TECHNICAL MEMORANDUM

171

Report on the pilot study to establish the value of information exchange between ECMWF and national focal points for radiosonde systems

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REPORT ON THE PILOT STUDY TO ESTABLISH THE VALUE OF INFORMATION EXCHANGE BETWEEN ECMWF AND NATIONAL FOCAL POINTS FOR RADIOSONDE SYSTEMS

31 October 1988 - 31 December 1989

1. INTRODUCTION

At its 40th session in June 1988 the Executive Council of WMO approved a recommendation of the 9th session of the CBS concerning a pilot study to improve the performance of the global radiosonde network. It had been considered by CBS-IX that information on apparent deficiencies in the performance of their radiosonde stations would assist system managers to achieve optimum performance, and in return that up-to-date information on the characteristics of systems in use and operational schedules would assist monitoring centres to better assess the quality of data being received. Thus CBS-IX recommended that a pilot study be set up, for a period of one year from October 1988, and direct contact be established between ECMWF and national focal points nominated by participating WMO Members.

The next paragraph explains how the pilot study was initiated. Then the way in which the information exchange took place is described, followed by a presentation of the results.

2. INITIATION OF THE STUDY

To initiate the study, letters were sent to 125 Members of WMO operating radiosonde or pilot (non optical) stations, inviting them to participate and to nominate a national focal point for the study. A technical questionnaire about equipment and operating procedures to be filled in by the focal points for each radiosonde station was attached to these letters, and also a complete example of the monitoring information which would be provided every month.

This monitoring information is based on statistics of the deviations of the observed values from the ECMWF first-guess field (6-hour forecast), taking into account that, although the quality of the first-guess field is of a generally high standard, it will vary in accuracy depending on the density and quality of data available to the preceding analyses. Similar results provided by other NWP centres can also be used for comparison. More details are given in papers by Hollingsworth et al (1986), Radford (1987), Strauss (1989).

Replies were received from 63 Members, 58 of which agreed to participate, operating 650 stations. This represents roughly 80% of the global network of radiosonde stations. The Table 1 gives the list of the participating countries. The chart figure 1 shows the spatial distribution of the stations belonging to the participating countries. It is important to note that in many cases the reply was received only several months after the

	57957
	58238
	58367
	58424
	59758
Pakistan	41780
Rep. of Korea	47185
Romania	15480
Turkey	17352
USSR	UMFW
	38062
	89592

The numbers of events are 15 for wind and 23 for geopotential height, to be compared to the total numbers detected by the ECMWF system for the global observing network during the whole period of the study, 47 and 60 respectively. In addition, two problems apparently due to incorrect transmission practices were notified, for ships FNPH (France) and DKQP (FRG).

3.3 Termination of the study

The study was terminated in January 1990 when the monitoring results for December 1989 were sent; in addition to these results, each final letter included a summary of the existing quality problems, if any. The focal points were thanked for their participation, and ECMWF proposed to continue with notifications about changes in operational performances for those who were interested.

4. RESULTS

The results of the pilot study can be arranged into four categories:

(i) several noticeable data quality problems have been corrected after provision of relevant information by ECMWF to the national focal point;

(ii) a better understanding of the performance of the ECMWF monitoring system has been gained, through information provided by focal points about particular features in the monitoring results for their stations;

(iii) up-to-date information has been acquired about the equipment and procedures in use at 650 upper-air observing stations. In a first stage, this information was used to correct a number of errors in the WMO master list of stations, and to check the value of the height used by TEMP SHIPs to report surface pressure; in addition, it is also being used for a study on improved criteria for the automatic detection of suspect stations, to be proposed to the NWP centres participating in the regular exchange of monitoring results recommended by CBS-ext (1985);

(iv) effective contacts have been established with a number of national focal points. They have continued since the end of the study, and regularly result in the correction of new data quality problems.

Details are given below for each of these four categories.

4.1 Correction of significant data quality problems

During the pilot study significant improvements were achieved at several stations, either for wind or for geopotential measurements, after the corresponding problems had been pointed out to the focal points. It would be interesting to assess the number of corrections which would not have been done without the pilot study; however this cannot be done precisely because in most cases the focal points did not inform ECMWF of the actions taken by them afterwards.

4.1.1 Correction of systematic errors on wind direction

On average the accuracy of the wind direction predicted by the first-guess is very good, better than 10 degrees in the mid troposphere. This is true especially in the mid-latitudes but even in most of the tropical belt. Therefore, errors in the reference direction are well detected, and many of such errors were notified. Figure 2 shows an example for station 24959, USSR. For this station an error was introduced in April 1989, i.e. before USSR participated in the study; it was pointed out to the focal point in September 1989, and corrected soon after.

37260 (fig 3) is one of the cases for which the focal point notified ECMWF that a corrective action had been taken. The trend shown in figure 3 may not look impressive; however, it must be remembered that this station is located on the east coast of the Black Sea very close to the Caucasus, i.e. in an area where the first-guess is less reliable. This is a typical example of a case where no firm conclusion could have been drawn from the monitoring results on their own without communication with the data producer.

A total of 7 such errors were corrected during or after the study: 24959 and 37260 already mentioned, and 27037, 29282, 34880, 35746 and 38457 (fig 4). For 29282 (fig 4.b) there has been a small error of about 10 degrees left after corrective action was taken in September or October 1989.

4.1.2 Correction of systematic errors on geopotential height

A number of stations report low level geopotential heights systematically biased against the first-guess; this is often due to the use of an erroneous altitude during the processing of the data.

Figure 5 illustrates the case of 96315, Brunei. The ECMWF monitoring system detected a change to the station height on 26 September 1989, which apparently was not taken into account in the coding of the TEMP reports (cf the mean bias for October 1989). The focal point confirmed that a move to a new building took place on 26 September, and later on the error was corrected.

The same problem of systematic bias near the surface occurs at several stations in China but no additional information was obtained during the study.

4.1.3 Correction of other types of errors

This category includes calibration errors for height measurements, and all sorts of random errors, generally due to incorrect ground procedures.

78954 and 26063 are examples of such problems. For 78954, Barbados (fig 6), the focal point informed ECMWF afterwards that a new equipment installed at the end of January 1989 could not be calibrated until the end of March because of a sick leave of the technician. The problem at 26063, USSR, in January and February 1990 (fig 7) was due to a deficiency of the radar used to measure the altitude of the sonde.

Several other corrections were obtained during the study or after its termination, but details were seldom given by the focal points. They are:

- for wind: 16754 (Greece), FNOR (France)
- for height: 24641, 24944, 26422, 35229, 37018, 38062, 38507 (USSR).

Figure 8 shows annual trends for these stations; it should be noted that the assessment of the quality problems was not only based on these curves but also on many other pieces of information not shown in this report, particularly the comparison with neighbouring stations.

Finally, the erroneous practices mentioned under 3.2 about data transmission from ships FNPH and DKQP were also corrected.

Overall a total of 21 quality problems have been corrected since the beginning of the pilot study (15 of them before the "normal" end of the study, 6 after). This includes 8 cases out of the 38 listed table 2.

4.2 Better assessment of the monitoring information

On some occasions the exchange of information helped to explain unusual features in the monitoring results which could not be understood otherwise. Two examples are given below:

4.2.1 Valentia, 03953

The focal point for Ireland, Officer-in-Charge at Valentia Observatory, noticed a discontinuity in the series of monthly mean departures (bias) for geopotential height at 12 UTC at its station for the month of September 1988 (fig 9). The magnitude of this discontinuity was small, less than 40 metres at 100 Hpa, so it would generally have passed unnoticed. However, the focal point investigated the question further and found that Vaisala RS 12-21C sondes coming from old reserve supplies were flown for most of the 12 UTC ascents during September 1988, instead of RS 80-15 as usual.

It is worth noting that, in spite of the position of Valentia downwind of a data sparse area, the monitoring system reacted quite accurately to a relatively minor modification.

4.2.2 Singapore, 48698

The focal point for Singapore noticed a slight negative geopotential bias at 12 UTC in the low troposphere (figure 10). Again the magnitude of this bias was very small, about 10 metres, but it was systematic, only at 12 UTC, and not present at neighbouring stations. The explanation proposed by the focal point was that because of local operational requirements, the second radiosonde ascent at Singapore is made at 10 UTC instead of 12 UTC. This means releases are made when surface temperatures and pressures are on average about 2 deg. higher and 1 hpa lower respectively.

These two examples show the wealth of information potentially available from the systematic comparison between observations and analysis or short range forecasts. However, they also show the need for a close communication between the data monitoring people and radiosonde operators well aware of the local characteristics of their stations. During the study, similar questions arose about peculiarities in monitoring results, for example about wind measurements from stations in the Pacific which are potentially very valuable for data assimilation; unfortunately contacts with the station operators (i.e. to provide them with detailed information and to get their feed-back) proved difficult and no satisfactory explanation could be found.

4.3 Utilisation of the information given by the questionnaires

With only one exception, all the national focal points provided ECMWF with completed questionnaires about the equipment and ground procedures at the stations within their responsibility, as shown in Annex 1. The information contained in these questionnaires has been stored in a computerized data base; an example of output from this data base is given in Annex 2. The two main applications of this data base so far are described below.

4.3.1 Corrections to the WMO master list of stations

The information on the position and altitude of the stations was compared to the list given in the WMO Handbook Volume A. Significant differences were found for about 90 stations. They are indicated in Annex 3 together with the altitude values given by the results of the ECMWF monitoring, which is based on a check of the consistency between the reported surface pressure and the geopotential heights at the lowest mandatory levels. In 4 cases, the focal point was actually led to correct the value given in the questionnaire, because he was not aware of a change which had occurred at the station and had been detected at ECMWF.

It should be noted that the list in Annex 3 is neither exhaustive nor up-to-date; it is representative of the time when the questionnaires were received, i.e. mid-1989. Problems with changing height happen regularly (cf 4.1.2 above), so that the list of station heights used at ECMWF for data assimilation is updated every six months (in addition to the regular update of the WMO Master list).

4.3.2 Improvement to the automatic detection of "suspect" stations

In conjunction with results of the WMO International Radiosonde Intercomparison Experiments, the information on the sonde types is being used for a study on improved criteria for the automatic detection of suspect stations, to be proposed to the NWP centres participating in the regular exchange of monitoring results recommended by CBS in 1985. The importance of taking the sonde type into account when assessing the quality of the data has been demonstrated many times, especially in the context of the WMO/CIMO Intercomparison Experiments (cf for example Kitchen, 1989, who makes interesting suggestions for the detection of suspect height data at 100 Hpa).

Figure 11 shows the distribution of departures from first-guess at 5 levels for 11 sonde types used at the participating stations. The panels on the left are for nighttime, on the right for daytime (defined as solar elevation above 10 degrees). The statistics are for the last month of the study, December 1989 (which is roughly 6 to 9 months after most of the questionnaires were sent). The Antarctic area has been excluded from these statistics. For most of the sondes, the shape of the distribution is regular and almost gaussian.

For each panel figure 11 the mean and standard deviations of the distributions are indicated (gross errors excluded; note that tidal effects are not taken into consideration). The values at 100 Hpa are listed in tables 3 and 4 below:

Table 3 : Mean bias at 100 Hpa (metres)

Sonde type		Number of stations	Night	Day
AVK MRZ-3A		53	-15.5	-7.3
Dr Graw, RSG		5	-26.5	-20.3
GZZ2-05		74	21.9	17.1
Jinyang 1524-511		3	-33.9	-9.5
Meteorit MARZ		65	5.2	29.4
Malahit A-22		10	-9.9	
Mesei/Oki RS2-80		20	-19.3	-9.5
Mesural		15	-28.5	-0.8
UK RS3		12	-50.6	-40.2
Vaisala	north of 60S	120	3.4	-0.2
	Europe	29	4.6	5.3
	Australia	27	1.1	-6.4
VIZ (Valcom)		29	-20.9	

Table 4 : Standard deviation at 100 hPa (metres)

Sonde type		Number of stations	Night	Day
AVK MRZ-3A		53	35.8	32.2
Dr Graw, RSG		5	19.3	19.9
GZZ2-05		74	39.3	37.5
Jinyang 1524-511		3	26.3	30.4
Meteorit MARZ		65	39.2	43.9
Malahit A-22		10	64.0	
Mesei/Oki RS2-80		20	20.1	21.8
Mesural		15	46.3	42.1
UK RS3		12	15.6	23.4
Vaisala	north of 60S	120	29.6	27.5
	Europe	29	27.2	28.9
	Australia	27	25.3	20.8
VIZ (Valcom)		29	23.8	

(no daytime data available in December for the participating stations operating Malahit sondes and VIZ sondes).

These two tables are not meant to give a complete picture of the sonde types performance and to substitute for the results of the WMO International Radiosonde Intercomparison experiments. Instead, they complement these results by estimating the data characteristics in a fully operational environment, as seen from a global NWP centre.

The differences between the different sonde types in tables 3 and 4 are striking; the largest values are certainly not found for sondes used in areas where the quality of the first-guess is relatively poor. This proves again how important it is that the sonde types be known by the data users. Eventually, this should be achieved through the use of the BUFR code. However, until it can be done it would be worthwhile that the WWW procedures be modified to take this requirement into account.

4.4 Contact with the focal points

The pilot study required a significant endeavour from the participating focal points. At the beginning, the task of filling in the questionnaires was far from negligible, and it was much appreciated that practically all the focal points supplied them within a short time. Then during the course of the study, a real exchange of information was achieved with many of the focal points as described above. Still now ECMWF continues to send monitoring information every month to certain countries, and this has already resulted in the correction of new problems at 6 more stations (cf 4.1.1).

However, the contacts established with the focal points were not always satisfactory. In several cases the exchange of information was limited to the mailing of questionnaires and monthly profiles. Overall, the exchange was productive for about 20 focal points. Out of the remaining 38, 32 belonged to countries operating stations of normal quality, so this was not really causing concern; but with 6 countries who presented serious quality problems, either no feed-back at all was received, or a reply was received but with no additional information and apparently no following up. It does seem that in several of these cases a result could have been achieved if the communication with the focal point had been closer. In this respect, it might be useful to organise technical workshops, preferably at a regional scale, to promote personal contacts between the various people involved.

5. CONCLUSION

The aim of the pilot study was to test the efficiency of information exchange between data producers and monitoring centres to improve the performance of the global radiosonde network. After a rather lengthy start-up phase, 58 countries formally agreed to participate in the study, and an effective and useful exchange took place with about 20 national focal points.

So far the pilot study has resulted in the correction of systematic errors at 21 radiosonde stations. Therefore the usefulness of this information exchange has undoubtedly been demonstrated; as a by-effect, it has also been confirmed that the overall efficiency of this sort of exercise is directly related to the time and effort spent on it.

Two types of action should now be pursued. Firstly, for its own benefit and in its rôle of lead centre for radiosonde monitoring designated by WMO, ECMWF will continue to communicate with the station operators to the maximum possible extent. Then more generally, practical ways of extending and enhancing further the relationships between data producers and data monitoring people should be considered within the meteorological community.

Acknowledgements

The contribution of A.M. Radford to the realisation of the pilot study is gratefully acknowledged.

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PILOT STUDY — Stations Participating

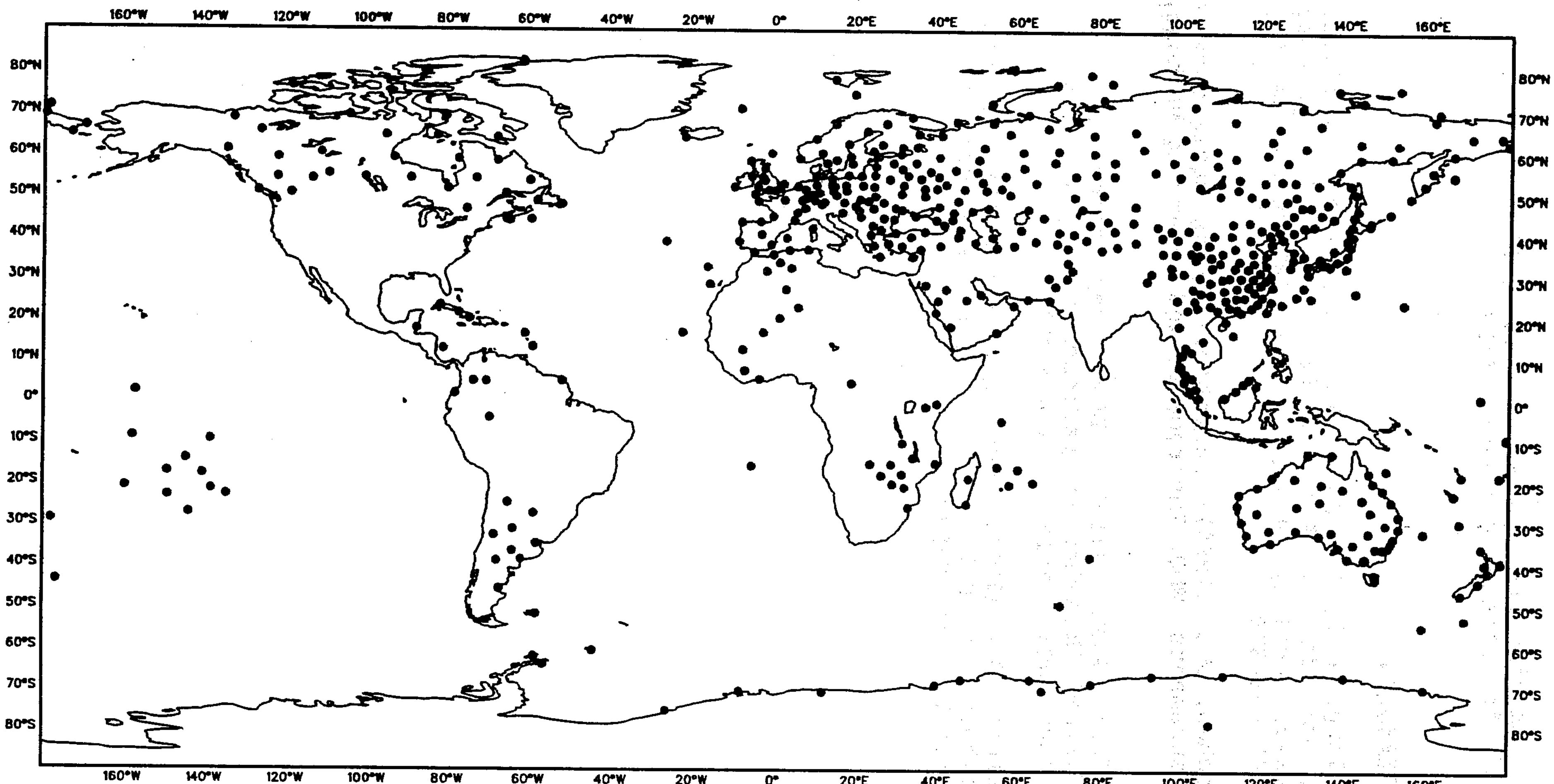


Fig. 1 Stations participating in the pilot study

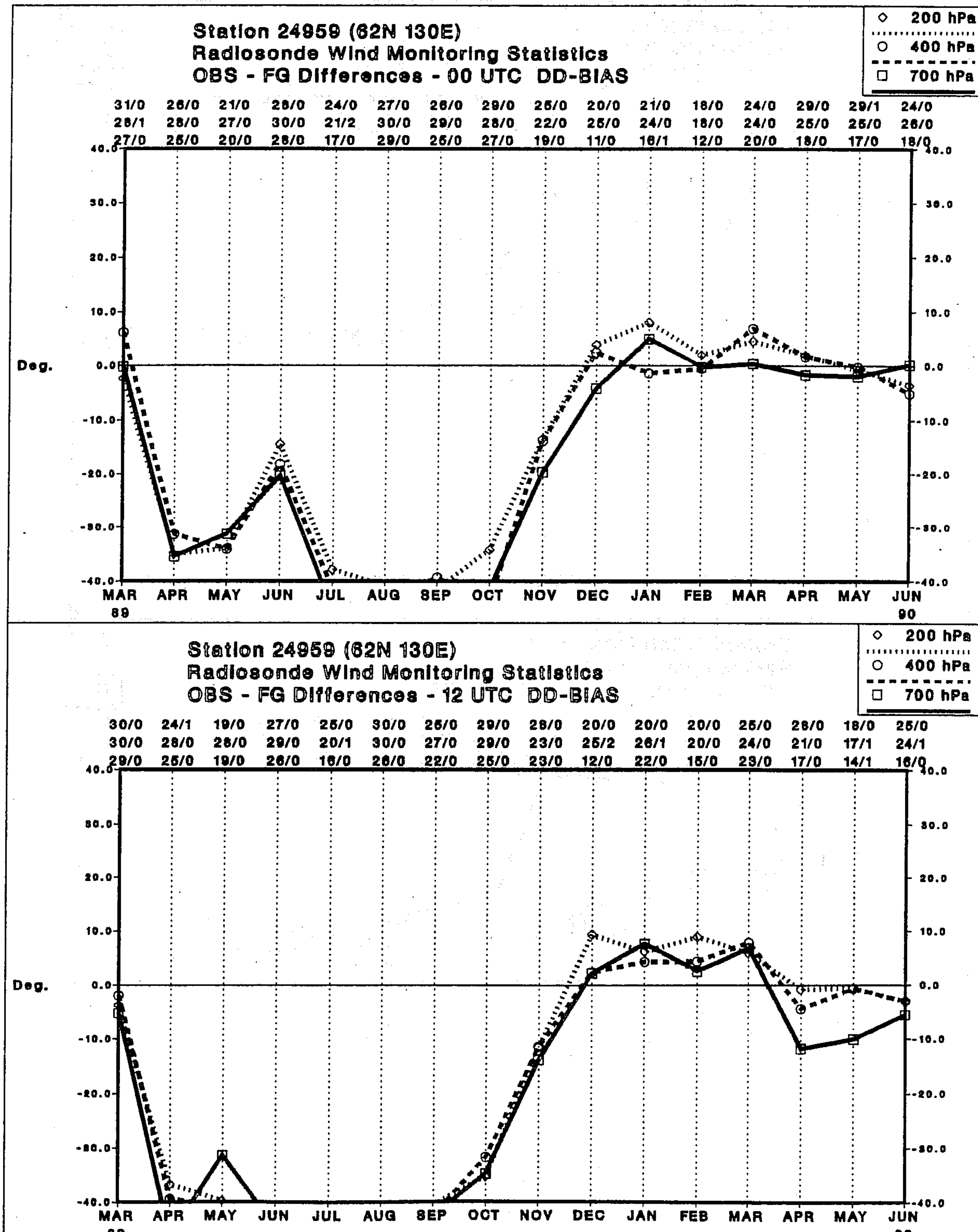
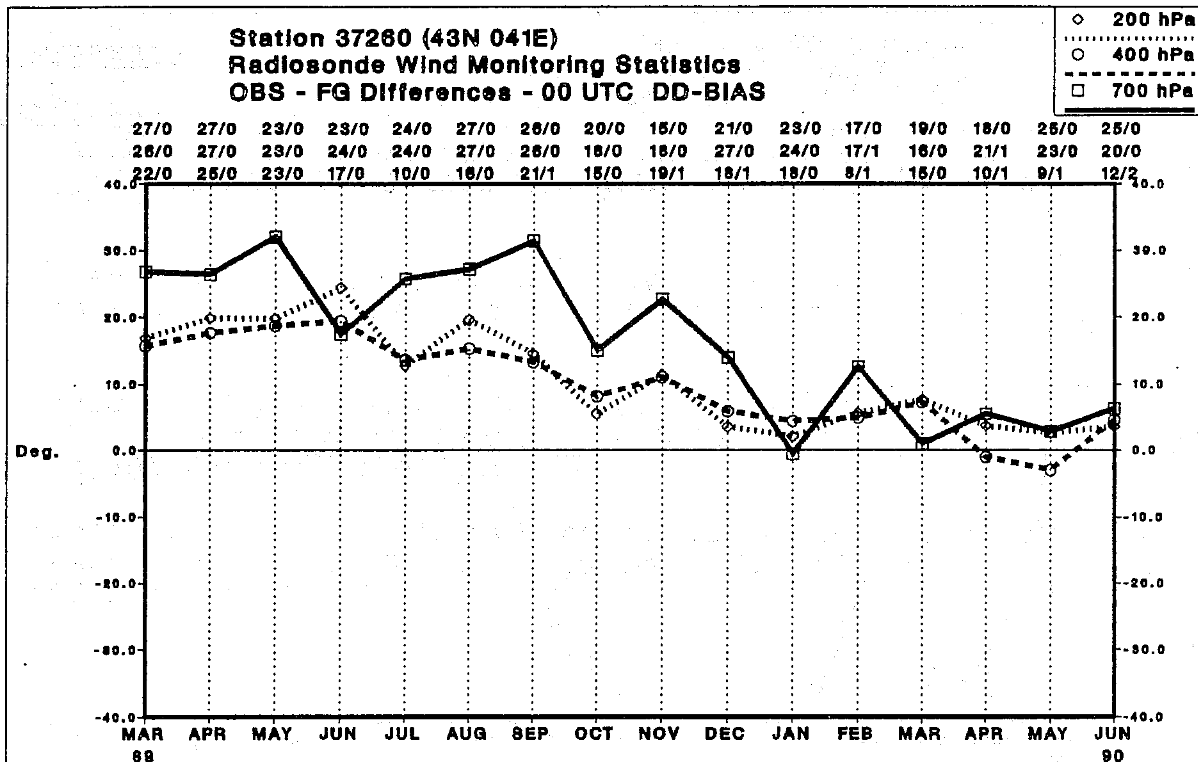


Fig. 2 Time graphs of mean monthly differences between observations and first-guess of wind direction at station 24959 (degrees), 00 UTC data (above) and 12 UTC (below)



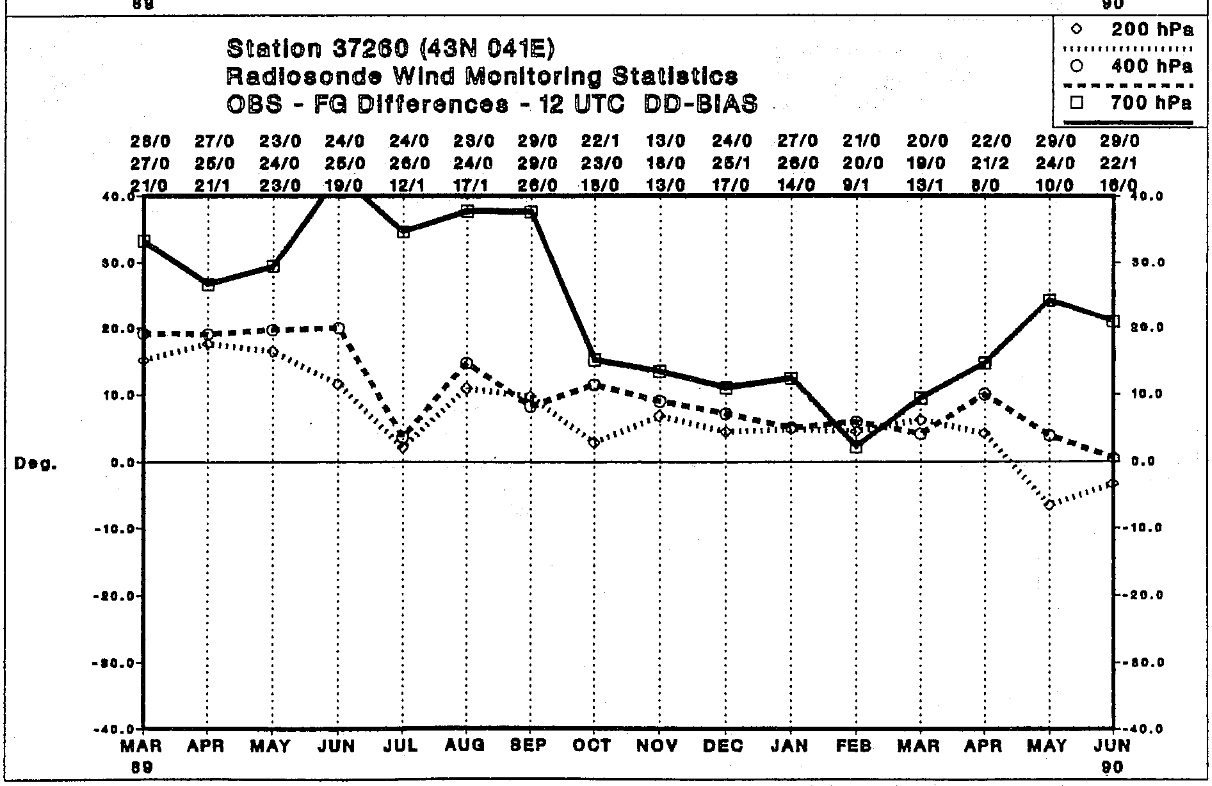
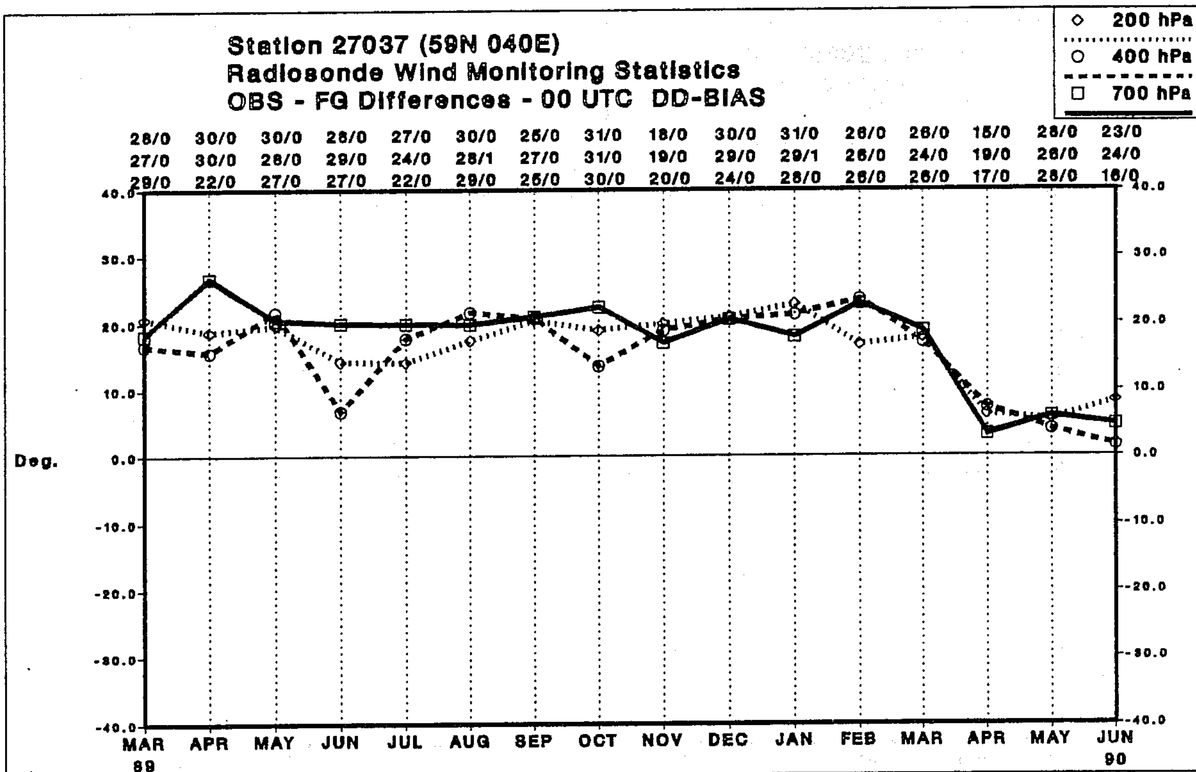


Fig. 3 As Fig. 2 for station 37260



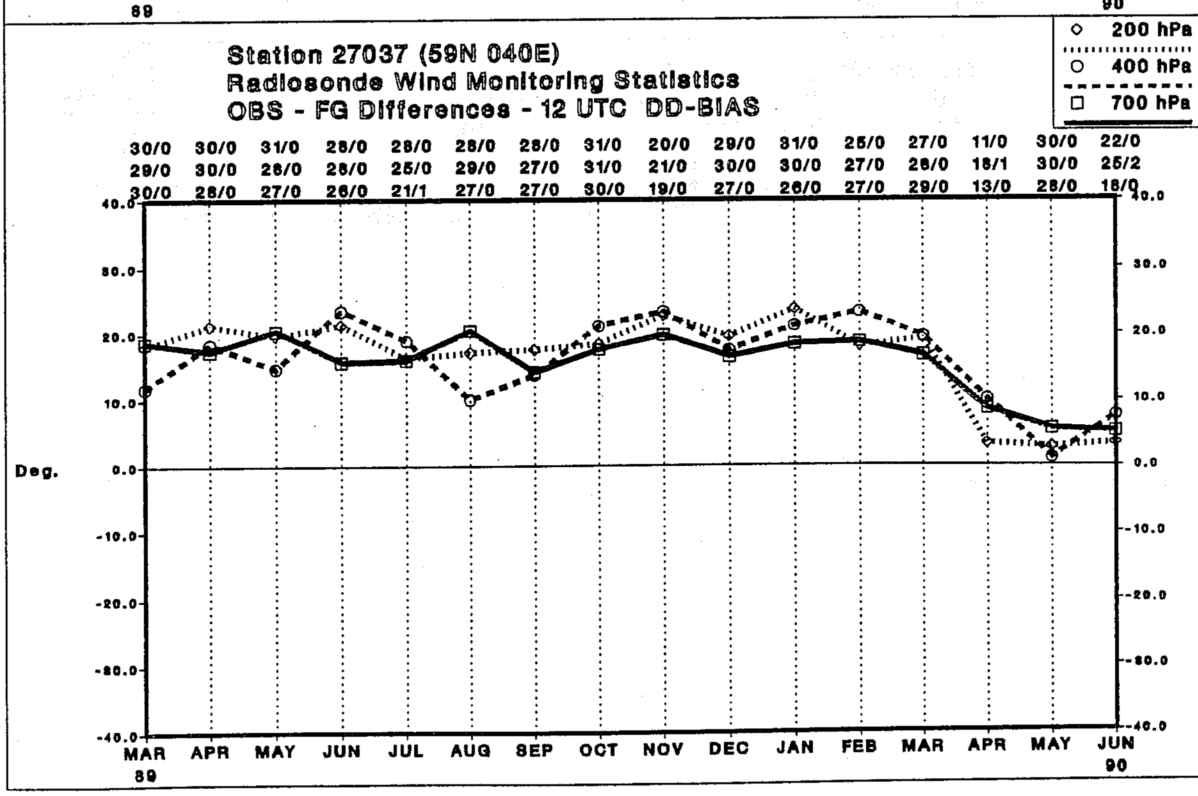
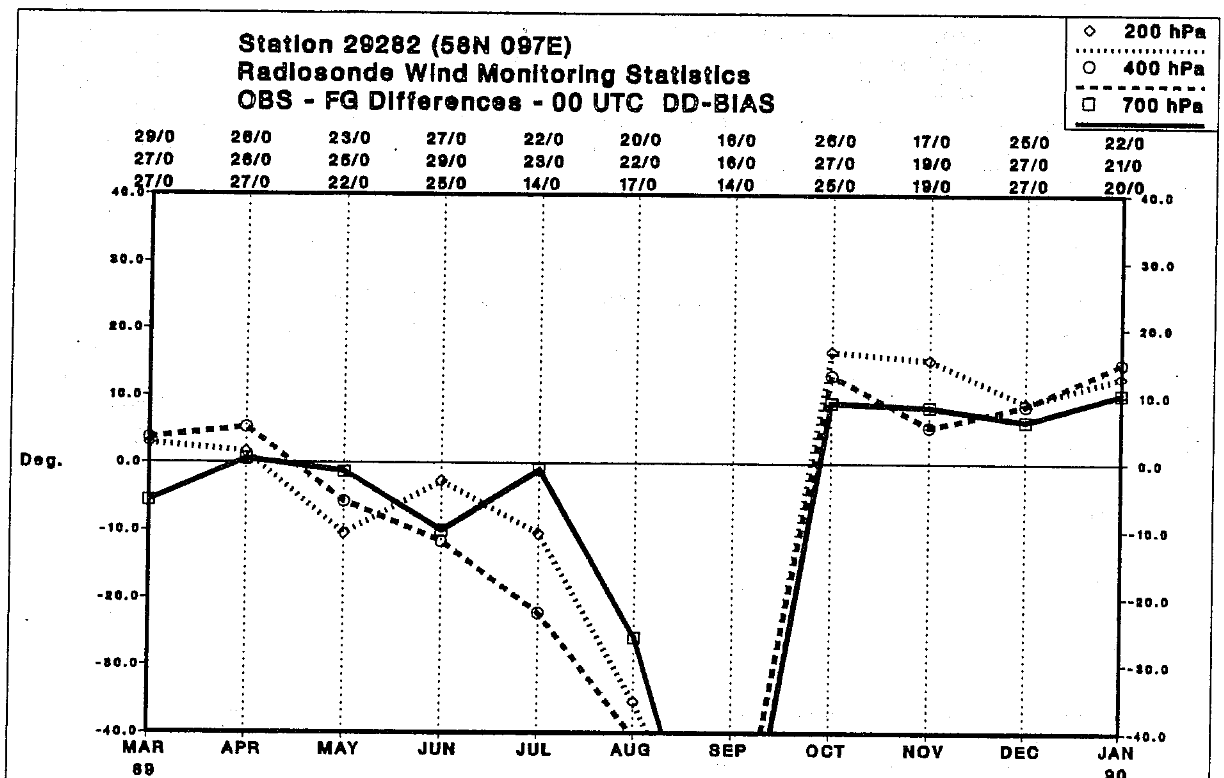


Fig. 4a

Figs. 4a to 4e As Fig. 2 for stations 27037, 29282, 34880, 35746 and 38457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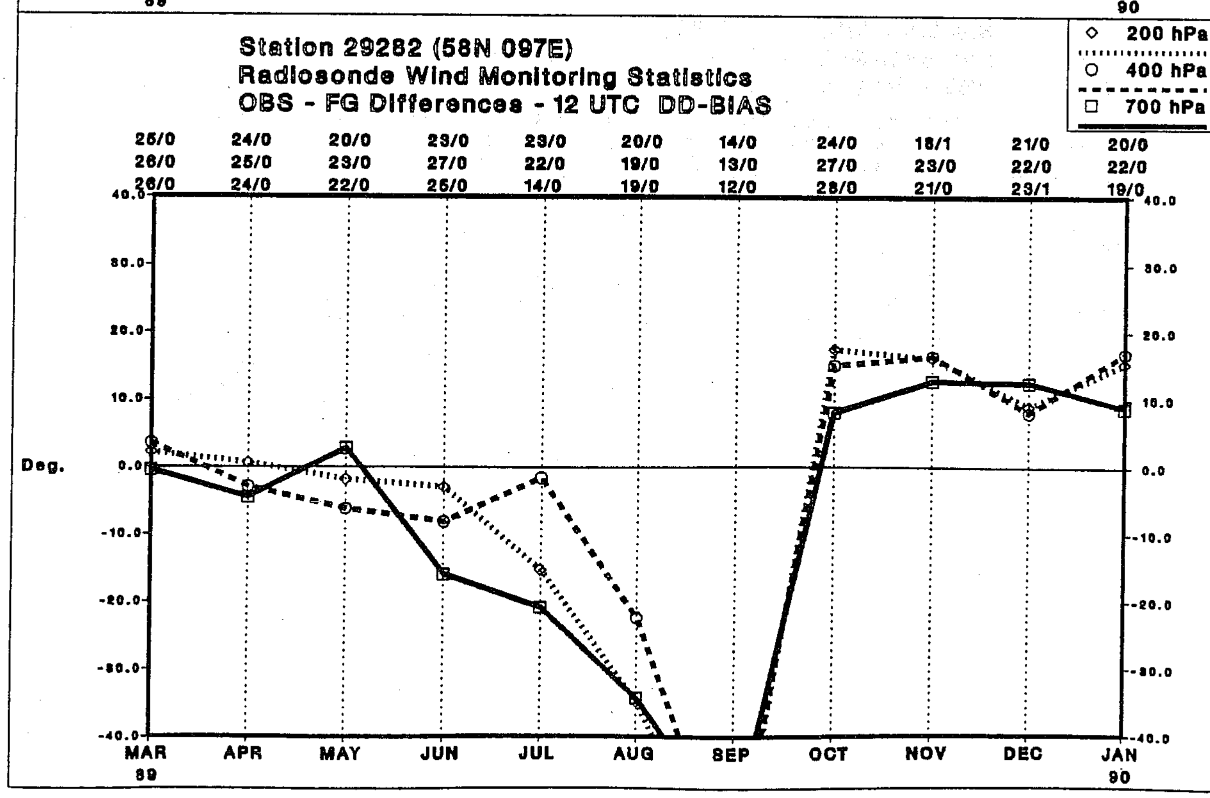
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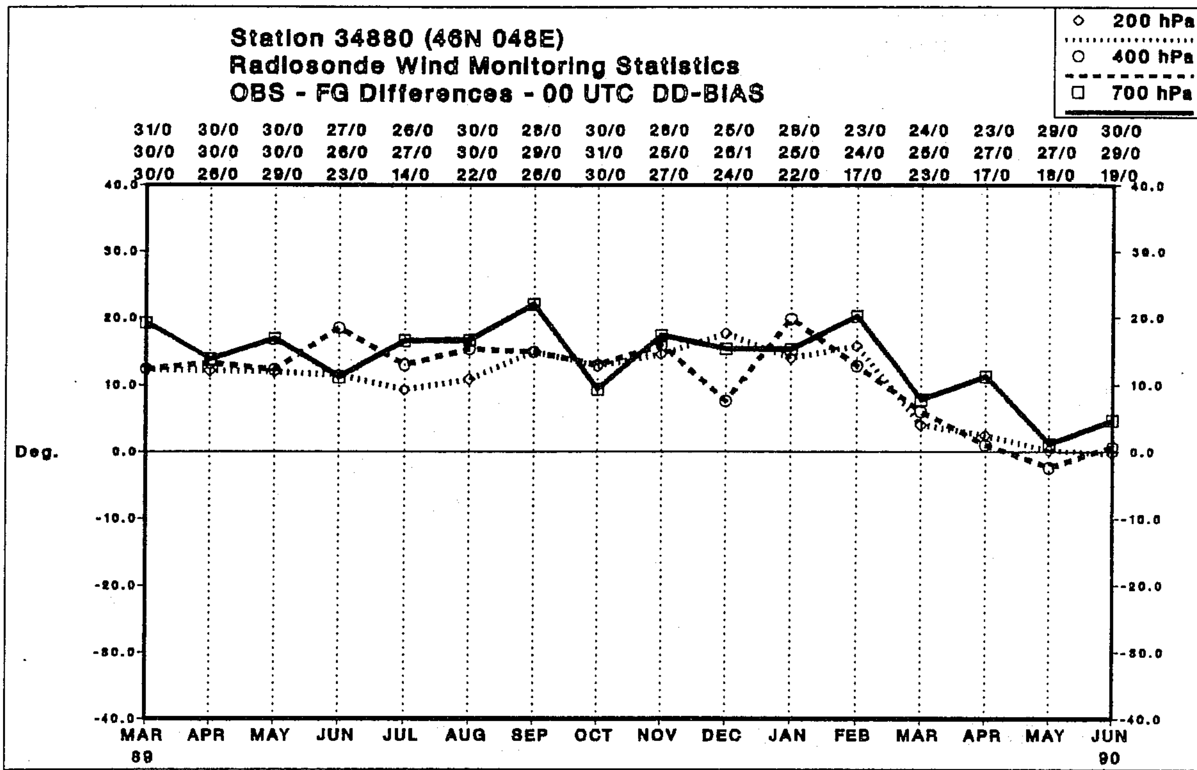
Fig. 4b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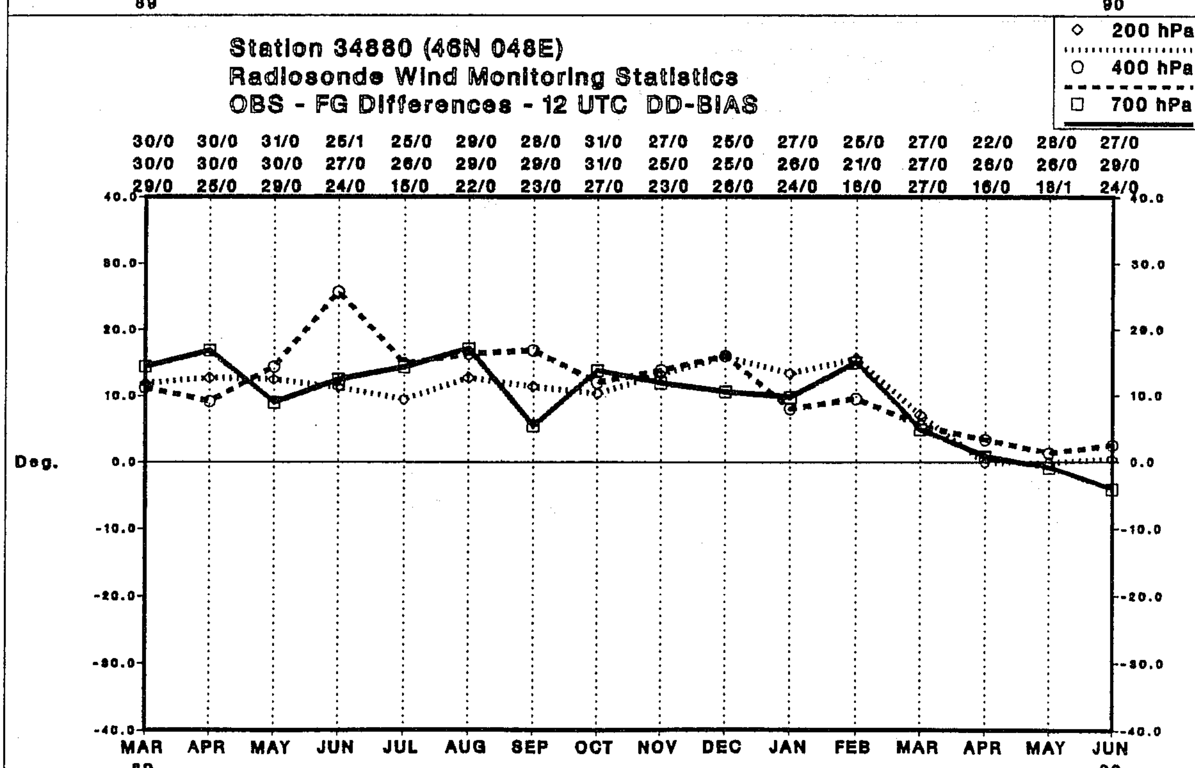
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Fig. 4c

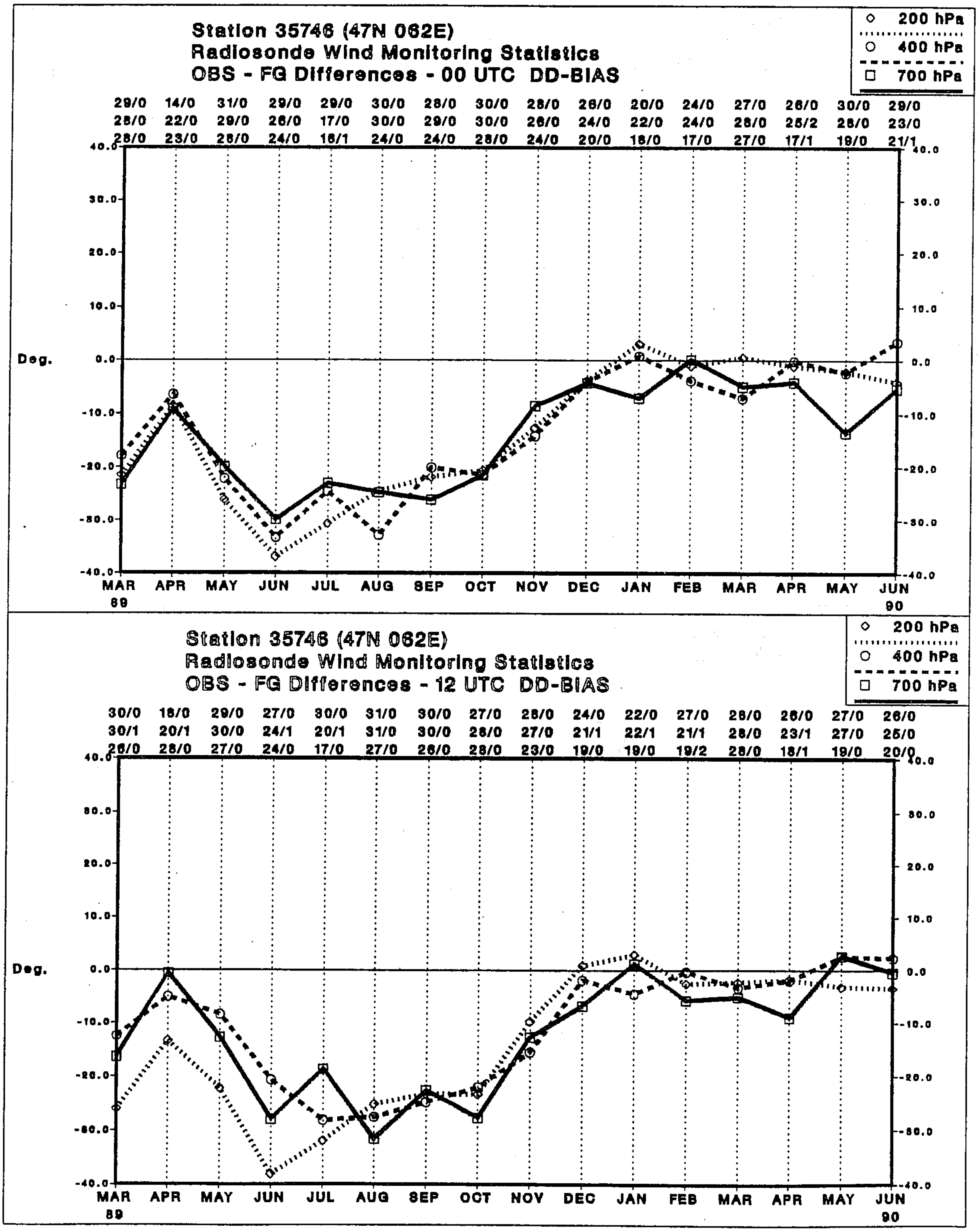
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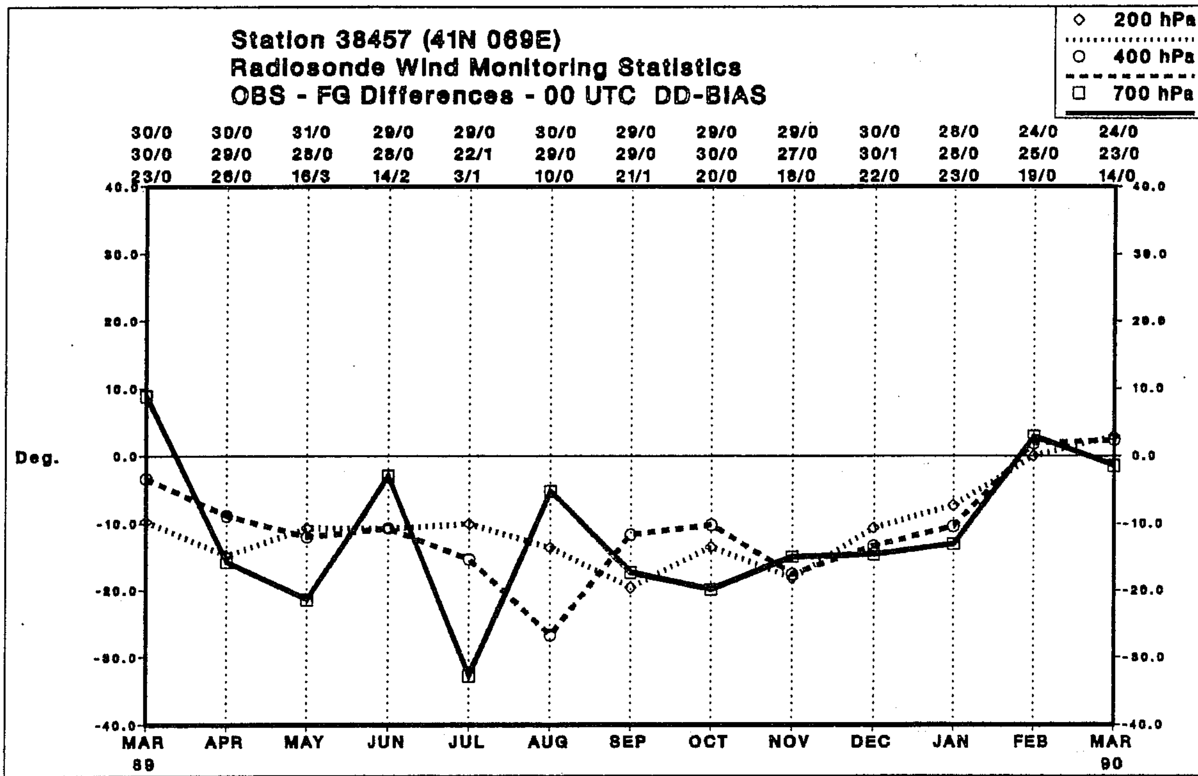
Fig. 4d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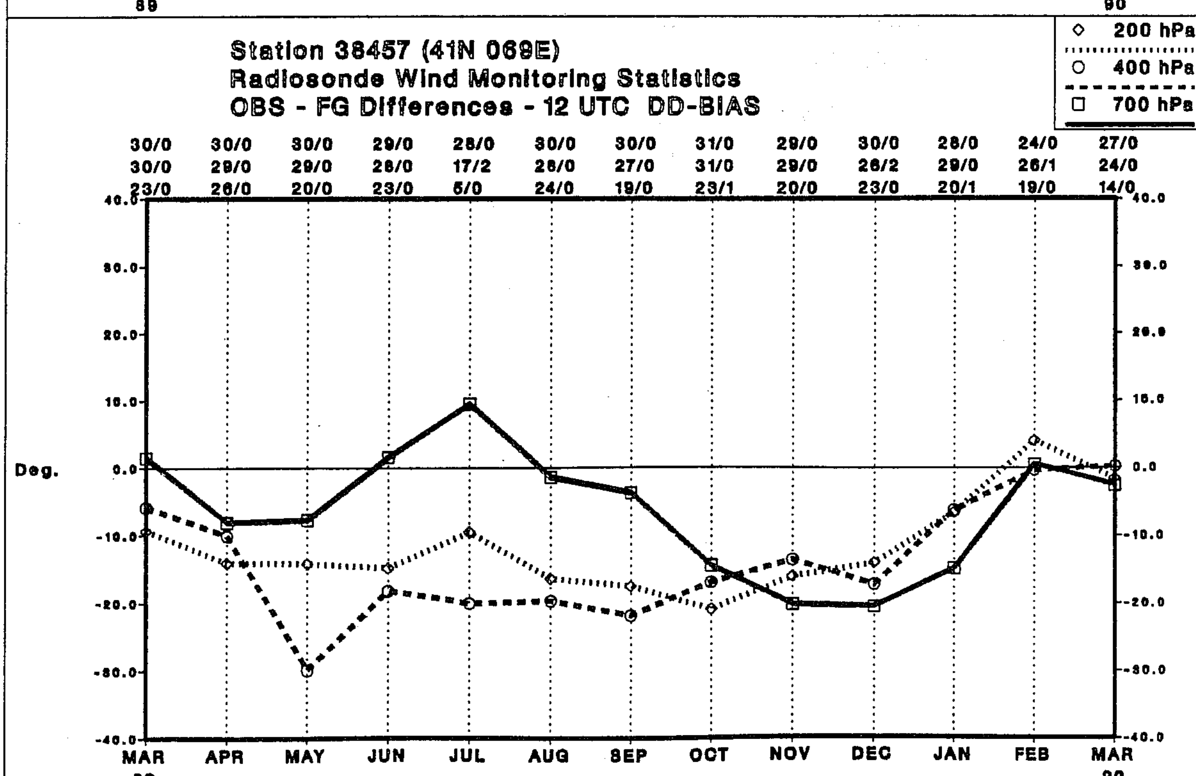
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Fig. 4e

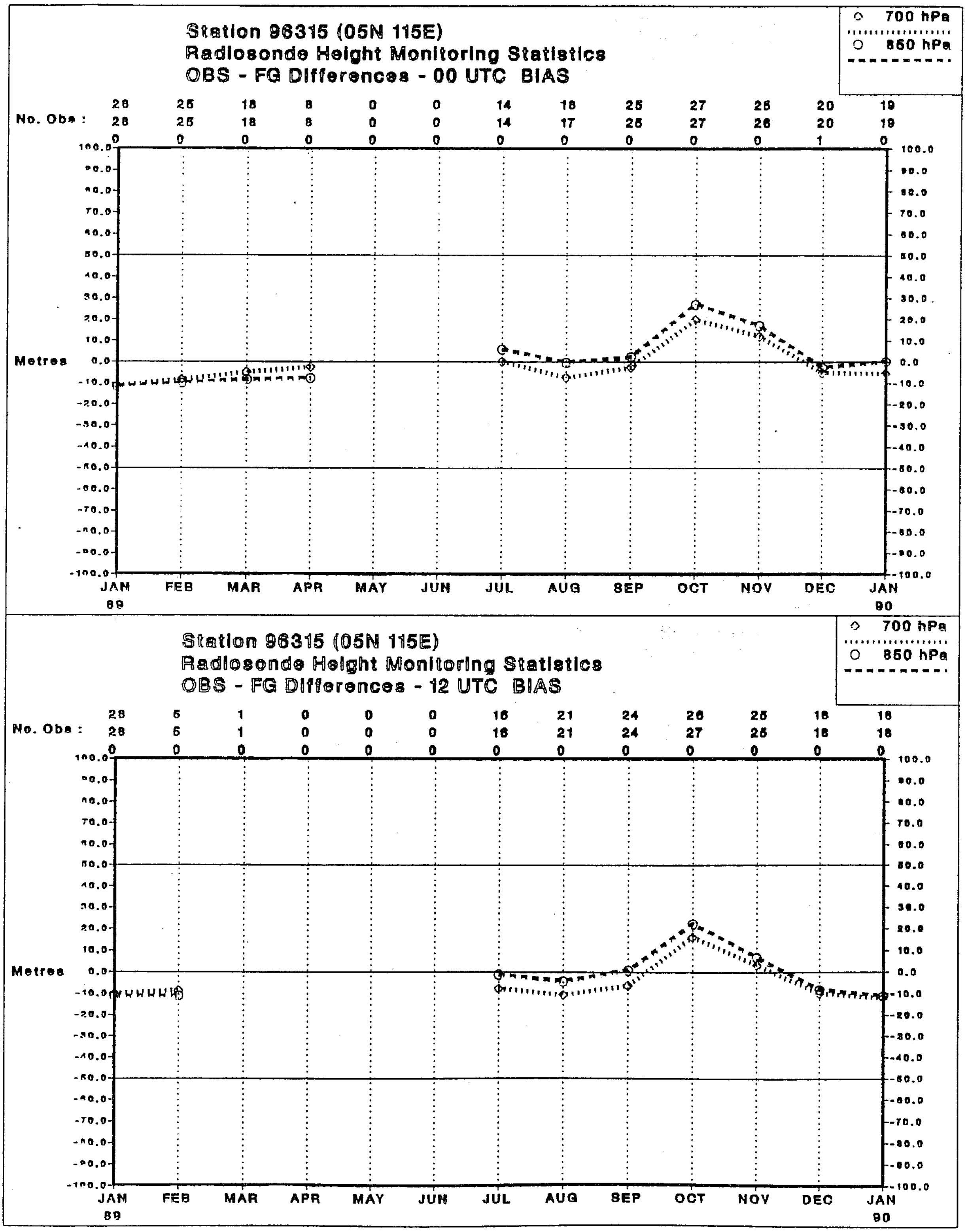


Fig. 5 Time graphs of mean monthly differences between observations and first-guess of geopotential height at station 96315 (metres), 00 UTC data (above) and 12 UTC (below)

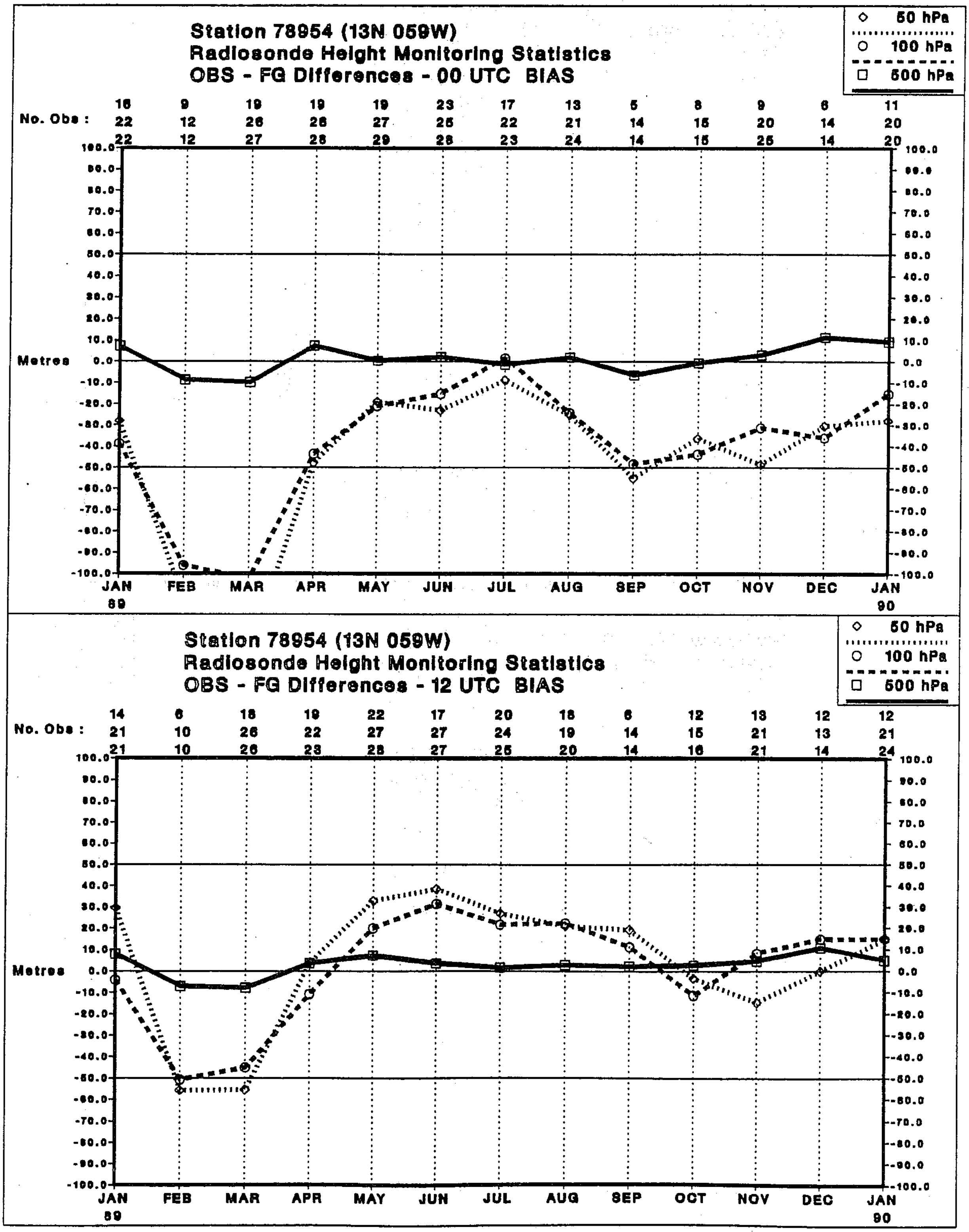


Fig. 6 As Fig. 5 for station 78954

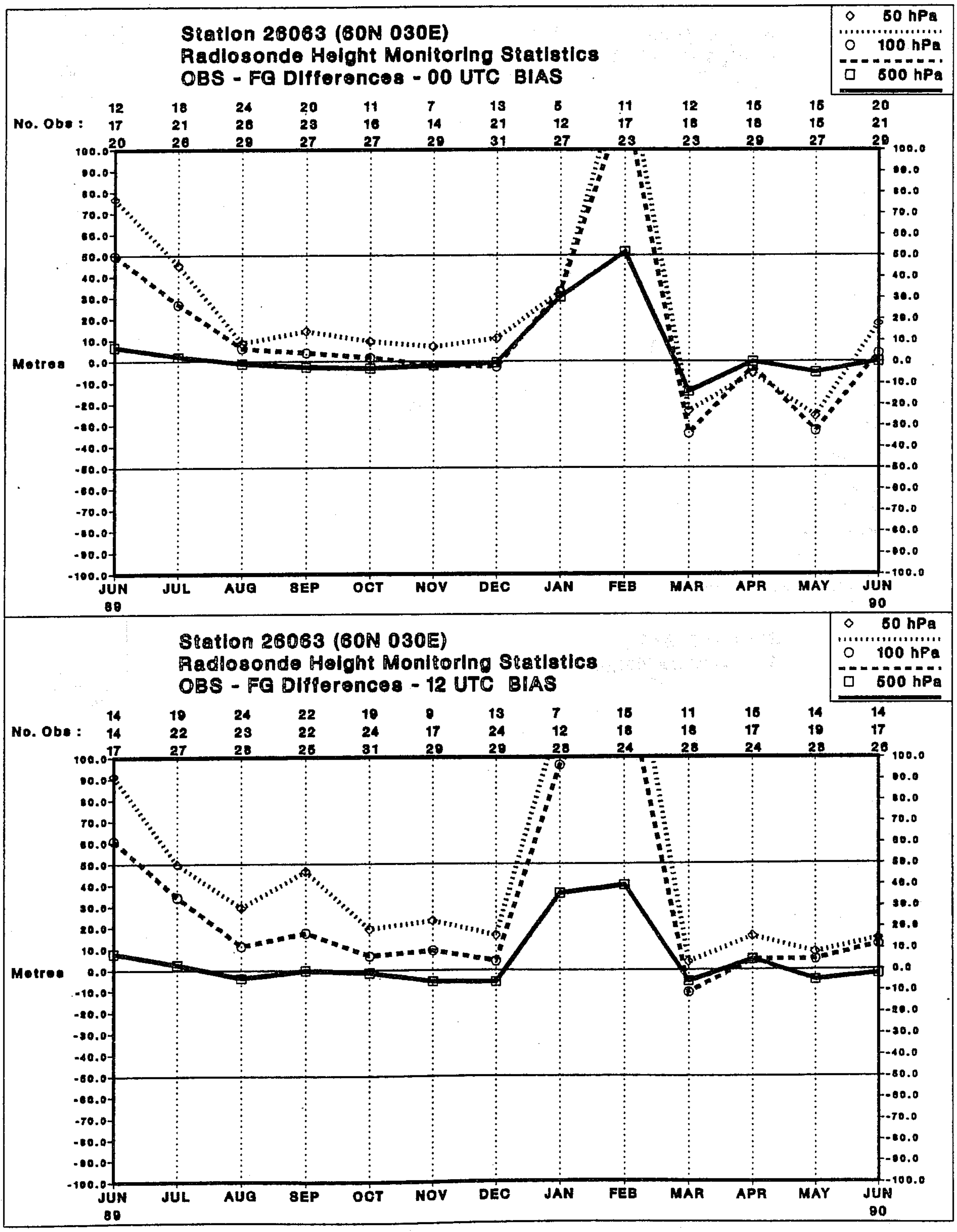


Fig. 7 As Fig. 5 for station 26063

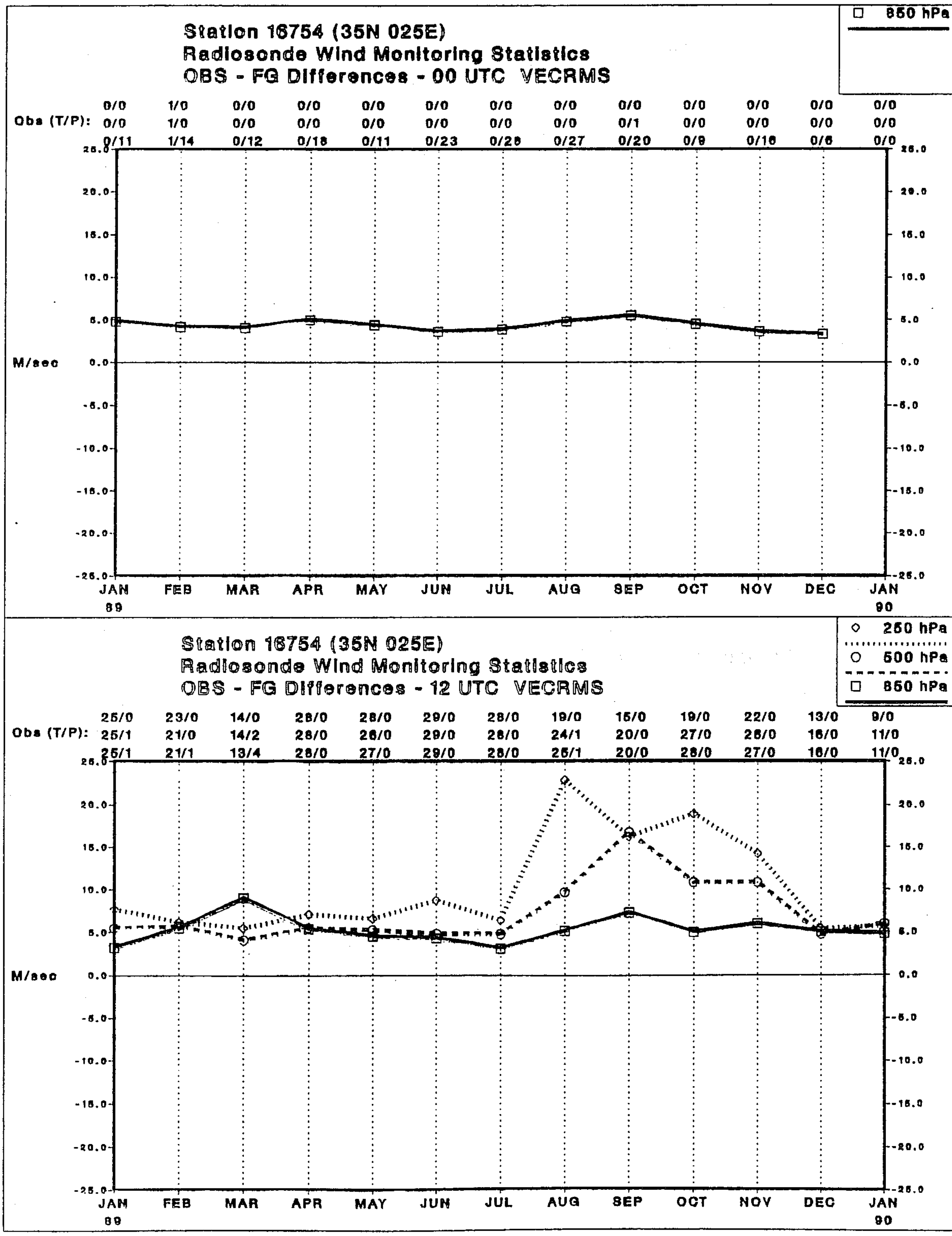
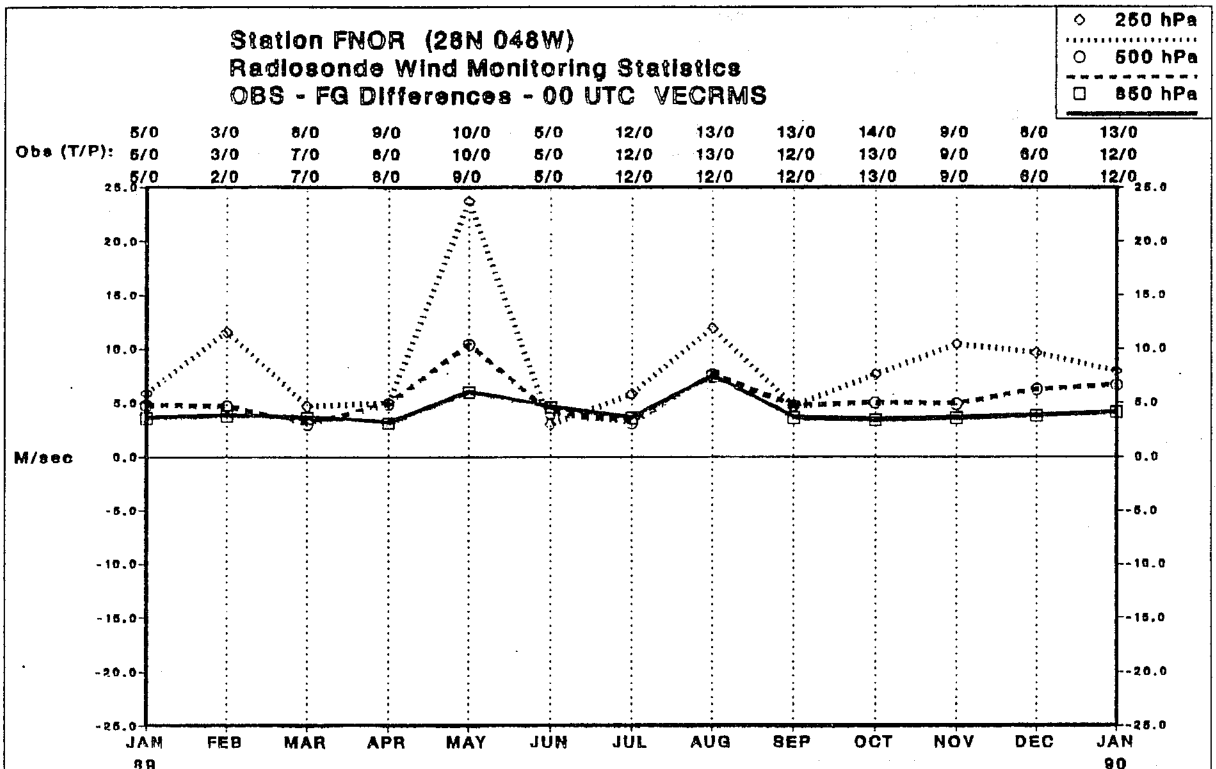


Fig. 8a

Figs. 8a to 8i Time graphs of mean monthly differences between observations and first-guess at station 16754 and ship FNOR (RMS vector differences for wind, m/s), and at stations 24641, 26422, 24944, 35229, 37018, 38062, 38507 (geopotential height, metres)


Station FNOR (28N 048W)
Radiosonde Wind Monitoring Statistics
OBS - FG Differences - 00 UTC VECRMS
250 hPa
500 hPa
850 hPa
Obs (T/P):
5/0 3/0 8/0 9/0 10/0 5/0 12/0 13/0 13/0 14/0 9/0 6/0 13/0
5/0 3/0 7/0 8/0 10/0 5/0 12/0 13/0 12/0 13/0 9/0 6/0 12/0
5/0 2/0 7/0 8/0 9/0 5/0 12/0 12/0 12/0 13/0 9/0 6/0 12/0
M/sec
JAN 89 FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN 90

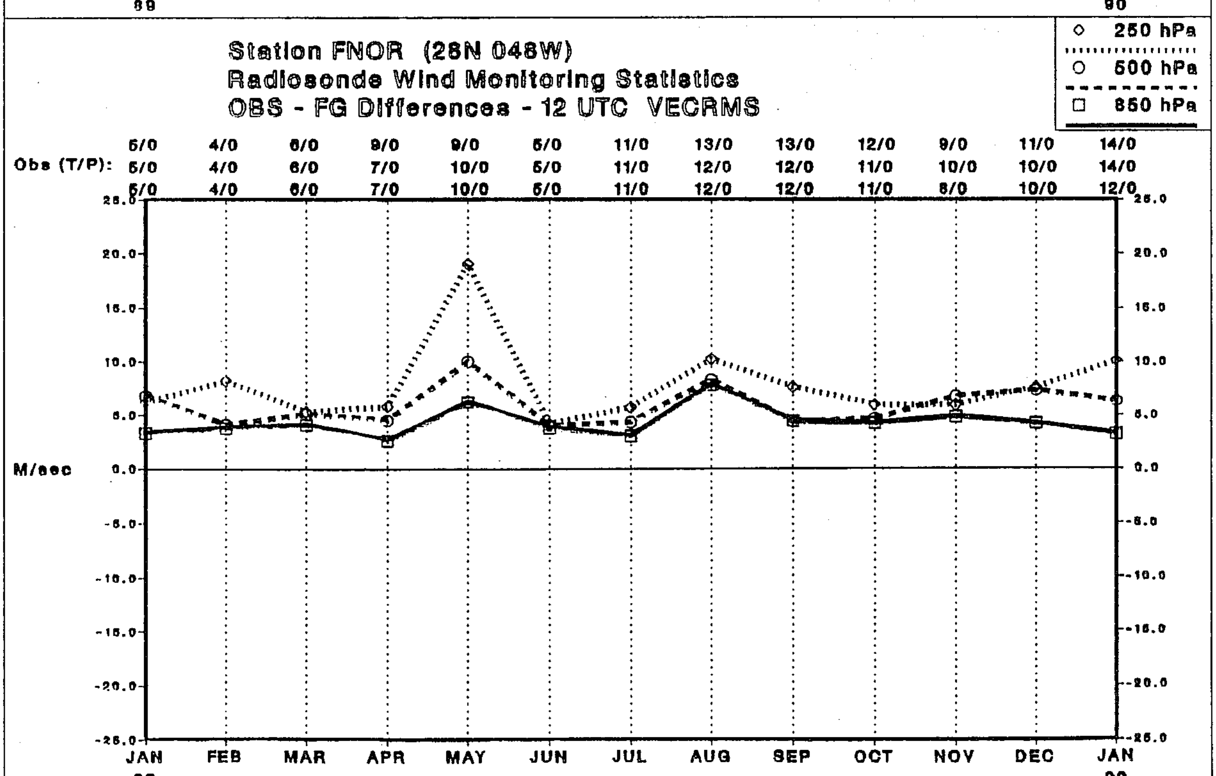
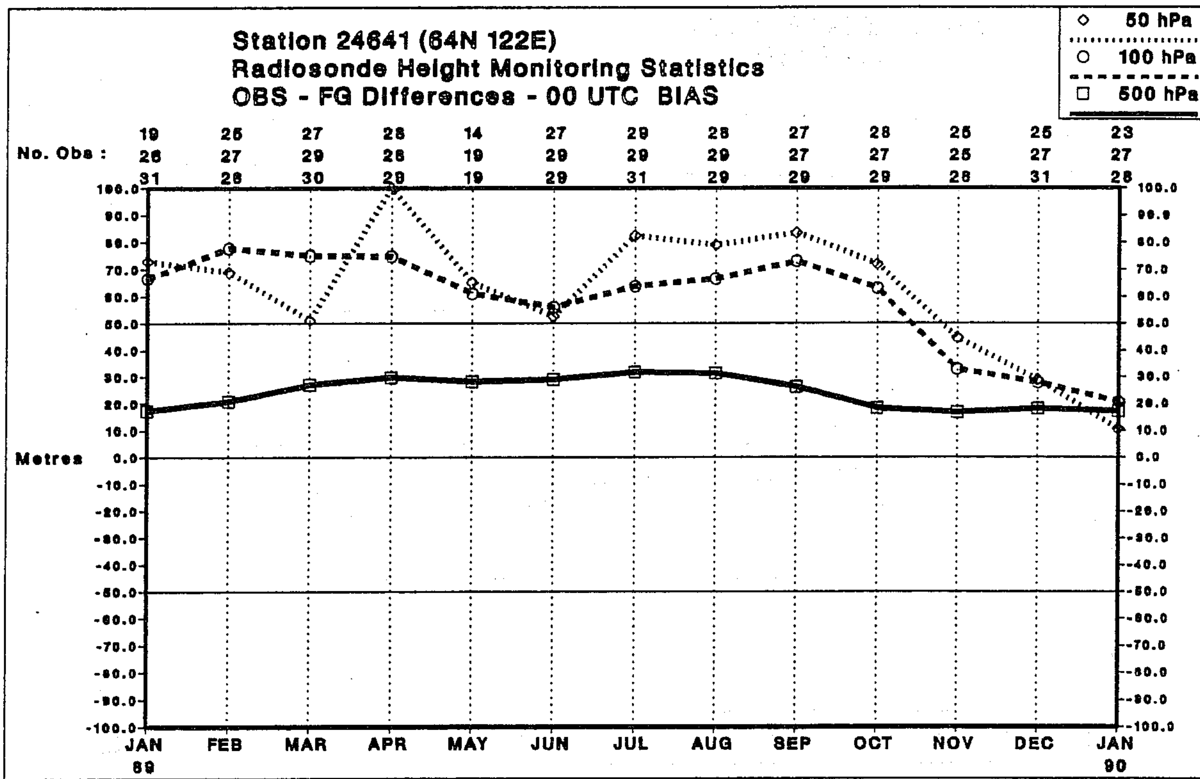

Station FNOR (28N 048W)
Radiosonde Wind Monitoring Statistics
OBS - FG Differences - 12 UTC VECRMS
250 hPa
500 hPa
850 hPa
Obs (T/P):
5/0 4/0 6/0 9/0 9/0 5/0 11/0 13/0 13/0 12/0 9/0 11/0 14/0
5/0 4/0 6/0 7/0 10/0 5/0 11/0 12/0 12/0 11/0 10/0 10/0 14/0
5/0 4/0 6/0 7/0 10/0 5/0 11/0 12/0 12/0 11/0 8/0 10/0 12/0
M/sec
JAN 89 FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN 90

Fig. 8b


Station 24641 (64N 122E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 00 UTC BIAS
50 hPa
100 hPa
500 hPa
No. Obs :
19 25 27 28 14 27 29 28 27 28 25 25 23
26 27 29 28 19 29 29 29 27 27 25 27 27
31 28 30 29 19 29 31 29 29 29 28 31 28
Metres
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN
89
90

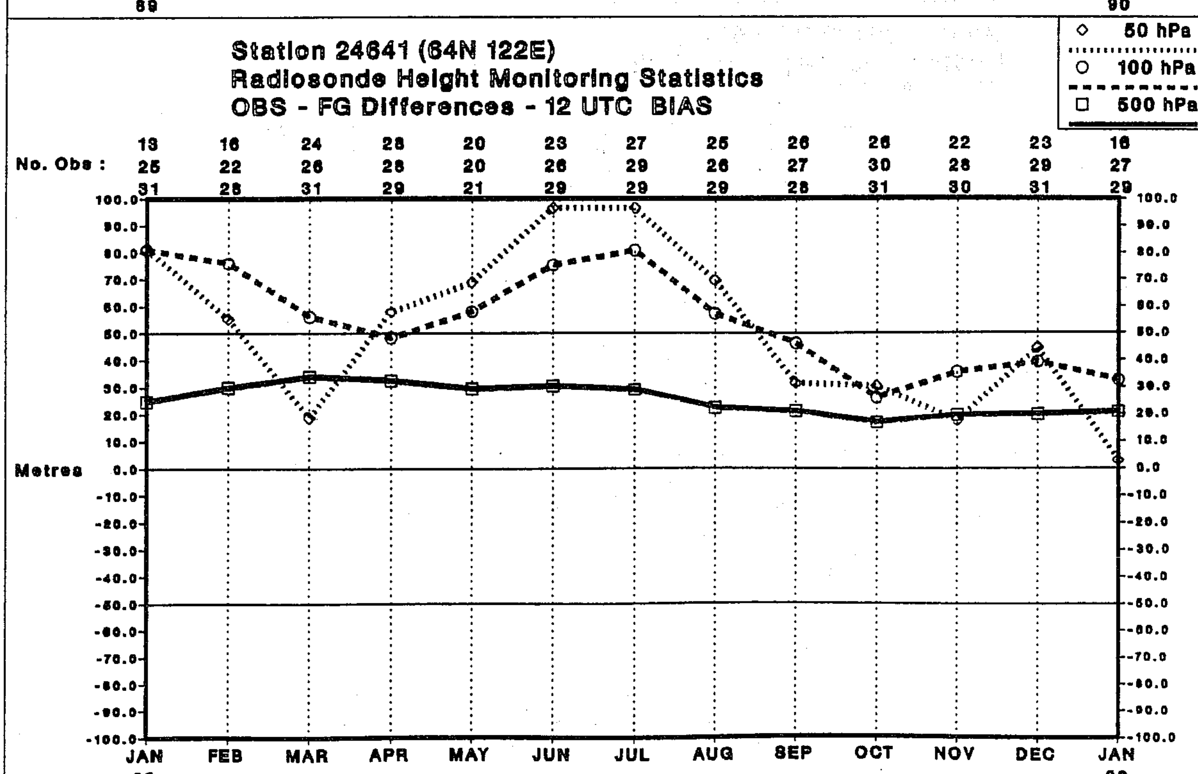
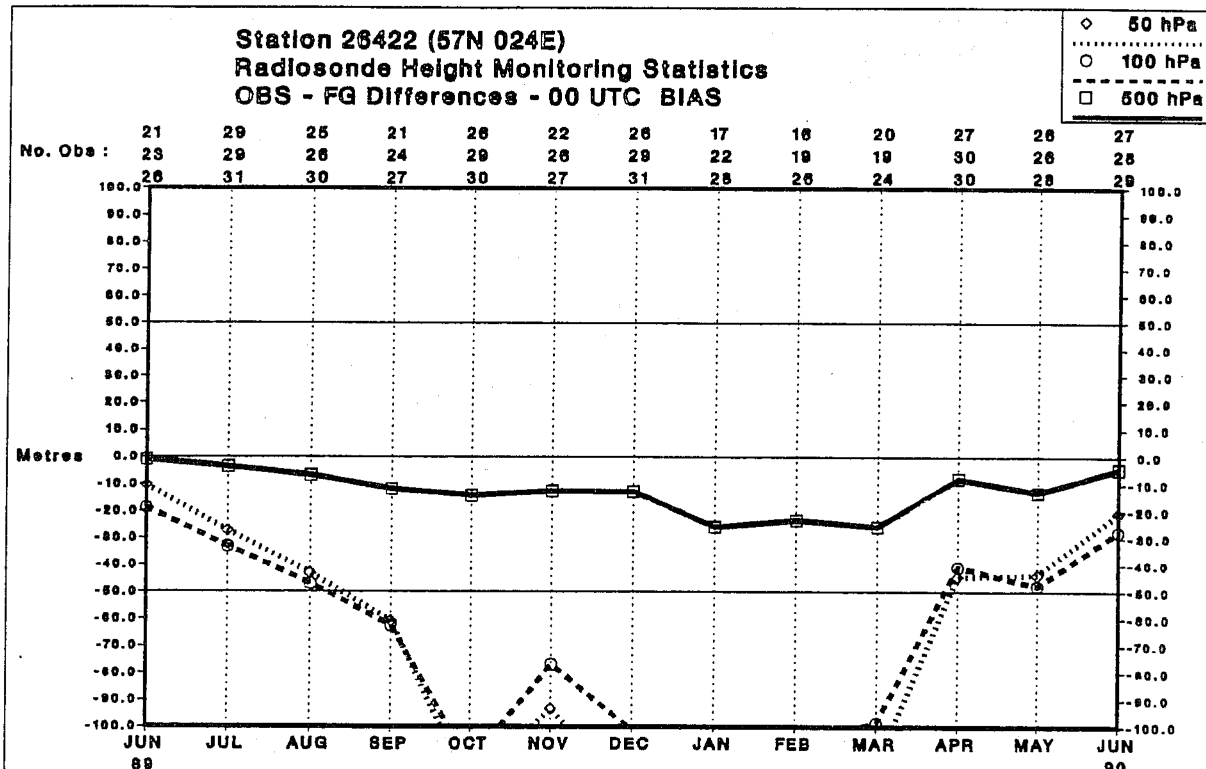

Station 24641 (64N 122E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 12 UTC BIAS
50 hPa
100 hPa
500 hPa
No. Obs :
13 16 24 28 20 23 27 25 26 26 22 23 16
25 22 26 28 20 26 29 26 27 30 28 29 27
31 28 31 29 21 29 29 29 28 31 30 31 29
Metres
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN
89
90

Fig. 8c


Station 26422 (57N 024E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 00 UTC BIAS
50 hPa
100 hPa
500 hPa
No. Obs :
21 29 25 21 26 22 26 17 16 20 27 26 27
23 29 26 24 29 26 29 22 19 19 30 26 28
26 31 30 27 30 27 31 28 26 24 30 28 29
Metres
JUN 89
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN 90

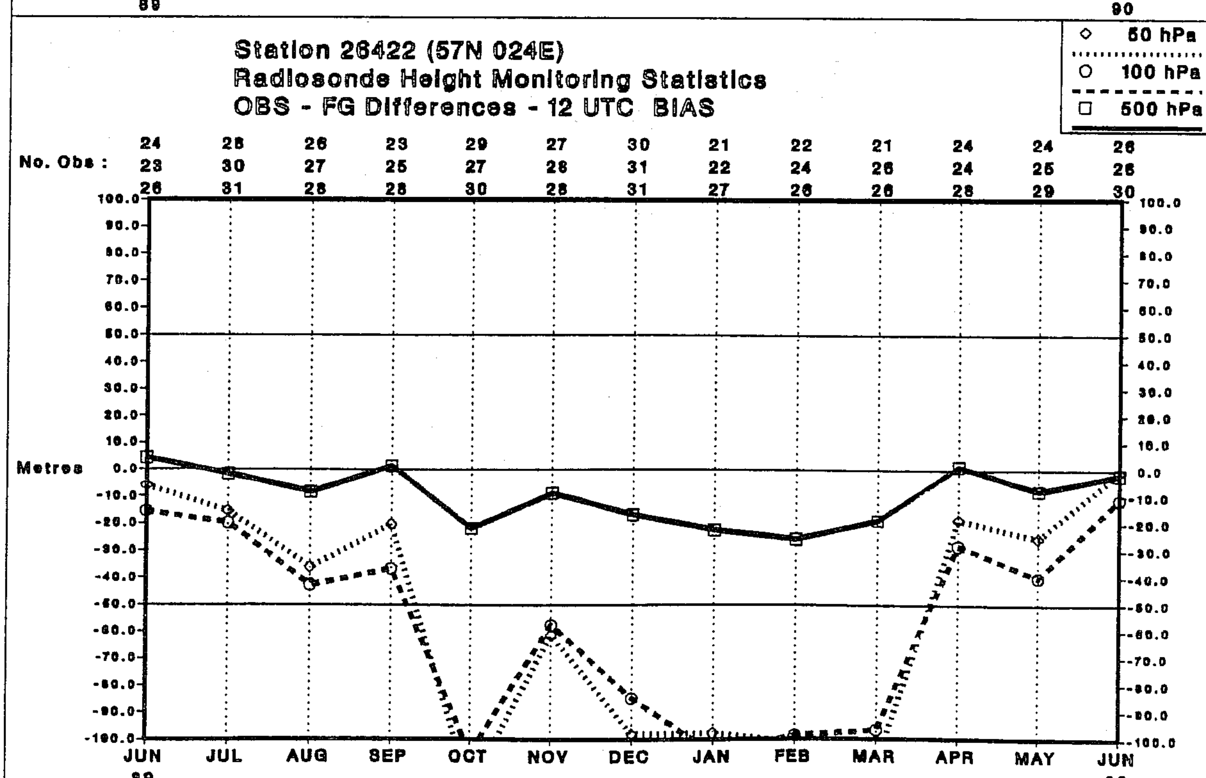
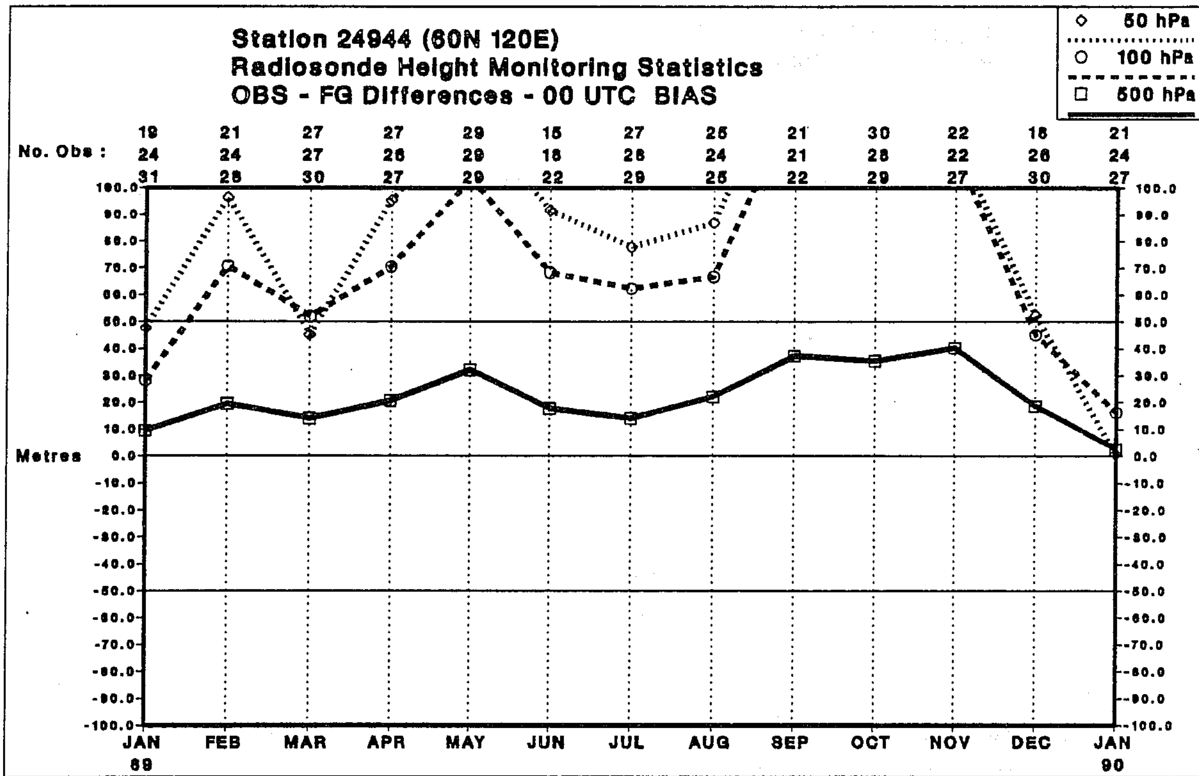

Station 26422 (57N 024E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 12 UTC BIAS
50 hPa
100 hPa
500 hPa
No. Obs :
24 28 26 23 29 27 30 21 22 21 24 24 26
23 30 27 25 27 28 31 22 24 26 24 25 26
26 31 28 28 30 28 31 27 26 26 28 29 30
Metres
JUN 89
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN 90

Fig. 8d


Station 24944 (60N 120E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 00 UTC BIAS
◇ 50 hPa
○ 100 hPa
□ 500 hPa
No. Obs :
19 24 31
21 24 28
27 27 30
27 26 27
29 29 29
15 16 22
27 28 29
25 24 25
21 21 22
30 28 29
22 22 27
18 26 30
21 24 27
Metres
JAN 89 FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN 90

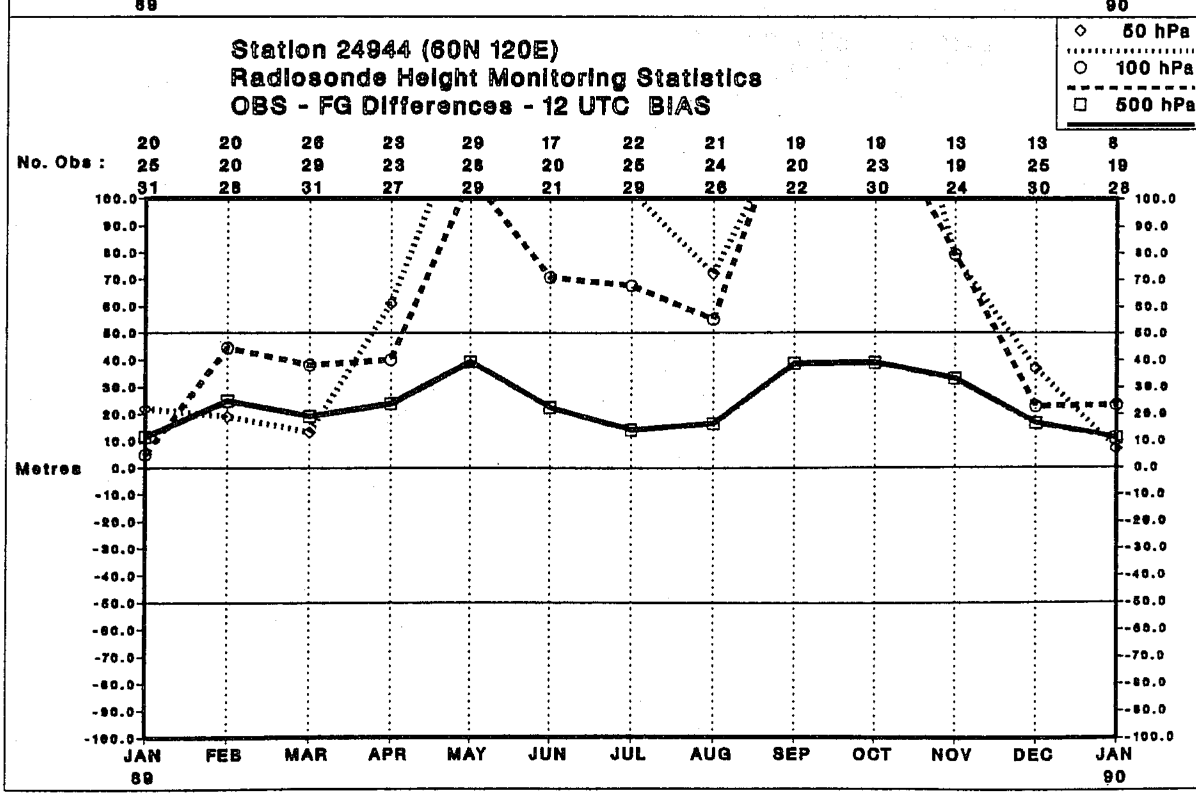

Station 24944 (60N 120E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 12 UTC BIAS
◇ 50 hPa
○ 100 hPa
□ 500 hPa
No. Obs :
20 25 31
20 20 28
26 29 31
23 23 27
29 28 29
17 20 21
22 25 29
21 24 26
19 20 22
19 23 30
13 19 24
13 25 30
8 19 28
Metres
JAN 89 FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN 90

Fig. 8e

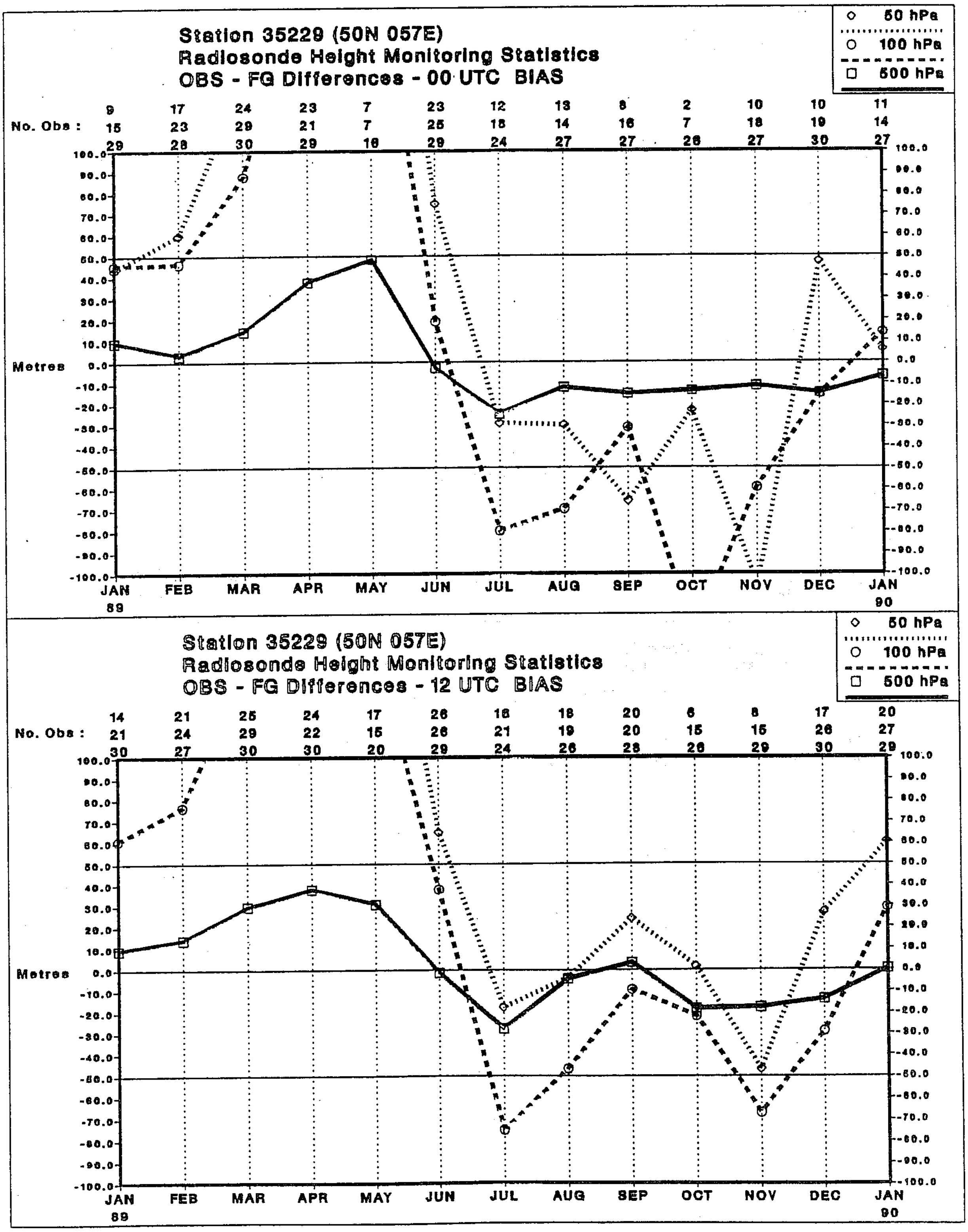
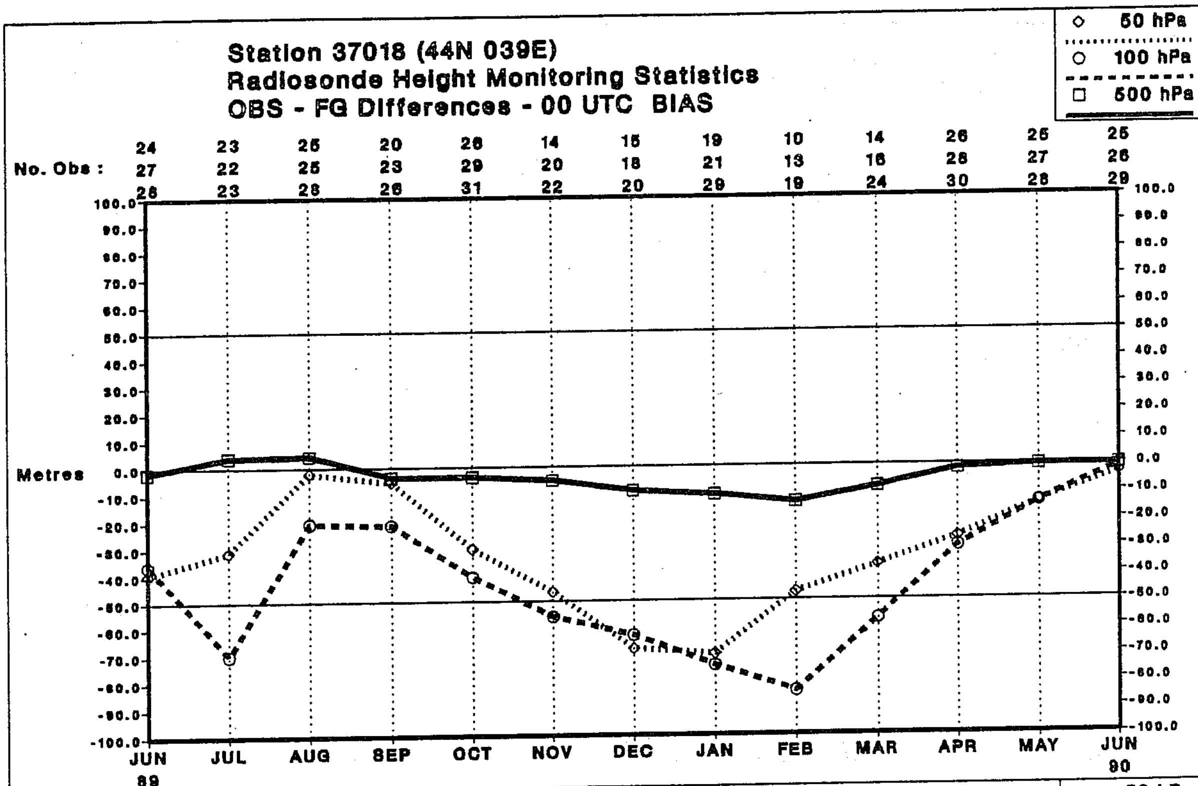

Station 35229 (50N 057E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 00 UTC BIAS
50 hPa
100 hPa
500 hPa
No. Obs :
9 17 24 23 7 23 12 13 8 2 10 10 11
15 23 29 21 7 25 18 14 16 7 18 19 14
29 28 30 29 18 29 24 27 27 26 27 30 27
Metres
JAN 89 FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN 90
Station 35229 (50N 057E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 12 UTC BIAS
50 hPa
100 hPa
500 hPa
No. Obs :
14 21 25 24 17 26 18 18 20 6 8 17 20
21 24 29 22 15 26 21 19 20 15 15 26 27
30 27 30 30 20 29 24 26 28 26 29 30 29
Metres
JAN 89 FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN 90

Fig. 8f


Station 37018 (44N 039E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 00 UTC BIAS
50 hPa
100 hPa
500 hPa
No. Obs :
24 23 25 20 26 14 15 19 10 14 26 25 25
27 22 25 23 29 20 18 21 13 16 28 27 26
28 23 28 26 31 22 20 29 19 24 30 28 29
Metres
JUN 89
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN 90

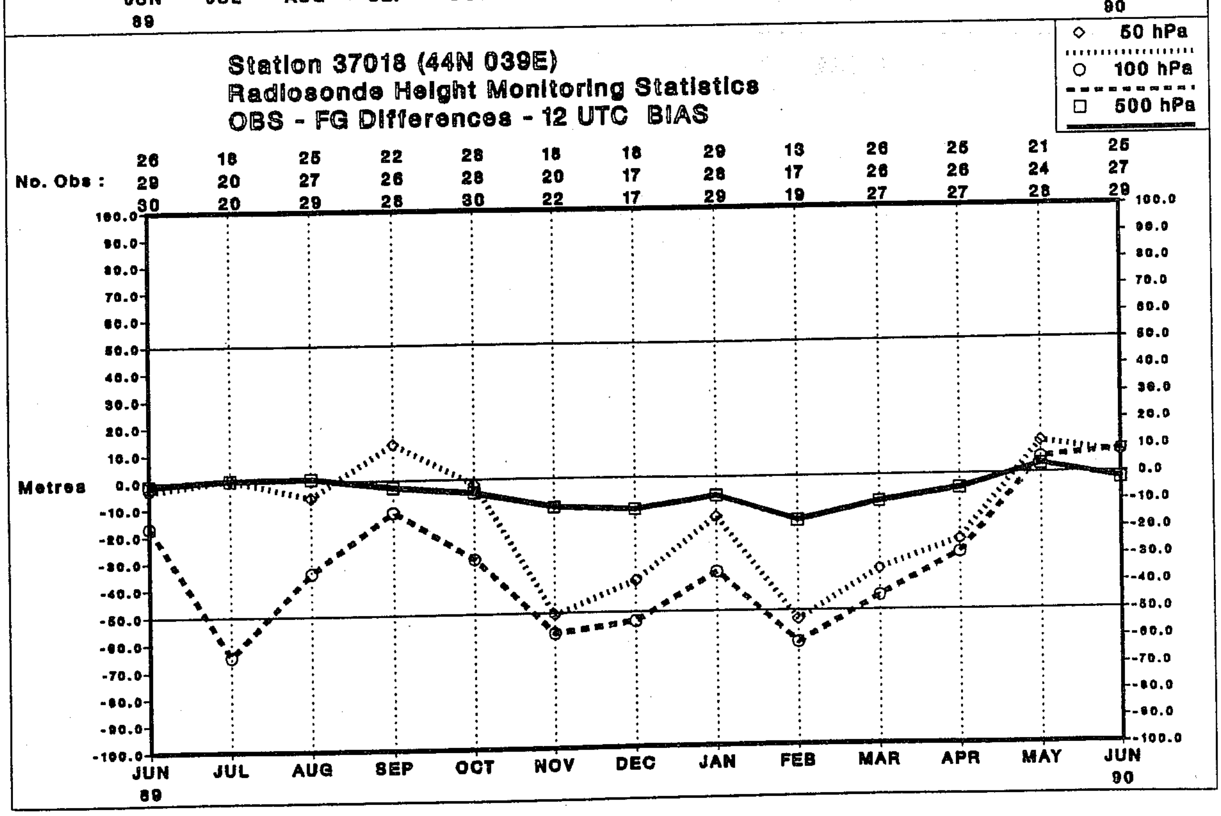

Station 37018 (44N 039E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 12 UTC BIAS
50 hPa
100 hPa
500 hPa
No. Obs :
26 18 25 22 28 18 18 29 13 26 25 21 25
29 20 27 26 28 20 17 28 17 26 26 24 27
30 20 29 28 30 22 17 29 19 27 27 28 29
Metres
JUN 89
JUL
AUG
SEP
OCT
NOV
DEC
JAN
FEB
MAR
APR
MAY
JUN 90

Fig. 8g

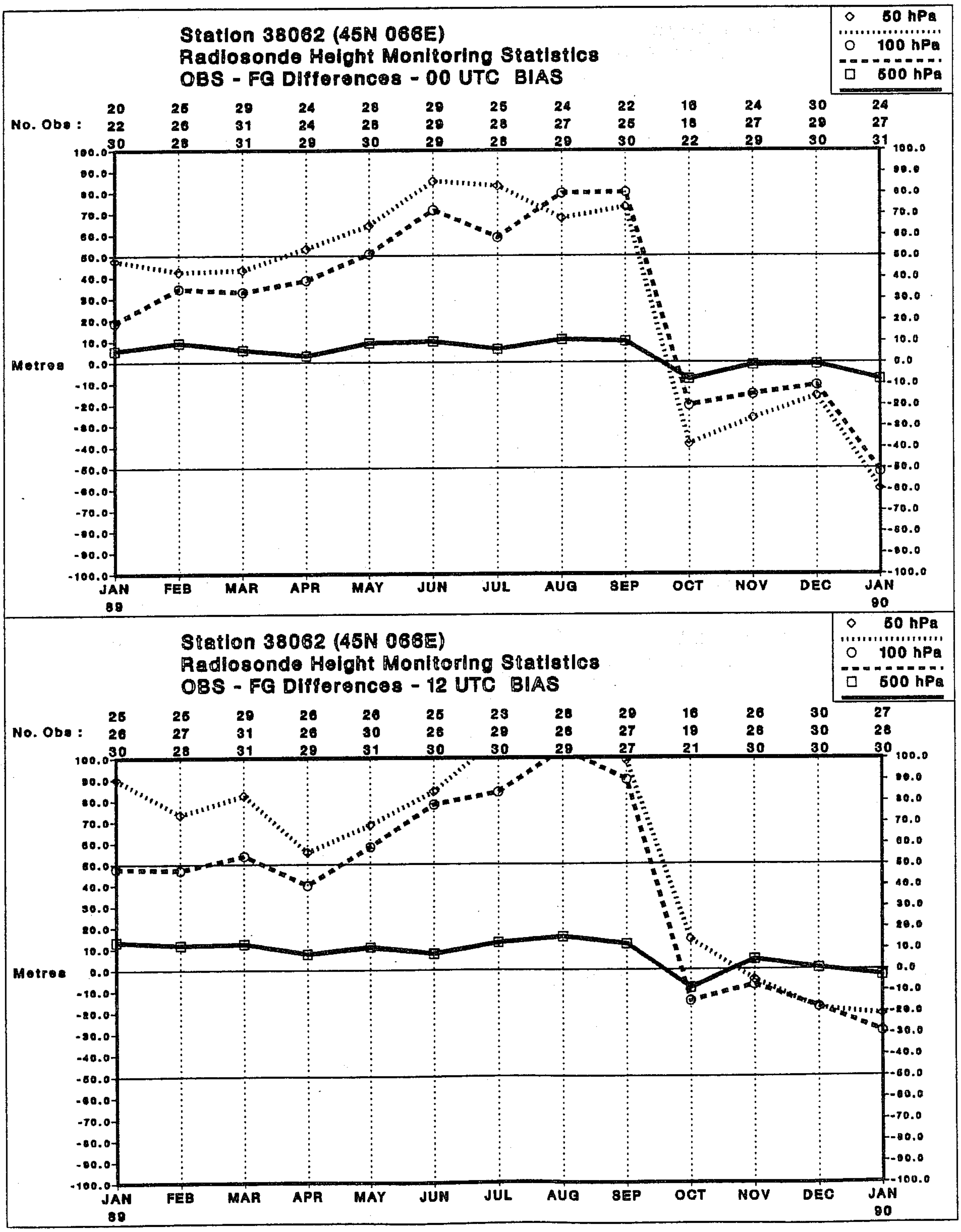
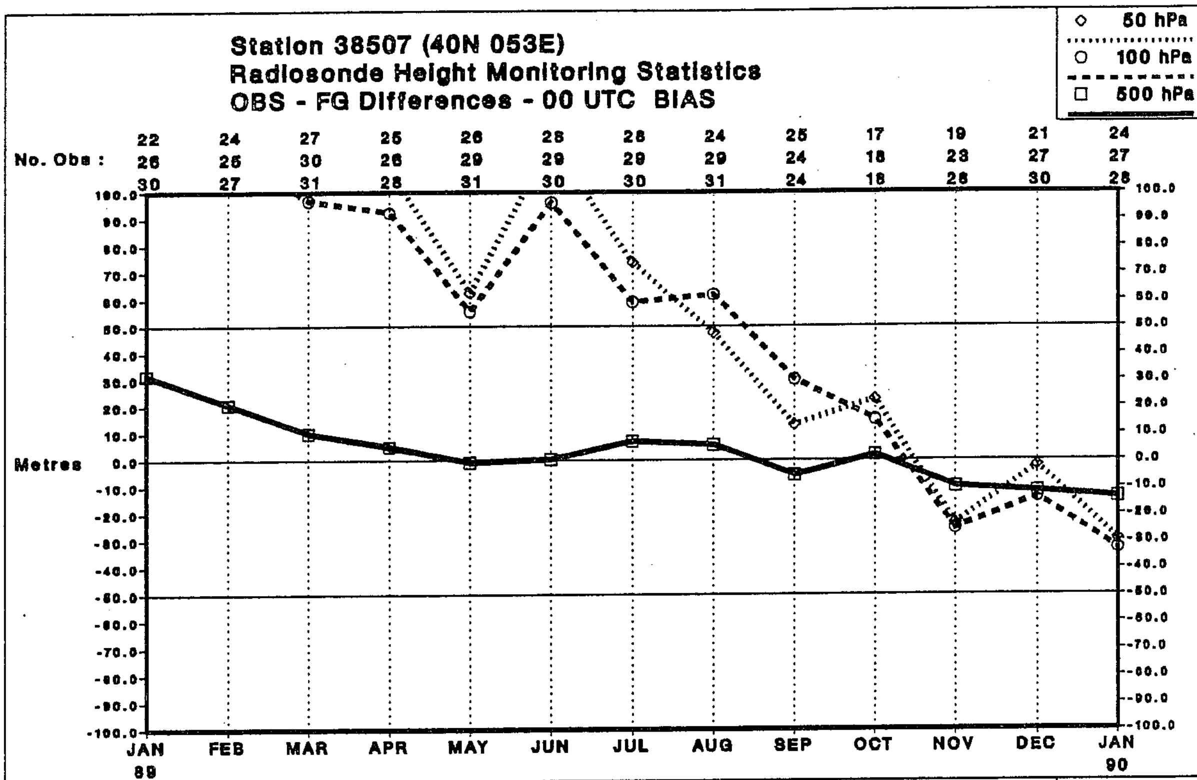

Station 38062 (45N 066E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 00 UTC BIAS
◇ 50 hPa
○ 100 hPa
□ 500 hPa
No. Obs :
20 25 29 24 28 29 25 24 22 16 24 30 24
22 26 31 24 28 29 28 27 25 18 27 29 27
30 28 31 29 30 29 28 29 30 22 29 30 31
Metres
100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0 -30.0 -40.0 -50.0 -60.0 -70.0 -80.0 -90.0 -100.0
JAN 89 FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN 90
Station 38062 (45N 066E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 12 UTC BIAS
◇ 50 hPa
○ 100 hPa
□ 500 hPa
No. Obs :
25 25 29 26 26 25 23 28 29 16 26 30 27
26 27 31 26 30 26 29 26 27 19 28 30 28
30 28 31 29 31 30 30 29 27 21 30 30 30
Metres
100.0 90.0 80.0 70.0 60.0 50.0 40.0 30.0 20.0 10.0 0.0 -10.0 -20.0 -30.0 -40.0 -50.0 -60.0 -70.0 -80.0 -90.0 -100.0
JAN 89 FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC JAN 90

Fig. 8h


Station 38507 (40N 053E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 00 UTC BIAS
◇ 50 hPa
○ 100 hPa
□ 500 hPa
No. Obs :
Metres
JAN 89
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN 90

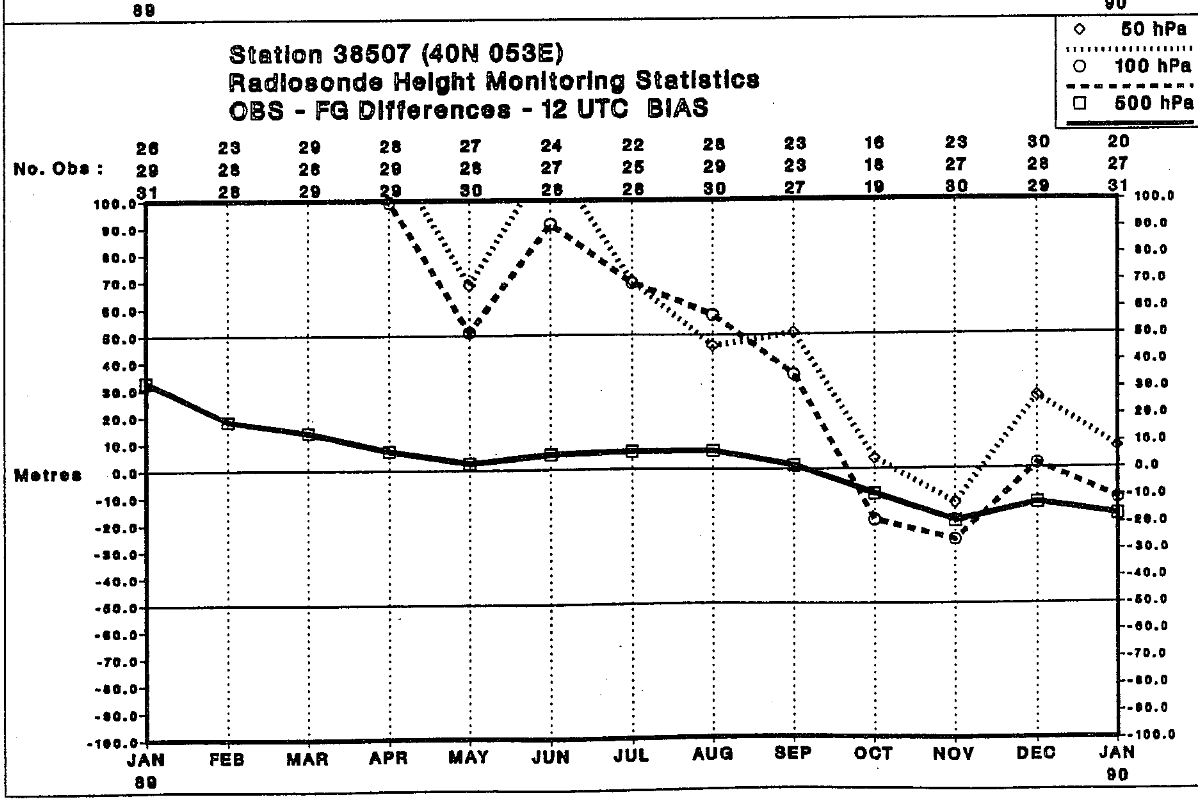
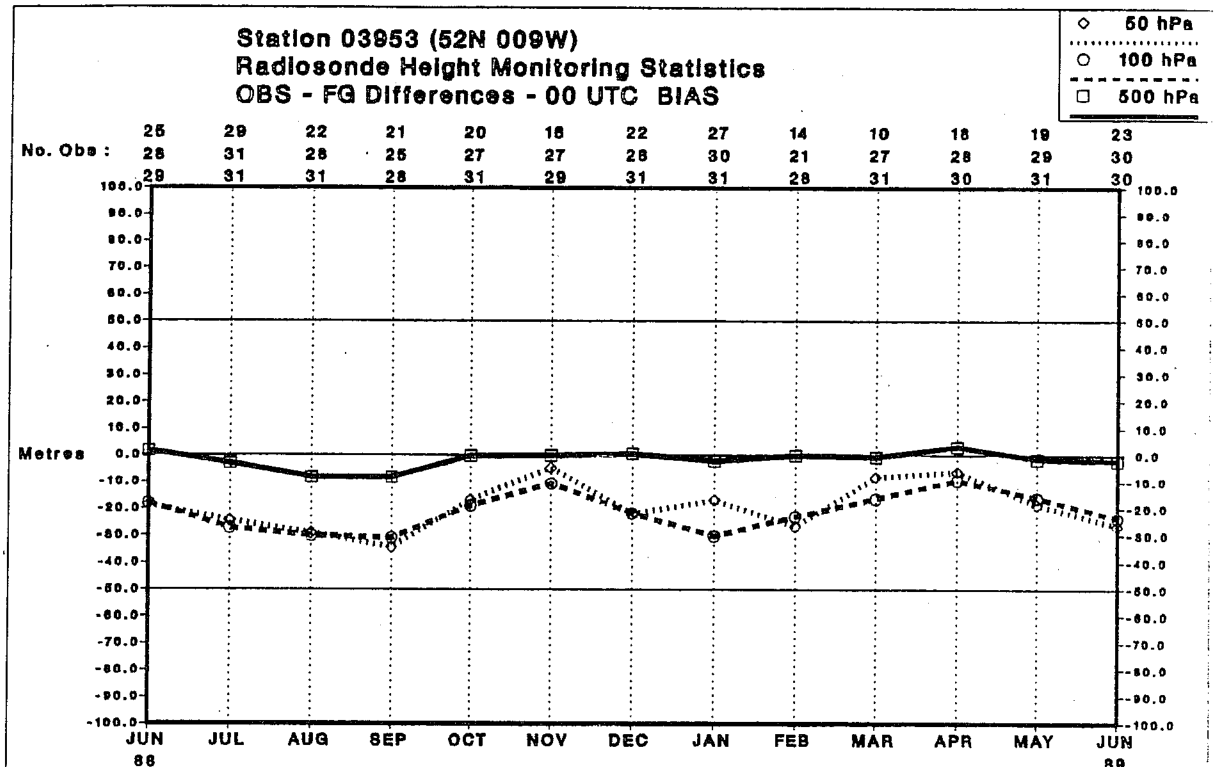

Station 38507 (40N 053E)
Radiosonde Height Monitoring Statistics
OBS - FG Differences - 12 UTC BIAS
◇ 50 hPa
○ 100 hPa
□ 500 hPa
No. Obs :
Metres
JAN 89
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
JAN 90

Fig. 8i



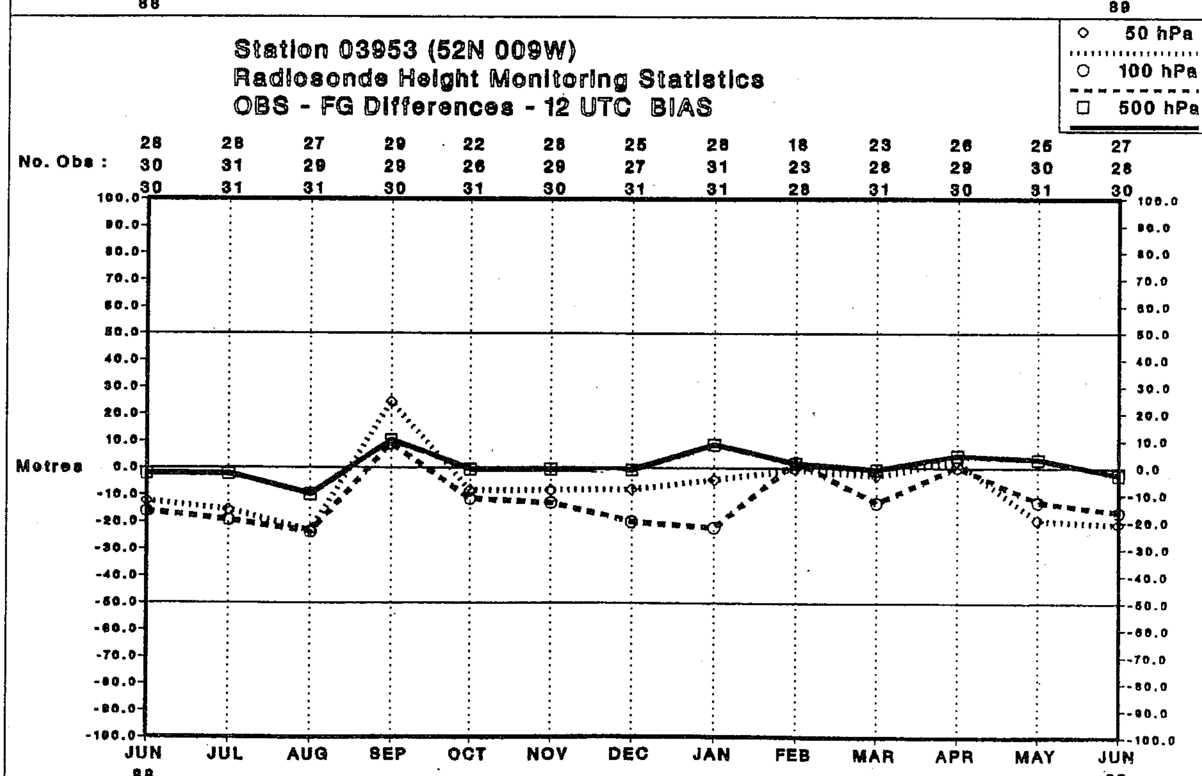


Fig. 9 As Fig. 5 for station 03953

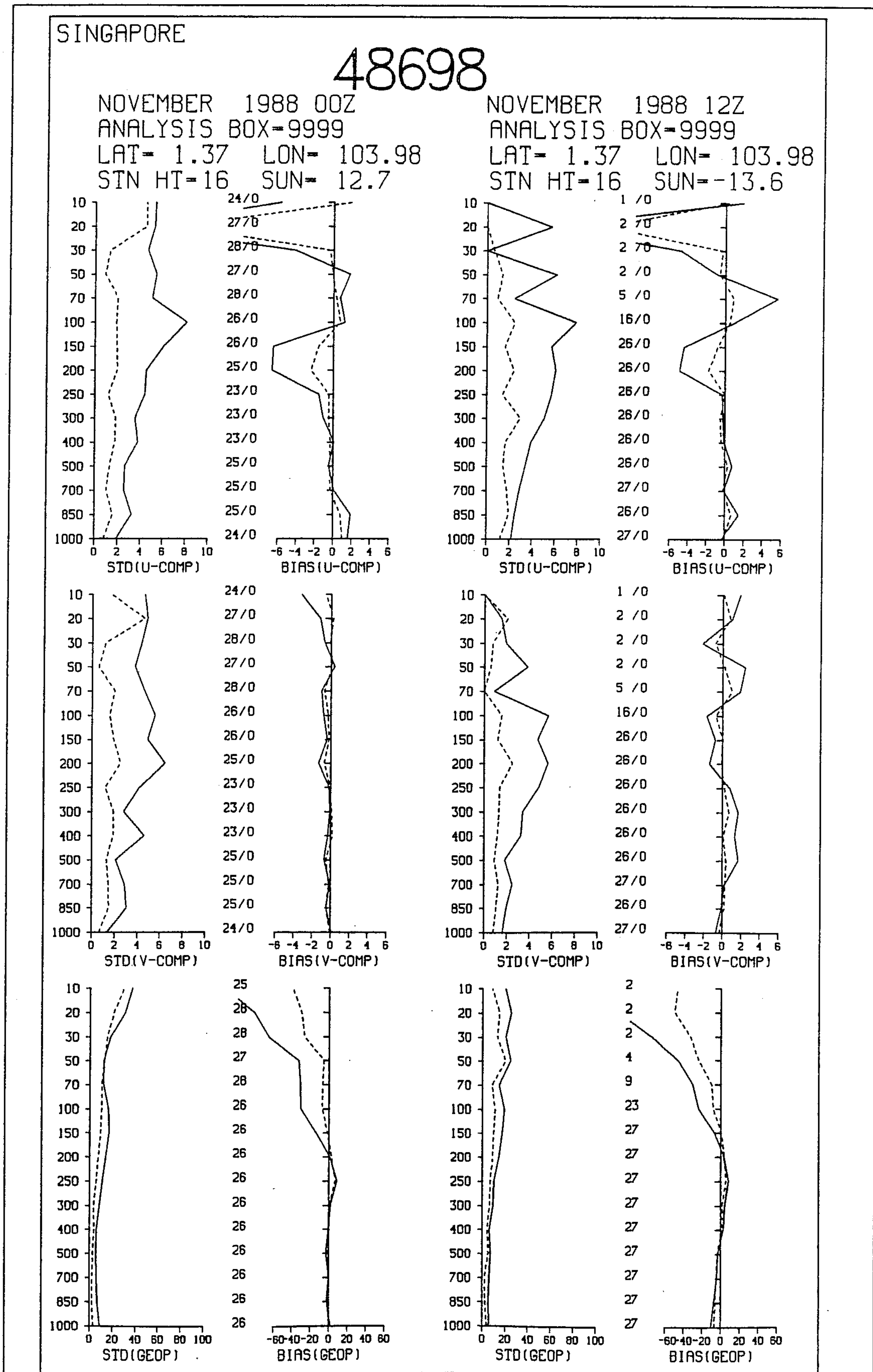


Fig. 10 Vertical profiles of observed minus first-guess (solid lines) and observed minus analysis (dashed lines) differences at station 48698 for November 1988

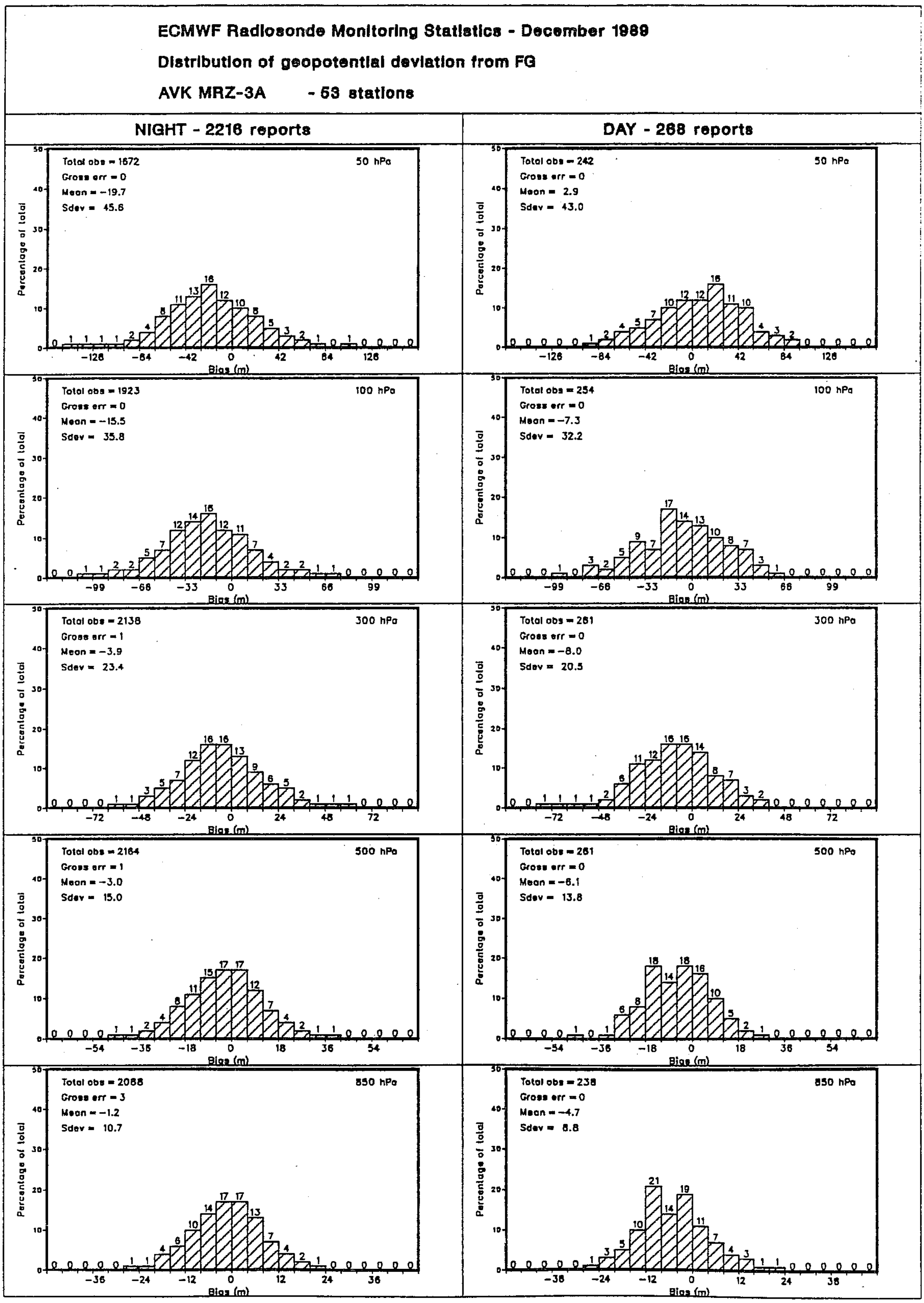


Fig. 11a

Figs. 11a to 11m Distributions of differences between observations and first-guess of geopotential height at 850, 500, 300, 100 and 50 Hpa for 11 different sonde types, night-time data (left) and daytime data (right, solar elevation larger than 10°)

ECMWF Radiosonde Monitoring Statistics - December 1989

Distribution of geopotential deviation from FG

Dr Graw, RSG - 5 stations

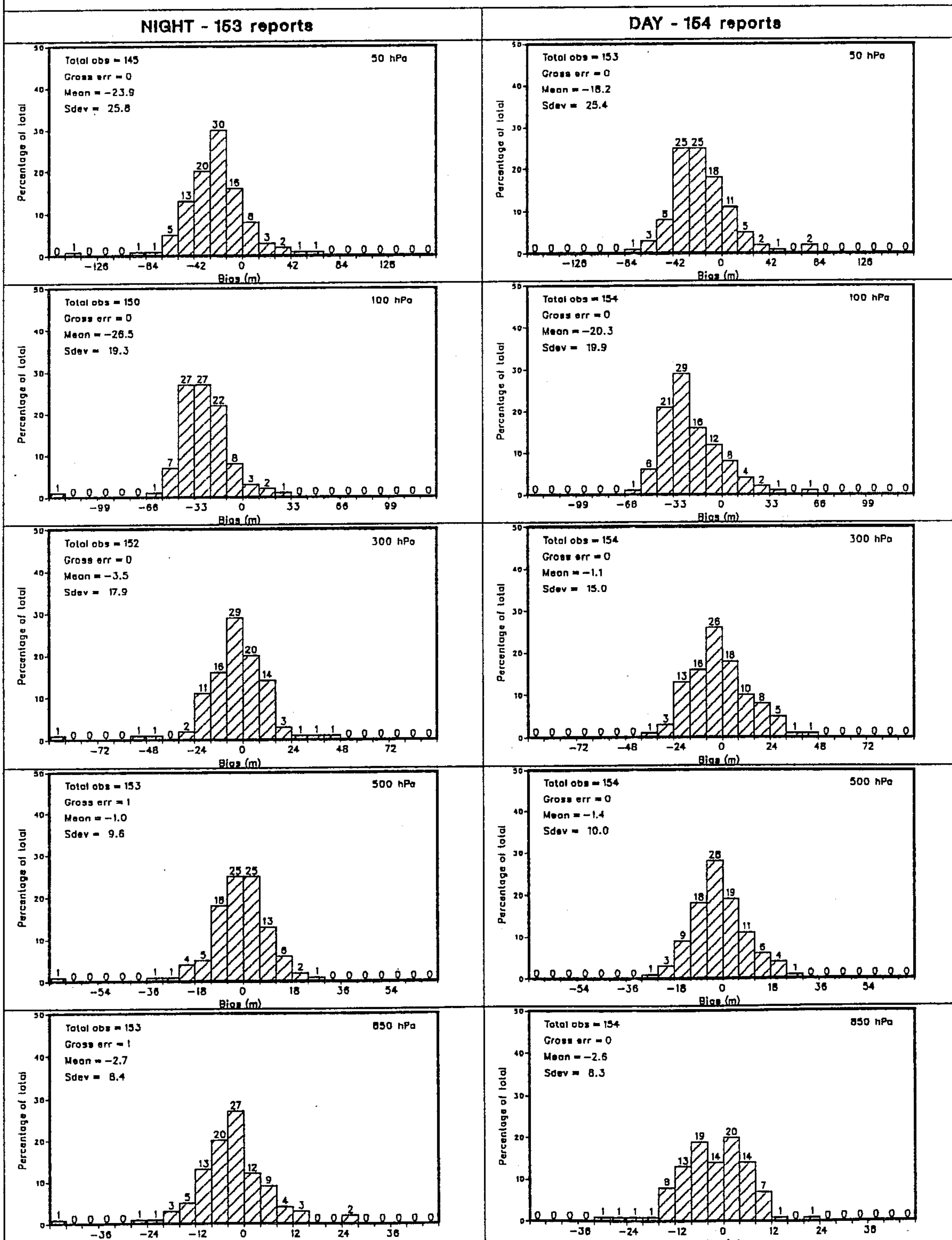


Fig. 11b

ECMWF Radiosonde Monitoring Statistics - December 1989

Distribution of geopotential deviation from FG

GZZ2-05 - 74 stations

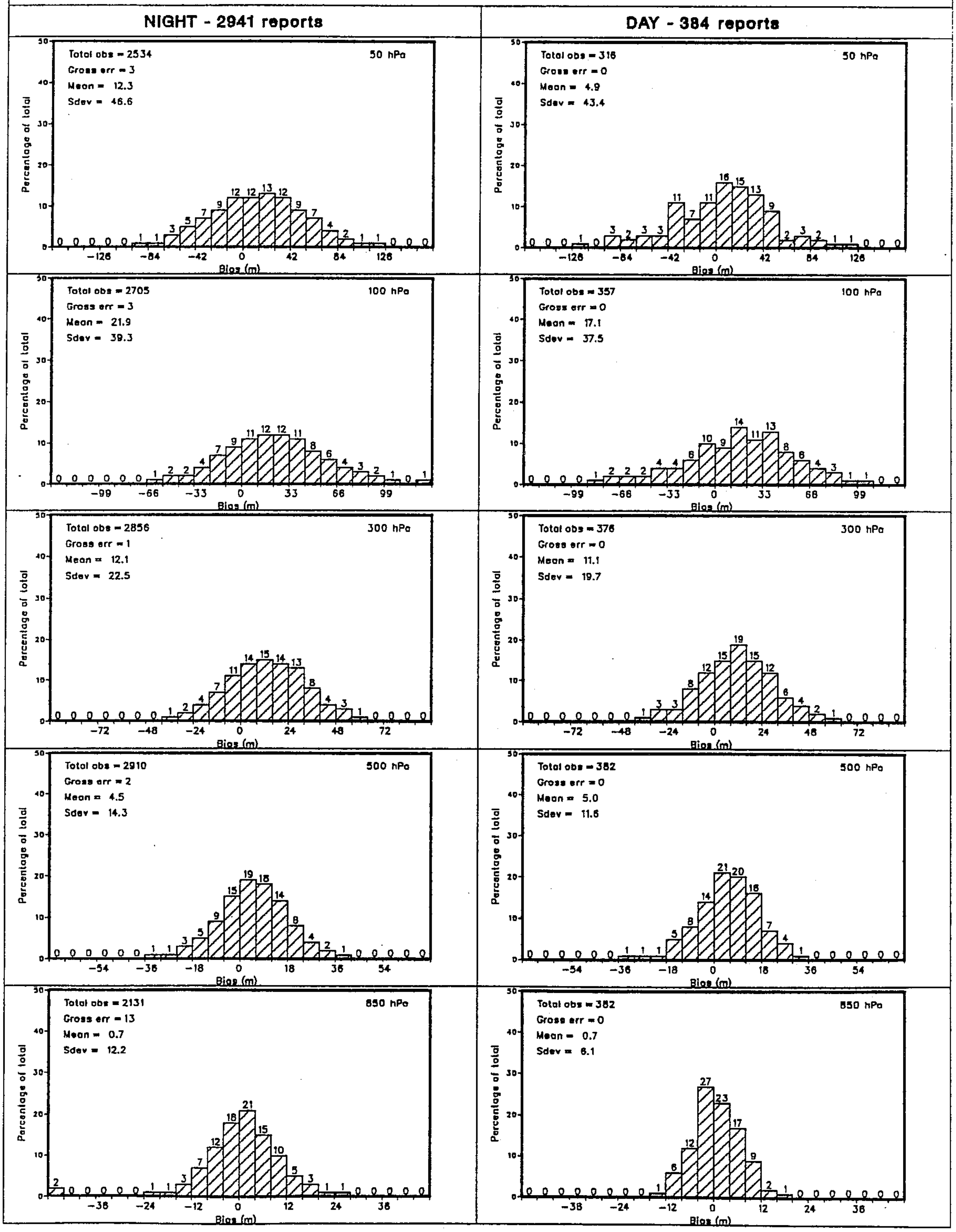


Fig. 11c

ECMWF Radiosonde Monitoring Statistics - December 1989

Distribution of geopotential deviation from FG

Jinyang Lo-Cate 1524-511 - 3 stations

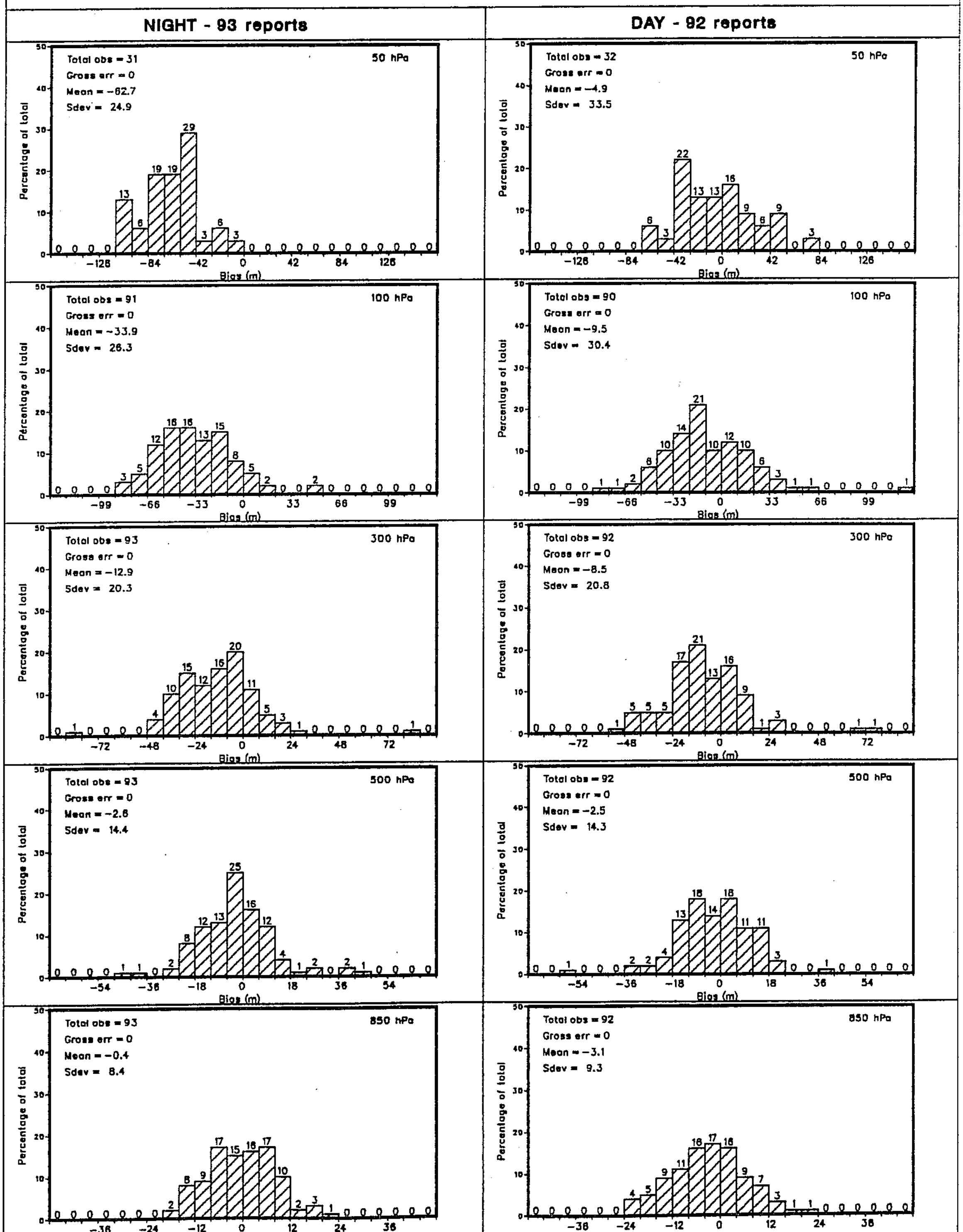
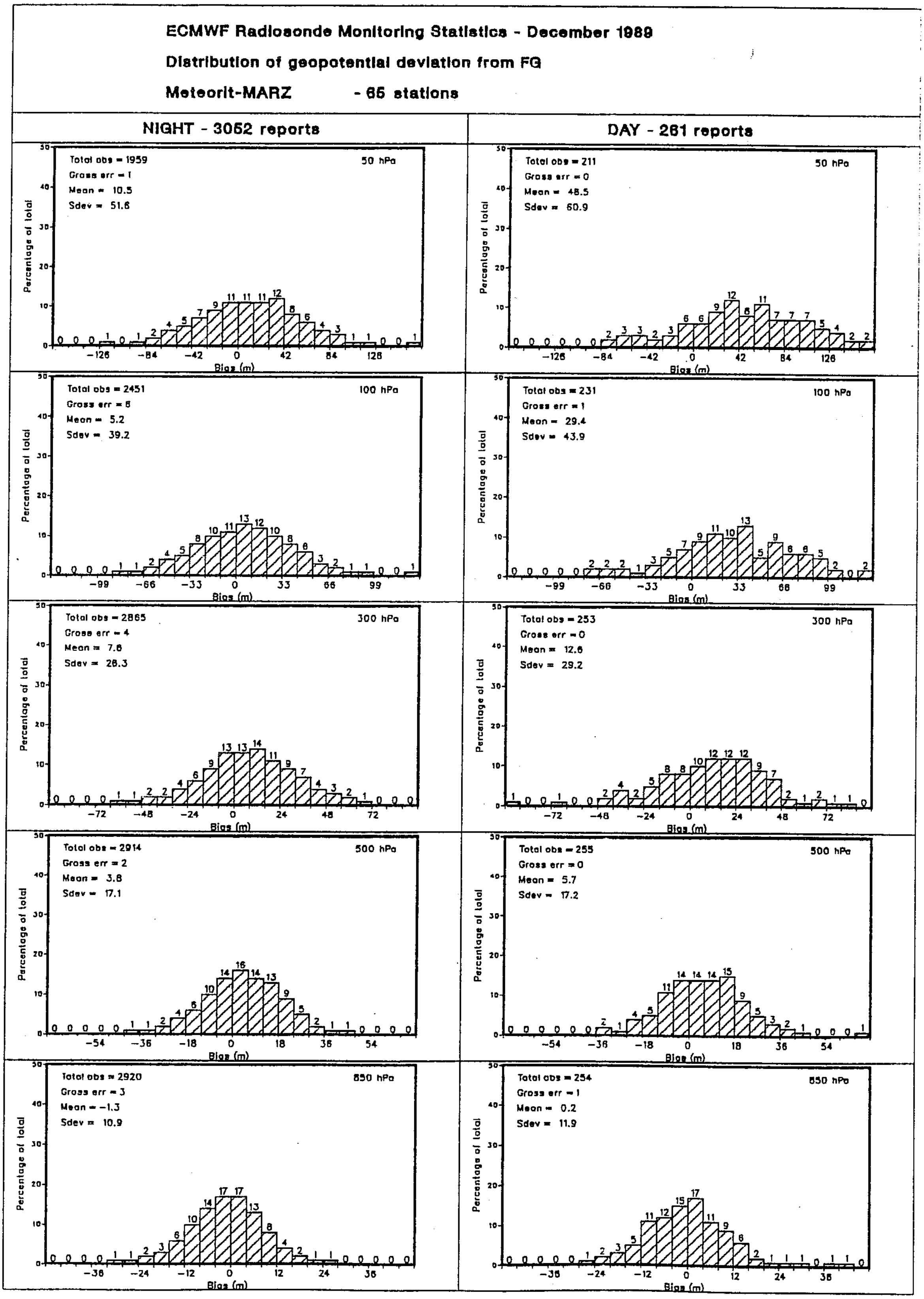
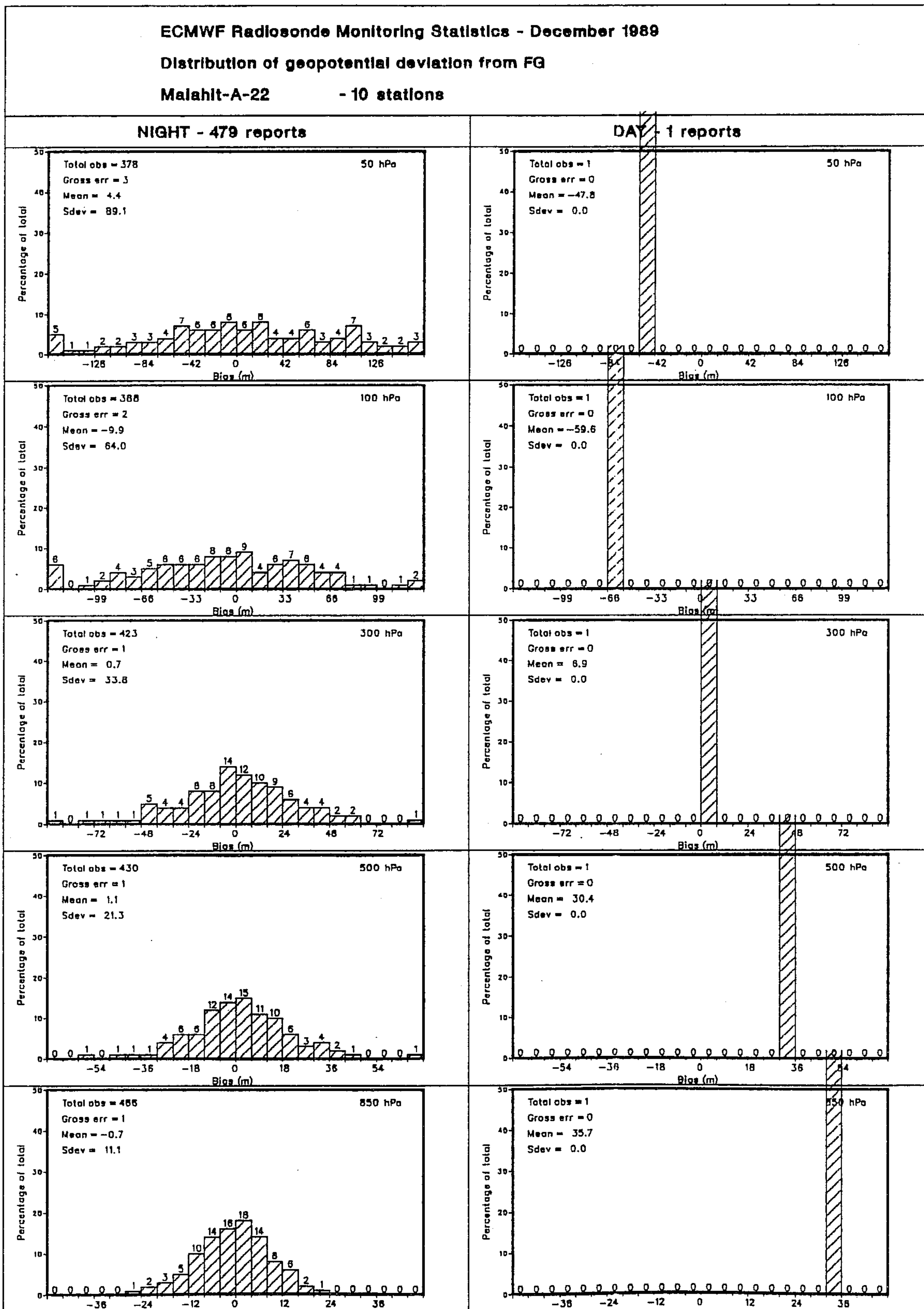


Fig. 11d



ECMWF Radiosonde Monitoring Statistics - December 1989
Distribution of geopotential deviation from FG
Meteorit-MARZ - 65 stations
NIGHT - 3052 reports
DAY - 261 reports
Total obs = 1959
Gross err = 1
Mean = 10.5
Sdev = 51.6
50 hPa
Total obs = 211
Gross err = 0
Mean = 48.5
Sdev = 60.9
50 hPa
Total obs = 2451
Gross err = 6
Mean = 5.2
Sdev = 39.2
100 hPa
Total obs = 231
Gross err = 1
Mean = 29.4
Sdev = 43.9
100 hPa
Total obs = 2865
Gross err = 4
Mean = 7.6
Sdev = 26.3
300 hPa
Total obs = 253
Gross err = 0
Mean = 12.6
Sdev = 29.2
300 hPa
Total obs = 2914
Gross err = 2
Mean = 3.8
Sdev = 17.1
500 hPa
Total obs = 255
Gross err = 0
Mean = 5.7
Sdev = 17.2
500 hPa
Total obs = 2920
Gross err = 3
Mean = -1.3
Sdev = 10.9
850 hPa
Total obs = 254
Gross err = 1
Mean = 0.2
Sdev = 11.9
850 hPa
Percentage of total
Bias (m)

Fig. 11e



ECMWF Radiosonde Monitoring Statistics - December 1989
Distribution of geopotential deviation from FG
Malahit-A-22 - 10 stations
NIGHT - 479 reports
DAY - 1 reports
Total obs = 378
Gross err = 3
Mean = 4.4
Sdev = 89.1
50 hPa
Total obs = 1
Gross err = 0
Mean = -47.8
Sdev = 0.0
Total obs = 388
Gross err = 2
Mean = -9.9
Sdev = 64.0
100 hPa
Total obs = 1
Gross err = 0
Mean = -59.6
Sdev = 0.0
Total obs = 423
Gross err = 1
Mean = 0.7
Sdev = 33.8
300 hPa
Total obs = 1
Gross err = 0
Mean = 6.9
Sdev = 0.0
Total obs = 430
Gross err = 1
Mean = 1.1
Sdev = 21.3
500 hPa
Total obs = 1
Gross err = 0
Mean = 30.4
Sdev = 0.0
Total obs = 466
Gross err = 1
Mean = -0.7
Sdev = 11.1
850 hPa
Total obs = 1
Gross err = 0
Mean = 35.7
Sdev = 0.0
Percentage of total
Bias (m)

Fig. 11f

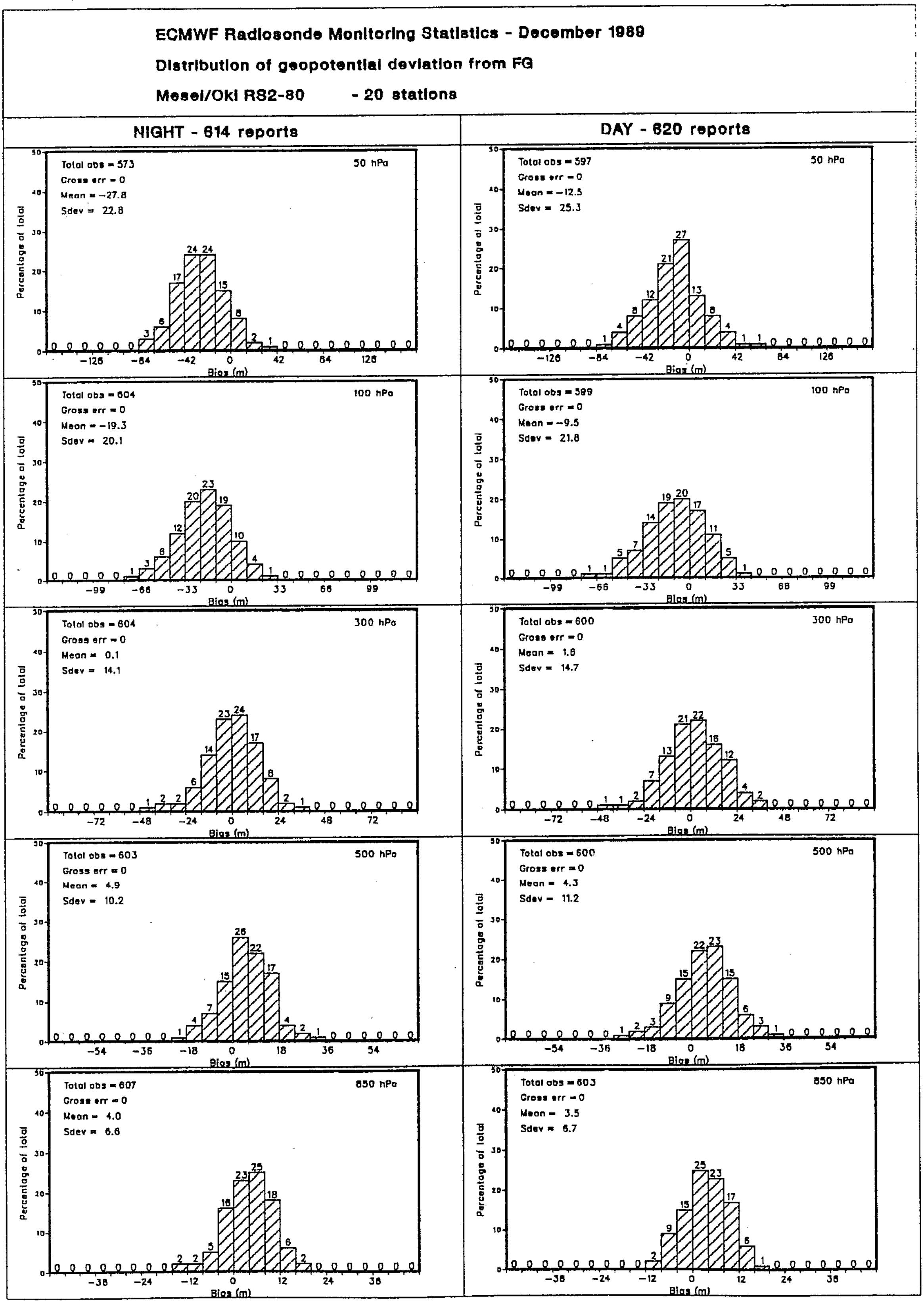

ECMWF Radiosonde Monitoring Statistics - December 1989
Distribution of geopotential deviation from FG
Meisei/Oki RS2-80 - 20 stations
NIGHT - 614 reports
DAY - 620 reports
Total obs = 573 Gross err = 0 Mean = -27.8 Sdev = 22.8 50 hPa
Total obs = 597 Gross err = 0 Mean = -12.5 Sdev = 25.3 50 hPa
Total obs = 604 Gross err = 0 Mean = -19.3 Sdev = 20.1 100 hPa
Total obs = 599 Gross err = 0 Mean = -9.5 Sdev = 21.8 100 hPa
Total obs = 604 Gross err = 0 Mean = 0.1 Sdev = 14.1 300 hPa
Total obs = 600 Gross err = 0 Mean = 1.6 Sdev = 14.7 300 hPa
Total obs = 603 Gross err = 0 Mean = 4.9 Sdev = 10.2 500 hPa
Total obs = 600 Gross err = 0 Mean = 4.3 Sdev = 11.2 500 hPa
Total obs = 607 Gross err = 0 Mean = 4.0 Sdev = 6.6 850 hPa
Total obs = 603 Gross err = 0 Mean = 3.5 Sdev = 6.7 850 hPa
Percentage of total
Bias (m)

Fig. 11g

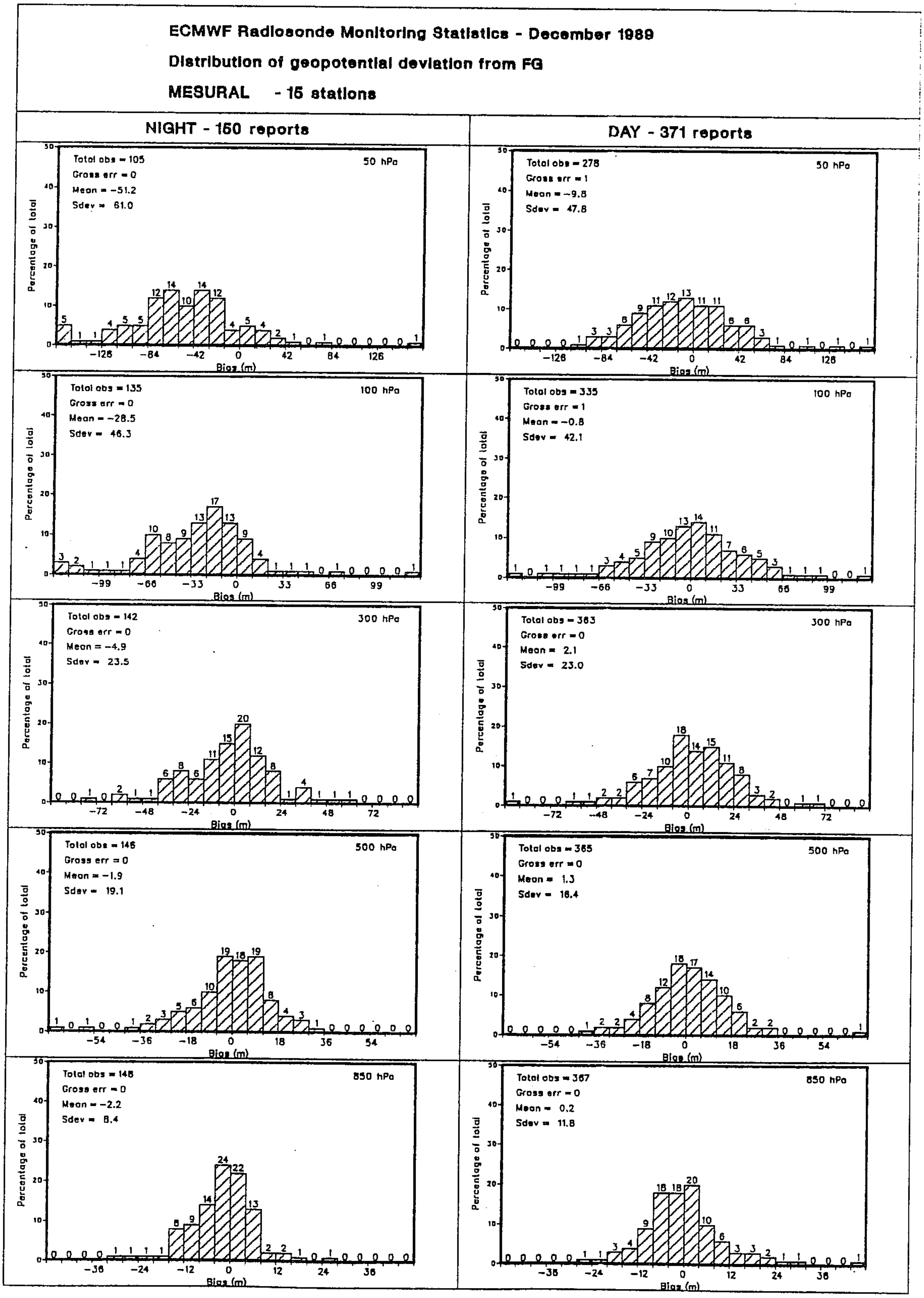

ECMWF Radiosonde Monitoring Statistics - December 1989
Distribution of geopotential deviation from FG
MESURAL - 15 stations
NIGHT - 150 reports
DAY - 371 reports
Total obs = 105
Gross err = 0
Mean = -51.2
Sdev = 61.0
50 hPa
Total obs = 278
Gross err = 1
Mean = -9.8
Sdev = 47.8
50 hPa
Total obs = 135
Gross err = 0
Mean = -28.5
Sdev = 46.3
100 hPa
Total obs = 335
Gross err = 1
Mean = -0.8
Sdev = 42.1
100 hPa
Total obs = 142
Gross err = 0
Mean = -4.9
Sdev = 23.5
300 hPa
Total obs = 363
Gross err = 0
Mean = 2.1
Sdev = 23.0
300 hPa
Total obs = 146
Gross err = 0
Mean = -1.9
Sdev = 19.1
500 hPa
Total obs = 365
Gross err = 0
Mean = 1.3
Sdev = 18.4
500 hPa
Total obs = 148
Gross err = 0
Mean = -2.2
Sdev = 8.4
850 hPa
Total obs = 367
Gross err = 0
Mean = 0.2
Sdev = 11.8
850 hPa
Percentage of total
Bias (m)

Fig. 11h

ECMWF Radiosonde Monitoring Statistics - December 1989

Distribution of geopotential deviation from FG

UK RS3 - 12 stations

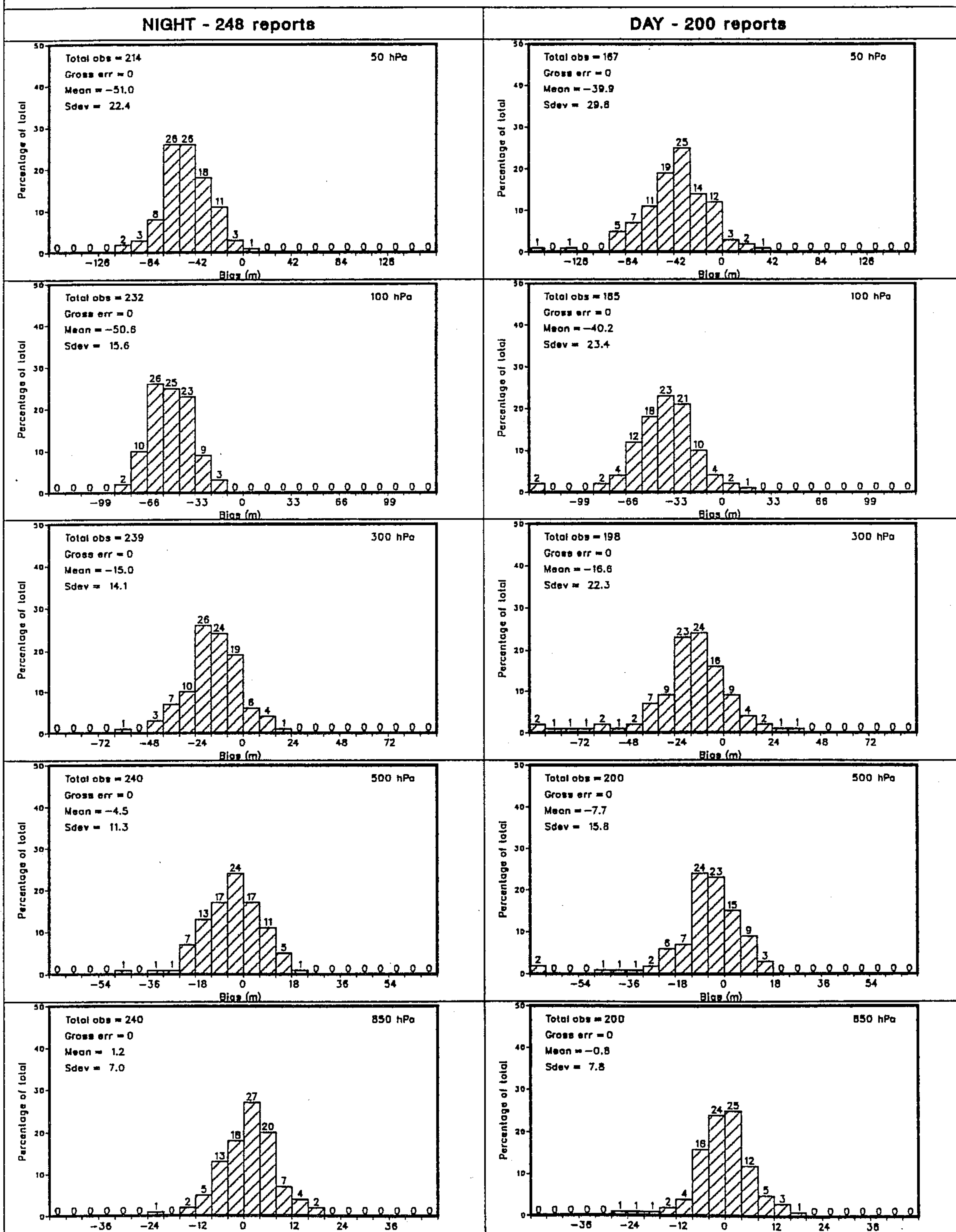


Fig. 11i

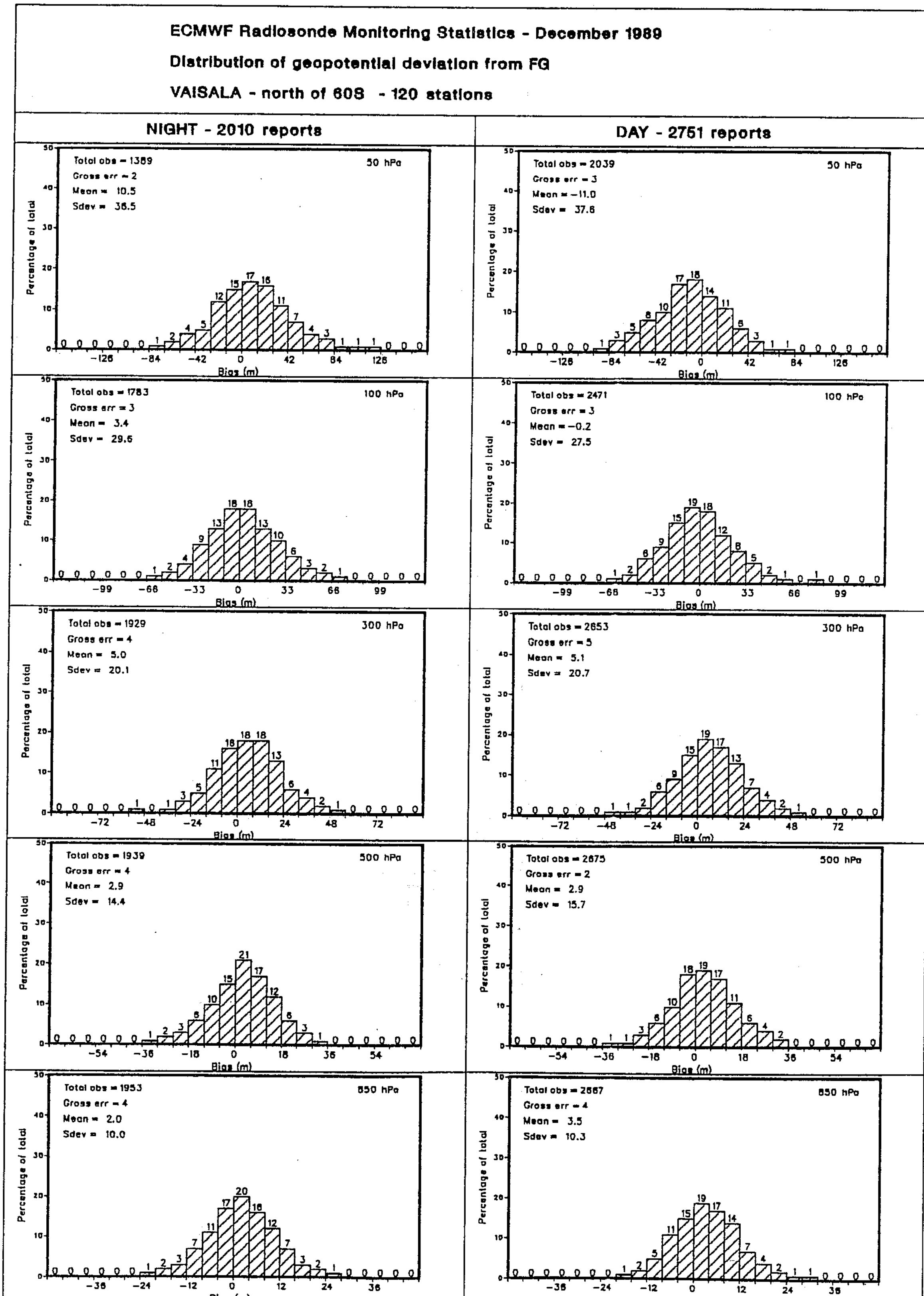

ECMWF Radiosonde Monitoring Statistics - December 1989
Distribution of geopotential deviation from FG
VAISALA - north of 60S - 120 stations
NIGHT - 2010 reports
DAY - 2751 reports
Total obs = 1389
Gross err = 2
Mean = 10.5
Sdev = 36.5
50 hPa
Total obs = 2039
Gross err = 3
Mean = -11.0
Sdev = 37.6
50 hPa
Total obs = 1783
Gross err = 3
Mean = 3.4
Sdev = 29.6
100 hPa
Total obs = 2471
Gross err = 3
Mean = -0.2
Sdev = 27.5
100 hPa
Total obs = 1929
Gross err = 4
Mean = 5.0
Sdev = 20.1
300 hPa
Total obs = 2653
Gross err = 5
Mean = 5.1
Sdev = 20.7
300 hPa
Total obs = 1939
Gross err = 4
Mean = 2.9
Sdev = 14.4
500 hPa
Total obs = 2675
Gross err = 2
Mean = 2.9
Sdev = 15.7
500 hPa
Total obs = 1953
Gross err = 4
Mean = 2.0
Sdev = 10.0
850 hPa
Total obs = 2667
Gross err = 4
Mean = 3.5
Sdev = 10.3
850 hPa
Percentage of total
Bias (m)

Fig. 11j

ECMWF Radiosonde Monitoring Statistics - December 1989

Distribution of geopotential deviation from FG

VAISALA - Europe - 29 stations

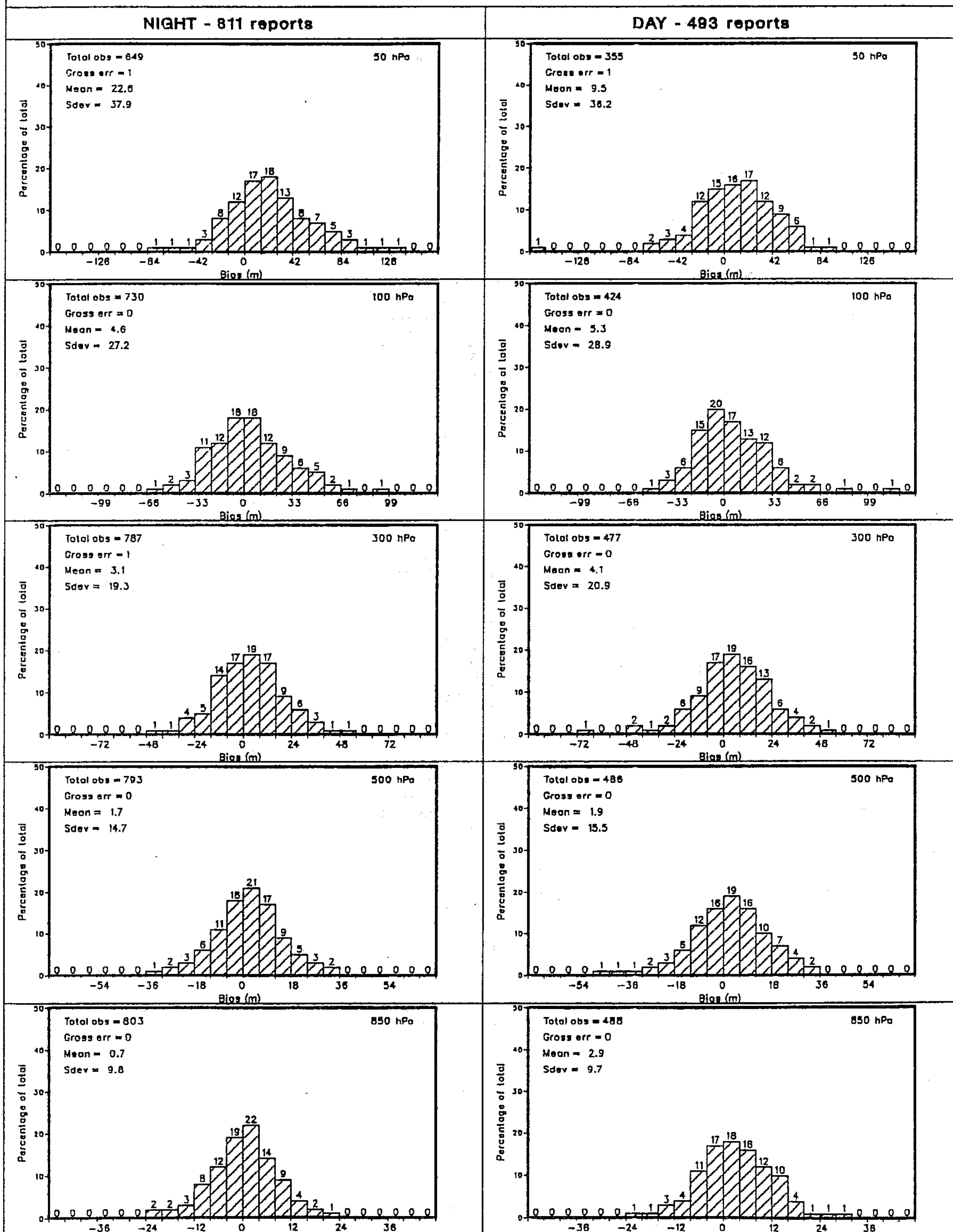


Fig. 11k

ECMWF Radiosonde Monitoring Statistics - December 1989

Distribution of geopotential deviation from FG

VAISALA - Australia - 27 stations

NIGHT - 211 reports	DAY - 824 reports

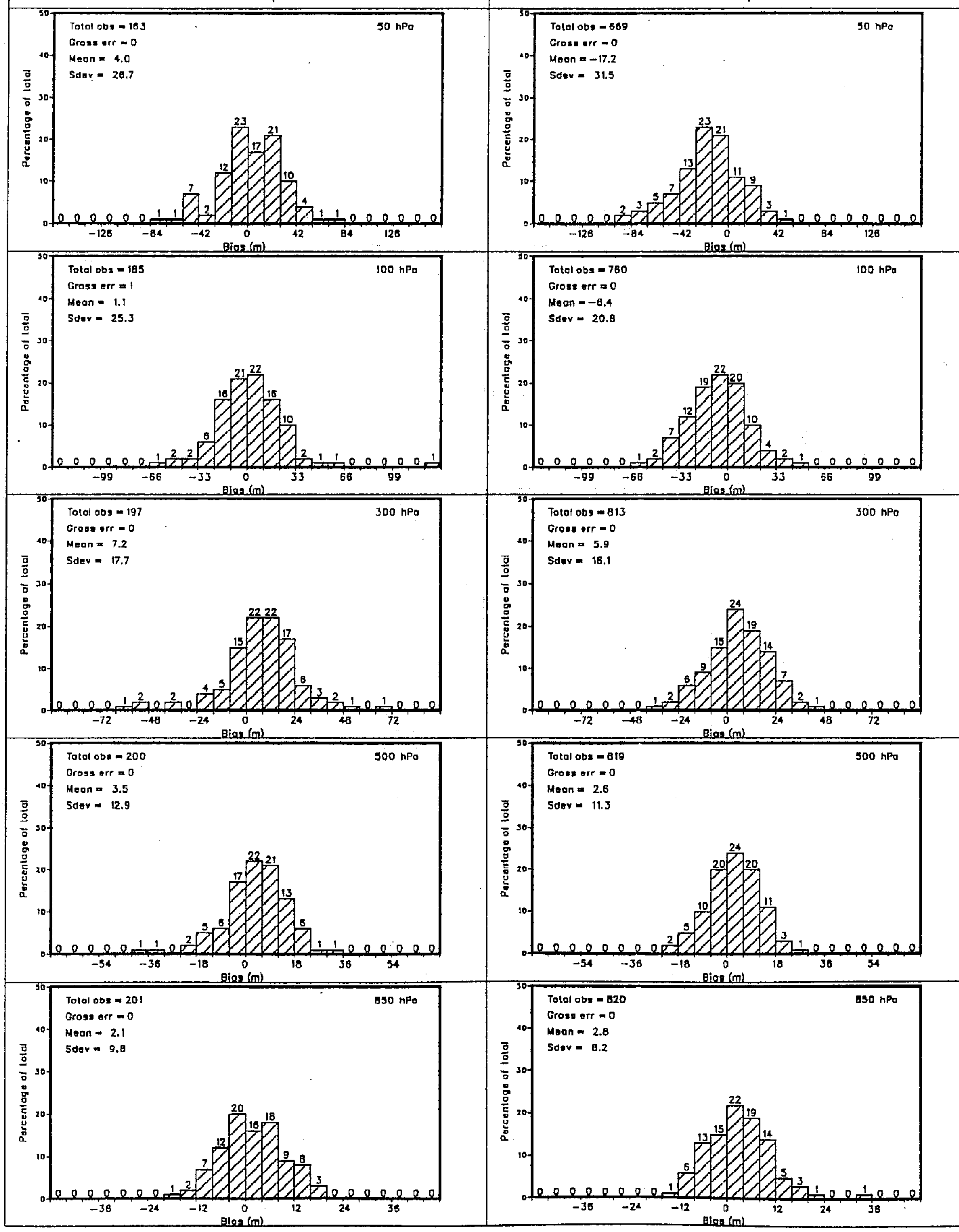


Fig. 111

Operator	Ident	Country	Sonde Type	Start
China	52533	China	GZZ2-05 - 400 MHz	800101
	52681	China	GZZ2-05 - 400 MHz	800101
	52818	China	GZZ2-05 - 400 MHz	800101
	52836	China	GZZ2-05 - 400 MHz	800101
	52866	China	GZZ2-05 - 400 MHz	800101
	52889	China	GZZ2-05 - 400 MHz	800101
	53068	China	GZZ2-05 - 400 MHz	800101
	53463	China	GZZ2-05 - 400 MHz	800101
	53513	China	GZZ2-05 - 400 MHz	800101
	53614	China	GZZ2-05 - 400 MHz	800101
	53772	China	GZZ2-05 - 400 MHz	800101
	53845	China	GZZ2-05 - 400 MHz	800101
	53915	China	GZZ2-05 - 400 MHz	800101
	54102	China	GZZ2-05 - 400 MHz	800101
	54135	China	GZZ2-05 - 400 MHz	800101
	54161	China	GZZ2-05 - 400 MHz	800101
	54218	China	GZZ2-05 - 400 MHz	800101
	54292	China	GZZ2-05 - 400 MHz	800101
	54337	China	GZZ2-05 - 400 MHz	800101
	54342	China	GZZ2-05 - 400 MHz	800101
	54374	China	GZZ2-05 - 400 MHz	800101
	54497	China	GZZ2-05 - 400 MHz	800101
	54511	China	GZZ2-05 - 400 MHz	800101
	54662	China	GZZ2-05 - 400 MHz	800101
	54823	China	GZZ2-05 - 400 MHz	800101
	54857	China	GZZ2-05 - 400 MHz	800101
	55299	China	GZZ2-05 - 400 MHz	800101
	55591	China	GZZ2-05 - 400 MHz	800101
	56029	China	GZZ2-05 - 400 MHz	800101
	56080	China	GZZ2-05 - 400 MHz	800101
	56137	China	GZZ2-05 - 400 MHz	800101
	56146	China	GZZ2-05 - 400 MHz	800101
	56294	China	GZZ2-05 - 400 MHz	800101
	56571	China	GZZ2-05 - 400 MHz	800101
	56691	China	GZZ2-05 - 400 MHz	800101
	56739	China	GZZ2-05 - 400 MHz	800101
	56778	China	GZZ2-05 - 400 MHz	800101
	56964	China	GZZ2-05 - 400 MHz	800101
	56985	China	GZZ2-05 - 400 MHz	800101
	57036	China	GZZ2-05 - 400 MHz	800101
	57083	China	GZZ2-05 - 400 MHz	800101
	57127	China	GZZ2-05 - 400 MHz	800101
	57178	China	GZZ2-05 - 400 MHz	800101
	57447	China	GZZ2-05 - 400 MHz	800101
	57461	China	GZZ2-05 - 400 MHz	800101
	57494	China	GZZ2-05 - 400 MHz	800101
	57516	China	GZZ2-05 - 400 MHz	800101
	57679	China	GZZ2-05 - 400 MHz	800101
	57749	China	GZZ2-05 - 400 MHz	800101
	57816	China	GZZ2-05 - 400 MHz	800101
	57957	China	GZZ2-05 - 400 MHz	800101
	57972	China	GZZ2-05 - 400 MHz	800101
	57993	China	GZZ2-05 - 400 MHz	800101
	58027	China	GZZ2-05 - 400 MHz	800101
	58150	China	GZZ2-05 - 400 MHz	800101
	58203	China	GZZ2-05 - 400 MHz	800101
	58238	China	GZZ2-05 - 400 MHz	800101

Operator	Ident	Country	Sonde Type	Start
China	58367	China	GZZ2-05 - 400 MHz	800101
	58424	China	GZZ2-05 - 400 MHz	800101
	58457	China	GZZ2-05 - 400 MHz	800101
	58606	China	GZZ2-05 - 400 MHz	800101
	58633	China	GZZ2-05 - 400 MHz	800101
	58666	China	GZZ2-05 - 400 MHz	800101
	58725	China	GZZ2-05 - 400 MHz	800101
	58847	China	GZZ2-05 - 400 MHz	800101
	58968	China	GZZ2-05 - 400 MHz	800101
	59134	China	GZZ2-05 - 400 MHz	800101
	59211	China	GZZ2-05 - 400 MHz	800101
	59265	China	GZZ2-05 - 400 MHz	800101
	59287	China	GZZ2-05 - 400 MHz	800101
	59316	China	GZZ2-05 - 400 MHz	800101
	59431	China	GZZ2-05 - 400 MHz	800101
	59553	China	GZZ2-05 - 400 MHz	800101
	59758	China	GZZ2-05 - 400 MHz	800101
	59981	China	GZZ2-05 - 400 MHz	800101
Colombia	80001	Colombia	VIZ 1680 MHz	800101
	80222	Colombia	VIZ 1680 MHz	800101
	80241	Colombia	Vaisala RS28 403 MHz	800101
	80398	Colombia	Vaisala Mac-12 403 MHz	800101
Cuba	78355	Cuba	Meteorit 2 (USSR) Marz 2-2	800101
Cyprus	17607	Cyprus	VIZ type 1395 - 403 MHz	800101
Czechoslov	11520	Czechoslova	DFR/MARS 45k - 1782 MHz	800101
	11952	Czechoslova	DFR/MARS 45k - 1782 MHz	800101
Federal Re	DBBH	ASAP	Vaisala RS80-15N 403 MHz	800101
	DBFJ	ASAP	Vaisala RS80-15N 403 MHz	800101
	DBFM	ASAP	Vaisala RS80-15N 403 MHz	800101
	DBLK	ASAP	Vaisala RS80-15N 403 MHz	800101
	10035	Federal Rep	Dr Graw, RSG, 400 MHz	891001
	10338	Federal Rep	Dr Graw, RSG, 400 MHz	890701
	10384	Federal Rep	Vaisala RS80-30N 404 MHz	890701
	10410	Federal Rep	Dr Graw, RSG, 400 MHz	800101
	10739	Federal Rep	Dr Graw, RSG, 400 MHz	800101
	10868	Federal Rep	Dr Graw, RSG, 400 MHz	800101
	89002	Antarctica	Vaisala RS80-15N 403 MHz	800101
Fiji	91680	Fiji	Vaisala RS80-15 403 MHz	800101
Finland	VSBV3	ASAP	Vaisala RS80-15N 403 MHz	800101
	02836	Finland	Vaisala RS80-15N 403 MHz	800101
	02935	Finland	Vaisala RS80-15N 403 MHz	800101
	02963	Finland	Vaisala RS80-15N 403 MHz	800101
France	FNOR	ASAP	Vaisala - RS 80 15 - 403 MHz	800101
	FNOU	ASAP	Vaisala - RS 80 15 - 403 MHz	800101
	FNPH	ASAP	Vaisala - RS 80 15 - 403 MHz	800101
	FNRS	ASAP	Vaisala - RS 80 15 - 403 MHz	800101
	07110	France	MESURAL - MH73A - 403 MHZ	800101
	07145	France	Vaisala - RS 80 15 - 403 MHz	890116
	07180	France	MESURAL - MH73A - 403 MHZ	800101

Radiosonde/Pilot Stations Database

Operator	Ident	Country	Sonde Type	Start
France	07481	France	MESURAL - MH73A - 403 MHZ	800101
	07510	France	Vaisala - RS 80 15 - 403 MHz	900109
	07645	France	Vaisala - RS 80 15 - 403 MHz	890124
	07761	France	MESURAL - MH73A - 403 MHZ	800101
	61976	Ile Tromeli	MESURAL-BAROSWITCH 2900-403MHz	800101
	61996	Ile Amsterd	Vaisala - RS 80 15 - 403 MHz	800101
	61998	Iles Kergue	Vaisala - RS 80 15 - 403 MHz	800101
	78897	Guadeloupe	MESURAL - MH73A - 403 MHZ	800101
	81405	French Guia	MESURAL - MH73A - 403 MHZ	800101
	89642	Antarctica	Vaisala - RS 80 15 - 403 MHz	900101
	91592	New Caledon	MESURAL - MH73A - 403 MHZ	800101
	91925	French Poly	MESURAL - MH73A - 403 MHZ	800101
	91938	French Poly	MESURAL - MH73A - 403 MHZ	800101
	91943	French Poly	MESURAL-BAROSWITCH 2900-403MHz	800101
	91944	French Poly	MESURAL - MH73A - 403 MHZ	800101
	91945	French Poly	MESURAL-BAROSWITCH 2900-403MHz	800101
	91948	French Poly	MESURAL-BAROSWITCH 2900-403MHz	800101
	91952	French Poly	MESURAL - MH73A - 403 MHZ	800101
	91954	French Poly	MESURAL-BAROSWITCH 2900-403MHz	800101
	91958	French Poly	MESURAL - MH73A - 403 MHZ	800101
German Dem	09184	German Demo	USSR, MARZ 2.2, 1780 MHz	800101
	09393	German Demo	USSR, MARZ 2.2, 1780 MHz	800101
	09486	German Demo	GDR, DFR/MARS 33, 1780 MHz	800101
	09548	German Demo	USSR, MARZ 2.1, 1780 MHz	800101
Greece	16622	Greece	Vaisala RS80-16, 1680MHz	800101
	16716	Greece	Vaisala RS80-15N, 403MHz	800101
	16754	Greece	Vaisala RS80-15N, 403MHz	800101
Hong Kong	45004	Hong Kong	Vaisala RS80-15N 403 MHz	800101
Hungary	12843	Hungary	USSR, MARZ-2-2, 1782 MHz	800101
	12982	Hungary	USSR, MARZ-2-2, 1782 MHz	800101
Iceland	04018	Iceland	Vaisala MW12, RS80, 403 MHz	900125
Ireland	03953	Ireland	Vaisala RS80-15p 403 MHz	800101
Ivory Coas	65578	Ivory Coast	Vaisala RS80, 403 MHz	800101
Japan	JBOA	ASAP	Meisei/Oki RS2-80, 1680 MHz	800101
	JCCX	ASAP	Vaisala RS80-15, 404.5 MHz	800101
	JDWX	ASAP	Vaisala RS80-15, 404.5 MHz	800101
	47401	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47412	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47420	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47580	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47582	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47590	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47600	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47646	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47678	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47681	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47744	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47778	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47807	Japan	Meisei/Oki RS2-80, 1680 MHz	800101

Operator	Ident	Country	Sonde Type	Start
Japan	47827	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47909	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47918	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47936	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47945	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47971	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	47991	Japan	Meisei/Oki RS2-80, 1680 MHz	800101
	89532	Antarctica	Meisei/Oki RS2-80, 1680 MHz	800101
Kenya	63723	Kenya	MESURAL - MH73A - 401-407 MHz	800101
	63741	Kenya	MESURAL - MH73A - 401-407 MHz	800101
Korea	47122	Korea	Jinyang Lo-Cate 1524-511	800101
	47138	Korea	Jinyang Lo-Cate 1524-511	800101
	47158	Korea	Jinyang Lo-Cate 1524-511	800101
	47185	Korea	Jinyang Lo-Cate 1524-511	800101
Madagascar	67083	Madagascar	Vaisala RS80-15, 403 MHz	800101
	67197	Madagascar	Vaisala RS80-15, 403 MHz	800101
Malawi	67586	Malawi	MESURAL, CITA, MH73A 403 MHz	800101
Malaysia	48601	Malaysia	Vaisala RS80-15 - 403 MHz	800101
	48615	Malaysia	Vaisala RS80-15 - 403 MHz	800101
	48648	Malaysia	Vaisala RS80-15 - 403 MHz	800101
	48657	Malaysia	Vaisala RS80-15 - 403 MHz	800101
	96413	Malaysia	Vaisala RS80-15 - 403 MHz	800101
	96441	Malaysia	Vaisala RS80-15 - 403 MHz	800101
	96471	Malaysia	Vaisala RS80-15 - 403 MHz	800101
	96481	Malaysia	Vaisala RS80-15 - 403 MHz	800101
Mali	61223	Mali	Vaisala RS80 - 403 MHz	800101
	61291	Mali	Vaisala RS80 - 403 MHz	800101
Mauritius	61986	Mauritius	N/A	0
	61988	Mauritius	N/A	0
	61995	Mauritius	N/A	0
Mozambique	67341	Mozambique	Vaisala RS80-15P, 403 MHz	800101
Netherland	06260	Netherlands	Vaisala RS80-15N - 403 MHz	800101
New Zealan	91610	Kiribati	Vaisala RS80-15	890730
	91643	Tuvalu	Vaisala RS80-15	890804
	91701	Phoenix Isl	Vaisala	800101
	91792	Tonga		0
	91800	Cook Island		0
	91801	Cook Island		0
	91830	Cook Island		0
	91843	Cook Island	Philips RS4	800101
	93012	New Zealand	Vaisala RS80-15	890330
	93246	New Zealand		0
	93291	New Zealand		0
	93308	New Zealand		0
	93417	New Zealand	Vaisala RS80-15	890227
	93545	New Zealand		0
	93614	New Zealand		0

Operator	Ident	Country	Sonde Type	Start
New Zealan	93677	New Zealand		0
	93780	New Zealand		0
	93844	New Zealand	Vaisala RS80-15	890410
	93890	New Zealand		0
	93944	New Zealand	Vaisala RS80-15N	800101
	93986	New Zealand	Vaisala RS80-15N	860918
	93997	New Zealand	Vaisala RS80-15N	800101
Norway	C7M	OWS	Vaisala RS80-15L 403 MHz	800101
	01001	Norway	Vaisala RS80-15N 403 MHz	800101
	01028	Norway	Vaisala RS80-15N 403 MHz	800101
	01152	Norway	Vaisala RS80-15L 403 MHz	800101
	01241	Norway	Vaisala RS80-15N 403 MHz	800101
	01384	Norway	Vaisala RS80-15N 403 MHz	800101
	01415	Norway	Vaisala RS80-15L 403 MHz	800101
Oman	41256	Oman	Vaisala RS80 403 MHz	800101
	41316	Oman	VIZ W08000 400-406 MHz	800101
Pakistan	41530	Pakistan	Vaisala RS80 403 MHz	800101
	41594	Pakistan	Vaisala RS80 403 MHz	800101
	41661	Pakistan	Vaisala RS80 403 MHz	800101
	41675	Pakistan	Vaisala RS80 403 MHz	800101
	41780	Pakistan	Vaisala RS80 403 MHz	800101
Poland	12120	Poland	Meteorit USSR MARZ 2.2	800101
	12330	Poland	Meteorit USSR MARZ 2.2	800101
	12374	Poland	Meteorit USSR MARZ 2.2	800101
	12425	Poland	Meteorit USSR A-22-IV 400 MHz	800101
Portugal	08522	Portugal	Vaisala RS80 - 1680 MHz	800101
	08579	Portugal	Vaisala RS80 - 403 MHz	800101
Romania	15120	Romania	USSR, A-22-IV, 217 MHz	800101
	15420	Romania	USSR, A-22-IV, 217 MHz	800101
	15480	Romania	USSR, A-22-IV, 217 MHz	800101
Saudi Arab	40375	Saudi Arabi	Vaisala RS80-15N, 403 MHz	800101
	40394	Saudi Arabi	Vaisala RS80-15N, 403 MHz	800101
	40416	Saudi Arabi	Vaisala RS80-15N, 403 MHz	800101
	40430	Saudi Arabi	Vaisala RS80-15N, 403 MHz	800101
	40437	Saudi Arabi	Vaisala RS80-15N, 403 MHz	800101
	41024	Saudi Arabi	Vaisala RS80-15N, 403 MHz	800101
	41114	Saudi Arabi	Vaisala RS80-15N, 403 MHz	800101
Seychelles	63985	Seychelles	Vaisala RS80, 403 MHz	800101
Singapore	48698	Singapore	Vaisala RS80-15N, 403 MHz	800101
South Afri	ZRRT	ASAP	Vaisala RS80-15N	800101
	68174	South Afric	Vaisala RS21	800101
	68263	South Afric	Vaisala RS80-16	800101
	68424	South Afric	Vaisala RS80-16	800101
	68442	South Afric	Vaisala RS80-16	800101
	68461	South Afric	Vaisala RS80-16	800101
	68512	South Afric	Vaisala RS80-16	800101
	68588	South Afric	Vaisala RS80-16	800101

Operator	Ident	Country	Sonde Type	Start
South Afri	68816	South Afric	Vaisala RS80-16	800101
	68842	South Afric	Vaisala RS80-16	800101
	68906	South Afric	Vaisala RS80-15N	800101
	68994	South Afric	Vaisala RS80-15N	800101
	89001	Antarctica	Vaisala RS80-15N	800101
Spain	08001	Spain	Vaisala RS80-15 403 MHz	800101
	08023	Spain	Vaisala RS80-15 403 MHz	800101
	08221	Spain	Vaisala RS80-15 403 MHz	800101
	08301	Spain	Vaisala RS80-15 403 MHz	800101
	08430	Spain	Vaisala RS80-15 403 MHz	800101
	60020	Spain(Canar	Vaisala RS80-15 403 MHz	800101
Switzerlan	06610	Switzerland	Meteolabor A.G. - 400 MHz	800101
Thailand	48327	Thailand	VIZ type 1495-411 (see file)	800101
	48407	Thailand	VIZ type 1495-411 (see file)	800101
	48455	Thailand	VIZ type 1495-411 (see file)	800101
	48568	Thailand	VIZ type 1495-411 (see file)	800101
Turkey	17030	Turkey	VIZ, Vaisala - 1680 MHz	800101
	17062	Turkey	VIZ, Vaisala - 1680 MHz	800101
	17130	Turkey	VIZ, Vaisala - 1680 MHz	800101
	17220	Turkey	VIZ, Vaisala - 1680 MHz	800101
	17240	Turkey	VIZ - 1680 MHz	800101
	17280	Turkey	VIZ - 1680 MHz	800101
	17352	Turkey	VIZ - 1680 MHz	800101
U.S.S.R.	20046	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	20069	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	20107	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	20274	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	20292	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	20353	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	20674	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	20744	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	20891	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	21358	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	21432	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	21504	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	21647	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	21824	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	21965	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	21982	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	22113	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	22271	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	22522	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	22550	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	22802	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	23022	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	23146	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	23205	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	23330	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	23418	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	23472	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	23552	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	23804	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101

Operator	Ident	Country	Sonde Type	Start
U.S.S.R.	23884	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	23921	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	23933	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	23955	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	24125	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	24266	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	24343	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	24507	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	24641	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	24688	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	24817	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	24908	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	24944	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	24959	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	25123	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	25173	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	25399	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	25551	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	25563	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	25594	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	25677	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	25703	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	25913	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	25954	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	26038	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	26063	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	26258	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	26298	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	26422	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	26629	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	26702	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	26781	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	26850	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	27037	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	27196	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	27553	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	27595	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	27612	U.S.S.R.	Meteorit-MARS/AVK-MRZ 1780 MHz	800101
	27947	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	28275	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	28440	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	28698	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	28722	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	28900	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	28952	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	29231	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	29282	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	29574	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	29612	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	29634	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	29698	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	30054	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	30230	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	30554	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	30635	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	30673	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	30692	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101

Operator	Ident	Country	Sonde Type	Start
U.S.S.R.	30715	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	30758	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	30935	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	30965	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31004	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31088	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31168	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31300	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31329	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31369	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31510	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31707	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31735	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31873	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31909	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31960	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	32061	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	32150	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32165	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32186	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32217	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32389	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	32540	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32618	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33008	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33041	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33345	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33393	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	33631	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33658	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	33815	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33837	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	33946	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	34009	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	34122	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	34172	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	34300	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	34560	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	34731	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	34858	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	34880	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35108	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35121	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35229	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	35394	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	35700	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35746	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35796	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	36177	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	36870	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	37018	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	37054	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	37260	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	37549	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	37789	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	37985	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	38062	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101

Operator	Ident	Country	Sonde Type	Start
U.S.S.R.	38392	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	38457	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	38507	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	38613	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	38687	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	38750	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	38836	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	38880	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	38954	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
UK	GACA	OWS	Vaisala RS80	800101
	ONDA	ASAP	Vaisala RS80	800101
	VPHA	ASAP	Vaisala RS80	800101
	03005	UK	UK RS3	800101
	03026	UK	UK RS3	800101
	03170	UK	UK RS3	800101
	03213	UK	UK RS3	800101
	03322	UK	UK RS3	800101
	03496	UK	UK RS3	800101
	03502	UK	UK RS3	800101
	03693	UK	UK RS3	800101
	03743	UK	UK RS3	800101
	03774	UK	UK RS3	800101
	03808	UK	UK RS3	800101
	03920	UK	UK RS3	800101
	08495	Gibraltar	Grawsonde M60	800101
	61901	St Helena	Vaisala RS80	800101
	88889	Falkland Is	Vaisala RS80	800101
	89022	Antarctica	Vaisala RS80	800101
Vanuatu	91557	Vanuatu	Vaisala RS80-15N	800101
Yugoslavia	13130	Yugoslavia	VIZ Type 1392-411, 1680 MHz	800101
	13275	Yugoslavia	Vaisala RS80-15P, 403 MHz	800101
Zambia	67475	Zambia		0
	67633	Zambia		0
	67666	Zambia	Vaisala RS80-15N, 403 MHz	800101
Zimbabwe	67774	Zimbabwe	Vaisala RS80 403 MHz	800101

Operator	Ident	Country	Sonde Type	Start
U.S.S.R.	30715	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	30758	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	30935	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	30965	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31004	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31088	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31168	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31300	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31329	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31369	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31510	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31707	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	31735	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31873	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31909	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	31960	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	32061	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	32150	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32165	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32186	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32217	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32389	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	32540	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	32618	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33008	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33041	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33345	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33393	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	33631	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33658	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	33815	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	33837	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	33946	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	34009	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	34122	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	34172	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	34300	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	34560	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	34731	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	34858	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	34880	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35108	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35121	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35229	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	35394	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	35700	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35746	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	35796	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	36177	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	36870	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	37018	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	37054	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	37260	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	37549	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	37789	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	37985	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	38062	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101

Operator	Ident	Country	Sonde Type	Start
U.S.S.R.	38392	U.S.S.R.	Malahit-A-22 1780 MHz	800101
	38457	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	38507	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	38613	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	38687	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	38750	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	38836	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
	38880	U.S.S.R.	AVK MRZ-3A, 1780 MHz	800101
	38954	U.S.S.R.	Meteorit-MARZ, 1780 MHz	800101
UK	GACA	OWS	Vaisala RS80	800101
	ONDA	ASAP	Vaisala RS80	800101
	VPHA	ASAP	Vaisala RS80	800101
	03005	UK	UK RS3	800101
	03026	UK	UK RS3	800101
	03170	UK	UK RS3	800101
	03213	UK	UK RS3	800101
	03322	UK	UK RS3	800101
	03496	UK	UK RS3	800101
	03502	UK	UK RS3	800101
	03693	UK	UK RS3	800101
	03743	UK	UK RS3	800101
	03774	UK	UK RS3	800101
	03808	UK	UK RS3	800101
	03920	UK	UK RS3	800101
	08495	Gibraltar	Grawsonde M60	800101
	61901	St Helena	Vaisala RS80	800101
	88889	Falkland Is	Vaisala RS80	800101
	89022	Antarctica	Vaisala RS80	800101
Vanuatu	91557	Vanuatu	Vaisala RS80-15N	800101
Yugoslavia	13130	Yugoslavia	VIZ Type 1392-411, 1680 MHz	800101
	13275	Yugoslavia	Vaisala RS80-15P, 403 MHz	800101
Zambia	67475	Zambia		0
	67633	Zambia		0
	67666	Zambia	Vaisala RS80-15N, 403 MHz	800101
Zimbabwe	67774	Zimbabwe	Vaisala RS80 403 MHz	800101

ANNEX 3 : Discrepancies in the altitude of the stations (September 1989 - altitudes in metres)

id.	Questionnaires	WMO list	ECMWF list
04018	38	54	38
13275	203	243	204
17280	660	677	659
20274	22	9	24
21432	22	10	22
21504	34	6	35
21647	20	10	24
21965	41	6	45
22113	121	46	120
23330	16	35	21
23804	116	96	121
24125	203	127	203
24688	740	726	742
24944	135	226	134
25563	6	62	2
25677	82	1	85
26063	76	4	74
26422	26	3	28
27553	157	82	161
27595	120	64	117
27612	183	156	191
27947	161	139	160
28440	287	237	284
28722	104	197	101
29574	206	194	212
29634	143	162	152
30715	437	450	450
30758	671	685	671
31960	87	138	82
32217	32	16	16
33041	126	139	124
33345	167	179	167
33658	214	240	220
33815	180	95	178
33837	42	64	41
33946	280	205	285
34009	248	167	245
34122	104	164	99
34172	170	156	168
34880	-17	18	-18
35121	120	109	113
36870	663	847	662
37260	115	13	122
37789	1113	907	1142
38457	492	428	495
38613	736	771	771
38750	-25	23	-23
38836	802	824	800
38880	304	228	302
38954	2102	2080	2105
47678	153	80	153

48455	3	20	5
48648	5	57	46
53845	959	245	959
57516	260	351	265
60020	36	46	37
60571	807	773	813
60680	1362	1378	1362
67083	1262	1276	1260
71072	58	12	61
71815	60	26	60
71896	675	691	675
71906	37	60	36
71924	40	67	42
89564	518	16	16
89611	41	15	50
94750	0	110	110
94995	6	46	7
96315	43	15	29
DBBH	6		6
DBFJ	3		3
DBFM	3		3
DBLK	25		27
FNOR	13		10
FNOU	13		11
FNPH	27		26
FNRS	27		26
ONDA	19		17
VPHA	19		17
VSBV3	18		16