ministerie van verkeer en waterstaat

koninklijk nederlands meteorologisch instituut

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Scientific Reports; WR 90-03

wetenschappelijke rapporten; WR 90-03

de bilt, 1990

de bilt 1990, publicationnumber: Scientific reports=
wetenschappelijke rapporten; WR 90-03

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ISSN: 0169-1615

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KNMI

Contents

1. Introduction

In the period from June 1 to June 25 1987, the so-called "Crau" experiment took place in the South of France. The purpose of this experiment was:

1. To study the exchange of heat and moisture between the earth's surface and the atmosphere over homogeneous and non-homogeneous terrain in relation to satellite observations of surface temperature.
2. To investigate the behaviour of the atmospheric surface layer if dry, warm air is advected over a wet cool surface.

The Crau is an extremely dry and flat area with penetrations of irrigated parcels along its northern border. It is situated east of the river Rhône, and approximately south of the line Arlon - Salon-de-Provence. The "dry Crau" measures about 150 km^2 and its area covers at least one Meteosat infrared pixel. Several measuring stations equipped and manned by institutes from England, Germany, Italy and the Netherlands were installed in the area. A description of the contribution of the KNMI ground station is given by Kohsiek et al. (1988).

The present document describes the Meteosat PDUS data (see Muller 1990 or MEP 1989b) which have been recorded at KNMI during the same period. General information on the processing of Meteosat data at KNMI and the utilities available for handling of the data can is given by Muller (1990).
In addition some related data sets which have not been described elsewhere are summarized in appendix D (sea surface temperatures - SST) and Appendix E (radiosonde data).

In sections 5.2 and 8 comparisons between Meteosat and Heimann data are made. In section 5.2 the comparison between raw Meteosat and Heimann data aims at an accurate locatization of the Meteosat data. In section 8 data for all available days are compared after the application of atmospheric corrections.

2. Area coverage of Meteosat data

Meteosat data were collected for an area of about 160x75 km^2 (32 columns x 10 lines) which was chosen such that the locations of all participants in the Crau area were covered and that sufficient ground control points would be available. The coordinates of the corner points are: NW 44.05N, 3.72E; NE 44.07N, 5.55E; SW 43.44N, 3.68E; SE 43.46N, 5.49E. The coordinates of the KNMI measurement location are 43°,35',13" (43.587) North and 4°,51',30" (4.858) East. Radiosonde data (Appendix E) are available in Nîmes which is located at about 43.89N, 4.31E. For comparisons with ship SST measurements (appendix D) and for a wider check of the ground control point localization several IR (infrared channel) and WV (water vapour channel) images also cover a larger area of the Mediteranean (southward down to 42.14N).

3. Time coverage of Meteosat data

Meteosat data of the following days are available: June 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 22, 23, 24. Due to a malfunctioning of the reception computer no data were received during several days in the middle of June. For direct comparisons between ground data and Meteosat data cloud free situations are required. These were mainly found on June 2,5,6,12,23,24. All PDUS data as disseminated by Darmstadt were recorded, which means:

- During the night an IR and a WV low resolution (5 x 7.8km^2)image every half hour.
- During the day a low resolution IR, WV and VIS (visible channel) image every hour, and in between a low resolution IR and a high resolution (2.5 x 3.9 km^2) VIS image.

4. Calibration

Visible images are not and cannot be calibrated. IR images are avalaible both in a calibrated form and in uncalibrated form. The calibrated images give temperatures in steps of one degree from -128 to +127 °C (byte 0-255), which means that there is some quantization error. This quantization error can be avoided by the use of the uncalibrated images. WV images are not calibrated but this can be done using the calibration procedure for IR and WV images which is described in Muller (1990) and in MEP(1989a and 1989b). Note that for the conversion from radiance to temperature the tables for Meteosat 2 (operational in June 1987) must be used, not those for Meteosat 4 (the present operational satellite). Since the start of MOP (Meteosat Operational Program) with the launch of Meteoat 4 in June 1989 the calibration procedure and formats have been changed (old procedure in Wolf 1984, new procedure in MDN 1989 and MEP 1989b). For consistency with recent satellite images the Meteosat 2 calibration coefficients have been recalculated and reformatted into the new format (see appendix B).

5 Localization (Navigation)

5.1 Navigation using ground control points

In Darmstadt every image is corrected for the actual position of the satellite (: is rectified). Using standard formulas (see Muller 1990) the geographical location of a pixel can be calculated from the Meteosat line and column number with an accuracy corresponding to about two lines/colums. The location of a small area can be determined more accurately using local ground control points, but this requires a (nearly) cloud free image. For the Crau images ground control points were available in the form of the shape of the nearby boundaries between land and water of the lakes Etang de Vacares and Etang de Berre (see figure 1).

Variation between succesive images is generally less than one pixel. Very accurate localization requires a cloudfree situation with a high resolution visible image and a careful comparison between visible image, infrared image and map. A quick inspection of those high resolution images which were (nearly) cloudfree over the whole area (found on 2, 5, 6, 12, 23, 24 June) showed that the KNMI measurement location is located at line 2171 or 2172 and column 1165 or 1166. Usually pixel 2172/1165 is the best choice. Nîmes is approximately located at 2176/1177.

5.2 Additional navigation using the passage of a narrow cloud band on June 9.

On June 9 a narrow cloud band moved over the KNMI location in south easterly direction. (see figure 2). This passage made an additional check on the localization possible. The amount of clouds over the whole area was small so that an accurate localization using the lakes was possible. Moreover we can compare the time dependence of the temperature as observed by Meteosat with the time dependence of the Heimann temperature and of the global radiation. Figure 3 shows the Meteosat pixels of lines 2171-2173 and columns 1164-1166 and the Heimann surface temperature and global radiation as a function of decimal time, as well as some corrected data which will be discussed hereafter. The large absolute difference between Heimann and Meteosat temperatures is due to the fact that no correction for the effect of the atmosphere has been made (see section 8). In this case we are only interested in the time dependence, so that we can ignore the absolute difference. Nevertheless the comparison of these different types of data is not straightforward. A large number of considerations and corrections must be made before any conclusions can be drawn:

a Timing difference:
Meteosat data in southern France are taken about 7 minutes before the (half) hour, the Heimann and global radiation give an average over the last 10 minutes before the (half) hour, so that the Meteosat data are taken 2 minutes before the middle of the averaging period of the other data.

b Difference in observed quantity:
When comparing the data we should remember that the global radiation gives the integral over the total hemisphere above the instrument and that the Heimann and Meteosat look towards the suface. Meteosat yields information about pixels of about 5x7.8 km^2 and the Heimann about an area of about 0.5 m^2. Moreover Meteosat observes a mixture of clouds and surface, but the Heimann in principle only the surface. Because the surface cools if clouds obscure the sun, the Heimann will indirectly show the presence of clouds. We can compensate for some of these differences by considering the complete cloud passage (both the onset of cooling and the subsequent heating after the passage of the cloud band). We must then allow for the fact that shortly after this cloud band other (probably semitransparent) clouds were partially covering the area

c Difference in viewpoint, position of Meteosat:
The change in Heimann temperature and global radiation depend on the moment the sun is obscured by cloud, i.e. on the position of the sun. At this time of the day the sun zenith angle is about 50 degrees, and the azimuth about 250 degrees. Because the frontside of cloud band is oriented from southwest to northeast (approximately the azimuth direction of the sun), the low zenith angle is not important in first approximation.
Meteosat is not overhead, but at a zenith angle in southern direction of about 50.2 degrees. From the temperature of the clouds and the radiosonde profile the cloud height can be estimated to be about 6 km. This means that the clouds are observed about one pixel too far to the north. In the figure 3 the hand-drawn dashed-dotted, dotted and warped lines show the results for ground pixels (1165,2172), (1166,2172) and (1166,2171) if a correction for this effect is made.

If we now compare the corrected Meteosat curves and the ground measured curves we see that the best fit for this case is surface pixel 1166,2172; closely followed by 1166,2171.Comparison of the nearly cloudfree high resolution visible image of 13.50(decimal time) with the position of the lakes on the map yielded the eastern side of column 1166 and a position between lines 2171 and 2172 as the optimum location of the ground measurements, which is in agreement with the conclusion based on figure 3.

6. Data storage

For use on the Vax the data have been stored on TK50 tape both in the C16- and the ASC-format (see section 7 for the definition of file formats). On MacIntosch floppy the data have been stored in the ASC-format.

The file name consists of a time group followed by an indicator of the datatype: YMMDDHHmm_x, where x can be I (IR, calibrated in steps of one degree), C (IR counts, to be calibrated using the data in the header), V (visible, counts), W (water vapour, counts, to be calibrated using the data in the header). The extension indicates the format type:.C16 or .ASC. Appendix A gives an overview of the available data.

7. Image file formats

Three different file formats have been defined for storage of Meteosat images. The principle format is the so called PIF (Processed Image File) format. For very small images this format is inefficient in its consumption of storage space, so that a C16 format has been defined which is identical to the PIF format except that the recordlength is 16 times smaller. Both the PIF format and the C16 format are unformatted internal Vax files, which are not very well suited for transport to other machines. Therefore a formatted filestructure has been defined, the ASC format. A description of the Vax utilities which can be used to handle all three file formats is given in Muller (1990).

7.1 VCS PIF format

A complete description of the PIF format can be found in the VCS manuals (1989, Structure of processed image files) the reference manuals of the VCS SAT and PDUS systems. All PIF files are unformatted sequential files with a fixed record length of 256 bytes. In version 2 of the SAT software the header consists of one record of 256 bytes, followed by the image data, but in version 3.0 it will be possible to insert additional header records between the first record and the image data. Then the routines for reading and writing PIF, ASC and C16 files must be adapted. The general header of the PIF file is specified as a Vax-Fortran Structure using 'unions and maps' (see the Vax Fortran Reference manual, version 5.0) to define the Meteosat specific parts. In Appendix B a description without unions and maps of the contents of the PIF header for a Meteosat file can be found.

7.2 C16 format

The C16 format is identical to the PIF format except for the record length which is only 16 bytes, so that storage of small images is more efficient.

7.3 ASC format

The ASC format is a formatted file with a recordlength of 192 bytes. The header consists of 4 records. The structure of the header can be inferred from the subroutine LHEADASC in the example program given in Appendix C.

Because of communication problems from Vax to MacIntosh using the communication program Mac240 and Kermit file transfer protocol the ASC files as produced in the Vax are defined with a recordlength of 193 bytes. The first byte contains only a space and is lost during transmission. An additional problem during transmission is that the first character which is received when a file or a series of files (using the. % wildcard character) is transmitted,is a linefeed. This linefeed has been removed from the Crau dataset.

8. Comparison of Meteosat and Heimann data.

8.1 Introduction

For all days on which both Meteosat and Heimann data were available a comparison between these datasets was made (for the Heimann data see Kohsiek et al. 1988) . In figures 4.x.**b** and 4.x.**d** (x= day number) the comparison of the calculated surface temperatures is shown for two different surface emissivities.

When comparing surface measured radiances and satellite radiances we must account for the effects of the atmosphere. A general description of this problem is given in Muller 1990. In this case we have used three different radiative transfer models to calculate the surface temperatures from the Meteosat infrared data and from the Heimann radiometer: Lowtran 6 (Kneizys et al. 1983), Lowtran 7 (Kneizys et al. 1988) and a simple bandmodel developed at KNMI (Tjemkes and Nieuwstadt 1990, Tjemkes 1988 a,b) . For the calculation of the atmospheric corrections we need:

a- the temperature and humidity profile,
b- the emissivity of the surface
c- the temperature of the surface
d- the height of the surface
e- the viewing angle,
f- the characteristics of the filter in the radiometer
g- the ozon and aerosol profile.

ad a. Temperare and humidity profiles for all hours were constructed from the radiosonde profiles observed at Nîmes at 00 and 12 GMT (see Appendix E) in the following way. For levels at or above 800 mb the temperatures of the day and night sonde were linearly interpolated. The diurnal change of the temperature at the lowest level (0 km) was estimated using Parton and Logan (1981). They show that a reasonable description of the diurnal temperature variation is obtained using a sine funcion during the day and an exponential during the night, although in sea-wind situations larger deviations much be expected. It was assumed that daily variation of the level at 900 mb has the same shape as that of the surface. The dewpoint temperature was linearly interpolated between the day and night sonde for all levels. Before June 17 only the soundings at 12 GMT are available in tabulated form. Data for 00 GMT were derived from the plots in Appendix E, so that the accuracy of these data is less good. Shortcomings of these constructed profiles will be discussed in section 8.2.1.

ad b. Two different emissivities were used: 1.0 and 0.96. If the surface emissivity equals 1.0 it is not necessary to correct the Heimann temperature because the Heimann is calibrated for an emissivity of 1.0. and is located only 2 meter above the surface so that the absorption by the atmosphere will be negligible. The true surface emissivity is certainly lower than 1.0. It was estimated as 0.96 ± 0.01 from a comparison between Heimann and air temperature for zero sensible heat flux for clear days only. If the surface emissivity is 0.96 the Heimann also observes about 4% (100-96) of the radiation from the sky, so that the atmospheric transfer model must be used to calculate a correction. Using the same method in an earlier publication (Muller et al. 1989) the surface emissivity was estimated as 0.97. In that case only the first days of June were used and moreover the Heimann data were not corrected for reflected radiation.

ad c. At the start of the calculation of the atmospheric correction the actual surface temperature is not known. As a first estimate we used the temperature as observed by the radiometer itself. Using the atmospheric correction as calculated with this estimate of the surface temperature a new estimate of the surface temperature is obtained. After three iterations the calculated correction was stable within 0.1 C. In Muller et al. (1989) a different procedure was followed. There the temperature at the top of the atmosphere as observed from the satellite was calculated.
For the calculation of the surface temperature from the Meteosat IR radiometer we used an average of the four Meteosat pixels which have the highest probability to correspond to the location of the Heimann radiometer (see section 5.1). Figures 4.x.e show the uncorrected IR value of these four pixels. If no clouds are present these four pixels have nearly identical values, proving the high homogeneity of the Crau area. If the Meteosat temperature was lower than 275 K clouds were certainly present and the data were not used.

ad d. The height of the KNMI location in the Crau area is 2m.

ad e The zenith angle of Meteosat for the KNMI location is 50.5 °C (see Muller 1990, appendix A2).

ad f. The filter characteristics of the Meteosat 2 IR (10.3-12.2 µm) and WV (5.7-7.3 µm) radiometers can be found in MEP (1982-1989). The filter characteristics of the Heimann radiometer are not precisely known, but the filter is probably located between 8 and 14 µm. A comparison between the atmospheric corrections using the Meteosat filter, a block filter between 10.3 and 12.2 µm and a block filter between 8 and 14 µm showed differences smaller than 0.4 °C, so that the precise shape is not very important. For the final calculations of the surface temperature for an emissivity of 0.96 a block filter between 8 and 14 µm was assumed.

ad g. The ozon and aerosol profile are not known , but not very important at IR and WV wavelengths. Therefore the standard profiles as available in the radiative transfer models were used.

An additional correction was applied to the Heimann temperatures to correct for the viewing direction. The Heimann radiometer was mounted such that it pointed towards the surface under an angle of 45° in southern direction. Therefore the Heimann observes a cooler scene than than an instrument looking north, such as Meteosat, and will indicate a lower temperature. Turning the instrument 180° around a vertical axis yielded a difference of roughly 2 °C per 1000 W/m^2 incident global radiation. Using the observed global radiation (see figure 5) the Heimann temperatures were corrected with a proportianal amount.

Figures 4.x.**f** show the magnitude of the atmospheric corrections for a surface emissivity of 0.96. Meteosat corrections vary between -2 and +17 degrees. Usually the KNMI bandmodel gives the smallest correction and Lowtran 6 the largest, but differences between always less than about 3 K. The Heimann correction (not shown) as discussed under ad b varies little and is about 1.7 K.

Together with figure 4.x.**e** figures 4.x.**a** and 4.x.**c** can be used to get an indication about the presence of clouds (see section 8.2.2). Figures 4.x.**a** and 4.x.**c** show the averages of the Meteosat observation in the VIS, IR and WV channels for 16 pixels around the KNMI location. Actually the Crau area is not really homogenous over this area, so that even on clear days the standard deviation is not zero (see figure 4.6.**a**). With error bars the standard deviation is indicated for the VIS and IR channel. For the WV channel only the average is shown because the standard deviation was nearly constant (about ± 4 K).

Meteosat data are available every half hour (except for the WV channel , which is only available every hour during the day). Atmospheric correction calculations were only performed at the hours, so that figures 4.x.**b**, 4.x.**e** and 4.x.**f** only give hourly values, which can not be interpolated to obtain the half-hourly results but nevertheless have been connected in the figure for clarity. Figures 4.x.**a**, 4.x.**c** and4.x.**e** give half-hourly Meteosat data. Therefore comparisons between these two sets of figures must be made carefully.

8.2 Discussion

If we only consider situation which are probably cloud-free in the direction of Meteosat (decision based on Meteosat data, see section 8.2.2 and 8.2.3) figures 4.x.**d** (emissivity = 1.0) generally give a better agreement between the surface temperatures as calculated from Meteosat and Heimann then figures 4.x.**b** (emissivity = 0.96). Figures calculated with a surface emissivity of 0.97 (not shown) show significantly less agreement than the figures based on an emissivity of 0.96. Altogether the comparison of Meteosat and Heimann data confirms the estimate of an emissivity of 0.96 ± 0.01 based on surface observations only (see section 8.1, ad b).

In the few really cloud free situations the difference between Meteosat and Heimann temperatures as calculated using the KNMI bandmodel is usually less than about 1 ^{o}C which is an excellent result considering:

- the large corrections which have been applied (atmosphere, viewing direction);
- the difference in observed scene;
- the temperature resolution of the digital Meteosat data which is about 0.5 ^{o}C for temperatures around 300K;
- the measurement error of the Heimann (several tenths of a degree).

Especially for large atmospheric corrections the KNMI bandmodel performs better than the Lowtran models, which are often about 1^{o}C too warm. Both Lowtran models give nearly the same results although Lowtran 7 performs slightly better.

Meteosat temperatures which are lower than Heimann temperatures are presumably caused by clouds, which can often be detected from the satellite data themselves (see section 8.2.2). Only in a few cases Meteosat temperatures were considerably higher than Heimann temperatures (up to 3 ^{o}C difference). This problem is discussed in section 8.2.1.

8.2.1 Meteosat temperatures higher than Heimann temperatures.

Occasionally the corrected Meteosat temperatures are higher than the Heimann temperatures. This cannot be due to clouds, but suggests an imperfect calculation of the atmospheric correction, as the effect is mainly observed when the atmospheric correction is very large (figure 4.6.**d** around noon). However in some cases during the evening the Meteosat temperature is considerably higher even for small atmospheric corrections (see figures 4.1.**d**, 4.5.**d**, 4.6.**d**).

This phenomenon is not fully understood. It might be due to the fact that the atmospheric corrections are calculated using the atmospheric profiles in Nîmes, which is located 50 km from the Crau location so that these profiles are not necessarily representative for the true profile. Using the Synop observations (Kohsiek et al, 1988) no correspondence with the occurrence of sea wind could be seen. Figure 6 shows a comparison between air temperatures as measured at the KNMI location and as estimated from the interpolation of the radiosonde data. On some days the phase diffence is considerable, and the deviations are systematically largest during the evenings. Moreover the constructed radiosonde profiles do not realistically follow the growth and decline of the atmospheric boundary layer. In the evening the whole boundary may stay warmer than it was assumed in section 8.1 (ad a). Recalculating the atmospheric corrections with higher temperatures at 100 and 900 mb showed that about 0.5 °C of the differences in figures 4.x.d might be explained in this way. Figure 7 compares the surface humidity data as measured at the KNMI location and as constucted from the radiosonde profiles. Here the correpondence is rather poor and no systematic differences are visible, so that alltogether the observed deviations between Heimann and Meteosat can only be partly explained.

8.2.2 Heimann temperatures higher than Meteosat temperatures, cloud detection

If the Meteosat temperature are lower than the Heiman temperature, this can usually be explained by the presence of (thin) clouds although also imperfections in the bandmodels will play a part. If clouds are present, figures 4.x.**a** and 4.x.**c** will show low average values and large standard variations. The average values are not a very reliable detector, because the actual surface temperature is not known. An unusually large IR standard deviation often indicates the presence of clouds (see the difference before and after 14 GMT in figure 4.2). In addition the presence of small scale clouds will give large fluctuactions between succesive observation in figures 4.x.**e** (see e.g. figure 4.12). In figure 4.6 between 18 and 20 GMT figures **a**,**c** and **e** indicate clouds which do not seem to influence the Meteosat temperatures. Note that these clouds are only present at the half hours whilst figures **b** and **d** only give hourly values!.

In nearly all figures large IR and/or VIS standard deviations are observed if the Heimann temperature is significantly higher than the Meteosat temperature. However, on June 24 the Heimann temperature is coniderably higher than the Meteosat temperature without an enhanced standard deviation in IR or VIS. In this case a thin semi-transparent layer of cirrus may be present between Meteosat and the KNMI location (see section 8.2.3). Unfortunately the Synop observations (see Kohsiek et al, 1988) can not be used to resolve this question, as these observations describe the state of the whole hemispheric dome and we are only interested in clouds between the site and Meteosat.

8.2.3 Detection of high thin or broken clouds.

An additional tool for the detection of high clouds is the combined use of IR and WV data (Bowen and Saunders 1984, Muller 1990). A radiative transfer model is used to calculate the expected theoretical relation between the radiances at 6.7 and 11 μm for optically thick clouds at different heights. If the radiative transfer model is fed with realistic input values (water vapour and temperature profile, see section 8.1), the observed values for the radiances from a pixel at 6.7 and 11 μm filled with opaque clouds should satisfy the theoretical relation. If transparent cirrus is present the observed infrared temperature will be too high, so that the observed points in the affected area deviate significantly from the curve (see figure 8). When comparing theoretical and observed IR/WV relations the theoretical curve often lies below the observed points for cloudless situations, but a satisfactory explanation has never been given.

For several days figures 9.x (x=date) give the IR/WV data for an area of 16 pixels with highlighting of the 4 central pixels together with the theoretical curve. For each day two periods are shown which were usually selected such that clouds are more likely for one period than for the other (expectation based on figures 4.x). Note that for all cloudless situations the observed (surface) points do indeed not lie on the theoretical curve. This cannot be due to the uncertainty in the lowest part of the radiosonde profiles (see section 8.2.1) as this part of the profile does not influence the calculated WV values. For clouds the observed and theoretical relationship are much better in agreement (see e.g. figure 9.5). Table 2 summarizes the results for the 4 central pixels compared to the theoretical value as calculated using the KNMI bandmodel.

In general the IR-WV comparison confirms the presence of clouds as inferred from figures 4.x.**a**,**c**,**e**: if clouds are present the points in the IR/WV plot have a relativily lower WV value (in figure 9.6 the two lowest points are probably due to noise in the WV channel) and the difference in tabel 2 is smaller. However, on 24 June neither the IR nor the VIS standard deviation detect the presence of cloud between 9 and 17 GMT although the Heimann temperature is much higher than the Meteosat temperature between 10 and 15 GMT. Only the IR/WV comparison (table 2) suggests that in the early afternoon more cirrus may be present than in the early morning.

Table 2 Comparison between 4-point WV averages and theoretical values (see also figures 9.x)

day x	theoretical value at surface	time period	average 4 pixels value	difference with theoretical value KNMI bandmodel	day x	theoretical value at surface	time period	average 4 pixels	difference with theoretical value KNMI bandmodel
1	241.5	13-15	248.1	6.6	9	240.4	3-6	249.3	8.9
		18-20	249.6	8.1			11-13	246.5	6.1
2	243.4	8-12	245.9	2.5	11	242.7	4.30-6	247.1	4.4
		15-18.30	249.3	5.9			11-12	249.3	6.6
5	244.1	5.30-9	250.6	6.5	12	242.6	10-12	245.1	2.5
		13-17	244.9	0.8			16-17	247.1	4.5
6	238.7	5-9	248.2	9.5	23	242.1	4-6	244.1	2.0
		12-16	246.9	8.2			14-17	246.0	3.9
8	243.4	14-16	249.0	5.6	24	242.6	5.30-9	246.5	3.9
		18-19.30	250.4	7.0			11-15	244.8	2.2

8.2.4 Conclusions

- When comparing Meteosat and Heimann observations large corrections for the influence of the atmosphere must be made (up to about 15 ^{o}C , typically 5-10 ^{o}C). Moreover Meteoat and Heimann have a different viewing direction and scene size. Despite these large corrections and the resolution of the digital Meteosat data of about 0.5 ^{o}C around 300K the difference between Meteosat and Heimann observed temperatures during clear periods is usually less than 1 ^{o}C.
- Frequently Meteosat temperatures are lower than Heimann temperature, which is almost certainly due to clouds.
- Using the standard deviation of IR and VIS channels it is possible to detect many of the cloudy situations.
- Comparison of the observed WV brightness with a theoretical estimate gives an addional indication of clouds.
- Heimann temperatures which are up to 3 ^{o}C lower than Meteosat temperatures occur preferentially during the evening, which has not been explained completely.
- The average surface emissivity between 10 and 12 μm is 0.96 ± 0.01.
- The KNMI bandmodel performs slightly better than the Lowtran models.

9. References

MEP reports are available from:
Meteosat Exploitation Project, ESOC, Robert-Bosch Strasse 5, 6100 Darmstadt, Germany.

Bowen R.A. and Saunders R.W., 1984, The Semi Transparancy correction as applied operationally to Meteosat Infrared data, ESA Journal 8, p 125-131.

Kneizys F.X., Shettle. E.P., Abreu L.W., Chetwynd J.G., Anderson G.P., Gallery W.O., Selby J.E.A. and Clough S.A., 1988, Users guide to LOWTRAN 7, AFGL-TR-88-0177, AFGL Hanscom AFB, Ma 01731, USA, 137 pp.

Kneizys F.X., Shettle. E.P., Gallery W.O., Chetwynd J.G.,Abreu L.W., Selby J.E.A., Clough S.A. and Fenn R.W., 1983, Atmospheric Transmittance/Radiance: Computer Code LOWTRAN 6, AFGL-TR-83-0817, AFGL Hanscom AFB, Ma 01731, USA, 200 pp.

Kohsiek W., van der Vliet J.G., Monna W.A.A., 1988 , Crau 1987: the KNMI contribution, KNMI Technical Report TR-110.

MDN, 1982-1989, Meteosat Dissemination News, available from: Eumetsat, Am Elfengrund 45, D-6100 Darmstadt

MEP, 1982-1989, Meteosat 2,3,4 Calibration reports, OD/MEP/MET, ESOC Darmstadt.

MEP, 1987, MIEC processing, OD/MEP/MET, ESOC Darmstadt.

MEP, 1989a, Annexe to the Meteosat-4 calibration report, OD/MEP/MET, ESOC Darmstadt.

MEP, 1989b, , Meteosat High Resolution Image Dissemination , OD/MEP/MEt, ESOC, Darmstadt (Meteosat System Guide Volume 9).

Muller S.H., De Bruin H.A.R., and Jacobs C.M.J.,1989, Crau Experiment: Surface temperatures derived from Meteosat, comparisons with ground truth data, Proceedings of the 7th Meteosat Scientific User Conference Madrid, 1988, p 155-158

Muller S.H., 1990, Quantitative processing of Meteosat data: Implementation at KNMI, Applications, KNMI Technical Report 127.

Parton W.J. and Logan J.A., 1981, A model for diurnal variation in soil and air temperature, Agric. Met. 23, p 205-216

Tjemkes S.A., 1988a, Radiative cooling in the nocturnal boundary layer, KNMI Scientific reports, WR 88-05

Tjemkes S.A., 1988b, A comparison of infrared radiation codes for the nocturnal boundary layer. In IRS'88: Current problems in atmospheric radiation. August 1988, Lille, Deepak, Hampton, Vir., p 429-432.

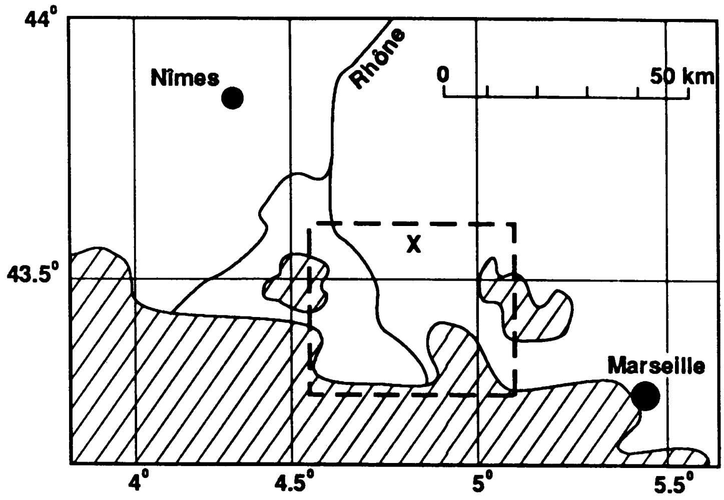
Tjemkes S.A. and Nieuwstadt F.T.M., 1990, An longwave radiation model for the nocturnal boundary layer, J. Geoph. Res. 95, p 867-872.

VCS Manuals 1989, VAX-SAT Reference Manual,
VAX-SAT Structure of Processed Image Files
VAX-SAT User's guide
VAX-PDUS Reference Manual
VAX-PDUS User's guide

Wolf R., 1984, Meteosat System Guide Volume 9, Meteosat High Resolution Image Dissemination (and updates), ESOC-MEP, Darmstadt.

Figure 1

Maps of the Crau area



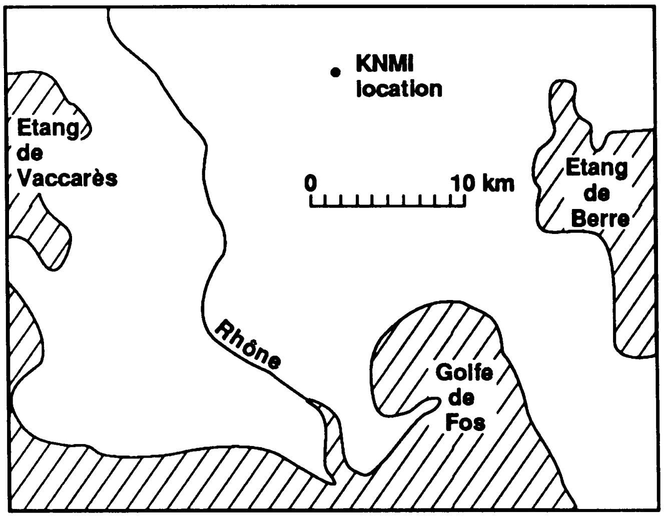
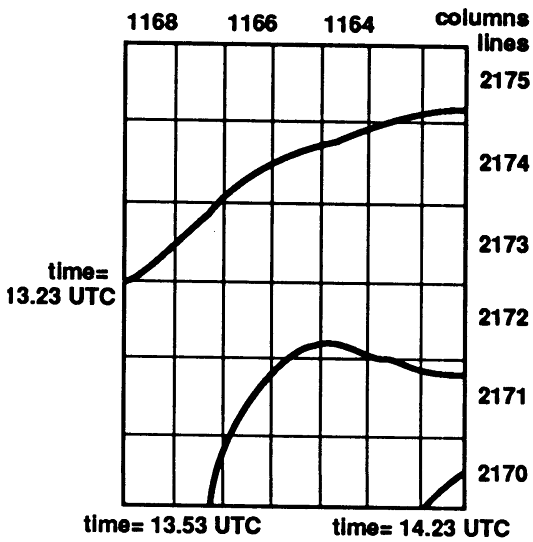


Figure 2

Impression of the passage of a narrow cloud band over the KNMI location in the Crau area on June 9, 1987. An indication of the postion of the frontal edge of the cloud band is given as derived from the Meteosat images images. The cloud edge is not very sharp; the distance between fully cloud free and fully clouded is about two pixels. The back side of the cloud is less clear. Its location at 14.23 is about the position of the frontal sideat 13.22.



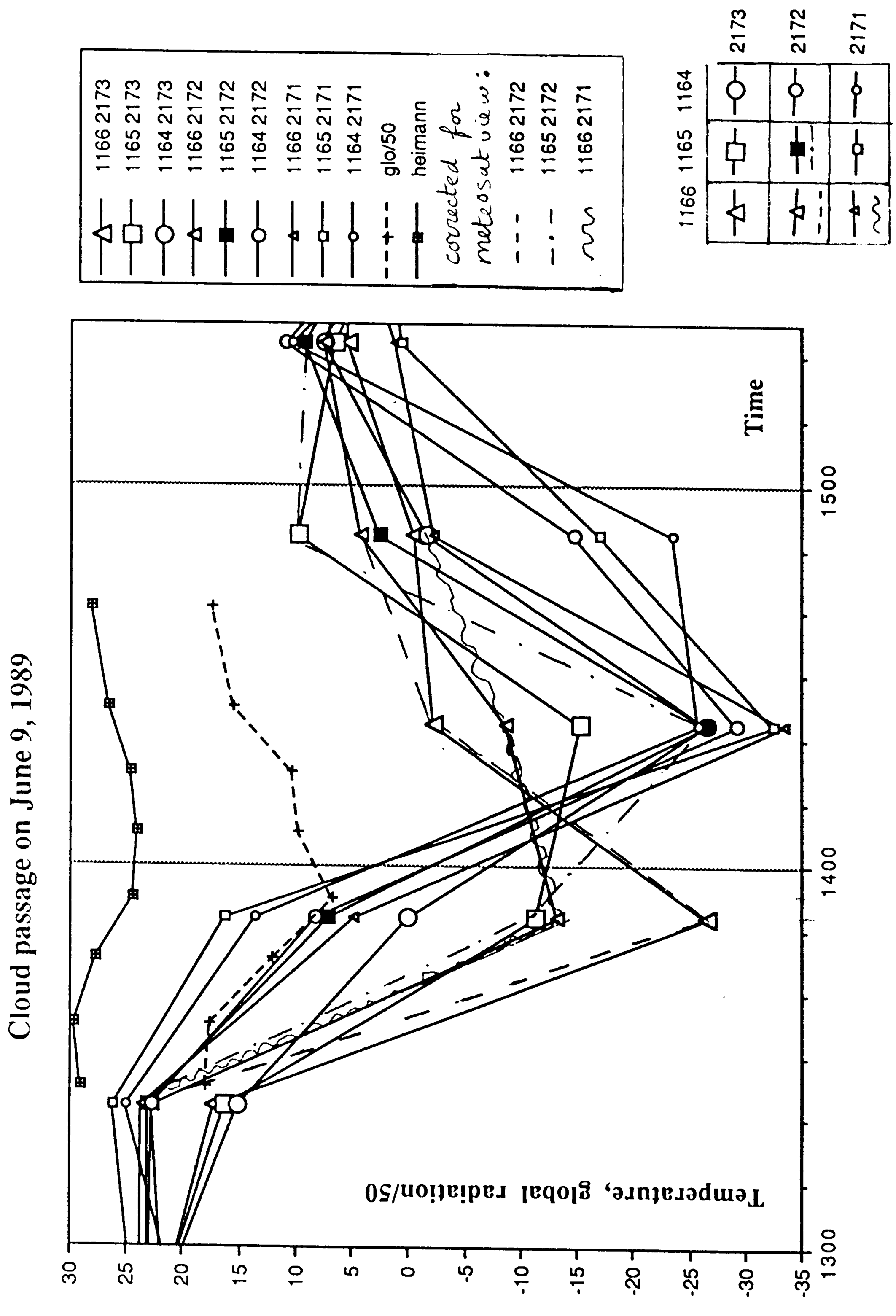


Figure 3 Comparison of Meteosat data with data from the Heimann radiometer and global radiation measurements at the KNMI location in the Crau area. An explanation is given in the text.

Figures 4.x (x = date: 4.1, 4.2, 4.5, 4.6, 4.8, 4.9, 4.10, 4.11, 4.12, 4.23, 4.24).

Results of the comparison between Heimann and Meteosat data using atmospheric corrections calculated with three different band models: Lowtran 6 and 7 and the KNMI bandmodel.
Note: Figures a,c,e give half-hourly values and figures b,d,f give hourly results, which can not be interpolated to get the half-hourly results, although for clarity the points have been connected in the figures!

a Average and standard deviation of Vis channel for 16 pixels (unit=counts ~ intensity).
b Comparison of corrected Heimann and corrected Meteosat temperatures (average of 4 central pixels) for a surface emissivity of 1. Calculations with Lowtran 7 are very time consuming and have not been performed for a surface emissivity of 1.
c Average and standard deviation of IR channel for 16 pixels. Average of WV channel.
d Comparison of corrected Heimann and corrected Meteosat temperatures (average of 4 central pixels) for a surface emissivity of 0.96.
e IR temperature for 4 central pixels.
f Magnitude of the atmospheric correction for each of the three models, surface emissivity=0.96.

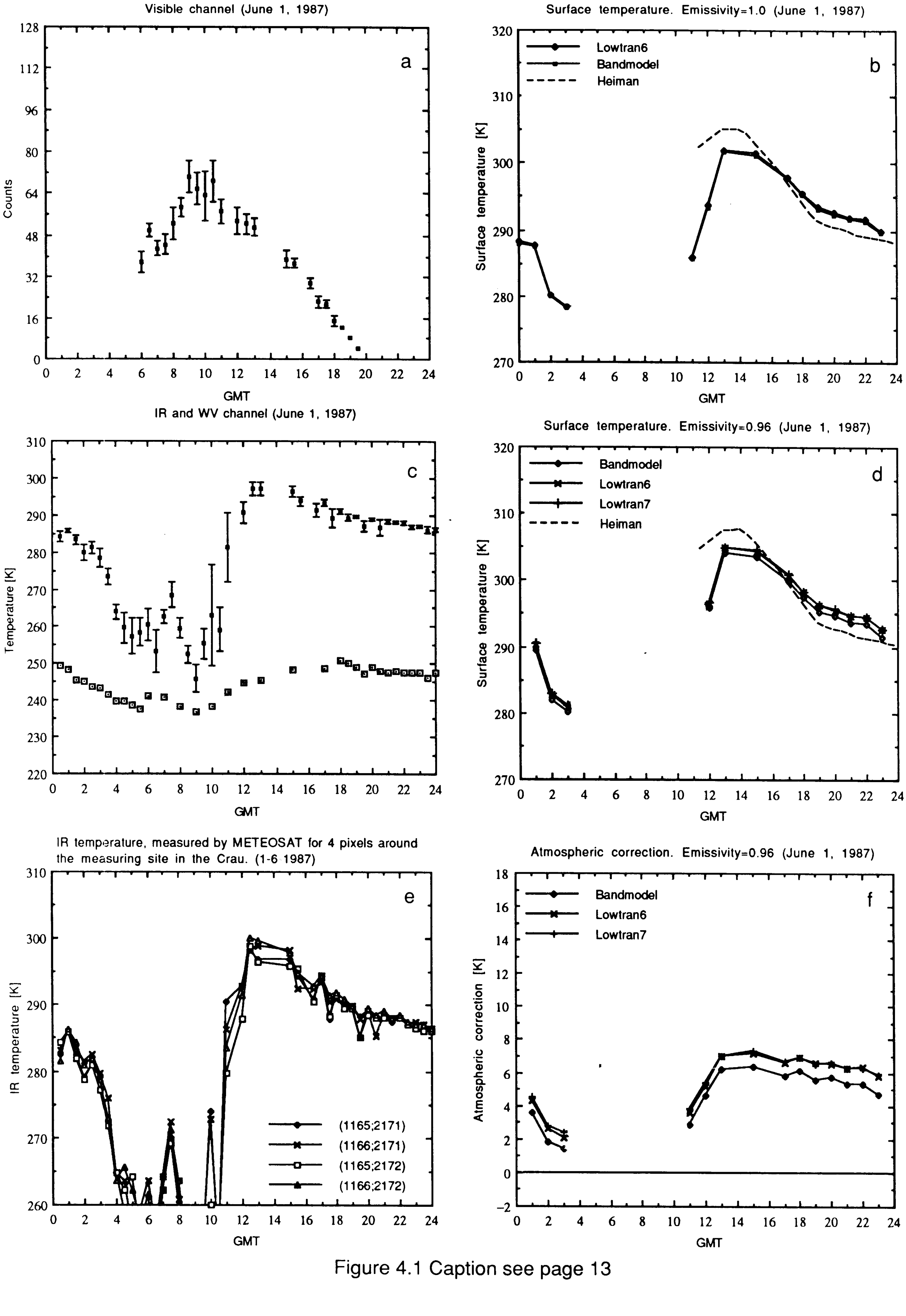


Figure 4.1 Caption see page 13

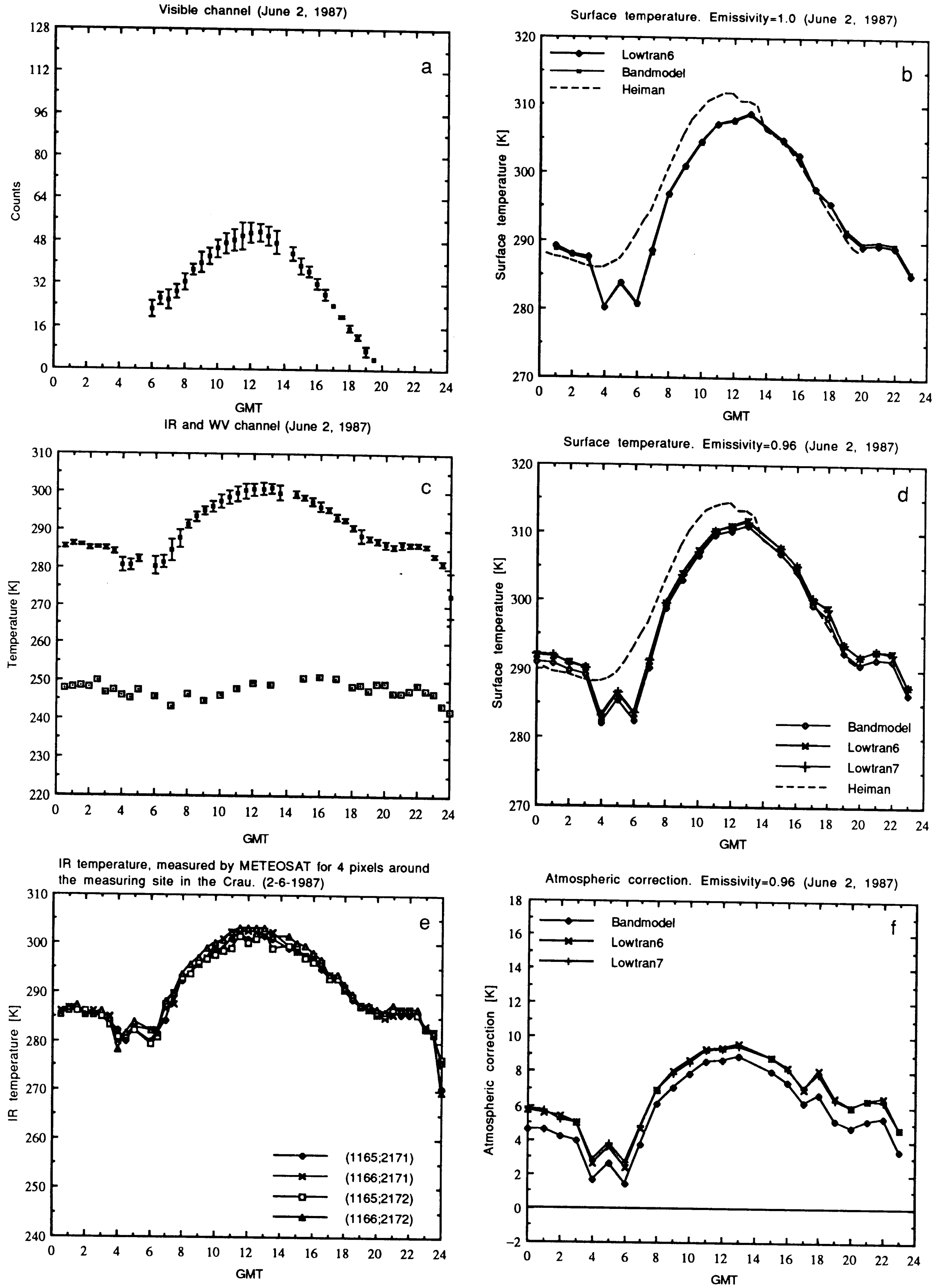


Figure 4.2 Caption see page 13

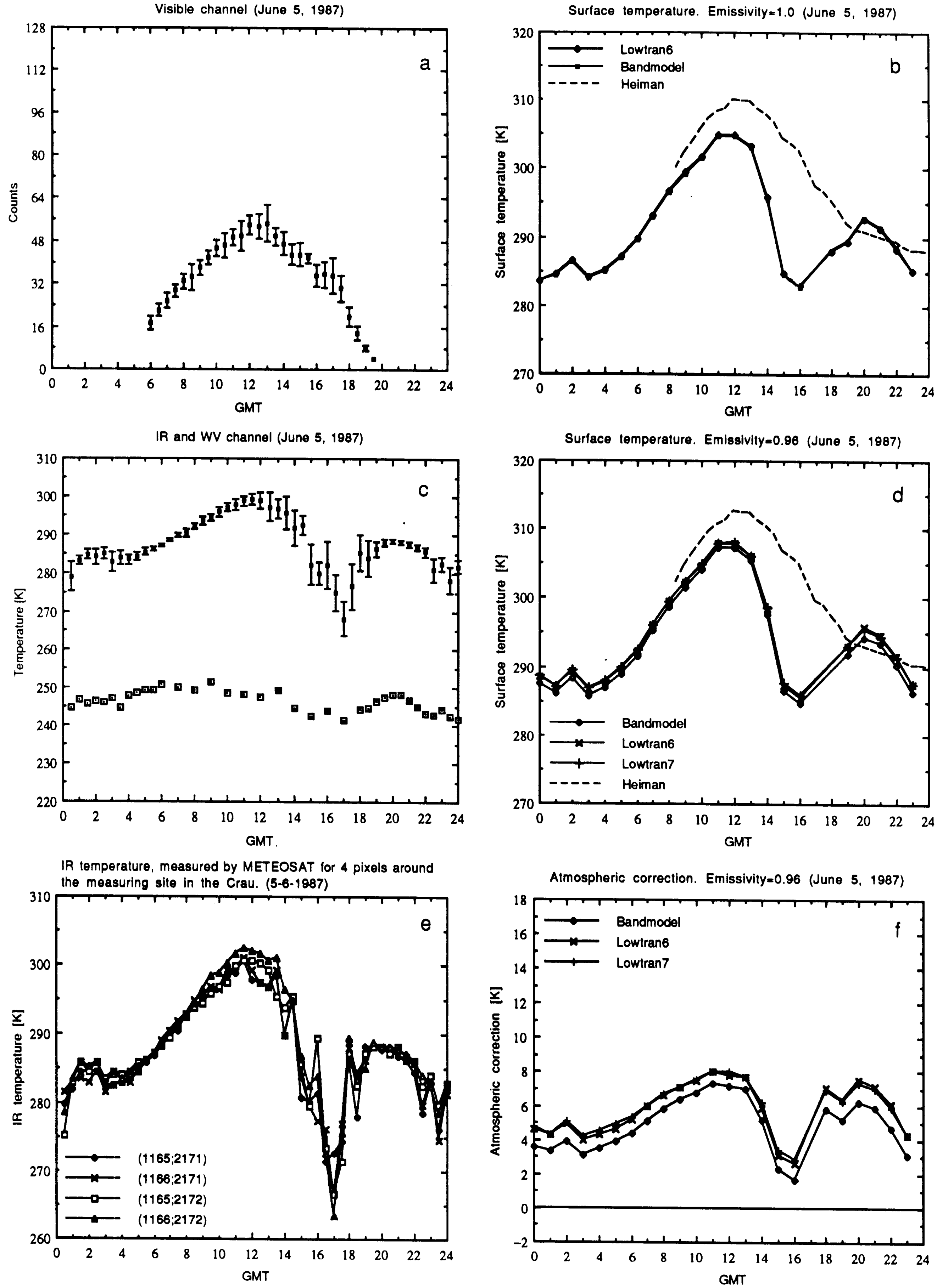


Figure 4.5 Caption see page 13

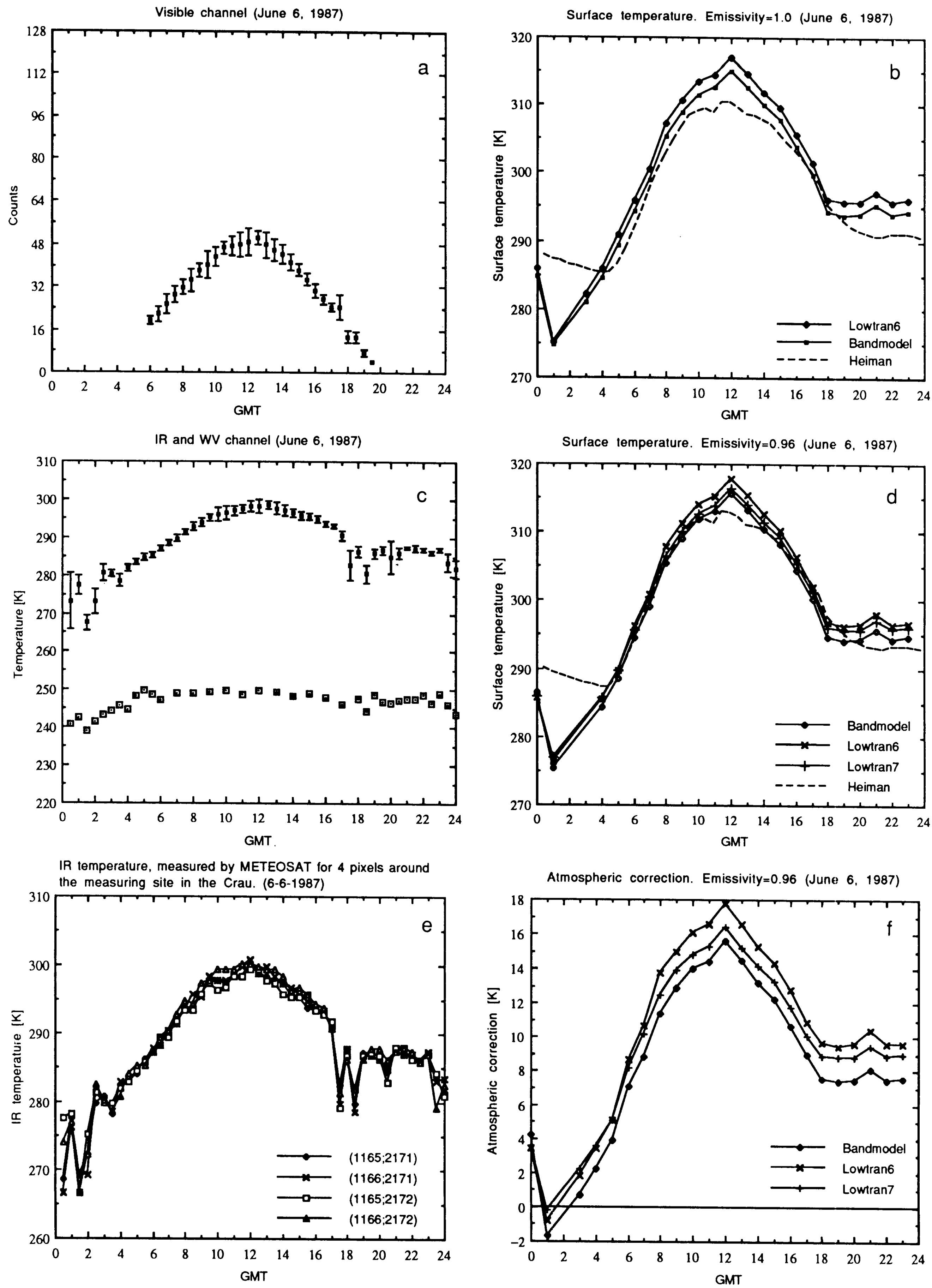


Figure 4.6 Caption see page 13

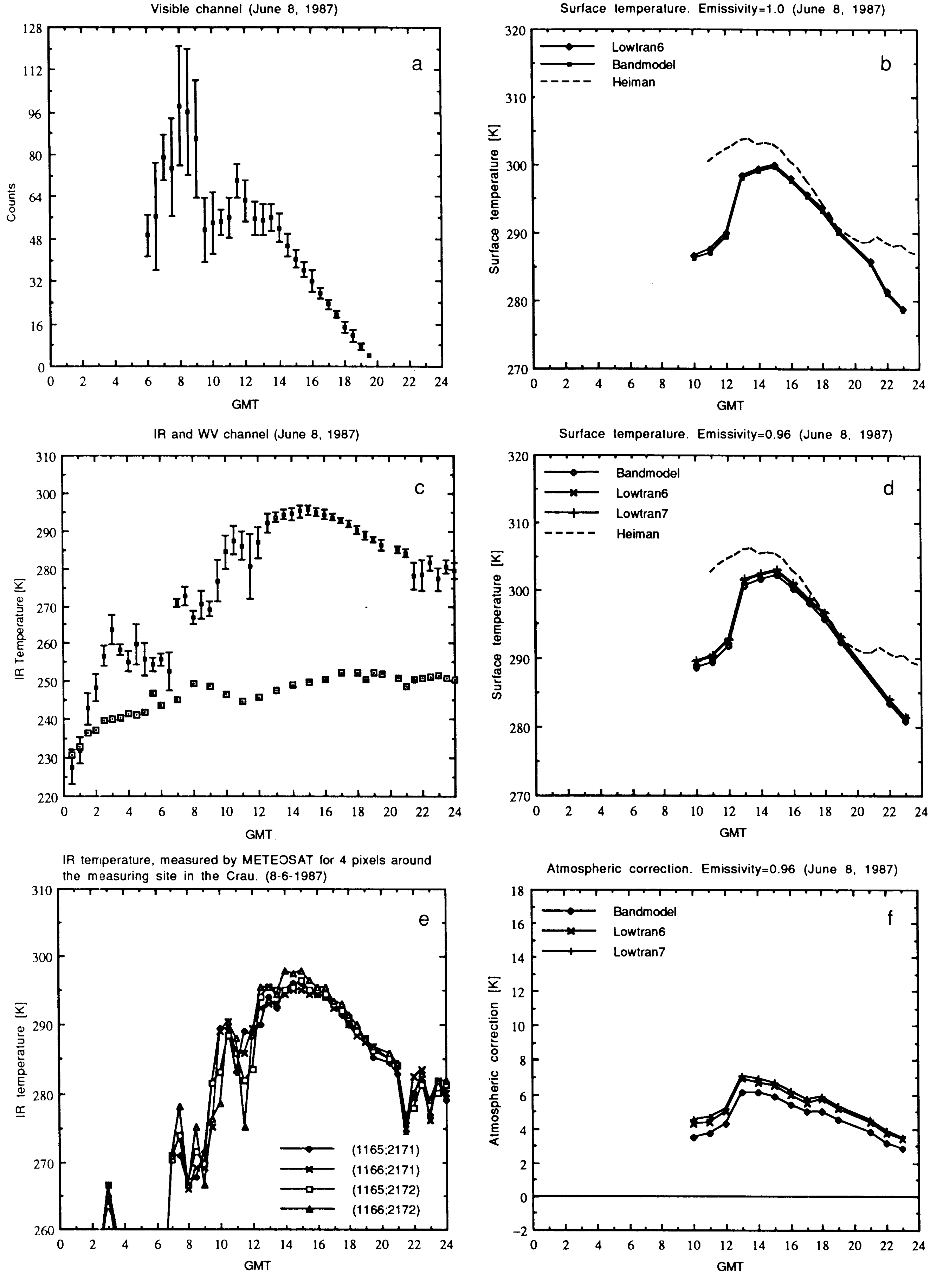


Figure 4.8 Caption see page 13

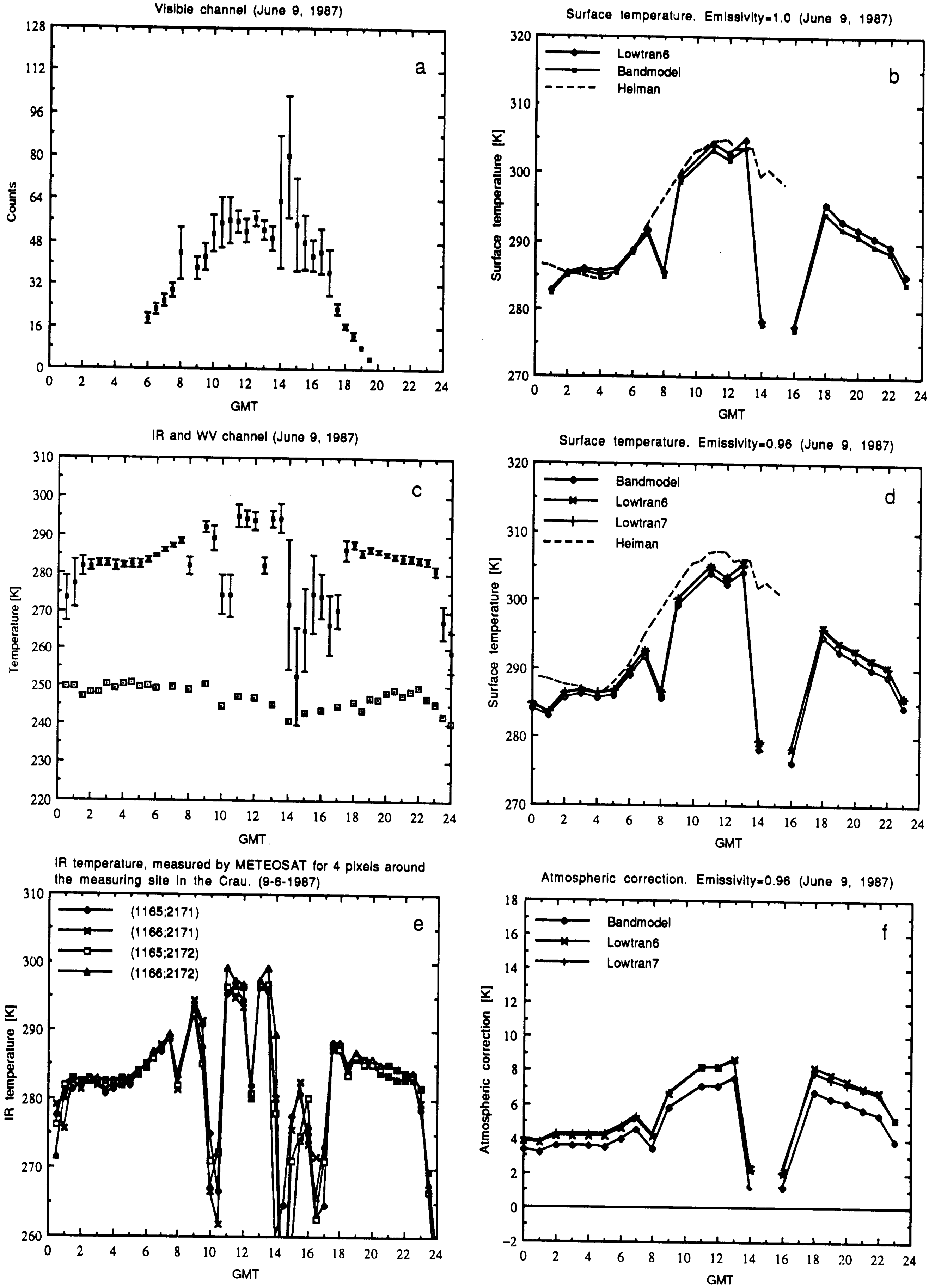


Figure 4.9 Caption see page 13

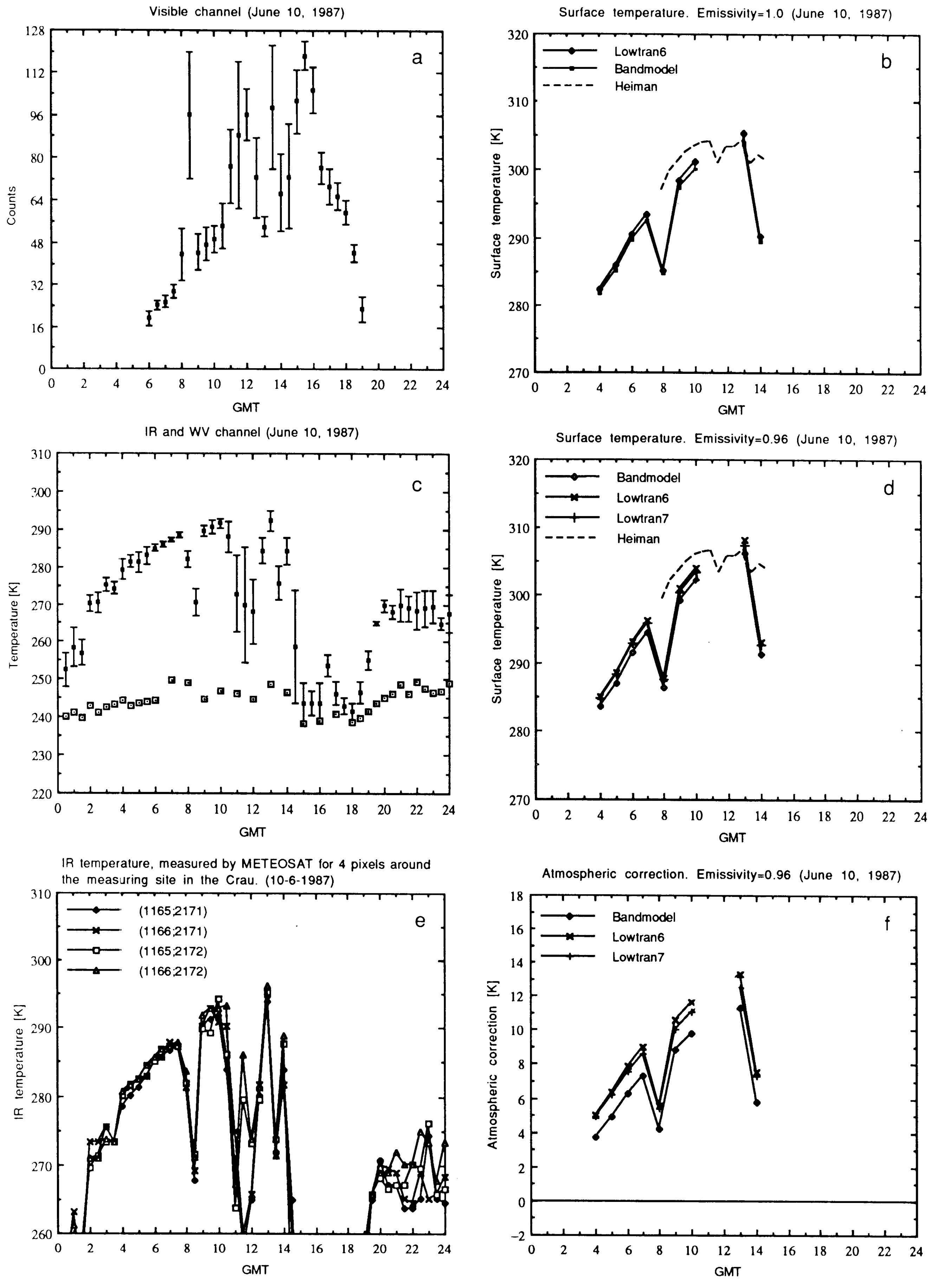


Figure 4.10 Caption see page 13

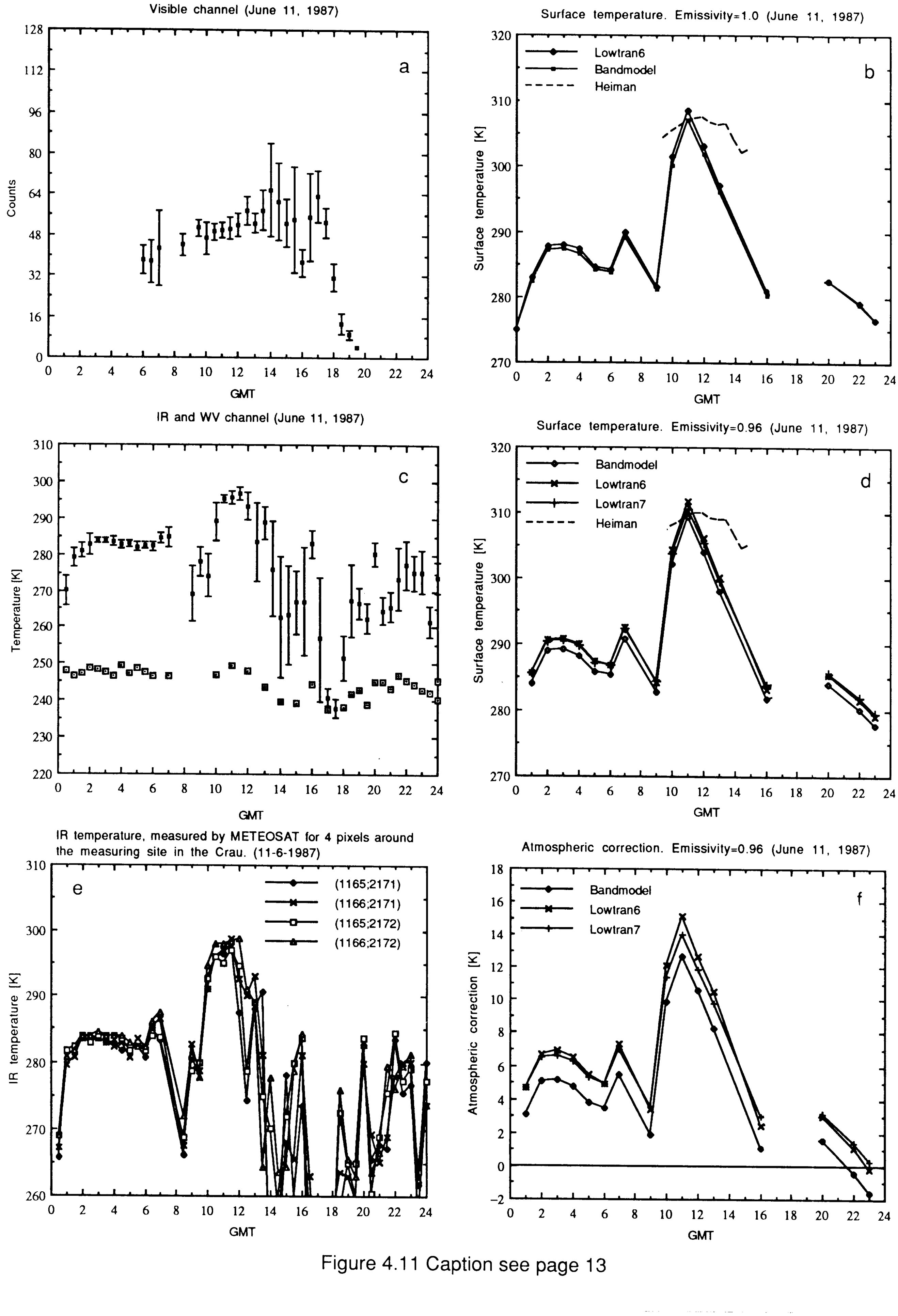


Figure 4.11 Caption see page 13

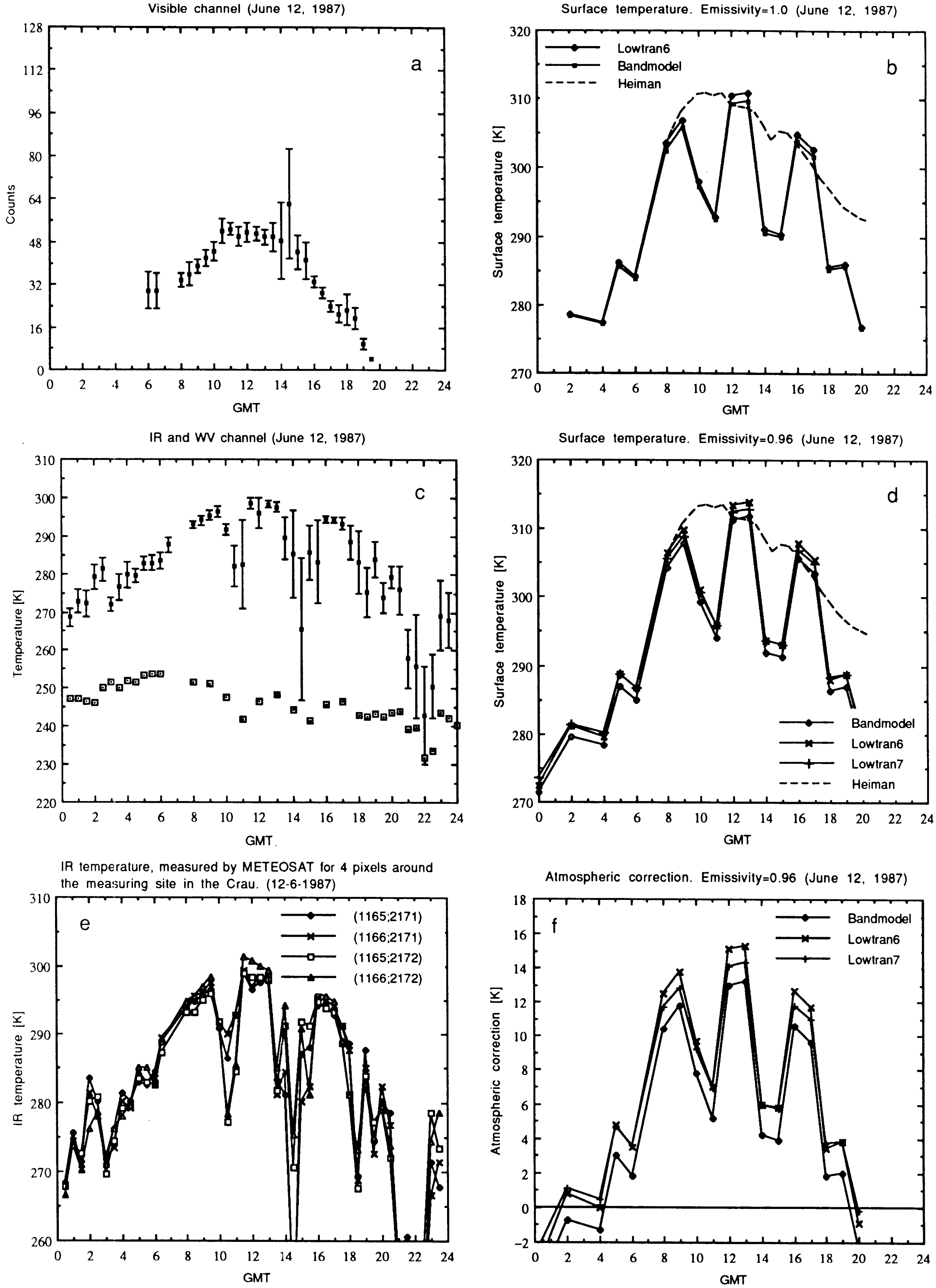


Figure 4.12 Caption see page 13

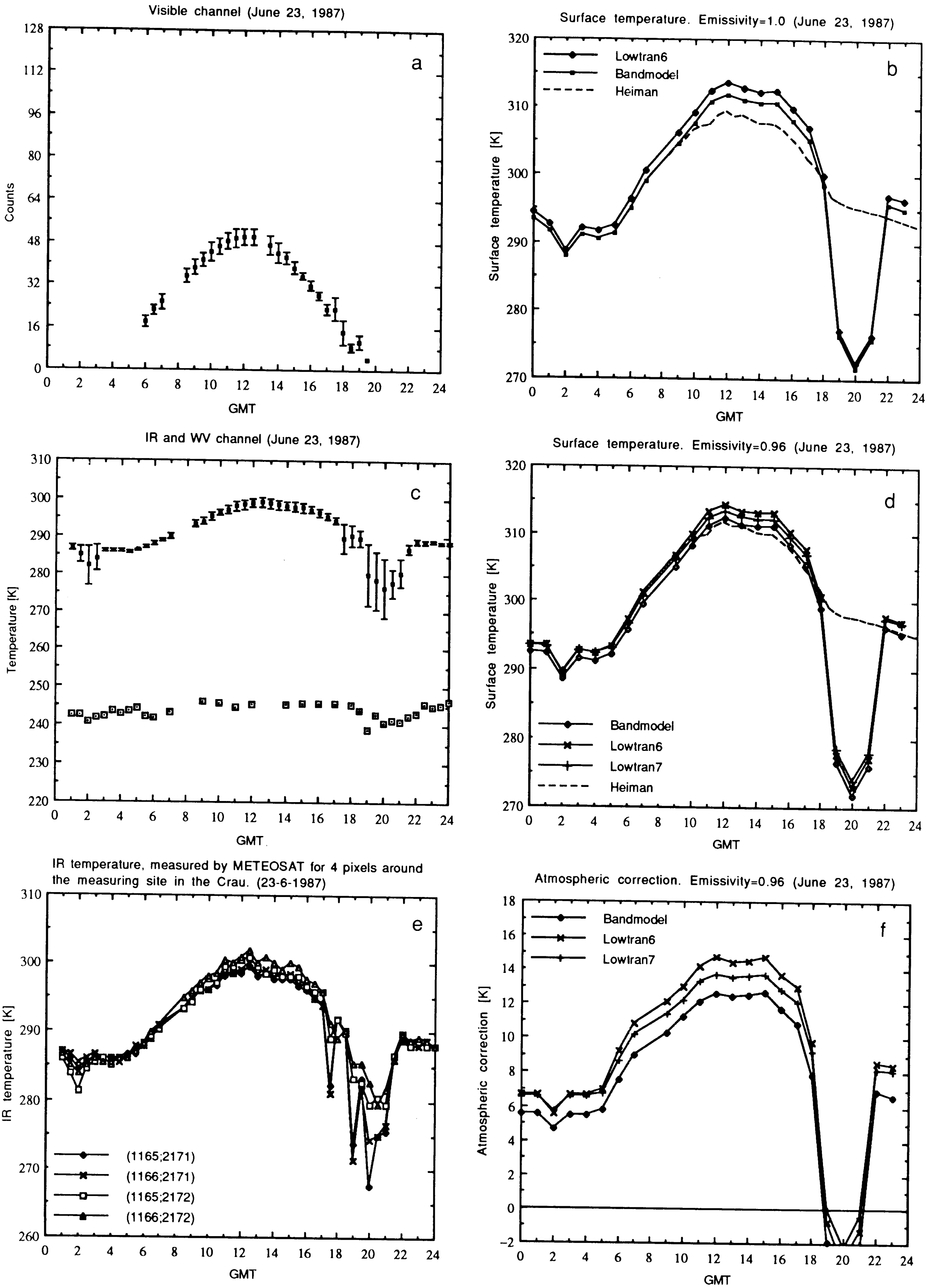


Figure 4.23 Caption see page 13

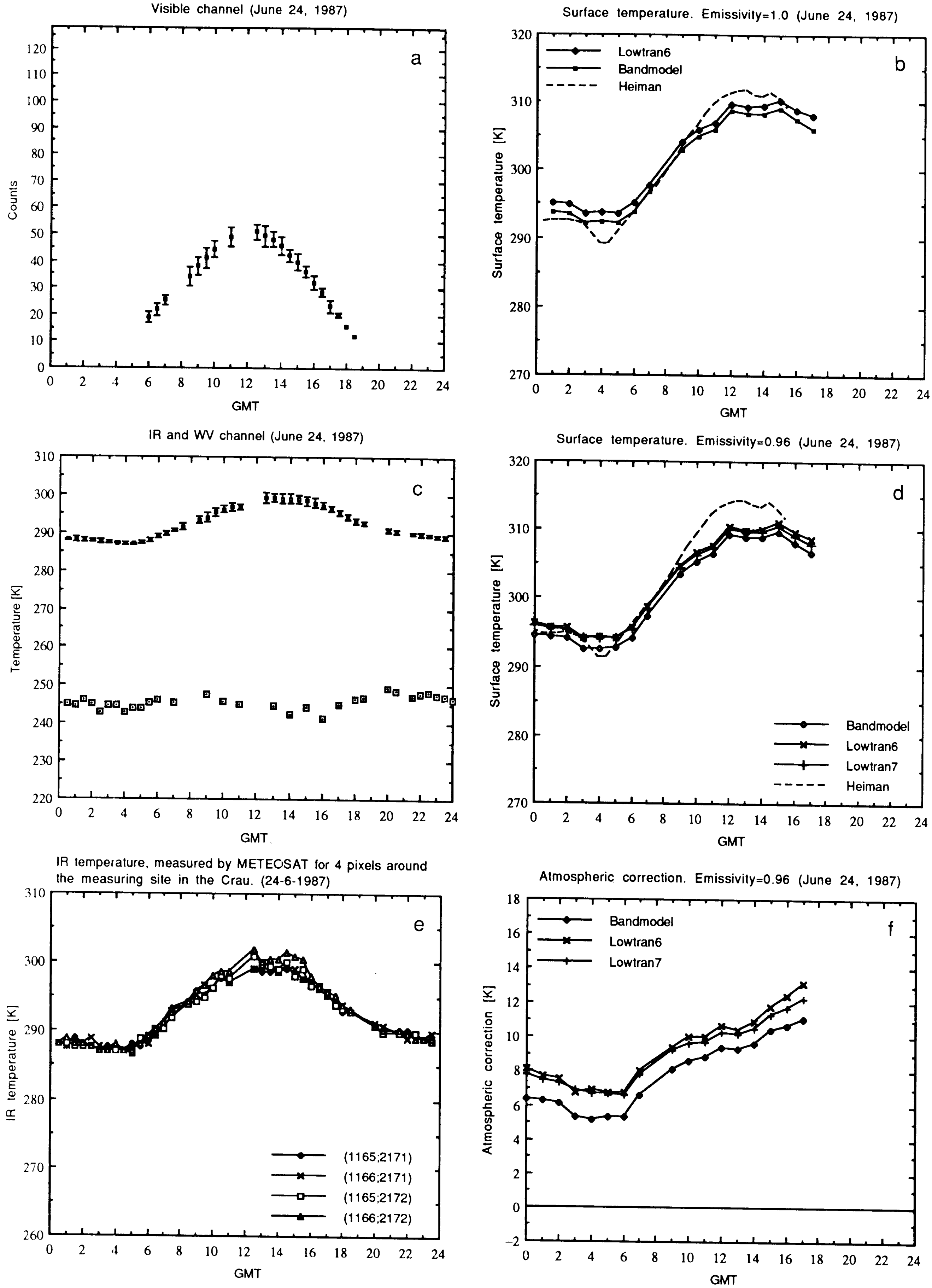
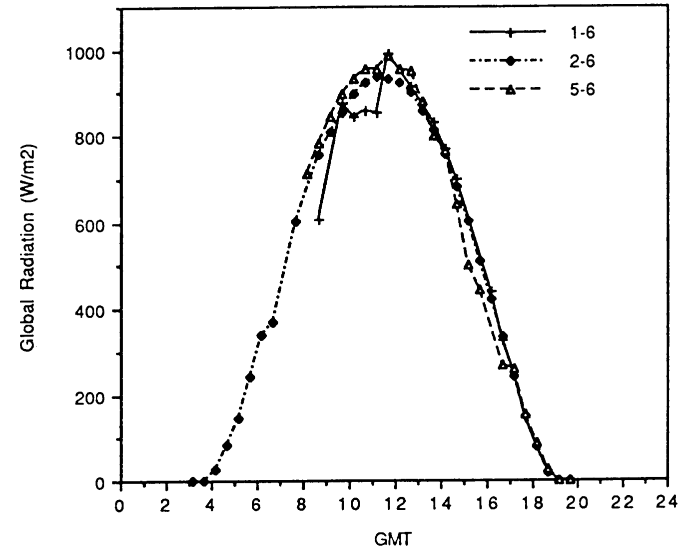
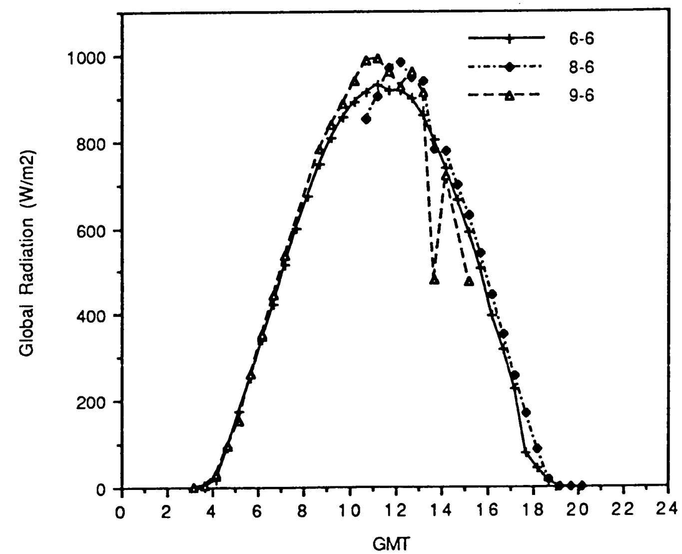
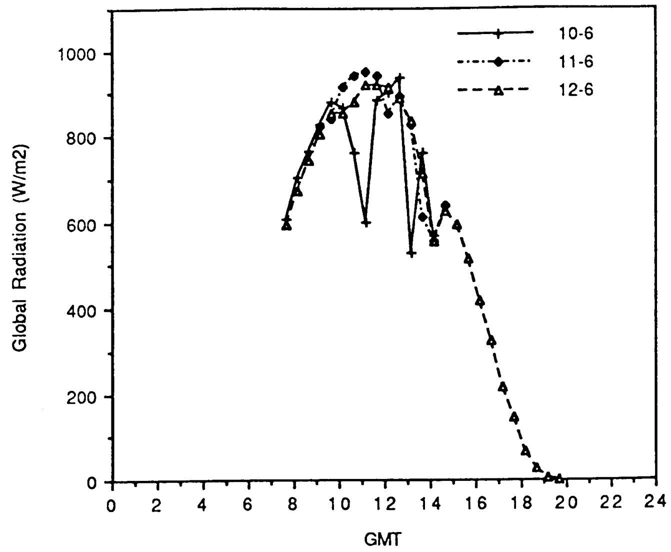


Figure 4.24 Caption see page 13

Figure 5 Global radiation at KNMI location (see Kohsiek et al 1988)







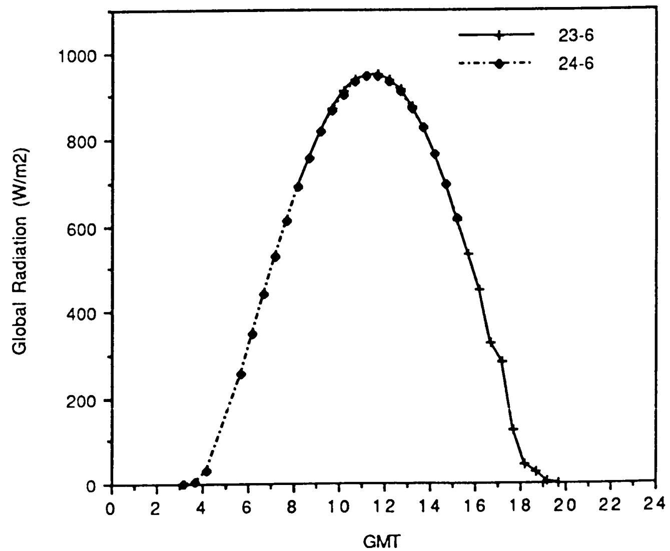


Figure 6 Comparison between screen temperature at KNMI location and air temperature estimated from radiosonde observations at Nîmes (see section 8.1, ad a).

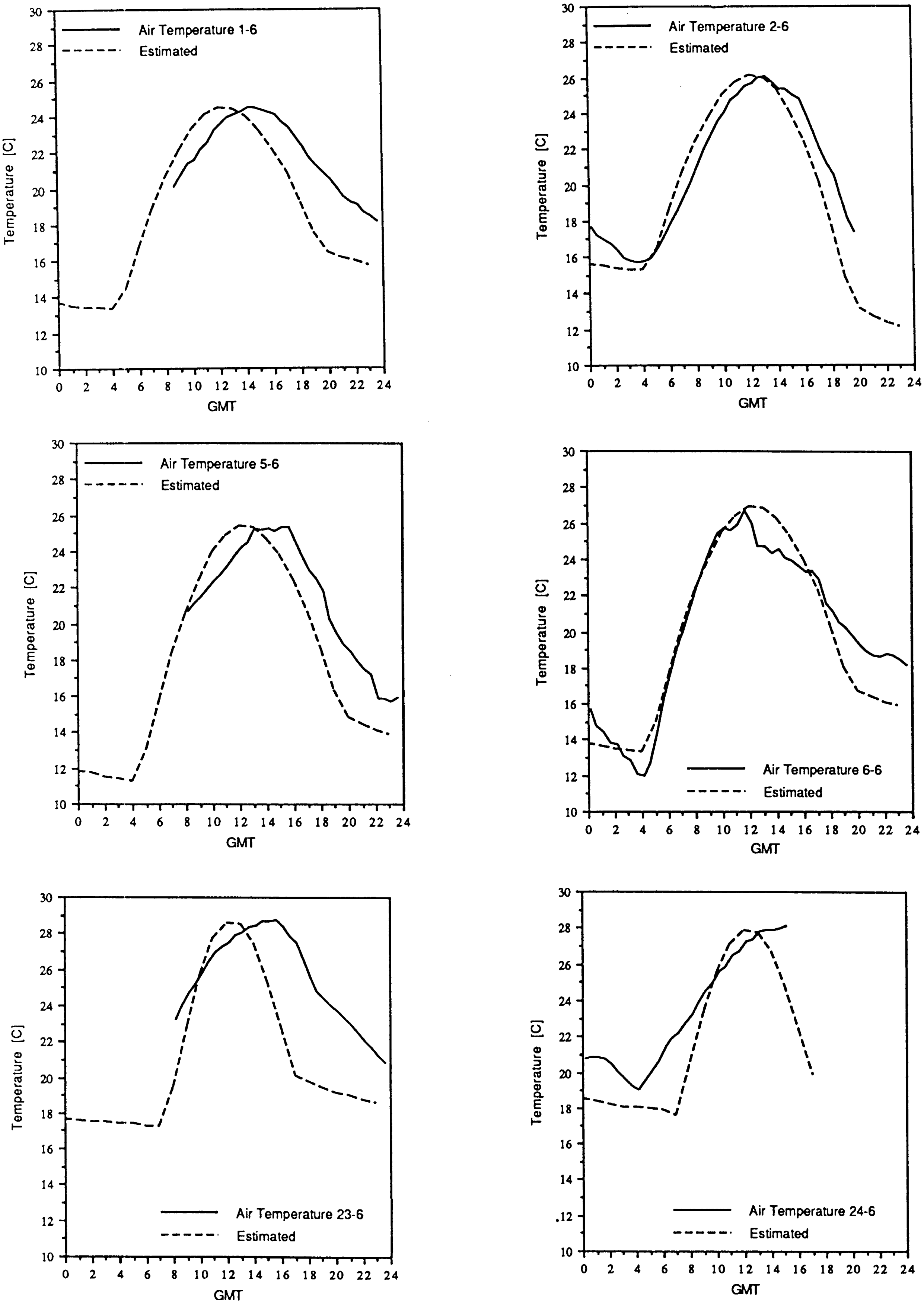
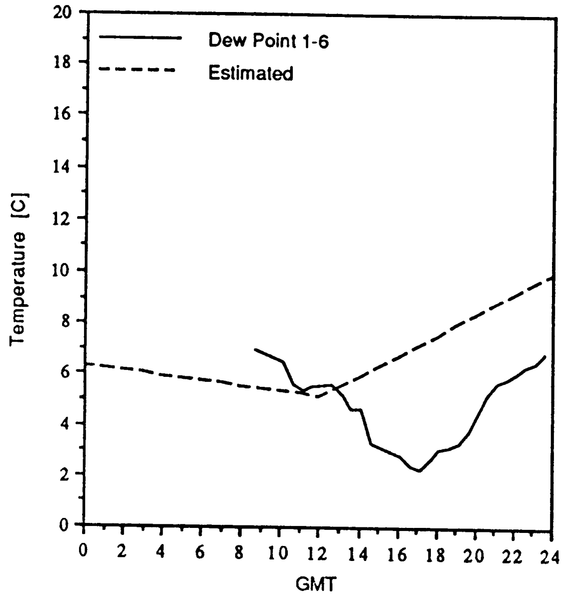
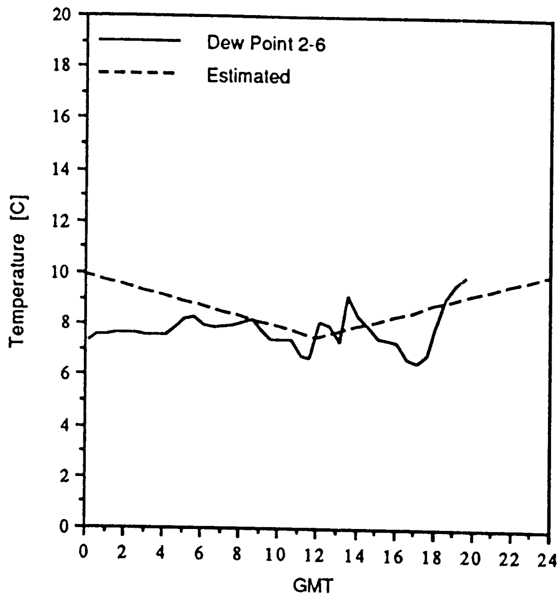
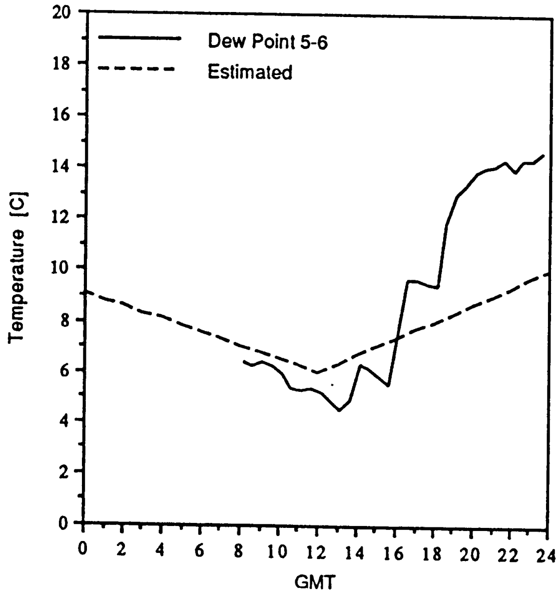
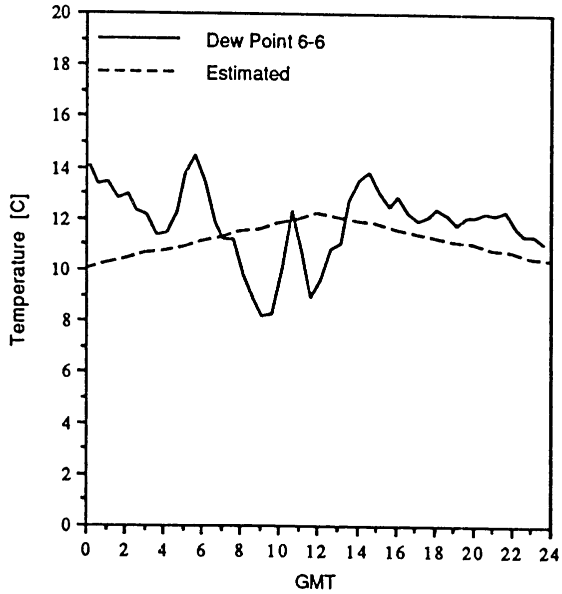


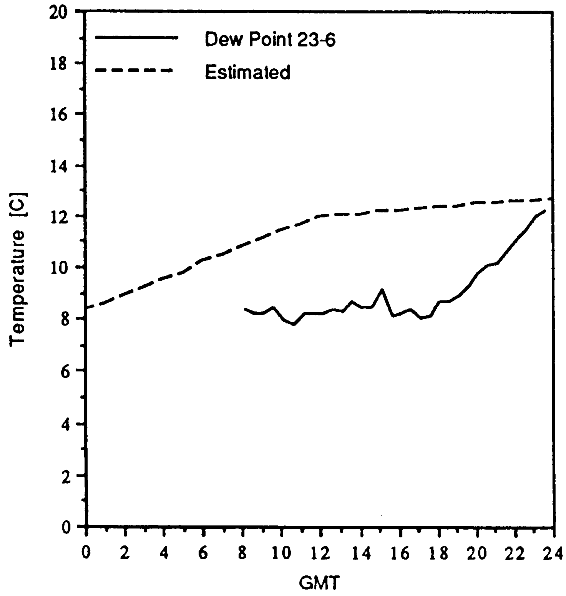
Figure 7 Comparison between screen humidity at KNMI location the humidity estimated from radiosonde observations at Nîmes(see section 8.1, ad a).











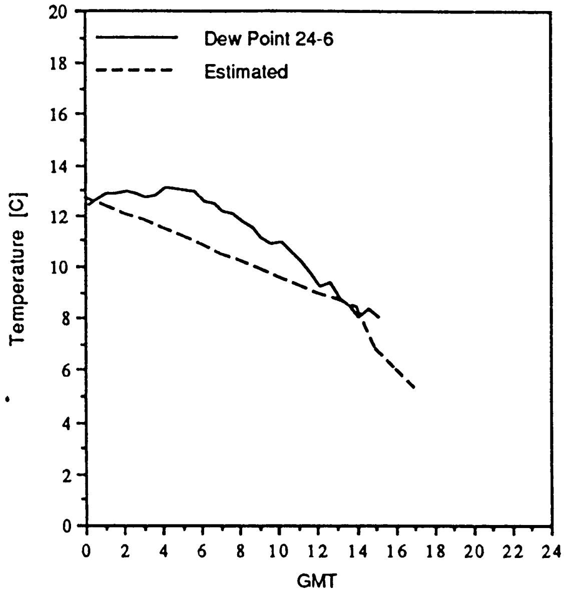
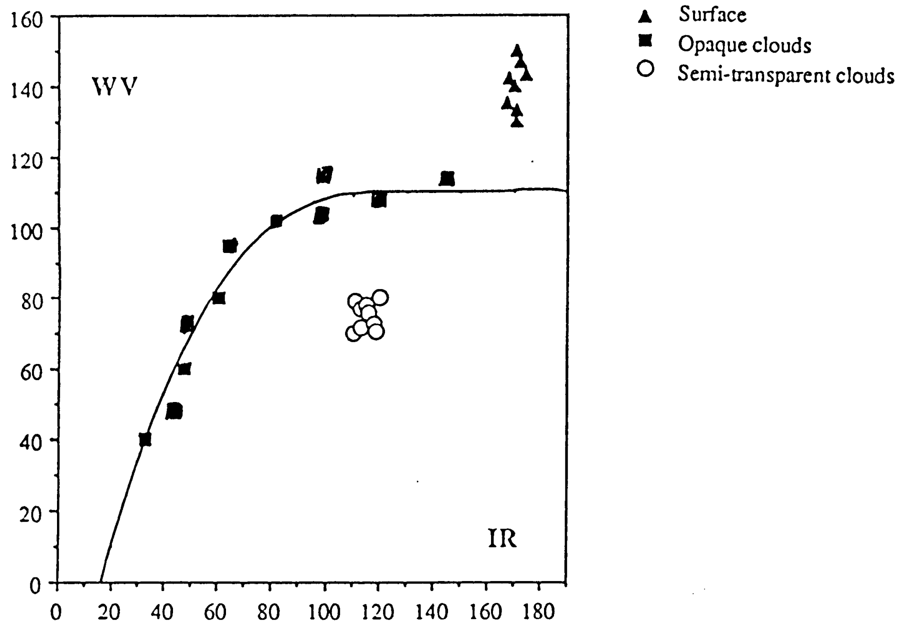


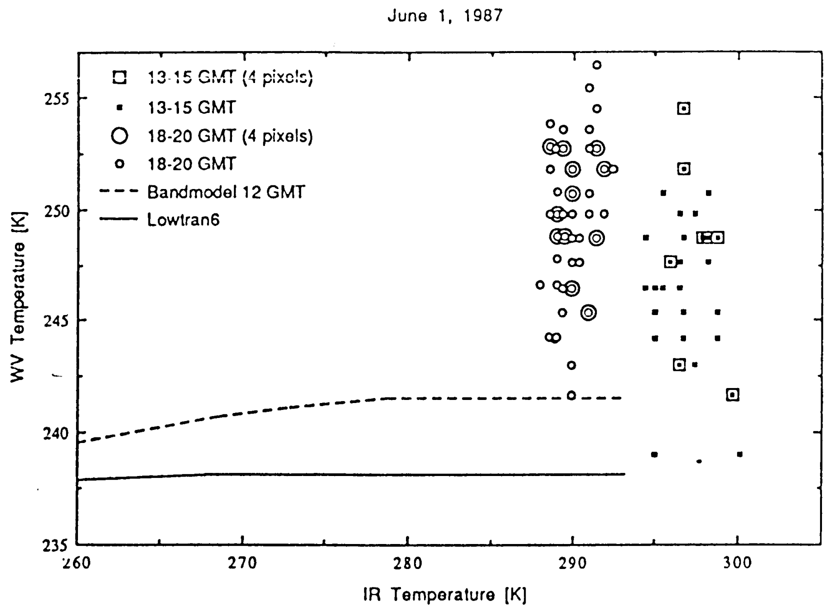
Figure 8

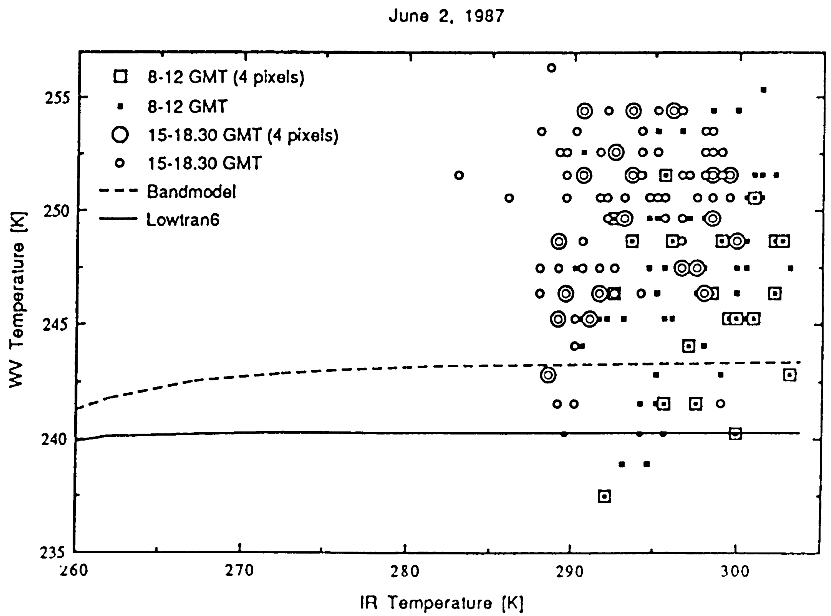
Example of the relationship between IR and WV observations and theoretical relationships.
This figure is not based on actual data
(see also Bowen and Saunders 1984).
Arbitrary units (Counts) along the axes,
(High count ~ High temperature).

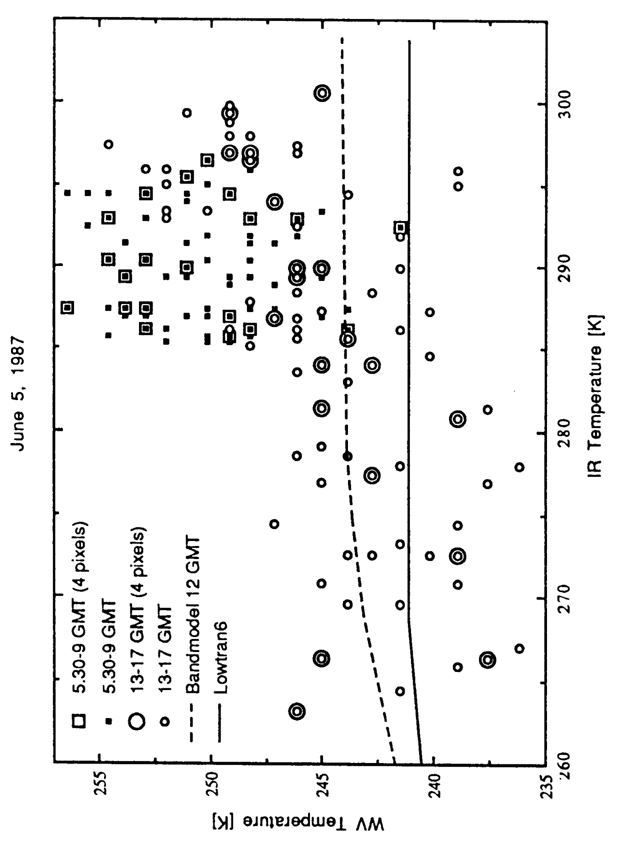


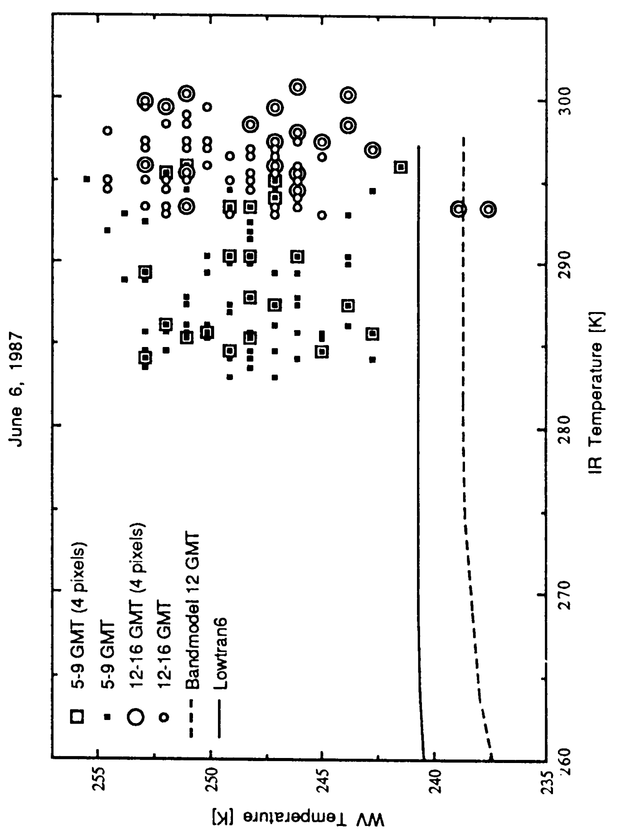
Figures 9.x (x = date: 9.1, 9.2, 9.5, 9.6, 9.8, 9.9, 9.11, 9.12, 9.23,9.24

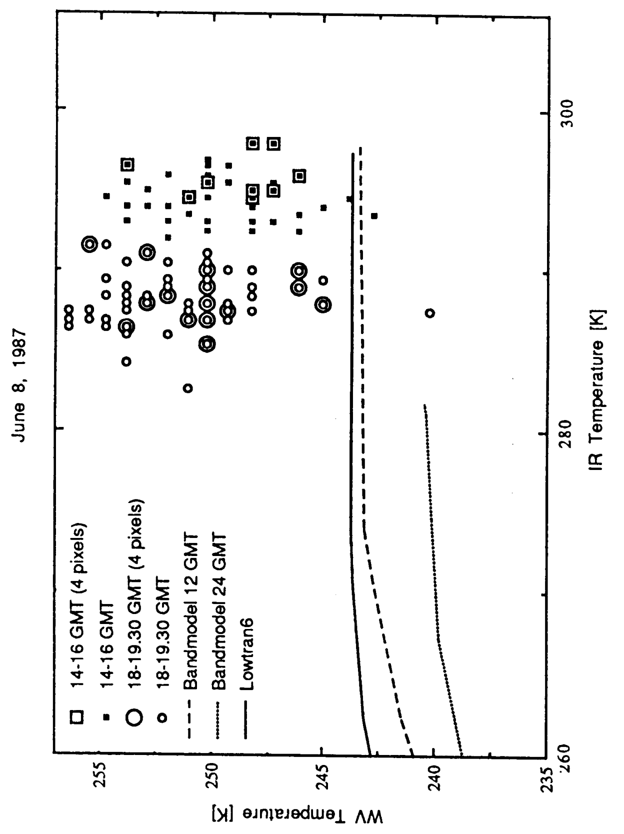
Relationship between IR and WV brightness temperature. Curves: theoretical relationships as calculated using the radiative transfer models. Smaller symbols are the values for an area of 4x4 pixels for the indicated period. Large symbols highlight the results of the 4 central pixels.

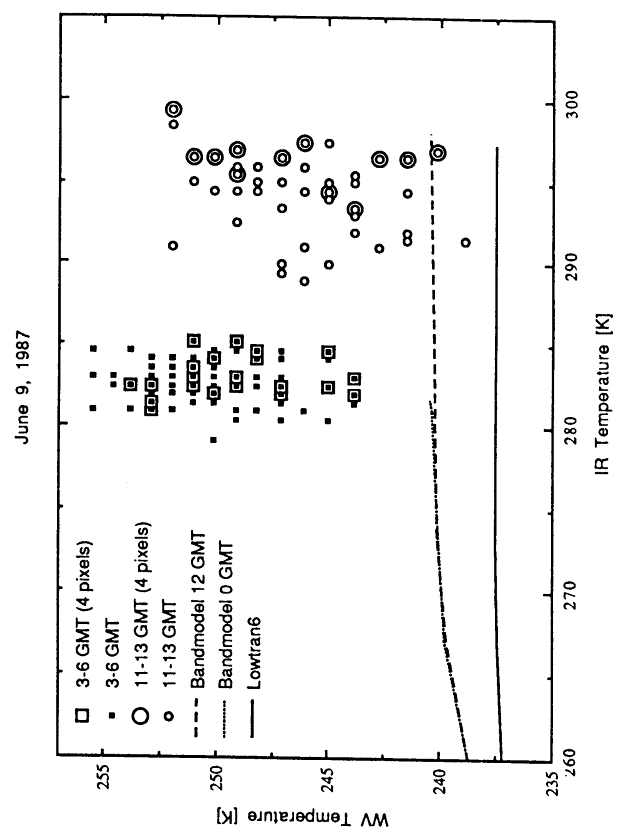


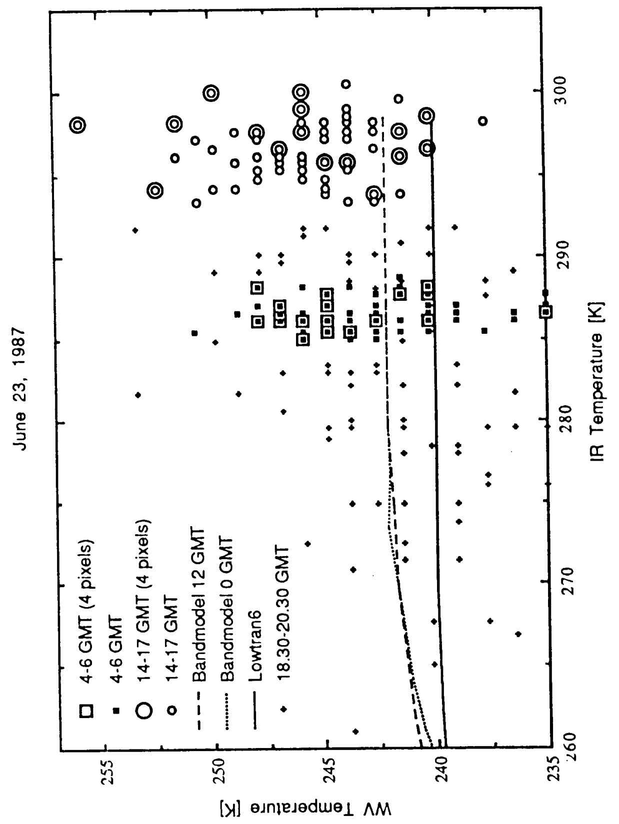


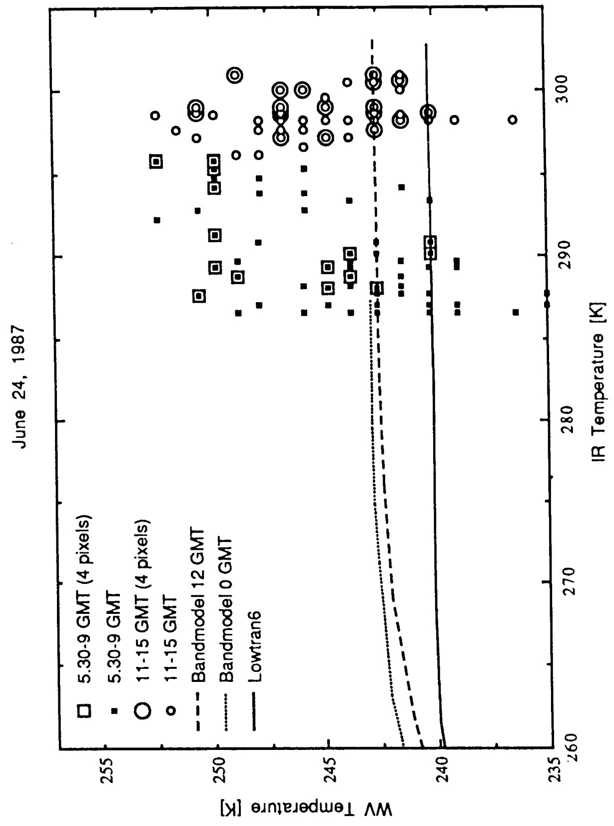

June 5, 1987
5.30-9 GMT (4 pixels)
5.30-9 GMT
13-17 GMT (4 pixels)
13-17 GMT
Bandmodel 12 GMT
Lowtran6
WV Temperature [K]
IR Temperature [K]

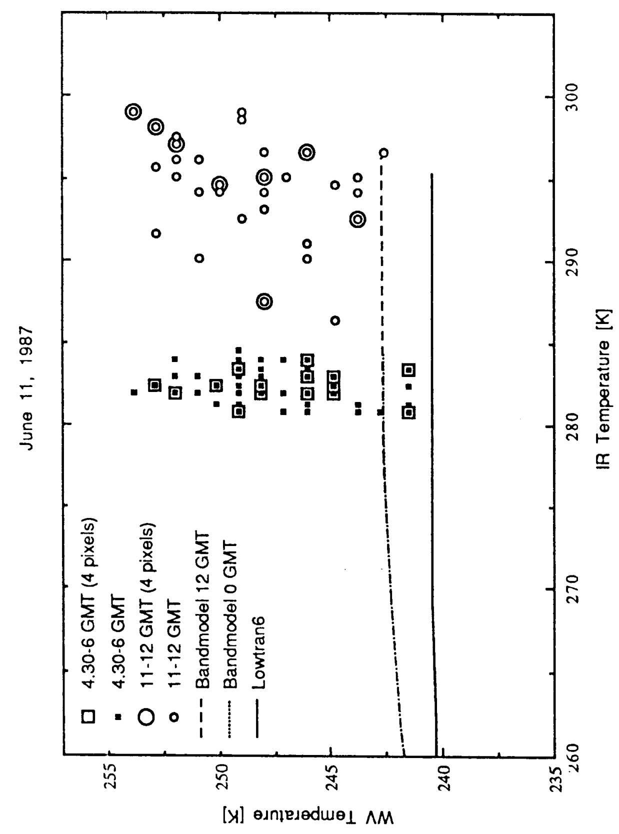

June 6, 1987
5-9 GMT (4 pixels)
5-9 GMT
12-16 GMT (4 pixels)
12-16 GMT
Bandmodel 12 GMT
Lowtran6
WV Temperature [K]
IR Temperature [K]

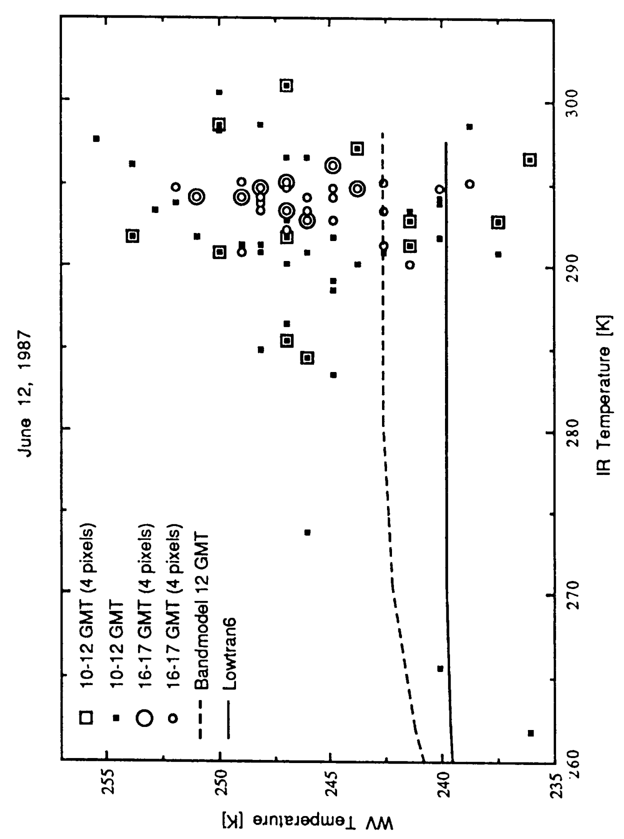

June 8, 1987
14-16 GMT (4 pixels)
14-16 GMT
18-19.30 GMT (4 pixels)
18-19.30 GMT
Bandmodel 12 GMT
Bandmodel 24 GMT
Lowtran6
WV Temperature [K]
IR Temperature [K]


June 9, 1987
3-6 GMT (4 pixels)
3-6 GMT
11-13 GMT (4 pixels)
11-13 GMT
Bandmodel 12 GMT
Bandmodel 0 GMT
Lowtran6
WV Temperature [K]
IR Temperature [K]


June 23, 1987
4-6 GMT (4 pixels)
4-6 GMT
14-17 GMT (4 pixels)
14-17 GMT
Bandmodel 12 GMT
Bandmodel 0 GMT
Lowtran6
18.30-20.30 GMT
WV Temperature [K]
IR Temperature [K]
255
250
245
240
235
260
270
280
290
300


June 24, 1987
5.30-9 GMT (4 pixels)
5.30-9 GMT
11-15 GMT (4 pixels)
11-15 GMT
Bandmodel 12 GMT
Bandmodel 0 GMT
Lowtran6
WV Temperature [K]
IR Temperature [K]
255
250
245
240
235
260
270
280
290
300


June 11, 1987
4.30-6 GMT (4 pixels)
4.30-6 GMT
11-12 GMT (4 pixels)
11-12 GMT
Bandmodel 12 GMT
Bandmodel 0 GMT
Lowtran6
WV Temperature [K]
IR Temperature [K]
255
250
245
240
235
260
270
280
290
300


June 12, 1987
10-12 GMT (4 pixels)
10-12 GMT
16-17 GMT (4 pixels)
16-17 GMT (4 pixels)
Bandmodel 12 GMT
Lowtran6
WV Temperature [K]
IR Temperature [K]
255
250
245
240
235
260
270
280
290
300

Appendix A: Available Meteosat data

During the Crau experiment the PDUS station was not fully protected against reception errors. Occassionaly the following errors may have occurred during reception:

a: Wrong line count.
b: Pixel with a value reserved for space or grid.
c: Lines of wrong data type.

The images have been fully checked for errors a and b, and erroneous images have been removed from the dataset. Full checking for error c is not possible, only the mixing of IR and (VIS or WV) images can simply be detected (IR images use the full 8-bit resolution, VIS an dWV images use only 6 bits) Only one error of this type was found: image 706050730_c(and _i) has visible data on line 2158. This low occurence indicates that it is not very likely that VIS lines in WV images or WV lines in VIS images are present. However, if lines with strongly deviating valuyes are found this may have happened. In addition a bit error was detected in image 706031430_v. Pixel 1163,1271 had value 45, this must probably be 44.

Due to discontinuation of services in Darmstadt sometimes images are missing for several hours.

Macintosh:

A set of 14 floppy disks containing the data is available:

Name of disk	contents: image data	program to read .ASC file on disc
CRAU01/22	data of June 1, part of data of June 22	no
CRAU02	data of June 2	yes
CRAU03	data of June 3	yes
CRAU04	data of June 4	yes
CRAU05	data of June 5	yes
CRAU06	data of June 6	yes
CRAU07	data of June 7	yes
CRAU08	data of June 8	yes
CRAU09	data of June 9	yes
CRAU10	data of June 10	yes
CRAU11	data of June 11	yes
CRAU12	data of June 12	yes
CRAU23/22	data of June 23, part of data of June 22	yes
CRAU24/22	data of June 24, part of data of June 22	no

Microvax

On TK50 tape both the .C16 and .ASC file for all available days are saved in a save-set with the following directories:

[muller.crau.c1601]	[muller.crau.asc01]
[muller.crau.c1602]	[muller.crau.asc02]
[muller.crau.c1603]	[muller.crau.asc03]
[muller.crau.c1604]	[muller.crau.asc04]
[muller.crau.c1605]	[muller.crau.asc05]
[muller.crau.c1606]	[muller.crau.asc06]
[muller.crau.c1607]	[muller.crau.asc07]
[muller.crau.c1608]	[muller.crau.asc08]
[muller.crau.c1609]	[muller.crau.asc09]
[muller.crau.c1610]	[muller.crau.asc10]
[muller.crau.c1611]	[muller.crau.asc11]
[muller.crau.c1612]	[muller.crau.asc12]
[muller.crau.c1622]	[muller.crau.asc22]
[muller.crau.c1623]	[muller.crau.asc23]
[muller.crau.c1624]	[muller.crau.asc24]

Appendix B: Description of PIF header

A description of the general PIF format can be found in VCS manuals (1989, VAX-SAT reference manual). An explanation of the calibration parameters can be found in MDN (1989).The new calibration coefficient srcpduscal is equal to a combination of the old parameters: srcpduscal = cal * rfc / bbc. The total length of the header is 256 bytes.

```
c   1. PIF group
        integer*1       pifk            ! number of integer*1s per pixel
        integer*2       pifn            ! number of records per line
        integer*4       pifl            ! number of lines
        integer*4       pifc            ! number of columns
        integer*1       spare1(5)
c   2. NAV group
        integer*1       navfunc                       ! navigation function code
        integer*4       navloff                       ! line offset
        integer*4       navcoff                       ! column offset
        integer*4       navlres                       ! line resolution
        integer*4       navcres                       ! column resolution
c   2.2 optional navigation parameters
c   2.2.1 specific parameters for (METEOSAT) PIFs
          integer*2     navpdusline                   ! METEOSAT line number of PIF line 1
          integer*2     navpduscol                    ! METEOSAT column numberof PIFcolumn 1
          integer*2     navpdusstep2                  ! METEOSAT line number step
                                                      ! from PIF line to next PIF line multiplied by 2
c   2.2.2 variable parameters for general use
          integer*1     navdata(89)                   ! function specific data
c   3. DAT group
c   3.1 Mandatory data description parameters
        integer*1       datf                          ! data function code
        integer*1       datnam(16)                    ! data name
        integer*1       datenh(16)                    ! default enhancement
c   3.2 Optional data description parameters
c   3.2.1 Specific parameters for files generated by SATMHRPROC (VAX-PDUS)
          integer*1     datpdusgrid                   ! greylevel for grids
c   3.2.2 Specific parameters for general use
          integer*1     spare2(30)
c   4. SRC group
c   4.1 Mandatory source parameters
        integer*1       srcobj(16)                    ! source object
        integer*2       srcyear                       ! source year (xxxx)
        integer*2       srcday                        ! day of year
        integer*2       srchour                       ! time (hhmm)
c   4.2 Optional source parameters
c   4.2.1 Source parameters for METEOSAT images generated by SATMHRPROC
          integer*4     srcpduscal                    ! absolute calibration value * 10E5 (set to 0 for VIS)
          integer*2     srcpdusspc                    ! space count * 10 (set to 0 for VIS)
          integer*2     srcpduscalday                 ! Julian day of calibration (set to 0 for VIS)
          integer*1     srcpduscalslot                ! calibration time slot set to 0 for VIS)
          integer*4     srcpdusbbc1                   ! space view mode BB count * 10E3 (0 for VIS)
          integer*2     srcpdusbbsd1                  ! st dev of space view mode BBC*100(0 for VIS)
          integer*4     srcpdusbbc2                   ! nominal cal mode BB count * 10E3 (0 for VIS)
          integer*2     srcpdusbbsd2                  ! st dev of nominal cal mode BBC*100(0 for VIS)
          integer*4     srcpdusbb1t                   ! temperature of cold BB *100/K
          integer*4     srcpdusbb2t                   ! temperature of hot BB *100/K
          integer*1     srcpdusgain                   ! gain IR/WV/VIS1 or VIS4
          integer*1     srcpdusgain2                  ! gain VIS2 or VIS3
          integer*1     srcpdusdetflags               ! detector flags (0=off,1=on)
bit0-IR1  bit1-IR2  bit2-WV1  bit3-WV2  bit4-VIS1  bit5-VIS2  bit6-VIS3  bit7-VIS4
          integer*2     srcpdusimstat                 ! image status flags (1=true)
bit0 - horizon analysis  bit1 - spin speed fit  bit2 - orbit offset fit
bit3 - sampling rate fit  bit4 - attitude refinement  bit5- aut landmark registration
bit6 - actual image frame movement based on landmark results
bit7 - calculation of deformation vector field  bit8 - geometrical processing  completed
bit9 - rectification complete  bit10 - ampl processing completed  bit11-bit15- set to 0
c   4.2.2 Optional source parameters for general use

          integer*1     spare(8)
```

Appendix C: Example program to read an .ASC file

The program given in this paragraph can be used to read an .ASC file using the Macintosh MacFortran 020 compiler. Using different compilers, the non-standard Fortran parts may have to be adapted. Especially the data type byte, in this compiler integer*1, is sometimes difficult to implement.

```
      program lascnew

c ****    PURPOSE
c         simple main program to demonstrate a call of lasc77

          implicit            none
          character*32        yfilename
          integer*1           gimage(256,256)
          logical             gshowheader,gscherm
          integer*2           istatus,ilun

          ilun =11
          istatus = 0
          yfilename   = '                                   '
          write (*,*) ' filenaam'
          read (*,*) yfilename
          gscherm = .true.
          gshowheader = .true.
          call lasc77(yfilename,gimage,
     +          gshowheader,gscherm,istatus)
          end
```

```
          subroutine lasc77(hfilename,oimage,oshowheader,oscherm,kstatus,klun)

c****     PURPOSE
c         Reading of an asc file: header and image.
c         Header on output in pifstructure in commonblock header.
c         Image in array (*) (max 1250**2), but in subroutines the array is
c         declared with the appropriate size.
c
c**       INTERFACE
c         call lasc77(hfilename,oimage,oshowheader,oscherm,kstatus)
c         hfilename          input/output   name of pif file
c         oimage             input          image
c         oshowheader        input          show header?
c         oscherm            input          output to screen
c         kstatus            output         error parameter
c         klun               input          logical unit number
c
c**       EXTERNALS
c         lheadasc
c         limageasc
c         toonheadpif
c
c         AUTHOR
c         KNMI muller 890427
c
          IMPLICIT            NONE
          character*32        hfilename
          integer*1           oimage(*)
          logical             oshowheader,oscherm
          integer*2           kstatus
```

```
          integer*4             klun

c         here the PIF header declaration as defined in Appendix B should be included

           common /header/ pifk,pifn,pifl,pifc,spare1(5),navfunc,
     +     navloff,navcoff,navlres,navcres,navpdusline,
     +     navpduscol,navpdusstep2,navdata(89),datf,
     +     datnam(16),datenh(16),datpdusgrid,spare2(30),
     +     srcobj(16),srcyear,srcday,srchour,srcpduscal,srcpdusspc,
     +     srcpduscalday,srcpduscalslot,
     +     srcpdusbbc1,srcpdusbbsd1,srcpdusbbc2,srcpdusbbsd2,
     +     srcpdusbb1t,srcpdusbb2t,srcpdusgain,srcpdusgain2,
     +     srcpdusdetflags,srcpdusimstat,spare(8)

c* Initialisation
          kstatus = 0

c* Open file
          open (file=hfilename,err=9005,unit=klun)
c* Read header
          call lheadasc(oscherm,klun,kstatus)
          if (kstatus.ne.0) goto 9000

c* Check size of image
          if (( pifc* pifl).gt.1562500) then
            kstatus = 1
            if (oscherm) write (*,190)
190         format (' Lasc: asc file too large,
     +    more than 1250**2 lines*columns')
            go to 9000
          endif
c* Show header
          if (oshowheader.and.oscherm) call toonheadpif
          pause
c* Read image
          call limageasc(oimage, pifc, pifl,
     +           oscherm,klun,kstatus)
          if (kstatus.ne.0) goto 9000
          pause
c* Close file
9000      continue
          close (klun)
          go to 10000

9005      continue
          kstatus = 2
          if (oscherm) write (*,*) 'Lasc: error opening asc file'

10000     continue
          return
          end
```

```
          subroutine lheadasc(oscherm,klun,kstatus)

c****     PURPOSE
c         Reading of the header of an asc file
c         Header on output in pifstructure
c
c**       INTERFACE
c         call lheadasc(oscherm,klun,kstatus)
c         oscherm input ouput to screen
```

```
c          klun   input  unit
c          kstatus       output error parameter
c
c          The header information is passed via the commonblock header
c
c**        EXTERNALS
c          lbyte
c
c          AUTHOR
c          KNMI muller 890427

           IMPLICIT      NONE
           logical       oscherm
           integer*4     klun
           integer*2     kstatus
           integer*2     ipifk,inavfunc,inavdata(95)
           integer*2     idatf,idatnam(16),idatenh(16)
           integer*2     isrcobj(16)
           integer*2     iflag,igain,igain2,igrid,islot
           integer*2     ji
           integer*1     lbyte   !function

c          here the PIF header declarations as defined in Appendix B should be included
            common /header/  see subroutine lasc77

c* Read header

           read (klun,120) ipifk, pifn
     +           , pifc,  pifl
     +           , inavfunc,  navloff,  navcoff
     +           ,  navcres,  navlres, idatf
     +           , (inavdata(ji),ji=1,49)

120        format (i3,3i4,i3,2i6,2i6,i3,49i3)

           read (klun,121) (inavdata(ji),ji=50,95)
     +           , (idatnam(ji),ji=1,16)
121        format (46i3,16i3)

           read (klun,122) (idatenh(ji),ji=1,16)
     +           , (isrcobj(ji),ji=1,16)
     +           ,  srcyear, srcday
     +           ,  srchour    ,     navpduscol
     +           ,  navpdusline,  navpdusstep2
     +           , igrid, srcpduscalday,islot
122        format (16i3,16i3,3i4,3i4,i6,i3,i2)

           read (klun,123,err=9000)
     +             srcpdusbbc1, srcpdusbbc2,
     +             srcpdusbbsd1, srcpdusbbsd2,
     +             srcpdusbb1t, srcpdusbb2t,
     +             srcpduscal, srcpdusspc,
     +            igain,igain2,iflag, srcpdusimstat
123        format (2i6,2i3,2i5,i5,i3,2i2,i6,i8)

c* Convert reals and integer*1 to integer variables
            navpdusstep2 = max(1,2* navpdusstep2)
            pifk = lbyte(ipifk)
            datf = lbyte(idatf)
            navfunc = lbyte(inavfunc)
           do ji = 1,95
              navdata(ji) = lbyte(inavdata(ji))
```

```
          enddo
          do ji = 1,16
              datnam(ji) = lbyte(idatnam(ji))
              datenh(ji) = lbyte(idatenh(ji))
              srcobj(ji) = lbyte(isrcobj(ji))
          enddo
           datpdusgrid = lbyte(igrid)
           srcpduscalslot = lbyte(islot)
           srcpdusgain = lbyte(igain)
           srcpdusgain2 = lbyte(igain2)
           srcpdusdetflags = lbyte(iflag)

c* Calculate number of pif records
           pifn =  pifc / 256
          if (mod( pifc,256).ne.0)
     +        pifn =  pifn + 1

          goto 10000

c* Errorhandling
9000      if (oscherm) write(*,*)
     +     'lheadasc: Error reading header asc-file'
          kstatus = 3

10000     return
          end
```

```
          subroutine limageasc(oimage,kcol,kline,oscherm,klun,kstatus)

c****     Purpose
c         Reading of the image from an asc file
c
c**       INTERFACE
c         call limageasc(oimage,kcol,kline,oscherm,klun,kstatus)
c         oimage output image
c         kcol          input         number of columns
c         kline         input         number of lines
c         oscherm       input         output to screen
c         klun          input         unit
c         kstatus       output error parameter
c
c**       EXTERNALS
c         lbyte
c
c**       AUTHOR
c         KNMI Muller 890427

          implicit      none
          integer*4     kcol,kline
          integer*1     oimage(kcol,kline)
          logical       oscherm
          integer*4     klun
          integer*2     kstatus

          integer*2     iimage(1250)
          integer*2     irec
          integer*2     icolhulp
          integer*2     jcol,jline,jrec        !loopvariables
          integer*1     lbyte  !function

c* Calculate number of records per line for an asc file
```

```
          irec = kcol / 64
          if (mod(kcol,64).ne.0)
     +        irec = irec + 1

          if (oscherm) then
            write (*,*)
            write (*,*) 'Reading image from asc file'
          endif  !oscherm

          do jline = 1,kline,1

c* Read image
                icolhulp = 1
                do jrec = 1,irec-1,1
                   read(klun,120,err=9000) (iimage(jcol),
     +                            jcol = icolhulp , icolhulp+63)
                   icolhulp = icolhulp + 64
                enddo   ! jrec
                read(klun,120,err=9000) (iimage(jcol),
     +                       jcol = icolhulp , kcol)

c* Calculate integer*1 image
           do jcol = 1,kcol
              oimage(jcol,jline) = lbyte(iimage(jcol))
           enddo

           if ((oscherm).and.(mod(jline,10).eq.0))
     +    write (*,*) jline, '  pif-lines  of',
     +    kline,'   pif-lines have been processed'

          enddo      ! jline
120       format (64i3)

          if (oscherm) write (*,*) 'Reading of image finished'

          goto 10000

c*        3. Errorhandling
9000      if (oscherm) write (*,9007) jcol,jline,jrec
9007      format (' Limageasc: error reading image from asc-file,
     +     col,line,rec',3i5)
          kstatus = 4

10000     return
          end
```

```
          subroutine toonheadpif

c****     PURPOSE
c         Showing the header of a pif-file on the terminal screen
c         Header in pifstructure
c
c**       INTERFACE
c         call toonheadpif
c         de informatie is passed via the commonblock header
c
c**       EXTERNALS
c         none
c
c         AUTHOR
c         KNMI muller 890508
```

```
c
        IMPLICIT                NONE
        integer*2               ihulp
        integer*4               ji,iflag(8),iimstat(16)
        integer*2               mint

c       here the PIF header declarations as defined in Appendix B should be included
        common /header/    see subroutine lasc77

        write (*,*)
        write (*,*) 'PIF-HEADER INFORMATION:'

         write (*,136)  navpduscol,  navpdusline
     +         ,  navpdusstep2 / 2
136      format (' Meteosat col,line offset  =   ',2i6
     +         ,' Meteosat resolution       =   ',i4)

         write (*,122)  pifC,  pifl,  datf
122      format (' Number of colums,lines   =  ',2i6
     +         ,'   Data function (cal)       =  ',i4)

         write (*,124)  navcoff,  navloff
     +         , mint( navfunc)
124      format (' Meng column, line offset =  ',2i6
     +         ,'   Navigation function code  =  ',i4)

         write (*,126)  navcres,  navlres
     +         , mint( pifk), pifn
126      format (' Meng column,line resolut =  ',2i6
     +         ,'   integer*1s/pixel, records/line =  ',2i4)

         write (*,128)  srcyear, srcday, srchour
128      format (' Year, julian day, hour   =  ',3i6)

         write (*,132)  ( datnam(ji),ji=1,16)
     +         ,( datenh(ji),ji=1,16)
132      format (' Data name  =     ',16a
     +         ,'             Def enh funct =     ',16a)

         write (*,134)  ( srcobj(ji),ji=1,16)
     +              ,mint( datpdusgrid)
134      format (' Image source object = ',16a
     +         ,'     Grid grey level  (if any) = ',i4)

         write (*,138)  srcpduscal/100000.
     +         ,  srcpdusspc/10.
     +         ,  srcpdusbb1t /100.
     +         ,  srcpdusbb2t /100.
138      format (' cal ,spc      =      ',f10.5,'    ',f10.1,
     +         '  temp1, temp2 =     ',f8.2,' ',f10.2)
         write (*,140)  srcpdusbbc1/1000.
     +         ,  srcpdusbbc2/1000.
     +         ,  srcpdusbbsd1/100.
     +         ,  srcpdusbbsd2/100.
140      format (' bbc1 , bbc2  =      ',f10.3,'    ',f10.3,
     +         '  sdbbc1,sdbbc2=     ',f8.3,' ',f10.3)

        do ji = 1,8
          iflag(ji) = 0
        enddo
        ihulp = mint( srcpdusdetflags)
```

```
      do ji = 0,7
        if (btest(ihulp,ji))  iflag(ji+1) = 1
      enddo
       write (*,142) iflag,
  +    mint( srcpdusgain),mint( srcpdusgain2)
142    format  (' Ch(iiwwvvvv) =',8i1,
  +            '   Gain(iwv1/4)=',i3,'  Gain(v2/3)=',i3)

      do ji = 1,16
        iimstat(ji) = 0
      enddo
      ihulp = mint( srcpdusimstat)
      do ji = 0,15
        if (btest(ihulp,ji))  iimstat(ji+1) = 1
      enddo
      write (*,146) iimstat, srcpdusscalday,
  +         mint( srcpduscalslot)
146   format(' Imstat         = ',16i1,'          Calday = 'i3,
  +         '  Calslot = ',i3)

      return
      end
```

```
      function lbyte(kint)
c****  PURPOSE
c      Converts an integer to a byte (integer*1,liogical*1)
c      implementation machine dependent
c      The inverse operation (byte to integer*2/4) is performed
c      using the function mint or on the vax intrinsic function izext or jzext

      implicit      none
      integer*1     lbyte
      integer*2     kint,iint

      iint = kint
      if (iint.gt.127)   iint = iint - 256
      lbyte = iint
      return
      end
```

```
      function mint(obyte)
c****  PURPOSE
c      Conversion of a byte (integer*1, lobgical*1) to an integer*2
c      implementation machine dependent
c      on the vax the intrinsic function izext (or jzext) can be used instead

      implicit           none
      integer*1          obyte
      integer*2          mint

      mint = obyte
      if (mint.lt.0) mint = mint+256
      return
      end
```

Appendix D: Sea water temperatures

Sea surface temperature (SST) information for the Crau period covers the area between 42.5 en 43.5 North and between 3.0 en 8.0 East. Unfortunately the number of cloud free days with reliable data is small, so that comparisons with the satellite observations are difficult. Moreover the comparison is complicated by the possibility of a strong SST gradient close to the shore in the case of off-shore winds (Mistral). The number of useful observations is so small that a meaningful comparision for the fully cloud free days is not possible. The data are given as a sort of WMO code. Missing codes have been codes as -(00)1.
Obviously the wind direction code is not correct, possibly the given numbers mean : dd=10 => 50°<direction <150° etc. Wind direction code 100 is coded as 11.

YYMMDDHH	Lat	Lon	N	dd	ff	TTT	T_d	SST	H	N_L	C_L	C_M	C_H
87060100	430	073	0	30	51	171	160	183	9	0	0	0	0
87060112	432	049	5	40	51	190	135	160	5	0	0	2	0
87060118	430	056	2	30	23	182	146	176	8	0	0	-1	0
87060121	430	074	1	11	06	190	159	184	-1	1	-1	-1	0
87060121	430	077	1	10	14	175	167	183	8	1	0	0	0
87060206	429	056	3	30	14	185	145	170	9	0	0	6	0
87060212	432	048	3	30	17	240	142	170	8	0	0	1	0
87060300	430	073	0	00	00	171	160	187	9	0	0	0	0
87060300	430	079	2	11	06	171	139	183	-1	2	-1	-1	0
87060300	429	068	0	30	35	173	115	199	9	0	0	0	0
87060309	431	054	8	10	31	176	151	170	8	7	6	-1	0
87060318	430	056	6	20	17	153	144	159	7	6	3	0	0
87060400	430	070	8	30	31	177	141	176	3	8	7	-1	0
87060412	429	067	6	30	16	180	170	170	5	7	5	0	0
87060418	429	066	2	30	47	195	176	190	8	2	0	8	0
87060500	431	069	7	30	64	187	084	184	9	0	0	6	0
87060500	431	069	3	30	35	200	118	190	6	3	0	0	0
87060500	430	080	3	30	54	185	131	179	8	1	0	6	0
87060500	430	080	5	30	39	187	143	174	5	5	-1	8	0
87060512	432	046	1	30	49	240	142	170	-1	0	0	1	0
87060512	430	075	1	30	23	187	146	185	3	1	2	9	0
87060518	430	056	6	30	39	164	120	169	8	0	0	8	0
87060600	430	078	1	30	35	167	137	175	9	0	0	8	0
87060606	426	042	1	20	49	180	162	163	7	0	0	1	0
87060621	430	074	2	30	14	167	162	196	7	2	4	0	0
87060718	430	057	8	10	41	180	154	172	5	7	5	-1	0
87060721	430	068	8	10	27	189	155	183	5	7	5	-1	0
87060906	428	057	3	30	62	162	143	210	9	2	0	8	0
87060906	427	047	5	30	35	135	109	170	4	5	8	0	0
87060912	432	069	6	20	49	183	151	183	6	2	5	0	0
87060918	431	056	3	20	35	160	111	154	8	3	2	0	0
87060921	430	067	0	30	33	157	119	161	8	0	0	0	0

87060921 430 070 0 30 29 160 144 179 9 0 0 0 0

87061009 431 054 2 10 31 170 138 200 9 1 1 5 0
87061112 429 055 3 10 29 178 160 170 8 1 0 6 0

87061118 431 056 6 10 23 192 144 168 7 6 6 0 0
87061121 430 064 3 10 27 185 144 175 8 3 2 5 0

87061218 430 066 3 10 19 181 166 186 9 0 0 8 0
87061218 425 056 2 10 25 210 174 188 9 0 0 1 0

87061700 433 077 0 30 23 171 121 167 9 0 0 0 0
87061703 430 064 0 30 39 166 075 163 9 0 0 0 0
87061709 432 043 2 30 43 192 095 220 9 1 0 5 0
87061712 425 043 0 30 56 168 096 203 9 0 0 0 0

87061800 430 076 0 30 68 171 118 174 9 0 0 0 0
87061812 425 050 4 30 49 183 177 170 9 0 0 4 0
87061818 431 054 0 20 35 173 136 155 8 0 0 0 0
87061821 430 065 0 30 35 160 137 150 8 0 0 0 0

87061903 430 062 4 30 23 145-001 147 6 3 2 6 0
87062000 430 069 3 30 54 160 152 176 8 3 0 6 0

87062000 430 077 1 30 43 154 136 171 6 1 4 0 0
87062000 430 078 1 30 49 162 149 170 8 1 0 4 0
87062003 430 058 7 30 39 153 153 140 8 7 5-1 0

87062103 430 063 1 30 31 159-001 152 9 0 0 0 0
87062106 433 080 0 40 06 190 146 180 9 0 0 0 0
87062118 431 057 0 30 29 205 107 137 8 0 0 0 0
87062121 430 068 0 30 29 170 138 157 8 0 0 0 0

87062212 430 055 1 30 78 187 121 210 9 0 0 0 0
87062215 429 059 0 30 35 198 139 160 9 0 0 0 0
87062218 431 054 1 30 27 215 136 210 9 0 0 5 0

87062306 434 072 0 20 04 196 166 190 9 0 0 0 0
87062318 431 055 0 30 06 193 151 156 8 0 0 0 0
87062321 430 067 0 30 10 189 186 189 8 0 0 0 0

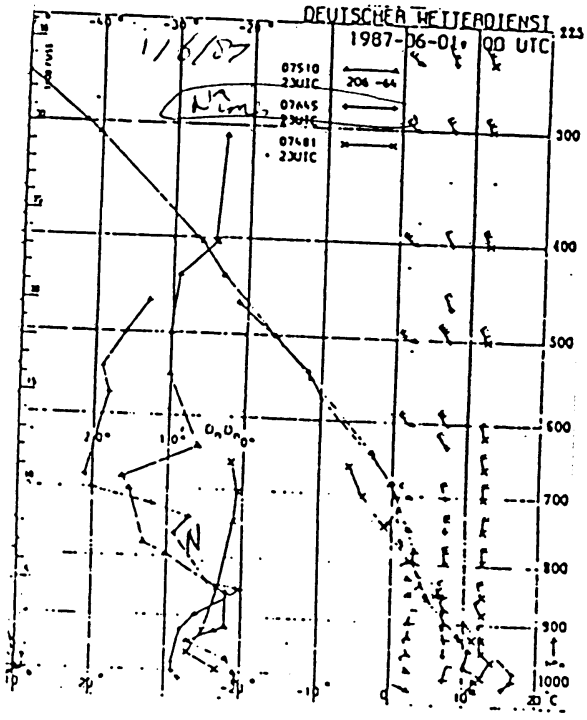
87062400 430 080 0 10 00 184 180 193 9 0 0 0 0

Appendix E: Radiosonde data

Radiosonde data are essential for the calculation of atmospheric corrections when comparing satellite and ground data. Unfortunately no local radiosonde data were collected. The French Weather Service supplied the data for the nearest regular station: Nîmes. Nîmes is located about 50 km north-north-west from the Crau, so that these data must be used cautiously. An example of the use of radiosonde data in the comparison of ground and satellite data for the Crau is given by Muller et al (1989).

In this appendix copies of the original radiosonde data are collected for those days on which other CRAU data were available. Most data are in the form of a table, giving time (H), geopotential height (Z), temperature (T, 0.1 °C), relative humidity (U), absolute humidity (R 0.1 g/kg), dew point (TD, 0.1 °C),and wind direction and speed (DD,FF). A check on the consistency of the different humidity parameters for 87060212 showed that P, T, U, and TD are mutually consistent, but that there is some doubt about the reliability of R. Before 15 june the tabular data are not complete, and copies of plots as produced by the German weather service had to be used. Unfortunately the quality of these copies is not very good.

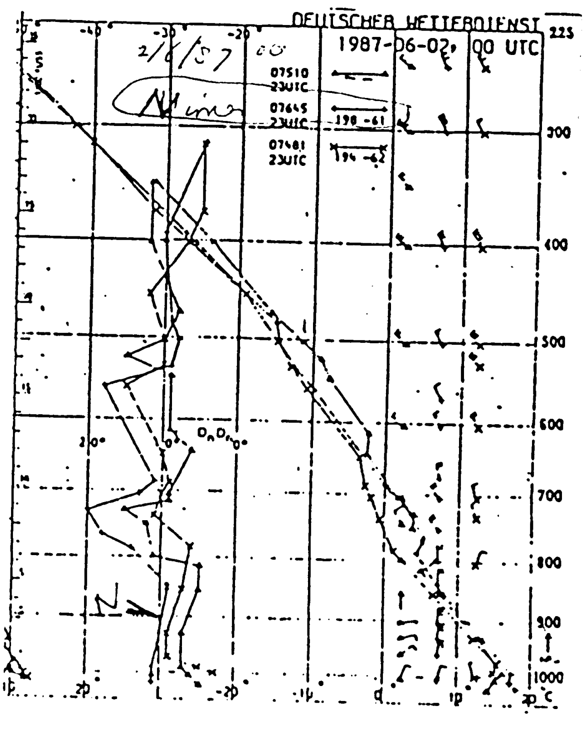
Radiosonde Nîmes: 1 June 1987 and 2 June 1981



STATION DE NIMES
CRA E8/2 03048706011220764SA2

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

	H	Z	P	T	U	R	TD
C	0000	00062	10119	0232	031	051	0051
C	0082	00316	09824	0181	036	047	0028
C	0439	01526	08503	0068	053	011	-019
C	0513	01816	08208	0068	032	007	-085
C	0658	02440	07605	0046	022	015	-151
C	0851	03416	06736	-017	020	010	-213
C	0942	03882	06351	-029	020	009	-224
C	1009	04194	06106	-043	027	012	-203
C	1379	05990	04828	-199	063	010	-249
C	1453	06286	04639	-216	068	009	-258
C	1589	06832	04305	-248	069	008	-287
C	1616	06944	04239	-239	069	009	-279
C	1937	08336	03490	-339	062	003	-385
C	2148	09222	03071	-400	041	001	-481
C	2828	12202	01935	-618	...	...	....
C	2892	12536	01833	-620	...	...	....
C	2918	12678	01792	-576	...	...	....
C	3594	16298	01013	-545	...	...	....
C	3982	18678	00696	-575	...	...	....
C	4086	19348	00627	-542	...	...	....
C	4154	19800	00584	-569	...	...	....
C	4639	23126	00347	-513	...	...	....
T	2828	12202	01935	-618	...	...	....
S	0032	00164	10000	0211	033	051	0042
S	0172	00600	09500	0153	041	047	0021
S	0243	00826	09250	0131	044	044	0011
S	0311	01056	09000	0112	046	042	0000
S	0439	01528	08500	0068	053	038	-021
S	0562	02024	08000	0062	027	019	-114
S	0683	02552	07500	0037	021	013	-166
S	0791	03108	07000	0002	020	011	-201
S	0903	03698	06500	-024	020	009	-223
S	1038	04330	06000	-055	030	012	-203
S	1324	05728	05000	-176	058	011	-239
S	1714	07364	04000	-266	067	007	-309
S	2188	09382	03000	-415	...	...	....
S	2487	10588	02500	-523	...	...	....
S	2787	11998	02000	-614	...	...	....
S	3122	13800	01500	-576	...	...	....
S	3378	15220	01200	-559	...	...	....
S	3609	16378	01000	-549	...	...	....
S	3722	17046	00900	-566	...	...	....
S	3839	17796	00800	-556	...	...	....
S	3904	18210	00750	-558	...	...	....
S	3976	18642	00700	-574	...	...	....
S	4125	19630	00600	-558	...	...	....
S	4320	20790	00500	-541	...	...	....
S	4522	22214	00400	-538	...	...	....

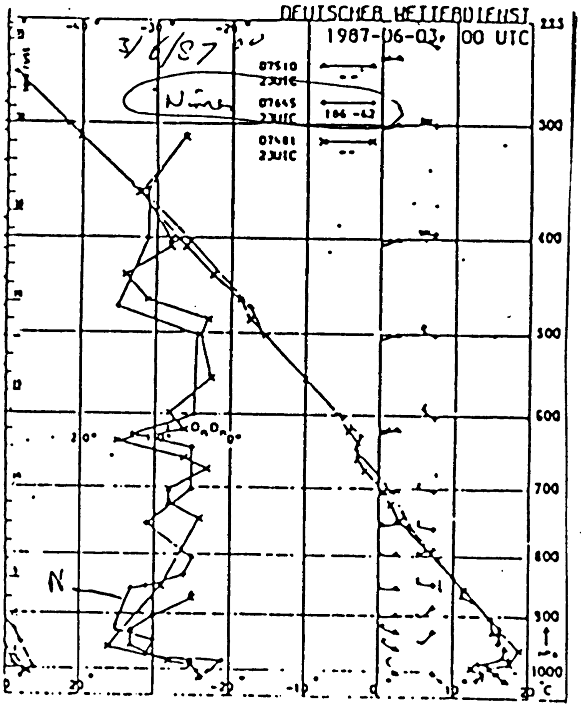


STATION DE NIMES
CRA E8/2 03068706021220764SA2

AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA

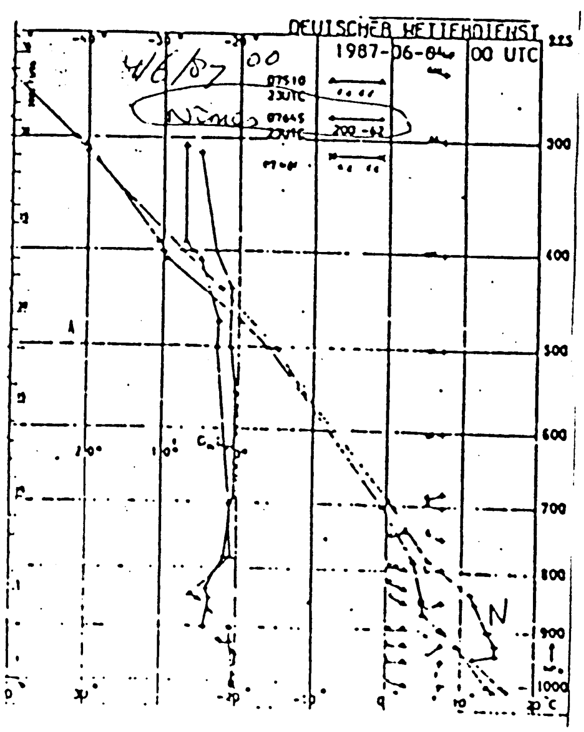
	H	Z	P	T	U	R	TD
C	0000	00062	10118	0260	031	064	0075
C	0236	01480	08575	0115	061	022	0043
C	0283	01696	08355	0097	049	018	-004
C	0321	01872	08181	0107	027	028	-075
C	0603	03204	06956	0033	026	018	-143
C	0863	04406	05986	-030	058	029	-100
C	1012	05104	05478	-058	037	017	-179
C	1050	05284	05353	-068	058	024	-137
C	1313	06412	04621	-165	061	014	-221
C	1484	07146	04187	-224	037	005	-328
C	1636	07808	03822	-272	047	005	-350
C	1867	09030	03216	-357	031	001	-465
C	1995	09626	02949	-400	044	001	-474
C	2589	12498	01897	-598	...	...	....
C	2807	13715	01561	-612	...	...	....
C	2960	14592	01357	-552	...	...	....
C	3032	14992	01273	-602	...	...	....
C	3094	15656	00712	-566	...	...	....
T	2588	12493	01897	-595	...	...	....
S	0017	00164	10000	0252	032	064	0073
S	0057	00610	09500	0204	040	063	0063
S	0122	00840	09250	0179	043	059	0051
S	0159	01072	09000	0154	047	057	0041
S	0252	01552	08500	0108	059	056	0031
S	0360	02056	08000	0096	024	022	-100
S	0473	02588	07500	0067	030	024	-097
S	0591	03152	07000	0036	026	018	-141
S	0722	03750	06500	-003	043	024	-114
S	0858	04386	06000	-030	055	028	-108
S	1169	05812	05000	-111	055	017	-184
S	1560	07478	04000	-249	046	005	-332
S	1973	09510	03000	-392	041	001	-474
S	2235	10732	02500	-483	...	...	....
S	2523	12168	02000	-588	...	...	....
S	2847	13964	01500	-604	...	...	....
S	3094	15360	01200	-594	...	...	....
S	3310	16510	01000	-570	...	...	....
S	3422	17174	00900	-580	...	...	....
S	3541	17916	00800	-574	...	...	....
S	3618	18326	00750	-571	...	...	....

Radiosonde Nîmes: 3 June 1987 and 4 June 1981



STATION DE NIMES
CRA E8/2 03086706031220764SA2

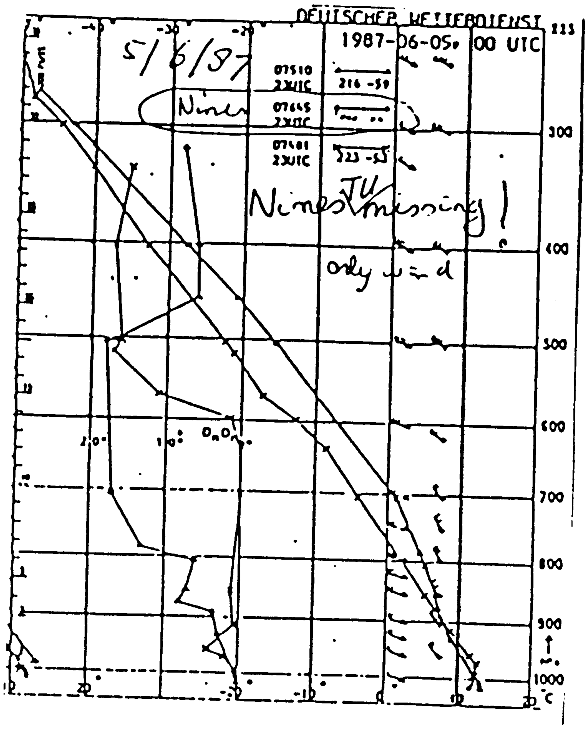
	H	Z	P	T	U	R	TD
C	0000	00062	10099	0205	059	084	0122
C	0125	00610	09469	0141	07[illegible]	060	0091
C	0343	01600	06416	0111	063	008	0045
C	0527	02456	07586	0040	078	053	0006
C	0800	03808	06414	-029	083	040	-052
C	0991	04792	05656	-091	073	025	-129
C	1087	05304	05293	-119	034	009	-245
C	1262	06236	04678	-198	054	009	-265
C	1400	06976	04231	-235	028	003	-366
C	1762	09098	03133	-400	029	001	-508
C	2096	11138	02299	-552	...	...	....
C	....	.....	.....	....	...	...	....
C	2298	12338	01903	-579	...	...	....
C	2604	14264	01404	-547	...	...	....
C	2860	15860	01093	-555	...	...	....
C	2904	16154	01043	-561	...	...	....
C	3040	16998	00913	-547	...	...	....
C	3377	19242	00441	-583	...	...	....
C	3492	19964	00572	-557	...	...	....
?	2298	12338	01903	-579	...	...	....
S	0019	00146	10000	0193	060	084	0113
S	0118	00582	09500	0143	071	076	0091
S	0167	00806	09250	0136	057	060	0052
S	0216	01038	09000	0129	058	060	0048
S	0324	01518	08500	0108	061	058	0035
S	0434	02020	08000	0077	072	059	0029
S	0546	02548	07500	0040	080	054	0006
S	0659	03108	07000	0013	084	050	-011
S	0778	03700	06500	-023	083	041	-048
S	0903	04334	06000	-067	078	030	-099
S	1168	05736	05000	-155	039	008	-263
S	1475	07382	04000	-265	028	003	-395
S	1810	09392	03000	-426	...	...	....
S	1999	10598	02500	-517	...	...	....
S	....	.....	.....	....	...	...	....
S	2534	13842	01500	-566	...	...	....
S	2764	15264	01200	-565	...	...	....
S	2943	16420	01000	-575	...	...	....
S	3054	17088	00900	-551	...	...	....
S	3166	17836	00800	-565	...	...	....
S	3230	18246	00750	-575	...	...	....
S	3297	18688	00700	-568	...	...	....
S	3434	19658	00600	-568	...	...	....



STATION DE NIMES
CRA E8/2 1087060412207645A2

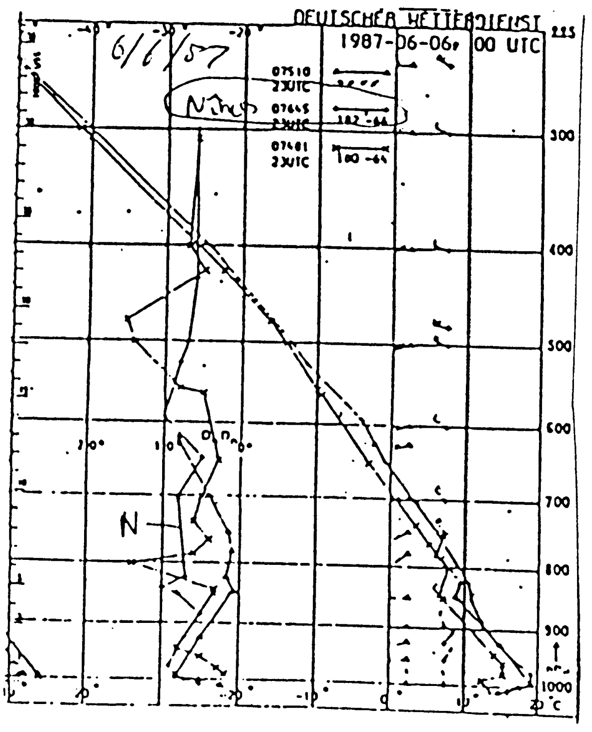
	H	Z	P	T	U	R	TD
C	0000	00062	10054	0214	050	076	0105
C	0246	01332	08653	0075	086	065	0054
C	0302	01584	08392	0047	081	051	0017
C	0428	02140	07839	0053	073	052	0009
C	0552	02422	07572	0046	073	051	0002
S	0009	00108	10000	0206	050	076	0098
S	0092	00546	09500	0167	055	069	0076
S	0133	00774	09250	0145	062	069	0073
S	0174	01004	09000	0116	069	065	0061
S	0278	01476	08500	0058	082	055	0029
S	0386	01972	08000	0051	075	051	0010

Radiosonde Nîmes: 5 June 1987 and 6 June 1981



STATION DE NIMES
C.IA E8/2 031287060512207645A2

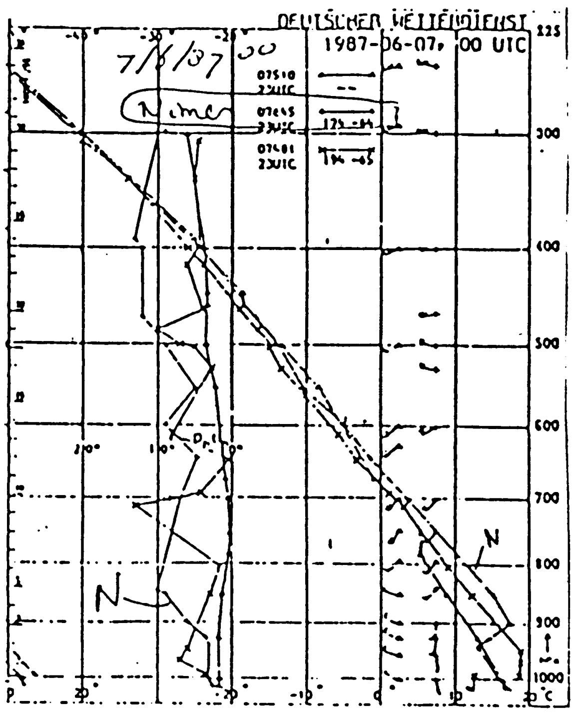
	H	Z	P	T	U	R	TD
C	0000	00062	10086	0237	032	057	0060
C	0087	00354	09749	0189	041	053	0054
C	0353	01172	08852	0109	046	019	-002
C	0526	01638	08345	0050	070	003	0001
C	0622	01950	08055	0068	041	031	-053
C	1040	03772	06427	-013	014	007	-248
C	1117	04170	06113	-031	021	010	-219
C	1156	04374	05957	-040	044	021	-142
C	1571	06468	04534	-197	030	005	-327
C	2171	09024	03162	-400	038	001	-486
C	2596	10924	02372	-560	...	...	....
C	2881	12374	01883	-625	...	...	....
C	3229	14114	01427	-559	...	...	....
C	3613	15954	01067	-582	...	...	....
C	3751	16666	00954	-550	...	...	....
C	4015	18160	00754	-579	...	...	....
C	4371	20390	00530	-560	...	...	....
T	2881	12374	01883	-625	...	...	....
T	2881	12374	01883	-625	...	...	....
S	0022	00136	10000	0224	034	057	0057
S	0150	00574	09500	0168	042	053	0038
S	0221	00802	09250	0146	045	050	0028
S	0303	01022	09000	0123	050	049	0021
S	0472	01508	08500	0069	067	049	0012
S	0634	02006	08000	0065	040	030	-062
S	0756	02532	07500	0038	029	019	-126
S	0885	03068	07000	0019	020	012	-187
S	1021	03682	06500	-009	015	008	-243
S	1145	04316	06000	-038	038	018	-161
S	1413	05730	05000	-139	034	008	-264
S	1778	07382	04000	-274	033	003	-387
S	2247	09384	03000	-430	...	...	....
S	2518	10586	02500	-531	...	...	....
S	2808	11996	02000	-601	...	...	....
S	3160	13794	01500	-573	...	...	....
S	3460	15212	01200	-569	...	...	....
S	3693	16362	01000	-559	...	...	....
S	3818	17032	00900	-558	...	...	....
S	3951	17782	00800	-561	...	...	....
S	4020	18192	00750	-579	...	...	....
S	4092	18626	00700	-573	...	...	....
S	4242	19604	00600	-580	...	...	....



STATION DE NIMES
CRA E8/2 031487060612207645A2

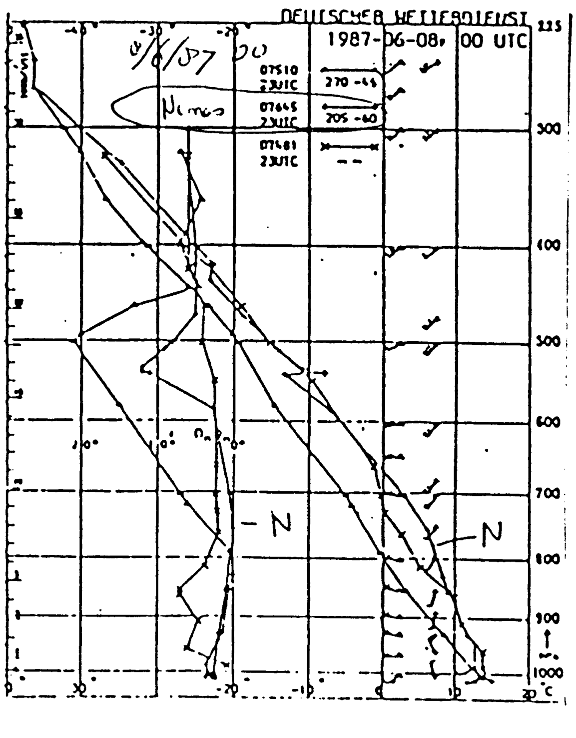
	H	Z	P	T	U	R	TD
C	0000	00062	10120	0270	040	081	0122
C	0044	00248	09908	0229	045	081	0104
C	0120	00570	09546	0200	054	073	0106
C	0231	01058	09016	0173	044	067	0051
C	0483	02236	07841	0100	075	075	0060
C	0734	03416	06787	0006	092	054	-006
C	0865	04046	06272	-036	071	033	-081
C	1035	04884	05636	-076	067	025	-126
C	1073	05068	05504	-090	079	028	-118
C	1129	05342	05313	-109	058	018	-176
C	1329	06360	04645	-183	055	010	-249
C	1418	06834	04359	-197	044	008	-287
S	0024	00166	10000	0246	042	081	0108
S	0129	00610	09500	0196	054	081	0100
S	0182	00840	09250	0178	053	073	0081
S	0234	01074	09000	0173	045	062	0052
S	0337	01558	08500	0141	054	064	0049
S	0446	02068	08000	0110	069	071	0055
S	0560	02602	07500	0069	081	067	0038
S	0680	03166	07000	0025	088	057	0007
S	0806	03762	06500	-020	080	040	-050
S	0936	04394	06000	-056	076	031	-092
S	1222	05802	05000	-143	058	014	-208

Radiosonde Nîmes: 7 June 1987 and 8 June 1981



STATION DE NIMES
CRA E8/2 0316870607122207645A2

.	H	Z	P	T	U	R	TD
C	0000	00062	10105	0200	067	094	0136
C	0139	00636	09446	0146	079	078	0110
C	0201	00912	09145	0150	072	071	0101
C	0322	01456	08572	0109	070	045	0028
C	0374	01696	08330	0115	075	009	0072
C	0628	02896	07207	0062	079	066	0029
C	0773	03626	06587	0006	097	059	0002
C	1124	05506	05188	-096	089	031	-111
C	1150	05638	05101	-122	087	025	-138
C	[illegible]						
C	1172	05750	05027	-127	083	023	-149
C	1272	06232	04717	-159	058	013	-223
C	1444	07036	04236	-202	067	012	-247
C	1989	09652	02933	-400	052	002	-459
C	2441	11708	02144	-584	...	...	....
C	2635	12640	01847	-608	...	...	....
C	2745	13180	01694	-615	...	...	....
C	2943	14174	01446	-556	...	...	....
C.	3767.	18870	00689	-573	...	...	....
C	4015	20484	00535	-538	...	...	....
C	4549	24548	00285	-529	...	...	....
T	2635	12640	01847	-608	...	...	....
S	0022	00150	10000	0188	069	094	0129
S	0127	00588	09500	0149	080	090	0114
S	0179	00814	09250	0148	074	084	0102
S	0230	01046	09000	0142	069	078	0086
S	0337	01526	08500	0110	074	071	0065
S	0445	02032	08000	0096	077	072	0057
S	0559	02566	07500	0080	082	073	0051
S	0675	03132	07000	0043	085	063	0020
S	0793	03732	06500	-002	095	055	-010
S	0910	04370	06000	-035	093	045	-045
S	1180	05790	05000	-131	080	022	-159
S	1533	07458	04000	-234	065	009	-282
S	1959	09498	03000	-387	053	002	-447
S	2229	10722	02500	-498	...	...	....
S	2529	12142	02000	-591	...	...	....
S	2898	13940	01500	-578	...	...	....
S	3168	15352	01200	-570	...	...	....
S	3374	16508	01000	-567	...	...	....
S	3485	17174	00900	-569	...	...	....
S	3607	17920	00800	-558	...	...	....
S	3676	18332	00750	-553	...	...	....
S	3750	18768	00700	-570	...	...	....
S	3902	19756	00600	-554	...	...	....
S	4074	20916	00500	-540	...	...	....
S	4288	22344	00400	-533	...	...	....
S	4515	24206	00300	-530	...	...	....

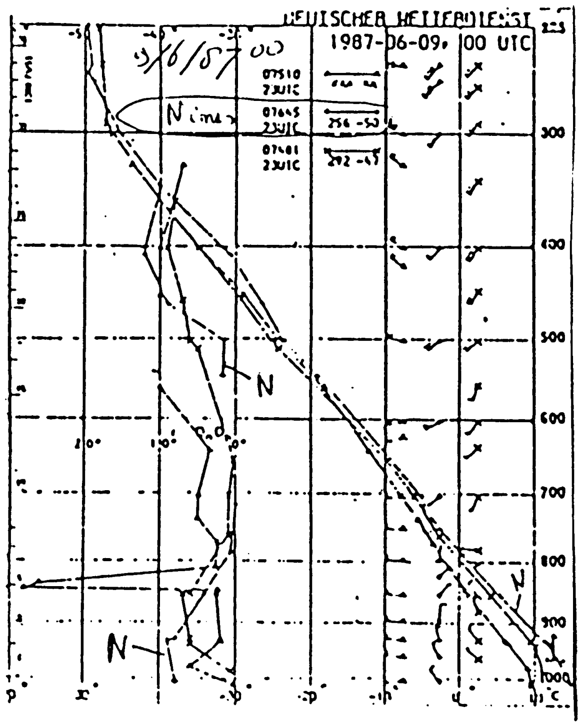


STATION DE NIMES
CRA E8/2 0318870608122207645A2 8/6/

	H	Z	P	T	U	R	TD
C	0000	00062	10040	0206	042	058	0072
C	0088	00314	09747	0147	048	050	0039
C	0463	01556	08392	0039	077	046	0003
C	0557	01966	07977	0011	069	035	-039
C	0613	02216	07733	0017	042	024	-095
C	0822	03114	06911	-028	019	008	-229
C	1123	04434	05831	-120	015	004	-328
C	1551	06306	04548	-203	020	003	-371
S	0012	00096	10000	0192	042	058	0059
S	0158	00528	09500	0129	053	052	0035
S	0229	00752	09250	0111	057	051	0029
S	0298	00980	09000	0091	063	050	0024
S	0435	01450	08500	0047	074	046	0004
S	0551	01942	08000	0011	069	035	-040
S	0667	02462	07500	0000	039	019	-123
S	0798	03012	07000	-023	024	011	-201
S	0933	03594	06500	-065	017	006	-275
S	1073	04214	06000	-107	019	005	-298
S	1384	05598	05000	-171,	023	004 .	-333 .

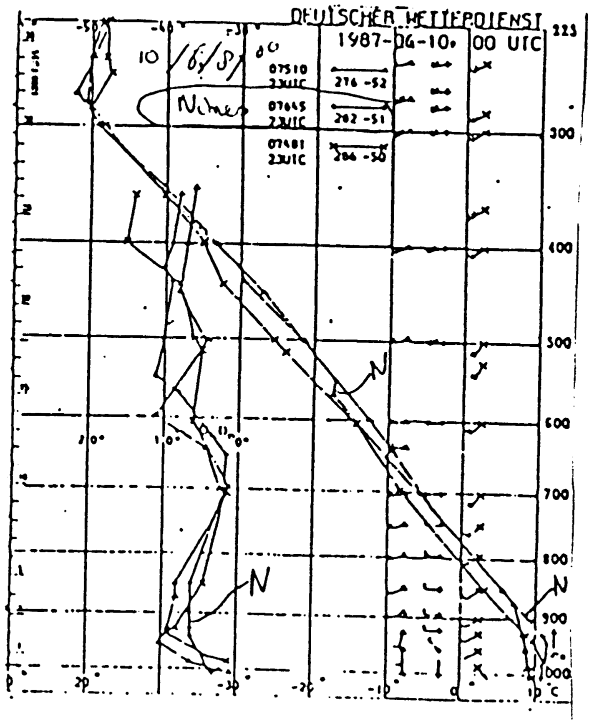
Radiosonde Nîmes:

9 June 1987 and 10 June 1981



STATION DE NIMES 9/6
CRA E8/2 032067040912207645A2

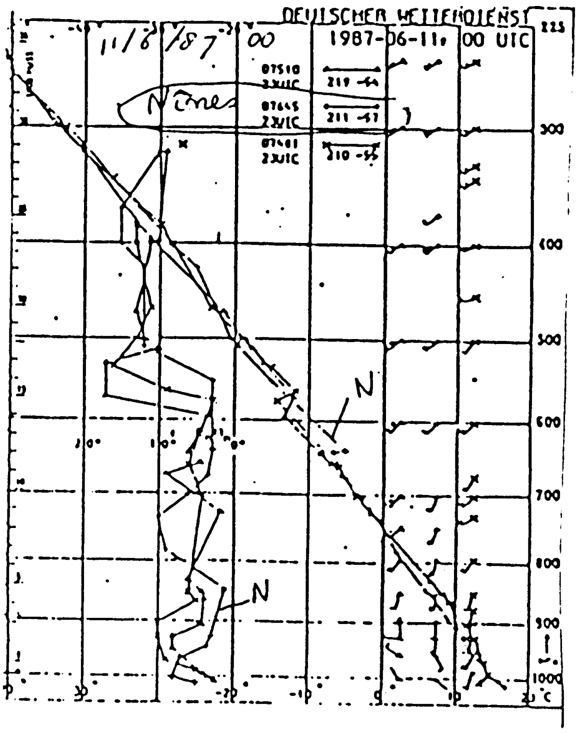
	H	Z	P	T	U	R	TD
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA							
C	0000	00062	10034	0210	036	052	0053
C	0015	00140	09941	0182	037	047	0034
C	0291	01584	08362	0040	071	036	-007
C	0516	02640	07329	-047	086	003	-066
C	0550	02804	07178	-060	076	003	-094
C	0572	02910	07060	-051	060	022	-116
C	0703	03588	06491	-087	042	013	-190
C	0823	04226	05973	-141	040	008	-247
C	....	.....	.....	....	...	...	....
C	1073	05538	05012	-220	027	003	-358
C	1413	07418	03856	-333	053	003	-395
C	1568	08328	03381	-400	059	002	-448
C	1807	09620	02787	-502	...	...	....
C	1647	09804	02709	-505	...	...	....
C	2098	11034	02247	-477	...	...	....
C	2201	11580	02067	-485	...	...	....
C	....	.....	.....	....	...	...	....
C	2507	13366	01577	-476	...	...	....
C	2527	13476	01551	-487	...	...	....
C	2838	15276	01177	-515	...	...	....
C	3049	16624	00958	-461	...	...	....
C	3277	18260	00743	-544	...	...	....
C	3396	19150	00649	-549	...	...	....
C	3509	20030	00569	-509	...	...	....
C	3742	21696	00438	-507	...	...	....
T	2527	13476	01551	-487	...	...	....
T	3277	18280	00743	-544	...	...	....
S	0005	00090	10000	0199	036	052	0044
S	0082	00526	09500	0144	044	047	0023
S	0121	00750	09250	0122	048	046	0015
S	0161	00978	09000	0099	052	044	0005
S	0260	01450	08500	0052	066	043	-007
S	0368	01942	08000	0008	073	036	-035
S	0478	02456	07500	-033	079	031	-065
S	0589	02998	07000	-057	056	019	-131
S	0700	03576	06500	-087	043	013	-190
S	0816	04192	06000	-137	040	008	-244
S	1076	05554	05000	-222	027	003	-361
S	1367	07160	04000	-321	046	002	-398
S	1702	09134	03000	-464	...	...	....
S	1957	10330	02500	-493	...	...	....
S	[illegible]	[illegible]	[illegible]	[illegible]	...	...	....
6	...	...	....	...	...		
S	2816	15150	01200	-515	...	...	....
S	3007	16344	01000	-488	...	...	....
S	3108	17034	00900	-508	...	...	....
S	3213	17802	00800	-524	...	...	....
S	3268	18218	00750	-542	...	...	....
S	3324	18660	00700	-535	...	...	....
S	3463	19654	00600	-526	...	...	....
S	3604	20826	00500	-521	...	...	....

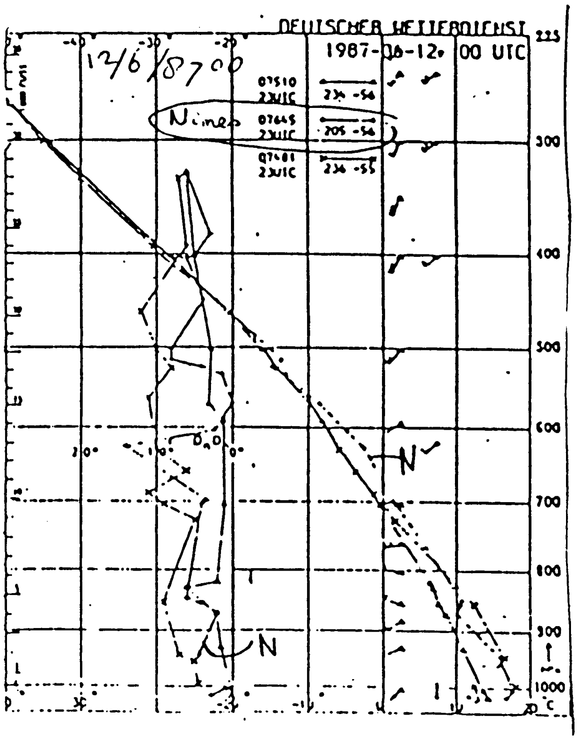


STATION DE NIMES
CRA E8/2 032287061012207645A2

	H	Z	P	T	U	R	TD
AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA							
C	0000	00062	10073	0210	052	078	0107
C	0077	00406	09676	0148	067	076	0089
C	0151	00750	09289	0114	086	076	0093
C	0320	01526	08457	0055	085	022	0032
C	0339	01600	08382	0063	071	012	0016
C	0374	01736	08242	0040	089	055	0024
C	0432	01964	08014	0014	089	047	0000
C	0451	02040	07939	0035	071	044	-011
C	0486	02186	07797	0031	084	051	0007
C	0693	03144	06919	-039	082	033	-065
C	0750	03400	06699	-060	067	024	-111
C	0901	04088	06129	-112	082	021	-136
C	0939	04268	05988	-113	063	017	-169
C	1034	04722	05643	-124	073	019	-162
C	1110	05086	05380	-139	053	012	-214
C	1322	06034	04742	-198	071	011	-237
C	1398	06370	04531	-235	079	010	-261
C	1427	06500	04451	-227	059	008	-283
C	1590	07220	04032	-267	031	003	-364
C	1676	07598	03825	-282	030	002	-402
C	2003	09118	03077	-400	027	001	-516
C	2557	11826	02038	-566	...	...	....
C	2752	12806	01745	-586	...	...	....
C	3003	14110	01422	-534	...	...	....
C	3135	14832	01270	-571	...	...	....
C	3448	16604	00965	-512	...	...	....
C	3480	16792	00937	-482	...	...	....
C	3614	17632	00824	-526	...	...	....
C	4057	20556	00524	-534	...	...	....
C	4339	22680	00378	-506	...	...	....
T	2557	11826	02038	-566	...	...	....
T	3614	17632	00824	-526	...	...	....
S	0014	00124	10000	0198	054	078	0102
S	0110	00560	09500	0132	076	076	0090
S	0158	00784	09250	0110	086	076	0087
S	0205	01012	09000	0091	083	067	0063
S	0309	01484	08500	0060	085	058	0036
S	0435	01978	08000	0017	085	045	-006
S	0554	02500	07500	0016	084	048	-009
S	0672	03052	07000	-032	080	034	-062
S	0801	03634	06500	-078	069	022	-125
S	0935	04252	06000	-112	064	017	-167
S	1234	05638	05000	-172	065	012	-222
S	1603	07276	04000	-270	031	003	-390
S	2040	09292	03000	-413	...	...	....
S	2296	10508	02500	-492	...	...	....
S	2578	11944	02000	-568	...	...	....
S	2939	13770	01500	-544	...	...	....
S	3199	15192	01200	-543	...	...	....
S	3407	16370	01000	-516	...	...	....
S	3523	17058	00900	-494	...	...	....
S	3643	17822	00800	-518	...	...	....
S	3703	18240	00750	-528	...	...	....
S	3769	18686	00700	-530	...	...	....
S	3924	19684	00600	-518	...	...	....
S	4102	20856	00500	-517	...	...	....
S	4295	22304	00400	-517	...	...	....

Radiosonde Nîmes: 11 June 1987 and 12 June 1981





STATION DE NIMES
CRA E8/2 03278706121220764SA2 12/6

	H	Z	P	T	U	R	TD
C	0000	00062	10120	0237	050	094	0144
C	0193	01148	08920	0140	072	073	0090
C	0371	01912	08141	0081	080	033	0049
C	0461	02320	07749	0079	052	003	-012
C	0752	03678	06534	-013	074	039	-053
C	0825	04026	06275	-023	042	021	-134
C	1154	05540	05168	-111	033	010	-238
C	1341	06402	04612	-183	062	012	-237
C	1559	07402	04025	-274	053	005	-339
C	1642	07782	03817	-285	041	003	-375
C	1978	09344	03053	-400	038	002	-486
C	2064	09752	02676	-429	...	...	....
S	0019	00166	10000	0241	050	094	0130
S	0098	00610	09500	0191	059	086	0109
S	0137	00838	09250	0169	066	086	0105
S	0177	01072	09000	0147	072	084	0097
S	0288	01552	08500	0114	074	073	0069
S	0403	02036	08000	0085	069	060	0031
S	0518	02586	07500	0060	052	040	-031
S	0639	03148	07000	0022	066	042	-035
S	0765	03744	06500	-017	068	035	-069
S	0900	04378	06000	-042	041	019	-153
S	1209	05794	05000	-133	042	011	-235
S	1568	07446	04000	-273	053	005	-340
S	2003	09464	03000	-409	....	...	....

Radiosonde Nîmes: 17June 1987 and 18 June 1981

Handwritten form (C.R.V.)

n° du C.R.V.		An	Mois	Jour	Heure		
0671	212	87	06	17	12	2	91

Niveaux caractéristiques Z dam	DD	FF	Niveaux standard P	DD	FF	Altitudes principales Z dam	DD	FF
Sol 0006	040	004	1000			Sol 0006	040	004
0031	314	011	0950			0050	312	003
0069	335	006	0900			0100	331	006
0101	337	006	0850			0150	[illegible]	006
0336	297	017	0800			0200	[illegible]	006
0751	286	029	0750			0300	311	014
			0700			0400	[illegible]	015
			0650			0500	293	[illegible]
			0600			0550	294	023
			0500			0600	[illegible]	024
			0400			0700	[illegible]	023

Vent tropopause Z dam	DD	FF

Rédacteur du C.R.V.: Alizeat
vérifié par: M Martin
Altitude atteinte: 7510 m
Cause de fin de sondage: [illegible]

TEMPS AU MOMENT DU LANCER
Nébulosité totale: 4/8
Météores: [illegible]
REMARQUES: [illegible]

Handwritten form (C.R.A.)

Station: Nîmes N°: 07645

n° du C.R.A.		An	Mois	Jour	Heure		
0336	212	87	06	17	12	2	[illegible]

Niveaux caractéristiques Z	P	T	U
Sol. 00062	10159	+197	41
00860	[illegible]	+103	51
[illegible]	[illegible]	-011	[illegible]
02326	07719	-011	59
[illegible]	[illegible]	[illegible]	[illegible]
/////	/////	///	//
[illegible]	[illegible]	[illegible]	//
[illegible]	[illegible]	-579	//
[illegible]	[illegible]	[illegible]	//
[illegible]	[illegible]	[illegible]	//
16253	[illegible]	-528	//
16518	01005	-501	//
17671	00842	-528	//

Niveaux standard Z	P	T	U
00196	1000	+181	42
00630	0950	+129	48
01080	0900	+085	56
01550	0850	+045	69
[illegible]	0800	-008	80
/////	0750	///	//
/////	0700	///	//
/////	0650	///	//
/////	0600	///	//
/////	0500	///	//
/////	0400	///	//
/////	0300	///	//
/////	0250	///	//
[illegible]	0200	-560	//
14085	0150	-516	//
15371	0120	-505	//
15554	0100	-502	//
17260	0090	-518	//

Tropopause Z	P	T	U
[illegible]	[illegible]	-579	//

Rédacteur du C.R.A.: Alizeat
Radiosonde
Marque: M
Type: FMO S
REMARQUES: [illegible]

CODE ÉCART HORAIRE:
1 = Lâcher entre l'heure du réseau exclue et 30 minutes avant.
2 = " entre 31 et 60 minutes avant.
3 = " entre 61 et 90 minutes avant.
5 = Lâcher entre l'heure du réseau incluse et 30 minutes après.
6 = " entre 31 et 60 minutes après.
7 = " entre 61 et 90 minutes après.

CODE VENT:
0 = pas de sondage de vent
1 = sondage de vent par ballon séparé.
2 = sondage de vent sur ballon de radiosondage

STATION DE NIMES
CRA E8/2 033587061700207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10164	0133	072	066	0083
C	0019	00146	10062	0133	070	058	0081
C	0062	00342	09831	0136	067	050	0076
C	0477	02208	07626	-021	094	008	-026
C	0593	02736	07322	-045	061	023	-107
C	0652	03004	07076	-043	064	017	-146
C	0822	03718	06459	-079	036	011	-210
C	0958	04314	05980	-116	069	018	-161
C	1494	06708	04334	-274	057	005	-331
C	2032	08650	03286	-400	041	001	-460
C	2525	11012	02297	-547	...	...	....
C	3095	13926	01465	-488	...	...	....
C	3281	14826	01276	-495	...	...	....
C	3456	15734	01109	-541	...	...	....
C	3634	16652	00961	-536	...	...	....
C	3762	17312	00869	-472	...	...	....
C	4014	18752	00695	-569	...	...	....
C	4068	19090	00659	-543	...	...	....
C	4495	21518	00451	-551	...	...	....
C	4721	22802	00370	-519	...	...	....
T	2525	11012	02297	-547	...	...	....
T	3456	15734	01109	-541	...	...	....
T	4014	18752	00695	-569	...	...	....
S	0030	00198	10000	0133	069	066	0077
S	0123	00624	09500	0110	067	058	0051
S	0171	00850	09250	0091	068	053	0035
S	0219	01076	09000	0072	071	050	0023
S	0321	01544	08500	0035	078	045	0000
S	0436	02032	08000	-009	090	040	-026
S	0552	02546	07500	-036	076	029	-073
S	0672	03088	07000	-064	039	015	-143
S	0810	03668	06500	-078	034	011	-209
S	0952	04288	06000	-115	067	017	-164
S	1247	05662	05000	-199	057	008	-262
S	1639	07280	04000	-306	053	003	-371
S	2175	09266	03000	-444	...	...	....
S	2419	10464	02500	-522	...	...	....
S	2685	11902	02000	-520	...	...	....
S	3060	13766	01500	-501	...	...	....
S	3358	15226	01200	-518	...	...	....
S	3580	16396	01000	-544	...	...	....
S	3718	17078	00900	-491	...	...	....
S	3859	17852	00800	-520	...	...	....
S	3931	18268	00750	-545	...	...	....
S	4006	18706	00700	-567	...	...	....
S	4177	19694	00600	-542	...	...	....
S	4378	20860	00500	-539	...	...	....
S	4616	22284	00400	-524	...	...	....

STATION DE NIMES
CRV E8/2 066987061700207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	040	003
C	0115	00730	.....	319	006
C	1635	07360	.....	289	032
C	2405	10490	.....	290	032
C	2525	11140	.....	274	039
C	3345	15230	.....	255	023
C	3405	16480	.....	270	020
C	3805	17570	.....	287	002
C	3945	18380	.....	287	001
C	4005	18780	.....	247	004
C	4125	19380	.....	287	006
C	4365	20640	.....	054	003
C	4465	21190	.....	069	004
C	4425	21310	.....	107	003
C	4665	22370	.....	044	002
S	0030	.....	10000	019	004
S	0123	.....	09500	319	006
S	0171	.....	09250	320	006
S	0219	.....	09000	321	007
S	0321	.....	08500	324	009
S	0436	.....	08000	327	011
S	0552	.....	07500	317	012
S	0672	.....	07000	307	013
S	0810	.....	06500	295	015
S	0952	.....	06000	291	018
S	1247	.....	05000	286	025
S	1639	.....	04000	289	032
S	2175	.....	03000	295	031
S	2419	.....	02500	289	032
S	2685	.....	02000	275	036
S	3060	.....	01500	273	027
S	3358	.....	01200	255	023
S	3580	.....	01000	268	021
S	3718	.....	00900	279	010
S	3859	.....	00800	287	002
S	3931	.....	00750	287	001
S	4006	.....	00700	247	004
S	4177	.....	00600	.287	004
S	4378	.....	00500	.054	003
S	4616	.....	00400	.082	001

STATION DE NIMES
CRA E8/2 033787061800207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10150	0157	068	063	0098
C	0011	00108	10094	0140	065	055	0076
C	0040	00228	09952	0150	061	052	0076
C	0387	01816	08213	0030	084	003	0006
C	0531	02464	07580	0010	059	032	-059
C	0769	03534	06624	-054	069	026	-101
C	0880	04072	06184	-088	051	016	-170
C	0973	04494	05854	-122	061	015	-181
C	1028	04724	05660	-124	047	012	-213
C	1564	07012	04175	-265	030	003	-386
C	2003	08936	03173	-400	051	002	-462
C	2469	11292	02215	-591	...	...	....
C	2519	11598	02110	-595	...	...	....
C	2575	11950	01995	-541	...	...	....
C	2817	13446	01282	-515	...	...	....
C	3053	14996	01244	-550	...	...	....
C	3209	16006	01063	-521	...	...	....
C	3319	16750	00947	-541	...	...	....
C	3443	17540	00838	-497	...	...	....
C	3614	18740	00697	-556	...	...	....
C	3679	19118	00657	-530	...	...	....
C	3769	19630	00606	-557	...	...	....
C	4053	21396	00460	-532	...	...	....
T	2469	11292	02215	-591	...	...	....
T	3614	18740	00697	-558	...	...	....
S	0030	00186	10000	0146	061	063	0071
S	0130	00618	09500	0117	061	055	0044
S	0181	00840	09250	0099	064	052	0034
S	0231	01068	09000	0082	069	052	0028
S	0329	01536	08500	0045	076	047	0006
S	0429	02030	08000	0025	080	045	-006
S	0550	02548	07500	0006	060	031	-063
S	0675	03098	07000	-034	064	027	-093
S	0799	03682	06500	-058	061	023	-121
S	0927	04304	06000	-105	055	015	-178
S	1248	05688	05000	-181	039	007	-287
S	1642	07320	04000	-289	038	003	-387
S	2085	09318	03000	-429	...	...	....
S	2332	10522	02500	-528	...	...	....
S	2572	11934	02000	-544	...	...	....
S	2870	13792	01500	-532	...	...	....
S	3085	15226	01200	-538	...	...	....
S	3268	16400	01000	-532	...	...	....
S	3369	17078	00900	-521	...	...	....
S	3488	17842	00800	-504	...	...	....
S	3547	18264	00750	-529	...	...	....
S	3610	18712	00700	-557	...	...	....
S	3779	19694	00600	-555	...	...	....
S	3970	20858	00500	-544	...	...	....

STATION DE NIMES
CRV E8/2 067387061800207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	340	003
C	0190	00970	.....	327	011
C	0410	02050	.....	359	010
C	0510	02500	.....	324	011
C	1710	07770	.....	292	035
C	2480	11550	.....	293	042
C	3280	15900	.....	294	011
S	0030	.....	10000	338	004
S	0130	.....	09500	332	008
S	0181	.....	09250	328	010
S	0231	.....	09000	332	011
S	0329	.....	08500	347	011
S	0429	.....	08000	353	010
S	0550	.....	07500	323	012
S	0675	.....	07000	317	014
S	0799	.....	06500	311	016
S	0927	.....	06000	306	018
S	1248	.....	05000	302	026
S	1642	.....	04000	294	034
S	2085	.....	03000	297	041
S	2332	.....	02500	295	041
S	2572	.....	02000	292	039
S	2670	.....	01500	266	029
S	3085	.....	01200	269	020
S	3268	.....	01000	293	012

STATION DE NIMES
CRA E8/2 033687061812207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10112	0215	041	060	0077
C	0125	00770	09304	0125	052	050	0031
C	0305	01654	08364	0062	073	027	0018
C	0412	02108	07911	0027	069	015	-024
C	0446	02254	07769	0041	052	014	-049
C	0608	03038	07047	-026	044	019	-130
C	0620	03102	06990	-030	010	004	-302
C	0661	03322	06798	-043	010	004	-313
C	0698	03524	06626	-054	050	019	-142
C	0935	04826	05601	-120	045	012	-213
C	1175	05826	04907	-181	077	014	-211
C	1231	06062	04755	-190	058	010	-252
C	1455	07016	04177	-242	042	005	-332
C	1862	08998	03152	-400	045	002	-471
C	2342	11542	02139	-582	...	...	....
C	2462	12206	01927	-535	...	...	....
C	2860	14372	01376	-520	...	...	....
C	3037	15452	01164	-548	...	...	....
C	3147	16182	01039	-508	...	...	....
C	3261	17094	00903	-535	...	...	....
C	3328	17426	00858	-511	...	...	....
C	3443	18296	00749	-547	...	...	....
C	3745	20272	00551	-549	...	...	....
C	3815	20738	00512	-515	...	...	....
C	4075	23084	00356	-524	...	...	....
T	2342	11542	02139	-562	...	...	....
T	3443	18298	00749	-547	...	...	....
S	0016	00156	10000	0198	042	060	0065
S	0093	00594	09500	0144	049	053	0038
S	0133	00818	09250	0121	053	050	0028
S	0175	01046	09000	0107	058	052	0027
S	0272	01520	08500	0073	069	052	0019
S	0390	02016	08000	0033	068	041	-021
S	0510	02540	07500	0016	048	027	-083
S	0617	03090	07000	-030	016	006	-253
S	0724	03672	06500	-062	050	018	-149
S	0835	04296	06000	-093	050	015	-178
S	1141	05684	05000	-174	075	014	-208
S	1528	07330	04000	-269	042	004	-359
S	1922	09336	03000	-426	...	...	....
S	2145	10544	02500	-514	...	...	....
S	2419	11968	02000	-561	...	...	....
S	2762	13816	01500	-533	...	...	....
S	3005	15256	01200	-541	...	...	....
S	3183	16434	01000	-509	...	...	....
S	3284	17114	00900	-537	...	...	....
S	3387	17876	00800	-530	...	...	....
S	3441	18288	00750	-547	...	...	....
S	3508	18730	00700	-537	...	...	....
S	3659	19724	00600	-544	...	...	....
S	3836	20892	00500	-515	...	...	....
S	4015	22334	00400	-530	...	...	....

STATION DE NIMES
CRV E8/2 067587061812207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	320	003
C	....	.....	.....	...	...
C	0153	01070	.....	005	006
C	0293	01580	.....	003	008
C	0533	02760	.....	282	014
C	1673	08020	.....	301	030
C	2043	10010	.....	298	029
C	2303	11390	.....	295	041
C	3063	15560	.....	286	018
C	3203	16430	.....	331	007
C	3323	17300	.....	281	006
C	3503	18520	.....	299	004
C	3863	20910	.....	358	004
C	3963	21640	.....	066	004
C	4343	24350	.....	106	004
S	0016	.....	10000	...	...
S	0093	.....	09500	...	...
S	0133	.....	09250	...	...
S	0175	.....	09000	005	006
S	0272	.....	08500	004	007
S	0390	.....	08000	328	010
S	0510	.....	07500	289	013
S	0617	.....	07000	284	014
S	0724	.....	06500	288	015
S	0835	.....	06000	291	016
S	1141	.....	05000	300	021
S	1528	.....	04000	303	027
S	1922	.....	03000	299	030
S	2145	.....	02500	297	034
S	2419	.....	02000	296	036
S	2762	.....	01500	297	023
S	3005	.....	01200	289	019
S	3183	.....	01000	324	009
S	3284	.....	00900	290	006
S	3387	.....	00800	287	006
S	3441	.....	00750	292	005
S	3508	.....	00700	301	004
S	3659	.....	00600	010	006
S	3836	.....	00500	359	003
S	4015	.....	00400	066	004

Radiosonde Nîmes: 19 June 1987 and 20 June 1981

STATION DE NIMES
CRA E8/2 033987061900207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10074	0154	067	070	0093
C	0063	00324	09766	0156	057	059	0072
C	0543	02456	07540	0000	072	004	-044
C	0589	02664	07348	0026	052	032	-062
C	0749	03420	06687	-021	073	036	-061
C	1091	04990	05475	-100	062	020	-158
C	1224	05588	05063	-135	072	019	-174
C	1311	06916	04239	-228	042	006	-321
C	1924	09050	03134	-400	045	001	-471
C	2388	11434	02174	-616	...	...	....
C	2460	11766	02060	-623	...	...	....
C	2551	12208	01920	-578	...	...	....
C	3079	14600	01318	-529	...	...	....
C	3470	16664	00955	-555	...	...	....
C	3506	16872	00925	-530	...	...	....
	3579	17270	00869	-555	...	...	....
C	3786	18430	00725	-552	...	...	....
C	3857	18800	00686	-526	...	...	....
C	4020	19730	00592	-570	...	...	....
C	4161	20490	00525	-542	...	...	....
C	4341	21506	00448	-573	...	...	....
C	4594	22868	00362	-518	...	...	....
C	4720	23506	00328	-535	...	...	....
C	4912	24616	00276	-506	...	...	....
T	2460	11766	02060	-623	...	...	....
T	4020	19730	00592	-570	...	...	....
T	4341	21506	00448	-573	...	...	....
S	0014	00124	10000	0154	064	070	0086
S	0116	00558	09500	0138	057	059	0054
S	0168	00782	09250	0122	058	055	0041
S	0220	01010	09000	0104	062	054	0034
S	0325	01482	08500	0064	074	052	0021
S	0434	01978	08000	0027	076	044	-011
S	0552	02498	07500	0005	066	034	-051
S	0673	03054	07000	0000	066	036	-056
S	0794	03644	06500	-028	072	034	-072
S	0928	04274	06000	-055	067	028	-107
S	1244	05682	05000	-141	068	017	-187
S	1598	07338	04000	-268	046	004	-349
S	1982	09348	03000	-425	...	...	....
S	2217	10550	02500	-534	...	...	....
S	2498	11948	02000	-589	...	...	....
S	2898	13770	01500	-555	...	...	....
S	3196	15198	01200	-547	...	...	....
S	3415	16370	01000	-546	...	...	....
S	3535	17046	00900	-543	...	...	....
S	3675	17798	00800	-542	...	...	....
S	3747	18214	00750	-549	...	...	....
S	3829	18654	00700	-534	...	...	....
S	4006	19646	00600	-566	...	...	....
S	4213	20802	00500	-552	...	...	....
S	4468	22222	00400	-556	...	...	....
S	4820	24066	00300	-515	...	...	....

STATION DE NIMES
CRV E8/2 067787061900207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	340	002
C	0375	01870	.....	338	007
C	0535	02570	.....	281	008
C	0595	02870	.....	308	013
C	0675	04160	.....	317	019
C	1275	05930	.....	282	019
C	2325	11320	.....	334	034
C	2625	12750	.....	293	022
C	3245	15710	.....	309	009
C	3305	16060	.....	293	009
C	3565	17400	.....	321	004
C	3645	17810	.....	001	004
C	3705	18150	.....	004	004
C	3725	18240	.....	336	004
C	3825	18820	.....	292	006
C	3905	19240	.....	348	004
C	3985	19720	.....	103	004
C	4265	21320	.....	023	005
C	4325	21680	.....	042	003
C	4505	22670	.....	002	004
C	4585	23130	.....	055	006
C	4845	24610	.....	091	005
S	0014	.....	10000	360	003
S	0116	.....	09500	352	007
S	0168	.....	09250	347	009
S	0220	.....	09000	337	009
S	0325	.....	08500	333	007
S	0434	.....	08000	319	007
S	0552	.....	07500	288	009
S	0673	.....	07000	310	014
S	0794	.....	06500	316	017
S	0928	.....	06000	313	019
S	1244	.....	05000	285	019
S	1598	.....	04000	298	023
S	1982	.....	03000	316	025
S	2217	.....	02500	328	030
S	2498	.....	02000	313	025
S	2898	.....	01500	306	020
S	3196	.....	01200	308	011
S	3415	.....	01000	304	007
S	3535	.....	00900	317	005
S	3675	.....	00800	002	004
S	3747	.....	00750	327	004
S	3829	.....	00700	294	006
S	4006	.....	00600	104	003
S	4213	.....	00500	024	004
S	4468	.....	00400	016	002
S	4820	.....	00300	087	006

STATION DE NIMES
CRA E8/2 034087061912207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10037	0161	066	097	0137
C	0183	00758	09240	0098	100	066	0098
C	0429	01830	08111	0040	095	037	0032
C	0449	01904	08038	0056	089	009	0039
C	0482	02026	07918	0046	080	003	0015
C	0840	03490	06597	-045	099	041	-045
C	1092	04634	05692	-129	069	017	-172
C	1200	05110	05347	-144	090	021	-156
C	1309	05530	05057	-174	047	009	-258
C	1385	05836	04854	-183	043	008	-276
C	1584	06854	04229	-246	035	004	-356
C	1967	08820	03198	-400	036	002	-491
C	2128	09692	02810	-468	...	...	....
C	2293	10472	02496	-496	...	...	....
C	2490	11382	02174	-469	...	...	....
C	3046	14304	01388	-542	...	...	....
C	3570	16962	00919	-528	...	...	....
T	2293	10472	02496	-496	...	...	....
S	0008	00092	10000	0158	066	097	0134
S	0123	00526	09500	0119	096	088	0112
S	0181	00768	09250	0099	100	083	0098
S	0230	00976	09000	0085	098	076	0082
S	0332	01446	08500	0058	094	064	0049
S	0459	01962	08000	0052	086	059	0030
S	0596	02466	07500	0017	091	052	0003
S	0731	03020	07000	-020	092	043	-032
S	0865	03606	06500	-054	095	037	-061
S	1003	04230	06000	-100	076	022	-135
S	1331	05614	05000	-176	069	009	-257
S	1662	07256	04000	-279	036	003	-363
S	2048	09256	03000	-434	...	...	....
S	2290	10460	02500	-496	...	...	....
S	2596	11936	02000	-484	...	...	....
S	2959	13806	01500	-530	...	...	....
S	3218	15236	01200	-536	...	...	....
S	3442	16412	01000	-523	...	...	....

STATION DE NIMES
CRV E8/2 067987061912207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	240	004
C	0176	00850	.....	236	006
C	0456	02090	.....	304	010
C	1256	05420	.....	285	023
C	2056	09470	.....	275	019
C	2426	11290	.....	293	025
C	3226	15410	.....	298	014
C	3486	16770	.....	329	005
S	0008	.....	10000	240	004
S	0123	.....	09500	234	007
S	0181	.....	09250	237	006
S	0230	.....	09000	249	007
S	0332	.....	08500	273	008
S	0459	.....	08000	304	010
S	0596	.....	07500	300	011
S	0731	.....	07000	296	011
S	0865	.....	06500	291	012
S	1003	.....	06000	289	015
S	1331	.....	05000	286	023
S	1662	.....	04000	294	024
S	2048	.....	03000	276	020
S	2290	.....	02500	286	023
S	2596	.....	02000	293	024
S	2959	.....	01500	293	020
S	3218	.....	01200	297	014
S	3442	.....	01000	323	007

STATION DE NIMES
CRA E8/2 034187062000207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10012	0152	095	103	0144
C	0024	00150	09907	0147	095	081	0139
C	0060	00290	09746	0154	084	076	0129
C	0268	01150	08798	0101	073	036	0055
C	0460	01972	07962	0042	092	060	0032
C	0957	04060	06126	-083	088	029	-098
C	1345	05748	04906	-192	070	011	-232
C	1765	07658	03764	-350	056	002	-405
C	1974	08484	03338	-400	044	001	-473
C	2089	08968	03109	-434	...	...	....
C	2391	10184	02595	-432	...	...	....
C	3754	15282	01192	-537	...	...	....
T	2089	08968	03109	-434	...	...	....
S	0002	00072	10000	0152	095	103	0144
S	0113	00506	09500	0139	077	081	0099
S	0167	00730	09250	0123	079	076	0087
S	0223	00958	09000	0112	076	070	0071
S	0333	01434	08500	0077	077	059	0039
S	0450	01932	08000	0044	091	059	0030
S	0573	02456	07500	0015	092	052	0003
S	0702	03008	07000	-019	091	043	-032
S	0844	03594	06500	-049	089	036	-065
S	0993	04218	06000	-097	082	024	-122
S	1312	05606	05000	-182	072	013	-220
S	1671	07230	04000	-314	059	004	-368
S	2145	09208	03000	-432	...	...	....
S	2467	10432	02500	-443	...	...	....
S	2907	11914	02000	-476	...	...	....
S	3400	13796	01500	-520	...	...	....
S	3745	15240	01200	-539	...	...	....

STATION DE NIMES
CRV E8/2 068187062000207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	300	001
C	0097	00580	.....	263	007
C	0417	01930	.....	298	009
C	1217	05320	.....	325	019
C	1477	06460	.....	296	015
C	1617	07110	.....	307	018
C	2387	10300	.....	311	040
C	3587	14760	.....	300	021
S	0002	.....	10000	300	001
S	0113	.....	09500	264	007
S	0167	.....	09250	270	007
S	0223	.....	09000	276	007
S	0333	.....	08500	288	008
S	0450	.....	08000	298	009
S	0573	.....	07500	299	011
S	0702	.....	07000	300	013
S	0844	.....	06500	303	014
S	0993	.....	06000	312	016
S	1312	.....	05000	315	018
S	1671	.....	04000	308	019
S	2145	.....	03000	313	033
S	2467	.....	02500	311	039
S	2907	.....	02000	313	031
S	3400	.....	01500	303	023

CRA E8/2 034287062012207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10041	0198	038	053	0050
C	0548	02102	07852	0004	068	004	-048
C	0562	02162	07792	0000	010	002	-280
~~C~~	~~0566~~	~~02190~~	~~07766~~	~~-002~~	~~037~~	~~001~~	~~-130~~
~~C~~	~~0584~~	~~02260~~	~~07698~~	~~-007~~	~~071~~	~~035~~	~~-052~~
C	0684	02642	07336	-034	072	029	-076
	0709	02728	07258	-016	067	031	-069
	0785	02986	07027	-011	048	024	-105
	1066	04118	06088	-056	022	009	-238
	1290	05134	05336	-134	015	004	-339
	1739	06950	04180	-255	026	003	-392
	1789	07170	04055	-256	025	002	-396
	2170	08880	03185	-368	032	001	-472
	2220	09120	03077	-367	032	001	-472
	2295	09506	02908	-400	032	001	-502
	2713	11822	02050	-535	...	...	....
	3061	14014	01455	-560	...	...	....
	3257	15406	01173	-497	...	...	....
	3432	16670	00963	-556	...	...	....
	3463	16994	00916	-517	...	...	....
	37[illegible]	18862	00685	-560	...	...	....
	[illegible]	20656	00517	-55[illegible]	...	...	....
	4213	22008	00419	-5[illegible]	...	...	....
	2713	11822	02050	-535	...	...	....
	3432	16670	00963	-566	...	...	....
	0010	00096	10000	0194	038	053	0047
	0142	00534	09500	0148	047	052	0036
	0207	00758	09250	0126	053	052	0032
	0270	00986	09000	0104	059	051	0027
	0398	01458	08500	0048	067	042	-008
S	0513	01950	08000	0018	068	037	-035
S	0630	02466	07500	-023	071	030	-069
	0793	03016	07000	-013	047	023	-112
S	0946	03602	06500	-045	031	013	-191
S	1091	04230	06000	-064	020	007	-256
S	1415	05626	05000	-166	020	004	-343
S	1811	07268	04000	-264	026	002	-401
S	2254	09294	03000	-382	032	001	-487
S	2490	10524	02500	-460	...	...	....
S	2738	11980	02000	-533	...	...	....
S	3030	13820	01500	-548	...	...	....
S	3236	15258	01200	-502	...	...	....
S	3392	16432	01000	-567	...	...	....
S	3500	17108	00900	-522	...	...	....
S	3608	17862	00800	-528	...	...	....
S	3664	18276	00750	-543	...	...	....
S	3721	18722	00700	-557	...	...	....
S	3878	19710	00600	-546	...	...	....
S	4057	20866	00500	-540	...	...	....

STATION DE NIMES
CRV .E8/2 068387062012207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	340	007
C	0142	00590	.....	298	014
C	0242	00920	.....	296	012
C	0322	01220	.....	336	010
C	0822	03670	.....	323	015
C	1922	09060	.....	319	059
C	2172	10340	.....	310	056
C	2392	11470	.....	309	043
C	2552	12250	.....	300	046

Radiosonde Nîmes: 21June 1987 and 22 June 1981

STATION DE NIMES
CRA E8/2 034387062100207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10095	0140	065	068	0075
C	0021	00140	10002	0140	068	058	0083
C	0058	00276	09838	0146	061	054	0074
C	0566	02526	07479	-015	074	001	-054
C	0794	03444	06645	-029	027	012	-189
C	0920	04056	06166	-059	024	009	-231
C	1046	04408	05742	-100	042	013	-203
C	1358	05862	04870	-162	028	006	-300
C	1525	06598	04411	-213	050	007	-289
C	1769	07616	03836	-275	037	003	-375
C	2194	09376	02984	-400	046	001	-470
C	2766	11810	02062	-553	...	...	....
C	2883	12378	01887	-513	...	...	....
C	3420	15496	01093	-559	...	...	....
C	3483	16182	01045	-534	...	...	....
C	3666	17156	00897	-567	...	...	....
C	3953	17676	00827	-543	...	...	....
C	4488	20518	00530	-561	...	...	....
C	4918	22858	00369	-494	...	...	....
C	5335	25588	00243	-479	...	...	....
T	2766	11810	02062	-553	...	...	....
S	0021	00140	10000	0140	068	068	0081
S	0133	00572	09500	0119	063	058	0050
S	0187	00794	09250	0100	066	054	0039
S	0237	01022	09000	0085	068	052	0029
S	0339	01492	08500	0053	070	045	0002
S	0446	01984	08000	0021	072	040	-025
S	0560	02504	07500	-014	074	034	-055
S	0698	03052	07000	-026	052	023	-111
S	0831	03638	06500	-038	026	011	-205
S	0966	04266	06000	-071	029	010	-221
S	1307	05664	05000	-154	029	006	-294
S	1695	07314	04000	-256	039	004	-355
S	2185	09340	03000	-398	046	001	-470
S	2488	10560	02500	-490	...	...	....
S	2804	12004	02000	-546	...	...	....
S	3205	13860	01500	-526	...	...	....
S	3487	15298	01200	-545	...	...	....
S	3741	16464	01000	-555	...	...	....
S	3862	17134	00900	-566	...	...	....
S	3990	17886	00800	-556	...	...	....
S	4067	18300	00750	-533	...	...	....
S	4143	18742	00700	-559	...	...	....
S	4334	19726	00600	-548	...	...	....
S	4555	20888	00500	-540	...	...	....
S	4823	22328	00400	-520	...	...	....
S	5148	24216	00300	-483	...	...	....
S	5311	25400	00250	-484	...	...	....

STATION DE NIMES
CRV E8/2 048587062100207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	060	002
C	0109	00610	.....	346	012
C	0429	02020	.....	356	015
C	1229	05450	.....	319	025
C	1629	07210	.....	311	041
C	2399	10400	.....	320	055
C	3199	13820	.....	314	028
S	0021	.....	10000	046	004
S	0133	.....	09500	346	012
S	0187	.....	09250	348	013
S	0237	.....	09000	350	013
S	0339	.....	08500	353	014
S	0446	.....	08000	355	015
S	0560	.....	07500	349	016
S	0698	.....	07000	340	017
S	0831	.....	06500	332	019
S	0966	.....	06000	328	021
S	1307	.....	05000	318	026
S	1695	.....	04000	312	042
S	2185	.....	03000	319	050
S	2488	.....	02500	319	051
S	2804	.....	02000	303	044

STATION DE NIMES
CRA E8/2 034487062112207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10109	0220	036	058	0062
C	0304	01808	08212	0039	073	021	-004
C	0411	02410	07623	0016	036	005	-116
C	0430	02518	07521	0030	033	021	-114
C	0741	04078	06188	-032	025	012	-203
C	0833	04568	05815	-067	050	019	-153
C	1077	05796	04960	-123	043	013	-221
C	1774	09552	02946	-400	043	002	-476
C	2219	12052	02013	-580	...	...	....
C	2365	12990	01735	-589	...	...	....
C	2407	13240	01668	-549	...	...	....
C	2626	13984	01085	-578	...	...	....
C	2930	16732	00965	-548	...	...	....
C	2992	17212	00894	-560	...	...	....
C	3063	17768	00819	-527	...	...	....
C	3172	18532	00727	-556	...	...	....
C	3548	21260	00476	-540	...	...	....
C	3867	23256	00350	-479	...	...	....
T	2219	12052	02013	-580	...	...	....
S	0016	00154	10000	0211	037	058	0058
S	0094	00594	09500	0167	044	055	0044
S	0133	00822	09250	0143	048	053	0034
S	0171	01052	09000	0117	051	048	0019
S	0252	01524	08500	0067	065	047	0005
S	0342	02018	08000	0023	065	036	-036
S	0433	02540	07500	0030	034	021	-113
S	0545	03096	07000	0007	038	021	-120
S	0666	03688	06500	-015	024	012	-194
S	0786	04320	06000	-050	042	018	-159
S	1064	05734	05000	-119	045	013	-214
S	1386	07398	04000	-244	042	005	-336
S	1753	09432	03000	-392	044	001	-468
S	1971	10658	02500	-481	...	...	....
S	2225	12092	02000	-579	...	...	....
S	2515	13920	01500	-548	...	...	....
S	2733	15340	01200	-558	...	...	....
S	2898	16502	01000	-552	...	...	....
S	2986	17170	00900	-578	...	...	....
S	3084	17918	00800	-533	...	...	....
S	3143	18332	00750	-549	...	...	....
S	3204	18776	00700	-547	...	...	....
S	3338	19764	00600	-532	...	...	....
S	3504	20942	00500	-539	...	...	....
S	3706	22376	00400	-511	...	...	....

STATION DE NIMES
CRV E8/2 048787062112207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	020	006
C	0229	01500	.....	330	008
C	0449	02740	.....	340	011
C	0869	04720	.....	316	017
C	1089	05920	.....	323	029
C	2279	12510	.....	308	036
C	2819	16010	.....	315	011
C	2959	17020	.....	272	007
C	3039	17630	.....	314	003
C	3099	18020	.....	197	002
C	3499	20810	.....	145	004
C	3579	21390	.....	172	003
C	3619	21680	.....	115	003
C	3739	22550	.....	128	008
C	3819	22870	.....	144	005
S	0016	.....	10000	017	006
S	0094	.....	09500	001	008
S	0133	.....	09250	353	009
S	0171	.....	09000	344	009
S	0252	.....	08500	331	008
S	0342	.....	08000	335	010
S	0433	.....	07500	339	011
S	0545	.....	07000	335	012
S	0666	.....	06500	327	014
S	0786	.....	06000	320	015
S	1064	.....	05000	322	028
S	1386	.....	04000	315	029
S	1753	.....	03000	316	033
S	1971	.....	02500	310	034
S	2225	.....	02000	308	036
S	2515	.....	01500	310	023
S	2733	.....	01200	313	014
S	2898	.....	01000	291	009
S	2986	.....	00900	266	006
S	3084	.....	00800	227	003
S	3143	.....	00750	197	002
S	3204	.....	00700	158	001
S	3338	.....	00600	168	002
S	3504	.....	00500	146	004
S	3706	.....	00400	124	006

STATION DE NIMES
CRA E8/2 034587062200207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10137	0170	051	058	0068
C	0035	00230	09937	0179	044	051	0056
C	0191	01012	09061	0120	048	039	0016
C	0348	01808	08230	0052	075	033	0012
C	0438	02226	07817	0038	055	035	-043
C	0473	02384	07668	0064	038	030	-067
C	0542	02702	07376	0050	065	048	-010
C	0612	03032	07083	0037	054	038	-045
C	0755	03702	06517	-019	067	034	-072
C	0843	04126	06178	-022	022	011	-206
C	0968	04756	05705	-048	017	008	-258
C	1022	05034	05506	-064	037	016	-184
C	1455	06862	04329	-217	045	007	-302
C	1626	07584	03922	-249	028	003	-378
C	1726	08108	03647	-293	023	002	-434
C	1975	09396	03031	-400	043	002	-477
C	2714	12696	01827	-586	...	...	....
C	2824	13160	01691	-590	...	...	....
C	2919	13606	01581	-550	...	...	....
C	2991	13920	01498	-574	...	...	....
C	3106	14534	01366	-548	...	...	....
C	3469	16468	01007	-560	...	...	....
C	3607	17264	00886	-537	...	...	....
C	4039	20046	00575	-550	...	...	....
C	4713	24274	00300	-481	...	...	....
T	2714	12696	01827	-588	...	...	....
S	0023	00176	10000	0176	046	058	0058
S	0111	00614	09500	0155	044	051	0033
S	0156	00838	09250	0135	046	048	0021
S	0202	01068	09000	0115	050	047	0014
S	0296	01544	08500	0066	065	046	0005
S	0395	02038	08000	0043	061	039	-026
S	0512	02564	07500	0056	056	042	-025
S	0632	03126	07000	0029	056	037	-050
S	0759	03722	06500	-021	066	033	-076
S	0889	04356	06000	-033	020	009	-230
S	1175	05778	05000	-120	042	012	-223
S	1592	07440	04000	-247	034	004	-360
S	1990	09468	03000	-406	...	...	....
S	2274	10686	02500	-488	...	...	....
S	2594	12126	02000	-573	...	...	....
S	2989	13940	01500	-574	...	...	....
S	3264	15358	01200	-579	...	...	....
S	3476	16512	01000	-575	...	...	....
S	3590	17182	00900	-545	...	...	....
S	3715	17936	00800	-545	...	...	....
S	3782	18350	00750	-541	...	...	....
S	3850	18792	00700	-552	...	...	....
S	4000	19774	00600	-546	...	...	....
S	4179	20940	00500	-533	...	...	....
S	4428	22384	00400	-516	...	...	....
S	4713	24274	00300	-481	...	...	

STATION DE NIMES
CRV E8/2 068987062200207645

	H	Z	P	DD	FF
C	0000	00060	.....	360	003
C	0133	00730	.....	350	015
C	0453	02320	.....	343	012
C	0693	03440	.....	306	014
C	0853	04280	.....	319	015
C	0993	04970	.....	317	023
C	2423	11410	.....	294	025
C	3443	16380	.....	296	008
C	3563	17110	.....	254	005
C	3603	17440	.....	266	003
C	3663	17760	.....	327	003
C	3783	18430	.....	123	003
C	3823	18660	.....	203	004
C	4003	19780	.....	143	003
C	4263	21400	.....	123	004
C	4343	21920	.....	123	003
C	4383	22160	.....	087	004
C	4603	23490	.....	083	008
S	0023	.....	10000	359	005
S	0111	.....	09500	352	013
S	0156	.....	09250	350	015
S	0202	.....	09000	349	015
S	0296	.....	08500	347	014
S	0395	.....	08000	345	013
S	0512	.....	07500	334	012
S	0632	.....	07000	316	013
S	0759	.....	06500	311	014
S	0889	.....	06000	319	017
S	1175	.....	05000	307	023
S	1592	.....	04000	297	023
S	1990	.....	03000	296	027
S	2274	.....	02500	296	032
S	2594	.....	02000	296	032
S	2989	.....	01500	295	022
S	3264	.....	01200	288	013
S	3476	.....	01000	285	008
S	3590	.....	00900	262	004
S	3715	.....	00800	040	002
S	3782	.....	00750	121	002
S	3850	.....	00700	213	004
S	4000	.....	00600	142	002
S	4179	.....	00500	055	002
S	4428	.....	00400	087	005

STATION DE NIMES
CRA E8/2 034687062212207645A2

	H	Z	P	T	U	R	TD
C	0000	00062	10145	0242	024	043	0023
C	0131	00680	09441	0161	031	038	-007
C	0381	01846	08212	0066	058	008	-010
C	0446	02090	07969	0042	051	010	-048
C	0490	02260	07806	0070	031	025	-087
C	0855	03864	06406	0007	010	006	-274
C	1045	04850	05656	-067	027	011	-225
C	1265	05902	04934	-134	014	003	-350
C	1702	08076	03672	-305	032	002	-418
C	1925	09298	03080	-400	025	001	-521
C	2295	11388	02249	-518	...	...	....
C	2591	13218	01690	-575	...	...	....
C	2769	14506	01350	-530	...	...	....
C	2887	15290	01221	-571	...	...	....
C	3048	16388	01027	-525	...	...	....
C	3126	16982	00936	-555	...	...	....
C	4043	23830	00325	-482	...	...	....
T	2591	13218	01690	-575	...	...	....
S	0026	00184	10000	0227	025	043	0016
S	0119	00626	09500	0168	031	039	-005
S	0165	00852	09250	0147	034	038	-010
S	0211	01082	09000	0129	037	038	-015
S	0303	01560	08500	0097	045	039	-017
S	0437	02058	08000	0044	056	036	-036
S	0572	02586	07500	0048	029	020	-117
S	0703	03146	07000	0034	012	008	-233
S	0830	03746	06500	0011	010	006	-271
S	0955	04384	06000	-028	021	010	-221
S	1242	05800	05000	-127	014	004	-346
S	1587	07460	04000	-255	029	003	-383
S	1959	09478	03000	-416	...	...	....
S	2177	10694	02500	-487	...	...	....
S	2421	12144	02000	-541	...	...	....
S	2698	13970	01500	-549	...	...	....
S	2903	15398	01200	-563	...	...	....
S	3071	16562	01000	-547	...	...	....
S	3157	17236	00900	-537	...	...	....
S	3268	17988	00800	-554	...	...	....
S	3322	18402	00750	-544	...	...	....
S	3378	18842	00700	-546	...	...	....
S	3516	19840	00600	-523	...	...	....
S	3665	21016	00500	-513	...	...	....
S	3875	22464	00400	-487	...	...	....

STATION DE NIMES
CRV E8/2 069187062212207645V2

	H	Z	P	DD	FF
C	0000	00060	.....	020	006
C	0390	01880	.....	340	011
C	0470	02230	.....	356	009
C	0530	02470	.....	333	009
C	0610	02820	.....	353	011
C	1190	05590	.....	309	013
C	2180	10770	.....	281	032
C	2660	13650	.....	296	017
C	2760	14420	.....	275	010
C	2820	14850	.....	260	011
C	2940	15700	.....	303	009
C	3100	16810	.....	234	004
C	3160	17250	.....	249	003
C	3300	18220	.....	339	001
C	3560	20050	.....	173	005
C	3660	20790	.....	106	003
C	3680	20940	.....	127	004
C	3820	21930	.....	144	003
C	3880	22370	.....	132	003
C	3920	22630	.....	088	003
C	4020	23280	.....	060	003
S	0026	.....	10000	014	009
S	0119	.....	09500	357	010
S	0165	.....	09250	354	010
S	0211	.....	09000	351	010
S	0303	.....	08500	346	010
S	0437	.....	08000	349	010
S	0572	.....	07500	343	010
S	0703	.....	07000	345	010
S	0830	.....	06500	335	010
S	0955	.....	06000	326	011
S	1242	.....	05000	307	014
S	1587	.....	04000	289	020
S	1959	.....	03000	289	026
S	2177	.....	02500	282	031
S	2421	.....	02000	283	023
S	2698	.....	01500	289	014
S	2903	.....	01200	289	010
S	3071	.....	01000	247	005
S	3157	.....	00900	248	003
S	3268	.....	00800	309	002
S	3322	.....	00750	056	001
S	3378	.....	00700	171	001
S	3516	.....	00600	166	003
S	3665	.....	00500	111	003
S	3875	.....	00400	133	003

Radiosonde Nîmes: 23 June 1987 and 24 June 1981

STATION DE NIMES
CRA E8/2 03478706230020764SA2

	H	Z	P	T	U	R	TD
C	0000	00062	10158	0190	050	020	0083
C	....	.....	.....	....	...	...	....
C	0282	01220	08860	0119	076	004	0079
C	0772	03448	06759	0028	040	027	-094
C	1160	05192	05421	-088	056	020	-159
C	1340	05824	04994	-119	042	013	-219
C	2076	09208	03126	-400	047	001	-469
C	2688	11892	02072	-598	...	...	....
C	2763	12316	01936	-589	...	...	....
S	0031	00194	10000	0179	056	020	-053
S	....	.....	.....	....	...	...	....
S	....	.....	.....	....	...	...	....
S	....	.....	.....	....	...	...	....
S	0364	01564	08500	0094	053	059	0038
S	0474	02068	08000	0085	060	052	0011
S	0586	02598	07500	0064	052	041	-025
S	0707	03162	07000	0041	044	032	-071
S	0843	03762	06500	0005	045	027	-101
S	0985	04400	06000	-046	047	021	-142
S	1307	05814	05000	-119	043	013	-219
S	1686	07476	04000	-265	046	004	-346
S	2142	09488	03000	-422	...	...	....
S	2424	10698	02500	-512	...	...	....
S	2727	12108	02000	-593	...	...	....

STATION DE NIMES
CRV E8/2 06938706230020764SV2

	H	Z	P	DD	FF
C	0000	00060	.....	020	002
C	0197	00840	.....	006	016
C	0517	02340	.....	357	010
C	0877	03830	.....	324	011
C	1277	05590	.....	331	014
C	2077	09270	.....	295	017
C	2847	12790	.....	305	016
C	2967	13420	.....	281	016
C	3147	14380	.....	299	010
C	3527	16480	.....	273	005
C	3647	17100	.....	305	004
C	3707	17400	.....	268	003
C	3767	17720	.....	264	003
C	3807	17930	.....	290	003
C	3867	18240	.....	278	003
C	3887	18350	.....	301	003
C	3927	18600	.....	301	003
C	3987	18900	.....	005	003
C	4047	19260	.....	134	000
S	0031	.....	10000	017	004
S	....	.....	.....	...	...
S	....	.....	.....	...	...
S	....	.....	.....	...	...
S	0364	.....	08500	359	015
S	0474	.....	08000	005	011
S	0586	.....	07500	351	010
S	0707	.....	07000	340	010
S	0843	.....	06500	328	010
S	0985	.....	06000	325	011
S	1307	.....	05000	330	014
S	1686	.....	04000	317	015
S	2142	.....	03000	295	017
S	2424	.....	02500	296	017
S	2727	.....	02000	302	017

STATION DE NIMES
CRA E8/2 03488706231220764SA2

	H	Z	P	T	U	R	TD
C	0000	00062	10158	0267	038	075	0112
C	0193	01082	09020	0125	062	067	0055
C	0266	01512	08569	0111	071	049	0061
C	0490	02822	07310	0039	069	016	-010
C	0752	03842	06442	-004	060	034	-071
C	0829	04148	06199	-030	059	029	-097
C	1147	05434	05255	-112	062	019	-168
C	1347	06314	04679	-181	071	014	-220
C	1620	07554	03951	-270	038	004	-368
C	1974	09348	03060	-400	039	001	-483
C	2566	12268	01953	-610	...	...	....
C	2778	13230	01674	-595	...	...	....
C	2857	13612	01576	-552	...	...	....
C	3217	15622	01151	-551	...	...	....
C	....	.....	.....	....	...	...	....
C	3451	17586	00848	-522	...	...	....
C	4548	23788	00325	-459	...	...	....
T	2566	12268	01953	-610	...	...	....
S	0027	00196	10000	0246	039	075	0097
S	0114	00642	09500	0181	047	064	0066
S	0154	00868	09250	0152	055	064	0062
S	0196	01103	09000	0125	062	062	0054
S	0277	01578	08500	0107	071	067	0056
S	0360	02082	08000	0080	062	052	0011
S	0445	02612	07500	0052	067	049	-005
S	0581	03172	07000	0023	063	040	-041
S	0733	03770	06500	-002	060	034	-071
S	0892	04404	06000	-051	065	028	-107
S	1237	05812	05000	-145	066	016	-195
S	1599	07464	04000	-264	039	004	-362
S	2000	09482	03000	-418	...	...	....
S	2229	10694	02500	-504	...	...	....
S	2534	12118	02000	-600	...	...	....
S	2920	13926	01500	-549	...	...	....
S	3179	15352	01200	-552	...	...	....
S	....	.....	.....	....	...	...	....
S	....	.....	.....	....	...	...	....
S	3487	17962	00800	-520	...	...	....
S	3527	18380	00750	-518	...	...	....
S	3585	18822	00700	-519	...	...	....
S	3744	19820	00600	-542	...	...	....
S	3943	20994	00500	-516	...	...	....
S	4164	22442	00400	-506	...	...	....

STATION DE NIMES
CRV E8/2 06958706231220764SV2

	H	Z	P	DD	FF
C	0000	00060	.....	040	004
C	0115	00910	.....	321	007
C	0295	01750	.....	355	008
C	0735	03740	.....	320	009
C	0835	04170	.....	292	010
C	2035	09700	.....	330	014
C	2405	11550	.....	289	014
C	2545	12180	.....	267	013
C	2705	13030	.....	300	013
C	3285	15830	.....	286	006
C	3345	16180	.....	256	006
C	3545	17200	.....	292	005
C	3625	17640	.....	238	003
C	3685	17990	.....	238	003
C	3765	18450	.....	303	002
C	3845	18910	.....	326	003
C	4105	20490	.....	143	006
C	4505	23040	.....	094	002
S	0027	.....	10000	022	005
S	0114	.....	09500	322	007
S	0154	.....	09250	328	007
S	0196	.....	09000	336	007
S	0277	.....	08500	351	008
S	0360	.....	08000	348	007
S	0445	.....	07500	339	006
S	0581	.....	07000	330	007
S	0733	.....	06500	321	008
S	0892	.....	06000	293	010
S	1237	.....	05000	300	012
S	1599	.....	04000	305	011
S	2000	.....	03000	327	013
S	2229	.....	02500	309	014
S	2534	.....	02000	269	013
S	2920	.....	01500	292	013
S	3179	.....	01200	283	010
S	....	.....	.....	...	...
S	....	.....	.....	...	...
S	3487	.....	00800	281	005
S	3527	.....	00750	288	005
S	3585	.....	00700	276	004
S	3744	.....	00600	285	003
S	3943	.....	00500	360	001
S	4164	.....	00400	146	005

STATION DE NIMES
CRA E8/2 03498706240020764SA2

	H	Z	P	T	U	R	TD
C	0000	00062	10157	0195	063	090	0127
C	0043	00258	09928	0197	063	083	0125
C	0137	00678	09455	0185	059	081	0105
C	0376	01762	08316	0092	082	026	0063
C	0743	03214	06966	0023	050	032	-070
C	1152	05128	05466	-098	074	024	-134
C	1264	05698	05074	-135	058	015	-200
C	1358	06186	04756	-178	074	014	-211
C	1624	07370	04053	-242	033	004	-356
C	2048	09508	02993	-400	033	001	-498
C	2666	12414	01913	-614	...	...	....
C	3052	14290	01420	-552	...	...	....
C	3244	15252	01220	-577	...	...	....
C	3295	15526	01168	-553	...	...	....
C	4014	19216	00645	-532	...	...	....
C	4152	20100	00571	-556	...	...	....
C	4325	21142	00485	-525	...	...	....
C	4525	22078	00419	-599	...	...	....
T	2666	12414	01913	-614	...	...	....
S	0030	00194	10000	0196	063	090	0123
S	0128	00636	09500	0186	059	083	0104
S	0176	00864	09250	0169	062	061	0095
S	0226	01098	09000	0150	065	077	0084
S	0333	01578	08500	0108	076	072	0067
S	0448	02082	08000	0077	079	065	0042
S	0577	02612	07500	0054	072	054	0007
S	0732	03174	07000	0025	051	033	-066
S	0876	03768	06500	-014	050	026	-105
S	1006	04400	06000	-057	056	023	-131
S	1285	05808	05000	-145	061	015	-204
S	1645	07464	04000	-250	033	004	-366
S	2044	09492	03000	-399	033	001	-500
S	2319	10712	02500	-496	...	...	....
S	2613	12136	02000	-597	...	...	....
S	2976	13936	01500	-570	...	...	....
S	3263	15356	01200	-573	...	...	....
S	3483	16516	01000	-559	...	...	....
S	3612	17184	00900	-553	...	...	....
S	3754	17940	00800	-546	...	...	....
S	3833	18352	00750	-547	...	...	....
S	3919	18790	00700	-541	...	...	....
S	4095	19780	00600	-552	...	...	....
S	4287	20942	00500	-540	...	...	....

STATION DE NIMES
CRV E8/2 06978706240020764SV2

	H	Z	P	DD	FF
C	0000	00060	.....	360	001
C	0120	00650	.....	356	013
C	0440	02080	.....	347	010
C	0640	02830	.....	317	011
C	0640	03690	.....	327	009
C	1420	06540	.....	280	017
C	2410	11110	.....	299	019
C	3110	14600	.....	277	012
C	3370	15870	.....	305	005
C	3610	17170	.....	258	005
C	3730	17810	.....	304	004
C	4050	19510	.....	042	003
C	4210	20400	.....	011	003
C	4290	20830	.....	086	003
C	4410	21500	.....	103	002
S	0030	.....	10000	359	004
S	0128	.....	09500	356	013
S	0176	.....	09250	355	012
S	0226	.....	09000	354	012
S	0333	.....	08500	351	011
S	0448	.....	08000	346	010
S	0577	.....	07500	327	011
S	0732	.....	07000	321	010
S	0876	.....	06500	326	009
S	1006	.....	06000	320	010
S	1285	.....	05000	302	013
S	1645	.....	04000	285	017
S	2044	.....	03000	302	016
S	2319	.....	02500	300	018
S	2613	.....	02000	299	015
S	2976	.....	01500	288	012
S	3263	.....	01200	298	010
S	3483	.....	01000	283	005
S	3612	.....	00900	258	005
S	3754	.....	00800	302	004
S	3833	.....	00750	293	003
S	3919	.....	00700	295	002
S	4095	.....	00600	103	001
S	4287	.....	00500	063	003

STATION DE NIMES
CRA E8/2 03508706241220764SA2

	H	Z	P	T	U	R	TD
C	0000	00062	10128	0261	034	065	0090
C	0043	00214	09953	0231	036	063	0075
C	0220	00904	09185	0166	046	040	0050
C	0382	01730	08327	0090	078	030	0055
C	0394	01788	08268	0084	068	011	0029
C	0417	01886	08171	0117	051	004	0019
C	0436	01968	08092	0112	038	039	-023
C	0635	02850	07273	0062	042	034	-056
C	0927	04210	06141	-038	058	027	-109
C	1234	05654	05101	-114	043	013	-213
C	1349	06202	04746	-163	039	008	-267
C	1989	09340	03062	-400	048	001	-466
C	2402	11332	02264	-561	...	...	....
C	2620	12476	01887	-615	...	...	....
C	2955	14276	01437	-553	...	...	....
C	3410	16636	00948	-563	...	...	....
C	3568	17660	00828	-515	...	...	....
C	3924	20058	00574	-539	...	...	....
C	4263	22232	00411	-489	...	...	....
C	4508	23830	00322	-502	...	...	....
T	2620	12476	01887	-615	...	...	....
S	0031	00172	10000	0239	035	065	0075
S	0155	00616	09500	0189	044	063	0063
S	0207	00844	09250	0170	046	060	0053
S	0254	01076	09000	0153	053	064	0057
S	0348	01558	08500	0107	071	067	0056
S	0457	02062	08000	0106	040	040	-025
S	0578	02598	07500	0075	044	038	-040
S	0703	03162	07000	0036	044	031	-075
S	0831	03758	06500	-010	056	030	-087
S	0965	04392	06000	-048	056	024	-123
S	1266	05804	05000	-126	041	011	-231
S	1623	07464	04000	-257	040	004	-353
S	2017	09480	03000	-411	...	...	....
S	2267	10694	02500	-507	...	...	....
S	2551	12114	02000	-598	...	...	....
S	2881	13914	01500	-574	...	...	....
S	3154	15334	01200	-554	...	...	....
S	3353	16496	01000	-553	...	...	....
S	3462	17164	00900	-561	...	...	....
S	3576	17920	00800	-522	...	...	....
S	3647	18340	00750	-525	...	...	....
S	3721	18784	00700	-530	...	...	....
S	3873	19780	00600	-532	...	...	....
S	4069	20956	00500	-520	...	...	....
S	4308	22406	00400	-492	...	...	....

STATION DE NIMES
CRV E8/2 06998706241220764SV2

	H	Z	P	DD	FF
C	0000	00060	.....	360	006
C	0108	00570	.....	338	010
C	0428	02080	.....	011	008
C	0708	03320	.....	355	003
C	0828	03910	.....	324	006
C	1628	07630	.....	289	013
C	2398	11490	.....	297	018
C	3198	15750	.....	280	008
C	3318	16460	.....	257	006
C	3538	17870	.....	291	003
C	3618	18310	.....	181	002
C	4138	21700	.....	075	003
C	4398	23470	.....	123	006
S	0031	.....	10000	354	007
S	0155	.....	09500	342	010
S	0207	.....	09250	347	009
S	0254	.....	09000	000	008
S	0346	.....	08500	006	008
S	0457	.....	08000	002	008
S	0578	.....	07500	358	007
S	0703	.....	07000	357	004
S	0831	.....	06500	324	006
S	0965	.....	06000	322	007
S	1266	.....	05000	314	009
S	1623	.....	04000	290	013
S	2017	.....	03000	293	016
S	2267	.....	02500	295	017
S	2551	.....	02000	293	017
S	2881	.....	01500	285	013
S	3154	.....	01200	281	009
S	3353	.....	01000	262	006
S	3462	.....	00900	279	004
S	3576	.....	00800	273	002
S	3647	.....	00750	197	002
S	3721	.....	00700	240	002
S	3873	.....	00600	122	001
S	4069	.....	00500	134	002
S	4308	.....	00400	106	005