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CENTRAL FORECASTING MONITORING NOTE NO. 16
MONITORING STATISTICS FOR SATEMs AND SATOBs

March 1993 - May 1993

J.R. Leighton

Central Forecasting Division

July 1993

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London Road
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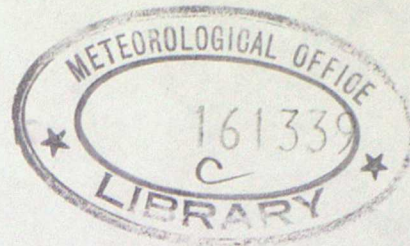
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1 Introduction

This monitoring note continues a series of monitoring results from SATEMs and SATOBs. This note covers the quarterly period March 1993 - May 1993.

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. 13, "Monitoring Statistics For SATEMs and SATOBs (December 1992- February 1993)", referred to as P1.

2 Temperatures

Notes:-

1. LASS data continued to be discarded from the analysis during this period.
2. 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) north of 20°S are generally more positive whilst south of 40°S they are less positive/more negative. RMS O-B temperature differences (figure 2) in this latter region are higher than in P1.

Comparing the 30-50 hPa layer of mean O-B temperature differences (figure 5) with P1, biases are generally lower this quarter but over the North Atlantic they are slightly higher.

The corresponding RMS O-B temperature differences (figure 6) are slightly lower this quarter over the entire globe.

2.2 TEMPs (figs 8 - 13)

O-B temperature differences in the layer 801-1000 hPa (figure 8) show large negative biases over parts of S. America and Central America.

The strong negative biases found in the previous quarters have continued for O-B temperature differences in the layer 11-100 hPa (figure 12). As in P1, compared with the upper level SATEMs (figure 5), the bias is in the opposite sense due to the SATEM background values being derived from the thickness field. The temperature fields, used to provide background values for the radiosonde statistics, are too warm due to an inconsistency in the vertical interpolation to standard levels at the model output stage. This was corrected on May 25, too late to have any effect on the statistics for this quarter.

2.3 AIREPs (figs 14 - 15)

The mean O-B temperature differences between 101-300 hPa for AIREPs (figure 14) show positive biases over S.E. Europe and E. Africa. The strong negative bias found over Poland in P1 has been replaced by a strong positive bias which extends into the North Sea.

2.4 LASS (figs 16 - 18)

Generally the values of mean O-B temperature for LASS at 850 hPa (figure 16) have shifted in a positive direction compared with P1.

At the 250-150 hPa band (figure 17) there has been very little change in the temperature bias which remains negative.

The strong negative biases found in P1, of mean O-B temperature differences in the 50-30 hPa band (figure 18), have been reduced but remain strong in the south eastern quarter of the LASS area.

3 Winds

Throughout the period of this report, SATOBs from the following platforms were discarded:-

GMS above 500 hPa, poleward of 20° ,

Meteosat above 500 hPa over land, poleward of 20° ,

GOES above 500 hPa over land, poleward of 20° ,

INSAT.

3.1 SATOBs (figs 19 - 28)

The speed biases between 701-1000 hPa (figure 21) found last quarter along the W.African coast have increased this quarter. Biases over the Indian Ocean are also very large with corresponding large RMS O-B vector differences (figure 22) although there are only few observations in this region from the INSAT satellite (figure 23).

As in P1 the 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) over the tropical Eastern Pacific have reduced slightly from P1 but remain rather high, as are those over the Indian Ocean and tropical Western Pacific Ocean.

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 and Greenland with corresponding large RMS O-B vector differences (figure 30).

In the 101-400 hPa band (figure 31) there are large positive O-B speed differences over Brazil, S.Africa and the Far East with corresponding high RMS O-B vector wind differences (figure 32).

3.3 AIREPs (figs 33 - 35)

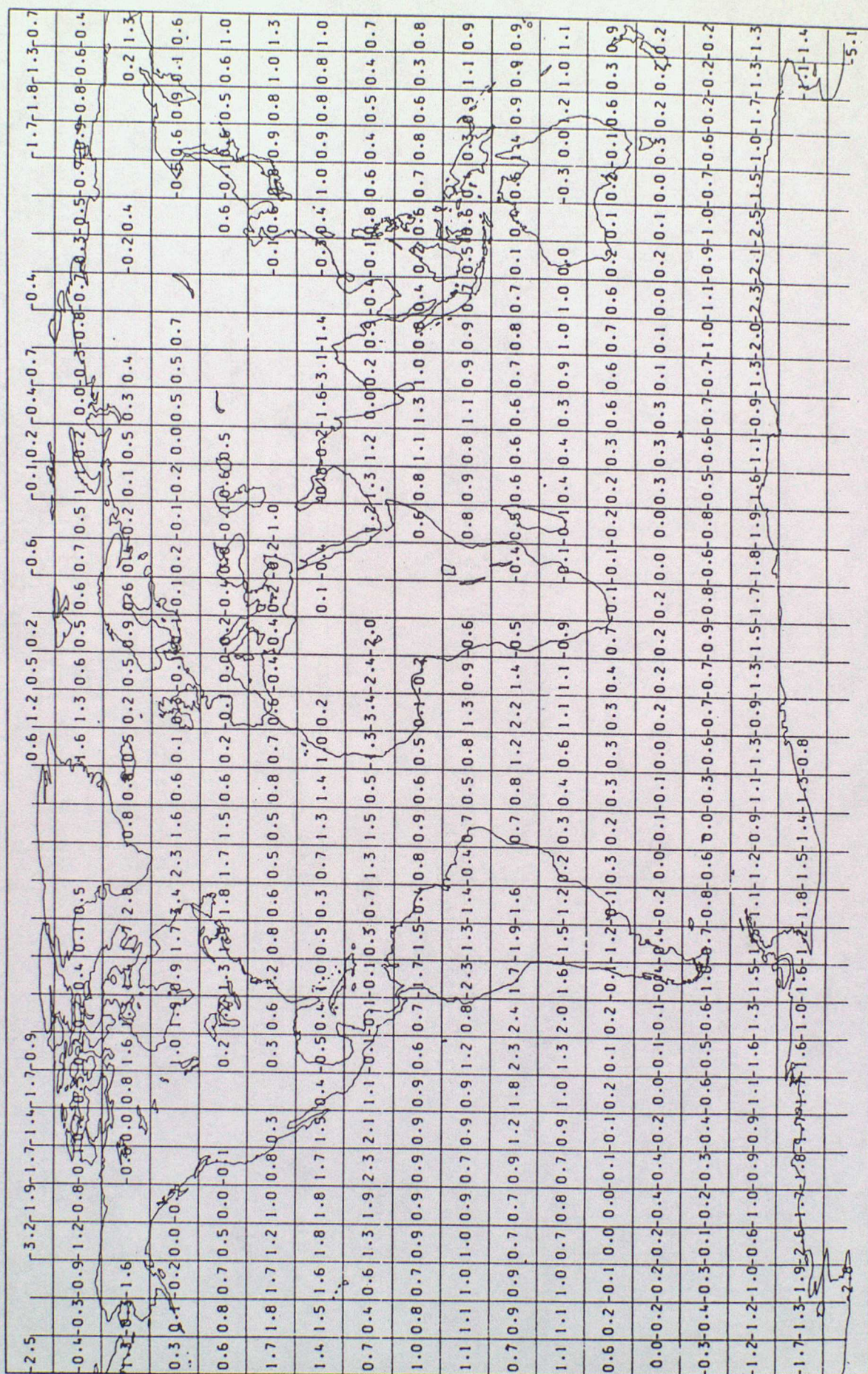
As in P1 there are positive differences in mean O-B speeds in the 101-400 hPa band over all areas of data coverage (figure 33).

4. Summary

SATEMs - Comparison of high level SATEMs with other data types has continued to be of little use because of the poor quality of the model background temperature fields at these levels.

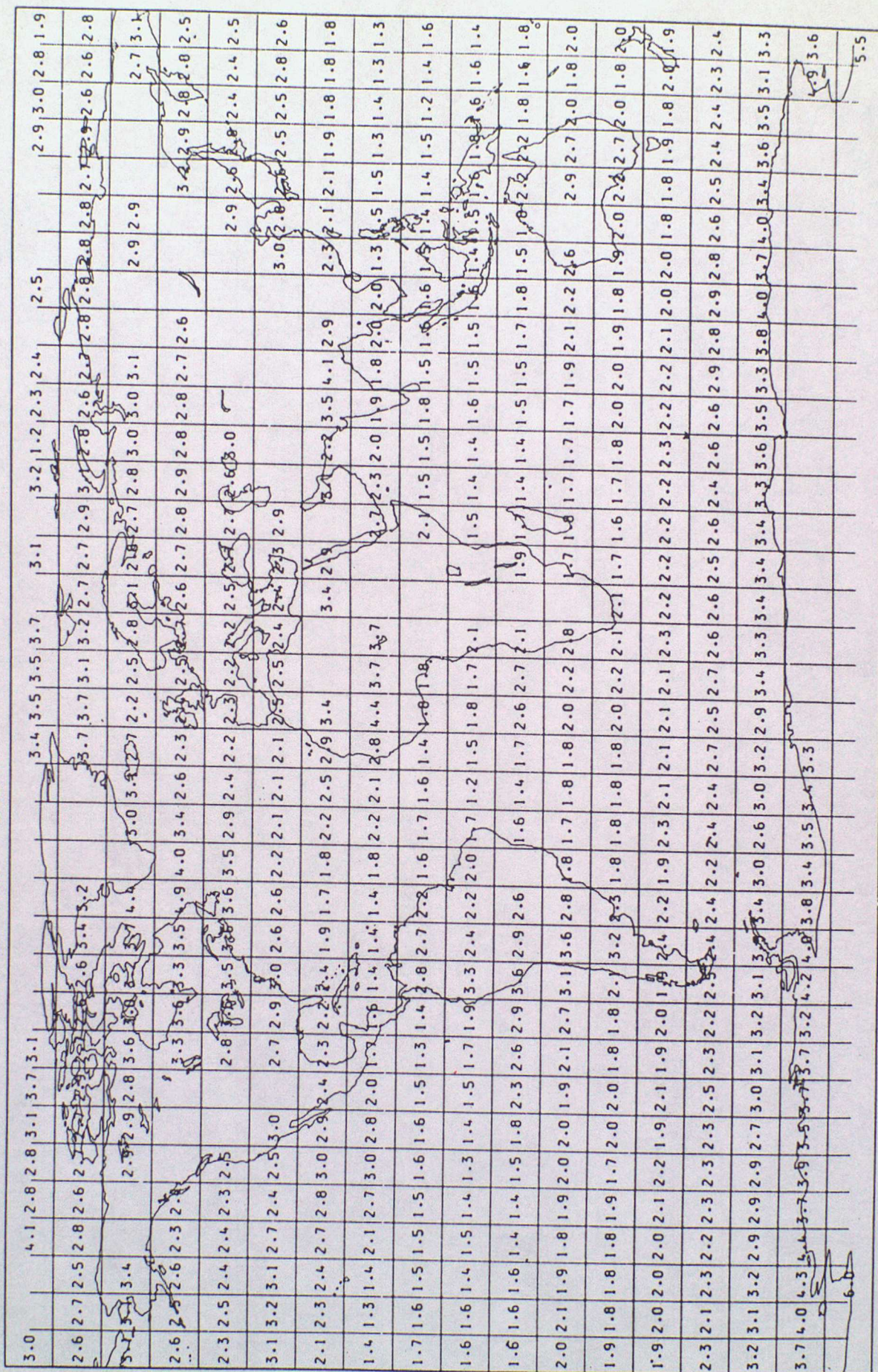
SATOBs - INSAT O-B vector wind differences in both bands covered in the report are very high, so rejection of all INSAT SATOB data is justified. SATOBs from Meteosat, GOES and GMS continue to compare well with the background field in the lowest band. In the upper band there is a strong divergent pattern 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 found in monitoring statistics from other centres so the problem may lie in the tropical SATOB observations.

FIGURE 1

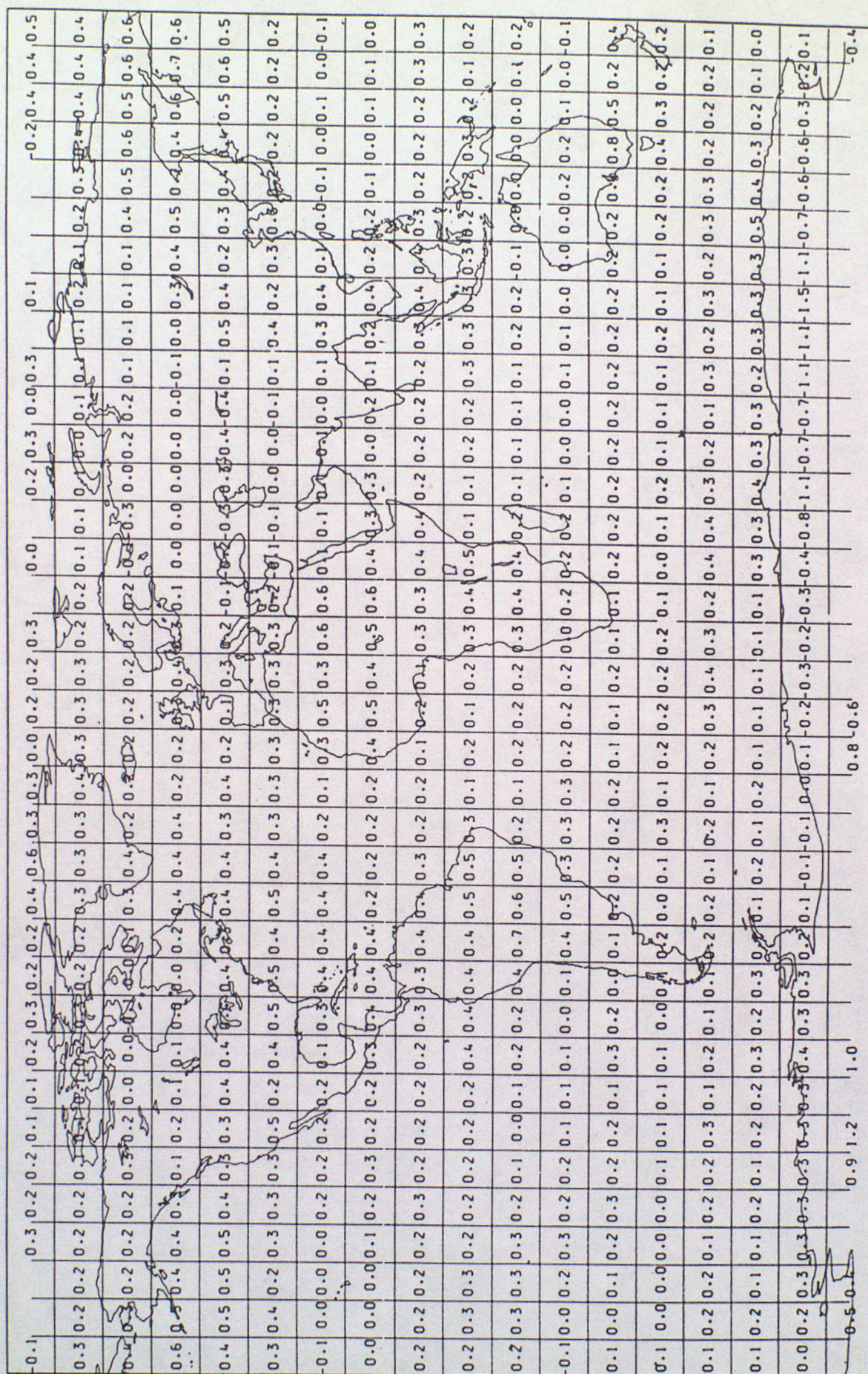


500 KM SATEMS : RMS 0-B TEMPERATURE DIFFERENCES (DEG C) : 850 TO 1000 HPA
 MARCH 1993 - MAY 1993
 NOAA-11 AND NOAA-12 STATISTICS COMBINED
 VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT

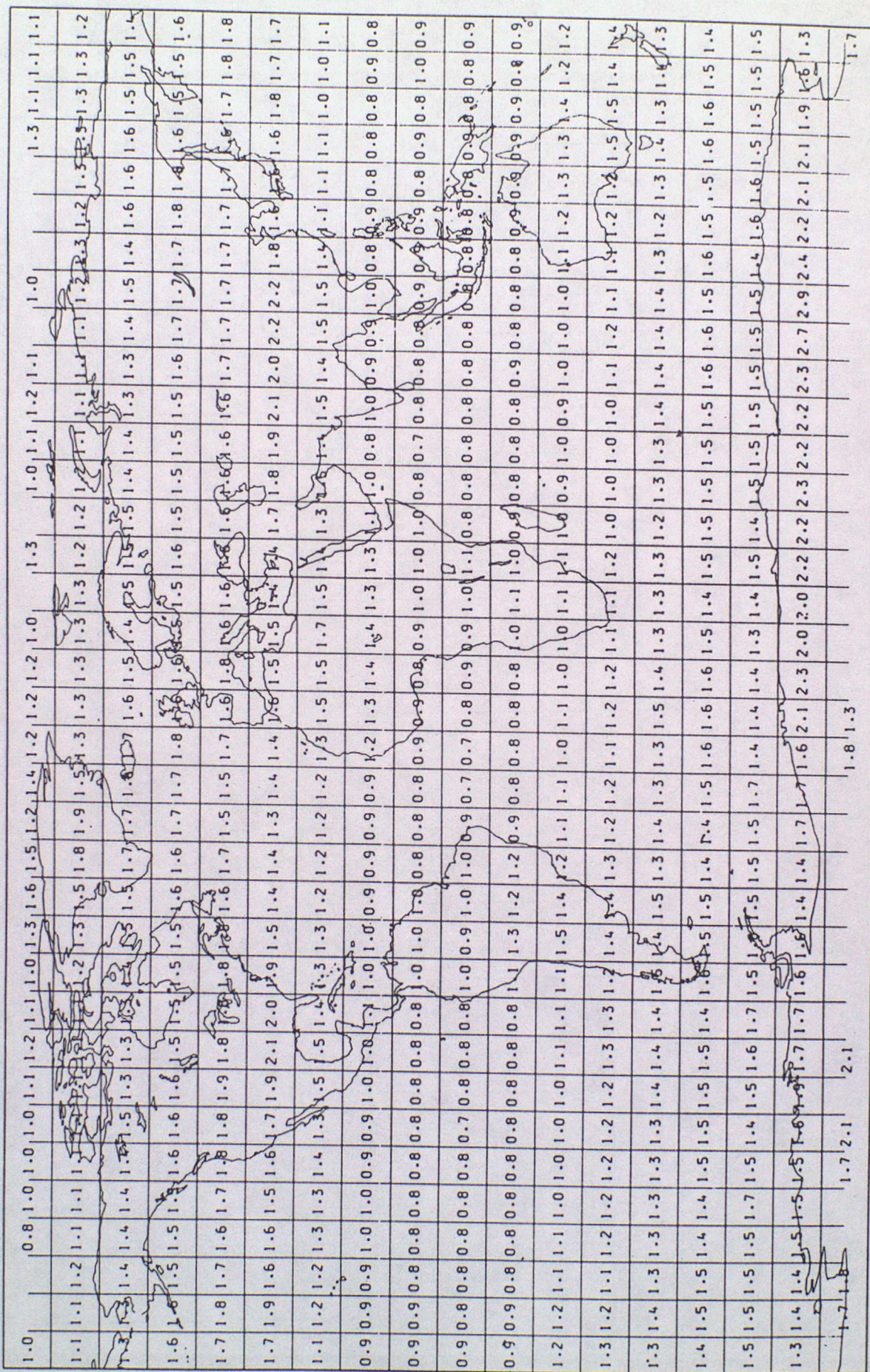
FIGURE 2



500 KM SATEMS : MEAN O-B TEMPERATURE DIFFERENCES (DEG C) : 100 TO 300 HPA
MARCH 1993 - MAY 1993
NOAA-11 AND NOAA-12 STATISTICS COMBINED
VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT



500 KM SATEMS : RMS O-B TEMPERATURE DIFFERENCES (DEG C) : 100 TO 300 HPA
 MARCH 1993 - MAY 1993
 NOAA-11 AND NOAA-12 STATISTICS COMBINED
 VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT



500 KM SATEMS : MEAN O-B TEMPERATURE DIFFERENCES (DEG C) : 30 TO 50 HPA
 MARCH 1993 - MAY 1993
 NOAA-11 AND NOAA-12 STATISTICS COMBINED
 VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT

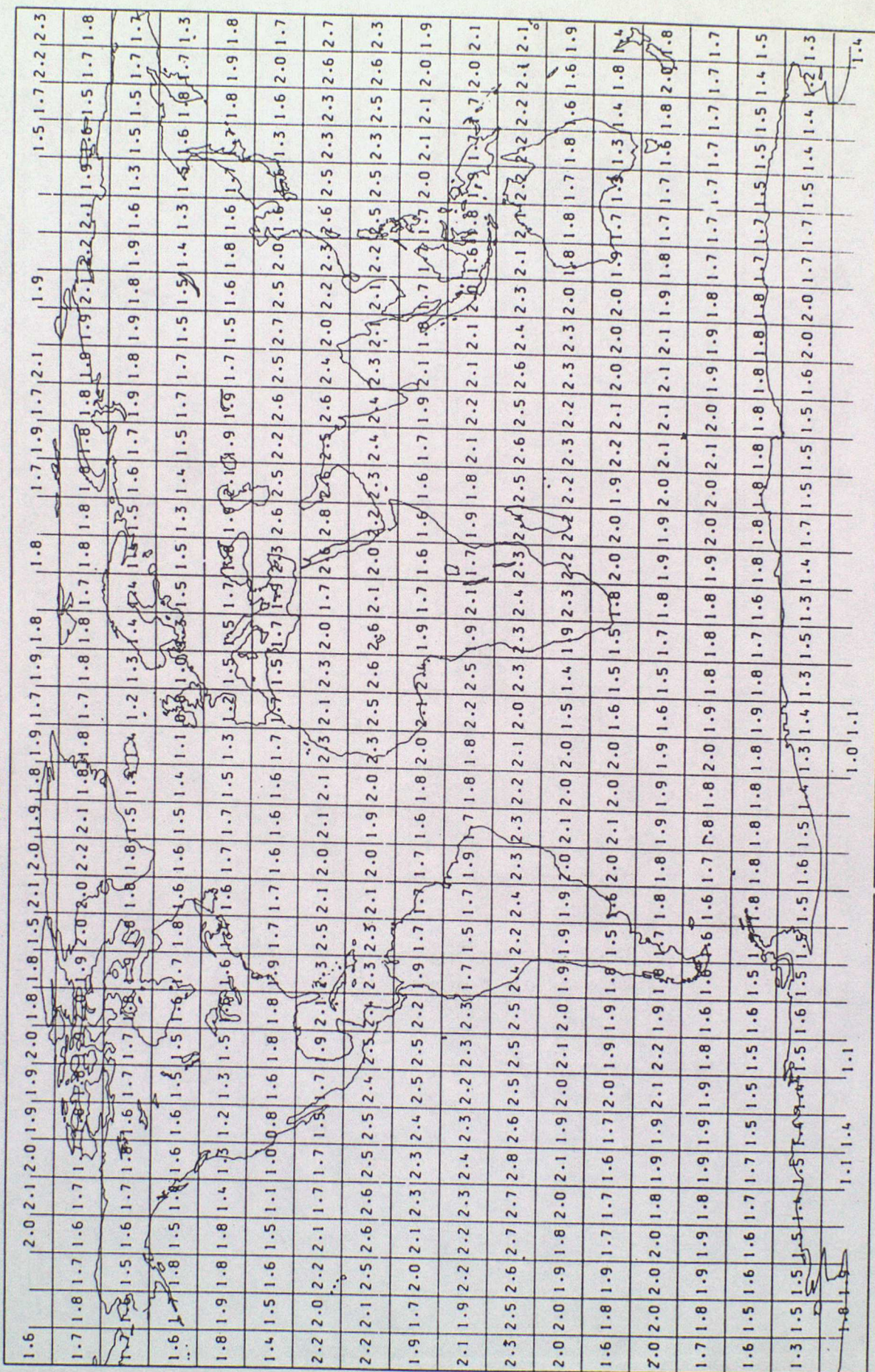
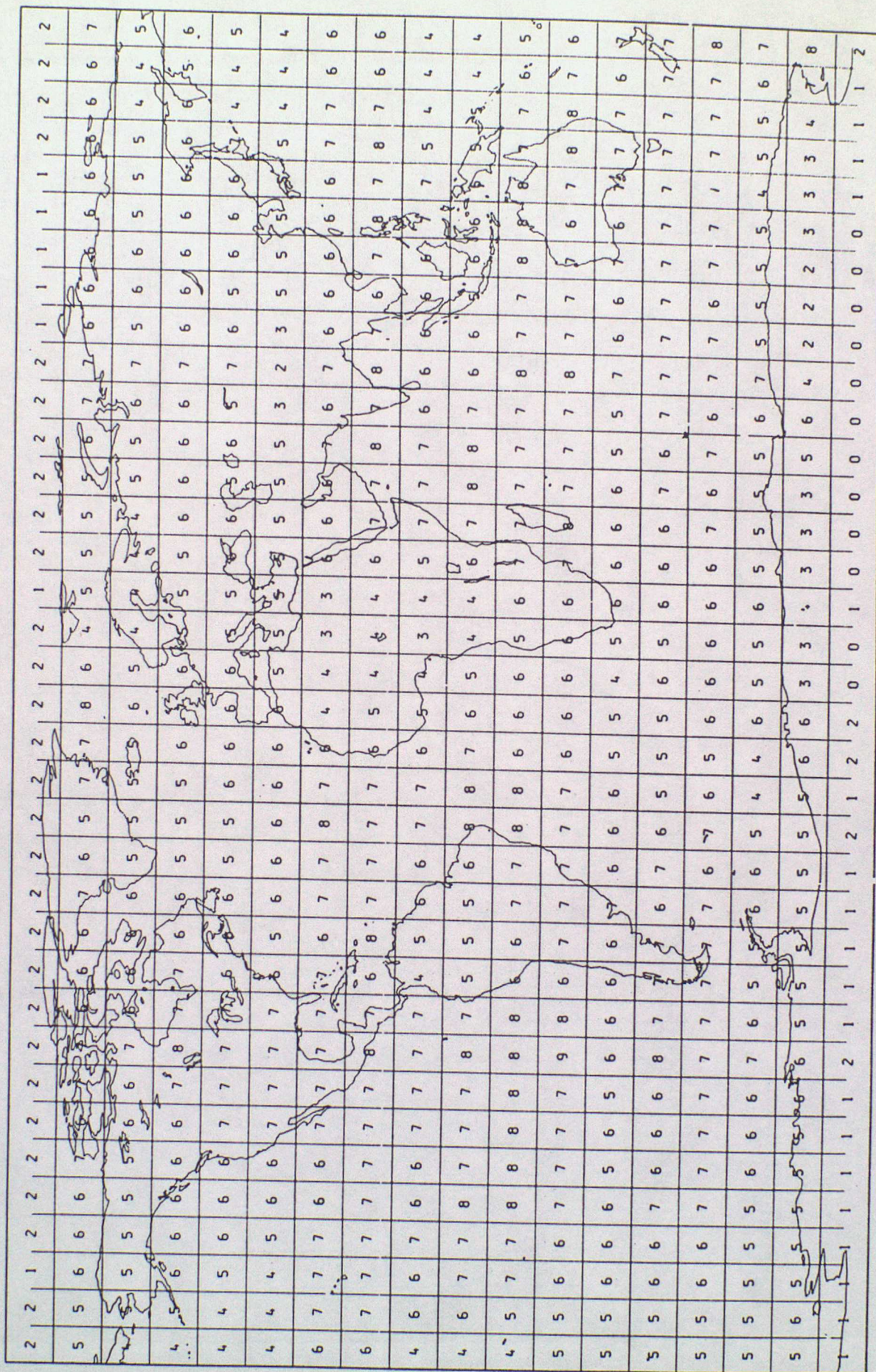


FIGURE 7



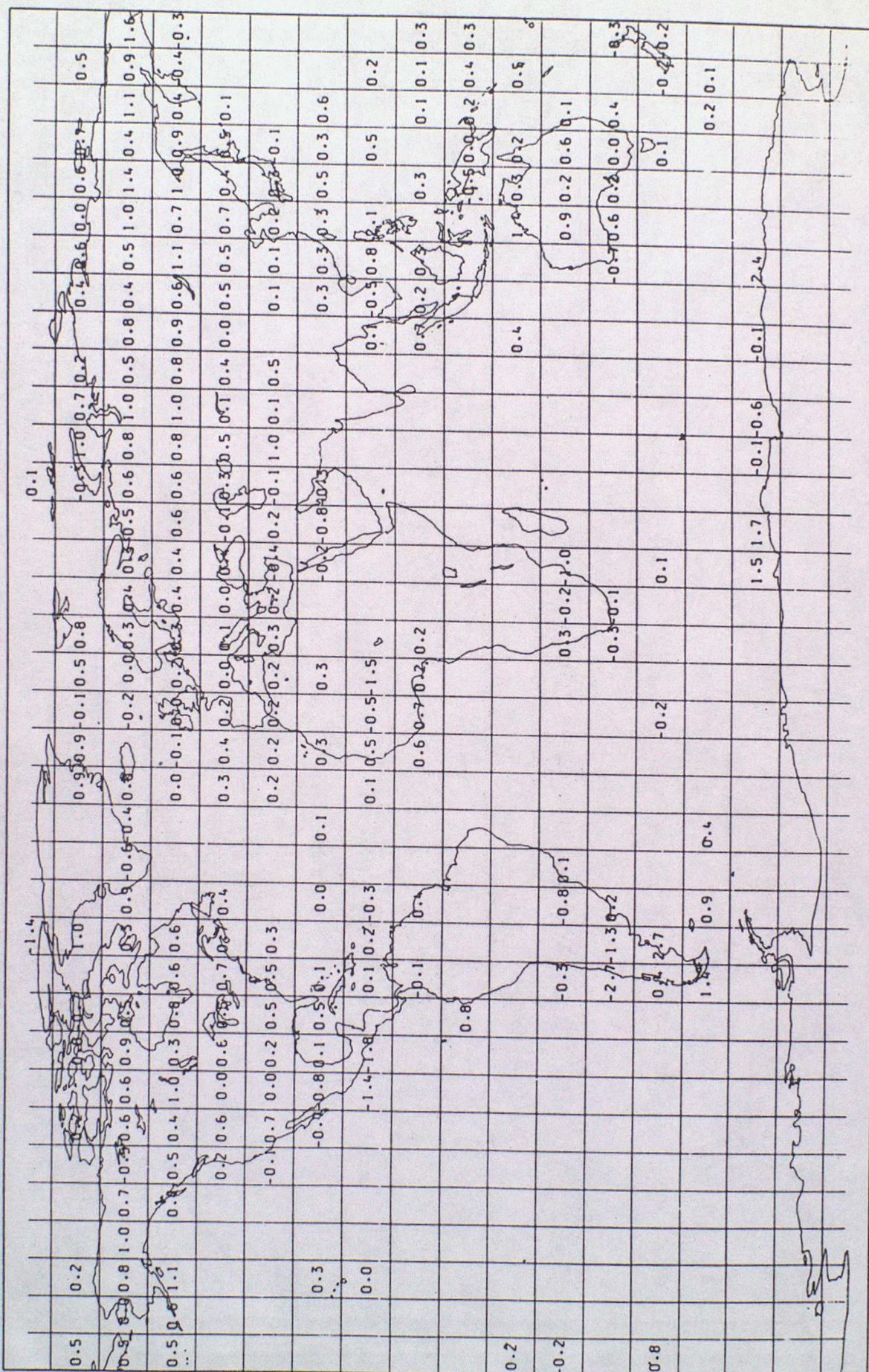
SONDES : 0-B TEMPERATURE DIFFERENCES (DEG C) 801 TO 1000 HPA

MARCH 1993 - MAY 1993

QUALITY CONTROL APPLIED

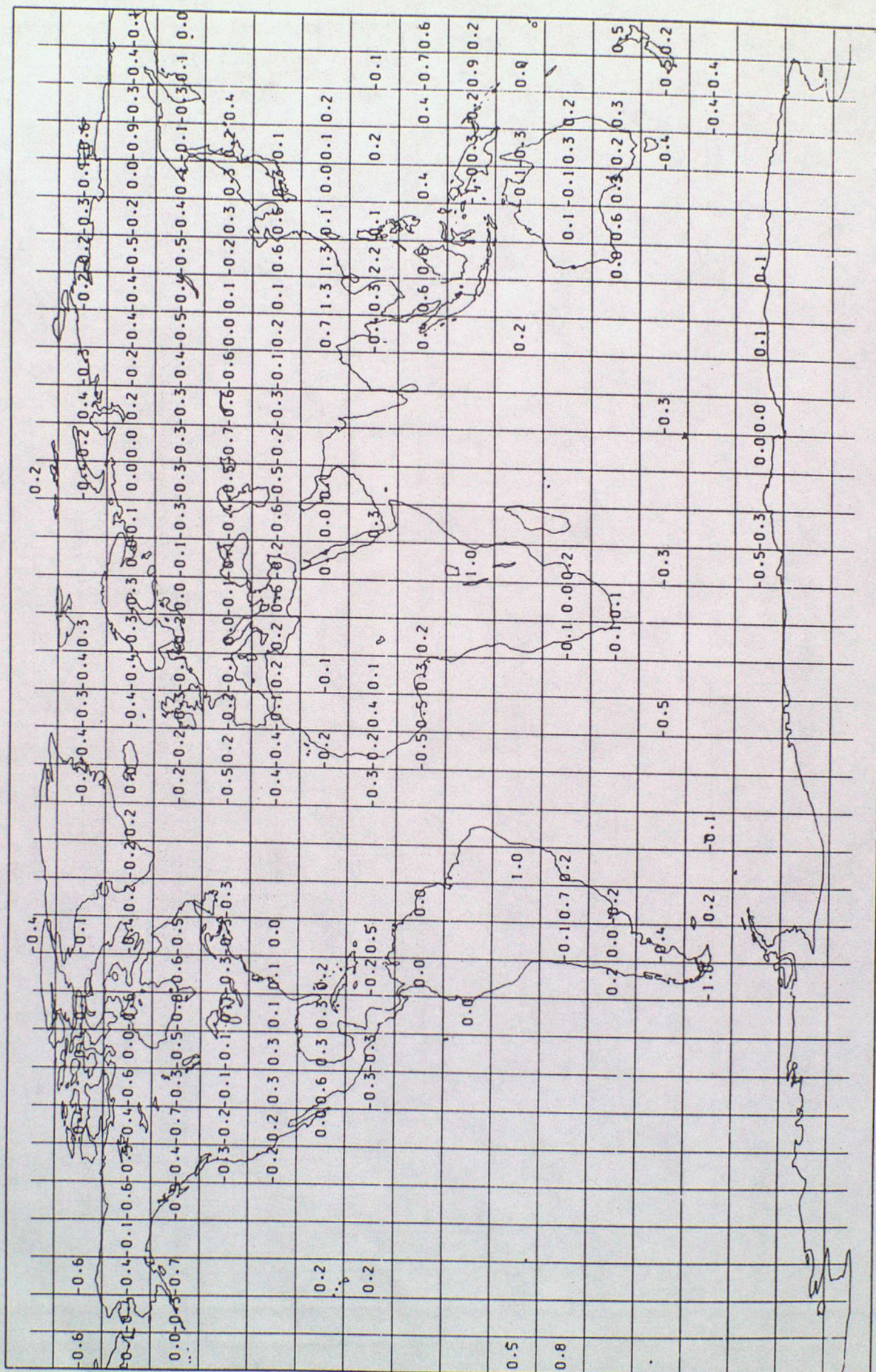
VALUES ARE PRINTED WHERE > 100 OBS ARE PRESENT

FIGURE 8



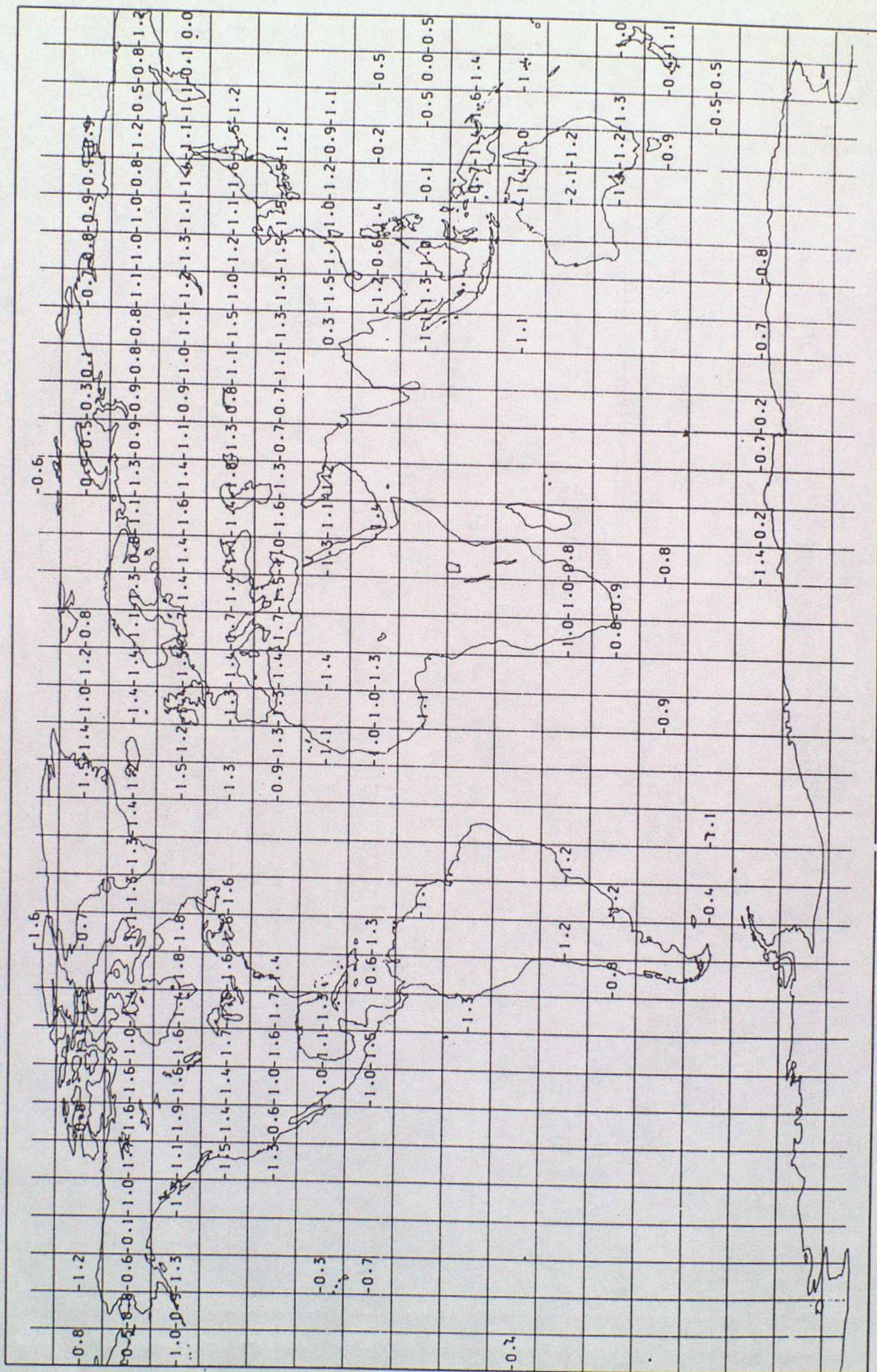
SONDES : O-B TEMPERATURE DIFFERENCES (DEG C) 101 TO 300 HPA
 MARCH 1993 - MAY 1993
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE > 100 OBS ARE PRESENT

FIGURE 10



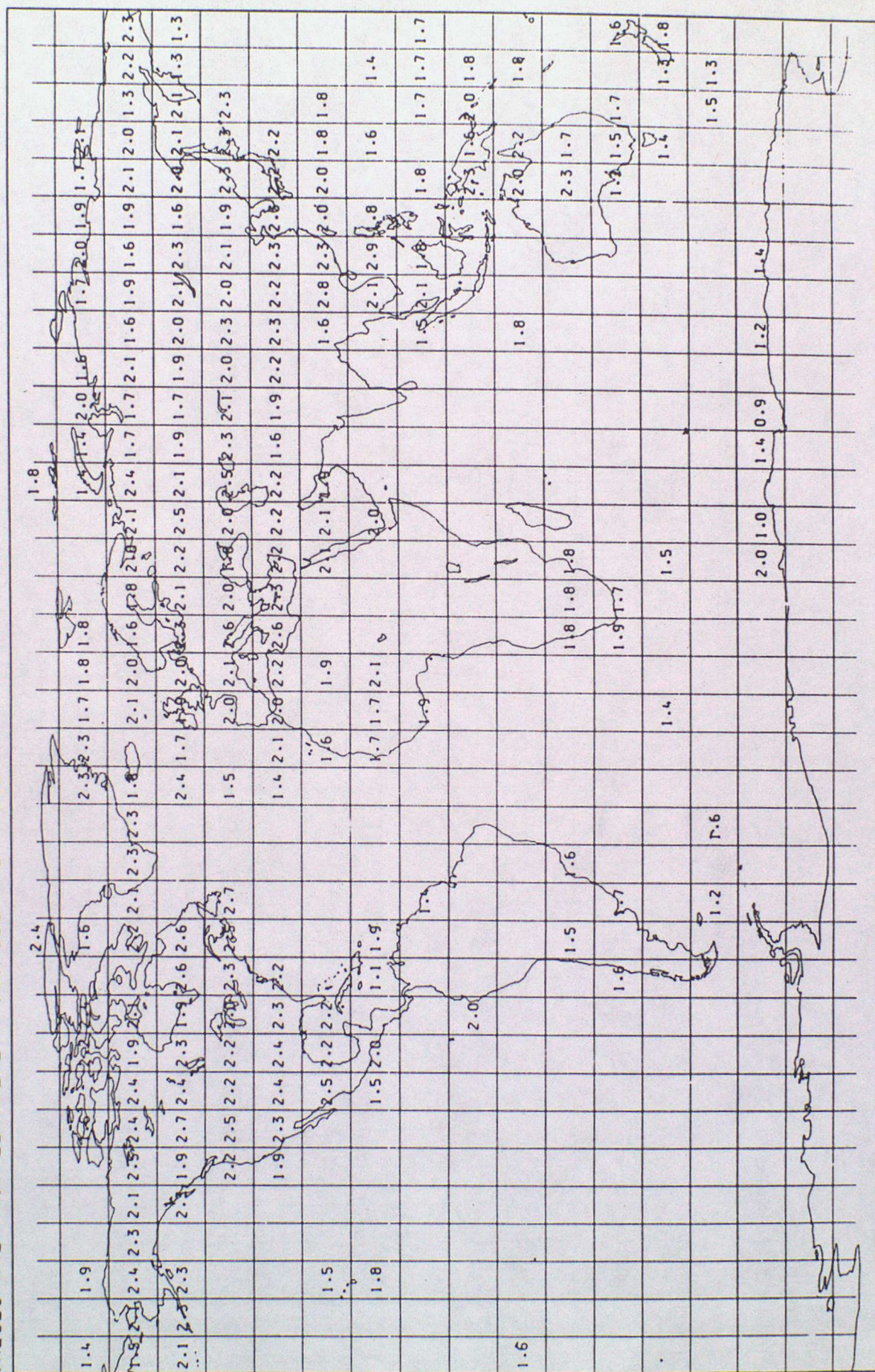
SONDES : 0-8 TEMPERATURE DIFFERENCES (DEG C) 11 TO 100 HPA
 MARCH 1993 - MAY 1993
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE > 100 OBS ARE PRESENT

FIGURE 12



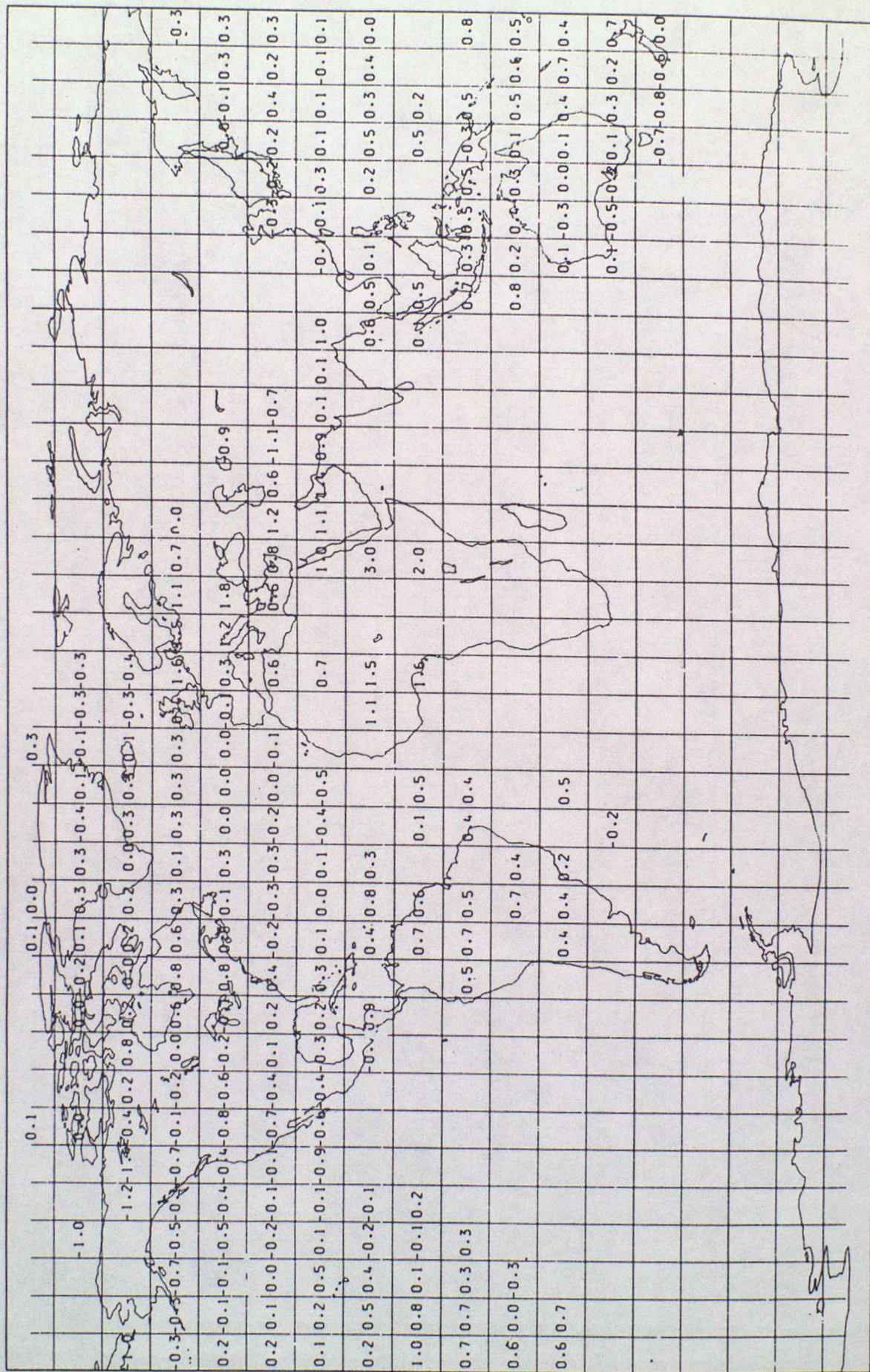
SONDES : RMS 0-8 TEMPERATURE DIFFERENCES (DEG C) 11 TO 100 HPA
 MARCH 1993 - MAY 1993
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE > 100 OBS ARE PRESENT

FIGURE 13



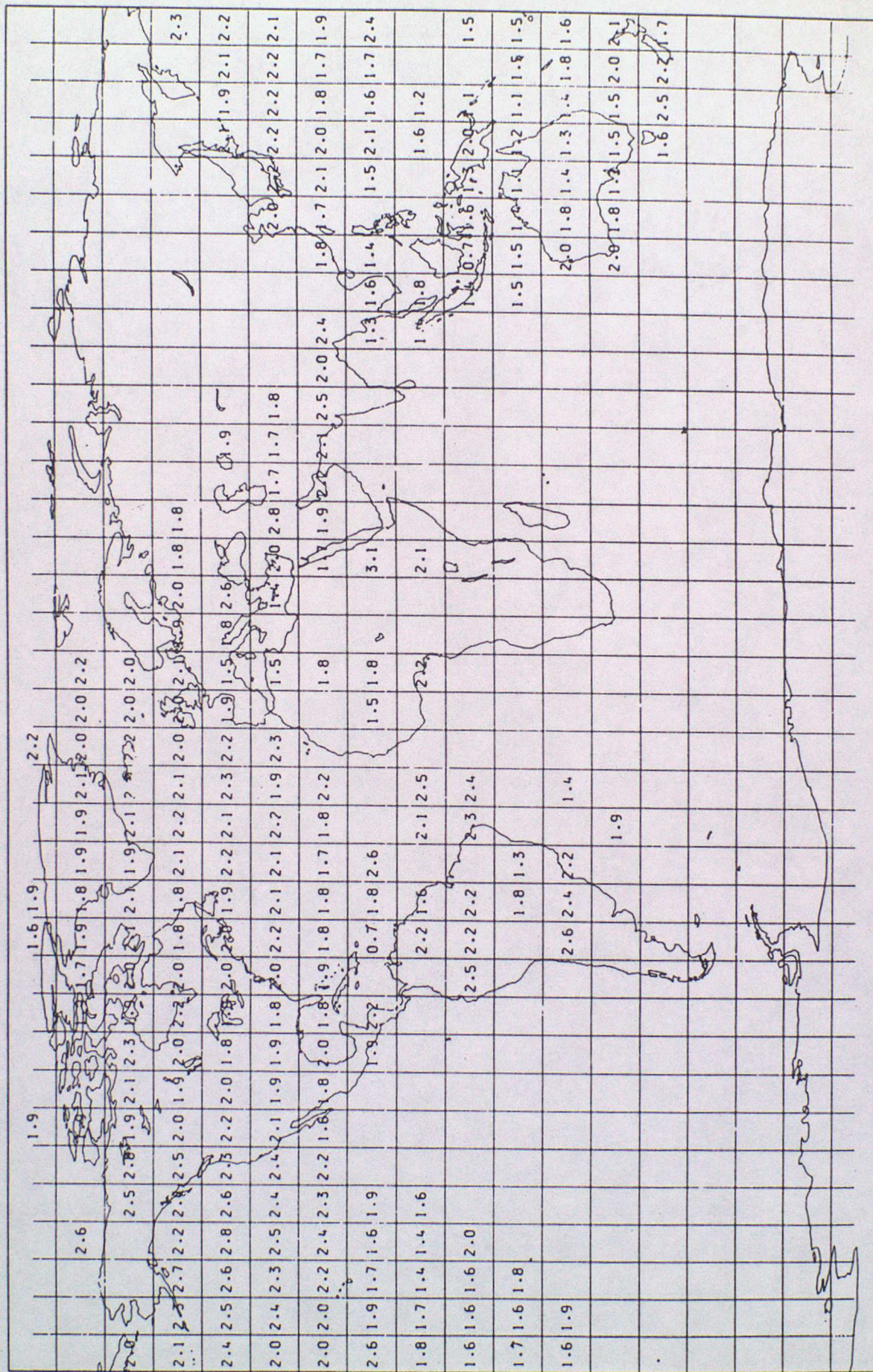
AIREPS & ASDARS : MEAN O-B TEMPERATURES BETWEEN 101 AND 300 HPA
 MARCH 1993 - MAY 1993. UNITS DEG C
 OBSERVATIONS WITH O-B > 10 DEG C EXCLUDED
 VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT

FIGURE 14



AIREPS & ASDARS : RMS 0-B TEMPERATURES BETWEEN 101 AND 300 HPA
 MARCH 1993 - MAY 1993. UNITS DEG C
 OBSERVATIONS WITH 0-B > 10 DEG C EXCLUDED
 VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT

FIGURE 15



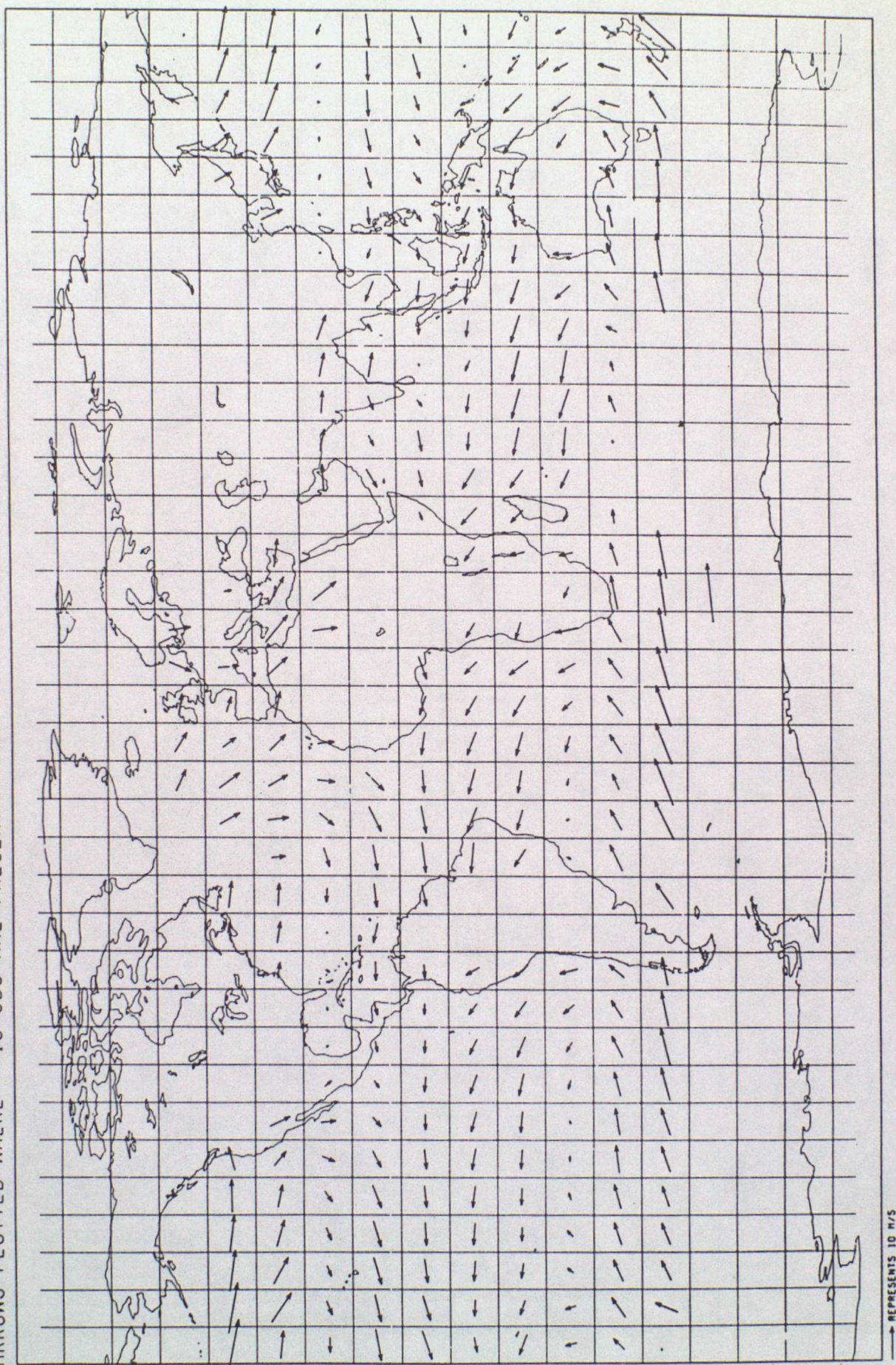
LASS : MEAN O-B TEMPERATURE DIFFERENCES (DEG C) AT 850 HPA
 MARCH 1993 - MAY 1993
 OBSERVATIONS FROM NOAA-11 AND NOAA-12
 VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT

FIGURE 16



SATOB VECTOR MEAN WINDS BETWEEN 701-1000 HPA
MARCH 1993 - MAY 1993
ALL OBSERVATIONS
ARROWS PLOTTED WHERE > 10 OBS ARE PRESENT

FIGURE 19



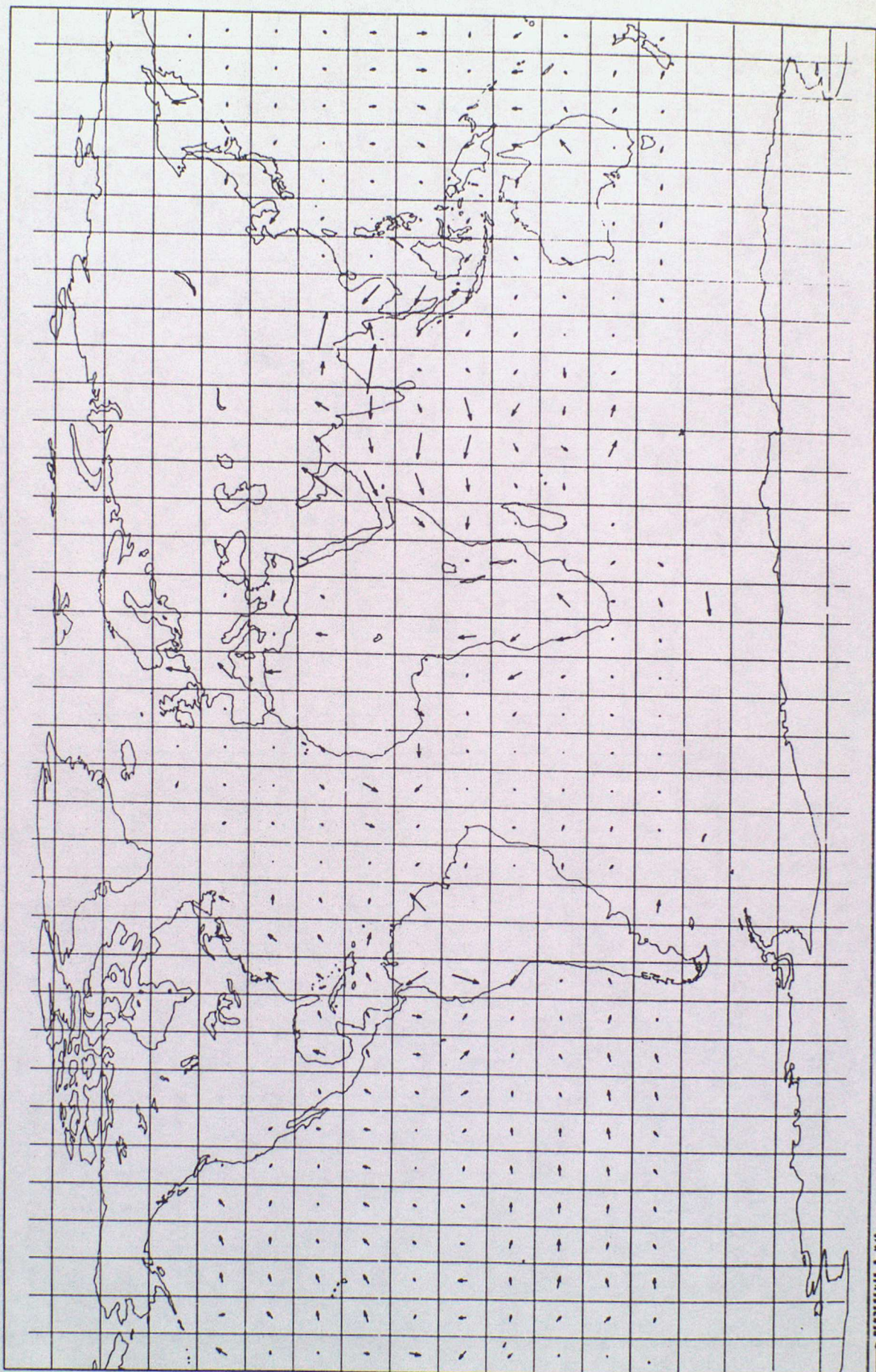
SATOB O-B VECTOR WIND DIFFERENCES BETWEEN 701-1000 HPA

MARCH 1993 - MAY 1993

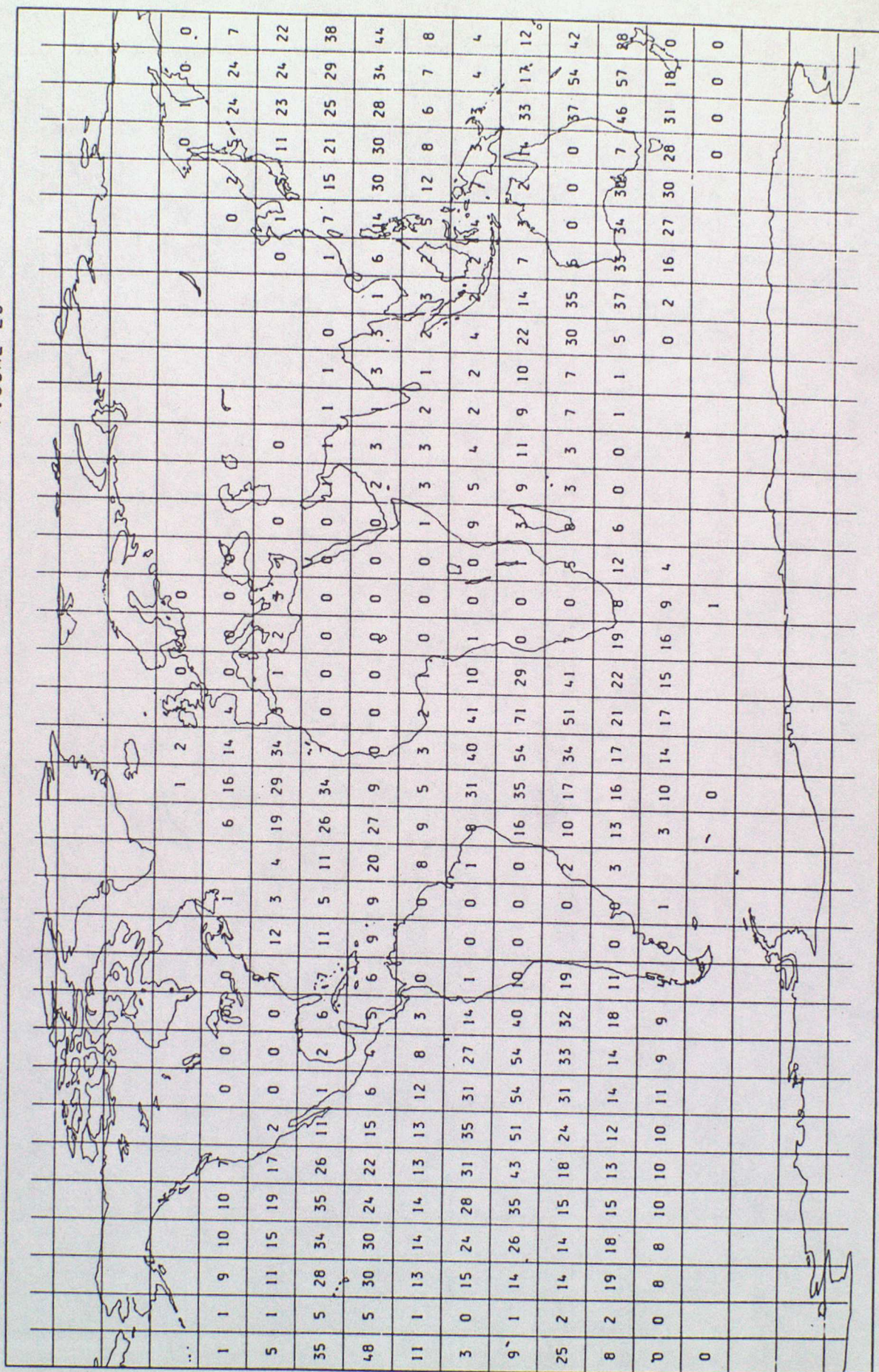
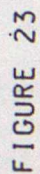
ALL OBSERVATIONS

ARROWS PLOTTED WHERE > 10 OBS ARE PRESENT

FIGURE 20

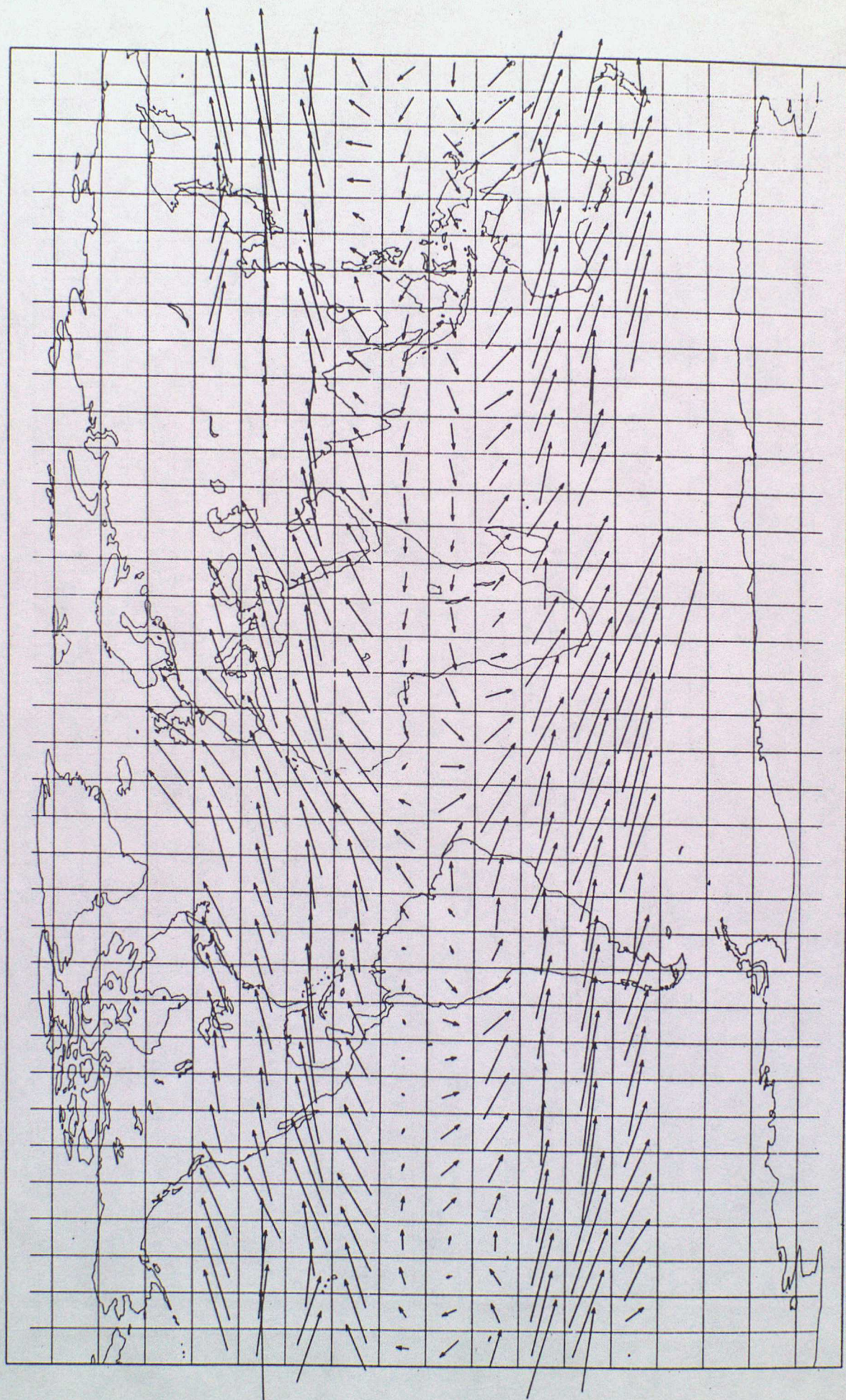


AVERAGE DAILY NUMBER OF SATOB OBSERVATIONS BETWEEN 701 AND 1000 HPA
 MARCH 1993 - MAY 1993



SATOB VECTOR MEAN WINDS BETWEEN 101-400 HPA
MARCH 1993 - MAY 1993
ALL OBSERVATIONS
ARROWS PLOTTED WHERE > 10 OBS ARE PRESENT

FIGURE 24



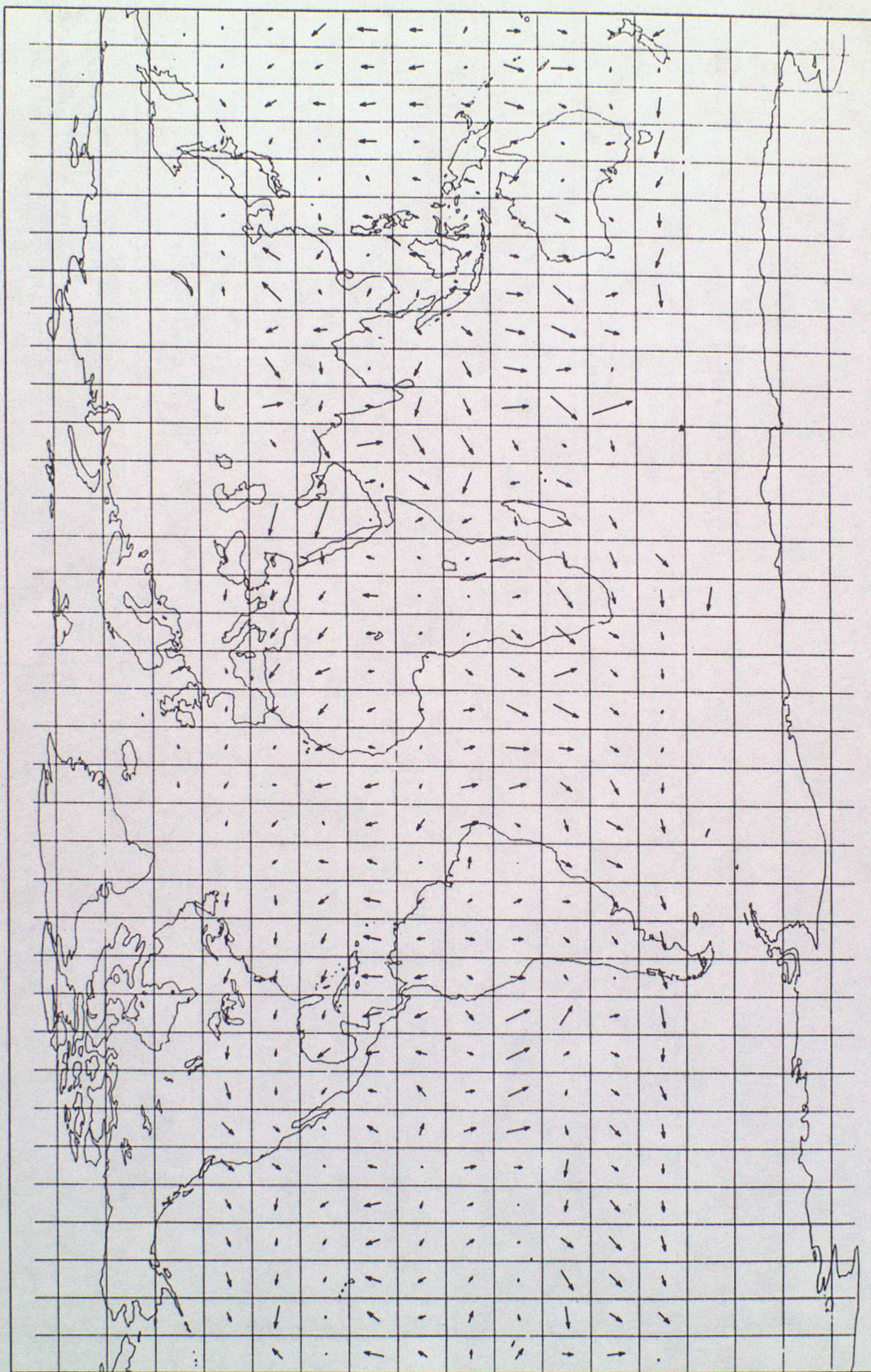
SATOB O-B VECTOR WIND DIFFERENCES BETWEEN 101-400 HPA

MARCH 1993 - MAY 1993

ALL OBSERVATIONS

ARROWS PLOTTED WHERE > 10 OBS ARE PRESENT

FIGURE 25



→ REPRESENTS 5 M/S

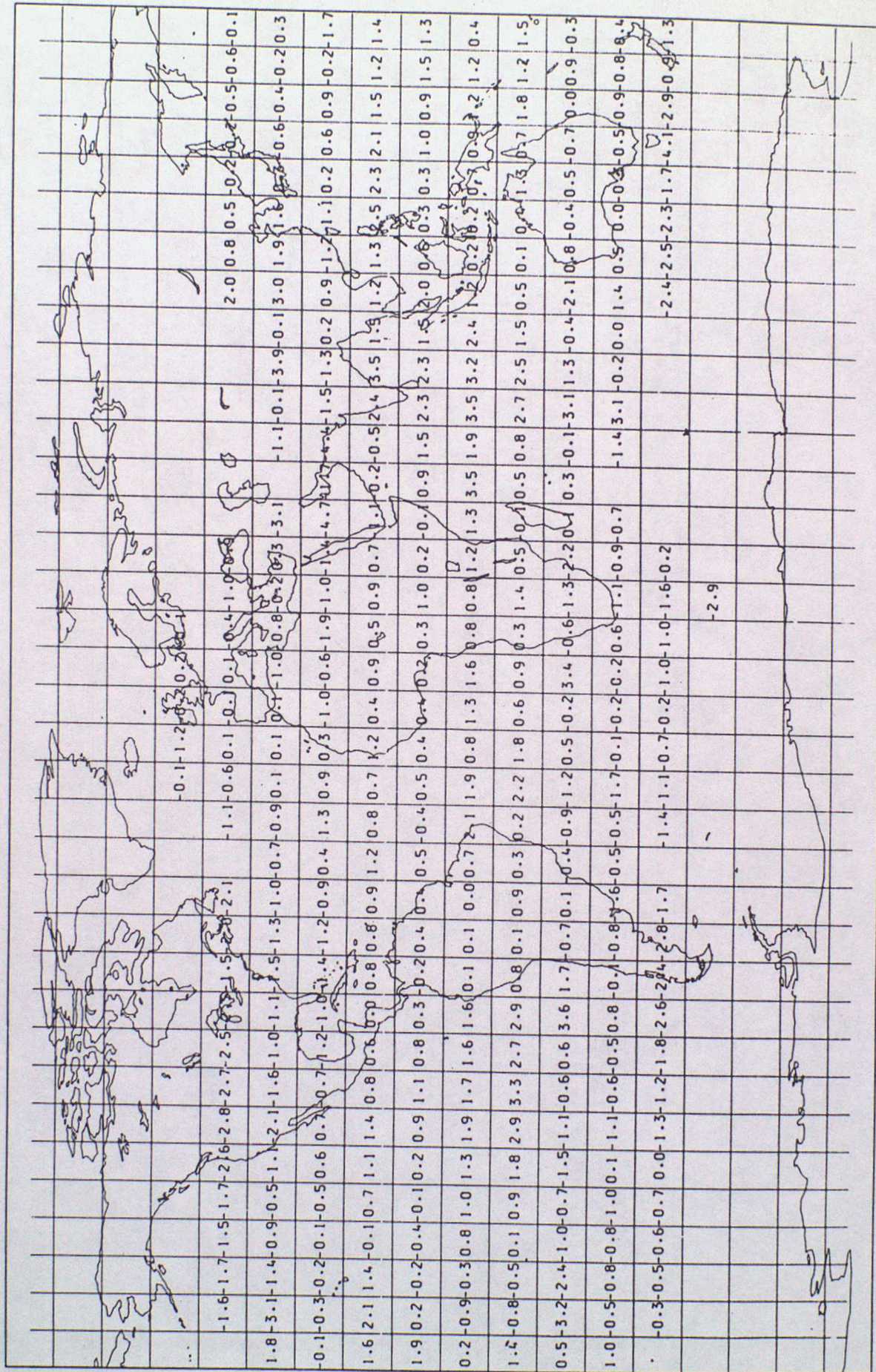
SATOB5 : MEAN O-B SPEED DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA

MARCH 1993 - MAY 1993

USING ALL OBSERVATIONS

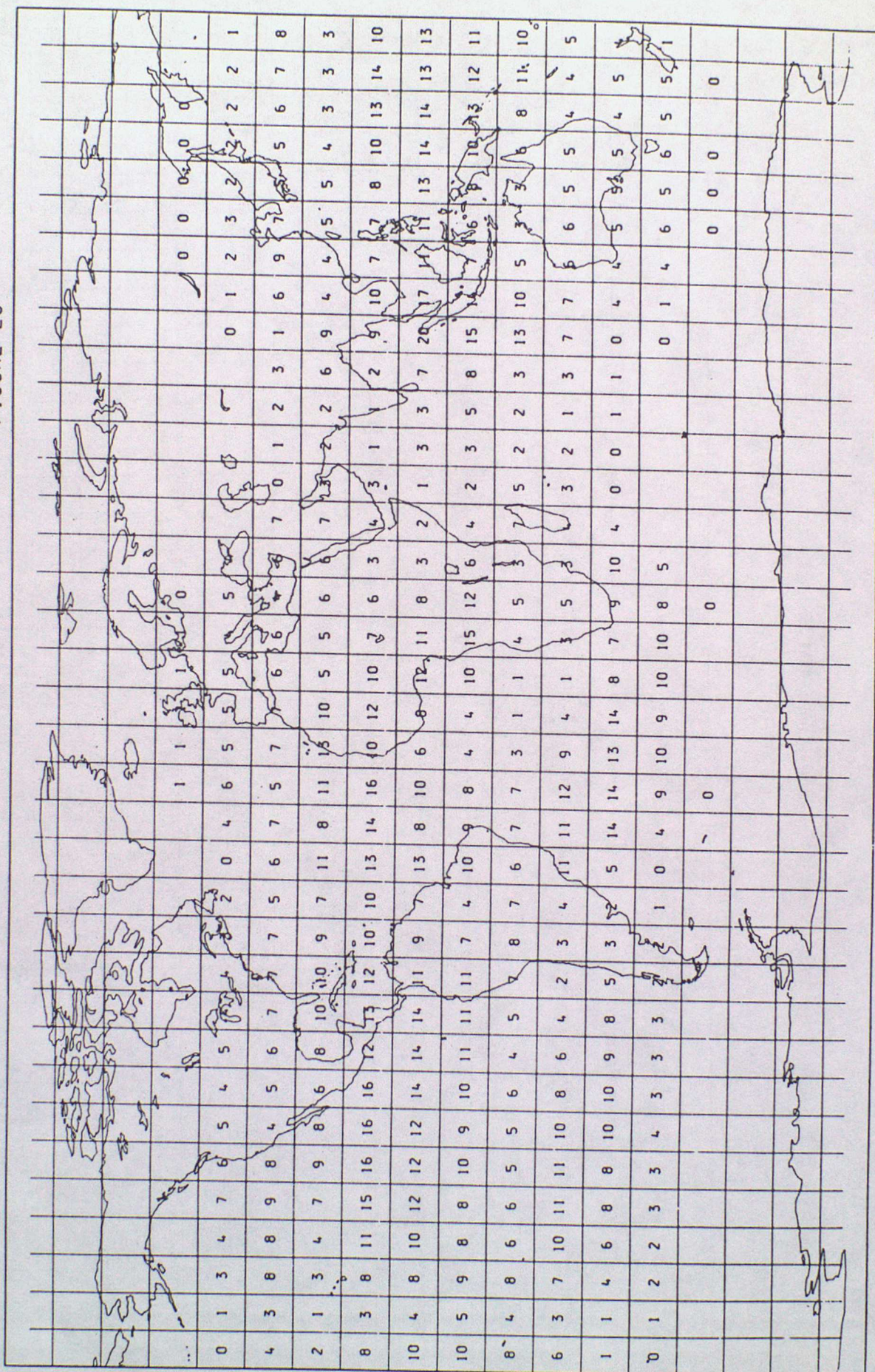
VALUES ARE PRINTED WHERE > 10 OBS ARE PRESENT

FIGURE 26



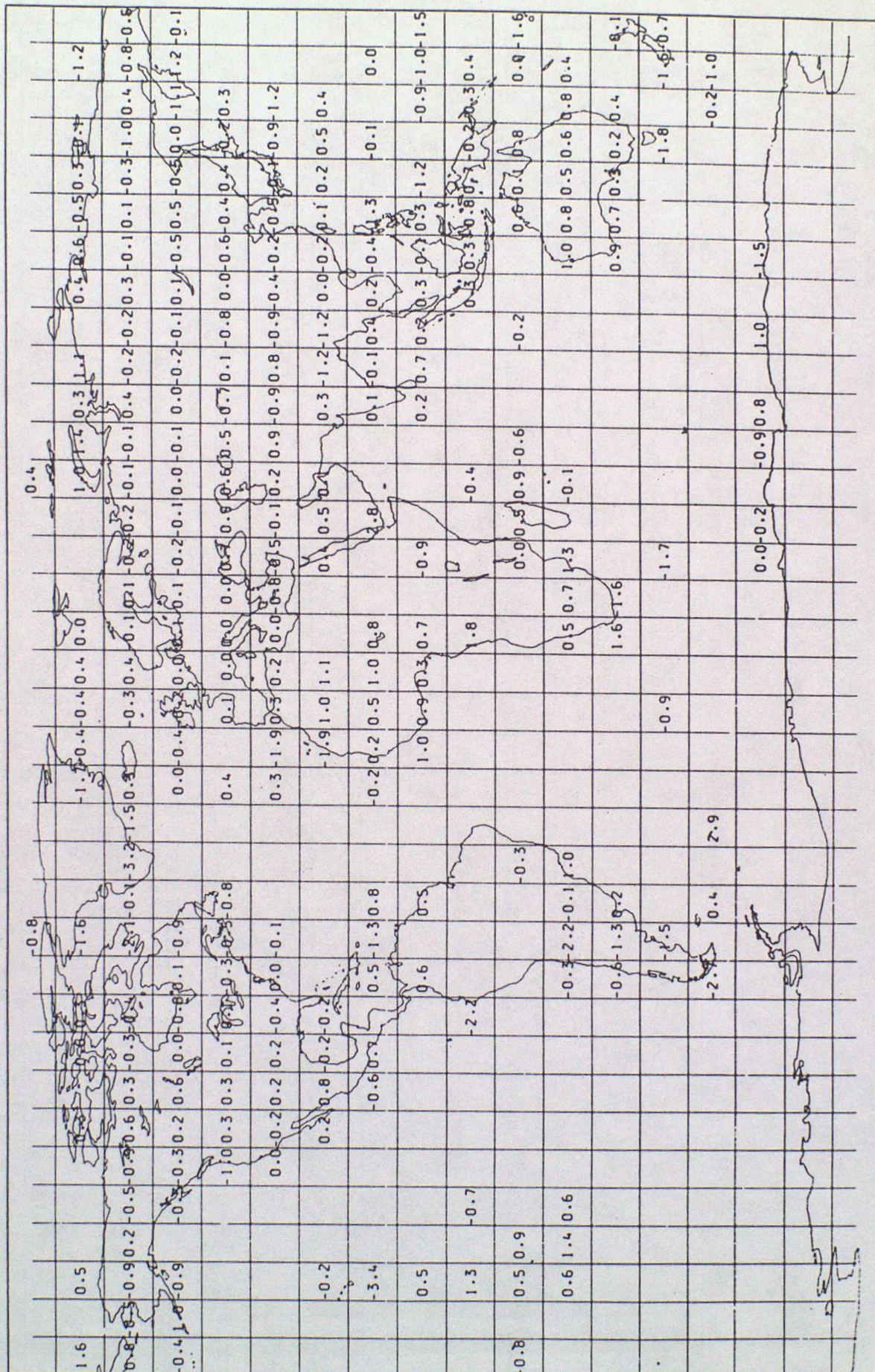
AVERAGE DAILY NUMBER
MARCH 1993 - MAY 1993

FIGURE 28



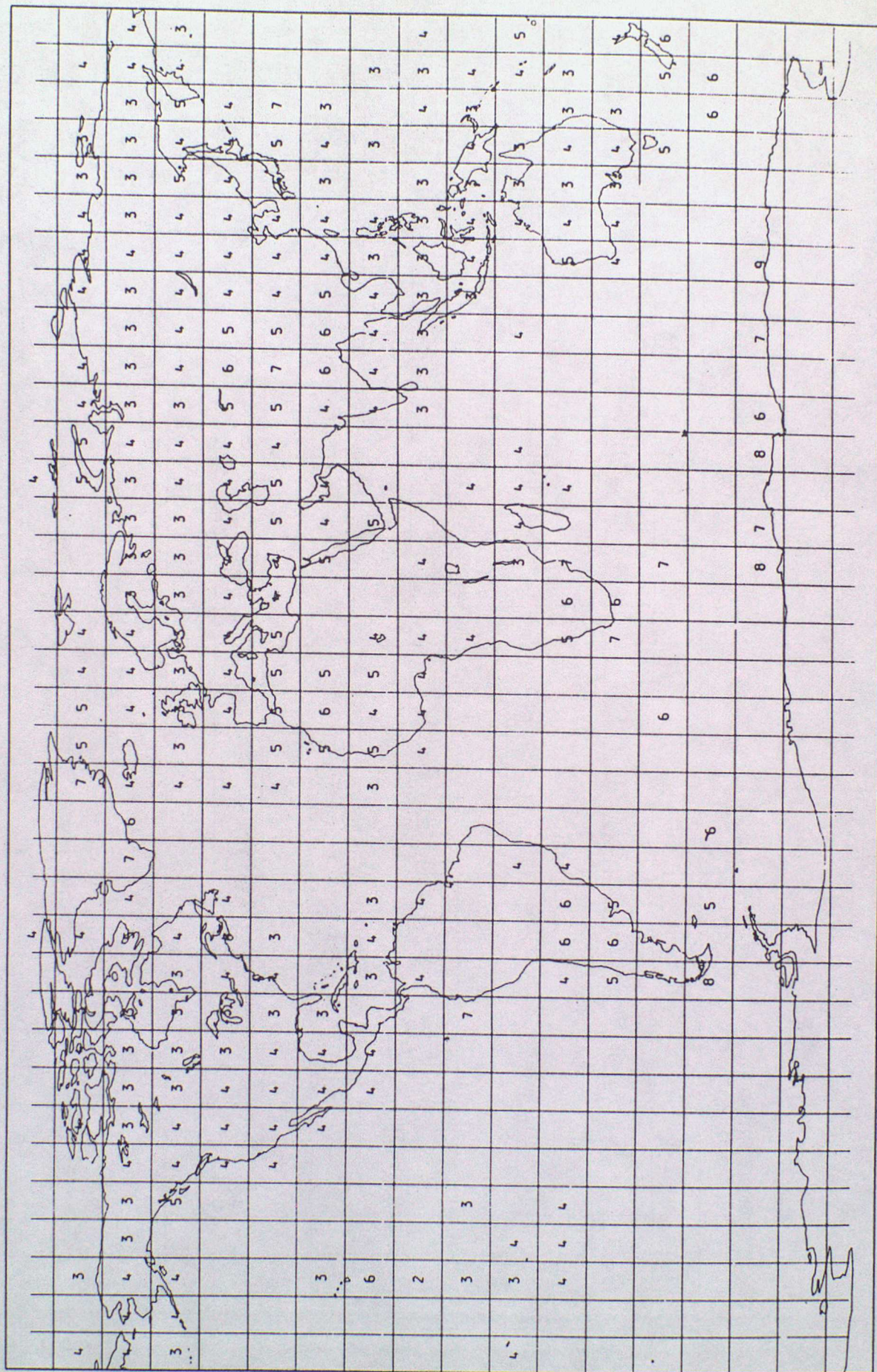
SONDES : 0-B SPEED DIFFERENCES (M/S) BETWEEN 701 AND 1000 HPA
 MARCH 1993 - MAY 1993
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE > 100 OBS ARE PRESENT

FIGURE 29



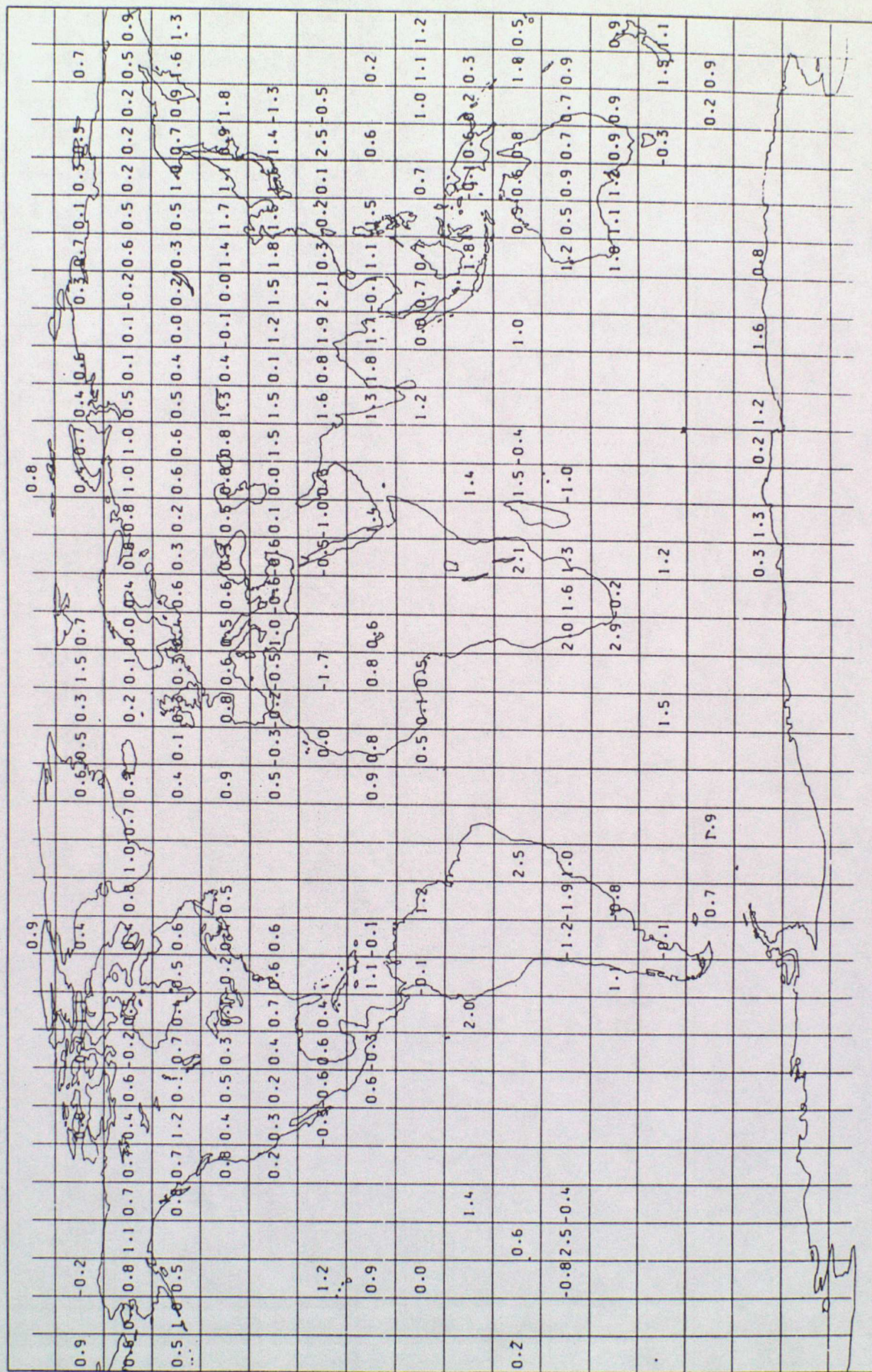
SONDES : RMS O-B VECTOR WIND DIFFERENCES (M/S) BETWEEN 701 AND 1000 HPA
 MARCH 1993 - MAY 1993
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE > 100 OBS ARE PRESENT

FIGURE 30



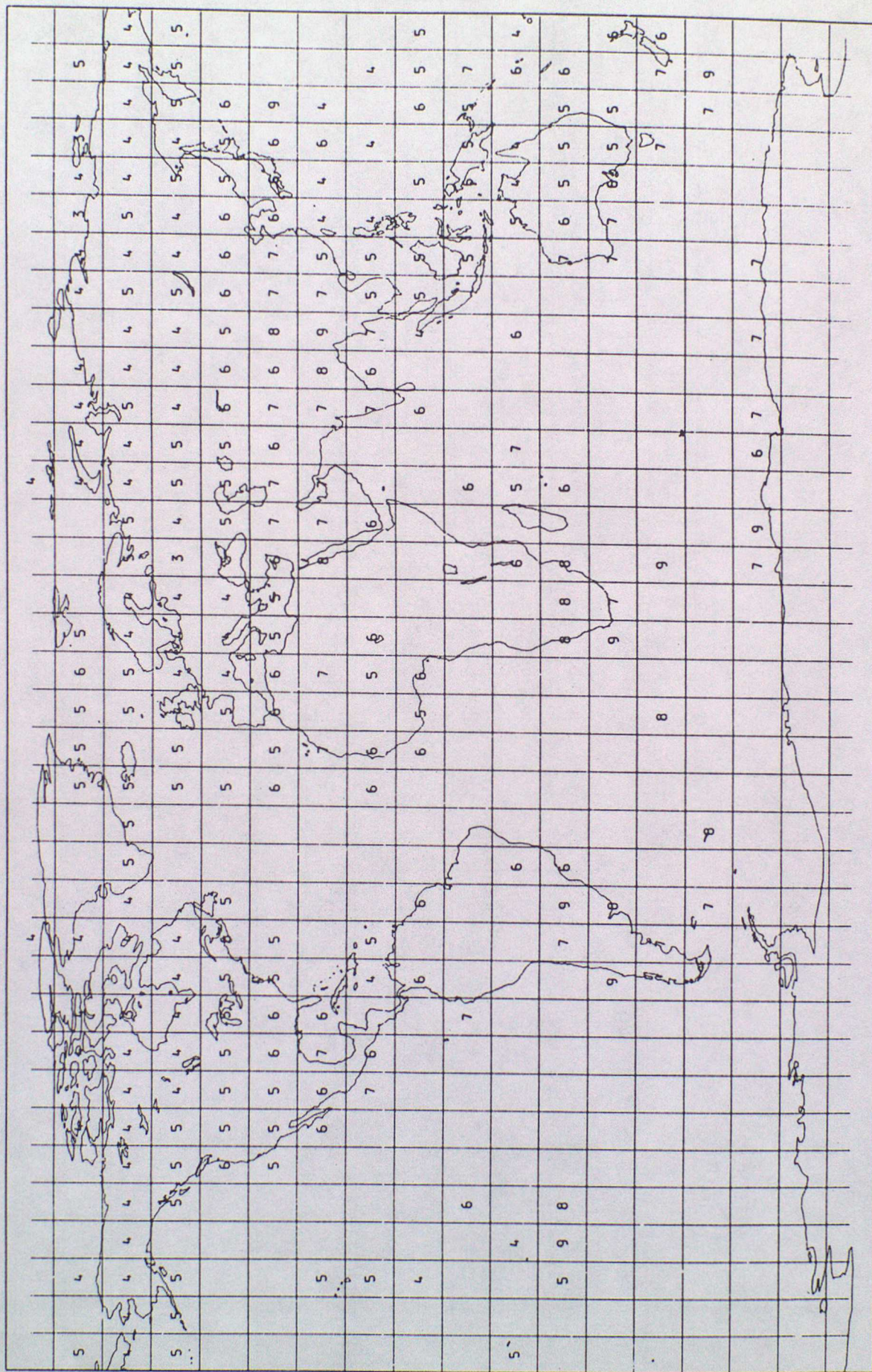
SONDES : 0-8 SPEED DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA
 MARCH 1993 - MAY 1993
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE > 100 OBS ARE PRESENT

FIGURE 31



SONDES : RMS O-B VECTOR WIND DIFFERENCES (M/S) BETWEEN 101 AND 400 HPA
 MARCH 1993 - MAY 1993
 QUALITY CONTROL APPLIED
 VALUES ARE PRINTED WHERE > 100 OBS ARE PRESENT

FIGURE 32

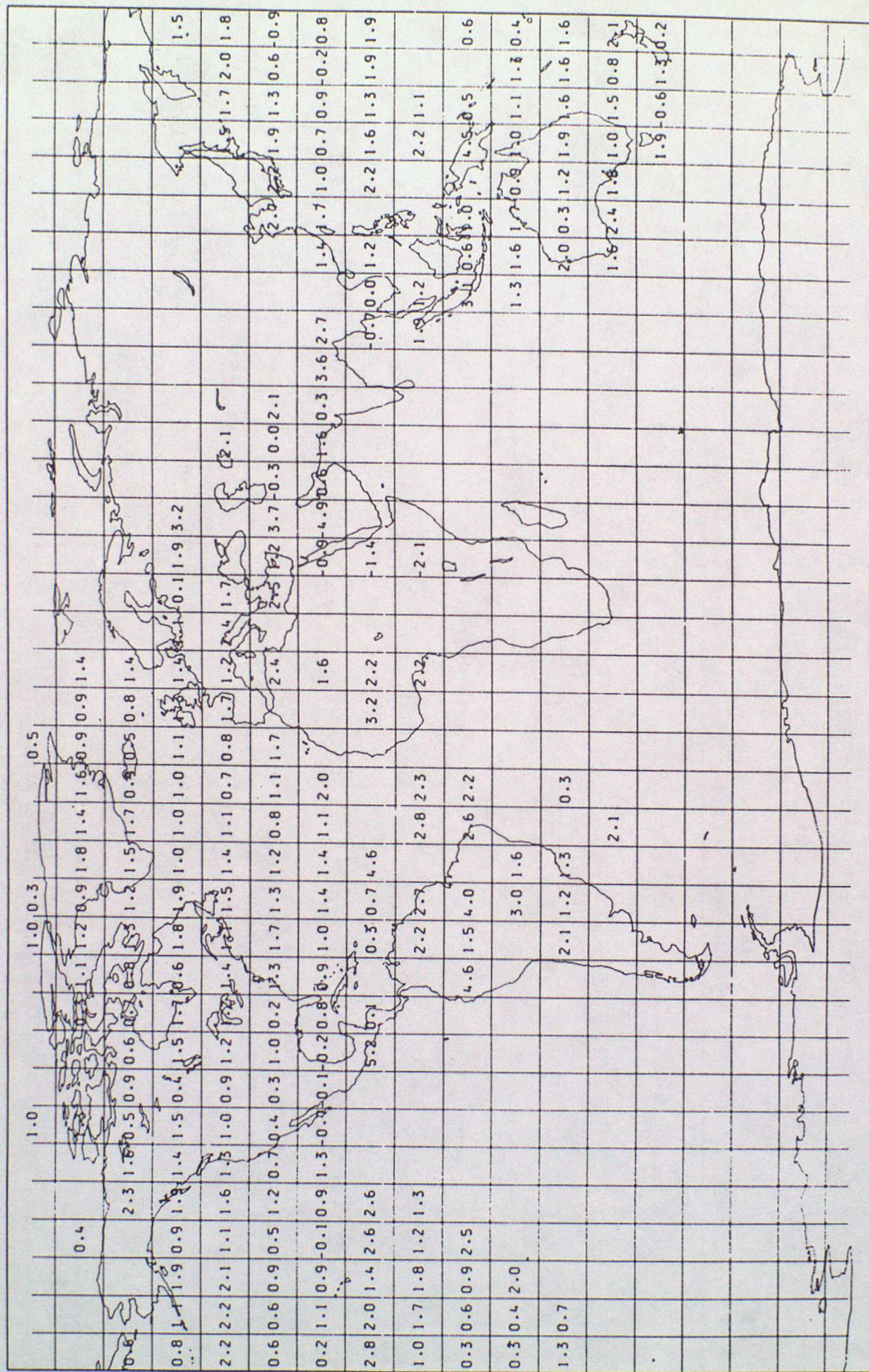


MARCH 1993 - MAY 1993

OBSERVATIONS WITH RMSVW DIFFERENCE > 60 MPS EXCLUDED

VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT

FIGURE 33



MARCH 1993 - MAY 1993

OBSERVATIONS WITH RMSVW DIFFERENCE > 60 MPS EXCLUDED

VALUES ARE PRINTED WHERE > 30 OBS ARE PRESENT

FIGURE 34

