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Crau 1987: the KNMI contribution

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KNMI

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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 (i) 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, and (ii) to investigate the behaviour of the atmospheric surface layer if dry, warm air is advected over a wet, cool surface. To that end several measuring stations were installed in the region of Crau. Crau is an extremely dry, flat area with penetrations of irrigated parcels along its border. It is situated east of the river Rhône, and approximately south of the line Arles-Salon-de-Provence. The "dry Crau" measures about 150 km^2 and its area covers at least one Meteosat temperature pixel (which is about 7 km square). The various stations were equipped and manned by institutes from England, Germany, Italy and the Netherlands.

The equipment of the stations was not standarized. A variety of measuring techniques was used, concentrating on the measurement of the vertical fluxes of heat and moisture by means of profile, energy budget and eddy correlation methods. In this report the KNMI contribution to the experiment is described. Information is given on the measuring site, on the instrumentation and on the data reduction that is applied. Finally, the dataset is described.

The observations can be divided into two groups:

- Synoptical observations.
  Hourly observations were carried out during most periods of time that the station was in operation. Since the station was not manned during night hours as a rule, in that case automatic hourly measurements were used to reconstruct the synop afterwards, viz. wind speed and direction, dry bulb temperature and dewpoint temperature. All synoptical observations are given by Appendix A.
- Micrometeorological measurements.
  These measurements incorporated: fast response measurements of wind speed, temperature and humidity at 11 m height; profiles of wind speed, temperature and wet bulb temperature; net and global radiation; infrared surface temperature. Appendix C gives a calendar of the micrometeorological measurements.

2. Measuring location and instrumentation

2.1 Description of the measuring site

The KNMI station was located in the "dry Crau" at 43°33'57.6" N, 4°50'6.7" E and at an altitude of 12.7 m. The terrain is flat, slightly sloping towards the SW at an angle of 0.2°, homogeneous and covered with pebbles and stones up to ca. 15 cm diameter, and a sparse vegetation of grasses and herbs. NE of the site, scattered stone piles are found with a height of approximately 1 m and a few meters diameter. About 750 m to the NW, trees border the complex terrain of a farming site. In the dry Crau, widely scattered "Bergeries" are found, simple sheep farms. The nearest to our site was 600 m to the SW. Fig. 1 shows part of the topographic map "3043 Ouest, St.-Martin-de-Crau Fontvieille", on which the measuring site is indicated. Fig. 2 gives a view from an airplane. The positions of our masts and instruments is shown in Fig. 3. Fig. 4. offers a 360° panoramic view of the surroundings. The camera was situated at the position indicated in Fig. 3 by a cross, at a height of approx. 1.5 m and level.

2.2 Instruments

We shall describe the instrumentation in three groups: 1. Synoptical instruments, 2. Flux instruments, 3. Data-collection and processing.

2.2.1 Synoptical instruments

a. Wind measurements

Wind speed and direction were measured at a level of 10.5 m; the instruments we used are: Cup-anemometer, designed by KNMI (Monna, 1978), modernized electronics; 3 cups, light-chopper, distance constant 2.9 m; calibrated in the windtunnel at KNMI.
Windvane, designed by KNMI (Wieringa, 1967), modernized electronics; 7 bit absolute optical encoder, damping ratio 0.30, damped wavelength 7.0 m; linearity calibration carried out at KNMI.

b. Temperature and humidity measurements

The temperature and humidity instrument were placed in a naturally ventilated temperature screen made of synthetic material, at a height of 1.9 m. A platinum PT500 resistor (Heraeus) was used to measure dry bulb temperature. Relative humidity was measured with a Rotronic

Hygroskop sensor type Hygrolyt (Muller, 1985).
Temperature and humidity instruments have been calibrated at KNMI. Calibrations of the humidity sensor, carried out before and after the campaign showed considerable differences at low humidities, leading to an expected underestimation of the absolute humidity of 10% or more. Therefore, all relative humidity measurements and derived quantities such as dew point and absolute humidity, are suspect. It is advised to use data from the psychrometers instead (section 2.2.2.b)

c. Pressure measurements

Pressure was measured with a Negrettie and Zambra digital aneroid barometer, which was read hourly by the observer. Moreover, the pressure was registrated continuously with a Fuess barograph. The instruments were placed in one of the office trailers. Both instruments were calibrated at KNMI.

d. Precipitation measurements

A KNMI standard rain gauge (funnel aperture 200 cm^2) was used. It was placed level with the rim 0.4 m above the ground. Information on the instrument is given by Muller and Van London (1983). A rain detector was mounted near the temperature screen.

e. Radiation

Global radiation was measured with a Kipp CM11 instrument, net radiation with a CSIRO net pyranometer, type Funk, which was ventilated (designed by KNMI). The polyethylene domes were pressurized with nitrogen (Fritschen and Gay, 1979). Both instruments were placed 1.7 m above the ground. Calibration was carried out by KNMI.

2.2.2 Flux instruments, profile instruments, infrared thermometer

a. Flux instruments

The momentum flux was measured at 11.3 m height with a sonic anemometer, type Kayo Denki DAT300, sensor TR61 (Hanafusa et al., 1980). An electronic levelling instrument, type Kayo Denki IC-05D, and a rotator (designed by KNMI) with electronic read-out of azimuth, were used to measure the actual orientation of the sonic. The rotator was used to direct the sonic in the mean wind direction (by hand). The top of the mast was constructed as slender as possible, in order to avoid mast induced errors in the turbulence measurements (Wyngaard, 1981).

To measure heat flux, the temperature fluctuations were sensed by a cold wire resistor (platinum, diameter 2.5 μm, 50 Ω; Kohsiek, 1987). The signal was electronically filtered (high pass, first order RC filter at 0.0016 Hz; low pass, second order Butterworth filter at 100 Hz). A Lyman-alpha humidiometer (Electromagnetic Research Corporation, model BLR) was used to measure humidity fluctuations. A pathlength of 15 mm, and a source current of 500 μA were used. The signal was low pass filtered at 100 Hz (2nd order Butterworth filter). Both sensors were mounted 0.45 m below the center of the sonic, and the cold wire was positioned 4.5 cm upstream from the Lyman-alpha. Sonic anemometer, cold wire and Lyman-alpha were calibrated at KNMI.

b. Profile instruments

Dry and wet bulb temperature were measured at 1.08 m and 2.07 m by means of ventilated thermocouple psychrometers designed by KNMI (Slob, 1978).

Wind speed was measured at 3 levels (1.95 m, 4.05 m and 8.10 m) with cup anemometers manufactured by the Agricultural University of Wageningen. These anemometers were calibrated by KNMI and have a distance constant of approximately 2 m.

c. Infrared thermometer

Surface temperature was observed with an infrared thermometer (Heimann KT24, viewing angle 17°) mounted on a tripod at a height of 1.5 m. The instrument was directed to the South at an angle of 45° with the vertical. It was calibrated at KNMI.

2.2.3 Data collection and processing

A DEC mini computer, type MINC-11 was used for data-collection and processing. Twenty-three analogue channels (20 differential and 3 single-ended inputs) were used. The resolution is 12 bits, the sample frequency about 0.7 Hz. After processing the data was stored on cassette, using a TEAC MT2-04 recorder. During the measurements the various signals were monitored on a video-screen and on recorders, in order to check the results.

3. Weather situation

At the start of the measurements, at June 2, 1988, a weak mistral (northerly wind) was blowing. The mistral has been much stronger on the preceding days, and ended on the 4th of June by the passage of a cold front connected to a depression above the British Islands. The front brought 3.1 mm precipitation to our site. For a short period of time after the 4th, the mistral was re-installed, but during the night of the 6th of June the wind turned to the south. By that time, the jet stream was located above France. Warm and moist air was transported at its east side from Spain, while on its west side cold, unstable air was flowing. Those contrasting air masses resulted in vigorous thunderstorms and wind gusts above SW France. At Pan-Toulouse, a tornado was reported. At Crau, the maximum activity occurred on the 7th with high thunderstorm activity. The disturbance gave in total 6.7 mm rain. After the passage of a cold front on the 8th, cold air flowed over the area permitting temperature maxima of only 20°C. The period of time between the 10th and 17th of June brought changeable weather with a thunderstorm during the night of the 15th (7.7 mm rain). From the 17th till the end of the measurements on the 24th, the mistral governed the weather stuation, bringing moderately strong NNW winds. At the 19th the passage of a cold front brought 5.9 mm rain. Thereafter, the area came under the influence of a ridge of high pressure that extended from the Azoren high. Over the period of June 2 till June 24, in total 23.4 mm of precipitation was collected.

4. Description of dataset

4.1 Synoptical observations

4.1.1 Introduction

Background information on the meteorological conditions during the measurements is often indispensible for a correct interpretation of the experimental data. Synoptical observations are perfectly suited for that purpose. Moreover, comparison with the observations of the regular synoptic network is possible. Notation in the WMO-code simplifies the use of this information.

4.1.2 General remarks

The code form FM 12-VII SYNOP is used for the synoptic surface observa-

tions (WMO Manual on Codes, Volume 1, WMO No. 306). The only differences with the standard synop message are the header (which is omitted here), the time indication, and the precipitation period indicator. The time of observation is Universal Time = UT, which corresponds to the time valid for the zero Meridian (formerly Greenwich Mean Time).
When no observations are available a stroke is filled in. All synoptic observations are reproduced in Table A.1 of Appendix A, where also a description of the code form is given.

4.1.3 Other remarks

The dewpoint temperature has been derived from the psychrometer data at 2.07 m instead of from the relative humidity sensor, because of the drifting calibration of the latter instrument (see section 2.2.1.b).

4.2 Surface layer measurements

4.2.1 Data processing

As mentioned in section 2.2.3, twenty-three data channels were connected to the data registration computer. Before storage on cassette, the signals were processed as follows:

a. Average values over 10 minute intervals were calculated.
b. The resulting data were transformed to physical quantities by linear transformations (exception: Lyman-alpha, see g).
c. Variances and covariances of several channels (e.g., $\overline{w'q'}$, $\overline{w'u'}$) were calculated by multiplying the appropriate samples and taking 10 minute averages following

$$\overline{a'b'} = \overline{ab} - \overline{a}\,\overline{b} .$$

Again, the data were transformed to physical quantities before storage on diskette.

d. The signals of the sonic anemometer, the Lyman-alpha and the cold wire were also collected by a second data loop giving time intervals of 0.04, 0.08 and 0.16 s between successive samples. With these samples, structure parameters were calculated following

$$C_{ab} = \frac{\overline{(a_i - a_j)(b_i - b_j)}}{(U\tau_{ij})^{2/3}} ,$$

where i and j denote sample numbers, τ_{ij} the time interval between samples i and j, U the average wind speed during the 10 minute interval considered.

e. The dewpoint temperature and specific humidity as calculated from the readings of the thermometer and humidity sensor in the screen are suspect (see section 2.2.1.b).

f. From the signals of the psychrometers, the temperature and humidity at the lower level (1.08 m) were calculated, as well as the vertical differences of these quantities (between 1.08 and 2.07 m). Also the Bowen ratio was determined.

g. The Lyman-alpha was monitored against the absolute humidity of the upper psychrometer. This had to be done because of drift of the instrument. Absolute humidity fluctuations were calculated by linearization of the quadratic sensitivity curve of the Lyman-alpha at the working point appropriate to the 10 minute averaged absolute humidity. Fluctuations of the specific humidity were calculated from the absolute humidity and the temperature fluctuations observed with the cold wire.

h. The wind velocity fluctuation signals of the sonic anemometer were transformed to a coordinate system that is aligned with the observed mean horizontal wind direction of the 10 minute interval considered.

i. The temperature signal from the sonic anemometer was corrected for fluctuations of the wind speed:

$$\tilde{T}_s = \tilde{\tilde{T}}_s + \frac{u^2+v^2}{403} .$$

$\tilde{\tilde{T}}_s$ is the uncorrected sonic temperature, $\tilde{T}_s$ the corrected one, u and v the components of the horizontal wind speed. The correction was applied at sample level. A second correction, due to fluctuations of the humidity, was added later on at the main office of KNMI. It is (Schotanus et al., 1983)

$$T_s = \tilde{T}_s - 0.51\ \bar{T}_a\ q ,$$

where $\bar{T}_a$ is the mean absolute air temperature and q the (fluctuating) specific humidity. This correction was applied to 10 minute averages of (co)variances, and not to the samples themselves. It is stressed that the temperature derived from the sonic exhibits large off-sets and is only to be used as a fluctuation quantity.

j. Calculation of friction velocity, sensible heat flux and latent heat flux, Monin-Obukhov length and Bowen ratio. These quantities were calculated from observed covariances (eddy correlation method), from the observed vertical dry and wet bulb differences and from the wind speeds at the levels of 1.95 and 4.05 m. In the latter calculation, the following flux-profile relationships were used (Holtslag, 1987; Holtslag and De Bruin, 1988)

$$\frac{u}{u_*} = \frac{1}{k} [\ln \frac{z}{z_o} - \psi_m(\frac{z}{L})]$$

$$\frac{\theta-\theta_o}{\theta_*} = \frac{1}{k} [\ln \frac{z}{z_o} - \psi_H(\frac{z}{L})]$$

unstable: $\psi_m(\frac{z}{L}) = (1 - 16 \frac{z}{L})^{1/4} - 1$

$$\psi_H(\frac{z}{L}) = 2 \ln [1 + (1-16 \frac{z}{L}) / 2]^{1/2}$$

stable: $\psi_m(\frac{z}{L}) = - [0.7 \frac{z}{L} + 0.75 (\frac{z}{L} - 14.286)e^{-0.35 z/L} + 10.714]$

$$\psi_H(\frac{z}{L}) = - 5 \frac{z}{L}$$

$$k = 0.40$$

$$\frac{1}{L} = - \frac{(\overline{wT} + 0.187 \overline{wq})4}{u_*^3 T} .$$

The Bowen ratio was calculalted in three ways:

a. with the eddy-correlation fluxes
b. with the profile fluxes
c. with the structure parameters of temperature (C_T^2) and humidity (C_q^2) according to $B = 0.37 (C_T^2/C_q^2)^{1/2}$.

At the main office of KNMI a second data processing procedure was applied. By this procedure incorrect calibration constants can be replaced by correct ones, a quadratic calibration to the infrared temperature readings was applied, and incorrect data were removed as well as quantities derived from incorrect data. We did not apply trend corrections to the signals before calculating (co)variances. Finally, half hour averages were calculated from successive 10 minute averages, starting at 10 minutes past the whole or half hour. Only cases were used where three 10 minute averages of a signal were present, otherwise the value was omitted. These half hour averages constitue the final data set.

4.2.2 Some results

For verification purposes and for quick reference a number of plots has been produced. A few of them are reproduced here. Fig. 5 shows the sum of the sensible and latent heat flux, measured by the eddy correlation technique, versus the net radiation. It turns out that H+LE is some tens per cent smaller than Q_{net} at high values of Q_{net}. Probably, the difference is to be ascribed for the major part to the ground heat flux, a quantity not measured by us. Fig. 6 gives the sensible heat flux as calculated from temperature differences and wind speed differences, against the eddy correlation heat flux. The agreements are satisfactory. Fig. 7 shows the daily courses of net radiation, sensible heat flux and latent heat flux for a particular day, and Fig. 8 the air temperature, surface temperature and specific humidity for the same day. Obviously, the latent heat flux is much smaller than the sensible heat flux. The air is dry, and the surface temperature may reach up to 40 °C.

5. Data storage

The data set is made up out of a number of records. Each record contains 140 numbers; in Appendix B the identification of all numbers is given. The data is available for external users both on magnetic tape and on floppy disk, with the next specifications:

tape
- 9 track
- density 1600 bpi
- ASCII characters
- unlabeled
- record size 1678
- format I10, 139F12.5

floppy disc
- high density
- ASCII characters
- record size 1678
- format I10, 139F12.5

Missing values are stored as -9999.
The synoptical code has been reproduced completely in Appendix A.
In Appendix C a calendar of available data is presented.

6. References

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Wieringa, J. 1967: Evaluation and design of wind vanes. J. Appl. Meteorol., Vol. 6, 1114-1122.

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Fig. 1 Part of topographic map "3043 ouest". The measuring site is indicated by a cross.

Fig. 2 View of the measuring site from the air. The circles enclose the vans and the masts.

Fig. 3 Positions of masts and instruments.

Fig. 4 Panoramic view of the surroundings of the measuring site.

Fig. 5 Sum of sensible heat flux and latent heat flux measured by the eddy correlation technique (H+LE) versus the net radiation (QNET).

Fig. 6 Scatterplot of the sensible heat flux derived from profiles of temperature and wind speed (HPR) versus eddy correlation values (HEDDY).

Fig. 7 Daily course of the net radiation (QNET), sensible heat flux (HEDDY) and latent heat flux (LEEDDY) on 6 June 1987.

Fig. 8 Daily course of the air temperature (TLAAG), surface temperature (THEIM) and specific humidity (QLAAG) on 6 June 1987.

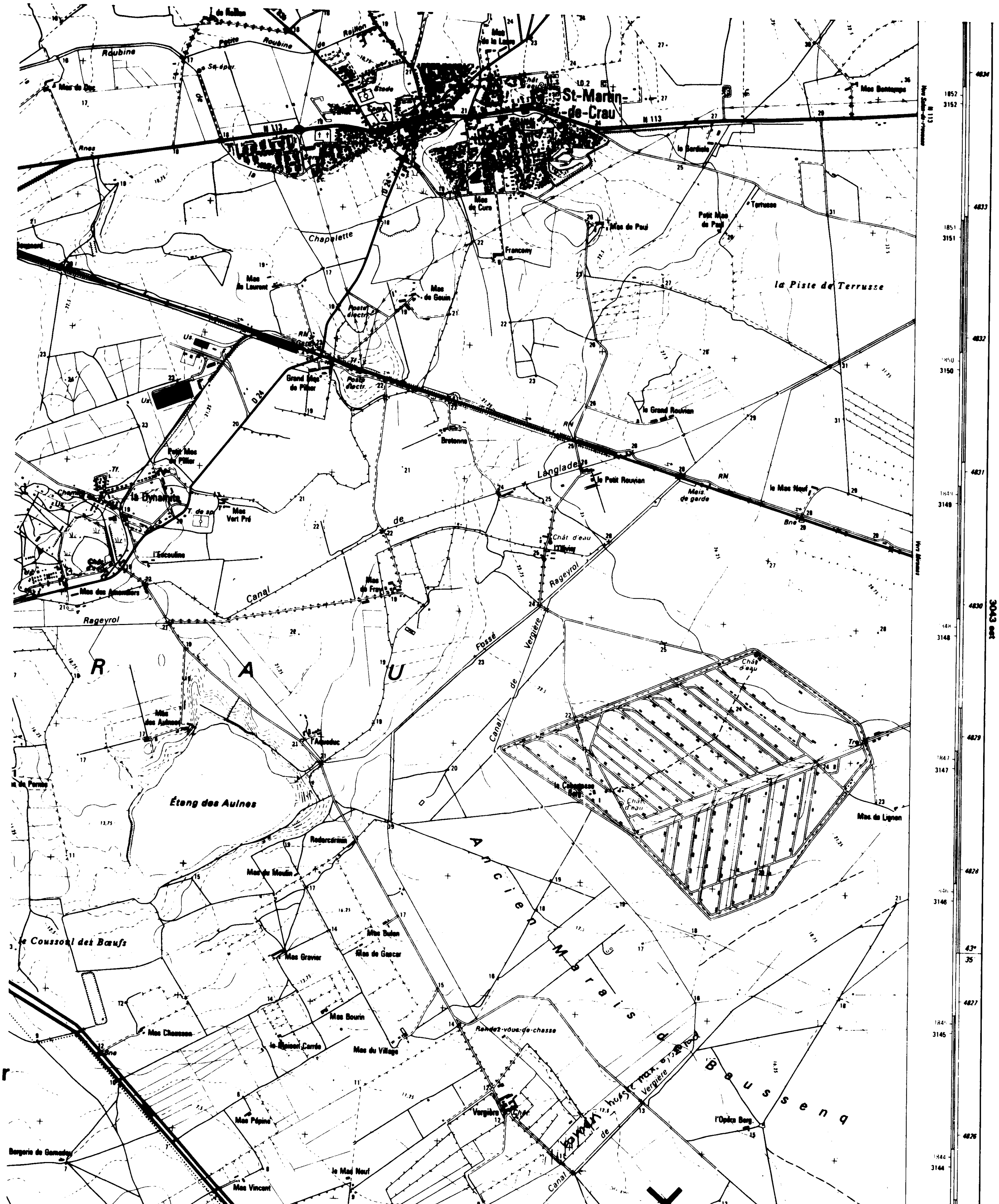

St-Martin-de-Crau
N 113
Chapelette
la Piste de Terrusse
Mas de Paul
Mas de Gouin
Grand Mas de Pillier
Petit Mas de Pillier
la Dynamite
Langlade
le Petit Rouvian
le Grand Rouvian
le Mas Neuf
Canal de Langlade
Rageyrol
Fossé
Canal de Vergière
R
A
U
Mas des Aulnes
Étang des Aulnes
Mas des Amandiers
Mas de Fray
l'Aqueduc
Mas du Moulin
le Coussoul des Bœufs
Mas Gravier
Mas Bulen
Mas de Gascar
Mas Bourin
Mas Chausson
Mas du Village
Rendez-vous-de-chasse
Ancien Marais de Baussenq
Mas de Lignon
l'Opéra Berg.
Vergière
Mas Pépine
le Mas Neuf
Mas Vincent
Bergerie de Gamadou
la Cabane Neuve
Peau de Meau Berg.
N 568
Vers Martigues
1km
3044 est
3043 est

fig.1

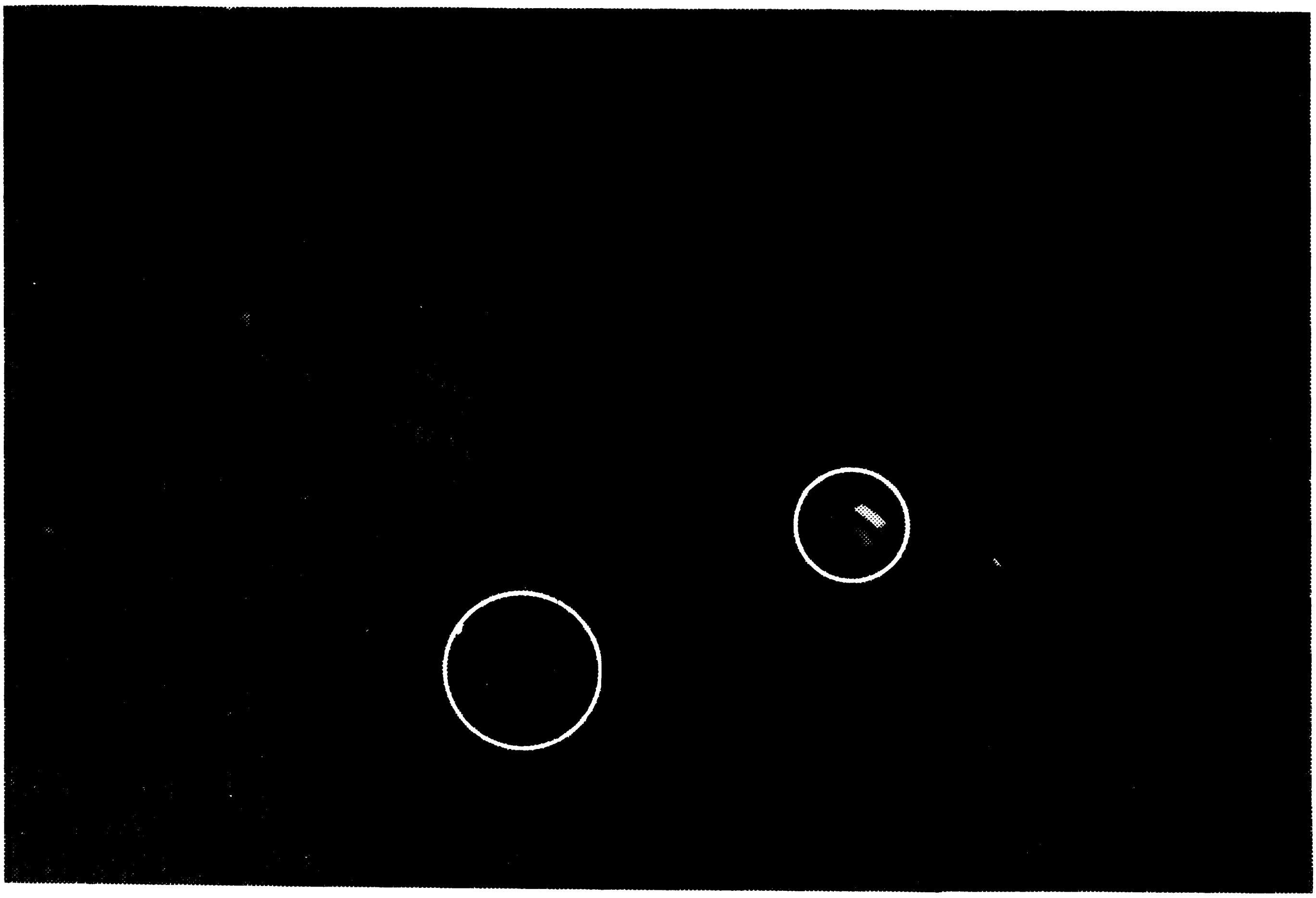


fig. 2

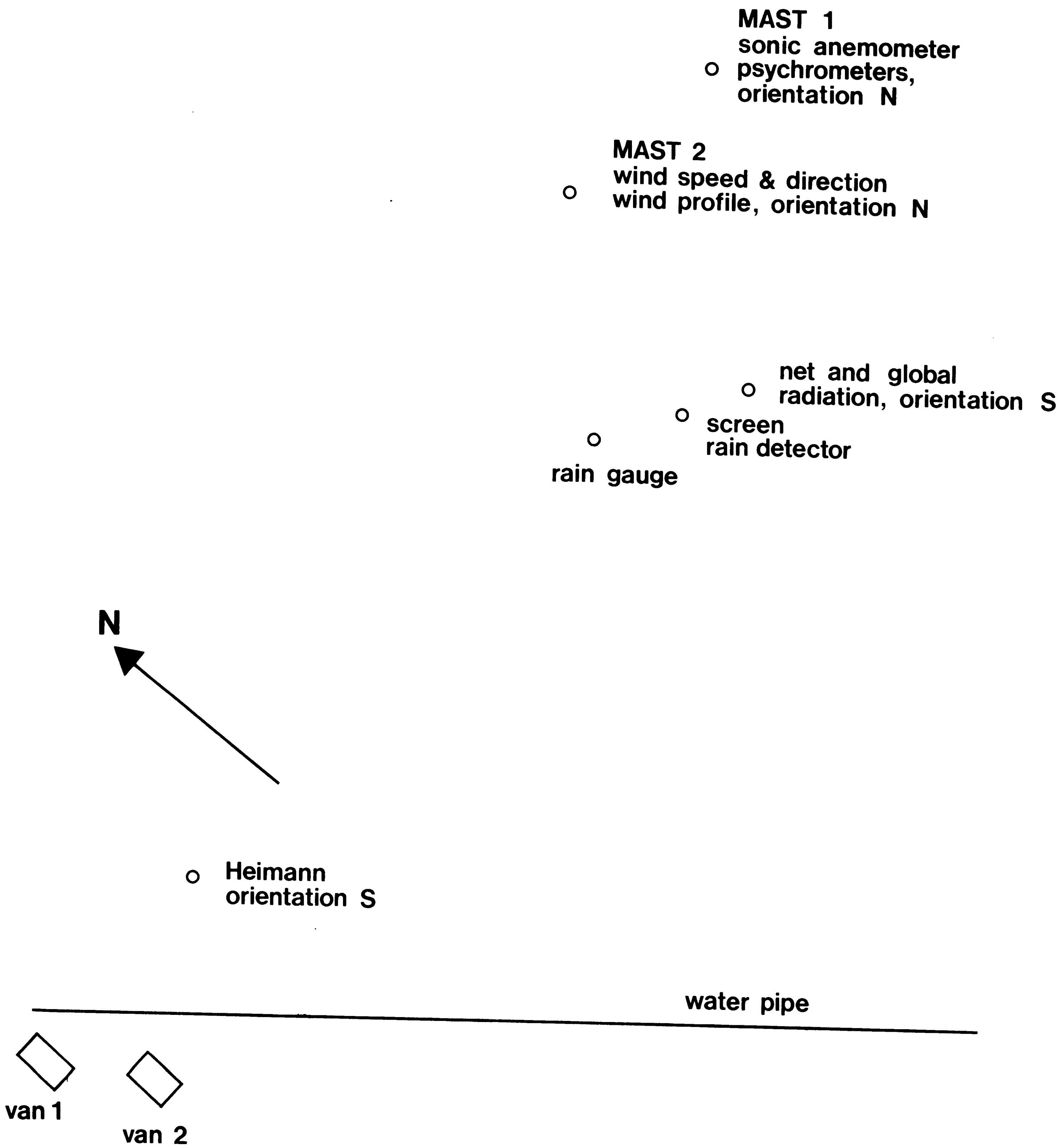

MAST 1
sonic anemometer
psychrometers,
orientation N
MAST 2
wind speed & direction
wind profile, orientation N
net and global
radiation, orientation S
screen
rain detector
rain gauge
N
Heimann
orientation S
water pipe
van 1
van 2

fig.3

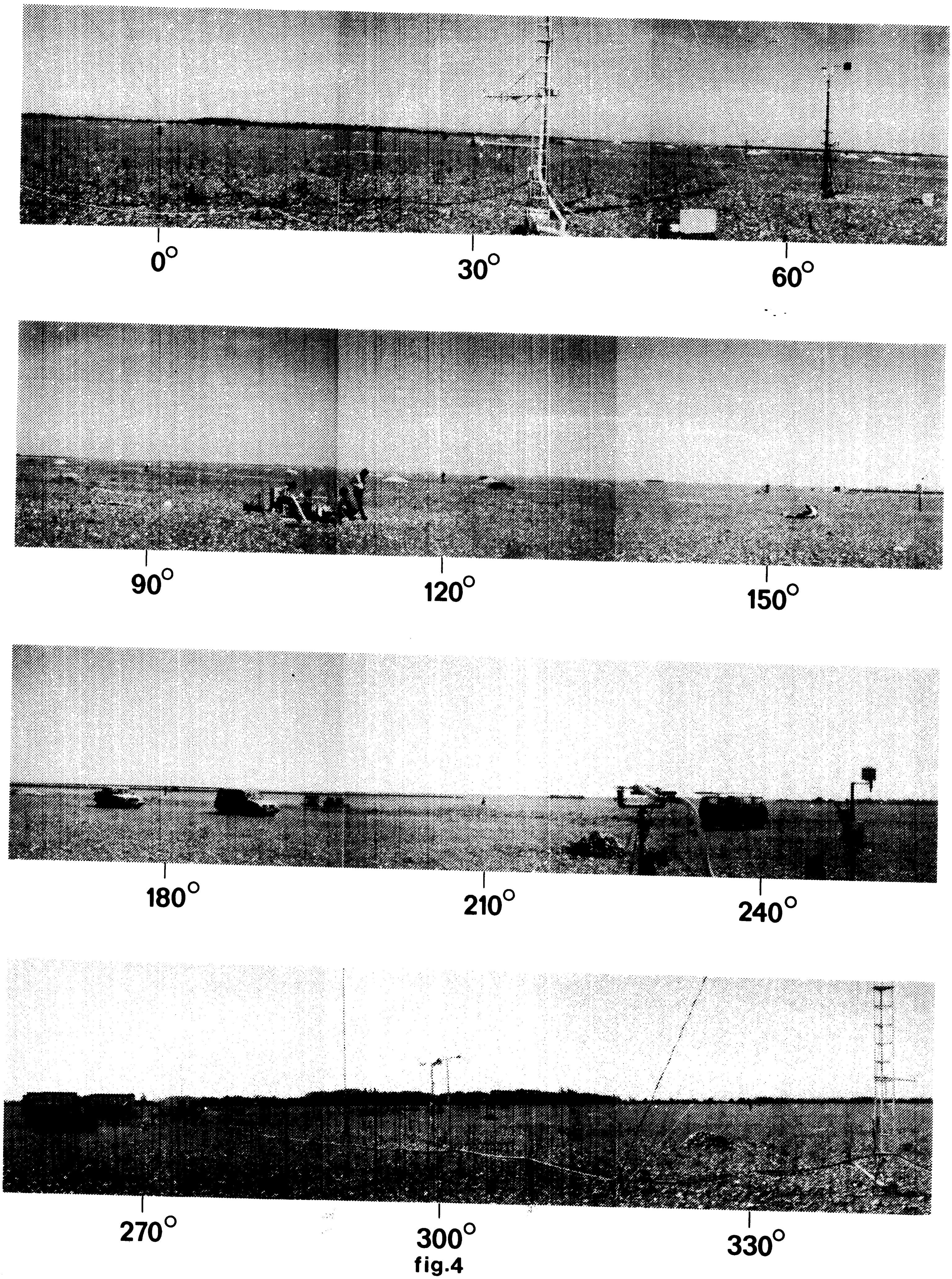


fig.4

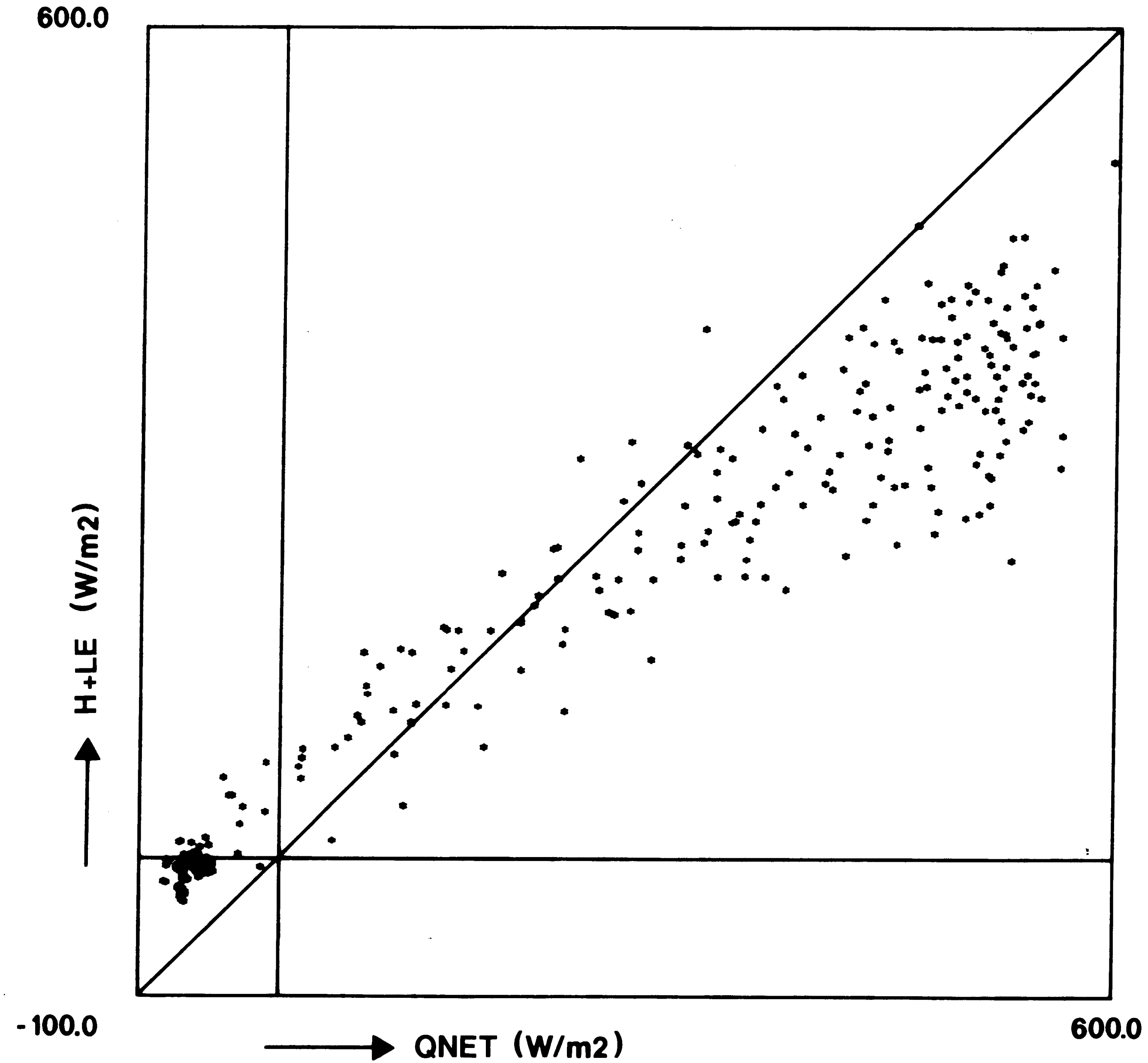


fig. 5

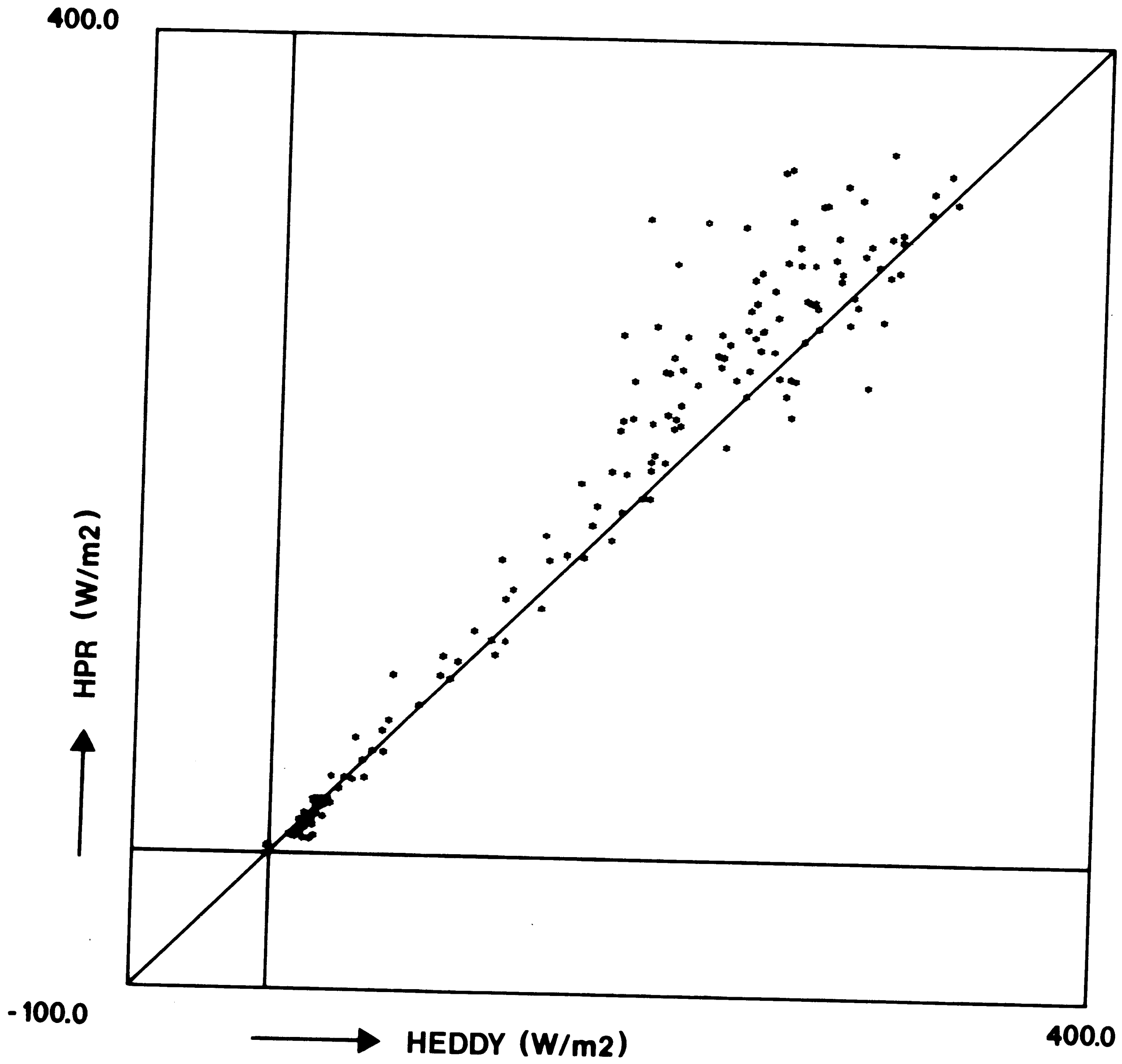


fig. 6

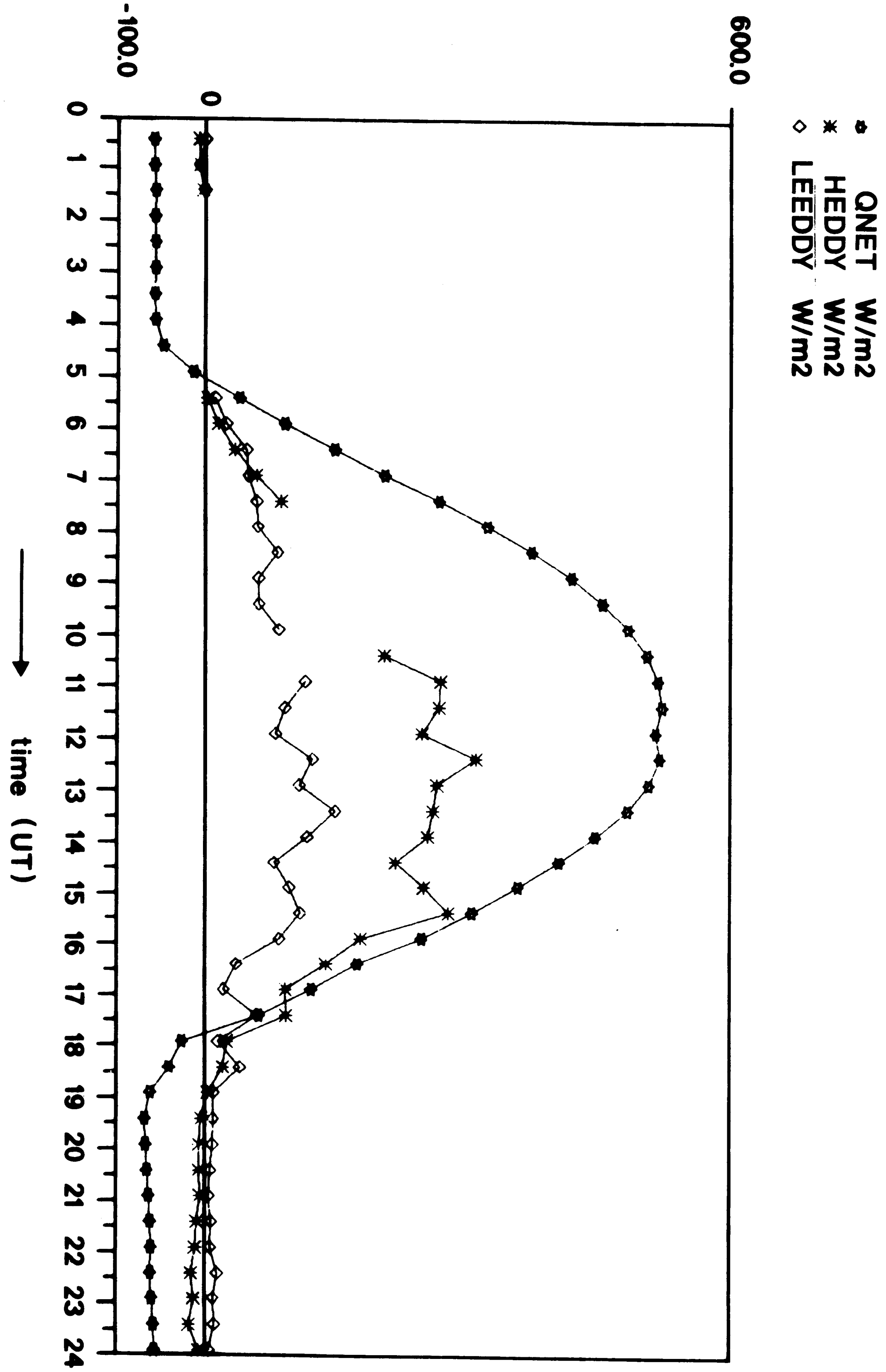
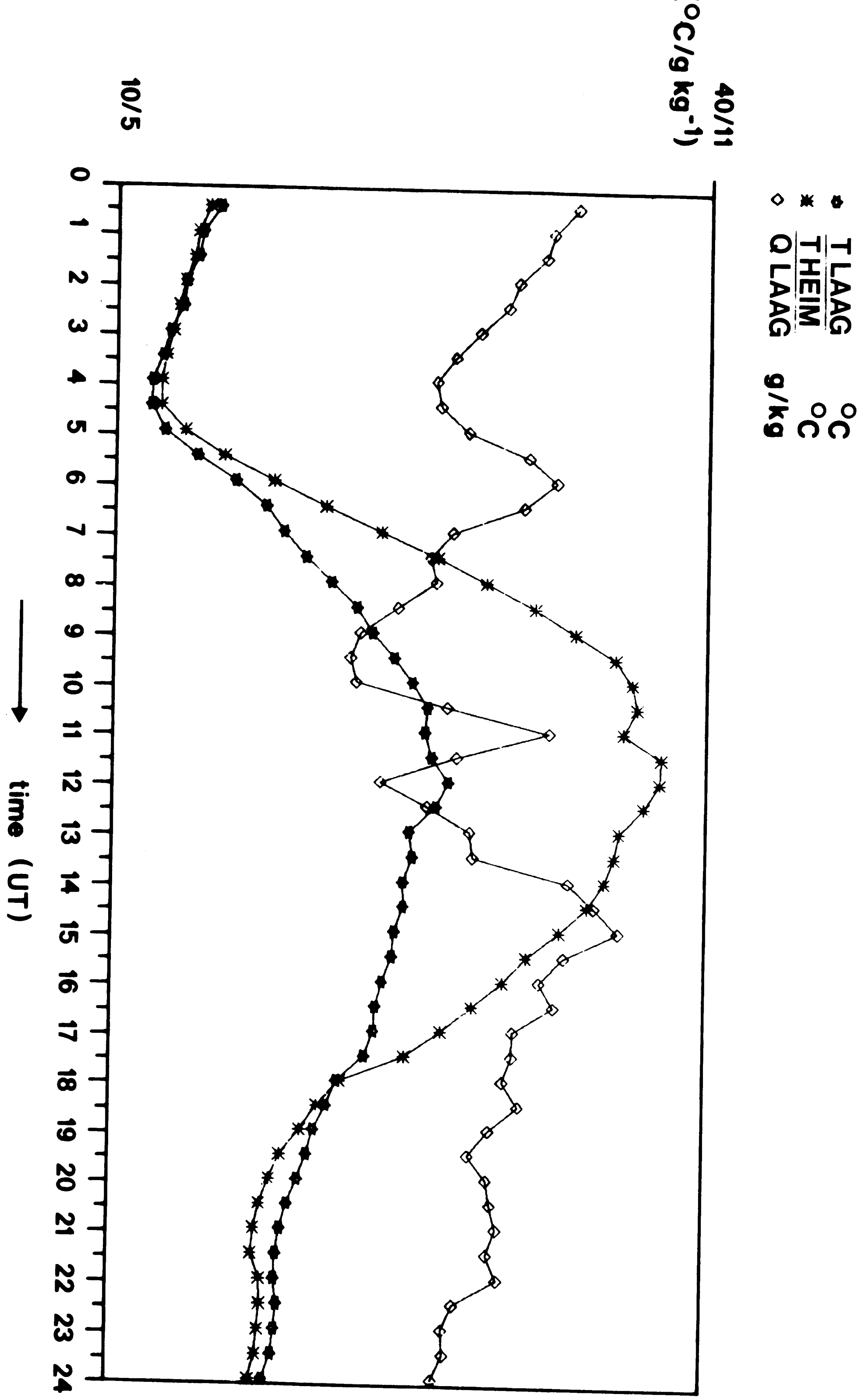

QNET W/m2
HEDDY W/m2
LEEDDY W/m2
600.0
-100.0
0
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
time (UT)

fig.7



T LAAG °C
THEIM °C
Q LAAG g/kg
40/11
(°C/g kg^{-1})
10/5
0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
time (UT)

fig. 8

fig.8

Appendix A. Synoptical observations

We here present all synoptical observations. The code form is:

YYMMDDHHMM $i_R i_X$hVV Nddff $1s_nTTT$ $2s_nT_dT_dT_d$
4PPPP 5appp $7wwW_1W_2$ $8N_hC_LC_MC_H$ $6RRRt_R$

The meaning of the symbols is as follows.

YY = year (minus 1900)
MM = month
DD = day
HH = hours
MM = minutes

i_R = Indicator for inclusion or omission of precipitation data.

Code figure	Precipitation data are reported:	Group $6RRRt_R$ is:
1	In Section 1	Included
2	In Section 3	Included
3	In none of the two Sections 1 and 3	Omitted (precipitation amount = 0)
4	In none of the two Sections 1 and 3	Omitted (precipitation amount not available)

i_X = Indicator for type of station operation (manned or automatic*) and for present and past weather data.

Code figure	Type of station operation	Group $7wwW_1W_2$ is:
1	Manned	Included
2	Manned	Omitted (no significant phenomenon to report)
3	Manned	Omitted (not observed, data not available)
4	Automatic	Included
5	Automatic	Omitted (no significant phenomenon to report)
6	Automatic	Omitted (not observed, data not available)

* When the station was automatic only the observations of wind, temperature and dew-point temperature were available.

h = Height above ground of the base of the lowest visible cloud.

Code figure	
0	0 to 50 m
1	50 to 100 m
2	100 to 200 m
3	200 to 300 m
4	300 to 600 m
5	600 to 1 000 m
6	1 000 to 1 500 m
7	1 500 to 2 000 m
8	2 000 to 2 500 m
9	2 500 m or more, or no clouds
/	Height of base of cloud not known *or* base of clouds at a level lower and tops at a level higher than that of the station

Notes:

(1) A height exactly equal to one of the values at the ends of the ranges shall be coded in the higher range, e.g. a height of 600 m shall be reported by code figure 5.

(2) Due to the limitation in range of the cloud-sensing equipment used by an automatic station, the code figures reported for h could have one of the three following meanings:

(*a*) The actual height of the base of the cloud is within the range indicated by the code figure; or

(*b*) The height of the base of the cloud is greater than the range indicated by the code figure but cannot be determined due to instrumental limitations; or

(c) There are no clouds vertically above the station.

VV = Horizontal visibility at surface level.

Code figure	km	Code figure	km	Code figure	km
00	< 0.1				
01	0.1	34	3.4	67	17
02	0.2	35	3.5	68	18
03	0.3	36	3.6	69	19
04	0.4	37	3.7	70	20
05	0.5	38	3.8	71	21
06	0.6	39	3.9	72	22
07	0.7	40	4	73	23
08	0.8	41	4.1	74	24
09	0.9	42	4.2	75	25
10	1	43	4.3	76	26
11	1.1	44	4.4	77	27
12	1.2	45	4.5	78	28
13	1.3	46	4.6	79	29
14	1.4	47	4.7	80	30
15	1.5	48	4.8	81	35
16	1.6	49	4.9	82	40
17	1.7	50	5	83	45
18	1.8	51		84	50
19	1.9	52		85	55
20	2	53	Not used	86	60
21	2.1	54		87	65
22	2.2	55		88	70
23	2.3	56	6	89	> 70
24	2.4	57	7	90	< 0.05
25	2.5	58	8	91	0.05
26	2.6	59	9	92	0.2
27	2.7	60	10	93	0.5
28	2.8	61	11	94	1
29	2.9	62	12	95	2
30	3	63	13	96	4
31	3.1	64	14	97	10
32	3.2	65	15	98	20
33	3.3	66	16	99	≧ 50

N = Total cloud cover.

Code figure	
0	0
1	1 okta or less, but not zero
2	2 oktas
3	3 oktas
4	4 oktas
5	5 oktas
6	6 oktas
7	7 oktas or more, but not 8 oktas
8	8 oktas
9	Sky obscured, or cloud amount cannot be estimated
/	No measurement made

dd = wind direction in tens of degrees, mean direction over the 10-minute period immediately preceding the time of observation.
code figure:

36 = north
09 = east
18 = south
27 = west
00 = calm
99 = variable

ff = wind speed (in knots): mean speed over the 10-minute periode immediately preceding the time of observation.

$1s_nTTT$ = mean air temperature over the 10-minute periode immediately preceding the time of observation, in tenths of a degree Celsius, its sign being given by S_n (0 = temperature positive or zero; 1 = temperature negative).

$2s_nT_dT_dT_d$ = mean dew-point temperature over the 10-minute periode immediately preceding the time of observation, in tenths of a degree Celsius, its sign being given by S_n (0 = temperature positive or zero; 1 = temperature negative).

4PPPP = atmospheric pressure at mean sea-level in tenths of a hectopascal, omitting thousands digit of hectopascals of the pressure value. For the reduction to sea level an imaginary column of air between the level of measurement and the sea-level was assumed with a temperature distribution derived from the screen temperature at the time of observation, assuming a constant vertical temperature gradient of 10°C per geopotential km and a constant specific humidity of 10 g/kg.

5appp = pressure change code, where

a = characteristic of pressure tendency during the three hours preceding the time of observation.

Code figure		
0	Increasing, then decreasing; atmospheric pressure the same or higher than 3 hours ago	
1	Increasing, then steady; or increasing, then increasing more slowly	atmospheric pressure now higher than 3 hours ago
2	Increasing (steadily or unsteadily) *	
3	Decreasing or steady, then increasing; or increasing, then increasing more rapidly	
4	Steady; atmospheric pressure the same as 3 hours ago *	
5	Decreasing, then increasing; atmospheric pressure the same or lower than 3 hours ago	
6	Decreasing, then steady; or decreasing, then decreasing more slowly	atmospheric pressure now lower than 3 hours ago
7	Decreasing (steadily or unsteadily) *	
8	Steady or increasing, then decreasing; or decreasing, then decreasing more rapidly	

ppp = pressure change at station level during the three hours preceding the time of observation, expressed in tenths of hectopascal.

wwW_1W_2 = characteristic weather code, where

ww = present weather.

Code figure

ww			
No meteors except photometeors	00	Cloud development not observed or not observable	characteristic change of the state of sky during the past hour
	01	Clouds generally dissolving or becoming less developed	
	02	State of sky on the whole unchanged	
	03	Clouds generally forming or developing	
Haze, dust, sand or smoke	04	Visibility reduced by smoke, e. g. veldt or forest fires, industrial smoke or volcanic ashes	
	05	Haze	
	06	Widespread dust in suspension in the air, not raised by wind at or near the station at the time of observation	
	07	Dust or sand raised by wind at or near the station at the time of observation, but no well developed dust whirl(s) or sand whirl(s), and no duststorm or sandstorm seen	
	08	Well developed dust whirl(s) or sand whirl(s) seen at or near the station during the preceding hour or at the time of observation, but no duststorm or sandstorm	
	09	Duststorm or sandstorm within sight at the time of observation, or at the station during the preceding hour	
	10	Mist	
	11	Patches of	shallow fog or ice fog at the station, whether on land or sea, not deeper than about 2 metres on land or 10 metres at sea
	12	More or less continuous	
	13	Lightning visible, no thunder heard	
	14	Precipitation within sight, not reaching the ground or the surface of the sea	
	15	Precipitation within sight, reaching the ground or the surface of the sea, but distant (i. e. estimated to be more than 5 km) from the station	
	16	Precipitation within sight, reaching the ground or the surface of the sea, near to, but not at the station	
	17	Thunderstorm, but no precipitation at the time of observation	
	18	Squalls	at or within sight of the station during the preceding hour or at the time of observation
	19	Funnel cloud(s)	

ww = 20 – 29 Precipitation, fog, ice fog or thunderstorm at the station during the preceding hour but not at the time of observation

Code figure

ww		
20	Drizzle (not freezing) or snow grains	not falling as shower(s)
21	Rain (not freezing)	
22	Snow	
23	Rain and snow or ice pellets, type (a)	
24	Freezing drizzle or freezing rain	
25	Shower(s) of rain	
26	Shower(s) of snow, or of rain and snow	
27	Shower(s) of hail , or of rain and hail	
28	Fog or ice fog	
29	Thunderstorm (with or without precipitation)	

ww = 30 – 39 Duststorm, sandstorm, drifting or blowing snow

ww		
30	Slight or moderate duststorm or sandstorm	– has decreased during the preceding hour
31		– no appreciable change during the preceding hour
32		– has begun or has increased during the preceding hour
33	Severe duststorm or sandstorm	– has decreased during the preceding hour
34		– no appreciable change during the preceding hour
35		– has begun or has increased during the preceding hour
36	Slight or moderate drifting snow	generally low (below eye level)
37	Heavy drifting snow	
38	Slight or moderate blowing snow	generally high (above eye level)
39	Heavy blowing snow	

ww = 40 – 49 Fog or ice fog at the time of observation

ww		
40	Fog or ice fog at a distance at the time of observation, but not at the station during the preceding hour, the fog or ice fog extending to a level above that of the observer	
41	Fog or ice fog in patches	
42	Fog or ice fog, sky visible	has become thinner during the preceding hour
43	Fog or ice fog, sky invisible	
44	Fog or ice fog, sky visible	no appreciable change during the preceding hour
45	Fog or ice fog, sky invisible	
46	Fog or ice fog, sky visible	has begun or has become thicker during the preceding hour
47	Fog or ice fog, sky invisible	
48	Fog, depositing rime, sky visible	
49	Fog, depositing rime, sky invisible	

ww = 50 – 59 Drizzle

ww		
50	Drizzle, not freezing, intermittent	slight at time of observation
51	Drizzle, not freezing, continuous	
52	Drizzle, not freezing, intermittent	moderate at time of observation
53	Drizzle, not freezing, continuous	
54	Drizzle, not freezing, intermittent	heavy (dense) at time of observation
55	Drizzle, not freezing, continuous	
56	Drizzle, freezing, slight	
57	Drizzle, freezing, moderate or heavy (dense)	
58	Drizzle and rain, slight	
59	Drizzle and rain, moderate or heavy	

ww = 60 – 69 Rain

ww		
60	Rain, not freezing, intermittent	slight at time of observation
61	Rain, not freezing, continuous	
62	Rain, not freezing, intermittent	moderate at time of observation
63	Rain, not freezing, continuous	
64	Rain, not freezing, intermittent	heavy at time of observation
65	Rain, not freezing, continuous	
66	Rain, freezing, slight	
67	Rain, freezing, moderate or heavy	
68	Rain or drizzle and snow, slight	
69	Rain or drizzle and snow, moderate or heavy	

ww – 70 – 79 Solid precipitation not in showers

ww		
70	Intermittent fall of snow flakes	slight at time of observation
71	Continuous fall of snow flakes	
72	Intermittent fall of snow flakes	moderate at time of observation
73	Continuous fall of snow flakes	
74	Intermittent fall of snow flakes	heavy at time of observation
75	Continuous fall of snow flakes	
76	Ice prisms (with or without fog)	
77	Snow grains (with or without fog)	
78	Isolated starlike snow crystals (with or without fog)	
79	Ice pellets, type (a)	

ww – 80 – 99 Showery precipitation, or precipitation with current or recent thunderstorm

ww		
80	Rain shower(s), slight	
81	Rain shower(s), moderate or heavy	
82	Rain shower(s), violent	
83	Shower(s) of rain and snow mixed, slight	
84	Shower(s) of rain and snow mixed, moderate or heavy	
85	Snow shower(s), slight	
86	Snow shower(s), moderate or heavy	
87	Shower(s) of snow pellets or ice pellets, type (b), with or without rain or rain and snow mixed	– slight
88		– moderate or heavy
89	Shower(s) of hail* with or without rain or rain and snow mixed, not associated with thunder	– slight
90		– moderate or heavy
91	Slight rain at time of observation	thunderstorm during the preceding hour but not at time of observation
92	Moderate or heavy rain at time of observation	
93	Slight snow, or rain and snow mixed or hail** at time of observation	
94	Moderate or heavy snow, or rain and snow mixed or hail** at time of observation	
95	Thunderstorm, slight or moderate, without hail** but with rain and/or snow at time of observation	thunderstorm at time of observation
96	Thunderstorm, slight or moderate, with hail** at time of observation	
97	Thunderstorm, heavy, without hail** but with rain and/or snow at time of observation	
98	Thunderstorm combined with duststorm or sandstorm at time of observation	
99	Thunderstorm, heavy, with hail** at time of observation	

* French: grêle.

** Hail, small hail, snow pellets. French: grêle, grésil ou neige roulée.

W_1W_2 = past weather, most important phenomenon in code. The period covered by W_1W_2 is six hours for observations at 0, 6, 12 and 18 UT, three hours for observations at 3, 9, 15 and 21, one hour for intermediate observations.

Code figure	
0	Cloud covering ½ or less of the sky throughout the appropriate period
1	Cloud covering more than ½ of the sky during part of the appropriate period and covering ½ or less during part of the period
2	Cloud covering more than ½ of the sky throughout the appropriate period
3	Sandstorm, duststorm or blowing snow
4	Fog or ice fog or thick haze
5	Drizzle
6	Rain
7	Snow, or rain and snow mixed
8	Shower(s)
9	Thunderstorm(s) with or without precipitation

$8N_hC_LC_MC_H$ = code form indicating clouds, where

N_h = amount of (all) the C_L cloud(s) present; if no C_L cloud is present the amount of (all) the C_M cloud(s) present.

Code figure	
0	0
1	1 okta or less, but not zero
2	2 oktas
3	3 oktas
4	4 oktas
5	5 oktas
6	6 oktas
7	7 oktas or more, but not 8 oktas
8	8 oktas
9	Sky obscured, or cloud amount cannot be estimated
/	No measurement made

C_L — *Clouds of the genera Stratocumulus, Stratus, Cumulus and Cumulonimbus*

Code figure	Technical specifications	Code figure	Non-technical specifications
0	No C_L clouds	0	No Stratocumulus, Stratus, Cumulus or Cumulonimbus
1	Cumulus humilis or Cumulus fractus other than of bad weather,* or both	1	Cumulus with little vertical extent and seemingly flattened, or ragged Cumulus other than of bad weather,* or both
2	Cumulus mediocris or congestus, with or without Cumulus of species fractus or humilis or Stratocumulus, all having their bases at the same level	2	Cumulus of moderate or strong vertical extent, generally with protuberances in the form of domes or towers, either accompanied or not by other Cumulus or by Stratocumulus, all having their bases at the same level
3	Cumulonimbus calvus, with or without Cumulus, Stratocumulus or Stratus	3	Cumulonimbus the summits of which, at least partially, lack sharp outlines, but are neither clearly fibrous (cirriform) nor in the form of an anvil; Cumulus, Stratocumulus or Stratus may also be present
4	Stratocumulus cumulogenitus	4	Stratocumulus formed by the spreading out of Cumulus; Cumulus may also be present
5	Stratocumulus other than Stratocumulus cumulogenitus	5	Stratocumulus not resulting from the spreading out of Cumulus
6	Stratus nebulosus or Stratus fractus other than of bad weather,* or both	6	Stratus in a more or less continuous sheet or layer, or in ragged shreds, or both, but no Stratus fractus of bad weather *
7	Stratus fractus or Cumulus fractus of bad weather,* or both (pannus), usually below Altostratus or Nimbostratus	7	Stratus fractus of bad weather * or Cumulus fractus of bad weather, or both (pannus), usually below Altostratus or Nimbostratus
8	Cumulus and Stratocumulus other than Stratocumulus cumulogenitus, with bases at different levels	8	Cumulus and Stratocumulus other than that formed from the spreading out of Cumulus; the base of the Cumulus is at a different level from that of the Stratocumulus
9	Cumulonimbus capillatus (often with an anvil), with or without Cumulonimbus calvus, Cumulus, Stratocumulus, Stratus or pannus	9	Cumulonimbus, the upper part of which is clearly fibrous (cirriform), often in the form of an anvil; either accompanied or not by Cumulonimbus without anvil or fibrous upper part, by Cumulus, Stratocumulus, Stratus or pannus
/	C_L clouds invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena	/	Stratocumulus, Stratus, Cumulus and Cumulonimbus invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena

* "Bad weather" denotes the conditions which generally exist during precipitation and a short time before and after.

C_M — *Clouds of the genera Altocumulus, Altostratus and Nimbostratus*

Code figure	Technical specifications	Code figure	Non-technical specifications
0	No C_M clouds	0	No Altocumulus, Altostratus or Nimbostratus
1	Altostratus translucidus	1	Altostratus, the greater part of which is semi-transparent; through this part the sun or moon may be weakly visible, as through ground glass
2	Altostratus opacus or Nimbostratus	2	Altostratus, the greater part of which is sufficiently dense to hide the sun or moon, or Nimbostratus
3	Altocumulus translucidus at a single level	3	Altocumulus, the greater part of which is semi-transparent; the various elements of the cloud change only slowly and are all at a single level
4	Patches (often lenticular) of Altocumulus translucidus, continually changing and occurring at one or more levels	4	Patches (often in the form of almonds or fishes) of Altocumulus, the greater part of which is semi-transparent; the clouds occur at one or more levels and the elements are continually changing in appearance
5	Altocumulus translucidus in bands, or one or more layers of Altocumulus translucidus or opacus, progressively invading the sky; these Altocumulus clouds generally thicken as a whole	5	Semi-transparent Altocumulus in bands, or Altocumulus in one or more fairly continuous layers (semi-transparent or opaque), progressively invading the sky; these Altocumulus clouds generally thicken as a whole
6	Altocumulus cumulogenitus (or cumulonimbogenitus)	6	Altocumulus resulting from the spreading out of Cumulus (or Cumulonimbus)
7	Altocumulus translucidus or opacus in two or more layers, or Altocumulus opacus in a single layer, not progressively invading the sky, or Altocumulus with Altostratus or Nimbostratus	7	Altocumulus in two or more layers, usually opaque in places, and not progressively invading the sky; or opaque layer of Altocumulus, not progressively invading the sky; or Altocumulus together with Altostratus or Nimbostratus
8	Altocumulus castellanus or floccus	8	Altocumulus with sproutings in the form of small towers or battlements, or Altocumulus having the appearance of cumuliform tufts
9	Altocumulus of a chaotic sky, generally at several levels	9	Altocumulus of a chaotic sky, generally at several levels
/	C_M clouds invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena, or because of a continuous layer of lower clouds	/	Altocumulus, Altostratus and Nimbostratus invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena, or more often because of the presence of a continuous layer of lower clouds

C_H — *Clouds of the genera Cirrus, Cirrocumulus and Cirrostratus*

Code figure	Technical specifications	Code figure	Non-technical specifications
0	No C_H clouds	0	No Cirrus, Cirrocumulus or Cirrostratus
1	Cirrus fibratus, sometimes uncinus, not progressively invading the sky	1	Cirrus in the form of filaments, strands or hooks, not progressively invading the sky
2	Cirrus spissatus, in patches or entangled sheaves, which usually do not increase and sometimes seem to be the remains of the upper part of a Cumulonimbus; or Cirrus castellanus or floccus	2	Dense Cirrus, in patches or entangled sheaves, which usually do not increase and sometimes seem to be the remains of the upper part of a Cumulonimbus; or Cirrus with sproutings in the form of small turrets or battlements, or Cirrus having the appearance of cumuliform tufts
3	Cirrus spissatus cumulonimbogenitus	3	Dense Cirrus, often in the form of an anvil, being the remains of the upper parts of Cumulonimbus
4	Cirrus uncinus or fibratus, or both, progressively invading the sky; they generally thicken as a whole	4	Cirrus in the form of hooks or of filaments, or both, progressively invading the sky; they generally become denser as a whole
5	Cirrus (often in bands) and Cirrostratus, or Cirrostratus alone, progressively invading the sky; they generally thicken as a whole, but the continuous veil does not reach 45 degrees above the horizon	5	Cirrus (often in bands converging towards one point or two opposite points of the horizon) and Cirrostratus, or Cirrostratus alone; in either case, they are progressively invading the sky, and generally growing denser as a whole, but the continuous veil does not reach 45 degrees above the horizon
6	Cirrus (often in bands) and Cirrostratus, or Cirrostratus alone, progressively invading the sky; they generally thicken as a whole; the continuous veil extends more than 45 degrees above the horizon, without the sky being totally covered	6	Cirrus (often in bands converging towards one point or two opposite points of the horizon) and Cirrostratus, or Cirrostratus alone; in either case, they are progressively invading the sky, and generally growing denser as a whole; the continuous veil extends more than 45 degrees above the horizon, without the sky being totally covered
7	Cirrostratus covering the whole sky	7	Veil of Cirrostratus covering the celestial dome
8	Cirrostratus not progressively invading the sky and not entirely covering it	8	Cirrostratus not progressively invading the sky and not completely covering the celestial dome
9	Cirrocumulus alone, or Cirrocumulus predominant among the C_H clouds	9	Cirrocumulus alone, or Cirrocumulus accompanied by Cirrus or Cirrostratus, or both, but Cirrocumulus is predominant
/	C_H clouds invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena, or because of a continuous layer of lower clouds	/	Cirrus, Cirrocumulus and Cirrostratus invisible owing to darkness, fog, blowing dust or sand, or other similar phenomena, or more often because of the presence of a continuous layer of lower clouds

333 = separation code

$1s_nT_xT_xT_x$ = Maximum temperature in tenths of a degree Celsius over the 12-hours period immediately preceding the time of observation (only at 06 and 18 hours UT), its sign being given by S_n (0 = temperature positive or zero; 1 = temperature negative).

$2S_nT_nT_nT_n$ = Minimum temperature, in tenths of a degree Celsius over the 12-hours period immediately preceding the time of observation (only at 06 and 18 hour UT), its sign being given by S_n (0 = temperature positive or zero; 1 = temperature negative).

$6RRRt_R$ = Amount of precipitation which has fallen during the period preceding the time of observation as indicated by t_R.
Code figure RRR:

Code figure	mm	Code figure	mm
000	Not used	990	Trace
001	1	991	0.1
002	2	992	0.2
etc.	etc.	993	0.3
988	988	994	0.4
989	989 mm or more	995	0.5
		996	0.6
		997	0.7
		998	0.8
		999	0.9

code figure t_R:

1 = a 6-hour period (at 12 hour UT)

2 = a 12-hour period

3 = a 24-hour period

4 = more than a 24-hour period

8706010900	46///	/3525	10200	20081	4////	5////	7////	8////	6////
8706011000	46///	/3427	10213	20075	4////	5////	7////	8////	6////
8706011100	46///	/3526	10220	20070	4////	5////	7////	8////	6////
8706011200	46///	/3521	10232	20070	4////	5////	7////	8////	6////
8706011300	46///	/3422	10239	20070	4////	5////	7////	8////	6////
8706011400	46///	/3519	10243	20066	4////	5////	7////	8////	6////
8706011500	46///	/3521	10245	20051	4////	5////	7////	8////	6////
8706011600	46///	/////	1////	2////	4////	5////	7////	8////	6////
8706011700	46///	/3623	10236	20042	4////	5////	7////	8////	6////
8706011800	46///	/3520	10228	20043	4////	5////	7////	8////	6////
8706011900	46///	/3620	10217	20049	4////	5////	7////	8////	6////
8706012000	46///	/3519	10208	2////	4////	5////	7////	8////	6////
8706012100	46///	/3519	10201	2////	4////	5////	7////	8////	6////
8706012200	46///	/3414	10192	2////	4////	5////	7////	8////	6////
8706012300	46///	/3417	10187	2////	4////	5////	7////	8////	6////

8706020000	46///	/3516	10181	2////	4////	5////	7////	8////	6////
8706020100	46///	/3413	10171	2////	4////	5////	7////	8////	6////
8706020200	46///	/3412	10167	2////	4////	5////	7////	8////	6////
8706020300	46///	/3409	10159	2////	4////	5////	7////	8////	6////
8706020400	46///	/3411	10157	2////	4////	5////	7////	8////	6////
8706020500	46///	/3610	10159	2////	4////	5////	7////	8////	6////
8706020600	46///	/3308	10172	2////	4////	5////	7////	8////	6////
8706020700	46///	/3509	10185	2////	4////	5////	7////	8////	6////
8706020800	46///	/3507	10203	2////	4////	5////	7////	8////	6////
8706020900	42965	23405	10219	20093	40190	5////	7////	80001	6////
8706021000	42965	23502	10235	20088	40188	5////	7////	80001	6////
8706021100	42965	12604	10246	20090	40187	5////	7////	80001	6////
8706021200	32865	22204	10255	20082	40185	57005	7////	80001	6////
8706021300	42865	22707	10261	20094	40184	57004	7////	81101	6////
8706021400	42865	12413	10259	20107	40180	57007	7////	81101	6////
8706021500	42965	12412	10255	20095	40177	57008	7////	80001	6////
8706021600	42965	12311	10247	20085	40175	57009	7////	80001	6////
8706021700	46///	/2311	10230	20082	4////	5////	7////	8////	6////
8706021800	36///	/2211	10212	20082	4////	5////	7////	8////	6////
8706021900	46///	/1906	10194	20101	4////	5////	7////	8////	6////
8706022000	42965	11404	10173	20105	40184	5////	7////	80001	6////

8706030800	41960	70302	10168	2////	40171	5////	760//	87070	6////
8706030900	41960	83508	10172	20145	40173	5////	760//	8807/	6////
8706031000	41960	70508	10163	20129	40166	5////	72162	87070	6////
8706031100	42962	60605	10194	20119	40162	57009	7////	83031	6////
8706031200	12962	71403	10224	20090	40159	57014	7////	84031	69942
8706031300	42962	6////	1////	2////	40155	57011	7////	85031	6////
8706031400	42960	42106	10233	20133	40149	57013	7////	81031	6////
8706031500	42958	32006	10233	20133	40145	57015	7////	80001	6////

8706041000	42561	53304	10200	2////	40119	5////	7////	83140	6////
8706041100	42562	53108	10206	20131	40120	5////	7////	84240	6////
8706041200	12565	33113	10220	20095	40116	5////	7////	83200	60033
8706041300	42575	53213	10225	20089	40114	57005	7////	84140	6////
8706041400	42675	43115	10236	20077	40114	57006	7////	84100	6////
8706041500	42680	23116	10234	20069	40114	57006	7////	82100	6////
8706041600	42680	23115	10234	20076	40111	57003	7////	81101	6////

8706050800	42580	13110	10200	2////	40152	5////	7////	81101	6////
8706050900	42580	13212	10210	20074	40156	5////	7////	81104	6////
8706051000	42580	23110	10219	20076	40154	5////	7////	81104	6////
8706051100	42580	33109	10227	20068	40154	51002	7////	81104	6////
8706051200	32580	33109	10236	20066	40153	57003	7////	81104	6////

8706051300	42680	43008	10244	20061	40150	57004	7////	82105	6////
8706051400	42680	42711	10251	20064	40149	57005	7////	81105	6////
8706051500	42780	42611	10249	20069	40147	57006	7////	81106	6////
8706051600	42978	42908	10254	20067	40143	57007	7////	80005	6////
8706051700	46///	/2414	10237	20108	4////	5////	7////	8////	6////
8706051800	36///	/2611	10225	20105	4////	5////	7////	8////	6////
8706051900	46///	/2610	10203	20128	4////	5////	7////	8////	6////
8706052000	46///	/2709	10188	20138	4////	5////	7////	8////	6////
8706052100	46///	/2709	10180	20143	4////	5////	7////	8////	6////
8706052200	46///	/2807	10172	20146	4////	5////	7////	8////	6////
8706052300	46///	/2802	10157	20142	4////	5////	7////	8////	6////

8706060000	36///	/3104	10160	20143	4////	5////	7////	8////	6////
8706060100	46///	/0101	10146	20134	4////	5////	7////	8////	6////
8706060200	46///	/1203	10137	20128	4////	5////	7////	8////	6////
8706060300	46///	/1503	10131	20122	4////	5////	7////	8////	6////
8706060400	46///	/0503	10121	20114	4////	5////	7////	8////	6////
8706060500	46///	/0405	10126	20118	4////	5////	7////	8////	6////
8706060600	36///	/0604	10164	20133	4////	5////	7////	8////	6////
8706060700	42975	10502	10191	20115	40192	5////	7////	80002	6////
8706060800	42975	10202	10213	20113	40193	5////	7////	80001	6////
8706060900	42775	13603	10234	20096	40191	5////	7////	81100	6////
8706061000	42978	12504	10255	20099	40191	58001	7////	81040	6////
8706061100	42965	12009	10257	20132	40191	57002	7////	80001	6////
8706061200	32965	01909	10269	20096	40190	57001	7////	80000	6////
8706061300	42965	12014	10246	20122	40192	51001	7////	81030	6////
8706061400	42765	12012	10244	20139	40195	51004	7////	81130	6////
8706061500	42965	11913	10241	20144	40194	51004	7////	80005	6////
8706061600	42965	21911	10236	20131	40192	54000	7////	80005	6////
8706061700	46///	/1909	10234	20128	4////	5////	7////	8////	6////
8706061800	36///	/1708	10215	20126	4////	5////	7////	8////	6////
8706061900	46///	/1509	10205	20123	4////	5////	7////	8////	6////
8706062000	46///	/1409	10197	20123	4////	5////	7////	8////	6////
8706062100	46///	/1308	10189	20125	4////	5////	7////	8////	6////
8706062200	46///	/1208	10186	20126	4////	5////	7////	8////	6////
8706062300	46///	/1309	10187	20114	4////	5////	7////	8////	6////

8706070000	36///	/1207	10182	20112	4////	5////	7////	8////	6////
8706070100	46///	/1308	10176	20112	4////	5////	7////	8////	6////
8706070200	46///	/1309	10177	20118	4////	5////	7////	8////	6////
8706070300	46///	/1308	10171	20115	4////	5////	7////	8////	6////
8706070400	46///	/1310	10177	20114	4////	5////	7////	8////	6////
8706070500	/////	/////	1////	2////	4////	5////	7////	8////	6////
8706070600	/////	/////	1////	2////	4////	5////	7////	8////	6////
8706070700	/////	/////	1////	2////	4////	5////	7////	8////	6////
8706070800	/////	/////	1////	2////	4////	5////	7////	8////	6////
8706070900	41560	81414	10202	2////	4////	5////	79298	889//	6////

8706080900	11665	63212	10157	2////	40111	5////	72582	85840	60074
8706081000	42570	43414	10184	2////	40110	5////	7////	83840	6////
8706081100	42572	43312	10194	20090	40105	5////	7////	83840	6////
8706081200	12575	43214	10207	20075	40099	57012	7////	83241	69901
8706081300	42680	43112	10216	20068	40094	57016	7////	83101	6////
8706081400	42680	32911	10222	20057	40090	57015	7////	82101	6////
8706081500	42680	33009	10225	20054	40084	57015	7////	82131	6////
8706081600	42780	22809	10227	20056	40079	57015	7////	81131	6////
8706081700	46///	/2908	10227	20055	4////	5////	7////	8////	6////
8706081800	36///	/2813	10218	20064	4////	5////	7////	8////	6////
8706081900	46///	/2809	10199	20085	4////	5////	7////	8////	6////
8706082000	46///	/2809	10179	20082	4////	5////	7////	8////	6////

8706082100	46///	/2708	10163	20087	4////	5////	7////	8////	6////
8706082200	46///	/2911	10162	20077	4////	5////	7////	8////	6////
8706082300	46///	/2908	10152	20080	4////	5////	7////	8////	6////

8706090000	36///	/2806	10138	20086	4////	5////	7////	8////	6////
8706090100	46///	/2807	10136	20087	4////	5////	7////	8////	6////
8706090200	46///	/2809	10129	20086	4////	5////	7////	8////	6////
8706090300	46///	/2908	10129	20077	4////	5////	7////	8////	6////
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8706090700	46///	/2909	10157	20073	4////	5////	7////	8////	6////
8706090800	42560	22807	10175	2////	40106	5////	7////	81151	6////
8706090900	42570	33008	10178	20055	40105	5////	7////	81105	6////
8706091000	42570	63006	10184	20063	40105	5////	7////	82106	6////
8706091100	42575	42409	10188	20057	40107	53001	7////	81104	6////
8706091200	32675	52513	10197	20059	40105	50000	7////	81106	6////
8706091300	42680	42614	10200	20056	40104	52001	7////	81101	6////
8706091400	42680	62613	10193	20065	40101	57006	7////	81106	6////
8706091500	42675	62618	10194	2////	40099	57006	7////	81256	6////
8706091600	42675	62315	10196	20067	40099	56005	7////	81246	6////

8706100800	42565	31209	10181	20114	40145	5////	7////	82260	6////
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8706101000	42665	31611	10194	20106	40146	5////	7////	82160	6////
8706101100	42668	41610	10201	20085	40145	54000	7////	81140	6////
8706101200	32665	51616	10203	20104	40151	53005	7////	82240	6////
8706101300	42665	41616	10203	20103	40150	52004	7////	81140	6////
8706101400	42665	51715	10202	20106	40148	52003	7////	81169	6////
8706101500	42665	61716	10189	20103	40148	56003	7////	81150	6////

8706110900	42975	41716	10226	2////	40198	5////	7////	81031	6////
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8706111100	42670	21614	10243	20067	40200	5////	7////	81141	6////
8706111200	32670	21715	10243	20072	40201	51003	7////	81101	6////
8706111300	42670	31617	10240	20086	40195	57007	7////	81105	6////
8706111400	42670	61714	10239	20102	40189	57011	7////	81151	6////
8706111500	42668	51617	10236	20109	40192	5009/	7////	81141	6////

8706120800	42965	14006	10229	20120	40186	5////	7////	81040	6////
8706120900	42965	13504	10244	20109	40186	5////	7////	81040	6////
8706121000	42967	33104	10259	20097	40187	5////	7////	80001	6////
8706121100	42665	42607	10266	20107	40188	53002	7////	81141	6////
8706121200	32667	22311	10271	20118	40189	53003	7////	81101	6////
8706121300	42665	21914	10263	20114	40191	53004	7////	81101	6////
8706121400	42665	31916	10258	20127	40190	50002	7////	81104	6////
8706121500	42962	41811	10244	20129	40181	58008	7////	80005	6////
8706121600	42962	21715	10250	20123	40175	58016	7////	80001	6////
8706121700	46///	/1911	10237	20133	4////	5////	7////	8////	6////
8706121800	36///	/1812	10226	20135	4////	5////	7////	8////	6////
8706121900	46///	/1908	10214	20146	4////	5////	7////	8////	6////
8706122000	46///	/2007	10202	20154	4////	5////	7////	8////	6////

8706170700	42965	2////	1////	2////	40235	5////	7////	82040	6////
8706170800	42965	2////	1////	2////	40235	5////	7////	82040	6////
8706170900	42665	23317	10185	2////	40232	5////	7////	81140	6////
8706171000	42667	33314	10190	2////	40232	56003	7////	81140	6////
8706171100	42667	33512	10200	2////	40226	57009	7////	81141	6////
8706171200	12667	33011	10204	2////	40219	58013	7////	81101	60084
8706171300	42668	23213	10214	2////	40215	57017	7////	81101	6////

8706171400	42668	43315	10216	20031	40211	57015	7////	83101	6////
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8706171600	42670	43315	10220	20033	40200	57015	7////	82101	6////

8706180800	42680	43113	10185	2////	40197	5////	7////	81109	6////
8706180900	42683	33216	10197	2////	40190	5////	7////	81109	6////
8706181000	42682	33318	10207	2////	40183	5////	7////	82101	6////
8706181100	42683	23212	10214	20068	40178	57019	7////	81108	6////
8706181200	32684	43312	10227	20065	40168	57022	7////	82101	6////
8706181300	42684	53013	10230	20066	40161	57022	7////	83101	6////
8706181400	42684	43310	10233	20067	40154	57024	7////	83101	6////
8706181500	42684	63208	10234	20069	40147	57021	7////	85101	6////
8706181600	42684	43408	10240	20076	40140	57021	7////	82101	6////
8706181700	42684	33310	10244	20074	40137	56017	7////	81261	6////
8706181800	32683	23413	10233	20077	40134	56013	7////	81101	6////
8706181900	42683	23611	10211	20085	40136	55004	7////	81101	6////
8706182000	42983	13308	10189	20085	40136	55001	7////	81101	6////

8706190800	11567	8////	1////	2////	40116	5////	76062	8122/	69942

8706200700	12575	2////	1////	2////	40091	5////	7////	81140	60063
8706200800	42575	23016	10190	2////	40095	5////	7////	81240	6////
8706200900	42578	43121	10201	2////	40097	5////	7////	83240	6////
8706201000	42578	53116	10205	20064	40098	51007	7////	84260	6////
8706201100	42578	53221	10213	20056	40102	53007	7////	84260	6////
8706201200	32578	53120	10208	20064	40105	52008	7////	85200	6////
8706201300	42575	53120	10204	20066	40107	51009	7////	85200	6////
8706201400	42572	63220	10209	20065	40111	52009	7////	86200	6////
8706201500	42572	63321	10210	20063	40115	52010	7////	85260	6////
8706201600	42572	63419	10202	20061	40119	52012	7////	85260	6////
8706201700	42572	33419	10194	20066	40125	53014	7////	82240	6////

8706210700	32670	2////	1////	2////	40162	5////	7////	81101	6////
8706210800	42670	13426	10187	20087	40162	5////	7////	81100	6////
8706210900	42670	13424	10198	2////	40165	5////	7////	81100	6////
8706211000	42668	13525	10208	2////	40167	53005	7////	81100	6////
8706211100	42668	13425	10218	20082	40167	51005	7////	81100	6////
8706211200	32668	13424	10230	20067	40167	51002	7////	81100	6////
8706211300	42670	13421	10238	20069	40168	53001	7////	81100	6////
8706211400	42670	23421	10243	20063	40168	53001	7////	81101	6////
8706211500	42670	33519	10246	20069	40166	58001	7////	81191	6////
8706211600	42973	13618	10244	20068	40165	58003	7////	80001	6////
8706211700	42673	13516	10240	20068	40165	56003	7////	81100	6////
8706211800	32670	13515	10229	20068	40166	5000/	7////	81100	6////
8706211900	42675	13515	10216	20059	40170	52005	7////	81130	6////
8706212000	42975	13516	10204	20062	40176	52005	7////	81030	6////
8706212100	42975	13417	10197	2////	40188	52022	7////	81030	6////

8706230800	32980	23518	10226	20108	40226	5////	7////	81031	6////
8706230900	42980	23518	10239	20095	40228	5////	7////	81031	6////
8706231000	42681	23516	10249	20096	40226	5////	7////	81131	6////
8706231100	42681	33415	10263	20091	40223	58003	7////	81151	6////
8706231200	32681	23517	10273	20092	40218	57010	7////	81151	6////
8706231300	42681	33518	10279	20095	40216	57010	7////	81141	6////
8706231400	42681	33620	10281	20100	40214	56009	7////	81141	6////
8706231500	42682	33616	10287	20094	40210	58008	7////	81191	6////
8706231600	42682	33518	10286	20090	40208	57008	7////	81291	6////
8706231700	42682	33515	10278	20098	40205	57009	7////	81191	6////
8706231800	32682	43514	10265	20102	40205	56005	7////	81251	6////
8706231900	42682	53411	10248	20098	40207	55001	7////	81132	6////

8706232000	42682	53416	10240	20103	40210	53005	7////	81132	6////
8706232100	42682	43516	10233	20109	40214	52009	7////	81132	6////
8706232200	42982	23413	10224	20114	40216	52009	7////	81032	6////
8706232300	46///	/3316	10218	20117	4////	5////	7////	8////	6////

8706240000	32982	03313	10208	20124	40211	5////	7////	80000	6////
8706240100	46///	/3317	10208	20128	4////	5////	7////	8////	6////
8706240200	42928	13418	10208	20130	40205	5////	7////	81030	6////
8706240300	42982	13316	10201	20130	40201	5////	7////	81030	6////
8706240400	42983	23214	10192	20128	40202	5////	7////	81030	6////
8706240500	42983	13214	10193	20131	40200	57005	7////	81041	6////
8706240600	32683	13215	10206	20130	40198	55003	7////	81101	6////
8706240700	42683	13421	10218	20127	40198	56004	7////	81101	6////
8706240800	42683	13423	10227	20124	40196	57004	7////	81101	6////
8706240900	42682	13420	10237	20122	40195	58003	7////	81101	6////
8706241000	42680	23518	10251	20119	40194	57004	7////	81101	6////
8706241100	42677	23416	10259	20117	40190	58006	7////	81101	6////
8706241200	32677	33516	10268	2////	40185	58010	7////	81101	6////
8706241300	42675	33517	10272	20109	40181	57013	7////	81101	6////
8706241400	42675	23421	10276	20097	40178	57012	7////	81201	6////
8706241500	42675	23619	10279	20099	40175	57010	7////	81201	6////

Appendix B. Channel identification

nr.	quantity symbolic	unit	description
0	TYD	-	time identification YYMMDDHHMM YY = year (87), MM = month (06), DD = day, HH = hour (UT), MM = minute. Eg., 8706090310 refers to the time interval of 03^h10^m-03^h40^m UT of the 9th of June, 1987.
1	DUUR	min	duration of the averaging period, c.q. 30 minutes
2	-	-	-
3	-	-	-
4	-	-	-
5	NSAMPLE	-	number of samples per channel collected during DUUR
6	FFSN	ms^{-1}	windspeed sonic anemometer
7	DDSN	deg	winddirection sonic anemometer
8	U*	ms^{-1}	friction velocity derived from sonic anemometer
9	DQDV	$gkg^{-1}V^{-1}$	slope of the Lyman-alpha calibration curve
10	VOLN	V	off-set of the Lyman-alpha calibration curve
11	QLAAG	gkg^{-1}	specific humidity at lower psychrometer level
12	DELQ	gkg^{-1}	specific humidity difference lower-upper psychrometer level
13	BWED	-	Bowen ratio from eddy correlation measurements
14	HEDDY	Wm^{-2}	sensible heat flux, eddy correlation method
15	LEEDDY	Wm^{-2}	latent heat flux, eddy correlation method
16	H+LE	Wm^{-2}	HEDDY + LEEDDY
17	LOED	m	Monin-Obukhov length from eddy correlation measurements
18	BWST	-	Bowen ratio from structure parameters
19	BWPR	-	Bowen ratio from profile measurements
20	QHUT	gkg^{-1}	specific humidity, screen
21	TDAUW	°C	dewpoint temperature, screen
22	THEIM	°C	surface temperature, infrared thermometer
23	NRAIN	-	fraction of time with rain detected

24	ROTB	deg	position rotor sonic anemometer at beginning of run
25	ROTE	deg	position rotor sonic anemometer at end of run
26	HPR	Wm^{-2}	sensible heat flux, profile method
27	LEPR	Wm^{-2}	latent heat flux, profile method
28	HLEPR	Wm^{-2}	HPR + LEPR
29	U*PR	ms^{-1}	friction velocity, profile method
30	LOPR	m	Monin-Obukhov length from profile measurements
31	-	-	-
32	KLOK	V	signal clock
33	-	-	-
34	RAIN	V	signal rain detector
35	ROTR	V	signal rotor
36	USON	ms^{-1}	longitudinal wind velocity sonic
37	VSON	ms^{-1}	lateral wind velocity sonic
38	WSON	ms^{-1}	vertical wind velocity sonic
39	TSON	°C	sonic temperature, corrected for horizontal wind
40	TPTA	°C	temperature cold wire sensor
41	LYAL	V	signal Lyman-alpha
42	TLAAG	°C	temperature at lower psychrometer level
43	TDD	°C	temperature difference lower-upper psychrometer level
44	TNN	°C	wet bulb temperature difference lower-upper psychrometer level
45	TDNH	°C	wet bulb depression at upper psychrometer level
46	ULAAG	ms^{-1}	wind speed at 1.95 m height
47	UMIDD	ms^{-1}	wind speed at 4.05 m height
48	UHOOG	ms^{-1}	wind speed at 8.10 m height
49	THUT	°C	temperature, screen
50	RHUT	%	relative humidity, screen
51	FF10	ms^{-1}	wind speed at 10 m height
52	DD10	deg	wind direction at 10 m height
53	QNET	Wm^{-2}	net radiation
54	GLOB	Wm^{-2}	global radiation
55	HEIM	V	signal infrared thermometer
56	-	-	-
57	-	-	-
58	-	-	-

59	-	-	-
60	SKLOK	V	standard deviation timing signal
61	-	-	-
62	SRAIN	V	standard deviation rain detector
63	SROTR	deg	" signal rotor
64	SUSON	ms^{-1}	" longitudinal sonic wind velocity
65	SVSON	ms^{-1}	" lateral sonic wind velocity
66	SWSON	ms^{-1}	" vertical sonic wind velocity
67	STSON	K	" sonic temperature
68	STPTA	K	" temperature cold wire
69	SLYAL	V	" Lyman-alpha voltage
70	STLAAG	K	" temperature lower psychrometer
71	STDD	K	" temperature difference psychrometers
72	STNN	K	" wet bulb temperature difference
73	STDNH	K	" wet bulb depression upper psychrometer
74	SULAAG	ms^{-1}	" wind speed at 1.95 m height
75	SUMIDD	ms^{-1}	" wind speed at 4.05 m height
76	SUHOOG	ms^{-1}	" wind speed at 8.10 m height
77	STHUT	K	" temperature, screen
78	SRHUT	%	" relative humidity, screen
79	SFF10	ms^{-1}	" wind speed at 10 m height
80	SDD10	deg	" wind direction at 10 m height
81	SQNET	Wm^{-2}	" net radiation
82	SQGLOB	Wm^{-2}	" global radiation
83	SHEIM	V	" infrared thermometer
84	<UU>	m^2s^{-2}	variance longitudinal wind velocity sonic
85	<UV>	m^2s^{-2}	covariance longitudinal-lateral wind sonic
86	<UW>	m^2s^{-2}	longitudinal stress sonic
87	<US>	$ms^{-1}K^{-1}$	covariance longitudinal wind sonic - sonic temperature
88	<UT>	$ms^{-1}K^{-1}$	covariance longitudinal wind sonic - cold wire temperature

89	<UQ>	$ms^{-1}gkg^{-1}$	covariance longitudinal wind sonic - Lyman-alpha
90	<VV>	m^2s^{-2}	variance lateral wind sonic
91	<VW>	m^2s^{-2}	lateral stress sonic
92	<VS>	$ms^{-1}K^{-1}$	covariance lateral wind sonic - sonic temperature
93	<VT>	$ms^{-1}K^{-1}$	covariance lateral wind sonic - cold wire temperature
94	<VQ>	$ms^{-1}gkg^{-1}$	covariance lateral wind sonic - specific humidity Lyman alpha
95	<WW>	m^2s^{-2}	variance vertical wind sonic
96	<WS>	$ms^{-1}K^{-1}$	sonic temperature flux
97	<WT>	$ms^{-1}K^{-1}$	cold wire temperature flux
98	<WQ>	$ms^{-1}gkg^{-1}$	specific humidity flux
99	<SS>	K^2	variance sonic temperature
100	<ST>	K^2	covariance sonic temperature - cold wire temperature
101	<SQ>	$Kgkg^{-1}$	covariance sonic temperature - specific humidity Lyman-alpha
102	<TT>	K^2	variance platinum wire temperature
103	<QT>	$gkg^{-1}K$	covariance specific humidity Lyman-alpha - platinum wire temperature
104	<QQ>	g^2kg^{-2}	variance specific humidity Lyman-alpha
105	-	-	-
106	-	-	-
107	-	-	-
108	-	-	-
109	-	-	-
110	-	-	-
111	-	-	-
112	CUU1	$m^2s^{-2}m^{-2/3}$	structure parameter longitudinal wind sonic, , τ = 0.04 s
113	CUU2	$m^2s^{-2}m^{-2/3}$	" , τ = 0.08 s
114	CUU4	$m^2s^{-2}m^{-2/3}$	" , τ = 0.16 s
115	CVV1	$m^2s^{-2}m^{-2/3}$	structure parameter lateral wind sonic , τ = 0.04 s
116	CVV2	$m^2s^{-2}m^{-2/3}$	" , τ = 0.08 s
117	CVV4	$m^2s^{-2}m^{-2/3}$	" , τ = 0.16 s

118	CWW1	$m^2s^{-2}m^{-2/3}$	structure parameter vertical wind sonic , τ = 0.04 s
119	CWW2	$m^2s^{-2}m^{-2/3}$	" , τ = 0.08 s
120	CWW4	$m^2s^{-2}m^{-2/3}$	" , τ = 0.16 s
121	CSS1	$K^2m^{-2/3}$	structure parameter sonic temperature , τ = 0.04 s
122	CSS2	$K^2m^{-2/3}$	" , τ = 0.08 s
123	CSS4	$K^2m^{-2/3}$	" , τ = 0.16 s
124	CTT1	$K^2m^{-2/3}$	structure parameter cold wire temperature , τ = 0.04 s
125	CTT2	$K^2m^{-2/3}$	" , τ = 0.08 s
126	CTT4	$K^2m^{-2/3}$	" , τ = 0.16 s
127	CQQ1	$g^2kg^{-2}m^{-2/3}$	structure parameter humidity Lyman-alpha , τ = 0.04 s
128	CQQ2	$g^2kg^{-2}m^{-2/3}$	" , τ = 0.08 s
129	CQQ4	$g^2kg^{-2}m^{-2/3}$	" , τ = 0.16 s
130	CUV1	$m^2s^{-2}m^{-2/3}$	structure parameter longitudinal-lateral wind , τ = 0.04 s
131	CUV2	$m^2s^{-2}m^{-2/3}$	" , τ = 0.08 s
132	CUV4	$m^2s^{-2}m^{-2/3}$	" , τ = 0.16 s
133	CTQ1	$gkg^{-1}Km^{-2/3}$	structure parameter temperature-humidity , τ = 0.04 s
134	CTQ2	$gkg^{-1}Km^{-2/3}$	" , τ = 0.08 s
135	CTQ4	$gkg^{-1}Km^{-2/3}$	" , τ = 0.16 s
136	-	-	-
137	CTT	$K^2m^{-2/3}$	temperature structure parameter, 3 τ's averaged
138	CTQ	$gkg^{-1}Km^{-2/3}$	temperature humidity structure parameter, 3 τ's averaged
139	CQQ	$g^2kg^{-2}m^{-2/3}$	humidity structure parameter, 3 τ's averaged

Missing values: -9999

Appendix C. Calender

From and all primary measurements (channels 36-55 of Appendix B) a detailed survey is made of the availability of the 30 min data.
When measurements are available a + is noted, when they are not available a - is noted. E.g., if in column "08" and row "sonic velocity" a "-+" is noted, the sonic velocity is absent for the time interval 0810-0840 and present for 0840-0910.

C R A U 1 9 8 7

DATE : 1- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	++	++	++	++	++	++
SONIC T	--	--	--	--	--	--	--	--	--	-+	++	++	-+	++	++	--	-+	++	++	++	++	++	++	++
PT WIRE	--	--	--	--	--	--	--	--	-+	-+	++	--	-+	++	++	--	++	++	++	++	++	++	++	++
LY ALFA	--	--	--	--	--	--	--	--	-+	-+	+-	--	-+	++	++	--	++	++	+-	--	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	+-	--	--	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	+-	--	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	+-	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	+-	--	--	--	--	--
CUP LOW	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	+-	--	--	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	+-	--	--	--	--	--
CUP HIGH	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	+-	--	--	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	++	++	++	++	++	++
RH SCREEN	--	--	--	--	--	--	--	--	-+	--	++	++	-+	++	++	--	++	++	++	++	++	++	++	++
WIND SPEED 10 M	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	++	++	++	++	++	++
WIND DIR. 10 M	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	++	++	--	++	++	++	++	++	++	++	++
NET RADIATION	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	-+	++	--	++	++	+-	--	--	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	--	-+	-+	++	++	-+	-+	++	--	++	++	++	++	++	++	++	++
SURFACE TEMP.	--	--	--	--	--	--	--	--	-+	-+	--	+-	-+	++	++	--	++	++	++	++	++	++	++	++

C R A U 1 9 8 7

DATE : 2- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	++	++	++	++	++	++	++	-+	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
SONIC T	++	++	++	++	++	++	++	-+	--	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
PT WIRE	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	--	-+	+-	++	++	++	++	++	++	++	++	++	++	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
CUP LOW	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
CUP HIGH	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
TEMP. SCREEN	++	++	++	++	++	++	++	-+	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
RH SCREEN	++	++	++	++	++	++	++	-+	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
WIND SPEED 10 M	++	++	++	++	++	++	++	-+	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
WIND DIR. 10 M	++	++	++	++	++	++	++	-+	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
NET RADIATION	--	--	--	--	--	-+	++	-+	-+	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--
GLOB. RADIATION	++	++	++	++	++	++	++	-+	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--
SURFACE TEMP.	++	++	++	++	++	++	++	-+	-+	++	++	++	++	++	++	++	++	++	++	++	--	--	--	--

C R A U 1 9 8 7

DATE : 3- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
SONIC T	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
PT WIRE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
CUP LOW	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
CUP HIGH	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
RH SCREEN	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
WIND SPEED 10 M	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
WIND DIR. 10 M	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
NET RADIATION	--	--	--	--	--	--	--	--	--	--	--	--	--	-+	++	--	--	--	--	--	--	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--
SURFACE TEMP.	--	--	--	--	--	--	--	--	++	++	++	++	+-	-+	++	--	--	--	--	--	--	--	--	--

C R A U 1 9 8 7

DATE : 4- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
SONIC T	--	--	--	--	--	--	--	--	--	--	++	++	++	++	+-	++	--	--	--	--	--	--	--	--
PT WIRE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
CUP LOW	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
CUP HIGH	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
RH SCREEN	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
WIND SPEED 10 M	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
WIND DIR. 10 M	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
NET RADIATION	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--
SURFACE TEMP.	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--

C R A U 1 9 8 7

DATE : 5- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
SONIC T	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	++	++
PT WIRE	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
LY ALFA	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
PSYCHRUM T	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
PSYCHROM DD	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
PSYCHROM NN	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
PSYCHROM DN	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
CUP LOW	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
CUP MIDDLE	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
CUP HIGH	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
TEMP. SCREEN	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
RH SCREEN	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
WIND SPEED 10 M	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
WIND DIR. 10 M	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
NET RADIATION	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
GLOB. RADIATION	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++
SURFACE TEMP.	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	-+	++	++	++	++	++	++	++

C R A U 1 9 8 7

DATE : 6- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
SONIC T	++	++	++	++	++	++	++	-+	++	++	-+	++	++	++	++	+-	++	++	++	++	++	++	++	++
PT WIRE	++	+-	--	--	--	++	++	+-	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++
LY ALFA	++	+-	--	--	--	++	++	++	++	++	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
PSYCHROM T	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
PSYCHROM DD	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
PSYCHROM NN	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
PSYCHROM DN	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
CUP LOW	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
CUP MIDDLE	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
CUP HIGH	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
TEMP. SCREEN	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
RH SCREEN	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
WIND SPEED 10 M	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
WIND DIR. 10 M	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
NET RADIATION	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
GLOB. RADIATION	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
SURFACE TEMP.	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++

C R A U 1 9 8 7

DATE : 7- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SONIC T	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PT WIRE	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LY ALFA	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM T	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM DD	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM NN	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM DN	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CUP LOW	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CUP MIDDLE	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CUP HIGH	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
TEMP. SCREEN	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
RH SCREEN	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WIND SPEED 10 M	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
WIND DIR. 10 M	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
NET RADIATION	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GLOB. RADIATION	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
SURFACE TEMP.	++	++	++	++	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

C R A U 1 9 8 7

DATE : 8- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
SONIC T	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	-+	++	++	++	++	++	++	++
PT WIRE	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
PSYCHROM DD	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
PSYCHROM NN	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
PSYCHROM DN	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
CUP LOW	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
CUP MIDDLE	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
CUP HIGH	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
TEMP. SCREEN	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
RH SCREEN	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
WIND SPEED 10 M	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
WIND DIR. 10 M	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
NET RADIATION	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
GLOB. RADIATION	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++
SURFACE TEMP.	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	++

C R A U 1 9 8 7

DATE : 9- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
SONIC T	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
PT WIRE	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
PSYCHROM T	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
PSYCHROM DD	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
PSYCHROM NN	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
PSYCHROM DN	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
CUP LOW	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
CUP MIDDLE	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
CUP HIGH	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
TEMP. SCREEN	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
RH SCREEN	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
WIND SPEED 10 M	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
WIND DIR. 10 M	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
NET RADIATION	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
GLOB. RADIATION	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--
SURFACE TEMP.	++	++	++	++	++	++	++	+-	-+	++	++	++	++	++	+-	+-	--	--	--	--	--	--	--	--

C R A U 1 9 8 7

DATE : 10- 6-87
TIME :

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
SONIC T	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
PT WIRE	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
CUP LOW	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
CUP HIGH	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
RH SCREEN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
WIND SPEED 10 M	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
WIND DIR. 10 M	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
NET RADIATION	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--
SURFACE TEMP.	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--	--

C R A U 1 9 8 7

DATE : 11- 6-87
TIME :

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
SONIC T	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	--	--	--	--	--	--	--	--	--
PT WIRE	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	--	++	++	--	-+	++	++	--	--	--	--	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
CUP LOW	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
CUP HIGH	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
RH SCREEN	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
WIND SPEED 10 M	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
WIND DIR. 10 M	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
NET RADIATION	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--
SURFACE TEMP.	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	--	--	--	--	--	--	--	--	--

C R A U 1 9 8 7

DATE : 12- 6-87
TIME :

	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
SONIC T	--	--	--	--	--	--	--	-+	++	++	++	++	++	+-	++	++	-+	++	++	++	+-	--	--	--
PT WIRE	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
LY ALFA	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
CUP LOW	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
CUP HIGH	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
RH SCREEN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
WIND SPEED 10 M	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
WIND DIR. 10 M	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
NET RADIATION	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
SURFACE TEMP.	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--

C R A U 1 9 8 7

DATE : 17- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
SONIC T	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	--	--	--	--	--	--	--	--
PT WIRE	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	--	--	--	--	--	--	-+	++	++	+-	--	--	--	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	--	--	--	--	--	--	-+	++	++	+-	--	--	--	--	--	--	--
CUP LOW	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
CUP HIGH	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
RH SCREEN	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
WIND SPEED 10 M	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
WIND DIR. 10 M	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--
NET RADIATION	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	-+	+-	--	--	--	--	--	--	--
SURFACE TEMP.	--	--	--	--	--	--	--	--	--	-+	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--

C R A U 1 9 8 7

DATE : 18- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
SONIC T	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	-+	++	++	++	++	++	--	--	--	--
PT WIRE	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	--	--	--	-+	-+	++	++	++	++	++	++	++	++	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
CUP LOW	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
CUP HIGH	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
RH SCREEN	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
WIND SPEED 10 M	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
WIND DIR. 10 M	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--
NET RADIATION	--	--	--	--	--	--	--	--	--	--	-+	++	--	-+	++	++	++	++	++	++	--	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	--	--	--	-+	++	--	-+	++	++	++	++	++	++	--	--	--	--
SURFACE TEMP.	--	--	--	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	--	--	--	--

C R A U 1 9 8 7

DATE : 20- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
SONIC T	--	--	--	--	--	--	--	--	++	++	++	-+	++	++	++	++	+-	--	--	--	--	--	--	--
PT WIRE	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
LY ALFA	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
CUP LOW	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
CUP HIGH	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
RH SCREEN	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
WIND SPEED 10 M	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
WIND DIR. 10 M	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
NET RADIATION	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--
SURFACE TEMP.	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--

C R A U 1 9 8 7

DATE : 21- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
SONIC T	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	-+	++	++	++	++	++	+-	--	--	--
PT WIRE	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
LY ALFA	--	--	--	--	--	--	--	-+	--	--	+-	++	++	++	++	++	++	++	++	++	+-	--	--	--
PSYCHROM T	--	--	--	--	--	--	--	-+	--	--	+-	++	++	++	++	++	++	++	++	++	+-	--	--	--
PSYCHROM DD	--	--	--	--	--	--	--	-+	-+	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	-+	--	+-	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
CUP LOW	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
CUP MIDDLE	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
CUP HIGH	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
TEMP. SCREEN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
RH SCREEN	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
WIND SPEED 10 M	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
WIND DIR. 10 M	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--
NET RADIATION	--	--	--	--	--	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	+-	--	--	--
GLOB. RADIATION	--	--	--	--	--	--	--	-+	++	++	--	++	++	++	++	++	++	++	++	++	+-	--	--	--
SURFACE TEMP.	--	--	--	--	--	--	--	-+	++	++	++	++	++	++	++	++	++	++	++	++	+-	--	--	--

C R A U 1 9 8 7

DATE : 23- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
SONIC T	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
PT WIRE	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
LY ALFA	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	-+	++	++	++	++
PSYCHROM T	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	-+	++	++	++	++
PSYCHROM DD	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
PSYCHROM NN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM DN	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
CUP LOW	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
CUP MIDDLE	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
CUP HIGH	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
TEMP. SCREEN	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
RH SCREEN	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
WIND SPEED 10 M	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
WIND DIR. 10 M	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
NET RADIATION	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
GLOB. RADIATION	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
SURFACE TEMP.	--	--	--	--	--	--	--	--	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++

C R A U 1 9 8 7

DATE : 24- 6-87

TIME :	00	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	21	22	23
SONIC VELOCITY	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
SONIC T	++	++	++	++	+-	-+	+-	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
PT WIRE	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
LY ALFA	++	++	++	+-	+-	-+	++	++	++	++	+-	--	++	++	++	+-	--	--	--	--	--	--	--	--
PSYCHROM T	++	++	++	++	+-	-+	++	++	++	++	+-	--	++	++	++	+-	--	--	--	--	--	--	--	--
PSYCHROM DD	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
PSYCHROM NN	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
PSYCHROM DN	++	++	++	++	+-	-+	++	++	++	++	++	+-	++	++	++	+-	--	--	--	--	--	--	--	--
CUP LOW	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
CUP MIDDLE	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
CUP HIGH	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
TEMP. SCREEN	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
RH SCREEN	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
WIND SPEED 10 M	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
WIND DIR. 10 M	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
NET RADIATION	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
GLOB. RADIATION	++	++	++	++	+-	-+	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--
SURFACE TEMP.	++	++	++	-+	+-	--	++	++	++	++	++	++	++	++	++	+-	--	--	--	--	--	--	--	--