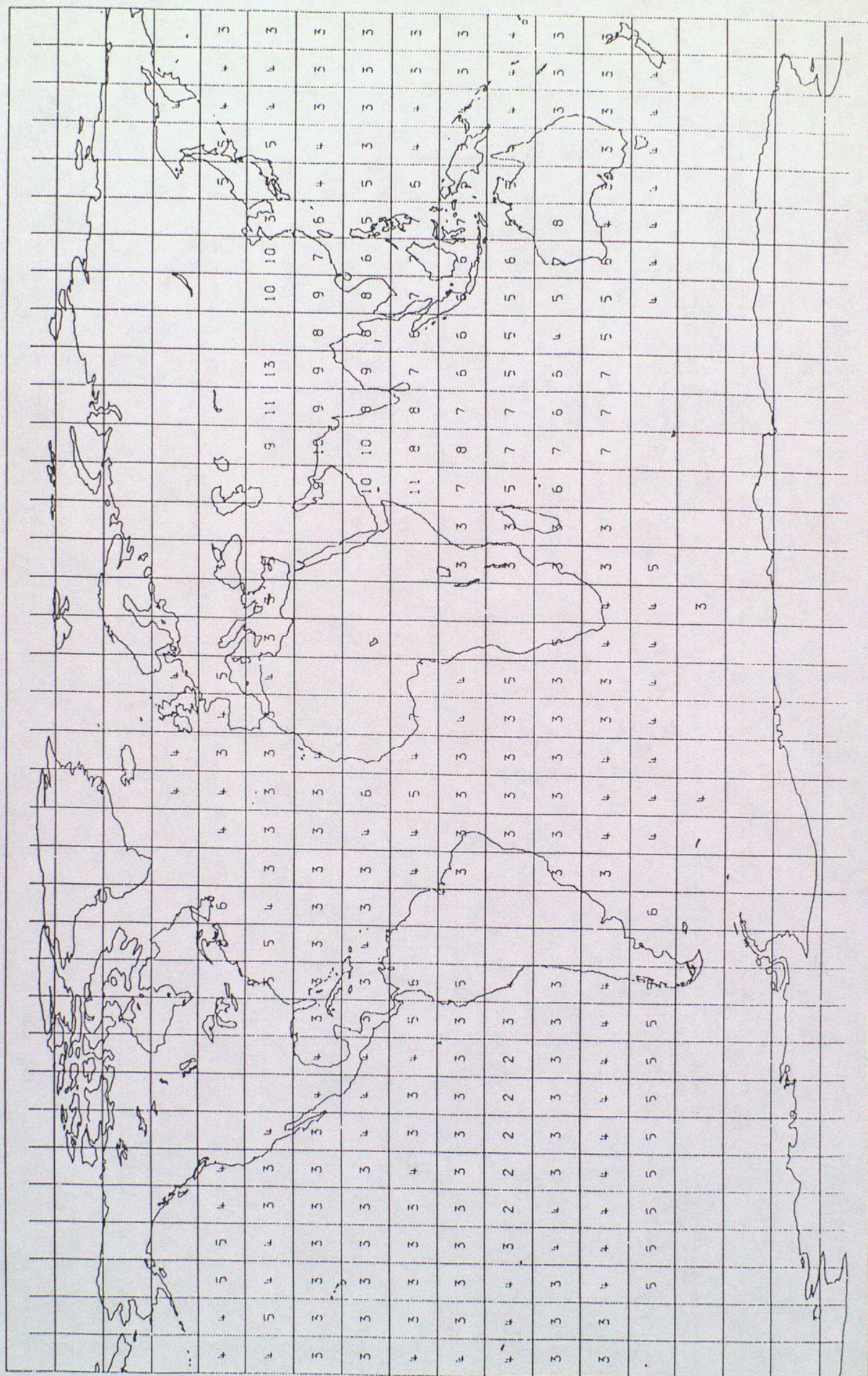
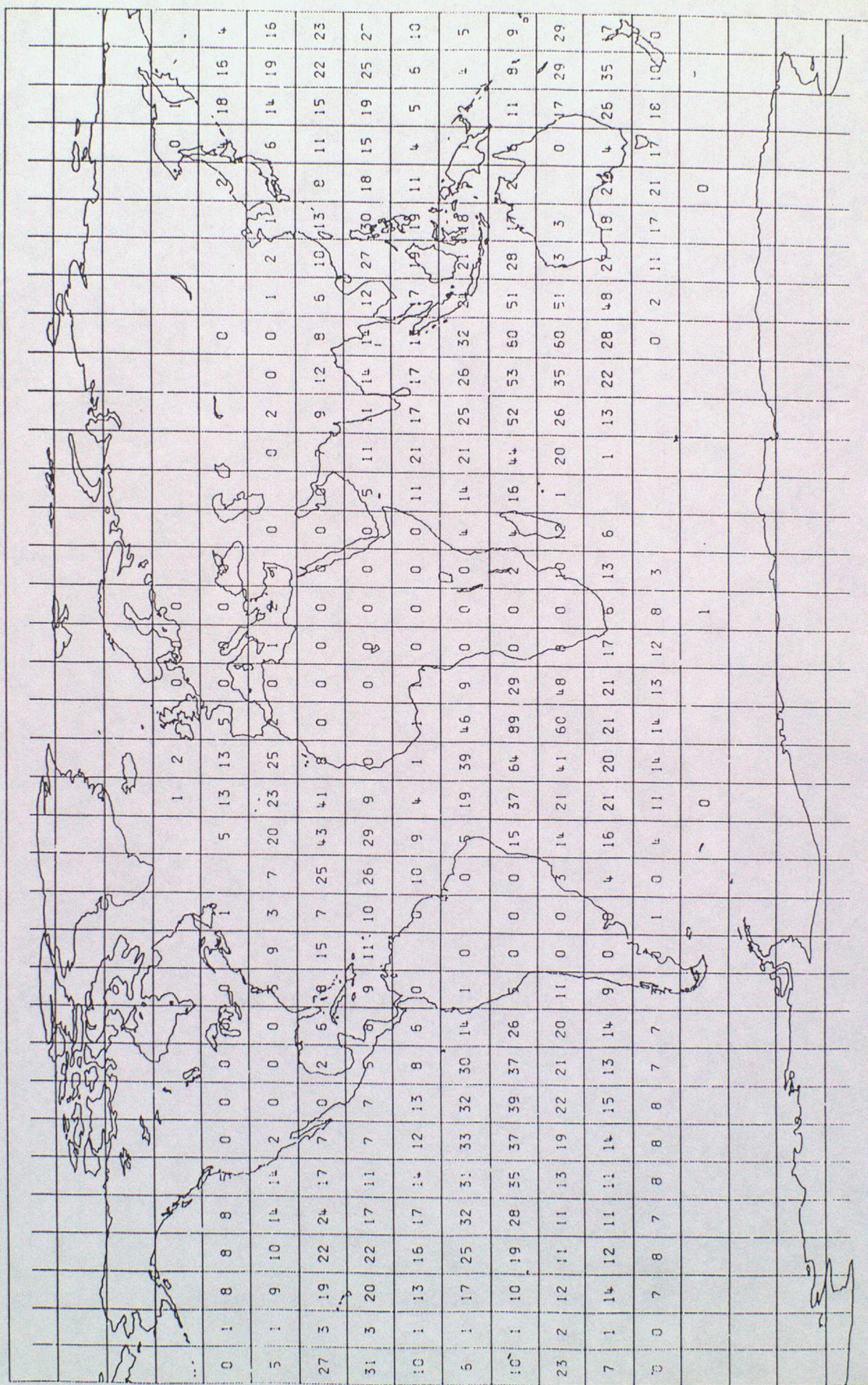


FIGURE 23



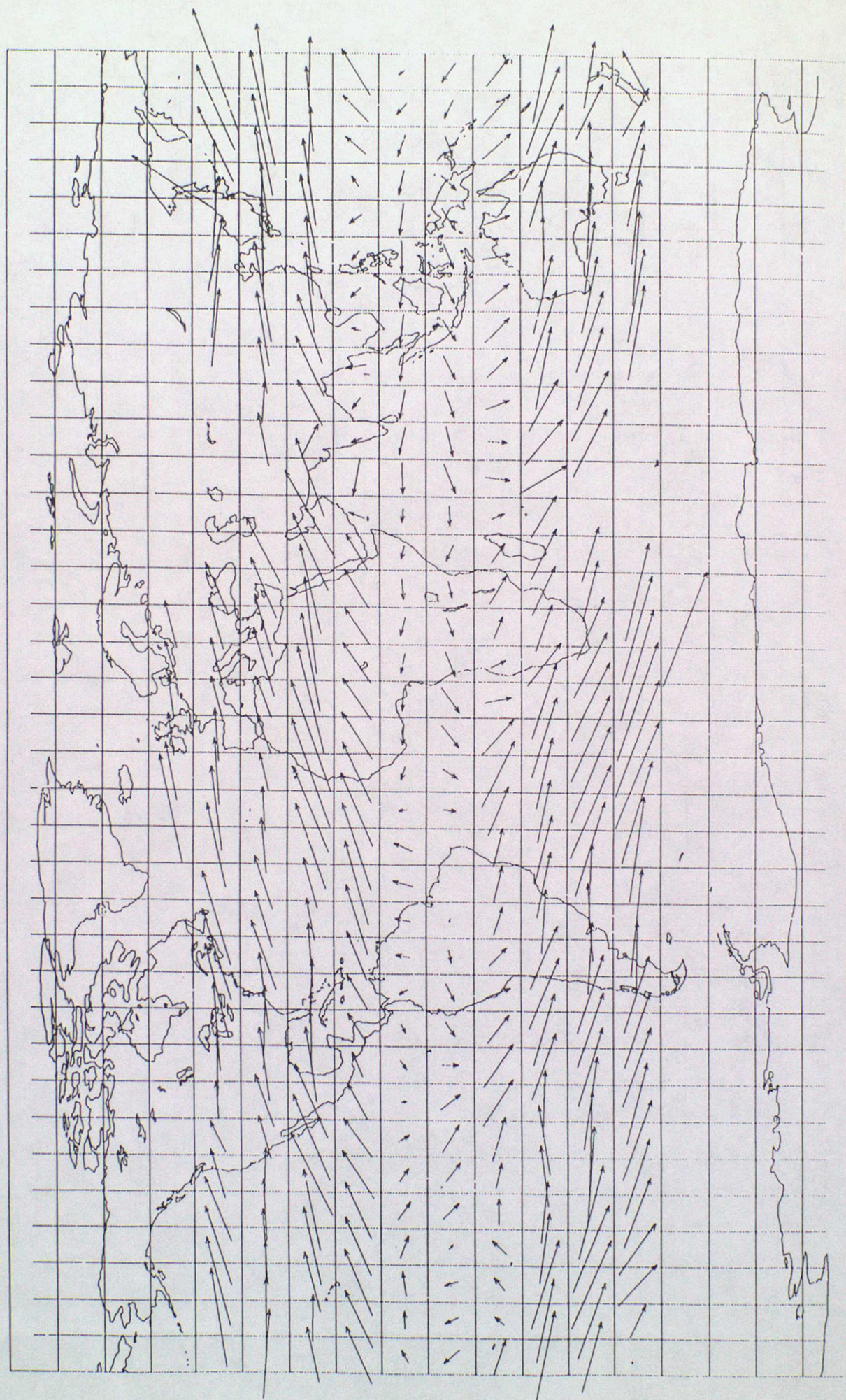
SATOB VECTOR MEAN WINDS BETWEEN 101-400 HPA

MARCH 1994 - MAY 1994

ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT

FIGURE 24



→ REPRESENTS 10 M/S

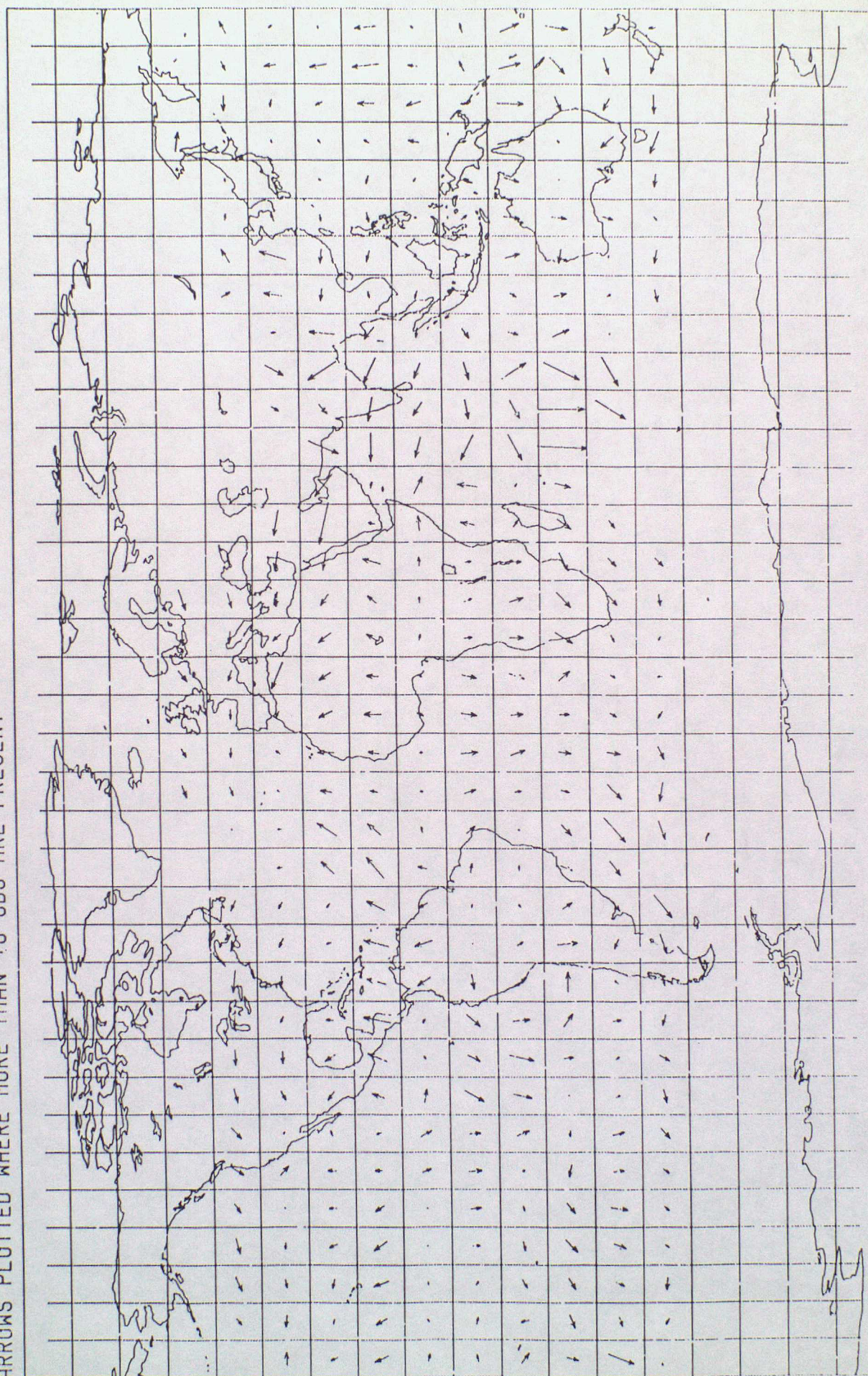
SATOB 0-B VECTOR WIND DIFFERENCES BETWEEN 101-400 HPA

MARCH 1994 - MAY 1994

ALL OBSERVATIONS

ARROWS PLOTTED WHERE MORE THAN 10 OBS ARE PRESENT

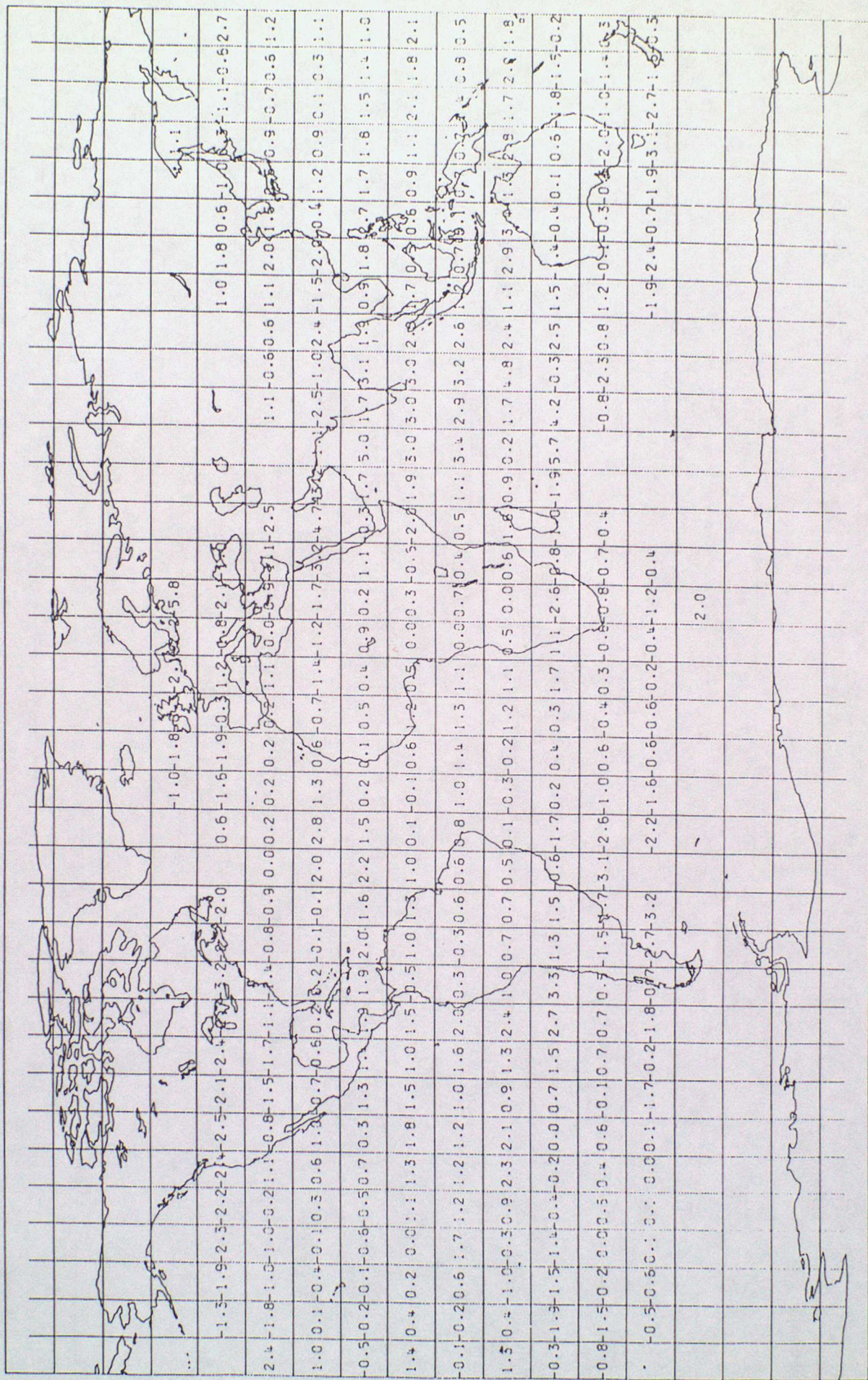
FIGURE 25



—→ REPRESENTS 5 M/S

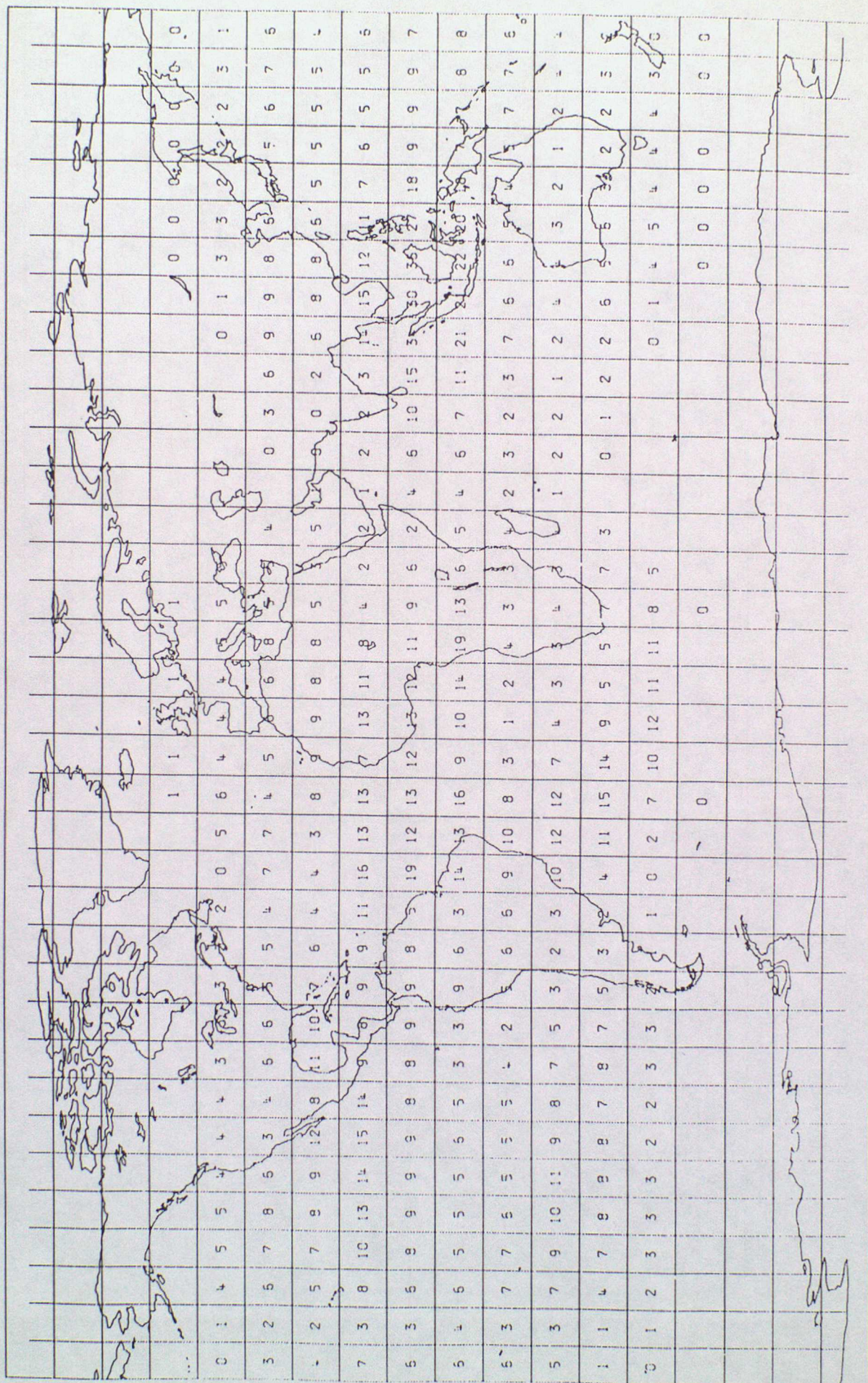
SATOB5 : MEAN 0-8 SPEED DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA
 MARCH 1994 - MAY 1994
 USING ALL OBSERVATIONS
 VALUES ARE PRINTED WHERE MORE THAN 10 OBS ARE PRESENT

FIGURE 26

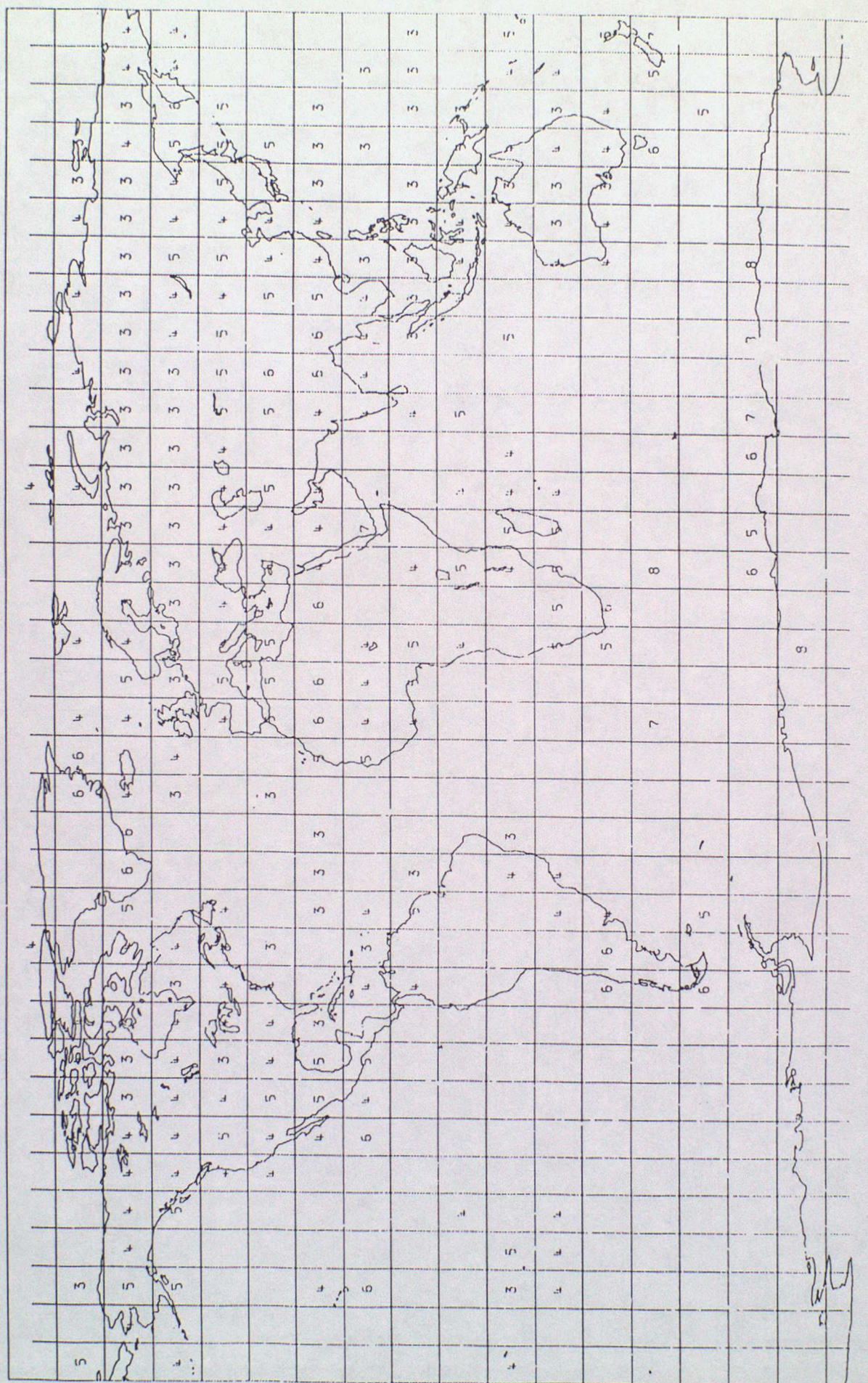


AVERAGE DAILY NUMBER OF SATOB OBSERVATIONS BETWEEN 101 AND 400 HPA
 MARCH 1994 - MAY 1994

FIGURE 28

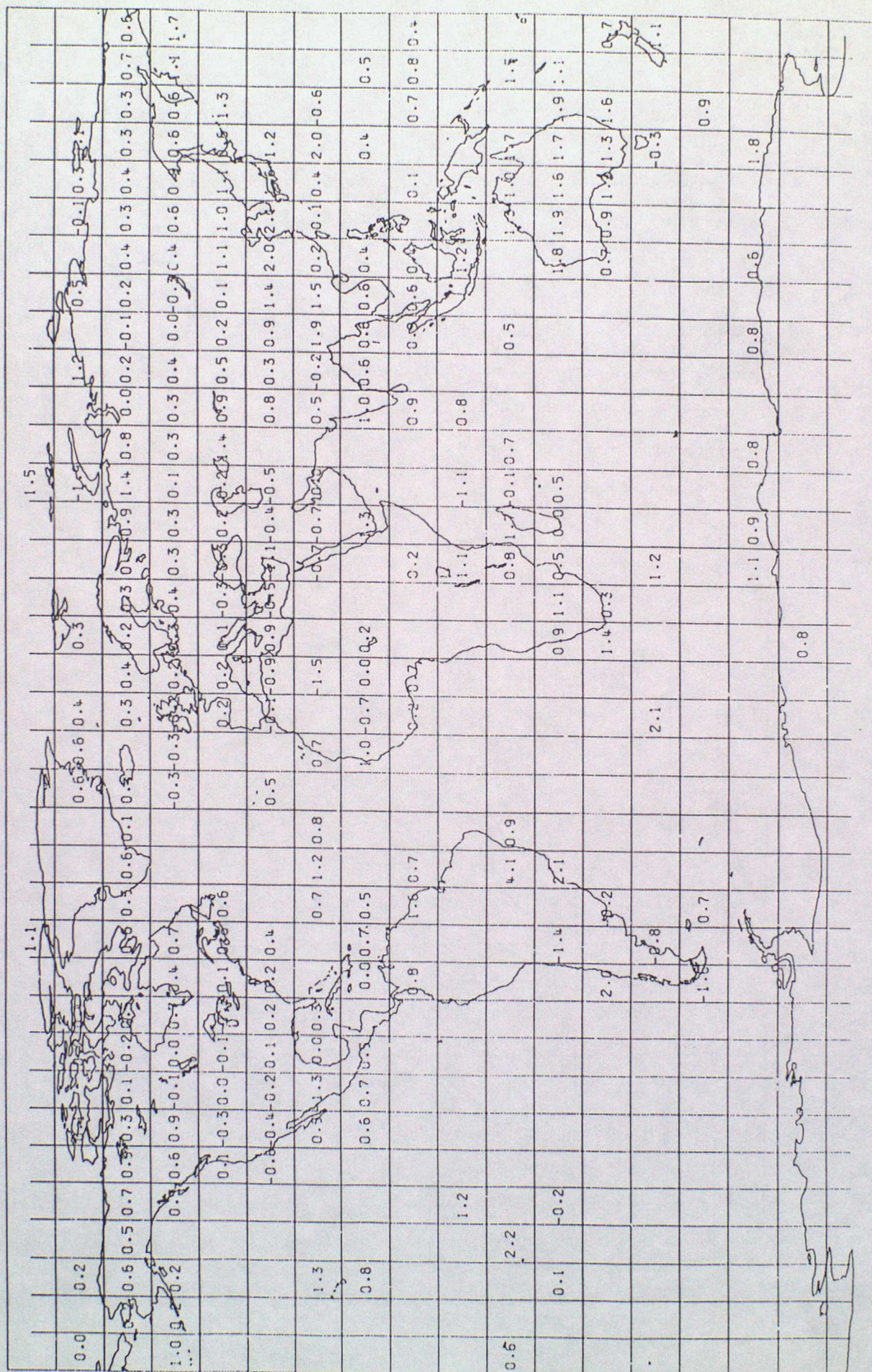


SONDES : RMS O-B VECTOR WIND DIFFERENCES (M/S) BETWEEN 701 AND 1000 HPA
 MARCH 1994 - MAY 1994
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE MORE THAN 100 OBS ARE PRESENT



SONDES : 0-8 SPEED DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA
 MARCH 1994 - MAY 1994
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE MORE THAN 100 OBS ARE PRESENT

FIGURE 31



SONDES : RMS 0-8 VECTOR WIND DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA
 MARCH 1994 - MAY 1994
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE MORE THAN 100 OBS ARE PRESENT

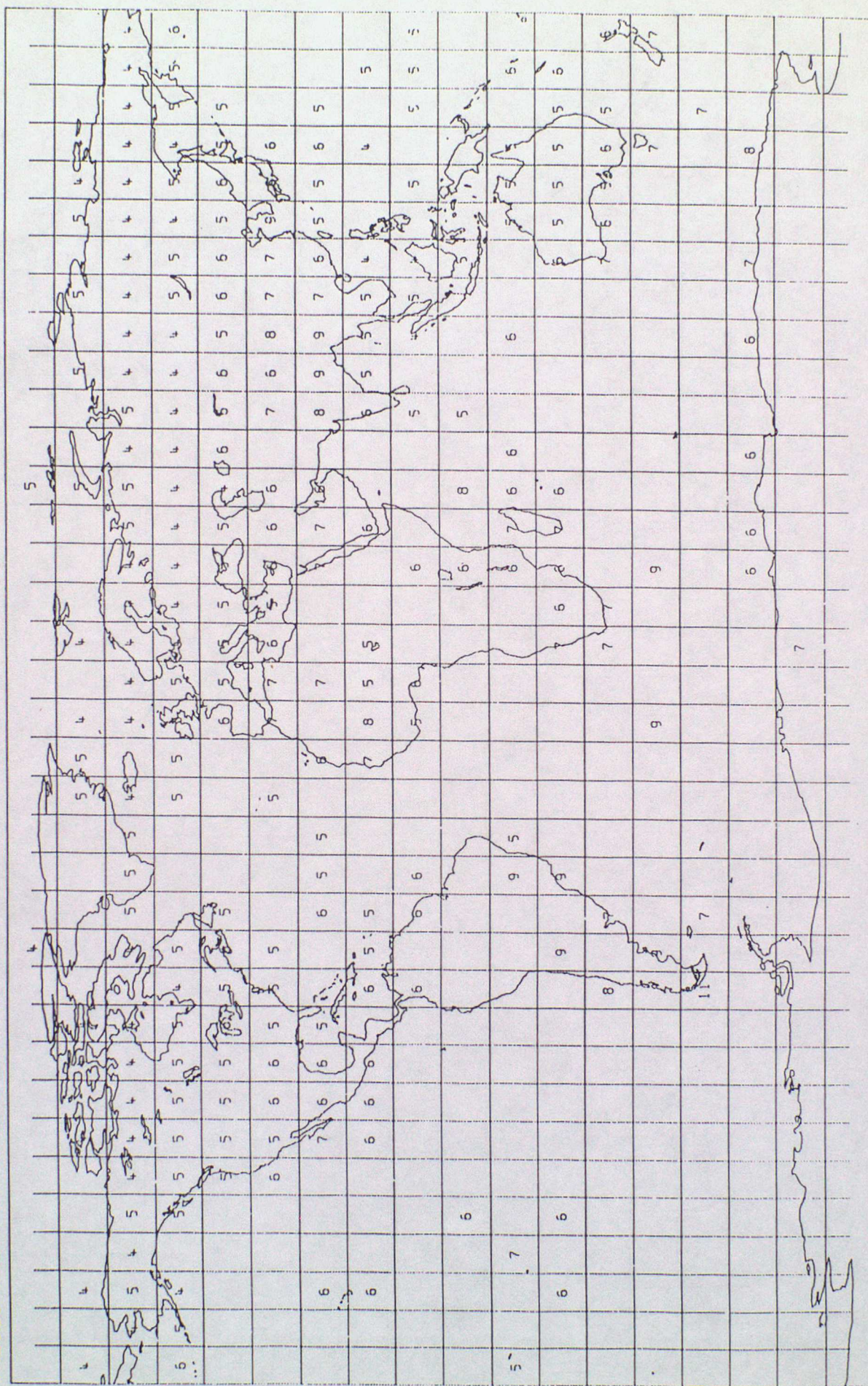
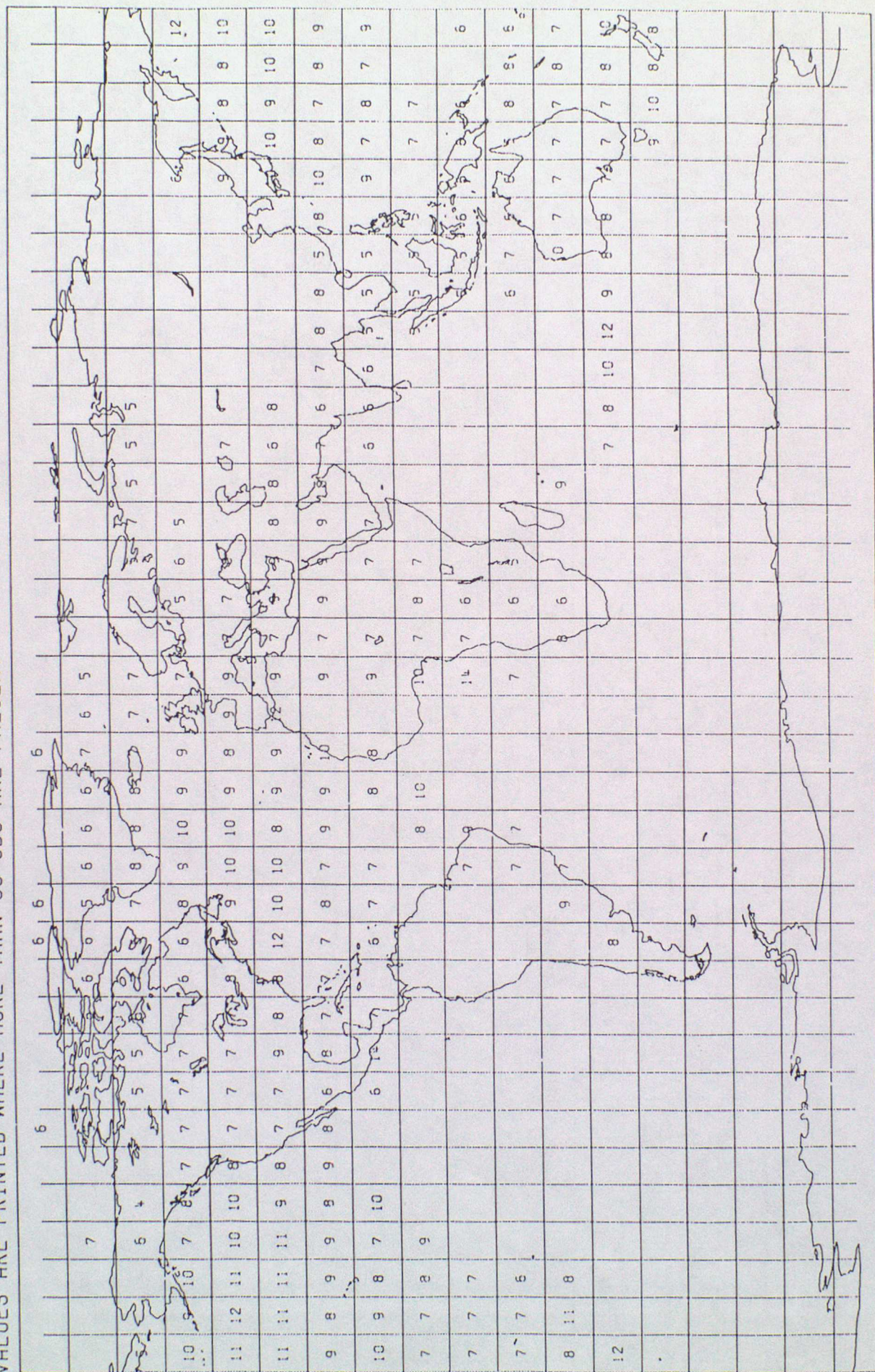


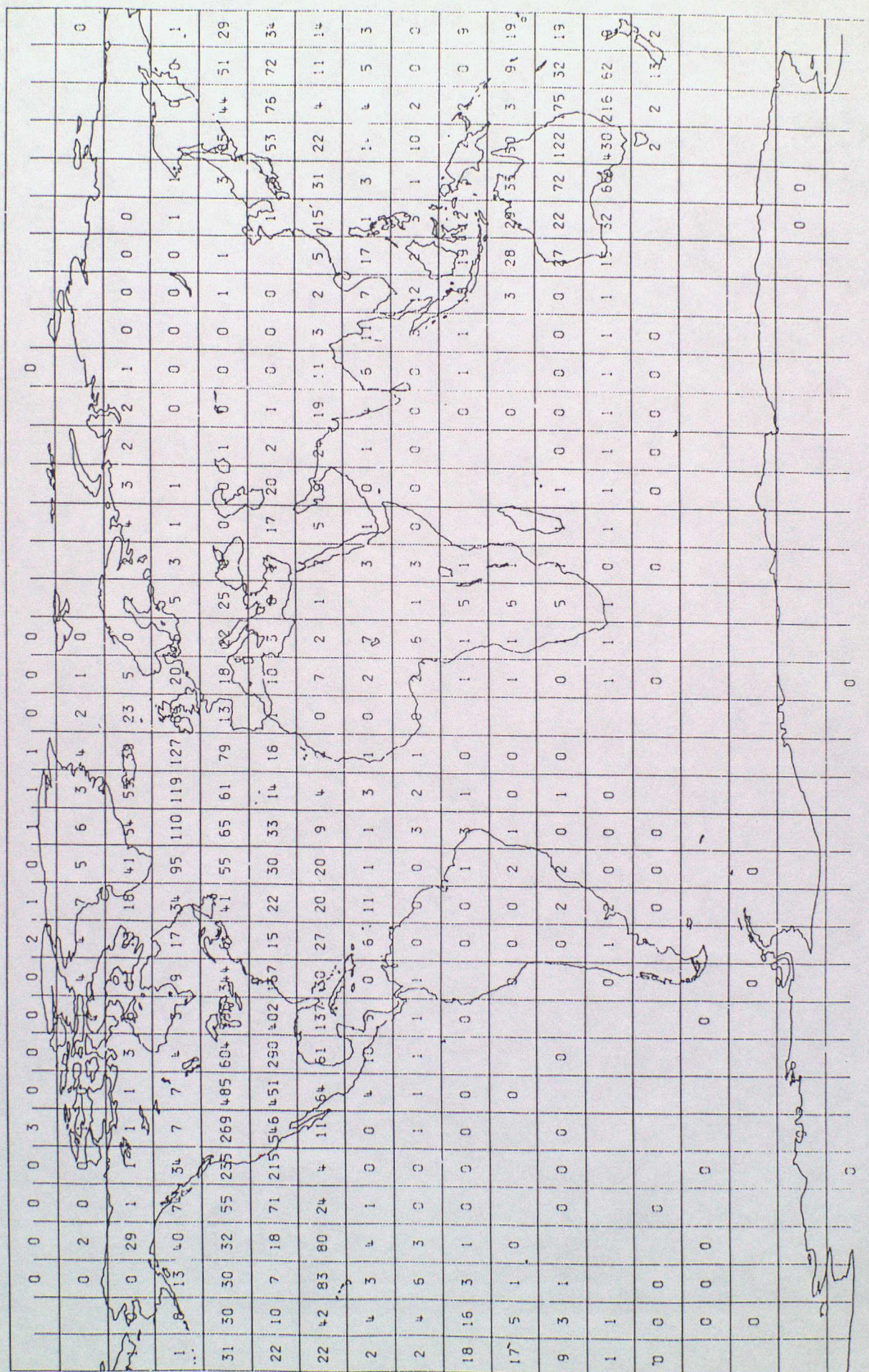
FIGURE 32

FIGURE 34

RAIRCRAFT REPORTS: RMS 0-B VECTOR (M/S) BETWEEN 101 AND 400 HPA
MARCH 1994 - MAY 1994
OBSERVATIONS WITH 0-B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED
VALUES ARE PRINTED WHERE MORE THAN 30 OBS ARE PRESENT



MEAN DAILY COUNT OF AIRCRAFT REPORTS 101 - 400 HPA
MARCH 1994 - MAY 1994
OBSERVATIONS WITH 0-B VECTOR DIFFERENCE GREATER THAN 60 MPS EXCLUDED



CENTRAL FORECASTING MONITORING NOTE

NUMBER	TITLE	AUTHOR	DATE
1	Statistics derived from the OPD archive for the year 1987 + figures	J. Ashcroft	1987
2	OPD statistics for 1988	J. Ashcroft S. G. Smith	1989
3	Monitoring statistics for satems and satobs, sept-nov 1989	S. G. Smith	1990
4	The use of an operational data assimilation system to infer the quality of wind observations from radiosondes.	C. D. Hall	1990
5	Monitoring statistics for satems and satobs, dec 1989 - feb 1990	S. G. Smith	1990
6	Quality of high level satobs from different satellites, feb 1990-apr 1991	S. R. Waters	1991
7	The use of output from a numerical to monitor the quality of radiosonde observations.	C. D. Hall	1992
8	Monitoring statistics for SATEMs & SATOBs DEC 1991-FEB 1992	S. G. Smith	1992
9	Statistics of ERS-1 scatterometer winds for March 1992 including a comparison with ship observations.	S.G. Smith S.G. WATERS	1992
10	Monitoring statistics for Satems & Satobs June - August 92	S. G. Smith	1992
11	Monitoring statistics for ERS-1 radar altimeter data. (16/10/92 - 22/10/92)	S. R. Waters	1992
12	Monitoring statistics for Satems and Satobs September - November 1992.	J. R. Leighton	1993
13	Monitoring statistics for Satems and Satobs December 1992 - November	J. R. Leighton	1993
14	The effect of using synop reported mean sea-level pressure on quality control decisions.	J. D. Wright	1993
15	A study of windspeed for the six classes of marine surface observations.	J. R. Leighton	1993
16	Monitoring statistics for SATEMs & SATOBs (March 93 - May 93)	J. R. Leighton	1993

CENTRAL FORECASTING MONITORING NOTE

NUMBER	TITLE	AUTHOR	DATE
17	Monitoring statistics for SATEMs & SATOBs (June 93 - August 93)	J. R. Leighton	1993
18	Monitoring statistics for SATEMs & SATOBs (September 93 - November 93)	J. R. Leighton	1993
19	Monitoring statistics for SATEMs & SATOBs December 93 - February 94)	J. R. Leighton	1994
20	Monitoring satellite water-vapour track winds (SATOBS) from the METEOSAT water vapour channel.	J. R. Leighton	1994
21	Monitoring statistics for SATEMs & SATOBs March 1994 - May 1994	J. R. Leighton	June 1994