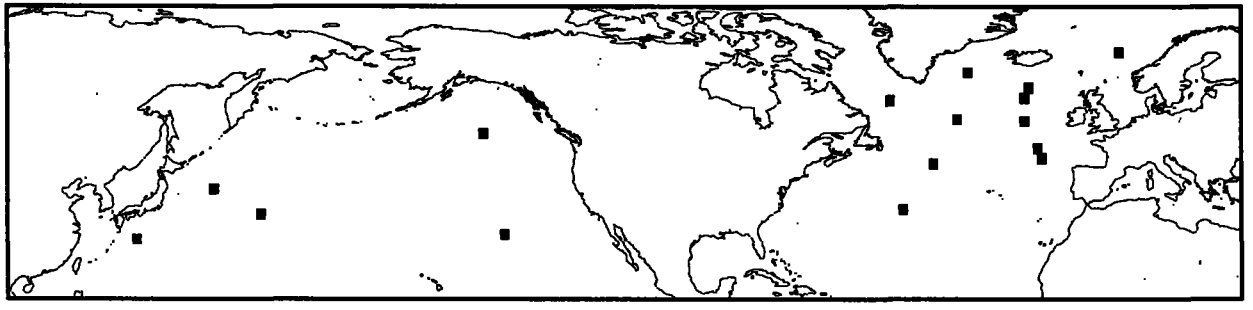

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Contents

Abstract

Surface and upper air climatological summaries for 16 Ocean Weather Stations (OWS) are presented. Periods of record for surface data vary from 7 years for OWS X to more than 30 years for OWS C, M, and P. OWS T operated primarily during the summer typhoon season (May to November). Valid upper air records are generally of equal or lesser duration than those taken at the surface. The interval of time covered extends from 1945 for the earliest starting OWS to 1982 for a few OWS, some of which are still operating. The purpose of this special report is to make available to the scientific community high-quality climatological data over generally fixed ocean areas for comparison with data from traveling merchant ships and for comparison with profiles derived from satellite observations. The basic data used for preparation of the summaries are available through either the National Center for Atmospheric Research in Boulder, Colorado or the National Climatic Data Center in Asheville, North Carolina.

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1. Introduction

The value of meteorological observations from fixed locations at sea had become evident by the 1930s when France and Germany established specially outfitted ships to assist aviation over the Atlantic (Roll, 1965). In the United States during World War II, Coast Guard or Navy vessels were assigned to approximately fixed locations designated as Ocean Weather Stations (OWS) for weather reporting, as well as search and rescue (Crutcher and Whiting, 1956). Starting about 1945, international agreements were made to maintain a network of OWS in the Northern Hemisphere Atlantic and Pacific Oceans. Eventually, stations were identified by a letter (A, B, etc.), or by the corresponding phonetic code in use at any given time (Able, Baker),* initially such that the Atlantic stations were chosen from the first 13 letters of the alphabet (A-M) and the Pacific stations from the others (N-X). Other than shifts in location during the 1940s and 1950s, a relatively stable set of about 13 OWS continued to operate until the mid-1970s (National Climatic Data Center, 1978). Although two Atlantic stations were added in 1975 (L and R), advances in remote sensing, aircraft performance, and other technology have rendered the OWS less important for weather forecasting or for rescue work; furthermore, economics have lead to closure of all but about four OWS operated by the USSR or European countries (Table 1).

Nevertheless, the weather observations (both surface and upper air) taken at these OWS comprise the best continuous records available over the world's oceans. They have been made by trained observers at essentially fixed locations, and they provide valuable climate information in regions where the only other data come from traveling ships, or, more recently, buoys (Hamilton, 1986). Although standard meteorological observations every 3 hours (surface) or twice a day (upper air), as well as some oceanographic data (e.g, from bathythermographs), have been used in numerous past studies for selected stations and weather variables (see Section 5), we lack a detailed summary of the meteorological conditions at each OWS over the available record.

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* These are earlier codes than those shown to the right of station letters in the Contents. All are from Crutcher and Whiting (1956) or the U.S. Naval Oceanographic Office (1968).

Table 1. The 16 OWS used for this study*

OWS	Assigned location	Study Area	Surface reports	Period of record Surface	Period of record Upper air	Approximate nationality	Status
A	62°00'N, 33°00'W	61.0°N–62.9°N, 33.9°W–32.0°W	67874	1945–73	1950–69	U.S./Netherlands/U.K.	
B	56°30'N, 51°00'W	55.5°N–57.4°N, 51.9°W–50.0°W	67593	1946–74	1950–74	U.S./Canada	
C	52°45'N, 35°30'W	51.8°N–53.7°N, 36.4°W–34.5°W	86486	1945–82	1950–73	U.S./USSR	X
D	44°00'N, 41°00'W	43.0°N–44.9°N, 41.9°W–40.0°W	65535	1945–73	1950–73	U.S.	
E	35°00'N, 48°00'W	34.0°N–35.9°N, 48.9°W–47.0°W	64451	1949–73	1950–73	U.S.	
I	59°00'N, 19°00'W	58.0°N–59.9°N, 19.9°W–18.0°W	59030	1950–75	1950–75	U.K.	
J	52°30'N, 20°00'W	51.5°N–53.4°N, 20.9°W–19.0°W	64233	1950–75	1950–75	U.K./Netherlands	
K	45°00'N, 16°00'W	44.0°N–45.9°N, 16.9°W–15.0°W	66519	1949–75	1950–75	Belgium/France/Netherlands	
L	57°00'N, 20°00'W	56.0°N–57.9°N, 20.9°W–19.0°W	18863	1975–82	1975–82	U.K.	X
M	66°00'N, 2°00'E	65.0°N–66.9°N, 1.0°E–2.9°E	80657	1949–82	1952–75	Norway/Sweden/Netherlands	X
N	30°00'N, 140°00'W	29.0°N–30.9°N, 140.9°W–139.0°W	66363	1946–74	1950–74	U.S.	
P	50°00'N, 145°00'W	49.0°N–50.9°N, 145.9°W–144.0°W	88330	1949–81	1950–81	U.S./Canada	
R	47°00'N, 17°00'W	46.0°N–47.9°N, 17.9°W–16.0°W	14478	1975–82	1975–82	France	X
T	29°00'N, 135°00'E	28.0°N–29.9°N, 134.0°E–135.9°E	36519	1948–81	1956–81	Japan	
V	34°00'N, 164°00'E	33.0°N–34.9°N, 163.0°E–164.9°E	47021	1955–71	1955–71	U.S.	
X	39°00'N, 153°00'E	38.0°N–39.9°N, 152.0°E–153.9°E	15623	1947–53	—	Japan	

* Each Study Area forms a 2° box centered, as nearly as possible, on the assigned location. The boundaries of each box, however, are governed by rules of inclusivity (see Appendix A) that effectively reduce the size of each Area by 0.1° of latitude and longitude. The number of surface reports and periods of record refer to the data available in the Study Area surrounding the assigned location. All of the stations except L, M, R, T, and X were subject to changes in assigned location (either within or outside the indicated period of record) from which, data were generally not used. Nationality of the operating country also changed for several OWS. See NCDC (1978) and Crutcher and Whiting (1956) for further details. The stations with *Status* marked (by an X) were operating recently (World Meteorological Organization, 1986).

This report presents climatic summaries of the annual and diurnal cycles, as well as the interannual variability, for 16 selected OWS operated during 1945-82 (Table 1).* Other OWS were not selected (Table 2) because of short or discontinuous periods of record. The Study Areas (see also Figure 1) are the same size (although not necessarily at the exact location) as the boxes used in summarizing global ship data in the Comprehensive Ocean-Atmosphere Data Set (COADS; Woodruff *et al.*, 1987). Section 2 gives details of the data sets, and Section 3 describes the format and constituents of each summary data plot. Appendices incorporate processing notes and additional technical material. The summaries follow in alphabetical order by OWS letter.

Table 2. OWS excluded from this study†

OWS	Available data type	Reason for exclusion
F	All obs	Data only for 11 months, between 1945 and 1949
G	All obs	Data only for June and July 1949
H	On station	Spotty seasonal data for 1970-74; extant data are irregular
O	All obs	Data only for 8 months, Dec. 1949-July 1950
Q	All obs	Data only for 2 years, 1952-53
S	All obs	Data only for Sept. 1950-Dec. 1953
U	All obs	Data only for Dec. 1950-Dec. 1953
Z	All obs	Z was an unofficial OWS operated, apparently, by South Africa in the Southern Hemisphere, and thus was considered outside the scope of this report

† See Crutcher and Whiting (1956) for information on earlier OWS data and additional minor stations.

* See Diaz *et al.* (1986) for preliminary summaries of station A.

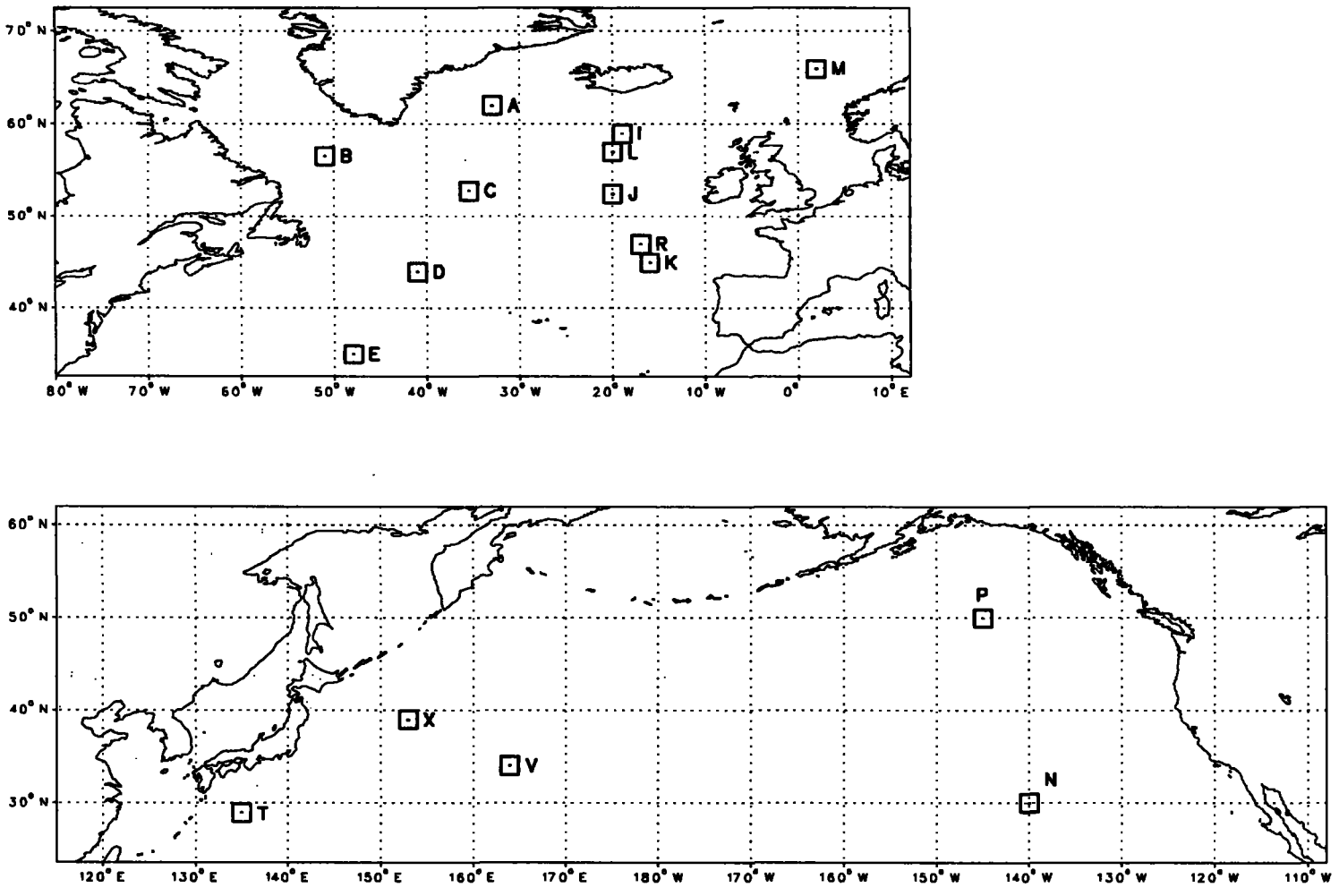

Figure 1. Ocean Weather Station Study Area Locations

2. Data

NOAA's National Climatic Data Center (NCDC) provided surface meteorological reports in its Ocean Station Vessel (OSV) upgrade (TD-1160), which combine all digital OSV ship reports already available at NCDC with data acquired specifically for TD-1160,* covering the period through 1982. TD-1160 is an edited version of these data from which most duplicate ship reports have been eliminated. The data set consists of two files:

On Station/Synoptic. This file is restricted to observations that were made "on station" and at standard 3-hourly synoptic times (00, 03, ..., 21 GMT). Generally, a report was said to be on station if it was within a 210 x 210 nautical mile box centered on the assigned OWS location (Crutcher and Whiting, 1956). The data from this file were found to be much cleaner than from the other file.

All Observations. This file contains all observations, whether taken on or off station and regardless of synoptic time. OSV could be off station when en route to and from the OWS location and when embarking on search and rescue missions. Stations T and X were found only in this file.

Appendix A details the procedures used to summarize the surface data.

NCAR's Data Support Section provided upper air data in the form of year-month summaries for the different stations. Two different data sets were combined in order to obtain the most complete coverage available at NCAR in year-month summaries. No upper air data were identified in either data set for station X.

Climats. The primary source was a set of world monthly mean rawinsonde data taken from "Climat temp" reports (Jenne and Crutcher, 1976). Quality con-

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* According to NCDC, additional data from the U.K. Meteorological Office would be useful for filling gaps in stations C, L, M, and R. Also, some U.S. data for B, H, and N may be recoverable from original manuscripts.

trol flags that formed a part of the data set were used selectively to eliminate erroneous year-months.

NCAR Raobs. Gaps in Climats data were sometimes filled using this alternate set of primarily U.S. data assembled at NCAR (Spangler and Jenne, 1986). Separate year-month summaries for 00 GMT and 12 GMT were averaged together to obtain a combined mean for these few gaps. Dew point temperature is not available from this data set.

Appendix B details the procedures used to summarize the upper air data.

3. Description of summaries

For each OWS an introductory page gives the station location and the period of record for surface data. The following 17 pages show the frequency of surface observations, and the climatology and monthly anomalies for both surface and upper air data (Appendices A and B precisely define the plotted values). Isopleths (always referred to as contours) were added where appropriate.* The following describes each of the 17 summaries (pages), for each OWS:

No. 1: Frequency of Surface Observations. This gives the number of days per year-month with surface observations, as well as long-term monthly and annual sums. Since some ship reports were incomplete, the maximum and minimum frequency from among all the variables are plotted.

No. 2: Surface Climatology. These are period-of-record averages by (3-hourly) synoptic time (GMT on the left, local time on the right). The dashed lines separate nighttime from daytime hours. The upper left panel shows mean vector wind and contours of wind steadiness in percent (as defined in Appendix A). Sea level pressure is shown in the upper right panel, total cloudiness in the lower left, and percentage frequency of observations reporting precipitation in the lower right (contoured).

No. 3: Surface Climatology (continued). Plots similar to No. 2 show air temperature (AT), dew point depression with contours (dew point may be approximated by subtracting this from the corresponding value of mean AT), sea surface temperature (SST), and SST minus AT with contours.

No. 4: Anomalies of Surface Air Temperature. The anomalies of each year-month with respect to the period-of-record monthly long-term mean (LTM) are

* Contours were smoothed (by piece-wise application of a spline) to avoid jagged lines. Intervals may vary from station to station, depending on the magnitude of the variable gradients, in order to improve presentation of patterns. When patterns are incoherent, contours are not shown.

plotted, together with the corresponding long-term standard deviation (SD), and annual anomalies (Ann) calculated only if observations were made for at least 6 months in a given year.

No. 5: Anomalies of Surface Dew Point Depression. Similar to No. 4.

No. 6: Anomalies of Sea Surface Temperature. Similar to No. 4.

No. 7: Anomalies of Sea - Air Temperature Difference. Similar to No. 4.

No. 8: Anomalies of Surface Scalar Wind. Similar to No. 4.

No. 9: Anomalies of Sea Level Pressure. Similar to No. 4.

No. 10: Anomalies of Total Cloudiness. Similar to No. 4.

No. 11: Anomalies of Precipitation Frequency. Similar to No. 4.

No. 12: Upper Air Climatology. These are period-of-record means of the monthly means of twice-daily (generally) rawinsondes of wind, dew point temperature, air temperature, and pressure height. Values are plotted for selected pressure surfaces (left scales) at their mean geopotential height (right scales). The pressure labels on the left are positioned at the annual mean of the 12 monthly heights.

No. 13: Anomalies of Air Temperature: 700 mb. Similar to No. 4.

No. 14: Anomalies of Air Temperature: 500 mb. Similar to No. 4.

No. 15: Anomalies of Air Temperature: 200 mb. Similar to No. 4.

No. 16: Anomalies of Dew Point Temperature: 700 mb. Similar to No. 4.

No. 17: Anomalies of Dew Point Temperature: 500 mb. Similar to No. 4.

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Appendix A. Surface data

A1. Variables

Observations (or measurements) were generally made every 3 hours of wind (speed and direction), sea level pressure, total cloudiness, present weather, air temperature, dew point (or wet bulb) temperature, and sea surface temperature. Other variables such as wave and swell fields were also observed (see Slutz *et al.*, 1985; hereafter *Release 1*), but were not used in this report.

In initial processing, wind observations were separated into their eastward and northward vector components (u and v) and dew point was subtracted from air temperature to yield dew point depression. Further variables were derived as follows (where, e.g., $\overline{u}$ indicates the monthly mean of all observations of u):

Wind steadiness. For each year-month, wind steadiness is a percentage calculated as

$$\frac{\sqrt{\overline{u}^2 + \overline{v}^2}}{\overline{w}} \times 100,$$

where $\overline{w}$ is the mean scalar wind speed (with $w = \sqrt{u^2 + v^2}$). If $\overline{u}$ and $\overline{v}$ are missing or $\overline{w}$ is 0, wind steadiness is missing.

Total cloudiness. Individual observations of total cloud amount are estimated in oktas from 0-8; an additional value (stored as 9) denotes the sky was obscured or the cloud amount could not be estimated. The monthly mean is the mean of all observations between 0 and 8 oktas inclusive. Observations with a value of 9 are considered to be missing.

Precipitation frequency. For each year-month, the precipitation frequency is a percentage calculated from present weather as

$$\frac{\text{the number of reports of precipitation events}}{\text{the total number of reports of present weather}} \times 100,$$

where a precipitation event is defined as any precipitation occurring at the OWS at time of observation or within the hour preceding the observation.*

A2. Plotted quantities

Surface Climatology. For each synoptic hour and month, the mean $\bar{x}$ and standard deviation σ of all individual observations were plotted.

The sunrise/sunset lines on the climatology plots are based on the position of the sun at the middle of each month at the latitude and longitude of the center of the COADS 2° box nearest the center of each Study Area. Each synoptic hour was considered to be in either daylight or darkness. For graphic clarity, the sunrise/sunset line was always plotted midway between synoptic hours even though the actual time may differ. For the method of calculation used for determining local daylight and darkness, see *Release 1.*

Anomalies. For each of m months j, and n years i, the anomaly $\Delta\bar{x}_{ij}$ is plotted, where $\bar{x}_{ij}$ is the mean of all individual observations for all synoptic hours of a given year-month:

$$\Delta\bar{x}_{ij} = \bar{x}_{ij} - \bar{X}_j \ ,$$

where

$$\bar{X}_j = \frac{1}{n}\left(\sum_{i=1}^{n} \bar{x}_{ij}\right) .$$

---

* Present-weather codes of 20-29 and 50-99 inclusive were considered as precipitation; see *Release 1.*

Long-term monthly means $\overline{X}_j$ are plotted as the upper numbers (Roman) of each pair in the column labeled "LTM"; the "Ann" row of that column contains the following annual LTM (upper number):

$$\overline{\overline{X}} = \frac{1}{m}\left(\sum_{j=1}^{m} \overline{X}_j \right)$$

Annual means of anomalies, $\overline{\Delta\bar{x}_i}$, are computed only if there are $m > 6$ months for a given year, as follows:

$$\overline{\Delta\bar{x}_i} = \frac{1}{m}\left(\sum_{j=1}^{m} \Delta\bar{x}_{ij} \right)$$

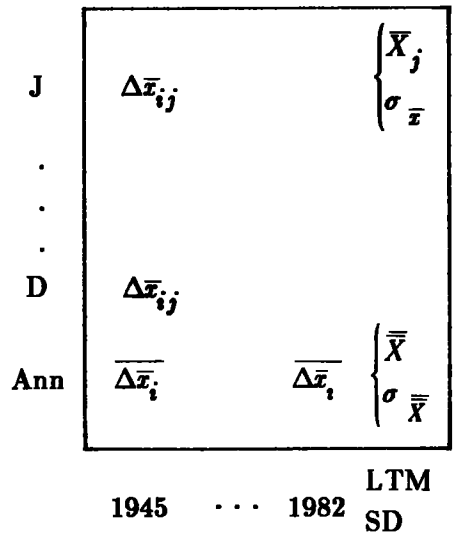
The standard deviation (SD) of the n $\bar{x}_{ij}$ about each $\overline{X}_j$ is

$$\sigma_{\bar{x}} = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} \Delta\bar{x}_{ij}^{2}} \quad ,$$

and, letting N represent the number of $\overline{\Delta\bar{x}_i}$ (i.e., years with $m > 6$), a corresponding standard deviation about $\overline{\overline{X}}$ is

$$\sigma_{\overline{\overline{X}}} = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N} \overline{\Delta\bar{x}_i}^{2}} \quad ,$$

where $\sigma_{\overline{X}}$ and $\sigma_{\overline{\overline{X}}}$ are plotted in italics beneath each $\overline{X}_j$ and $\overline{\overline{X}}$, respectively. Thus, the layout is the following:



A3. Processing

Surface data were processed from individual reports supplied by NCDC in its 148-character TD-1129 format (NCDC, 1986). To reduce the volume of data, the data were converted to the COADS format for Compressed Marine Reports (CMR) as described in Woodruff and Lubker (1986).* COADS trimming limits

* The conversion for TD-1129 into CMR differed from that described, but only as follows: Only a blank bucket indicator (BI) was considered to represent missing. BI of B or 0 were considered to represent bucket, and any other character was accepted as unknown. Wind observations were rejected under two more stringent conditions: (1) if observations resulting in $u = v = 0$ had a direction indicator (DI) of "-", or (2) if wind direction in conjunction with DI had an undefined conversion according to Table F2-1 of *Release 1.* These more stringent tests for validity may have caused some calm wind observations to be rejected. Ship type (ST) was set to 3 or 2 depending only on whether the input file was On Station or All Observations, respectively (TD-1129 positions 91-97, instead of 146, were used for input inventory purposes).

derived from 1950-79 data were used to flag statistical outliers in each CMR of sea surface temperature, air temperature, wind, sea level pressure, and relative humidity. Each flag was set to 0, 1, or 2 depending on how an individual observation x compared with its limits:*

0 if $g - 2.8\sigma_1 \le x \le g + 2.8\sigma_5$ (narrow interval), or
1 if $g - 3.5\sigma_1 \le x \le g + 3.5\sigma_5$ (but not within the narrow interval), or
2 if $x < g - 3.5\sigma_1$ or $x > g + 3.5\sigma_5$,

where g is the smoothed median for the COADS 2° box and the month of x, and σ_1 and σ_5 are the corresponding smoothed (possibly asymmetric) estimates of the standard deviation derived from the first and fifth sextiles of the data distribution. If, however, the variable itself was missing or the smoothed limits were missing, the flag was set to missing. For the computation of the smoothed limits and the method of setting flags, see *Release 1.*

Each report in this initial flagged set of CMR data was then filtered by its geographic location for inclusion in a Study Area. Any report not located within a Study Area (Table 1) was rejected. A report on a boundary of a Study Area was included if its location is on the edge closest to either the Equator or the Prime Meridian (see *Release 1*). These edges are the inclusive edges of the Study Area. Reports located on the other two edges were not included. Specifically, the inclusive edges of Study Areas in the Eastern Hemisphere (M, T, X, and V) are the western and southern sides. For the Western Hemisphere (all other Study Areas) the inclusive edges are the eastern and southern sides.

Reports located within a Study Area but recorded during dates when a given OWS was not in existence (see Table 1) were excluded from the summaries. Similarly, reports thought to be spurious because the the assigned location of the OWS at that time was not the center of the Study Area were usually excluded. In these cases, the final determination was based on the number of reports made during

* For wind, flagging was set at the maximum flag value found for separate tests of u and v. The relative humidity flag, dependent on both air and dew point temperatures, was used to later edit dew point values.

the questionable times: if only a few reports were made, all reports for those times were rejected. Table A1 lists the times and the number of reports rejected per OWS.

Table A1. Surface reports removed for periods when an OWS was not in operation or when the OWS was not assigned to the center of the Study Area

OWS	Reports removed		No. of reports removed
	Before	After	
A	Dec. 1945	Dec. 1973	236
I	Mar. 1950	Jun. 1975	757
J	Mar. 1950	—	36
K	—	Jun. 1975	8
L	Jul. 1975	—	8
P	Dec. 1949	—	1
R	Jul. 1975	—	25
V	—	Dec. 1971	112

In OWS T, 104 reports were excluded because they were not made on the usual synoptic hours 00, 03, 06, 12, 15, 18, or 21 GMT.

Some observations of present weather (Table A2) were subjectively removed from the data set. During early years some stations tended to record fewer present-weather observations, and the ones recorded were biased toward precipitation. As a result, precipitation frequency showed a sharp increase for these periods.

Table A2. Biased present-weather observations removed from surface reports

OWS	Present weather removed before	No. of reports changed
A	Jan. 1947	2317*
T	Jan. 1949	318†
X	Jan. 1949	2431

* Present weather was removed from these reports before entire reports made prior to December 1945 were removed for A (see Table A1).
† Present weather was removed from these reports before entire reports were removed from T because they were not made on 3-hourly intervals.

Duplicate reports were discovered and eliminated from five stations after the aforementioned processing (Table A3). Reports were considered duplicates if they had identical year, month, day, and hour. Latitude and longitude were ignored in this determination, but turned out to be equal in all duplicate matches except those for stations C, I, and J. Once two (or more) duplicates were identified, a single report was selected for retention as the best duplicate based on the following rules:

a) The report with the lowest trimming code (sum of the trimming flag values, CMR fields 30-34) was retained, where a missing variable caused a 2 (equal to the value flagging data outside the 3.5σ trimming limits) to be entered in place of the actual missing flag value in this calculation.

b) In the event the trimming codes of duplicate reports were equal, the report from the preferred deck (see Table A3) was retained; or, if the the decks were also equal, the first report in sequence was retained.

Each flagged variable from a given report was used in the summaries only if its flag is 0 or 1. If its flag is 2, the variable was excluded from the summaries. Total cloudiness and present weather have no flag fields, so they were always accepted if legitimately coded. Table A4 shows the number of observations (NOBS) at each flag level for the five flagged variables for each Study Area. The percentage trimmed at the 3.5σ level is

$$\frac{\text{NOBS with Flag} = 2}{(\text{NOBS with Flag} = 0) + (\text{NOBS with Flag} = 1) + (\text{NOBS with Flag} = 2)} \times 100.$$

Table A3. Duplicate elimination and deck structure*

	INPUT		OUTPUT			
			Non-duplicates		Duplicates	
Deck	No. reports	Years	No. reports	Years	No. reports	Years
			OWS A			
116	23692	1945–1955	23692	1945–1955	0	–
117	43	1952–1954	43	1952–1954	0	–
128	26622	1950–1971	26622	1950–1971	0	–
184	15318	1956–1961	15318	1956–1961	0	–
555	1197	1971–1973	1197	1971–1973	0	–
888	103	1973–1973	103	1973–1973	0	–
927	899	1972–1973	899	1972–1973	0	–
Total	67874		67874		0	

Table A3. Duplicate elimination and deck structure* (continued)

	INPUT		OUTPUT			
			Non-duplicates		Duplicates	
Deck	No. reports	Years	No. reports	Years	No. reports	Years
			OWS B			
116	40166	1946–1963	40166	1946–1963	0	–
117	412	1952–1964	412	1952–1964	0	–
128	25937	1963–1972	25937	1963–1972	0	–
555	559	1973–1973	559	1973–1973	0	–
888	519	1973–1974	519	1973–1974	0	–
Total	67593		67593		0	
			OWS C			
116	48282	1945–1963	48282	1945–1963	0	–
117	425	1952–1963	425	1952–1963	0	–
128	27644	1963–1973	27644	1963–1973	0	–
555	1	1972–1972	0	–	1	1972–1972
849	2587	1978–1979	2587	1978–1979	0	–
888	15	1980–1980	15	1980–1980	0	–
890	7533	1980–1982	7533	1980–1982	0	–
Total	86487		86486		1	

Table A3. Duplicate elimination and deck structure* (continued)

Deck	INPUT		OUTPUT			
			Non-duplicates		Duplicates	
	No. reports	Years	No. reports	Years	No. reports	Years
			OWS D			
116	39369	1945–1963	39369	1945–1963	0	–
117	297	1952–1964	297	1952–1964	0	–
128	25422	1963–1972	25422	1963–1972	0	–
555	384	1971–1973	383	1973–1973	1	1971–1971
888	64	1973–1973	64	1973–1973	0	–
Total	65536		65535		1	
			OWS E			
116	38541	1949–1963	38541	1949–1963	0	–
117	209	1952–1964	209	1952–1964	0	–
128	25701	1963–1973	25701	1963–1973	0	–
Total	64451		64451		0	
			OWS I			
116	3346	1950–1951	3346	1950–1951	0	–
128	27047	1962–1971	27047	1962–1971	0	–
184	19969	1953–1961	19969	1953–1961	0	–
194	1954	1952–1952	1954	1952–1952	0	–
555	2223	1970–1973	2222	1972–1973	1	1970–1970
888	507	1973–1974	507	1973–1974	0	–
927	3985	1972–1975	3985	1972–1975	0	–
Total	59031		59030		1	

Table A3. Duplicate elimination and deck structure* (continued)

Deck	INPUT No. reports	INPUT Years	OUTPUT Non-duplicates No. reports	OUTPUT Non-duplicates Years	OUTPUT Duplicates No. reports	OUTPUT Duplicates Years
			OWS J			
116	4346	1950–1951	4346	1950–1951	0	–
128	27062	1962–1971	27062	1962–1971	0	–
184	23084	1953–1961	23084	1953–1961	0	–
194	2055	1952–1952	2055	1952–1952	0	–
555	2621	1971–1973	2621	1971–1973	0	–
888	996	1973–1974	995	1973–1974	1	1974–1974
927	4070	1972–1975	4070	1972–1975	0	–
Total	64234		64233		1	
			OWS K			
116	37231	1949–1962	37231	1949–1962	0	–
128	21125	1963–1970	21125	1963–1970	0	–
555	2886	1971–1973	2886	1971–1973	0	–
888	597	1973–1974	597	1973–1974	0	–
927	4680	1971–1975	4680	1971–1975	0	–
Total	66519		66519		0	
			OWS L			
849	332	1978–1979	332	1978–1979	0	–
888	5111	1978–1981	5111	1978–1981	0	–
890	6712	1980–1982	6712	1980–1982	0	–
927	6708	1975–1979	6708	1975–1979	0	–
Total	18863		18863		0	

Table A3. Duplicate elimination and deck structure* (continued)

	INPUT		OUTPUT			
			Non-duplicates		Duplicates	
Deck	No. reports	Years	No. reports	Years	No. reports	Years
			OWS M			
116	27599	1949–1959	27599	1949–1959	0	–
128	30769	1959–1970	30769	1959–1970	0	–
555	2433	1971–1973	2433	1971–1973	0	–
849	188	1978–1979	188	1978–1979	0	–
888	7434	1973–1981	7434	1973–1981	0	–
890	5471	1980–1982	5471	1980–1982	0	–
927	6763	1971–1977	6763	1971–1977	0	–
Total	80657		80657		0	
			OWS N			
116	39074	1946–1963	39074	1946–1963	0	–
117	486	1954–1964	486	1954–1964	0	–
128	25820	1963–1972	25820	1963–1972	0	–
555	598	1973–1973	598	1973–1973	0	–
888	385	1973–1974	385	1973–1974	0	–
Total	66363		66363		0	
			OWS P			
116	36819	1949–1962	36819	1949–1962	0	–
128	31114	1963–1973	31114	1963–1973	0	–
926	20804	1974–1981	20196	1974–1981	608	1978–1980
927	203	1978–1979	201	1978–1979	2	1979–1979
Total	88940		88330		610	

Table A3. Duplicate elimination and deck structure* (continued)

	INPUT		OUTPUT			
			Non-duplicates		Duplicates	
Deck	No. reports	Years	No. reports	Years	No. reports	Years
			OWS R			
849	213	1978–1979	213	1978–1979	0	–
888	6434	1978–1981	6434	1978–1981	0	–
890	6533	1980–1982	6533	1980–1982	0	–
927	1298	1975–1976	1298	1975–1976	0	–
Total	14478		14478		0	
			OWS T			
116	21845	1948–1962	21845	1948–1962	0	–
119	246	1955–1959	246	1955–1959	0	–
128	9817	1963–1970	9817	1963–1970	0	–
849	506	1979–1979	506	1979–1979	0	–
888	2035	1978–1981	2035	1978–1981	0	–
890	2070	1980–1981	2070	1980–1981	0	–
Total	36519		36519		0	
			OWS V			
116	23385	1955–1963	23385	1955–1963	0	–
117	343	1955–1964	343	1955–1964	0	–
128	23293	1963–1971	23293	1963–1971	0	–
Total	47021		47021		0	

Table A3. Duplicate elimination and deck structure* (continued)

	INPUT		OUTPUT			
			Non-duplicates		Duplicates	
Deck	No. reports	Years	No. reports	Years	No. reports	Years
			OWS X			
116	15623	1947–1953	15623	1947–1953	0	–
Total	15623		15623		0	

* Source deck (CMR field 28) numbers were assigned as follows by NCDC (from *Release 1* Table F1-1, except for deck 890):

116	U.S. Merchant Marine
117	U.S. Navy Hourlies
119	Japanese Ships No. 2
128	International Marine (U.S. recruited ships punched in-house)
184	Great Britain Marine (194 Extension)
194	Great Britain Marine
555	Monterey Telecom.
849	FGGE (First GARP Global Experiment)
888	GWC (U.S. Air Force Global Weather Central)
890	NOAA National Meteorological Center
926	International Maritime Meteorological (IMM) Exchange
927	International Marine (U.S. recruited ships punched in-house)

Decks 555, 849, 888, and 890 were from the Global Telecommunication System (GTS). For duplicate elimination, the preferred deck had the highest non-GTS number; or, among strictly GTS reports, the highest number.

Table A4. Surface trimming performance*

	SST	AT	RH	WIND	SLP
			OWS A		
Flag = 0 (within ∓2.8σ):	66435	67460	58233	66695	67319
Flag = 1 (within ∓3.5σ):	588	255	5979	947	456
Flag = 2 (outside ∓3.5σ):	132	68	38	149	50
Missing variable:	719	91	3561	83	49
RH not valid:			63		
Percent trimmed at 3.5σ:	0.2%	0.1%	0.1%	0.2%	0.1%
			OWS B		
Flag = 0 (within ∓2.8σ):	66295	67126	59683	65351	66414
Flag = 1 (within ∓3.5σ):	799	298	7160	1701	820
Flag = 2 (outside ∓3.5σ):	294	103	52	387	247
Missing variable:	205	66	599	154	112
RH not valid:			99		
Percent trimmed at 3.5σ:	0.4%	0.2%	0.1%	0.6%	0.4%
			OWS C		
Flag = 0 (within ∓2.8σ):	85222	86139	76202	85147	85930
Flag = 1 (within ∓3.5σ):	906	278	9952	978	437
Flag = 2 (outside ∓3.5σ):	207	43	9	202	90
Missing variable:	151	26	284	159	29
RH not valid:			39		
Percent trimmed at 3.5σ:	0.2%	0.0%	0.0%	0.2%	0.1%

Table A4. Surface trimming performance* (continued)

	SST	AT	RH	WIND	SLP
			OWS D		
Flag = 0 (within ∓2.8σ):	64535	65491	62634	64445	65309
Flag = 1 (within ∓3.5σ):	837	32	2870	809	187
Flag = 2 (outside ∓3.5σ):	105		3	142	32
Missing variable:	58	12	28	139	7
RH not valid:					
Percent trimmed at 3.5σ:	0.2%	0.0%	0.0%	0.2%	0.0%
			OWS E		
Flag = 0 (within ∓2.8σ):	63794	64154	63314	63378	63989
Flag = 1 (within ∓3.5σ):	466	252	1042	805	391
Flag = 2 (outside ∓3.5σ):	89	33	3	156	66
Missing variable:	102	12	59	112	5
RH not valid:			33		
Percent trimmed at 3.5σ:	0.1%	0.1%	0.0%	0.2%	0.1%
			OWS I		
Flag = 0 (within ∓2.8σ):	58791	58655	53867	58358	58663
Flag = 1 (within ∓3.5σ):	59	293	5020	539	284
Flag = 2 (outside ∓3.5σ):	15	59	3	75	62
Missing variable:	165	23	85	58	21
RH not valid:			55		
Percent trimmed at 3.5σ:	0.0%	0.1%	0.0%	0.1%	0.1%

Table A4. Surface trimming performance* (continued)

	SST	AT	RH	WIND	SLP
			OWS J		
Flag = 0 (within ∓2.8σ):	63994	63868	56844	63555	63770
Flag = 1 (within ∓3.5σ):	174	263	6618	519	257
Flag = 2 (outside ∓3.5σ):	18	46	2	62	50
Missing variable:	47	56	726	97	156
RH not valid:			43		
Percent trimmed at 3.5σ:	0.0%	0.1%	0.0%	0.1%	0.1%
			OWS K		
Flag = 0 (within ∓2.8σ):	63741	66117	60985	65253	66099
Flag = 1 (within ∓3.5σ):	93	275	4193	948	338
Flag = 2 (outside ∓3.5σ):	39	38	5	166	75
Missing variable:	2646	89	1299	152	7
RH not valid:			37		
Percent trimmed at 3.5σ:	0.1%	0.1%	0.0%	0.3%	0.1%
			OWS L		
Flag = 0 (within ∓2.8σ):	18639	18733	16469	18649	18779
Flag = 1 (within ∓3.5σ):	2	94	1790	188	65
Flag = 2 (outside ∓3.5σ):	9	31	7	19	8
Missing variable:	213	5	575	7	11
RH not valid:			22		
Percent trimmed at 3.5σ:	0.0%	0.2%	0.0%	0.1%	0.0%

Table A4. Surface trimming performance* (continued)

	SST	AT	RH	WIND	SLP
			OWS M		
Flag = 0 (within ∓2.8σ):	79442	79630	72728	79680	79809
Flag = 1 (within ∓3.5σ):	771	439	3874	793	654
Flag = 2 (outside ∓3.5σ):	177	94	23	77	129
Missing variable:	267	494	3952	107	65
RH not valid:			80		
Percent trimmed at 3.5σ:	0.2%	0.1%	0.0%	0.1%	0.2%
			OWS N		
Flag = 0 (within ∓2.8σ):	65142	66246	65332	65436	66008
Flag = 1 (within ∓3.5σ):	134	85	867	626	282
Flag = 2 (outside ∓3.5σ):	39	18	6	142	53
Missing variable:	1048	14	141	159	20
RH not valid:			17		
Percent trimmed at 3.5σ:	0.1%	0.0%	0.0%	0.2%	0.1%
			OWS P		
Flag = 0 (within ∓2.8σ):	88245	88109	73921	86543	87469
Flag = 1 (within ∓3.5σ):	9	169	14043	1405	432
Flag = 2 (outside ∓3.5σ):	1	50	13	307	82
Missing variable:	75	2	303	75	347
RH not valid:			50		
Percent trimmed at 3.5σ:	0.0%	0.1%	0.0%	0.3%	0.1%

Table A4. Surface trimming performance* (continued)

	SST	AT	RH	WIND	SLP
			OWS R		
Flag = 0 (within ∓2.8σ):	14380	14381	12486	14355	14371
Flag = 1 (within ∓3.5σ):	5	57	1597	104	82
Flag = 2 (outside ∓3.5σ):	14	37		12	20
Missing variable:	79	3	369	7	5
RH not valid:			26		
Percent trimmed at 3.5σ:	0.1%	0.3%	0.0%	0.1%	0.1%
			OWS T		
Flag = 0 (within ∓2.8σ):	36388	36344	23824	35715	36243
Flag = 1 (within ∓3.5σ):	44	103	740	582	179
Flag = 2 (outside ∓3.5σ):	36	47	13	149	87
Missing variable:	51	25	11922	73	10
RH not valid:			20		
Percent trimmed at 3.5σ:	0.1%	0.1%	0.1%	0.4%	0.2%
			OWS V		
Flag = 0 (within ∓2.8σ):	46823	47003	44863	46560	46826
Flag = 1 (within ∓3.5σ):	152	6	2017	229	157
Flag = 2 (outside ∓3.5σ):	6			34	34
Missing variable:	40	12	141	198	4
RH not valid:					
Percent trimmed at 3.5σ:	0.0%	0.0%	0.0%	0.1%	0.1%

Table A4. Surface trimming performance* (continued)

	SST	AT	RH	WIND	SLP
		OWS X			
Flag = 0 (within ∓2.8σ):	15321	15565	5788	15230	15508
Flag = 1 (within ∓3.5σ):	122	13	635	314	75
Flag = 2 (outside ∓3.5σ):	57	7	4	70	35
Missing variable:	123	38	9192	9	5
RH not valid:			4		
Percent trimmed at 3.5σ:	0.4%	0.0%	0.1%	0.4%	0.2%

* The number of observations is shown for each of the five flagged variables (SST = sea surface temperature; AT = air temperature; RH = relative humidity; WIND = *u*, *v*, and derived *w*, jointly; SLP = sea level pressure) for each Study Area. Although relative humidity was not calculated, its flag was used to trim dew point depression. For relative humidity, the number for ***Missing variable*** is actually the number of missing dew point observations and the number for ***RH not valid*** is the number of reports with extant dew point and air temperature flagged as 2 (inadvertently included in the summaries).

Appendix B. Upper air data

B1. Variables

Upper air soundings of wind, humidity, temperature, and geopotential height were typically made twice daily (00 GMT and 12 GMT) at standard isobaric surfaces (1000 mb, 850 mb, 700 mb, 500 mb, 300 mb, 200 mb, 150 mb, and 100 mb). Both data sets used (see Section 2) contain already-calculated year-month summaries. Climats consists of year-month summaries from different countries for which, in general, the number and time of soundings constituting the year-month were not available. NCAR Raobs has separate summaries for 00 GMT and 12 GMT. Climats has summaries for dew point temperature whereas NCAR Raobs has mixing ratio (unused in this report). NCAR Raobs has summaries of the eastward and northward components of vector wind ($\bar{u}$ and $\bar{v}$) whereas Climats has summaries for vector mean speed and direction, which were converted back to $\bar{u}$ and $\bar{v}$.

B2. Plotted quantities

Upper Air Climatology. The quantities of the upper air climatology plot were calculated in the same way as the surface climatology plots (Appendix A). For each pressure surface and month, the period-of-record mean of each variable is plotted at the mean geopotential height for that pressure surface and month. The pressure labels on the left are plotted at the mean height across the 12 months.

Anomalies. The quantities of the upper air anomaly plots are calculated by the same method as the surface anomaly plots (see Appendix A).

B3. Processing

Climats contains some status codes (Jenne and Crutcher, 1976) to flag wild or inconsistent data. Report status codes from the hydrostatic check of height and temperature (applied by NCAR only through 1974) were checked. Any year-month reports with status codes of 9 or 11 had missing data substituted for all

variables. Some stations had two or more reports with identical dates. In all cases, only one of these duplicate reports had valid data and was retained; the remainder had a report status code of 10 and were eliminated. Report wind status codes were also checked, and any report with a status code of 3 had missing data substituted for the resultant $\bar{u}$ and $\bar{v}$ at all levels. The report hour code, which may indicate the hour or combination of hours used starting in 1967, was ignored.

Climats was the primary source of monthly means used in the summaries. NCAR Raobs was used to fill gaps in the Climats data. The merging of the data sets was done such that all the data for any year-month are entirely from one data set or the other. To help ensure against erroneous upper air data for times when the OWS moved outside the Study Area, etc., the merged upper air data were compared for time correspondence with the surface data, as shown in the Frequency of Observations plots (plot No. 1 for each OWS). Upper air data for year-months in which there were no surface data were rejected.

Climats was chosen to be the primary data set because of its longer period of record. Since NCAR Raobs consists of separate year-month summaries for the hours 00Z and 12Z, these hours were averaged to form a single year-month mean for each variable (except dew point temperature, which was not available from NCAR Raobs). The combined mean was then used to fill in the gaps in Climats where possible. Figure B1 shows the data set used for each year-month for each Study Area.

Early processing of the merged upper air data showed, however, that not all wild values were flagged in the Climats data. Also, flags were not available in NCAR Raobs. Hence, the new upper air data were trimmed in a manner similar (although not identical to) the surface data. For each OWS, the period of record median and sextiles (as defined in *Release 1*) were taken for each variable at each pressure (including the geopotential height of each pressure surface). The monthly data were then trimmed so that all remaining data met the condition

$$g - 3.5\sigma \leq \bar{x} \leq g + 3.5\sigma$$

where, here, g is the period-of-record median of a given variable at a given pressure, σ is the estimated standard deviation, and $\bar{x}$ is the monthly mean of the var-

iable at the pressure under consideration. The estimated standard deviation is computed as

$$\sigma = \frac{\sigma_5 - \sigma_1}{2}$$

where σ_5 and σ_1 are the fifth and first sextiles, respectively, of the data distribution. Thus the upper air data were trimmed using symmetric limits about g whereas the surface data were trimmed using possibly asymmetric limits.

Table B1 shows the number of year-months trimmed from the summaries (Trim) and the number used in the summaries (Rem, for remaining) for each Study Area. Since the upper air data consist only of monthly means, trimming resulted in the loss of entire year-months for the trimmed variables at individual pressure surfaces. All five variables—air temperature, dew point temperature, u and v wind, and pressure height—were subject to trimming at all pressure surfaces.

Period-of-record means were then made from the trimmed monthly data, and monthly anomalies of the trimmed data were made from these trimmed means. The trimmed means and anomalies constitute the data shown in all of the upper air summary plots.

Table B1. Upper air trimming performance*

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Total		
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	%Trim
						OWS A							
100 mb	4	156		2	1	138	2	137	4	156	11	589	1.8%
150 mb	2	159		2	2	139	2	139	3	158	9	597	1.5%
200 mb	3	217		2	1	145	2	144	3	217	9	725	1.2%
300 mb		228		2	2	147	1	148		228	3	753	0.4%
500 mb	2	226	2	210	1	147	3	145		228	8	956	0.8%
700 mb	1	227	1	215	2	147	3	146		228	7	963	0.7%
850 mb	2	226	4	215	2	147	3	146	2	226	13	960	1.3%
1000 mb		2		2		1		1		2	0	8	0.0%
Total	14	1441	7	650	11	1011	16	1006	12	1443	60	5551	1.1%
Percent trimmed	1.0%		1.1%		1.1%		1.6%		0.8%				
						OWS B							
100 mb		204			5	179	1	183	1	203	7	769	0.9%
150 mb	1	203			2	193	1	194	2	202	6	792	0.8%
200 mb		274			1	194	1	194	3	271	5	933	0.5%
300 mb	3	279		9		198		198		282	3	966	0.3%
500 mb	2	280		257	1	197	2	196	2	280	7	1210	0.6%
700 mb	2	280	1	275		198	2	196	2	280	7	1229	0.6%
850 mb	1	281	4	273	1	147	1	147	1	281	8	1129	0.7%
1000 mb		4		2		2		2		4	0	14	0.0%
Total	9	1805	5	816	10	1308	8	1310	11	1803	43	7042	0.6%
Percent trimmed	0.5%		0.6%		0.8%		0.6%		0.6%				

Table B1. Upper air trimming performance* (continued)

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Total		
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	%Trim
						OWS C							
100 mb	2	203			6	176	1	181		205	9	765	1.2%
150 mb	3	202			1	189	2	188		205	6	784	0.8%
200 mb	3	274				198	1	197		277	4	946	0.4%
300 mb	1	283		32		200	2	198	1	283	4	996	0.4%
500 mb	1	283		249		200	1	199	1	283	3	1214	0.2%
700 mb	1	283	1	279		201	2	199	2	282	6	1244	0.5%
850 mb	3	281		275		156	1	155	1	283	5	1150	0.4%
1000 mb		3		1		3		3		3	0	13	0.0%
Total	14	1812	1	836	7	1323	10	1320	5	1821	37	7112	0.5%
Percent trimmed	0.8%		0.1%		0.5%		0.8%		0.3%				
						OWS D							
100 mb	1	198			1	168	2	167	2	197	6	730	0.8%
150 mb	1	198			1	185		186	2	197	4	766	0.5%
200 mb	1	269				191		191	1	269	2	920	0.2%
300 mb	2	276		71	3	191	1	193	1	277	7	1008	0.7%
500 mb	2	276		246	3	191	1	193	2	276	8	1182	0.7%
700 mb	4	274		270	1	193	1	193	1	277	7	1207	0.6%
850 mb	3	275		274		160		160	1	277	4	1146	0.3%
1000 mb		2				2		2		2	0	8	0.0%
Total	14	1768	0	861	9	1281	5	1285	10	1772	38	6967	0.5%
Percent trimmed	0.8%		0.0%		0.7%		0.4%		0.6%				

Table B1. Upper air trimming performance* (continued)

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Total		
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	%Trim
						OWS E							
100 mb		196			1	167	3	165		196	4	724	0.5%
150 mb	3	194			1	184	1	184		197	5	759	0.7%
200 mb	2	267				188	1	187	1	268	4	910	0.4%
300 mb	2	274	1	107		191	1	190	1	275	5	1037	0.5%
500 mb		276		226	1	191		192	1	275	2	1160	0.2%
700 mb	2	274	3	262		192		192	3	273	8	1193	0.7%
850 mb	2	274	1	274	1	136	1	136	1	275	6	1095	0.5%
1000 mb											0	0	0.0%
Total	11	1755	5	869	4	1249	7	1246	7	1759	34	6878	0.5%
Percent trimmed	0.6%		0.6%		0.3%		0.6%		0.4%				
						OWS I							
100 mb	2	224			4	196	2	198		226	8	844	0.9%
150 mb		226			1	203	1	203		226	2	858	0.2%
200 mb		284				208	2	206		284	2	982	0.2%
300 mb		285		4		212	1	211	1	284	2	996	0.2%
500 mb		285	3	271		212	1	211		285	4	1264	0.3%
700 mb	1	284	7	269		212	1	211		285	9	1261	0.7%
850 mb	2	283	2	275	1	211		212		285	5	1266	0.4%
1000 mb		1		1		1		1		1	0	5	0.0%
Total	5	1872	12	820	6	1455	8	1453	1	1876	32	7476	0.4%
Percent trimmed	0.3%		1.4%		0.4%		0.5%		0.1%				

Table B1. Upper air trimming performance* (continued)

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Total		
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	%Trim
						OWS J							
100 mb	2	226			3	195		198		228	5	847	0.6%
150 mb	1	228			4	198	2	200		229	7	855	0.8%
200 mb	1	296			5	202	2	205	1	296	9	999	0.9%
300 mb	1	296		6	3	207	1	209		297	5	1015	0.5%
500 mb	1	297	4	290	3	209	1	211	1	297	10	1304	0.8%
700 mb	2	296	4	289	3	209	1	211	1	297	11	1302	0.8%
850 mb	1	297		292	2	210	3	209	1	297	7	1305	0.5%
1000 mb		1		1						1	0	3	0.0%
Total	9	1937	8	878	23	1430	10	1443	4	1942	54	7630	0.7%
Percent trimmed	0.5%		0.9%		1.6%		0.7%		0.2%				
						OWS K							
100 mb	3	205			1	133	2	132	1	207	7	677	1.0%
150 mb		212			1	141	1	141	2	210	4	704	0.6%
200 mb		275			2	141		143	3	272	5	831	0.6%
300 mb	4	274	1	17	4	140		144	1	277	10	852	1.2%
500 mb	2	276	3	272	2	143	1	144	1	277	9	1112	0.8%
700 mb		278	2	273	4	141		145		278	6	1115	0.5%
850 mb	1	277		276	3	142		145	1	277	5	1117	0.4%
1000 mb		2		1		1		1		2	0	7	0.0%
Total	10	1799	6	839	17	982	4	995	9	1800	46	6415	0.7%
Percent trimmed	0.6%		0.7%		1.7%		0.4%		0.5%				

Table B1. Upper air trimming performance* (continued)

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Total		
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	%Trim
					OWS L								
100 mb		87			2	85	1	86	2	85	5	343	1.4%
150 mb	2	85			1	86	1	86	1	86	5	343	1.4%
200 mb	2	85			2	85	1	86	1	86	6	342	1.7%
300 mb	2	85			2	85	2	85	1	86	7	341	2.0%
500 mb	1	86		86	3	84	3	84	1	86	8	426	1.8%
700 mb	2	85	1	85	4	83	3	84		87	10	424	2.3%
850 mb	4	83	3	83	5	82	2	85	2	85	16	418	3.7%
1000 mb		1		1							0	2	0.0%
Total	13	597	4	255	19	590	13	596	8	601	57	2639	2.1%
Percent trimmed	2.1%		1.5%		3.1%		2.1%		1.3%				
					OWS M								
100 mb	2	213		3		158		158	1	214	3	746	0.4%
150 mb	1	216		3		161	1	160	1	216	3	756	0.4%
200 mb	4	247		3		163		163	2	249	6	825	0.7%
300 mb	2	251		5		165	2	163	3	250	7	834	0.8%
500 mb	2	251		244	1	164	1	164	3	250	7	1073	0.6%
700 mb	1	252	2	250	1	164	4	161	2	251	10	1078	0.9%
850 mb		253	2	250	1	164	4	161	2	251	9	1079	0.8%
1000 mb		3		3		1		1		3	0	11	0.0%
Total	12	1686	4	761	3	1140	12	1131	14	1684	45	6402	0.7%
Percent trimmed	0.7%		0.5%		0.3%		1.0%		0.8%				

Table B1. Upper air trimming performance* (continued)

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Total		
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	%Trim
						OWS N							
100 mb	1	204			1	174	4	171	1	204	7	753	0.9%
150 mb	1	205				196		196	1	205	2	802	0.2%
200 mb	1	238			1	199	2	198	1	238	5	873	0.6%
300 mb		247	1	97	1	201	1	201	2	245	5	991	0.5%
500 mb		247		158		202	2	200	2	245	4	1052	0.4%
700 mb	3	244	2	202	1	201	2	200		247	8	1094	0.7%
850 mb	1	246	3	239		162	2	160		247	6	1054	0.6%
1000 mb		2				2		2		2	0	8	0.0%
Total	7	1633	6	696	4	1337	13	1328	7	1633	37	6627	0.6%
Percent trimmed	0.4%		0.9%		0.3%		1.0%		0.4%				
						OWS P							
100 mb	7	272				217	1	216	5	274	13	979	1.3%
150 mb	2	278			1	237		238	4	276	7	1029	0.7%
200 mb	1	346			2	243	1	244	2	345	6	1178	0.5%
300 mb	4	350		29	1	246	1	246		354	6	1225	0.5%
500 mb	2	352		332	3	245	3	245		354	8	1528	0.5%
700 mb	1	353		333	2	246	3	245		354	6	1531	0.4%
850 mb	3	351	3	330	2	243	1	244		354	9	1522	0.6%
1000 mb		21		3		20		20		21	0	85	0.0%
Total	20	2323	3	1027	11	1697	10	1698	11	2332	55	9077	0.6%
Percent trimmed	0.9%		0.3%		0.6%		0.6%		0.5%				

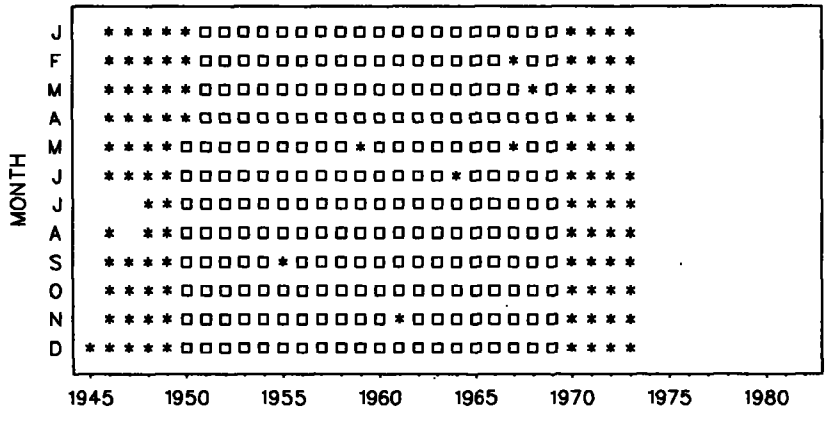
Table B1. Upper air trimming performance* (continued)

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Total		
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	%Trim
						OWS R							
100 mb	1	72				61	1	60	1	72	3	265	1.1%
150 mb		73				62		62	1	72	1	269	0.4%
200 mb	1	71			1	62	1	62	1	72	4	267	1.5%
300 mb	2	71				63		63	1	72	3	269	1.1%
500 mb	3	70	2	68		63		63	1	72	6	336	1.8%
700 mb		73	1	70		63	1	62	3	70	5	338	1.5%
850 mb	2	71	1	70		63	1	62	1	72	5	338	1.5%
1000 mb											0	0	0.0%
Total	9	501	4	208	1	437	4	434	9	502	27	2082	1.3%
Percent trimmed	1.8%		1.9%		0.2%		0.9%		1.8%				
						OWS T							
100 mb		108				24		24		108	0	264	0.0%
150 mb		108				24		24		108	0	264	0.0%
200 mb		108				24		24		108	0	264	0.0%
300 mb		108		54	2	22	2	22		108	4	314	1.3%
500 mb	1	107	2	82	1	23	2	22		108	6	342	1.7%
700 mb	1	107	1	82		24	1	23		108	3	344	0.9%
850 mb	1	107	1	83	2	22		24	1	107	5	343	1.4%
1000 mb		24				24		24	2	22	2	94	2.1%
Total	3	777	4	301	5	187	5	187	3	777	20	2229	0.9%
Percent trimmed	0.4%		1.3%		2.6%		2.6%		0.4%				

Table B1. Upper air trimming performance* (continued)

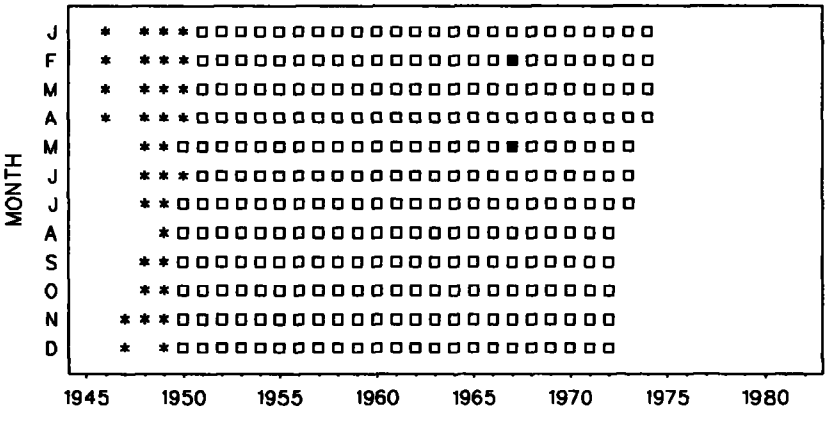
Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Total		
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	%Trim
						OWS V							
100 mb	2	140			1	102	1	102	2	140	6	484	1.2%
150 mb	3	139			1	120	6	115	1	141	11	515	2.1%
200 mb	2	195			1	129		130		197	3	651	0.5%
300 mb		198		107		135		135		198	0	773	0.0%
500 mb	1	197		157	1	135		136		198	2	823	0.2%
700 mb	2	196	2	176	1	134	1	134		198	6	838	0.7%
850 mb	1	197	8	179	1	128	4	125		198	14	827	1.7%
1000 mb											0	0	0.0%
Total	11	1262	10	619	6	883	12	877	3	1270	42	4911	0.8%
Percent trimmed	0.9%		1.6%		0.7%		1.3%		0.2%				

* The values shown for each of the five variables are the numbers of year-months trimmed from the summaries (Trim) and the numbers of year-months used in the summaries (Rem, for remaining).



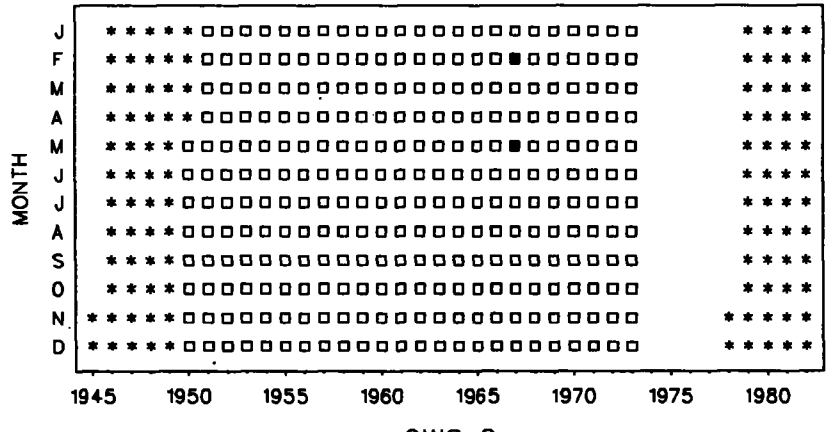
OWS A

year-months: 229 Climats, 0 NCAR, 105 surface data only



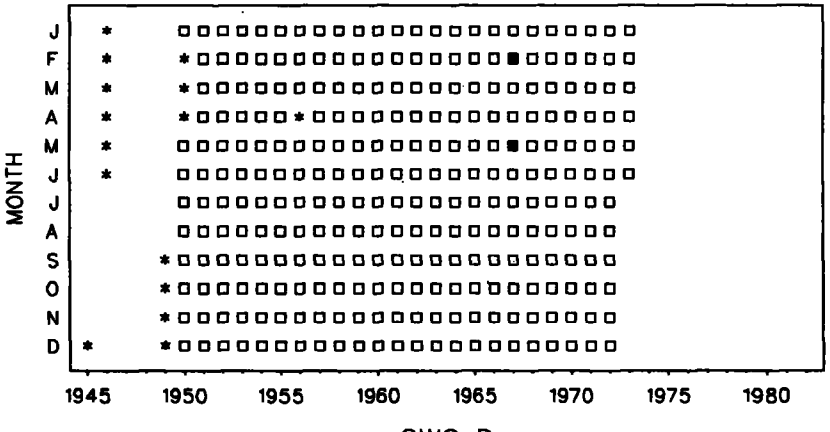
OWS B

year-months: 280 Climats, 2 NCAR, 33 surface data only



OWS C

year-months: 282 Climats, 2 NCAR, 104 surface data only



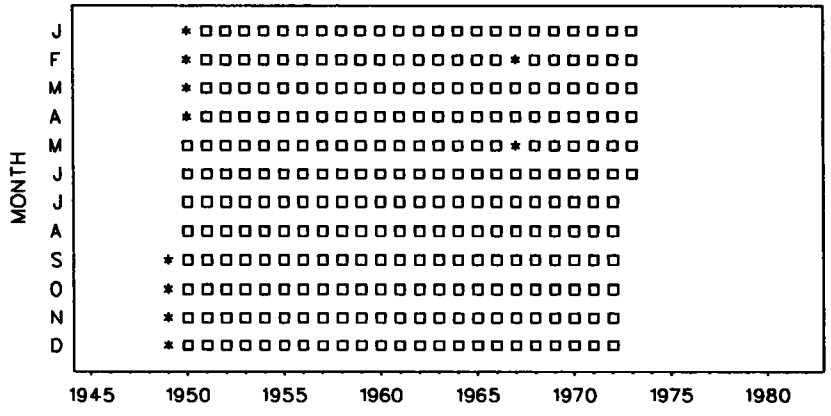
OWS D

year-months: 276 Climats, 2 NCAR, 15 surface data only

Figure B1. OWS Upper Air Data Sources

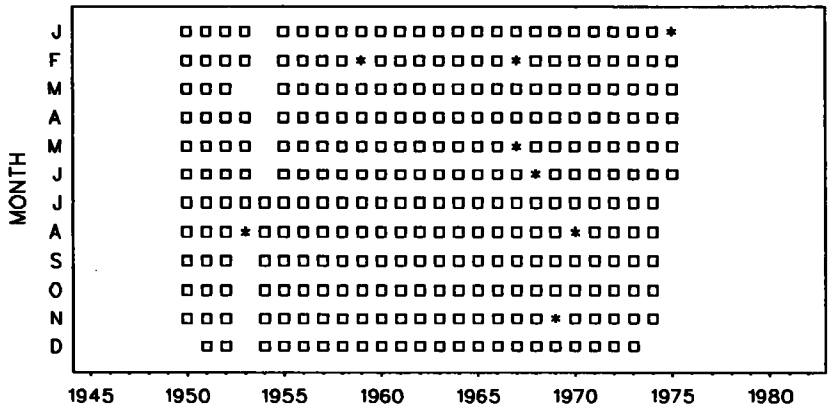
□ = Climats * = surface data only

■ = NCAR Raobs



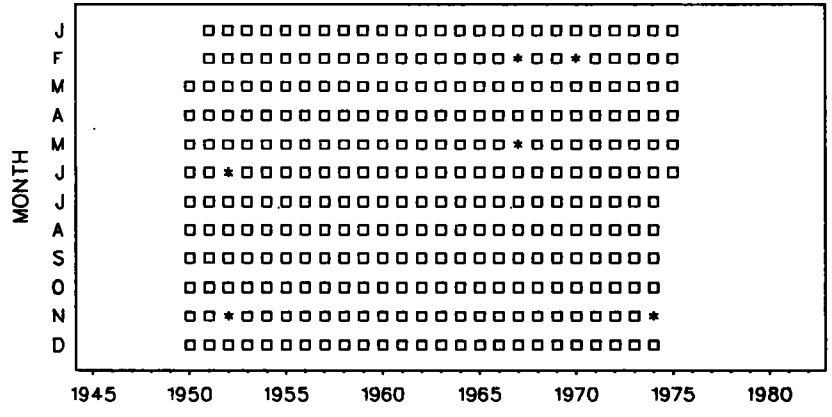
OWS E

year-months: 276 Climats, 0 NCAR, 10 surface data only



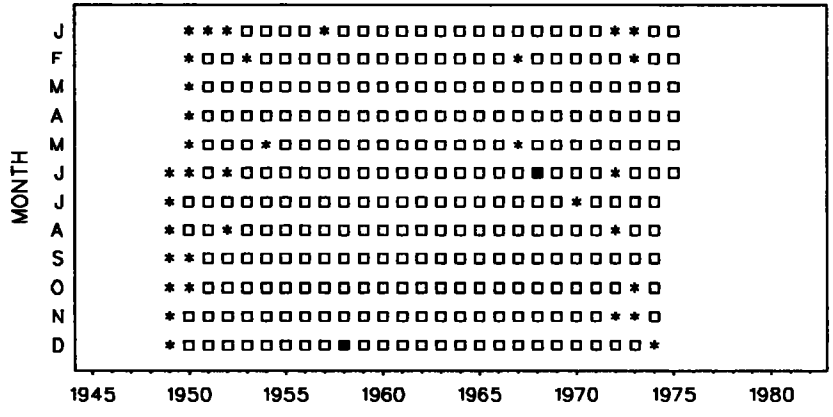
OWS I

year-months: 285 Climats, 0 NCAR, 8 surface data only



OWS J

year-months: 298 Climats, 0 NCAR, 6 surface data only



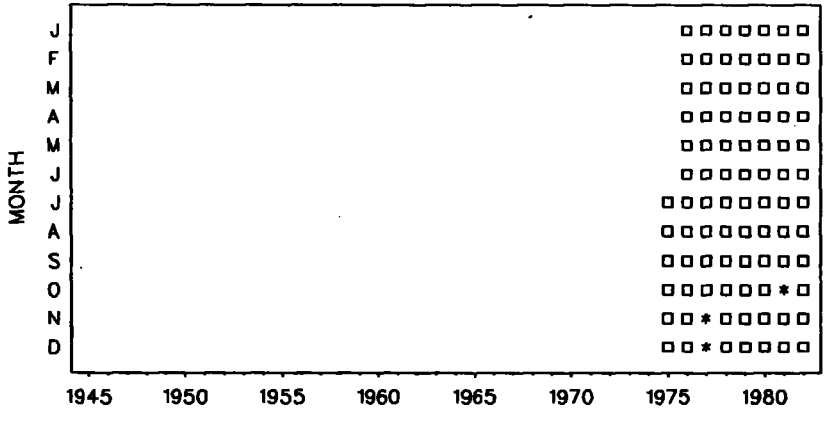
OWS K

year-months: 277 Climats, 2 NCAR, 34 surface data only

Figure B1 (continued). OWS Upper Air Data Sources

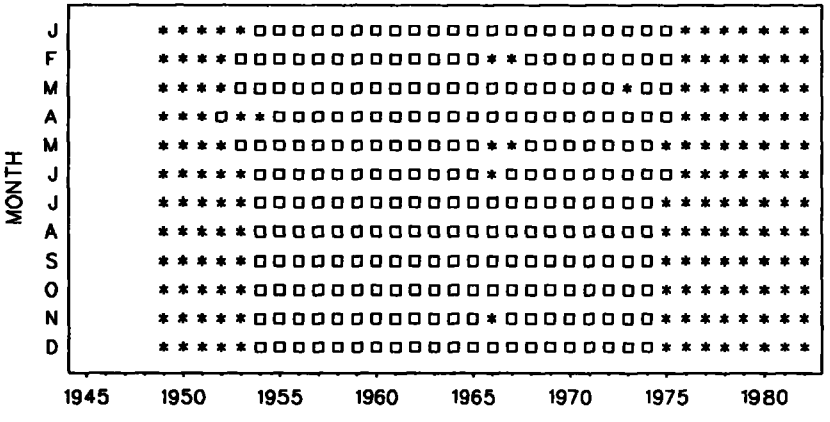
□ = Climats * = surface data only

■ = NCAR Raobs



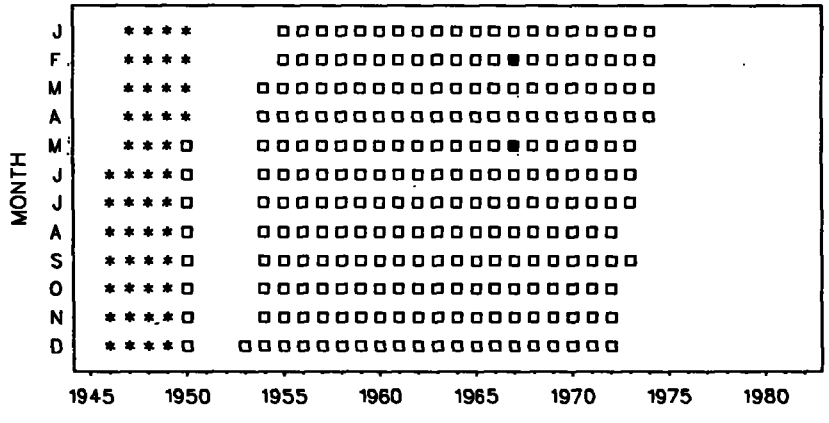
OWS L

year-months: 87 Climats, 0 NCAR, 3 surface data only



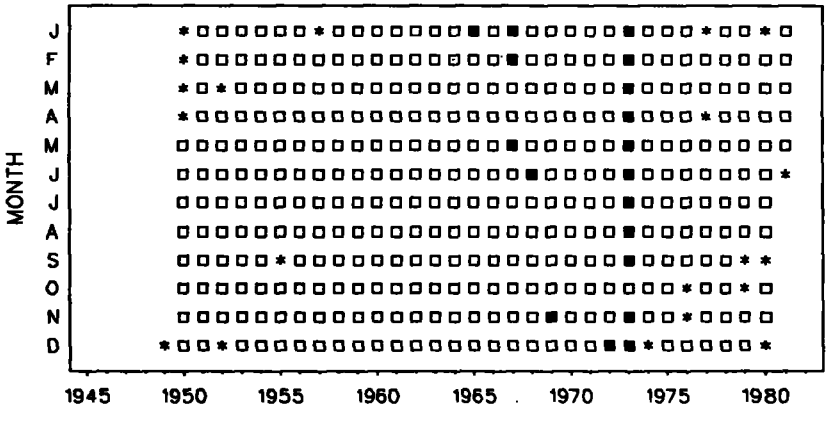
OWS M

year-months: 253 Climats, 0 NCAR, 155 surface data only



OWS N

year-months: 245 Climats, 2 NCAR, 47 surface data only



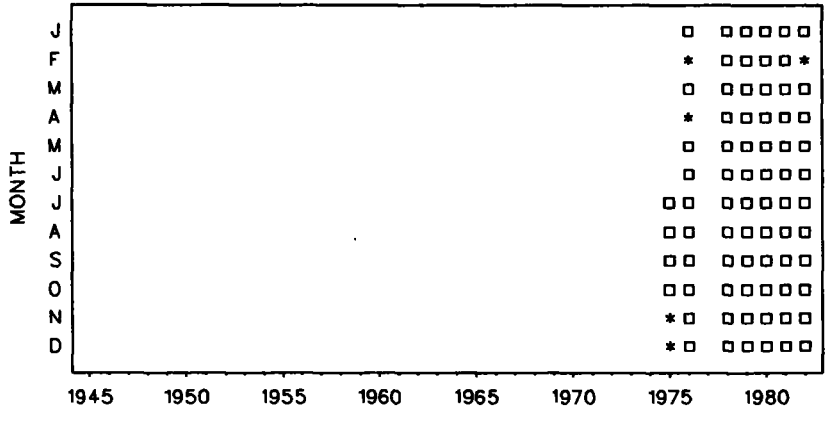
OWS P

year-months: 341 Climats, 18 NCAR, 20 surface data only

Figure B1 (continued). OWS Upper Air Data Sources

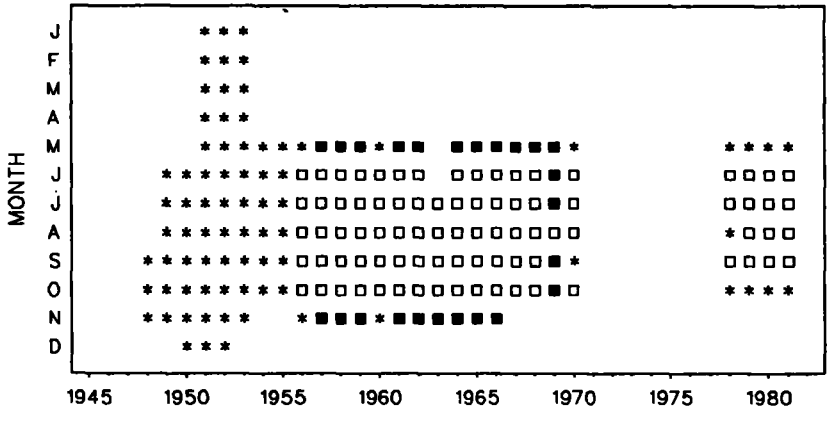
□ = Climats * = surface data only

■ = NCAR Raobs



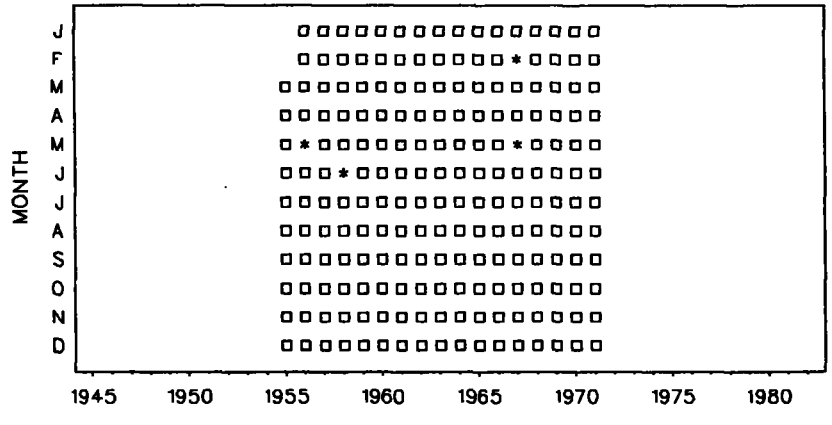
OWS R

year-months: 73 Climats, 0 NCAR, 5 surface data only



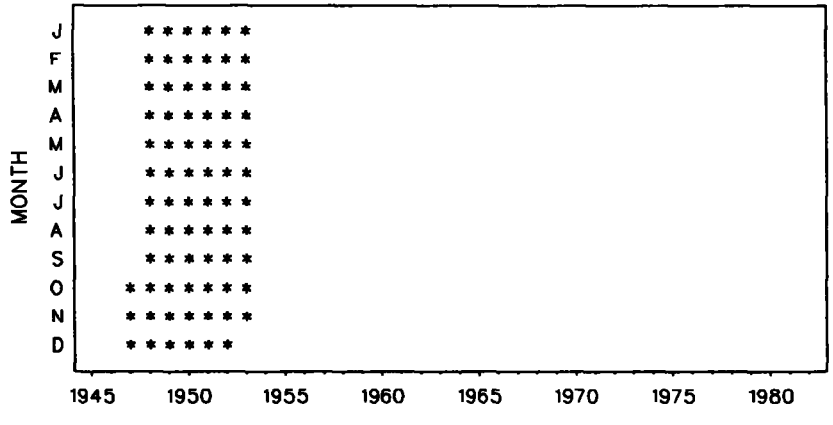
OWS T

year-months: 84 Climats, 24 NCAR, 78 surface data only



OWS V

year-months: 198 Climats, 0 NCAR, 4 surface data only



OWS X

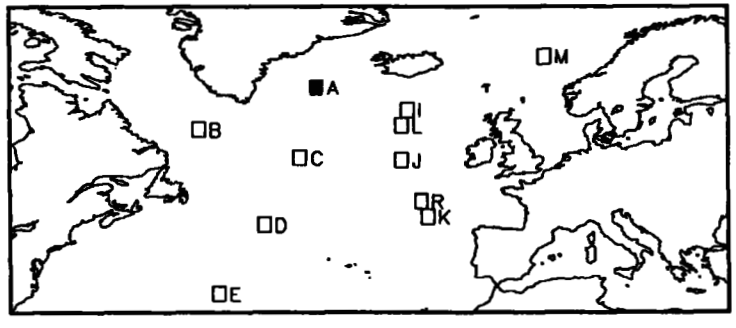
year-months: 0 Climats, 0 NCAR, 74 surface data only

Figure B1 (continued). OWS Upper Air Data Sources

□ = Climats * = surface data only

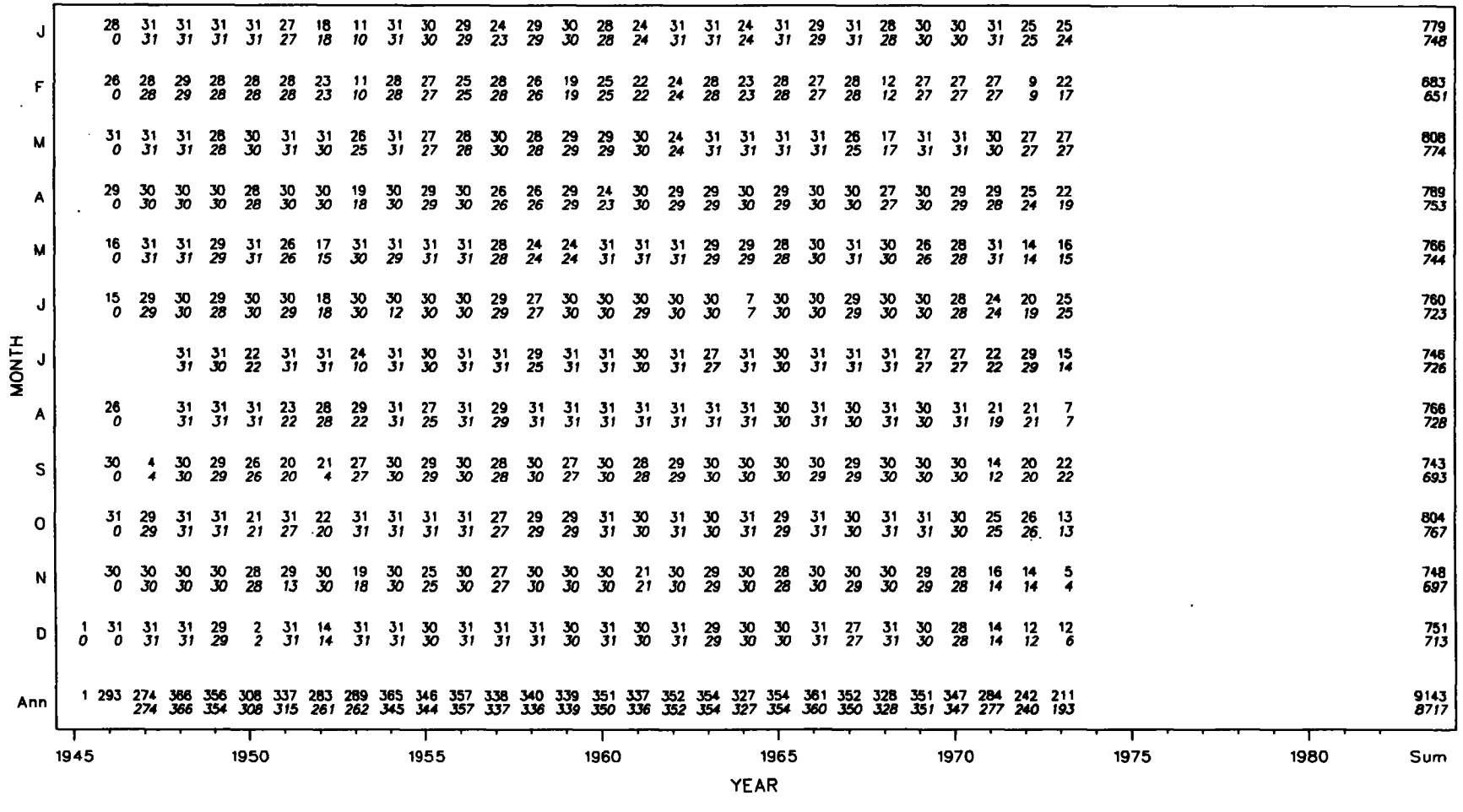
■ = NCAR Raobs

Summaries



OWS A

61.0°N – 62.9°N, 33.9°W – 32.0°W
1945 – 1973

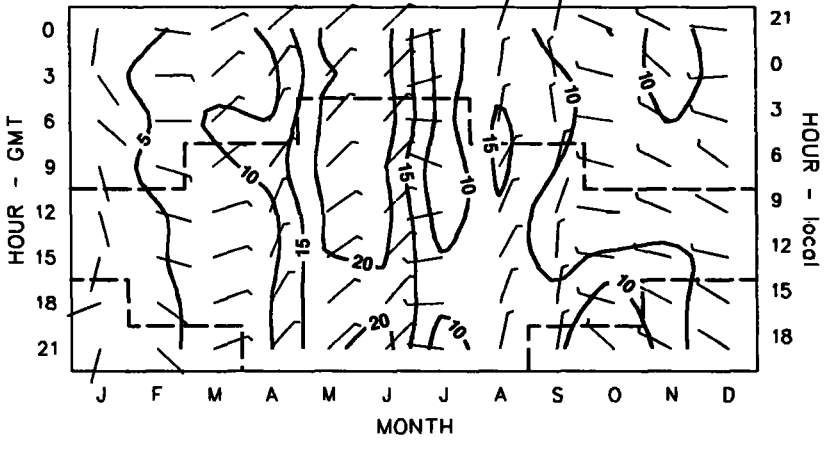


OWS Study Area A (62.0°N, 33.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

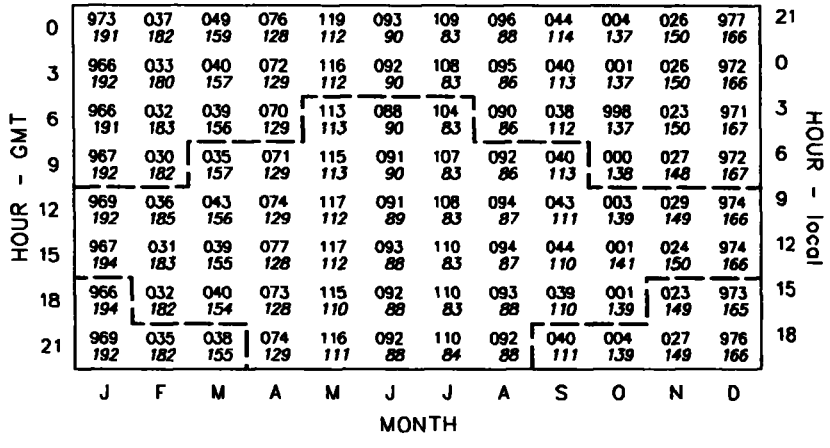
Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



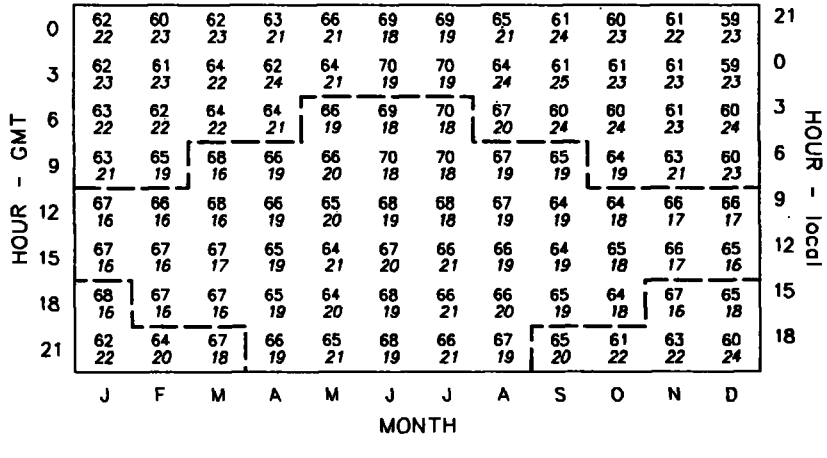
Pressure

Units = 0.1 mb



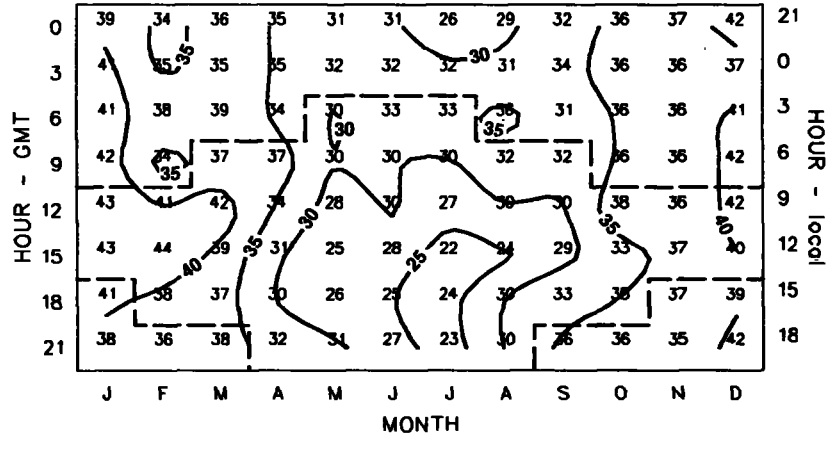
Total Cloudiness

Units = 0.1 okta



Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area A Surface Climatology

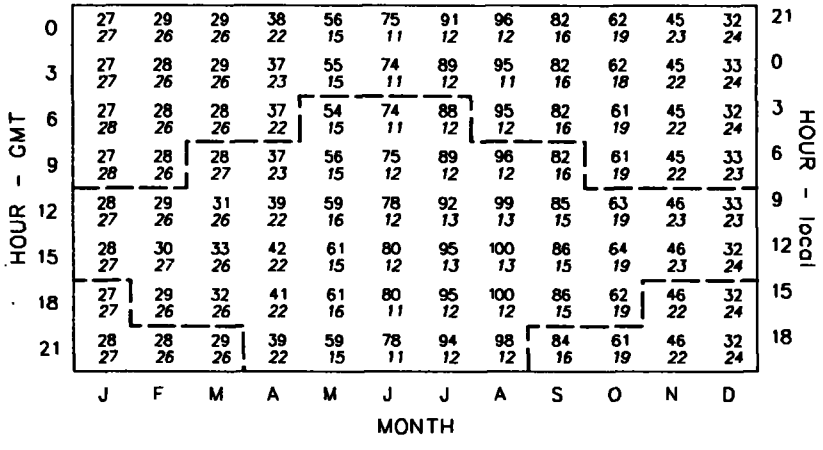
upper number = mean
lower number = standard deviation

——— data contours
— — — — sunrise/sunset

A2

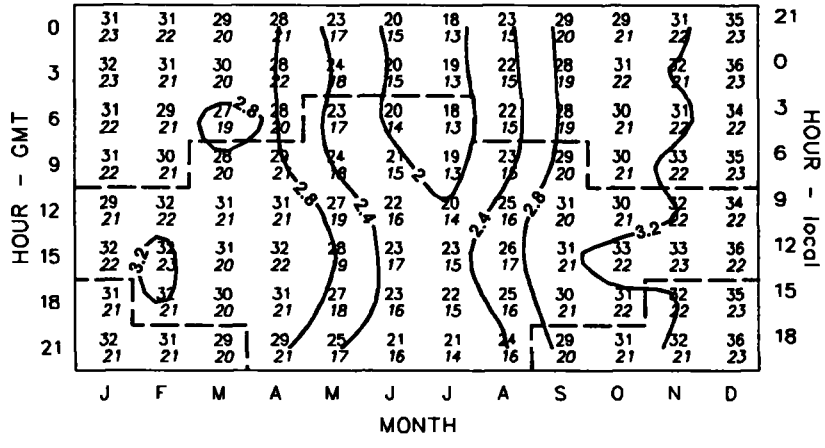
Air Temperature

Units = 0.1 °C



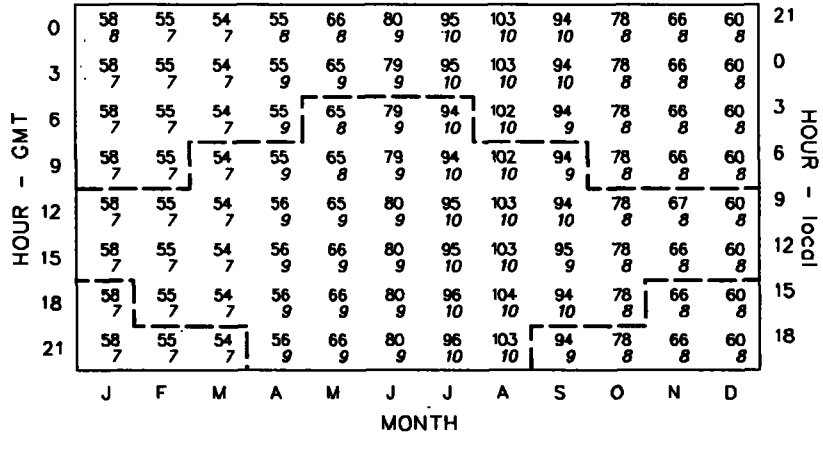
Dew Point Depression

Units = 0.1 °C
Contour interval = 0.4 °C



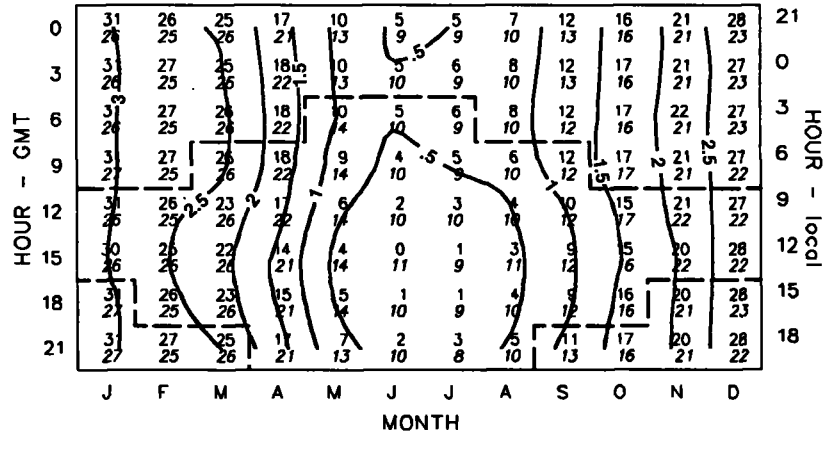
Sea Surface Temperature

Units = 0.1 °C



Sea – Air Temperature Difference

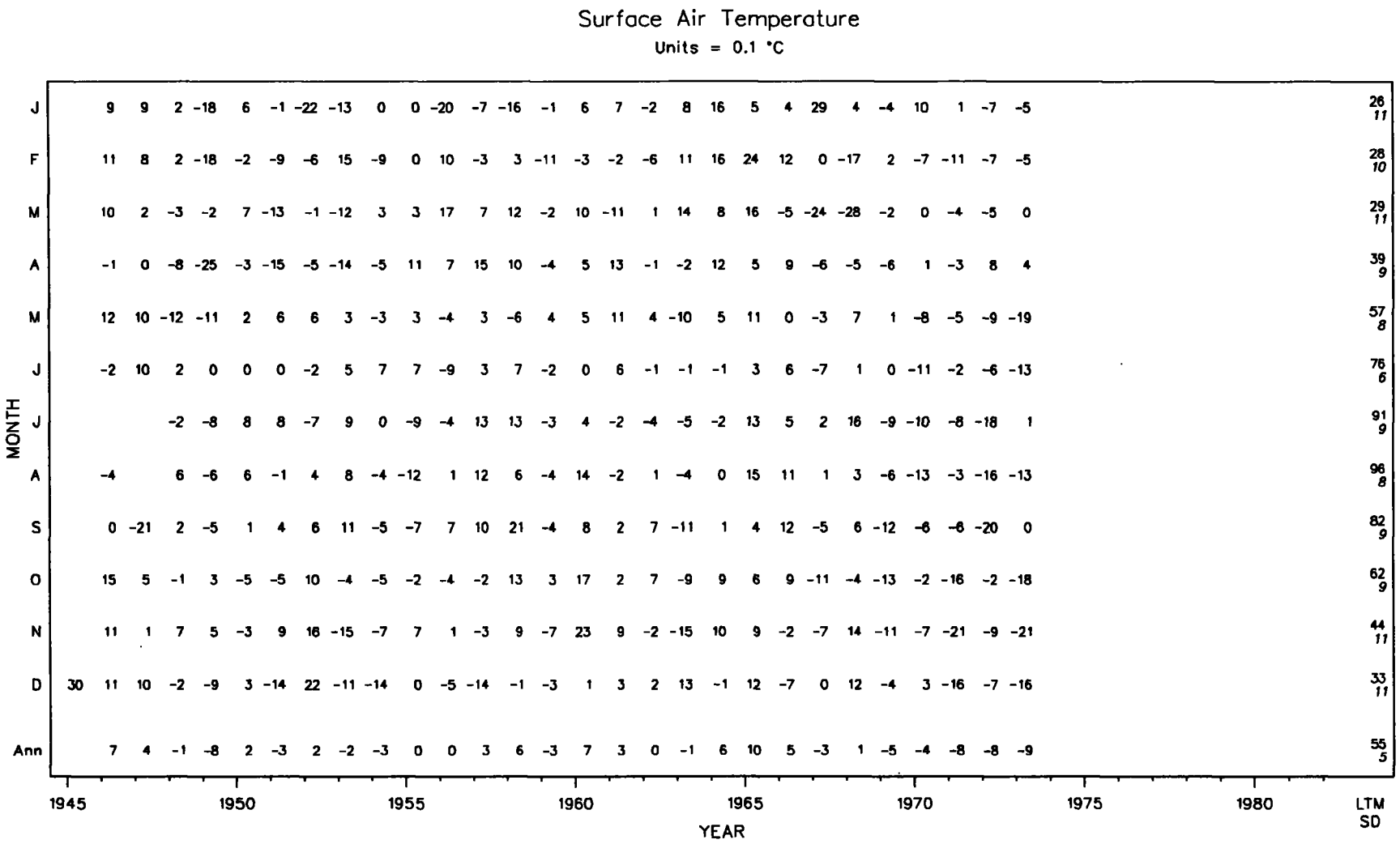
Units = 0.1 °C
Contour interval = 0.5 °C



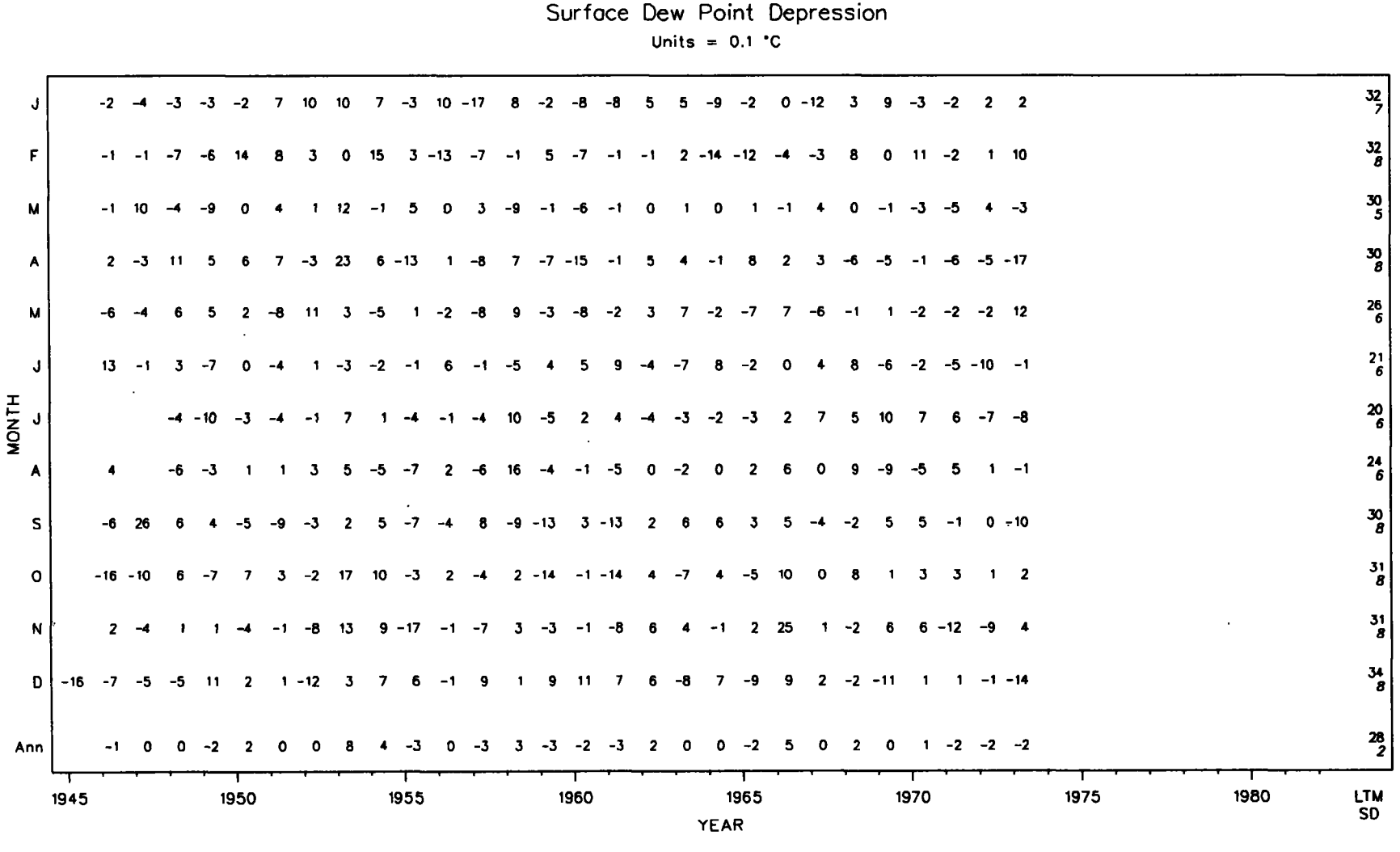
OWS Study Area A Surface Climatology

upper number = mean
lower number = standard deviation

——— data contours
— — — — sunrise/sunset



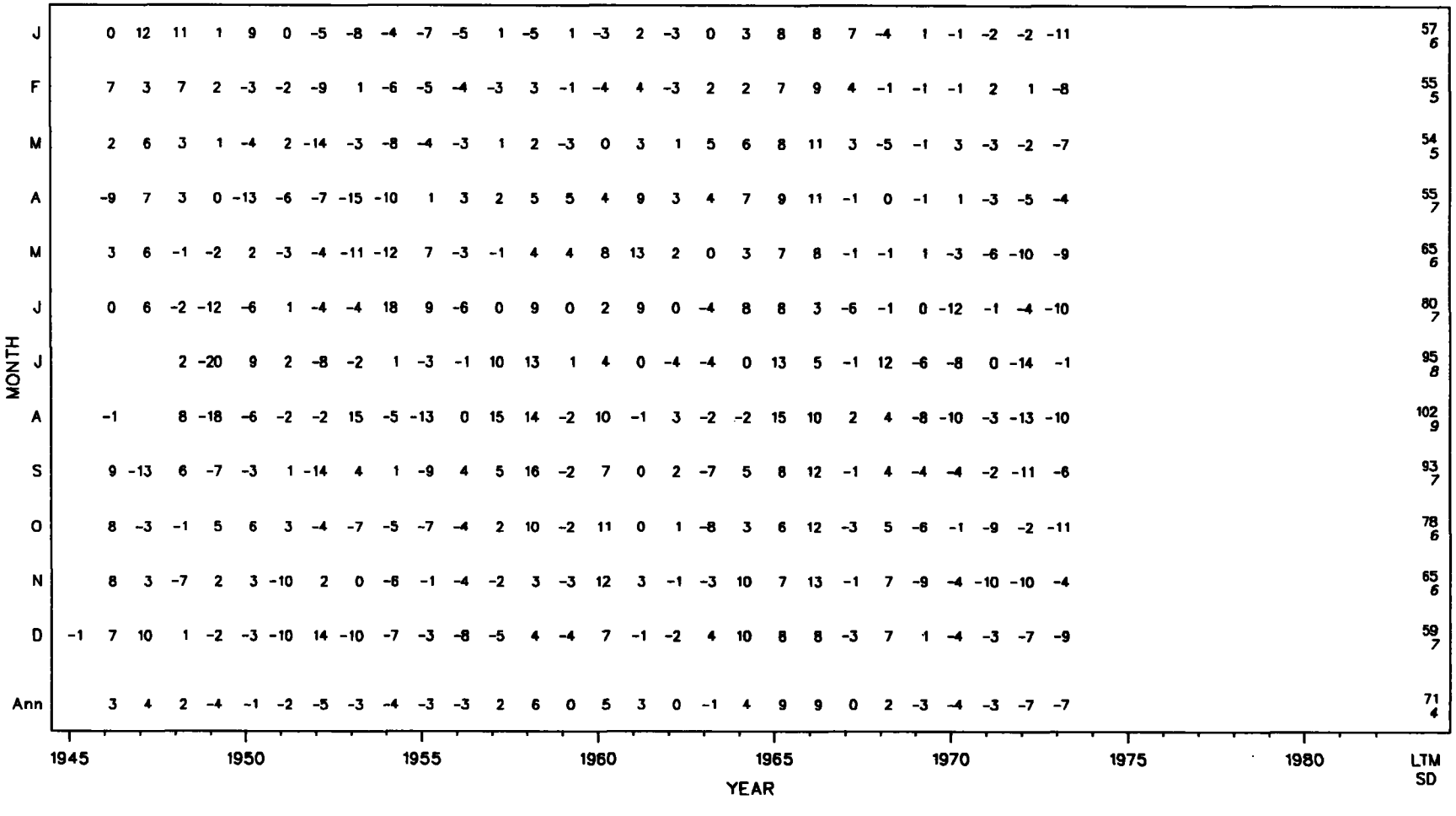
OWS Study Area A Anomalies



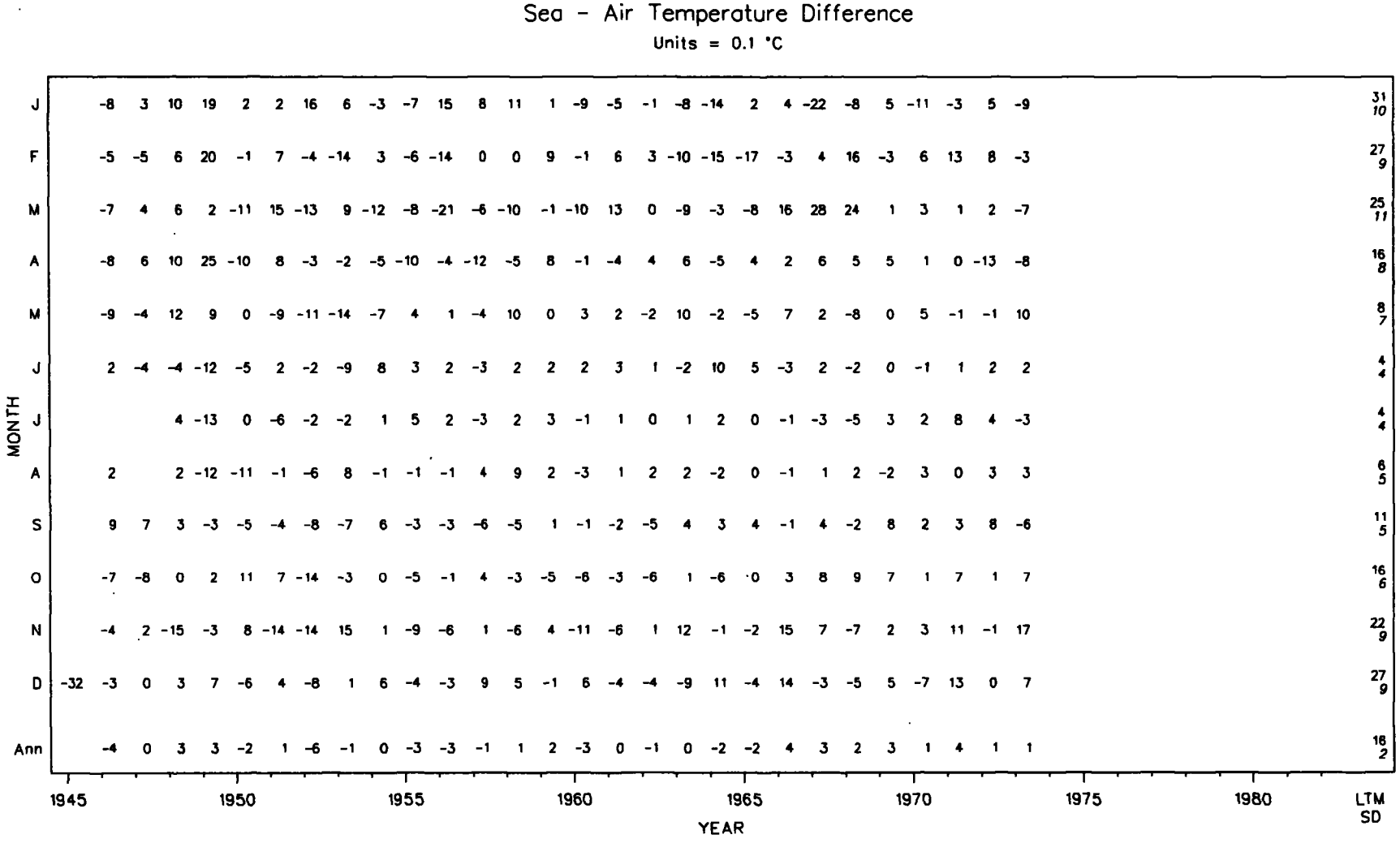
OWS Study Area A Anomalies

Sea Surface Temperature

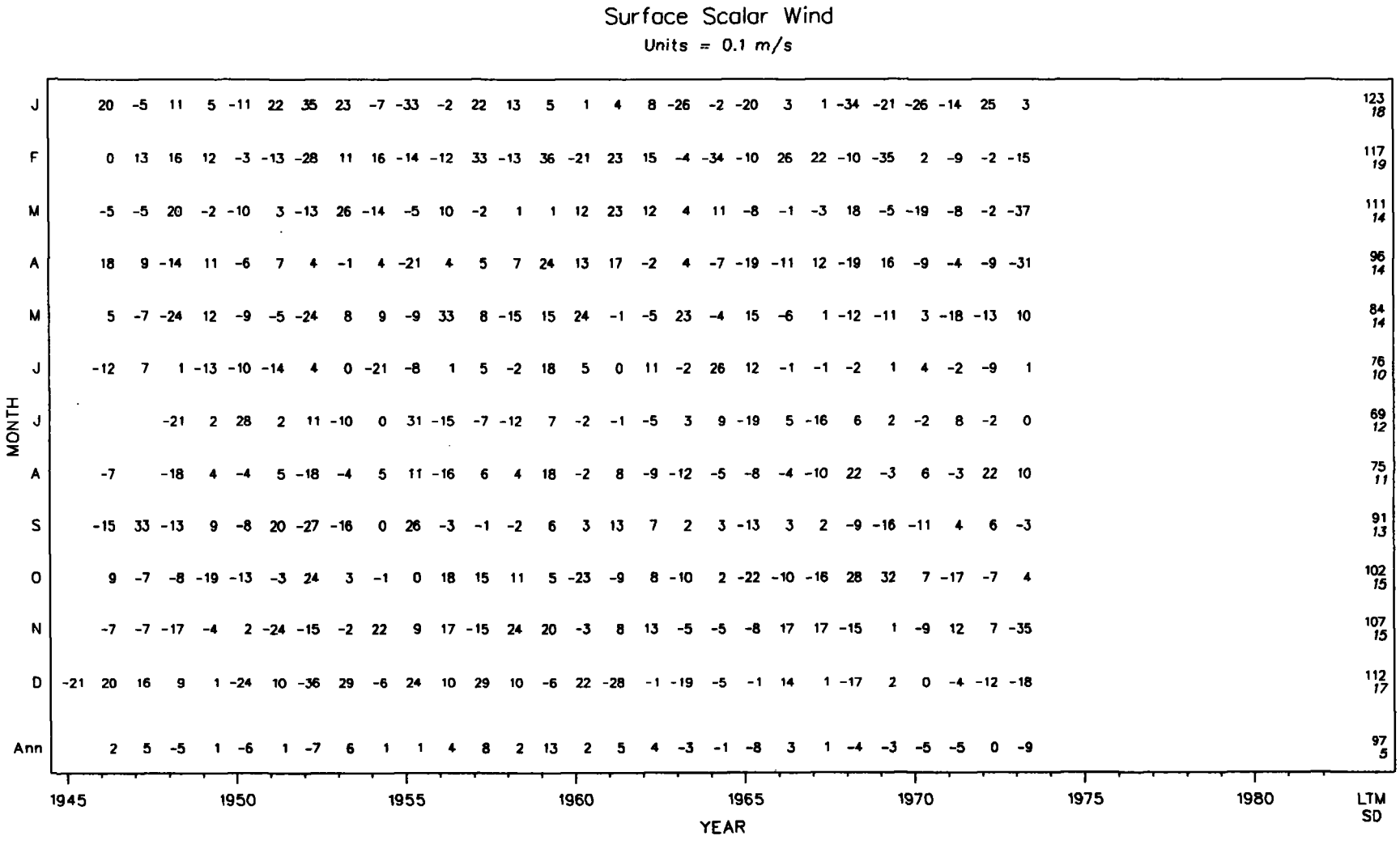
Units = 0.1 °C



OWS Study Area A Anomalies



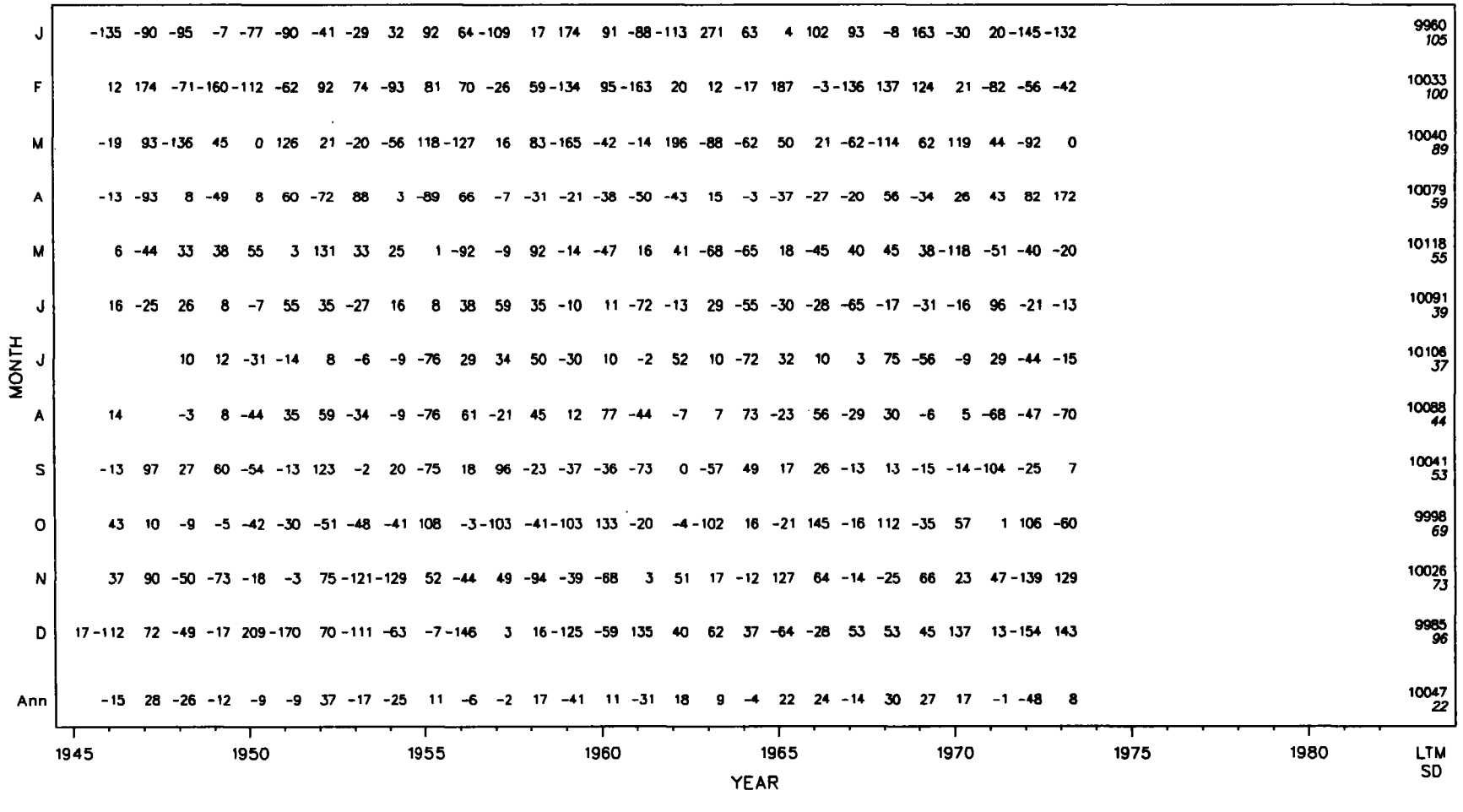
OWS Study Area A Anomalies



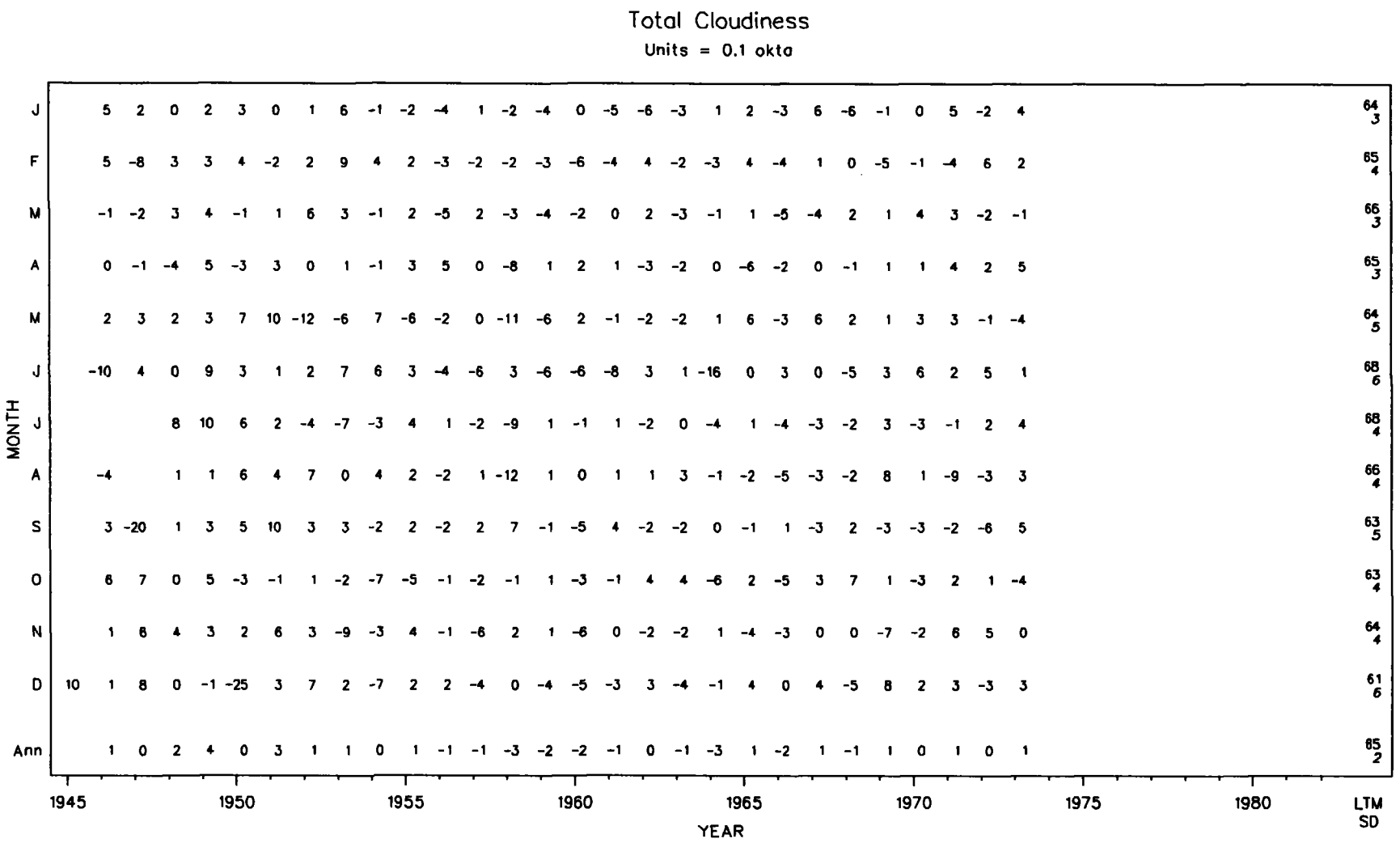
OWS Study Area A Anomalies

Sea Level Pressure

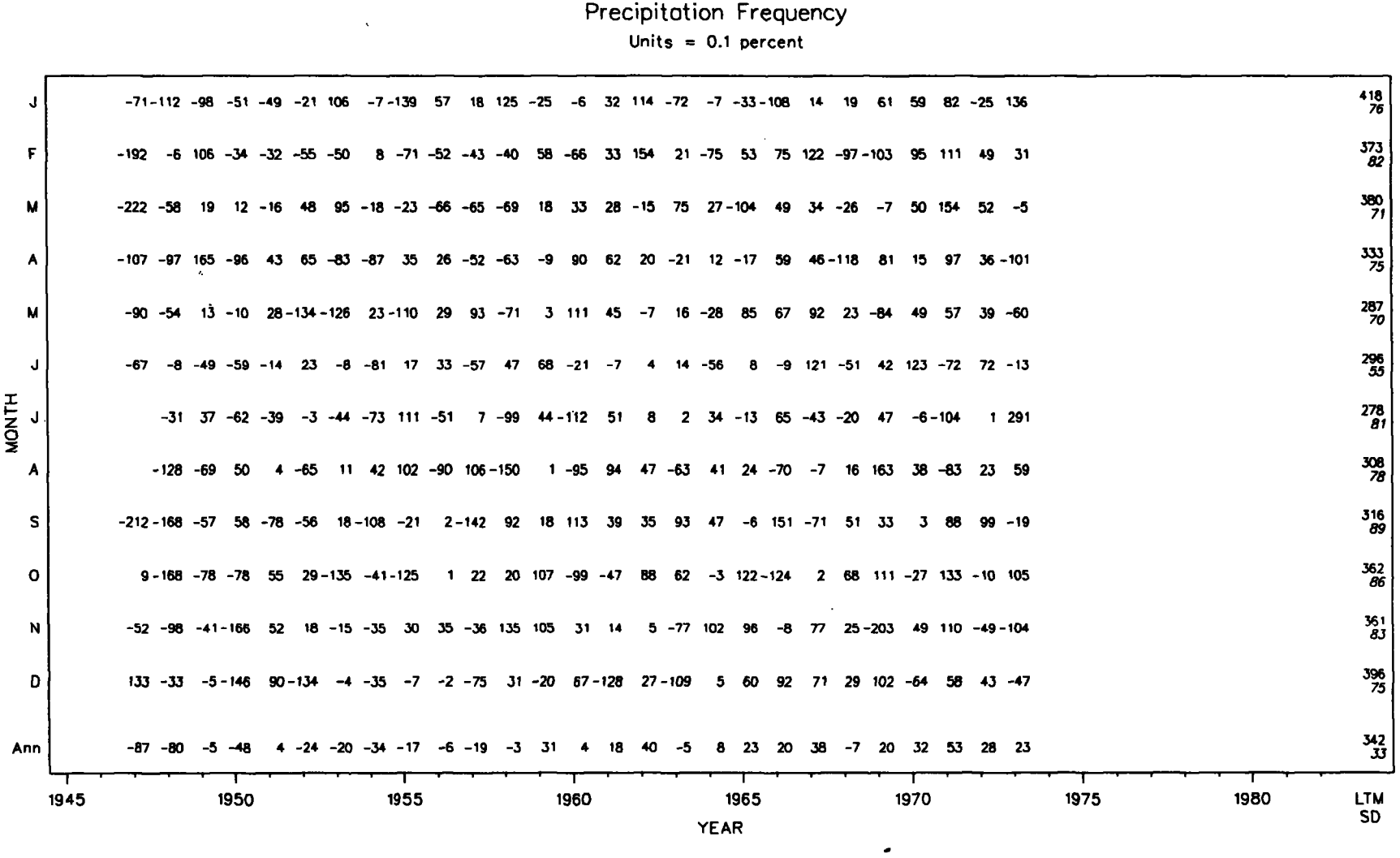
Units = 0.1 mb



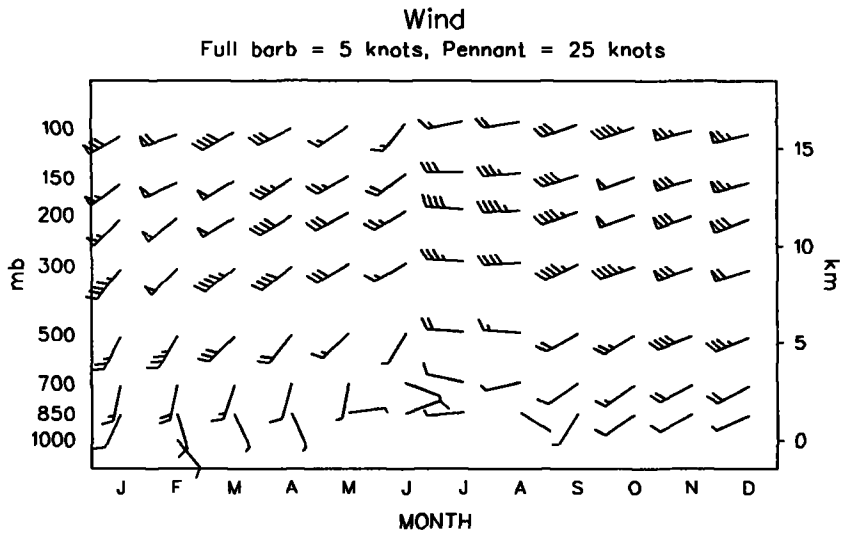
OWS Study Area A Anomalies

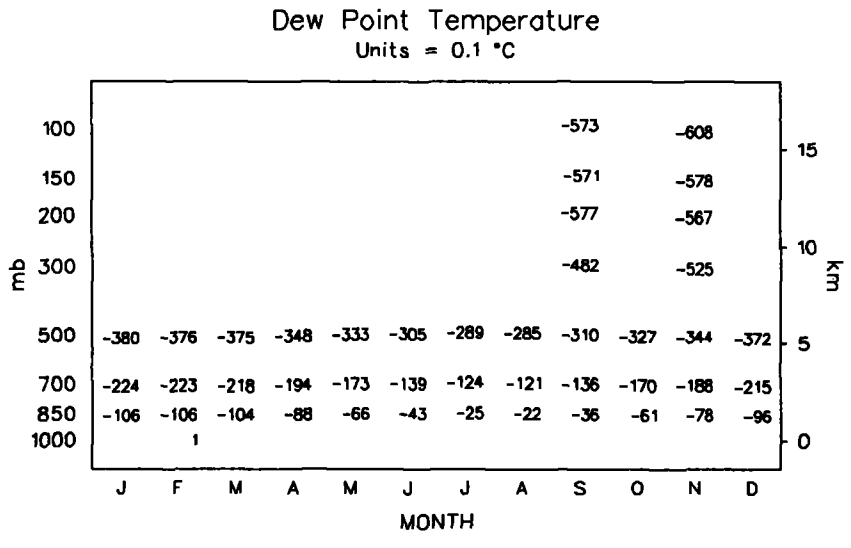


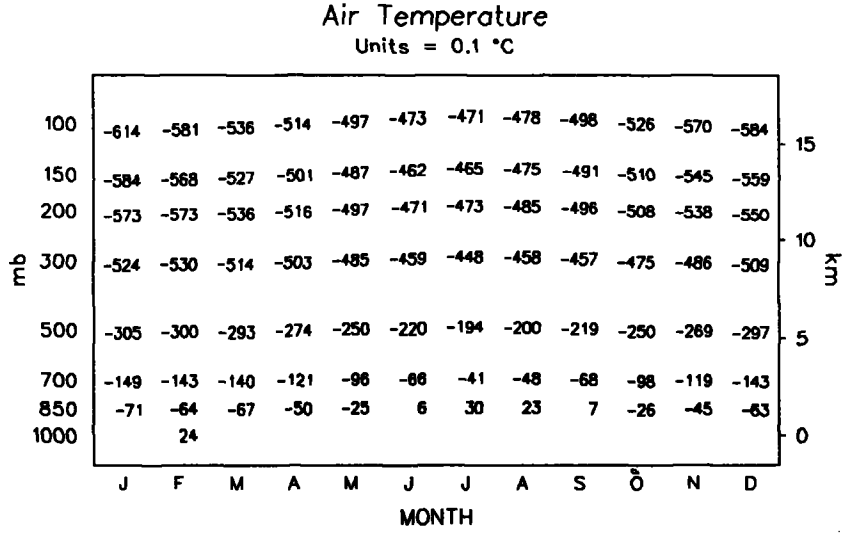
OWS Study Area A Anomalies

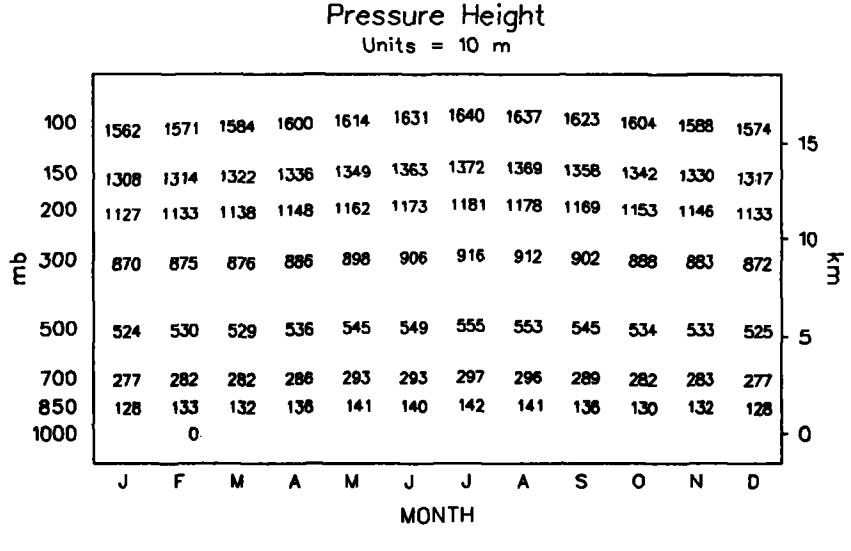


OWS Study Area A Anomalies



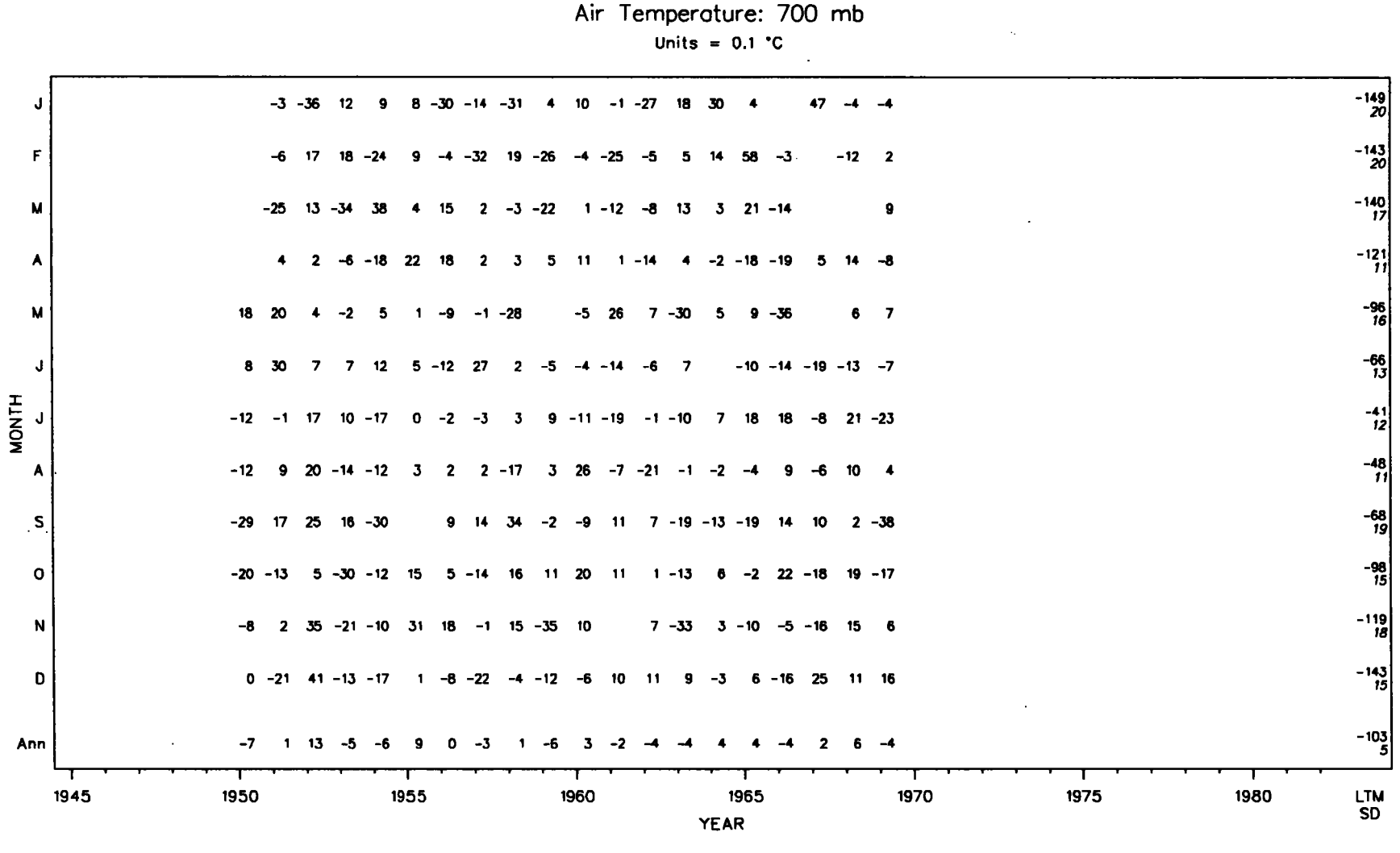




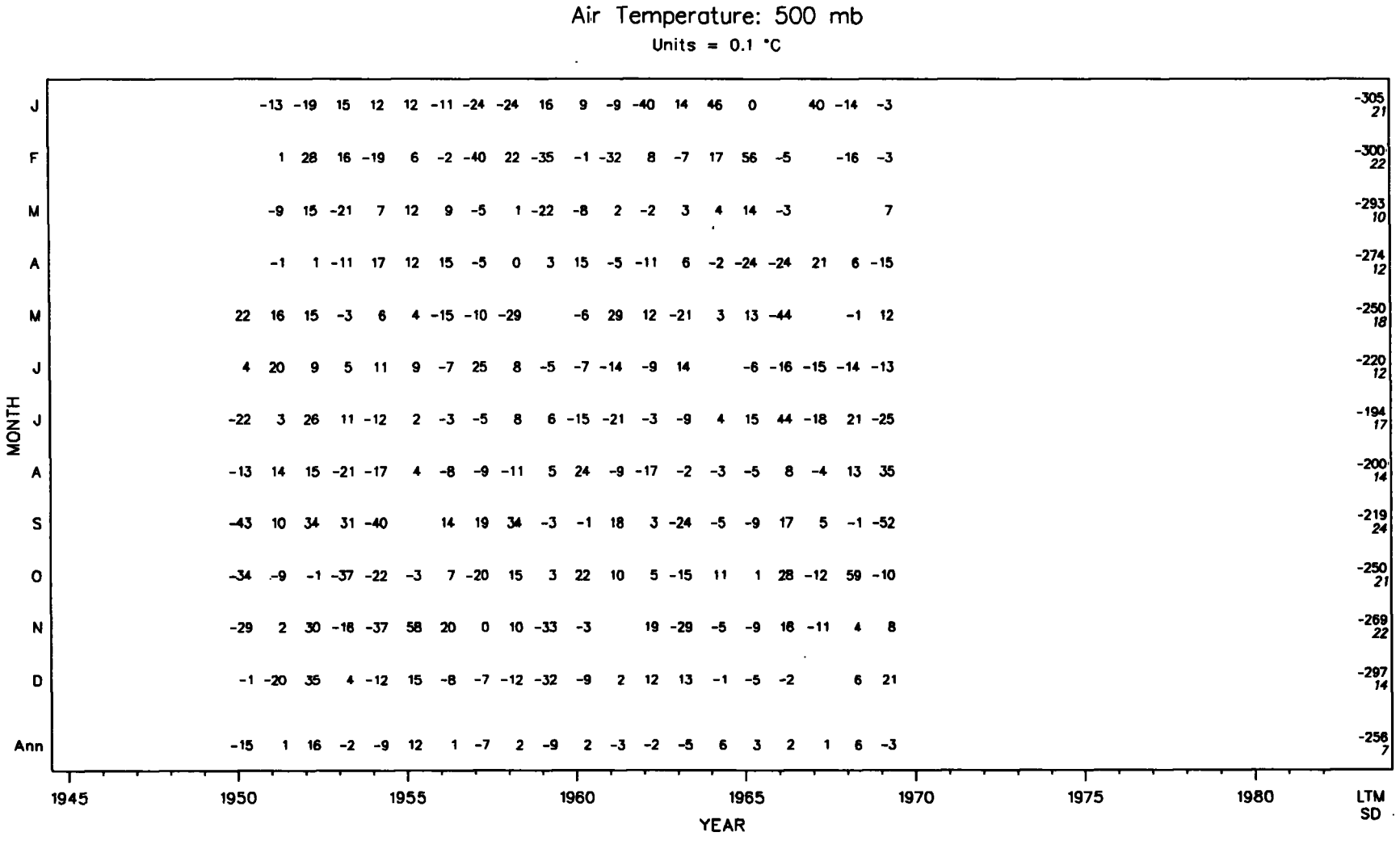


OWS Study Area A Upper Air Climatology

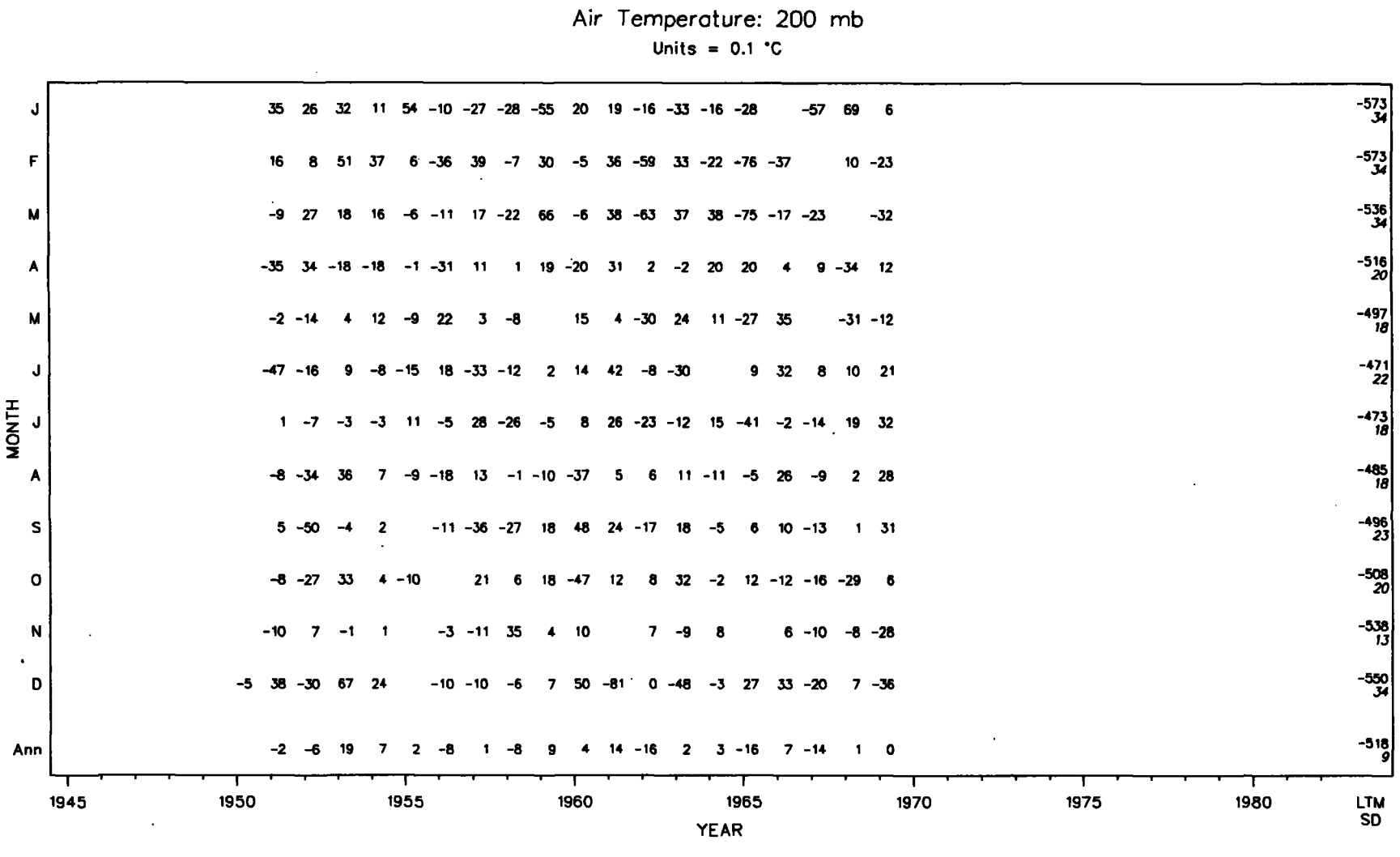
Mean plotted at actual height



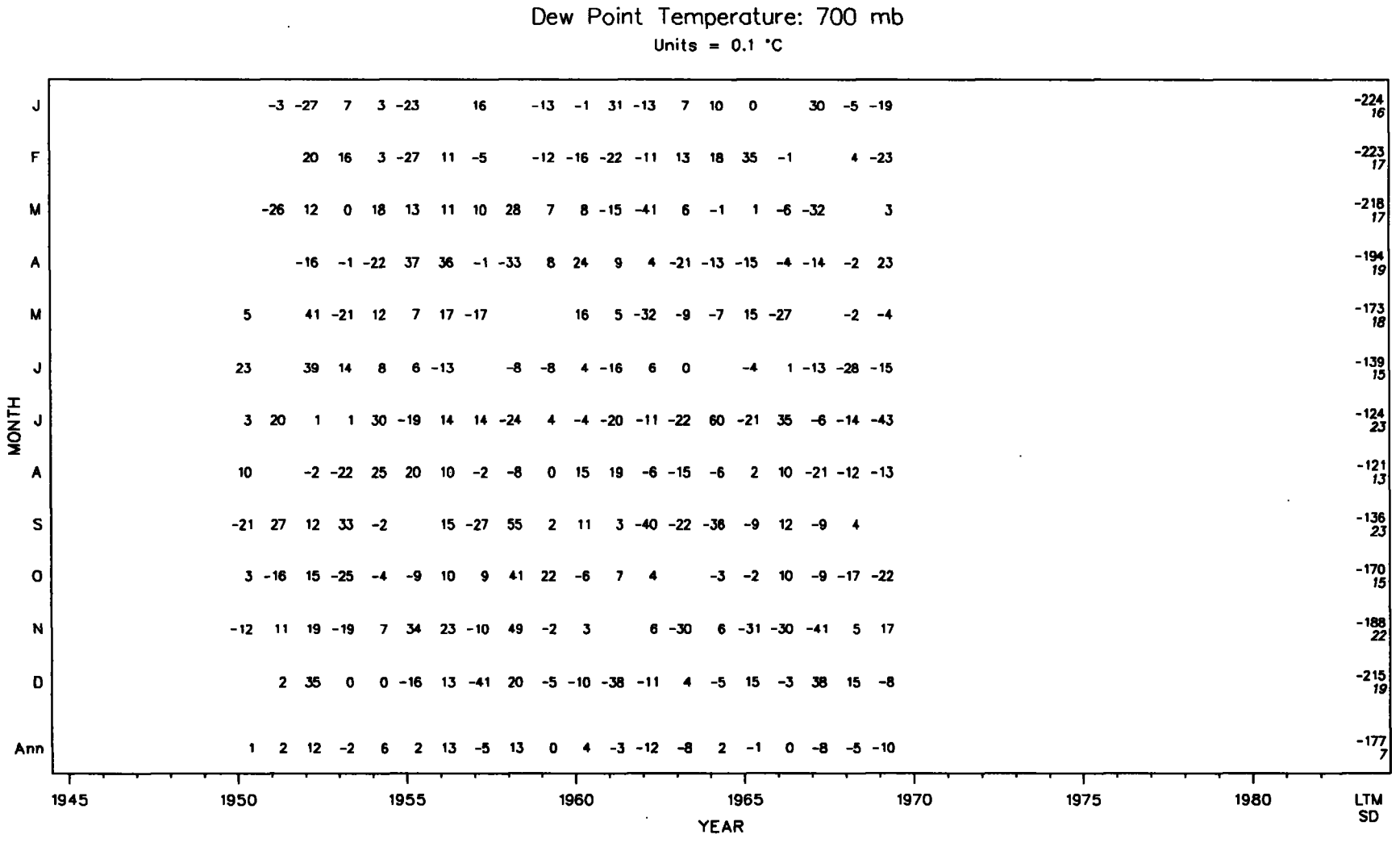
OWS Study Area A Anomalies



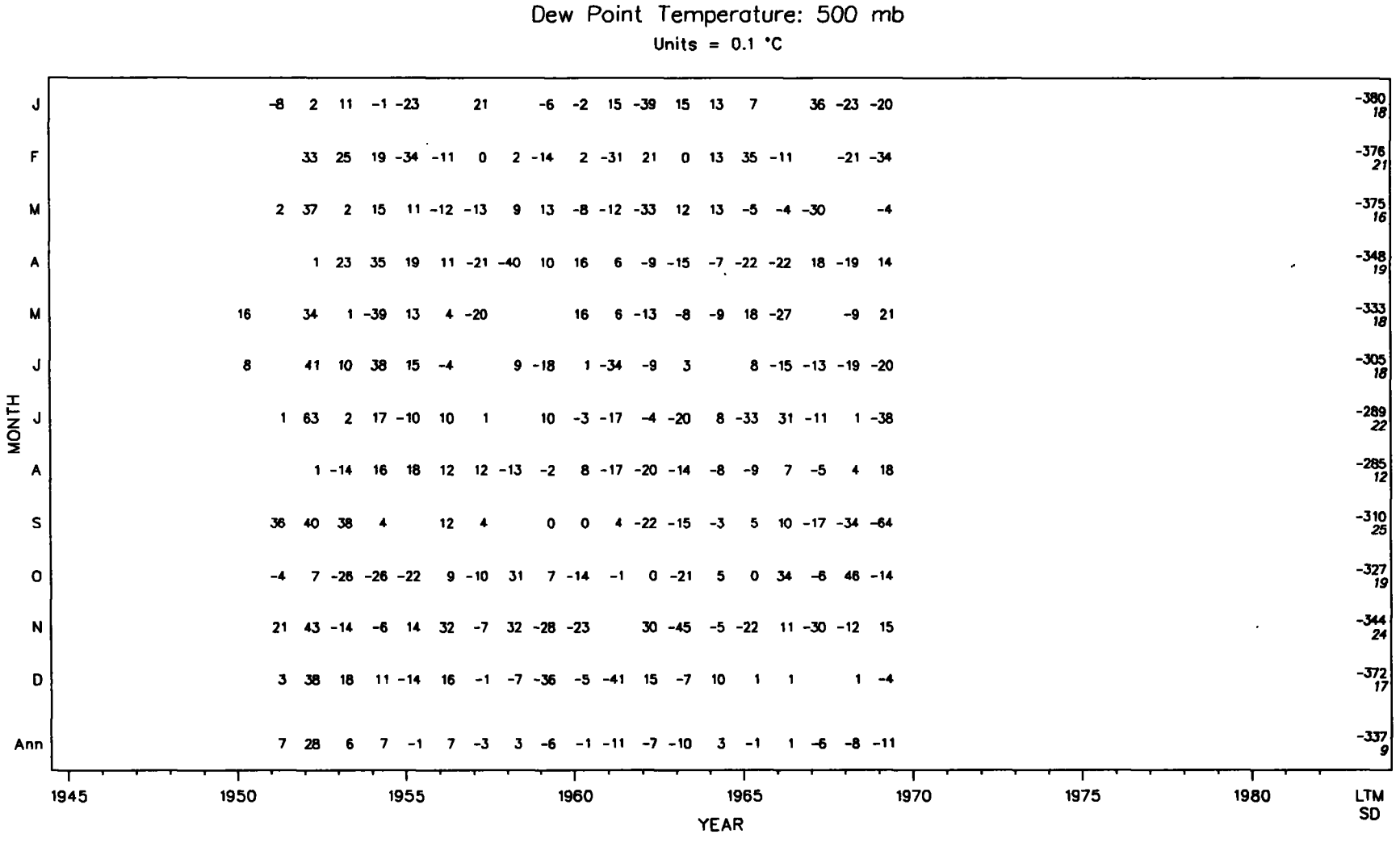
OWS Study Area A Anomalies



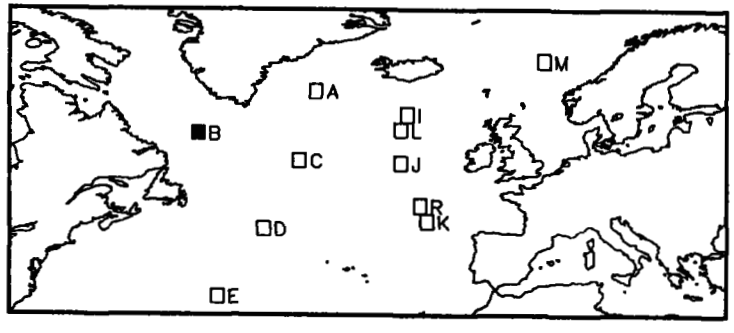
OWS Study Area A Anomalies



OWS Study Area A Anomalies

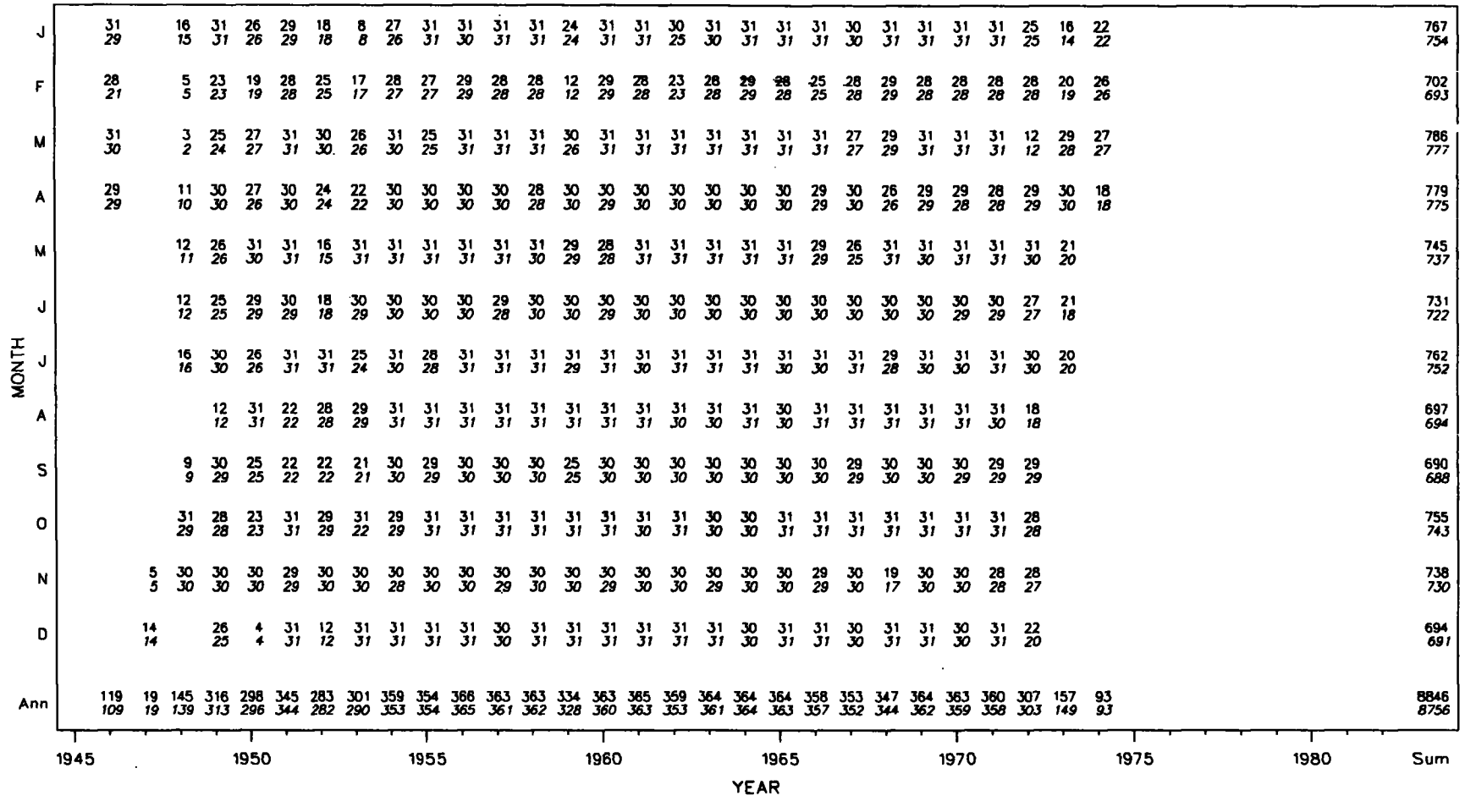


OWS Study Area A Anomalies



OWS B

55.5°N – 57.4°N, 51.9°W – 50.0°W
1946 – 1974

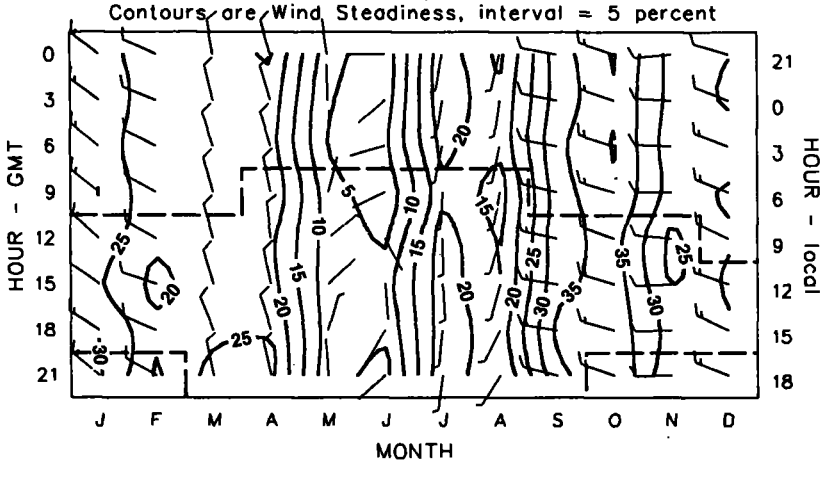


OWS Study Area B (56.5°N, 51.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



Pressure

Units = 0.1 mb

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	026 142	049 141	068 127	105 103	125 92	107 78	110 74	100 79	089 90	069 109	081 131	035 125	21
3	023 142	046 141	065 123	100 105	126 92	107 77	108 75	097 79	085 91	063 110	079 128	032 127	0
6	021 143	044 141	063 124	097 103	121 92	103 77	104 76	093 80	081 91	062 111	081 127	030 125	3
9	021 142	044 141	062 126	097 105	122 92	103 77	105 77	093 81	082 91	064 111	081 127	028 128	6
12	025 141	047 142	064 127	101 107	125 93	104 79	106 77	095 81	085 91	068 112	083 129	031 128	9
15	024 141	047 143	065 127	102 108	125 95	105 79	107 77	095 81	086 90	068 111	078 129	032 126	12
18	020 140	042 143	063 126	100 108	122 95	103 78	106 76	094 81	083 90	064 110	077 127	026 127	15
21	024 141	044 142	065 126	103 104	123 94	105 77	107 76	097 79	085 89	068 108	082 128	033 126	18

MONTH

Total Cloudiness

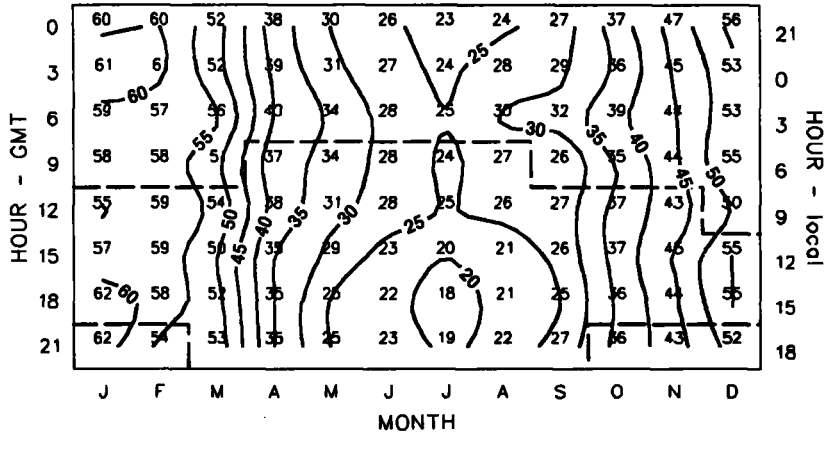
Units = 0.1 okta

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	71 16	69 19	70 18	69 18	70 19	68 21	68 21	67 21	64 22	67 20	69 19	68 19	21
3	71 16	70 18	70 17	69 20	69 21	69 20	67 23	65 26	64 24	66 21	69 19	67 19	0
6	72 15	70 18	72 16	70 19	70 19	69 20	68 22	66 24	63 24	65 22	69 18	70 17	3
9	71 16	71 16	73 13	72 16	73 15	71 19	68 22	68 21	67 19	66 20	68 20	69 19	6
12	74 11	74 10	73 12	71 16	72 16	70 19	69 21	68 20	68 18	69 16	72 13	72 13	9
15	72 13	73 10	72 14	70 17	70 18	69 20	68 22	68 21	67 19	69 15	72 13	70 13	12
18	73 11	73 12	72 13	70 17	69 19	68 21	67 23	68 21	66 19	69 16	71 14	71 12	15
21	72 13	73 12	72 13	70 17	69 20	68 21	67 22	68 21	67 18	70 16	70 16	70 16	18

MONTH

Precipitation Frequency

Units = percent
Contour interval = 5 percent



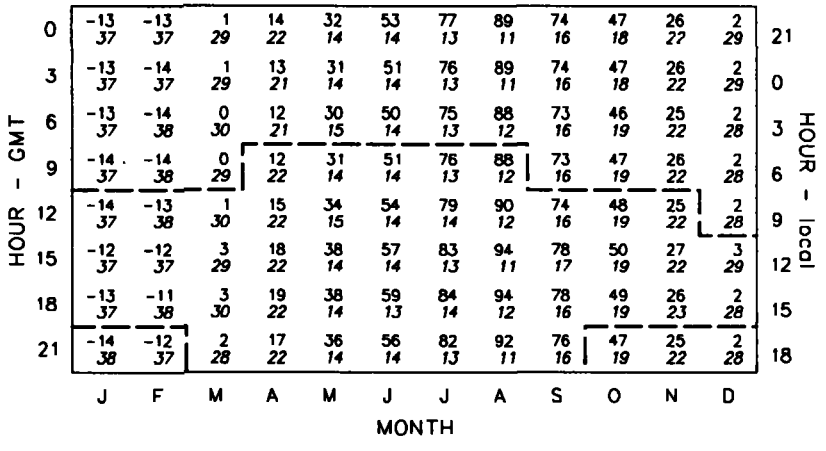
OWS Study Area B Surface Climatology

upper number = mean
lower number = standard deviation

——— data contours
— — — — sunrise/sunset

Air Temperature

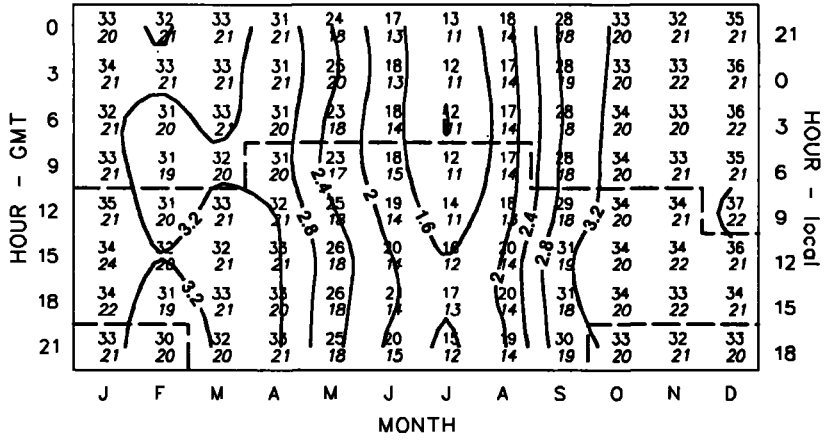
Units = 0.1 °C



Dew Point Depression

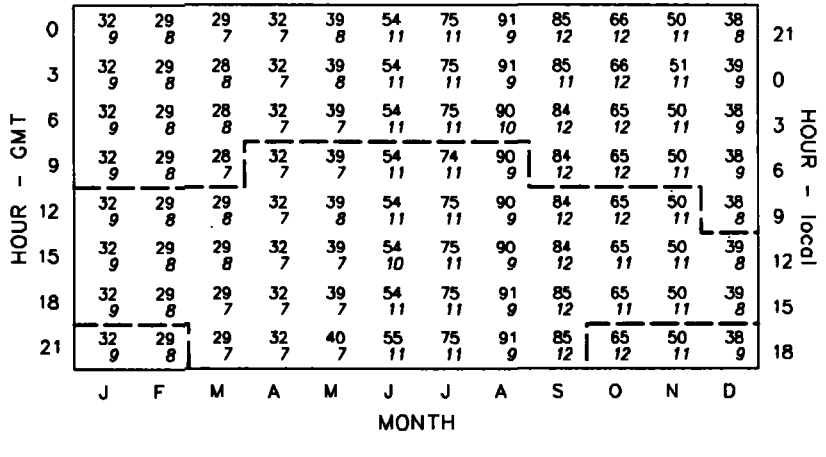
Units = 0.1 °C

Contour interval = 0.4 °C



Sea Surface Temperature

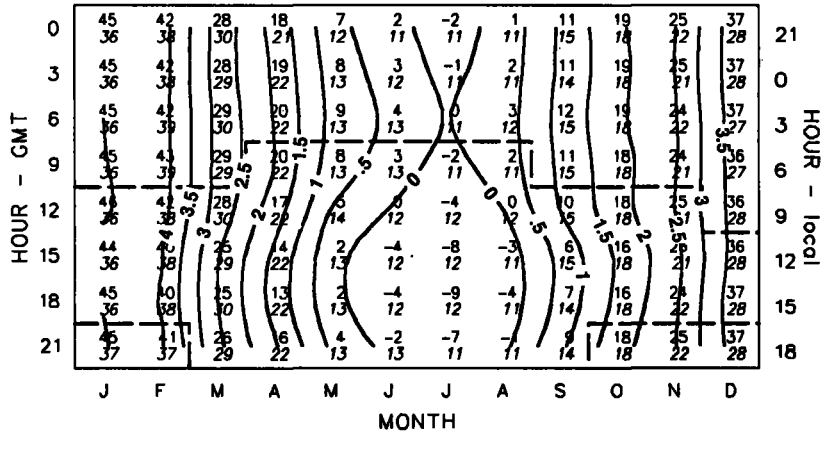
Units = 0.1 °C



Sea – Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



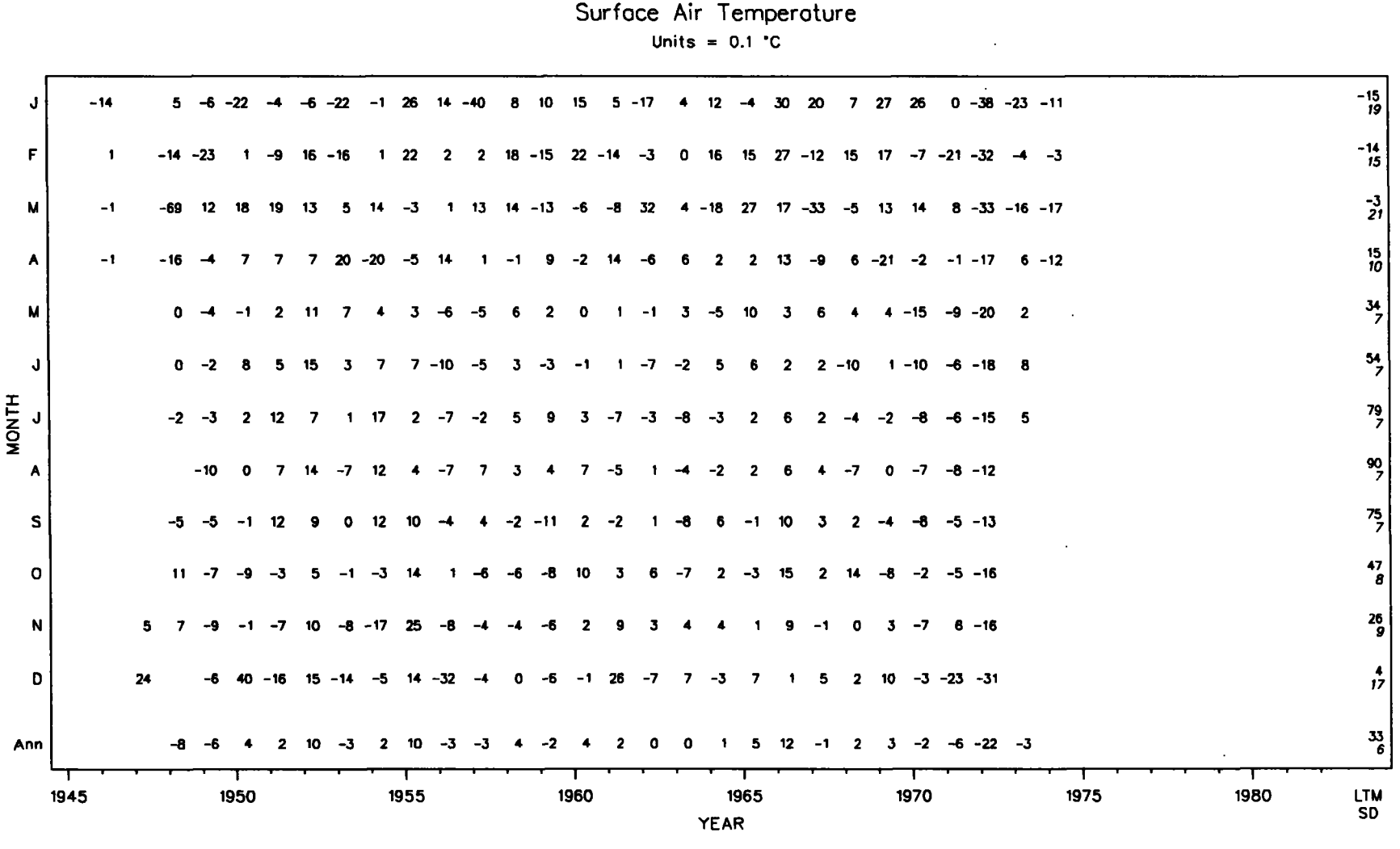
OWS Study Area B Surface Climatology

upper number = mean

lower number = standard deviation

data contours

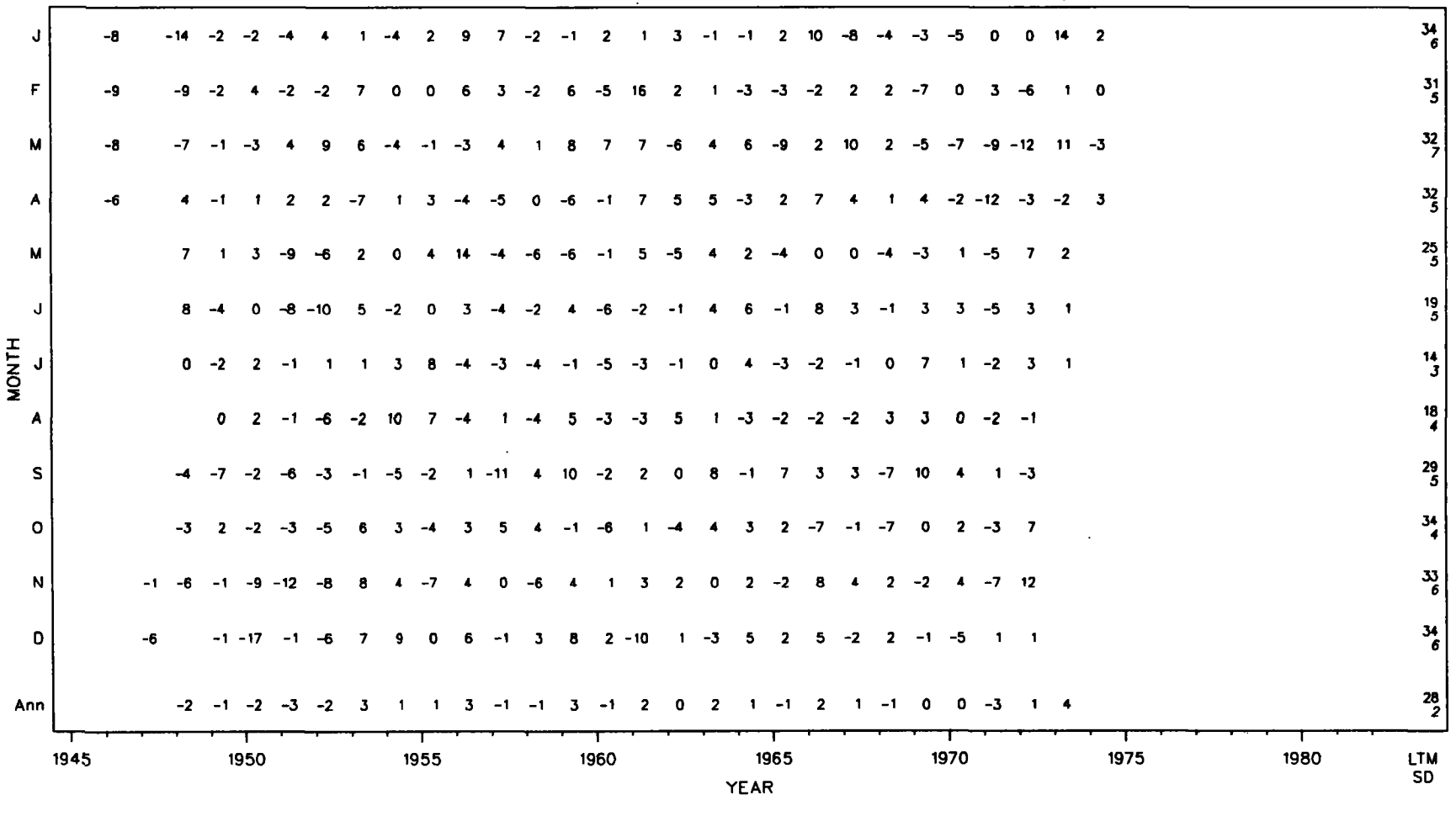
sunrise/sunset



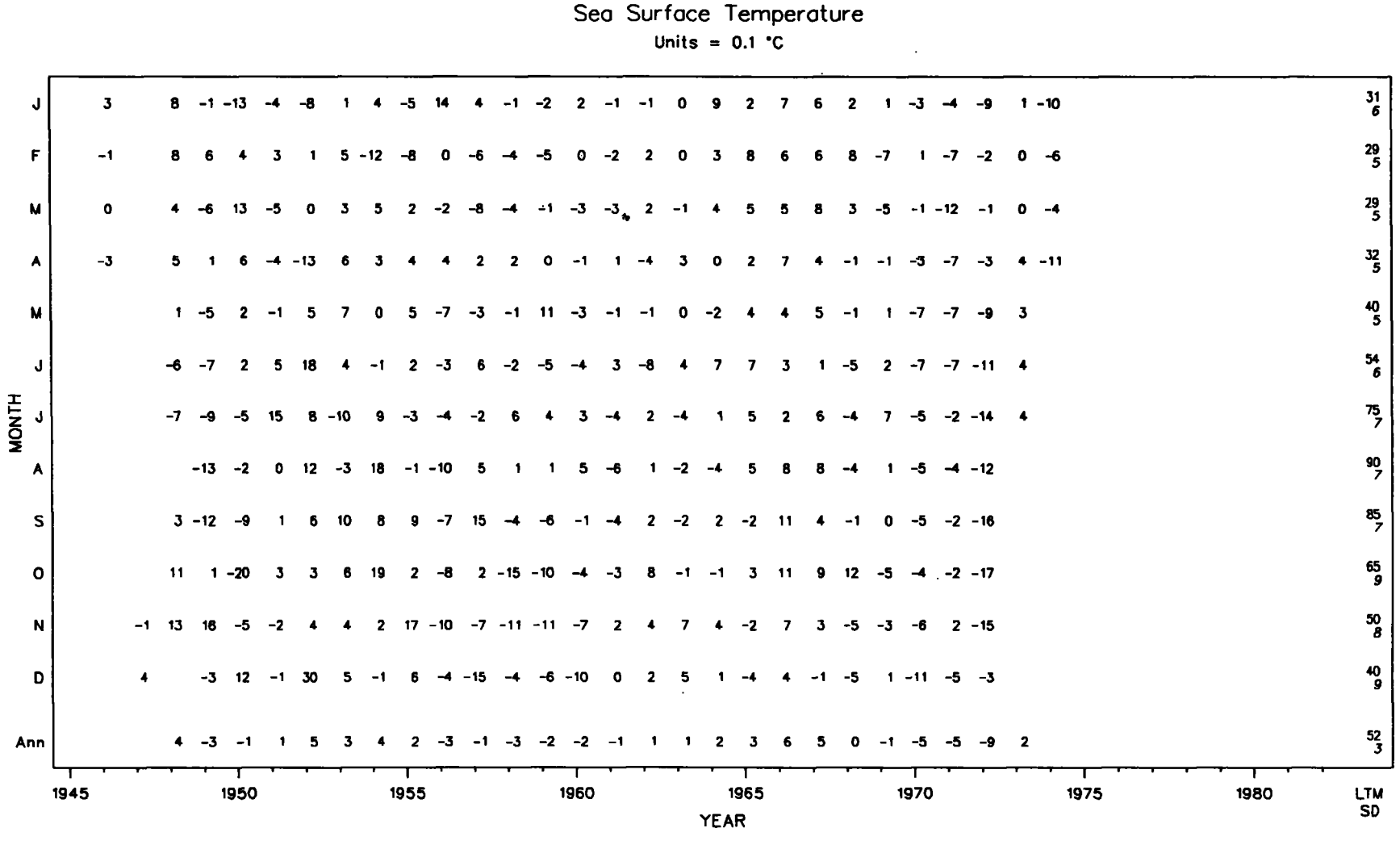
OWS Study Area B Anomalies

Surface Dew Point Depression

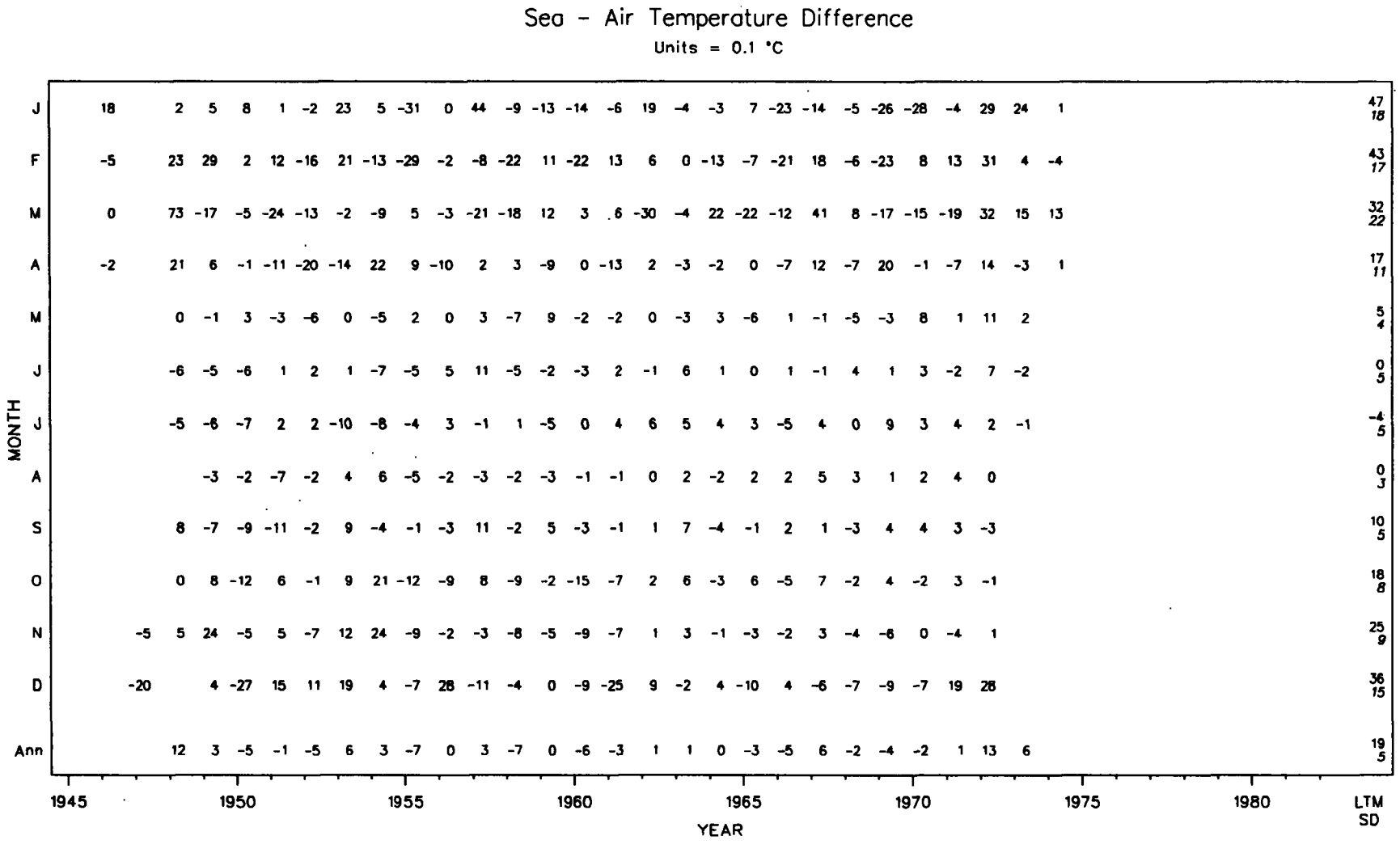
Units = 0.1 °C



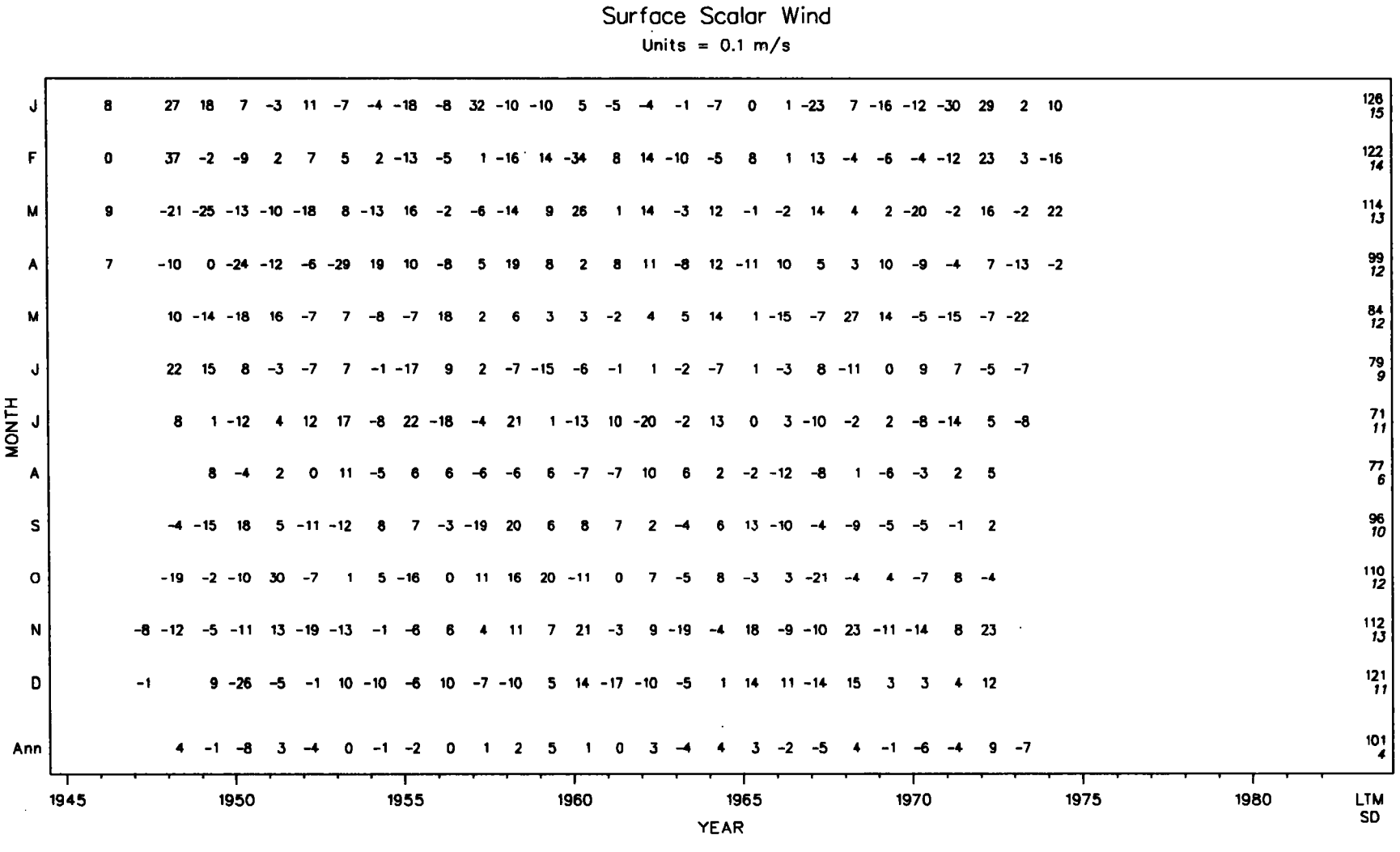
OWS Study Area B Anomalies



OWS Study Area B Anomalies



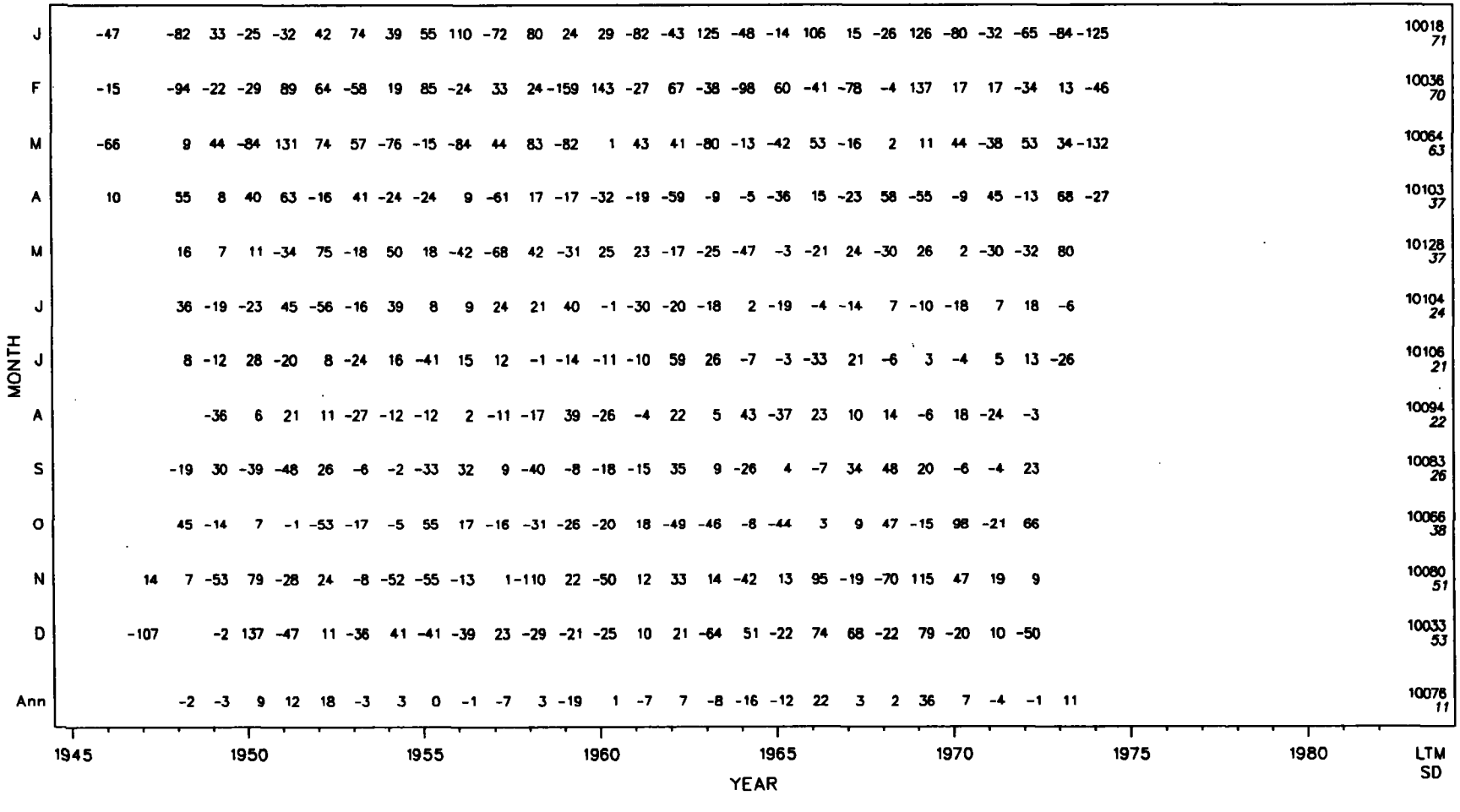
OWS Study Area B Anomalies



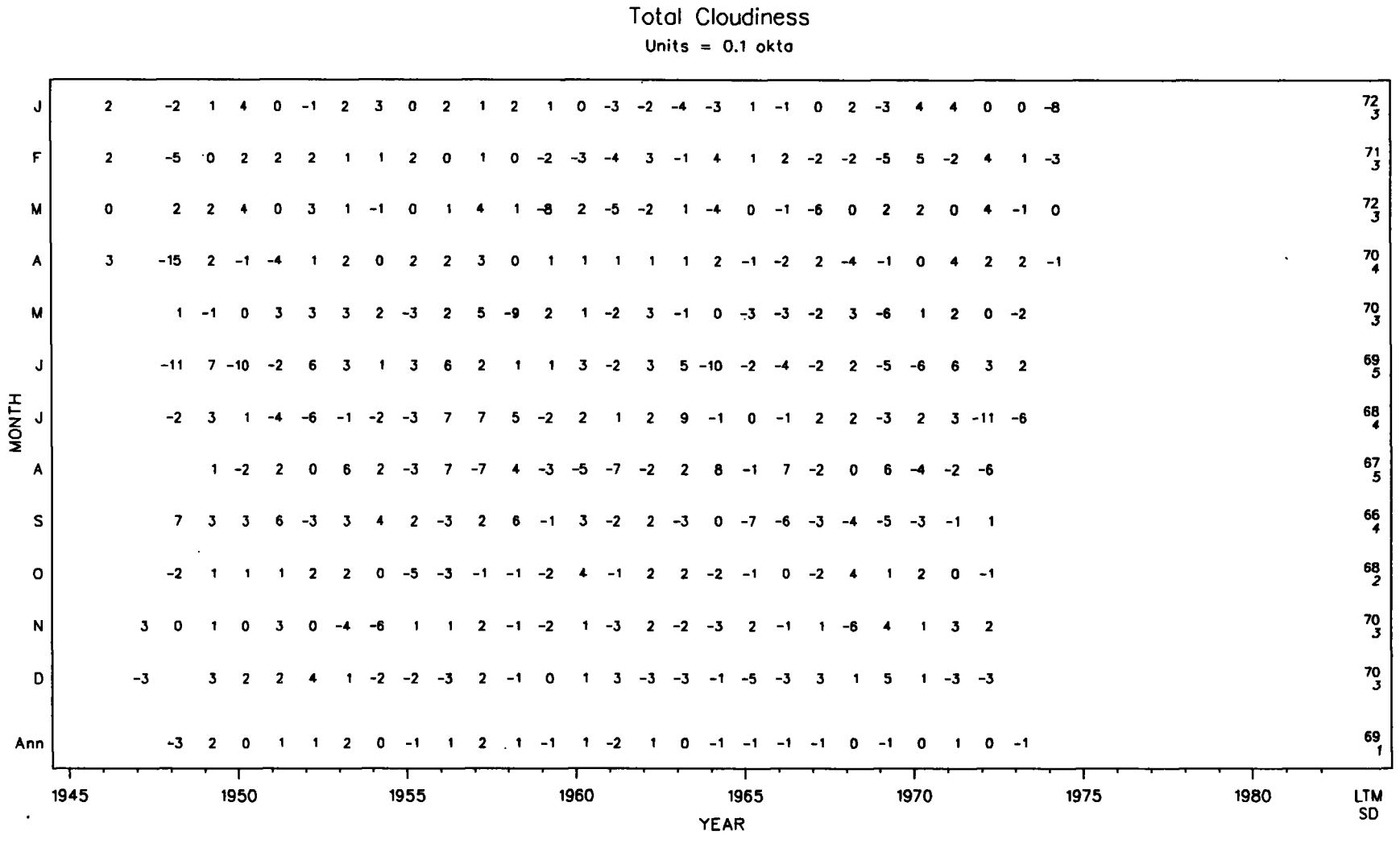
OWS Study Area B Anomalies

Sea Level Pressure

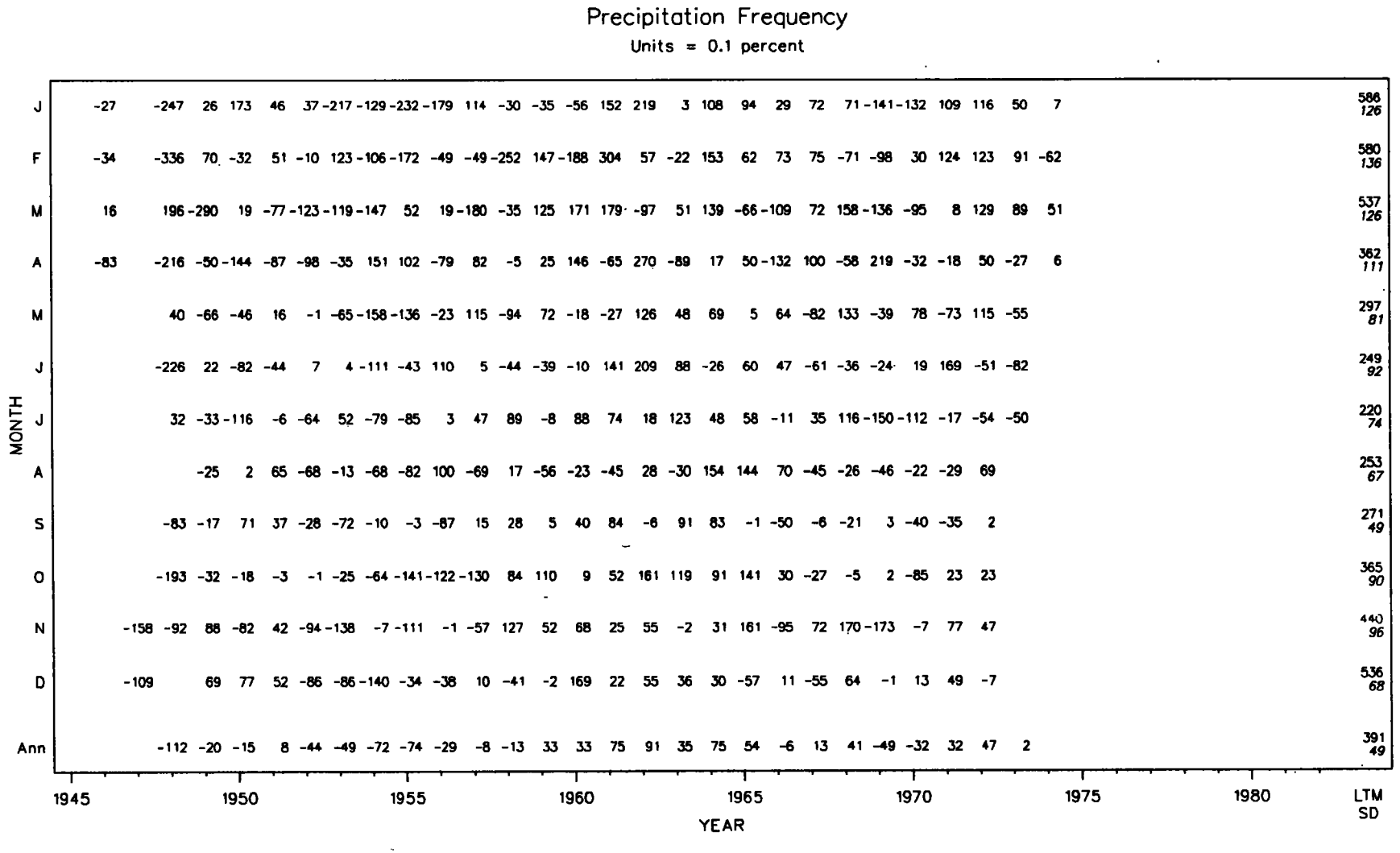
Units = 0.1 mb



OWS Study Area B Anomalies



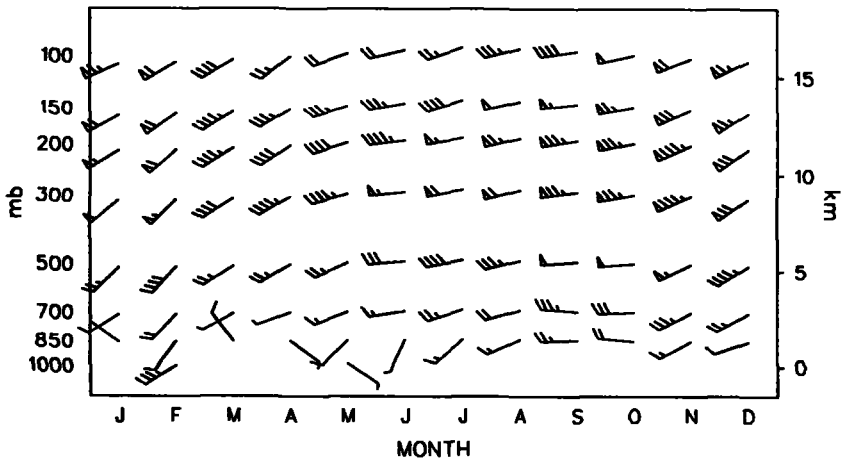
OWS Study Area B Anomalies



OWS Study Area B Anomalies

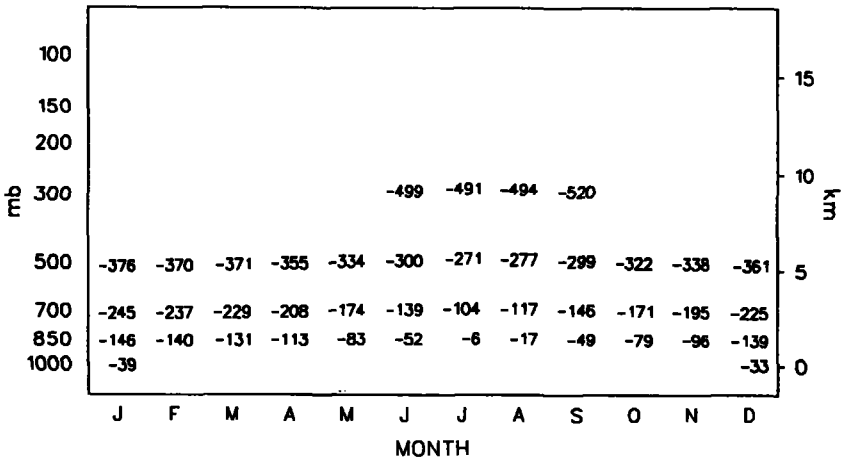
Wind

Full barb = 5 knots, Pennant = 25 knots



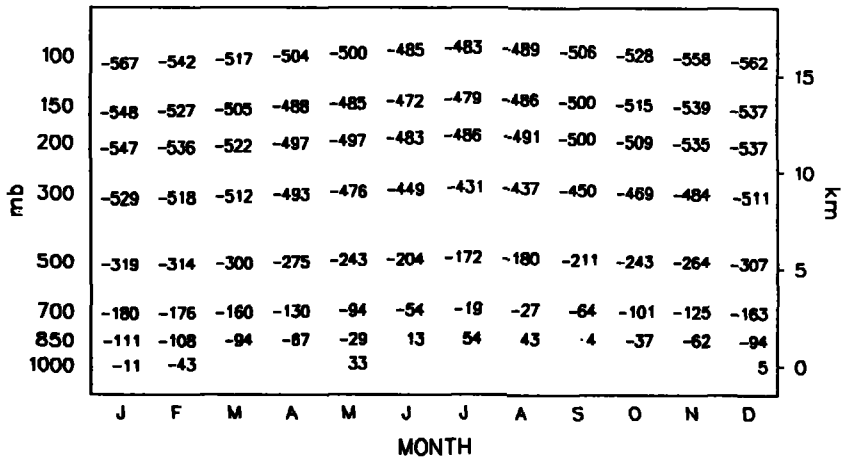
Dew Point Temperature

Units = 0.1 °C



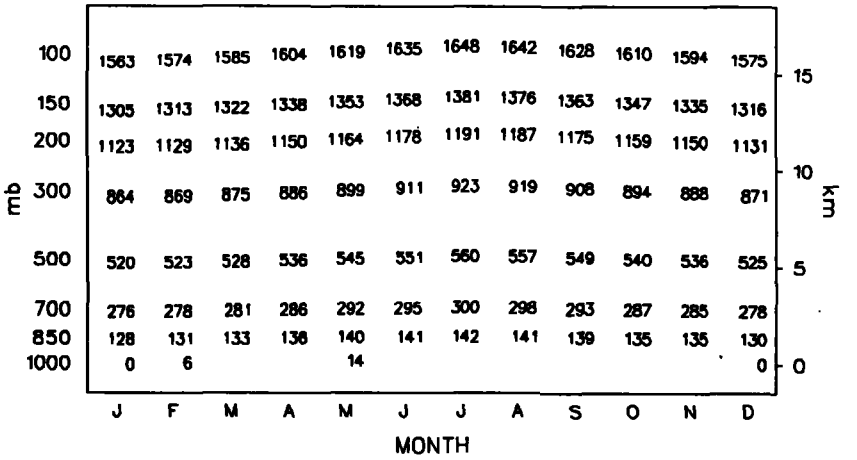
Air Temperature

Units = 0.1 °C



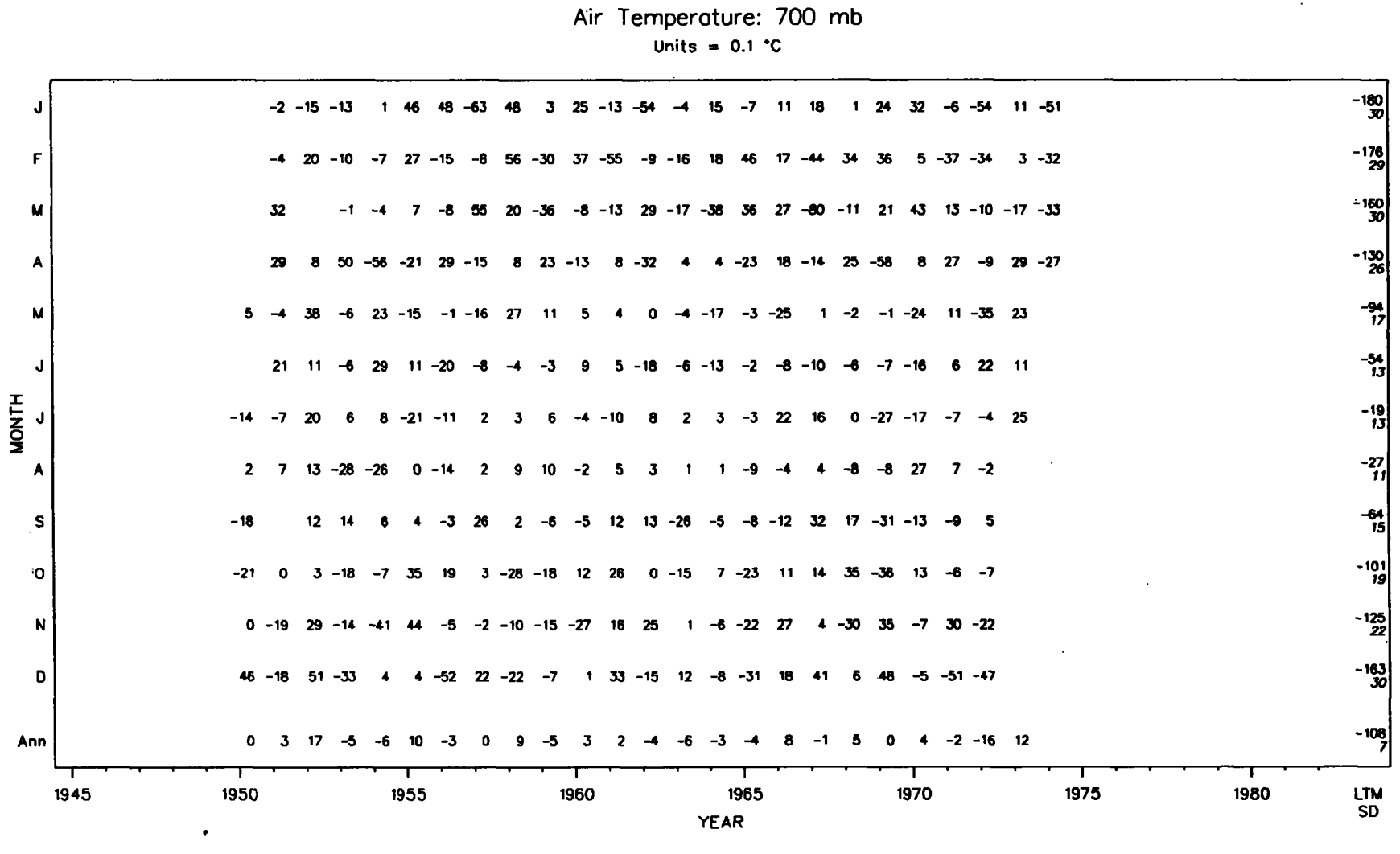
Pressure Height

Units = 10 m

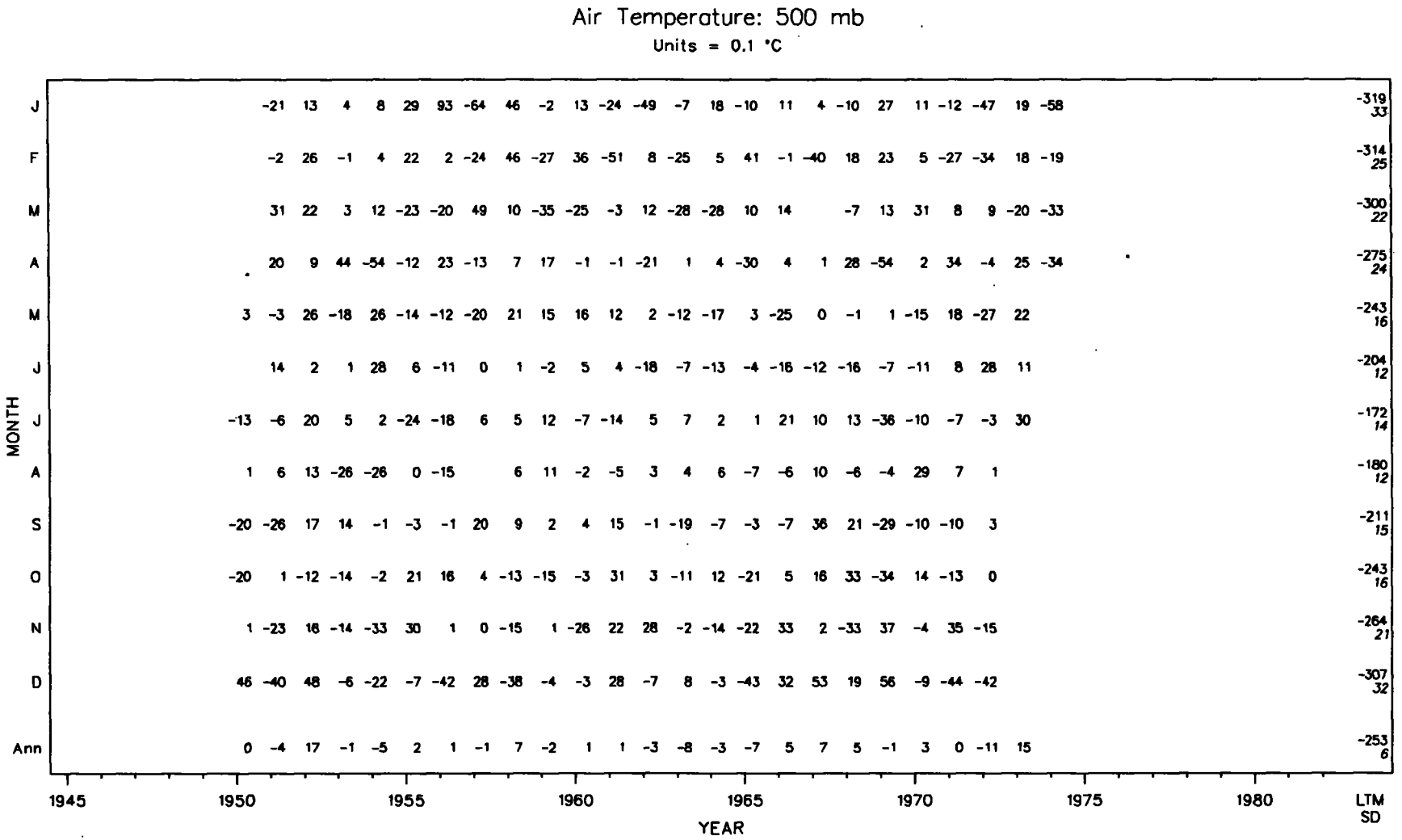


OWS Study Area B Upper Air Climatology

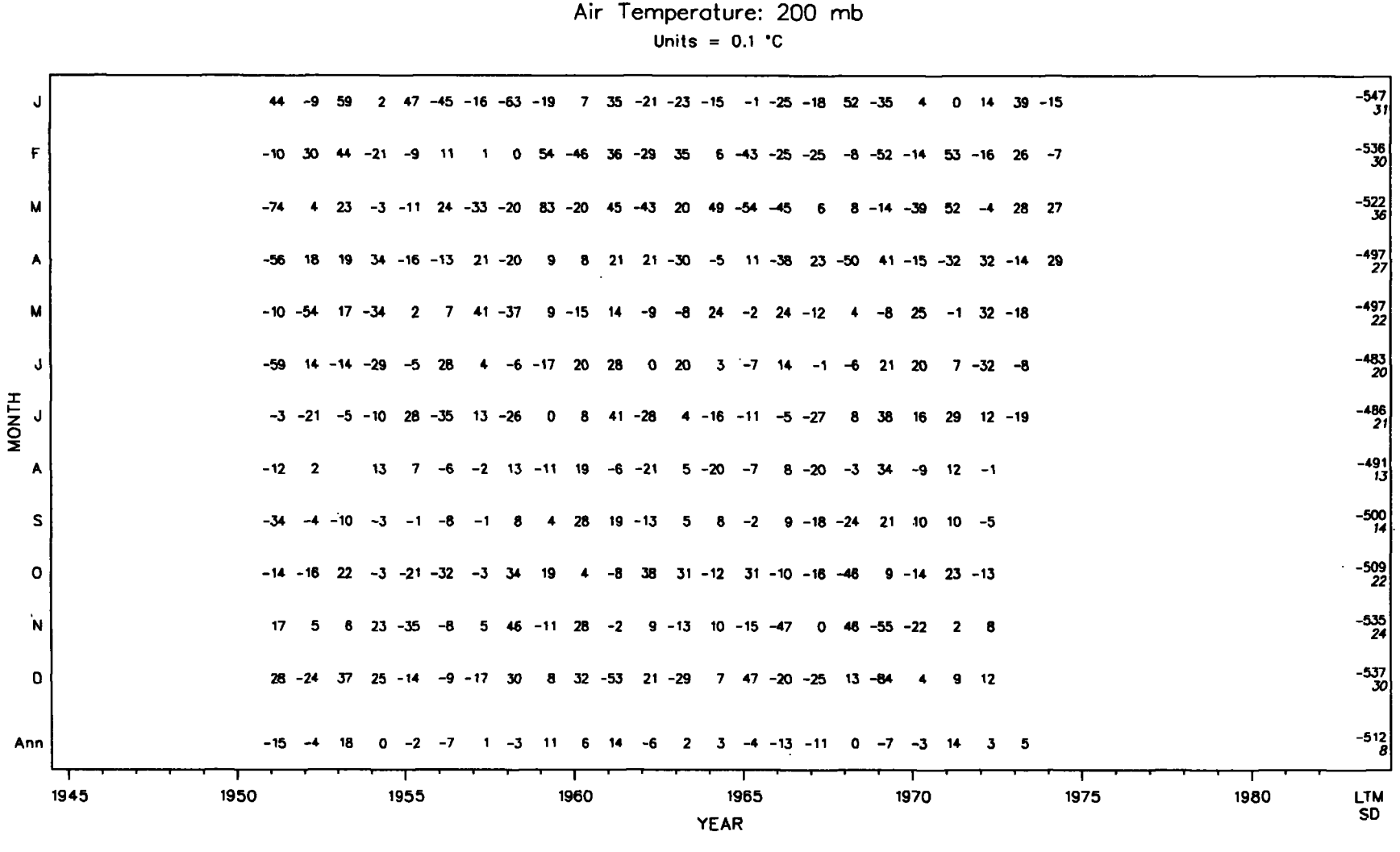
Mean plotted at actual height



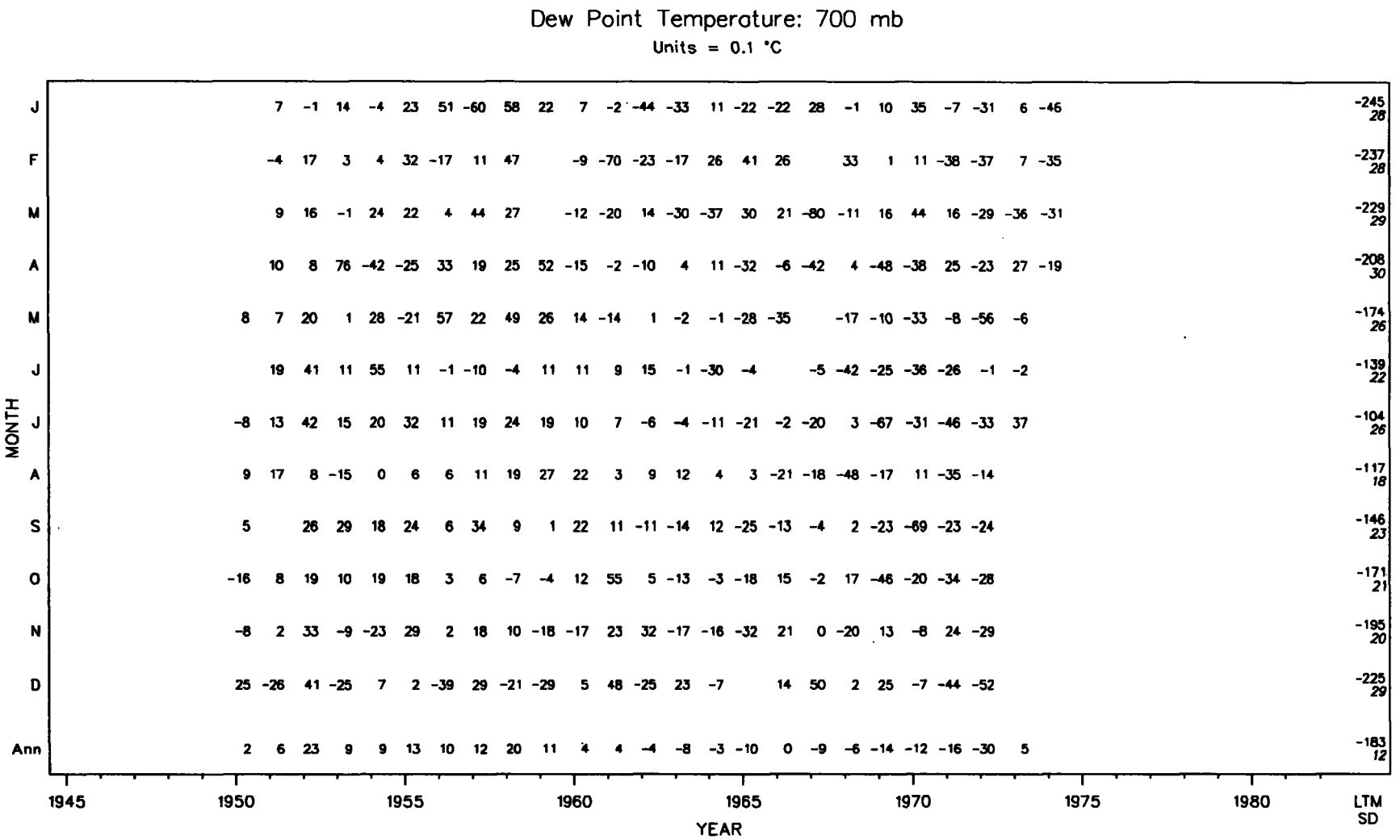
OWS Study Area B Anomalies



OWS Study Area B Anomalies



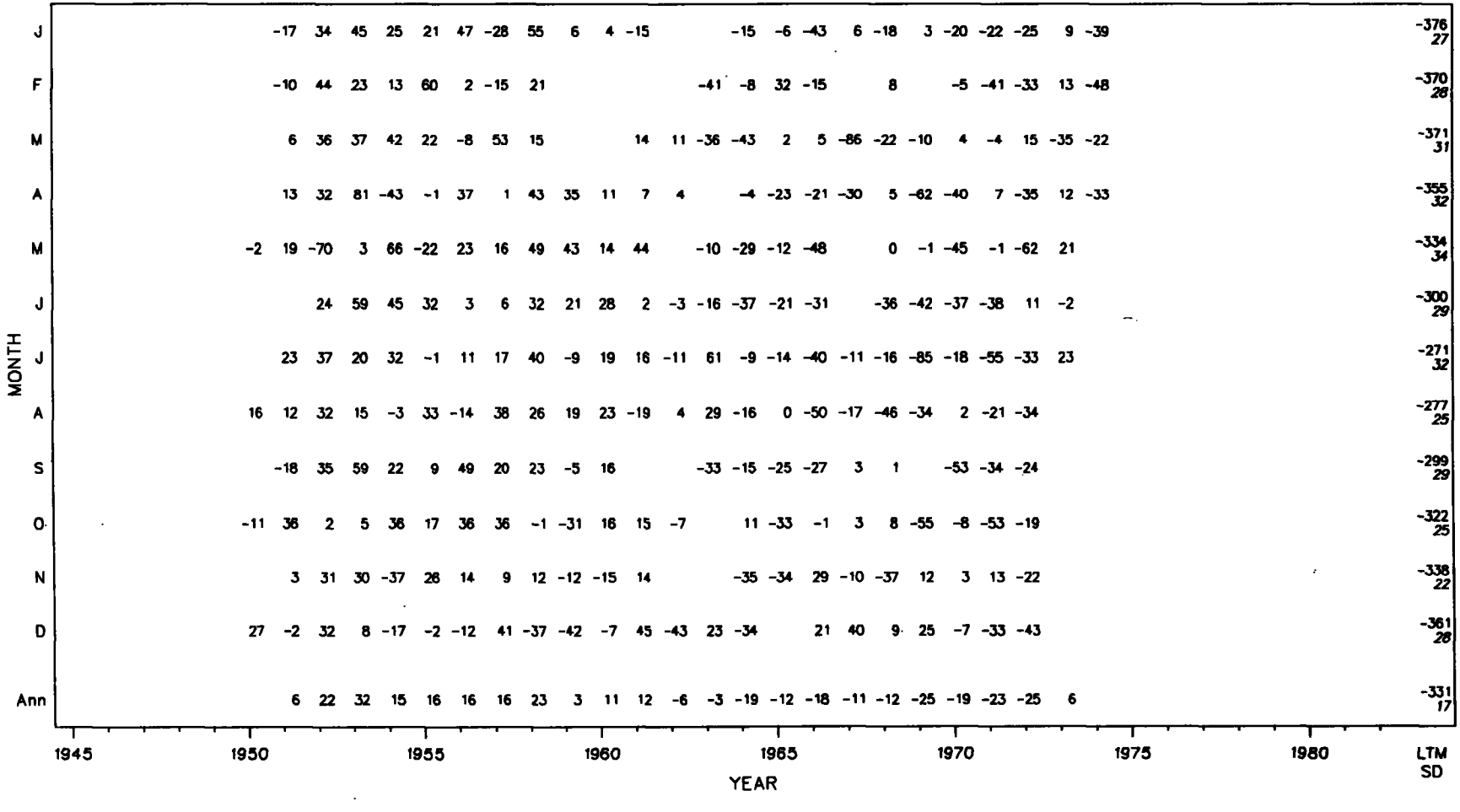
OWS Study Area B Anomalies



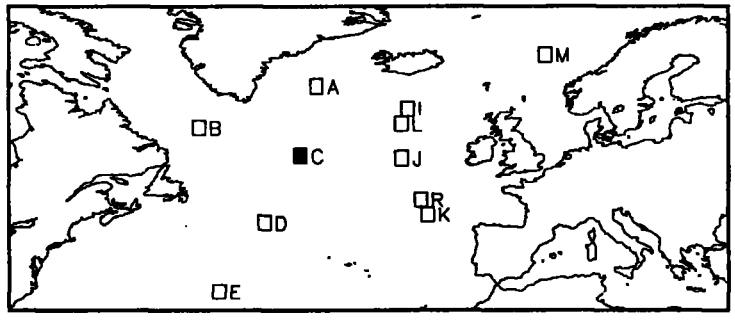
OWS Study Area B Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C

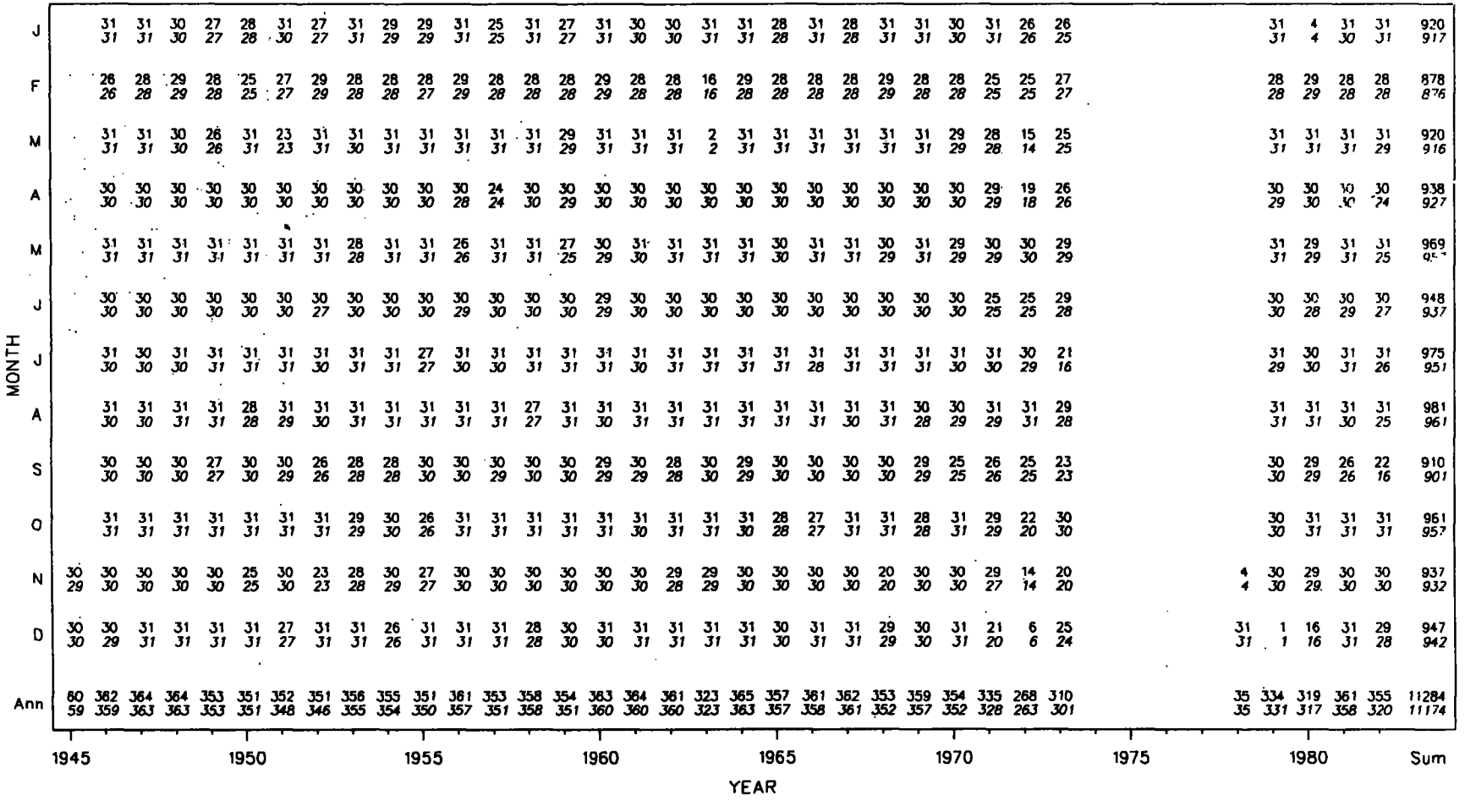


OWS Study Area B Anomalies



OWS C

51.8°N – 53.7°N, 36.4°W – 34.5°W
1945 – 1982

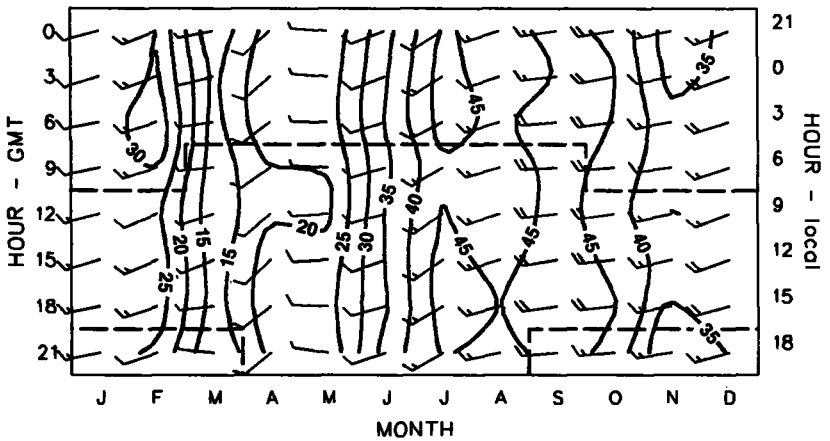


OWS Study Area C (52.8°N, 35.5°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



Pressure

Units = 0.1 mb

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	037	061	068	118	136	129	163	139	114	086	106	065	21
	154	*164*	*140*	*125*	*110*	*93*	*79*	*83*	*96*	*120*	*136*	*147*	
3	036	059	062	114	131	124	159	135	109	082	101	059	0
	153	*163*	*139*	*124*	*110*	*93*	*79*	*81*	*98*	*120*	*135*	*148*	
6	033	056	057	111	128	122	154	130	105	078	101	060	3
	152	*164*	*140*	*125*	*110*	*91*	*79*	*81*	*98*	*119*	*133*	*147*	
9	033	057	060	114	130	125	157	133	110	083	103	060	6
	154	*165*	*140*	*126*	*111*	*92*	*78*	*82*	*98*	*117*	*132*	*149*	
12	038	064	064	118	134	126	160	136	114	086	105	064	9
	156	*164*	*141*	*126*	*112*	*91*	*78*	*83*	*98*	*119*	*134*	*150*	
15	031	063	063	117	132	128	160	136	112	084	102	058	12
	157	*162*	*141*	*126*	*112*	*91*	*78*	*83*	*97*	*118*	*135*	*149*	
18	030	058	059	114	130	127	158	133	109	082	099	060	15
	157	*162*	*140*	*125*	*111*	*92*	*78*	*84*	*98*	*119*	*134*	*148*	
21	037	069	063	114	132	128	159	135	112	087	102	065	18
	157	*161*	*140*	*124*	*109*	*93*	*79*	*84*	*96*	*123*	*137*	*147*	

HOUR - GMT
HOUR - local
J F M A M J J A S O N D
MONTH

Total Cloudiness

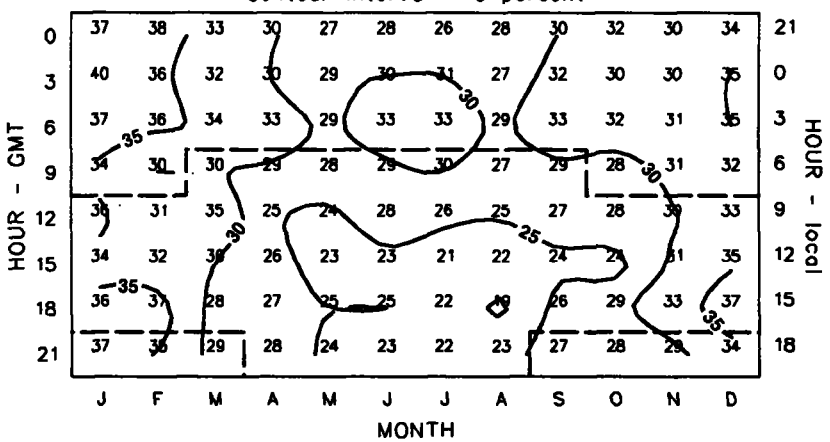
Units = 0.1 okta

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	62	62	63	64	66	70	71	68	63	62	63	61	21
	24	*24*	*24*	*24*	*22*	*18*	*18*	*20*	*24*	*24*	*23*	*24*	
3	63	60	64	62	65	69	70	67	63	62	62	63	0
	23	*25*	*23*	*25*	*23*	*21*	*20*	*22*	*23*	*23*	*23*	*23*	
6	62	61	64	65	68	72	73	69	62	62	62	62	3
	23	*24*	*23*	*23*	*19*	*15*	*16*	*20*	*24*	*24*	*23*	*23*	
9	62	65	67	68	68	72	73	71	67	67	66	62	6
	23	*20*	*18*	*18*	*19*	*16*	*15*	*17*	*18*	*19*	*20*	*22*	
12	67	66	67	68	68	71	72	69	67	66	67	67	9
	17	*18*	*19*	*18*	*19*	*16*	*17*	*17*	*18*	*18*	*17*	*17*	
15	68	67	67	67	68	69	71	67	66	66	67	68	12
	16	*18*	*18*	*19*	*18*	*18*	*18*	*20*	*18*	*19*	*17*	*17*	
18	68	66	67	67	67	69	70	68	66	66	68	68	15
	15	*19*	*18*	*19*	*20*	*18*	*18*	*19*	*19*	*18*	*17*	*17*	
21	64	63	67	67	67	70	71	70	66	64	64	64	18
	23	*22*	*19*	*18*	*20*	*18*	*18*	*18*	*19*	*21*	*23*	*22*	

HOUR - GMT
HOUR - local
J F M A M J J A S O N D
MONTH

Precipitation Frequency

Units = percent
Contour interval = 5 percent



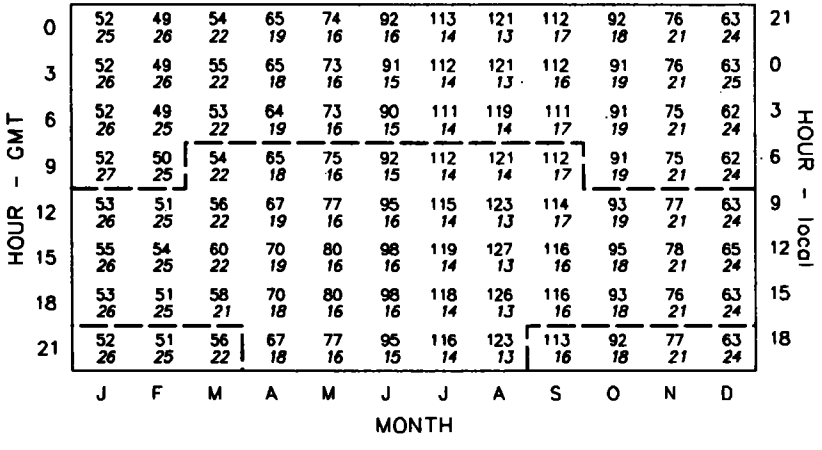
OWS Study Area C Surface Climatology

upper number = mean
lower number = standard deviation

data contours
sunrise/sunset

Air Temperature

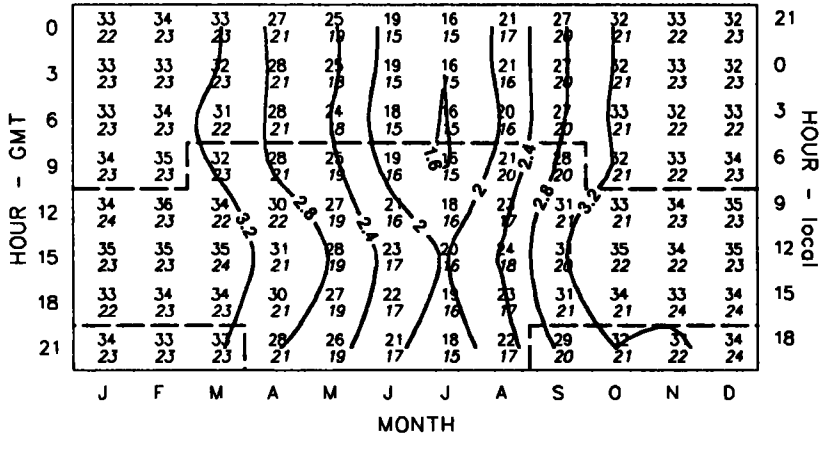
Units = 0.1 °C



Dew Point Depression

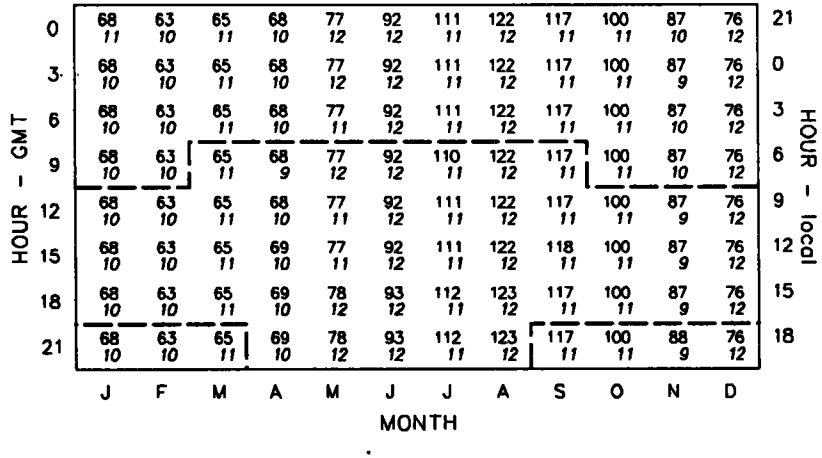
Units = 0.1 °C

Contour interval = 0.4 °C



Sea Surface Temperature

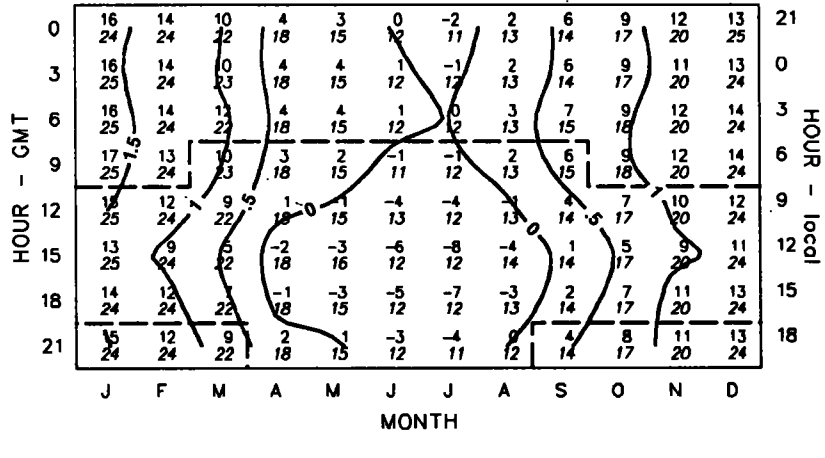
Units = 0.1 °C



Sea – Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



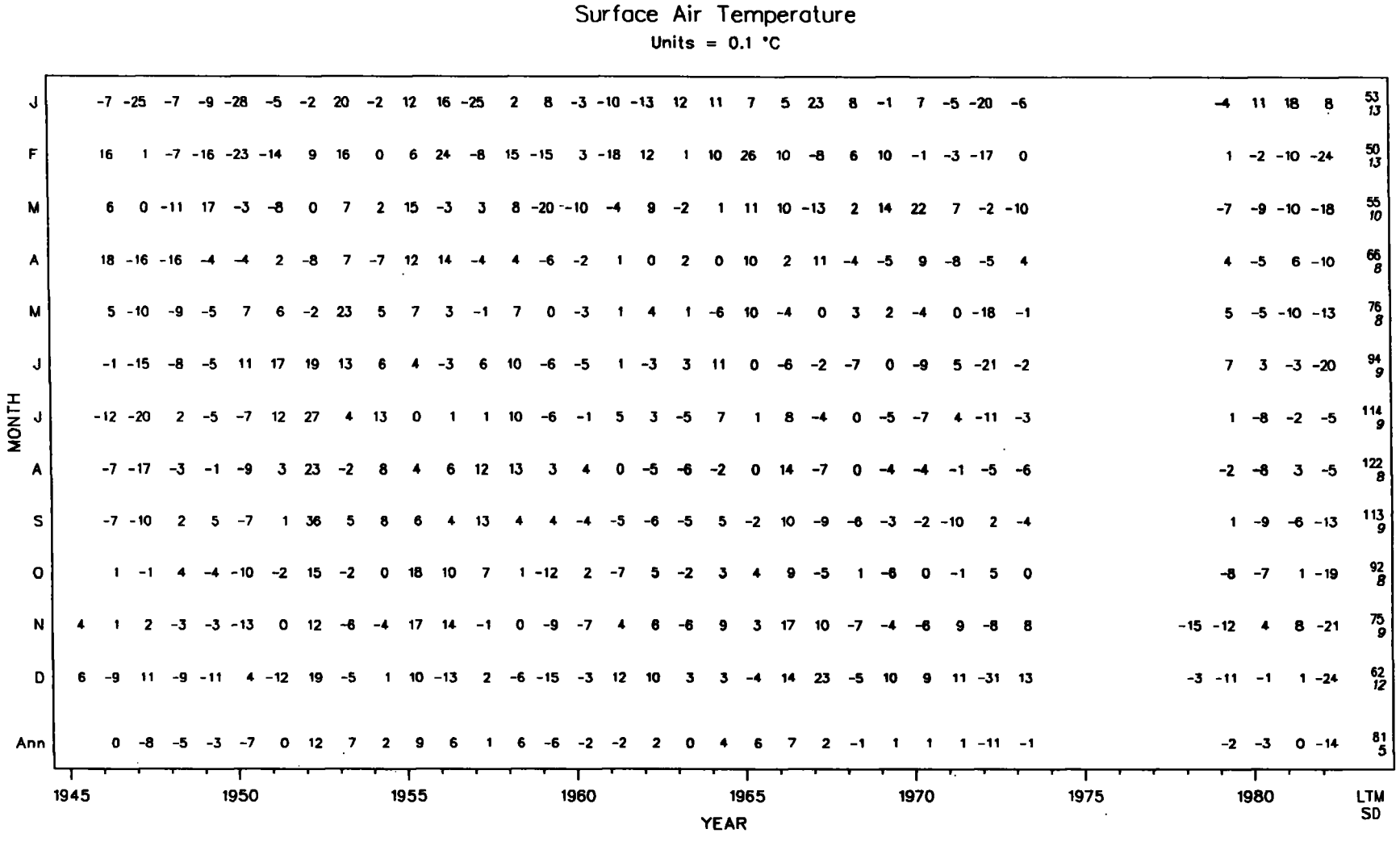
OWS Study Area C Surface Climatology

upper number = mean

lower number = standard deviation

data contours

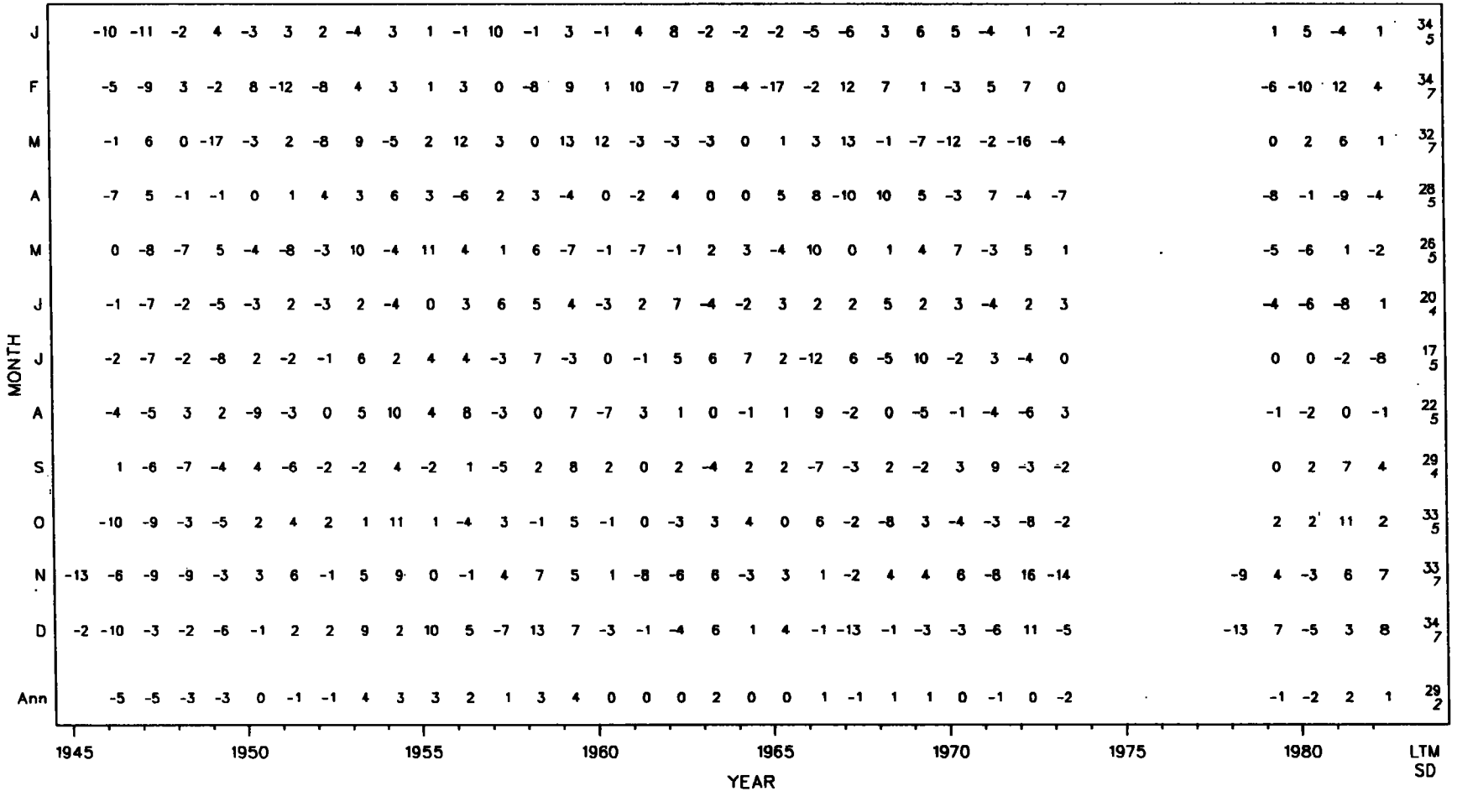
sunrise/sunset



OWS Study Area C Anomalies

Surface Dew Point Depression

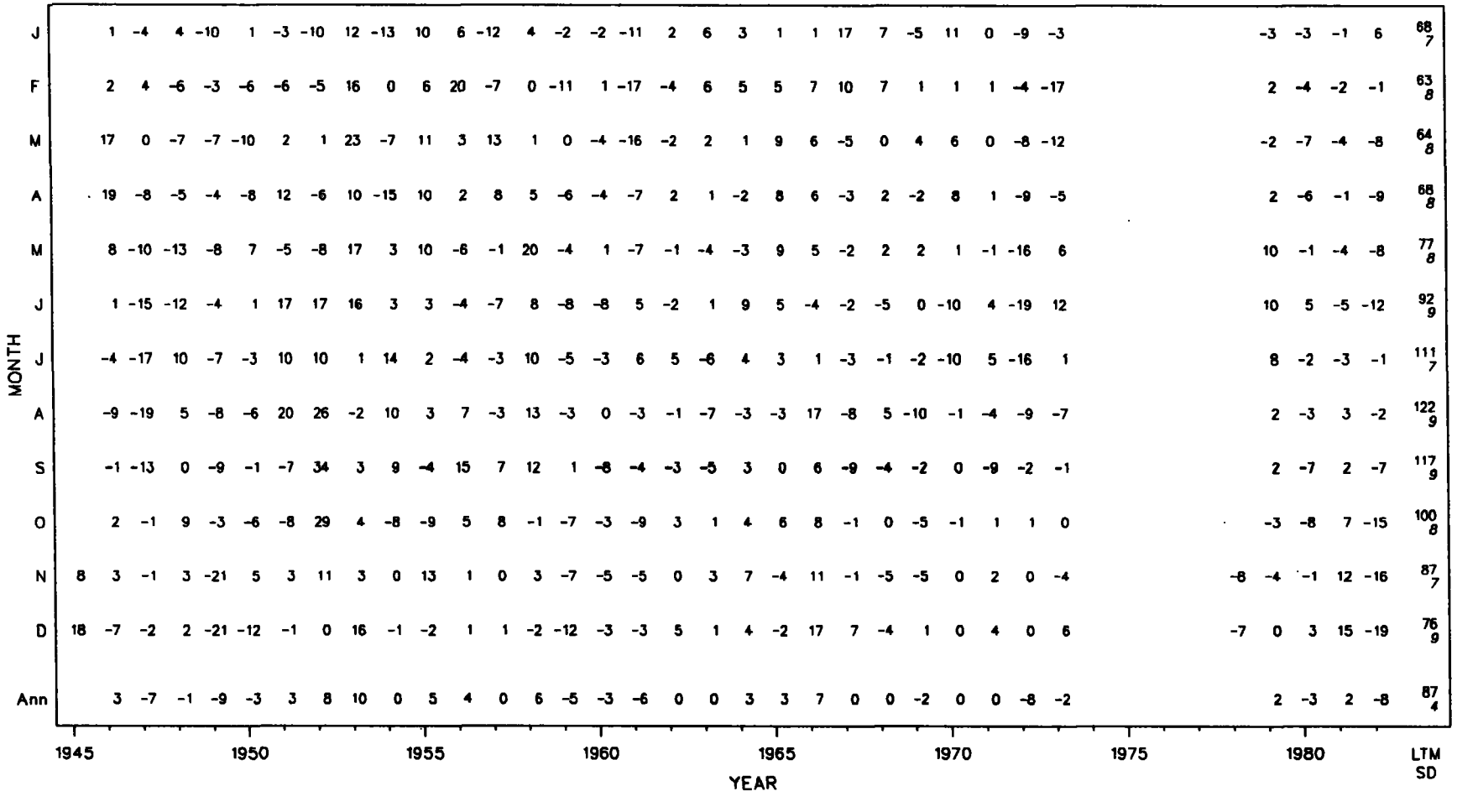
Units = 0.1 °C



OWS Study Area C Anomalies

Sea Surface Temperature

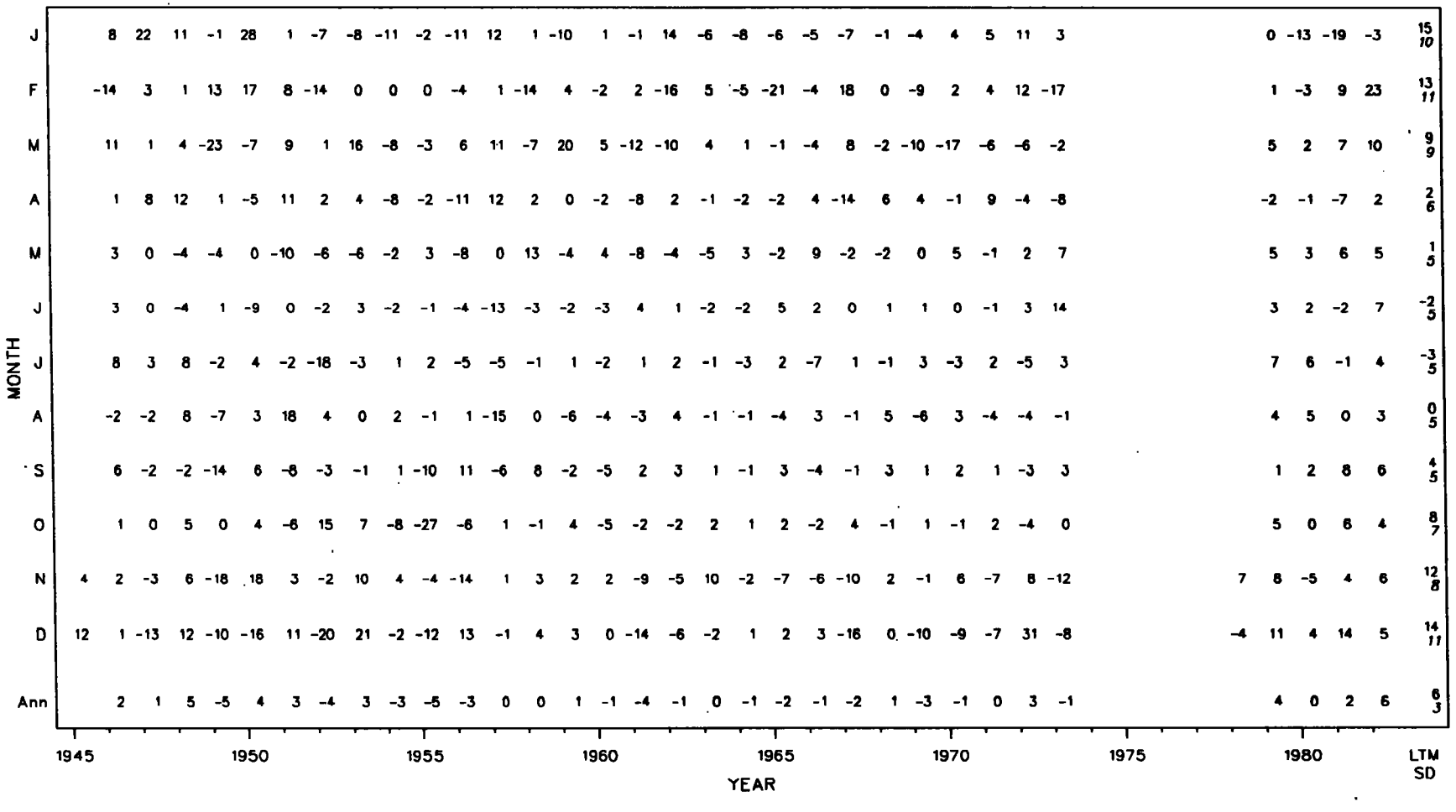
Units = 0.1 °C



OWS Study Area C Anomalies

Sea - Air Temperature Difference

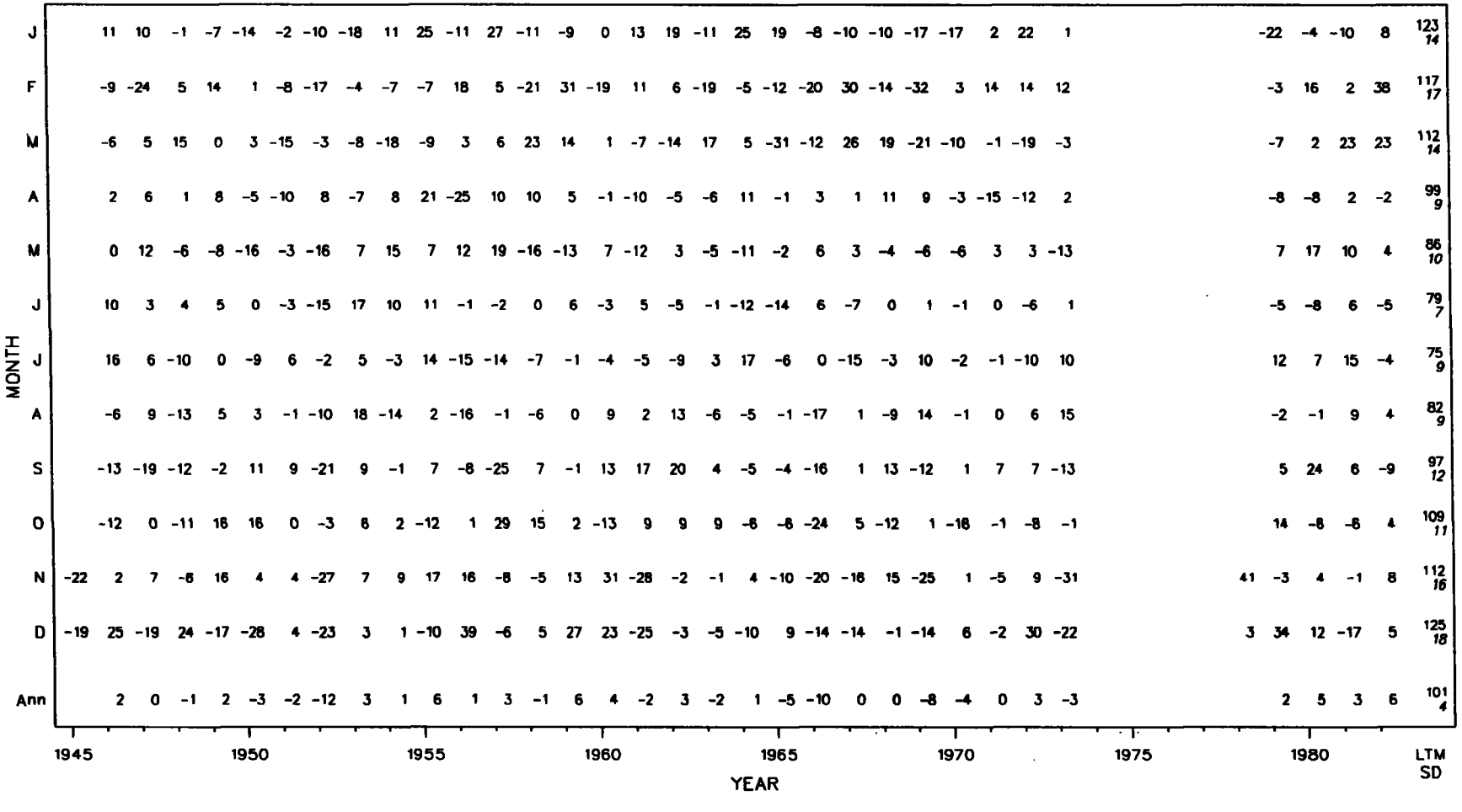
Units = 0.1 °C



OWS Study Area C Anomalies

Surface Scalar Wind

Units = 0.1 m/s



OWS Study Area C Anomalies

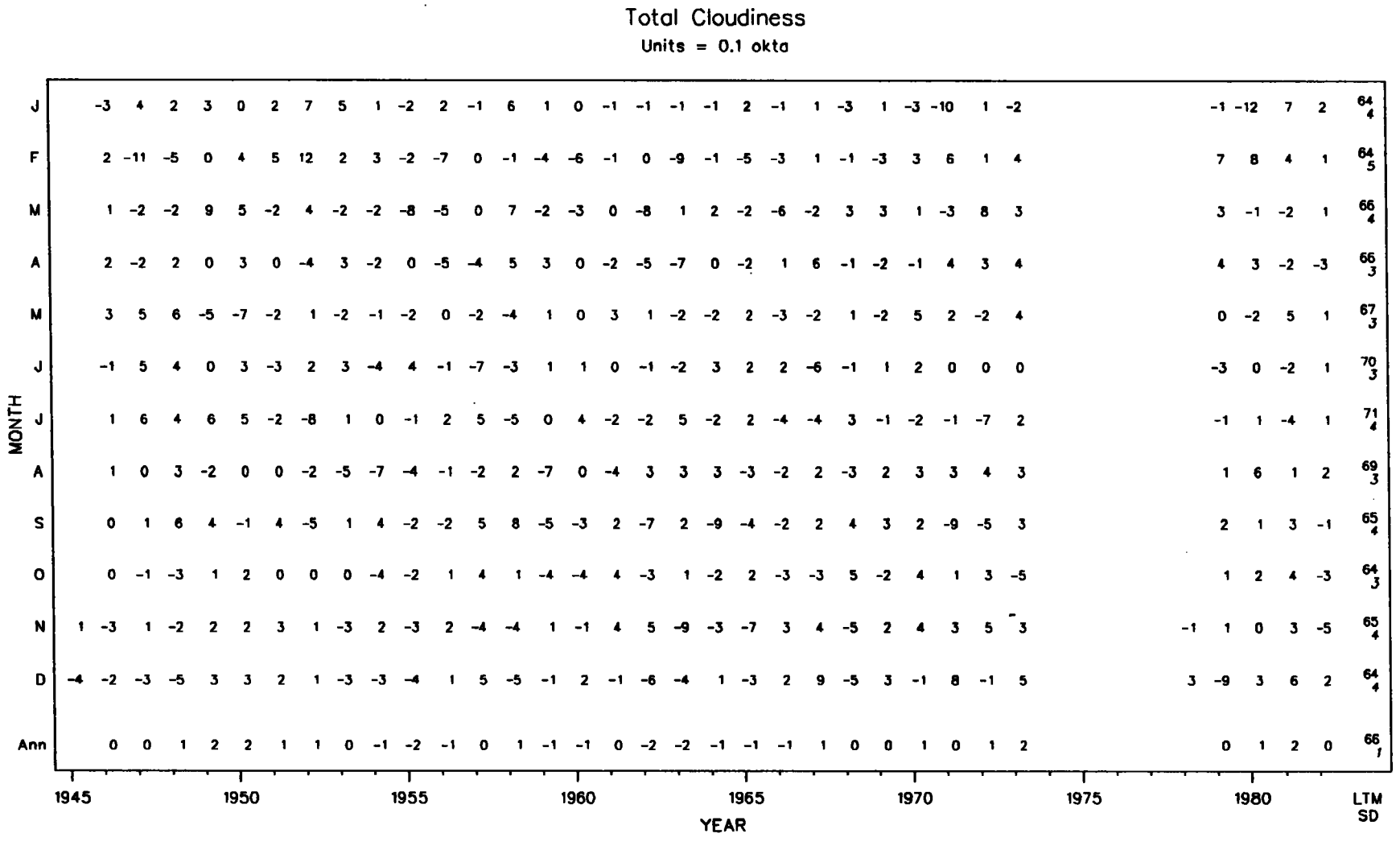
Sea Level Pressure

Units = 0.1 mb

MONTH	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	LTM SD
J	-42	-90	-77	98	-58	-16	100	65	73	-59	104	-58	74	14	-28	-51	-1	128	-37	-10	-79	13	47	69	-129	-125	-53	-41							123	-24	107	-37	10032 74
F	91	-12	10	4	-45	73	69	21	57	50	28	-134	-19	-50	41	-119	122	40	-108	103	-219	-88	44	140	122	3	-50	111							-142	-97	101	-146	10080 93
M	-18	-71	-44	89	-50	61	-49	57	-43	40	-40	-79	-35	-81	-83	37	-29	-26	-84	-67	90	27	69	-20	135	35	51	12							117	75	-88	8	10064 65
A	77	-84	36	-34	10	59	-43	69	34	-92	41	-28	30	-49	-53	-170	-20	-72	16	5	-108	26	7	-40	-30	66	23	98							64	66	46	49	10116 62
M	0	-58	31	27	15	-2	29	-24	2	-36	25	-31	83	-14	-49	20	11	41	-71	-67	-15	38	-38	10	21	14	-23	59							10	-33	19	5	10131 36
J	4	-75	-33	-57	-11	-7	22	9	28	-25	48	-28	-12	-20	15	17	-3	-9	5	-56	-28	15	-28	-4	8	51	73	14							39	37	17	-10	10127 32
J	-9	-43	7	-17	-59	-8	43	-31	16	0	-16	19	-50	1	-7	16	32	-2	20	-2	64	3	7	-12	-18	3	1	23							12	-5	-6	18	10159 25
A	34	9	-17	-3	-11	9	21	-37	-15	12	42	26	-45	32	-41	12	3	23	11	-9	-1	2	-28	-3	24	12	10	-41							2	-43	1	7	10134 24
S	26	32	-32	36	-14	-61	65	-7	3	-12	5	8	-47	-14	16	-36	3	36	-19	7	-24	17	-32	44	-2	-9	35	15							-18	-20	-3	1	10111 28
O	-8	-46	29	-41	-22	13	-30	-28	-5	44	49	6	8	-25	11	7	-1	-49	51	-27	66	-2	-103	-43	58	-41	95	34							-34	-9	90	-51	10084 45
N	-19	-57	-55	-124	-29	41	-12	59	-37	-22	4	43	-10	-33	28	-122	48	76	-31	-45	24	139	62	-86	139	57	84	21	33						-120	0	-43	7	-15	10099 65
D	-70	-38	-24	-81	45	133	-29	75	-11	28	-104	-77	57	-13	-55	42	-64	32	-33	105	-61	58	61	-19	139	62	8	-22	93						-148	-137	43	-9	14	10057 71
Ann	5	-43	-25	10	-6	7	30	4	13	-15	21	-21	-5	-19	-21	-24	19	4	-13	-13	-5	15	-13	35	26	8	13	34							3	-4	24	-13	10098 19

YEAR

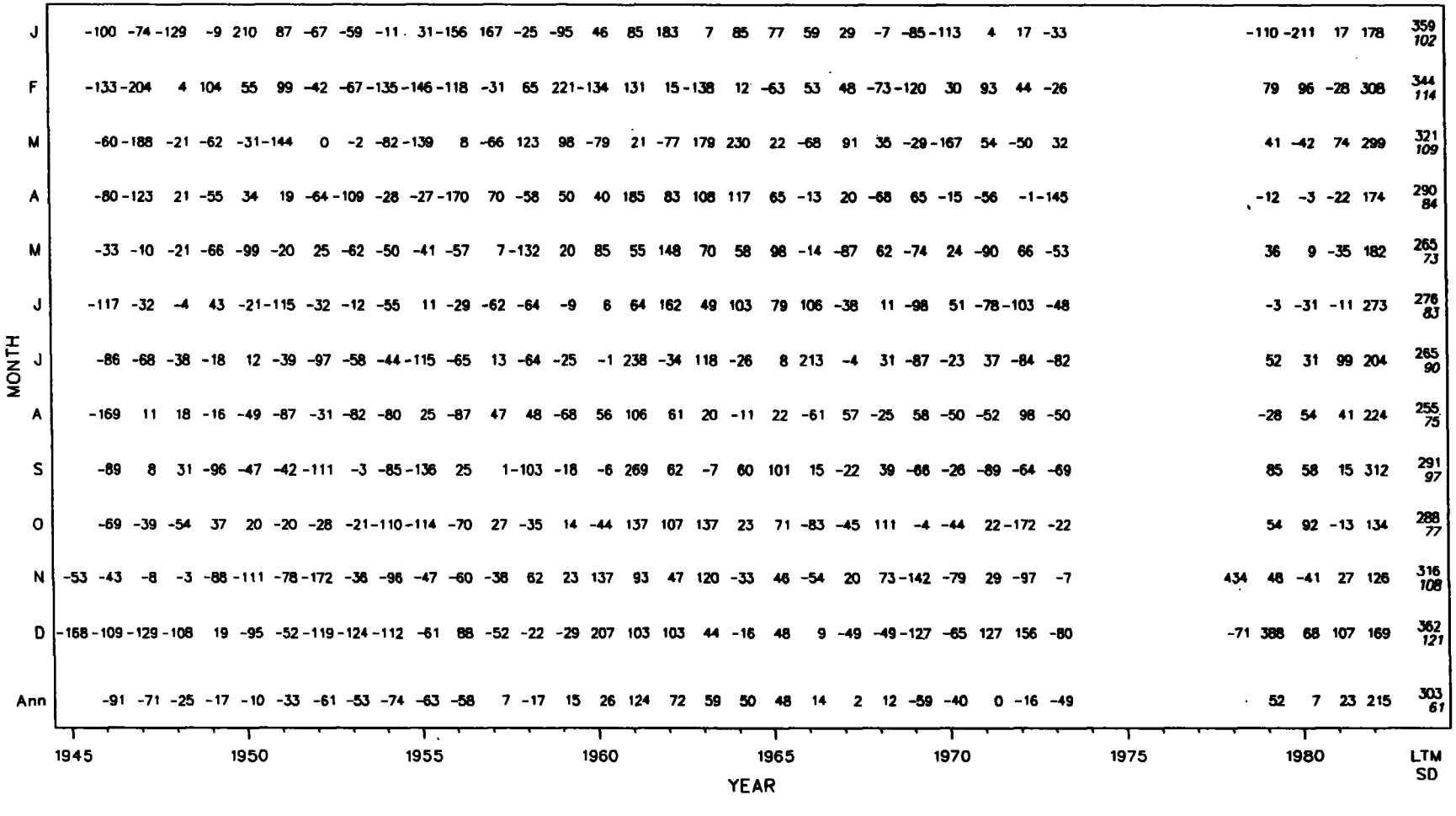
OWS Study Area C Anomalies



OWS Study Area C Anomalies

Precipitation Frequency

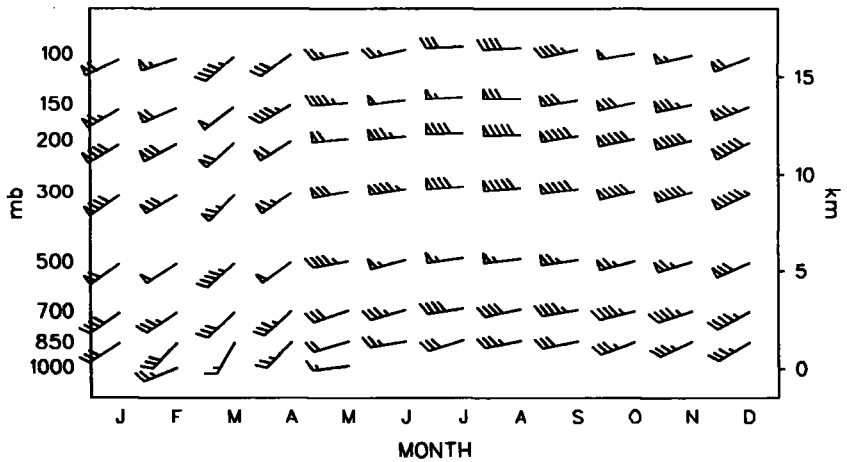
Units = 0.1 percent



OWS Study Area C Anomalies

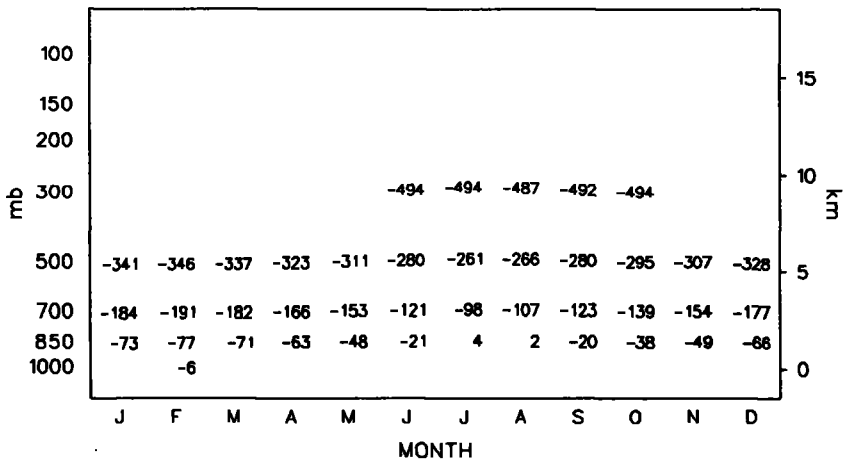
Wind

Full barb = 5 knots, Pennant = 25 knots



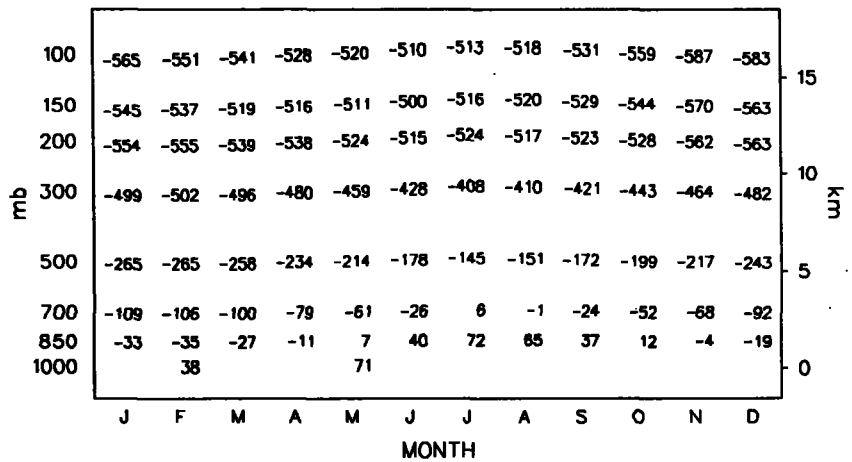
Dew Point Temperature

Units = 0.1 °C



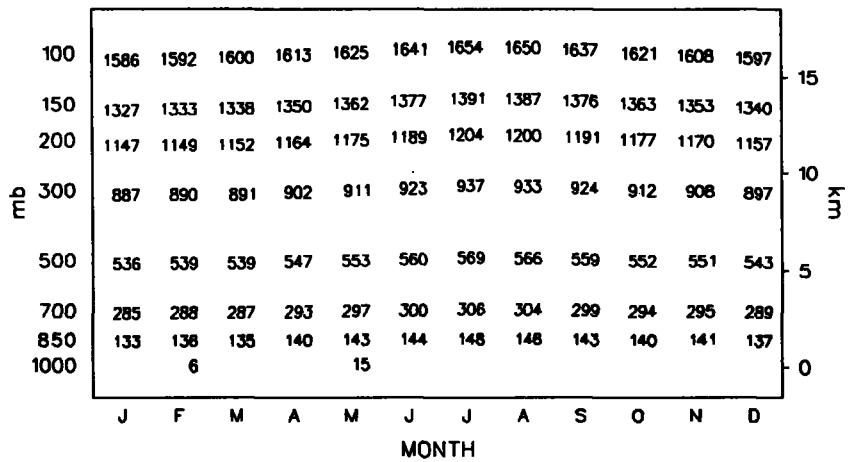
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m

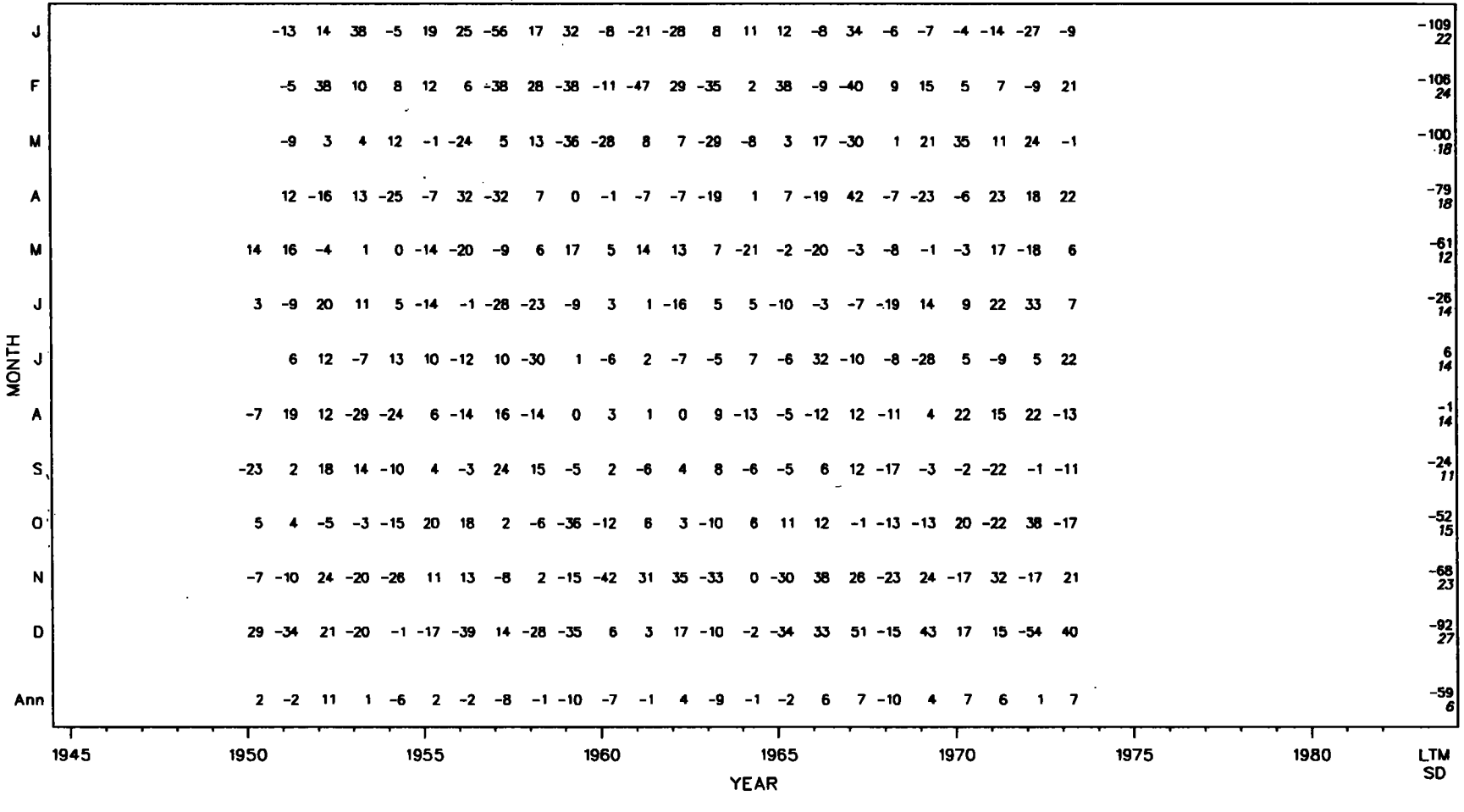


OWS Study Area C Upper Air Climatology

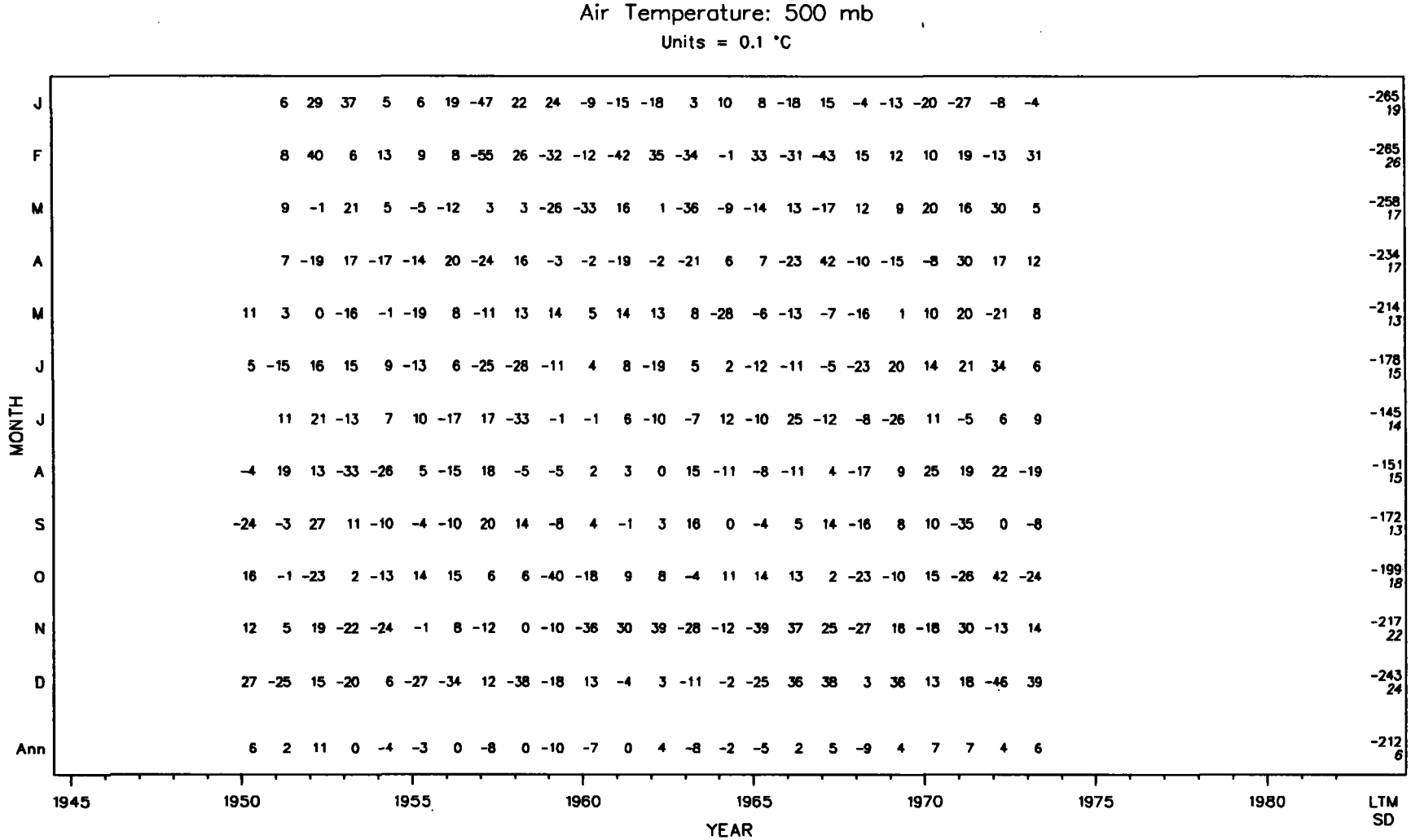
Mean plotted at actual height

Air Temperature: 700 mb

Units = 0.1 °C



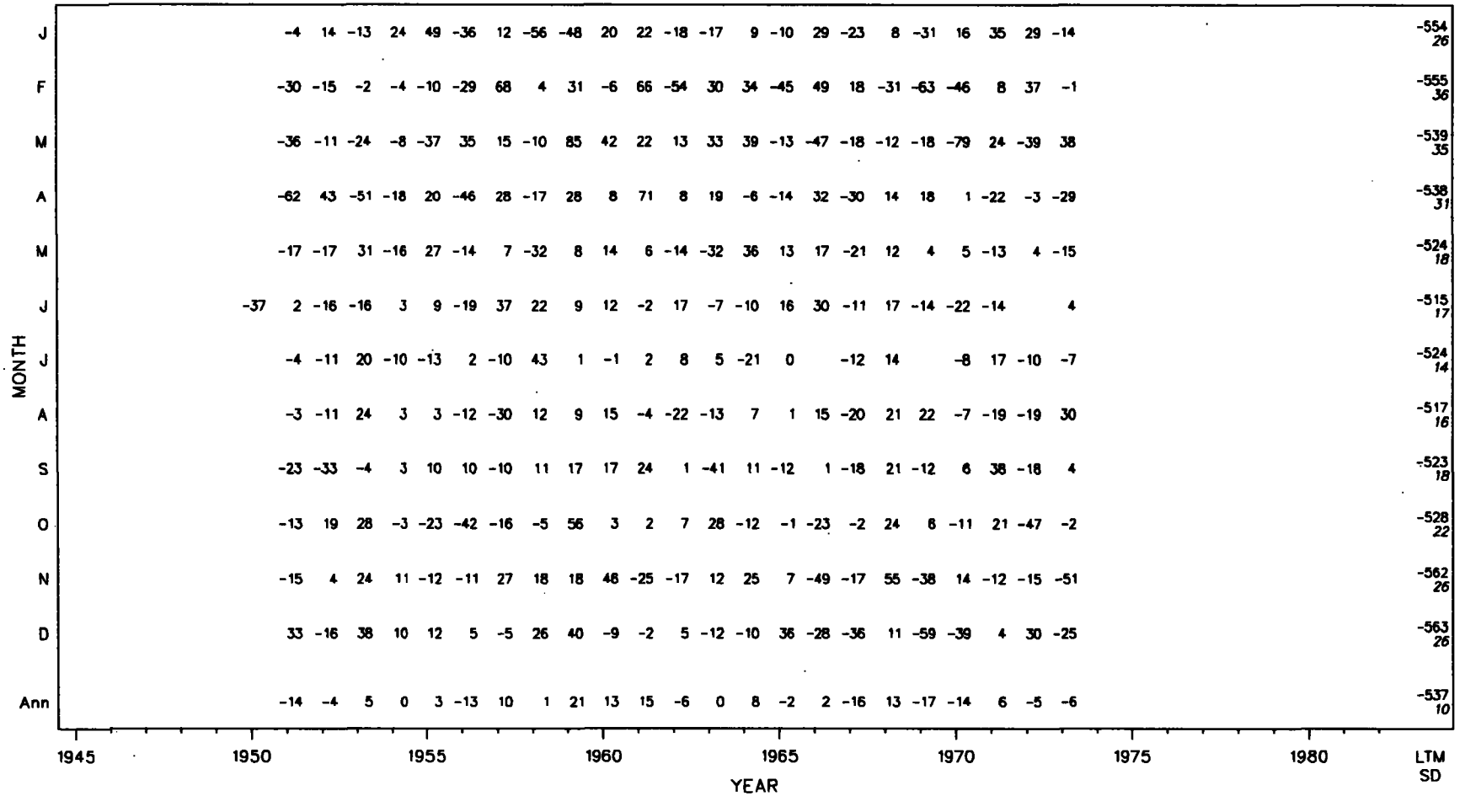
OWS Study Area C Anomalies



OWS Study Area C Anomalies

Air Temperature: 200 mb

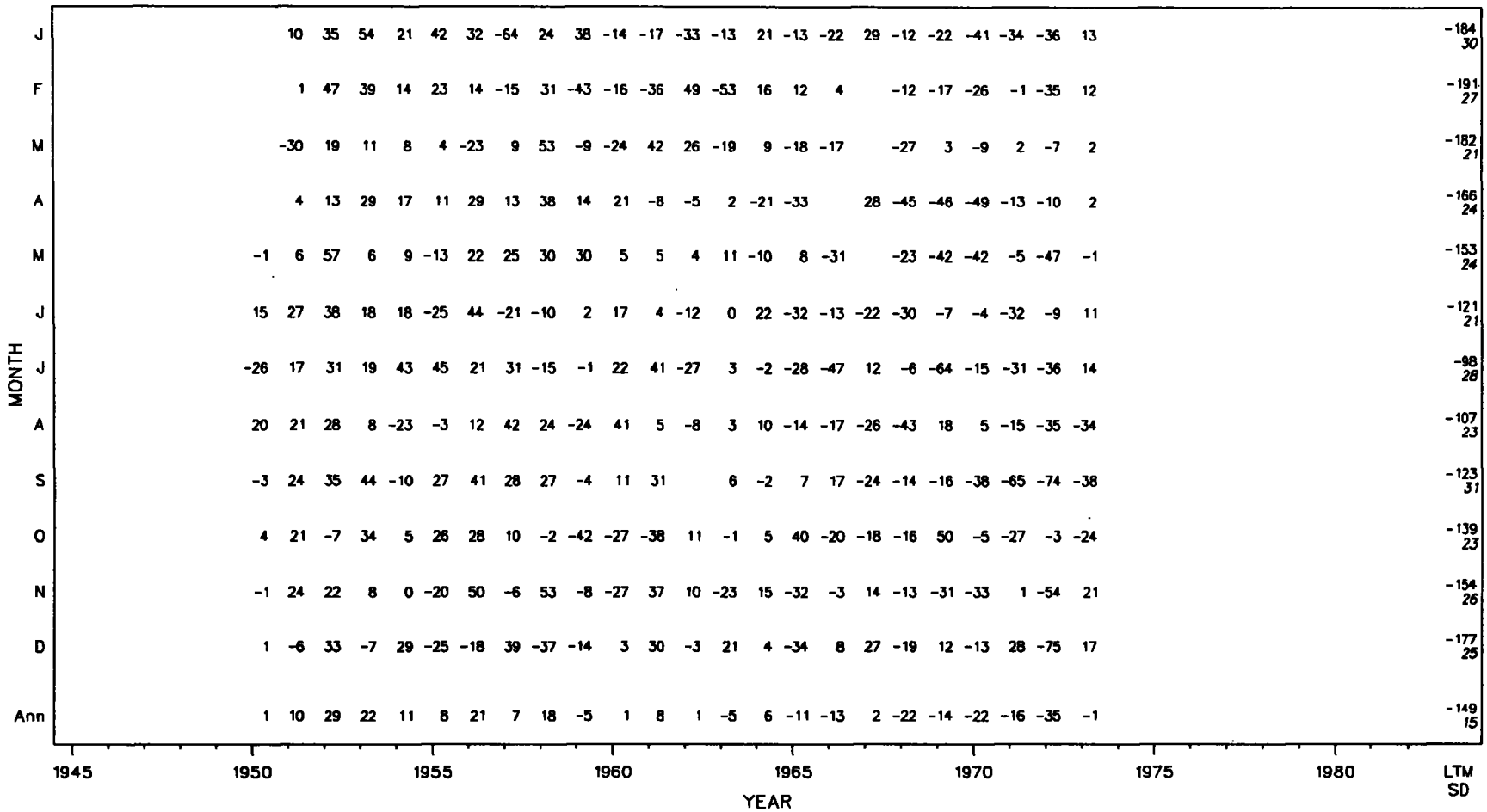
Units = 0.1 °C



OWS Study Area C Anomalies

Dew Point Temperature: 700 mb

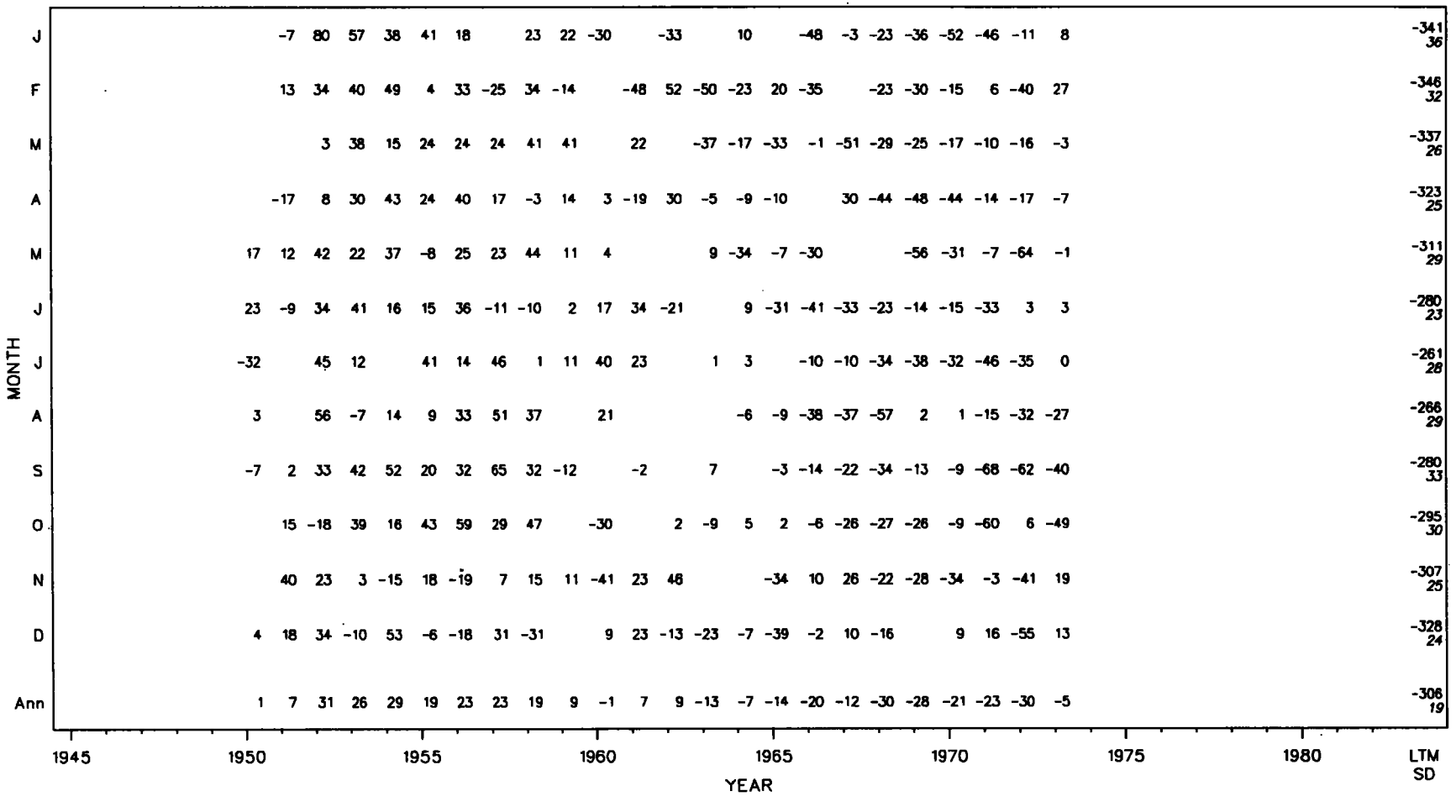
Units = 0.1 °C



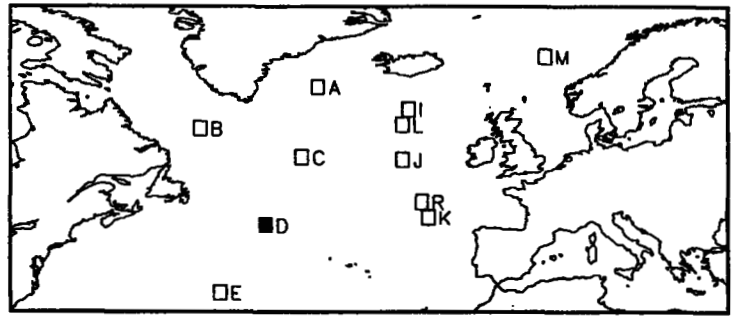
OWS Study Area C Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C

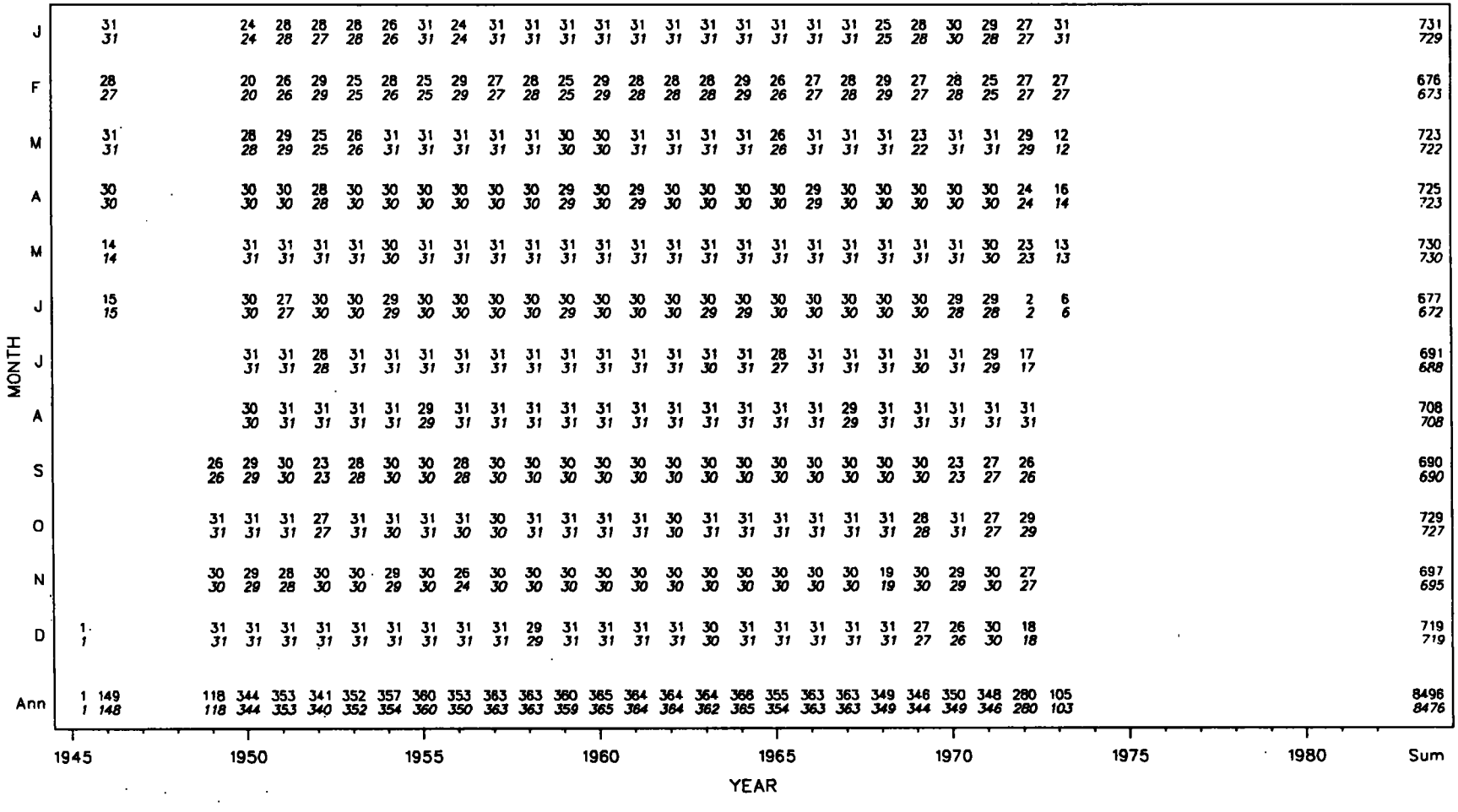


OWS Study Area C Anomalies



OWS D

43.0°N – 44.9°N, 41.9°W – 40.0°W
1945 – 1973

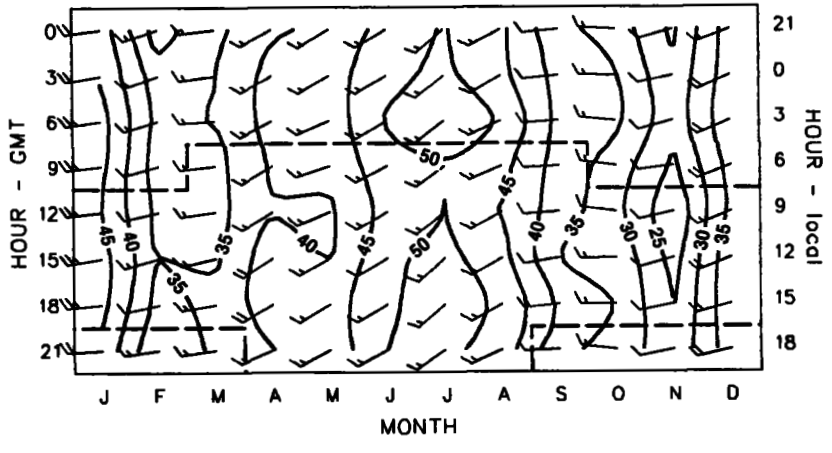


OWS Study Area D (44.0°N, 41.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

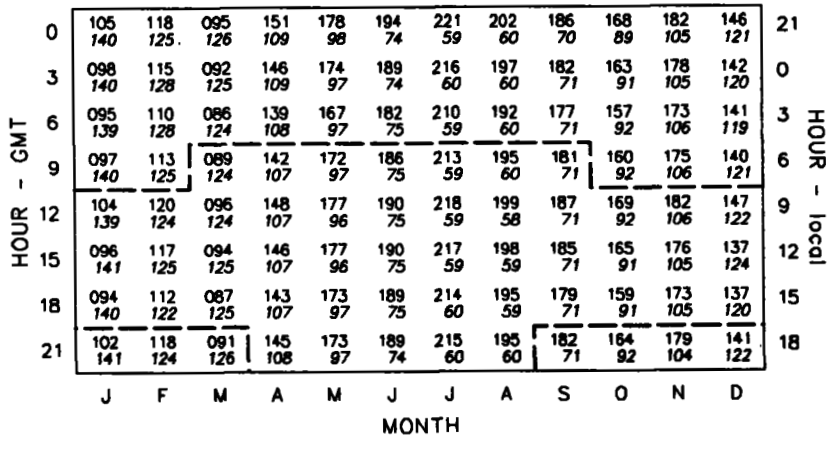
Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



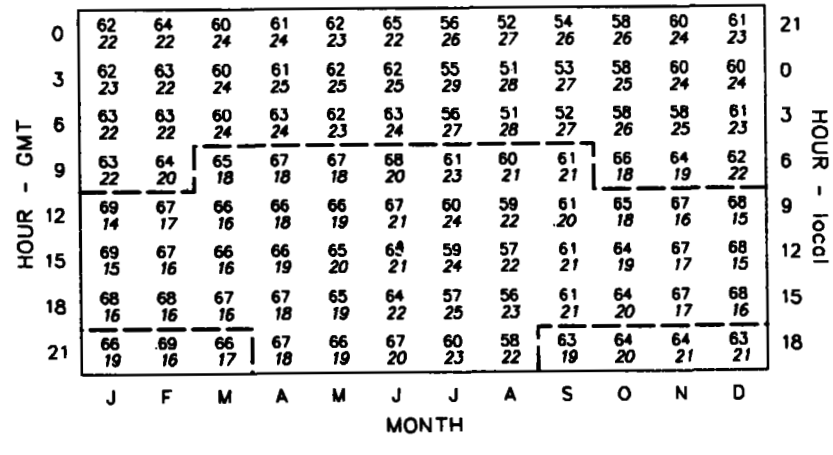
Pressure

Units = 0.1 mb



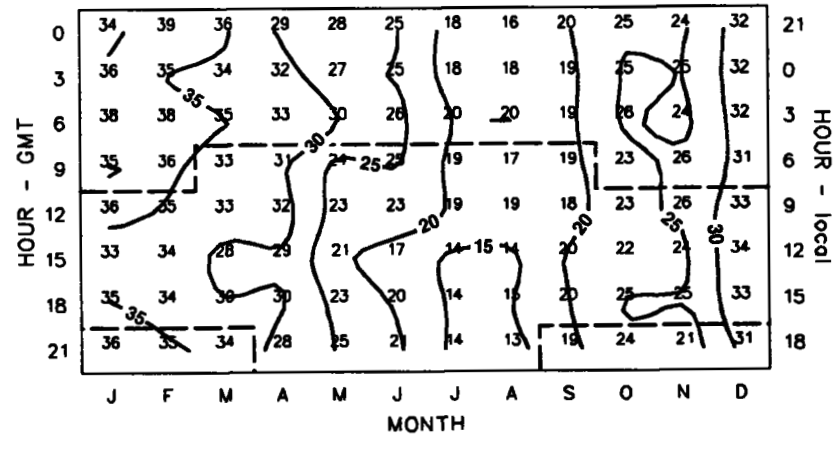
Total Cloudiness

Units = 0.1 okta



Precipitation Frequency

Units = percent
Contour interval = 5 percent



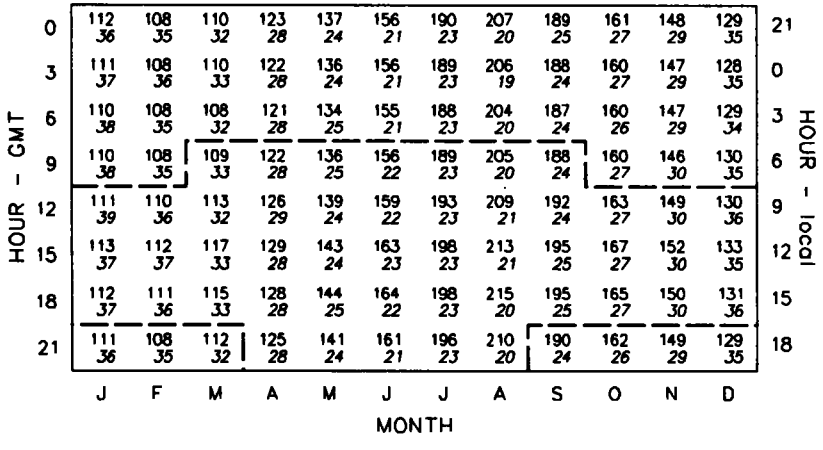
OWS Study Area D Surface Climatology

upper number = mean
lower number = standard deviation

——— data contours
— — — — sunrise/sunset

Air Temperature

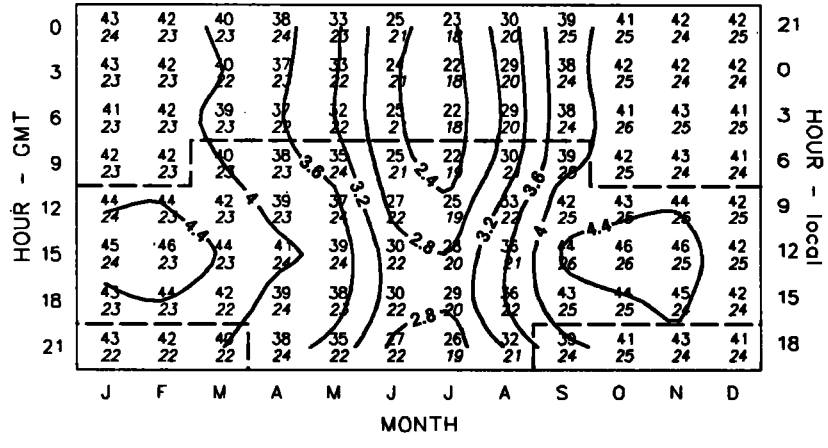
Units = 0.1 °C



Dew Point Depression

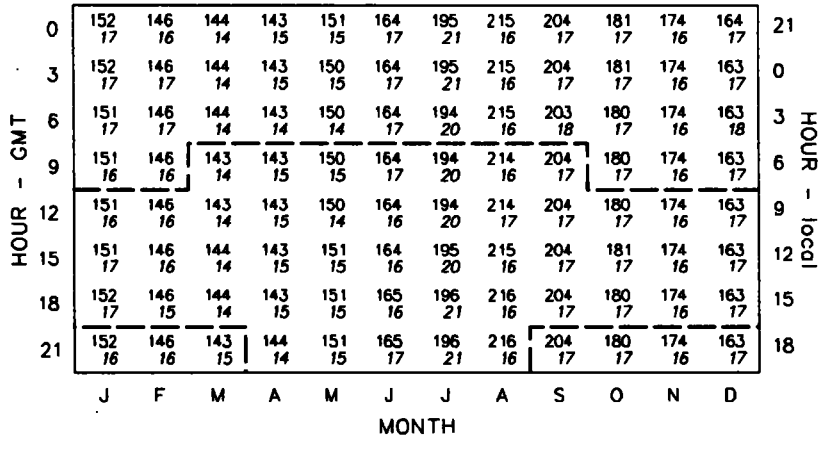
Units = 0.1 °C

Contour interval = 0.4 °C



Sea Surface Temperature

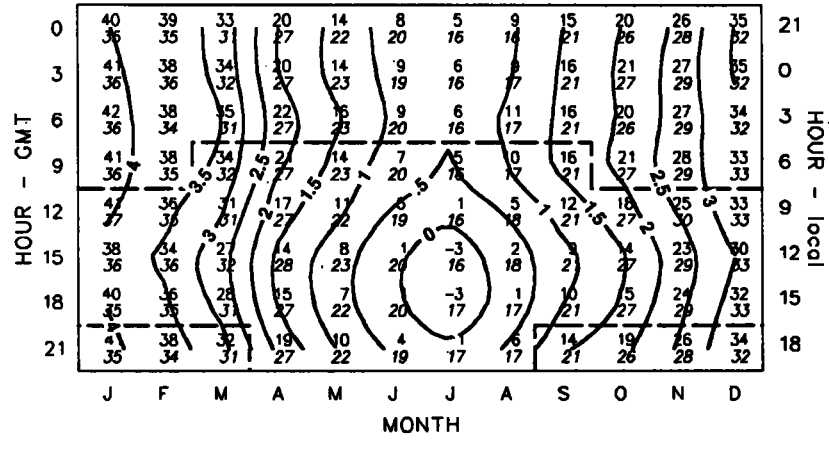
Units = 0.1 °C



Sea - Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



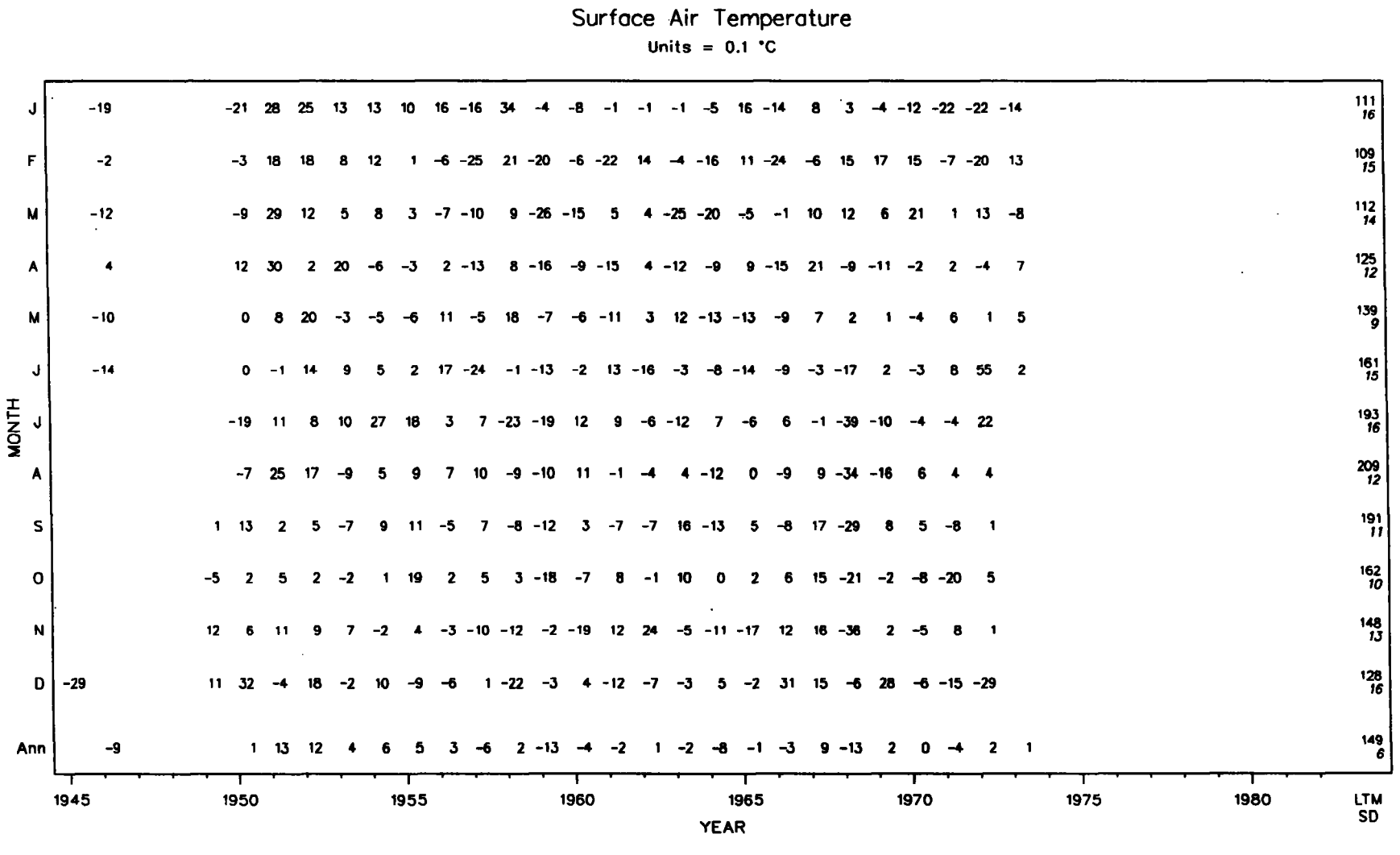
OWS Study Area D Surface Climatology

upper number = mean

lower number = standard deviation

data contours

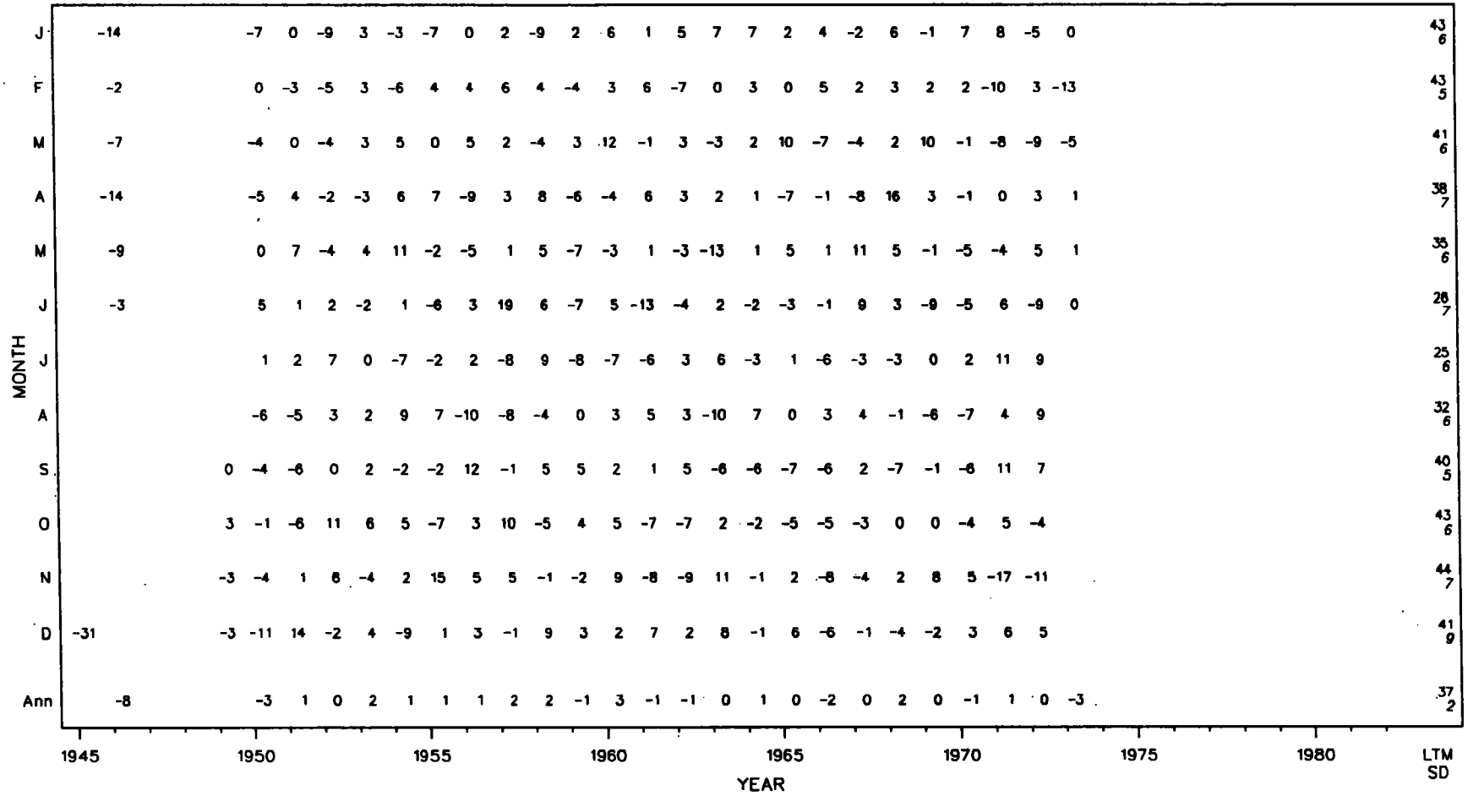
sunrise/sunset



OWS Study Area D Anomalies

Surface Dew Point Depression

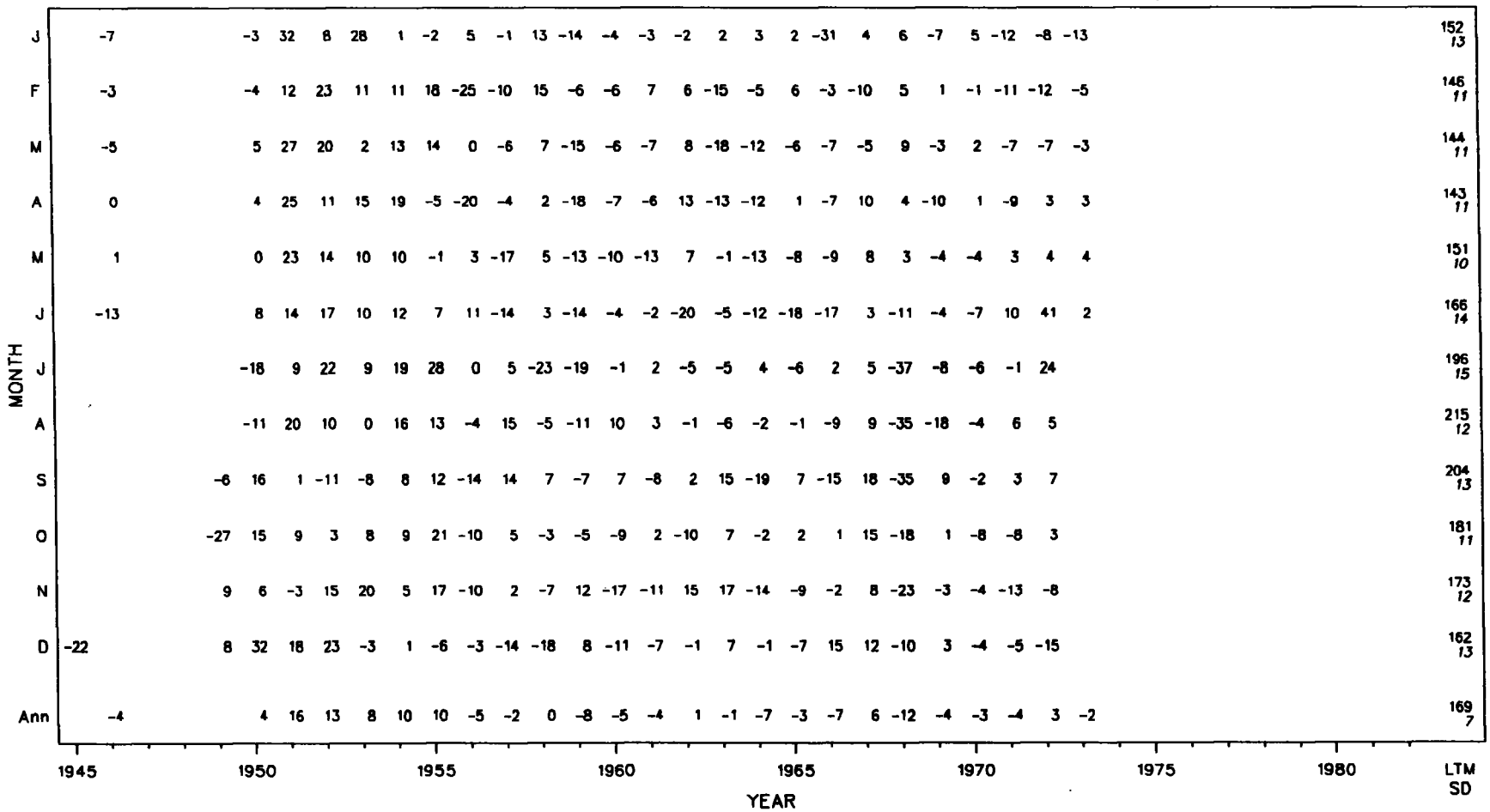
Units = 0.1 °C



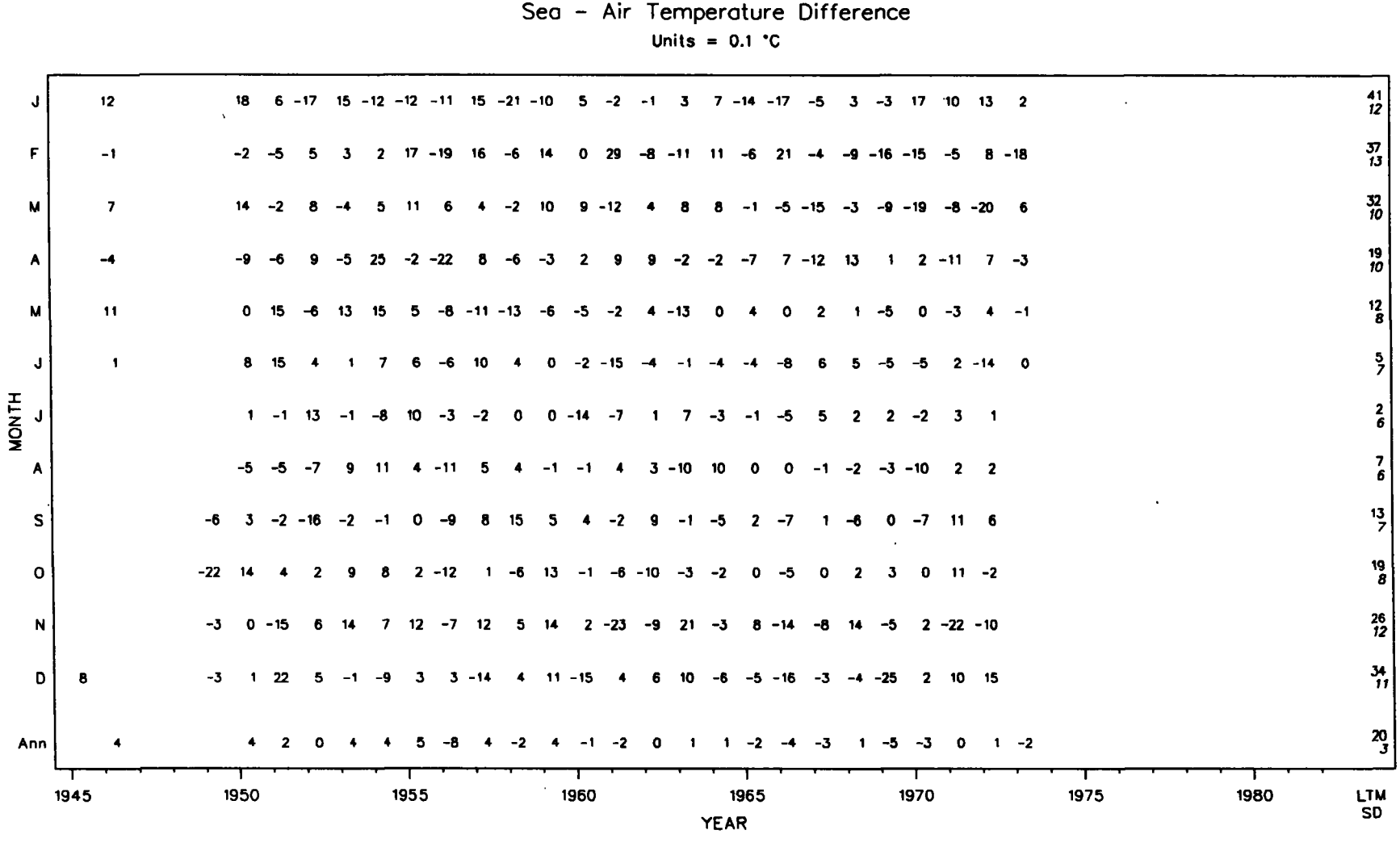
OWS Study Area D Anomalies

Sea Surface Temperature

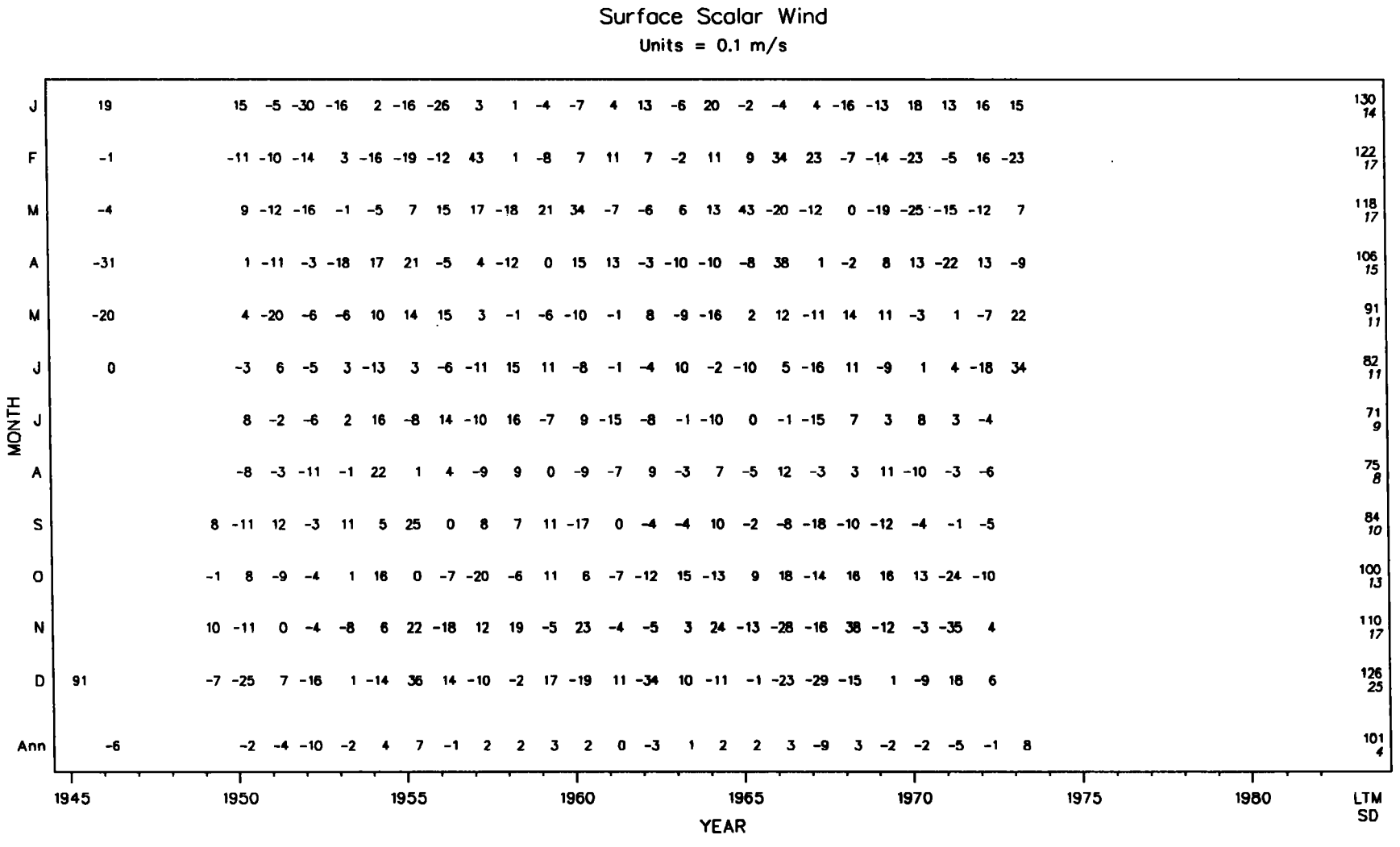
Units = 0.1 °C



OWS Study Area D Anomalies



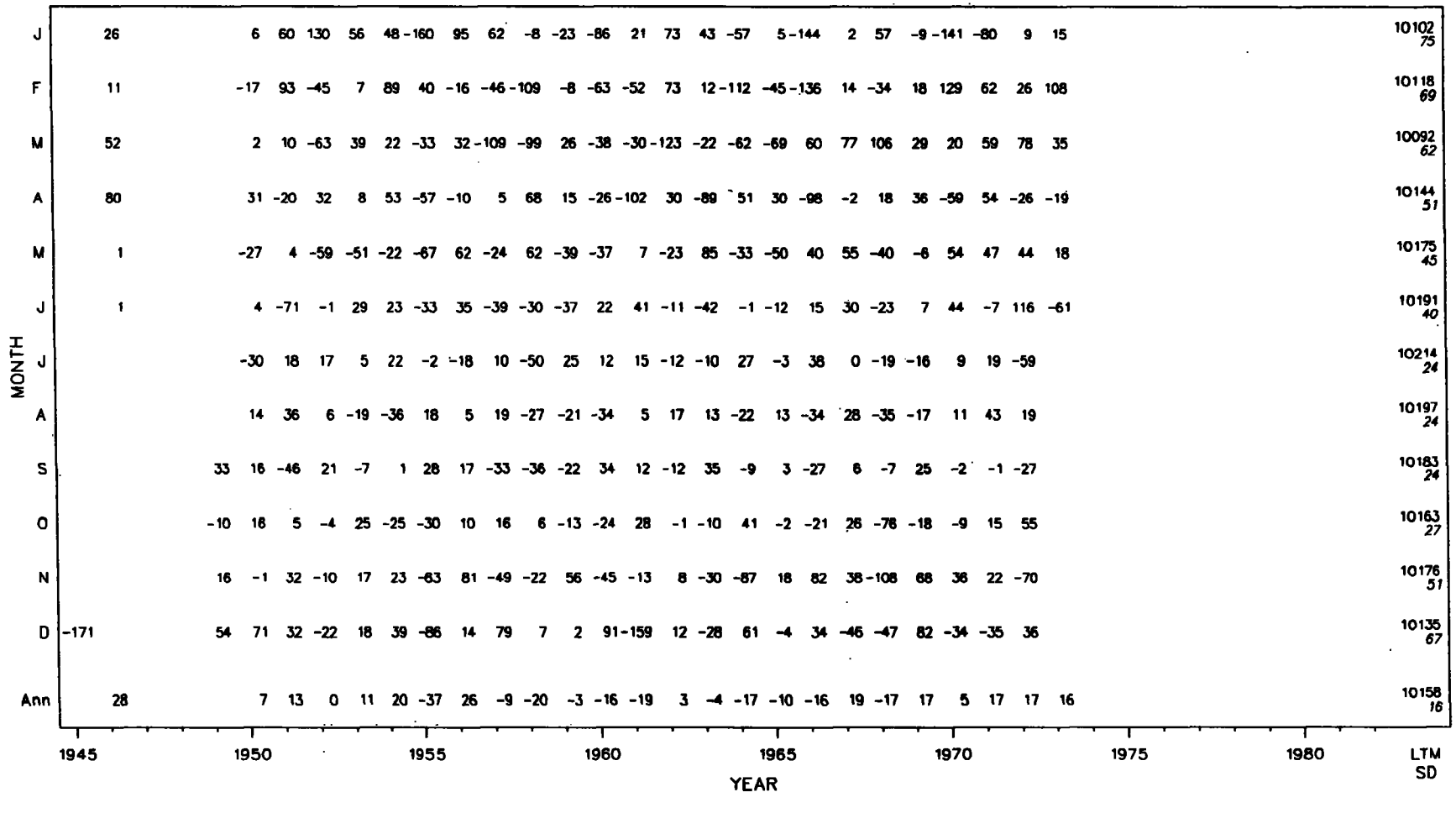
OWS Study Area D Anomalies



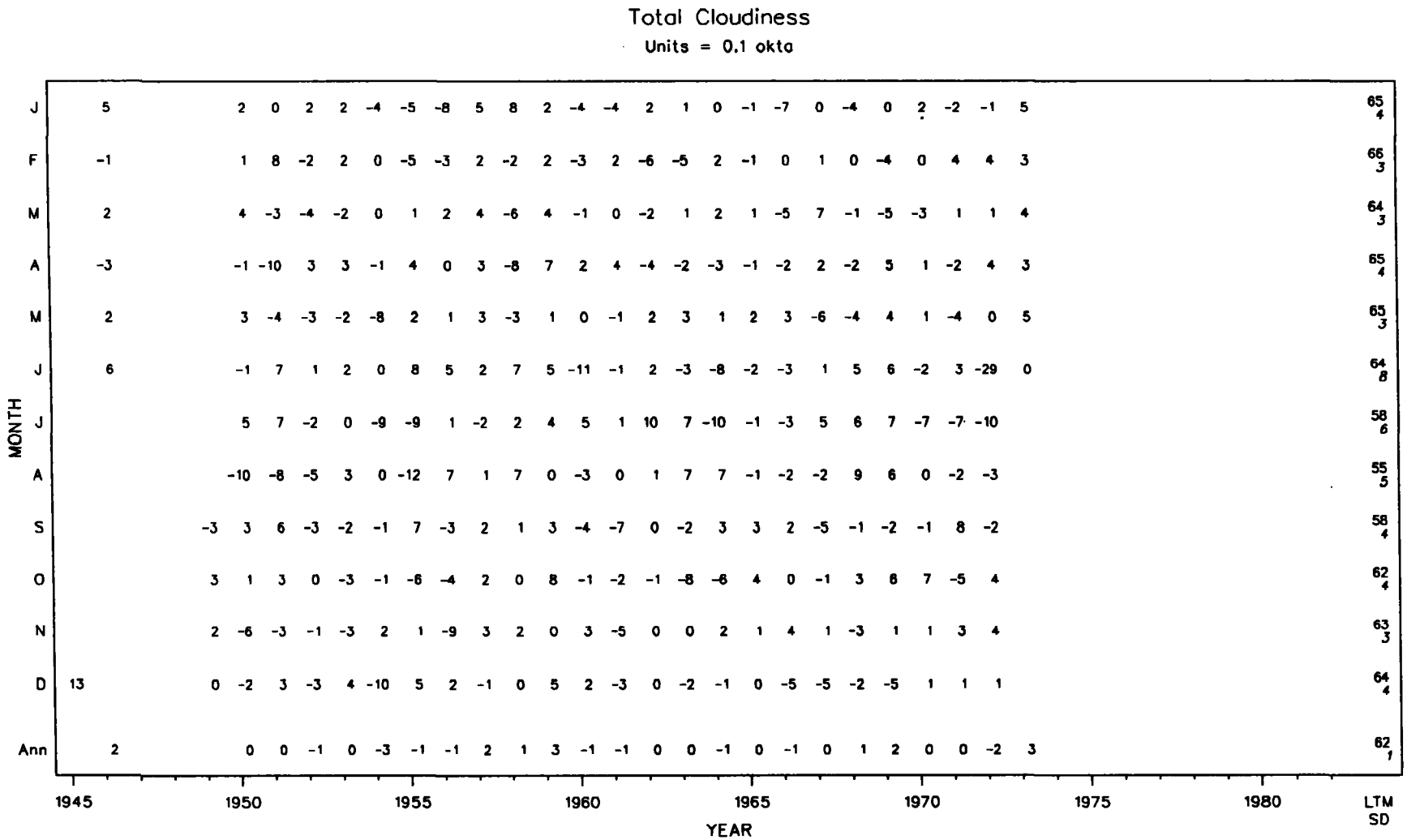
OWS Study Area D Anomalies

Sea Level Pressure

Units = 0.1 mb



OWS Study Area D Anomalies



OWS Study Area D Anomalies

Precipitation Frequency

Units = 0.1 percent

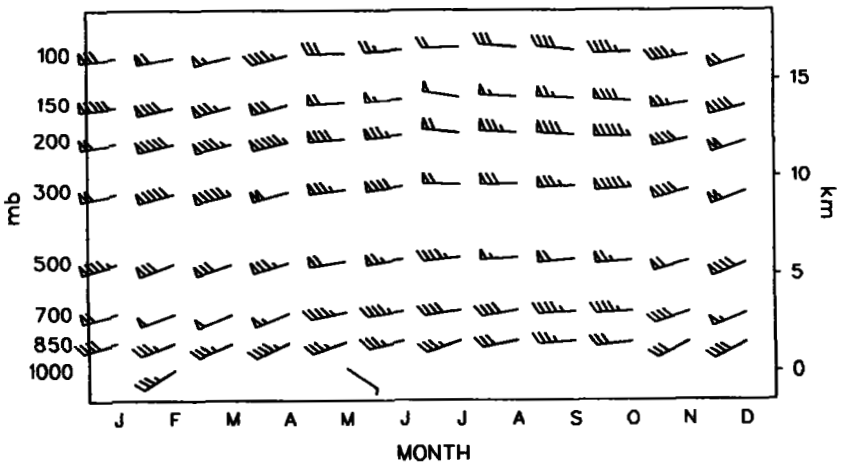
MONTH	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	LTM SD
J	-45			-4	-98	-149	-158	-45	-36	-152	-86	20	-42	10	28	59	171	102	31	69	17	-59	-37	111	97	151	47											352 90
F	-103			16	-97	39	-63	-154	-172	-70	-24	-12	79	79	124	7	126	153	82	178	82	-77	-128	-122	5	73	-24											355 100
M	-165			-77	-59	-60	-97	-23	-72	7	15	-22	-2	29	146	256	128	214	85	7	38	-78	-72	-129	-50	-90	71											329 104
A	-158			-35	-87	-2	-79	-66	-37	-125	44	-114	63	70	179	66	190	38	-21	208	62	31	-84	138	-132	59	-210											301 112
M	3			-49	-94	56	-25	-38	45	-98	28	-98	68	48	78	113	-11	158	63	24	-34	-12	53	-91	-43	-90	-53											247 70
J	-77			-55	-20	-6	8	-75	10	-56	-67	154	-2	-92	136	158	55	8	41	-42	-17	79	8	-69	31	-221	112											221 86
J				3	6	-34	-2	-49	-60	-24	-68	28	41	51	130	117	46	-63	30	-59	67	-4	49	-71	-97	-38												170 61
A				-49	-10	-43	-15	-2	-121	-10	-2	58	22	1	65	-32	56	94	0	35	-59	93	42	-7	-71	-42												166 53
S			-45	-41	0	-25	-30	-24	43	-113	23	28	53	-80	-11	17	68	83	27	123	-55	-21	-57	31	4	3												190 54
O			-19	-16	-68	-24	-69	-79	63	-90	-29	-11	20	19	-18	118	-32	16	141	-38	-2	170	77	-1	-60	-74												242 70
N			3	-33	-66	0	-76	-72	-93	-147	34	106	-35	-13	41	78	84	160	19	-36	29	74	-152	-50	29	115												244 80
D	-314		-6	-50	-107	-63	25	-47	13	18	-60	-7	75	-71	272	37	60	51	91	-34	-23	-35	-128	87	80	136												314 107
Ann	-91			-32	-58	-26	-48	-56	-35	-72	-16	11	28	4	98	83	78	84	49	36	9	13	-36	-14	-17	-1	-10												261 49

YEAR

OWS Study Area D Anomalies

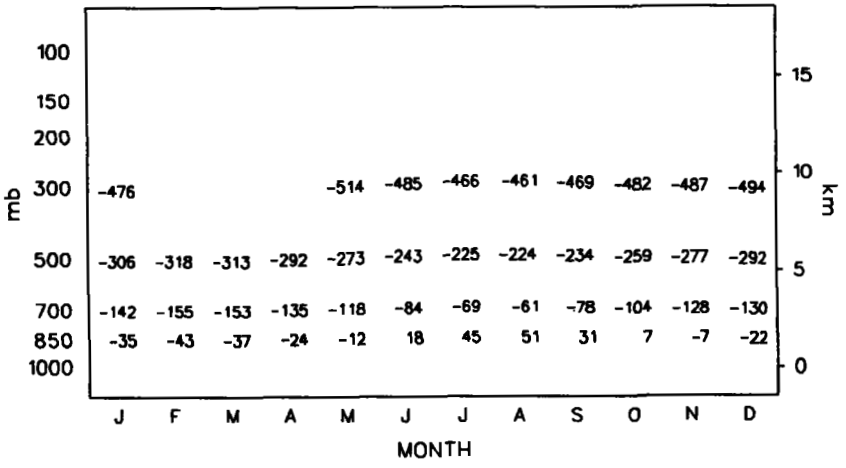
Wind

Full barb = 5 knots, Pennant = 25 knots



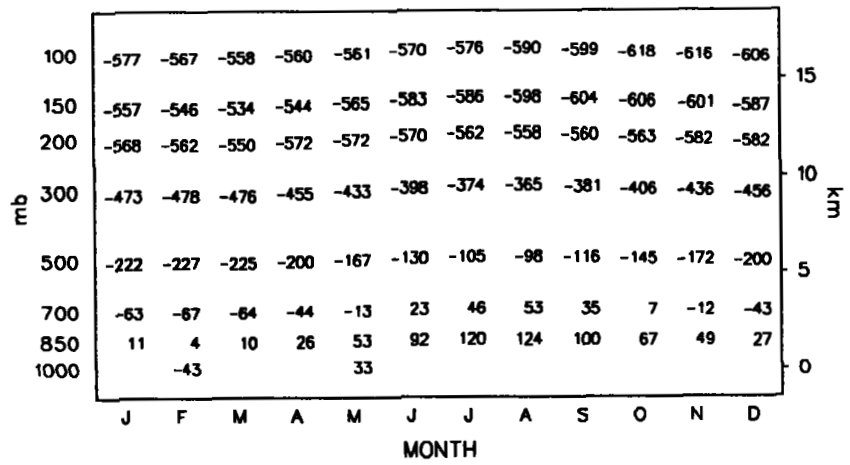
Dew Point Temperature

Units = 0.1 °C



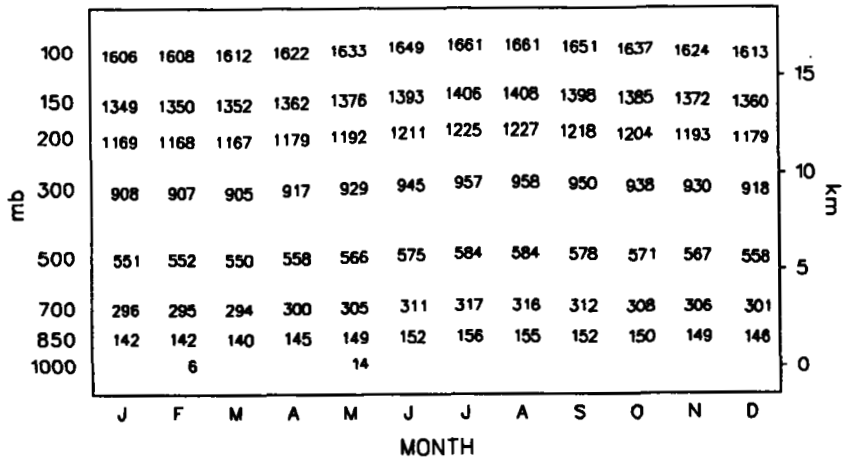
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m

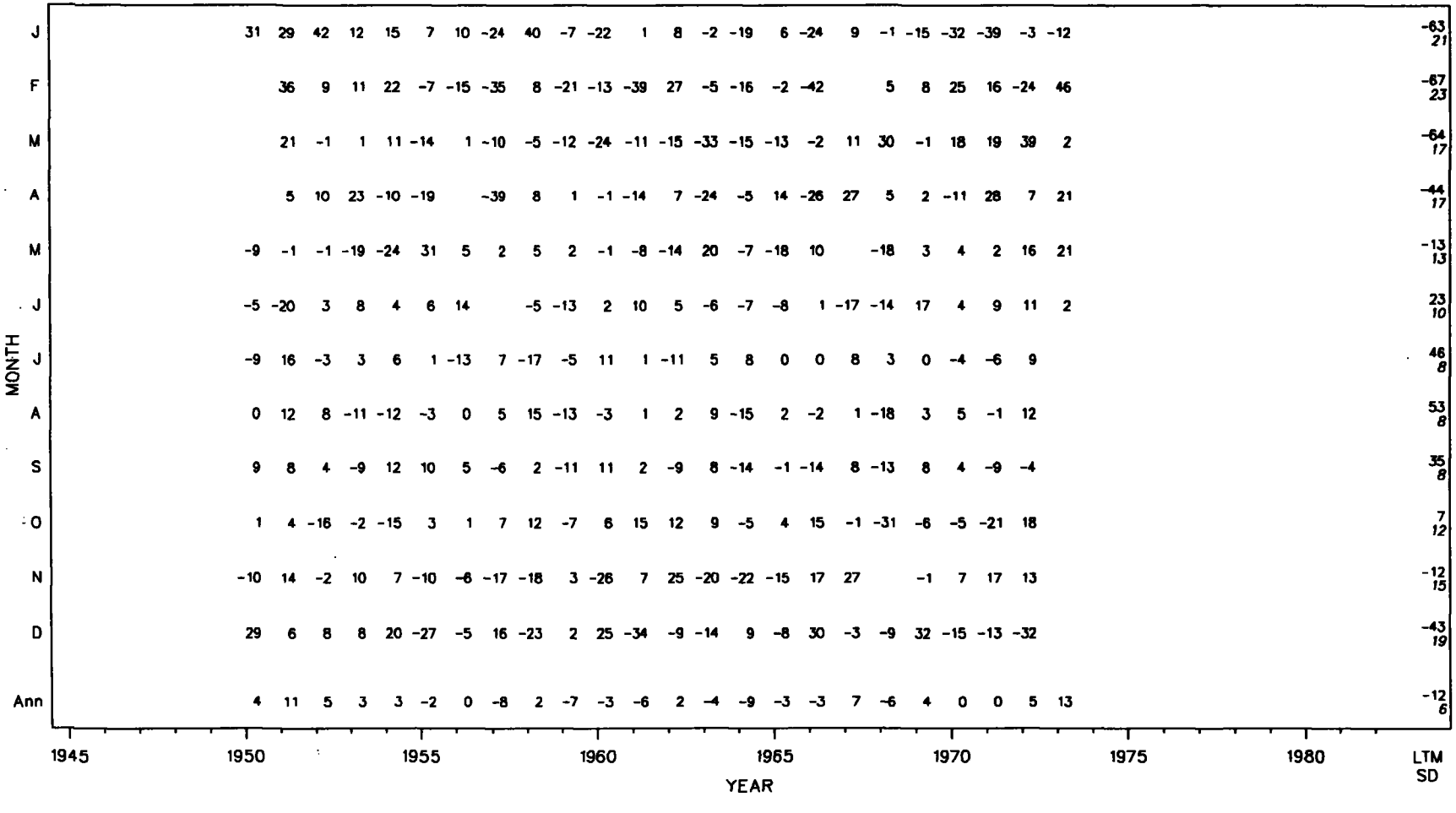


OWS Study Area D Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

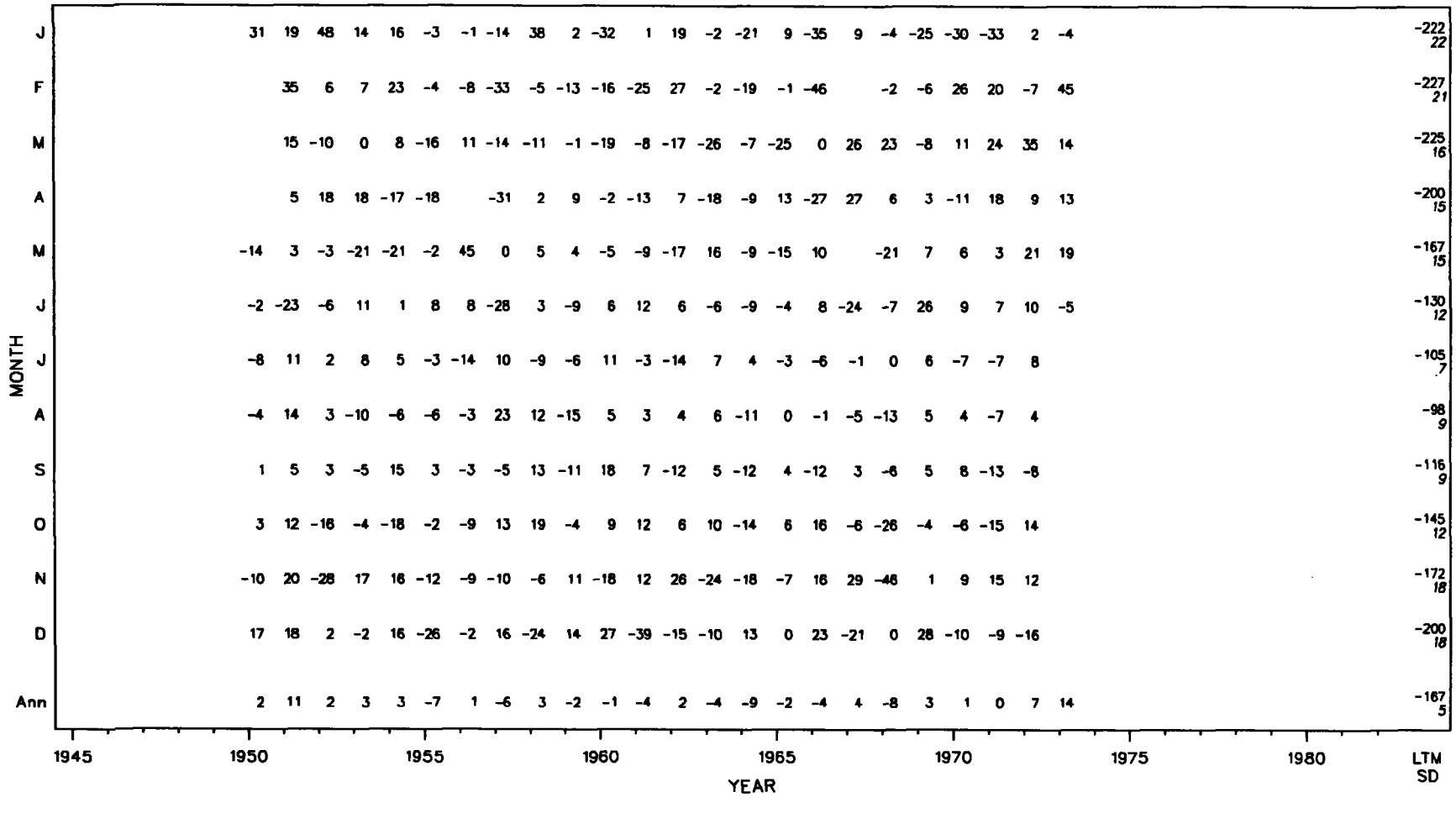
Units = 0.1 °C



OWS Study Area D Anomalies

Air Temperature: 500 mb

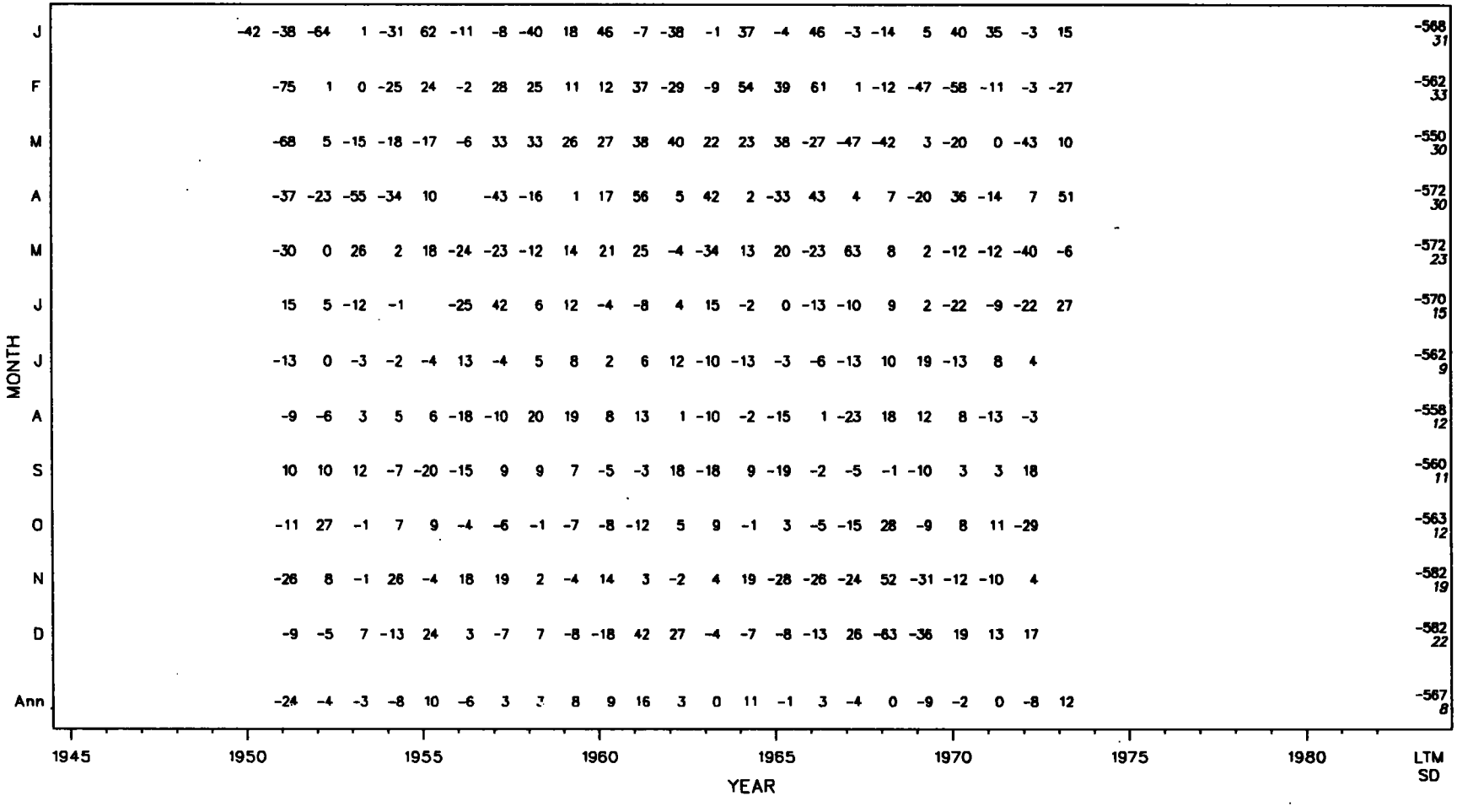
Units = 0.1 °C



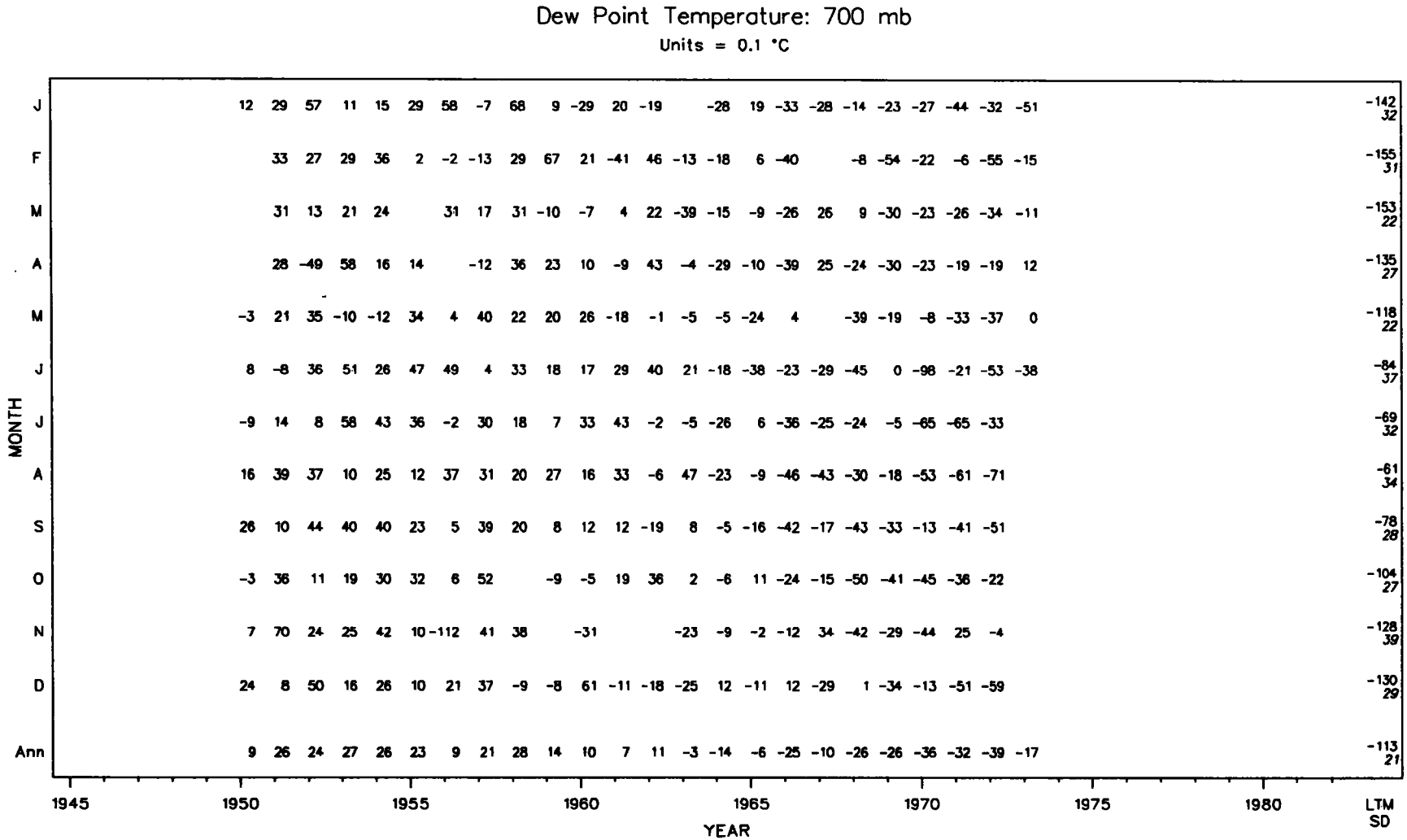
OWS Study Area D Anomalies

Air Temperature: 200 mb

Units = 0.1 °C



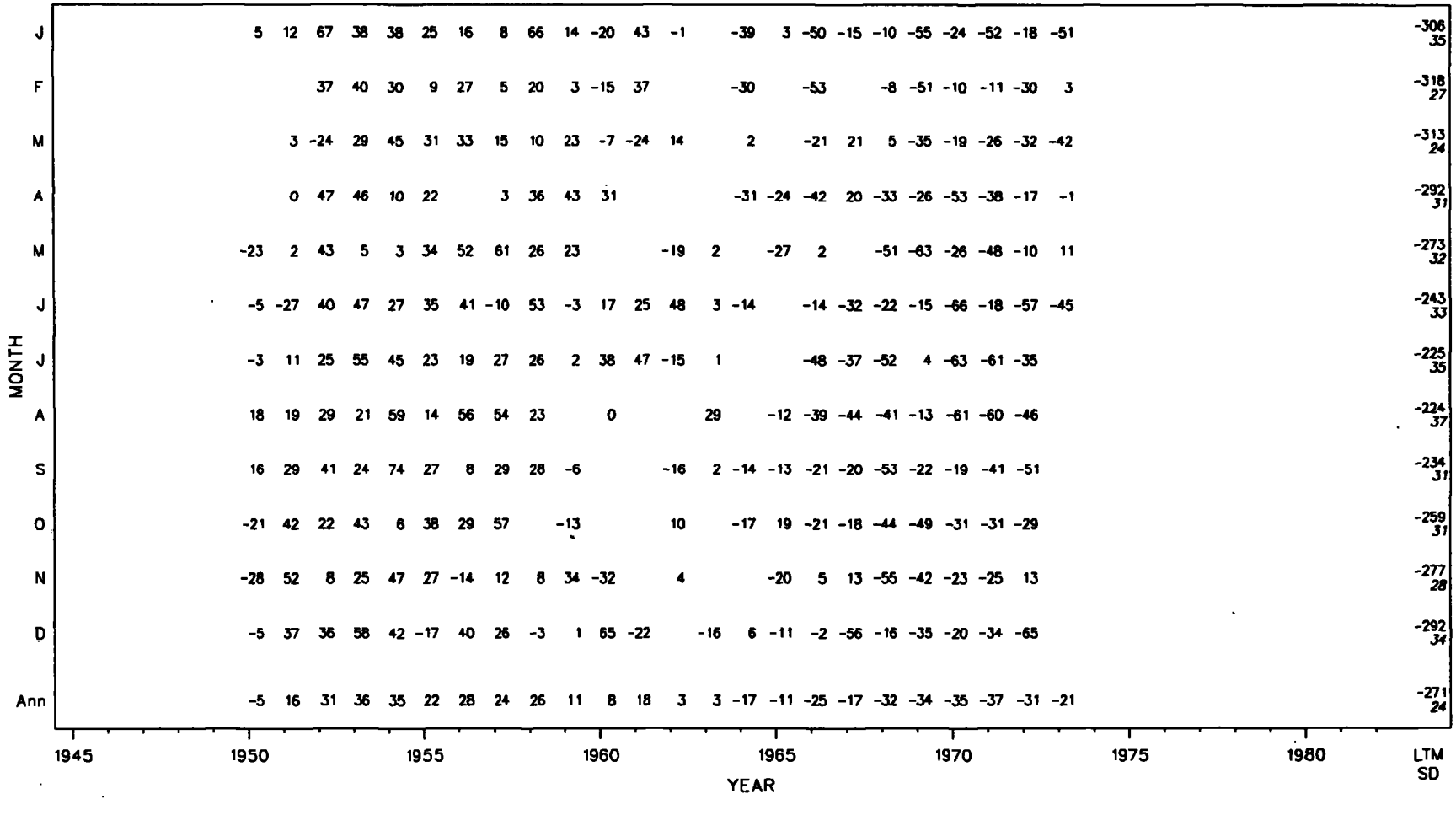
OWS Study Area D Anomalies



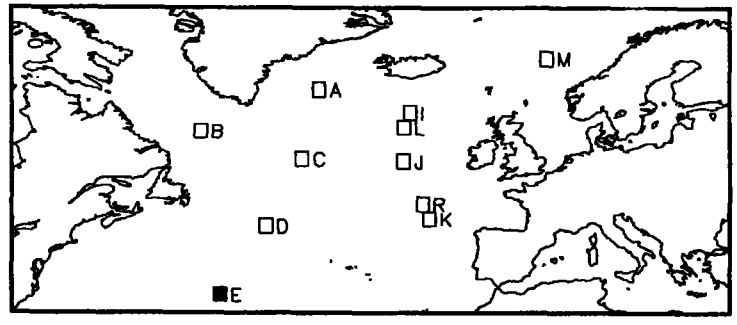
OWS Study Area D Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C

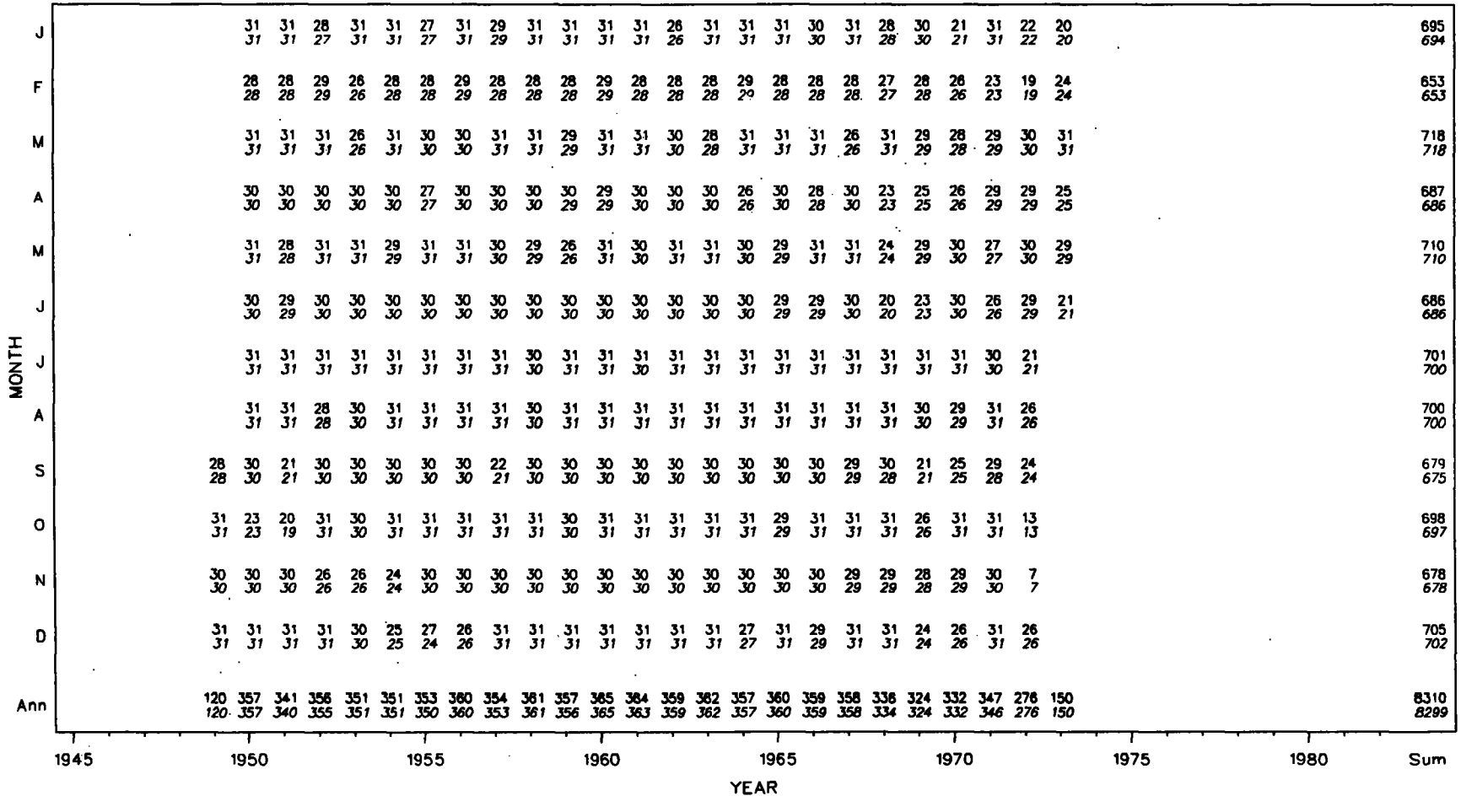


OWS Study Area D Anomalies



OWS E

34.0°N – 35.9°N, 48.9°W – 47.0°W
1949 – 1973

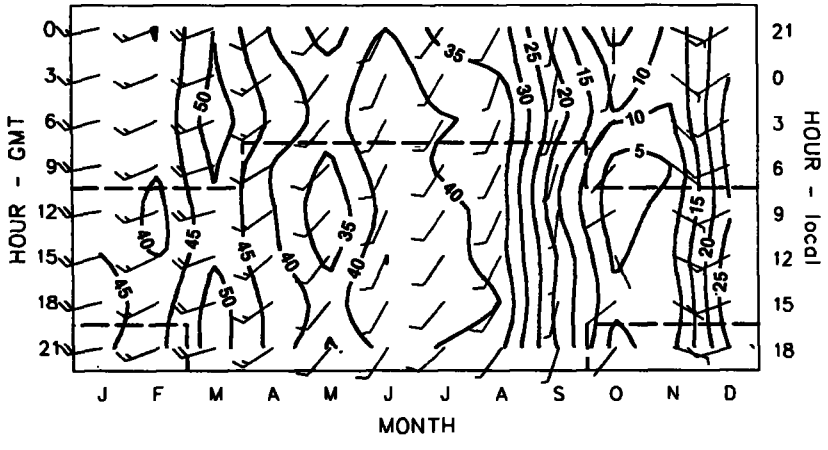


OWS Study Area E (35.0°N, 48.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



Pressure

Units = 0.1 mb

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	181 *102*	177 *84*	160 *92*	197 *75*	221 *60*	240 *48*	251 *37*	234 *35*	211 *41*	198 *51*	192 *71*	189 *78*	21
3	178 *101*	175 *83*	156 *93*	193 *76*	219 *60*	239 *49*	249 *37*	232 *36*	207 *41*	195 *51*	189 *72*	185 *78*	0
6	174 *101*	168 *84*	148 *93*	183 *74*	209 *60*	230 *49*	240 *38*	223 *35*	200 *41*	187 *52*	184 *70*	181 *79*	3
9	170 *101*	168 *84*	149 *93*	184 *74*	213 *60*	233 *49*	243 *37*	225 *35*	201 *42*	190 *51*	184 *70*	178 *78*	6
12	182 *101*	179 *84*	159 *93*	193 *74*	221 *60*	240 *49*	249 *37*	232 *35*	211 *42*	199 *51*	195 *70*	190 *78*	9
15	180 *101*	177 *85*	160 *92*	194 *74*	221 *59*	240 *49*	251 *37*	232 *35*	209 *42*	198 *51*	190 *70*	185 *79*	12
18	170 *100*	164 *85*	150 *91*	186 *74*	216 *59*	236 *48*	246 *37*	226 *36*	201 *42*	187 *52*	181 *69*	175 *79*	15
21	176 *101*	169 *84*	153 *92*	187 *74*	214 *59*	233 *48*	244 *37*	225 *36*	203 *41*	192 *51*	187 *70*	181 *78*	18

MONTH

Total Cloudiness

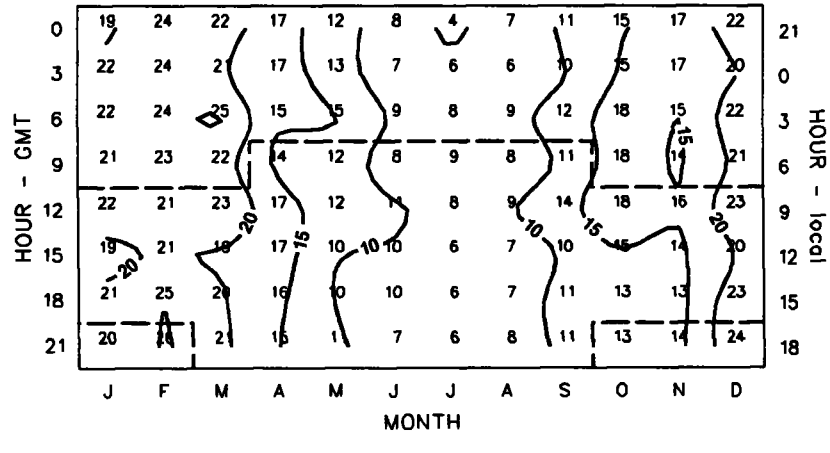
Units = 0.1 okta

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	51 *25*	55 *25*	50 *27*	49 *27*	49 *26*	43 *25*	35 *23*	30 *20*	38 *24*	44 *26*	48 *27*	51 *26*	21
3	51 *25*	54 *26*	52 *27*	49 *28*	47 *28*	39 *27*	31 *22*	28 *20*	36 *25*	43 *27*	47 *27*	50 *27*	0
6	52 *26*	55 *25*	54 *26*	49 *27*	48 *28*	39 *27*	31 *22*	28 *21*	36 *25*	43 *27*	45 *26*	50 *26*	3
9	50 *26*	53 *25*	57 *23*	57 *22*	56 *23*	49 *24*	43 *22*	40 *21*	46 *22*	51 *24*	48 *25*	50 *26*	6
12	60 *21*	61 *20*	60 *22*	58 *22*	55 *24*	48 *24*	41 *23*	39 *22*	46 *23*	56 *23*	55 *22*	60 *21*	9
15	59 *21*	61 *20*	58 *22*	58 *22*	54 *24*	48 *24*	41 *22*	41 *22*	47 *23*	55 *22*	56 *22*	59 *22*	12
18	61 *20*	63 *20*	60 *21*	57 *23*	54 *24*	48 *24*	41 *22*	41 *22*	48 *23*	55 *22*	56 *21*	61 *21*	15
21	61 *19*	63 *19*	60 *21*	58 *23*	55 *23*	48 *24*	43 *23*	41 *22*	50 *22*	55 *22*	55 *22*	59 *21*	18

MONTH

Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area E Surface Climatology

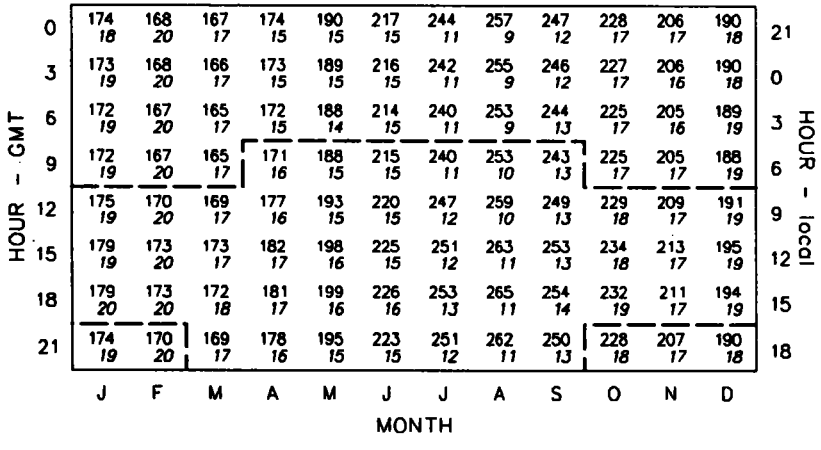
upper number = mean
lower number = standard deviation

data contours
sunrise/sunset

E2

Air Temperature

Units = 0.1 °C

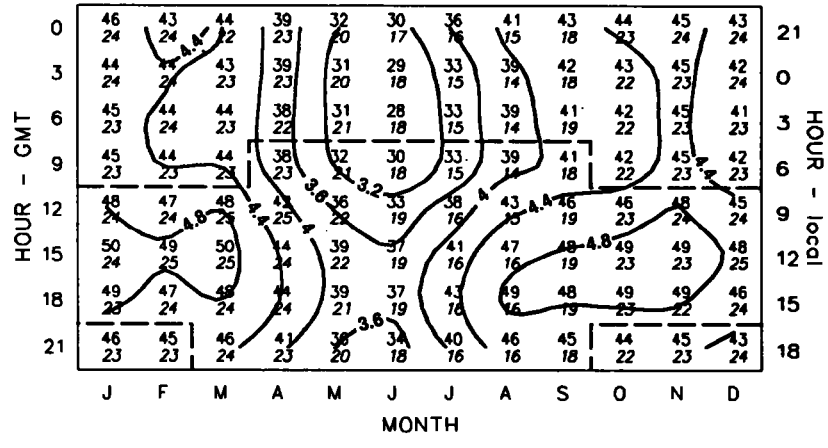


HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	174 / 18	168 / 20	167 / 17	174 / 15	190 / 15	217 / 15	244 / 11	257 / 9	247 / 12	228 / 17	206 / 17	190 / 18	21
3	173 / 19	168 / 20	166 / 17	173 / 15	189 / 15	216 / 15	242 / 11	255 / 9	246 / 12	227 / 17	206 / 16	190 / 18	0
6	172 / 19	167 / 20	165 / 17	172 / 15	188 / 14	214 / 15	240 / 11	253 / 9	244 / 13	225 / 17	205 / 16	189 / 19	3
9	172 / 19	167 / 20	165 / 17	171 / 16	188 / 15	215 / 15	240 / 11	253 / 10	243 / 13	225 / 17	205 / 17	188 / 19	6
12	175 / 19	170 / 20	169 / 17	177 / 16	193 / 15	220 / 15	247 / 12	259 / 10	249 / 13	229 / 18	209 / 17	191 / 19	9
15	179 / 19	173 / 20	173 / 17	182 / 17	198 / 16	225 / 15	251 / 12	263 / 11	253 / 13	234 / 18	213 / 17	195 / 19	12
18	179 / 20	173 / 20	172 / 18	181 / 17	199 / 16	226 / 16	253 / 13	265 / 11	254 / 14	232 / 19	211 / 17	194 / 19	15
21	174 / 19	170 / 20	169 / 17	178 / 16	195 / 15	223 / 15	251 / 12	262 / 11	250 / 13	228 / 18	207 / 17	190 / 18	18

Dew Point Depression

Units = 0.1 °C

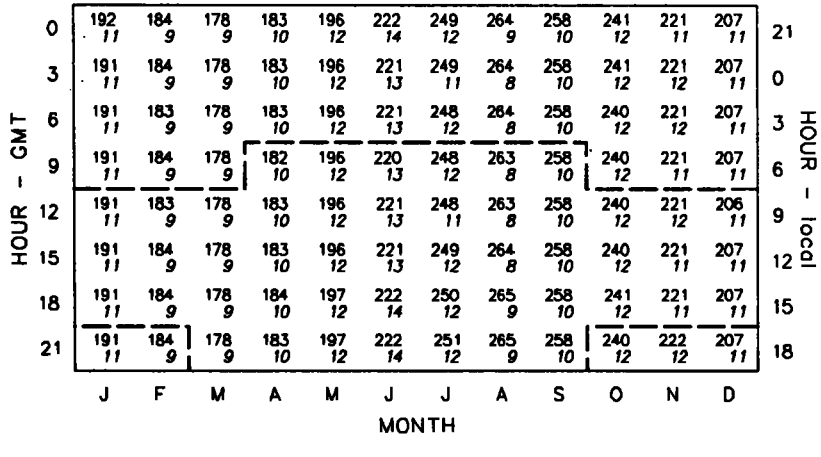
Contour interval = 0.4 °C



HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	46 / 24	43 / 24	44 / 22	39 / 23	32 / 20	30 / 17	36 / 16	41 / 15	43 / 18	44 / 23	45 / 24	43 / 24	21
3	44 / 24	41 / 24	43 / 23	39 / 23	31 / 20	29 / 18	33 / 15	39 / 14	42 / 18	43 / 22	45 / 23	42 / 24	0
6	45 / 23	44 / 24	44 / 23	38 / 22	31 / 21	28 / 18	33 / 15	39 / 14	41 / 19	42 / 22	45 / 23	41 / 23	3
9	45 / 23	44 / 23	44 / 23	38 / 23	32 / 21	30 / 18	33 / 15	39 / 14	41 / 18	42 / 22	45 / 23	42 / 23	6
12	48 / 24	47 / 24	48 / 25	43 / 25	36 / 22	33 / 19	38 / 16	43 / 15	46 / 19	46 / 23	48 / 24	45 / 24	9
15	50 / 24	49 / 25	50 / 25	44 / 24	39 / 22	37 / 19	41 / 16	47 / 16	48 / 19	49 / 23	49 / 23	48 / 25	12
18	49 / 23	47 / 24	48 / 24	44 / 24	39 / 21	37 / 19	43 / 16	49 / 16	48 / 19	49 / 23	49 / 22	46 / 24	15
21	46 / 23	45 / 23	46 / 24	41 / 23	36 / 20	34 / 18	40 / 16	46 / 16	45 / 18	44 / 22	45 / 23	43 / 24	18

Sea Surface Temperature

Units = 0.1 °C

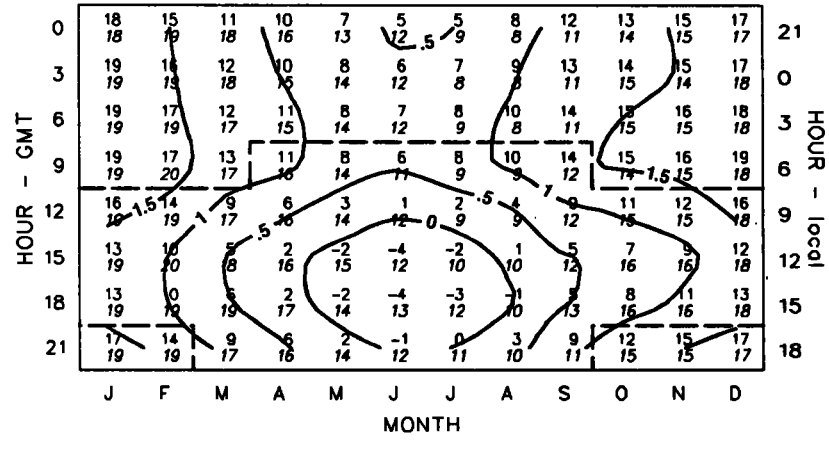


HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	192 / 11	184 / 9	178 / 9	183 / 10	196 / 12	222 / 14	249 / 12	264 / 9	258 / 10	241 / 12	221 / 11	207 / 11	21
3	191 / 11	184 / 9	178 / 9	183 / 10	196 / 12	221 / 13	249 / 11	264 / 8	258 / 10	241 / 12	221 / 12	207 / 11	0
6	191 / 11	183 / 9	178 / 9	183 / 10	196 / 12	221 / 13	248 / 12	264 / 8	258 / 10	240 / 12	221 / 12	207 / 11	3
9	191 / 11	184 / 9	178 / 9	182 / 10	196 / 12	220 / 13	248 / 12	263 / 8	258 / 10	240 / 12	221 / 11	207 / 11	6
12	191 / 11	183 / 9	178 / 9	183 / 10	196 / 12	221 / 13	248 / 11	263 / 8	258 / 10	240 / 12	221 / 12	206 / 11	9
15	191 / 11	184 / 9	178 / 9	183 / 10	196 / 12	221 / 13	249 / 12	264 / 8	258 / 10	240 / 12	221 / 11	207 / 11	12
18	191 / 11	184 / 9	178 / 9	184 / 10	197 / 12	222 / 14	250 / 12	265 / 9	258 / 10	241 / 12	221 / 11	207 / 11	15
21	191 / 11	184 / 9	178 / 9	183 / 10	197 / 12	222 / 14	251 / 12	265 / 9	258 / 10	240 / 12	222 / 12	207 / 11	18

Sea – Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C

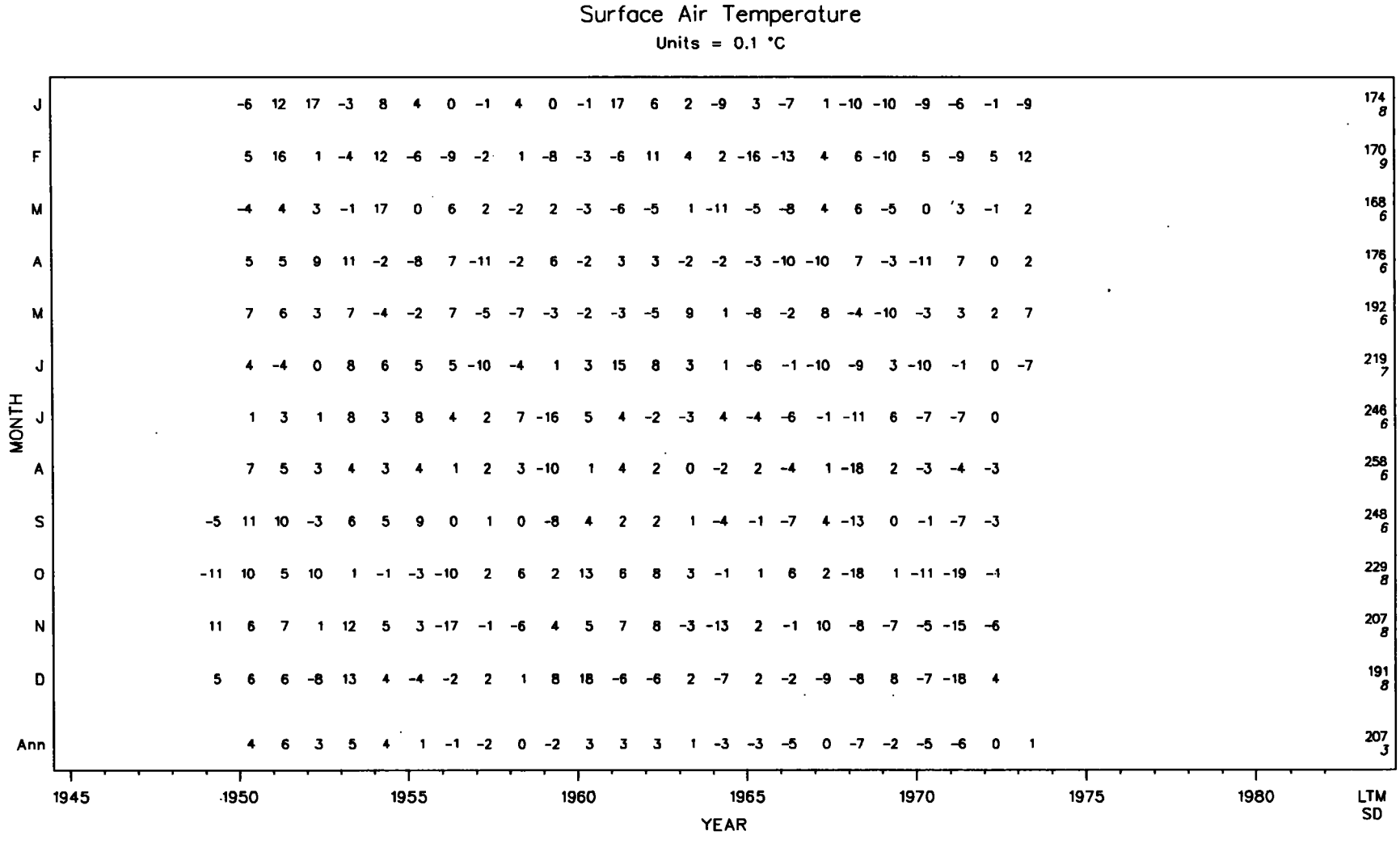


HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	18 / 18	15 / 19	11 / 18	10 / 16	7 / 13	5 / 12	5 / 9	8 / 8	12 / 11	13 / 14	15 / 15	17 / 17	21
3	19 / 19	16 / 19	12 / 18	10 / 15	8 / 14	6 / 12	7 / 8	9 / 8	13 / 11	14 / 15	15 / 14	17 / 18	0
6	19 / 19	17 / 19	12 / 17	11 / 15	8 / 14	7 / 12	8 / 9	10 / 8	14 / 11	15 / 15	16 / 15	18 / 18	3
9	19 / 19	17 / 20	13 / 17	11 / 16	8 / 14	6 / 11	8 / 9	10 / 9	14 / 12	15 / 14	16 / 15	19 / 18	6
12	16 / 19	14 / 19	9 / 17	6 / 16	3 / 14	1 / 12	2 / 9	4 / 9	9 / 12	11 / 15	12 / 15	16 / 18	9
15	13 / 19	10 / 20	5 / 18	2 / 16	-2 / 15	-4 / 12	-2 / 10	1 / 10	5 / 12	7 / 16	9 / 16	12 / 18	12
18	13 / 19	10 / 19	5 / 19	2 / 17	-2 / 14	-4 / 13	-3 / 12	1 / 10	5 / 13	8 / 16	11 / 16	13 / 18	15
21	17 / 19	14 / 19	9 / 17	6 / 16	2 / 14	-1 / 12	0 / 11	3 / 10	9 / 11	12 / 15	15 / 15	17 / 17	18

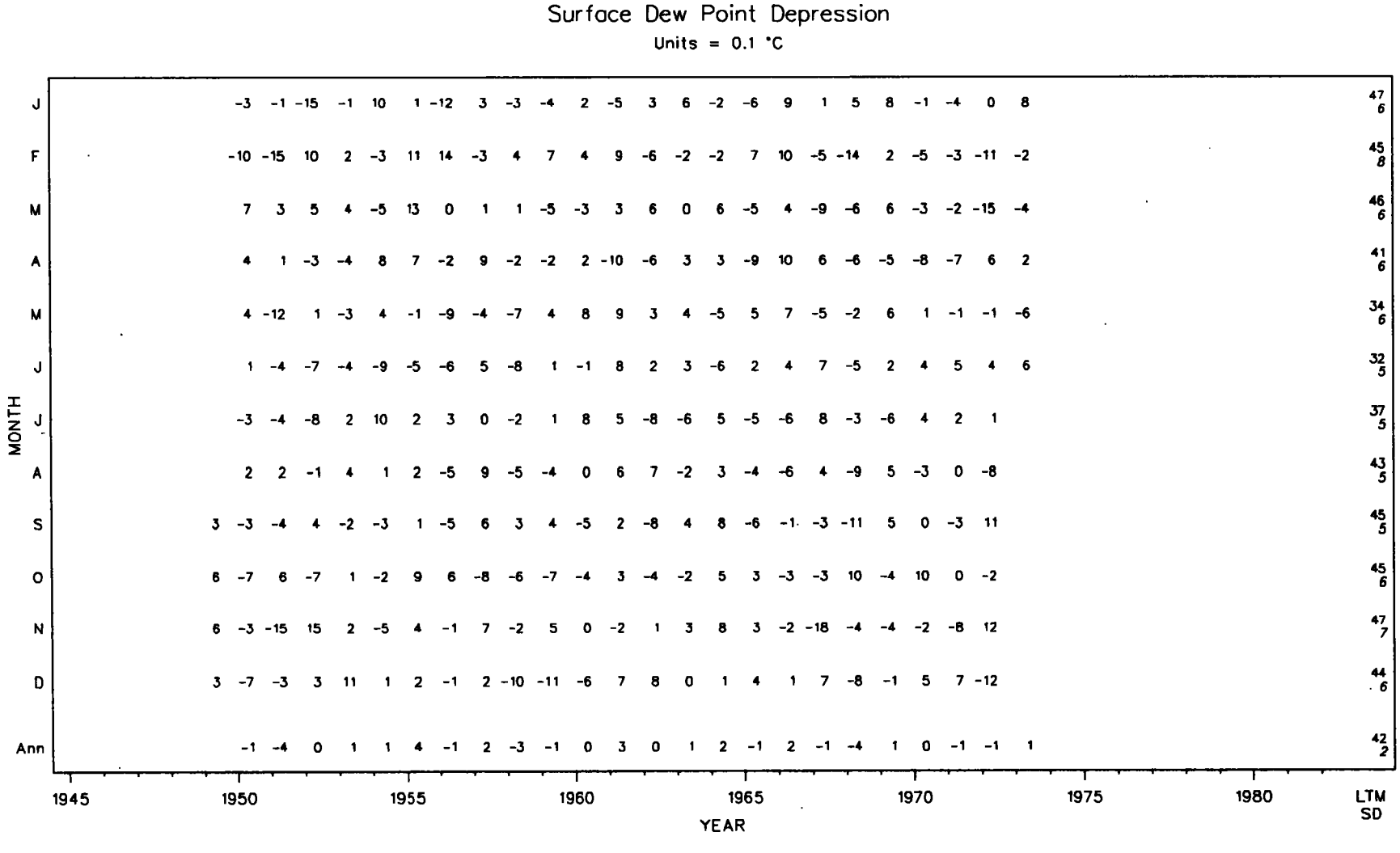
OWS Study Area E Surface Climatology

upper number = mean
lower number = standard deviation

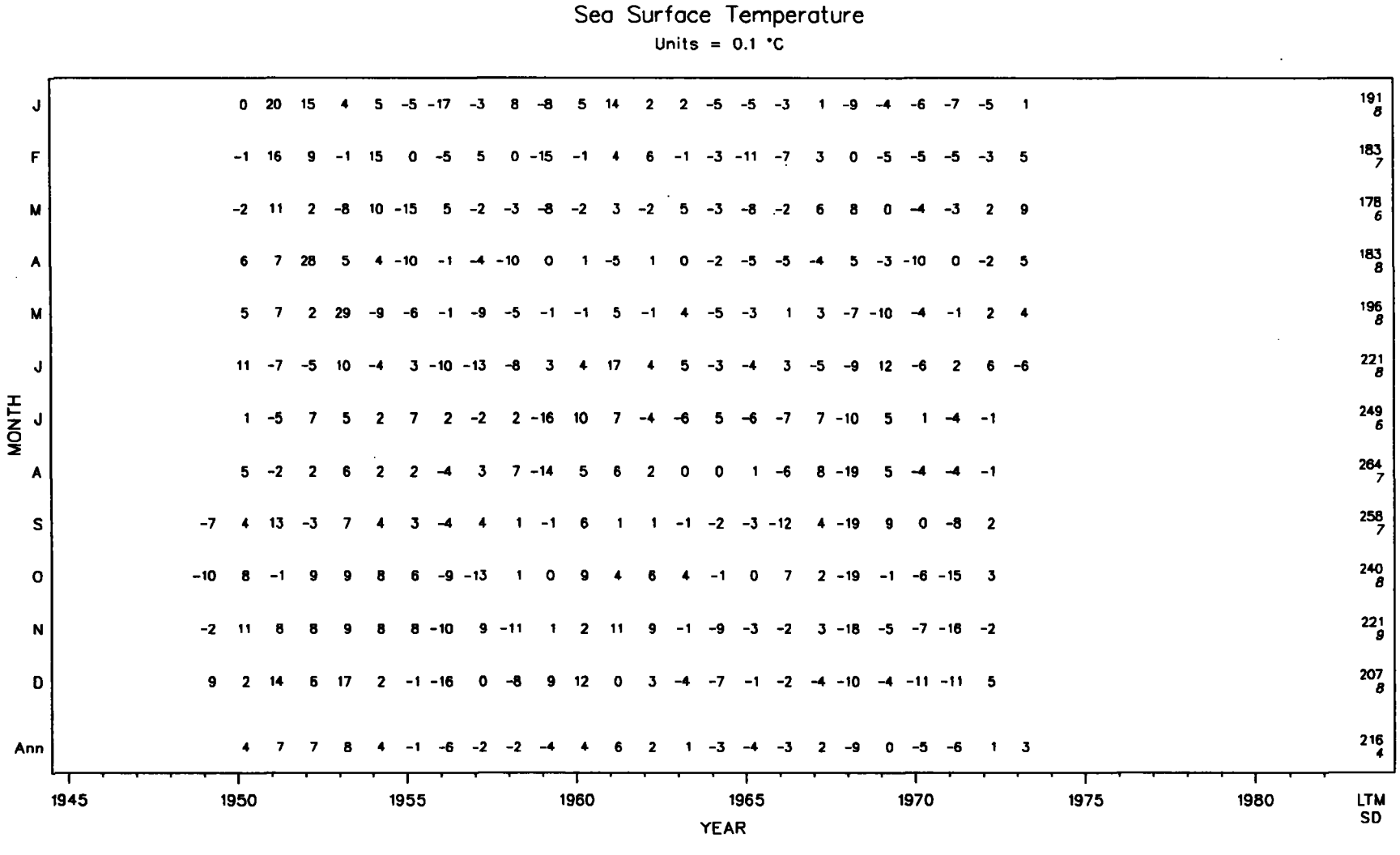
data contours
sunrise/sunset



OWS Study Area E Anomalies



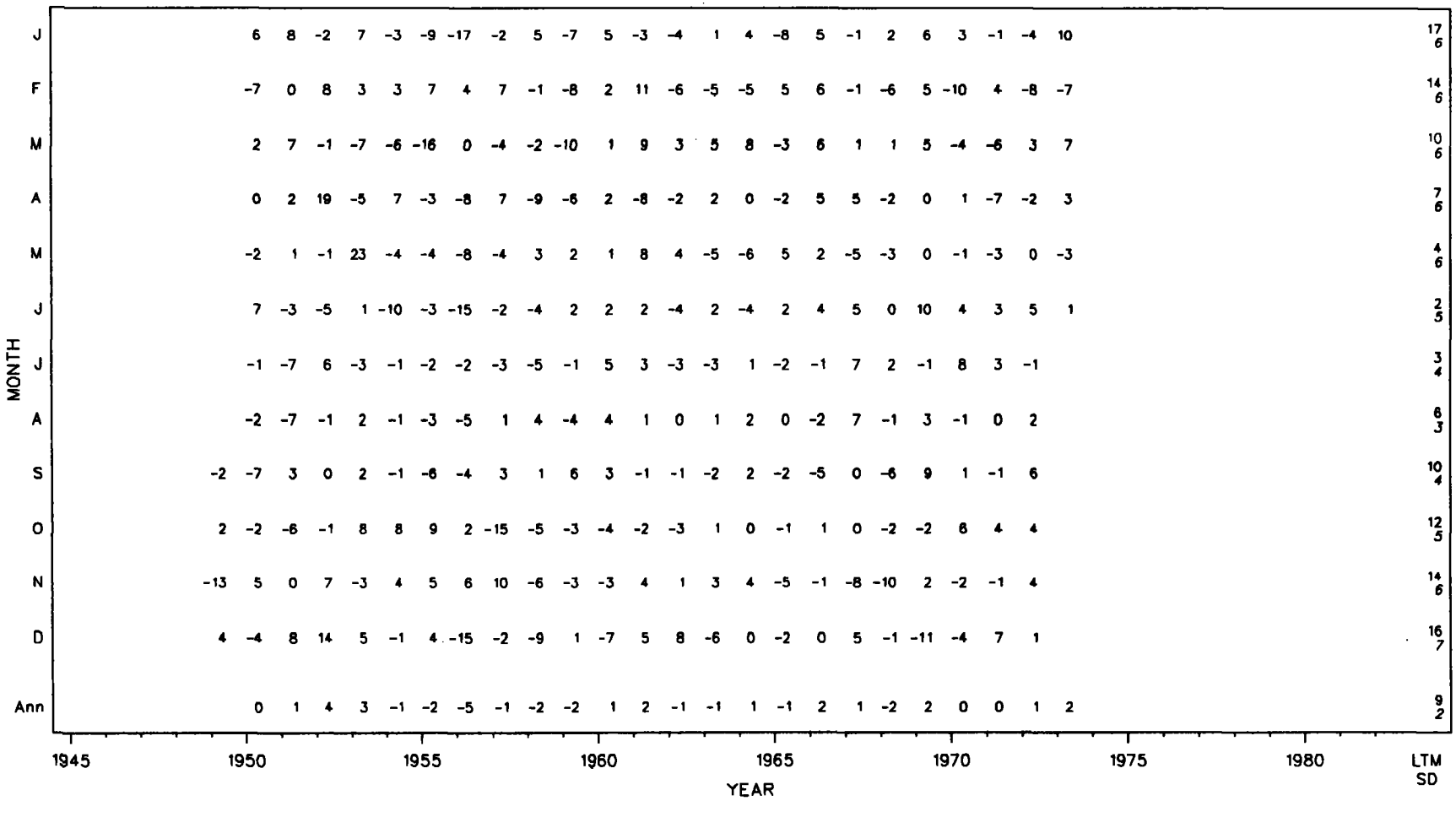
OWS Study Area E Anomalies



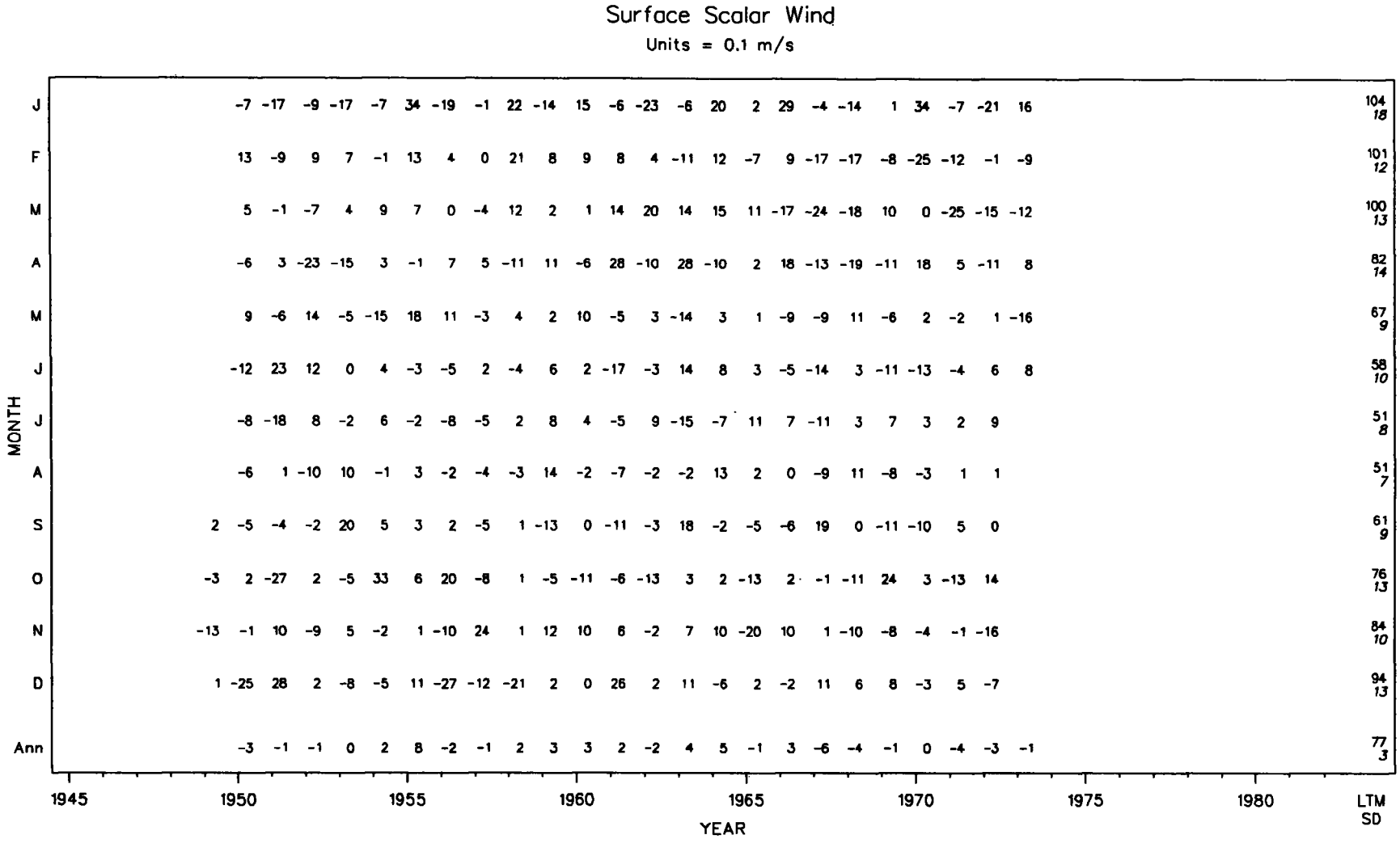
OWS Study Area E Anomalies

Sea - Air Temperature Difference

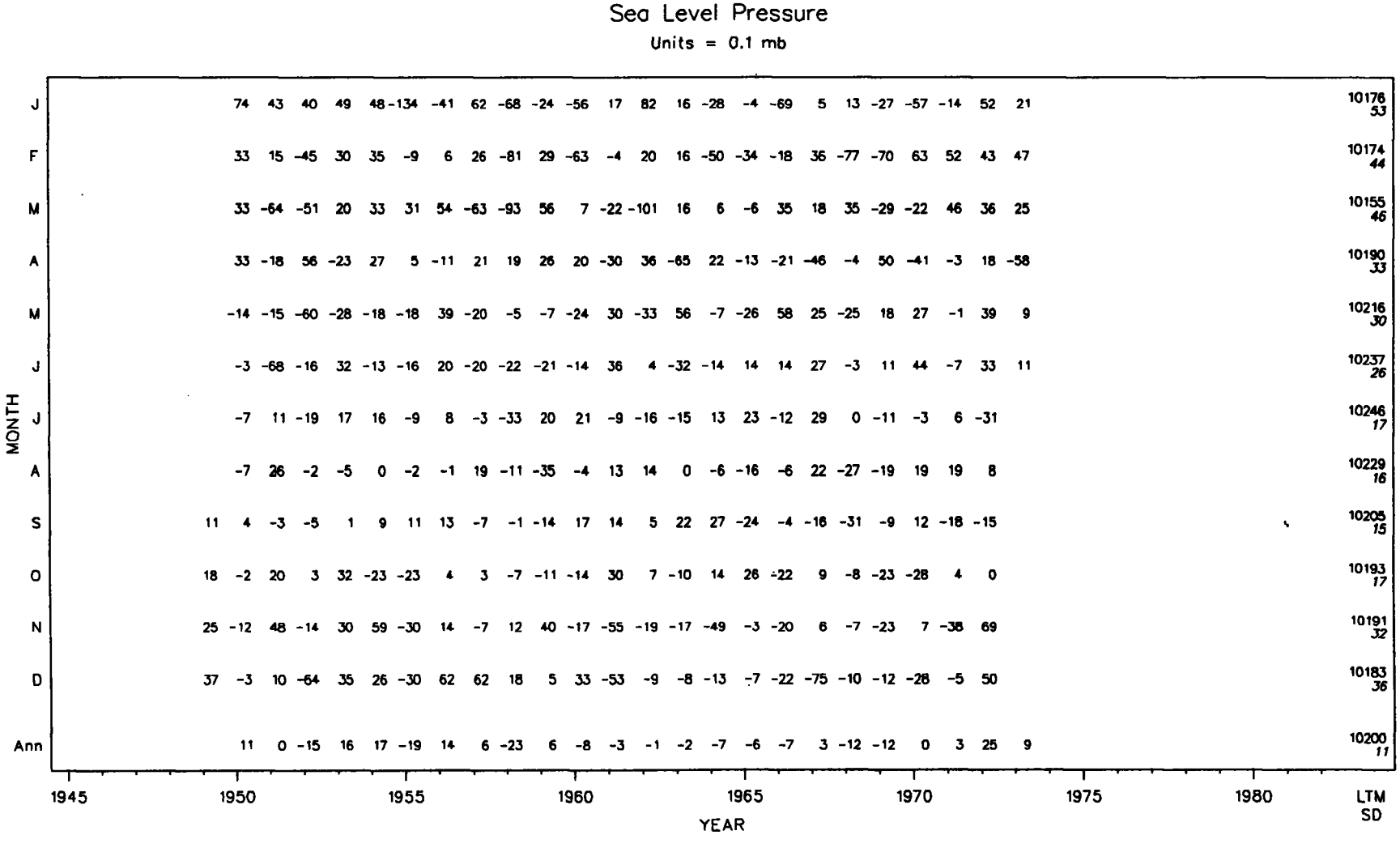
Units = 0.1 °C



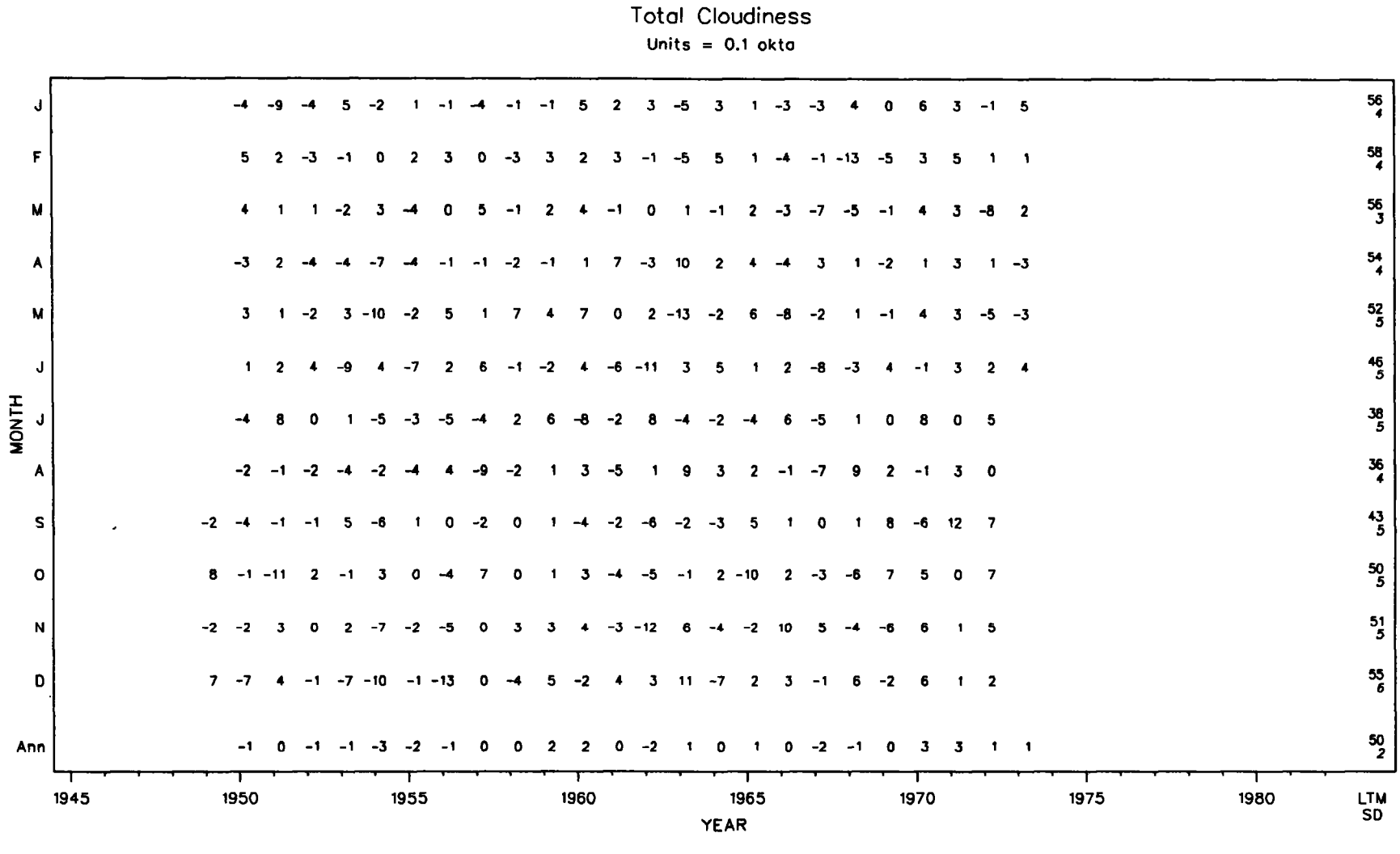
OWS Study Area E Anomalies



OWS Study Area E Anomalies



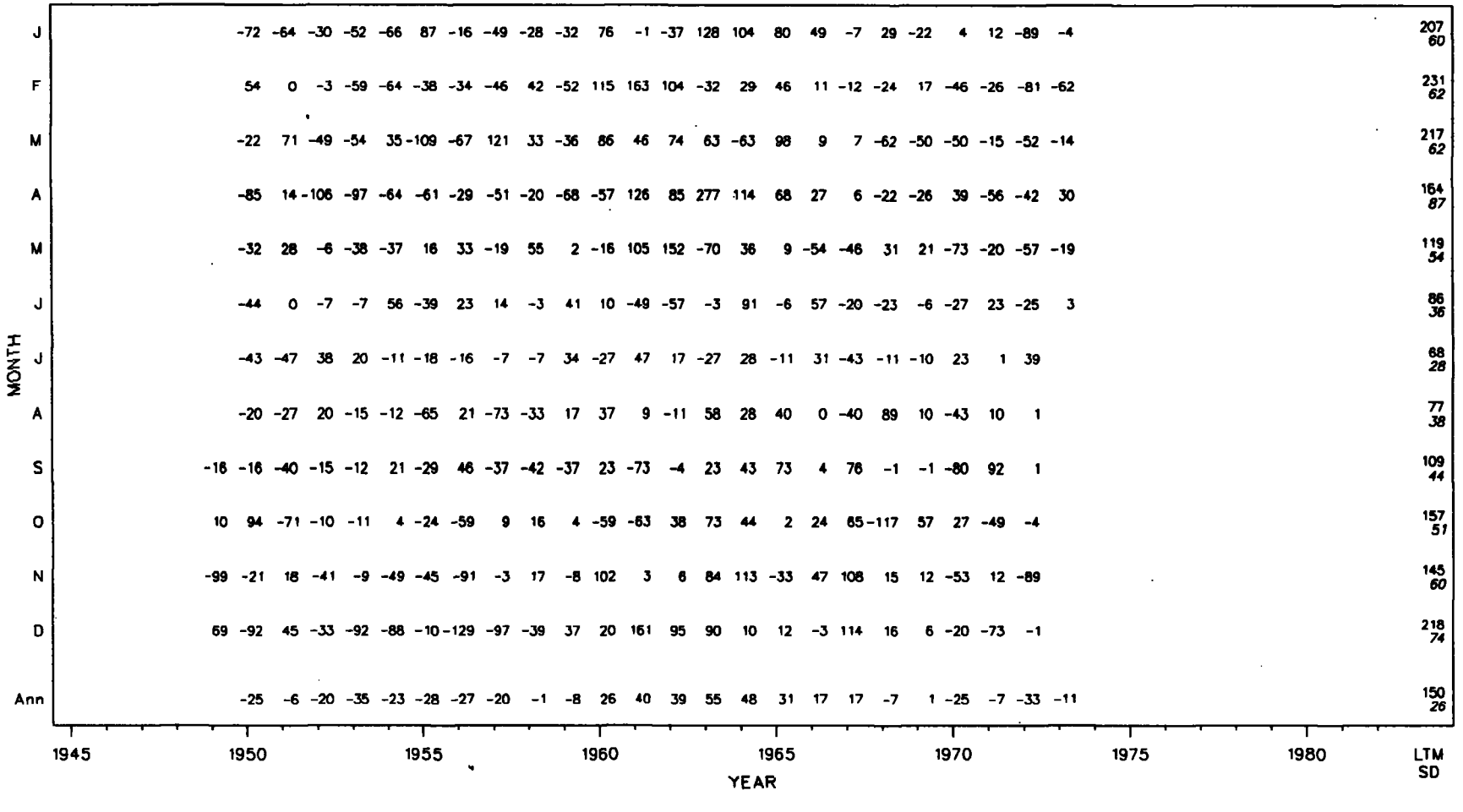
OWS Study Area E Anomalies



OWS Study Area E Anomalies

Precipitation Frequency

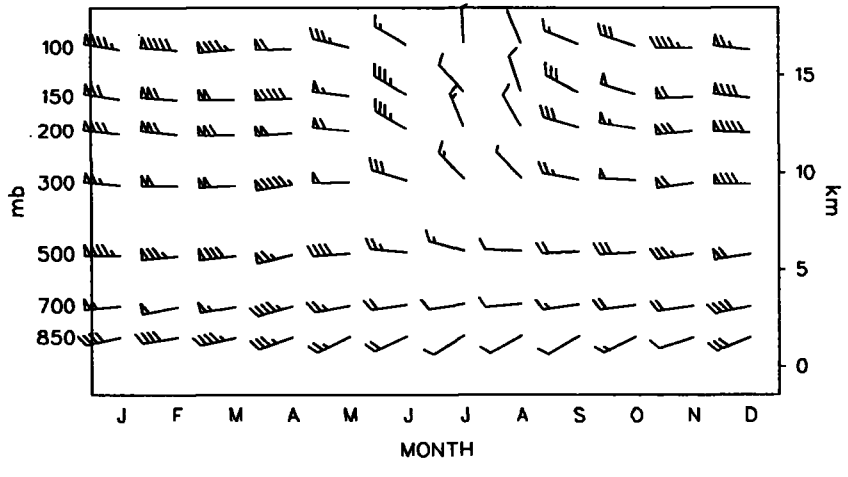
Units = 0.1 percent



OWS Study Area E Anomalies

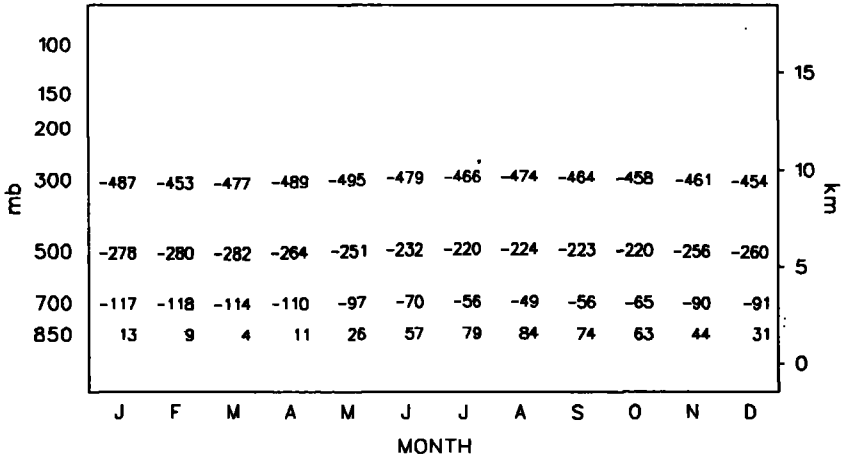
Wind

Full barb = 5 knots, Pennant = 25 knots



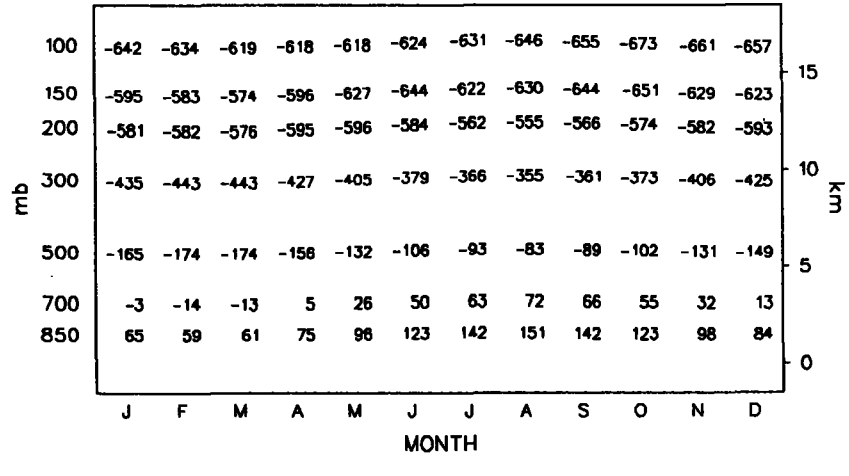
Dew Point Temperature

Units = 0.1 °C



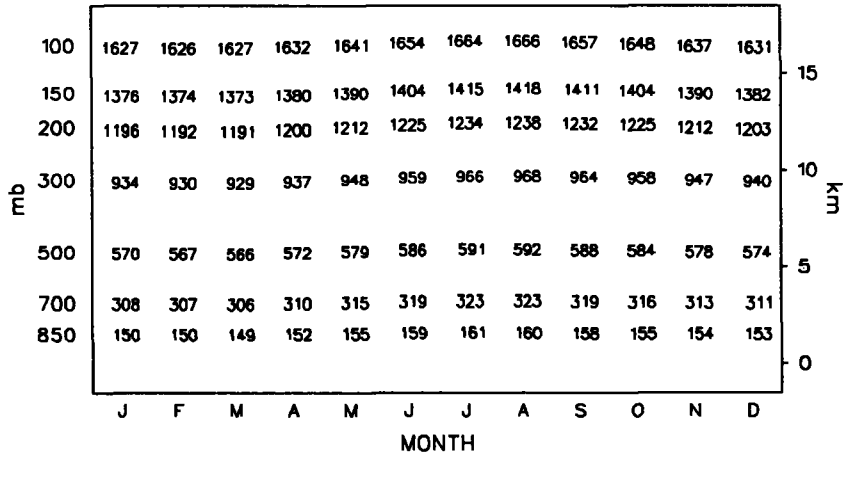
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m

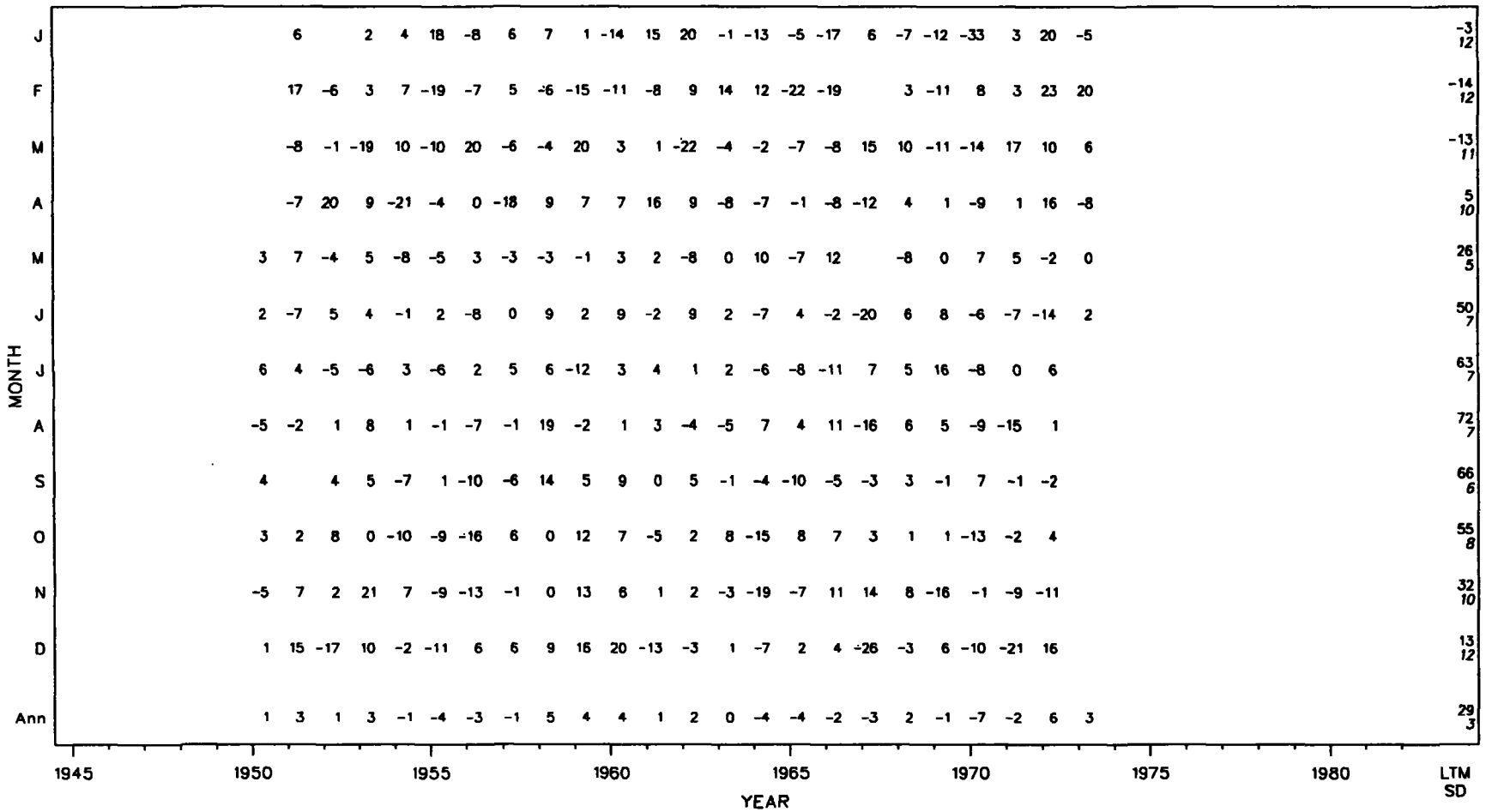


OWS Study Area E Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

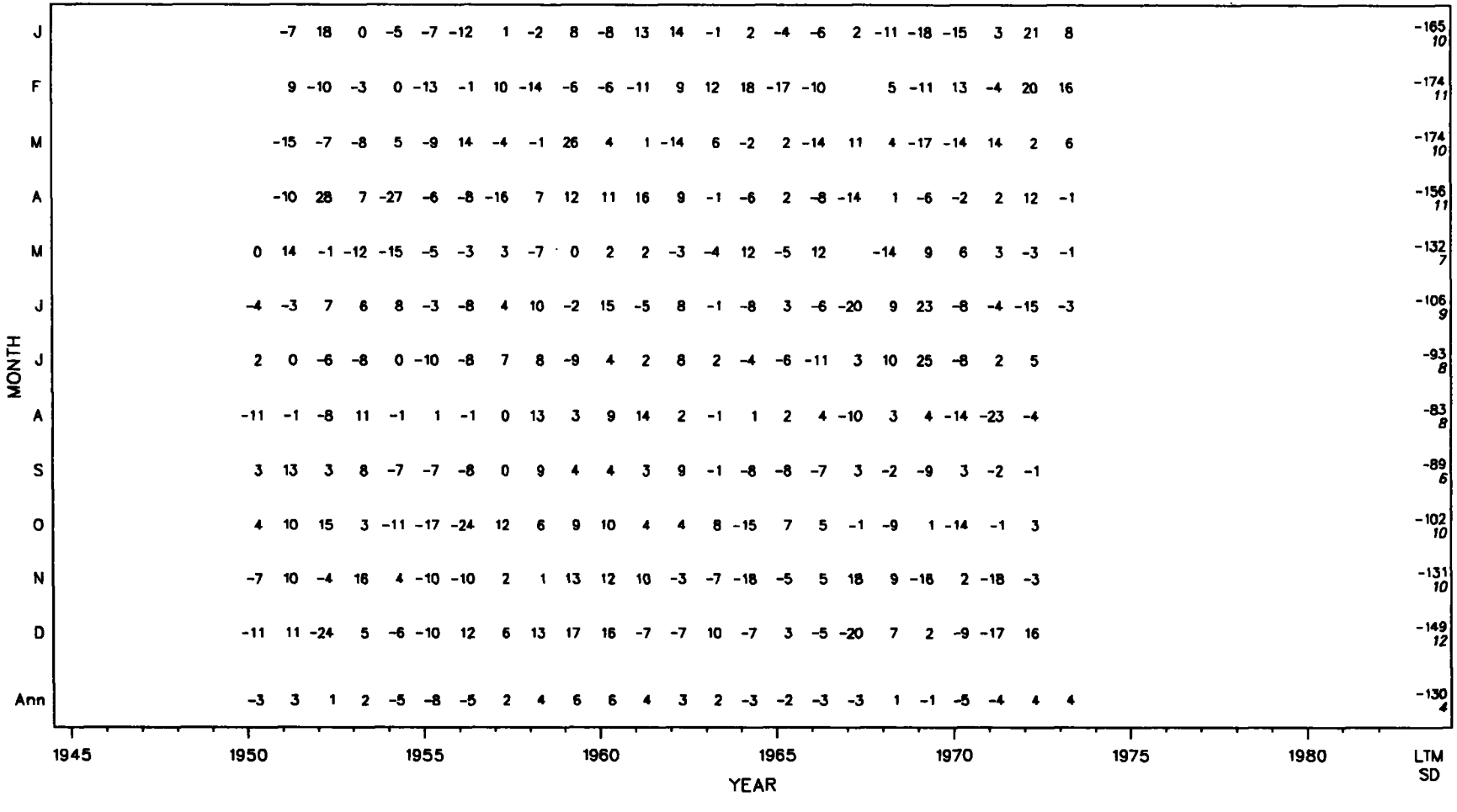
Units = 0.1 °C



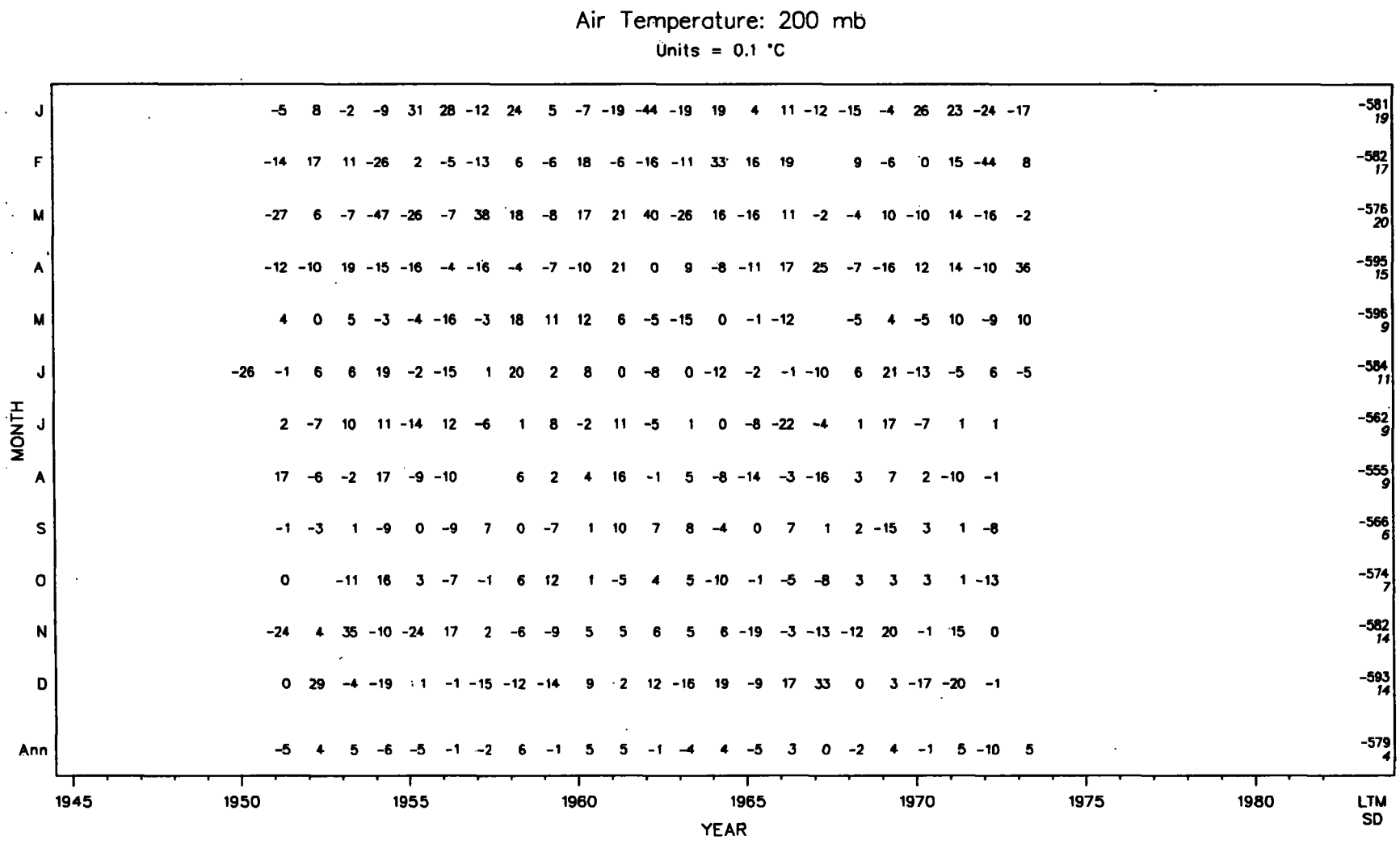
OWS Study Area E Anomalies

Air Temperature: 500 mb

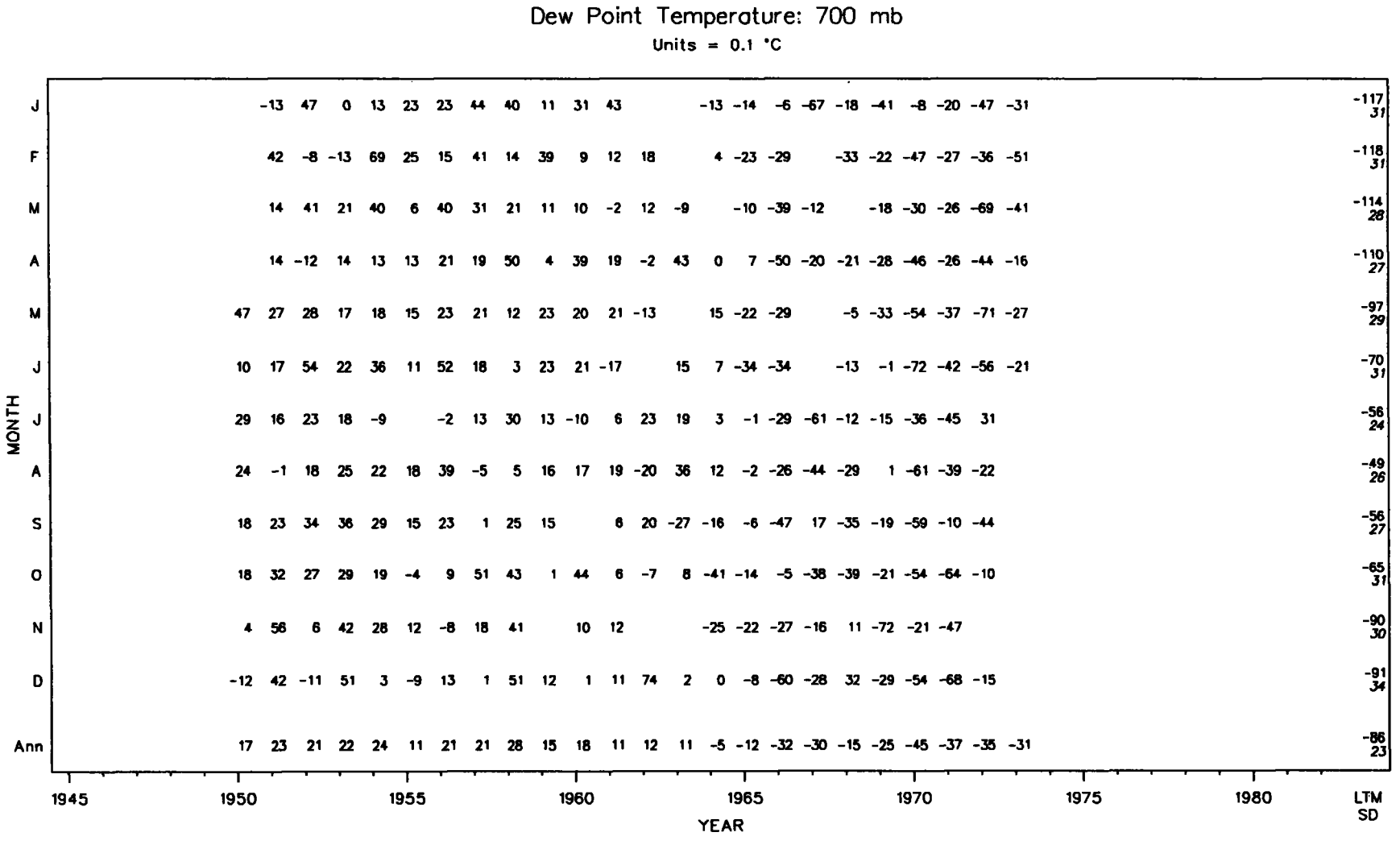
Units = 0.1 °C



OWS Study Area E Anomalies



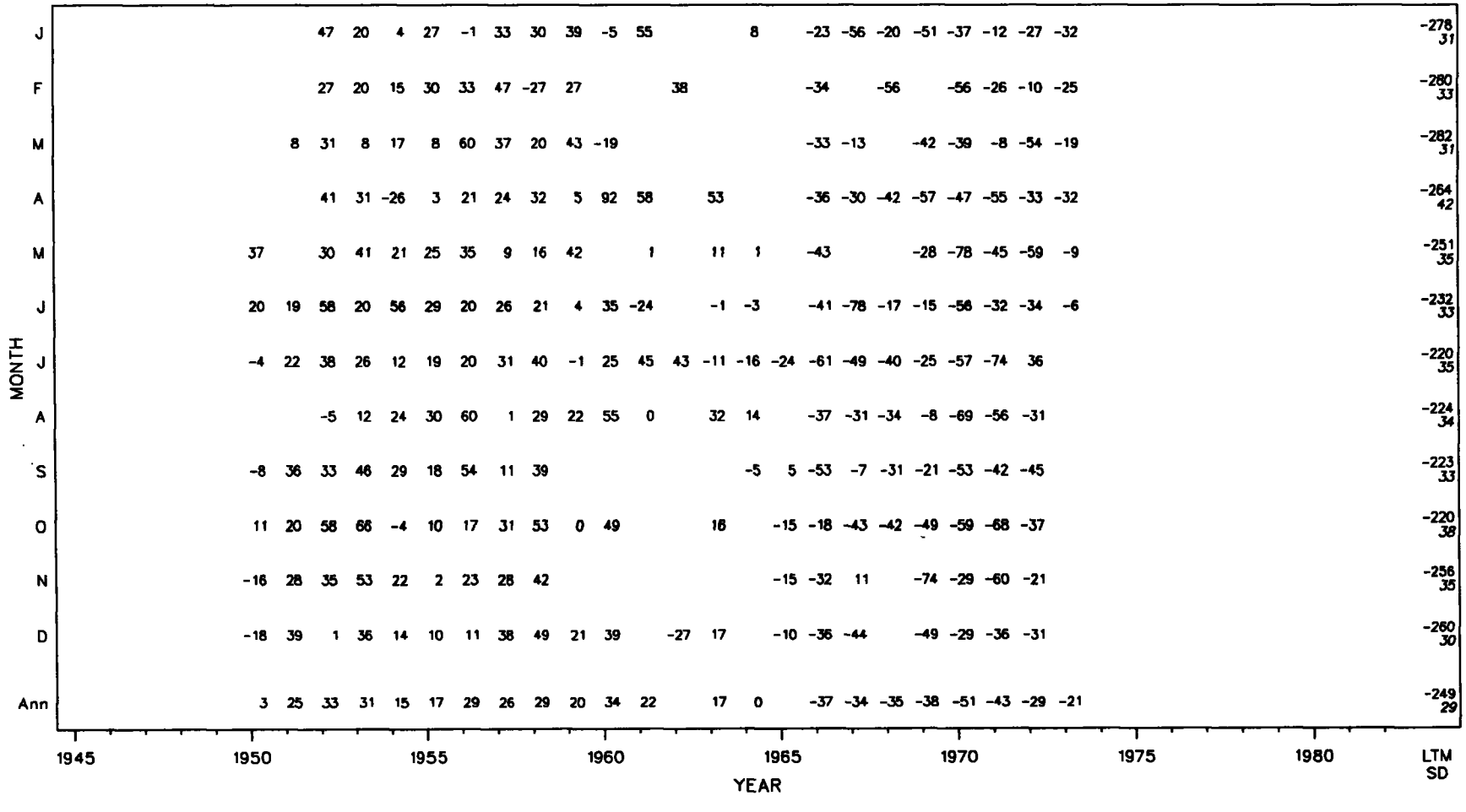
OWS Study Area E Anomalies



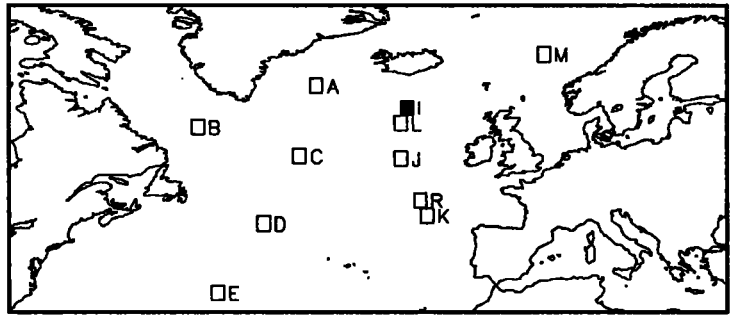
OWS Study Area E Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C



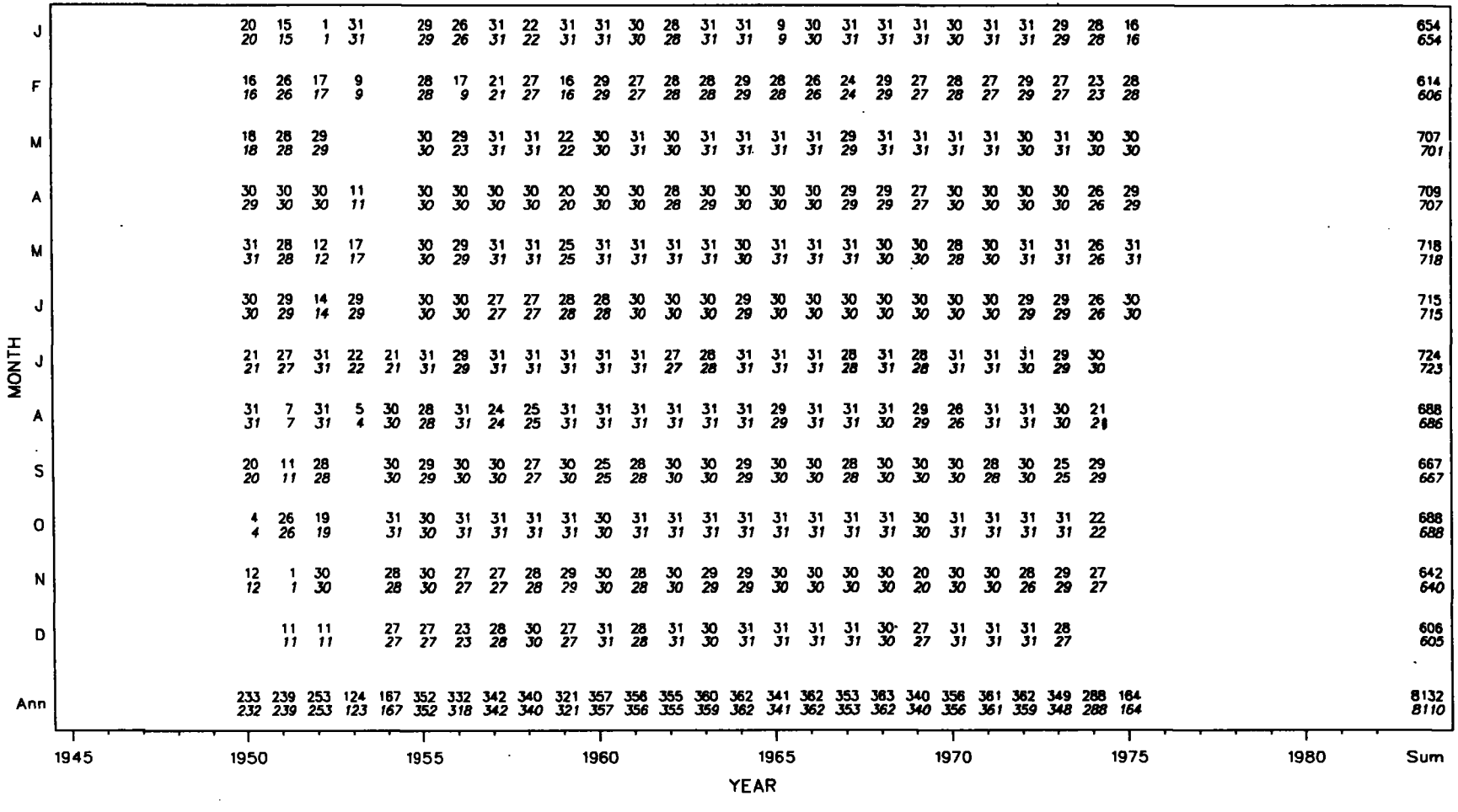
OWS Study Area E Anomalies



58.0°N – 59.9°N, 19.9°W – 18.0°W
1950 – 1975

OWS

I

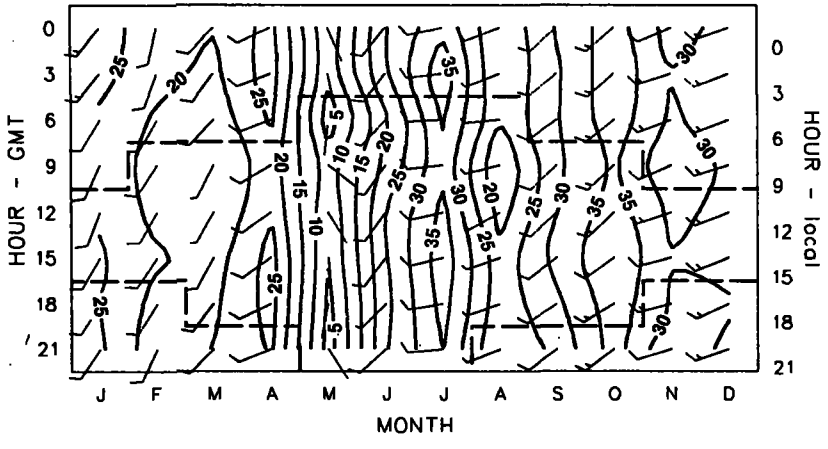


OWS Study Area I (59.0°N, 19.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



Pressure

Units = 0.1 mb

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	027 *176*	052 *178*	071 *149*	094 *133*	120 *121*	115 *101*	119 *86*	100 *95*	071 *118*	043 *132*	059 *159*	015 *179*
3	023 *179*	049 *180*	062 *148*	093 *136*	117 *122*	107 *104*	116 *86*	095 *96*	068 *116*	040 *133*	055 *157*	013 *176*
6	017 *182*	049 *180*	063 *145*	089 *136*	115 *120*	104 *104*	112 *87*	091 *97*	066 *115*	039 *130*	054 *158*	012 *174*
9	016 *184*	052 *178*	064 *146*	091 *135*	118 *120*	107 *103*	114 *88*	095 *96*	069 *118*	043 *131*	058 *157*	014 *175*
12	025 *183*	055 *176*	067 *147*	097 *133*	120 *121*	110 *103*	117 *89*	097 *97*	072 *118*	045 *130*	063 *156*	020 *172*
15	014 *184*	056 *176*	065 *146*	094 *135*	124 *119*	109 *103*	118 *88*	096 *97*	070 *117*	040 *132*	057 *156*	013 *172*
18	020 *180*	053 *176*	063 *147*	091 *134*	119 *119*	107 *104*	116 *87*	096 *94*	068 *115*	038 *132*	058 *157*	015 *173*
21	025 *182*	054 *176*	066 *150*	095 *134*	122 *121*	107 *103*	118 *86*	098 *95*	069 *118*	041 *133*	058 *159*	016 *176*

HOUR - local

MONTH

Total Cloudiness

Units = 0.1 okta

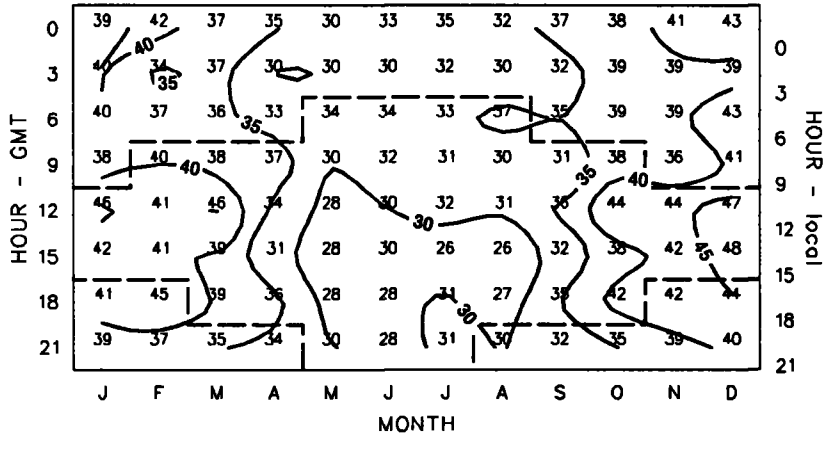
HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	56 *25*	62 *21*	58 *24*	58 *25*	61 *22*	66 *19*	67 *18*	61 *23*	59 *24*	57 *24*	57 *24*	56 *24*
3	57 *25*	59 *24*	61 *23*	58 *25*	61 *22*	66 *18*	68 *17*	61 *24*	57 *25*	58 *25*	58 *24*	58 *23*
6	58 *24*	59 *24*	60 *22*	64 *19*	65 *18*	67 *17*	68 *16*	65 *18*	62 *21*	57 *25*	56 *24*	58 *23*
9	61 *19*	65 *17*	65 *16*	64 *19*	63 *20*	66 *18*	67 *18*	65 *18*	63 *18*	63 *18*	63 *18*	63 *18*
12	63 *16*	66 *15*	65 *17*	64 *18*	62 *20*	64 *19*	65 *19*	63 *20*	63 *19*	63 *18*	63 *17*	64 *16*
15	64 *16*	65 *17*	65 *17*	63 *19*	61 *21*	65 *19*	64 *19*	62 *20*	63 *18*	63 *18*	64 *17*	65 *15*
18	63 *17*	66 *17*	66 *17*	63 *19*	62 *19*	66 *19*	66 *19*	64 *19*	63 *19*	63 *18*	65 *17*	65 *17*
21	57 *24*	60 *23*	62 *20*	64 *19*	63 *20*	65 *19*	67 *17*	65 *19*	62 *21*	59 *23*	59 *23*	59 *22*

HOUR - local

MONTH

Precipitation Frequency

Units = percent
Contour interval = 5 percent



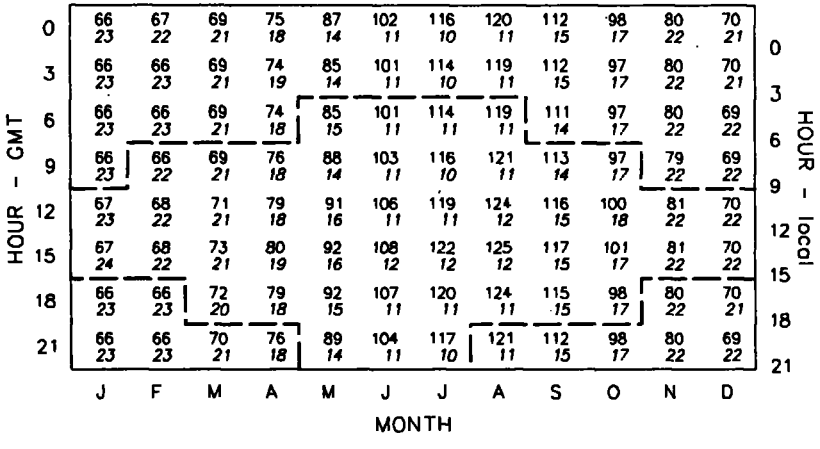
OWS Study Area I Surface Climatology

upper number = mean
lower number = standard deviation

data contours
sunrise/sunset

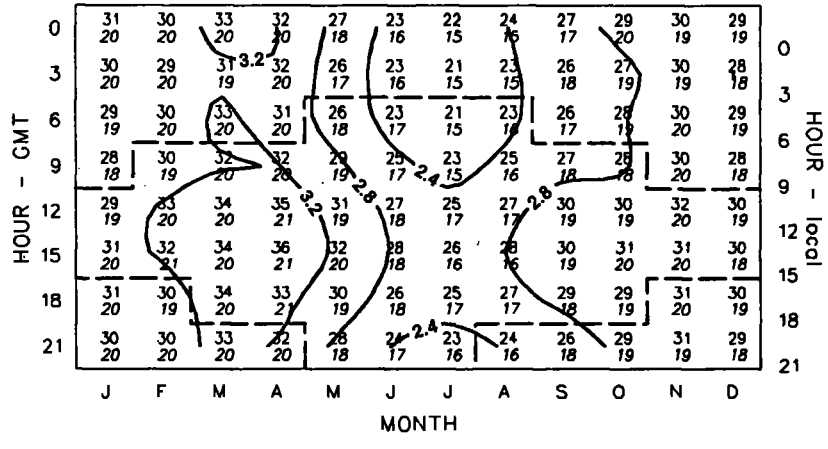
Air Temperature

Units = 0.1 °C



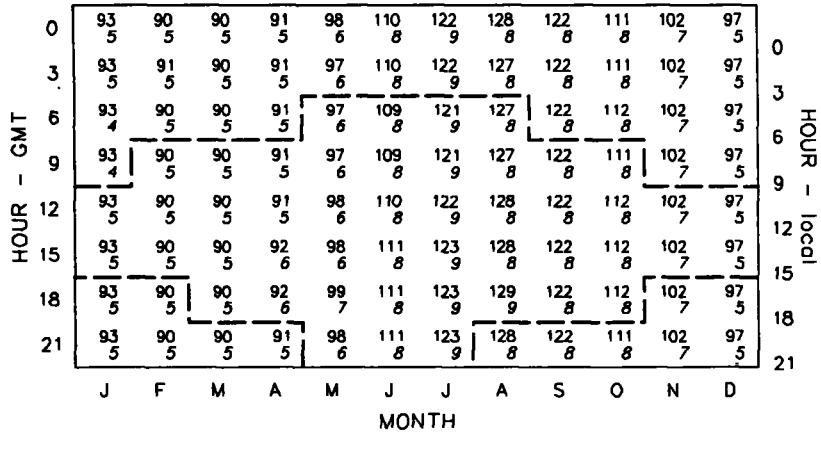
Dew Point Depression

Units = 0.1 °C
Contour interval = 0.4 °C



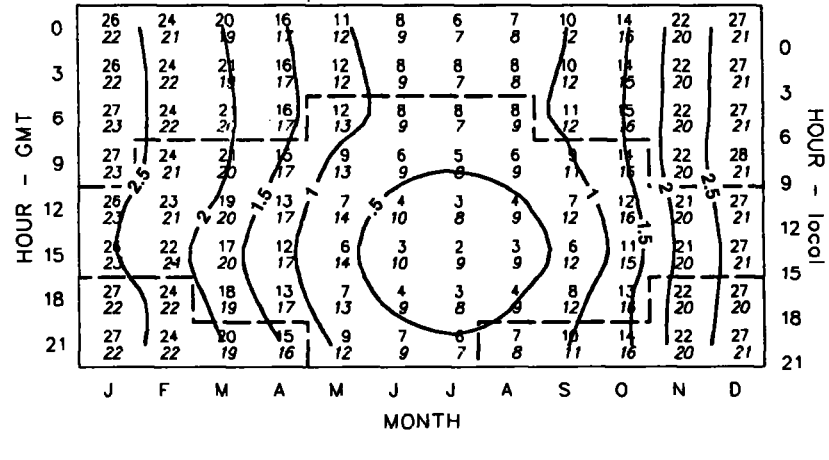
Sea Surface Temperature

Units = 0.1 °C



Sea – Air Temperature Difference

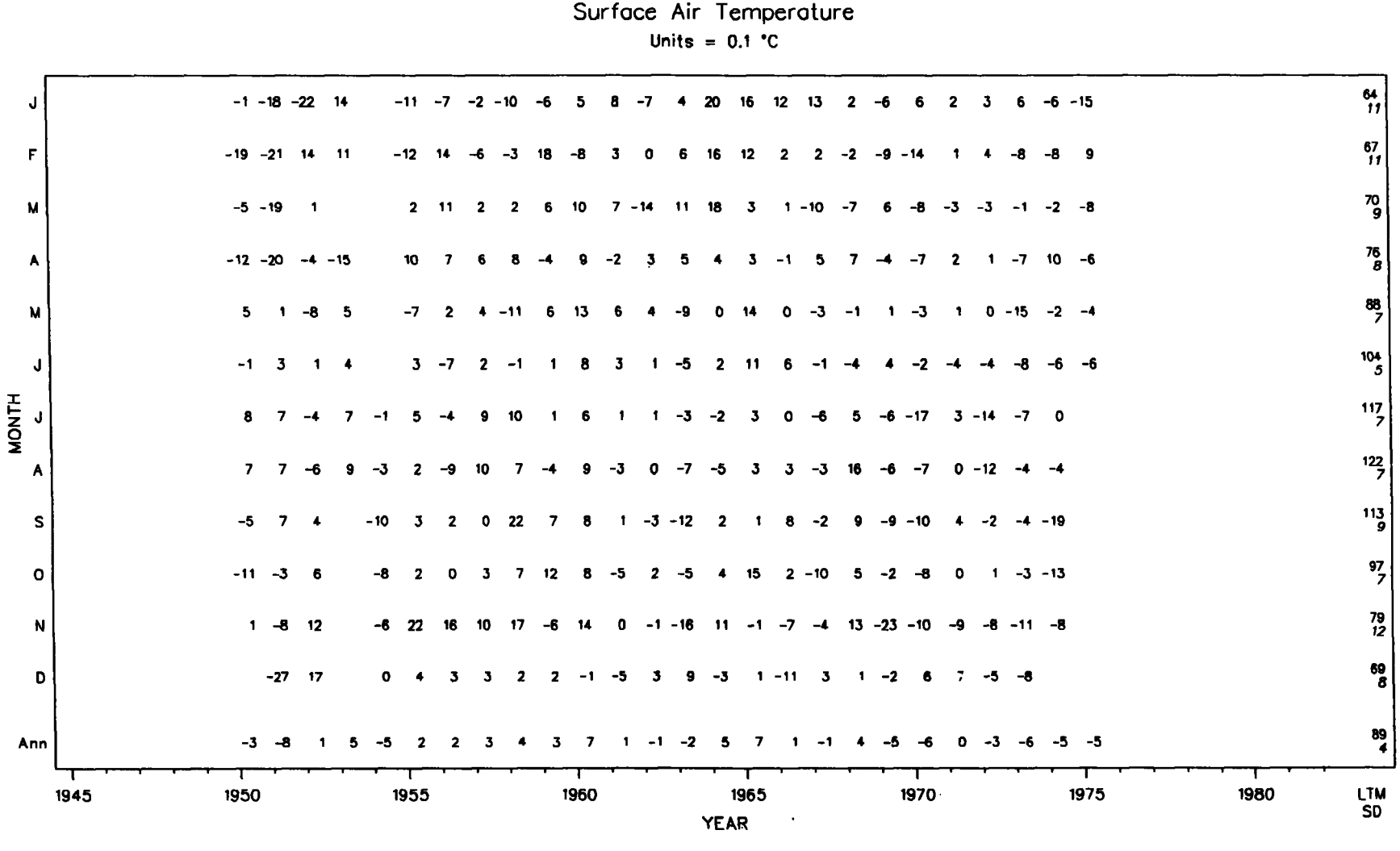
Units = 0.1 °C
Contour interval = 0.5 °C



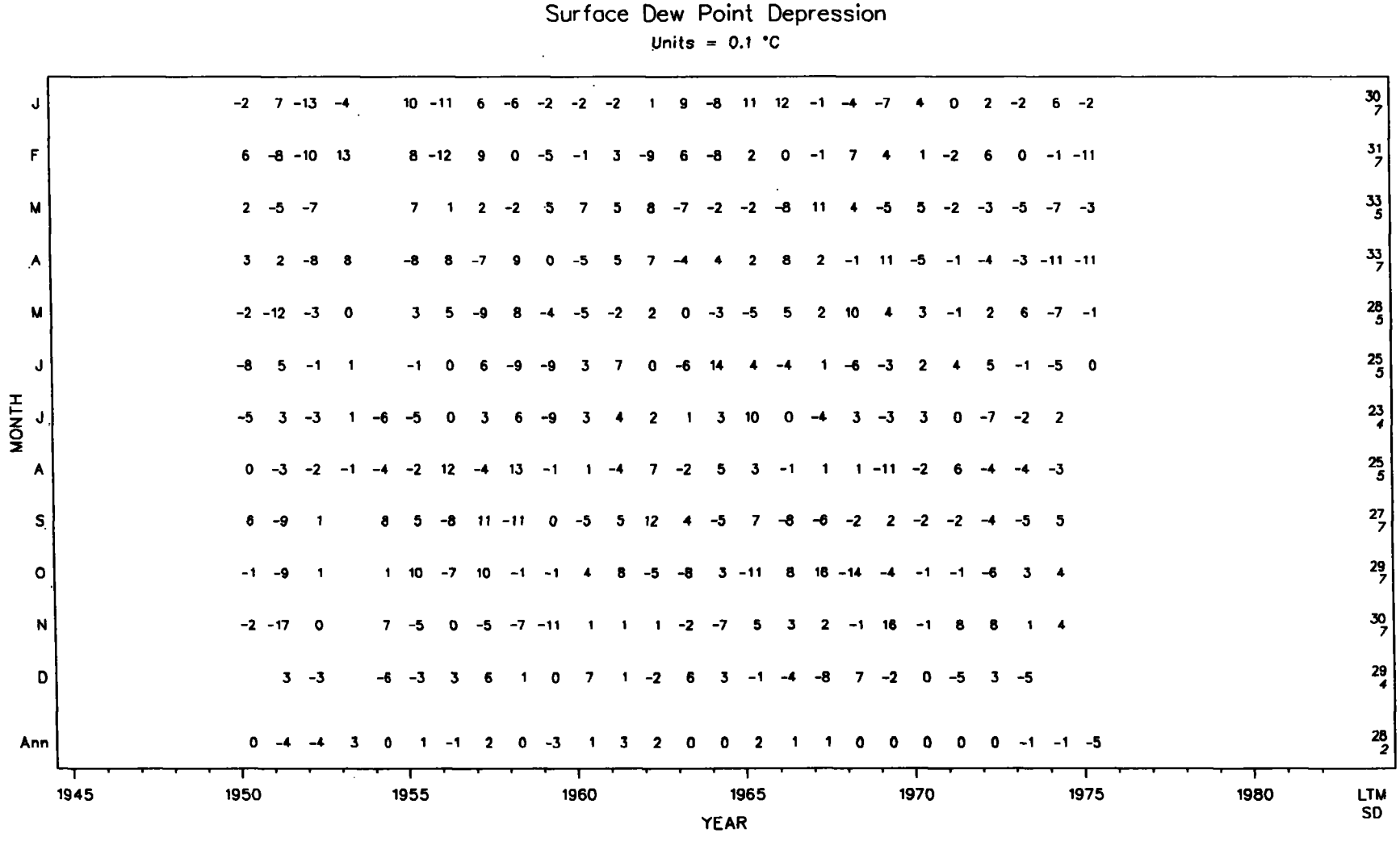
OWS Study Area I Surface Climatology

upper number = mean
lower number = standard deviation

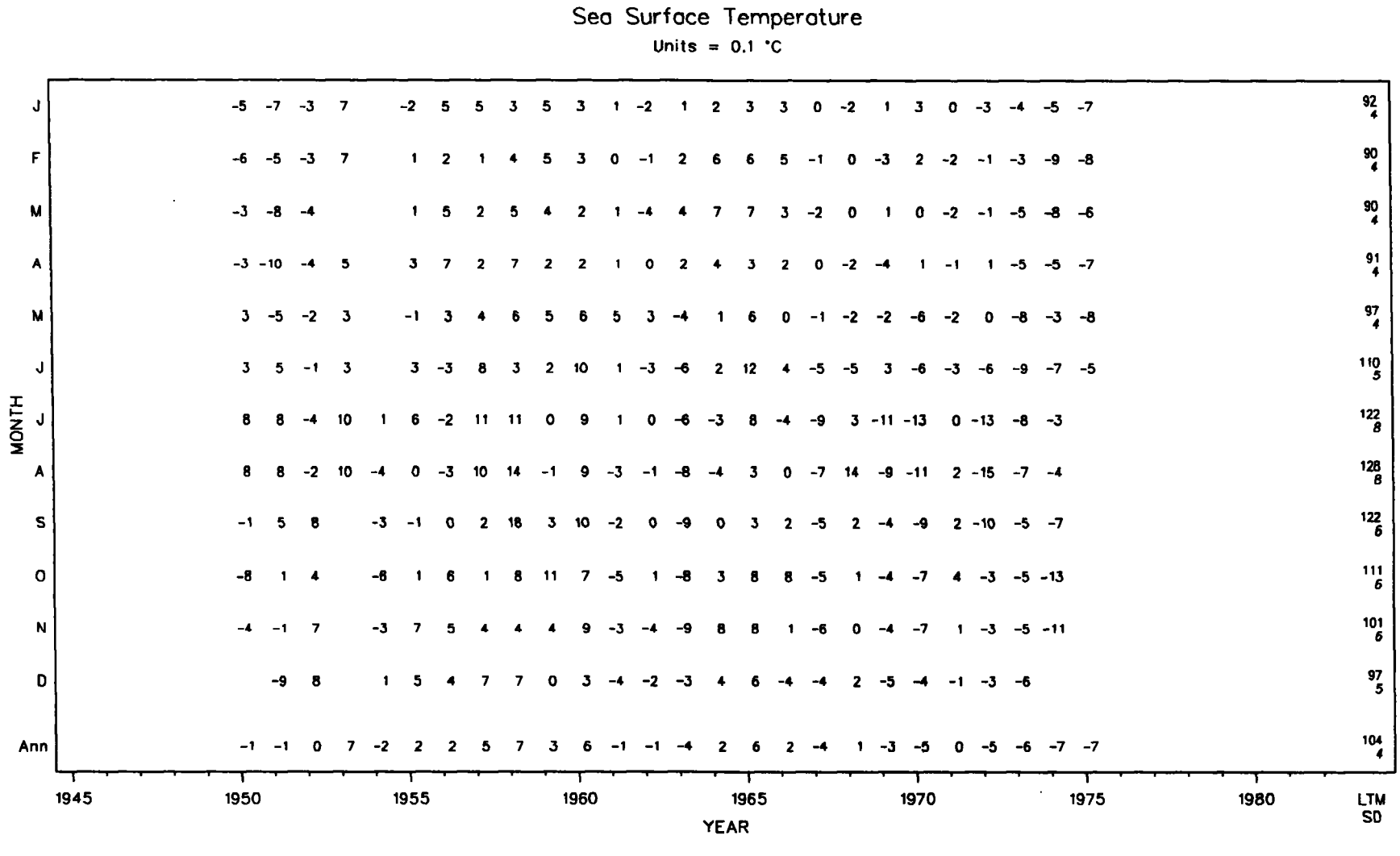
——— data contours
– – – – sunrise/sunset



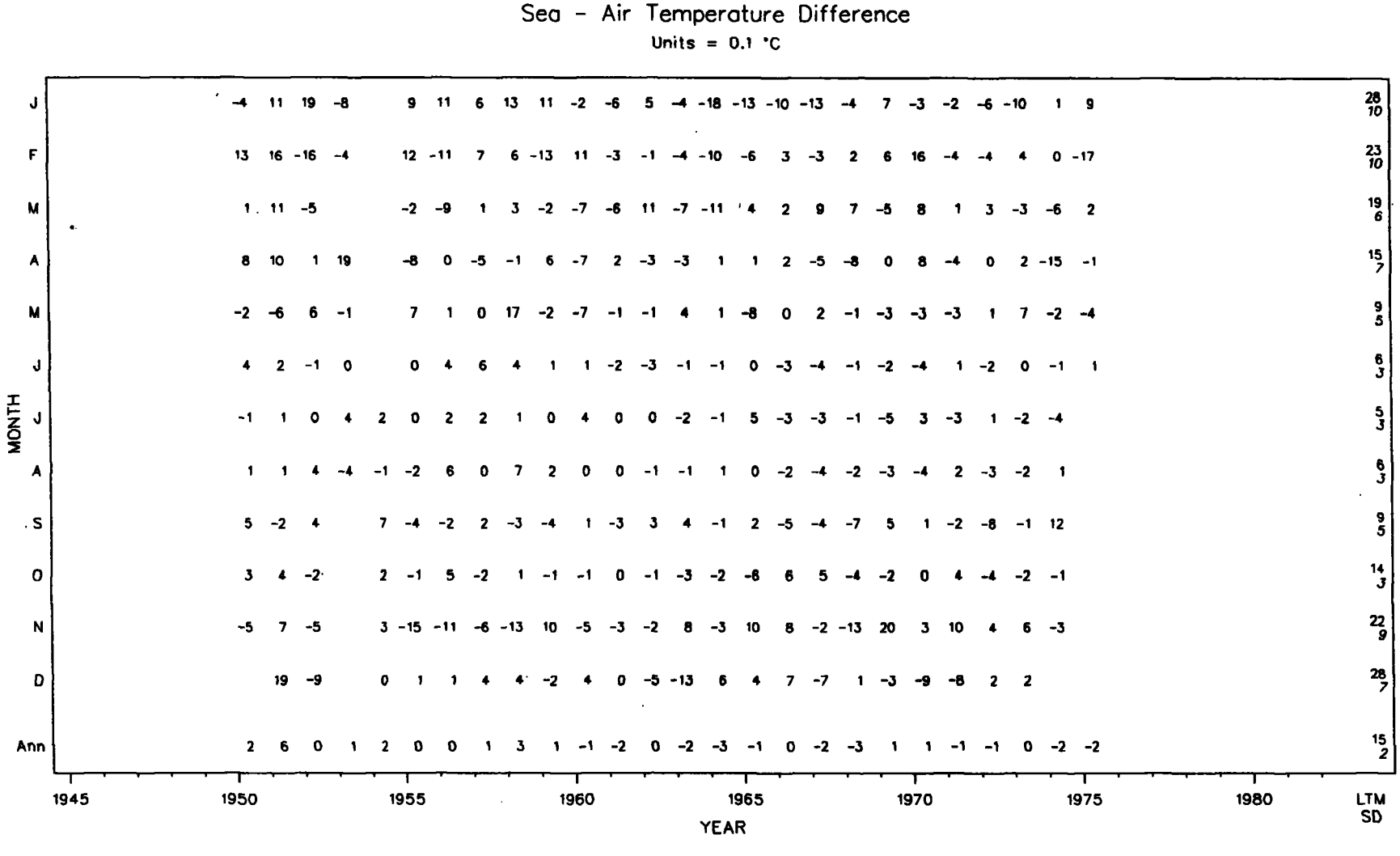
OWS Study Area I Anomalies



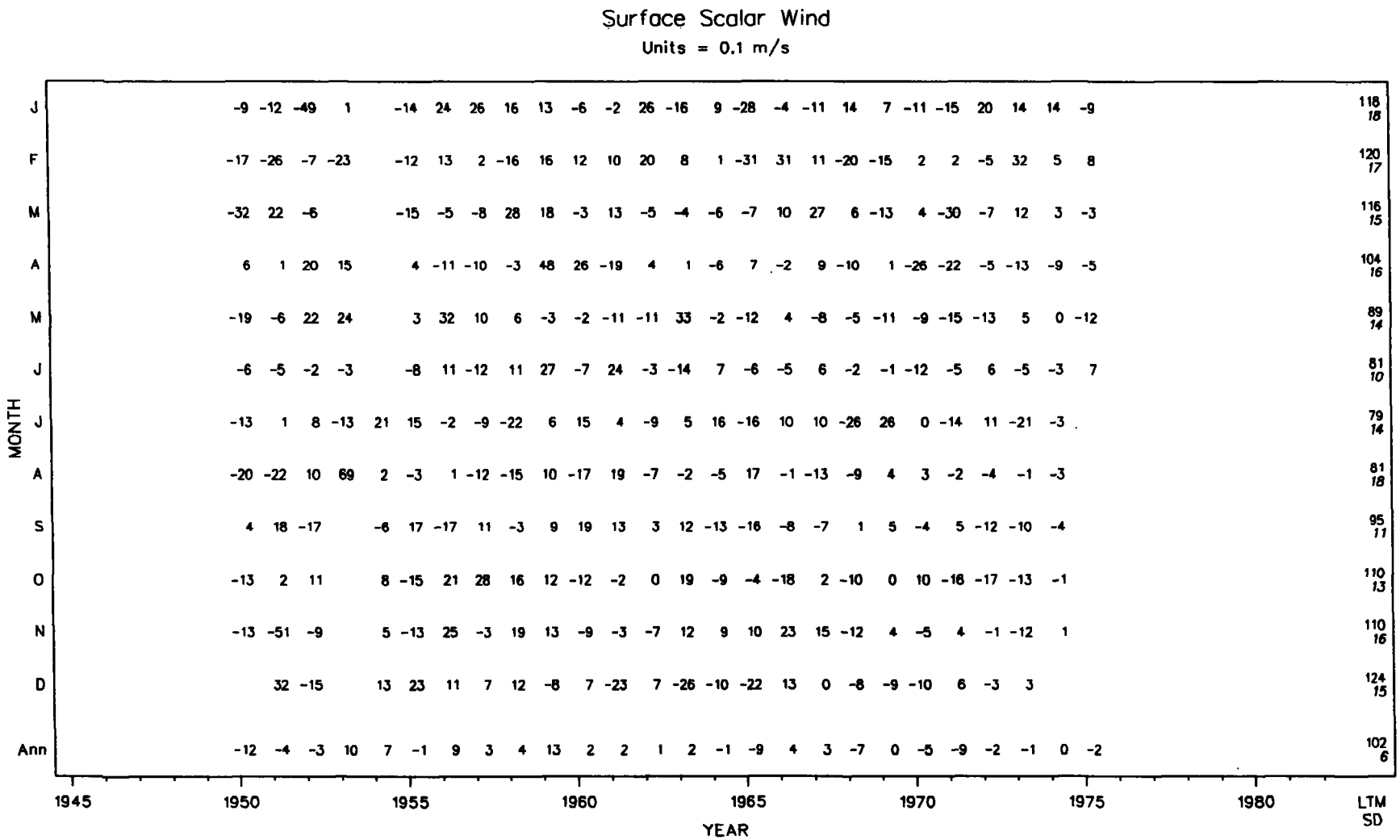
OWS Study Area I Anomalies



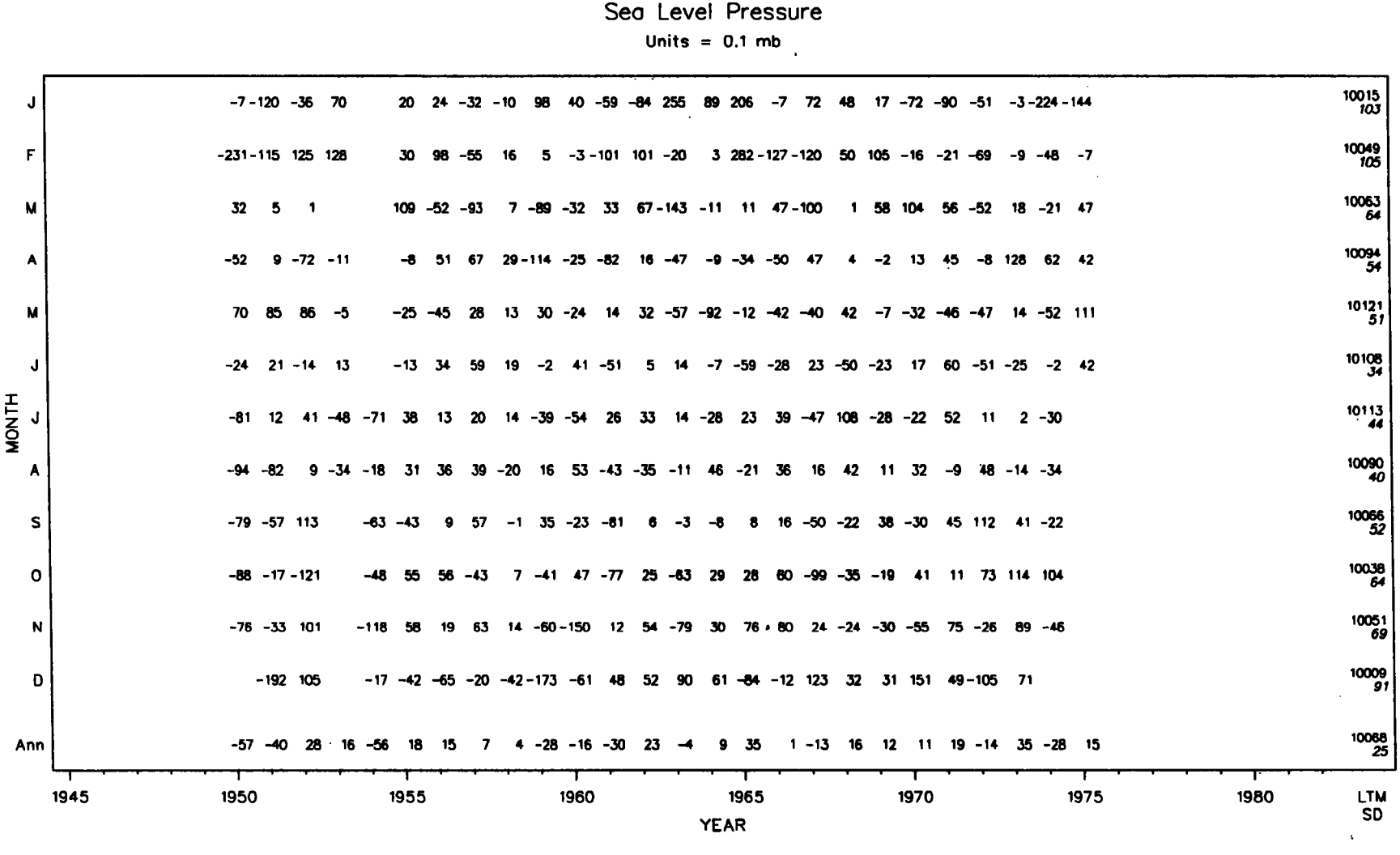
OWS Study Area I Anomalies



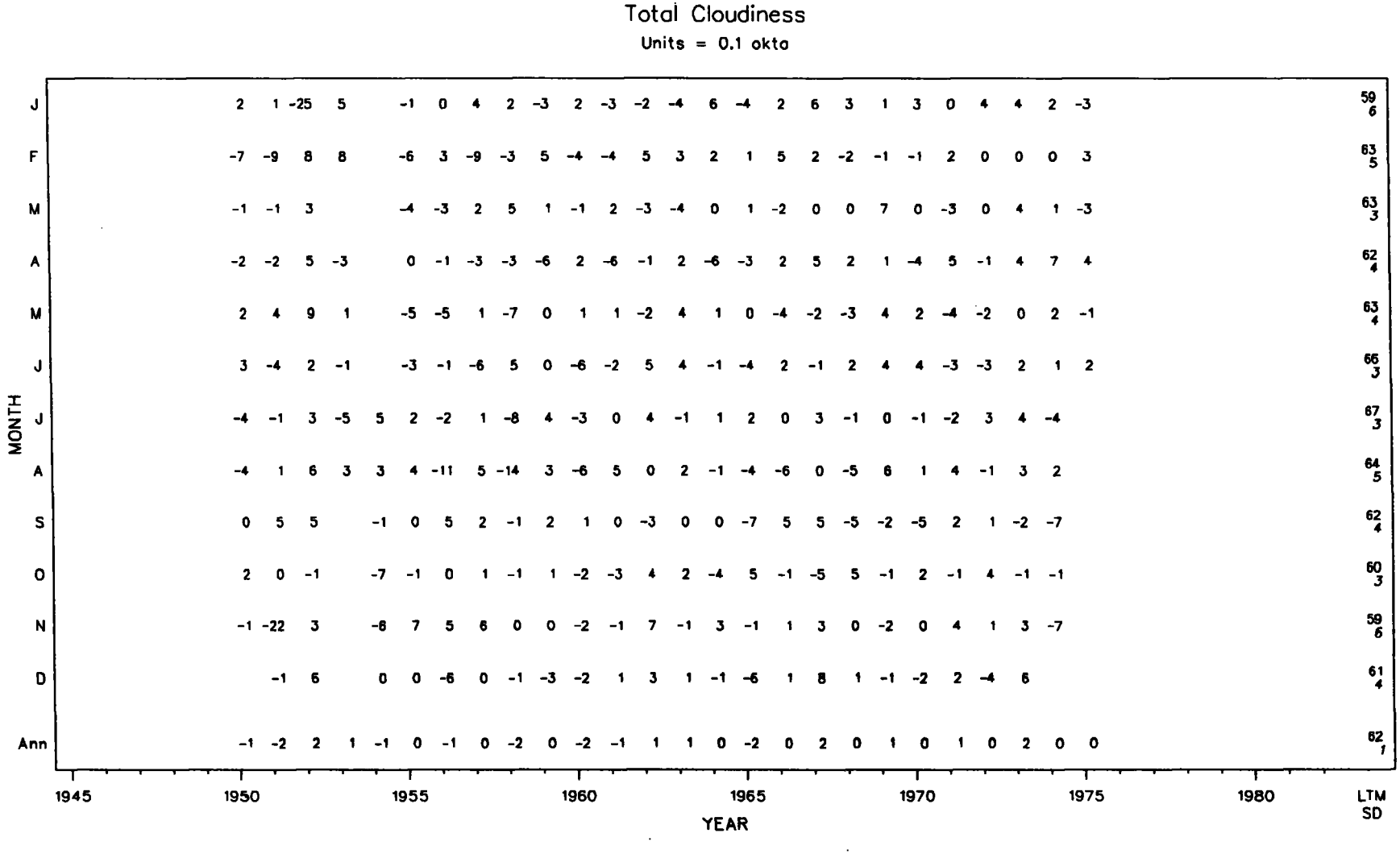
OWS Study Area I Anomalies



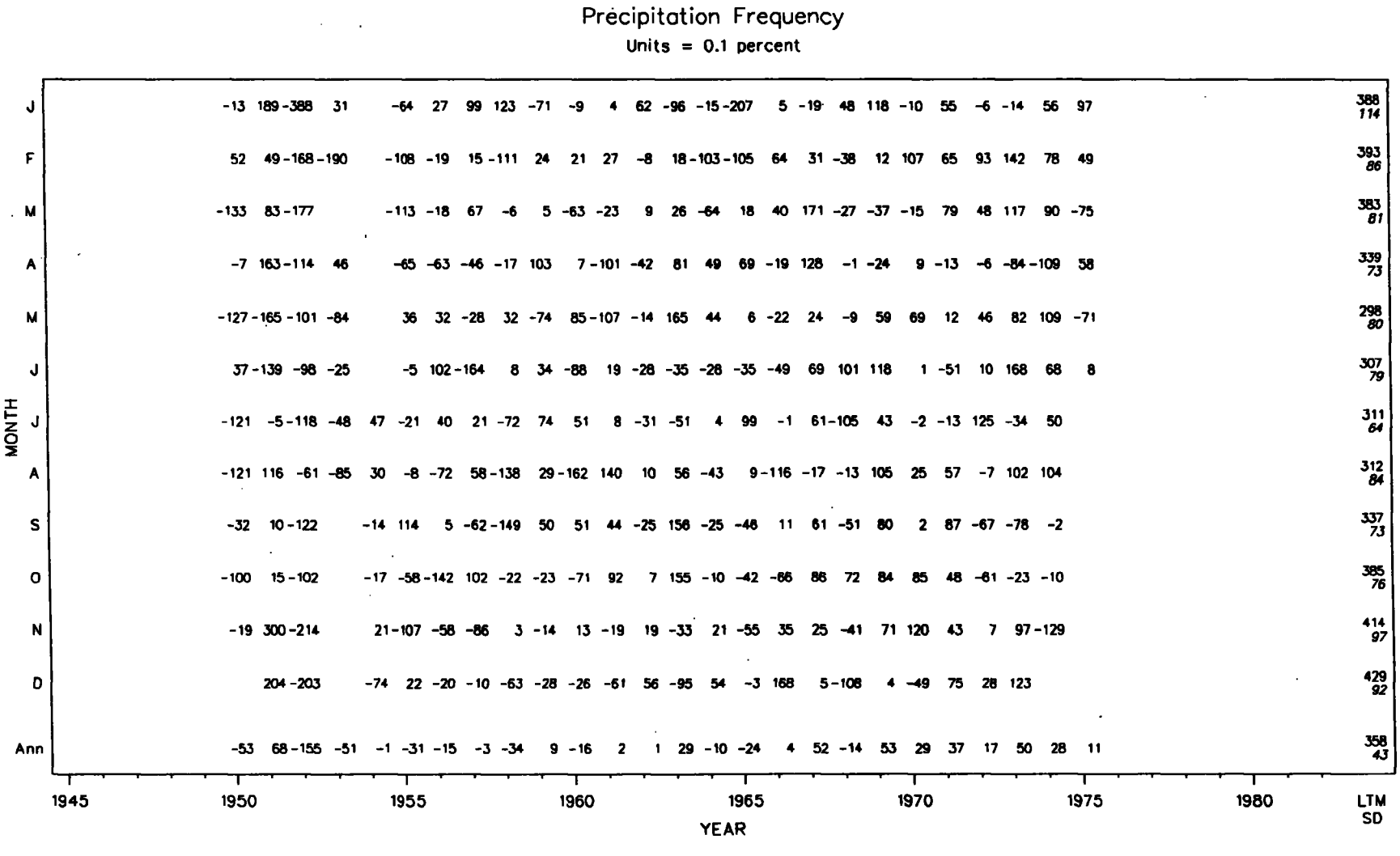
OWS Study Area I Anomalies



OWS Study Area I Anomalies



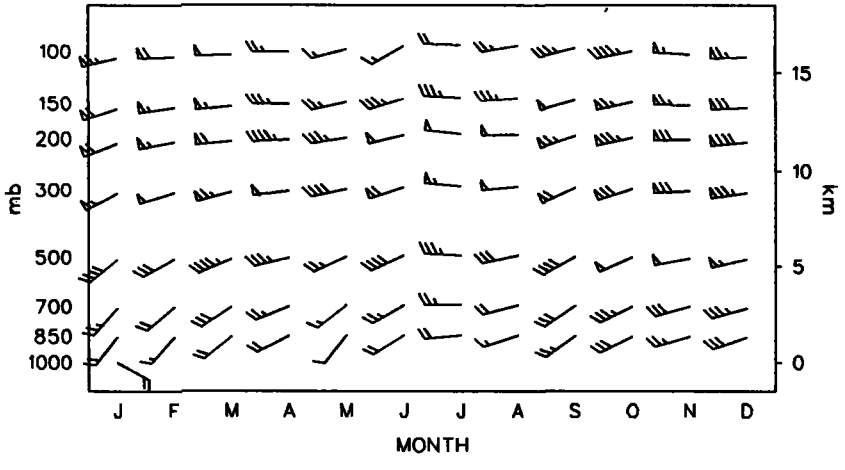
OWS Study Area I Anomalies



OWS Study Area I Anomalies

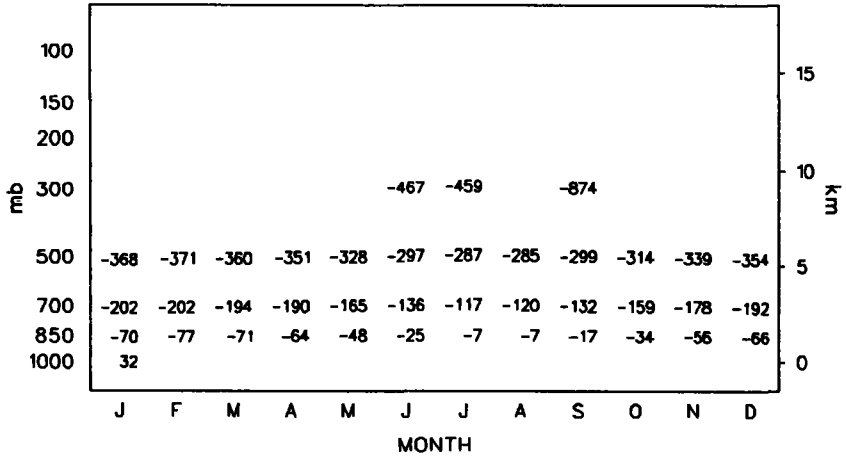
Wind

Full barb = 5 knots, Pennant = 25 knots



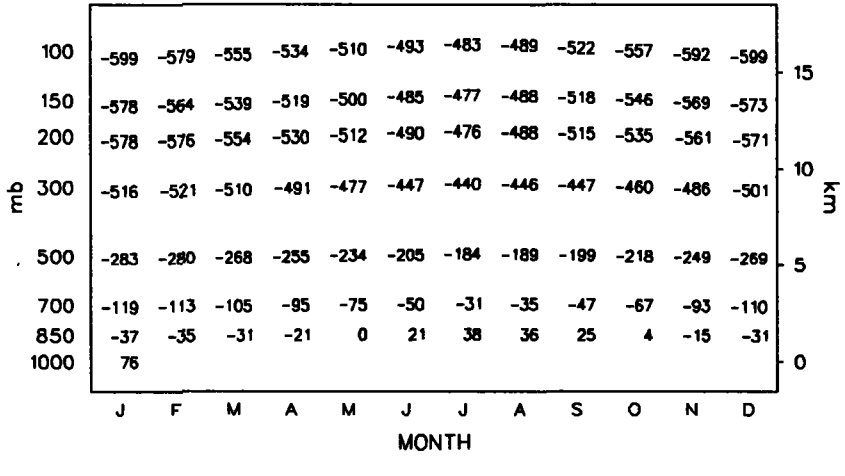
Dew Point Temperature

Units = 0.1 °C



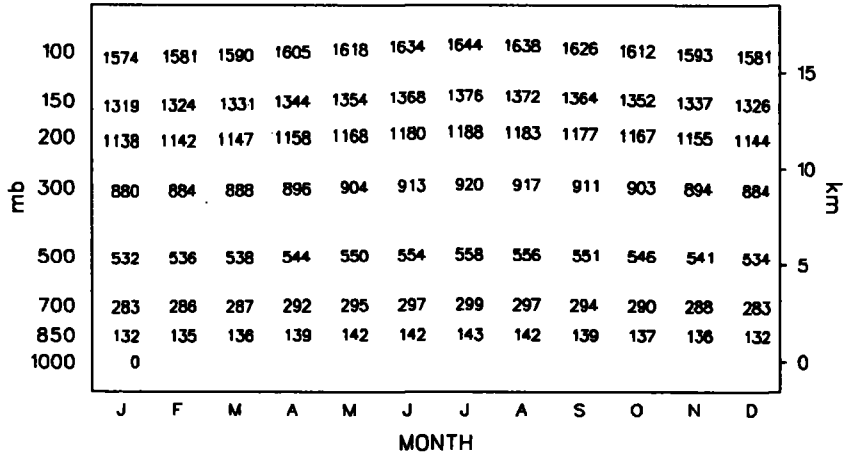
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m

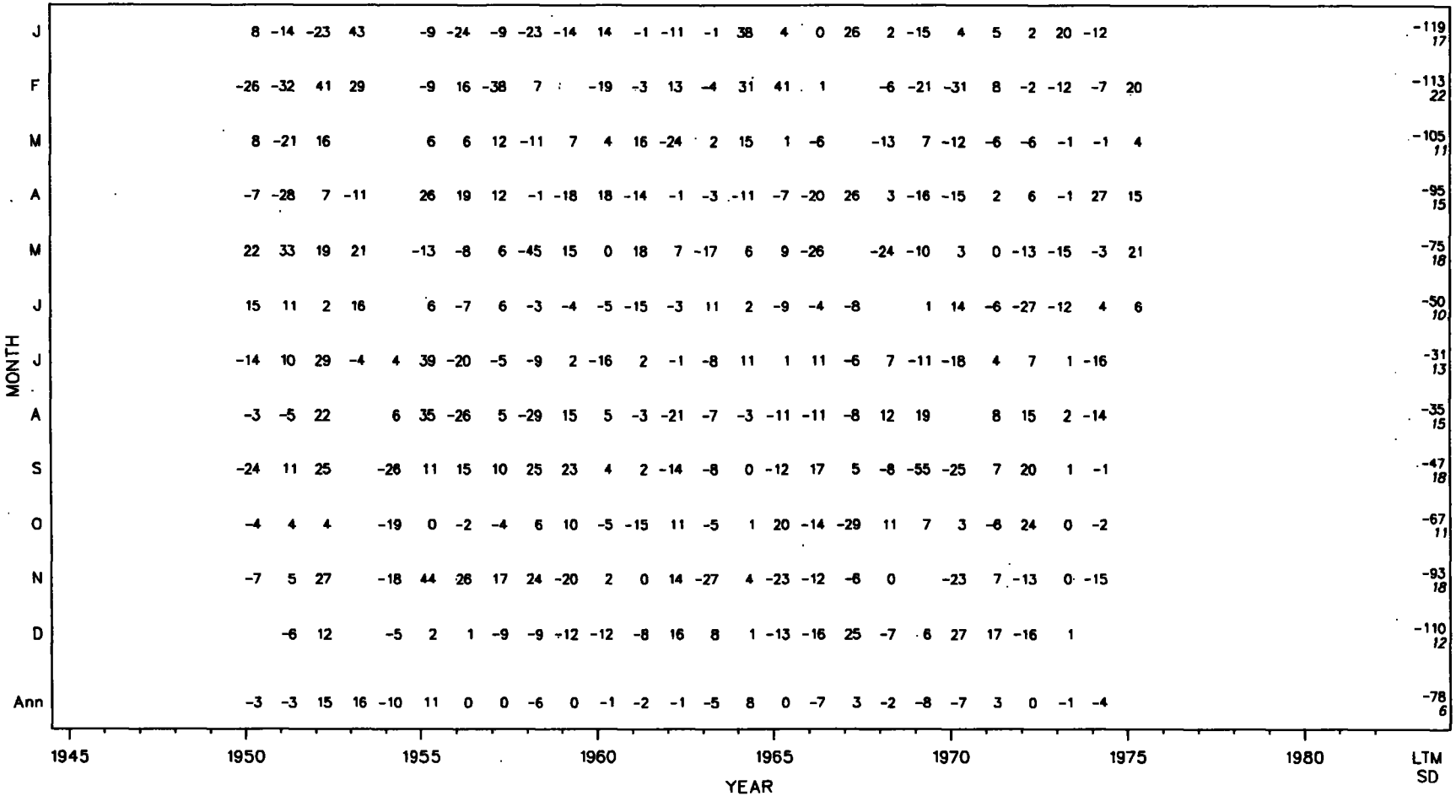


OWS Study Area I Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

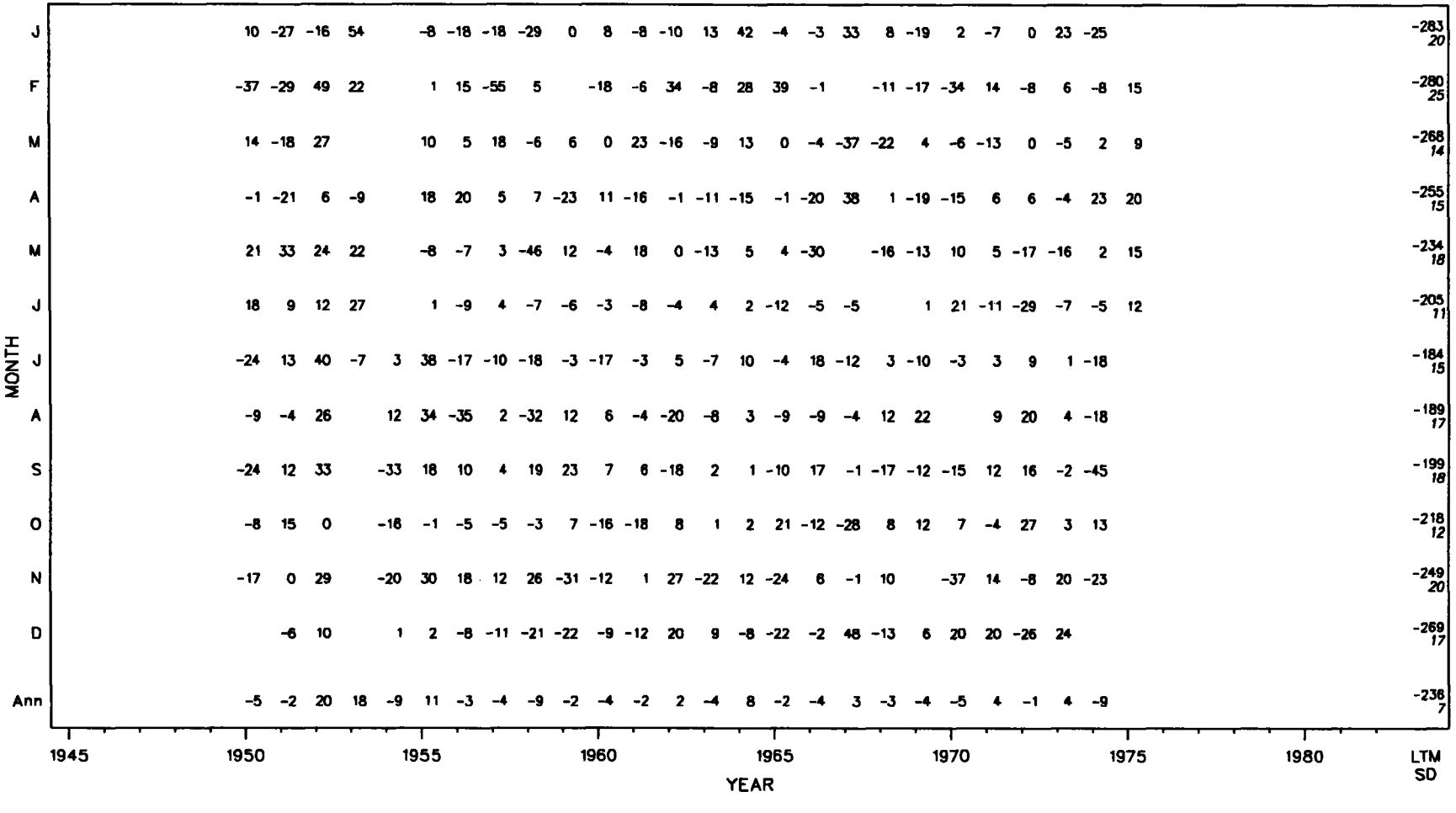
Units = 0.1 °C



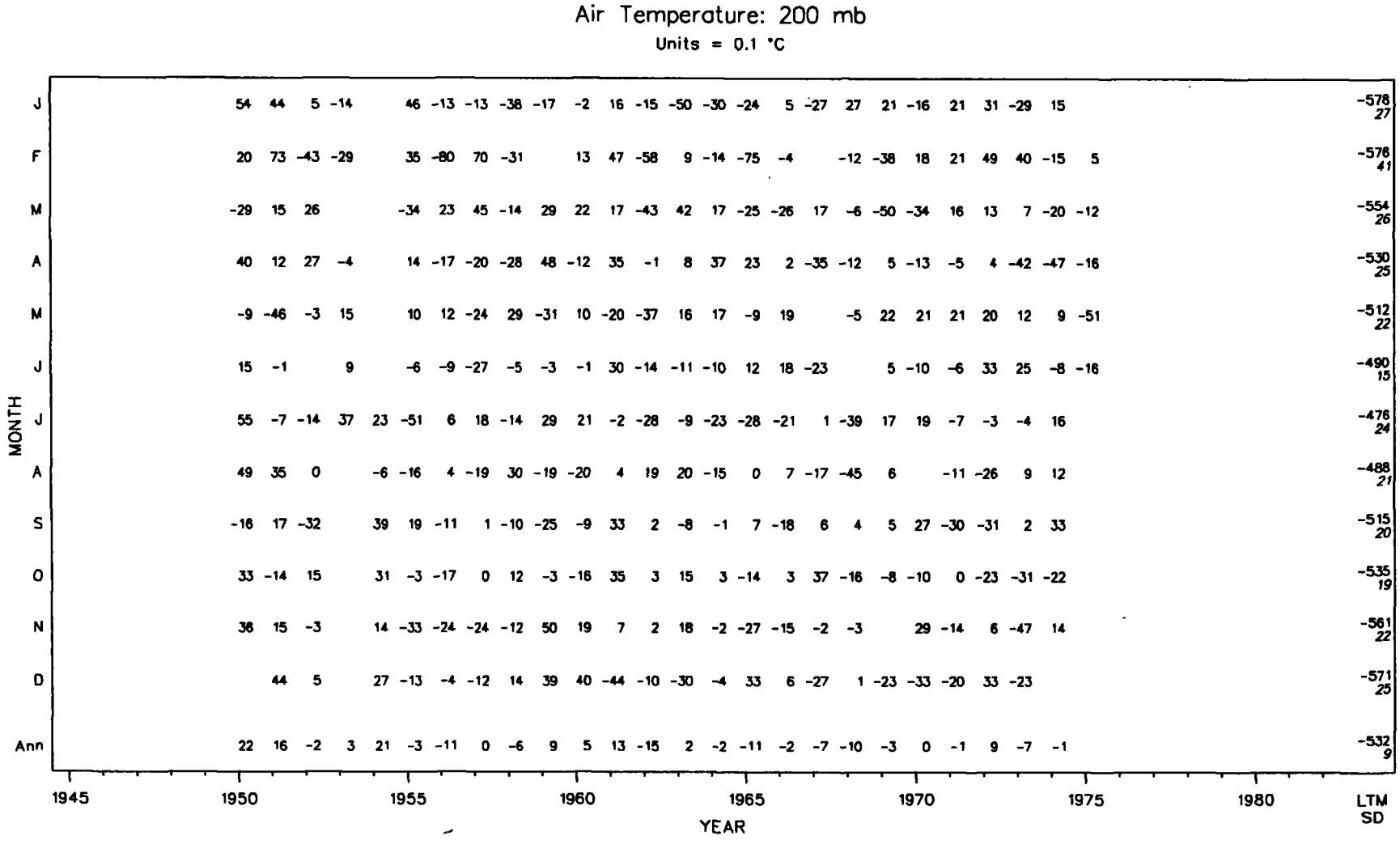
OWS Study Area I Anomalies

Air Temperature: 500 mb

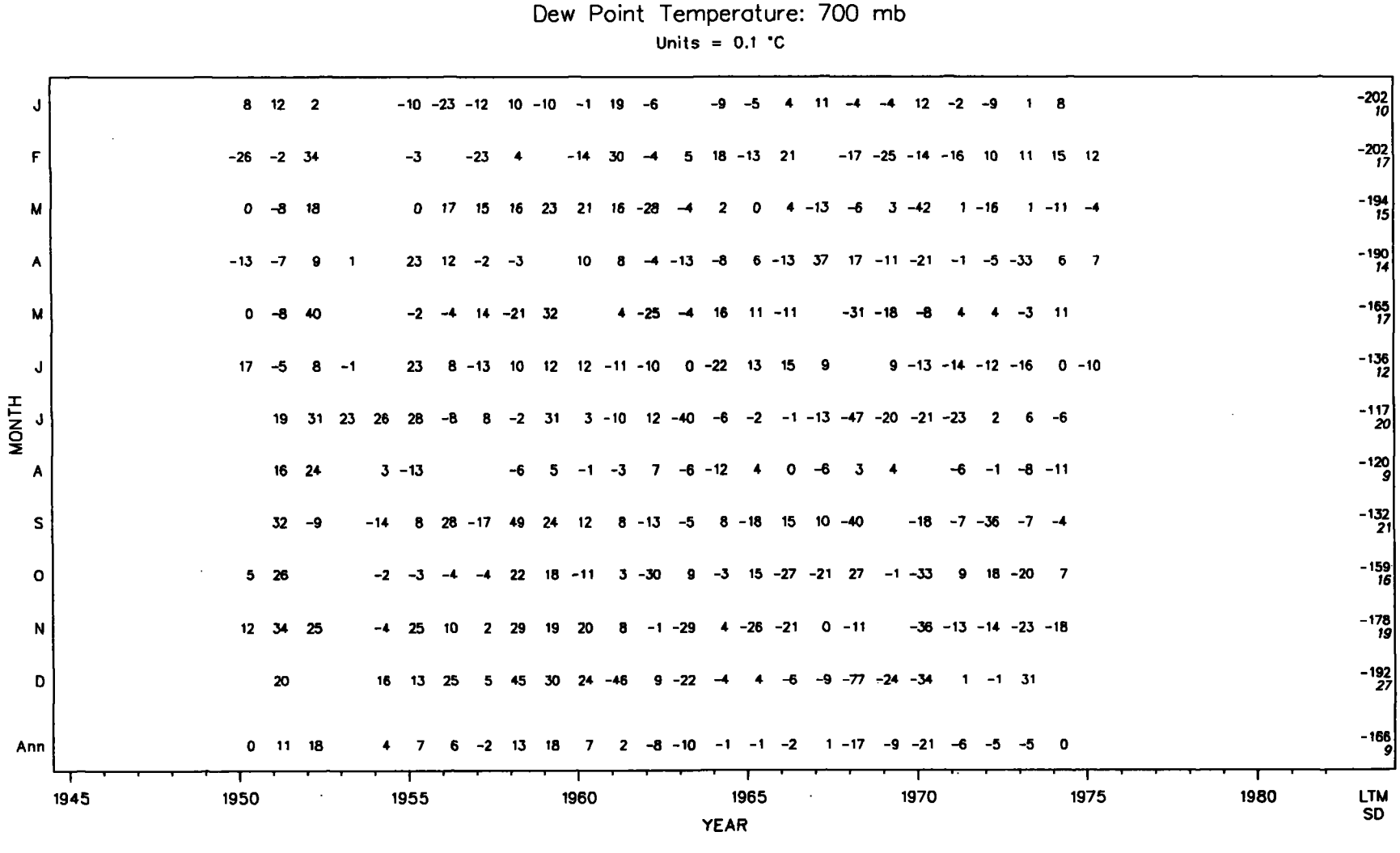
Units = 0.1 °C



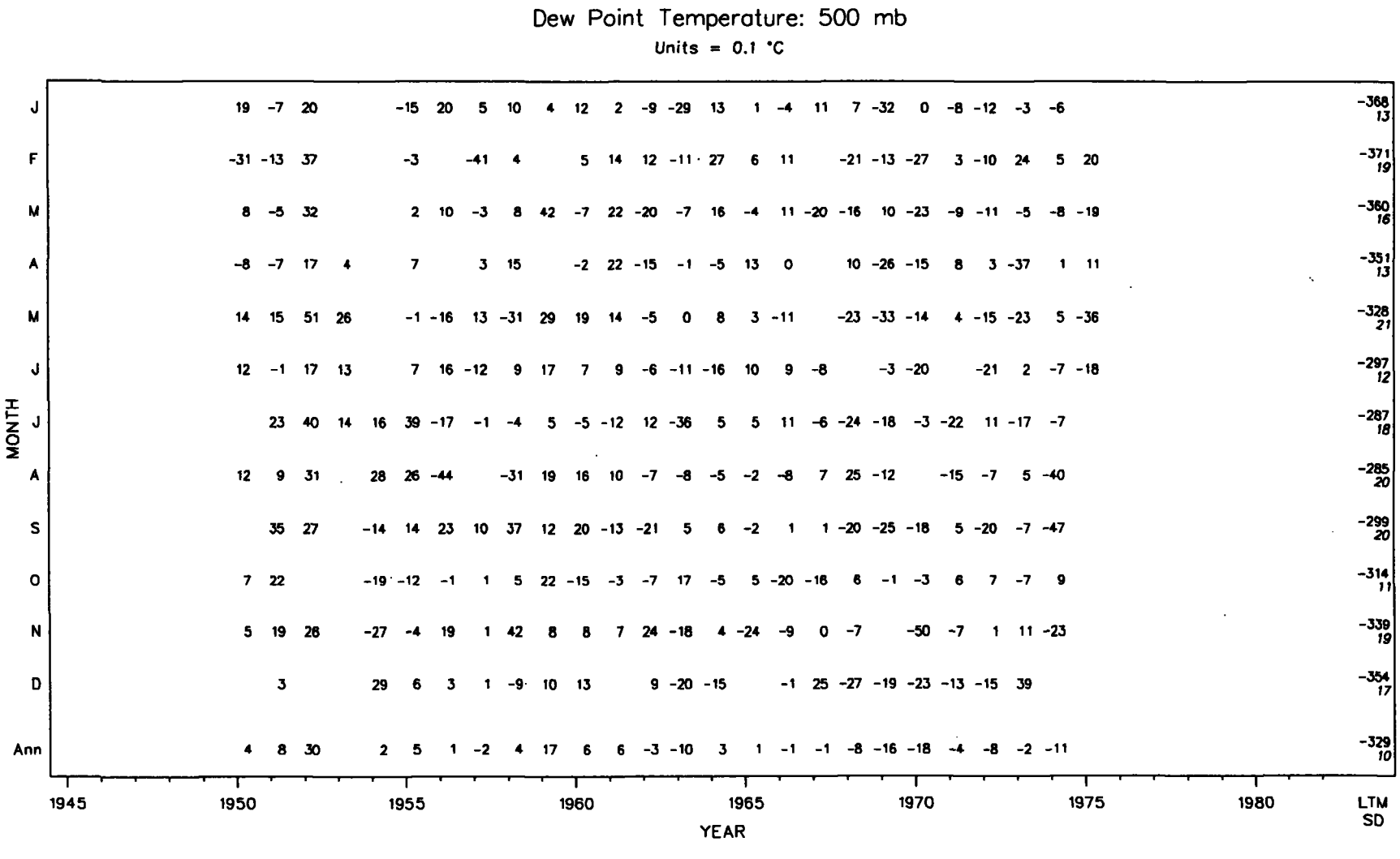
OWS Study Area I Anomalies



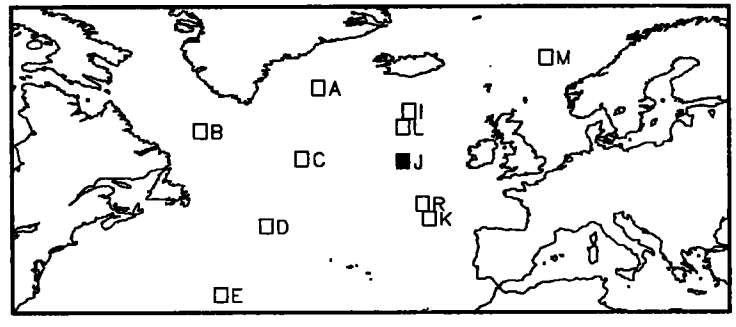
OWS Study Area I Anomalies



OWS Study Area I Anomalies

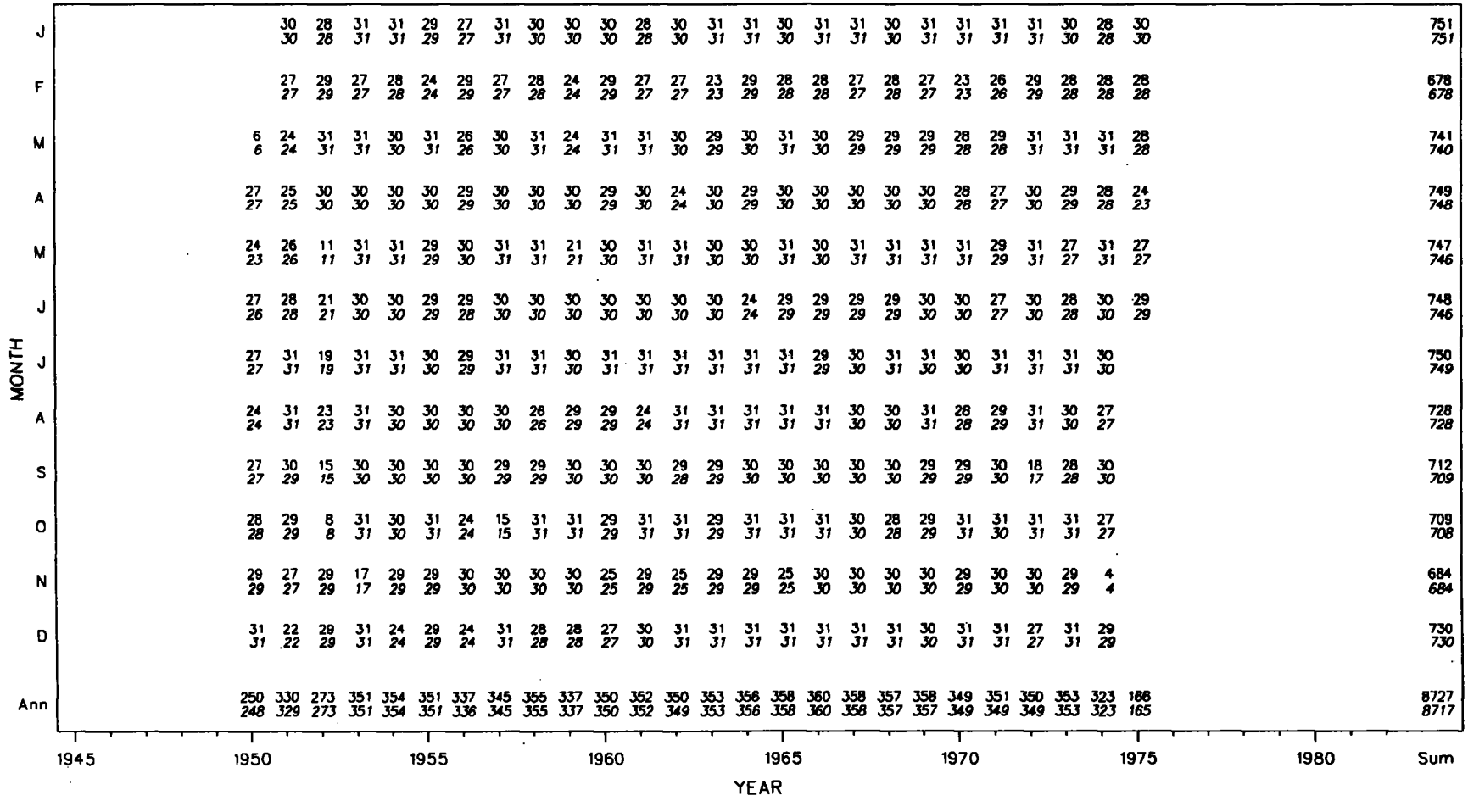


OWS Study Area I Anomalies



51.5°N – 53.4°N, 20.9°W – 19.0°W
1950 – 1975

OWS J

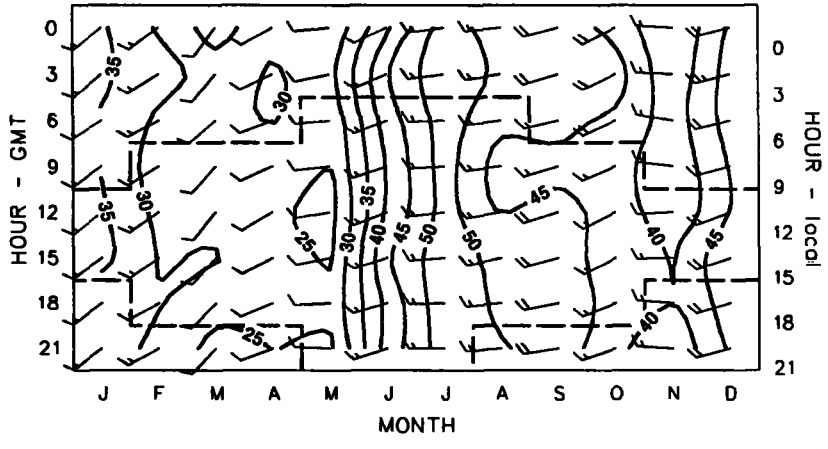


OWS Study Area J (52.5°N, 20.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

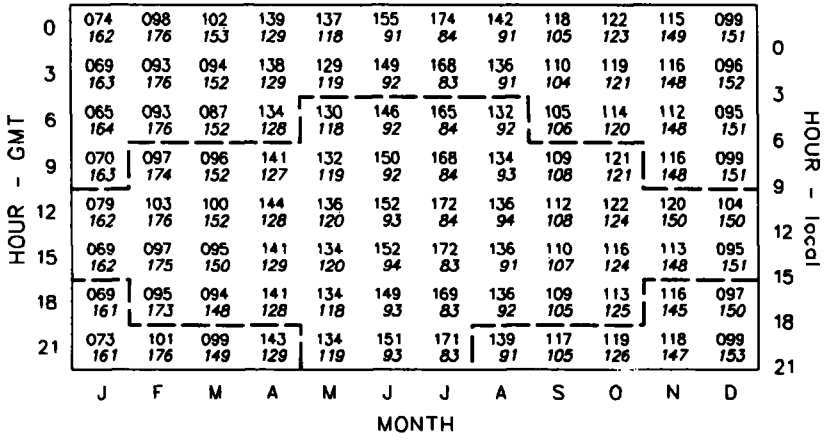
Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



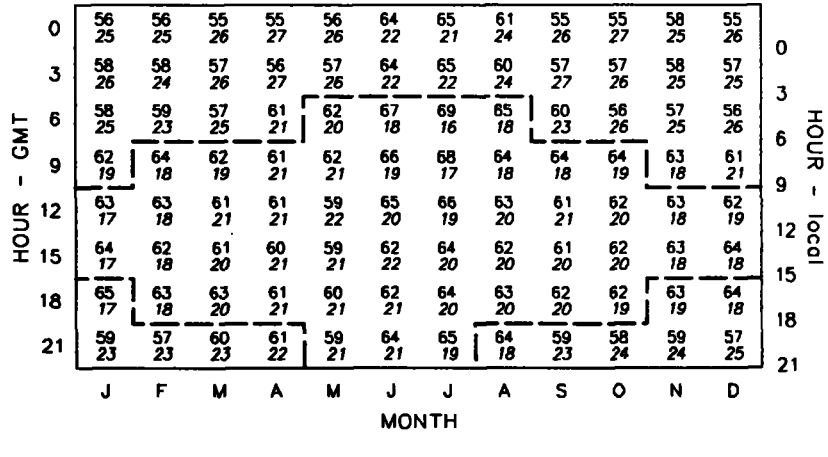
Pressure

Units = 0.1 mb



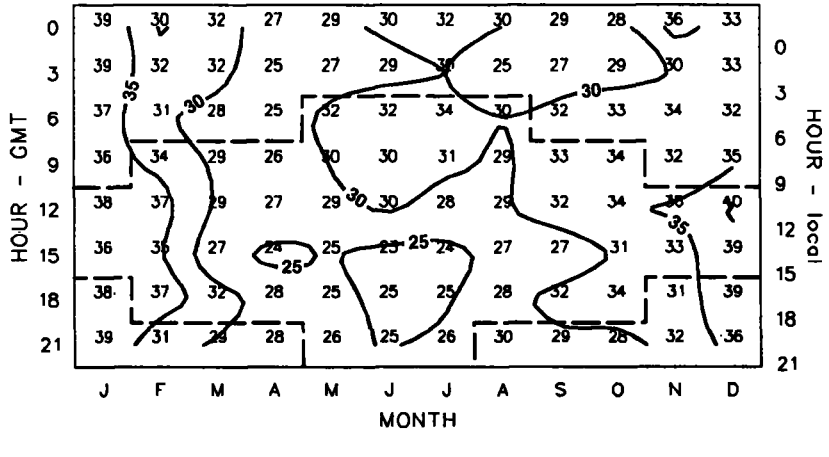
Total Cloudiness

Units = 0.1 okta



Precipitation Frequency

Units = percent
Contour interval = 5 percent



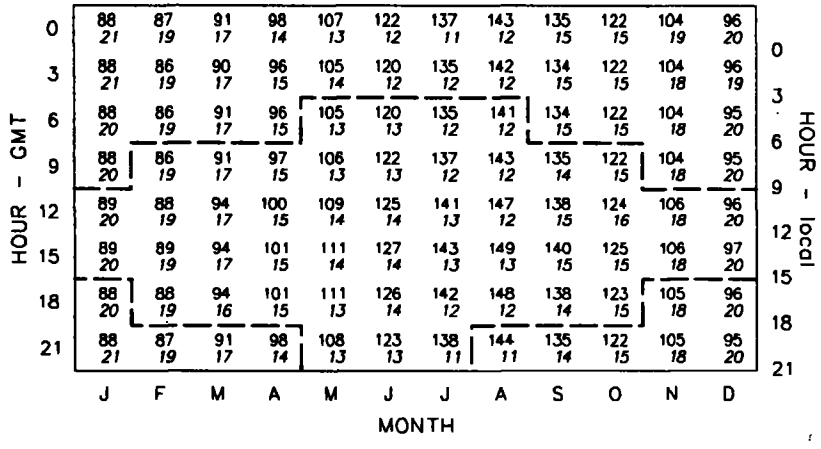
OWS Study Area J Surface Climatology

upper number = mean
lower number = standard deviation

——— data contours
— — — sunrise/sunset

Air Temperature

Units = 0.1 °C

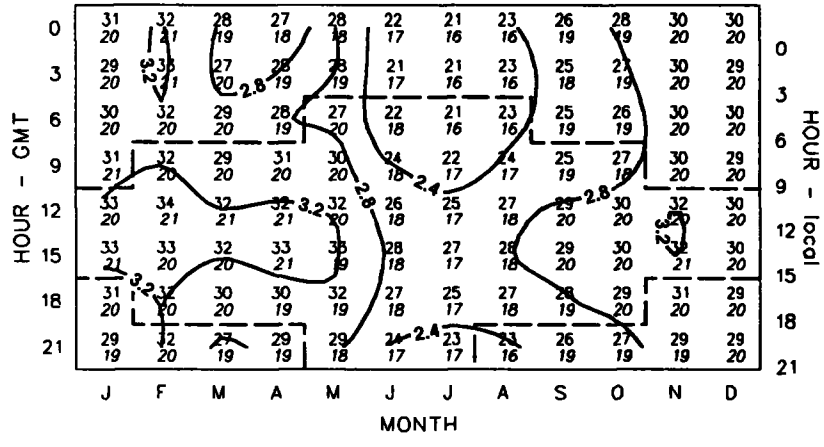


HOUR (GMT)	J	F	M	A	M	J	J	A	S	O	N	D
0	88 / 21	87 / 19	91 / 17	98 / 14	107 / 13	122 / 12	137 / 11	143 / 12	135 / 15	122 / 15	104 / 19	96 / 20
3	88 / 21	86 / 19	90 / 17	96 / 15	105 / 14	120 / 12	135 / 12	142 / 12	134 / 15	122 / 15	104 / 18	96 / 19
6	88 / 20	86 / 19	91 / 17	96 / 15	105 / 13	120 / 13	135 / 12	141 / 12	134 / 15	122 / 15	104 / 18	95 / 20
9	88 / 20	86 / 19	91 / 17	97 / 15	108 / 13	122 / 13	137 / 12	143 / 12	135 / 14	122 / 15	104 / 18	95 / 20
12	89 / 20	88 / 19	94 / 17	100 / 15	109 / 14	125 / 14	141 / 13	147 / 12	138 / 15	124 / 16	106 / 18	96 / 20
15	89 / 20	89 / 19	94 / 17	101 / 15	111 / 14	127 / 14	143 / 13	149 / 13	140 / 15	125 / 15	106 / 18	97 / 20
18	88 / 20	88 / 19	94 / 16	101 / 15	111 / 13	126 / 14	142 / 12	148 / 12	138 / 14	123 / 15	105 / 18	96 / 20
21	88 / 21	87 / 19	91 / 17	98 / 14	108 / 13	123 / 13	138 / 11	144 / 11	135 / 14	122 / 15	105 / 18	95 / 20

Dew Point Depression

Units = 0.1 °C

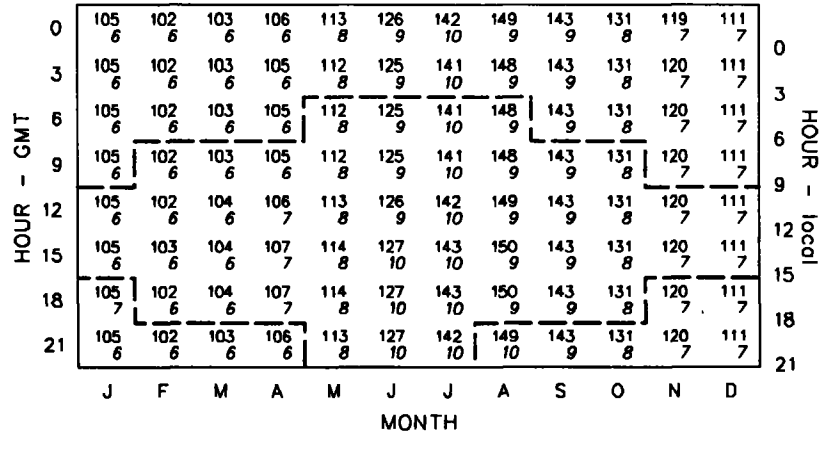
Contour interval = 0.4 °C



HOUR (GMT)	J	F	M	A	M	J	J	A	S	O	N	D
0	31 / 20	32 / 21	28 / 19	27 / 18	28 / 18	22 / 17	21 / 16	23 / 16	26 / 19	28 / 19	30 / 20	30 / 20
3	29 / 20	30 / 21	27 / 20	28 / 19	28 / 19	21 / 17	21 / 16	23 / 16	25 / 18	27 / 19	30 / 20	29 / 20
6	30 / 20	32 / 20	29 / 20	28 / 19	27 / 20	22 / 18	21 / 16	23 / 16	25 / 19	26 / 19	30 / 20	30 / 20
9	31 / 21	32 / 20	29 / 20	31 / 20	30 / 20	24 / 18	22 / 17	24 / 17	25 / 19	27 / 19	30 / 20	29 / 20
12	33 / 20	34 / 21	32 / 21	32 / 21	32 / 20	26 / 18	25 / 17	27 / 18	29 / 20	30 / 20	32 / 20	30 / 20
15	33 / 21	33 / 20	32 / 20	33 / 21	33 / 19	28 / 18	27 / 17	28 / 18	29 / 20	30 / 20	32 / 21	30 / 20
18	31 / 20	32 / 20	30 / 20	30 / 19	32 / 19	27 / 18	25 / 17	27 / 18	28 / 19	29 / 20	31 / 20	29 / 20
21	29 / 19	32 / 20	27 / 19	29 / 19	29 / 18	24 / 17	23 / 17	25 / 16	26 / 19	27 / 19	29 / 19	29 / 20

Sea Surface Temperature

Units = 0.1 °C

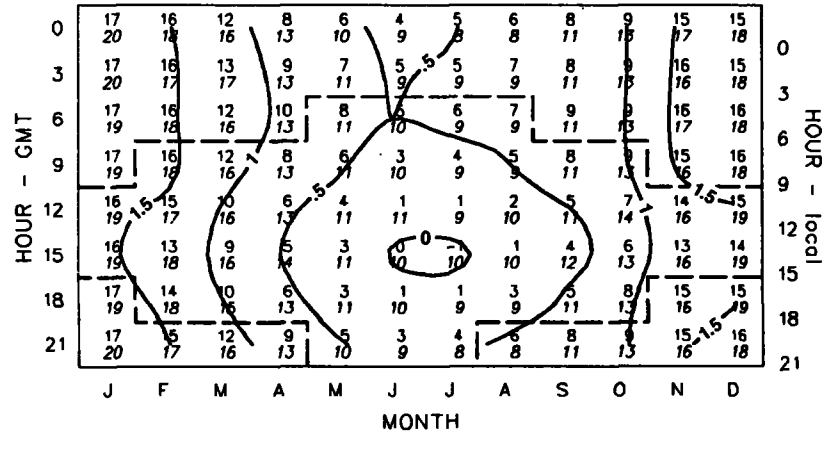


HOUR (GMT)	J	F	M	A	M	J	J	A	S	O	N	D
0	105 / 6	102 / 6	103 / 6	106 / 6	113 / 8	126 / 9	142 / 10	149 / 9	143 / 9	131 / 8	119 / 7	111 / 7
3	105 / 6	102 / 6	103 / 6	105 / 6	112 / 8	125 / 9	141 / 10	148 / 9	143 / 9	131 / 8	120 / 7	111 / 7
6	105 / 6	102 / 6	103 / 6	105 / 6	112 / 8	125 / 9	141 / 10	148 / 9	143 / 9	131 / 8	120 / 7	111 / 7
9	105 / 6	102 / 6	103 / 6	105 / 6	112 / 8	125 / 9	141 / 10	148 / 9	143 / 9	131 / 8	120 / 7	111 / 7
12	105 / 6	102 / 6	104 / 6	106 / 7	113 / 8	126 / 9	142 / 10	149 / 9	143 / 9	131 / 8	120 / 7	111 / 7
15	105 / 6	103 / 6	104 / 6	107 / 7	114 / 8	127 / 10	143 / 10	150 / 9	143 / 9	131 / 8	120 / 7	111 / 7
18	105 / 7	102 / 6	104 / 6	107 / 7	114 / 8	127 / 10	143 / 10	150 / 9	143 / 9	131 / 8	120 / 7	111 / 7
21	105 / 6	102 / 6	103 / 6	106 / 6	113 / 8	127 / 10	142 / 10	149 / 10	143 / 9	131 / 8	120 / 7	111 / 7

Sea – Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



HOUR (GMT)	J	F	M	A	M	J	J	A	S	O	N	D
0	17 / 20	16 / 18	12 / 16	8 / 13	6 / 10	4 / 9	5 / 8	6 / 8	8 / 11	9 / 13	15 / 17	15 / 18
3	17 / 20	16 / 17	13 / 17	9 / 13	7 / 11	5 / 9	5 / 9	7 / 9	8 / 11	9 / 13	16 / 16	15 / 18
6	17 / 19	16 / 18	12 / 16	10 / 13	8 / 11	6 / 10	6 / 9	7 / 9	9 / 11	9 / 13	16 / 17	16 / 18
9	17 / 19	16 / 18	12 / 16	8 / 13	6 / 11	3 / 10	4 / 9	5 / 9	8 / 11	9 / 13	15 / 16	16 / 18
12	16 / 19	15 / 17	10 / 16	6 / 13	4 / 11	1 / 11	1 / 9	2 / 10	5 / 11	7 / 14	14 / 16	15 / 19
15	16 / 19	13 / 18	9 / 16	5 / 14	3 / 11	0 / 10	0 / 10	1 / 10	4 / 12	6 / 13	13 / 16	14 / 19
18	17 / 19	14 / 18	10 / 16	6 / 13	3 / 11	1 / 10	1 / 9	3 / 9	5 / 11	8 / 13	15 / 16	15 / 19
21	17 / 20	15 / 17	12 / 16	9 / 13	5 / 10	3 / 9	4 / 8	6 / 8	8 / 11	9 / 13	15 / 16	16 / 18

OWS Study Area J Surface Climatology

upper number = mean

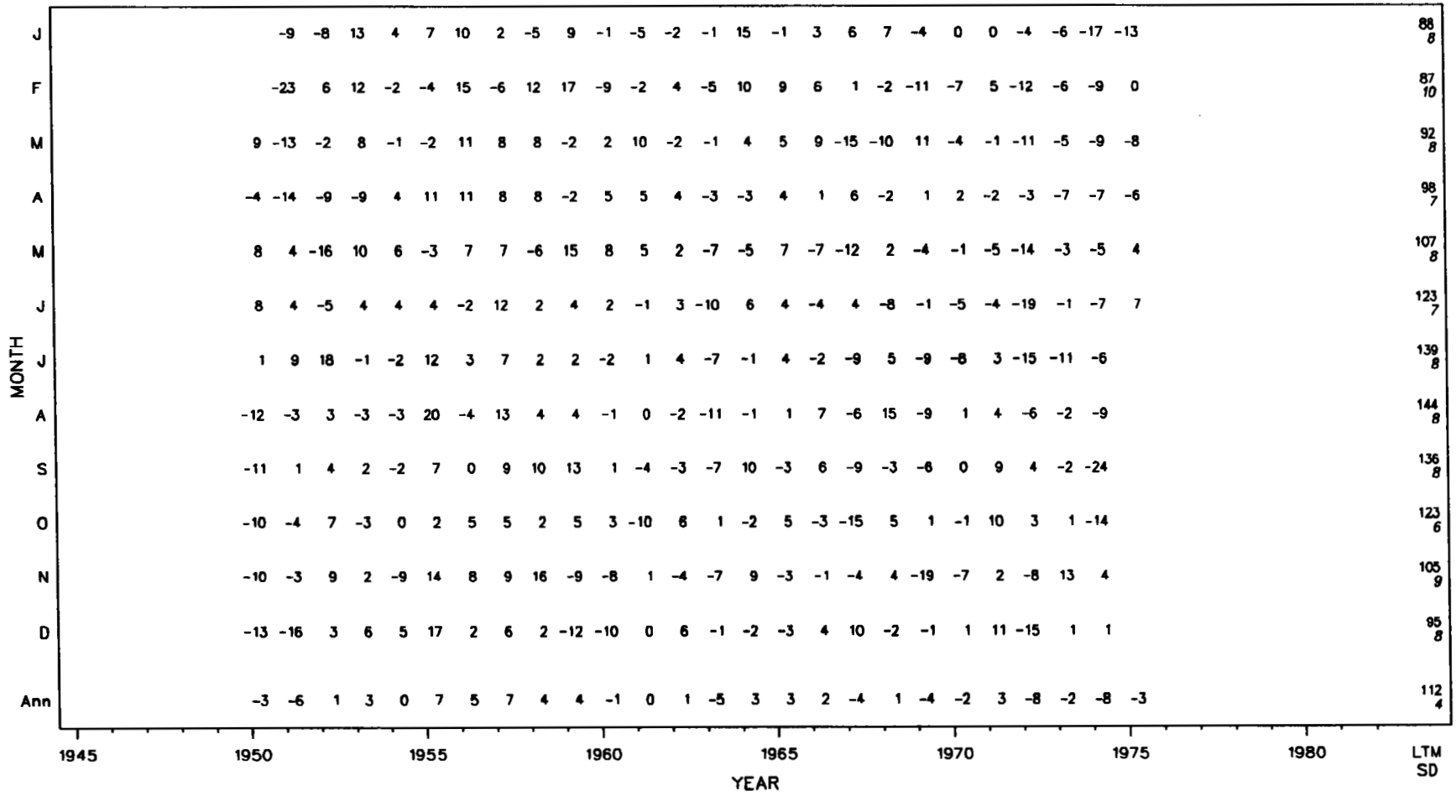
lower number = standard deviation

——— data contours

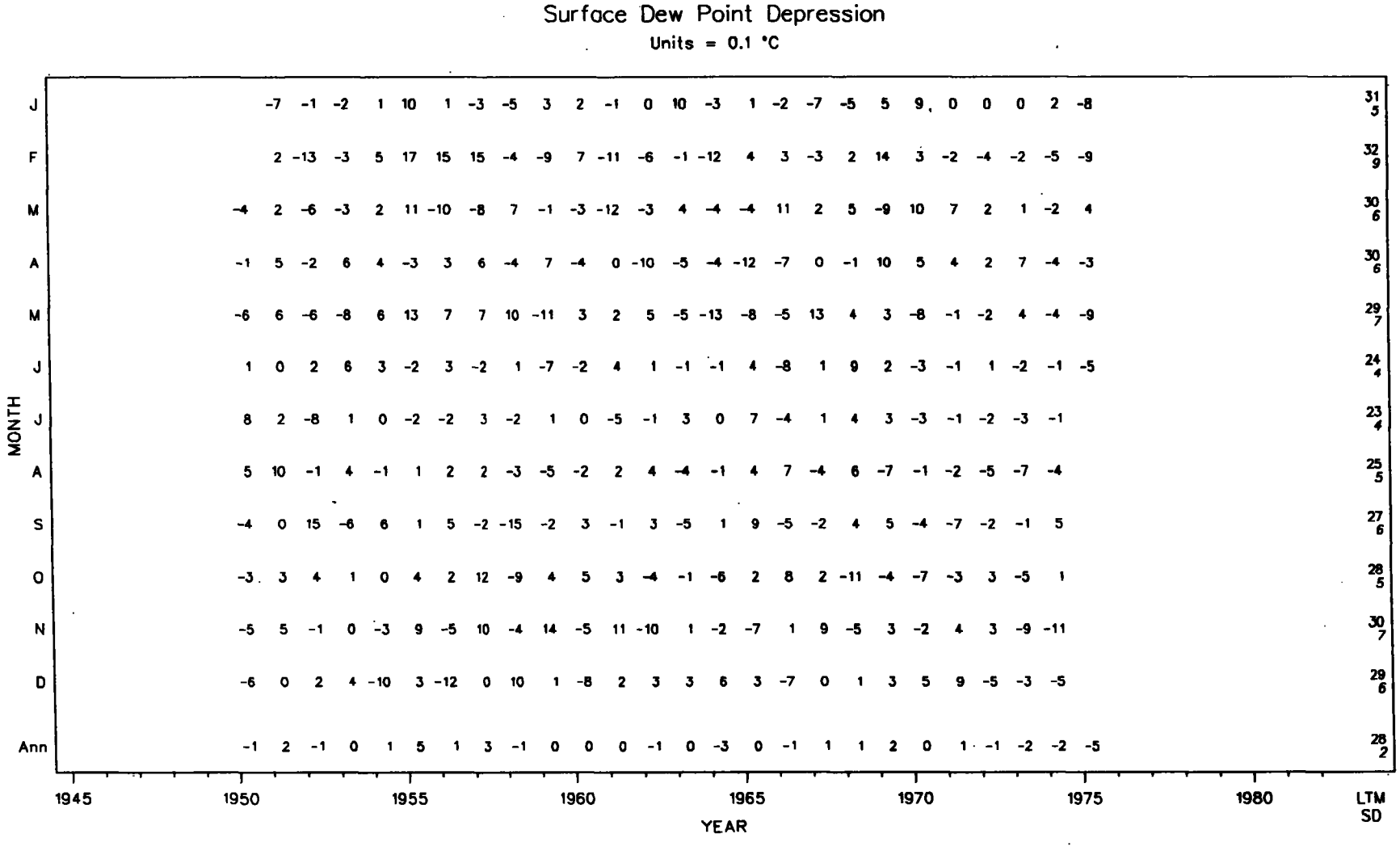
— — — — sunrise/sunset

Surface Air Temperature

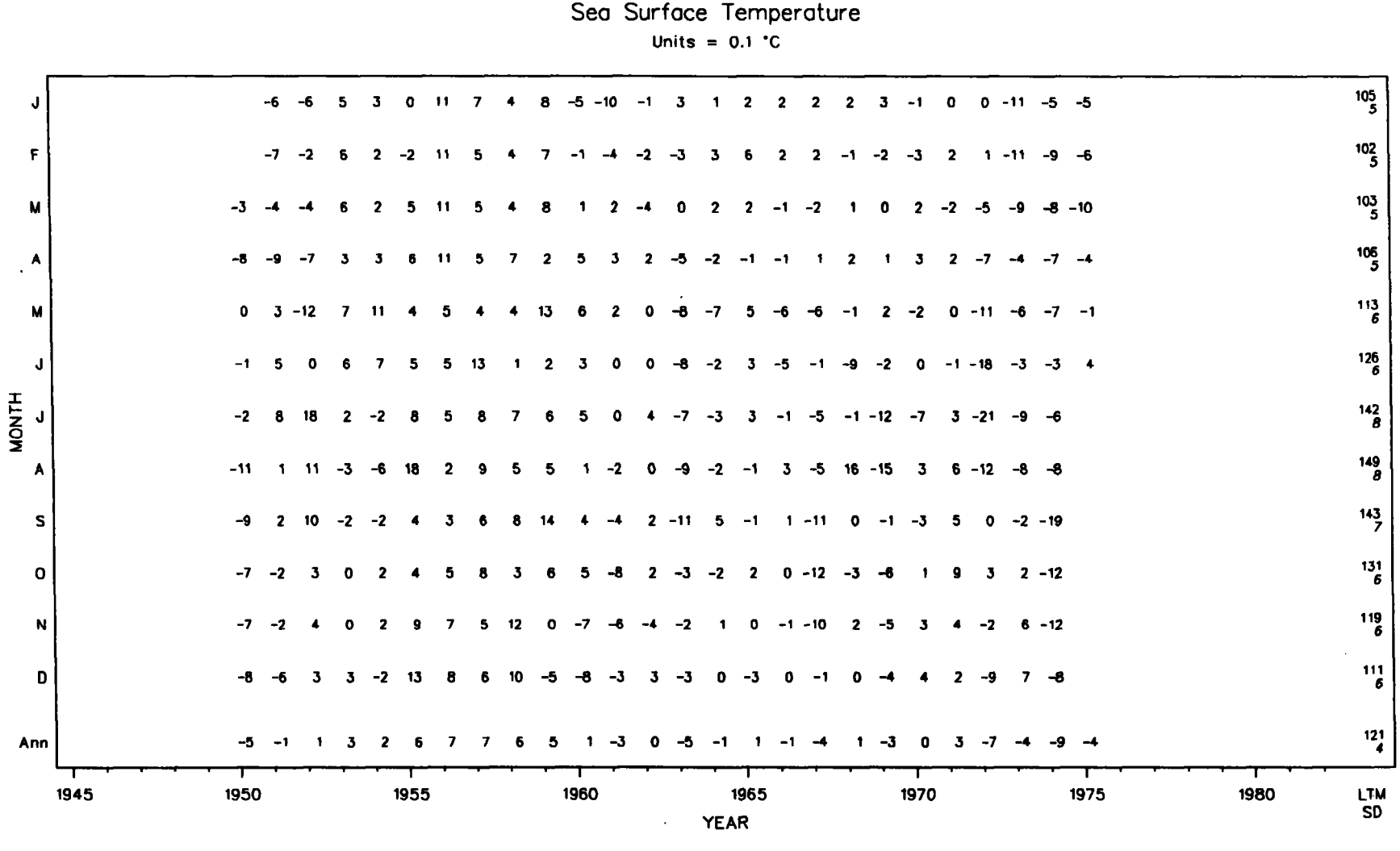
Units = 0.1 °C



OWS Study Area J Anomalies



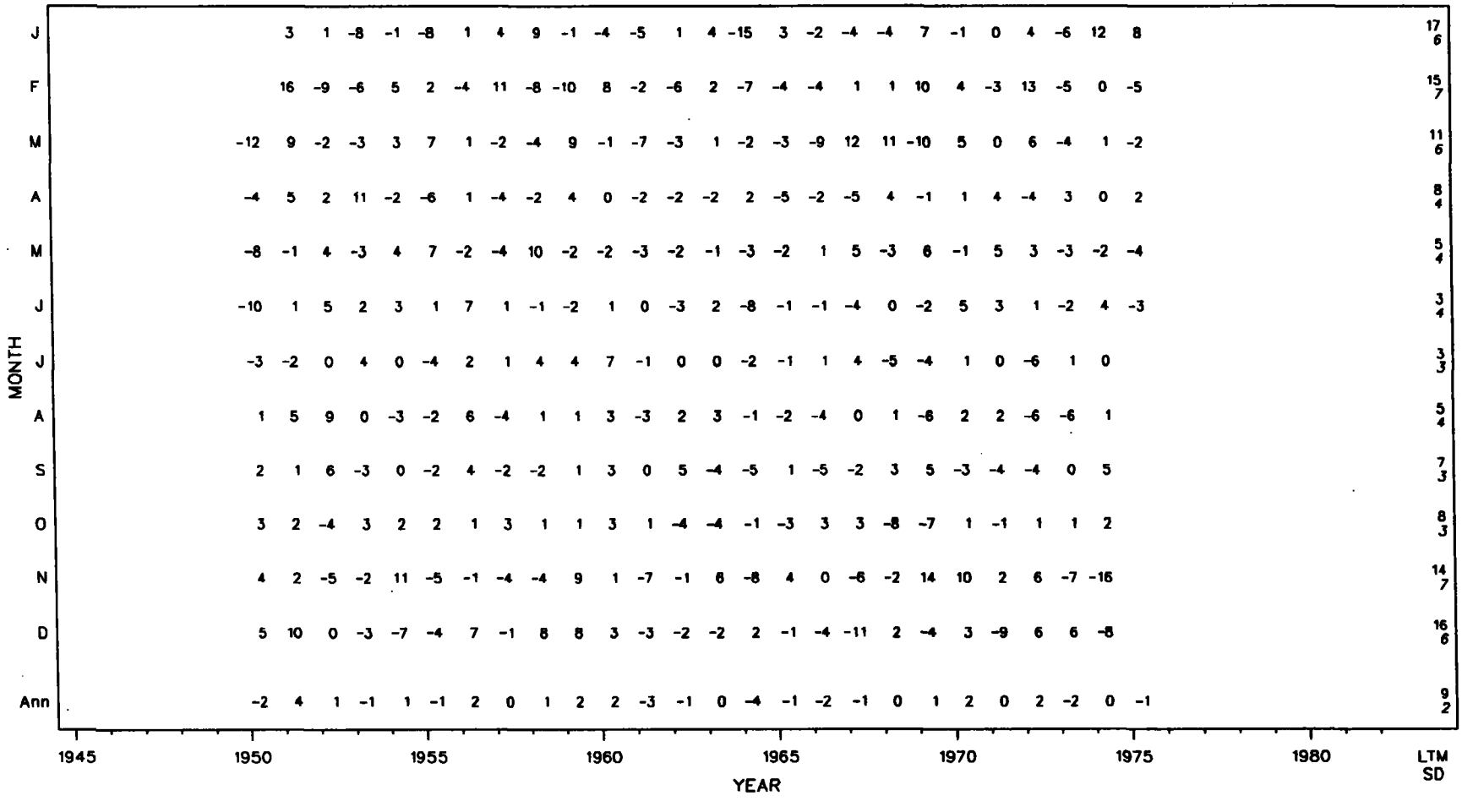
OWS Study Area J Anomalies



OWS Study Area J Anomalies

Sea - Air Temperature Difference

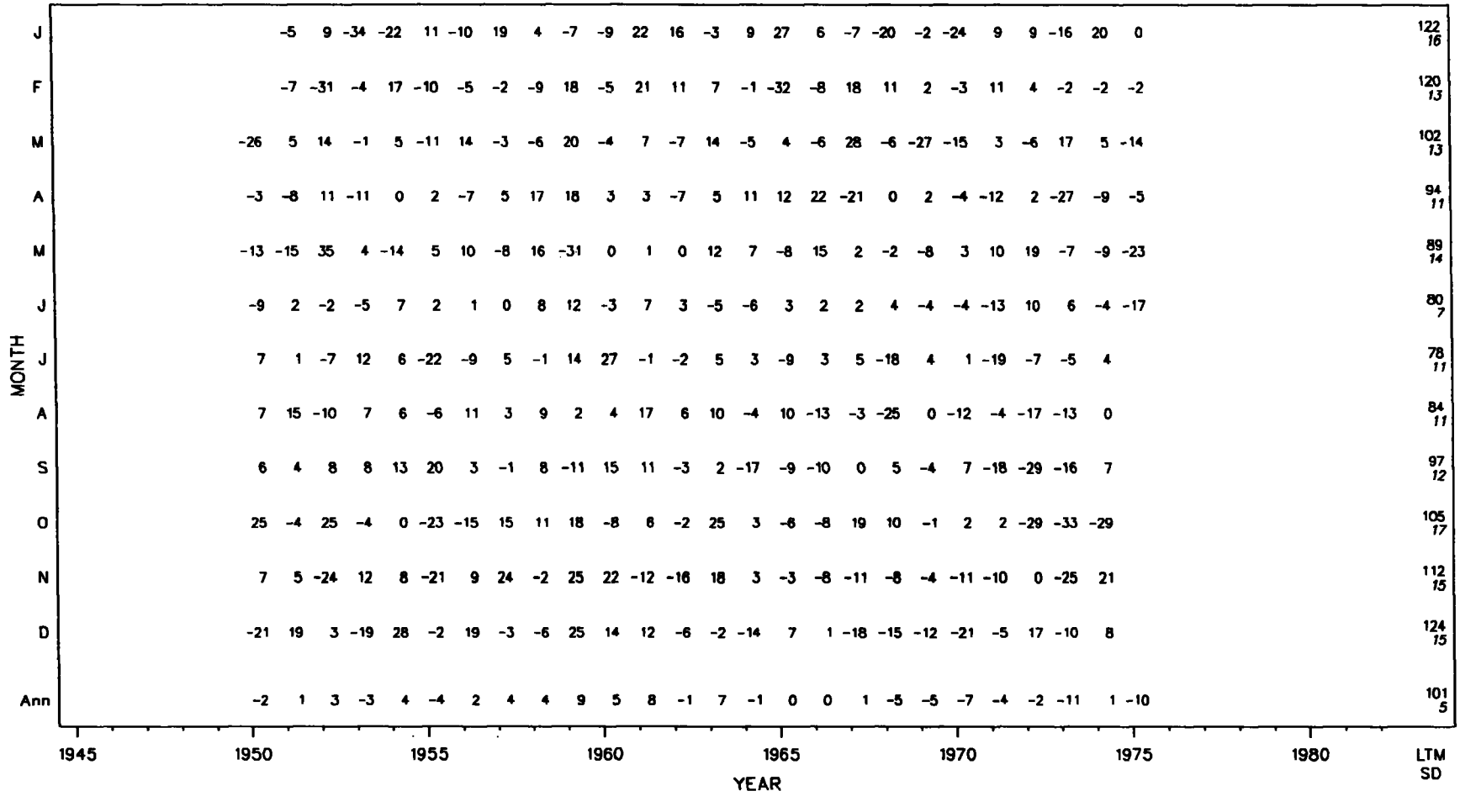
Units = 0.1 °C



OWS Study Area J Anomalies

Surface Scalar Wind

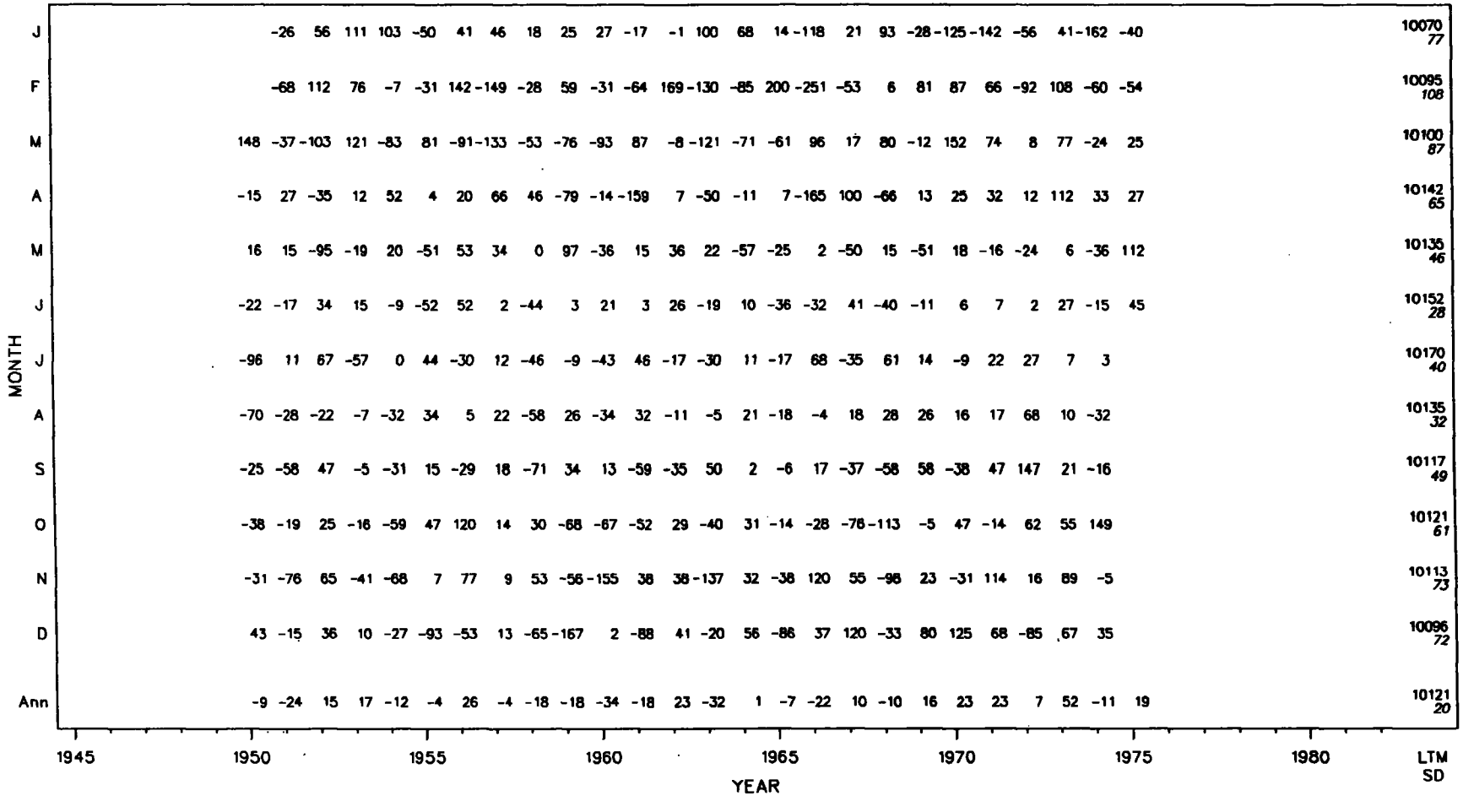
Units = 0.1 m/s



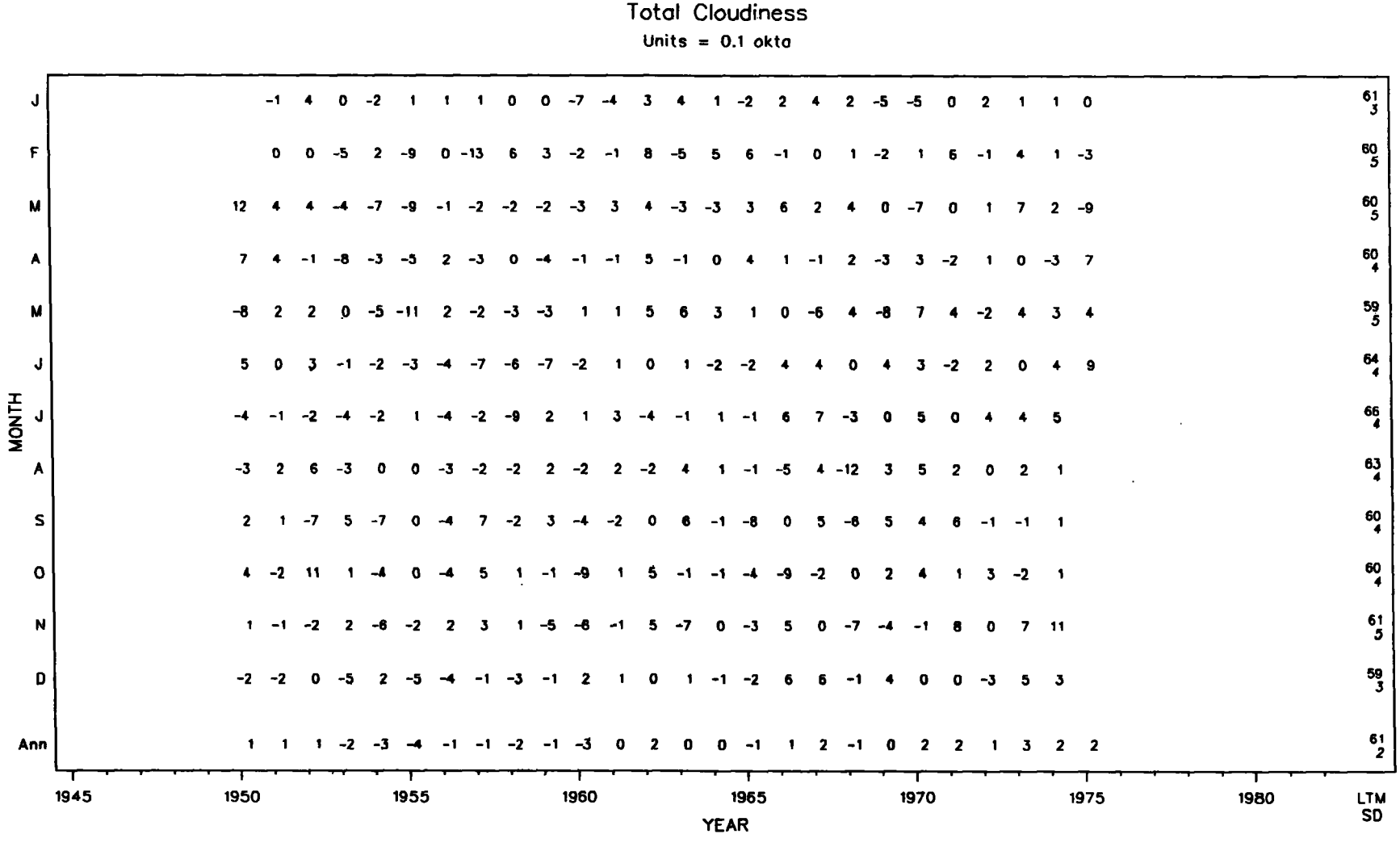
OWS Study Area J Anomalies

Sea Level Pressure

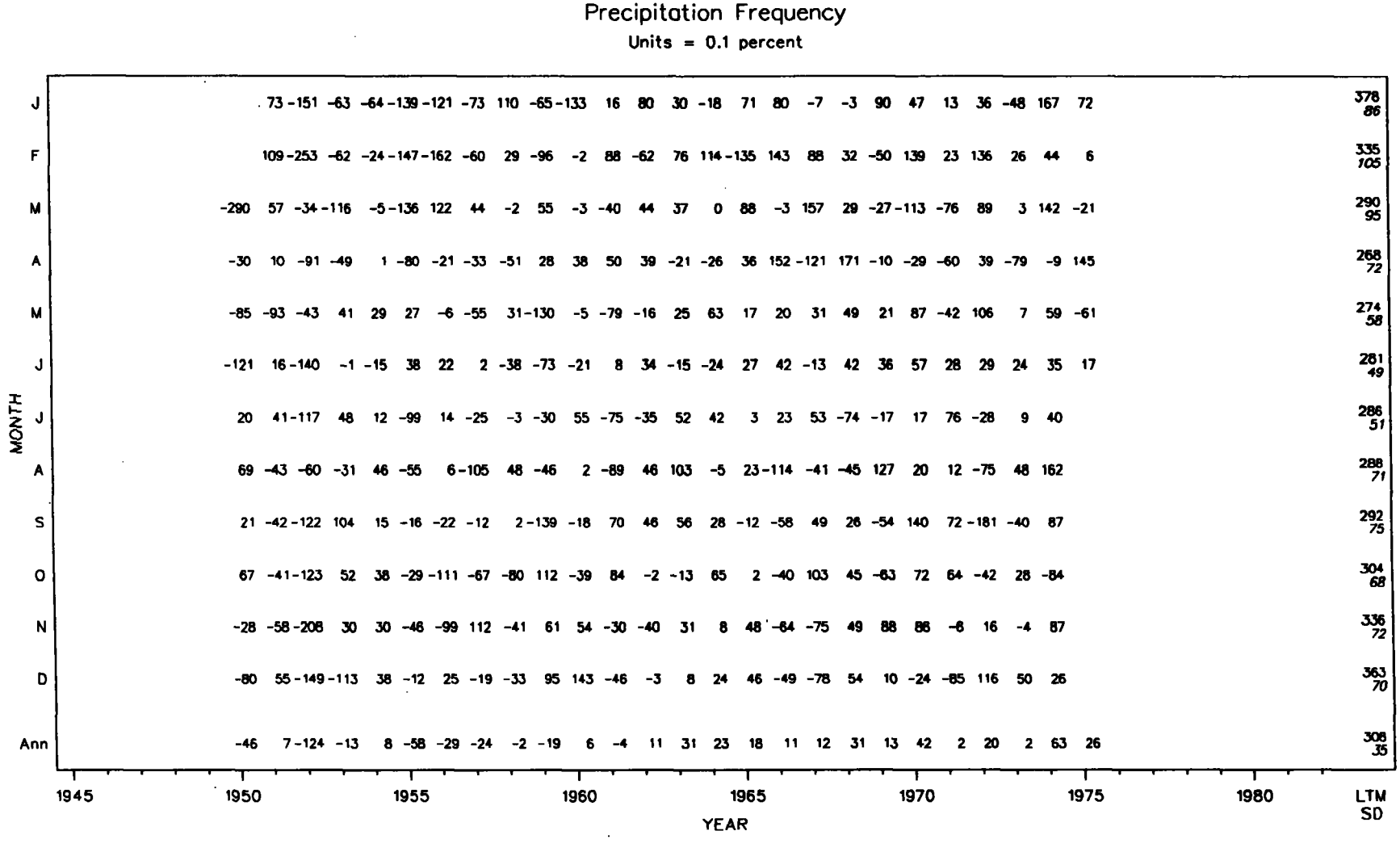
Units = 0.1 mb



OWS Study Area J Anomalies



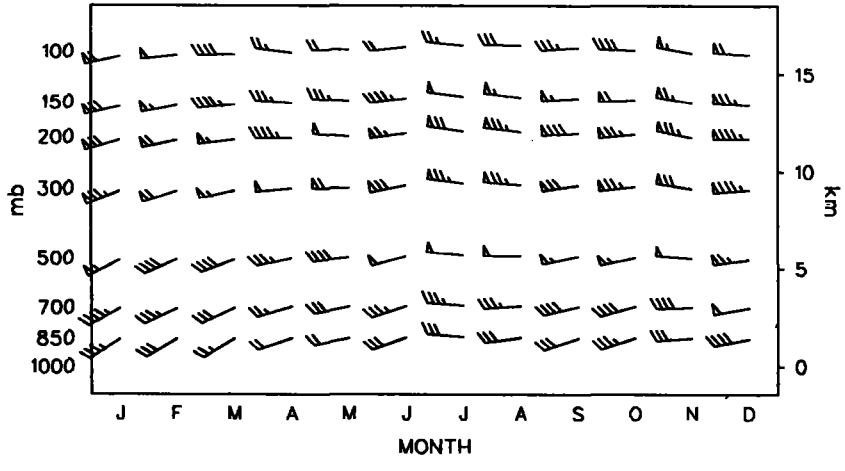
OWS Study Area J Anomalies



OWS Study Area J Anomalies

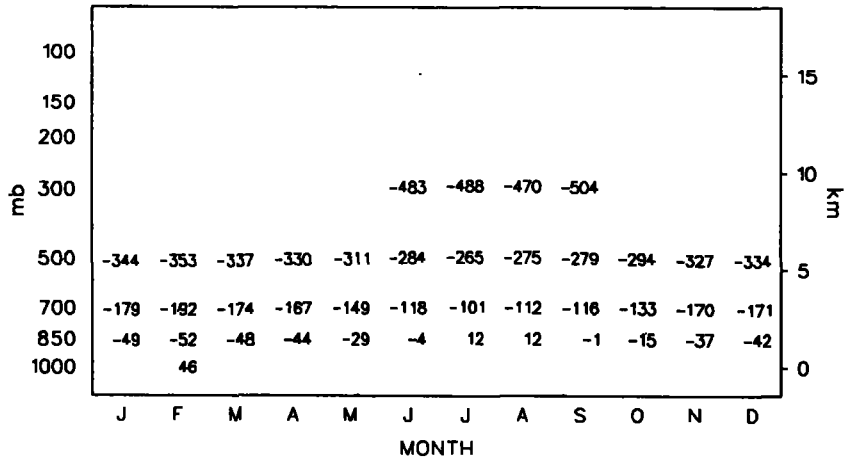
Wind

Full barb = 5 knots, Pennant = 25 knots



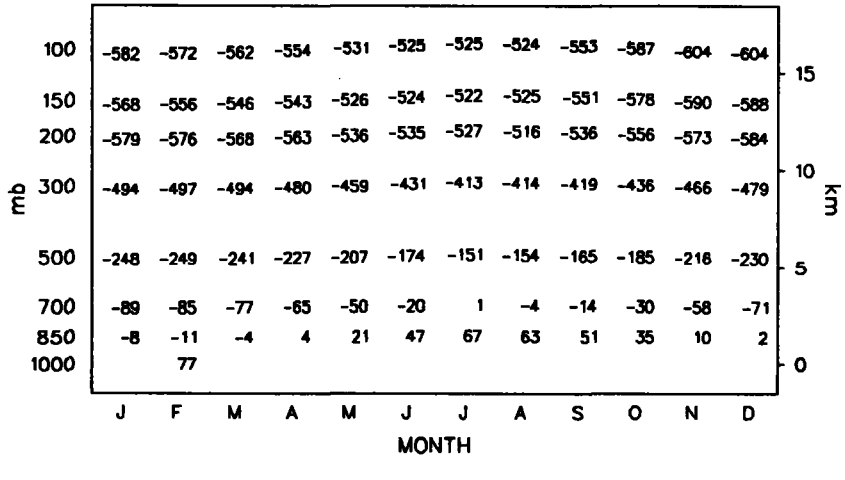
Dew Point Temperature

Units = 0.1 °C



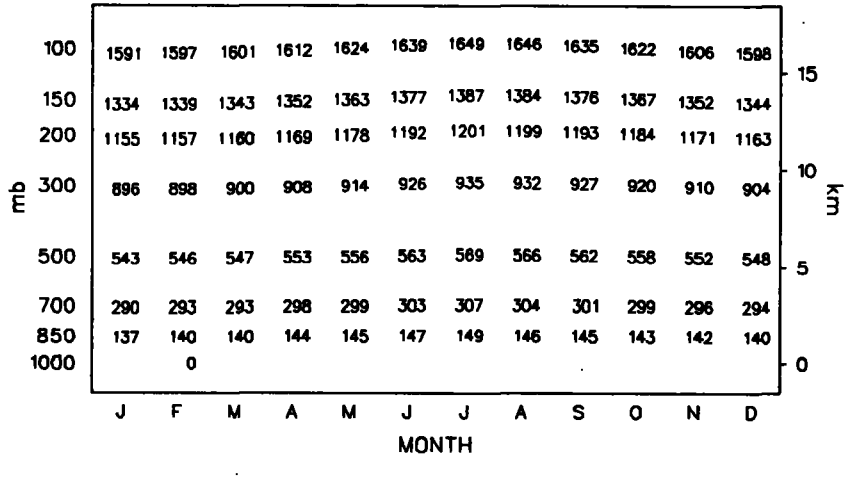
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m

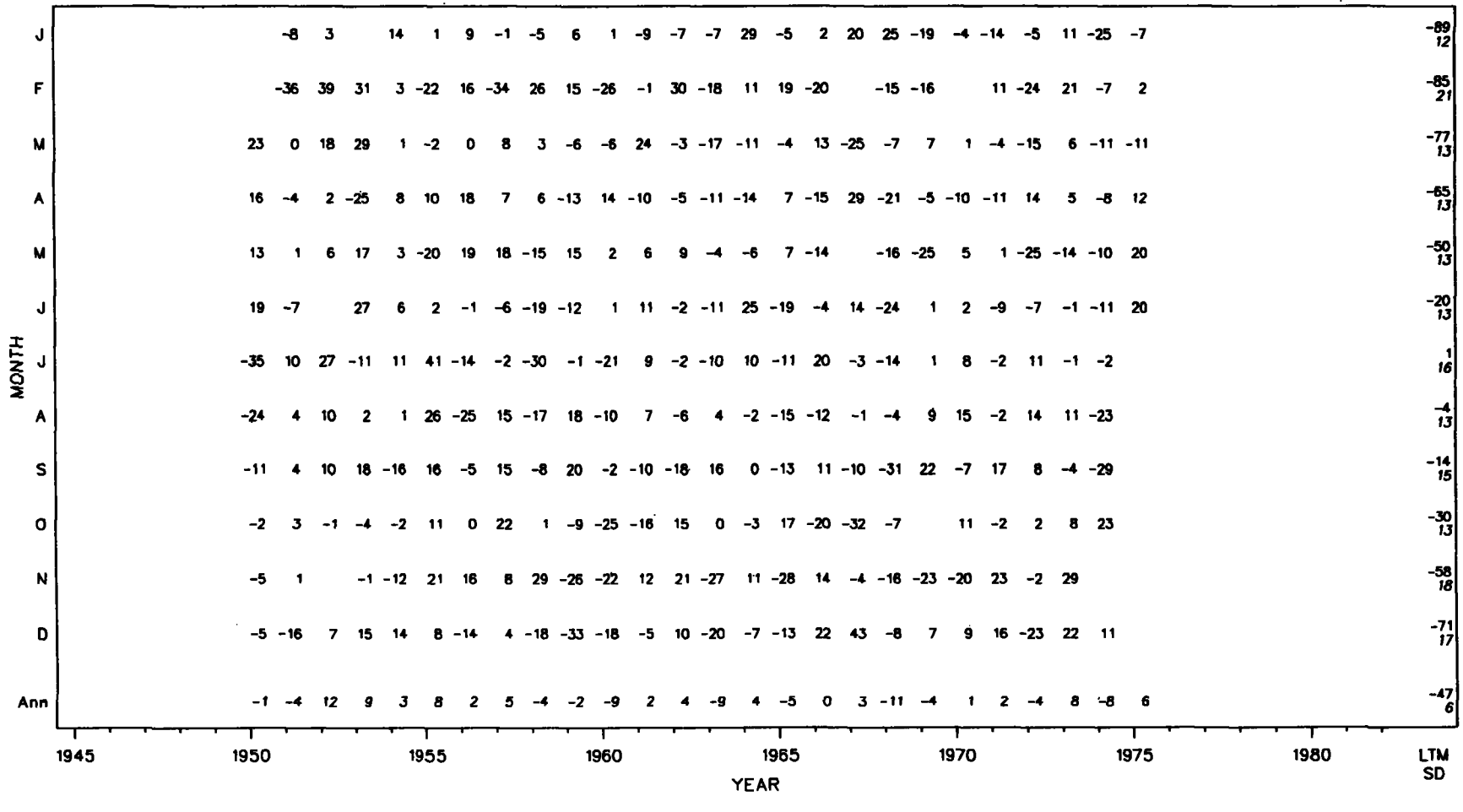


OWS Study Area J Upper Air Climatology

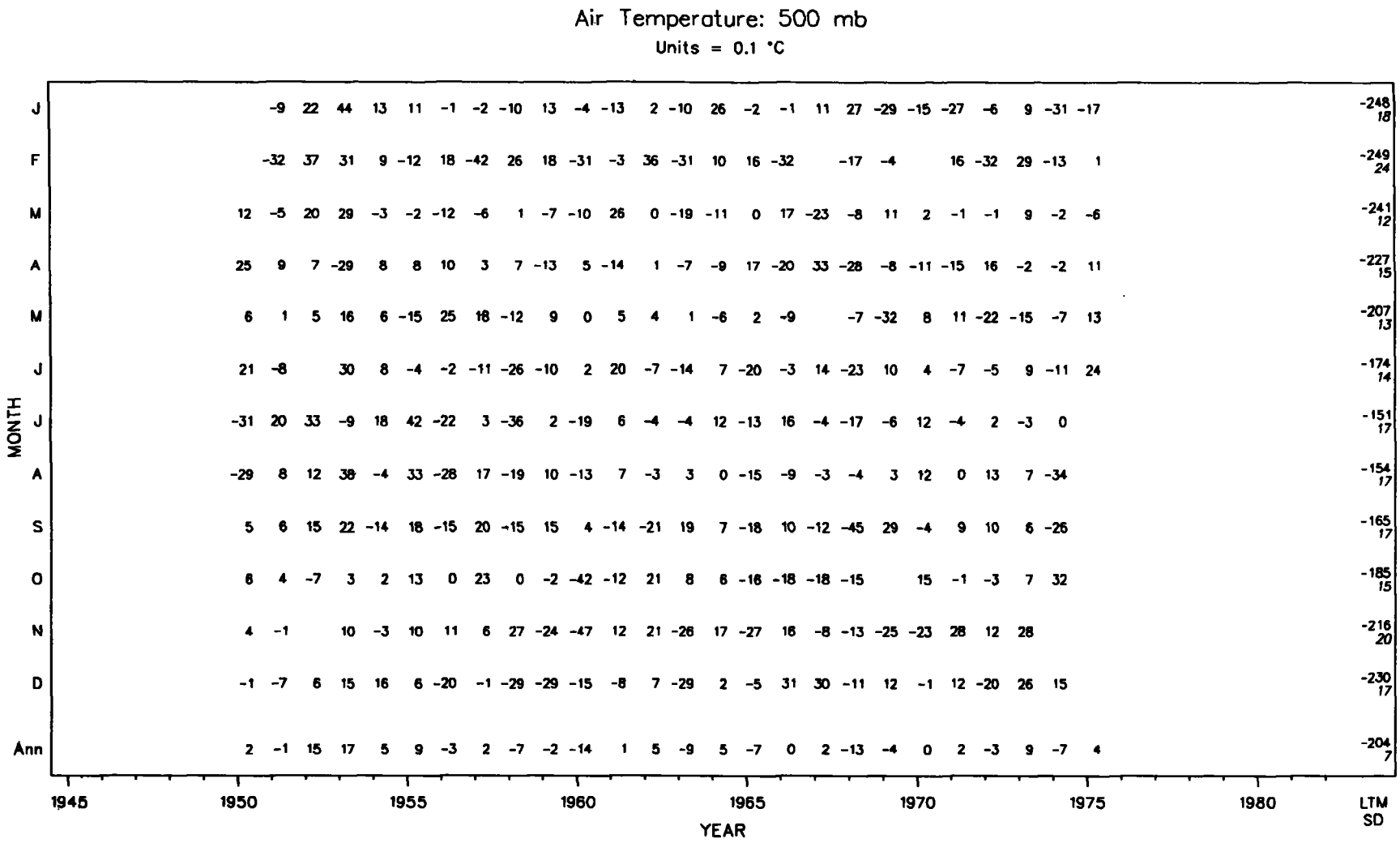
Mean plotted at actual height

Air Temperature: 700 mb

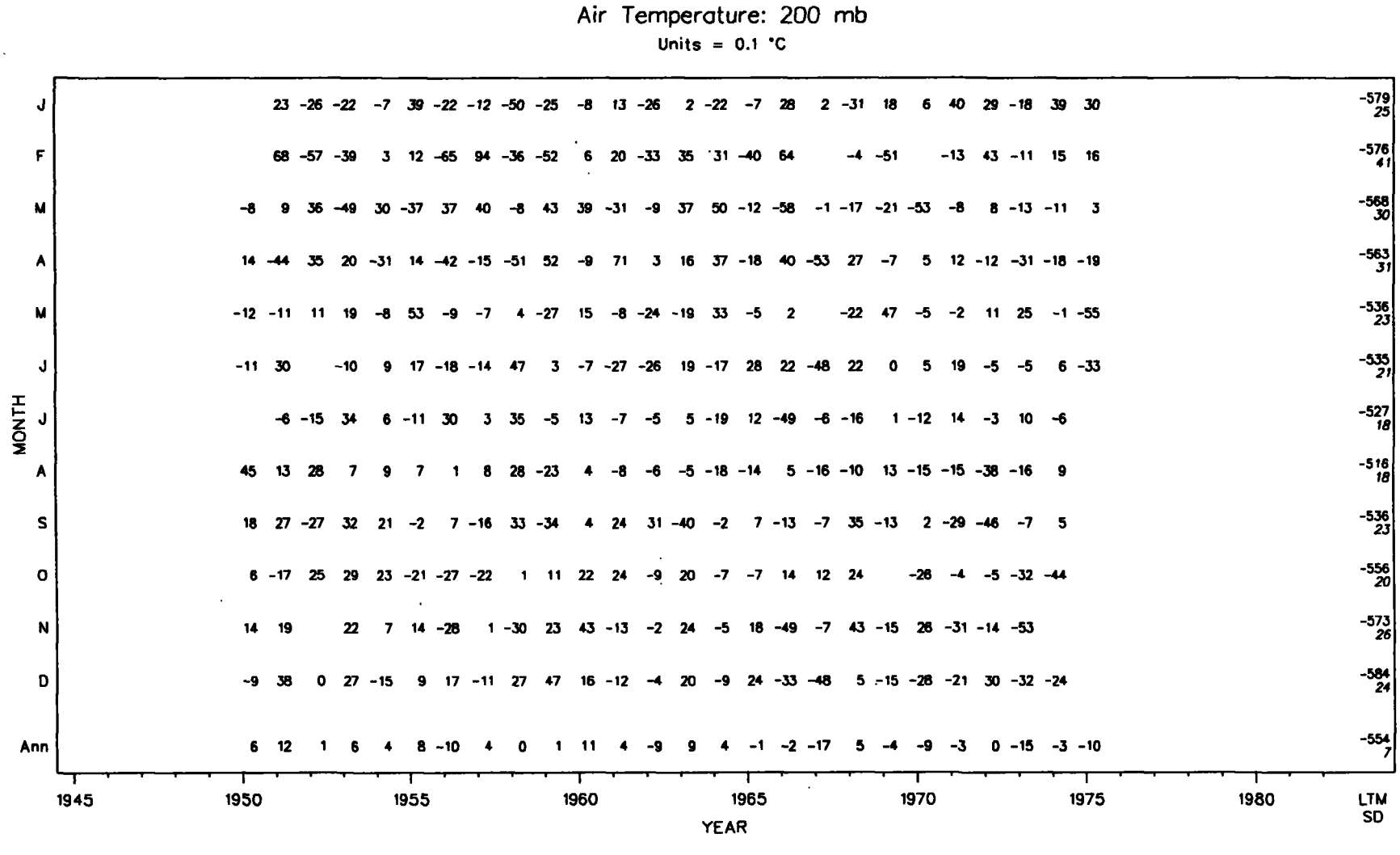
Units = 0.1 °C



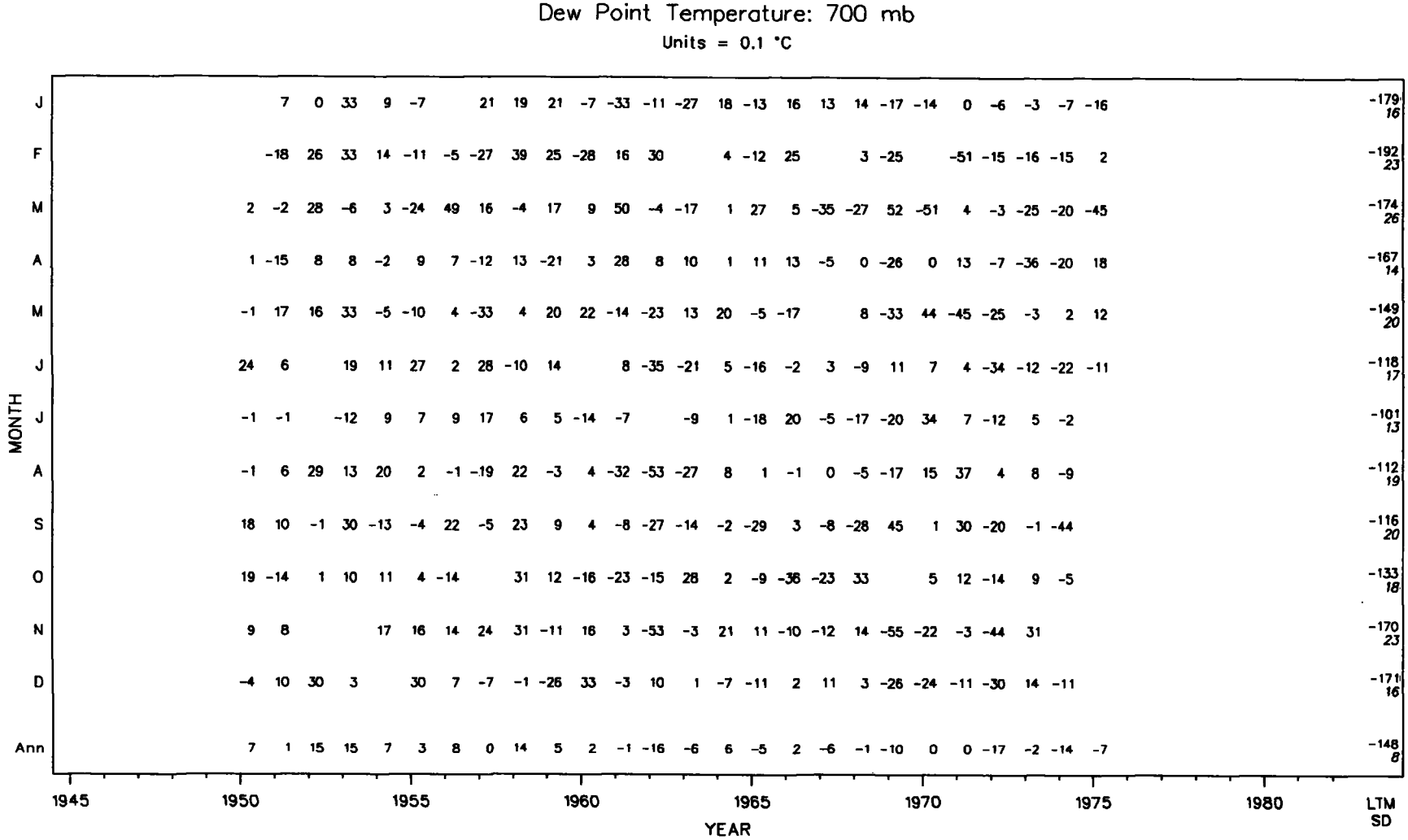
OWS Study Area J Anomalies



OWS Study Area J Anomalies



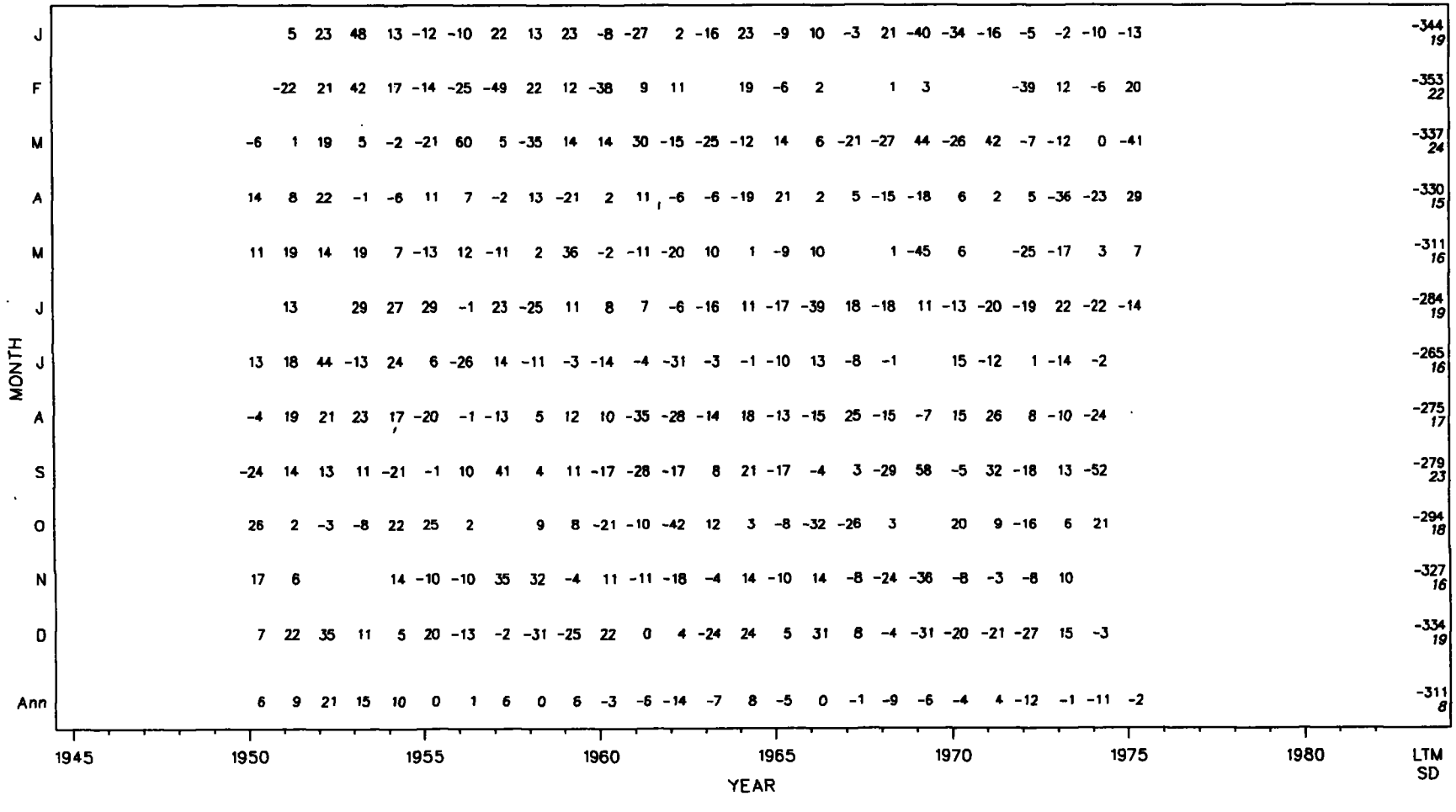
OWS Study Area J Anomalies



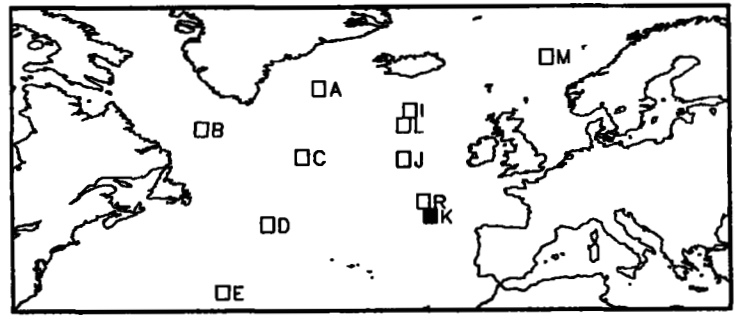
OWS Study Area J Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C

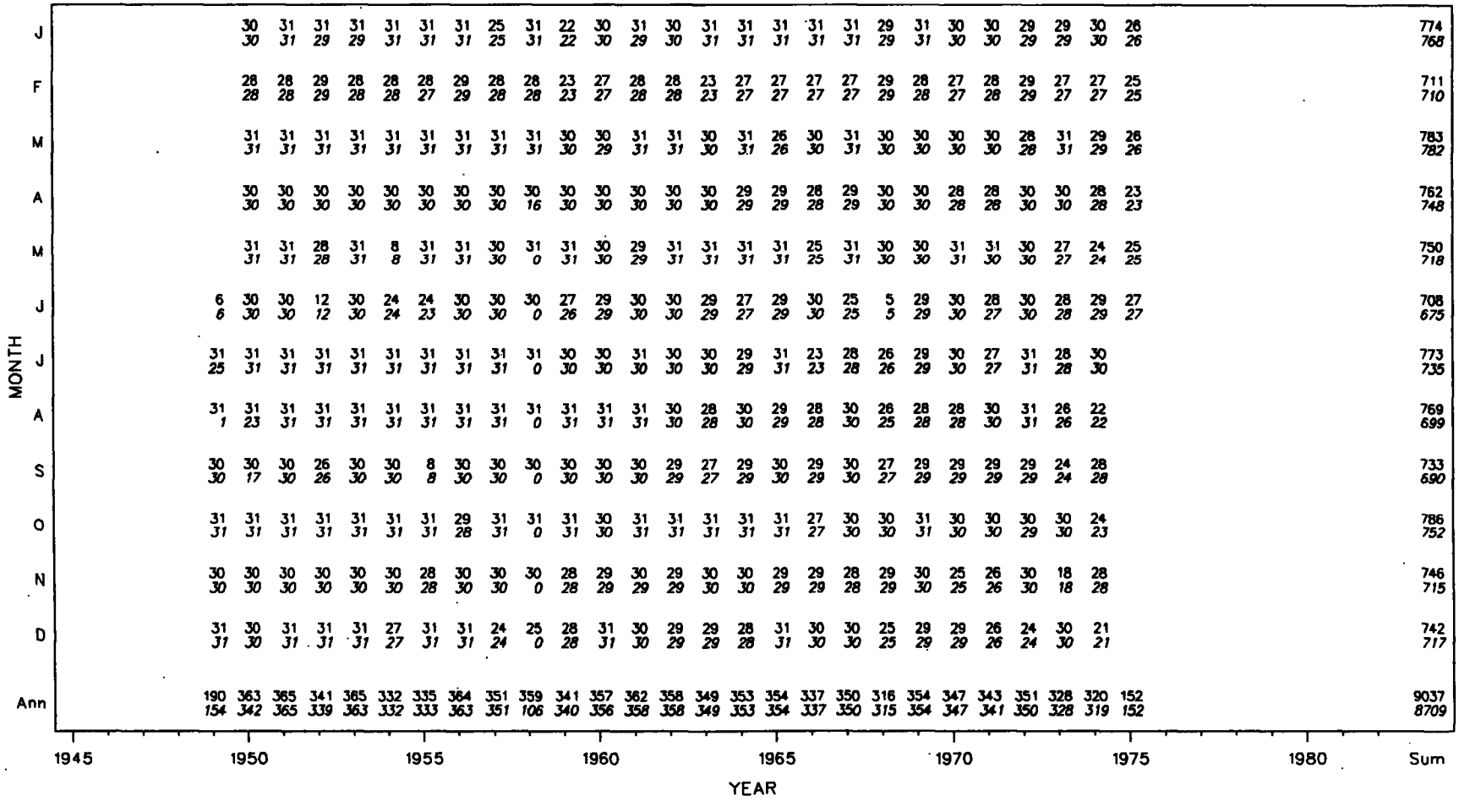


OWS Study Area J Anomalies



OWS K

44.0°N – 45.9°N, 16.9°W – 15.0°W
1949 – 1975

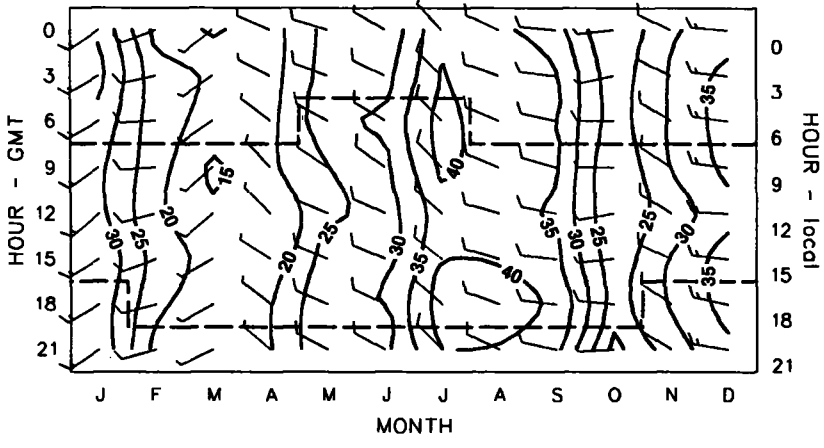


OWS Study Area K (45.0°N, 16.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

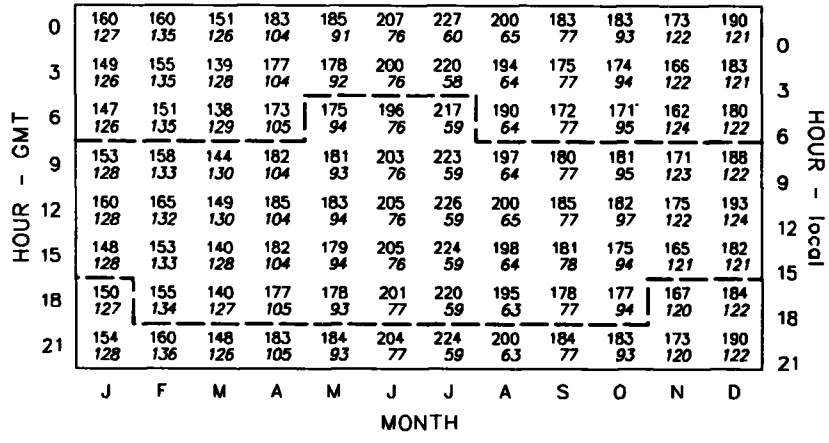
Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



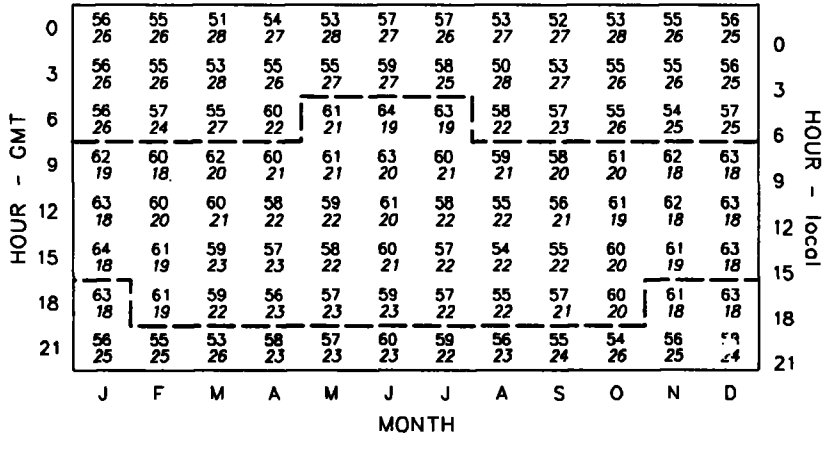
Pressure

Units = 0.1 mb



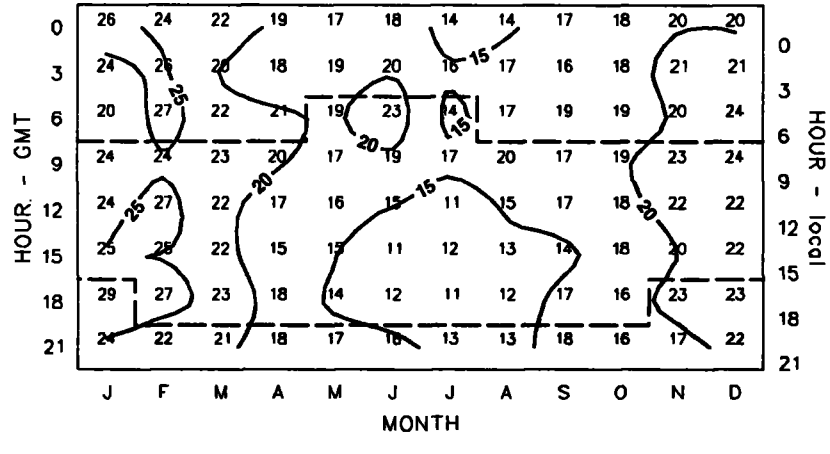
Total Cloudiness

Units = 0.1 okta



Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area K Surface Climatology

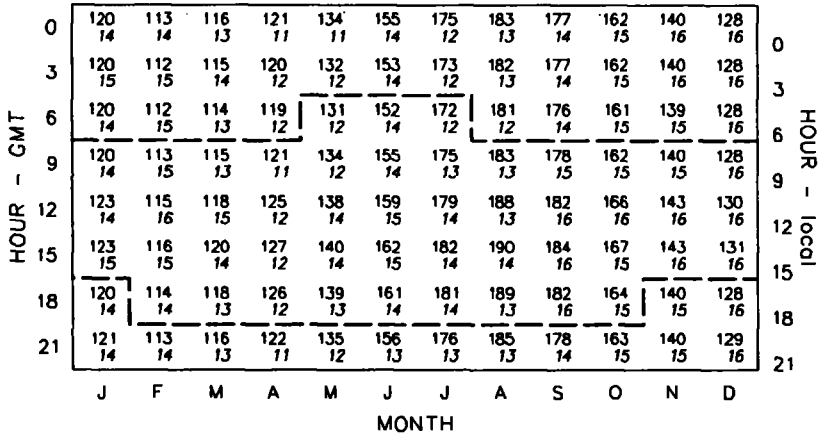
upper number = mean
lower number = standard deviation

data contours
sunrise/sunset

K2

Air Temperature

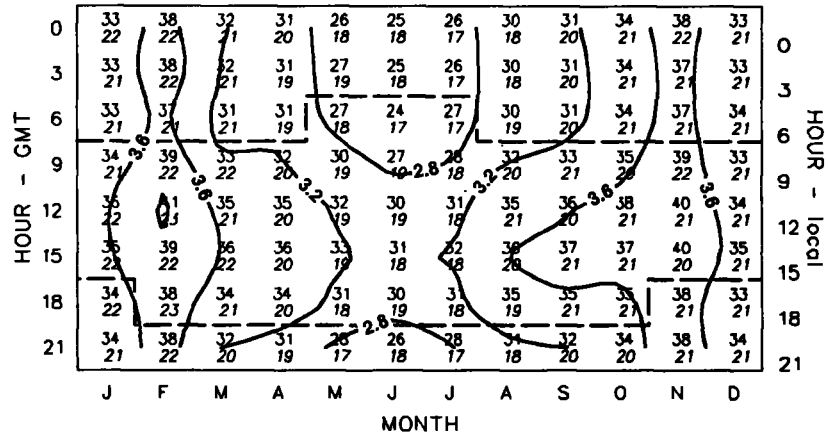
Units = 0.1 °C



Dew Point Depression

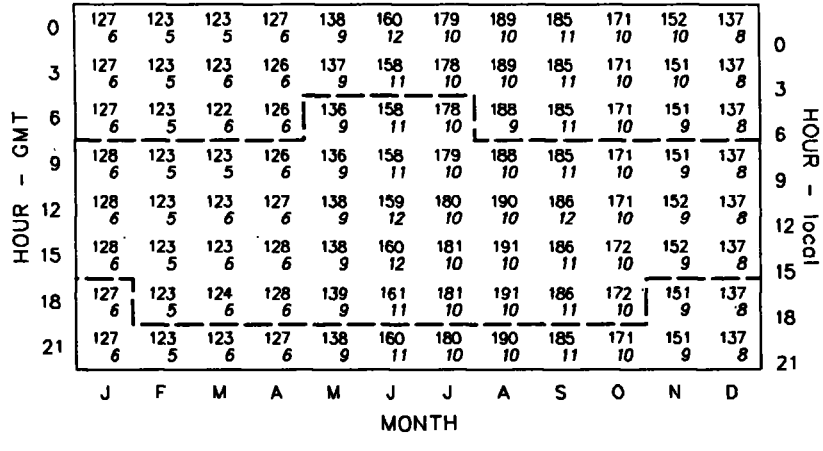
Units = 0.1 °C

Contour interval = 0.4 °C



Sea Surface Temperature

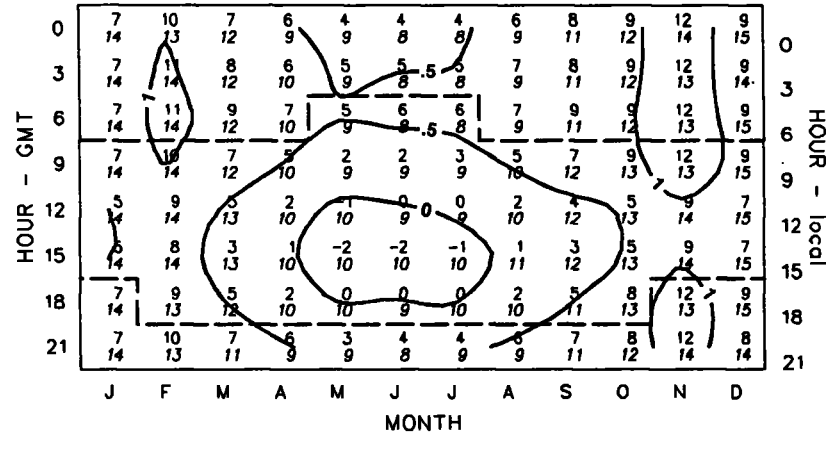
Units = 0.1 °C



Sea – Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



OWS Study Area K Surface Climatology

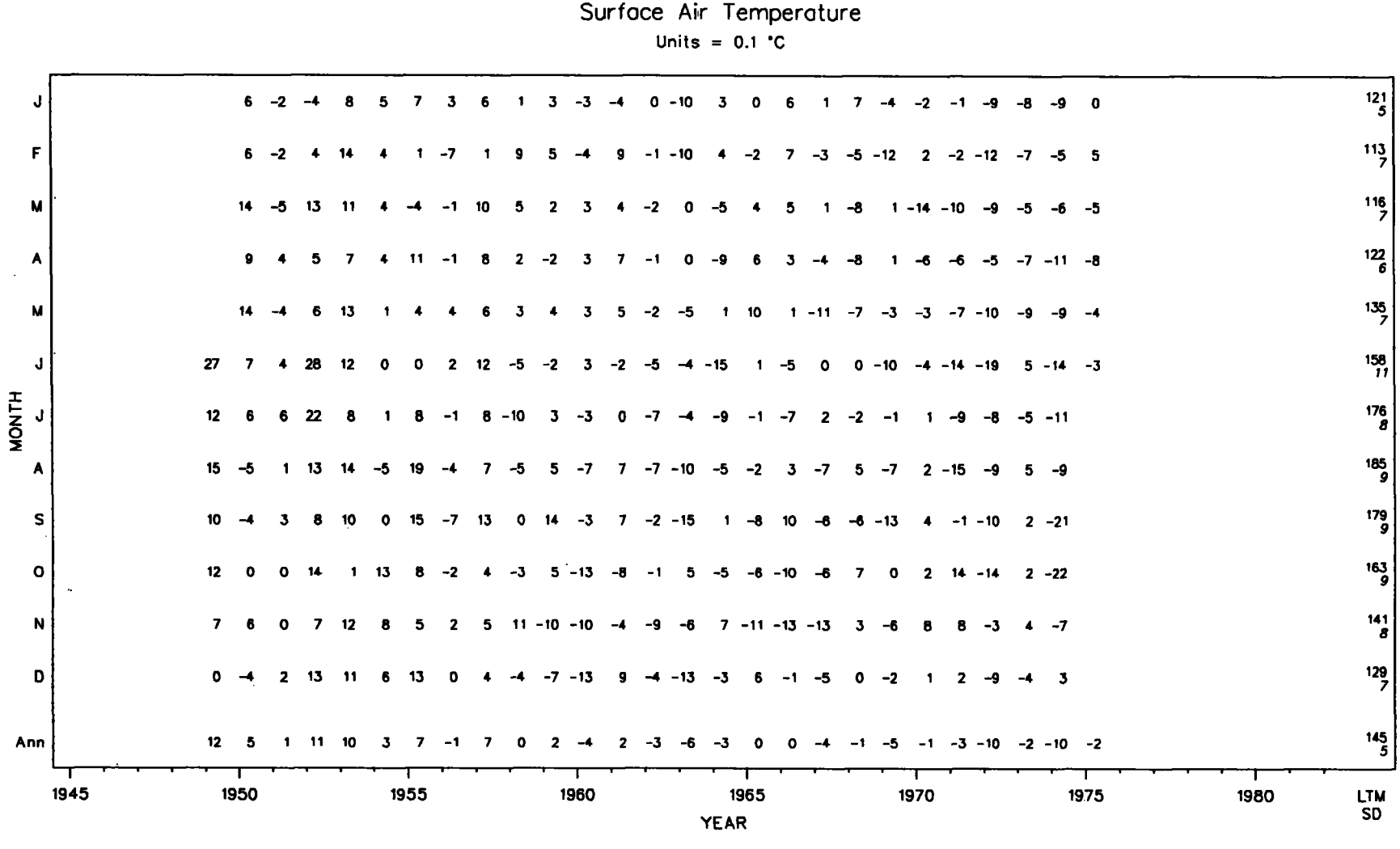
upper number = mean

lower number = standard deviation

——— data contours

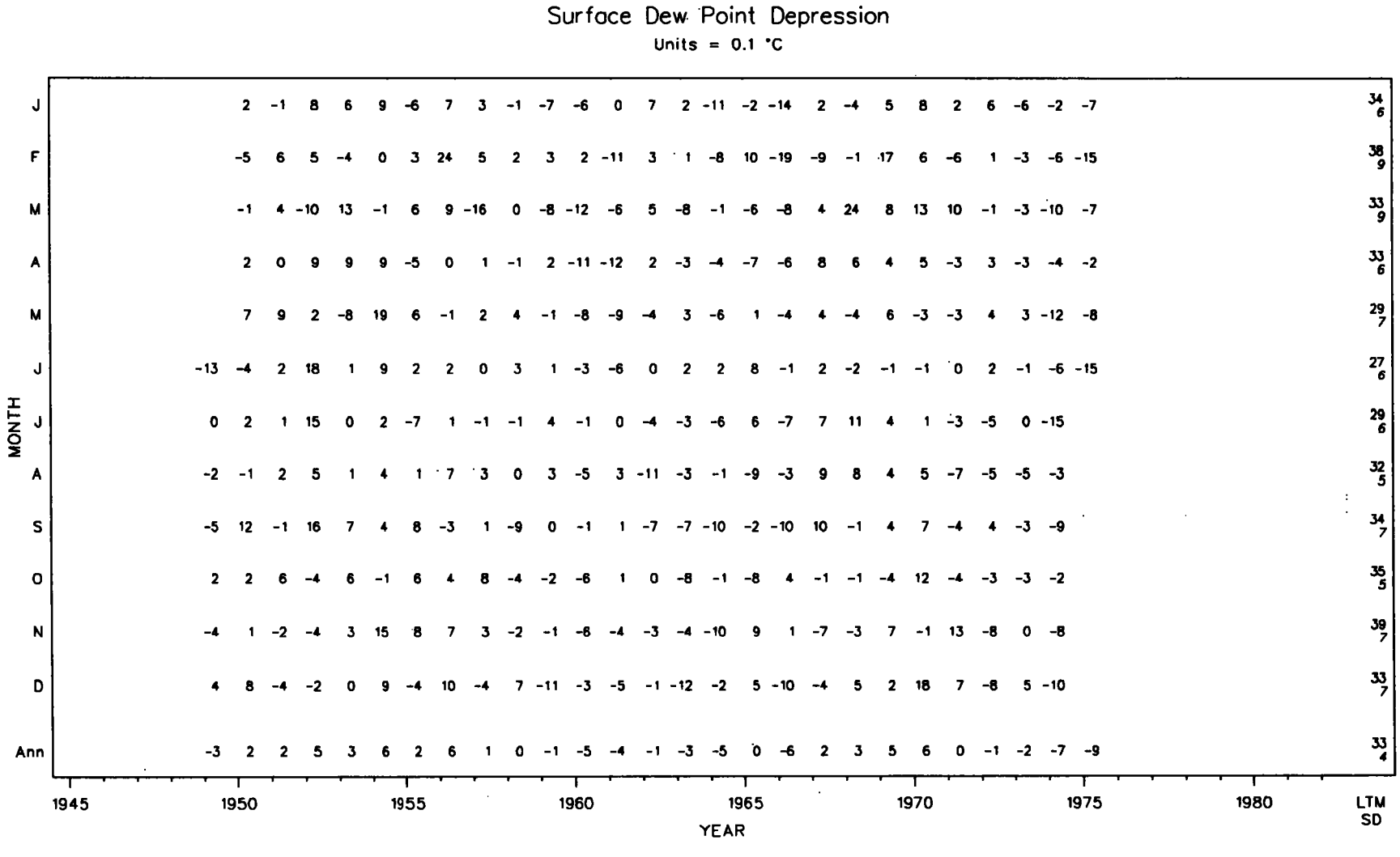
— — — — sunrise/sunset

K3

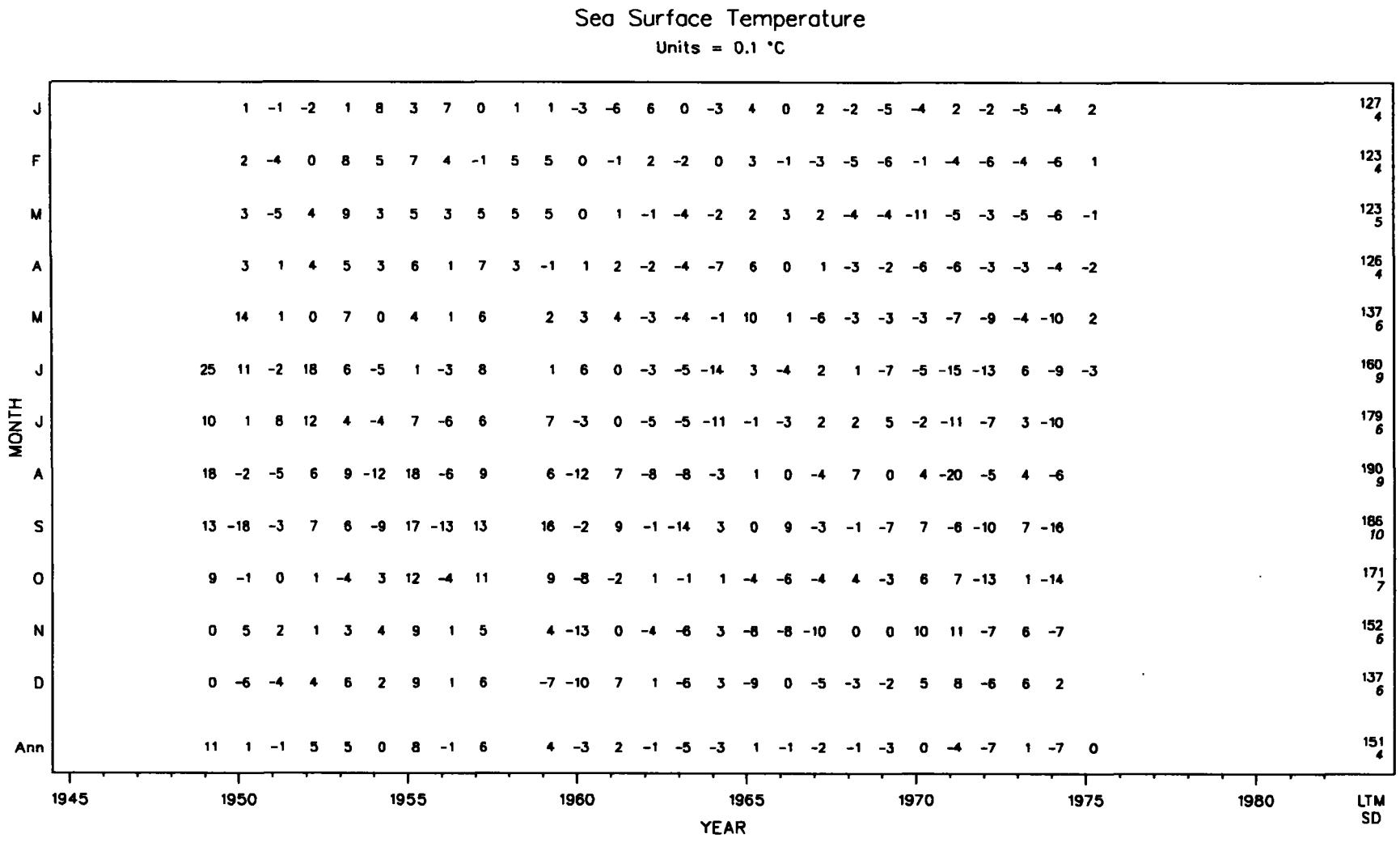


OWS Study Area K Anomalies

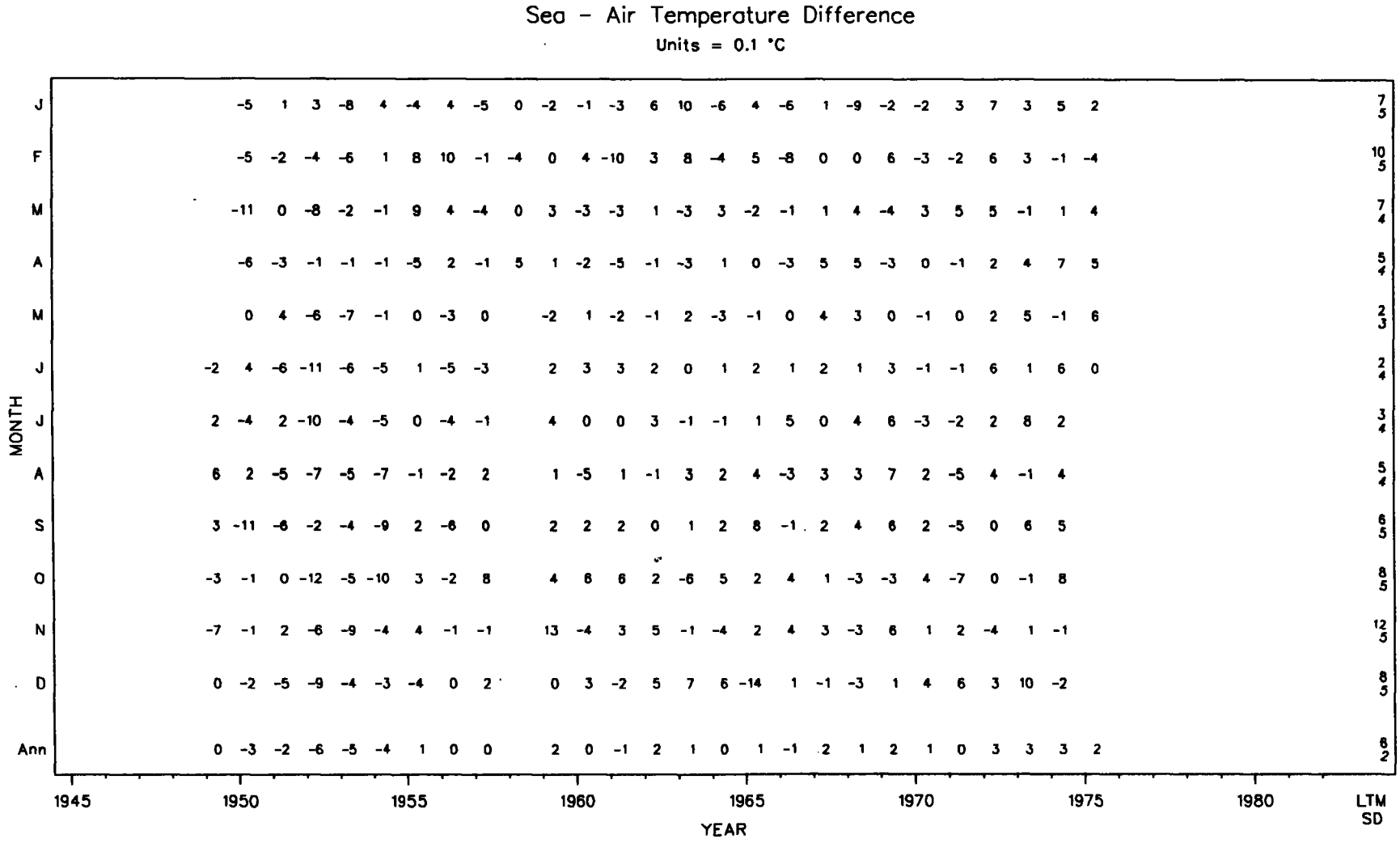
K4



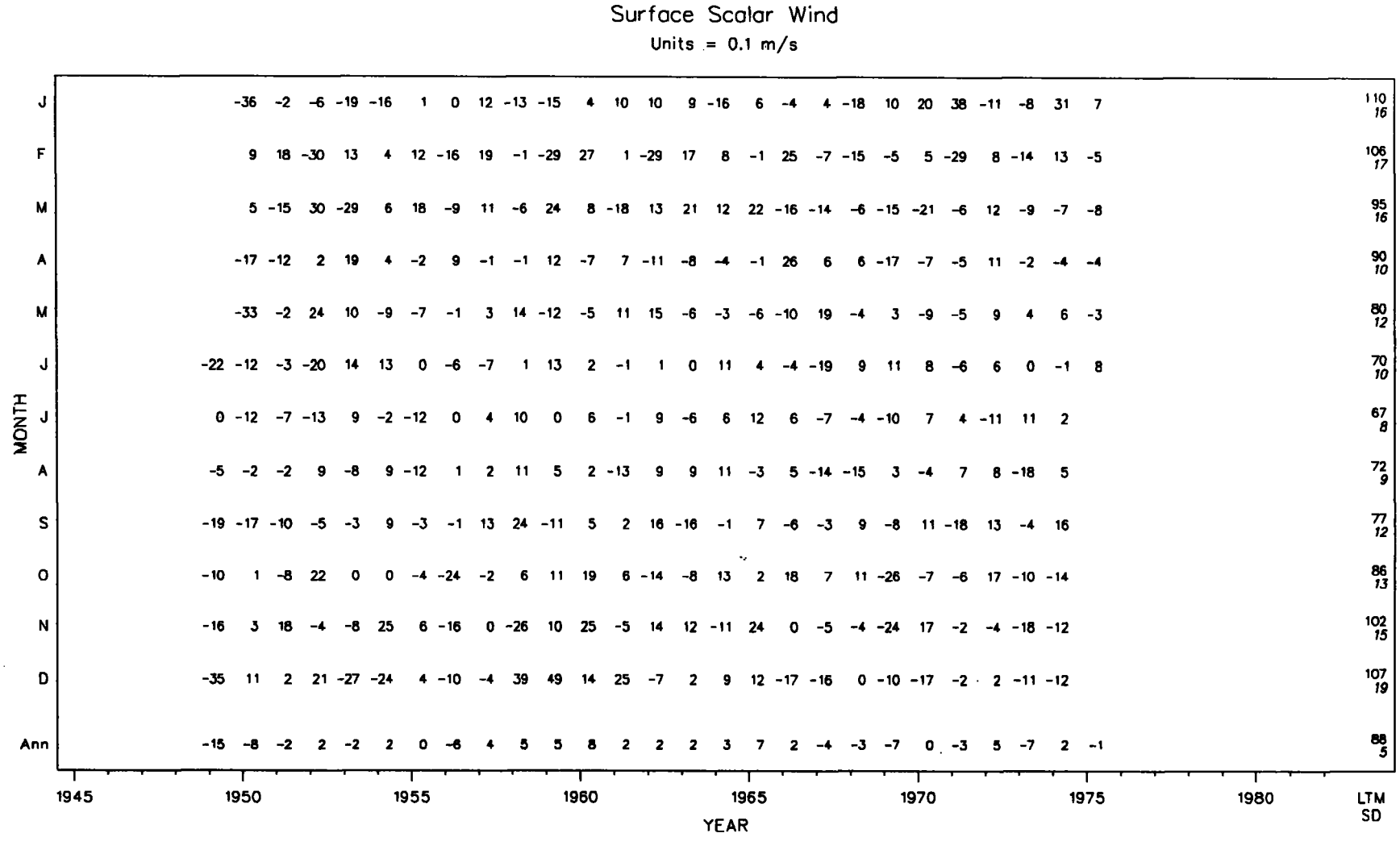
OWS Study Area K Anomalies



OWS Study Area K Anomalies



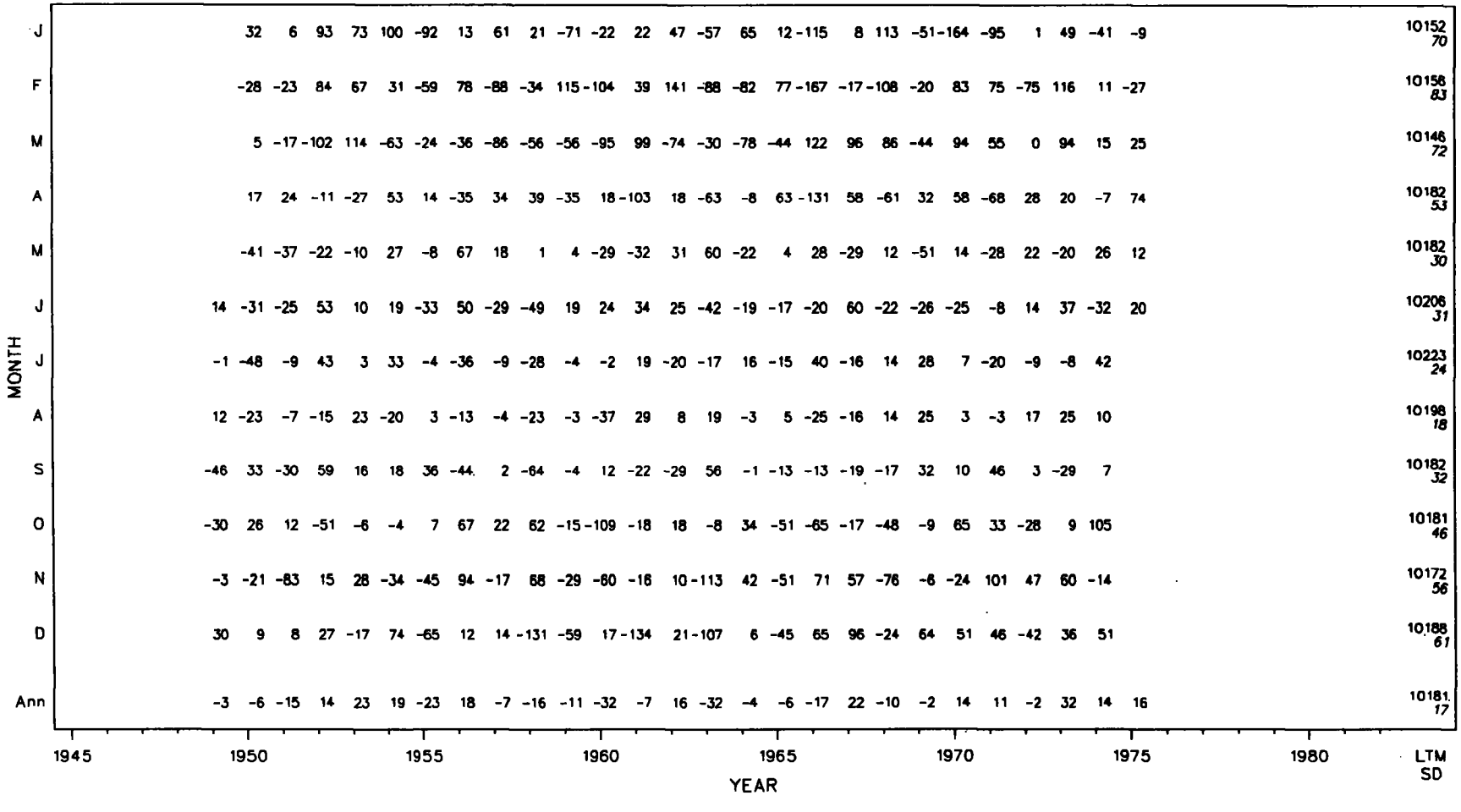
OWS Study Area K Anomalies



OWS Study Area K Anomalies

Sea Level Pressure

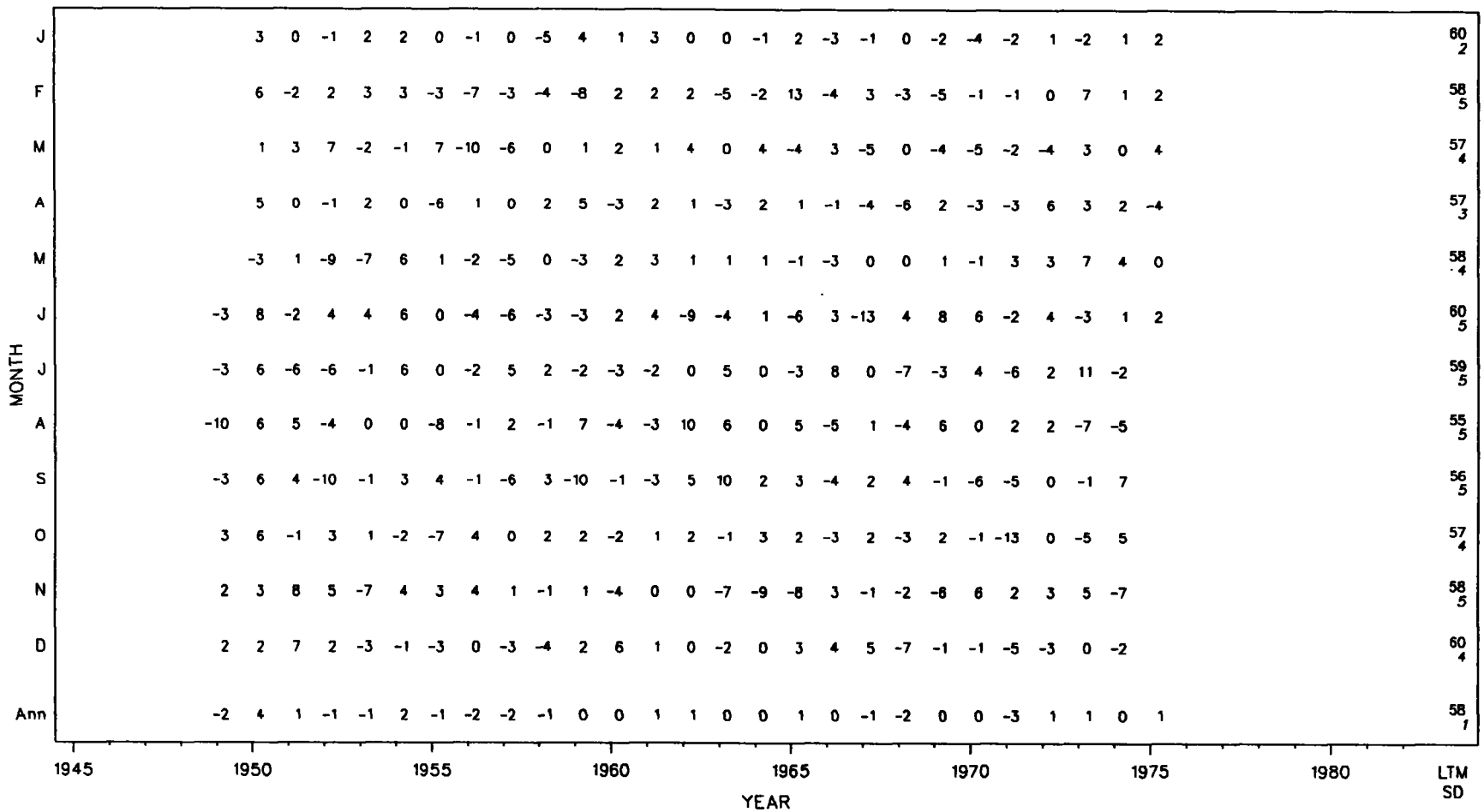
Units = 0.1 mb



OWS Study Area K Anomalies

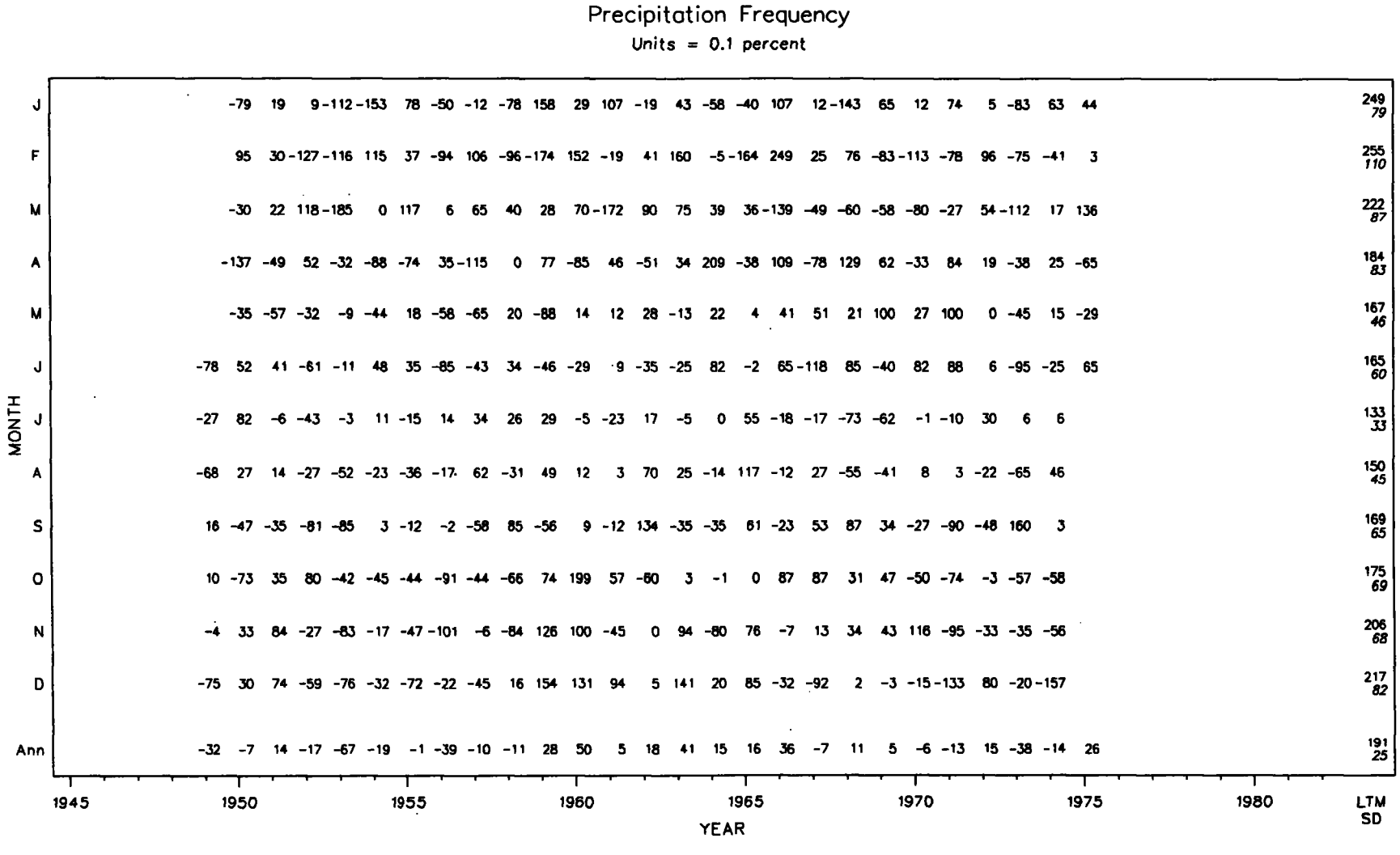
Total Cloudiness

Units = 0.1 okta



OWS Study Area K Anomalies

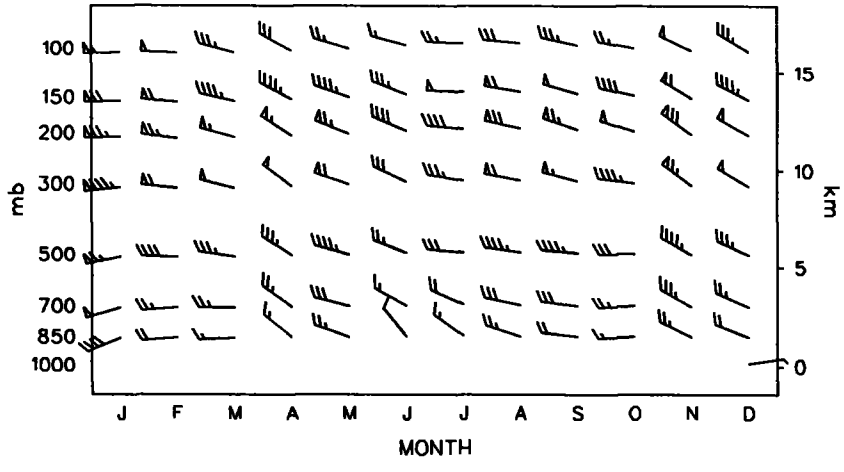
K10



OWS Study Area K Anomalies

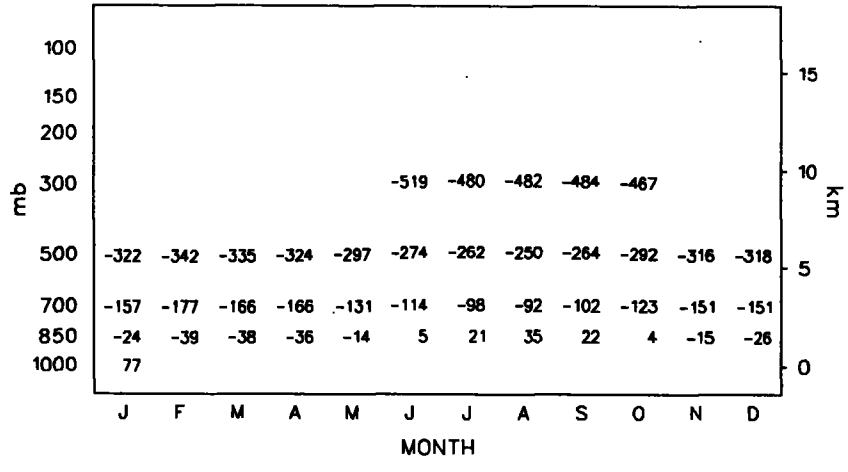
Wind

Full barb = 5 knots, Pennant = 25 knots



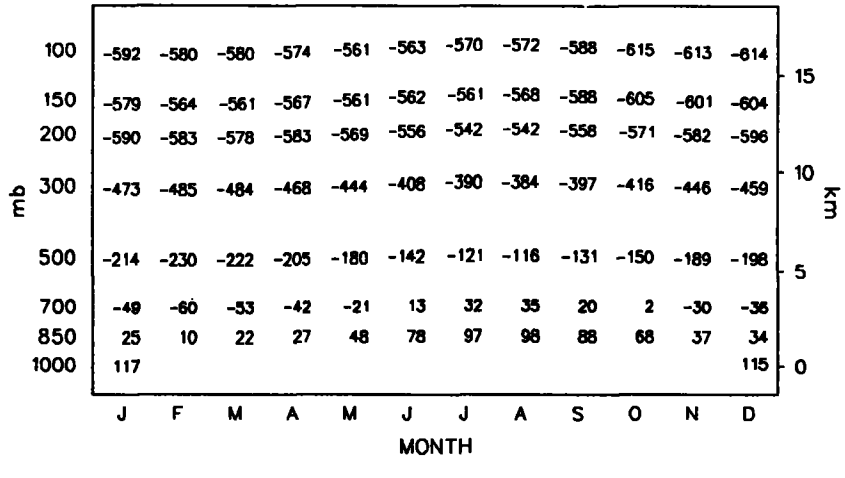
Dew Point Temperature

Units = 0.1 °C



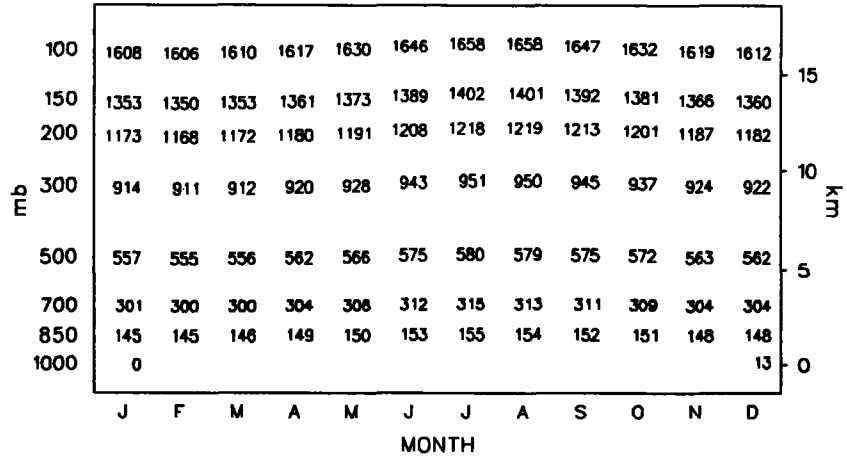
Air Temperature

Units = 0.1 °C



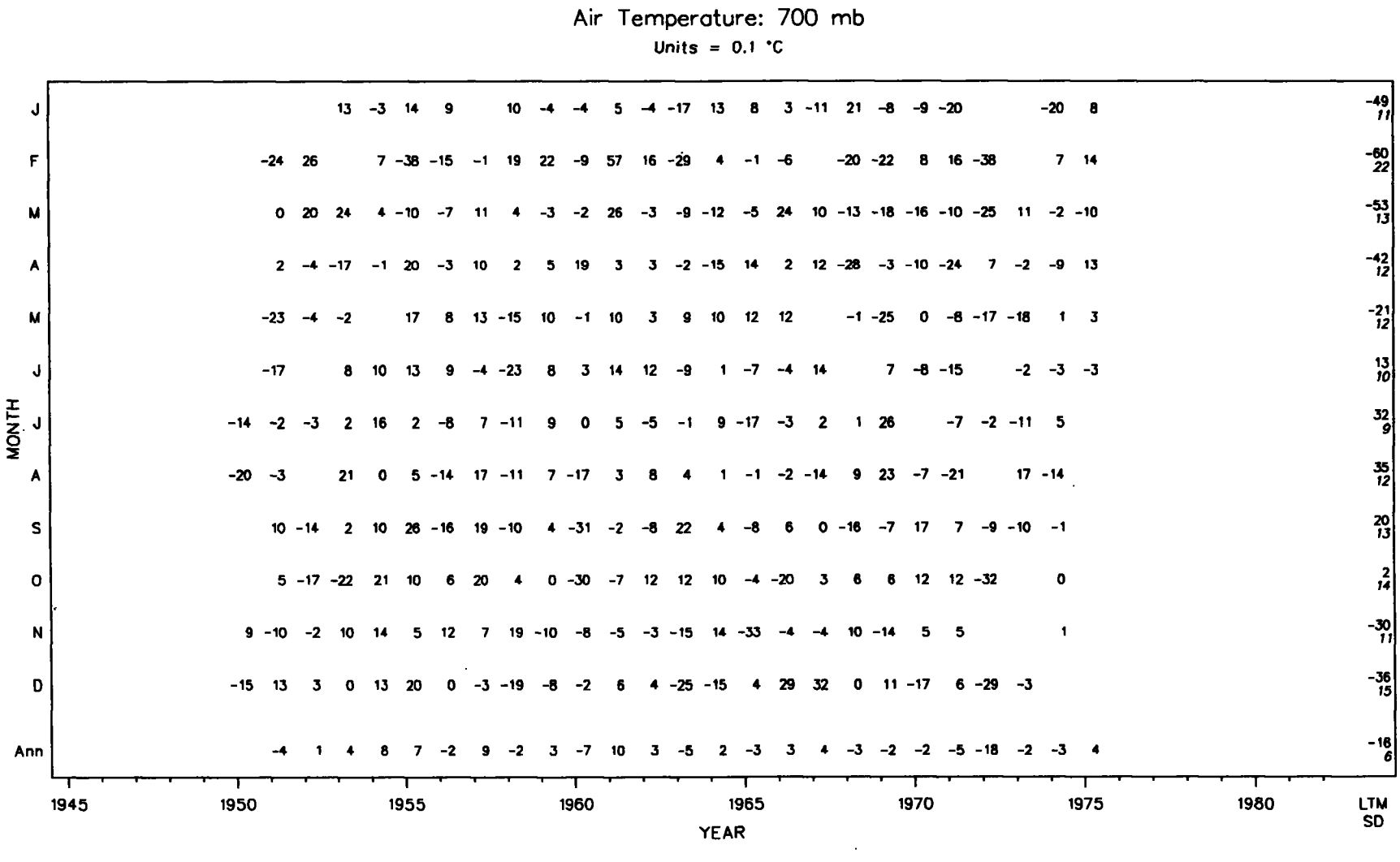
Pressure Height

Units = 10 m



OWS Study Area K Upper Air Climatology

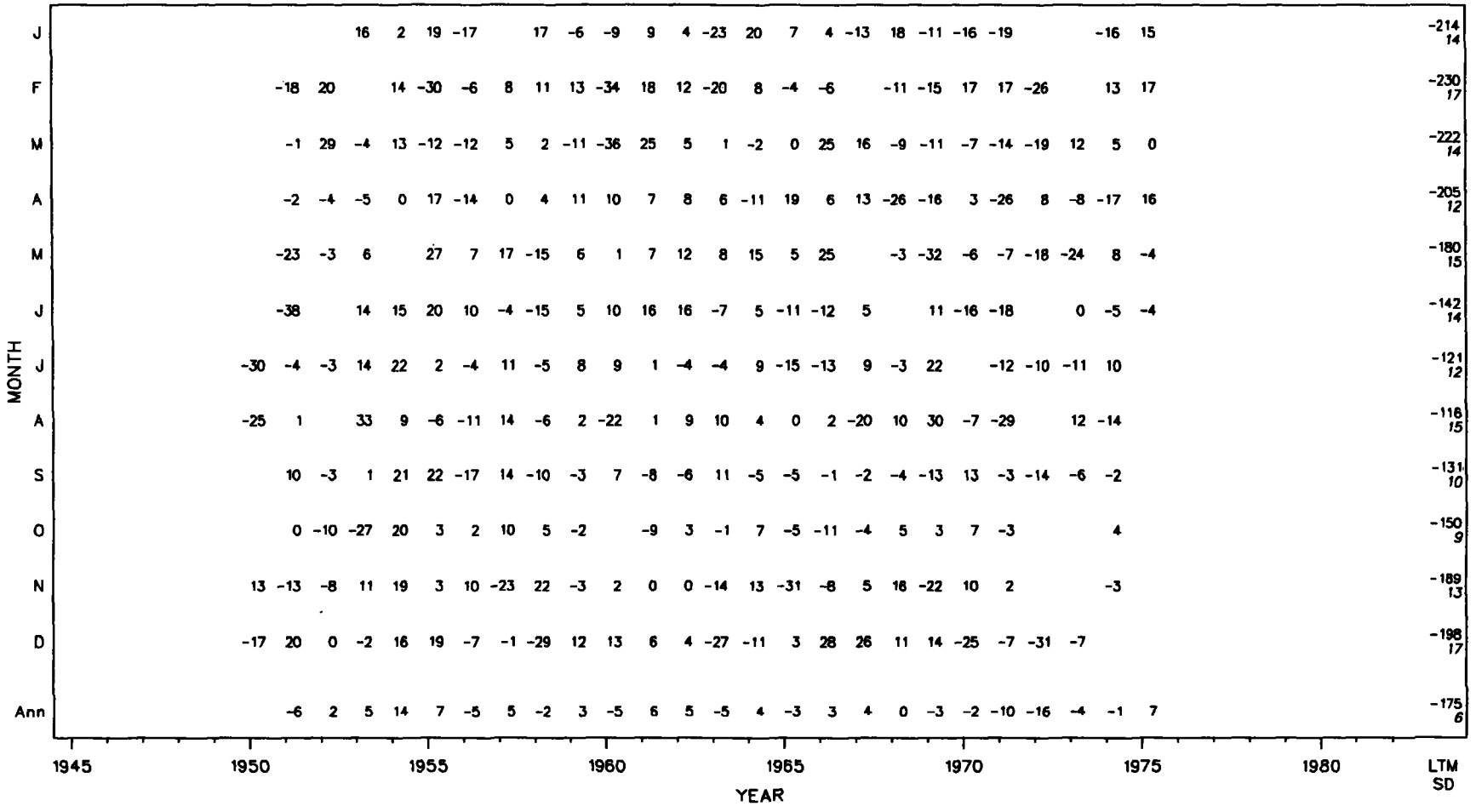
Mean plotted at actual height



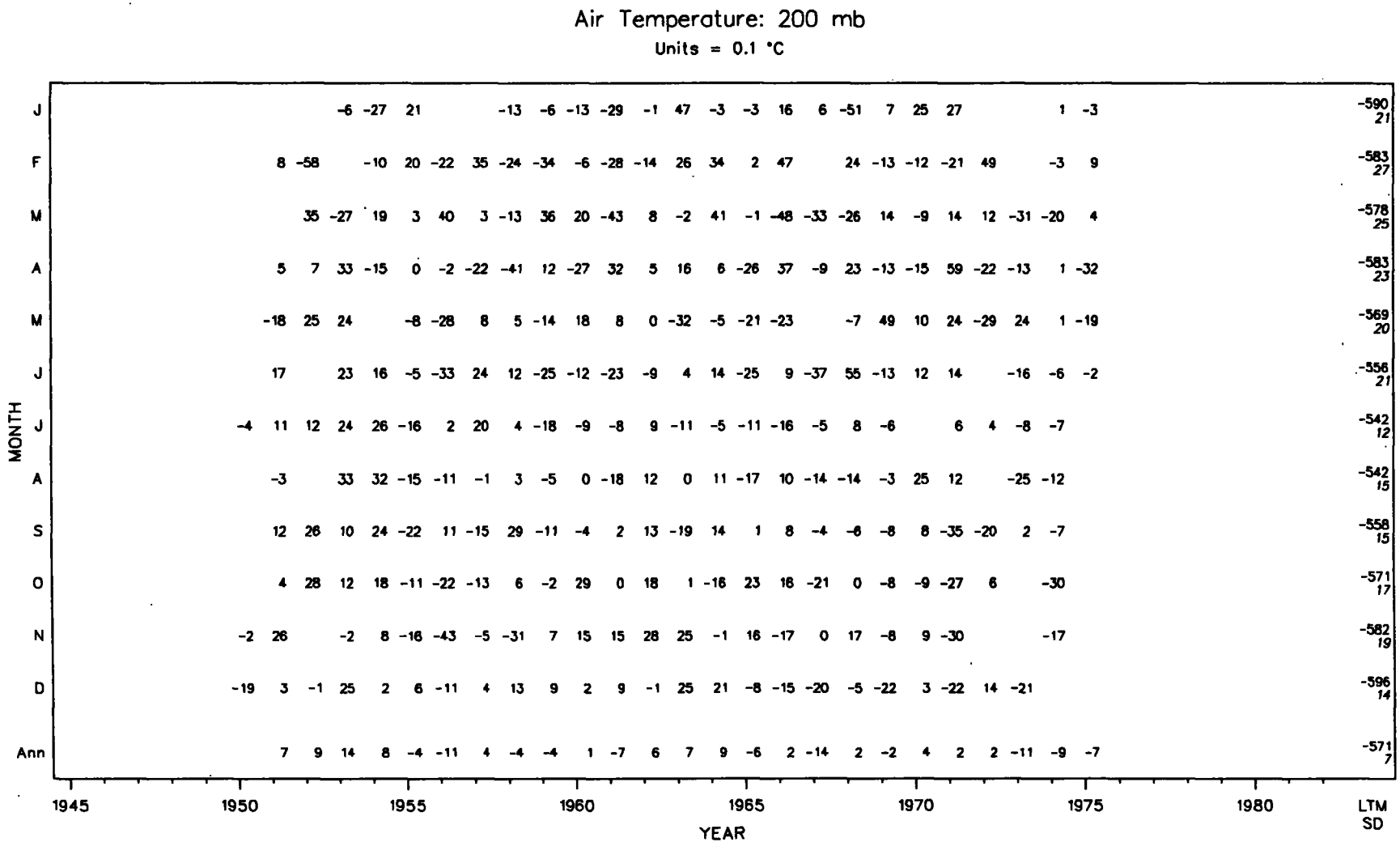
OWS Study Area K Anomalies

Air Temperature: 500 mb

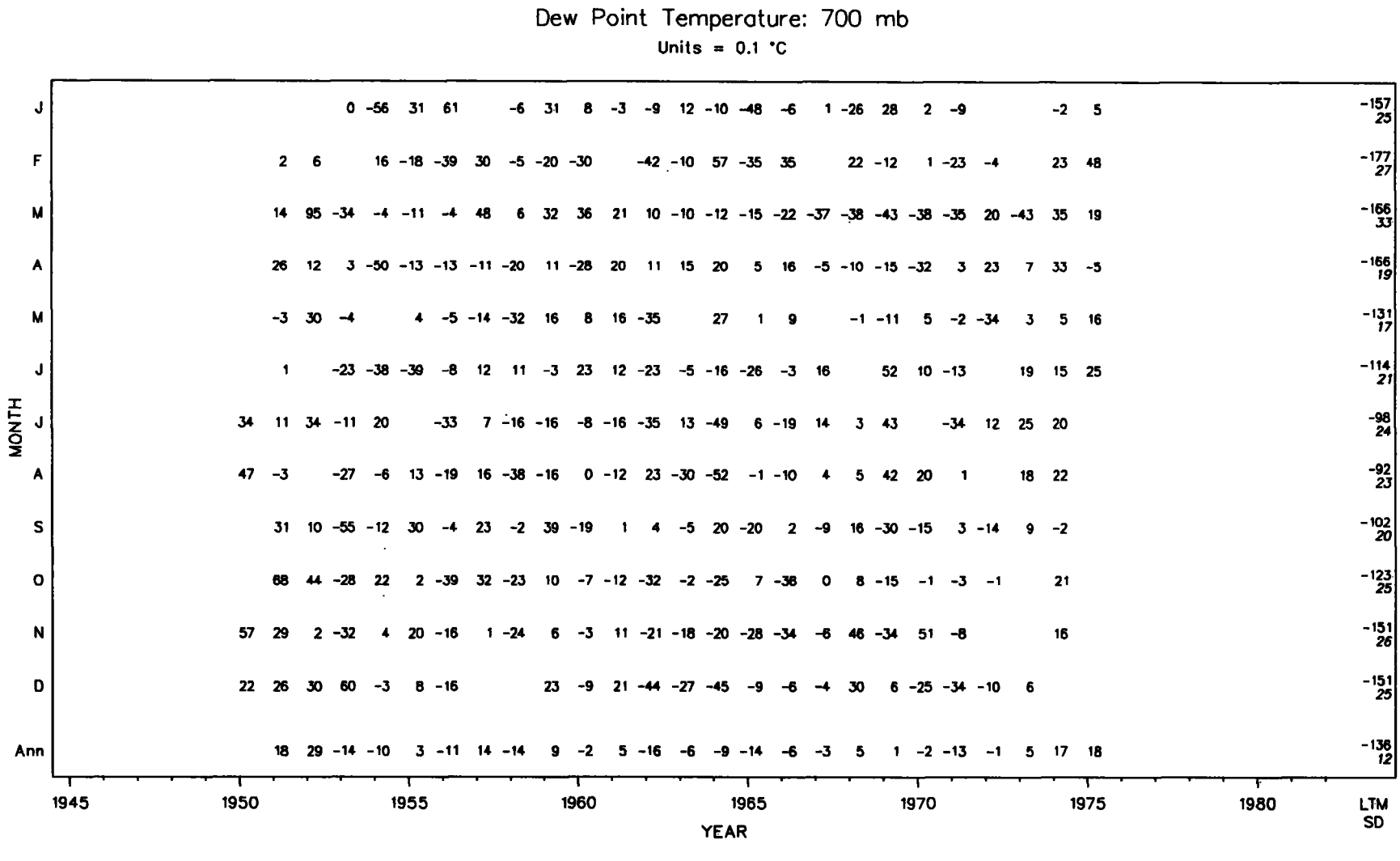
Units = 0.1 °C



OWS Study Area K Anomalies

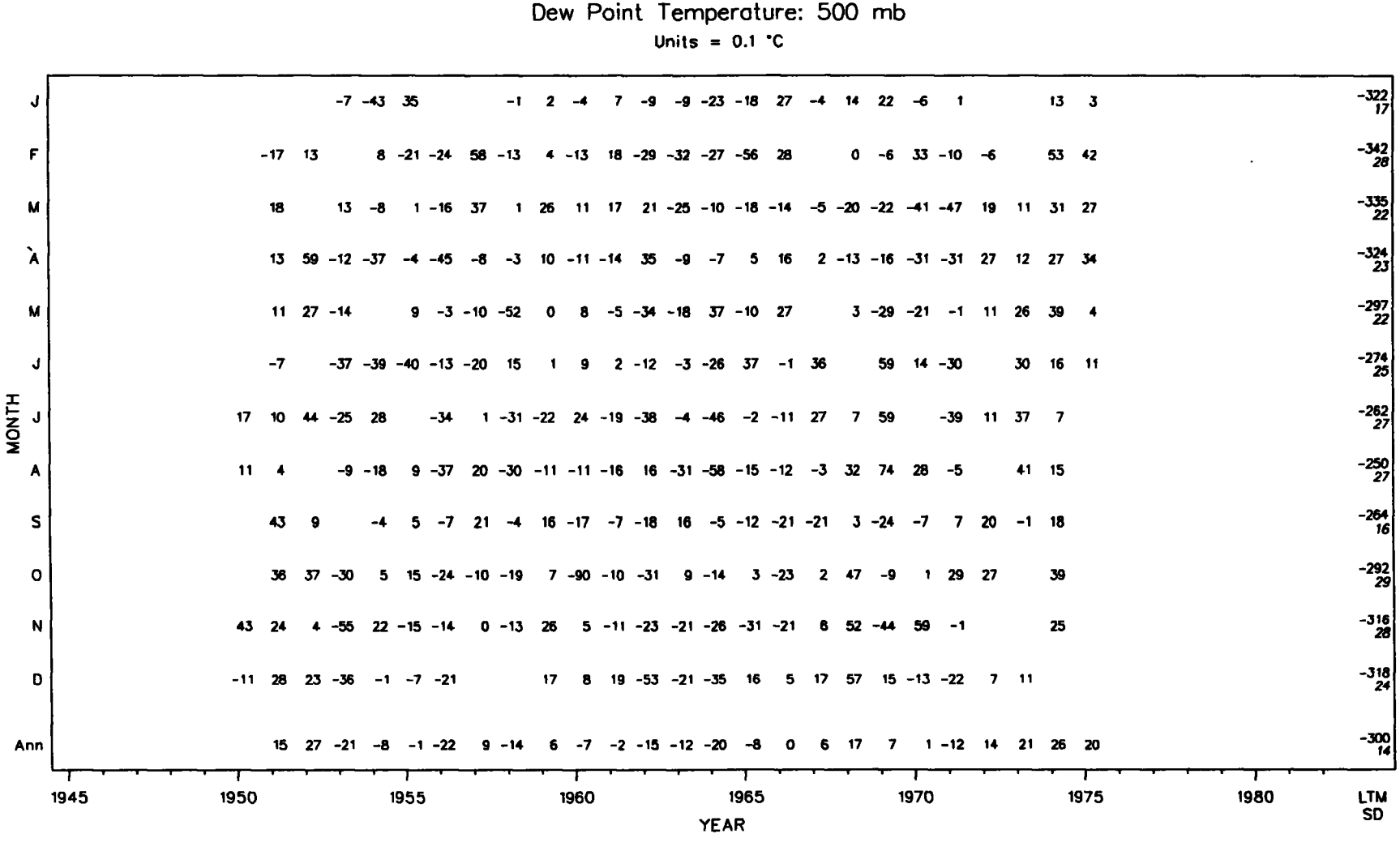


OWS Study Area K Anomalies

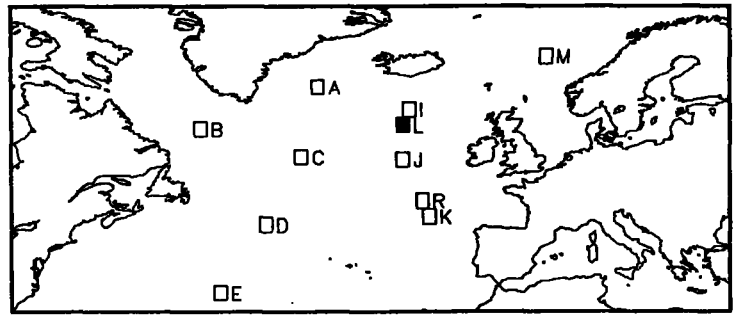


OWS Study Area K Anomalies

K16

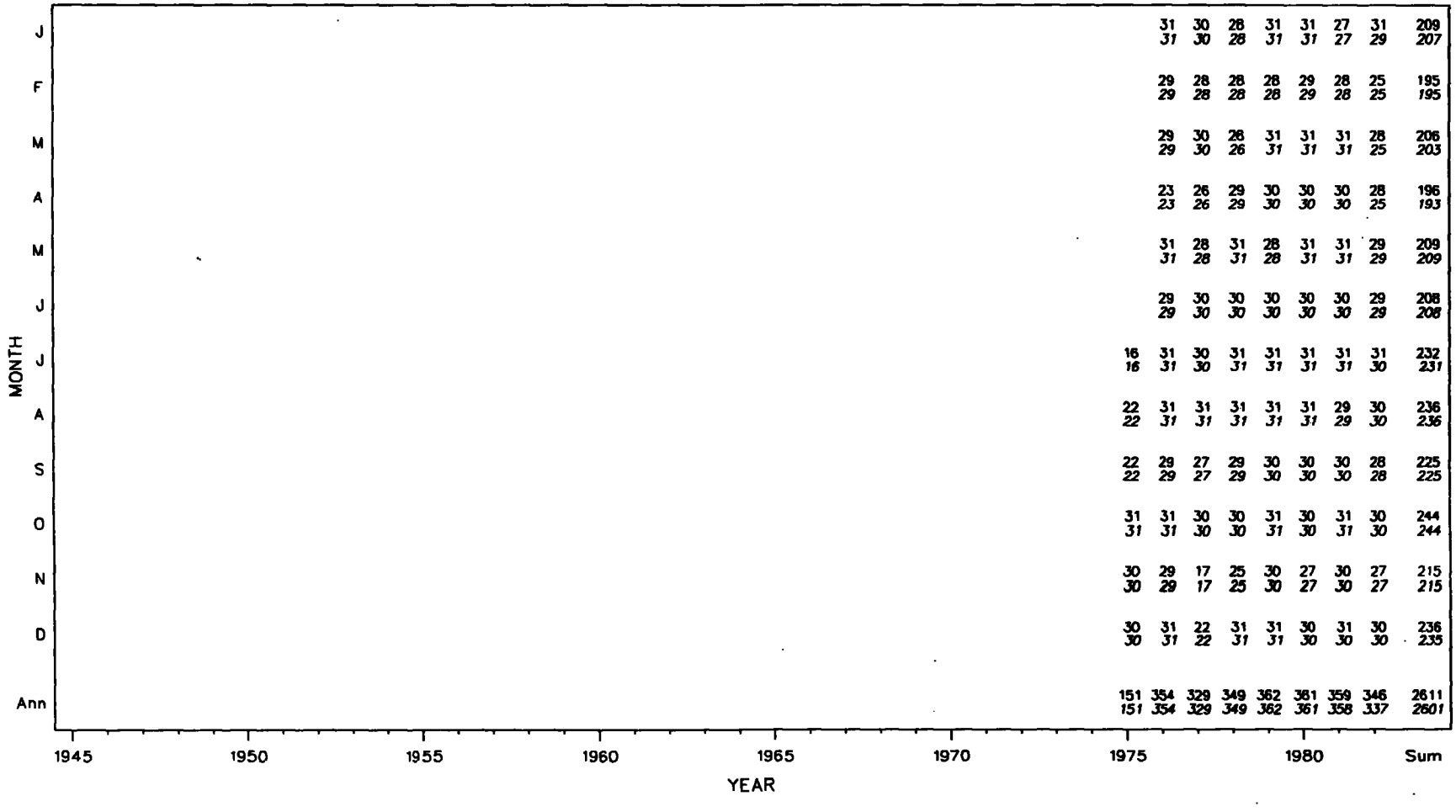


OWS Study Area K Anomalies



56.0°N – 57.9°N, 20.9°W – 19.0°W
1975 – 1982

OWS L

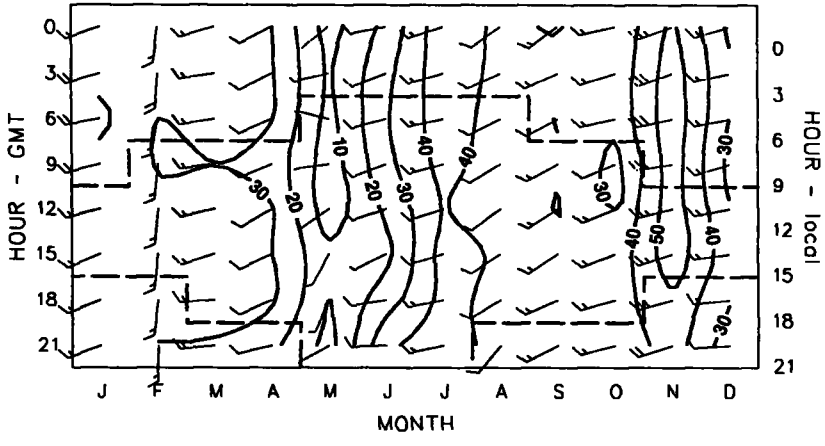


OWS Study Area L (57.0°N, 20.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

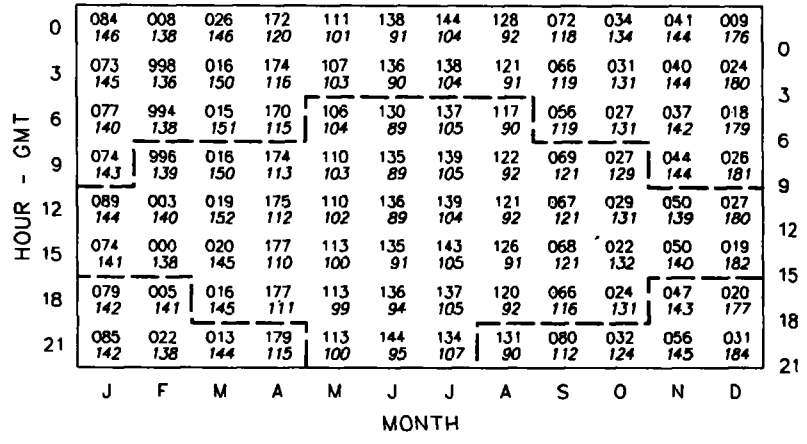
Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 10 percent



Pressure

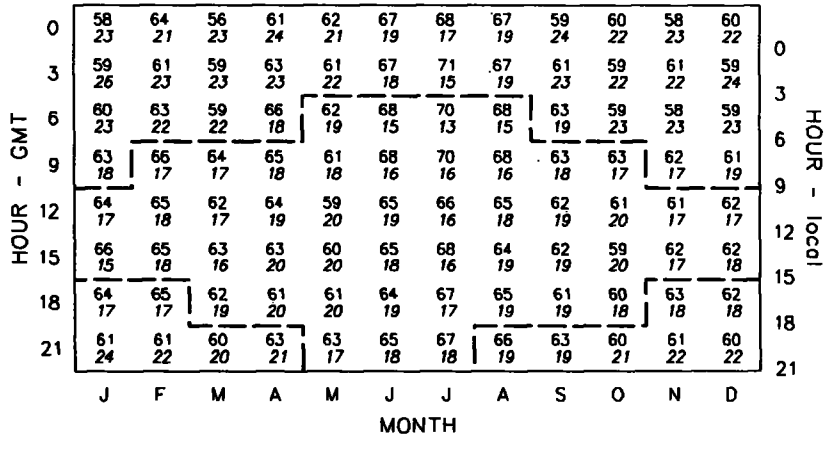
Units = 0.1 mb



HOUR	J	F	M	A	M	J	J	A	S	O	N	D
0	084 146	008 138	026 146	172 120	111 101	138 91	144 104	128 92	072 118	034 134	041 144	009 176
3	073 145	998 136	016 150	174 116	107 103	136 90	138 104	121 91	066 119	031 131	040 144	024 180
6	077 140	994 138	015 151	170 115	106 104	130 89	137 105	117 90	056 119	027 131	037 142	018 179
9	074 143	996 139	016 150	174 113	110 103	135 89	139 105	122 92	069 121	027 129	044 144	026 181
12	089 144	003 140	019 152	175 112	110 102	136 89	139 104	121 92	067 121	029 131	050 139	027 180
15	074 141	000 138	020 145	177 110	113 100	135 91	143 105	126 91	068 121	022 132	050 140	019 182
18	079 142	005 141	016 145	177 111	113 99	136 94	137 105	120 92	066 116	024 131	047 143	020 177
21	085 142	022 138	013 144	179 115	113 100	144 95	134 107	131 90	080 112	032 124	056 145	031 184

Total Cloudiness

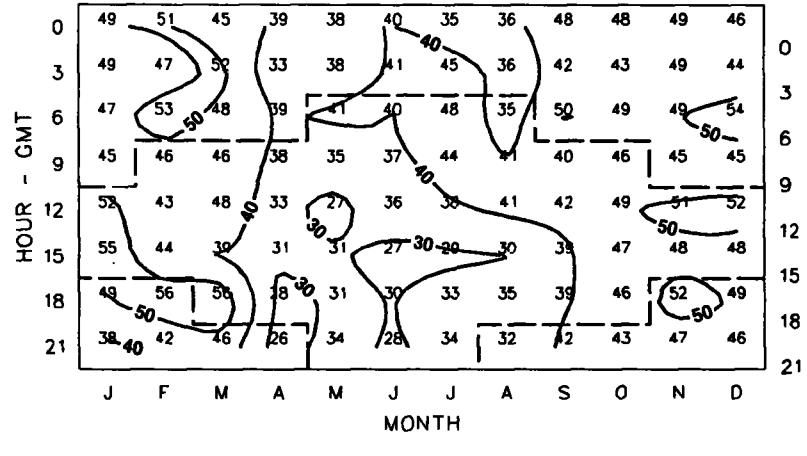
Units = 0.1 okta



HOUR	J	F	M	A	M	J	J	A	S	O	N	D
0	58 23	64 21	56 23	61 24	62 21	67 19	68 17	67 19	59 24	60 22	58 23	60 22
3	59 26	61 23	59 23	63 23	61 22	67 18	71 15	67 19	61 23	59 22	61 22	59 24
6	60 23	63 22	59 22	66 18	62 19	68 15	70 13	68 15	63 19	59 23	58 23	59 23
9	63 18	66 17	64 17	65 18	61 18	68 16	70 16	68 16	63 18	63 17	62 17	61 19
12	64 17	65 18	62 17	64 19	59 20	65 19	66 16	65 18	62 19	61 20	61 17	62 17
15	66 15	65 18	63 16	63 20	60 20	65 18	68 16	64 19	62 19	59 20	62 17	62 18
18	64 17	65 17	62 19	61 20	61 20	64 19	67 17	65 19	61 19	60 18	63 18	62 18
21	61 24	61 22	60 20	63 21	63 17	65 18	67 18	66 19	63 19	60 21	61 22	60 22

Precipitation Frequency

Units = percent
Contour interval = 10 percent



HOUR	J	F	M	A	M	J	J	A	S	O	N	D
0	49	51	45	39	38	40	35	36	48	48	49	46
3	49	47	52	33	38	41	45	36	42	43	49	44
6	47	53	48	39	41	40	48	35	50	49	49	54
9	45	46	46	38	35	37	44	41	40	46	45	45
12	52	43	48	33	27	36	38	41	42	49	51	52
15	55	44	39	31	31	27	30	30	39	47	48	48
18	49	56	56	38	31	30	33	35	39	46	52	49
21	38	42	46	26	34	28	34	32	42	43	47	46

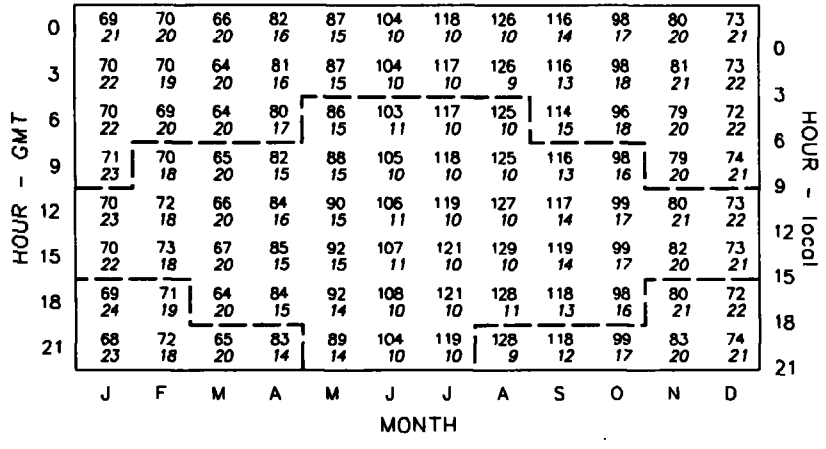
OWS Study Area L Surface Climatology

upper number = mean
lower number = standard deviation

——— data contours
— — — — sunrise/sunset

Air Temperature

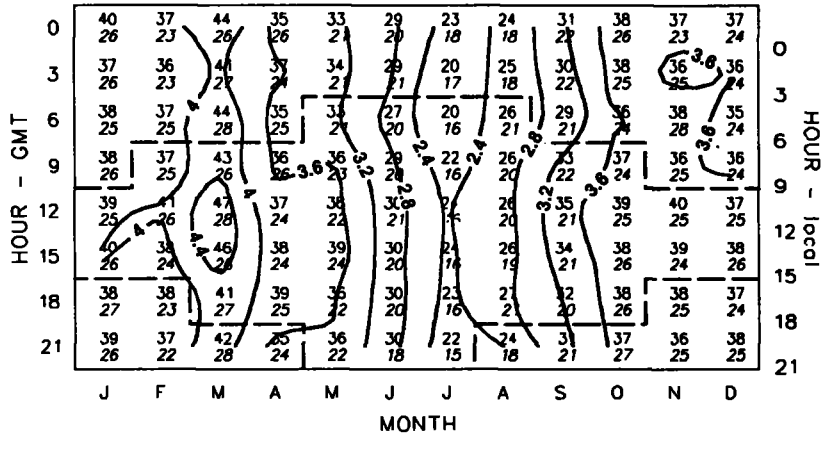
Units = 0.1 °C



Dew Point Depression

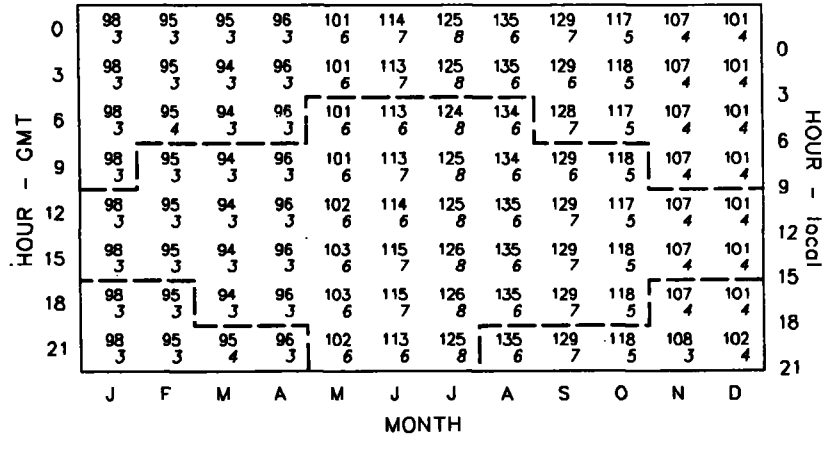
Units = 0.1 °C

Contour interval = 0.4 °C



Sea Surface Temperature

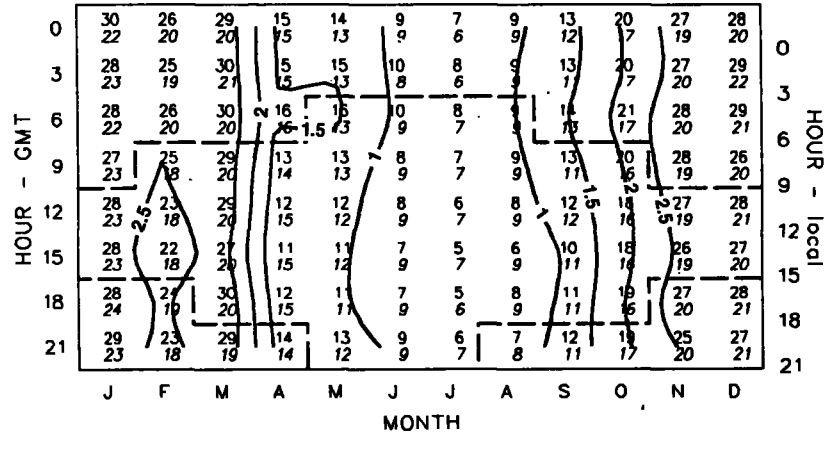
Units = 0.1 °C



Sea – Air Temperature Difference

Units = 0.1 °C

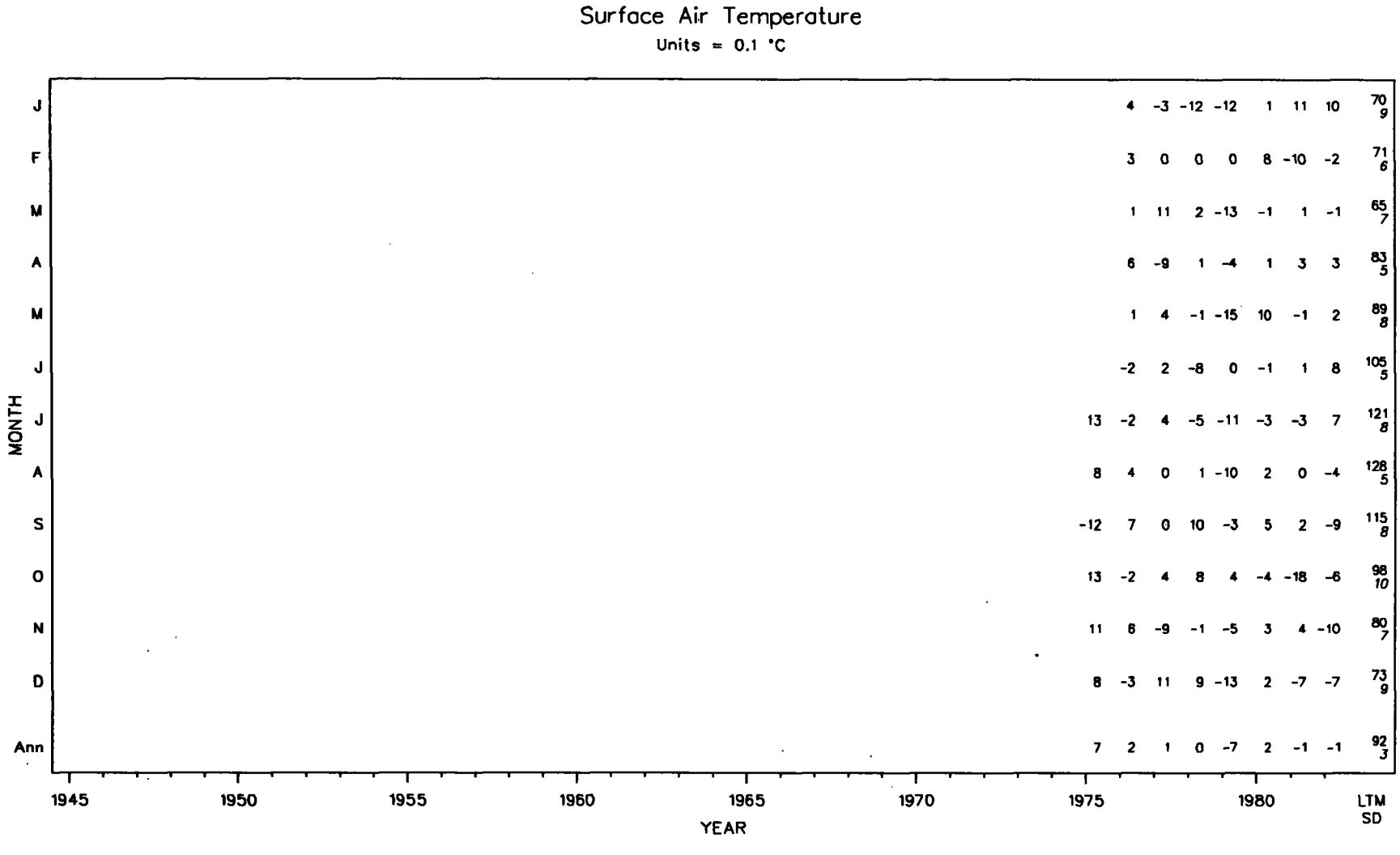
Contour interval = 0.5 °C



OWS Study Area L Surface Climatology

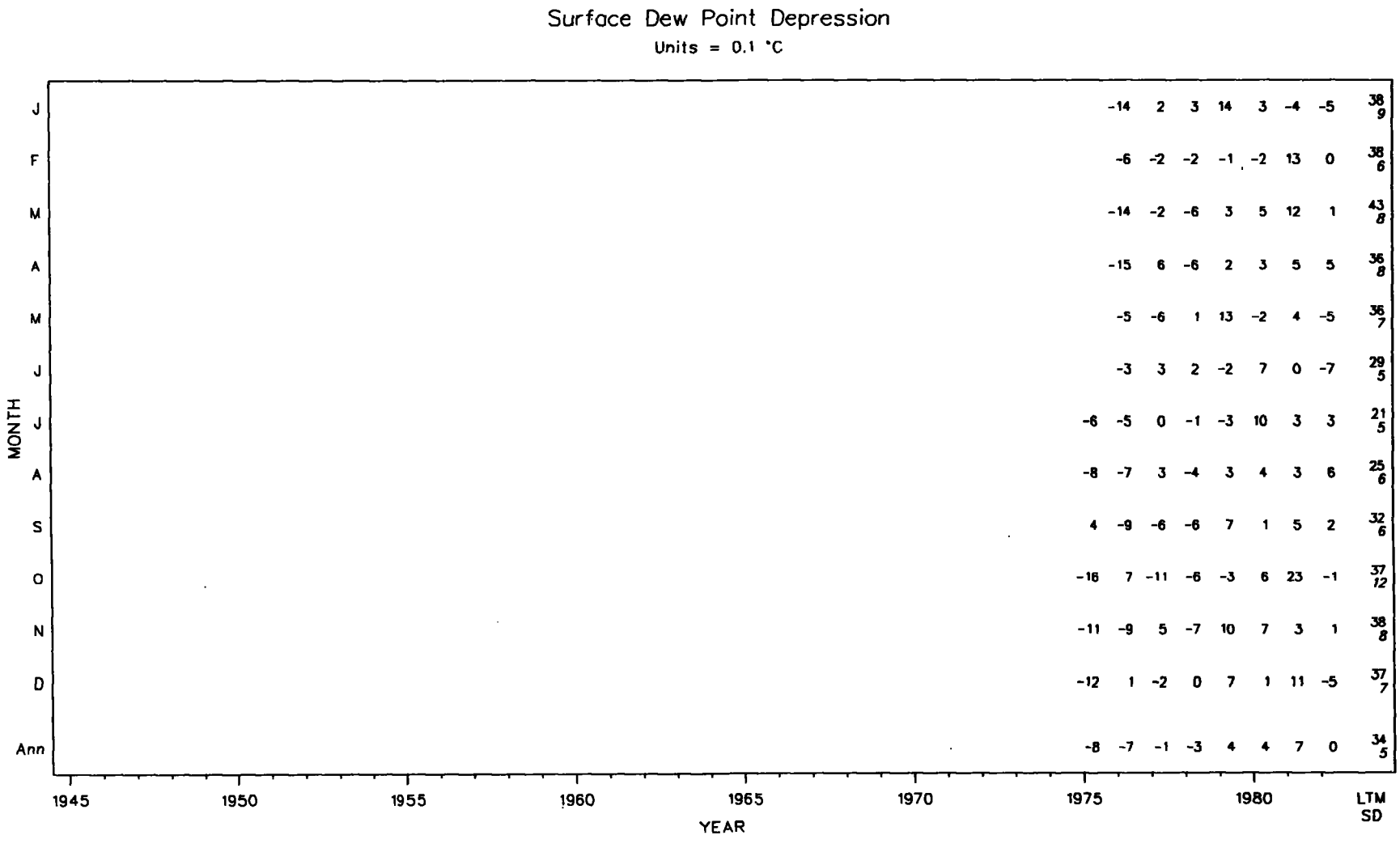
upper number = mean
lower number = standard deviation

data contours
sunrise/sunset

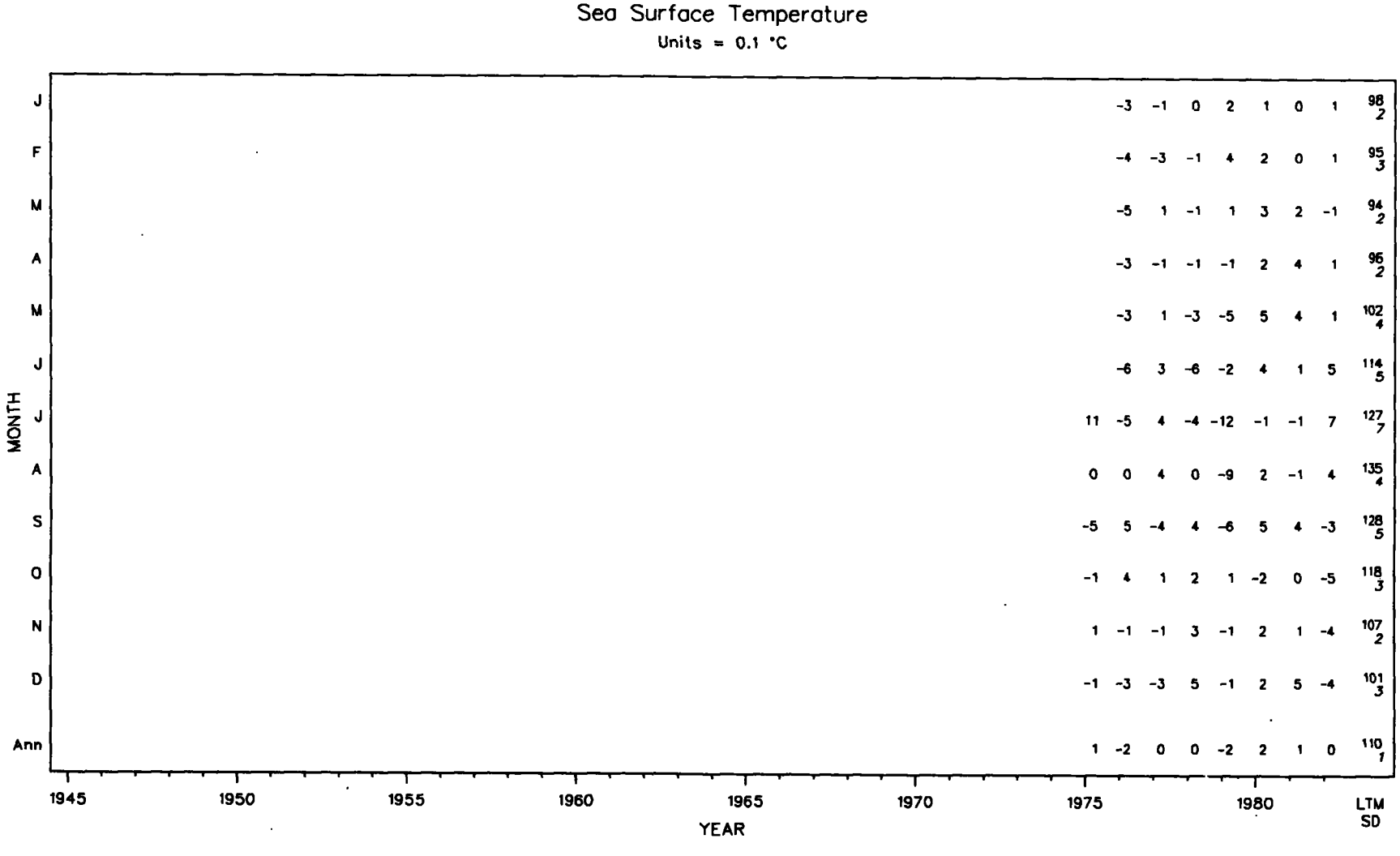


OWS Study Area L Anomalies

L4



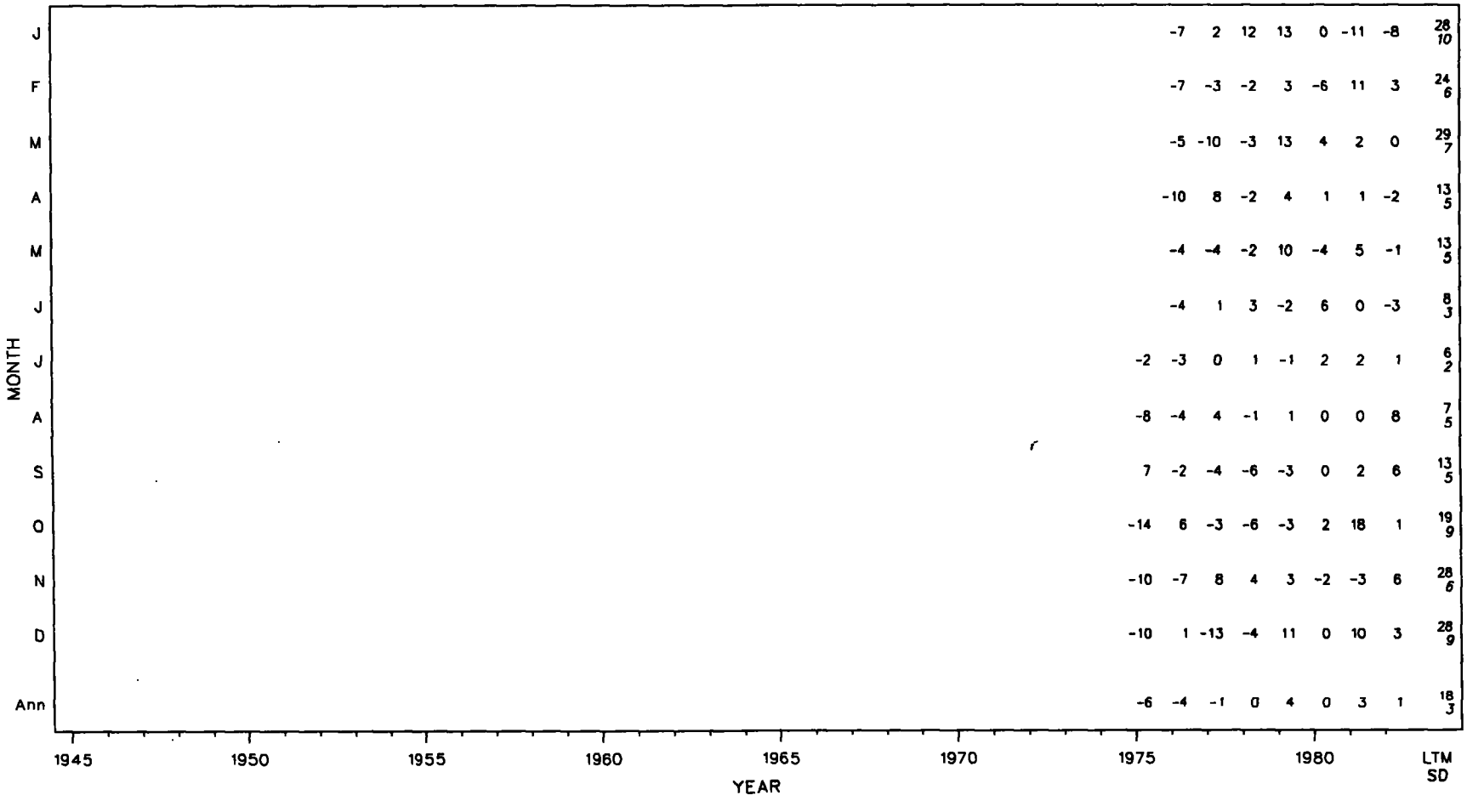
OWS Study Area L Anomalies



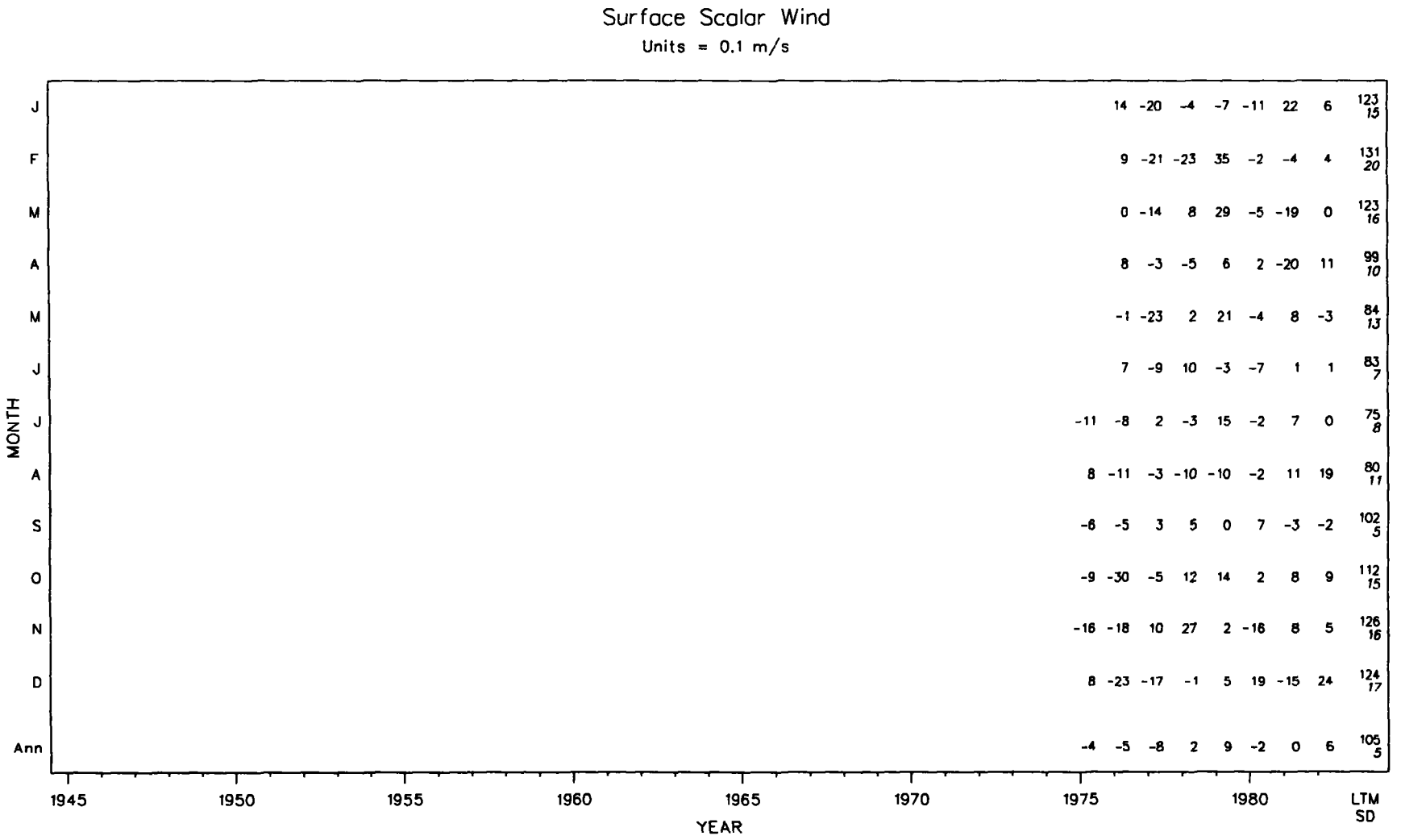
OWS Study Area L Anomalies

Sea - Air Temperature Difference

Units = 0.1 °C

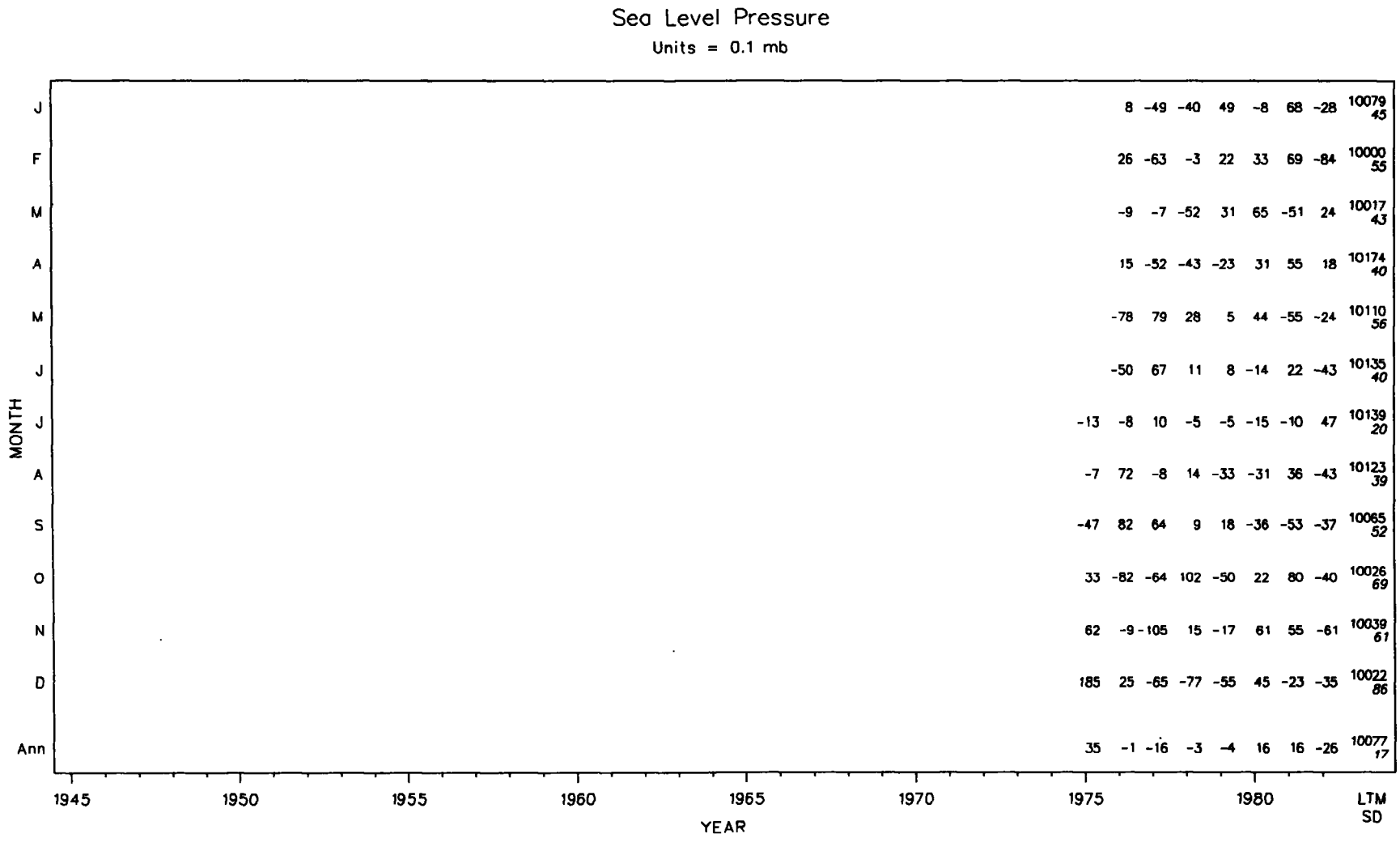


OWS Study Area L Anomalies

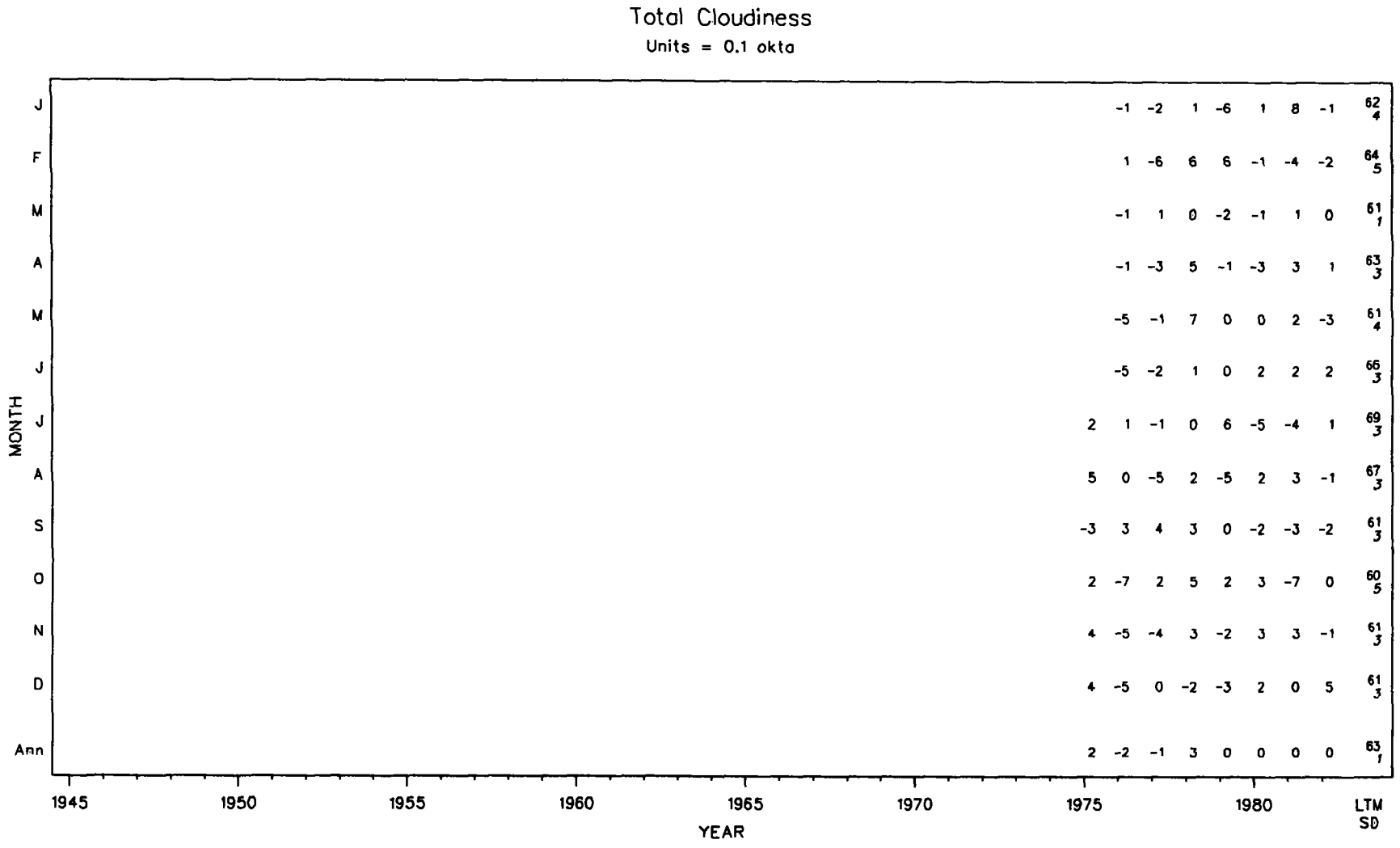


OWS Study Area L Anomalies

L8

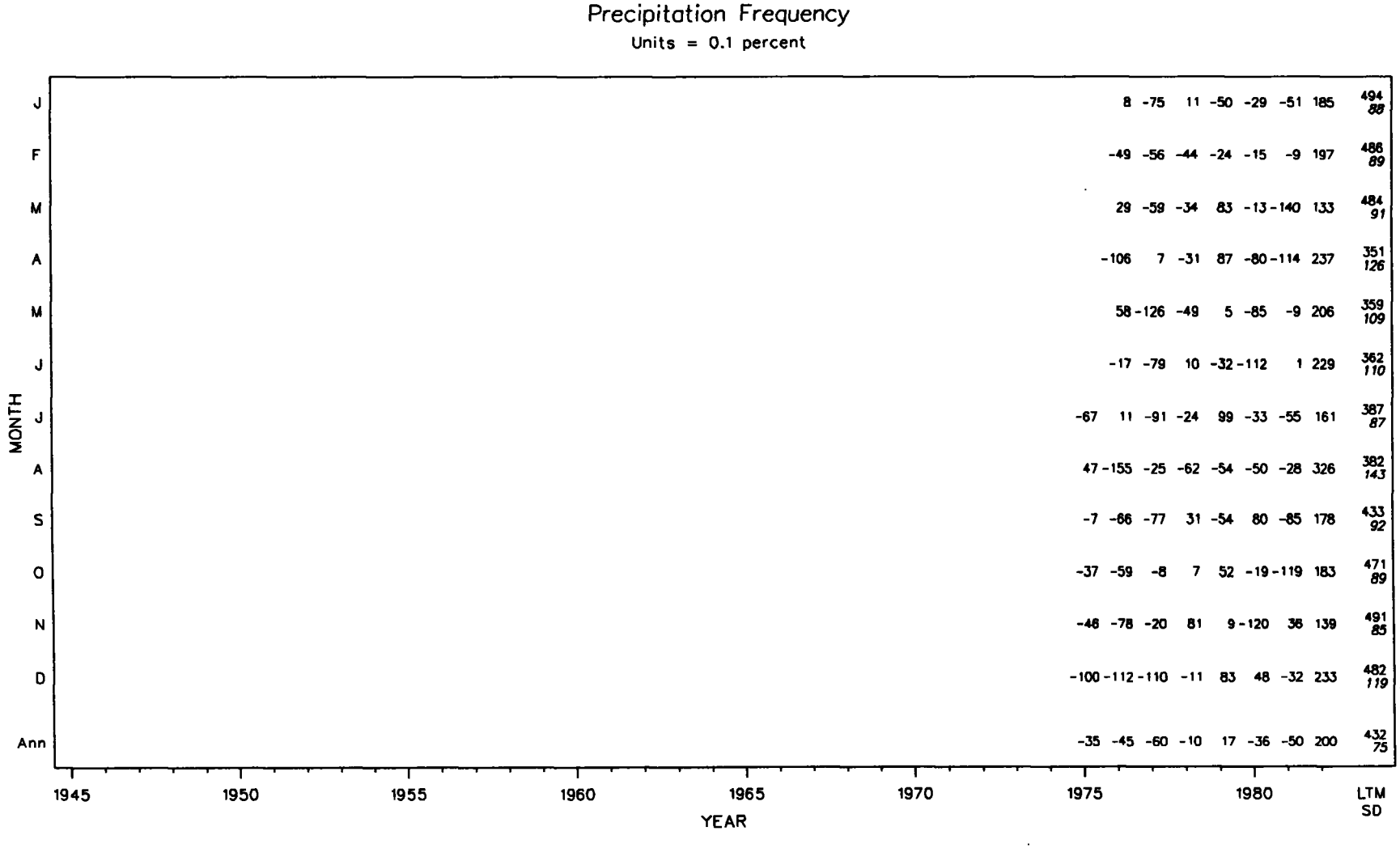


OWS Study Area L Anomalies



OWS Study Area L Anomalies

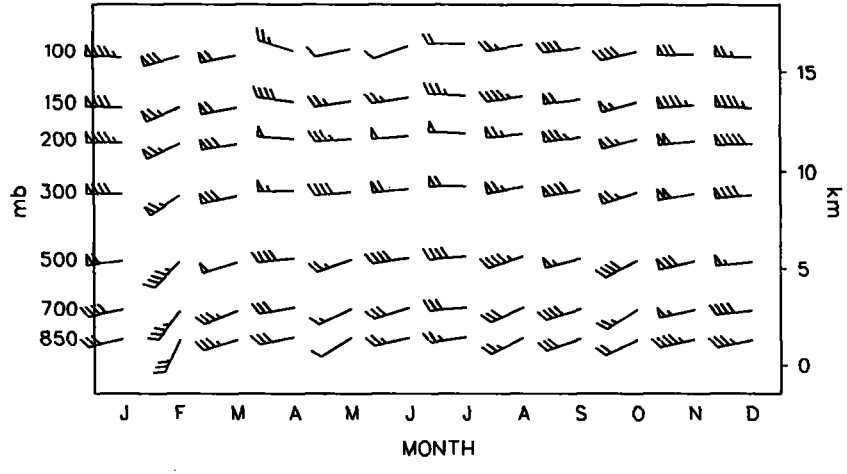
L10



OWS Study Area L Anomalies

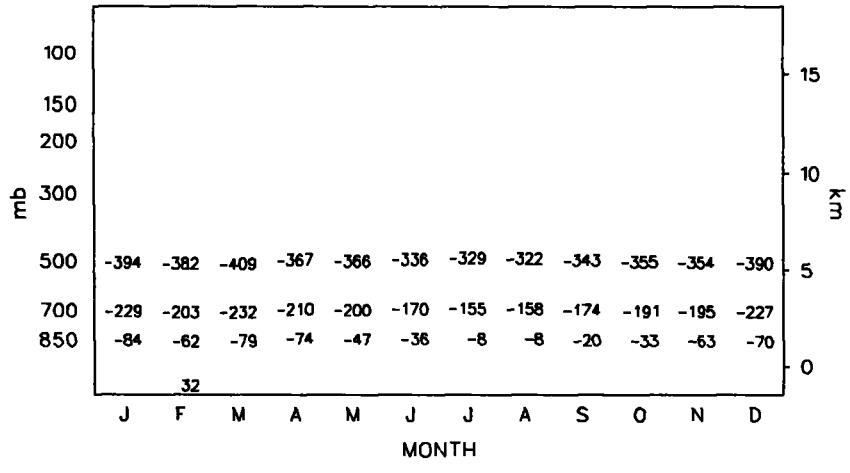
Wind

Full barb = 5 knots, Pennant = 25 knots



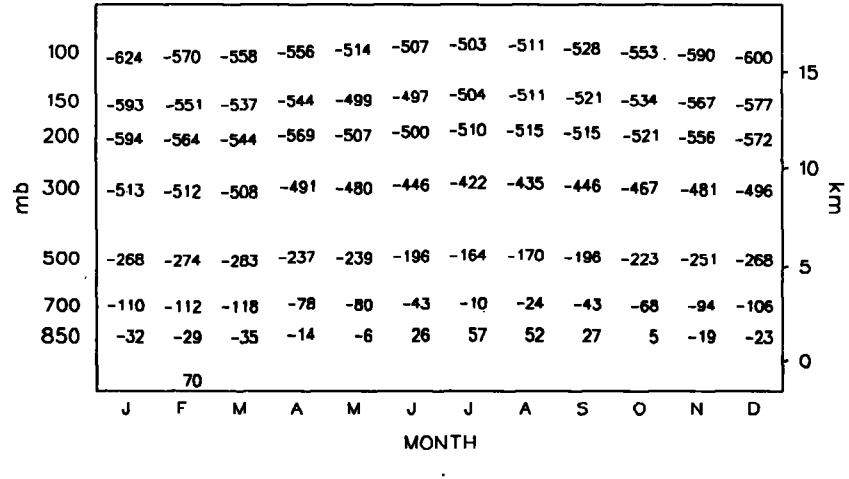
Dew Point Temperature

Units = 0.1 °C



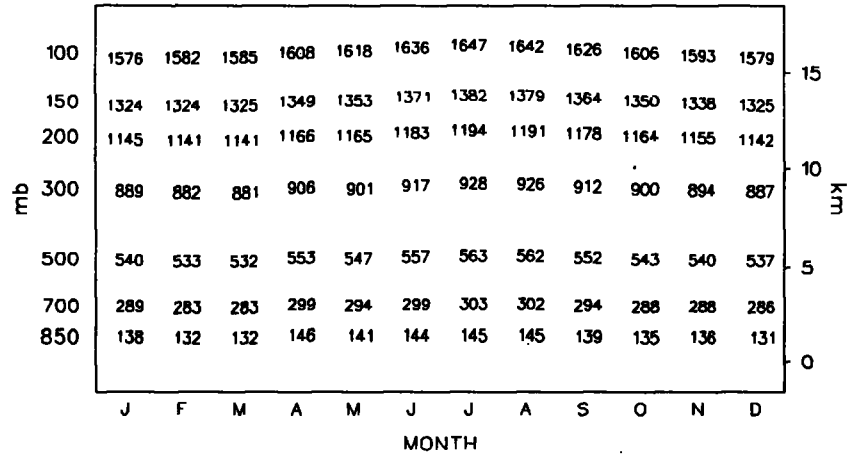
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m

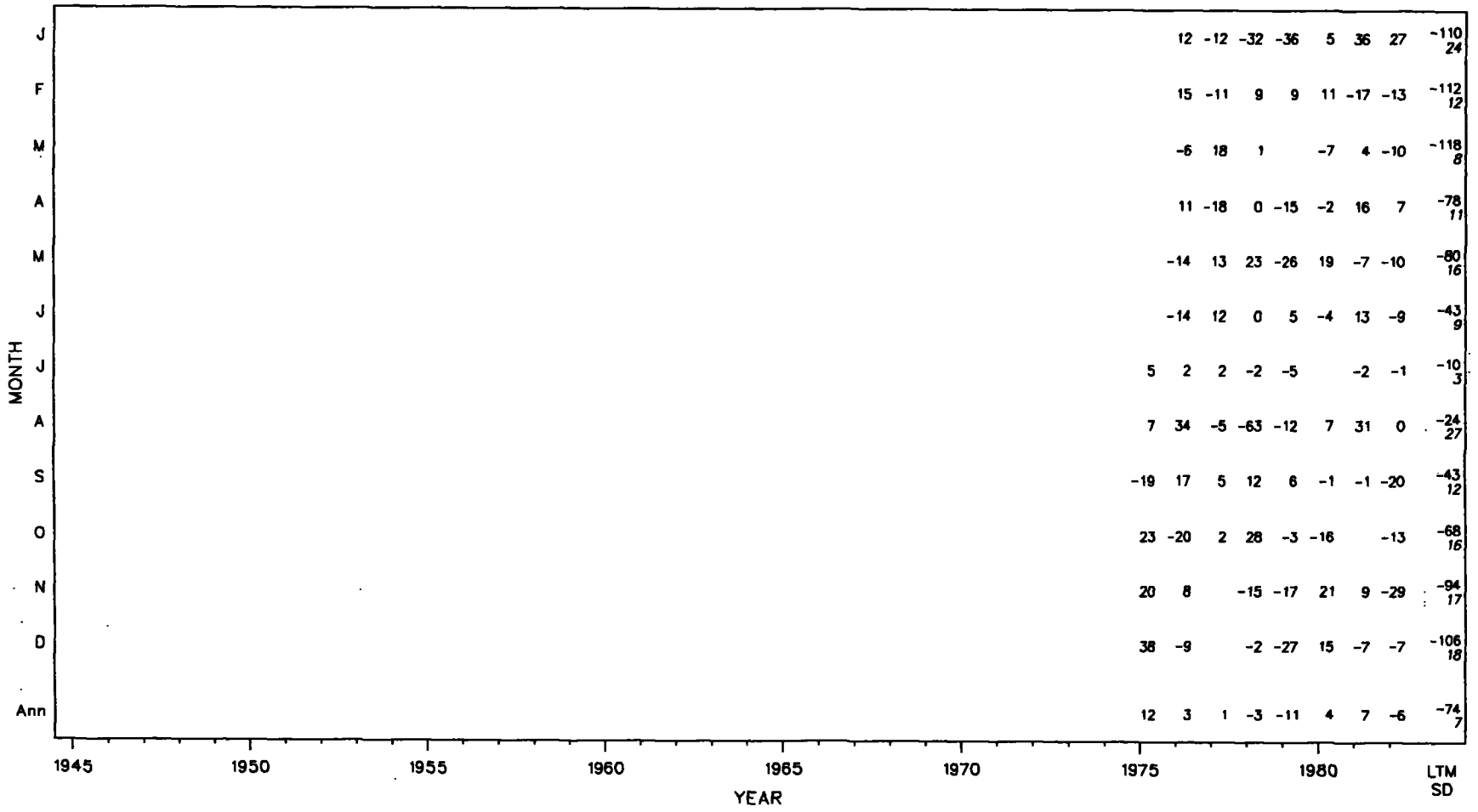


OWS Study Area L Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

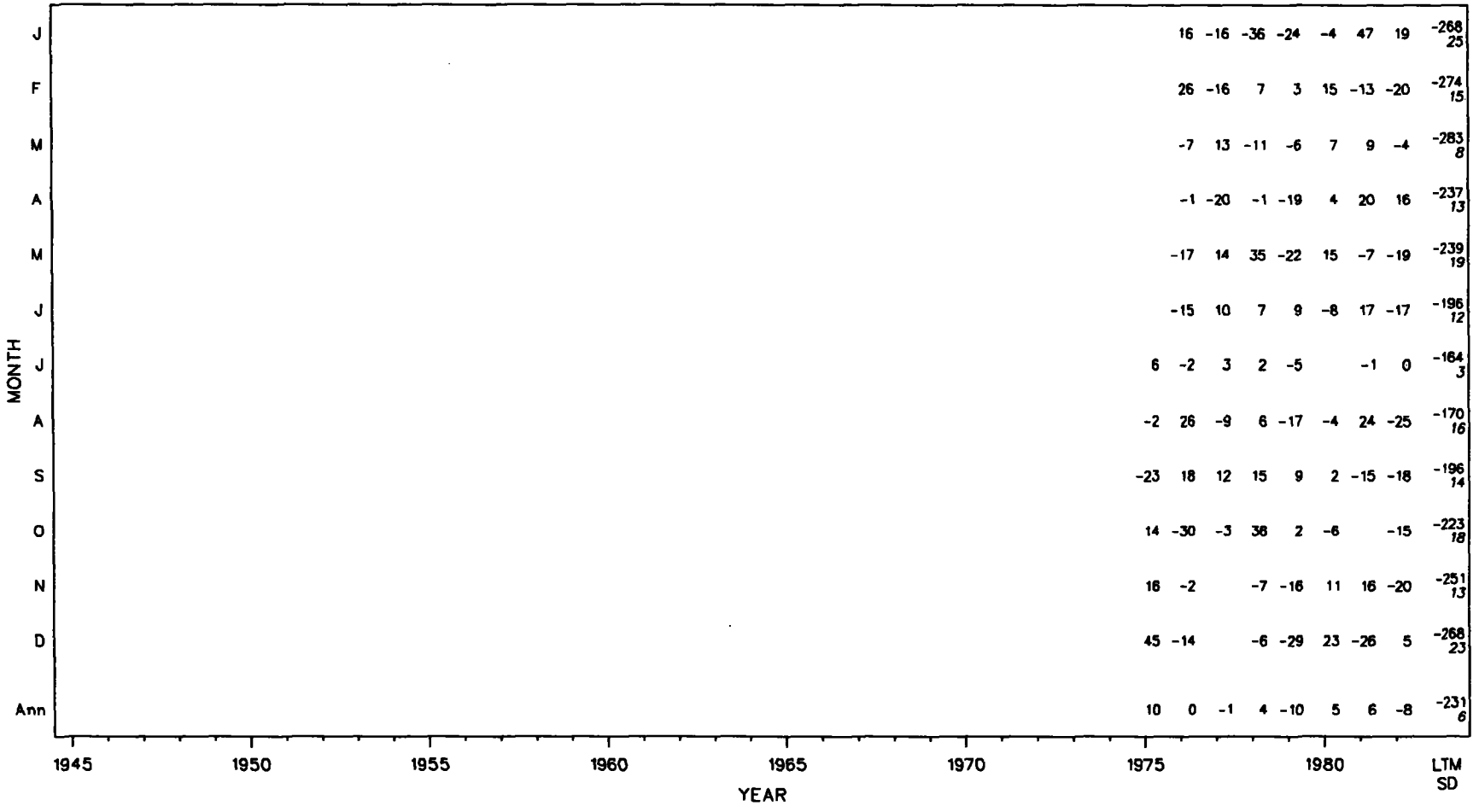
Units = 0.1 °C



OWS Study Area L Anomalies

Air Temperature: 500 mb

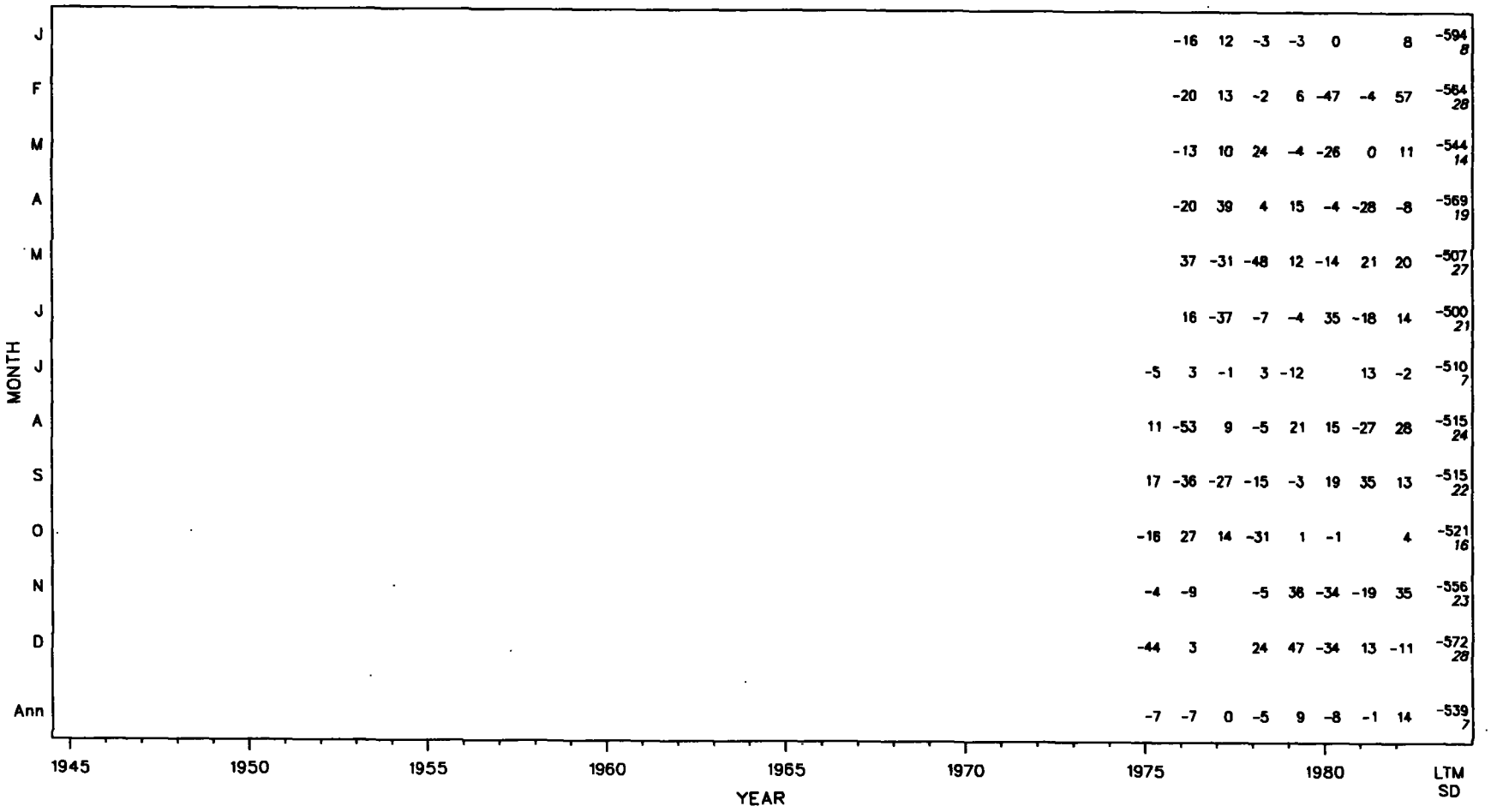
Units = 0.1 °C



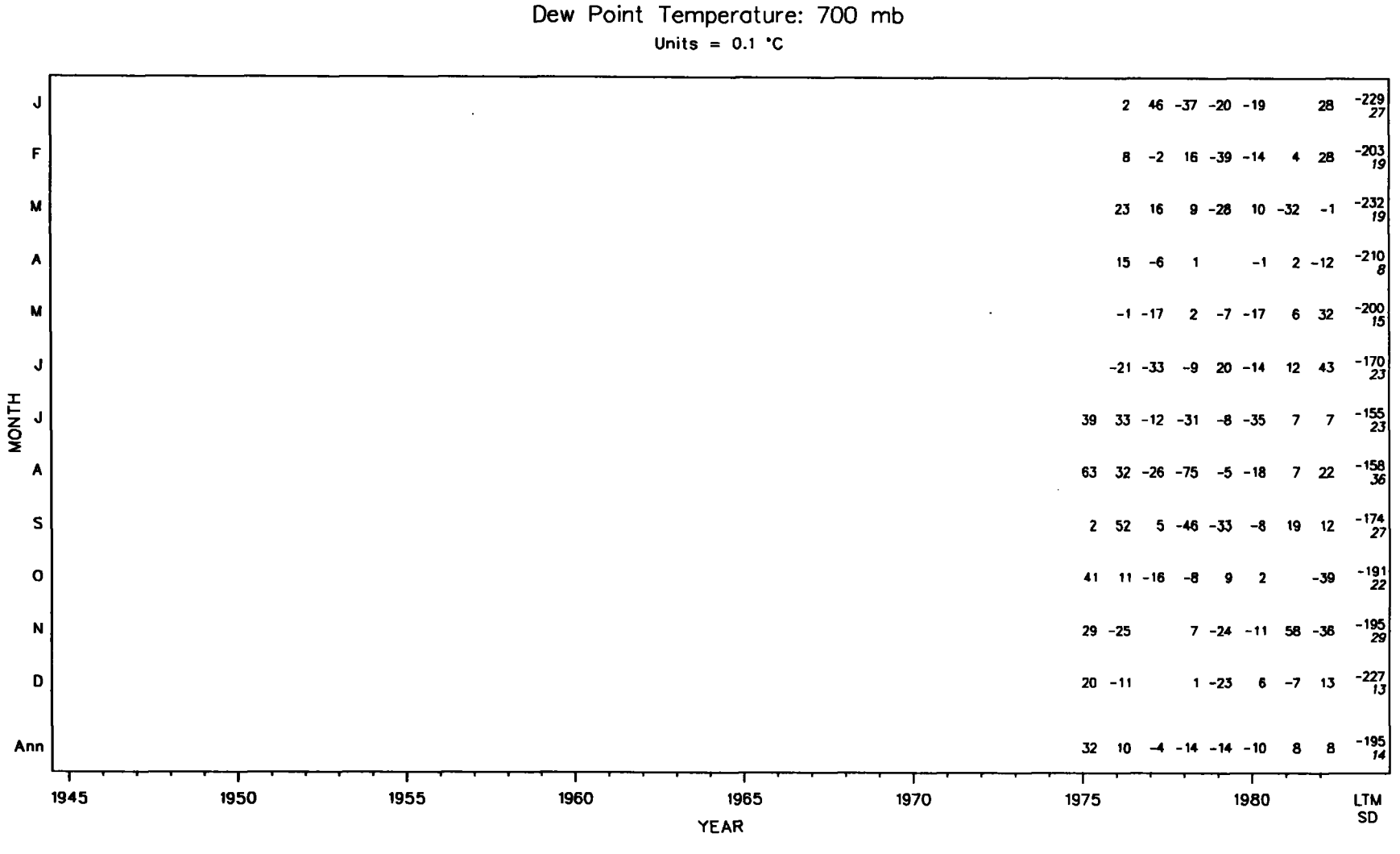
OWS Study Area L Anomalies

Air Temperature: 200 mb

Units = 0.1 °C



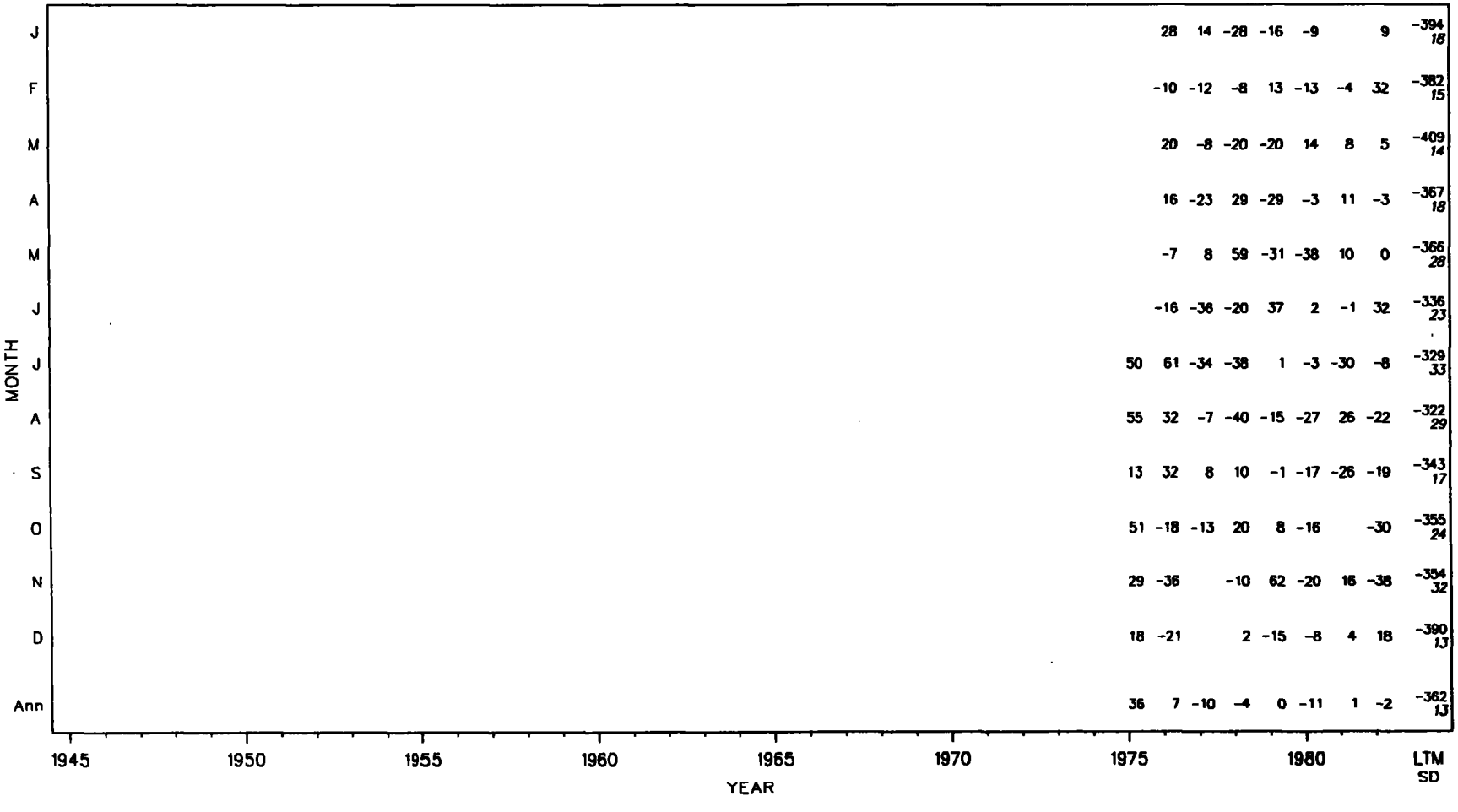
OWS Study Area L Anomalies



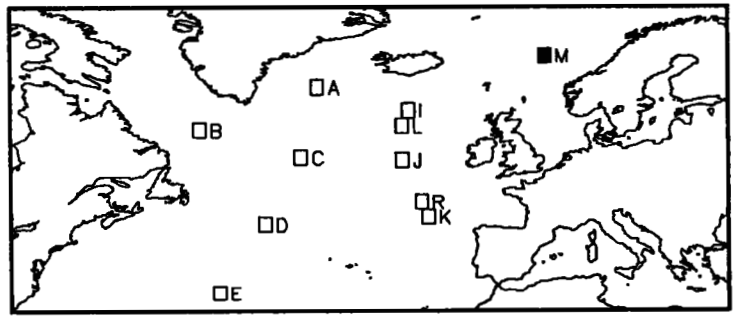
OWS Study Area L Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C

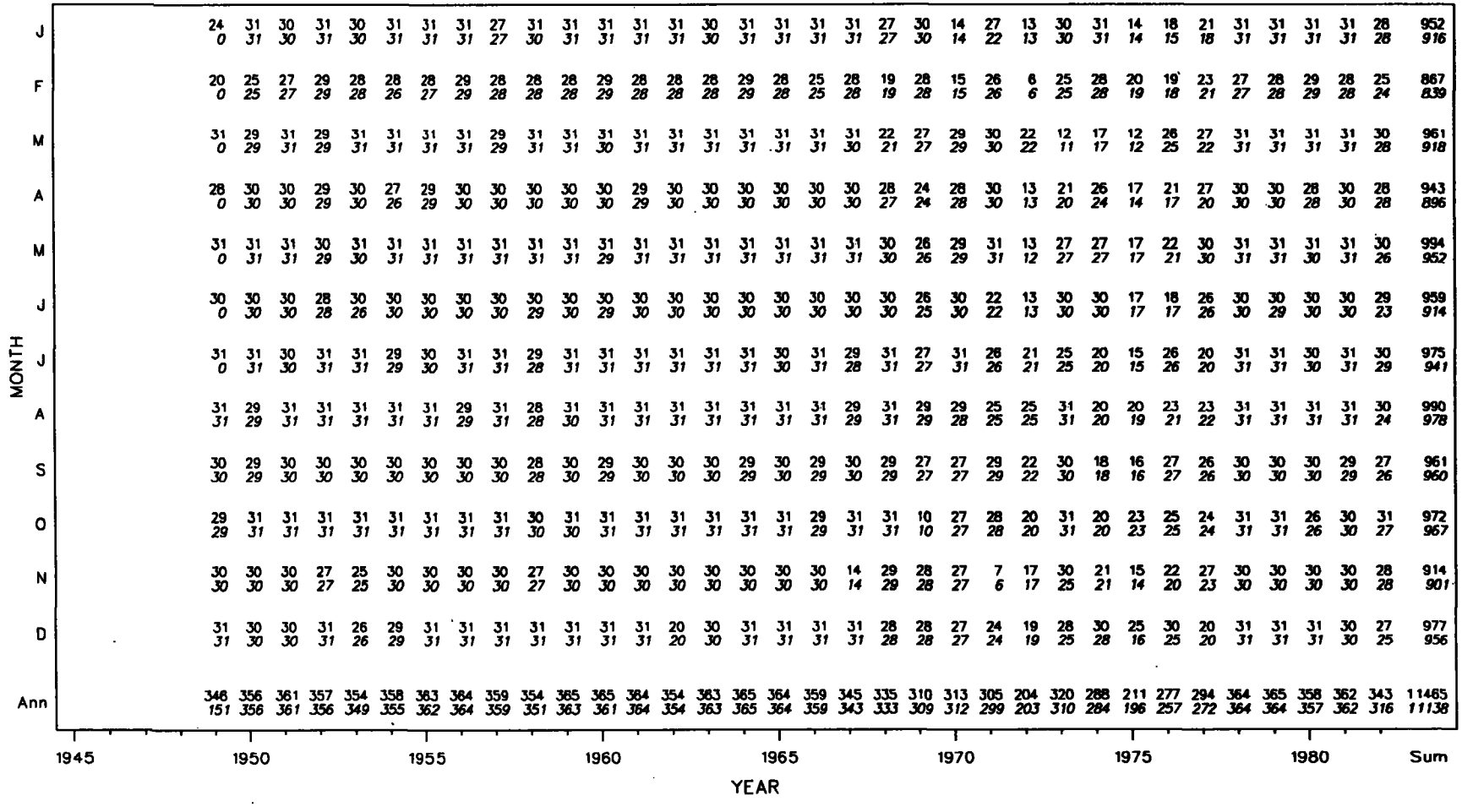


OWS Study Area L Anomalies



OWS M

65.0°N – 66.9°N, 1.0°E – 2.9°E
1949 – 1982



	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	Sum
J	24	31	30	31	30	31	31	31	27	31	31	31	31	31	30	31	31	31	31	27	30	14	27	13	30	31	14	18	21	31	31	31	31	28	952
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F	20	25	27	29	28	28	28	29	28	28	28	29	28	28	28	29	28	25	28	19	28	15	26	6	25	28	20	19	23	27	28	29	28	25	867
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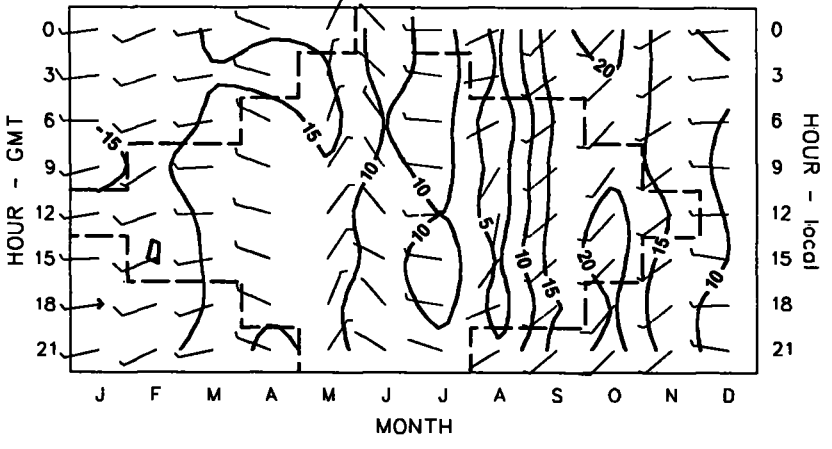
Ann	346	356	361	357	354	358	363	364	359	354	365	365	364	354	363	365	364	359	345	335	310	313	305	204	320	288	211	277	294	364	365	358	362	343	11465
	151	356	361	356	349	355	362	364	359	351	363	361	364	354	363	365	364	359	343	333	309	312	299	203	310	284	196	257	272	364	364	357	362	316	11138

OWS Study Area M (66.0°N, 2.0°E)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

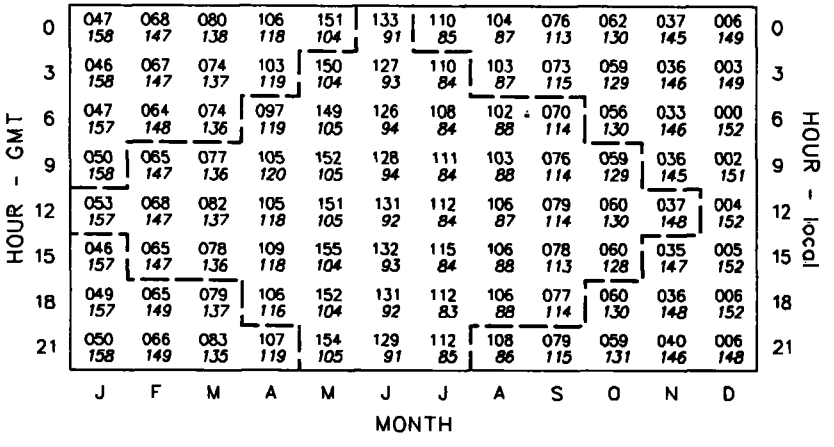
Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



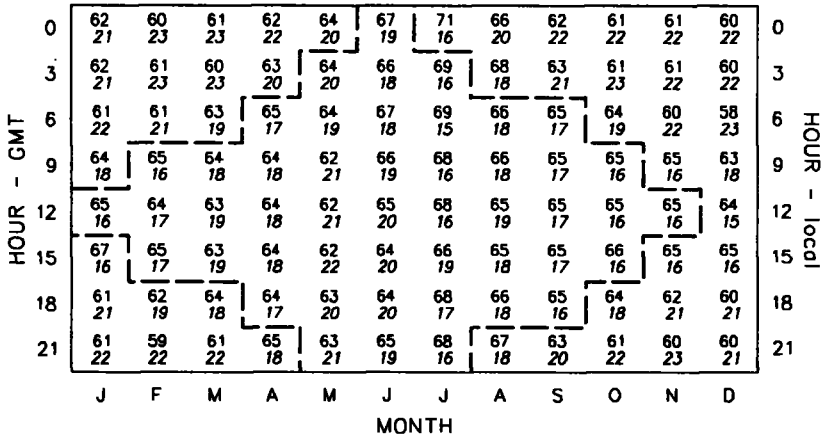
Pressure

Units = 0.1 mb



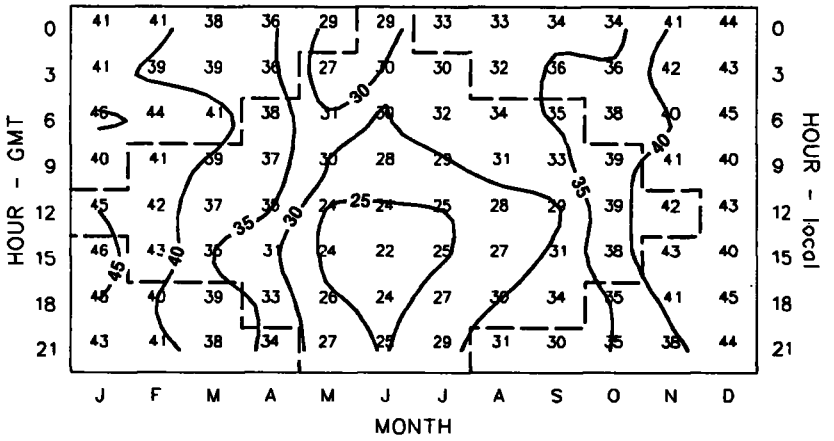
Total Cloudiness

Units = 0.1 okta



Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area M Surface Climatology

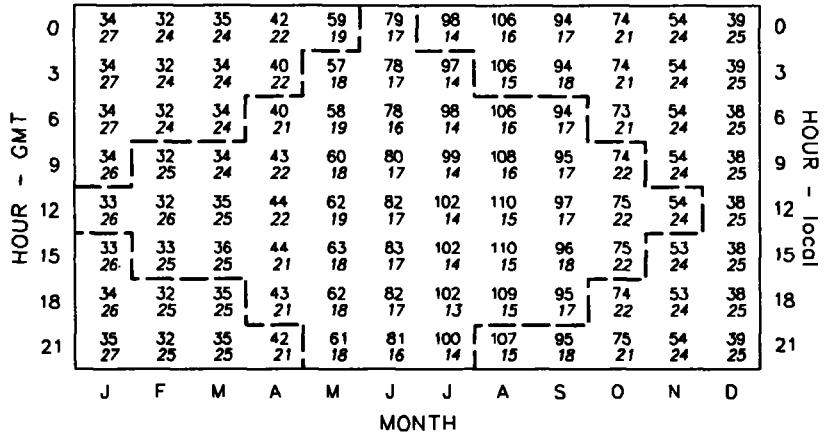
upper number = mean
lower number = standard deviation

data contours
sunrise/sunset

M2

Air Temperature

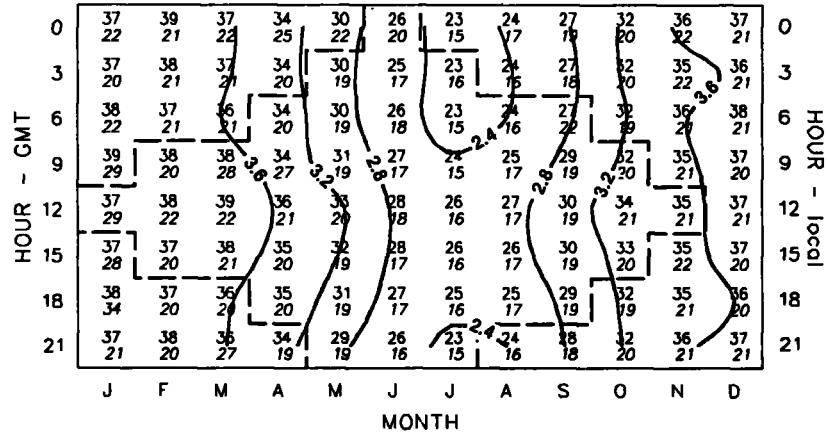
Units = 0.1 °C



Dew Point Depression

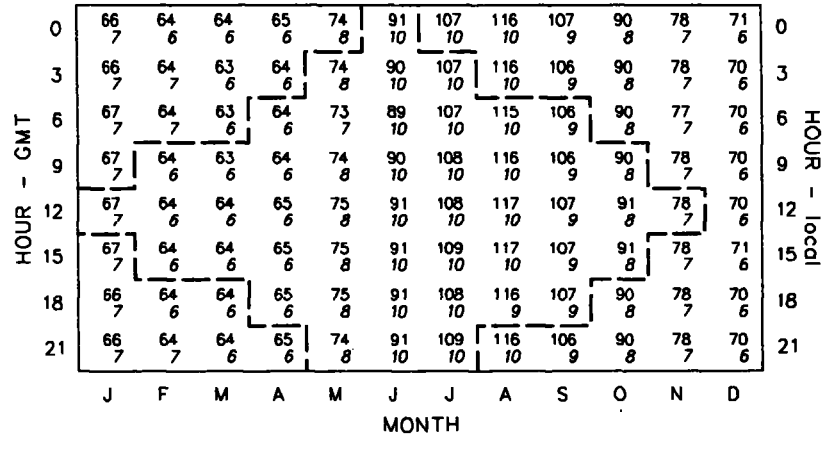
Units = 0.1 °C

Contour interval = 0.4 °C



Sea Surface Temperature

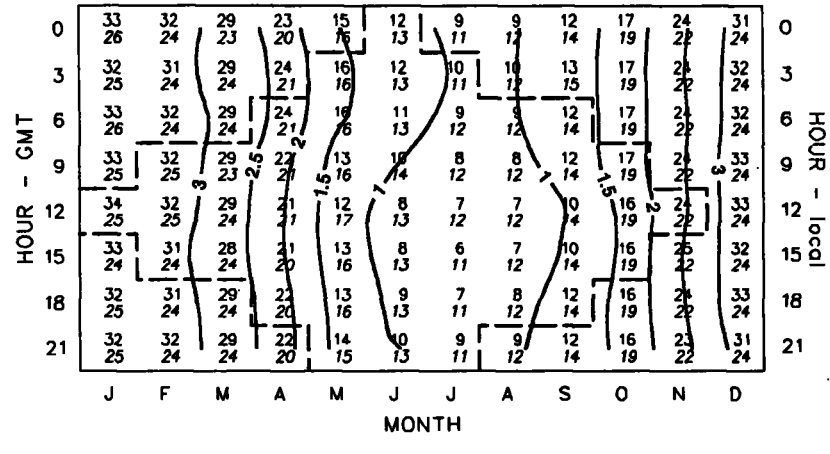
Units = 0.1 °C



Sea – Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



OWS Study Area M Surface Climatology

upper number = mean

lower number = standard deviation

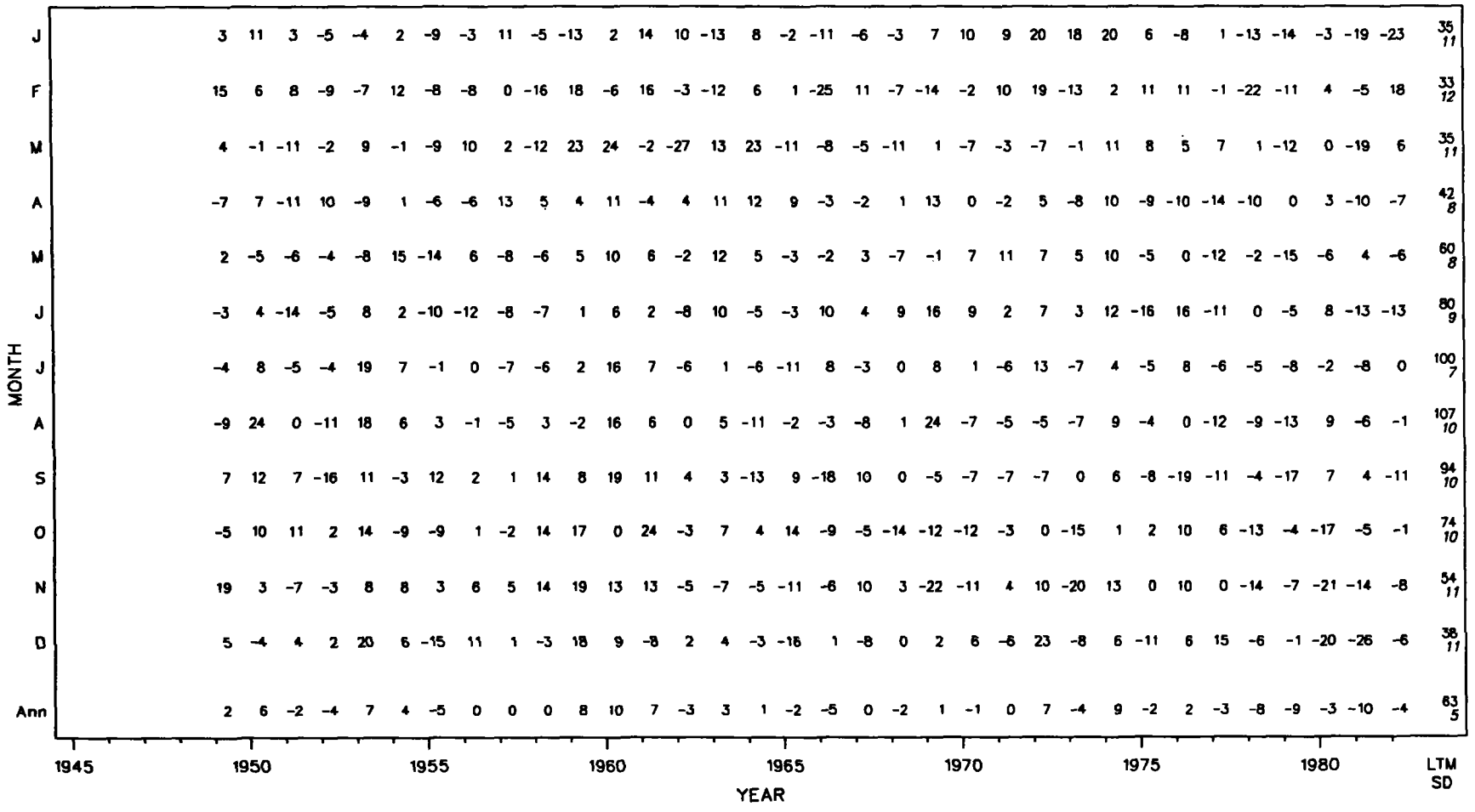
——— data contours

— — — — sunrise/sunset

M3

Surface Air Temperature

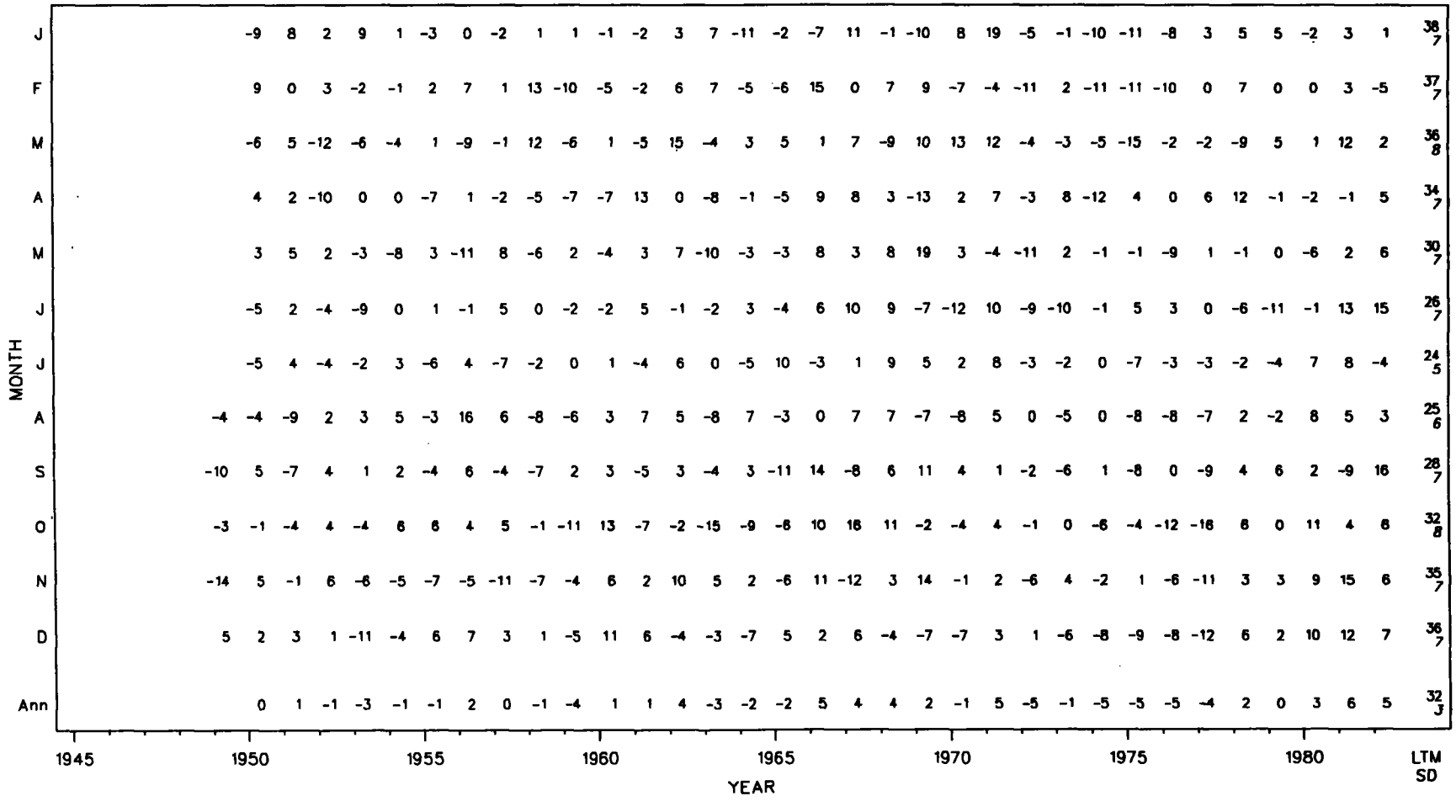
Units = 0.1 °C



OWS Study Area M Anomalies

Surface Dew Point Depression

Units = 0.1 °C



OWS Study Area M Anomalies

Sea Surface Temperature

Units = 0.1 °C

MONTH	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	LTM	SD
J						3	2	4	-5	-1	4	1	4	-2	-1	-6	5	8	8	-4	3	0	1	3	1	2	-3	2	1	5	1	0	-3	3	-3	-9	-7	-6	-9	66	4
F						1	3	-4	2	-4	1	1	-1	-3	-3	-2	3	10	7	0	3	6	-2	0	-3	5	-2	2	-1	2	0	4	-2	-1	-6	-7	-3	-5	-4	64	4
M						-2	1	2	-5	-1	2	1	1	0	-4	0	8	9	1	1	2	3	-1	0	-8	3	1	3	3	6	2	2	-5	-1	-3	-7	-2	-8	-4	64	4
A						-1	6	-8	3	-5	5	-7	-3	3	0	-1	4	3	1	3	6	1	-3	0	-2	-1	1	3	6	7	3	-1	-4	-1	-6	-5	-2	-3	-5	65	4
M						-6	4	-3	4	-3	7	-4	-2	0	-7	4	6	8	2	2	5	0	1	-3	-4	4	2	3	3	4	4	-3	-5	-3	-4	-8	-2	0	-5	74	4
J						-3	-2	-9	-3	-1	6	-7	-8	-4	-7	-3	8	4	-4	12	-3	-2	8	0	6	5	0	4	4	-3	14	-7	11	-10	-2	-11	5	-2	-1	90	7
J						-2	4	-5	-7	17	7	-4	-3	-4	0	-7	10	8	-3	9	-9	-4	11	-9	3	5	1	-3	9	-6	12	-8	9	-2	-10	-14	5	-5	-7	108	8
A						-8	13	-9	-5	18	11	-2	4	-1	1	-1	19	7	4	3	-10	2	0	-7	-1	17	-7	-6	-4	-10	10	-4	-6	-10	-4	-13	6	-5	-4	116	9
S						2	10	0	-11	9	3	5	-1	4	11	4	13	5	4	5	-10	8	-7	3	8	7	-6	-5	-5	-1	1	-7	-5	-16	-4	-13	5	-8	-6	106	7
O						0	4	3	-7	3	-4	0	-1	-1	11	10	9	9	1	-3	-1	11	-9	5	0	0	-5	-1	0	-2	0	-3	0	-4	-8	-9	-3	-3	-5	90	5
N						4	4	-2	1	2	-3	1	0	-1	4	7	9	14	0	0	-2	4	-4	-5	-3	0	-6	2	-2	1	4	0	2	-4	-9	-7	-6	-3	-2	77	5
D						4	-3	0	-3	5	0	-3	1	2	3	7	6	7	0	3	-2	4	-5	1	2	-2	-2	1	3	-3	5	0	2	-2	-8	-8	-6	-8	-1	70	4
Ann						-1	4	-3	-3	3	3	-1	-1	-1	1	1	8	8	2	3	-1	3	-1	-1	0	4	-2	0	1	0	5	-2	0	-4	-5	-9	-1	-5	-4	82	3

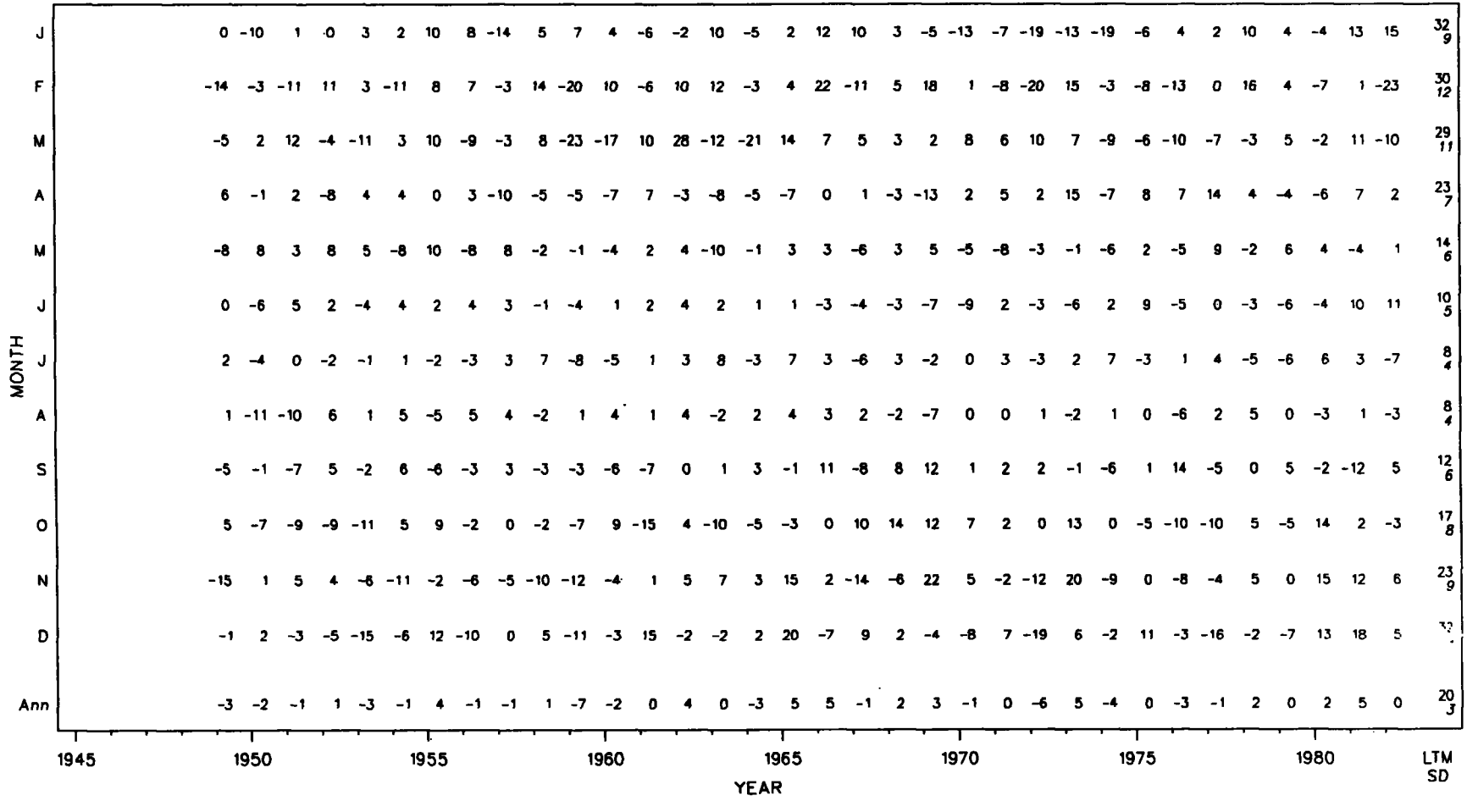
YEAR

OWS Study Area M Anomalies

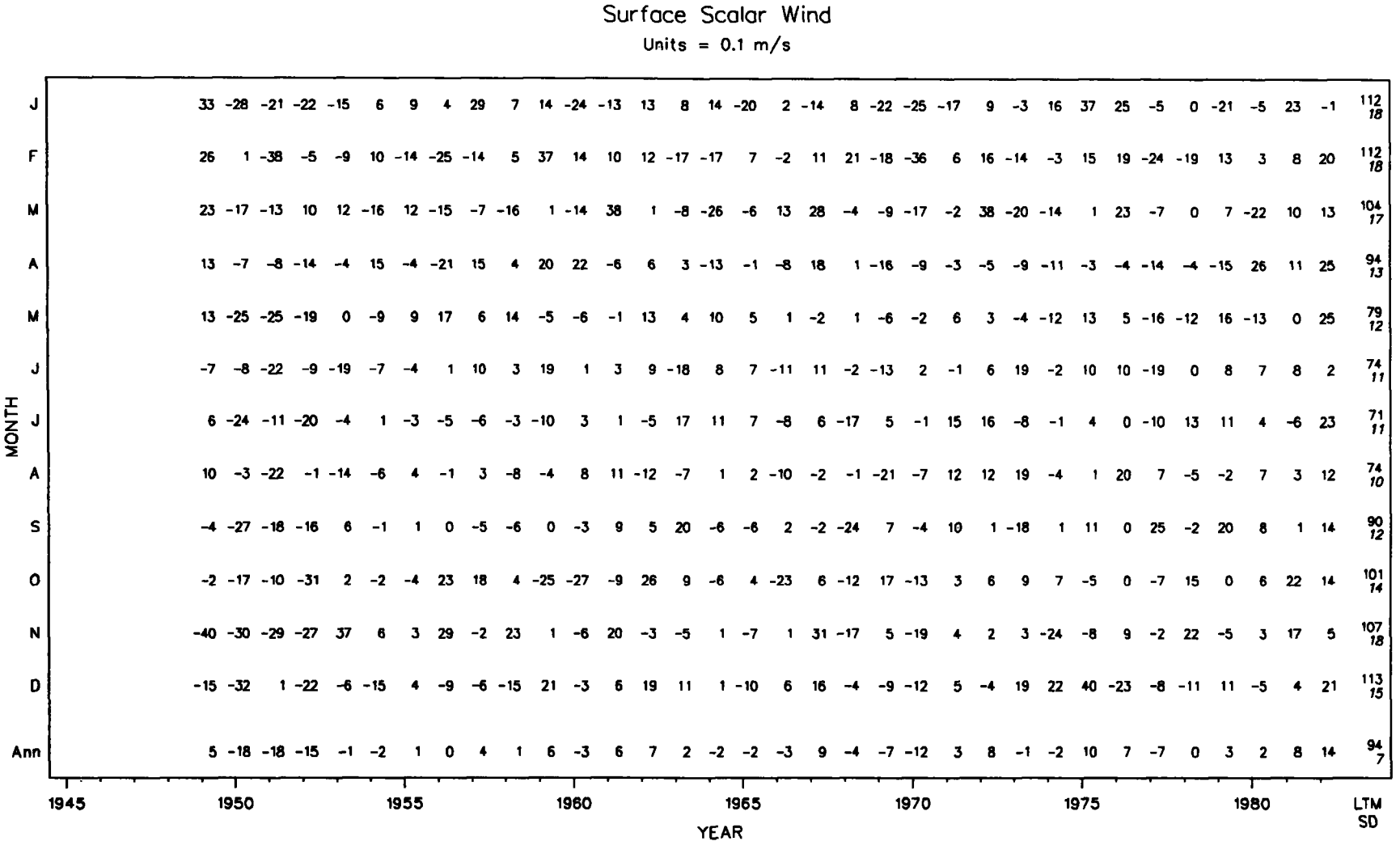
M6

Sea - Air Temperature Difference

Units = 0.1 °C



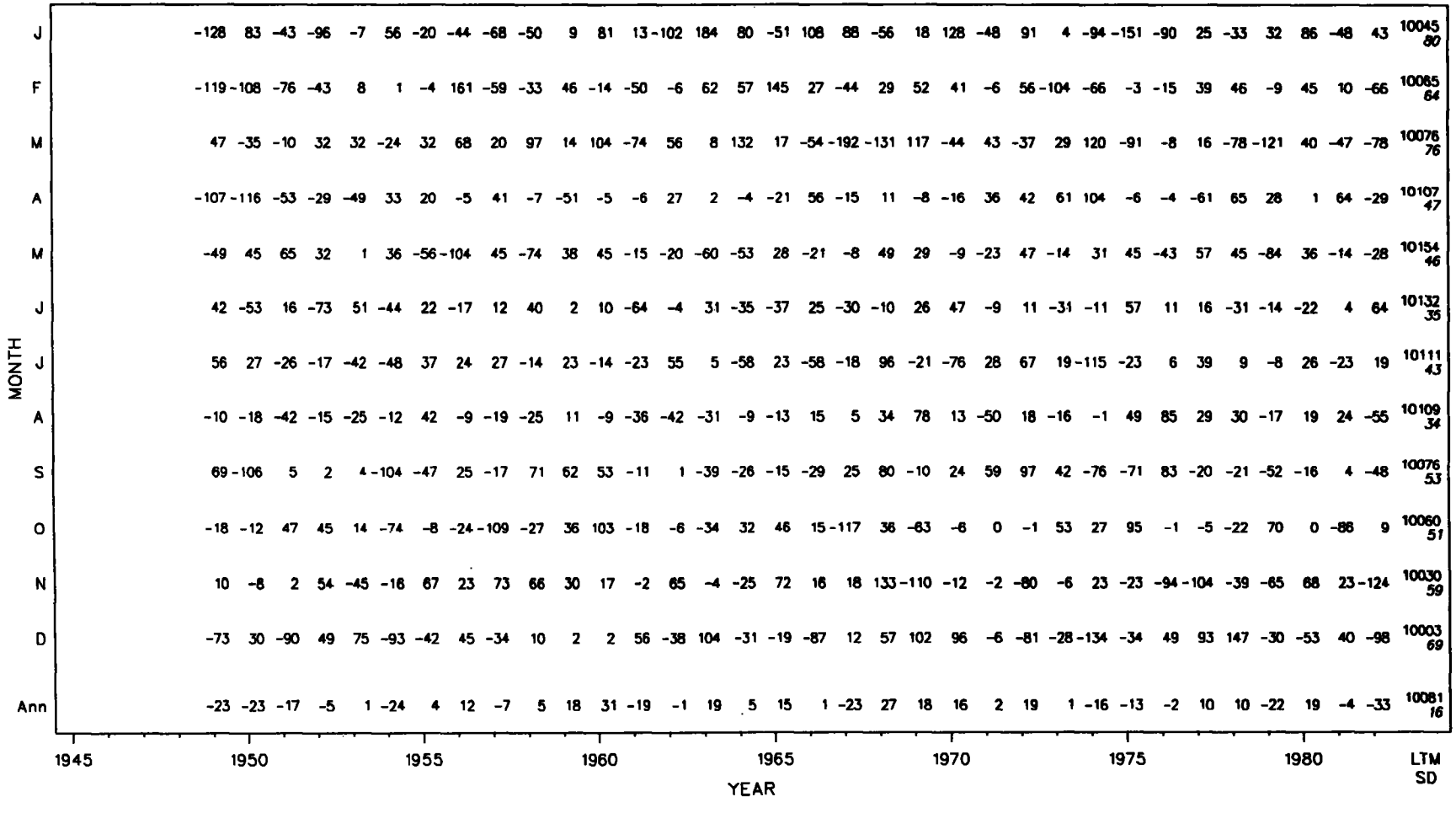
OWS Study Area M Anomalies



OWS Study Area M Anomalies

Sea Level Pressure

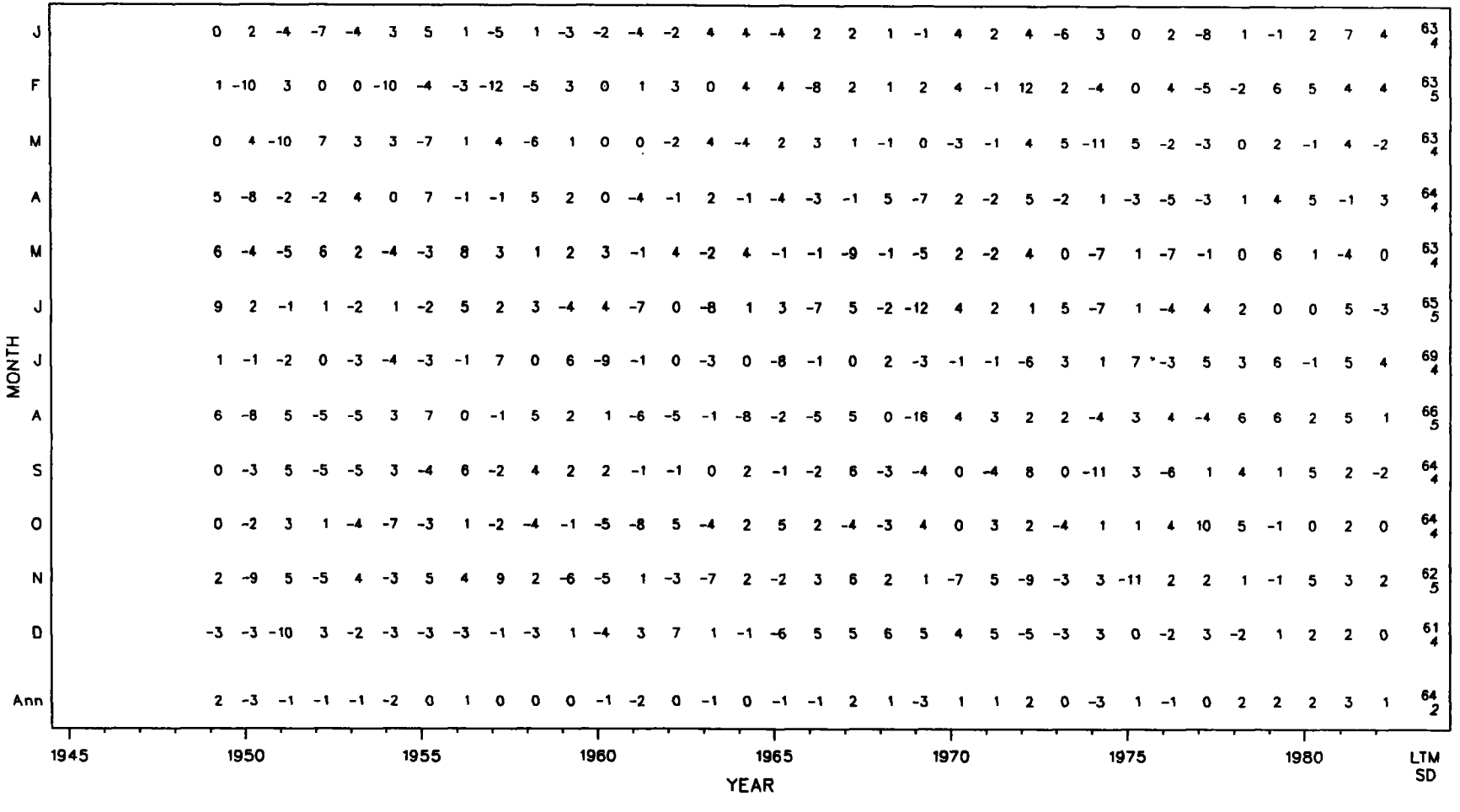
Units = 0.1 mb



OWS Study Area M Anomalies

Total Cloudiness

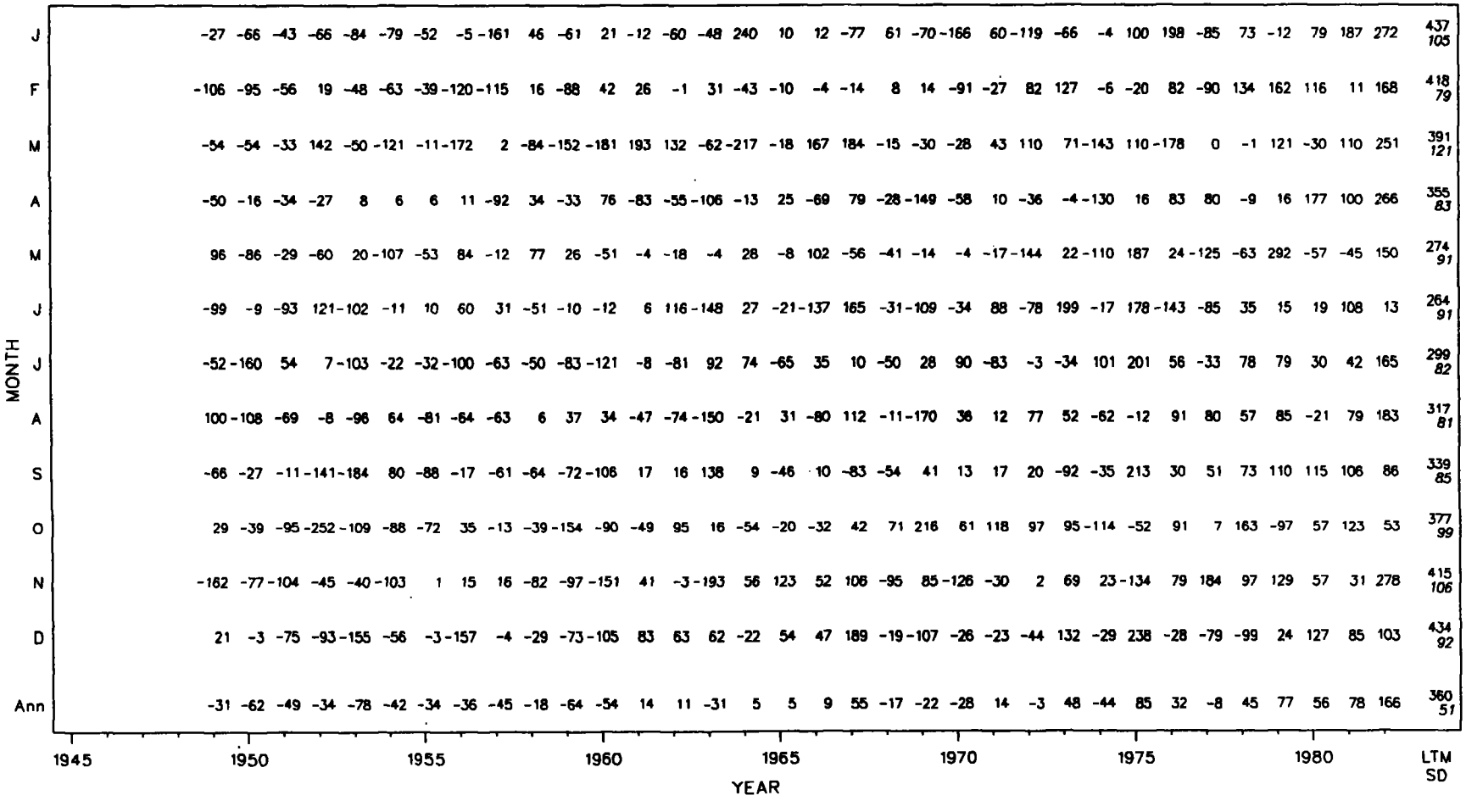
Units = 0.1 okta



OWS Study Area M Anomalies

Precipitation Frequency

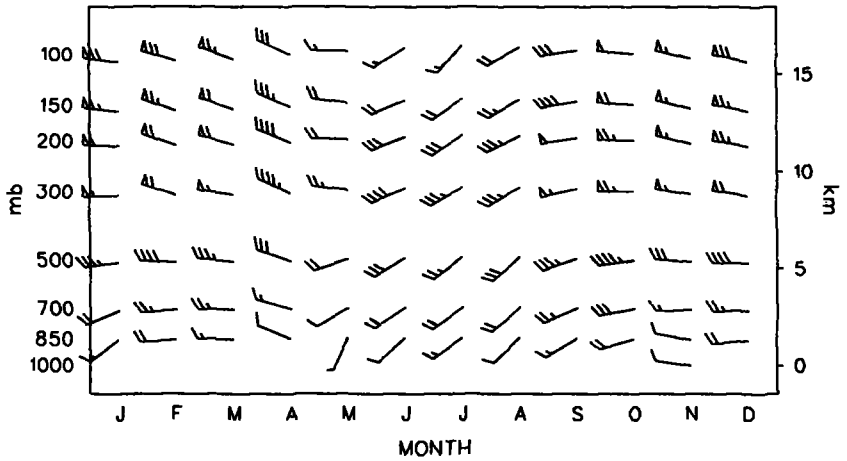
Units = 0.1 percent



OWS Study Area M Anomalies

Wind

Full barb = 5 knots, Pennant = 25 knots



Dew Point Temperature

Units = 0.1 °C

mb	J	F	M	A	M	J	J	A	S	O	N	D
100				-609	-563	-568						
150				-566	-537	-568						
200				-588	-522	-536						
300				-560	-529	-524	-488		-471			
500	-381	-378	-373	-359	-331	-294	-282	-285	-302	-331	-358	-377
700	-217	-214	-210	-198	-173	-138	-116	-118	-140	-164	-194	-214
850	-97	-100	-95	-85	-60	-36	-14	-11	-28	-55	-78	-93
1000	-16										11	

MONTH

Air Temperature

Units = 0.1 °C

mb	J	F	M	A	M	J	J	A	S	O	N	D
100	-618	-595	-564	-520	-494	-468	-454	-468	-506	-544	-589	-609
150	-601	-582	-552	-504	-489	-463	-447	-469	-506	-532	-565	-579
200	-608	-588	-566	-516	-494	-474	-454	-488	-514	-526	-564	-574
300	-543	-543	-529	-509	-487	-460	-448	-455	-465	-486	-516	-535
500	-313	-314	-307	-287	-254	-216	-201	-199	-217	-249	-285	-312
700	-150	-153	-145	-129	-94	-64	-45	-44	-61	-94	-125	-148
850	-67	-68	-64	-50	-21	8	28	32	12	-17	-45	-62
1000	28										44	

MONTH

Pressure Height

Units = 10 m

mb	J	F	M	A	M	J	J	A	S	O	N	D
100	1561	1566	1577	1599	1620	1636	1646	1639	1623	1602	1578	1564
150	1309	1311	1319	1336	1353	1367	1375	1369	1359	1342	1323	1310
200	1128	1130	1136	1147	1163	1177	1183	1180	1171	1156	1141	1127
300	873	874	877	885	899	909	915	913	907	894	882	870
500	529	531	533	537	547	552	555	554	549	541	534	526
700	283	284	286	289	295	297	297	297	294	288	284	279
850	134	135	136	138	143	143	142	142	139	136	134	130
1000	0										0	

MONTH

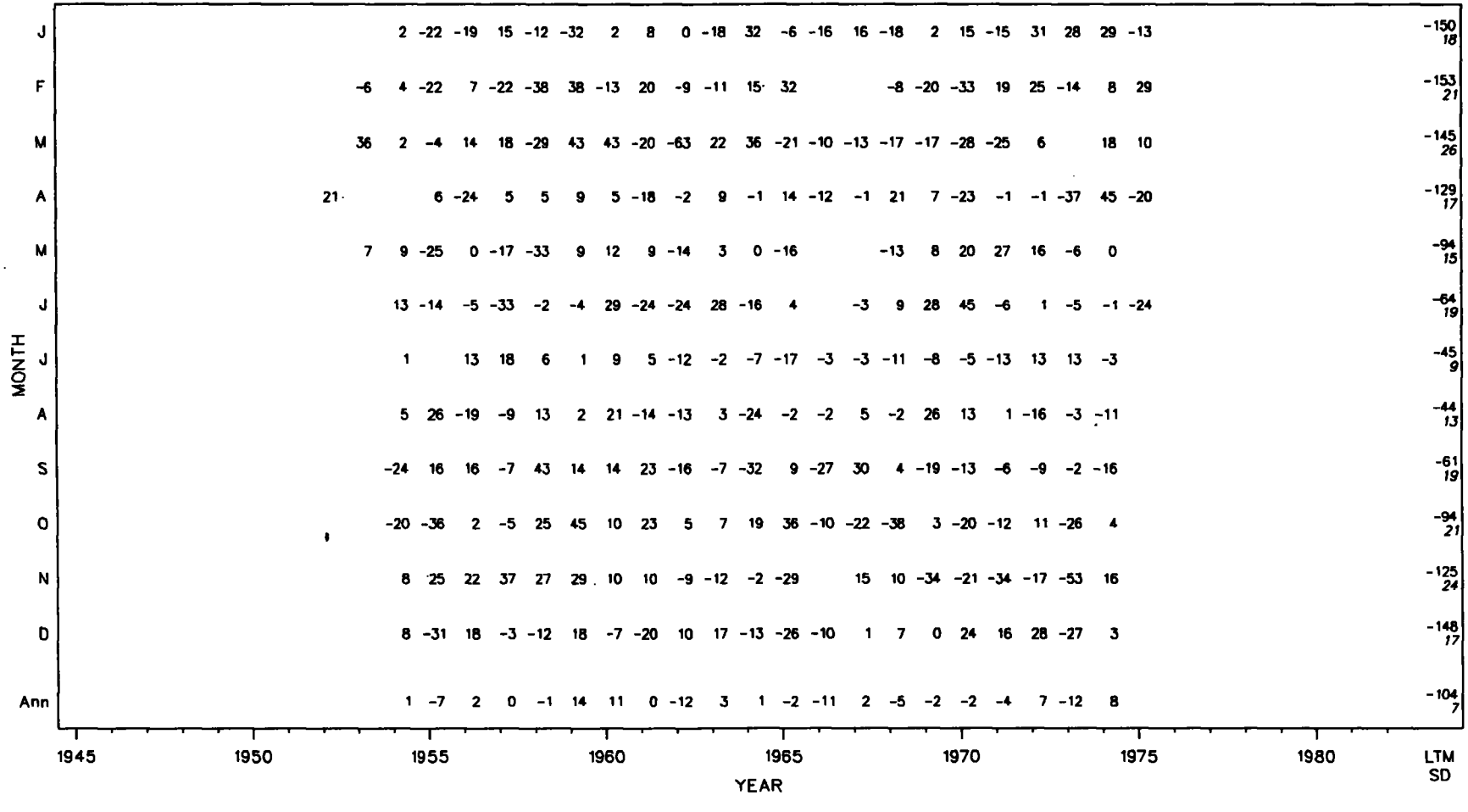
OWS Study Area M Upper Air Climatology

Mean plotted at actual height

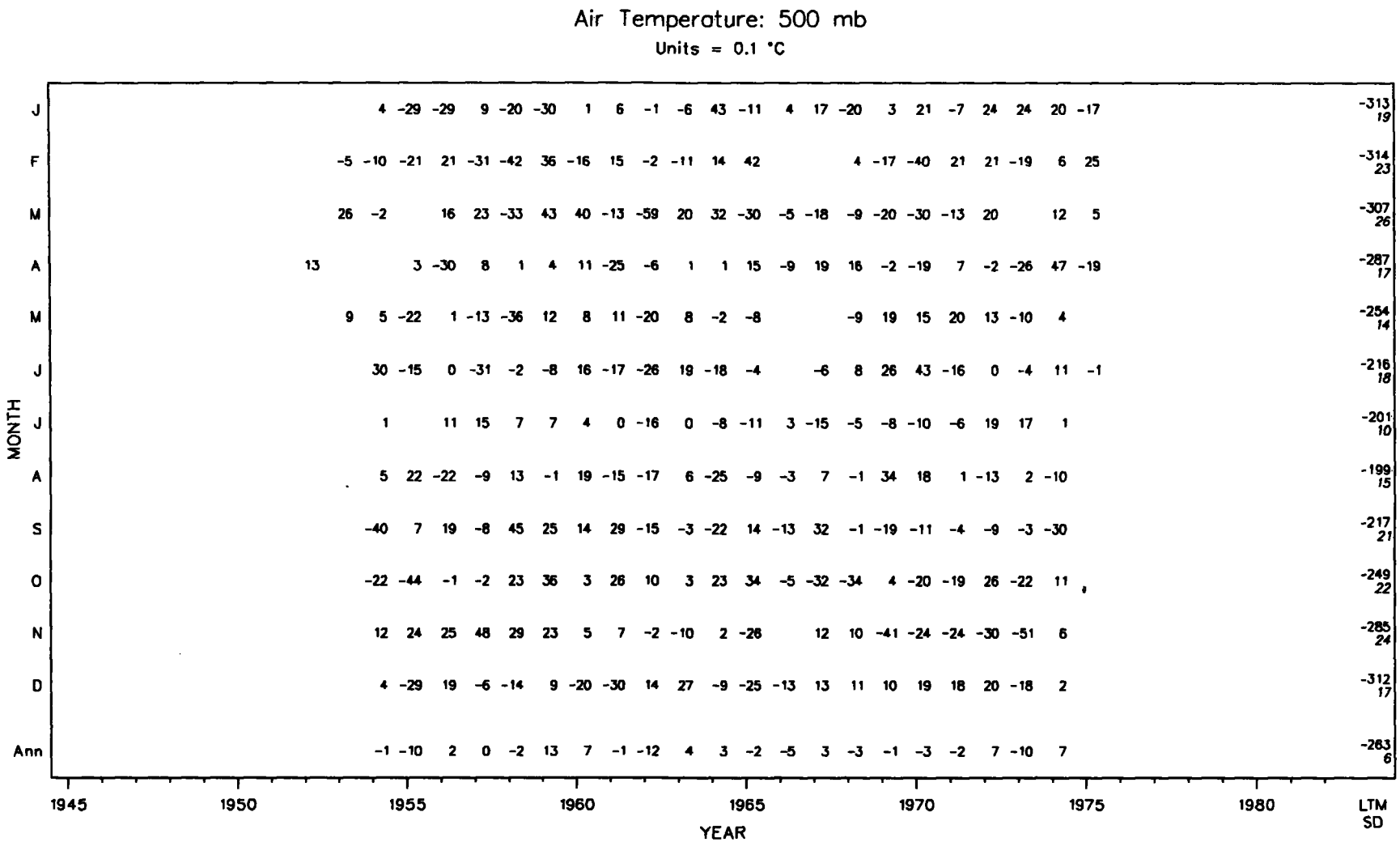
M12

Air Temperature: 700 mb

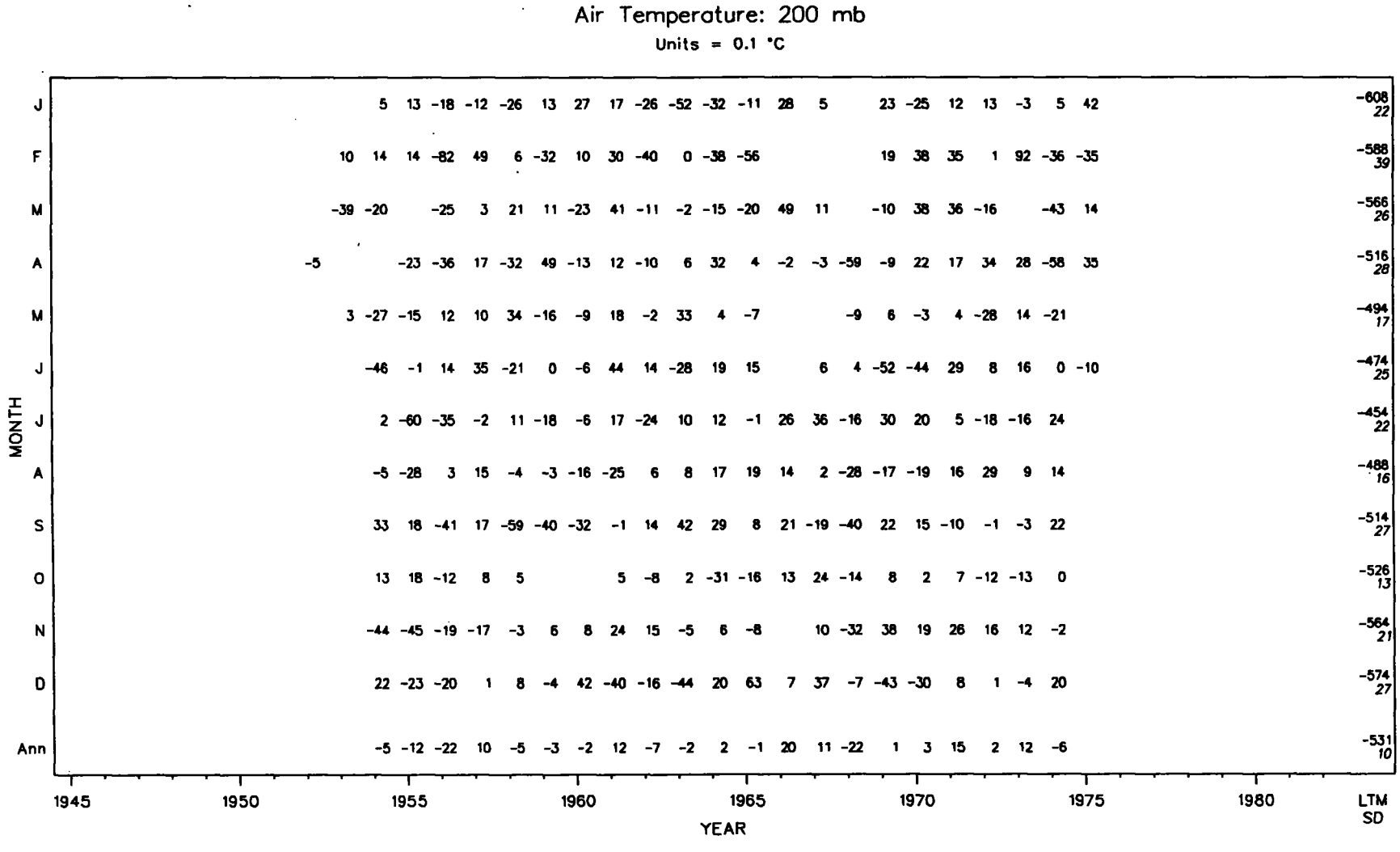
Units = 0.1 °C



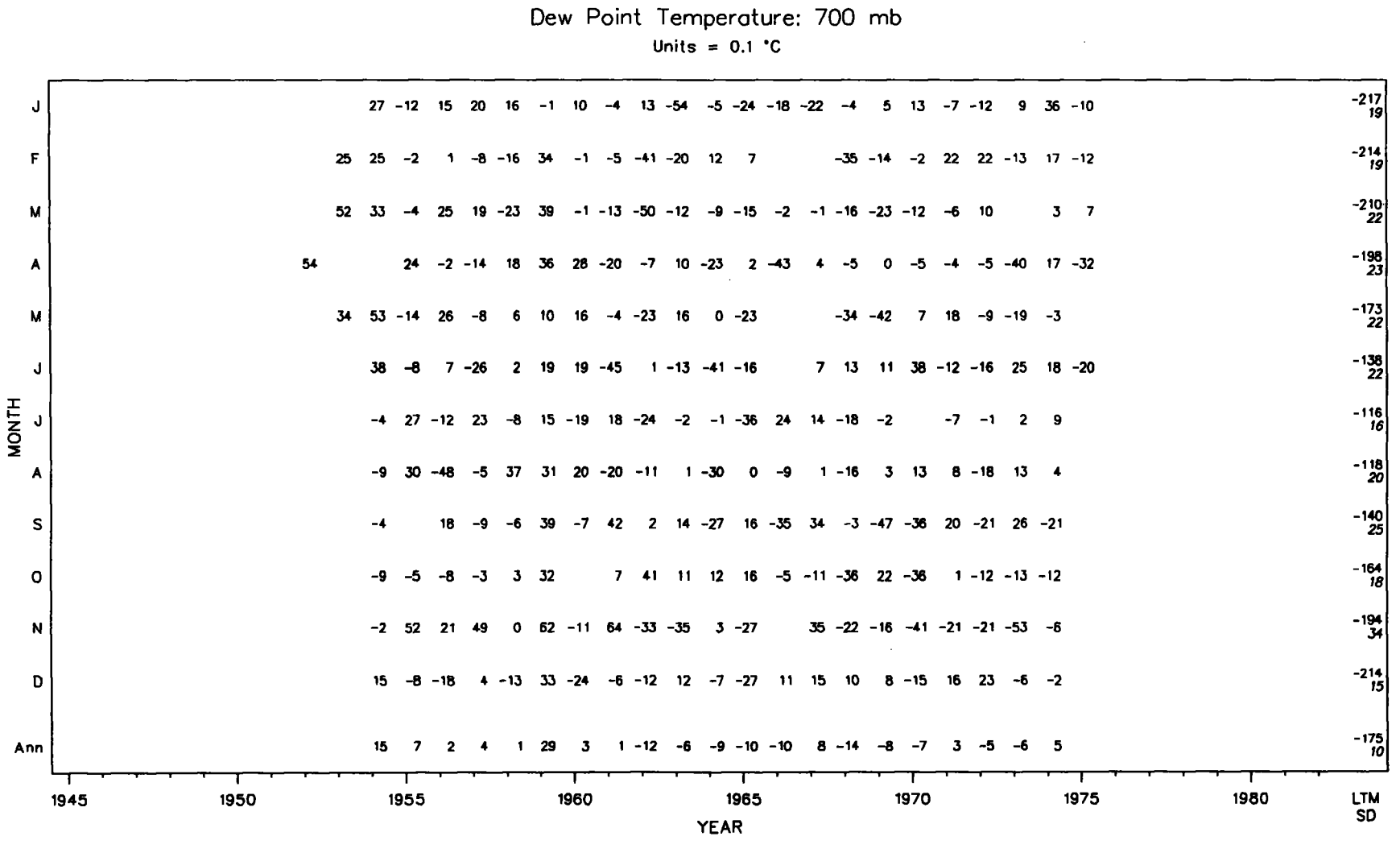
OWS Study Area M Anomalies



OWS Study Area M Anomalies



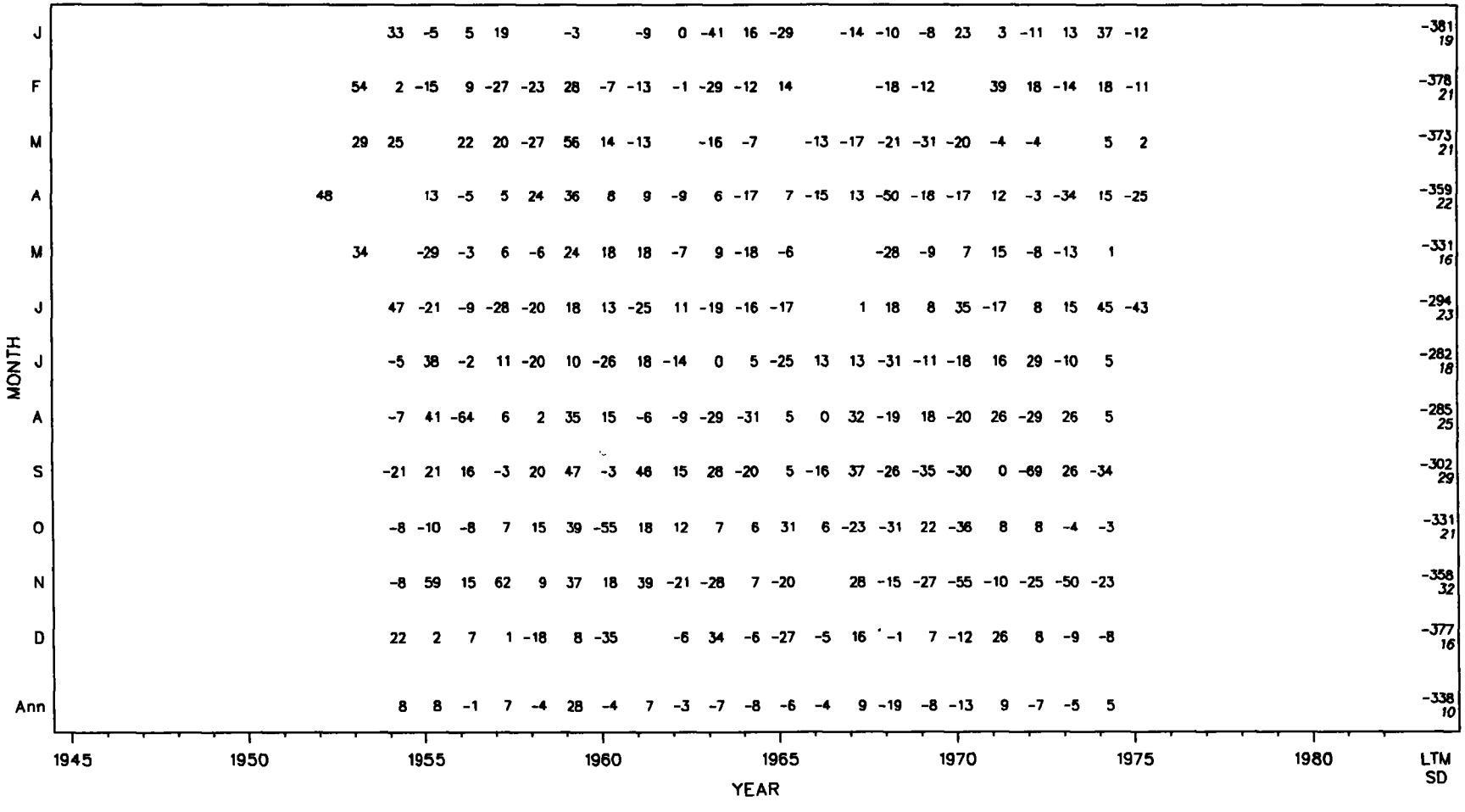
OWS Study Area M Anomalies



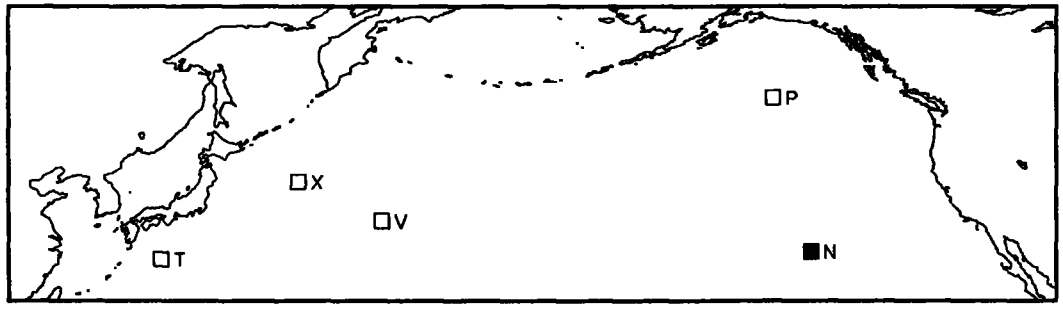
OWS Study Area M Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C

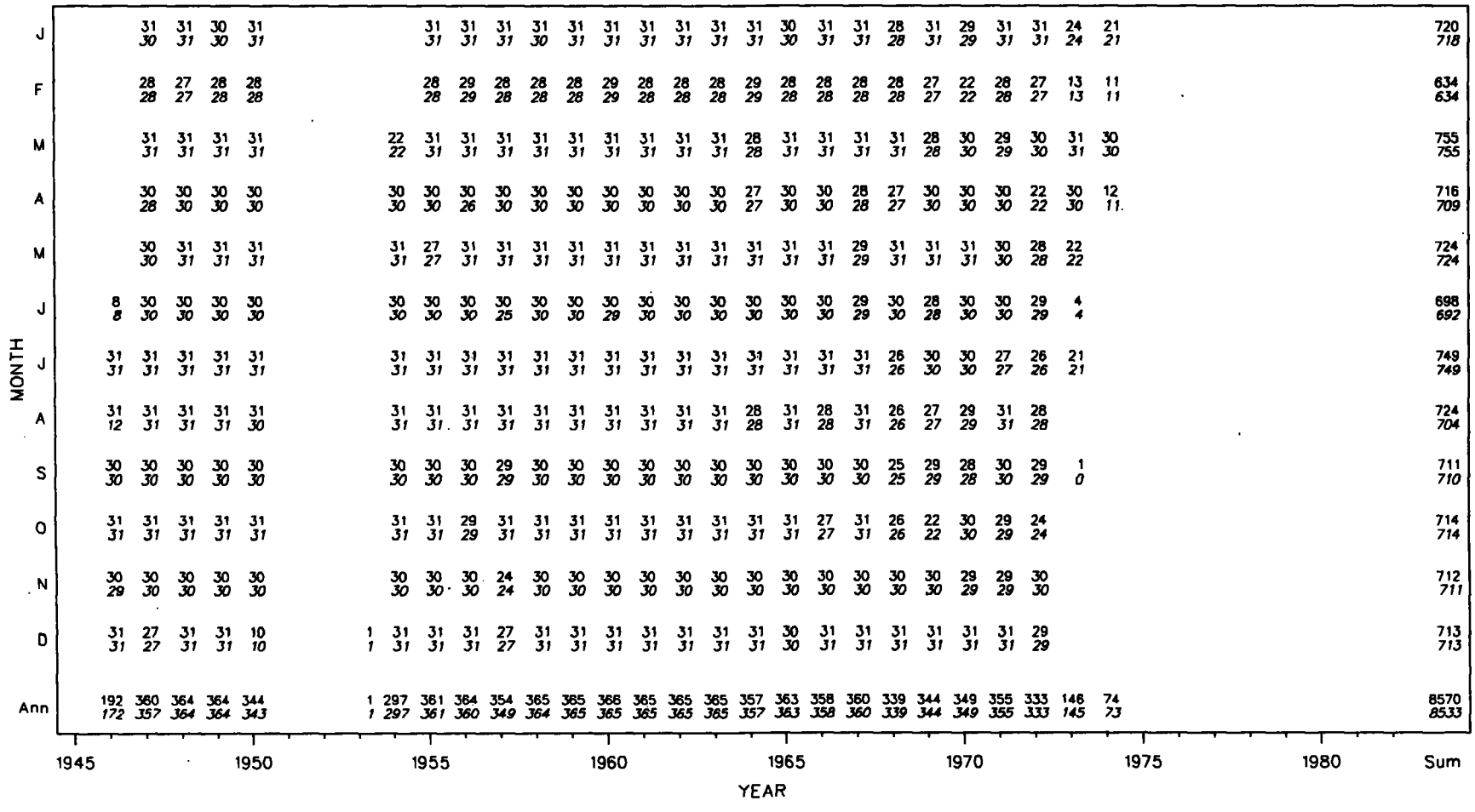


OWS Study Area M Anomalies



OWS N

29.0°N – 30.9°N, 140.9°W – 139.0°W
1946 – 1974



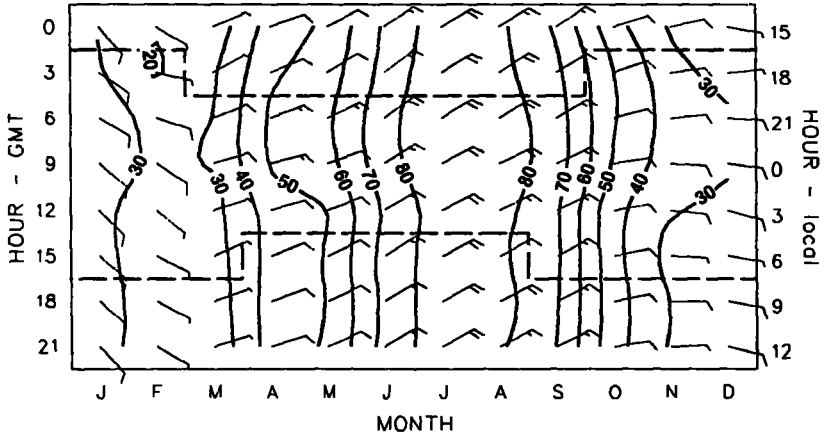
OWS Study Area N (30.0°N, 140.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

N1

Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 10 percent



Pressure

Units = 0.1 mb

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	197 *70*	203 *74*	227 *56*	237 *49*	236 *42*	235 *30*	232 *22*	220 *25*	200 *28*	203 *37*	212 *48*	212 *56*	15
3	204 *68*	205 *74*	226 *56*	232 *48*	232 *41*	229 *30*	227 *22*	215 *24*	197 *28*	204 *37*	215 *48*	216 *56*	18
6	213 *69*	216 *75*	237 *57*	245 *48*	242 *41*	238 *30*	234 *22*	225 *24*	209 *27*	215 *38*	226 *50*	227 *56*	21
9	214 *67*	216 *75*	239 *56*	246 *48*	243 *42*	239 *30*	237 *22*	226 *24*	209 *27*	215 *38*	226 *50*	227 *56*	0
12	204 *69*	209 *75*	229 *57*	234 *49*	232 *42*	230 *30*	228 *22*	217 *24*	200 *27*	206 *38*	218 *49*	220 *56*	3
15	204 *69*	206 *75*	229 *56*	235 *48*	235 *41*	233 *30*	231 *22*	219 *24*	202 *27*	208 *38*	218 *48*	218 *56*	6
18	215 *70*	221 *75*	240 *57*	248 *48*	245 *42*	242 *30*	240 *22*	229 *25*	213 *27*	220 *38*	231 *49*	231 *56*	9
21	213 *70*	220 *75*	242 *56*	248 *49*	246 *43*	243 *30*	241 *22*	229 *25*	212 *28*	217 *38*	227 *48*	227 *56*	12

MONTH

Total Cloudiness

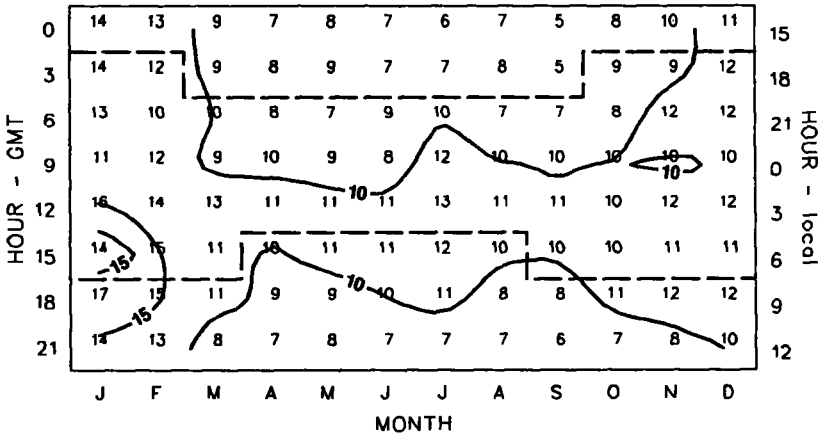
Units = 0.1 okta

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	62 *21*	59 *23*	61 *21*	57 *22*	55 *23*	55 *23*	55 *22*	49 *24*	48 *24*	53 *23*	58 *22*	61 *21*	15
3	64 *19*	61 *21*	61 *21*	60 *20*	56 *23*	57 *22*	57 *21*	51 *23*	48 *24*	54 *23*	59 *21*	61 *21*	18
6	58 *25*	55 *25*	55 *26*	55 *25*	55 *26*	58 *24*	59 *23*	50 *26*	44 *27*	49 *26*	53 *25*	56 *25*	21
9	57 *24*	57 *26*	56 *25*	59 *25*	57 *26*	59 *25*	61 *24*	53 *26*	48 *27*	50 *26*	53 *25*	55 *25*	0
12	57 *25*	56 *26*	57 *25*	60 *25*	60 *25*	61 *25*	62 *24*	55 *27*	50 *28*	49 *27*	53 *26*	55 *25*	3
15	59 *24*	57 *25*	60 *23*	64 *21*	64 *20*	65 *19*	66 *19*	58 *24*	55 *24*	52 *24*	52 *25*	55 *25*	6
18	65 *19*	63 *21*	63 *21*	62 *21*	62 *21*	63 *20*	62 *20*	55 *24*	52 *24*	56 *22*	59 *21*	62 *20*	9
21	63 *21*	60 *22*	62 *21*	60 *21*	57 *22*	58 *22*	58 *22*	51 *24*	49 *24*	52 *23*	57 *22*	60 *22*	12

MONTH

Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area N Surface Climatology

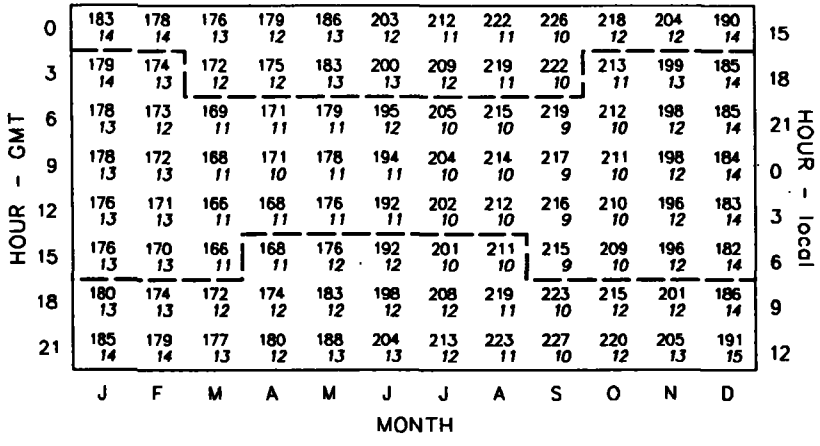
upper number = mean
lower number = standard deviation

data contours
sunrise/sunset

N2

Air Temperature

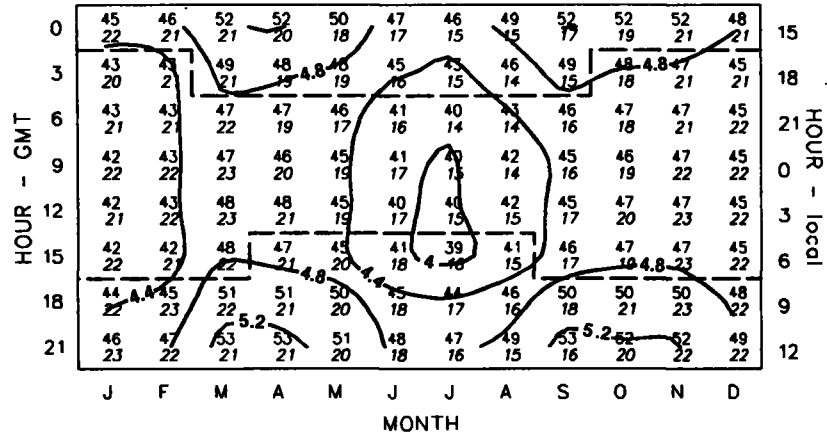
Units = 0.1 °C



Dew Point Depression

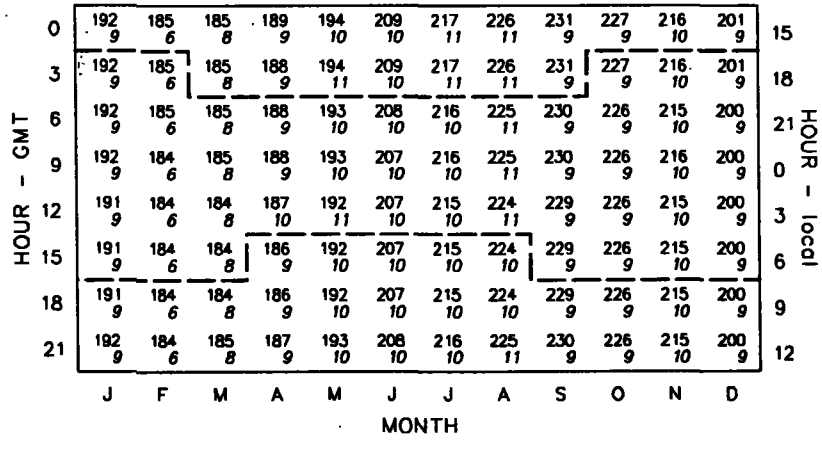
Units = 0.1 °C

Contour interval = 0.4 °C



Sea Surface Temperature

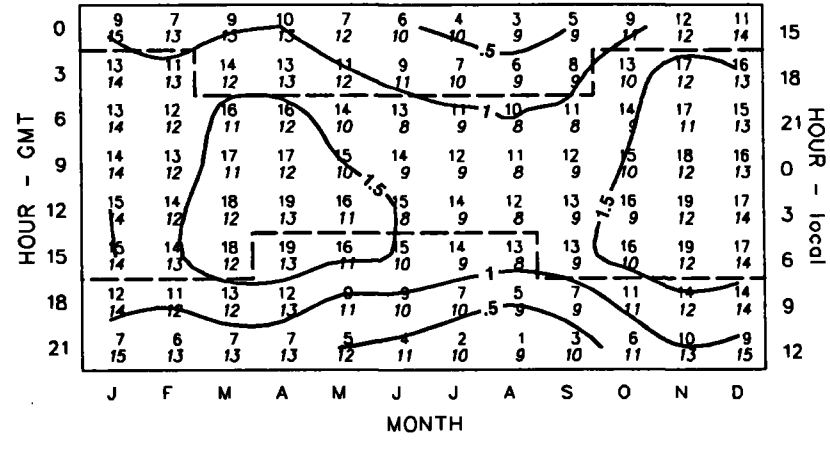
Units = 0.1 °C



Sea – Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



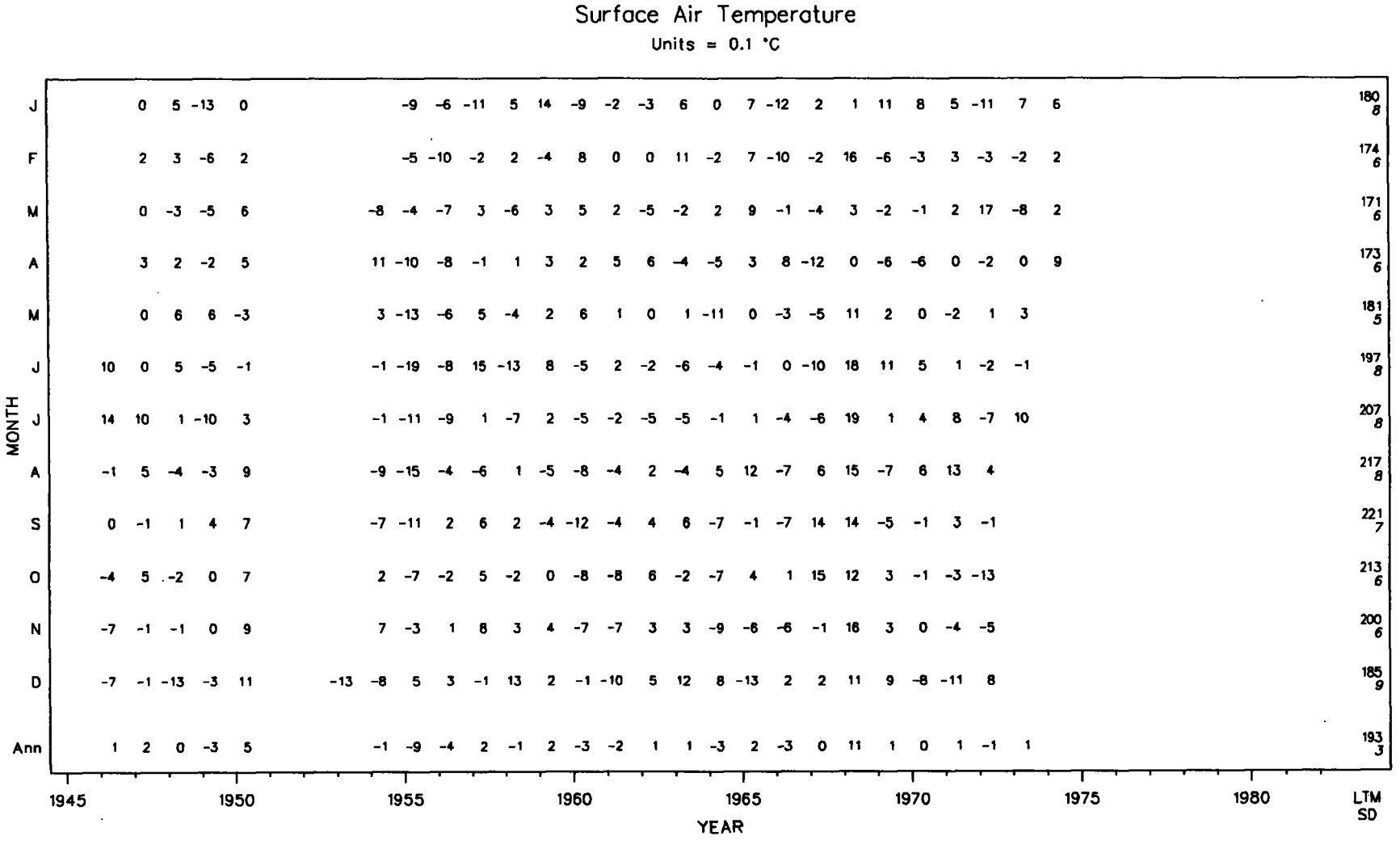
OWS Study Area N Surface Climatology

upper number = mean

lower number = standard deviation

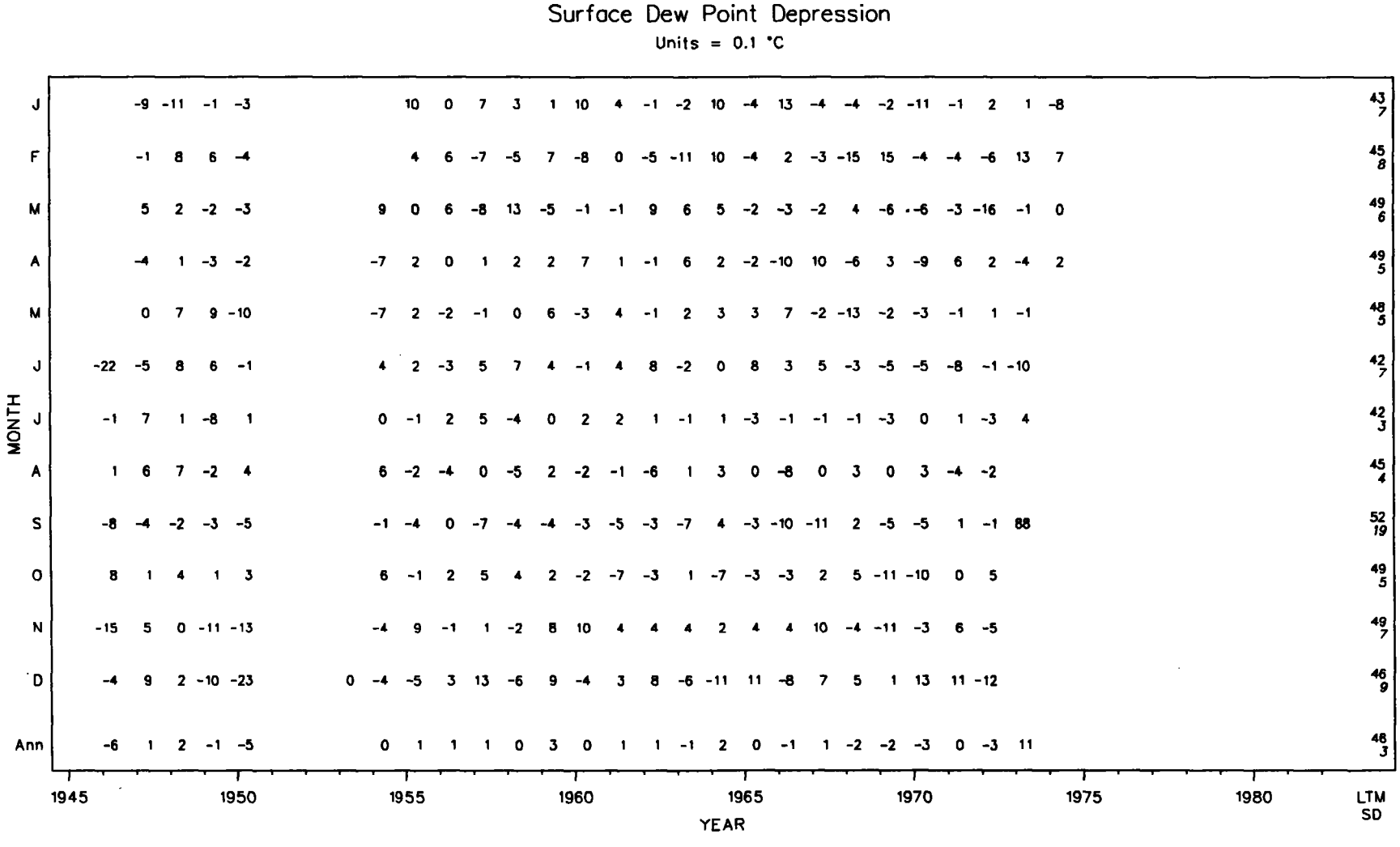
——— data contours

— — — — sunrise/sunset



OWS Study Area N Anomalies

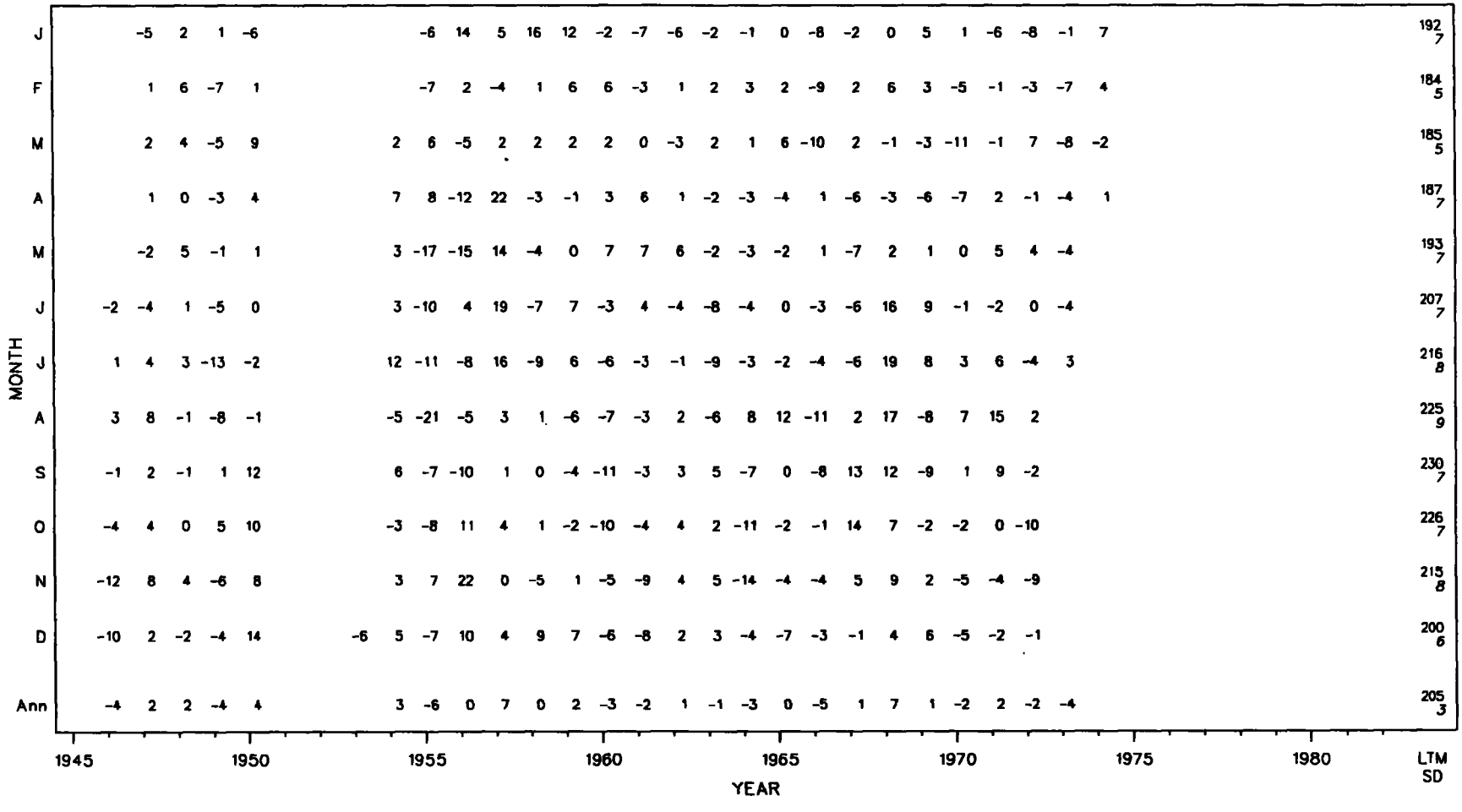
N4



OWS Study Area N Anomalies

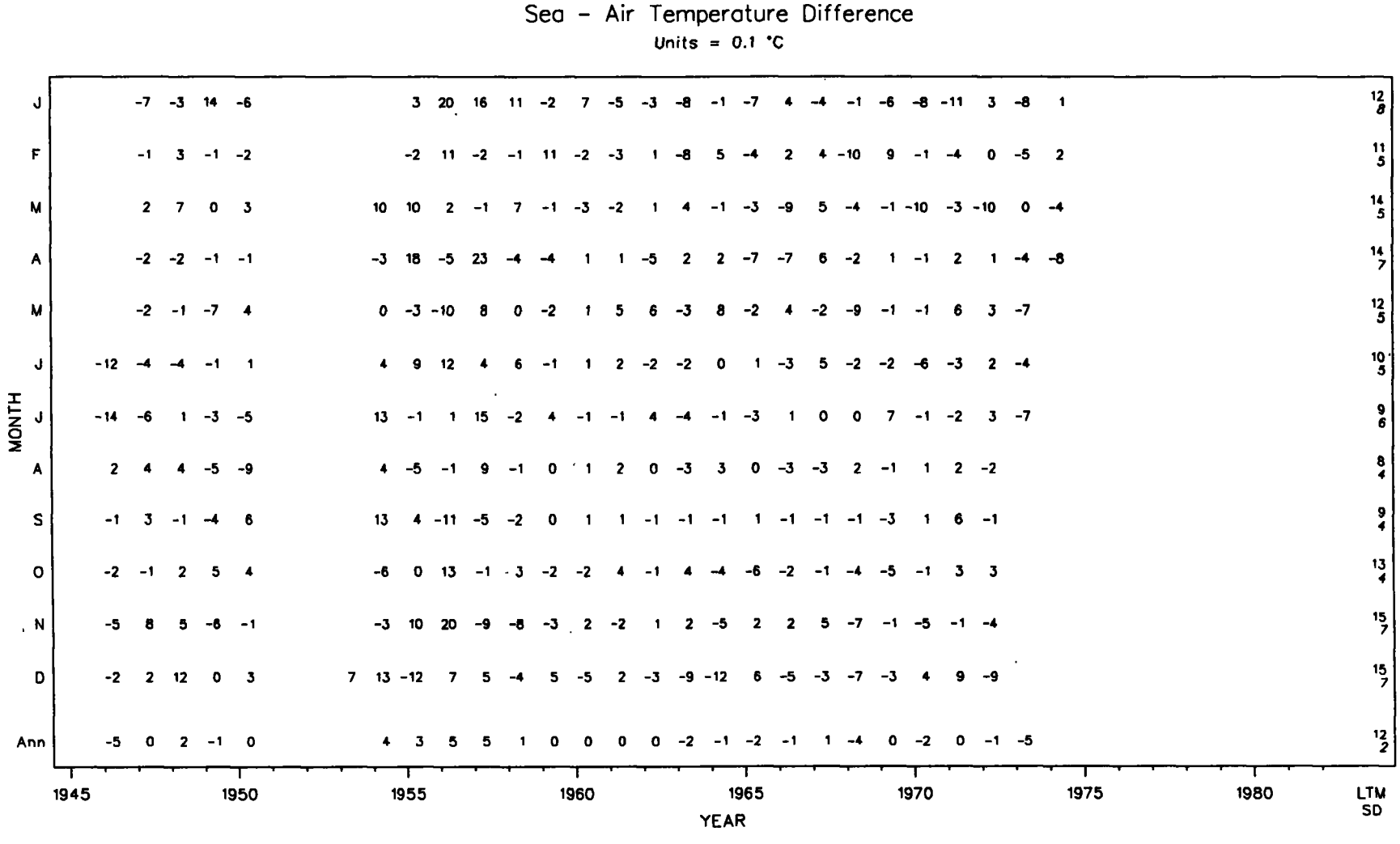
Sea Surface Temperature

Units = 0.1 °C

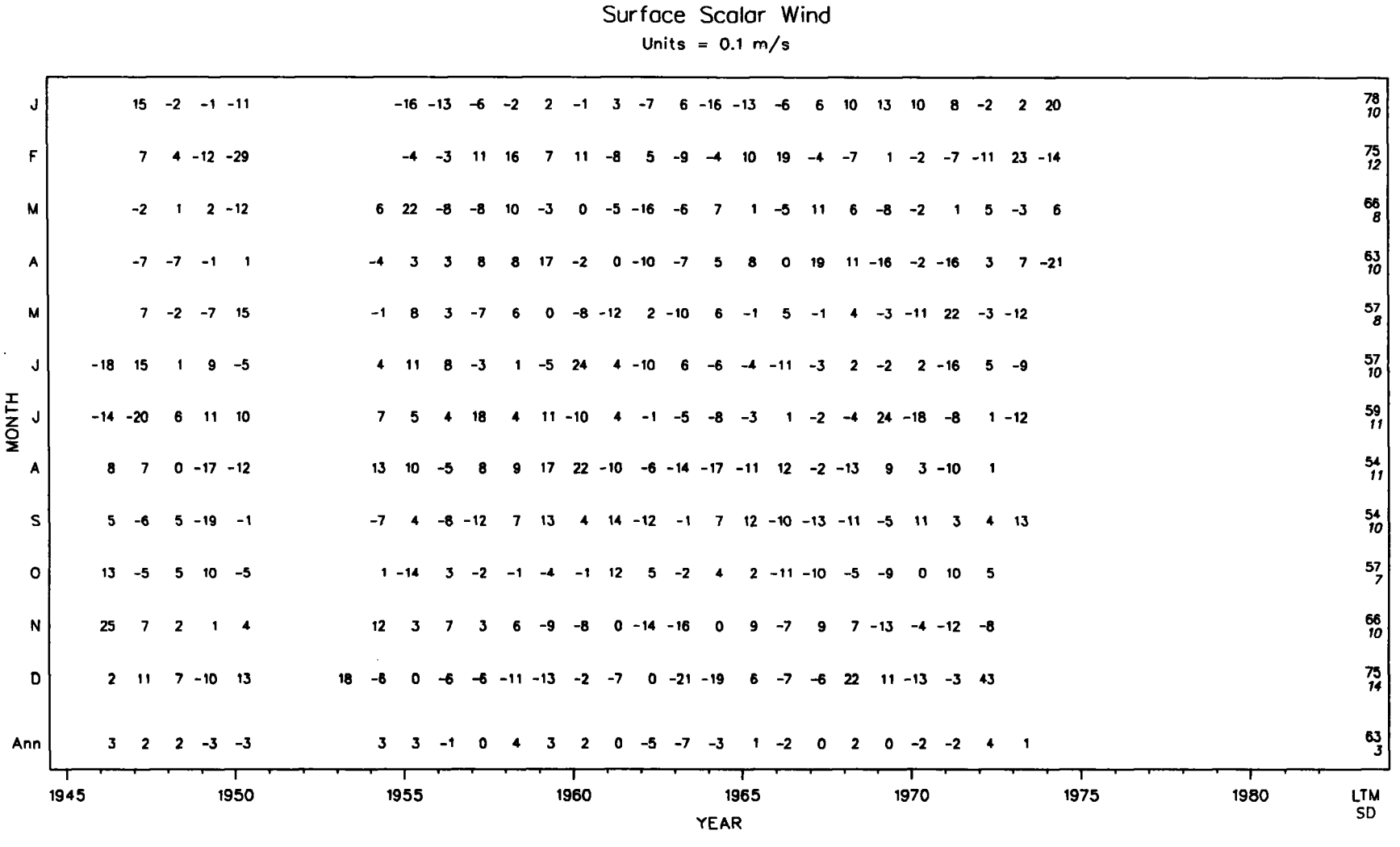


OWS Study Area N Anomalies

N6



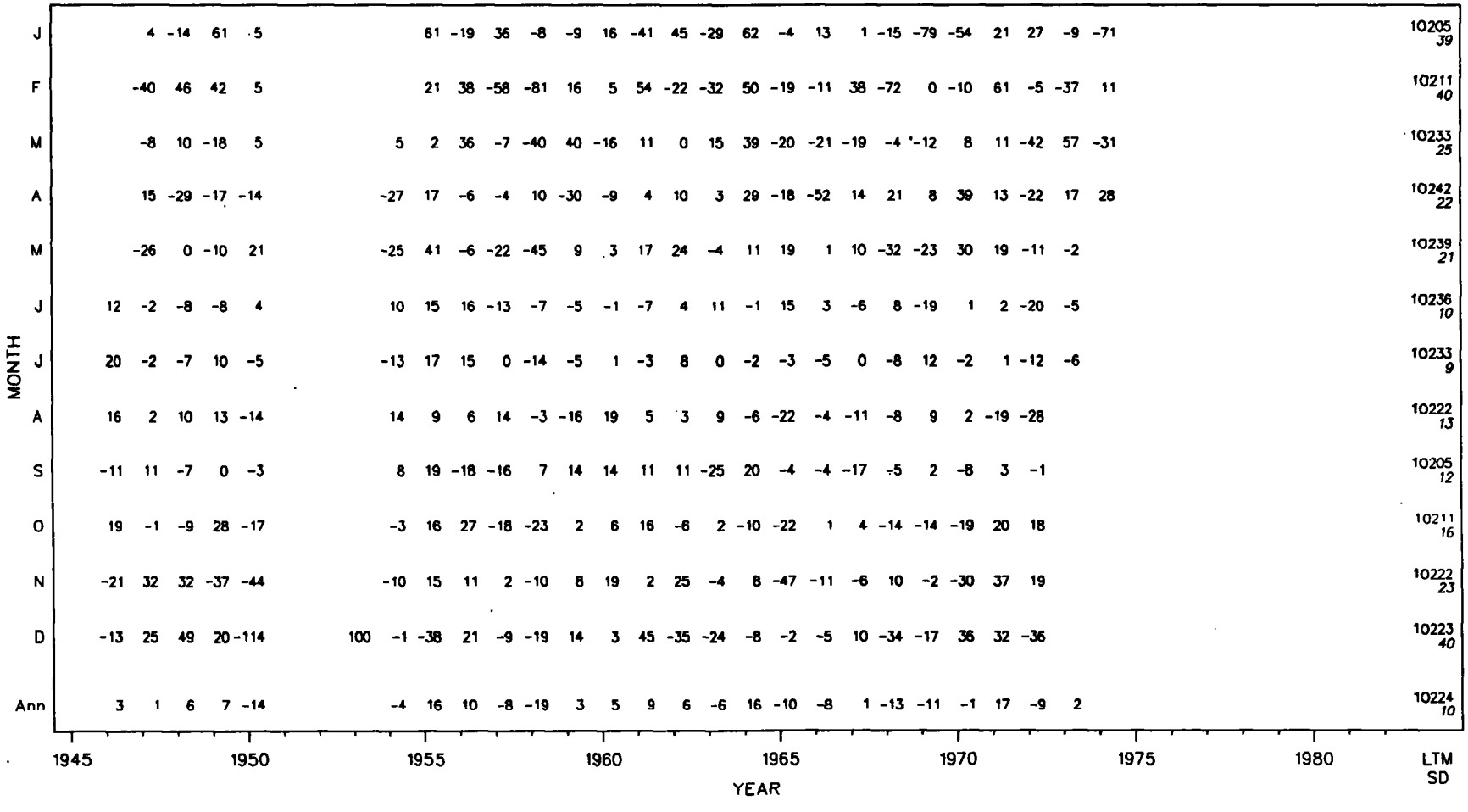
OWS Study Area N Anomalies



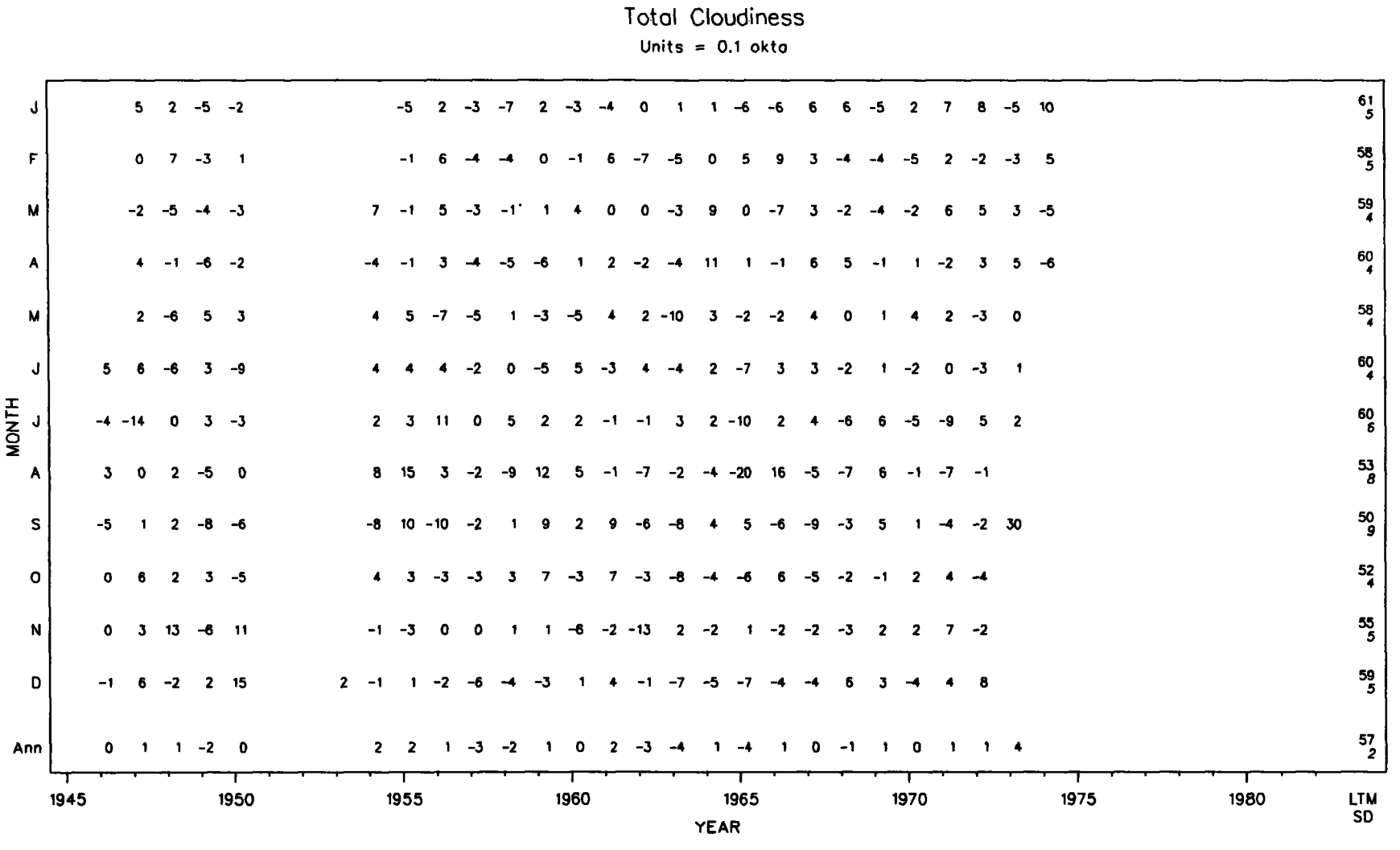
OWS Study Area N Anomalies

Sea Level Pressure

Units = 0.1 mb



OWS Study Area N Anomalies

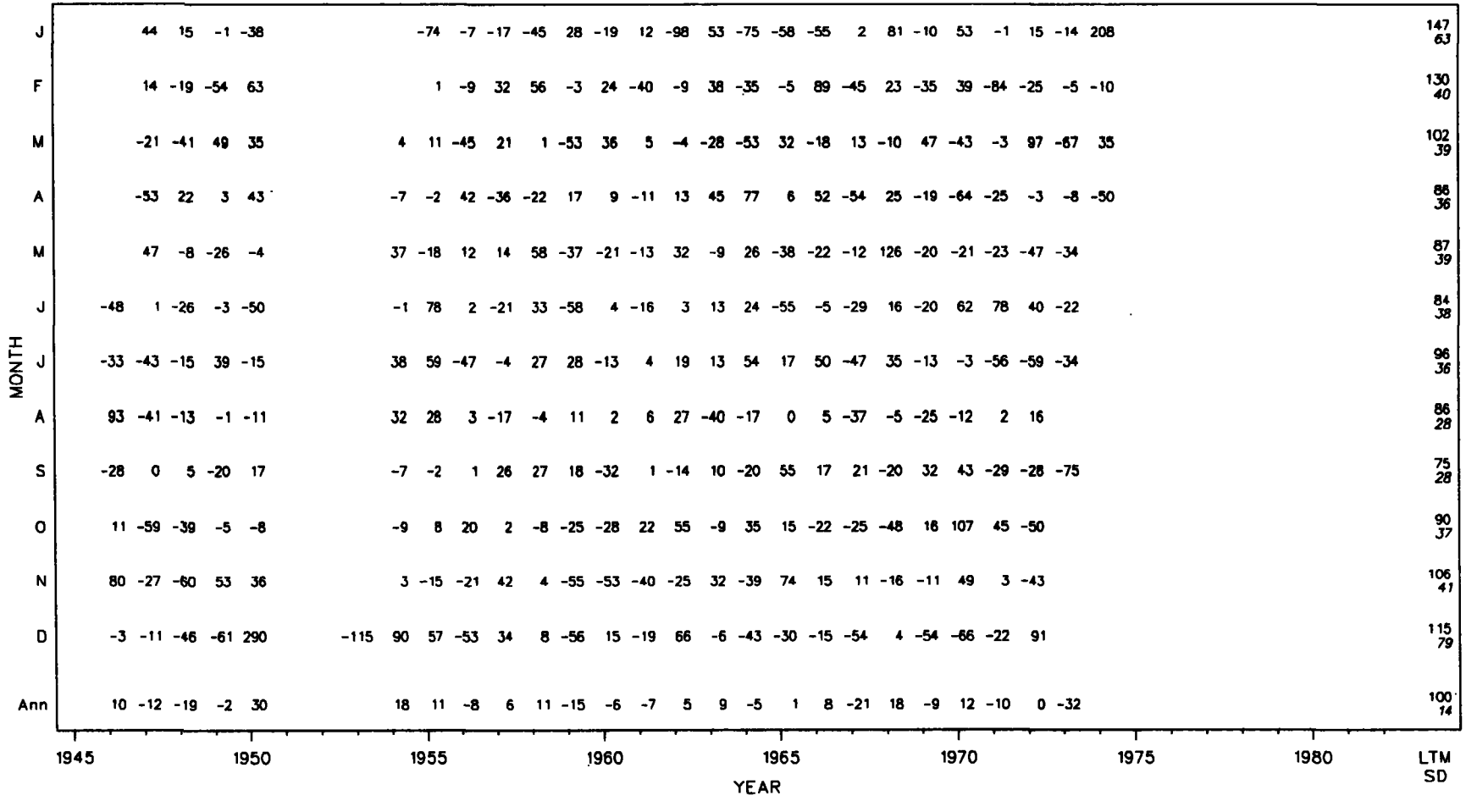


OWS Study Area N Anomalies

N10

Precipitation Frequency

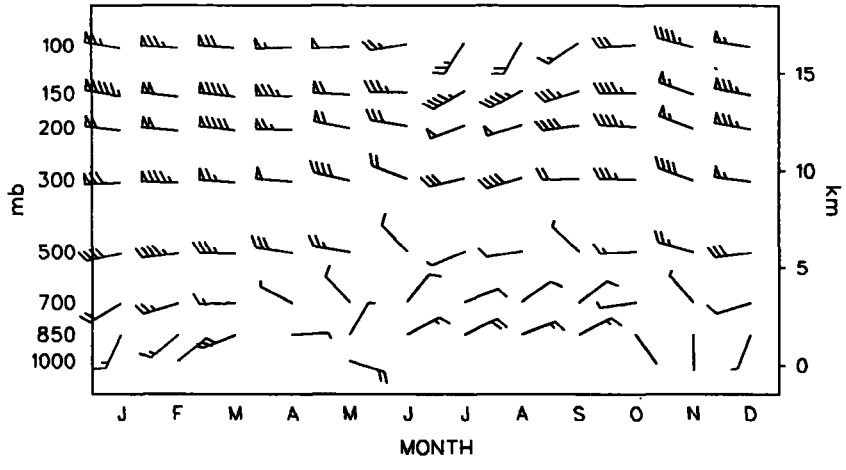
Units = 0.1 percent



OWS Study Area N Anomalies

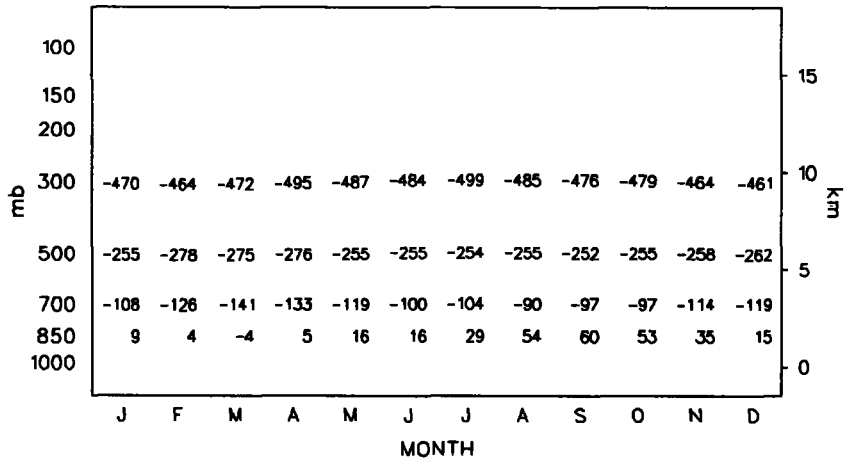
Wind

Full barb = 5 knots, Pennant = 25 knots



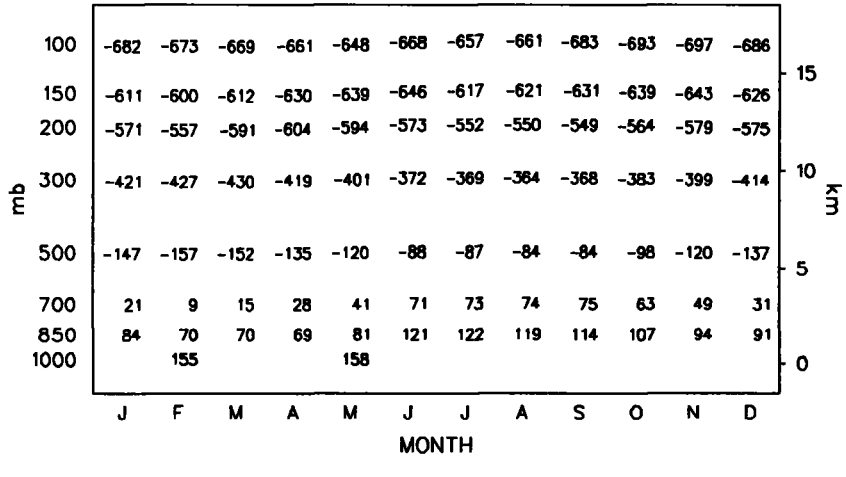
Dew Point Temperature

Units = 0.1 °C



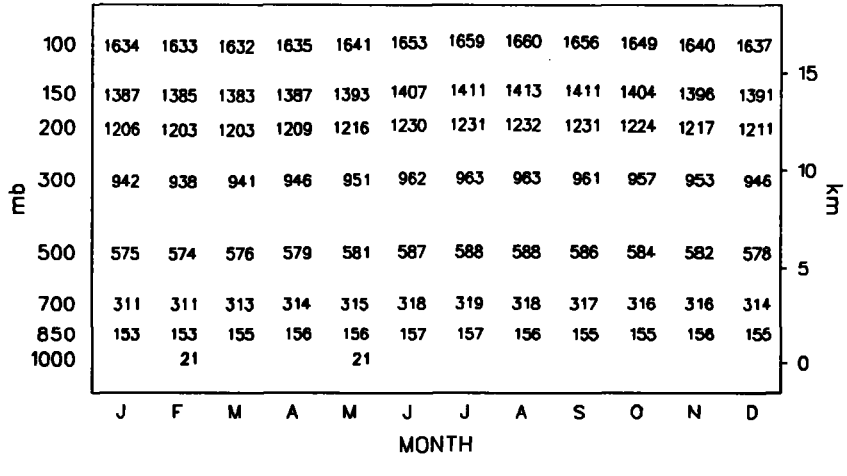
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m



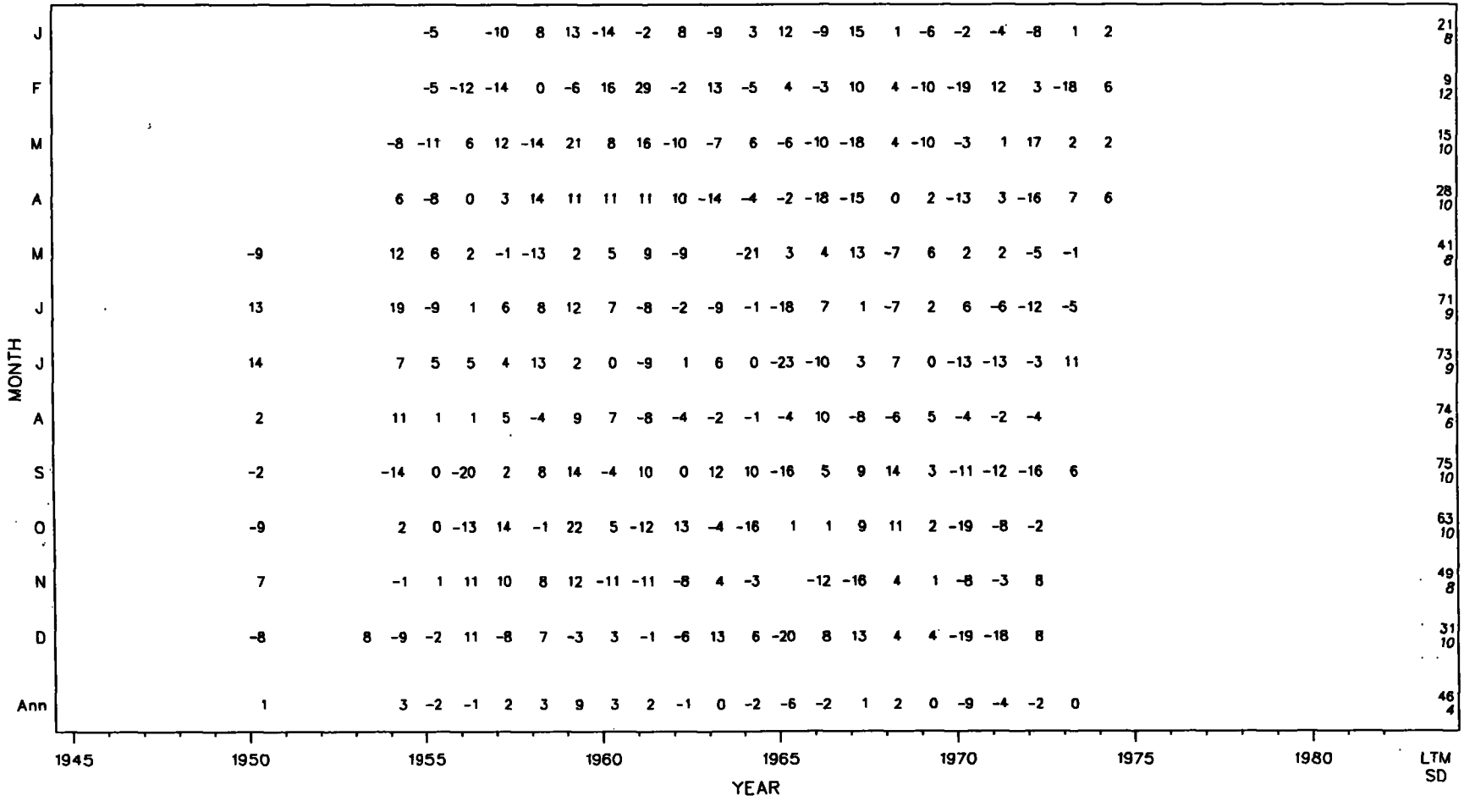
OWS Study Area N Upper Air Climatology

Mean plotted at actual height

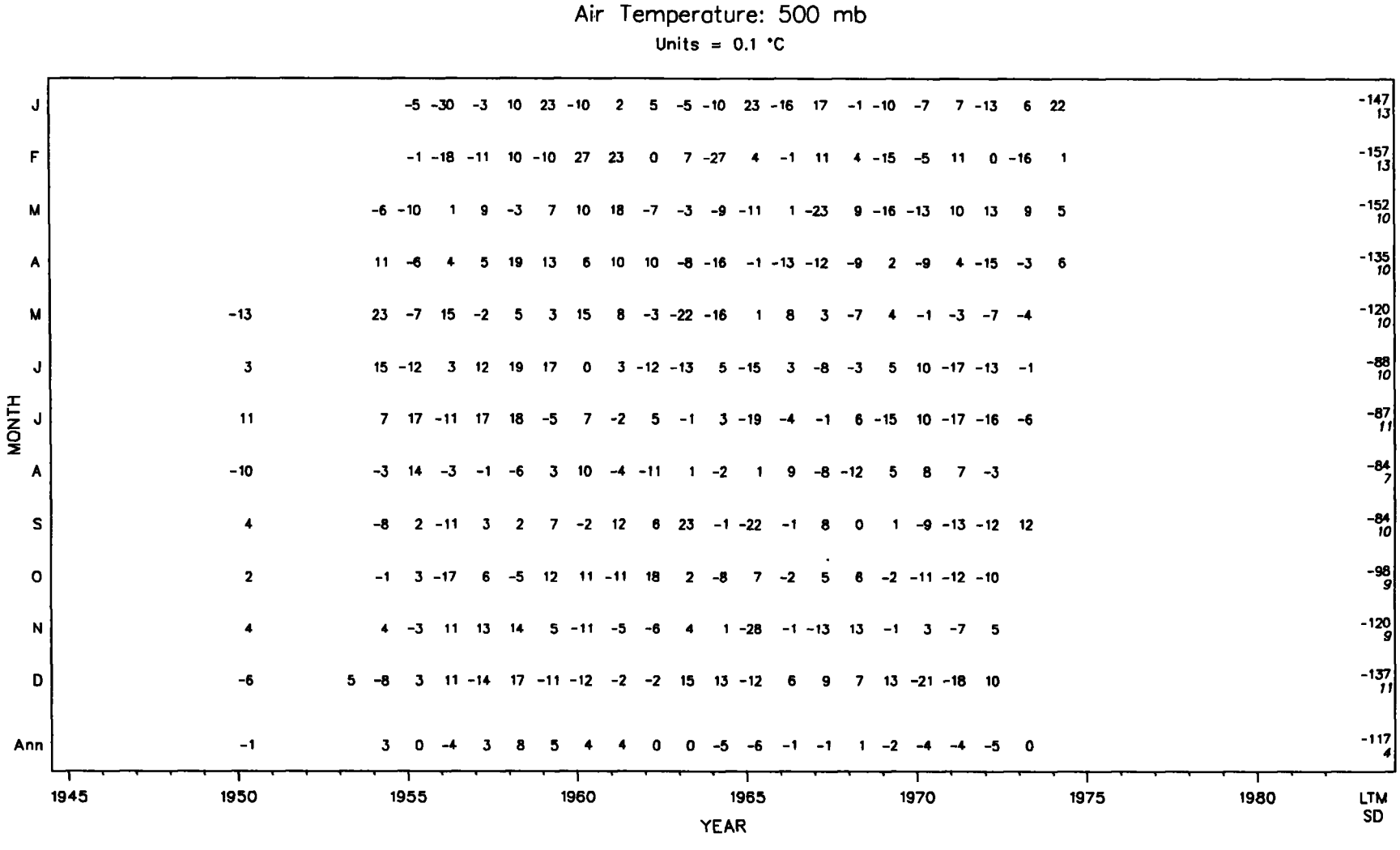
N12

Air Temperature: 700 mb

Units = 0.1 °C

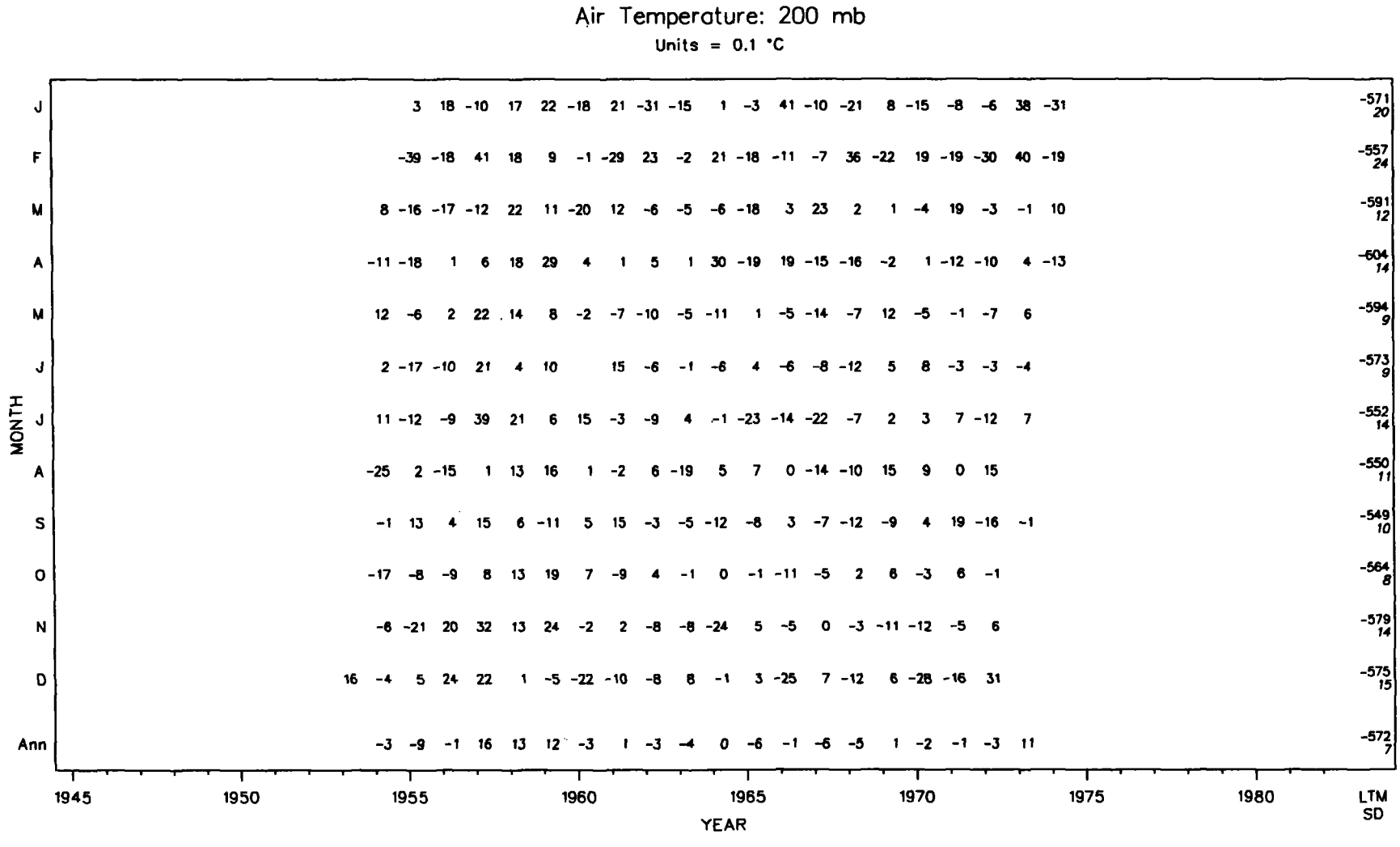


OWS Study Area N Anomalies



OWS Study Area N Anomalies

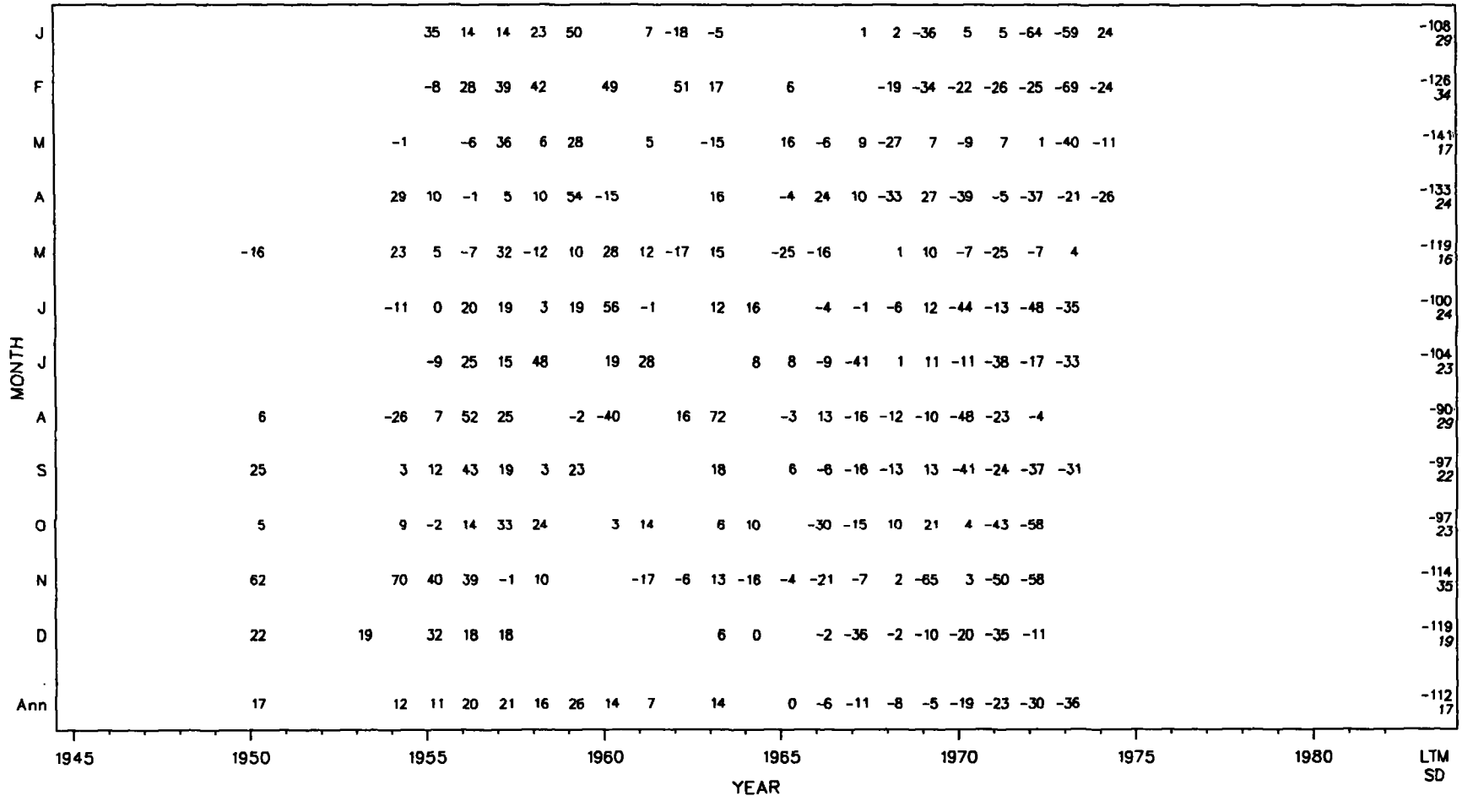
N14



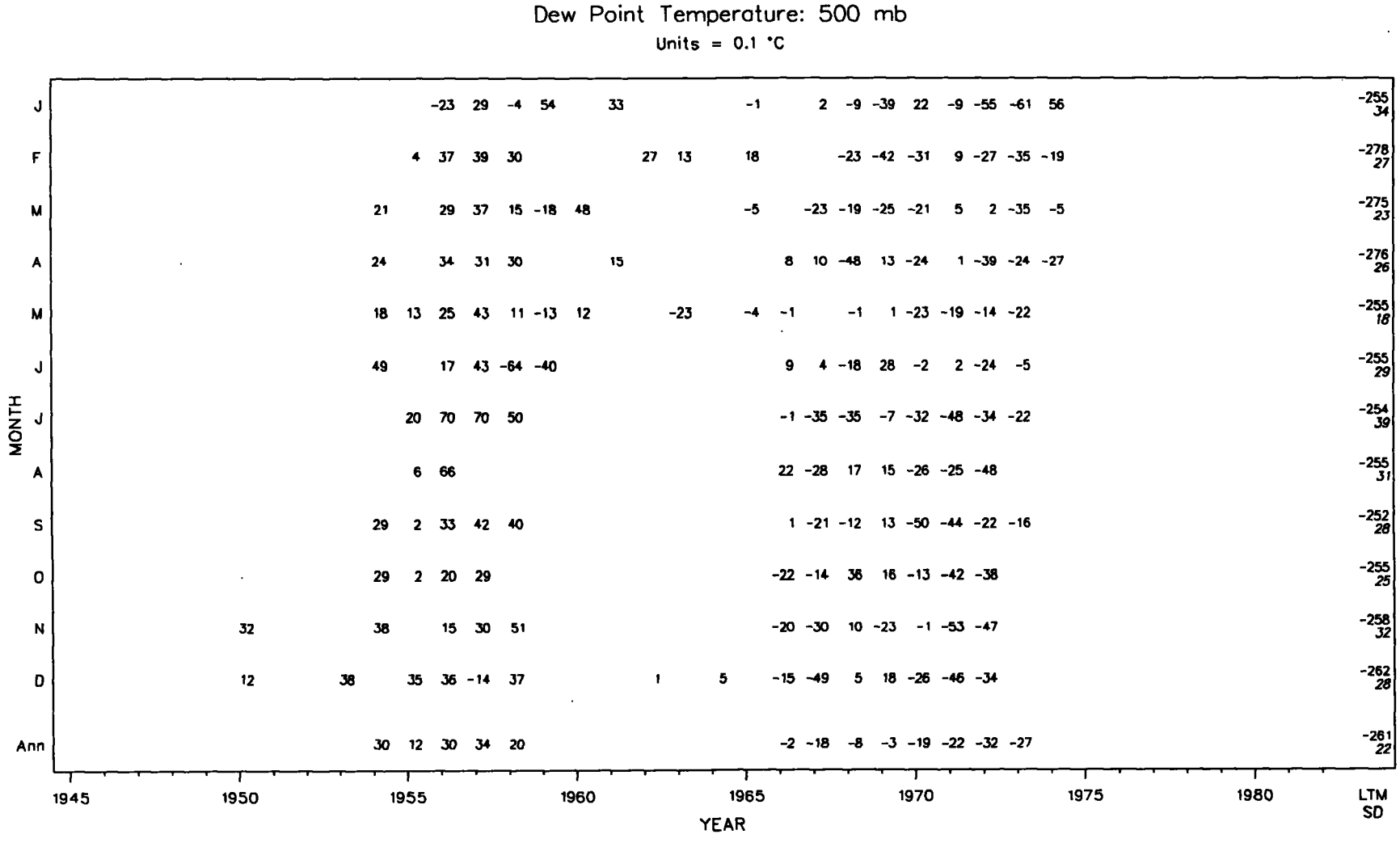
OWS Study Area N Anomalies

Dew Point Temperature: 700 mb

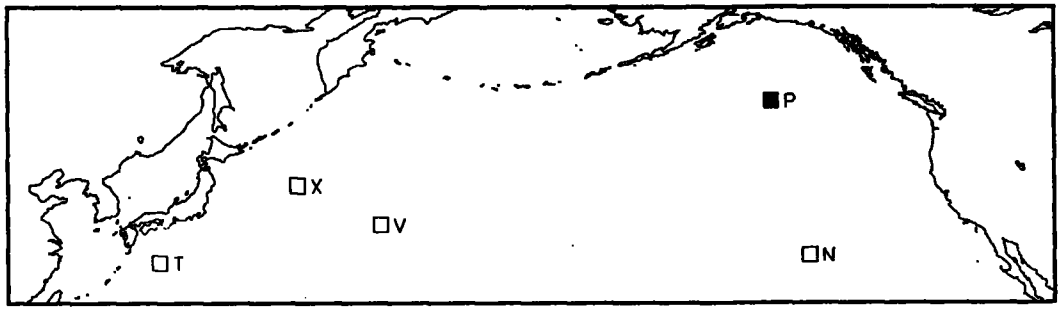
Units = 0.1 °C



OWS Study Area N Anomalies

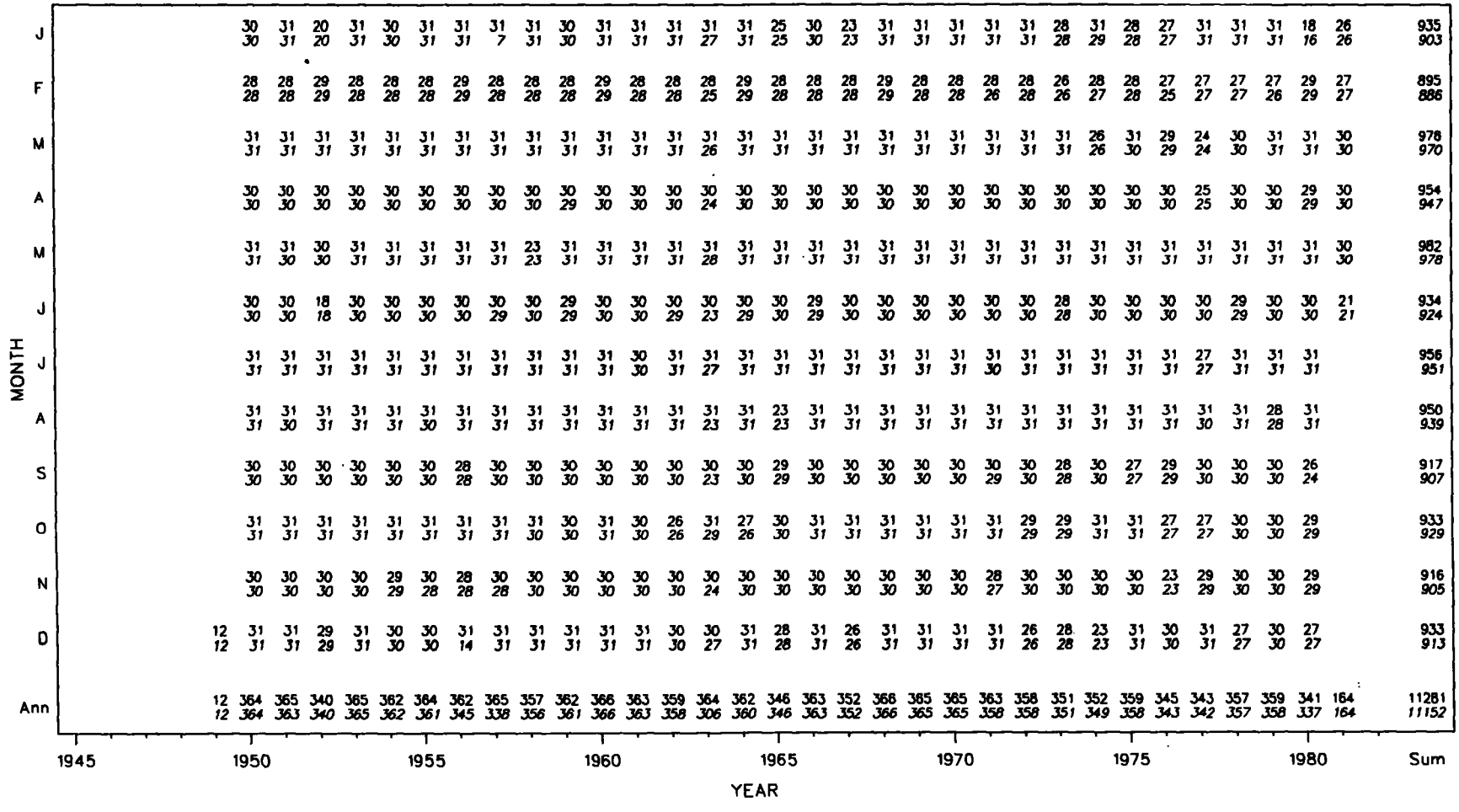


OWS Study Area N Anomalies



OWS P

49.0°N – 50.9°N, 145.9°W – 144.0°W
1949 – 1981

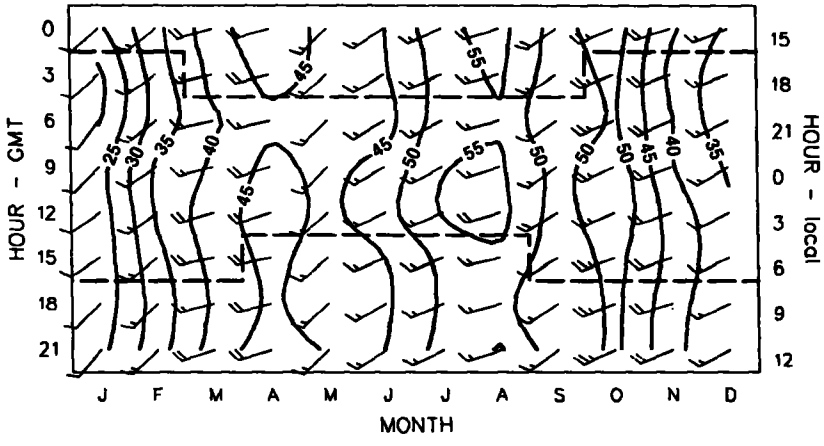


OWS Study Area P (50.0°N, 145.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



Pressure

Units = 0.1 mb

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	070	066	113	142	144	169	198	190	144	080	068	057	15
	157	*145*	*137*	*118*	*96*	*92*	*81*	*80*	*108*	*126*	*137*	*158*	
3	072	067	111	139	140	165	194	186	140	080	069	058	18
	156	*145*	*136*	*117*	*96*	*92*	*81*	*80*	*107*	*126*	*137*	*156*	
6	074	072	115	142	142	166	196	190	144	084	070	063	21
	156	*146*	*136*	*118*	*96*	*93*	*80*	*79*	*110*	*125*	*138*	*155*	
9	073	074	116	140	142	167	196	189	144	084	071	065	0
	157	*146*	*137*	*118*	*98*	*93*	*81*	*81*	*108*	*125*	*138*	*155*	
12	073	074	113	136	138	165	192	184	140	081	068	062	3
	156	*145*	*136*	*117*	*97*	*93*	*81*	*82*	*108*	*125*	*139*	*156*	
15	069	069	111	135	138	164	192	185	140	080	066	061	6
	156	*144*	*137*	*118*	*97*	*93*	*81*	*82*	*109*	*125*	*138*	*156*	
18	074	072	115	140	142	168	196	188	142	084	072	064	9
	157	*144*	*138*	*118*	*97*	*94*	*82*	*82*	*110*	*127*	*138*	*158*	
21	077	075	118	144	145	170	198	190	144	084	074	065	12
	156	*144*	*137*	*117*	*96*	*93*	*81*	*82*	*109*	*129*	*138*	*159*	

MONTH

Total Cloudiness

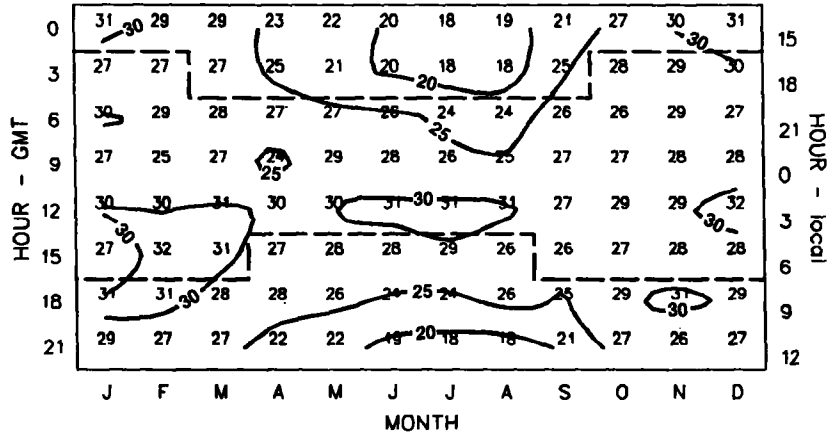
Units = 0.1 okta

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	68	67	67	66	67	72	73	71	66	64	64	66	15
	17	*18*	*18*	*19*	*19*	*16*	*15*	*17*	*19*	*20*	*18*	*18*	
3	68	68	67	66	69	72	74	72	67	64	63	65	18
	18	*17*	*18*	*19*	*17*	*16*	*13*	*16*	*18*	*19*	*21*	*20*	
6	63	62	62	63	70	74	75	73	64	59	59	62	21
	24	*24*	*24*	*23*	*18*	*15*	*13*	*16*	*23*	*24*	*24*	*24*	
9	62	61	61	61	68	73	75	71	63	59	58	61	0
	24	*25*	*25*	*25*	*21*	*17*	*15*	*19*	*24*	*25*	*25*	*24*	
12	62	62	64	64	67	74	75	72	64	60	60	62	3
	25	*25*	*23*	*24*	*22*	*16*	*15*	*19*	*24*	*24*	*24*	*24*	
15	62	62	65	68	70	74	76	74	67	59	58	62	6
	24	*24*	*21*	*18*	*16*	*14*	*11*	*14*	*19*	*24*	*25*	*23*	
18	68	67	68	67	70	74	76	74	67	64	64	66	9
	17	*17*	*17*	*18*	*17*	*14*	*11*	*13*	*18*	*20*	*19*	*18*	
21	67	67	67	65	68	72	73	73	67	64	64	66	12
	18	*17*	*18*	*20*	*18*	*16*	*13*	*14*	*18*	*19*	*19*	*18*	

MONTH

Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area P Surface Climatology

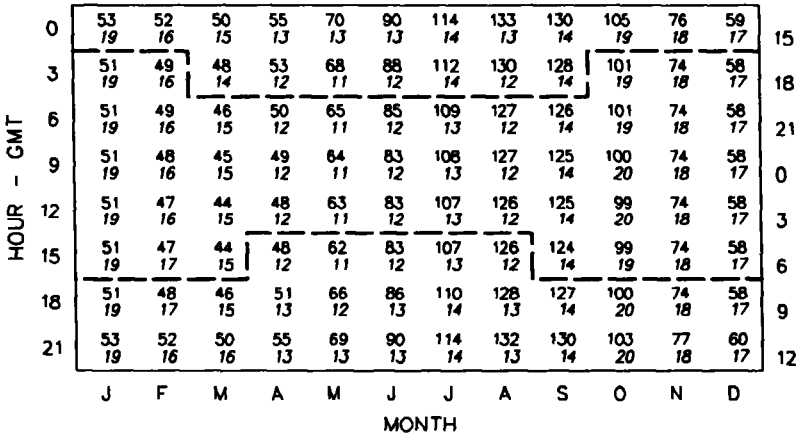
upper number = mean
lower number = standard deviation

——— data contours
— — — — sunrise/sunset

P2

Air Temperature

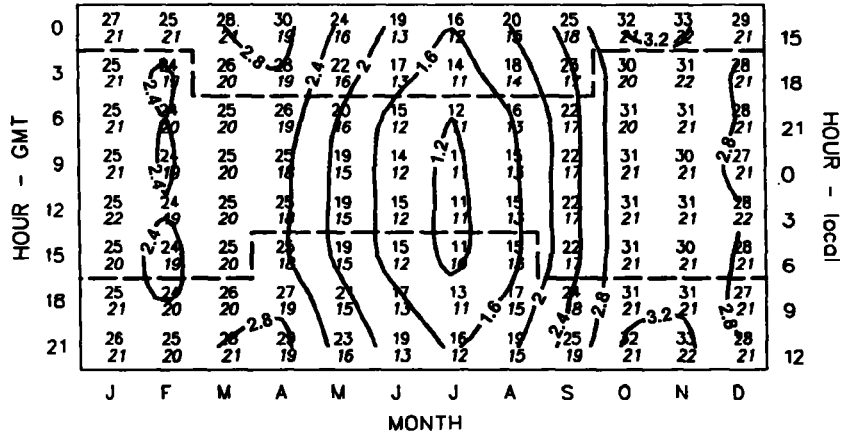
Units = 0.1 °C



Dew Point Depression

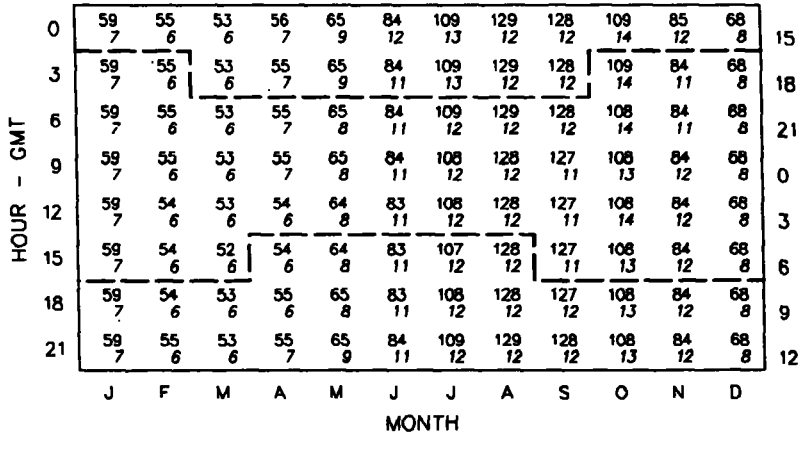
Units = 0.1 °C

Contour interval = 0.4 °C



Sea Surface Temperature

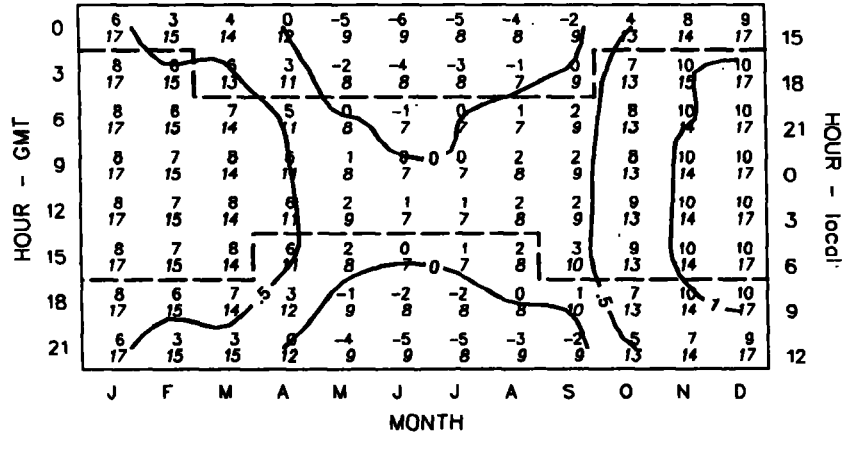
Units = 0.1 °C



Sea – Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



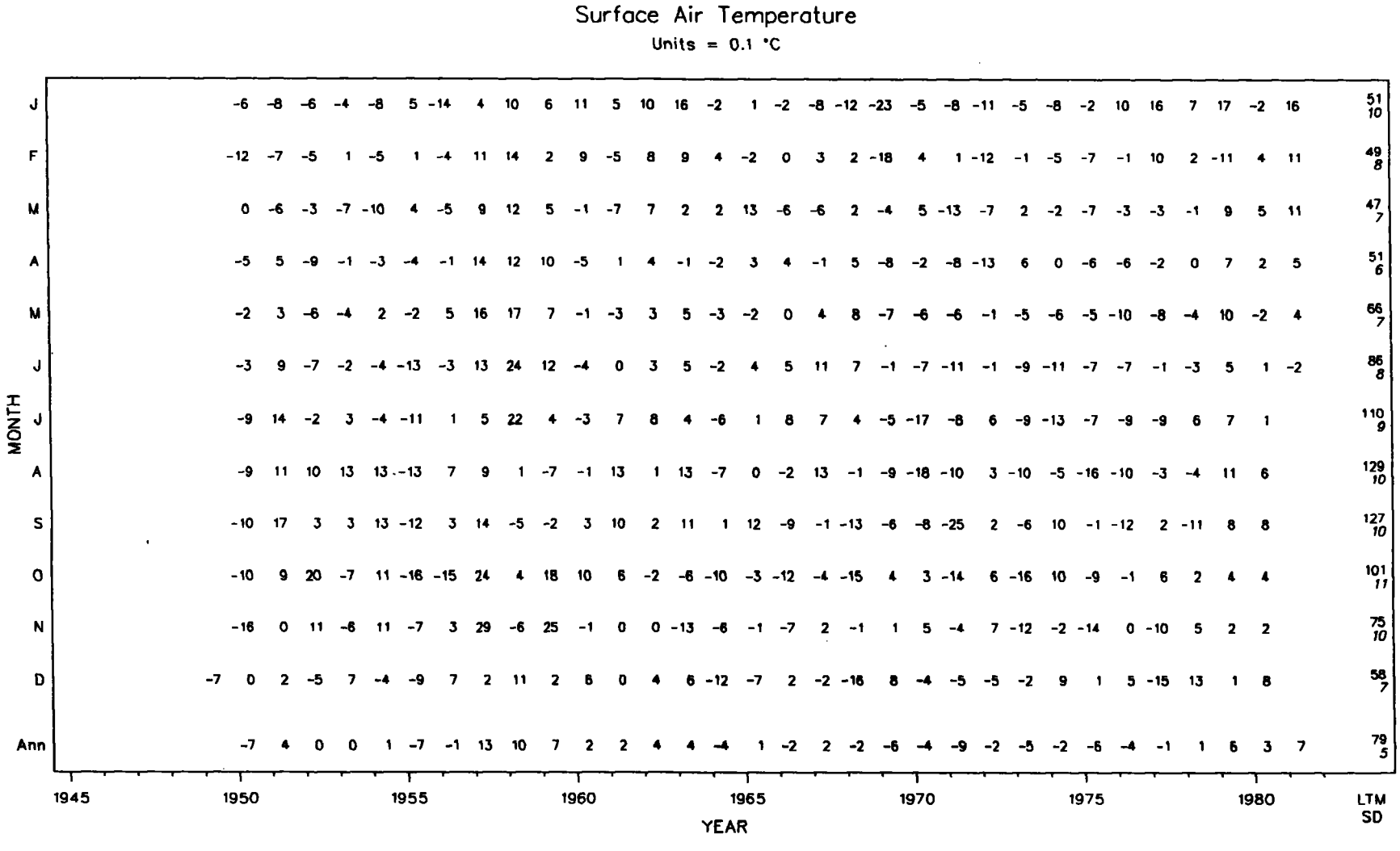
OWS Study Area P Surface Climatology

upper number = mean

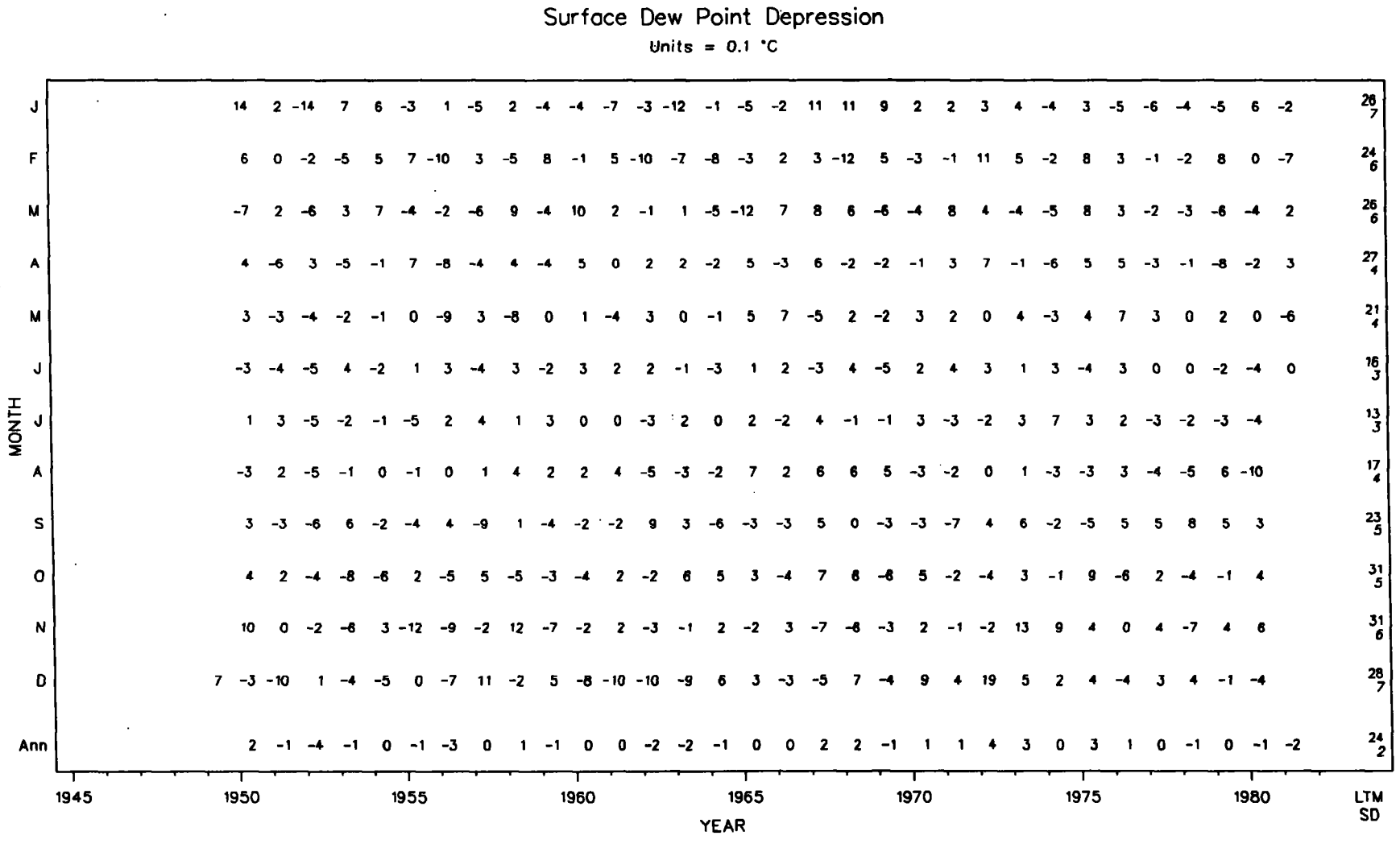
lower number = standard deviation

——— data contours

— — — — sunrise/sunset



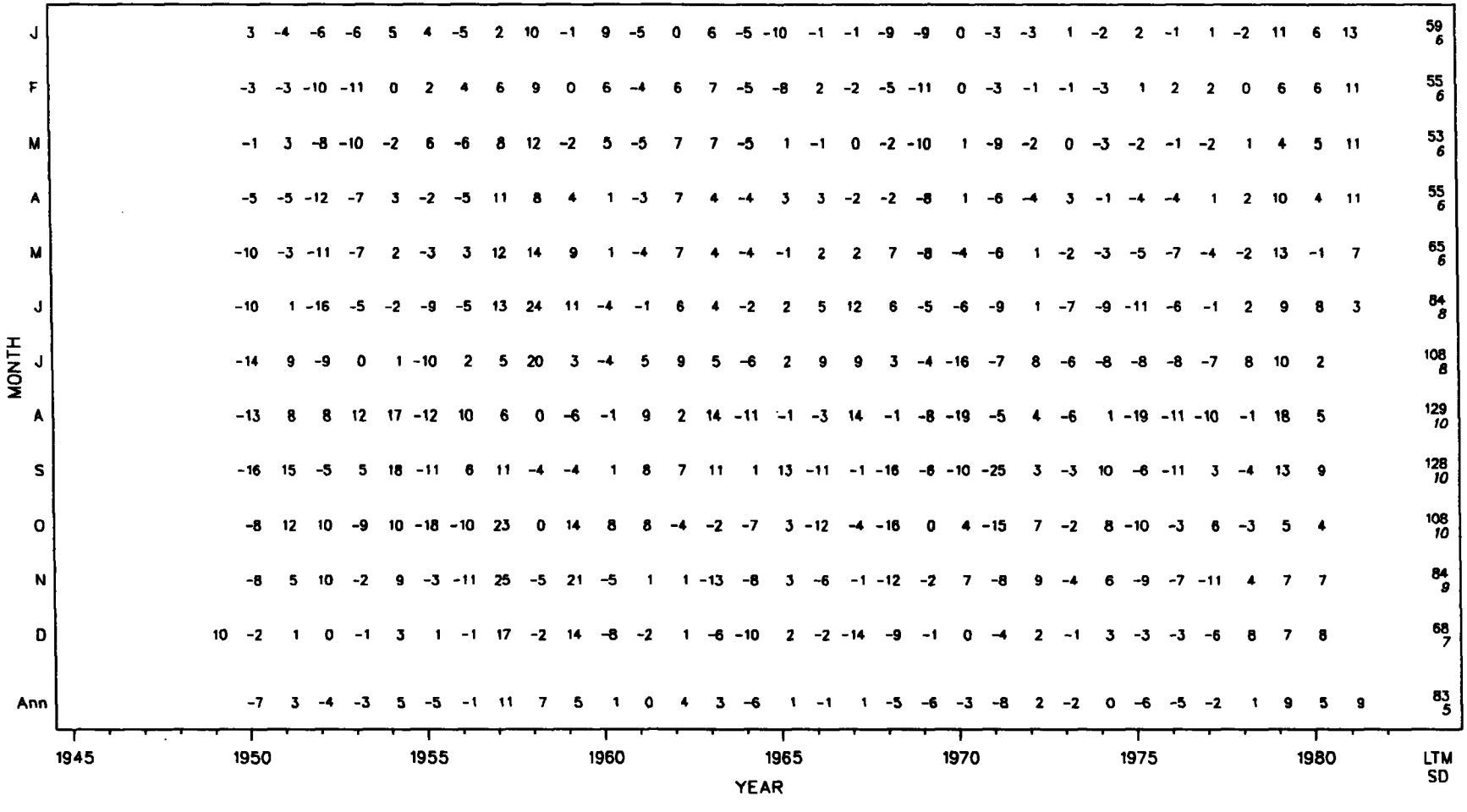
OWS Study Area P Anomalies



OWS Study Area P Anomalies

Sea Surface Temperature

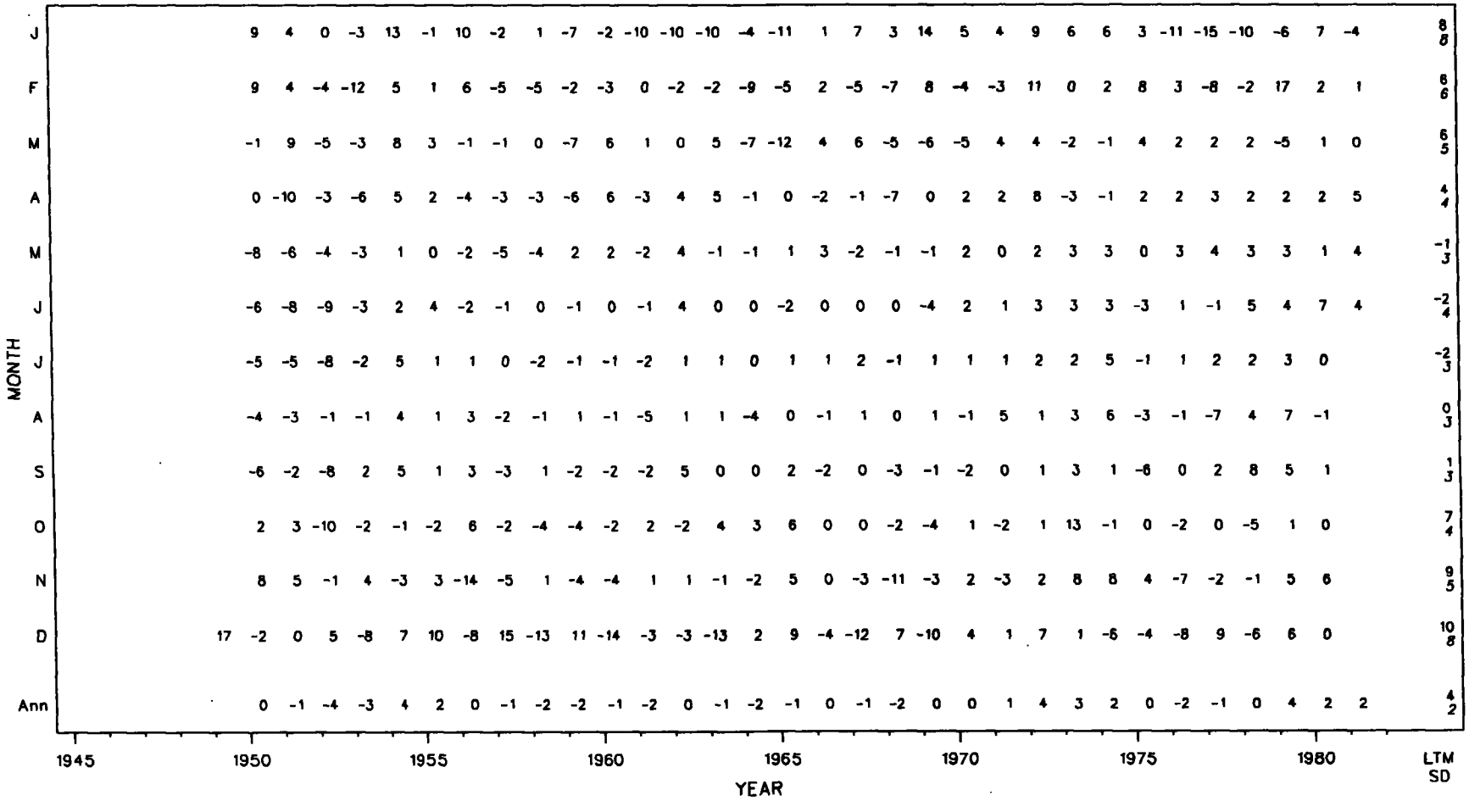
Units = 0.1 °C



OWS Study Area P Anomalies

Sea - Air Temperature Difference

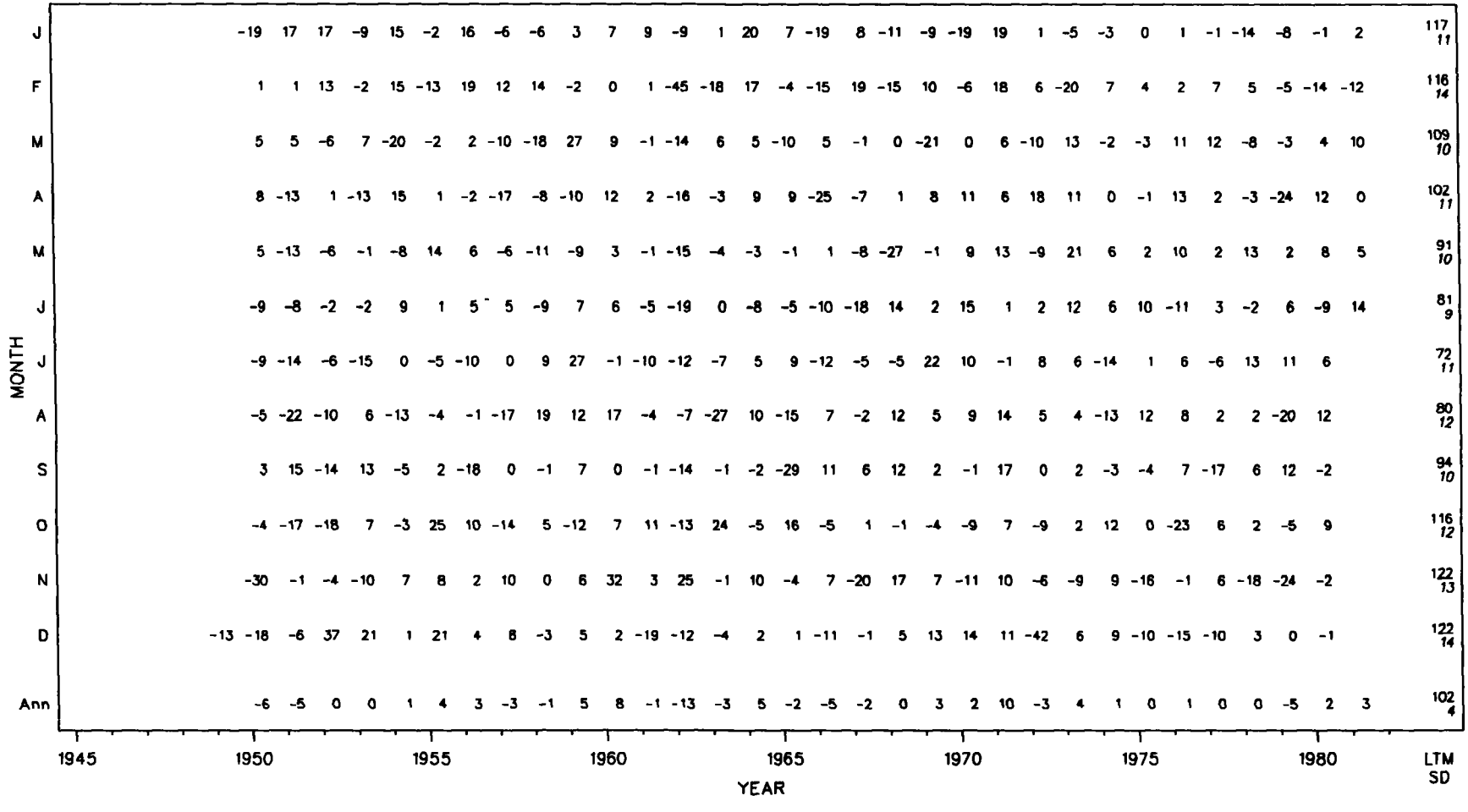
Units = 0.1 °C



OWS Study Area P Anomalies

Surface Scalar Wind

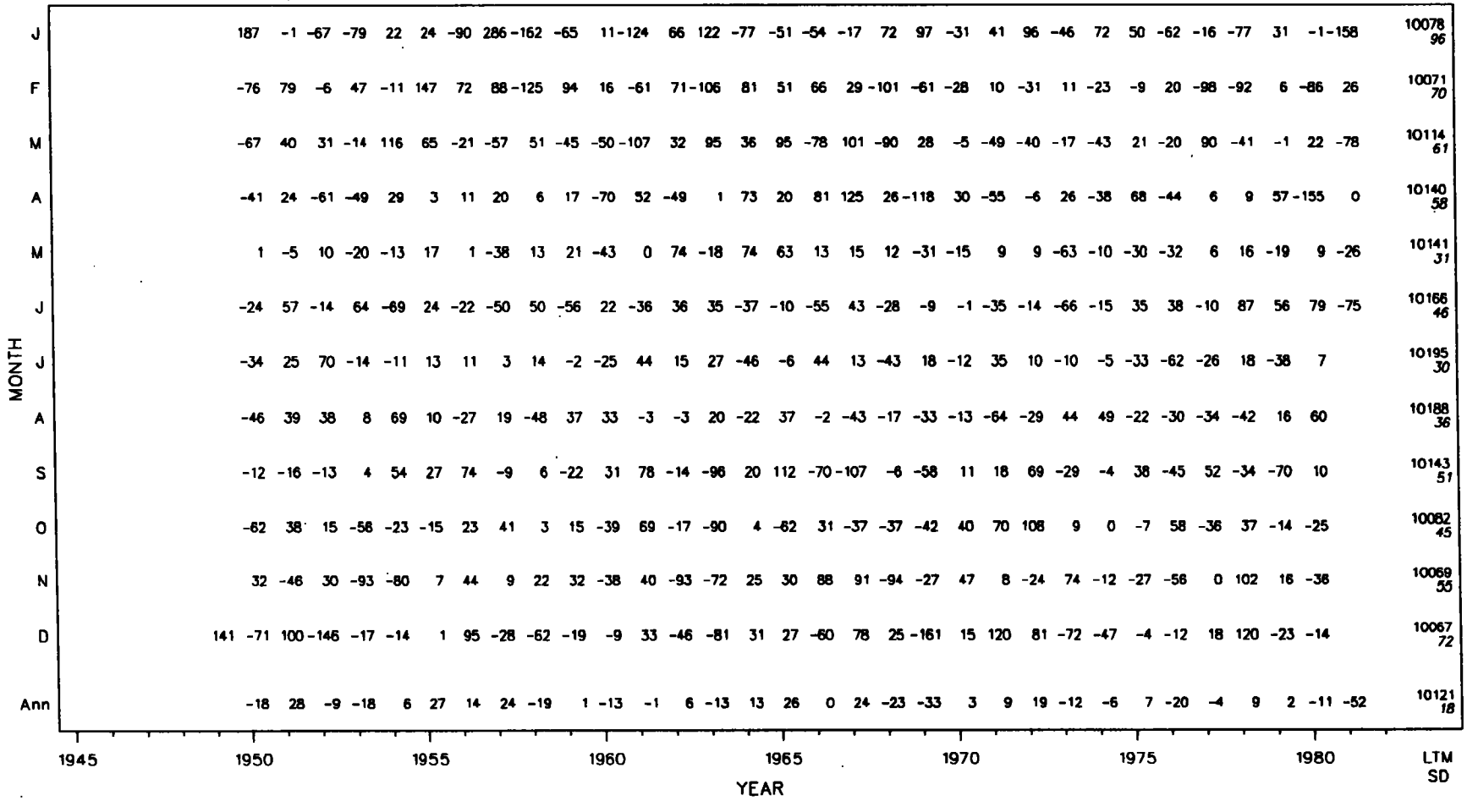
Units = 0.1 m/s



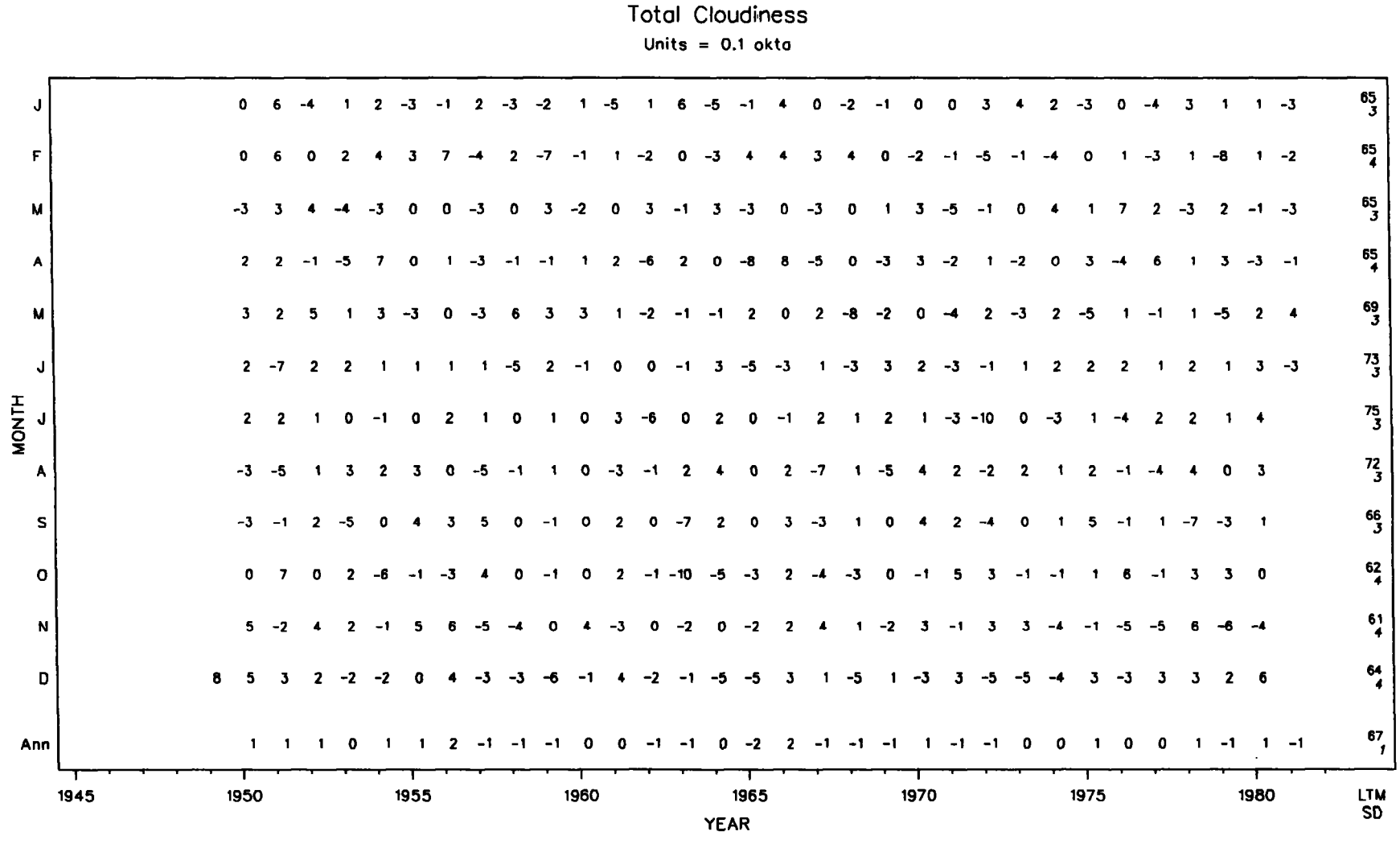
OWS Study Area P Anomalies

Sea Level Pressure

Units = 0.1 mb



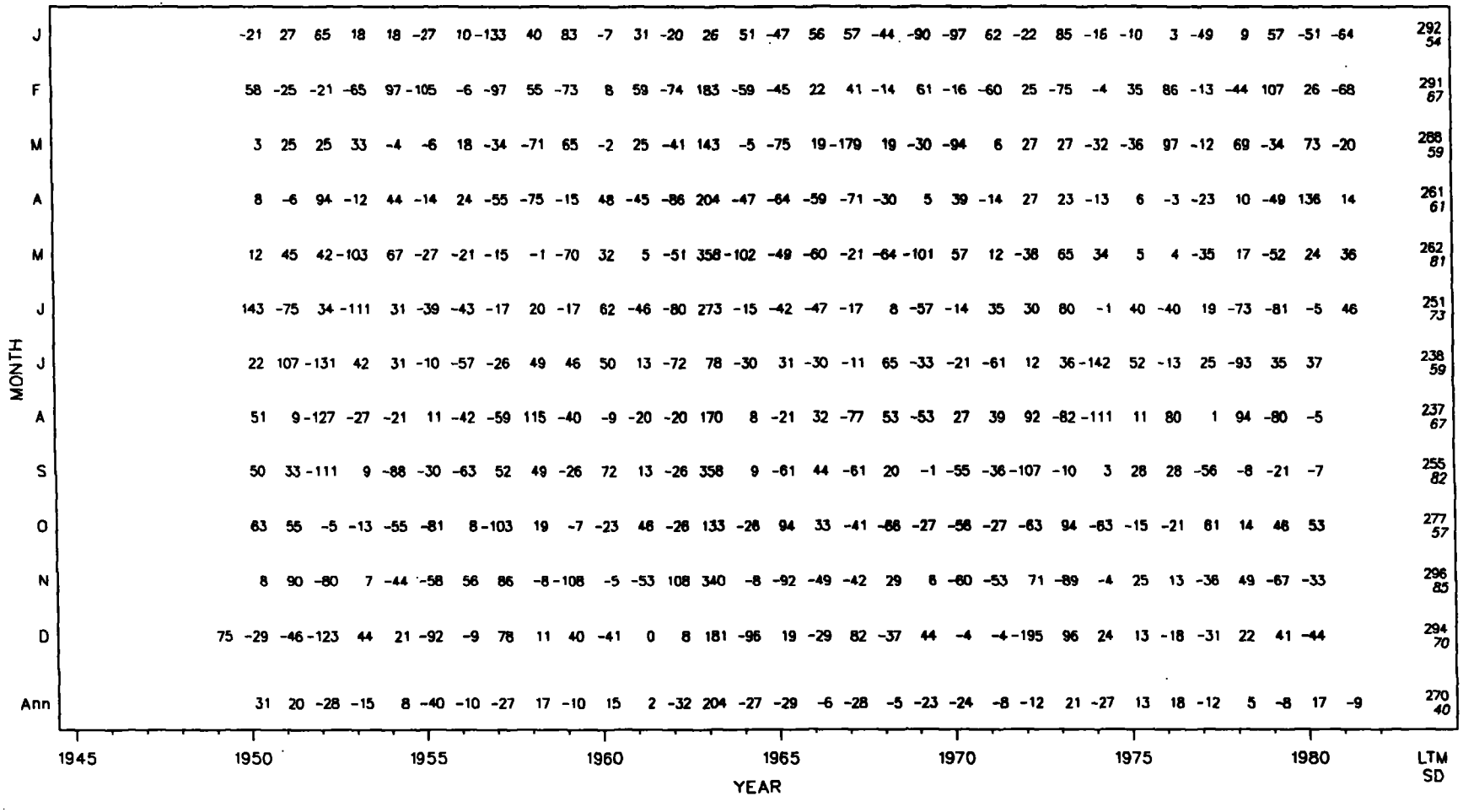
OWS Study Area P Anomalies



OWS Study Area P Anomalies

Precipitation Frequency

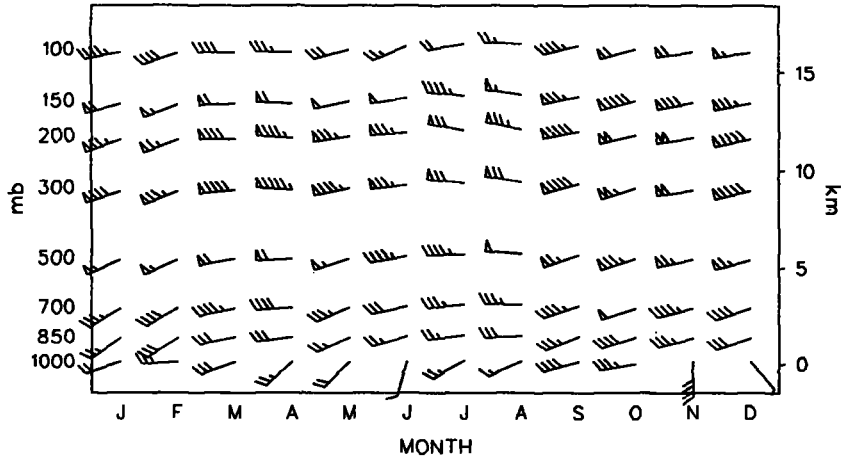
Units = 0.1 percent



OWS Study Area P Anomalies

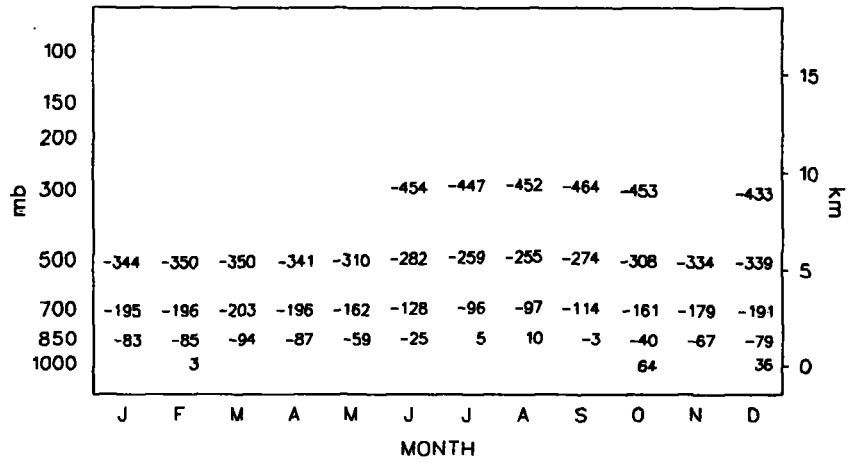
Wind

Full barb = 5 knots, Pennant = 25 knots



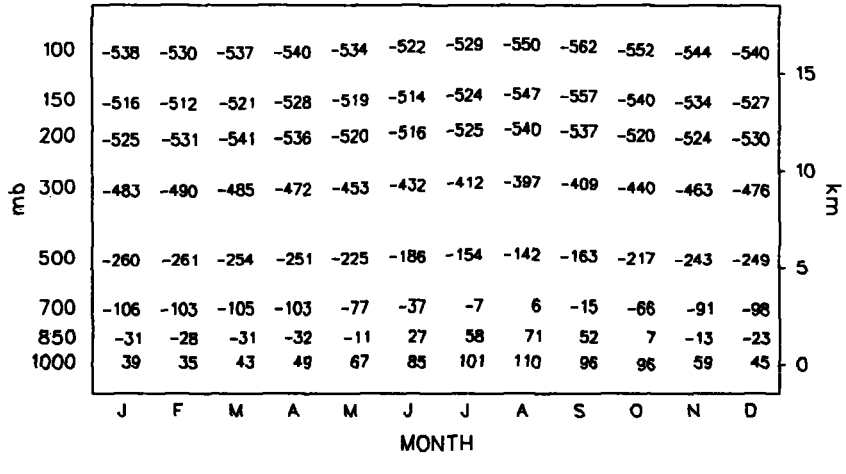
Dew Point Temperature

Units = 0.1 °C



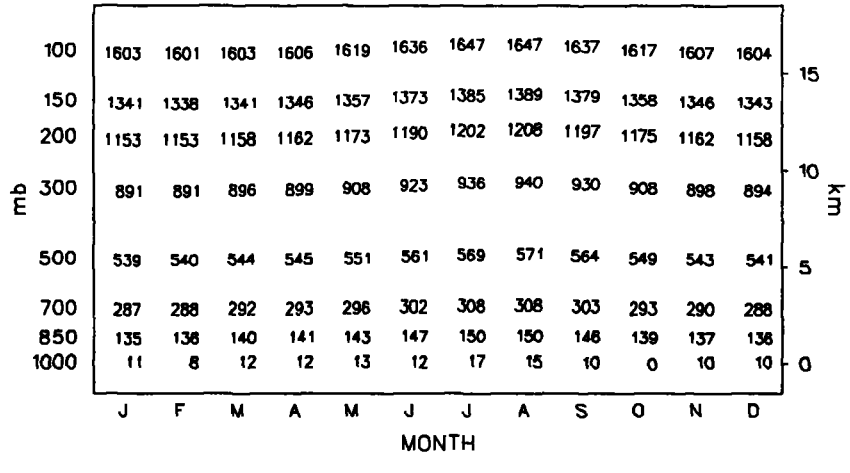
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m

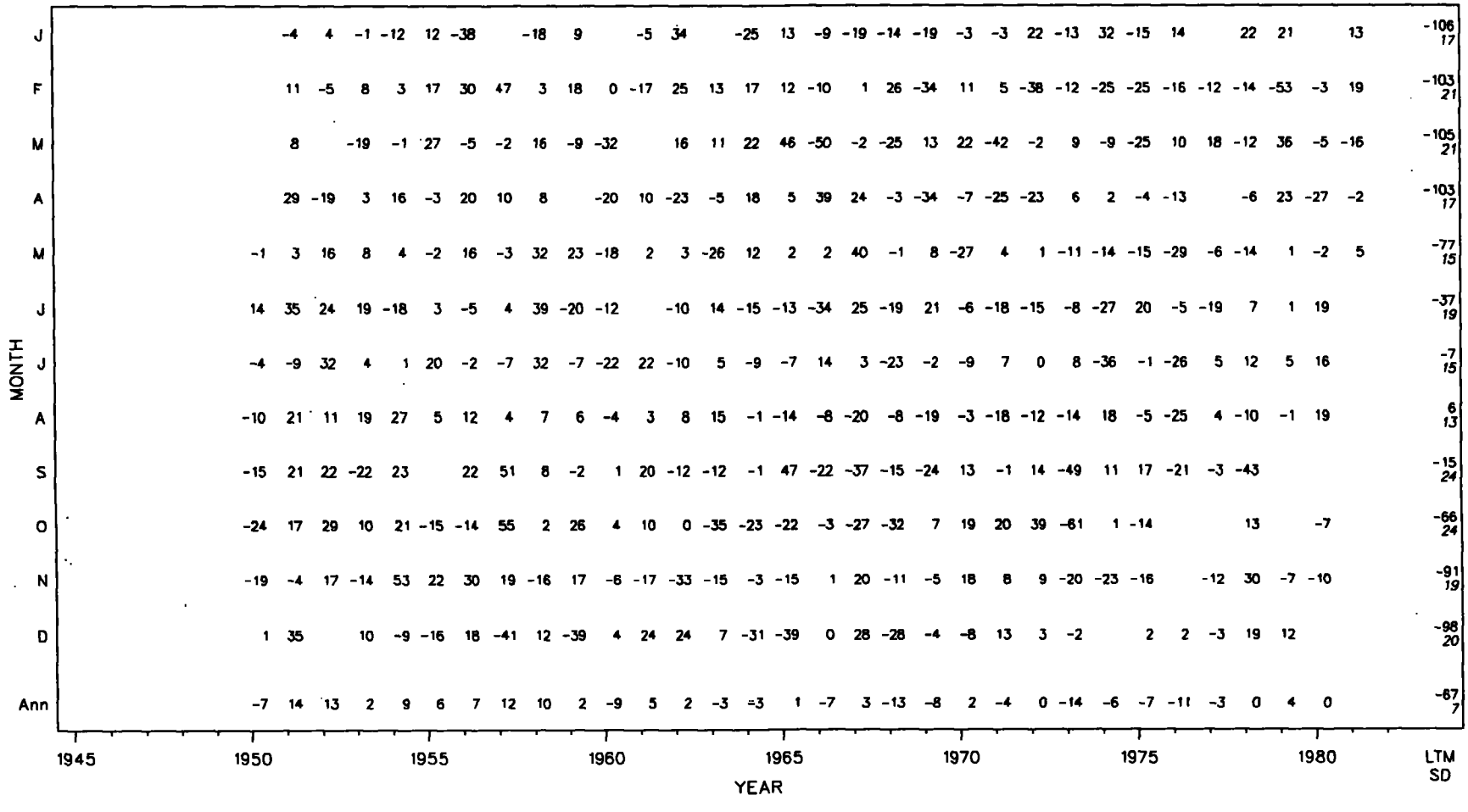


OWS Study Area P Upper Air Climatology

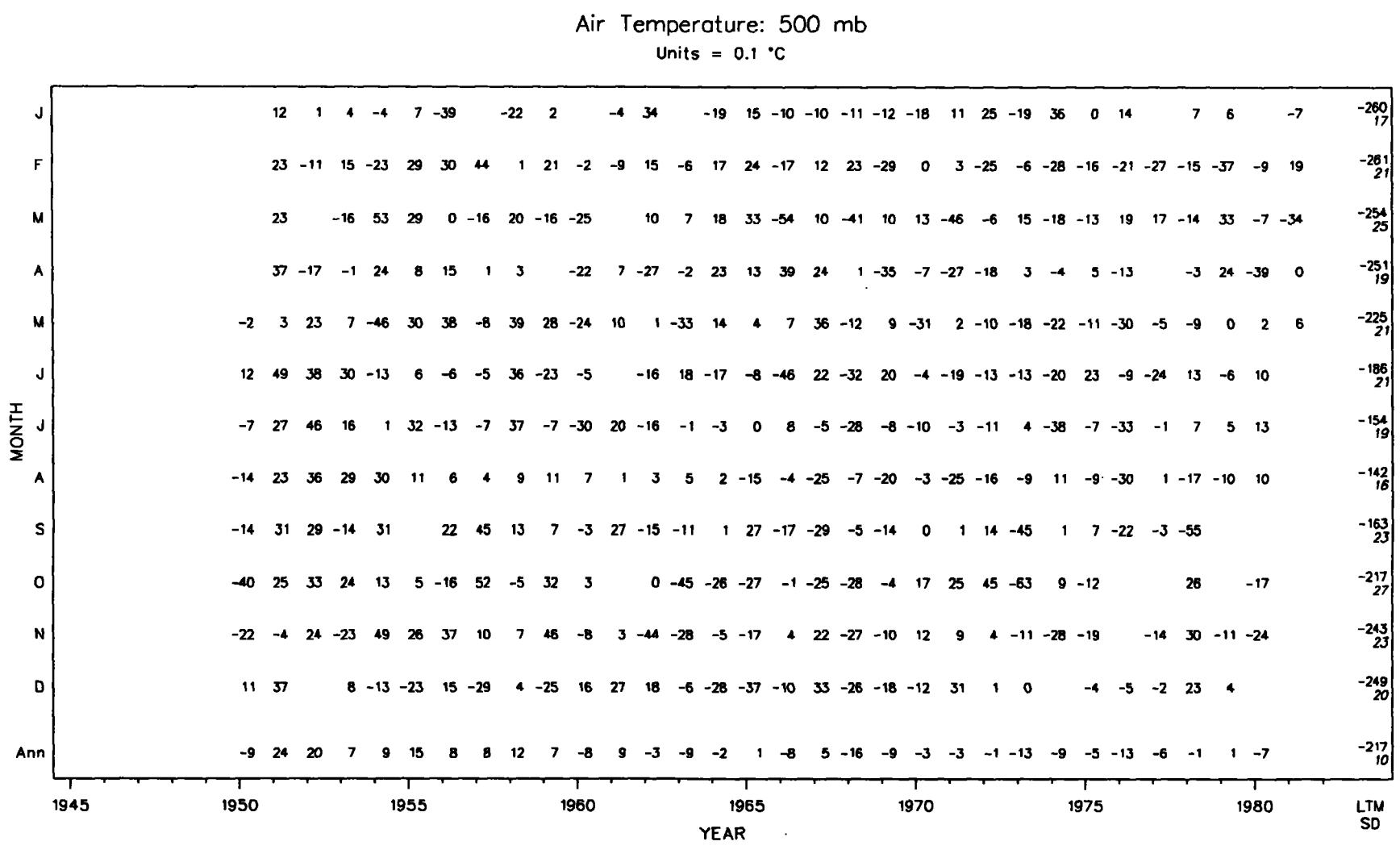
Mean plotted at actual height

Air Temperature: 700 mb

Units = 0.1 °C



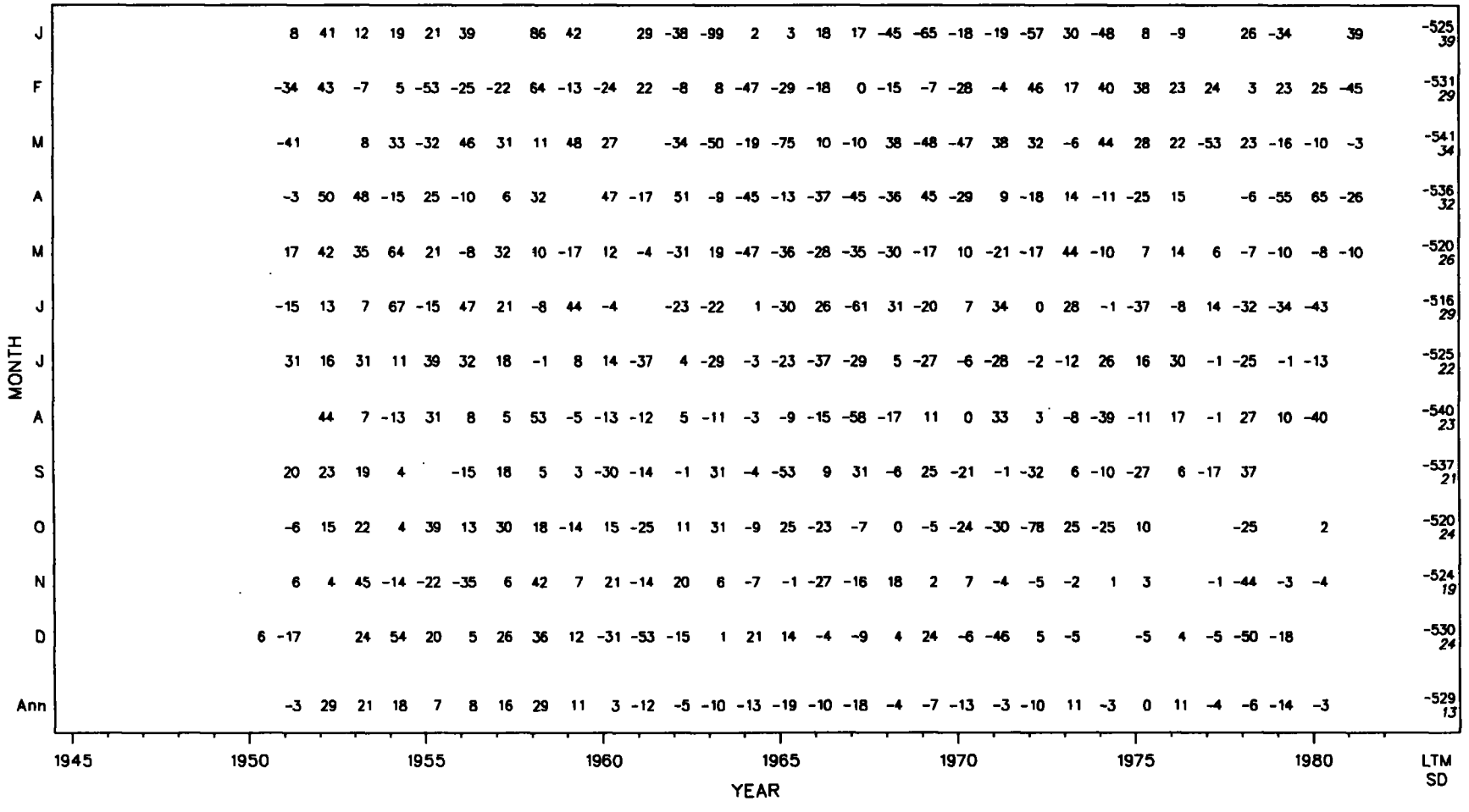
OWS Study Area P Anomalies



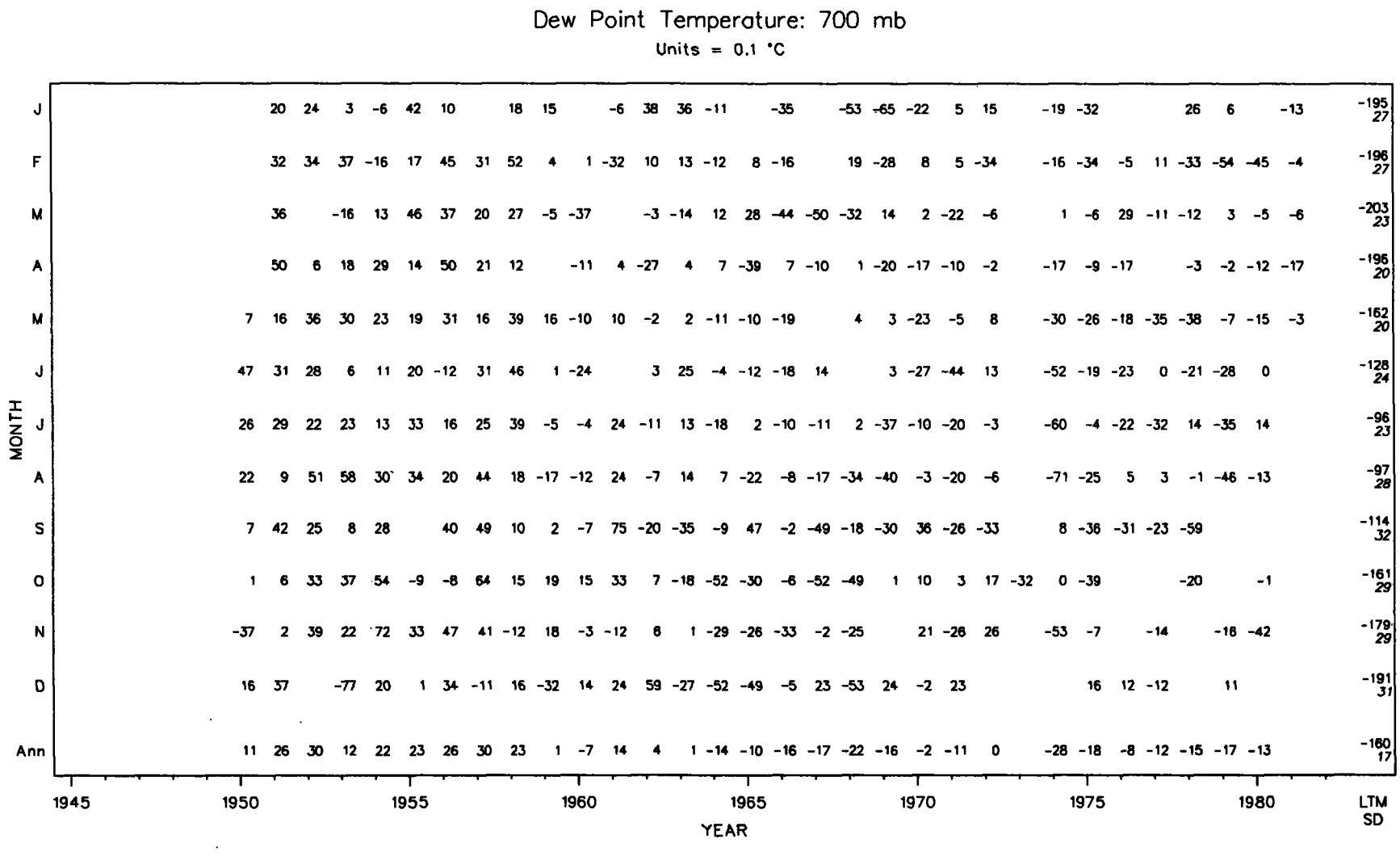
OWS Study Area P Anomalies

Air Temperature: 200 mb

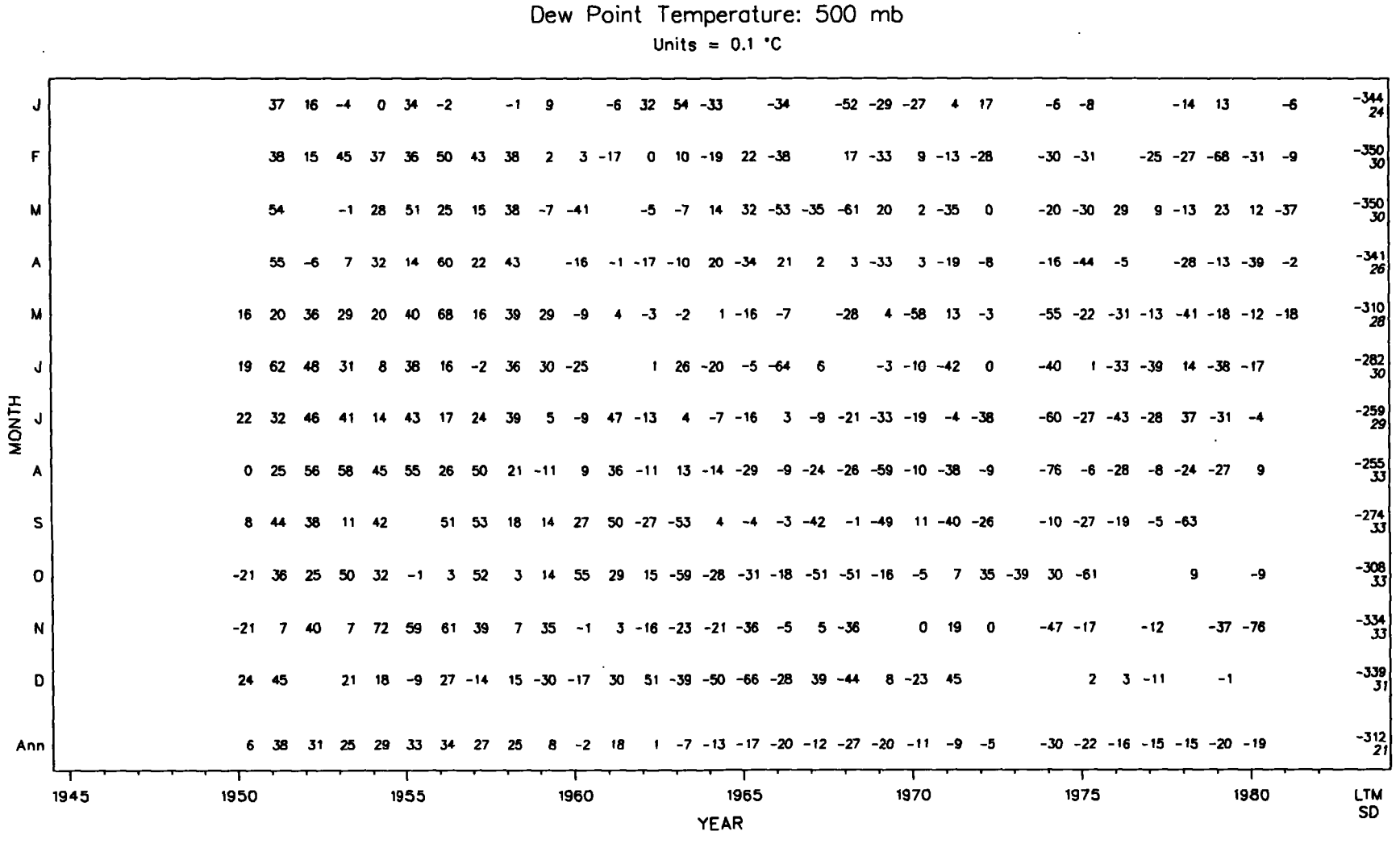
Units = 0.1 °C



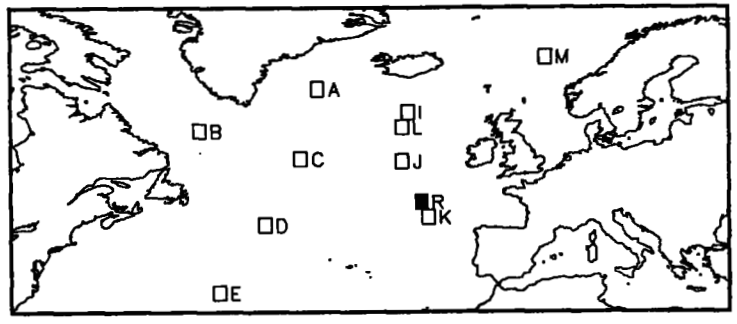
OWS Study Area P Anomalies



OWS Study Area P Anomalies

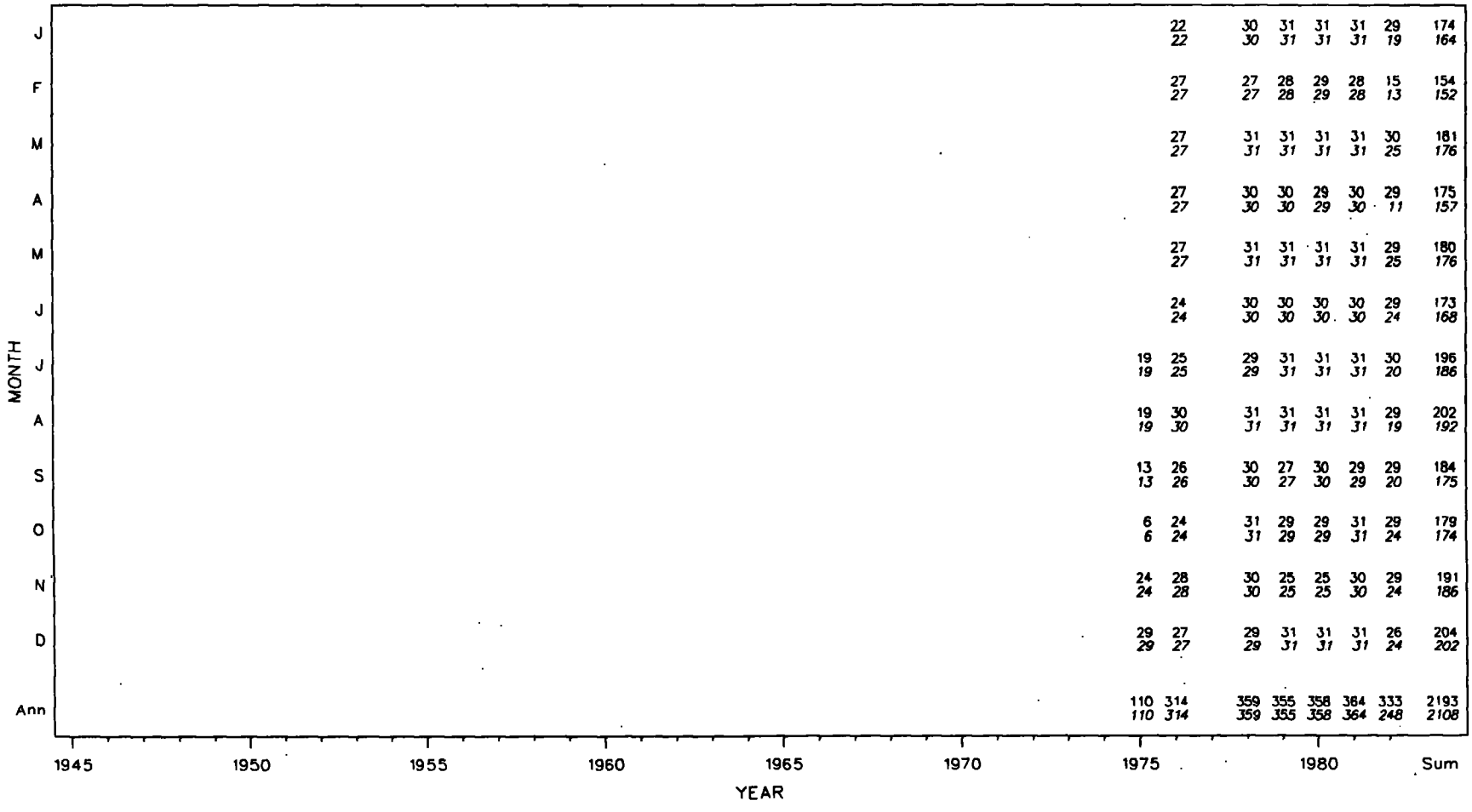


OWS Study Area P Anomalies



OWS R

46.0°N – 47.9°N, 17.9°W – 16.0°W
1975 – 1982



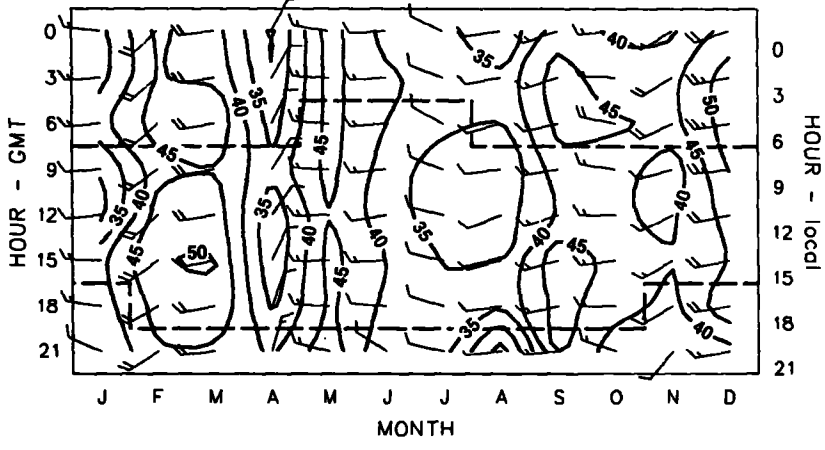
	1975		1980					
J	22 *22*		30 *30*	31 *31*	31 *31*	31 *31*	29 *19*	174 *164*
F	27 *27*		27 *27*	28 *28*	29 *29*	28 *28*	15 *13*	154 *152*
M	27 *27*		31 *31*	31 *31*	31 *31*	31 *31*	30 *25*	181 *176*
A	27 *27*		30 *30*	30 *30*	29 *29*	30 *30*	29 *11*	175 *157*
M	27 *27*		31 *31*	31 *31*	31 *31*	31 *31*	29 *25*	180 *176*
J	24 *24*		30 *30*	30 *30*	30 *30*	30 *30*	29 *24*	173 *168*
J	19 *19*	25 *25*	29 *29*	31 *31*	31 *31*	31 *31*	30 *20*	196 *186*
A	19 *19*	30 *30*	31 *31*	31 *31*	31 *31*	31 *31*	29 *19*	202 *192*
S	13 *13*	26 *26*	30 *30*	27 *27*	30 *30*	29 *29*	29 *20*	184 *175*
O	6 *6*	24 *24*	31 *31*	29 *29*	29 *29*	31 *31*	29 *24*	179 *174*
N	24 *24*	28 *28*	30 *30*	25 *25*	25 *25*	30 *30*	29 *24*	191 *186*
D	29 *29*	27 *27*	29 *29*	31 *31*	31 *31*	31 *31*	26 *24*	204 *202*
Ann	110 *110*	314 *314*	359 *359*	355 *355*	358 *358*	364 *364*	333 *248*	2193 *2108*

OWS Study Area R (47.0°N, 17.0°W)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 5 percent



Pressure

Units = 0.1 mb

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	196 *129*	105 *158*	141 *115*	207 *104*	166 *90*	188 *85*	221 *72*	203 *66*	187 *86*	152 *104*	194 *101*	132 *159*
3	189 *130*	107 *158*	128 *115*	200 *103*	150 *92*	181 *85*	215 *74*	194 *66*	175 *88*	143 *106*	189 *103*	122 *163*
6	184 *134*	100 *161*	128 *118*	197 *102*	151 *92*	178 *83*	210 *75*	195 *64*	171 *88*	141 *105*	190 *102*	123 *164*
9	194 *132*	108 *155*	132 *120*	205 *102*	156 *92*	188 *82*	215 *71*	202 *67*	181 *86*	144 *103*	192 *108*	124 *168*
12	193 *132*	115 *156*	139 *117*	208 *102*	158 *94*	189 *83*	217 *73*	202 *66*	177 *96*	154 *102*	198 *109*	132 *167*
15	186 *129*	098 *160*	132 *113*	208 *102*	157 *93*	191 *82*	215 *74*	202 *67*	176 *86*	146 *103*	191 *98*	130 *165*
18	185 *128*	104 *153*	126 *114*	206 *101*	155 *92*	186 *83*	210 *73*	201 *66*	170 *92*	140 *104*	194 *101*	126 *161*
21	198 *128*	112 *166*	116 *119*	206 *100*	153 *91*	207 *73*	215 *78*	199 *66*	187 *89*	156 *108*	210 *101*	122 *167*

HOUR - local

MONTH

Total Cloudiness

Units = 0.1 okta

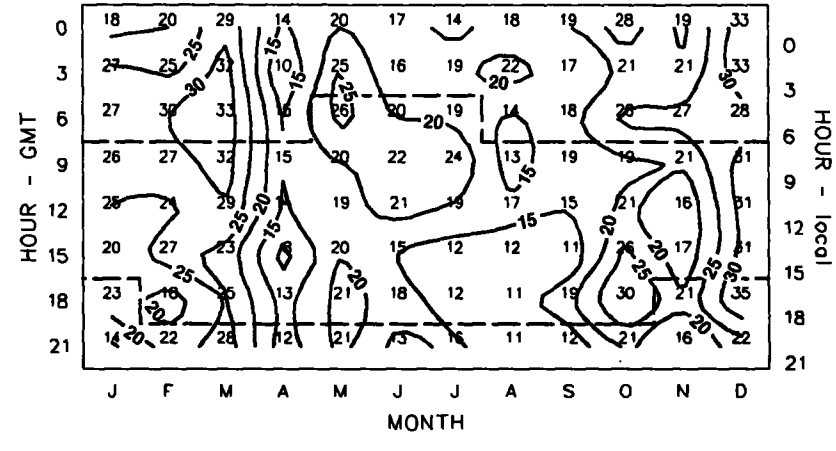
HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	55 *25*	53 *27*	56 *26*	57 *26*	57 *24*	58 *25*	62 *23*	54 *27*	50 *28*	61 *23*	58 *24*	60 *23*
3	54 *26*	55 *25*	58 *25*	54 *28*	55 *27*	55 *27*	62 *23*	52 *29*	52 *26*	56 *25*	58 *25*	58 *24*
6	56 *24*	58 *25*	59 *22*	59 *21*	60 *21*	62 *19*	64 *19*	59 *22*	55 *23*	58 *23*	61 *24*	57 *24*
9	62 *18*	60 *21*	63 *17*	62 *20*	61 *21*	62 *22*	66 *18*	59 *19*	62 *18*	60 *19*	64 *17*	64 *18*
12	60 *20*	62 *19*	63 *16*	59 *22*	61 *21*	61 *21*	61 *24*	56 *22*	58 *21*	62 *18*	62 *19*	63 *17*
15	62 *18*	61 *19*	62 *18*	58 *22*	58 *22*	62 *22*	58 *22*	53 *23*	55 *22*	61 *20*	64 *17*	64 *17*
18	62 *17*	60 *17*	62 *18*	59 *21*	57 *23*	59 *24*	59 *22*	55 *22*	57 *22*	62 *19*	63 *19*	63 *19*
21	58 *23*	57 *23*	60 *22*	57 *22*	61 *20*	61 *23*	62 *21*	57 *23*	48 *25*	56 *24*	57 *26*	59 *24*

HOUR - local

MONTH

Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area R Surface Climatology

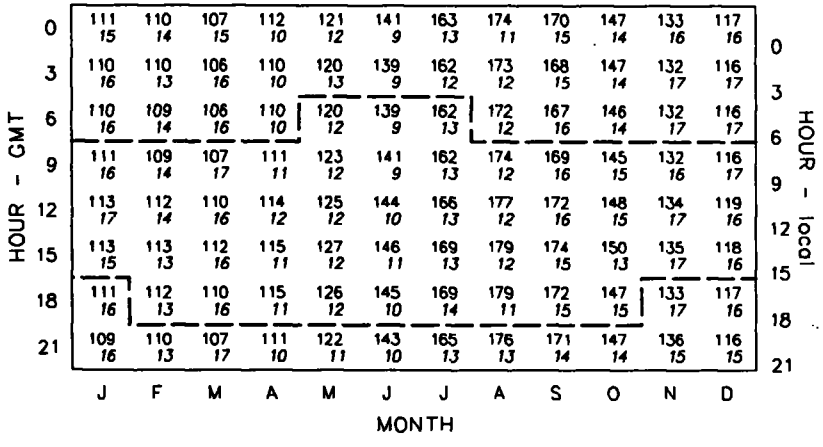
upper number = mean
lower number = standard deviation

——— data contours
— — — — sunrise/sunset

R2

Air Temperature

Units = 0.1 °C

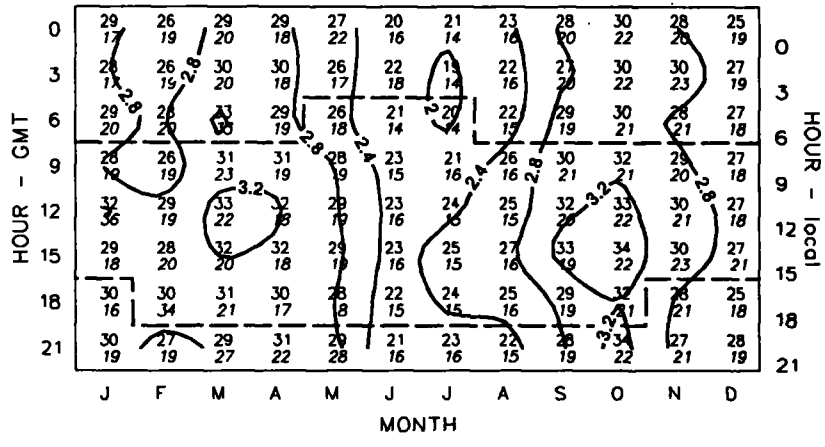


HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	111 15	110 14	107 15	112 10	121 12	141 9	163 13	174 11	170 15	147 14	133 16	117 16
3	110 16	110 13	106 16	110 10	120 13	139 9	162 12	173 12	168 15	147 14	132 17	116 17
6	110 16	109 14	106 16	110 10	120 12	139 9	162 13	172 12	167 16	146 14	132 17	116 17
9	111 16	109 14	107 17	111 11	123 12	141 9	162 13	174 12	169 16	145 15	132 16	116 17
12	113 17	112 14	110 16	114 12	125 12	144 10	166 13	177 12	172 16	148 15	134 17	119 16
15	113 15	113 13	112 16	115 11	127 12	146 11	169 13	179 12	174 15	150 13	135 17	118 16
18	111 16	112 13	110 16	115 11	126 12	145 10	169 14	179 11	172 15	147 15	133 17	117 16
21	109 16	110 13	107 17	111 10	122 11	143 10	165 13	176 13	171 14	147 14	136 15	116 15

Dew Point Depression

Units = 0.1 °C

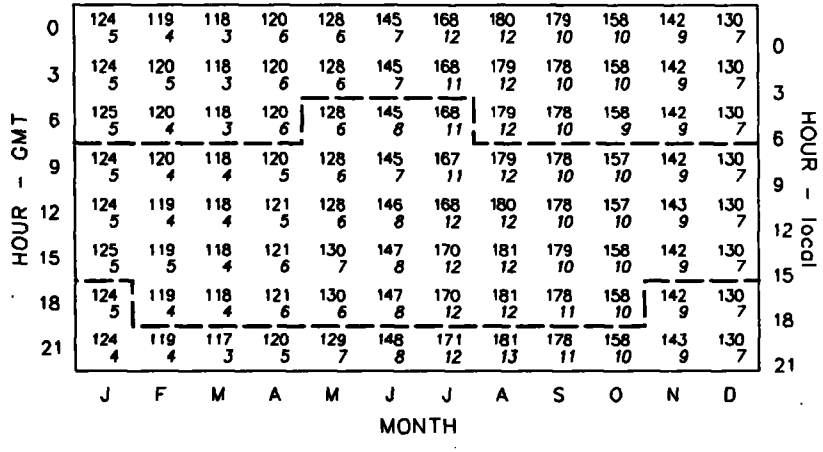
Contour interval = 0.4 °C



HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	29 17	26 19	29 20	29 18	27 22	20 16	21 14	23 16	28 20	30 22	28 20	25 19
3	28 17	26 19	30 20	30 18	26 17	22 18	19 14	22 16	27 20	30 22	30 23	27 19
6	29 20	28 20	33 20	29 19	26 18	21 14	20 14	22 15	29 19	30 21	28 21	27 18
9	28 19	26 19	31 23	31 19	28 19	23 15	21 16	26 16	30 21	32 21	29 20	27 18
12	32 36	29 19	33 22	32 18	29 19	23 16	24 16	25 15	32 20	33 22	30 21	27 18
15	29 18	28 20	32 20	32 18	29 19	23 16	25 15	27 16	33 19	34 22	30 23	27 21
18	30 16	30 34	31 21	30 17	28 18	22 15	24 15	25 16	29 19	32 21	28 21	25 18
21	30 19	27 19	29 27	31 22	29 28	21 16	23 16	22 15	28 19	34 22	27 21	28 19

Sea Surface Temperature

Units = 0.1 °C

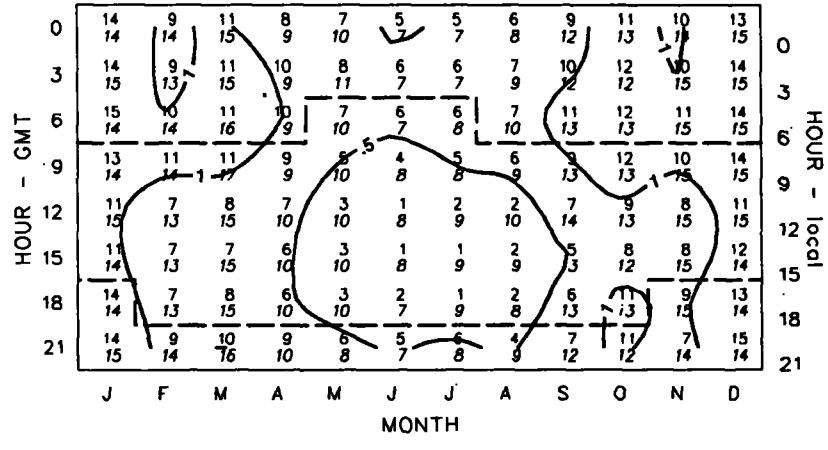


HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	124 5	119 4	118 3	120 6	128 6	145 7	168 12	180 12	179 10	158 10	142 9	130 7
3	124 5	120 5	118 3	120 6	128 6	145 7	168 11	179 12	178 10	158 10	142 9	130 7
6	125 5	120 4	118 3	120 6	128 6	145 8	168 11	179 12	178 10	158 9	142 9	130 7
9	124 5	120 4	118 4	120 5	128 6	145 7	167 11	179 12	178 10	157 10	142 9	130 7
12	124 5	119 4	118 4	121 5	128 6	146 8	168 12	180 12	178 10	157 10	143 9	130 7
15	125 5	119 5	118 4	121 6	130 7	147 8	170 12	181 12	179 10	158 10	142 9	130 7
18	124 5	119 4	118 4	121 6	130 6	147 8	170 12	181 12	178 11	158 10	142 9	130 7
21	124 4	119 4	117 3	120 5	129 7	148 8	171 12	181 13	178 11	158 10	143 9	130 7

Sea - Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	14 14	9 14	11 15	8 9	7 10	5 7	5 7	6 8	9 12	11 13	10 11	13 15
3	14 15	9 13	11 15	10 9	8 11	6 7	6 7	7 9	10 12	12 12	10 15	14 15
6	15 14	10 14	11 16	10 9	7 10	6 7	6 8	7 10	11 13	12 13	11 15	14 15
9	13 14	11 14	11 17	9 9	5 10	4 8	5 8	6 9	9 13	12 13	10 15	14 15
12	11 15	7 13	8 15	7 10	3 10	1 8	2 9	2 10	7 14	9 13	8 15	11 15
15	11 14	7 13	7 15	6 10	3 10	1 8	1 9	2 9	5 13	8 12	8 15	12 14
18	14 14	7 13	8 15	6 10	3 10	2 7	1 9	2 8	6 13	11 13	9 15	13 14
21	14 15	9 14	10 16	9 10	6 8	5 7	6 8	4 9	7 12	11 12	7 14	15 14

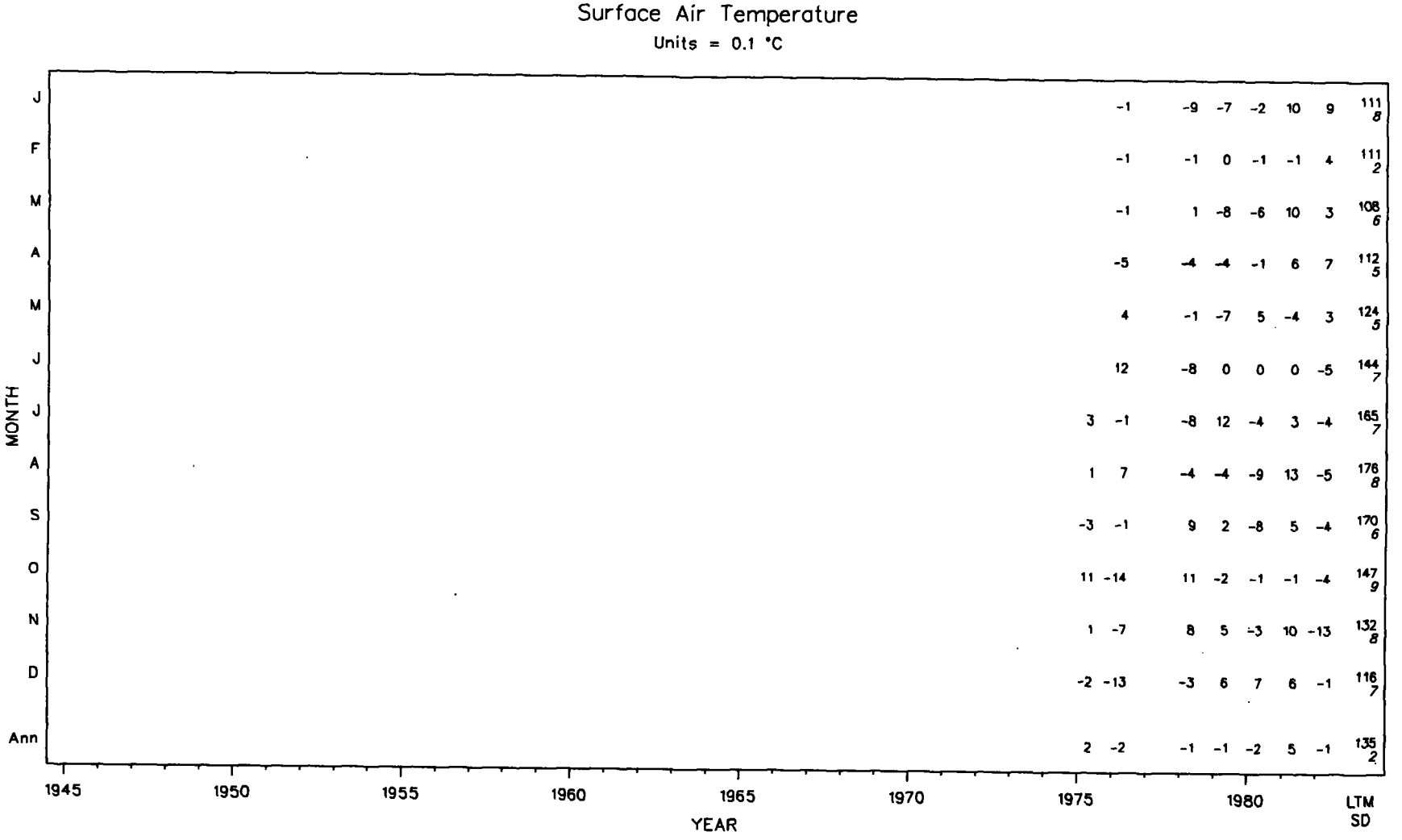
OWS Study Area R Surface Climatology

upper number = mean

lower number = standard deviation

——— data contours

— — — — sunrise/sunset

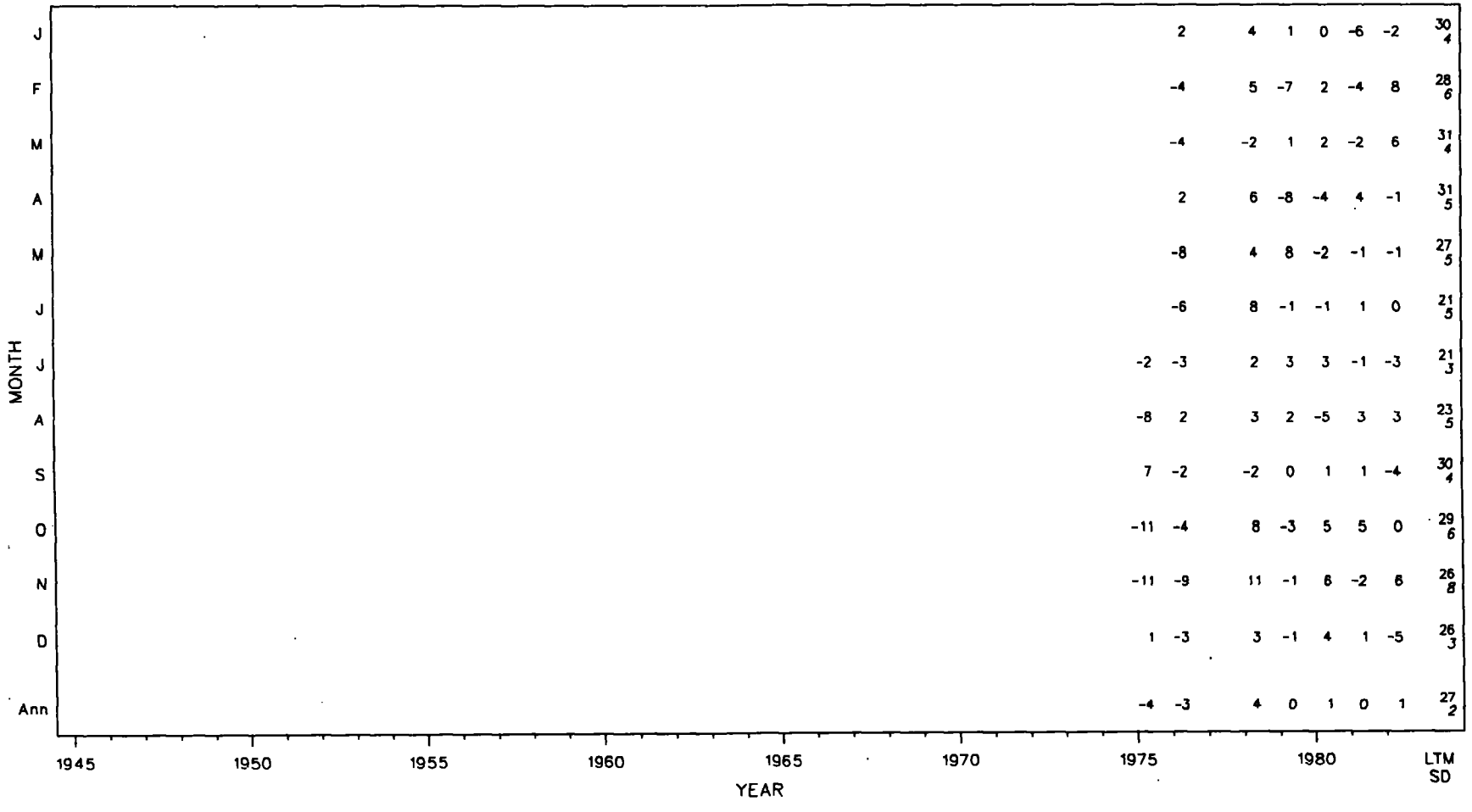


OWS Study Area R Anomalies

R4

Surface Dew Point Depression

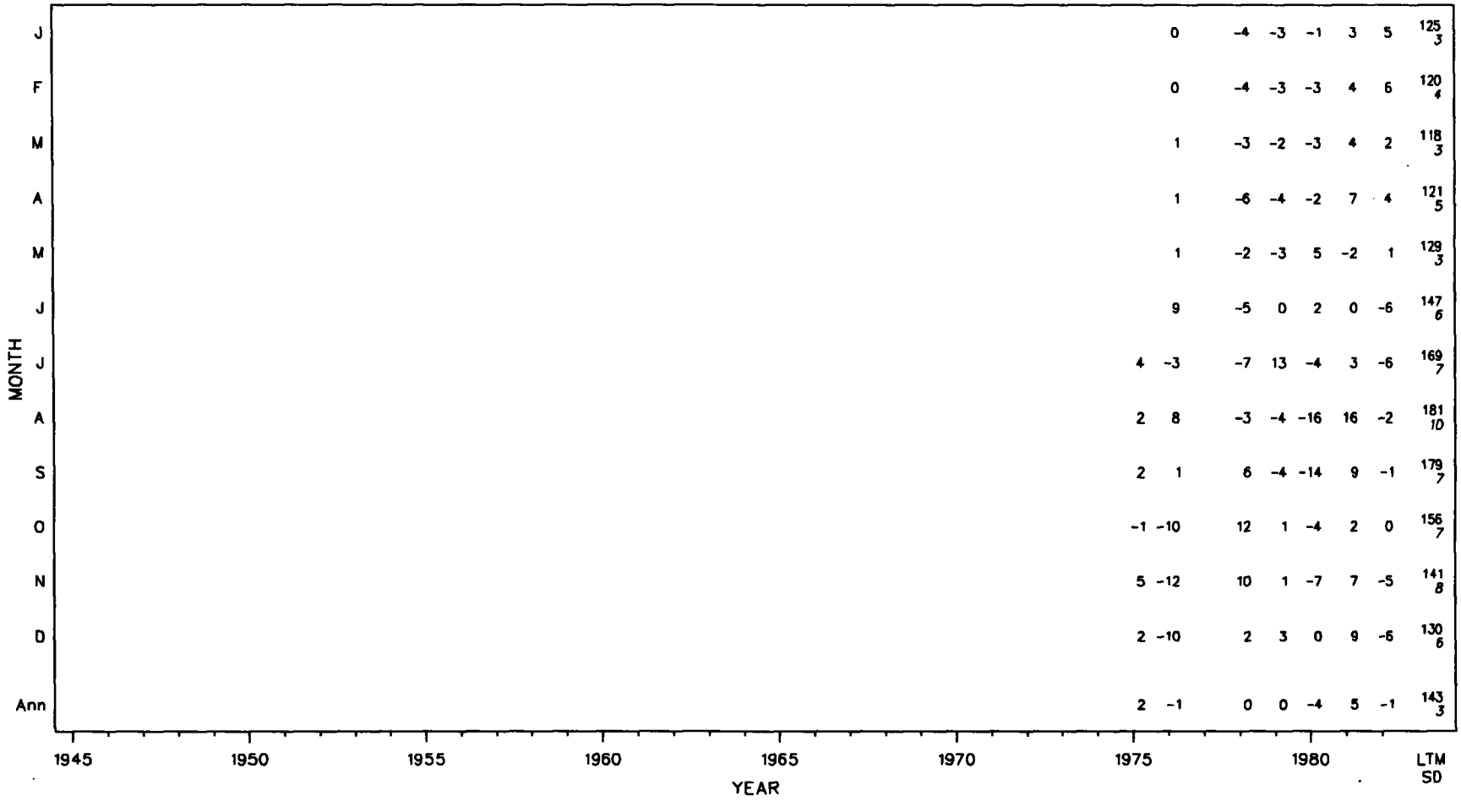
Units = 0.1 °C



OWS Study Area R Anomalies

Sea Surface Temperature

Units = 0.1 °C

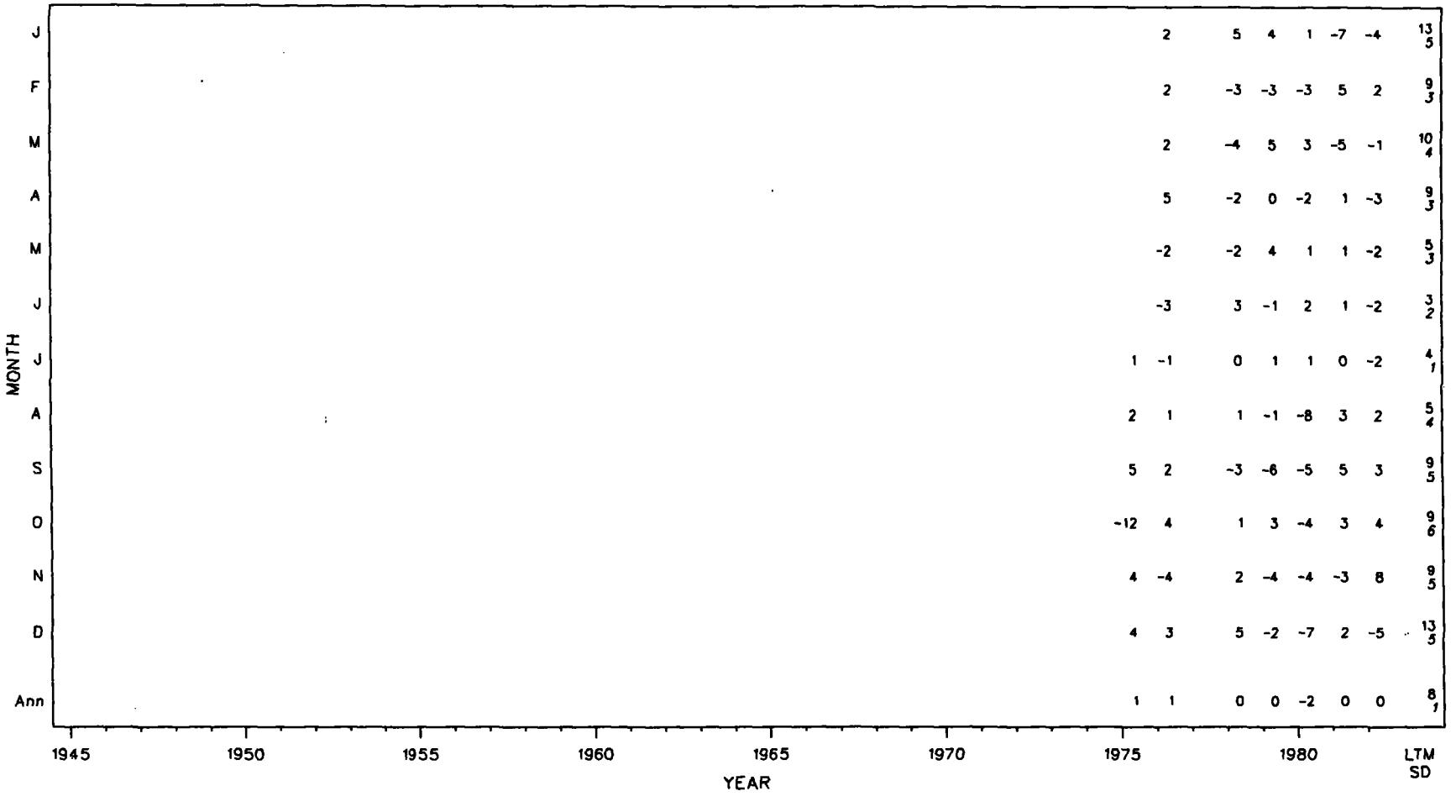


OWS Study Area R Anomalies

R6

Sea - Air Temperature Difference

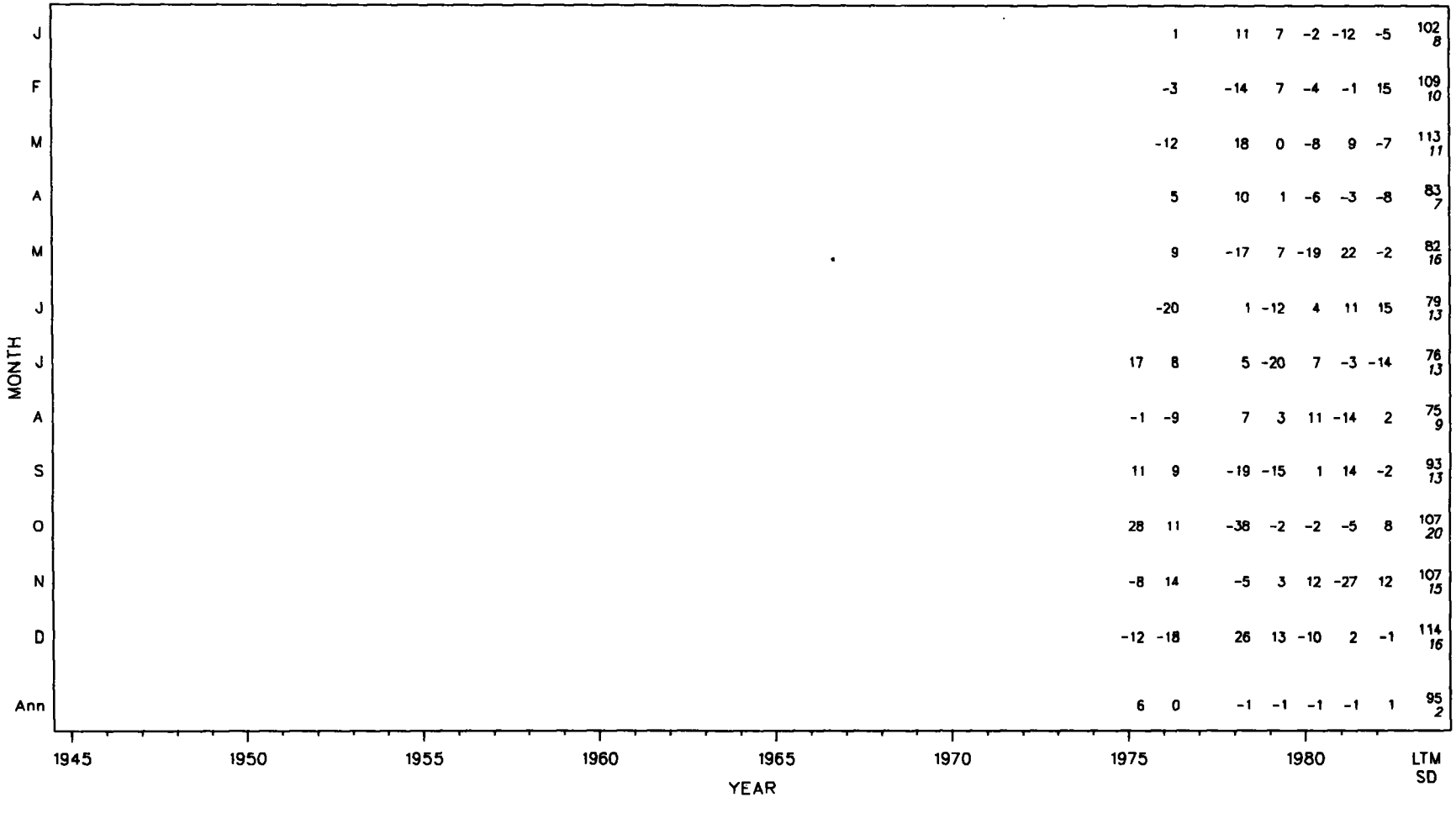
Units = 0.1 °C



OWS Study Area R Anomalies

Surface Scalar Wind

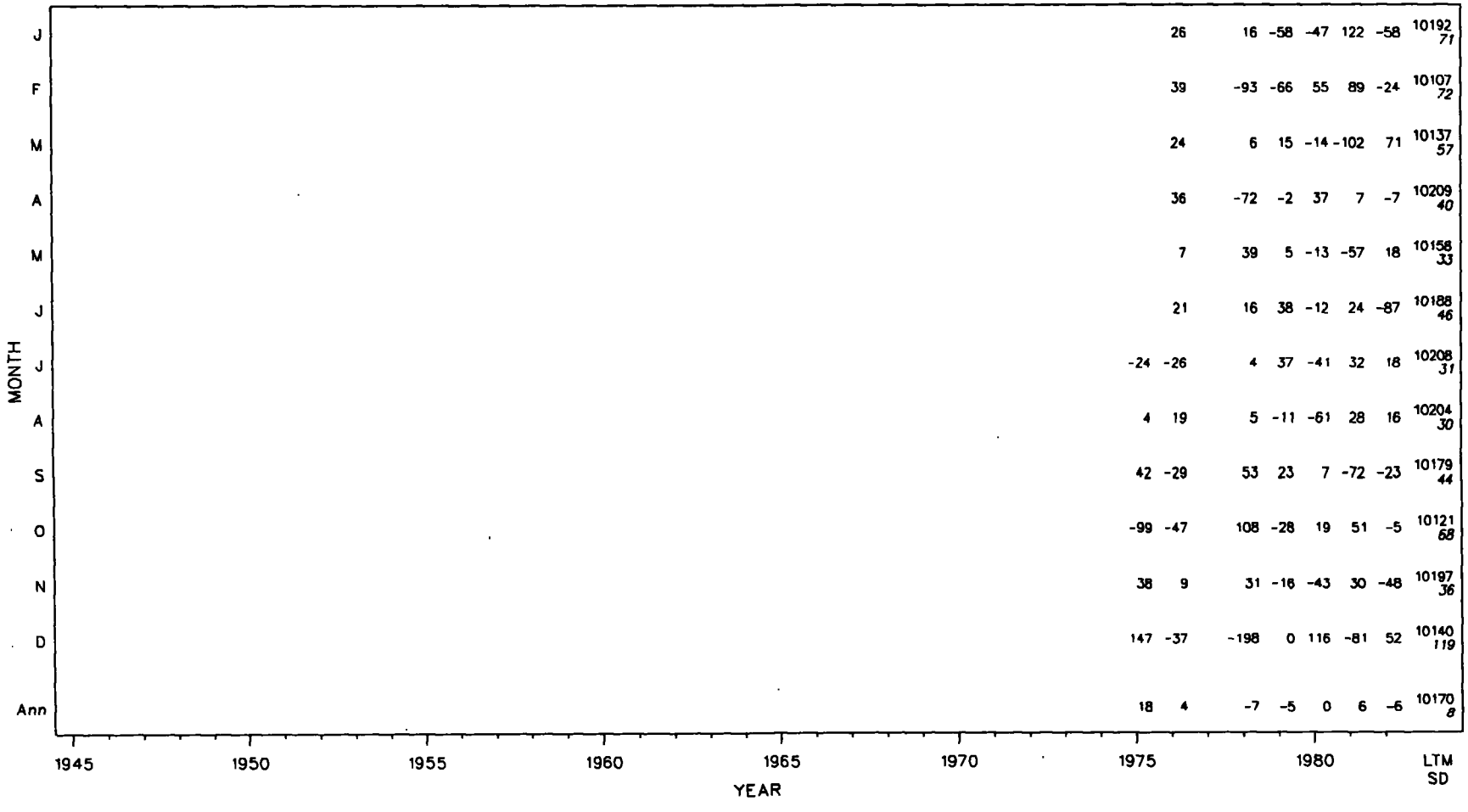
Units = 0.1 m/s



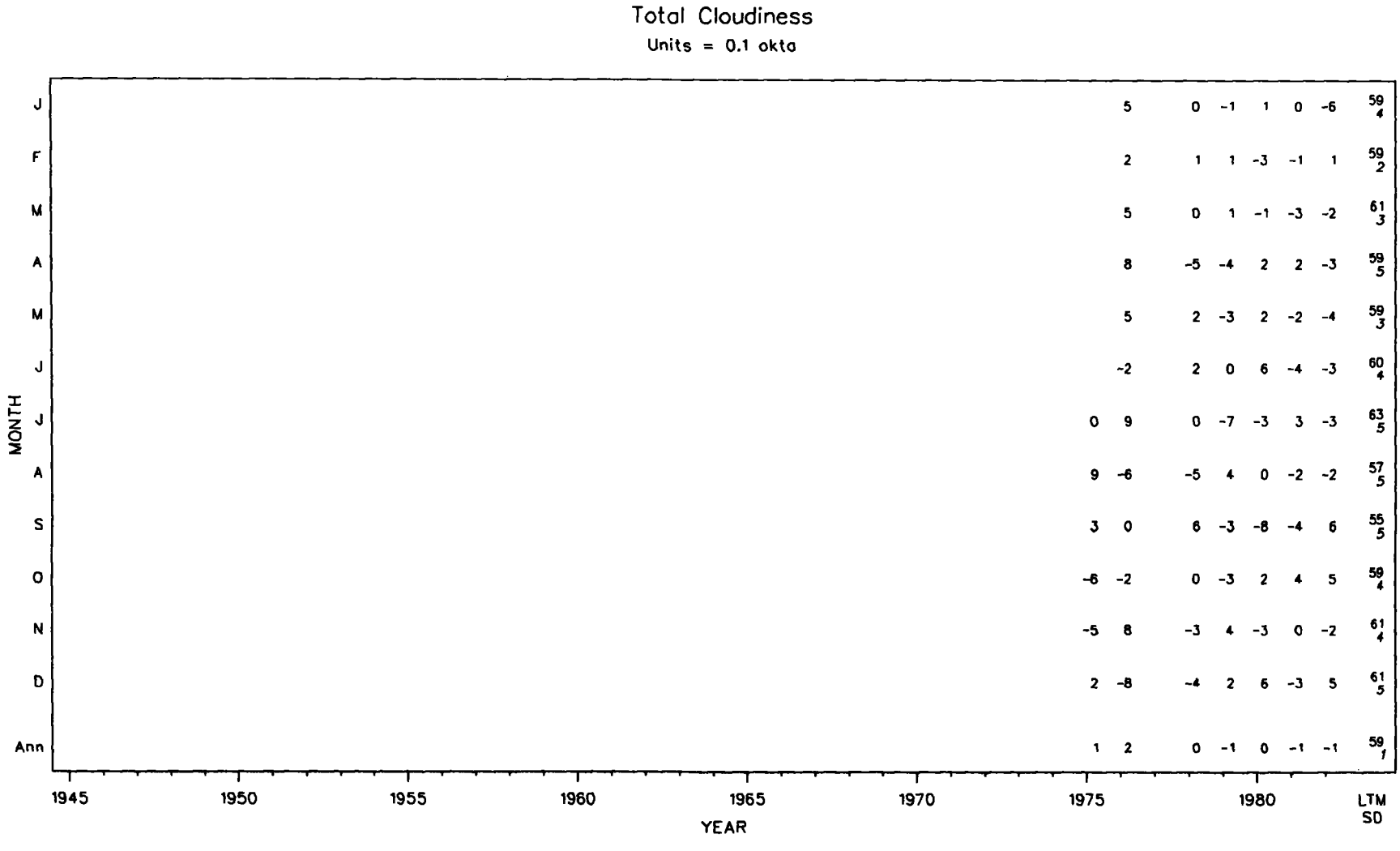
OWS Study Area R Anomalies

Sea Level Pressure

Units = 0.1 mb

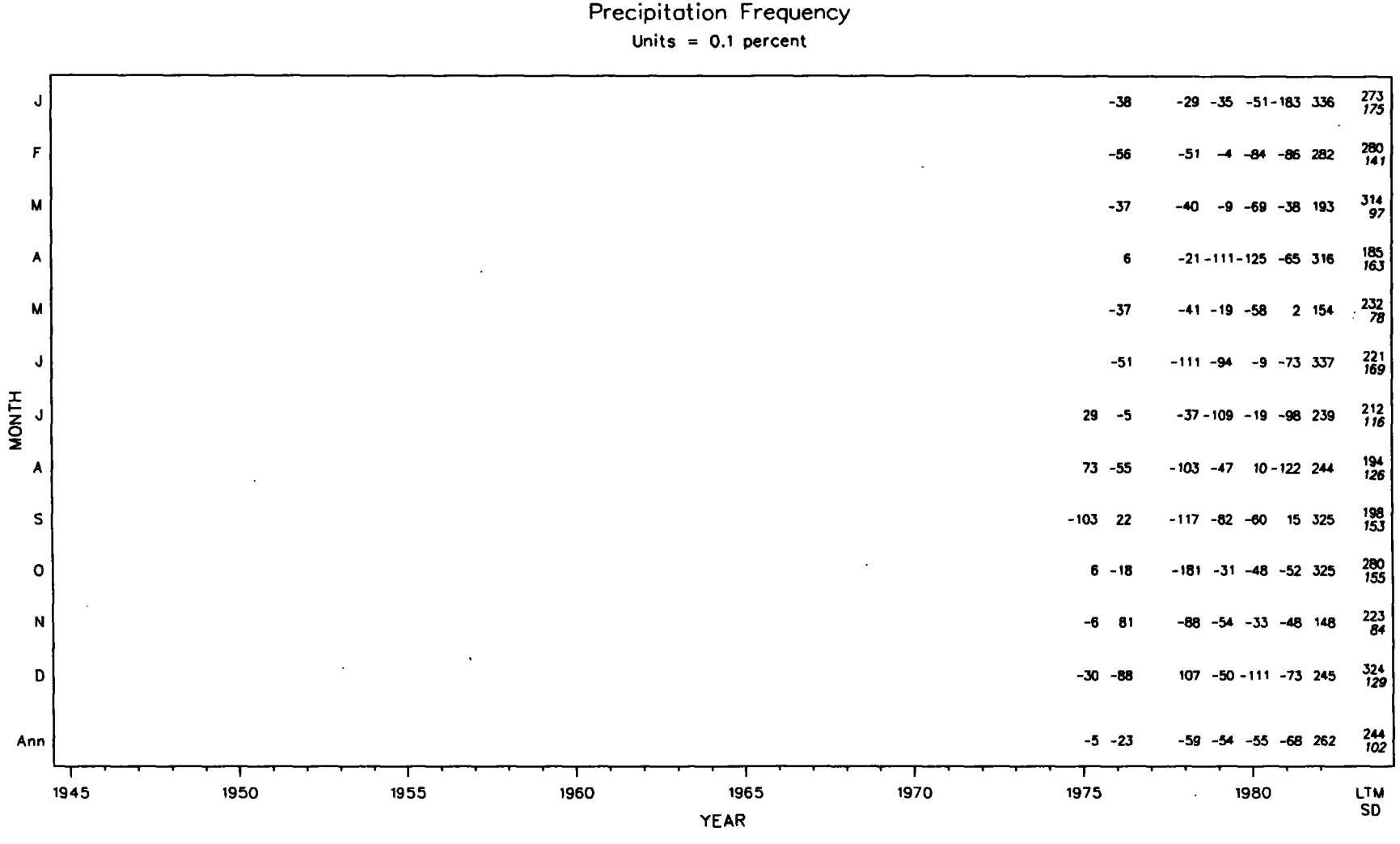


OWS Study Area R Anomalies



OWS Study Area R Anomalies

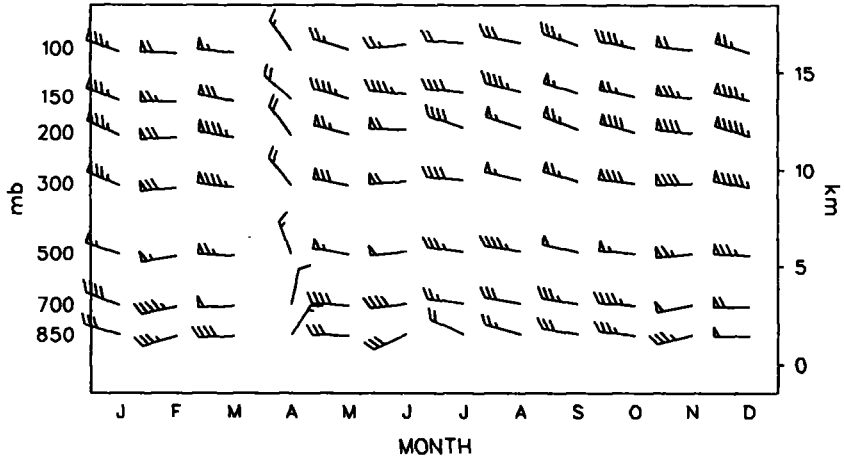
R10



OWS Study Area R Anomalies

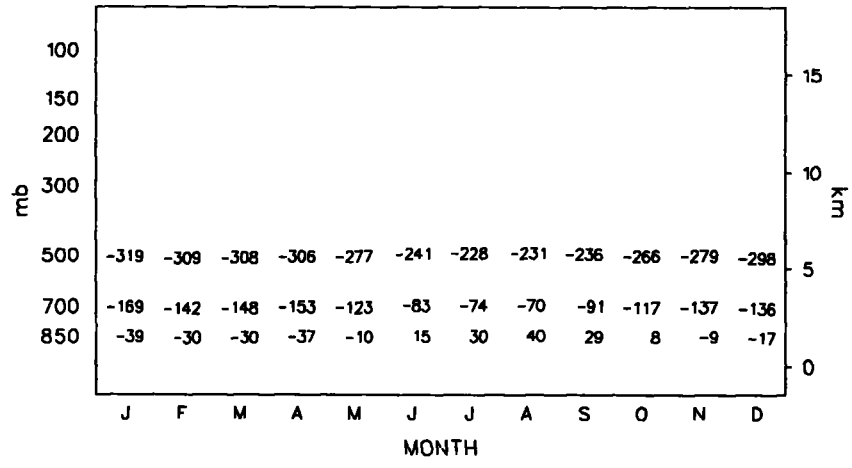
Wind

Full barb = 5 knots, Pennant = 25 knots



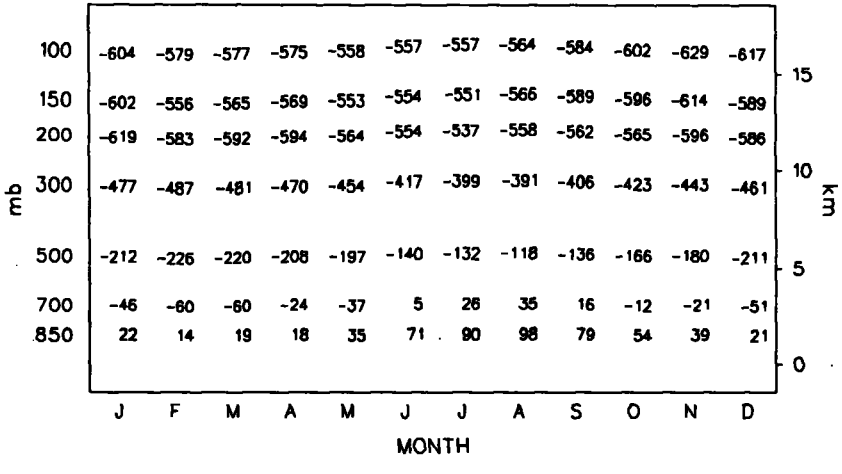
Dew Point Temperature

Units = 0.1 °C



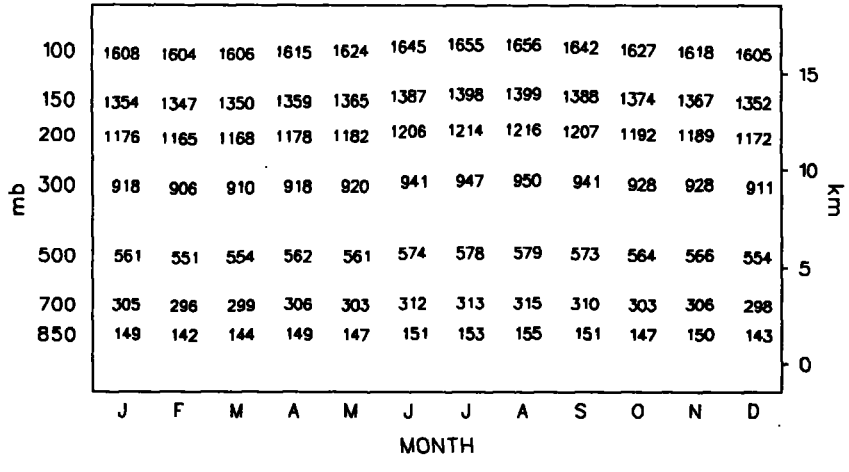
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m

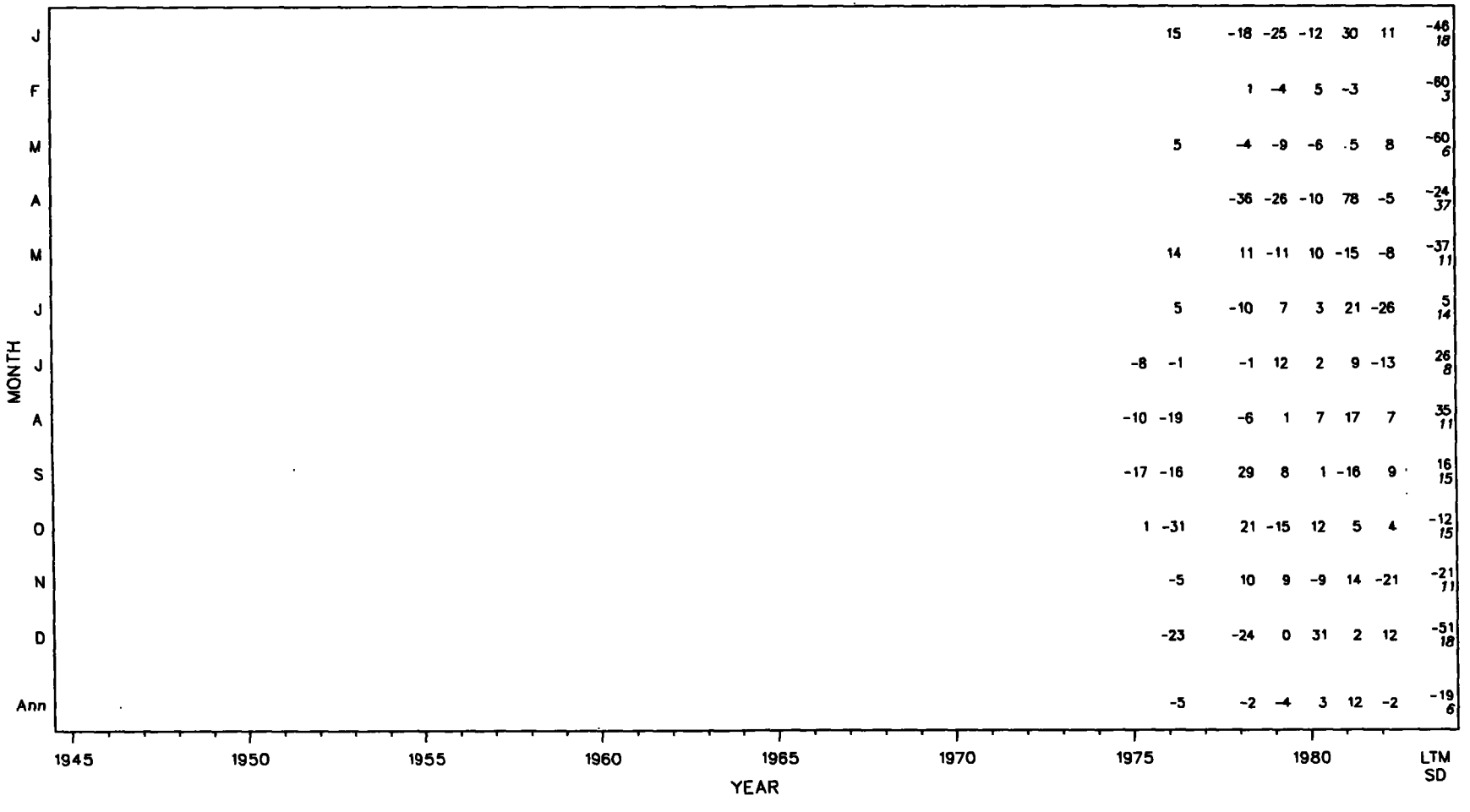


OWS Study Area R Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

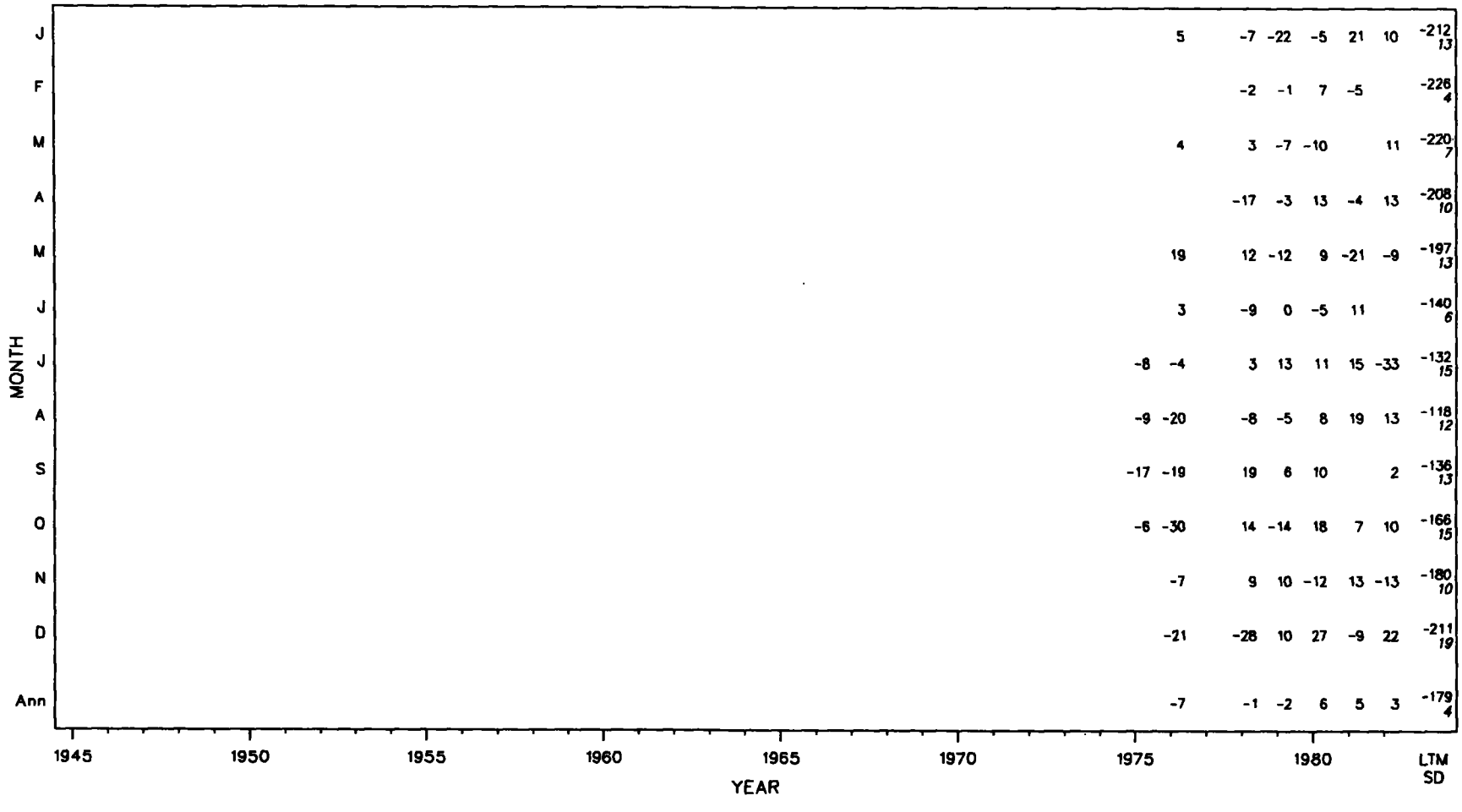
Units = 0.1 °C



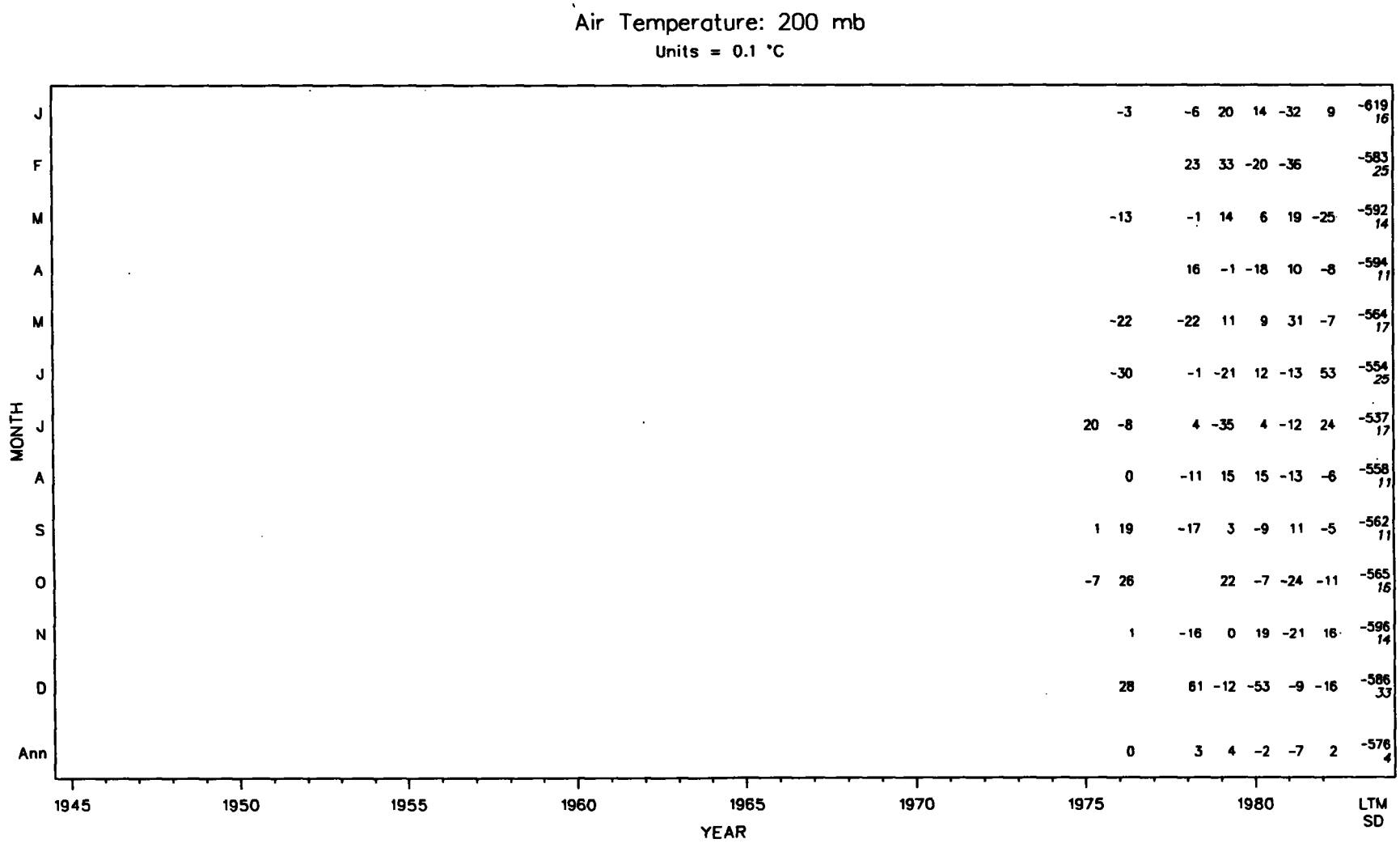
OWS Study Area R Anomalies

Air Temperature: 500 mb

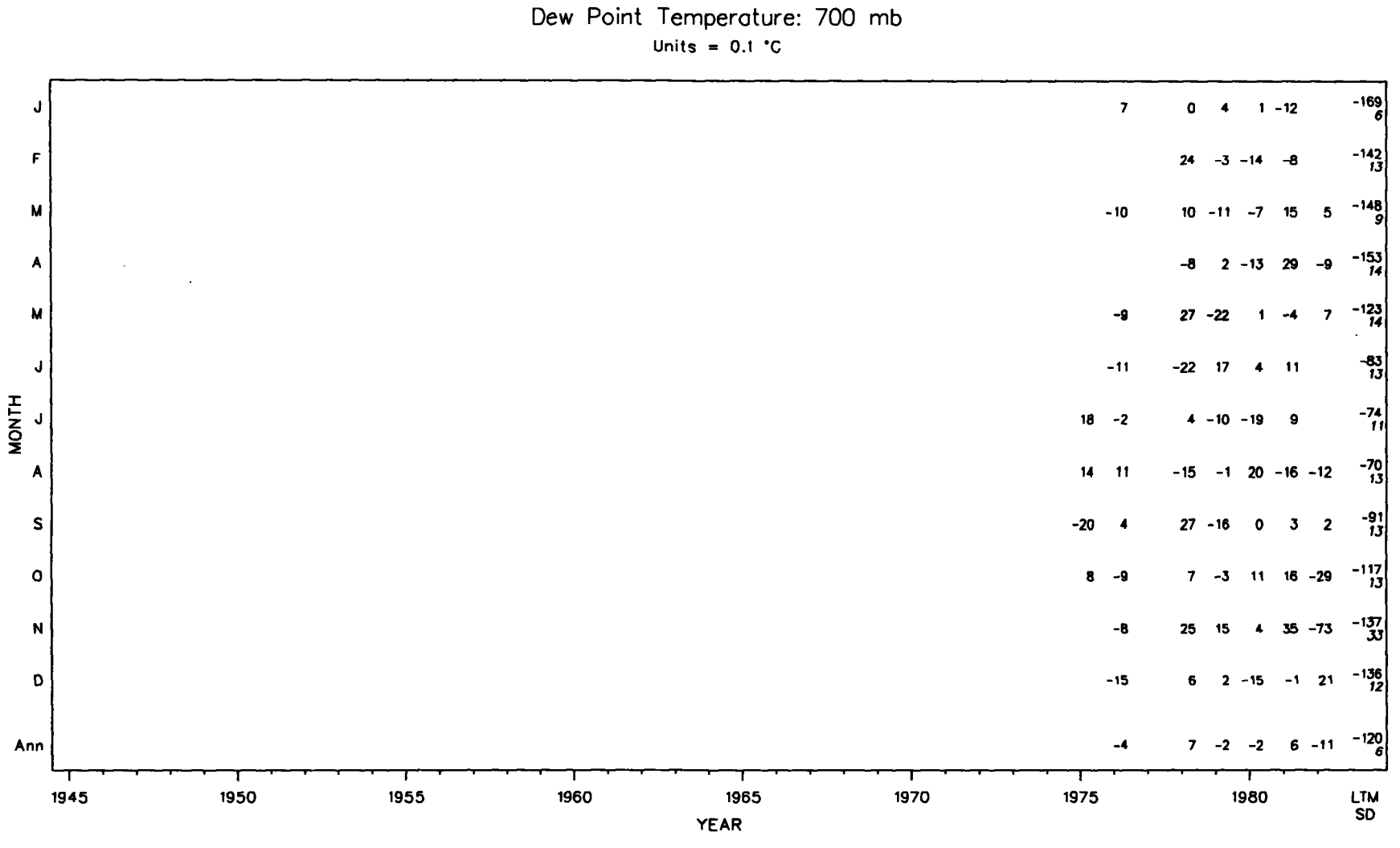
Units = 0.1 °C



OWS Study Area R Anomalies



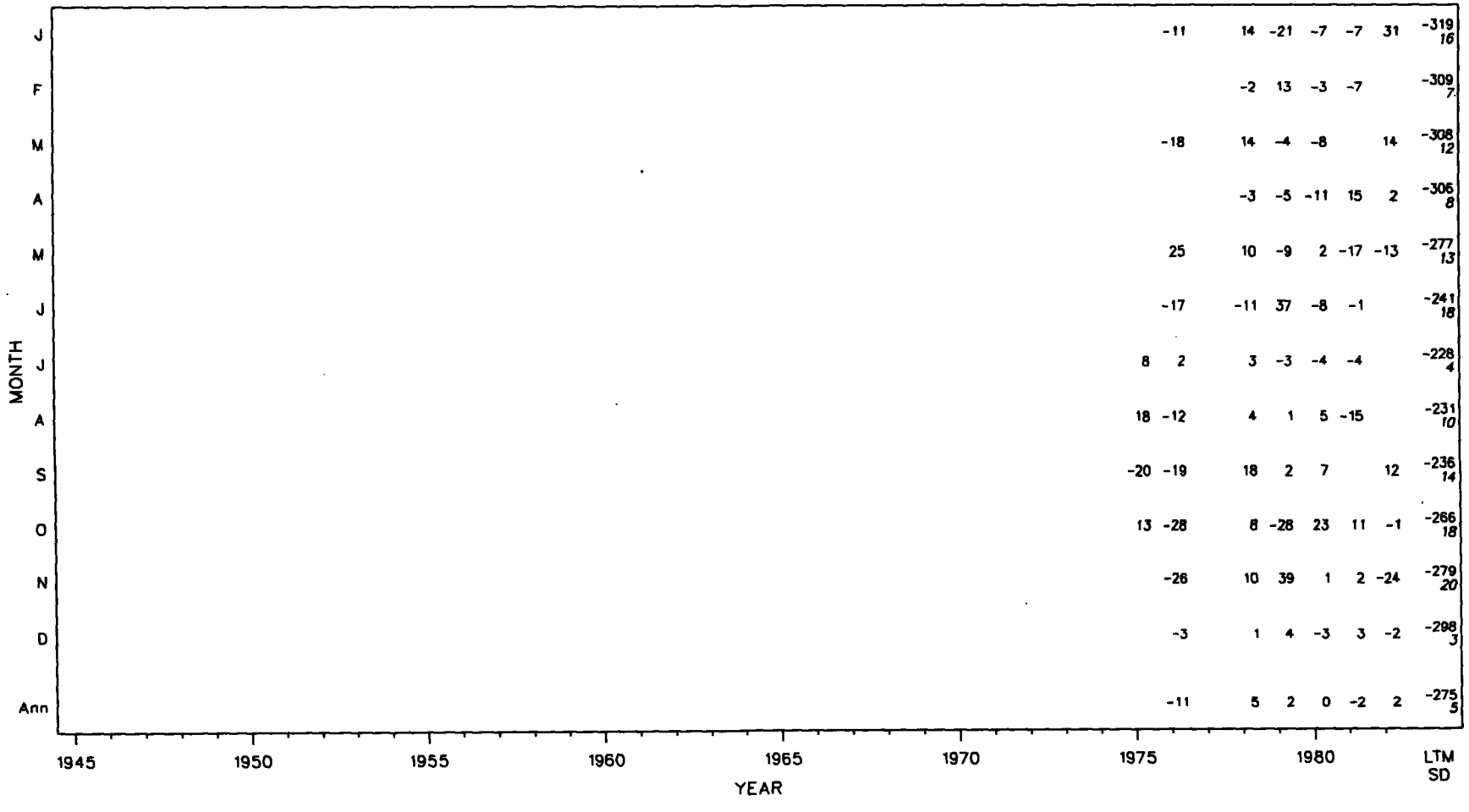
OWS Study Area R Anomalies



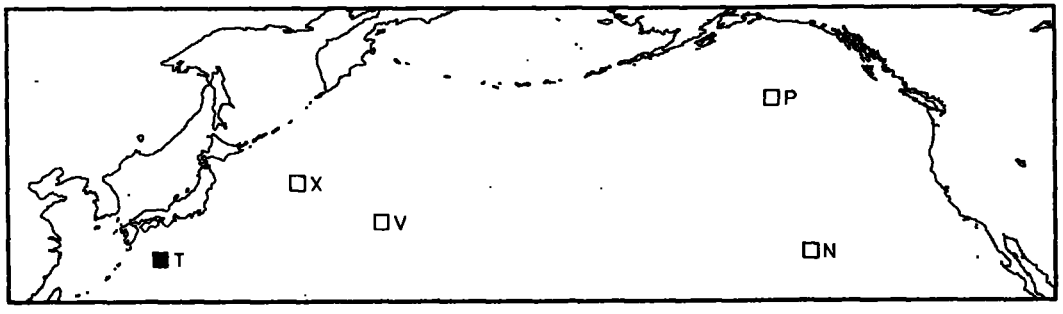
OWS Study Area R Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C



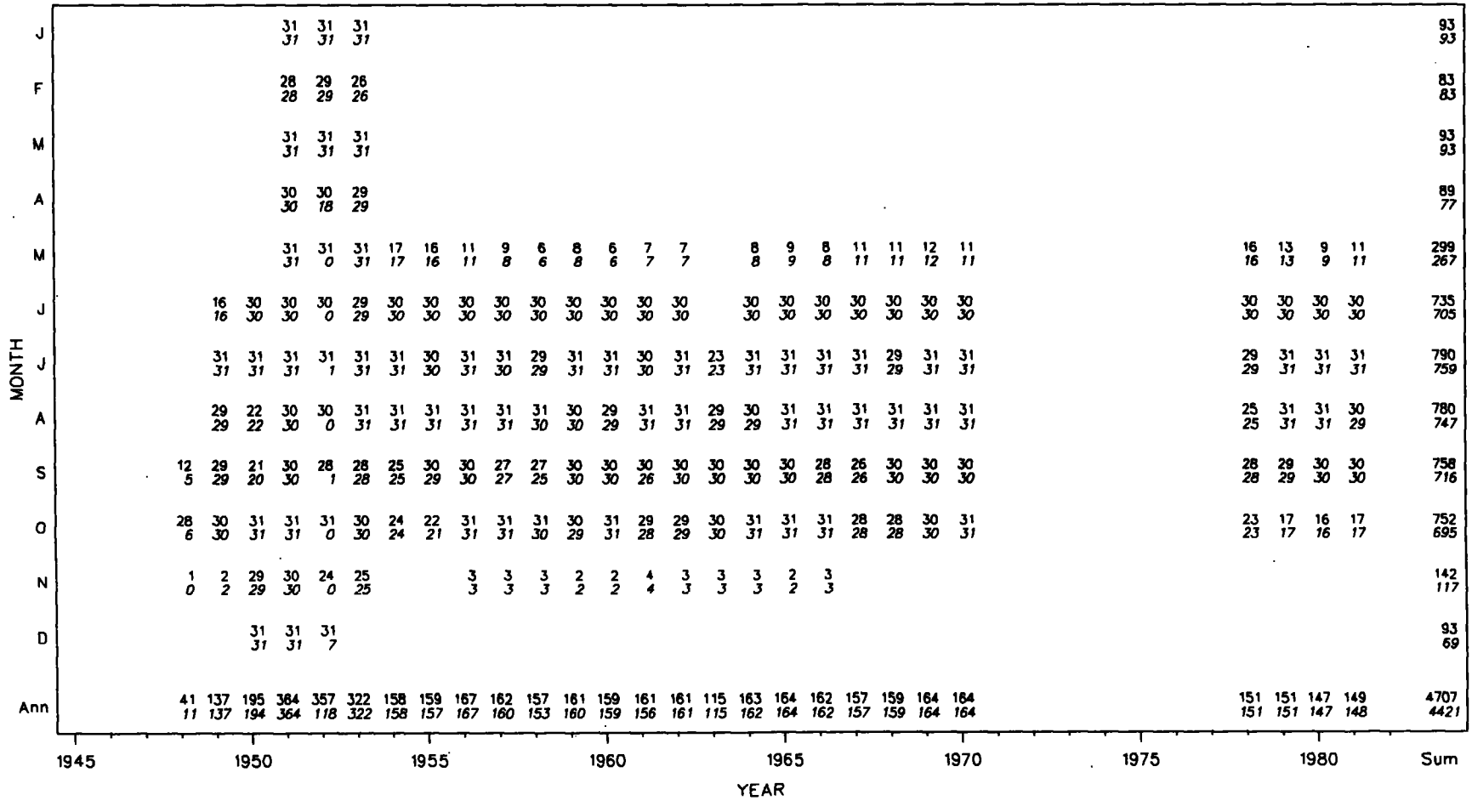
OWS Study Area R Anomalies



28.0°N – 29.9°N, 134.0°E – 135.9°E
1948 – 1981

OWS

T

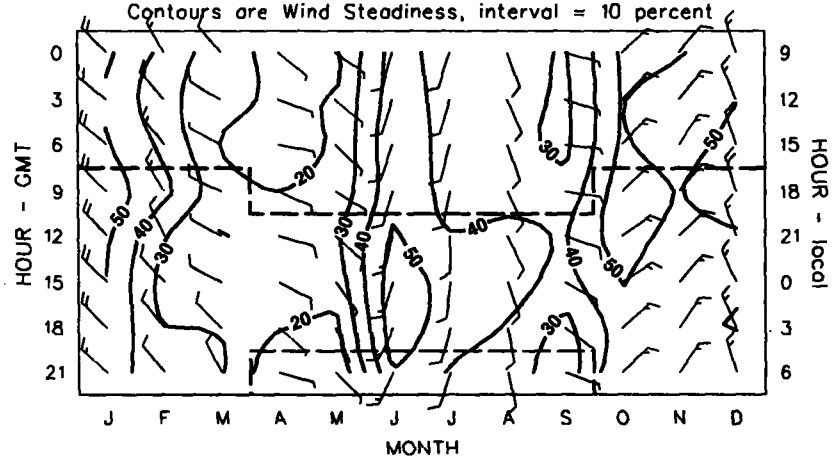


OWS Study Area T (29.0°N, 135.0°E)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the *maximum* X from among all the variables.
The lower number is the minimum X from among all the variables.

Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 10 percent



Pressure

Units = 0.1 mb

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	200 *46*	195 *53*	171 *53*	167 *50*	118 *45*	110 *39*	108 *34*	099 *41*	119 *38*	150 *42*	179 *41*	210 *49*	9
3	186 *46*	188 *55*	164 *54*	165 *47*	115 *45*	108 *38*	107 *34*	096 *41*	114 *38*	142 *41*	169 *41*	196 *49*	12
6	177 *45*	178 *50*	152 *52*	151 *50*	106 *43*	102 *37*	100 *34*	088 *40*	104 *38*	132 *40*	159 *42*	187 *48*	15
9	189 *44*	186 *49*	157 *54*	153 *49*	107 *42*	101 *37*	098 *35*	088 *40*	107 *39*	138 *40*	165 *43*	198 *48*	18
12	195 *45*	191 *54*	164 *57*	165 *48*	117 *43*	110 *37*	107 *35*	098 *40*	118 *39*	148 *40*	173 *42*	205 *50*	21
15	190 *44*	189 *55*	163 *57*	163 *48*	114 *43*	108 *37*	105 *35*	095 *41*	115 *38*	144 *41*	169 *44*	201 *50*	0
18	185 *46*	183 *53*	155 *56*	152 *49*	106 *44*	099 *38*	098 *35*	088 *41*	108 *37*	137 *41*	164 *43*	196 *49*	3
21	187 *45*	185 *53*	160 *55*	158 *48*	109 *45*	104 *38*	102 *35*	092 *40*	111 *38*	140 *42*	169 *41*	199 *47*	6

HOUR - GMT
HOUR - local
MONTH

Total Cloudiness

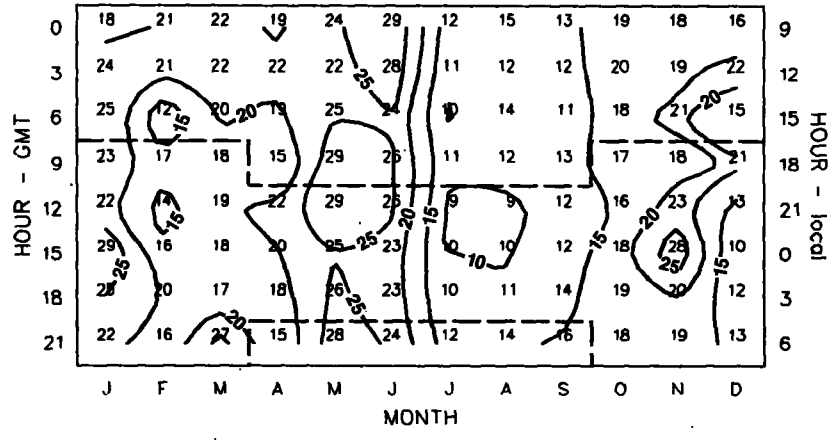
Units = 0.1 okta

HOUR - GMT	J	F	M	A	M	J	J	A	S	O	N	D	HOUR - local
0	56 *22*	56 *25*	59 *23*	58 *27*	64 *22*	65 *21*	52 *25*	49 *25*	47 *25*	52 *26*	55 *25*	57 *22*	9
3	56 *22*	55 *24*	59 *24*	57 *27*	63 *23*	65 *20*	54 *24*	49 *25*	48 *24*	51 *26*	52 *27*	54 *25*	12
6	58 *23*	57 *24*	58 *24*	58 *26*	63 *24*	64 *21*	53 *24*	51 *25*	49 *24*	52 *26*	54 *26*	51 *25*	15
9	59 *23*	60 *23*	56 *25*	58 *27*	65 *23*	66 *20*	54 *24*	50 *25*	51 *25*	55 *24*	55 *25*	50 *25*	18
12	49 *28*	49 *28*	53 *29*	51 *29*	58 *27*	57 *26*	43 *26*	39 *26*	39 *26*	46 *28*	49 *28*	45 *28*	21
15	49 *28*	48 *32*	48 *29*	54 *30*	57 *27*	56 *28*	40 *27*	35 *25*	38 *26*	47 *28*	50 *29*	40 *28*	0
18	53 *26*	54 *29*	51 *29*	54 *30*	58 *28*	56 *27*	39 *27*	34 *26*	37 *26*	46 *28*	50 *30*	41 *26*	3
21	54 *26*	57 *25*	59 *23*	60 *26*	65 *22*	65 *20*	53 *24*	50 *24*	50 *24*	55 *25*	57 *25*	52 *24*	6

HOUR - GMT
HOUR - local
MONTH

Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area T Surface Climatology

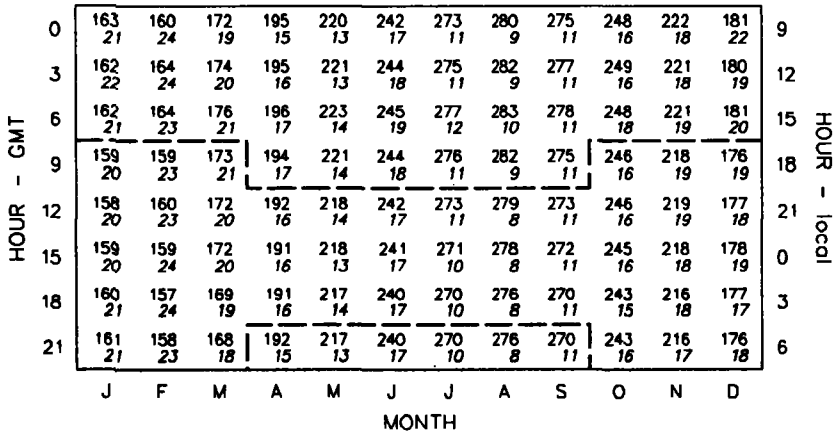
upper number = mean
lower number = standard deviation

——— data contours
— — — — sunrise/sunset

T2

Air Temperature

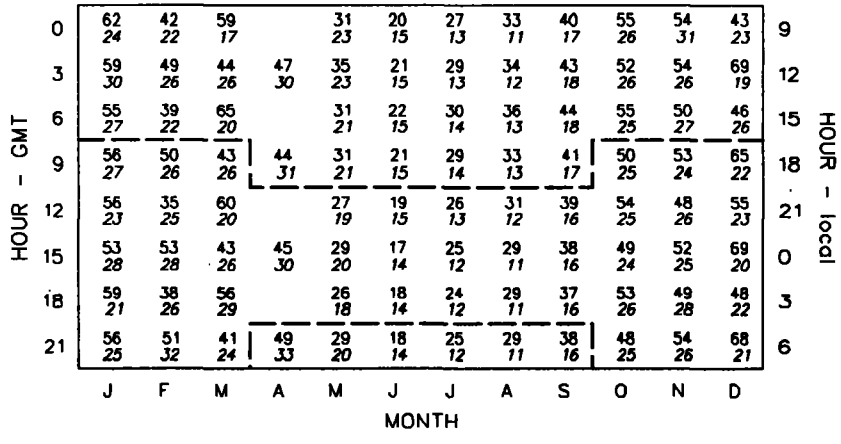
Units = 0.1 °C



GMT	J	F	M	A	M	J	J	A	S	O	N	D	local
0	163 / 21	160 / 24	172 / 19	195 / 15	220 / 13	242 / 17	273 / 11	280 / 9	275 / 11	248 / 16	222 / 18	181 / 22	9
3	162 / 22	164 / 24	174 / 20	195 / 16	221 / 13	244 / 18	275 / 11	282 / 9	277 / 11	249 / 16	221 / 18	180 / 19	12
6	162 / 21	164 / 23	176 / 21	196 / 17	223 / 14	245 / 19	277 / 12	283 / 10	278 / 11	248 / 18	221 / 19	181 / 20	15
9	159 / 20	159 / 23	173 / 21	194 / 17	221 / 14	244 / 18	276 / 11	282 / 9	275 / 11	246 / 16	218 / 19	176 / 19	18
12	158 / 20	160 / 23	172 / 20	192 / 16	218 / 14	242 / 17	273 / 11	279 / 8	273 / 11	246 / 16	219 / 19	177 / 18	21
15	159 / 20	159 / 24	172 / 20	191 / 16	218 / 13	241 / 17	271 / 10	278 / 8	272 / 11	245 / 16	218 / 18	178 / 19	0
18	160 / 21	157 / 24	169 / 19	191 / 16	217 / 14	240 / 17	270 / 10	276 / 8	270 / 11	243 / 15	216 / 18	177 / 17	3
21	161 / 21	158 / 23	168 / 18	192 / 15	217 / 13	240 / 17	270 / 10	276 / 8	270 / 11	243 / 16	216 / 17	176 / 18	6

Dew Point Depression

Units = 0.1 °C



GMT	J	F	M	A	M	J	J	A	S	O	N	D	local
0	62 / 24	42 / 22	59 / 17		31 / 23	20 / 15	27 / 13	33 / 11	40 / 17	55 / 26	54 / 31	43 / 23	9
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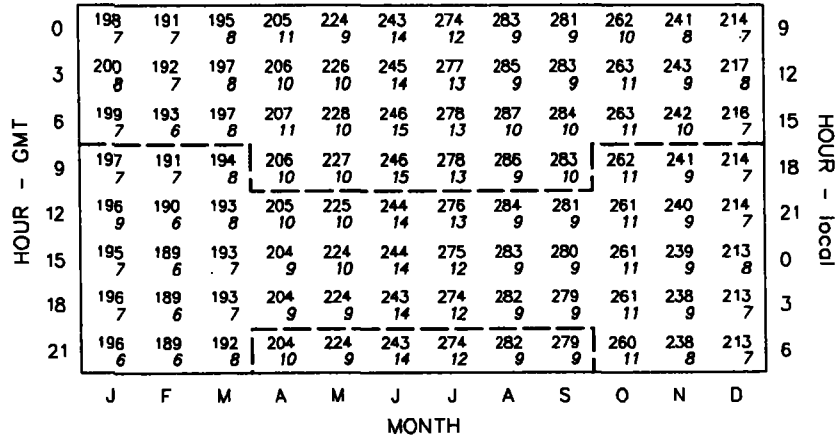
6	55 / 27	39 / 22	65 / 20		31 / 21	22 / 15	30 / 14	36 / 13	44 / 18	55 / 25	50 / 27	46 / 26	15
9	56 / 27	50 / 26	43 / 26	44 / 31	31 / 21	21 / 15	29 / 14	33 / 13	41 / 17	50 / 25	53 / 24	65 / 22	18
12	56 / 23	35 / 25	60 / 20		27 / 19	19 / 15	26 / 13	31 / 12	39 / 16	54 / 25	48 / 26	55 / 23	21
15	53 / 28	53 / 28	43 / 26	45 / 30	29 / 20	17 / 14	25 / 12	29 / 11	38 / 16	49 / 24	52 / 25	69 / 20	0
18	59 / 21	38 / 26	56 / 29		26 / 18	18 / 14	24 / 12	29 / 11	37 / 16	53 / 26	49 / 28	48 / 22	3
21	56 / 25	51 / 32	41 / 24	49 / 33	29 / 20	18 / 14	25 / 12	29 / 11	38 / 16	48 / 25	54 / 26	68 / 21	6

Sea Surface Temperature

Units = 0.1 °C



GMT	J	F	M	A	M	J	J	A	S	O	N	D	local
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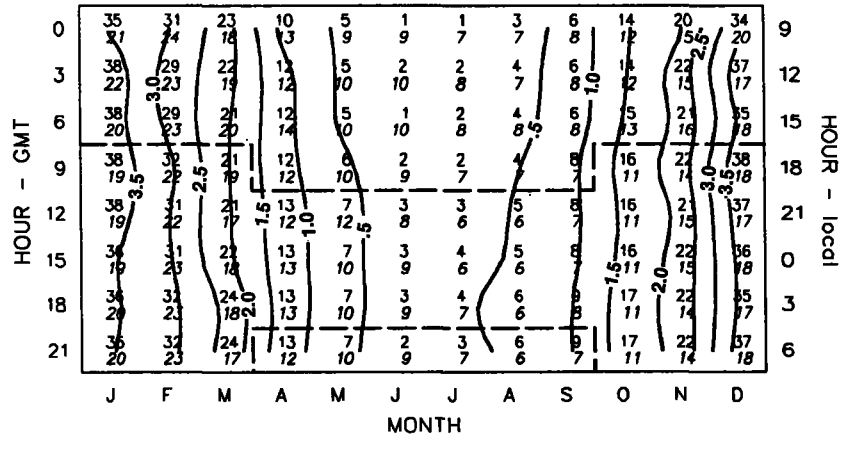
3	200 / 8	192 / 7	197 / 8	206 / 10	226 / 10	245 / 14	277 / 13	285 / 9	283 / 9	263 / 11	243 / 9	217 / 8	12
6	199 / 7	193 / 6	197 / 8	207 / 11	228 / 10	246 / 15	278 / 13	287 / 10	284 / 10	263 / 11	242 / 10	216 / 7	15
9	197 / 7	191 / 7	194 / 8	206 / 10	227 / 10	246 / 15	278 / 13	286 / 9	283 / 10	262 / 11	241 / 9	214 / 7	18
12	196 / 9	190 / 6	193 / 8	205 / 10	225 / 10	244 / 14	276 / 13	284 / 9	281 / 9	261 / 11	240 / 9	214 / 7	21
15	195 / 7	189 / 6	193 / 7	204 / 9	224 / 10	244 / 14	275 / 12	283 / 9	280 / 9	261 / 11	239 / 9	213 / 8	0
18	196 / 7	189 / 6	193 / 7	204 / 9	224 / 9	243 / 14	274 / 12	282 / 9	279 / 9	261 / 11	238 / 9	213 / 7	3
21	196 / 6	189 / 6	192 / 8	204 / 10	224 / 9	243 / 14	274 / 12	282 / 9	279 / 9	260 / 11	238 / 8	213 / 7	6

Sea – Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



GMT	J	F	M	A	M	J	J	A	S	O	N	D	local
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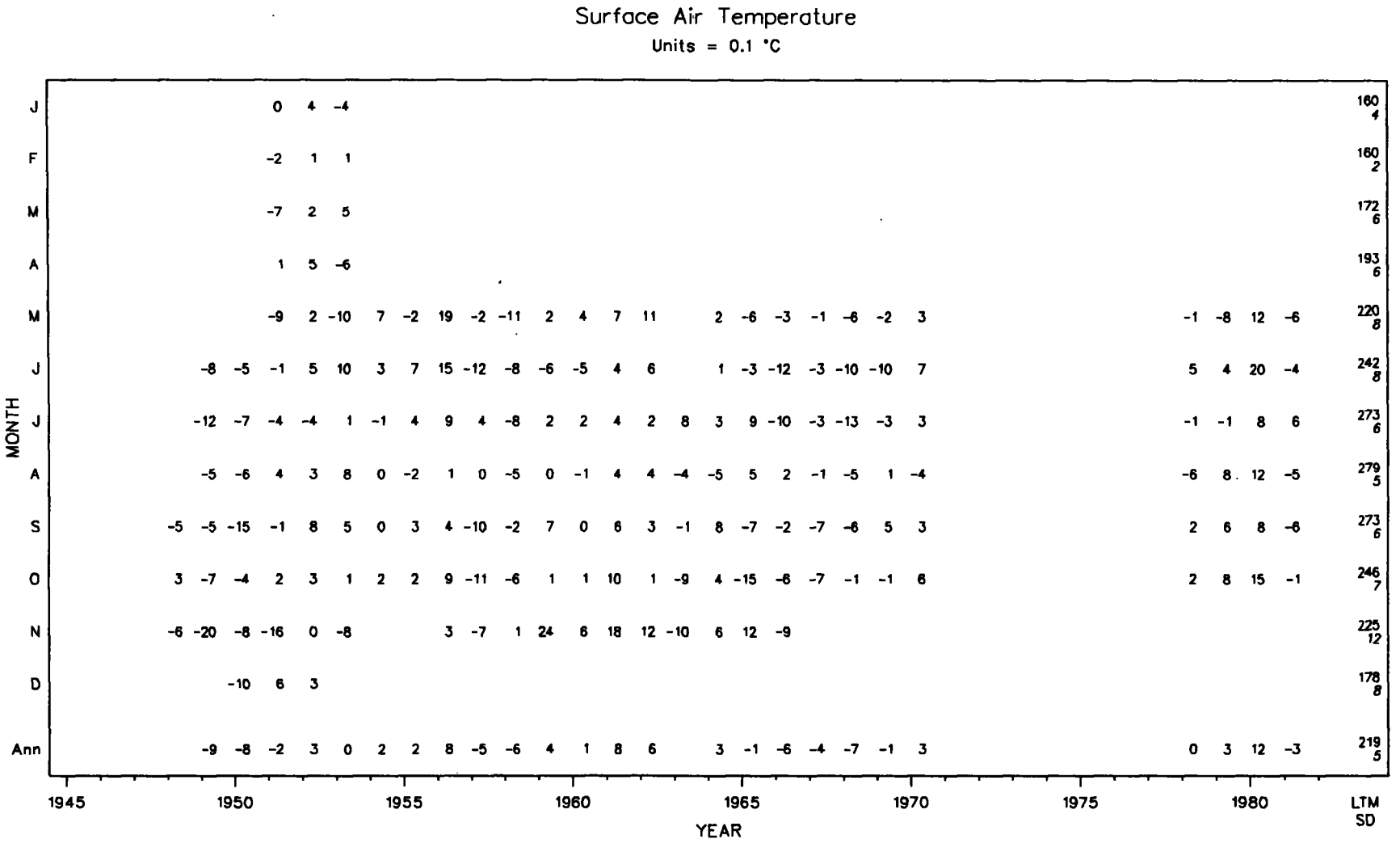
3	38 / 22	29 / 23	22 / 19	12 / 12	5 / 10	2 / 10	2 / 8	4 / 7	6 / 8	14 / 12	22 / 15	37 / 17	12
6	38 / 20	29 / 23	21 / 20	12 / 14	5 / 10	1 / 10	2 / 8	4 / 8	6 / 8	15 / 13	21 / 16	35 / 18	15
9	38 / 19	30 / 22	21 / 19	12 / 12	6 / 10	2 / 9	2 / 7	4 / 7	6 / 8	16 / 11	22 / 14	38 / 18	18
12	38 / 19	31 / 22	21 / 17	13 / 12	7 / 12	3 / 8	3 / 6	5 / 6	8 / 7	16 / 11	21 / 15	37 / 17	21
15	36 / 19	31 / 23	22 / 18	13 / 13	7 / 10	3 / 9	4 / 6	5 / 6	8 / 8	16 / 11	22 / 15	36 / 18	0
18	36 / 20	32 / 23	24 / 18	13 / 13	7 / 10	3 / 9	4 / 7	6 / 6	9 / 8	17 / 11	22 / 14	35 / 17	3
21	36 / 20	32 / 23	24 / 17	13 / 12	7 / 10	2 / 9	3 / 7	6 / 6	9 / 7	17 / 11	22 / 14	37 / 18	6

OWS Study Area T Surface Climatology

upper number = mean
lower number = standard deviation

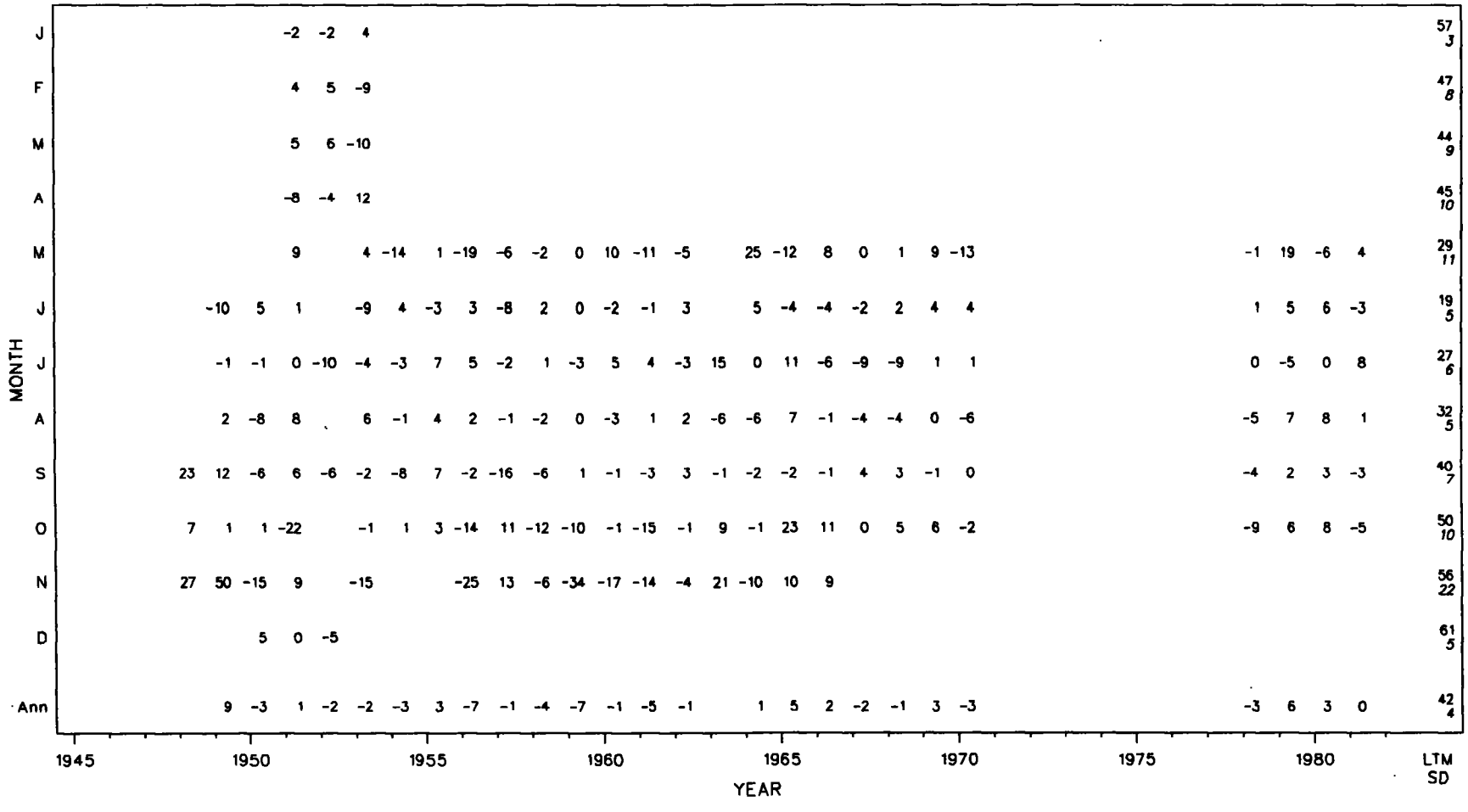
data contours
sunrise/sunset

T3



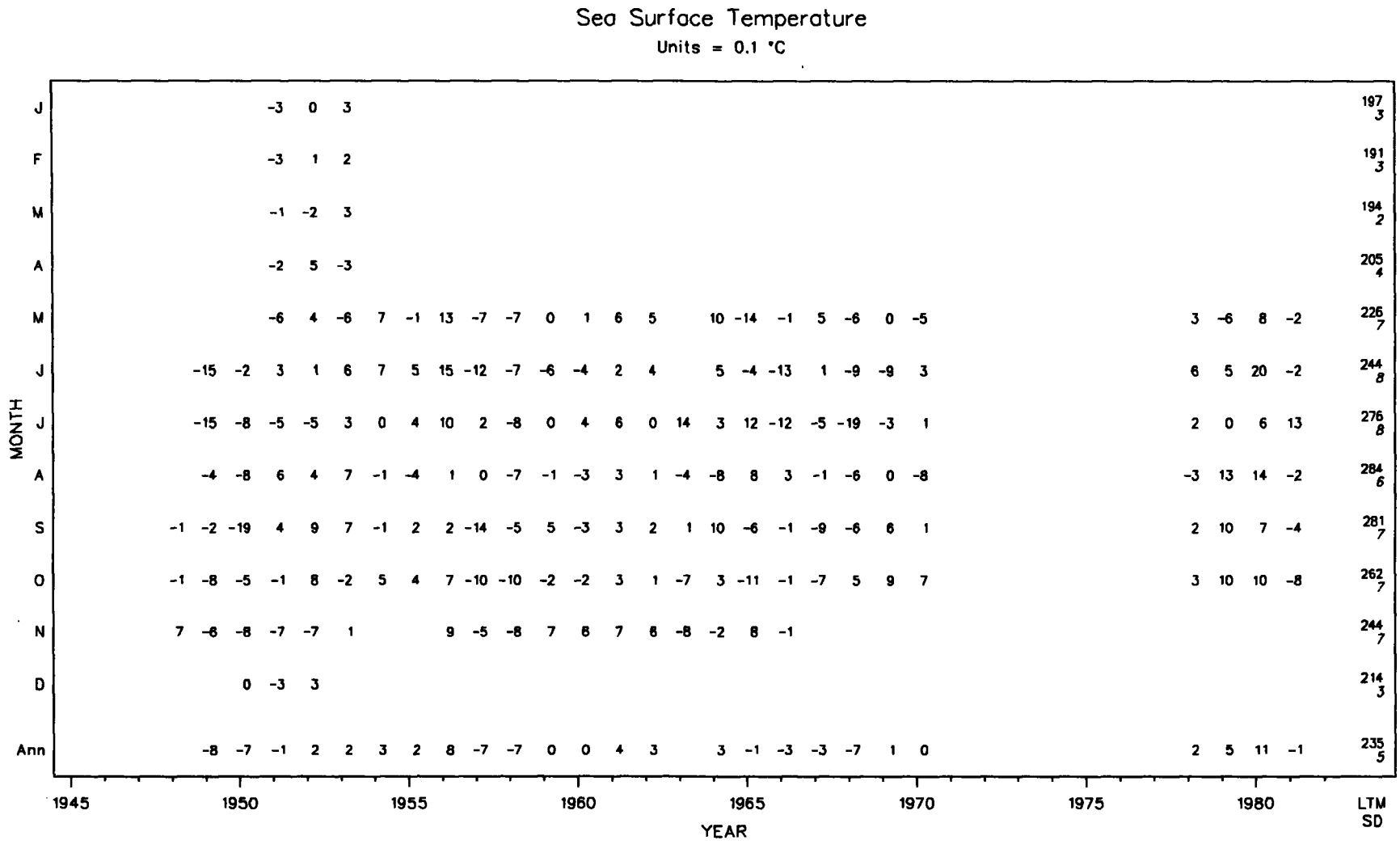
OWS Study Area T Anomalies

T4



OWS Study Area T Anomalies

T5

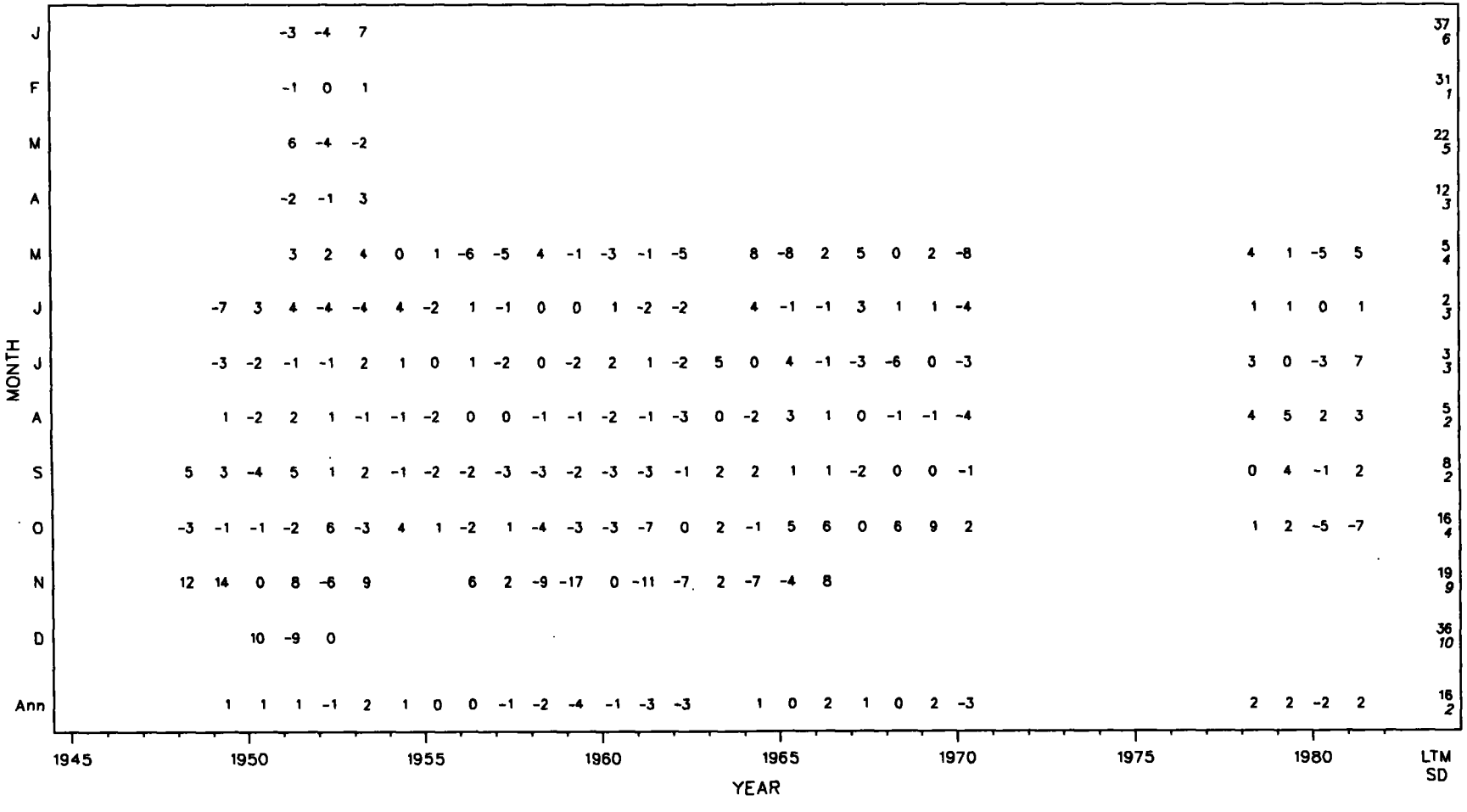


OWS Study Area T Anomalies

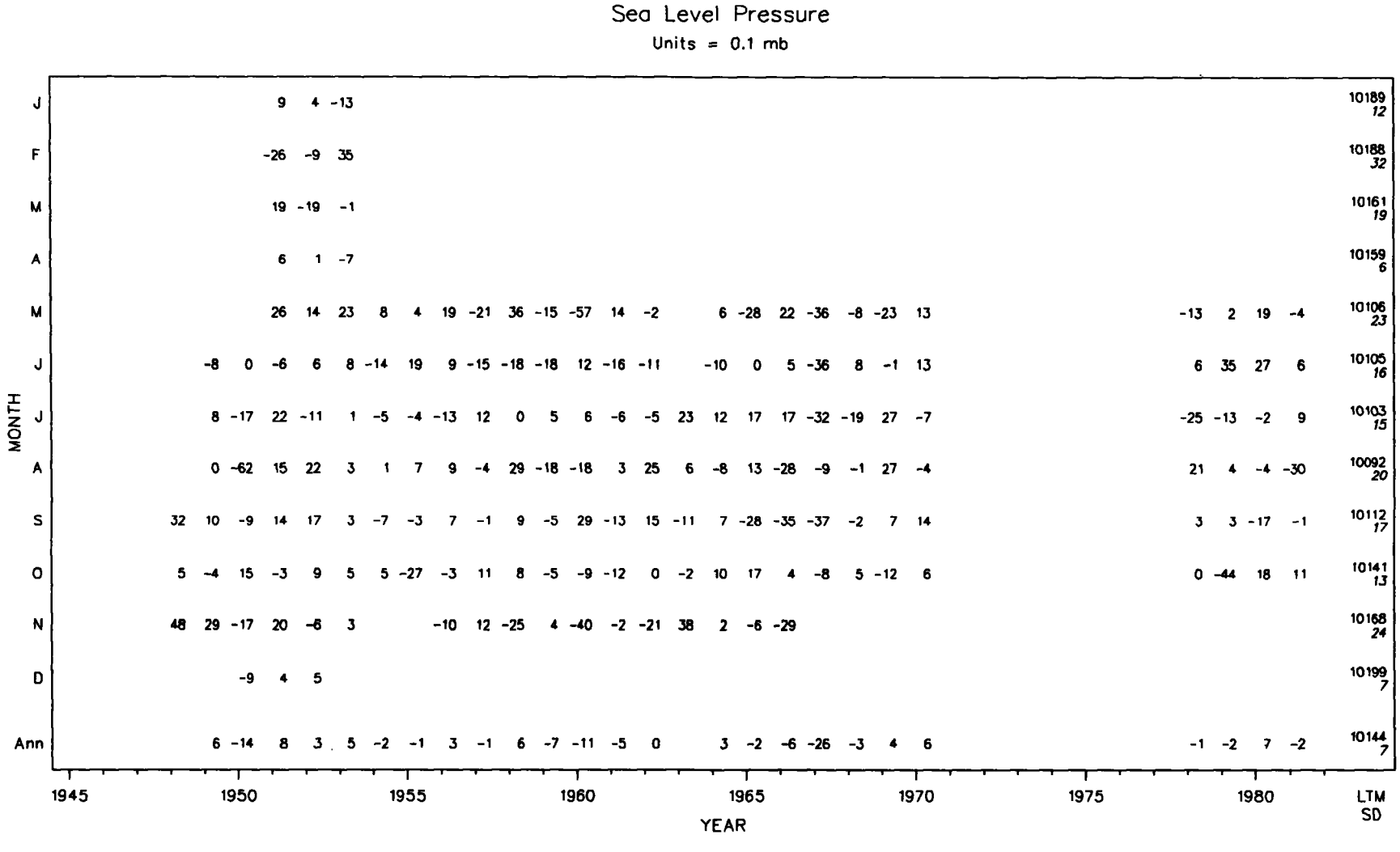
T6

Sea - Air Temperature Difference

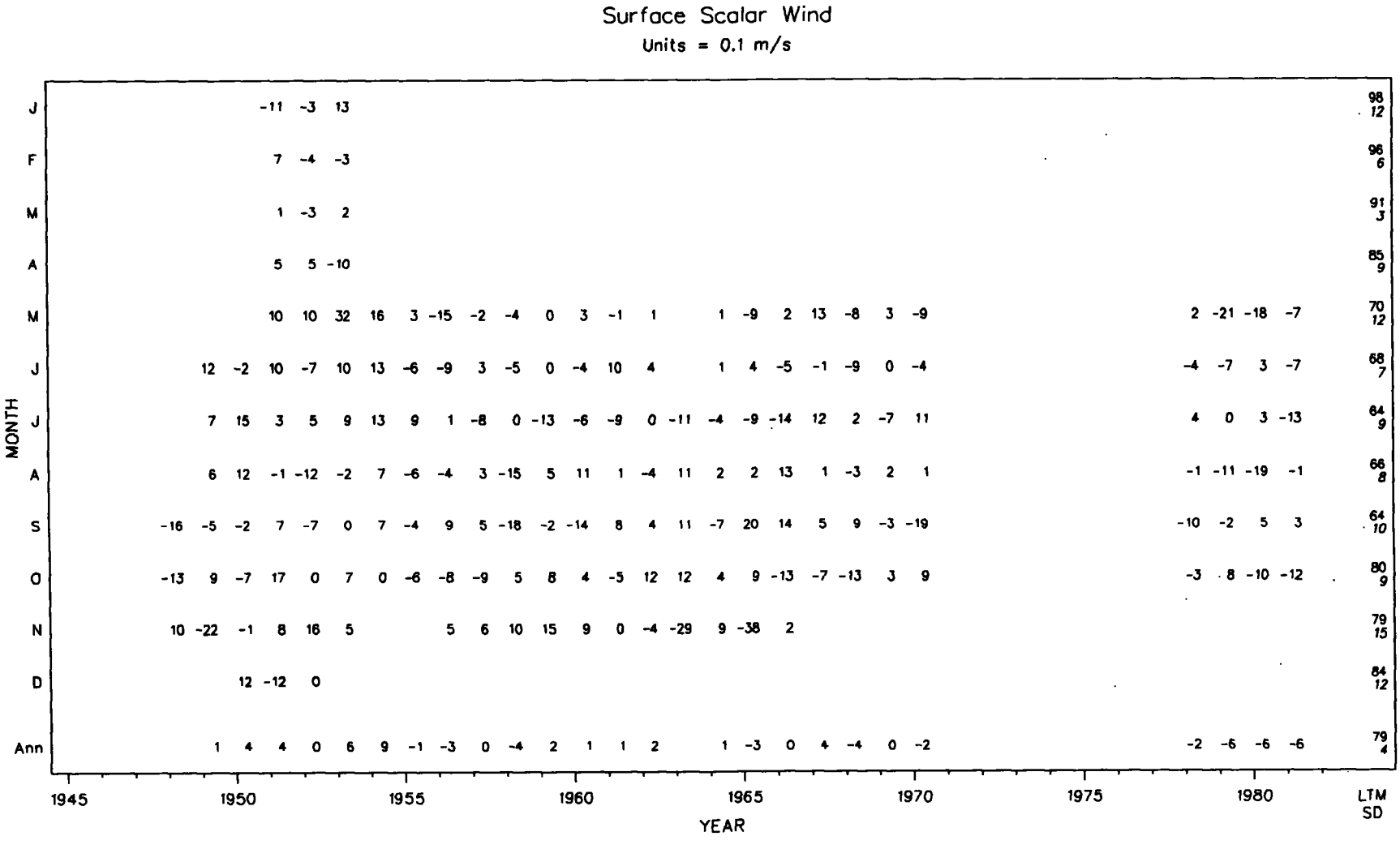
Units = 0.1 °C



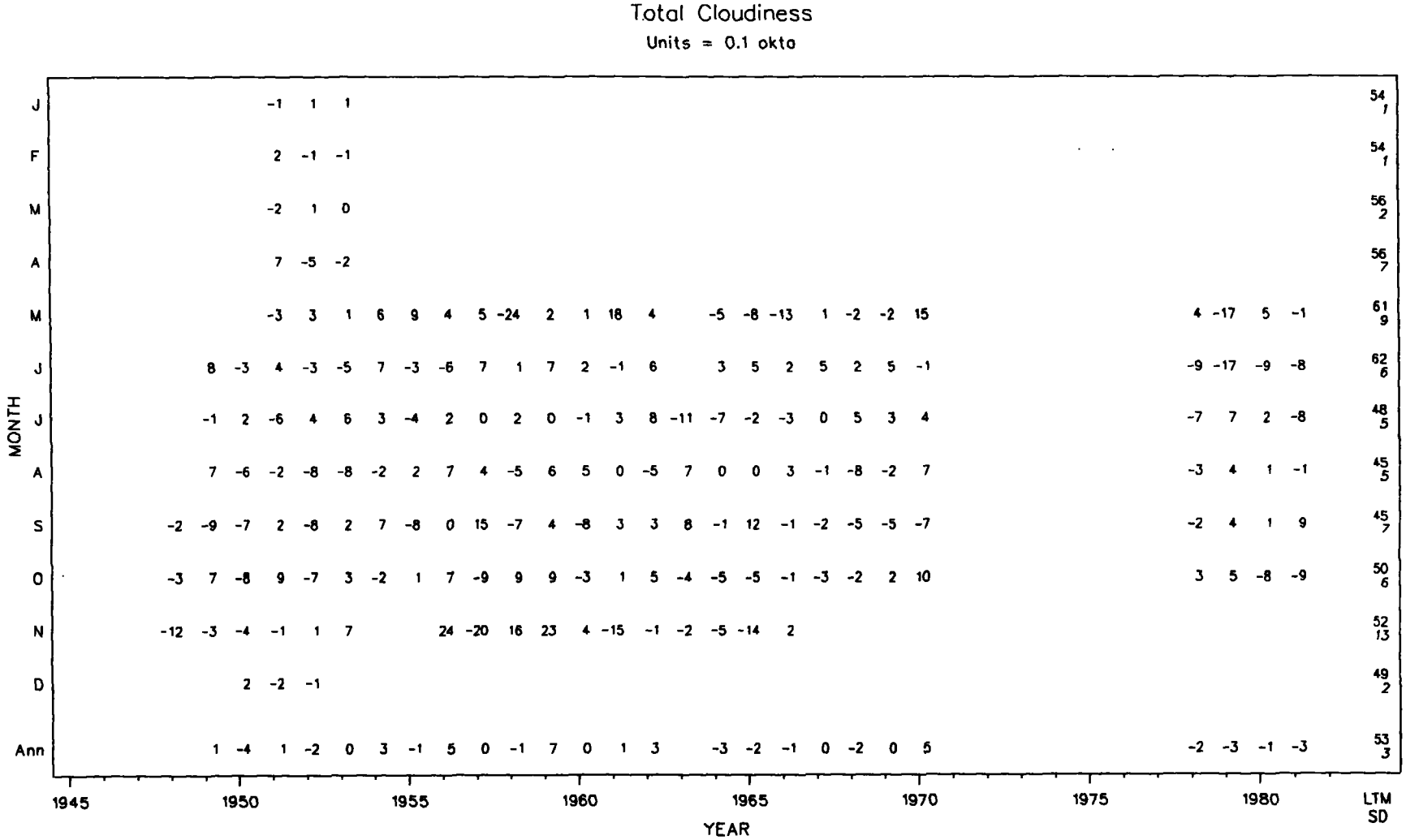
OWS Study Area T Anomalies



OWS Study Area T Anomalies

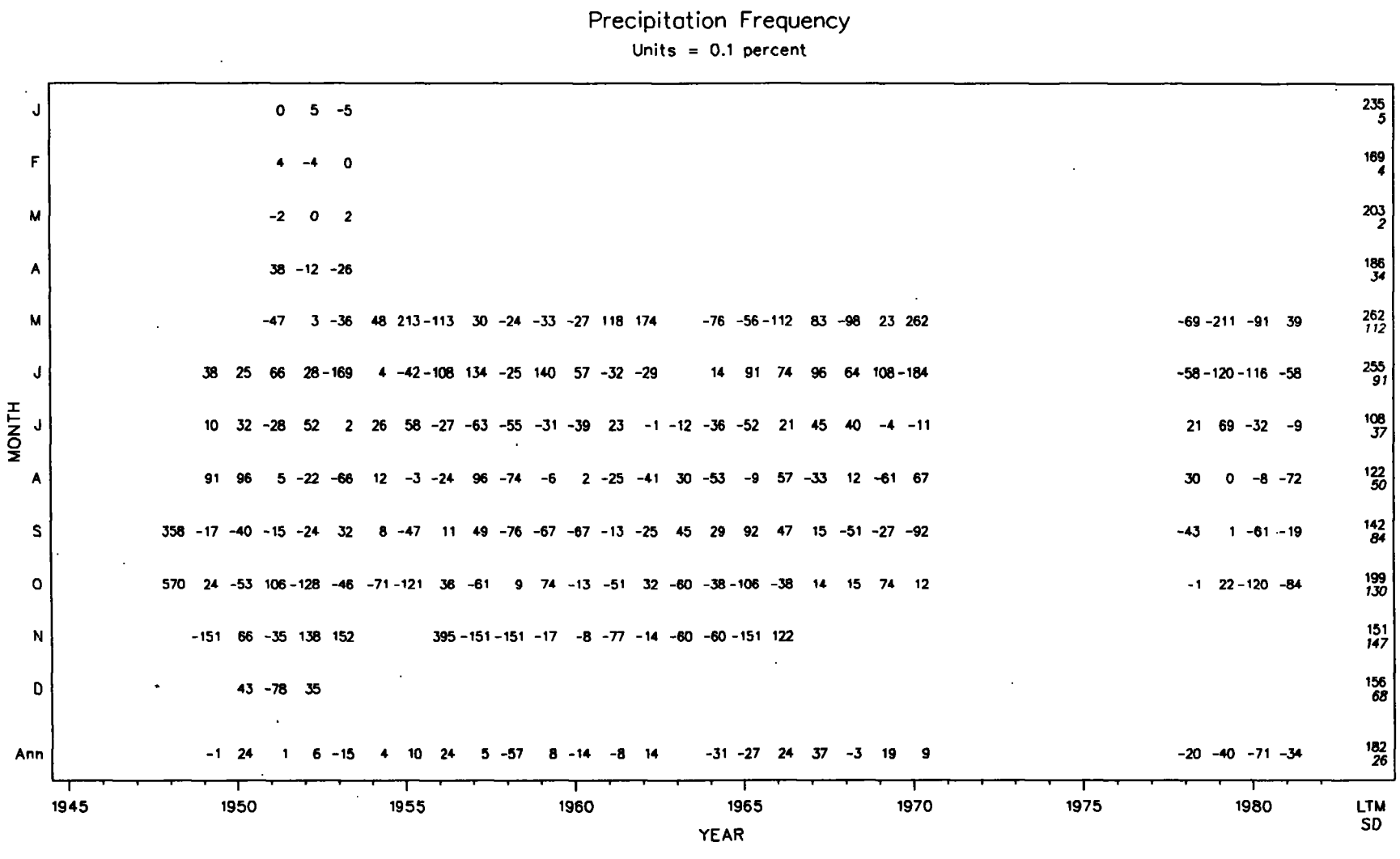


OWS Study Area T Anomalies



OWS Study Area T Anomalies

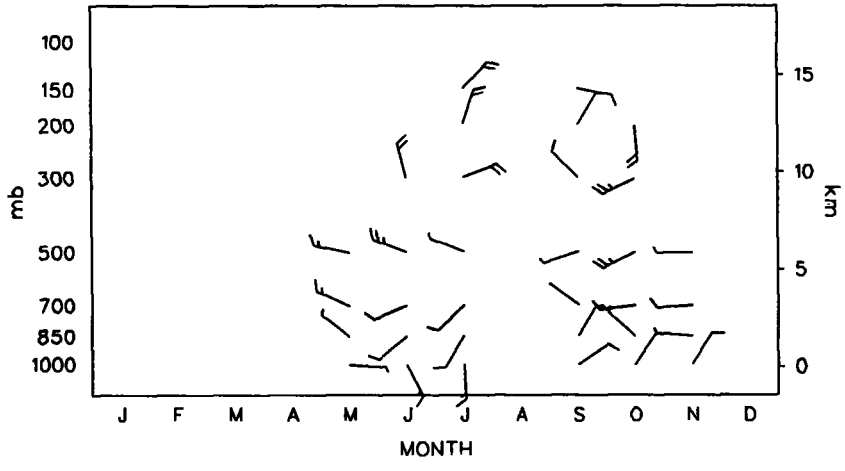
T10



OWS Study Area T Anomalies

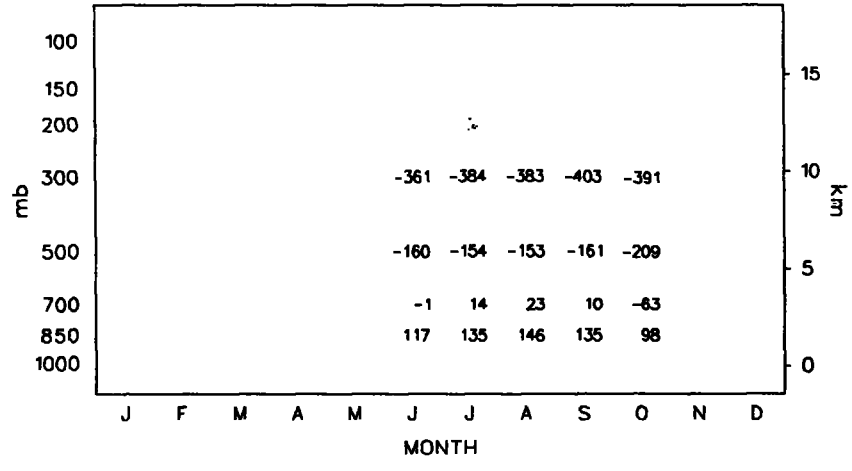
Wind

Full barb = 5 knots, Pennant = 25 knots



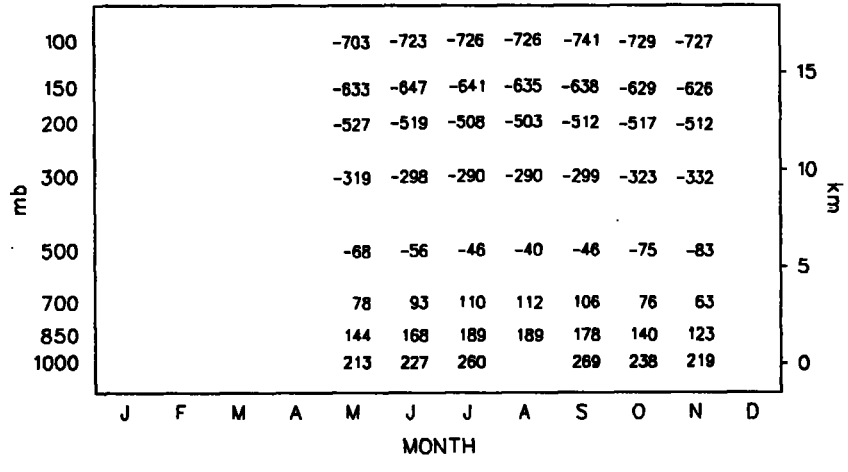
Dew Point Temperature

Units = 0.1 °C



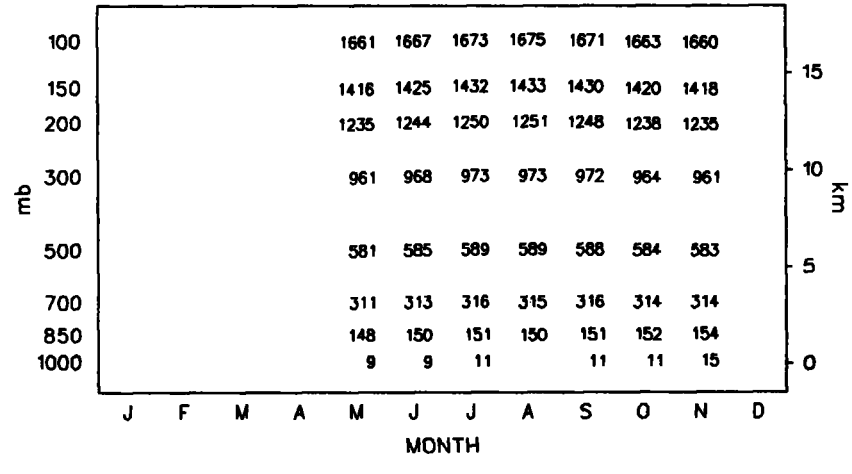
Air Temperature

Units = 0.1 °C



Pressure Height

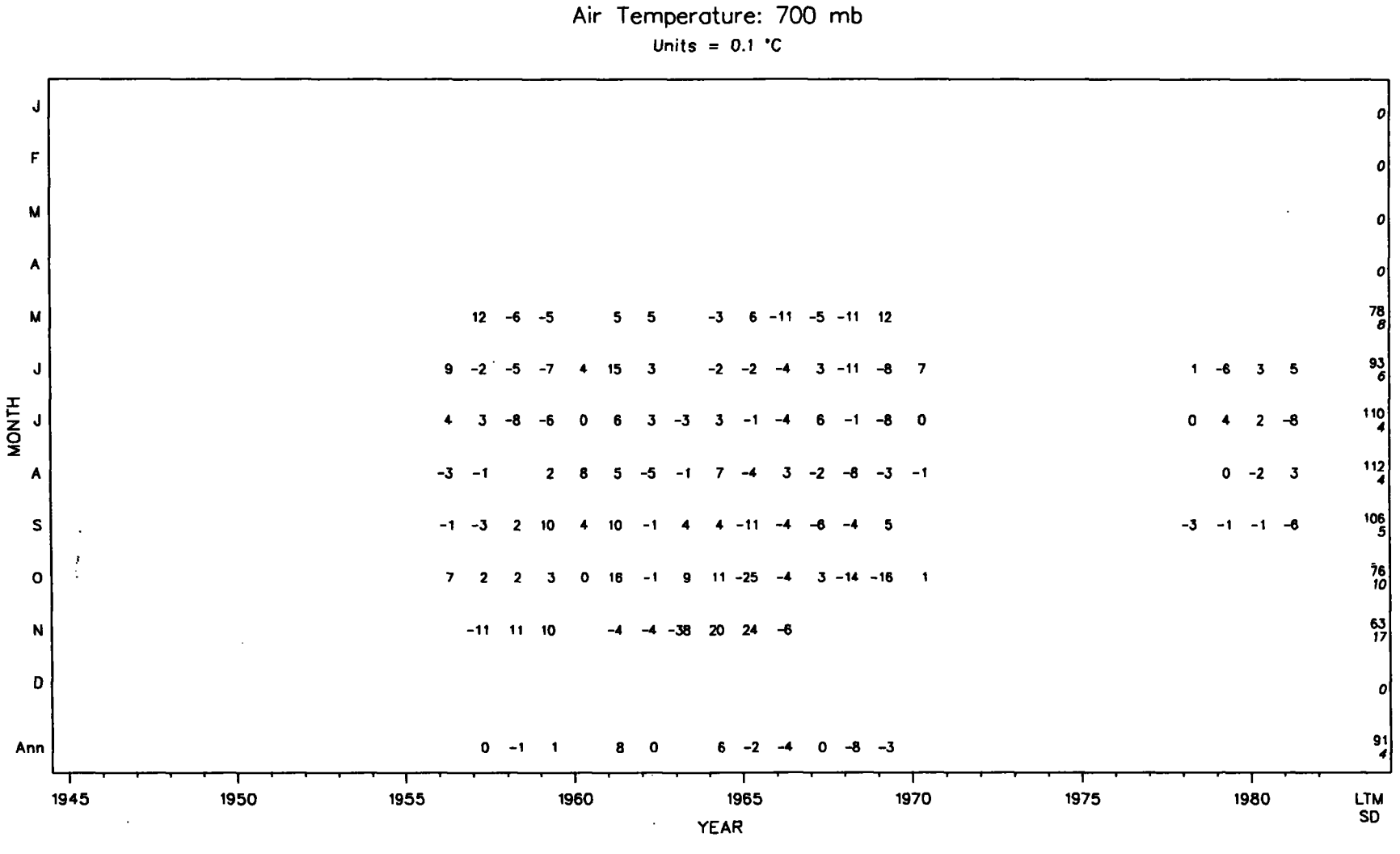
Units = 10 m



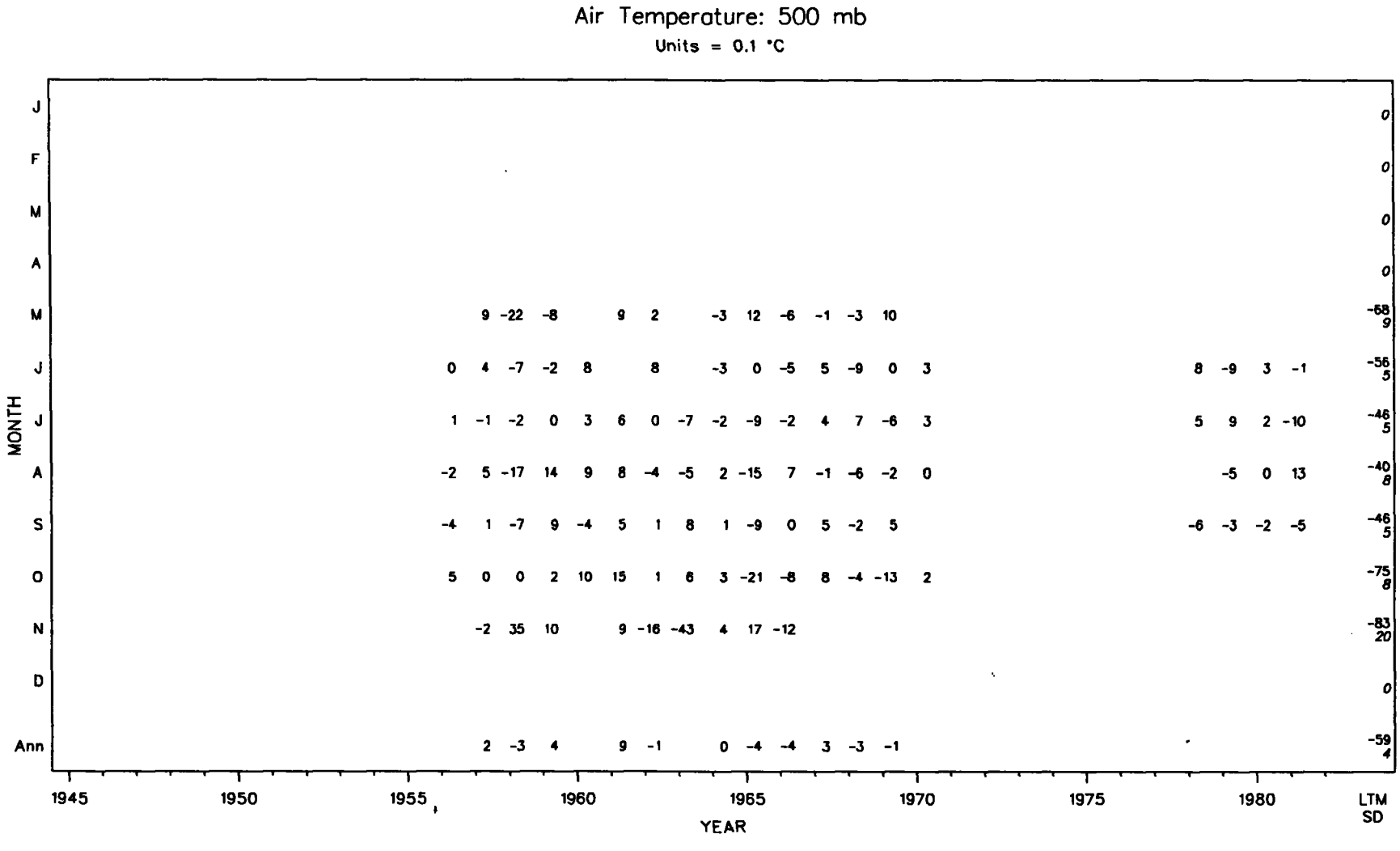
OWS Study Area T Upper Air Climatology

Mean plotted at actual height

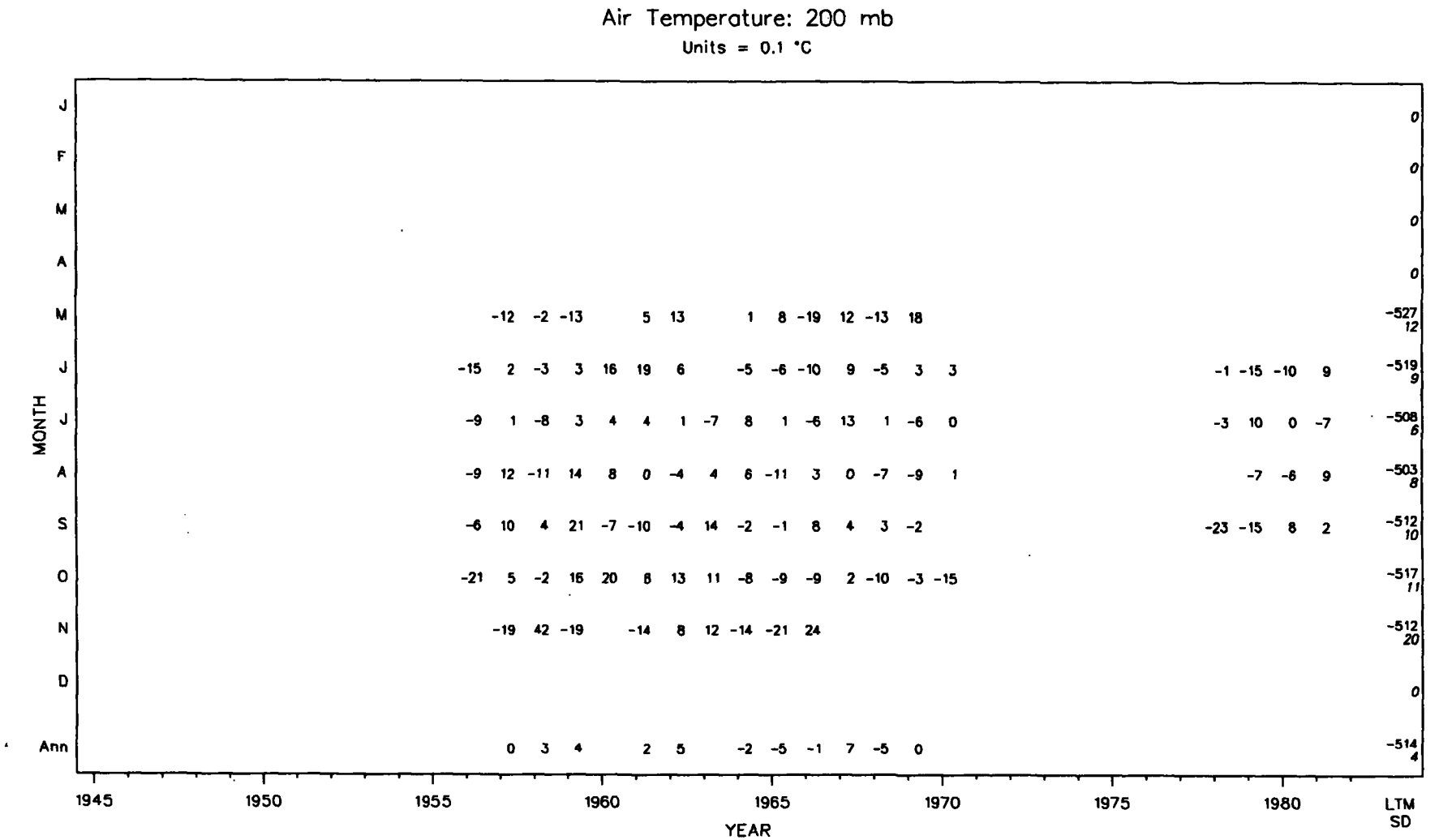
T12



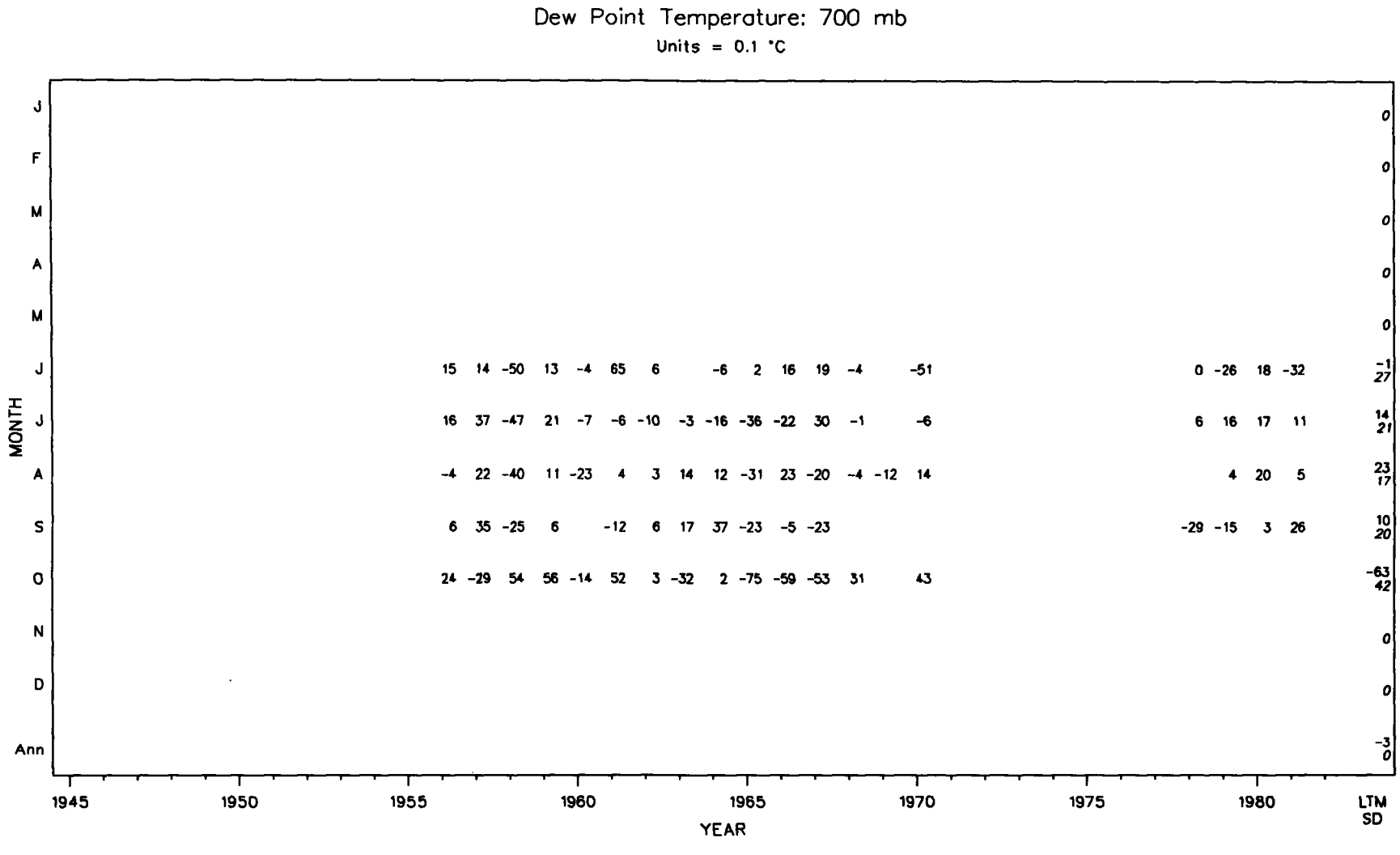
OWS Study Area T Anomalies



OWS Study Area T Anomalies

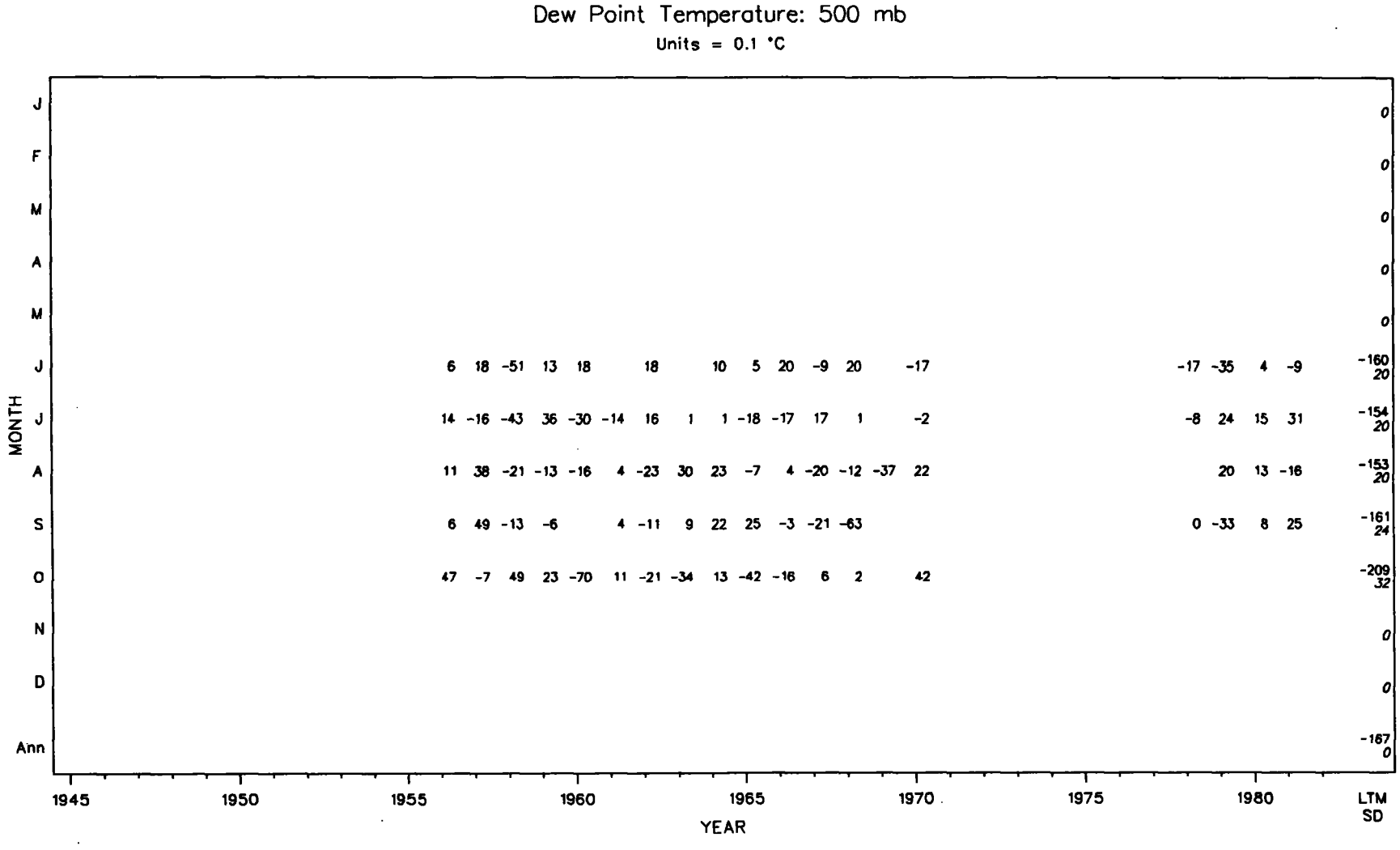


OWS Study Area T Anomalies

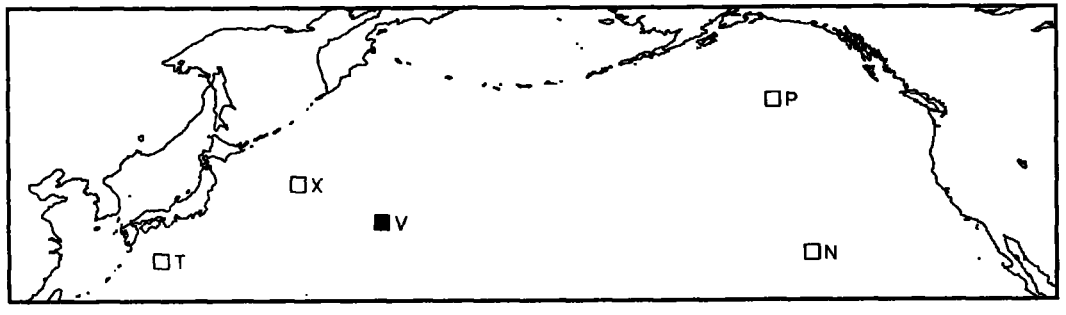


OWS Study Area T Anomalies

T16

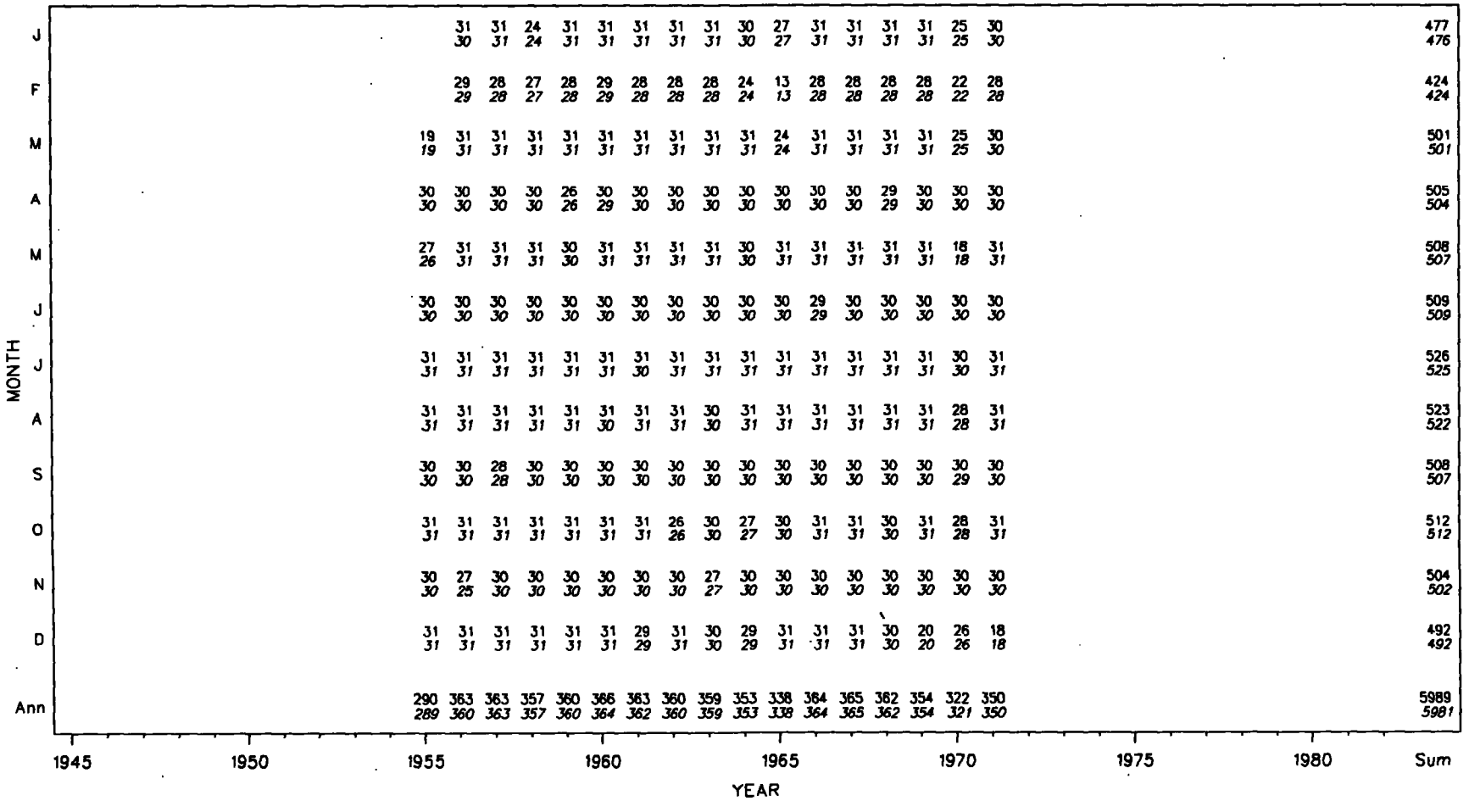


OWS Study Area T Anomalies



33.0°N – 34.9°N, 163.0°E – 164.9°E
1955 – 1971

OWS V



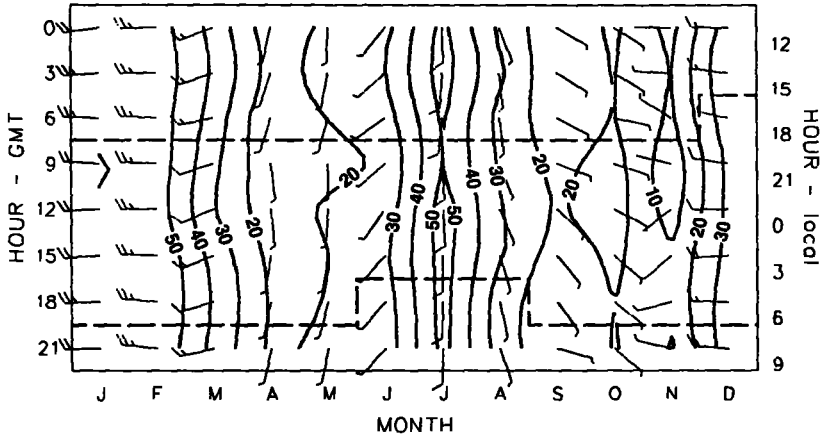
OWS Study Area V (34.0°N, 164.0°E)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

V1

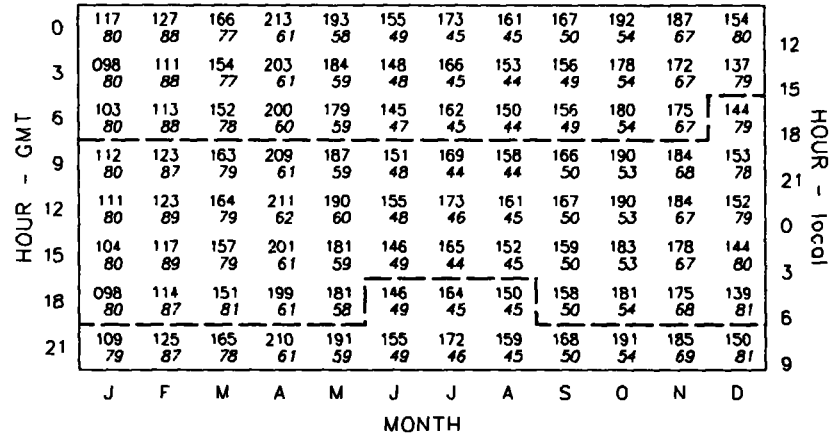
Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 10 percent



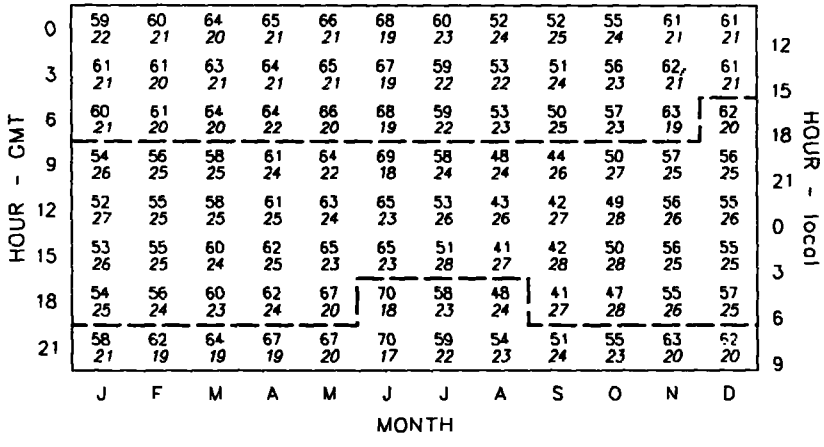
Pressure

Units = 0.1 mb



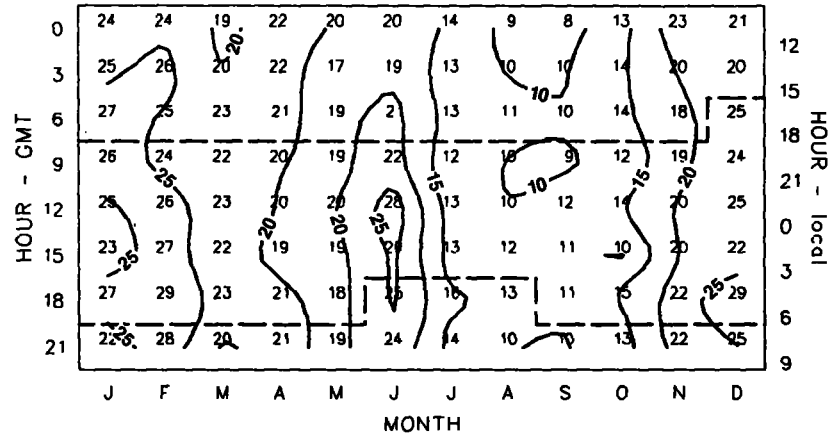
Total Cloudiness

Units = 0.1 okta



Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area V Surface Climatology

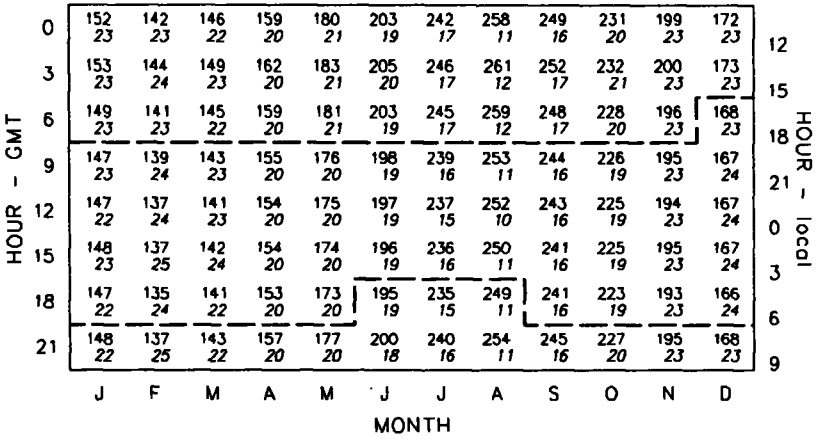
upper number = mean
lower number = standard deviation

data contours
sunrise/sunset

V2

Air Temperature

Units = 0.1 °C

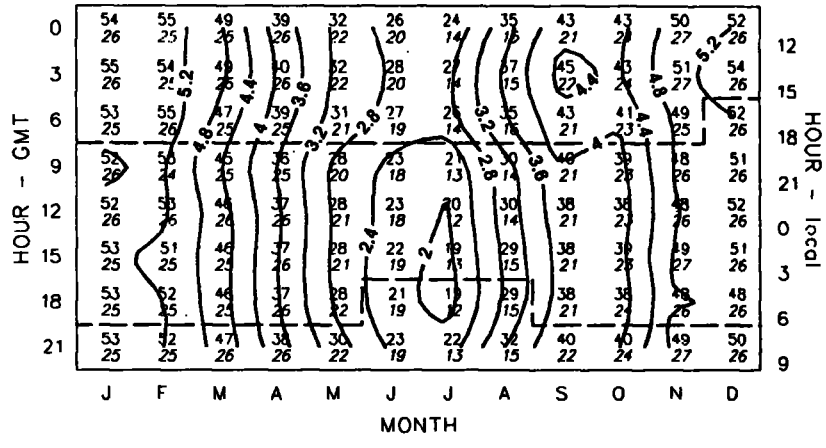


GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	152 23	142 23	146 22	159 20	180 21	203 19	242 17	258 11	249 16	231 20	199 23	172 23
3	153 23	144 24	149 23	162 20	183 21	205 20	246 17	261 12	252 17	232 21	200 23	173 23
6	149 23	141 23	145 22	159 20	181 21	203 19	245 17	259 12	248 17	228 20	196 23	168 23
9	147 23	139 24	143 23	155 20	176 20	198 19	239 16	253 11	244 16	226 19	195 23	167 24
12	147 22	137 24	141 23	154 20	175 20	197 19	237 15	252 10	243 16	225 19	194 23	167 24
15	148 23	137 25	142 24	154 20	174 20	196 19	236 16	250 11	241 16	225 19	195 23	167 24
18	147 22	135 24	141 22	153 20	173 20	195 19	235 15	249 11	241 16	223 19	193 23	166 24
21	148 22	137 25	143 22	157 20	177 20	200 18	240 16	254 11	245 16	227 20	195 23	168 23

Dew Point Depression

Units = 0.1 °C

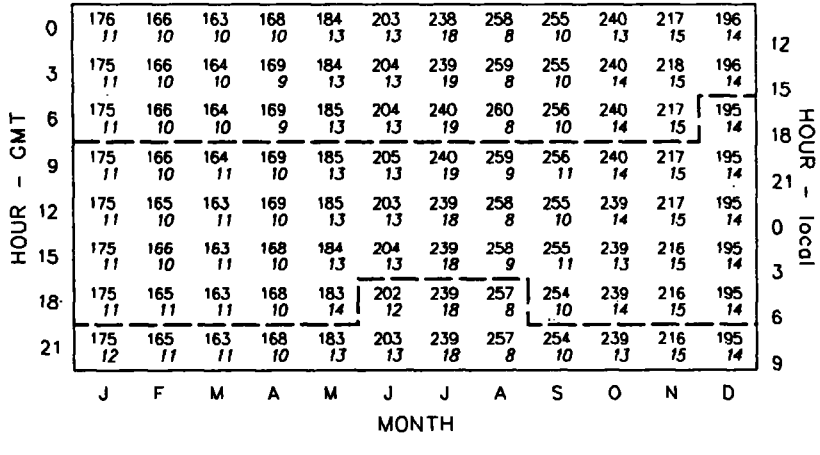
Contour interval = 0.4 °C



GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	54 26	55 25	49 25	39 26	32 22	26 20	24 14	35 16	43 21	43 24	50 27	52 26
3	55 26	54 25	49 25	40 26	32 22	28 20	27 14	37 15	45 22	43 24	51 27	54 26
6	53 25	55 26	47 25	39 25	31 21	27 19	25 14	35 15	43 21	41 23	49 25	52 26
9	52 26	50 24	45 25	36 25	28 20	23 18	21 13	30 14	40 21	39 23	48 26	51 26
12	52 26	50 26	46 26	37 26	28 21	23 18	20 12	30 14	38 21	38 23	48 26	52 26
15	53 25	51 25	46 25	37 26	28 21	22 19	19 13	29 15	38 21	38 23	49 27	51 26
18	53 25	52 25	46 25	37 26	28 22	21 19	19 12	29 15	38 21	38 23	48 26	48 26
21	53 25	52 25	47 26	38 26	30 22	23 19	22 13	32 15	40 22	40 24	49 27	50 26

Sea Surface Temperature

Units = 0.1 °C

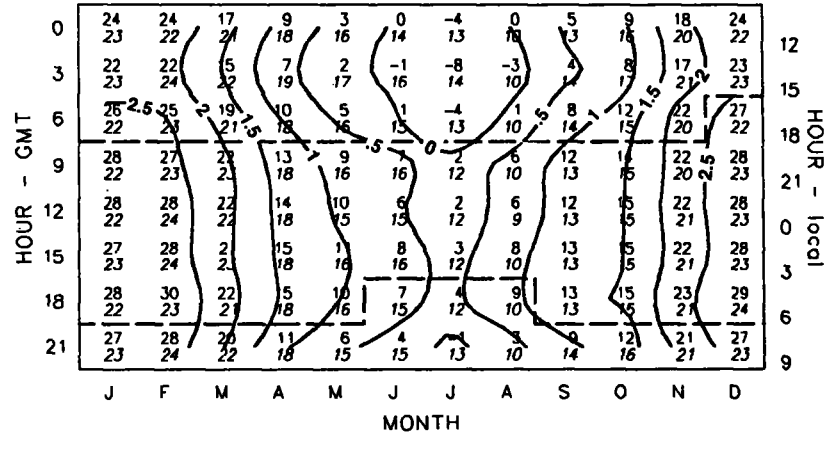


GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	176 11	166 10	163 10	168 10	184 13	203 13	238 18	258 8	255 10	240 13	217 15	196 14
3	175 11	166 10	164 10	169 9	184 13	204 13	239 19	259 8	255 10	240 14	218 15	196 14
6	175 11	166 10	164 10	169 9	185 13	204 13	240 19	260 8	256 10	240 14	217 15	195 14
9	175 11	166 10	164 11	169 10	185 13	205 13	240 19	259 9	256 11	240 14	217 15	195 14
12	175 11	165 10	163 11	169 10	185 13	203 13	239 18	258 8	255 10	239 14	217 15	195 14
15	175 11	166 10	163 11	168 10	184 13	204 13	239 18	258 9	255 11	239 13	216 15	195 14
18	175 11	165 11	163 11	168 10	183 14	202 12	239 18	257 8	254 10	239 14	216 15	195 14
21	175 12	165 11	163 11	168 10	183 13	203 13	239 18	257 8	254 10	239 13	216 15	195 14

Sea - Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



GMT	J	F	M	A	M	J	J	A	S	O	N	D
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3	22 23	22 24	15 22	7 19	2 17	-1 16	-8 14	-3 14	4 10	8 14	17 21	23 23
6	26 22	25 23	19 21	10 18	5 16	1 15	-4 13	1 10	8 14	12 15	22 20	27 22
9	28 22	27 23	23 21	13 18	9 16	5 16	2 12	6 10	12 13	16 15	22 20	28 23
12	28 22	28 24	22 22	14 18	10 15	6 15	2 12	6 9	12 13	15 15	22 21	28 23
15	27 23	28 24	21 21	15 18	11 16	8 16	3 12	8 10	13 13	15 15	22 21	28 23
18	28 22	30 23	22 21	15 18	10 16	7 15	4 12	9 10	13 13	15 15	23 21	29 24
21	27 23	28 24	20 22	11 18	6 15	4 15	1 13	5 10	9 14	12 16	21 21	27 23

OWS Study Area V Surface Climatology

upper number = mean

lower number = standard deviation

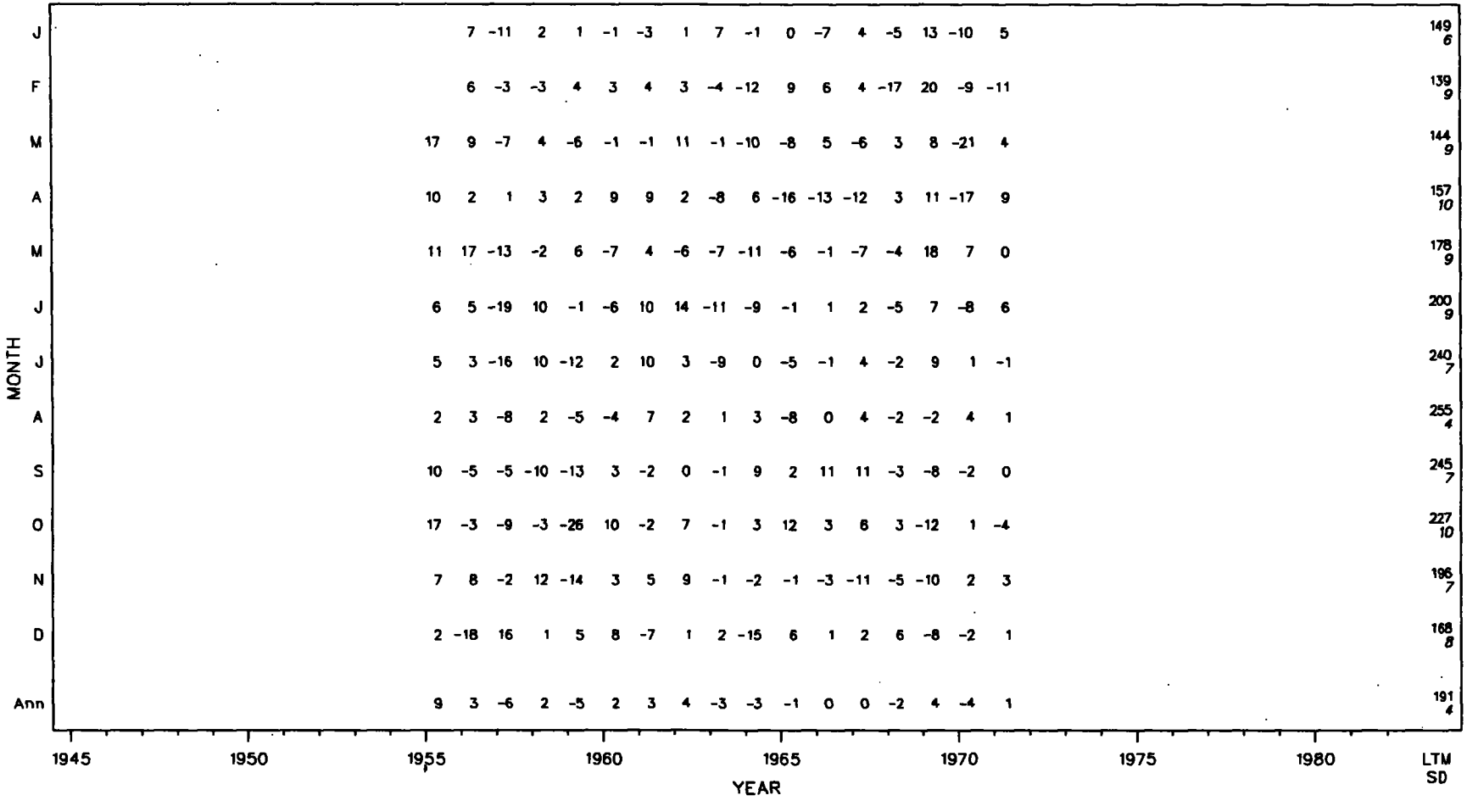
——— data contours

— — — — sunrise/sunset

V3

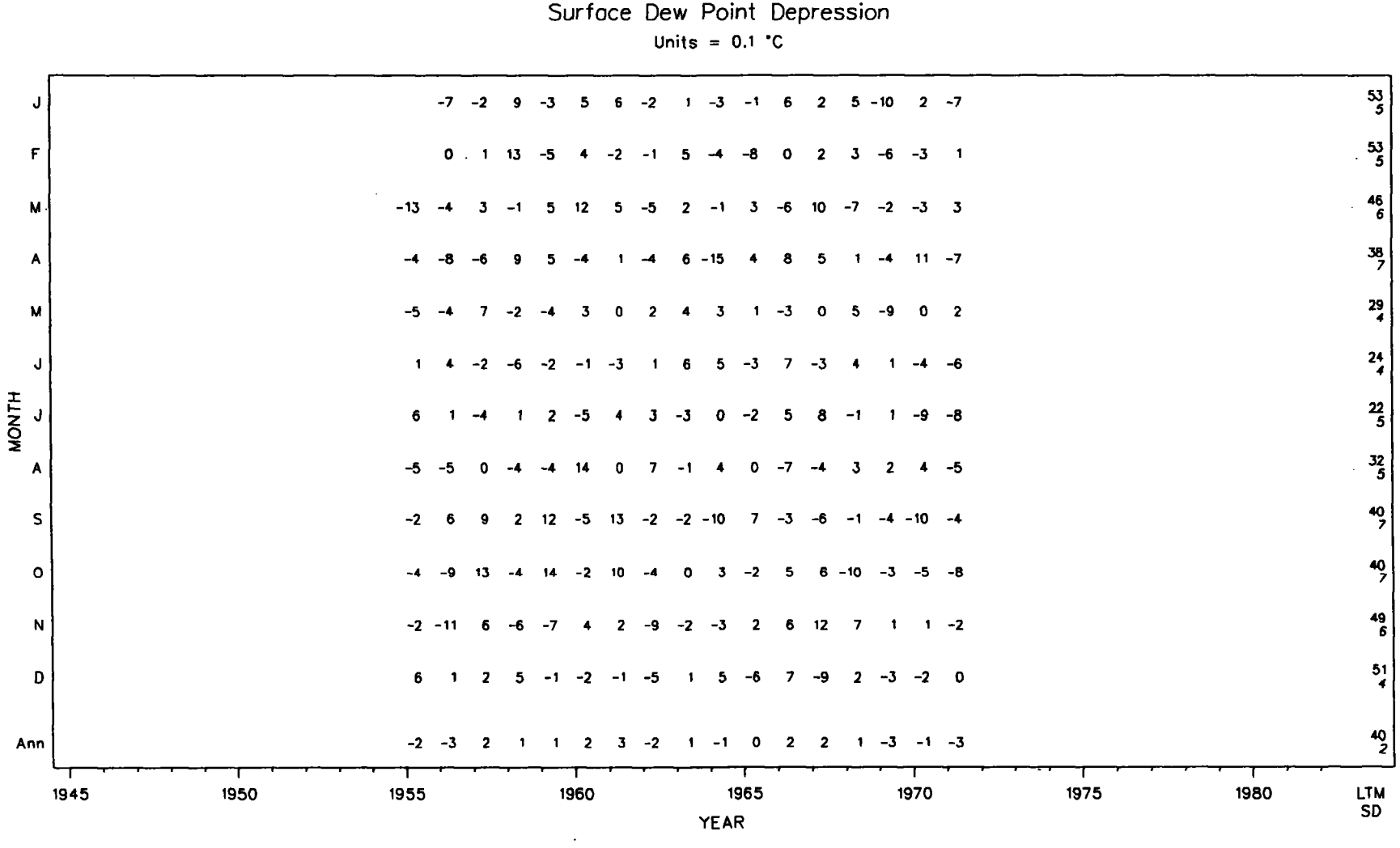
Surface Air Temperature

Units = 0.1 °C

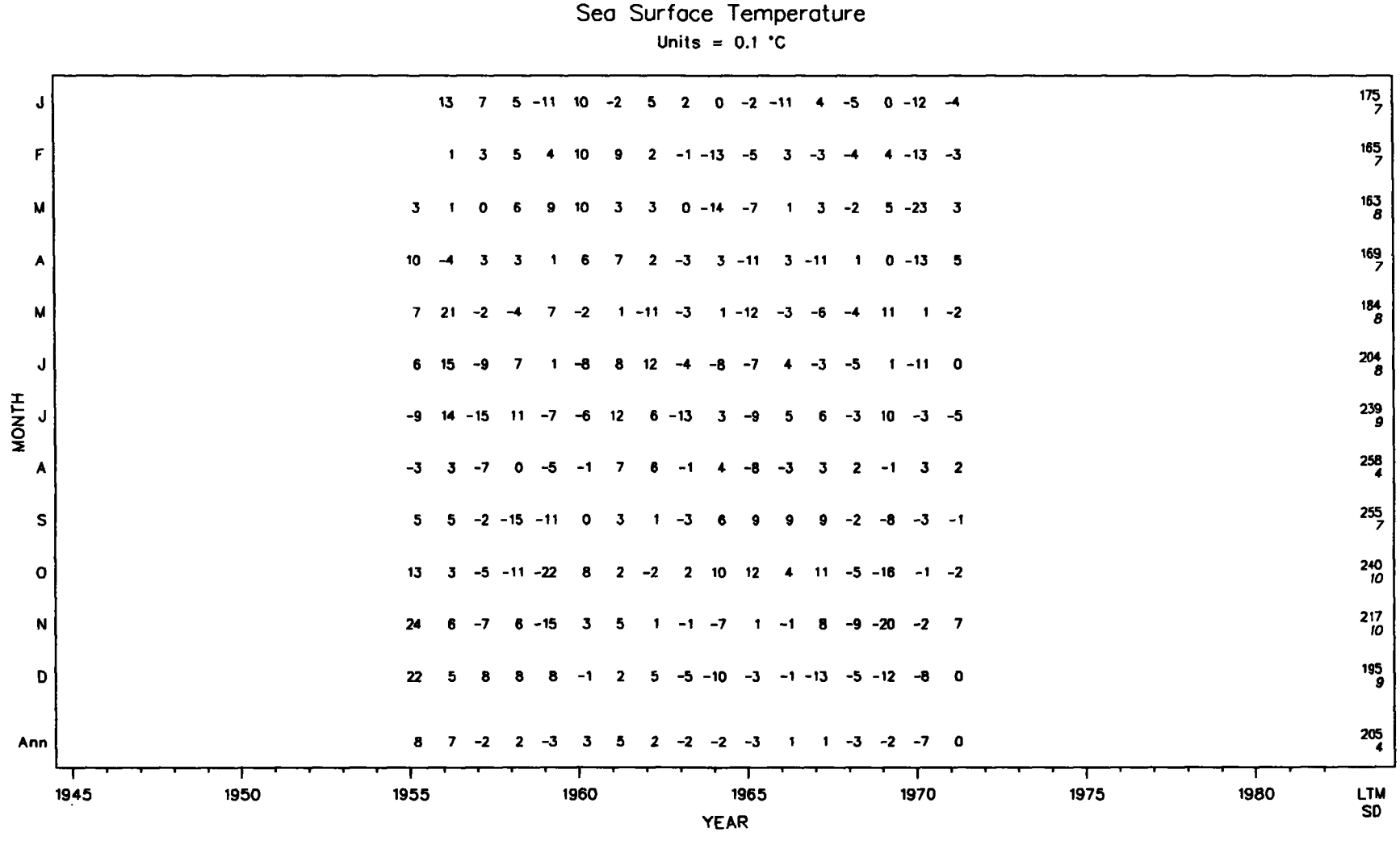


OWS Study Area V Anomalies

V4



OWS Study Area V Anomalies

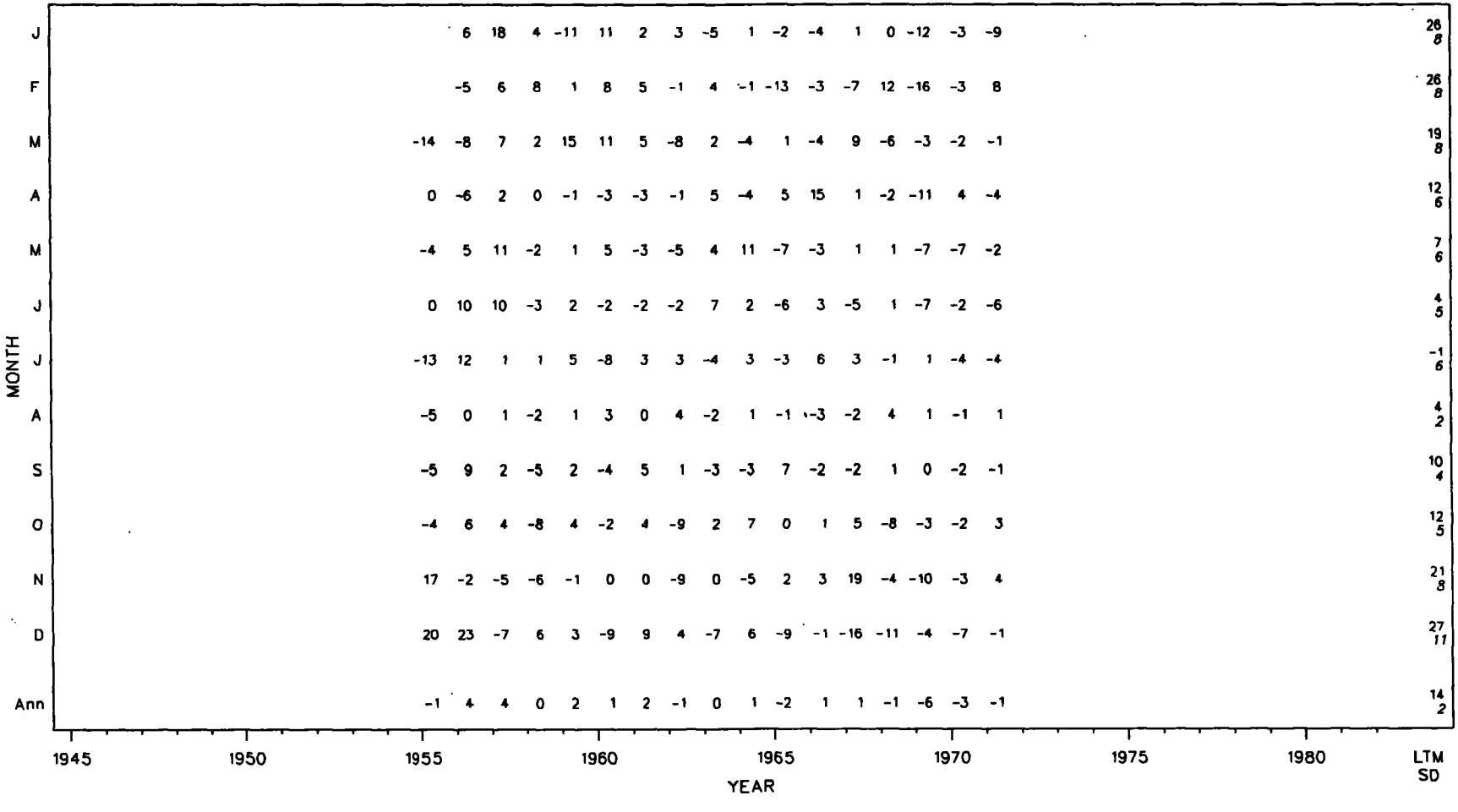


OWS Study Area V Anomalies

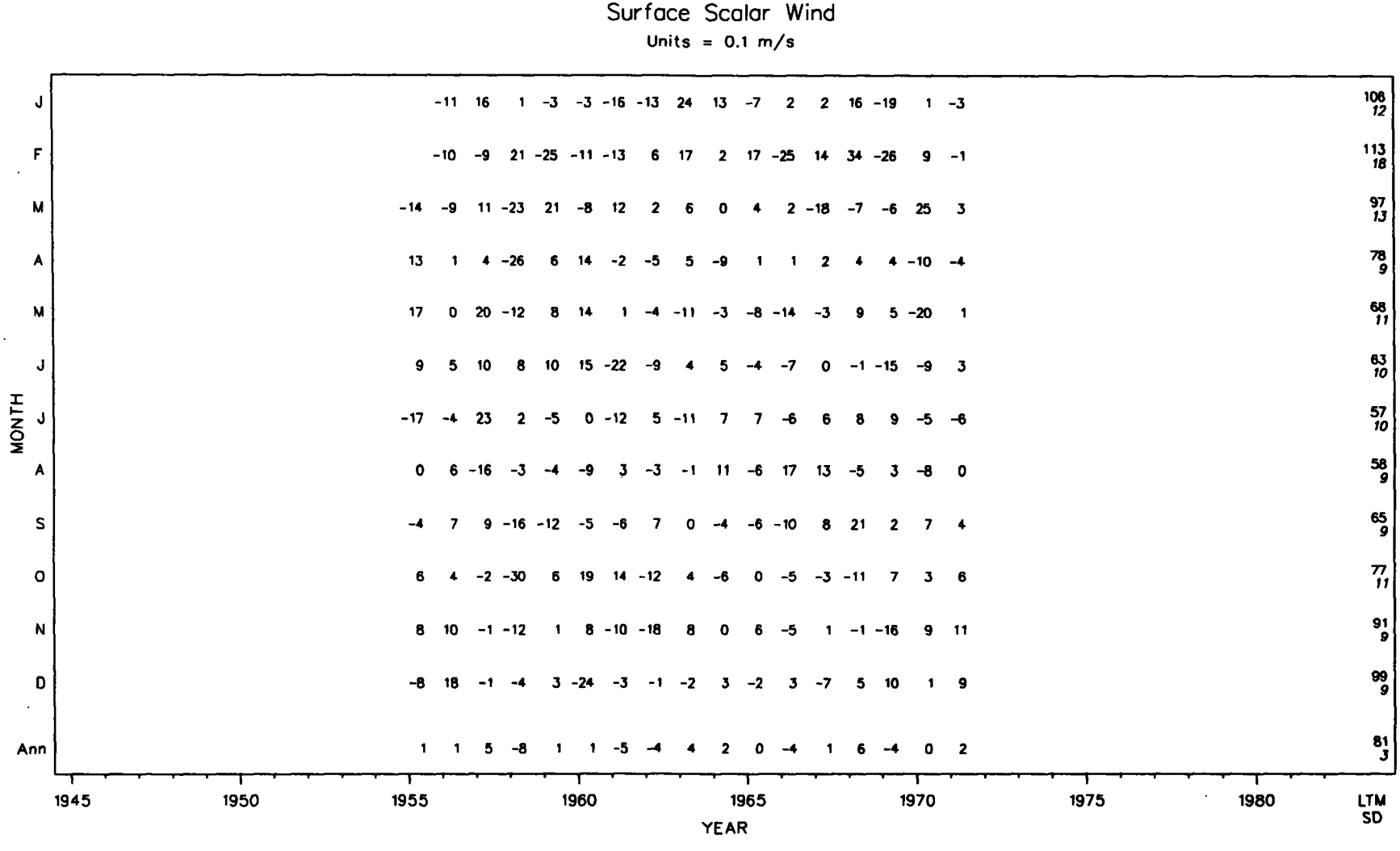
V6

Sea - Air Temperature Difference

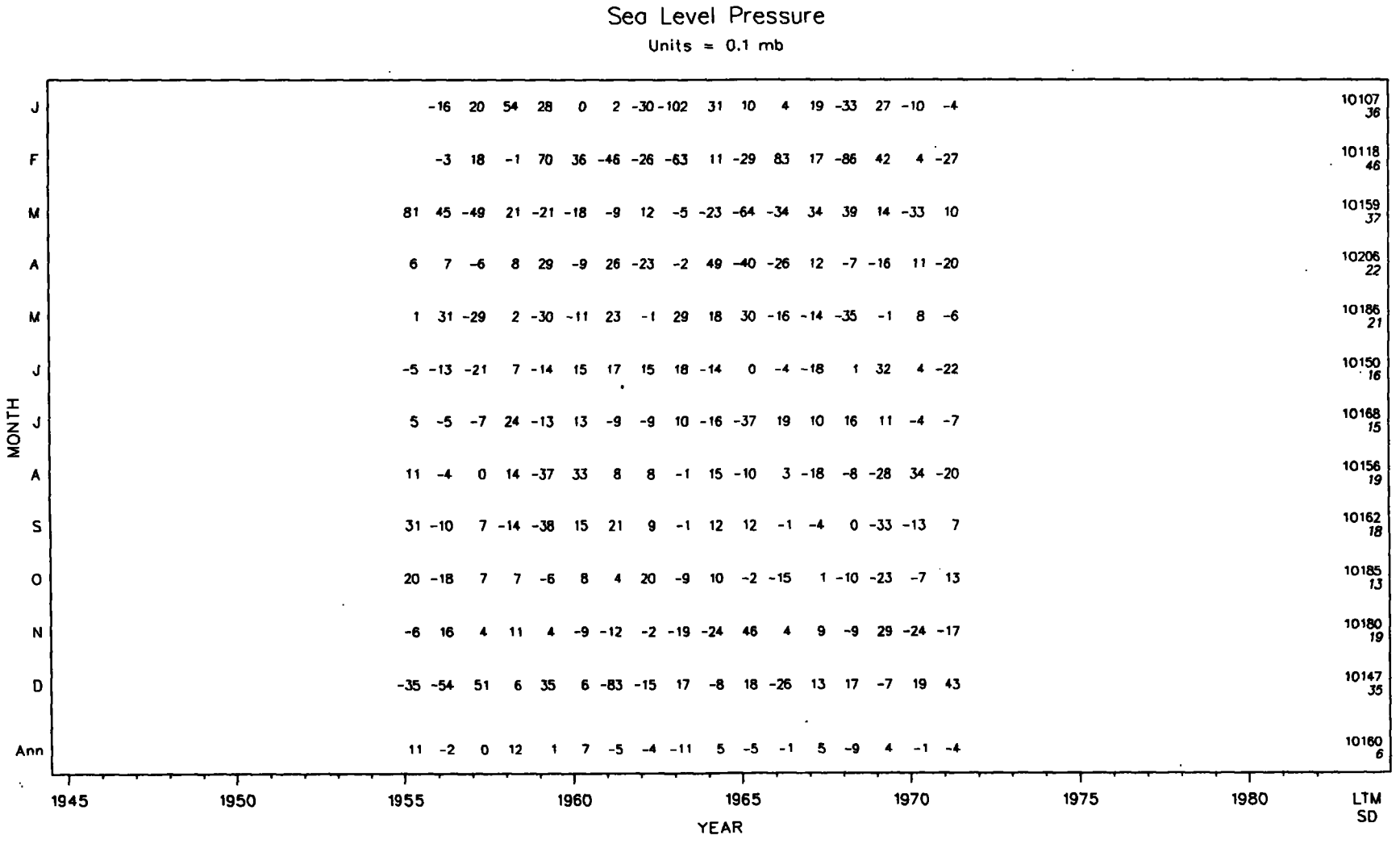
Units = 0.1 °C



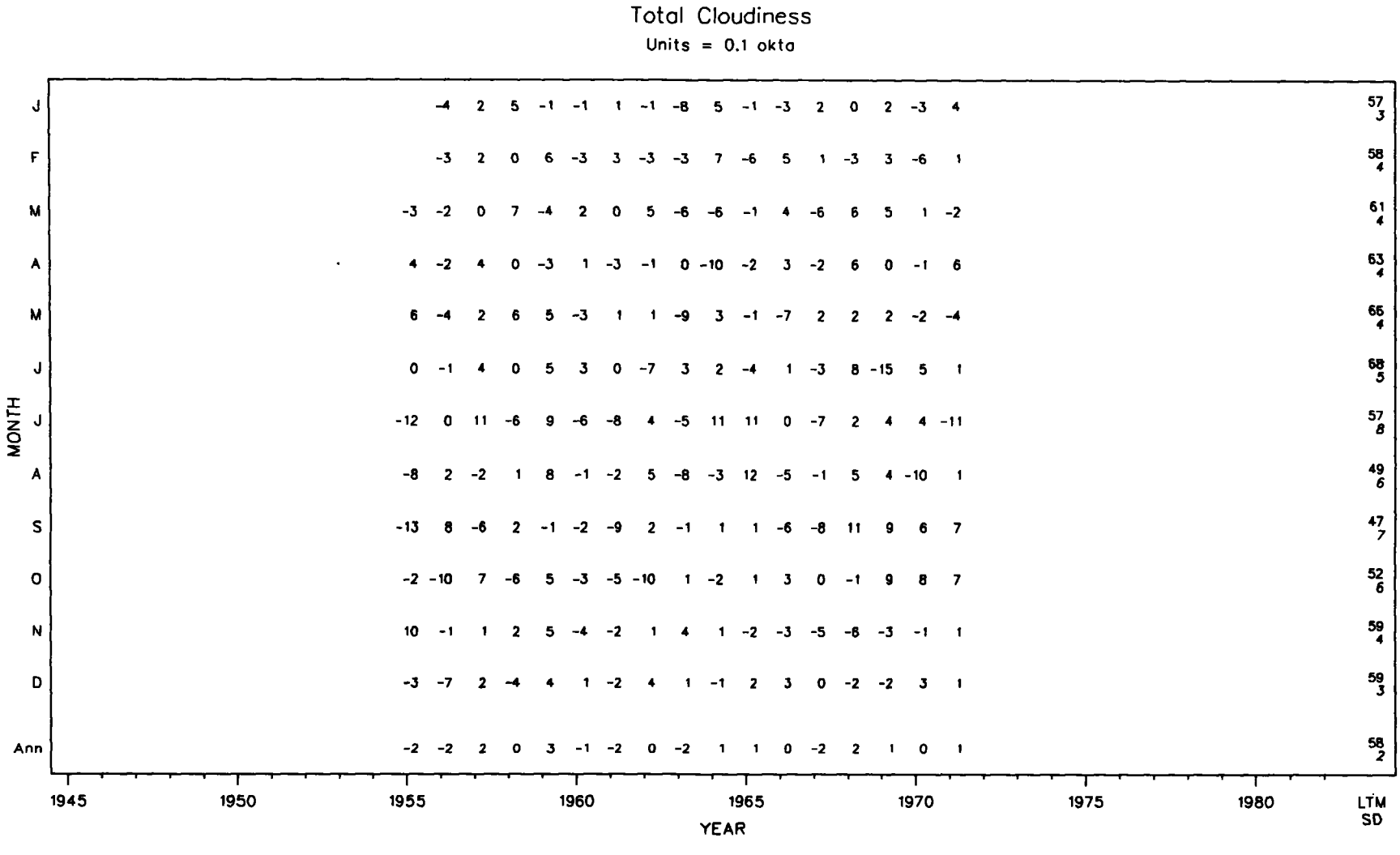
OWS Study Area V Anomalies



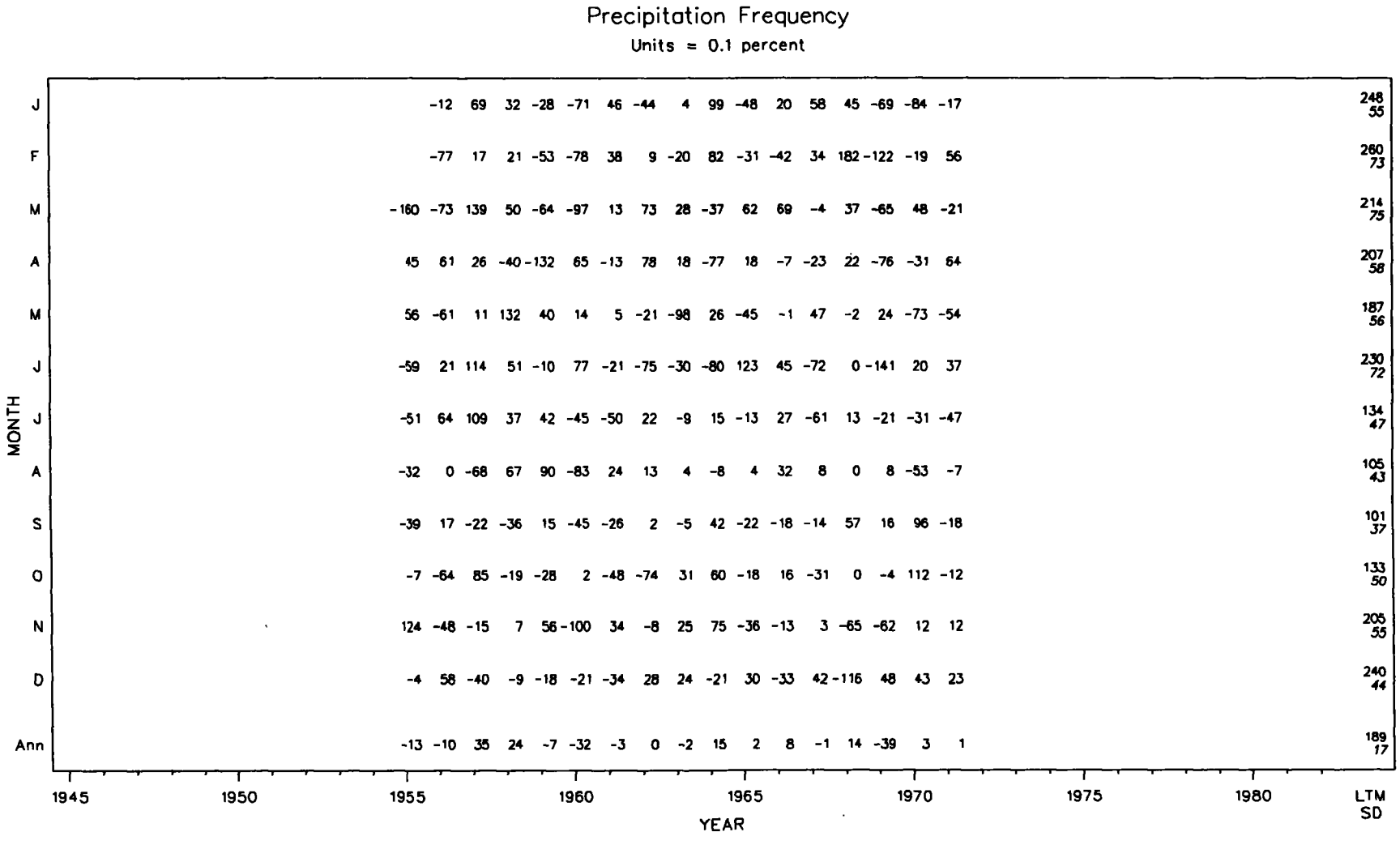
OWS Study Area V Anomalies



OWS Study Area V Anomalies



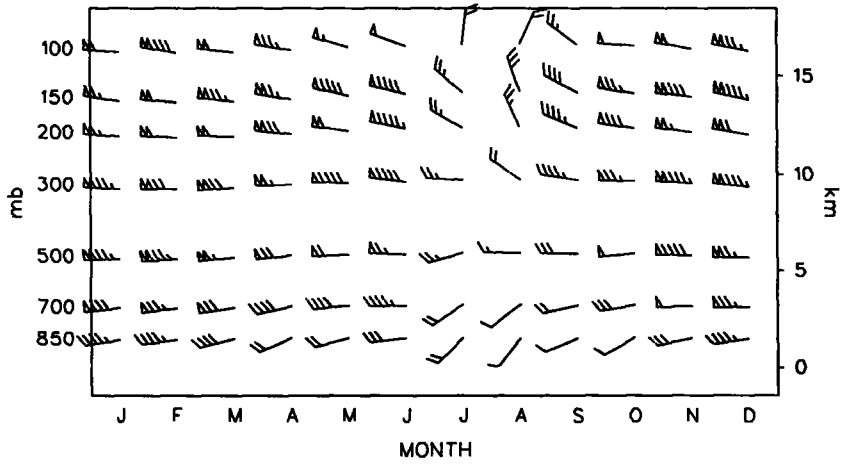
OWS Study Area V Anomalies



OWS Study Area V Anomalies

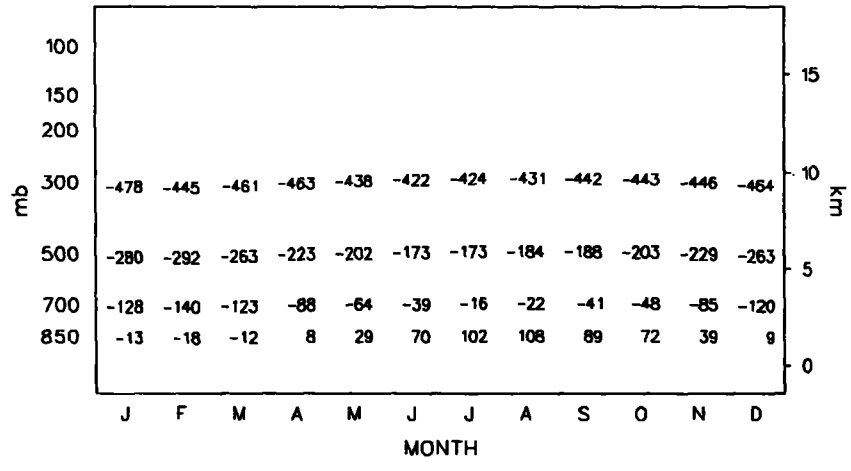
Wind

Full barb = 5 knots, Pennant = 25 knots



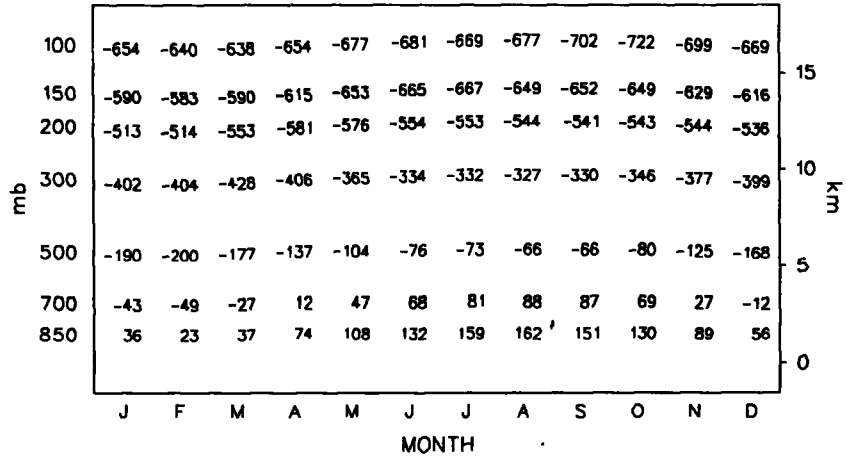
Dew Point Temperature

Units = 0.1 °C



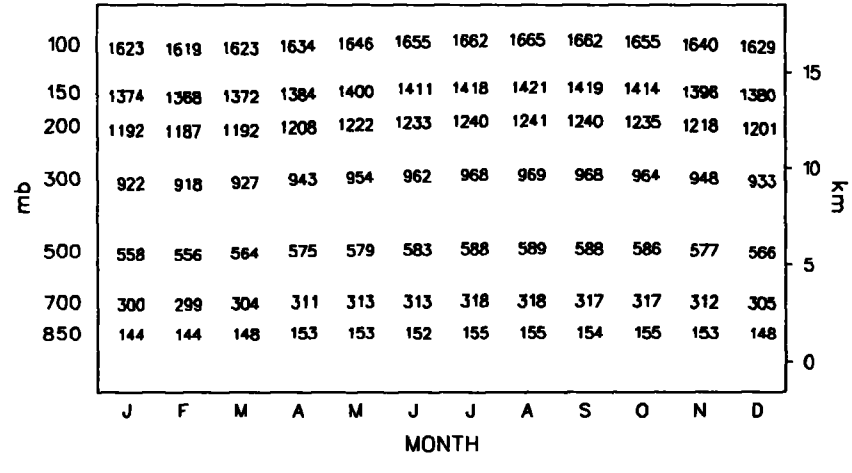
Air Temperature

Units = 0.1 °C



Pressure Height

Units = 10 m

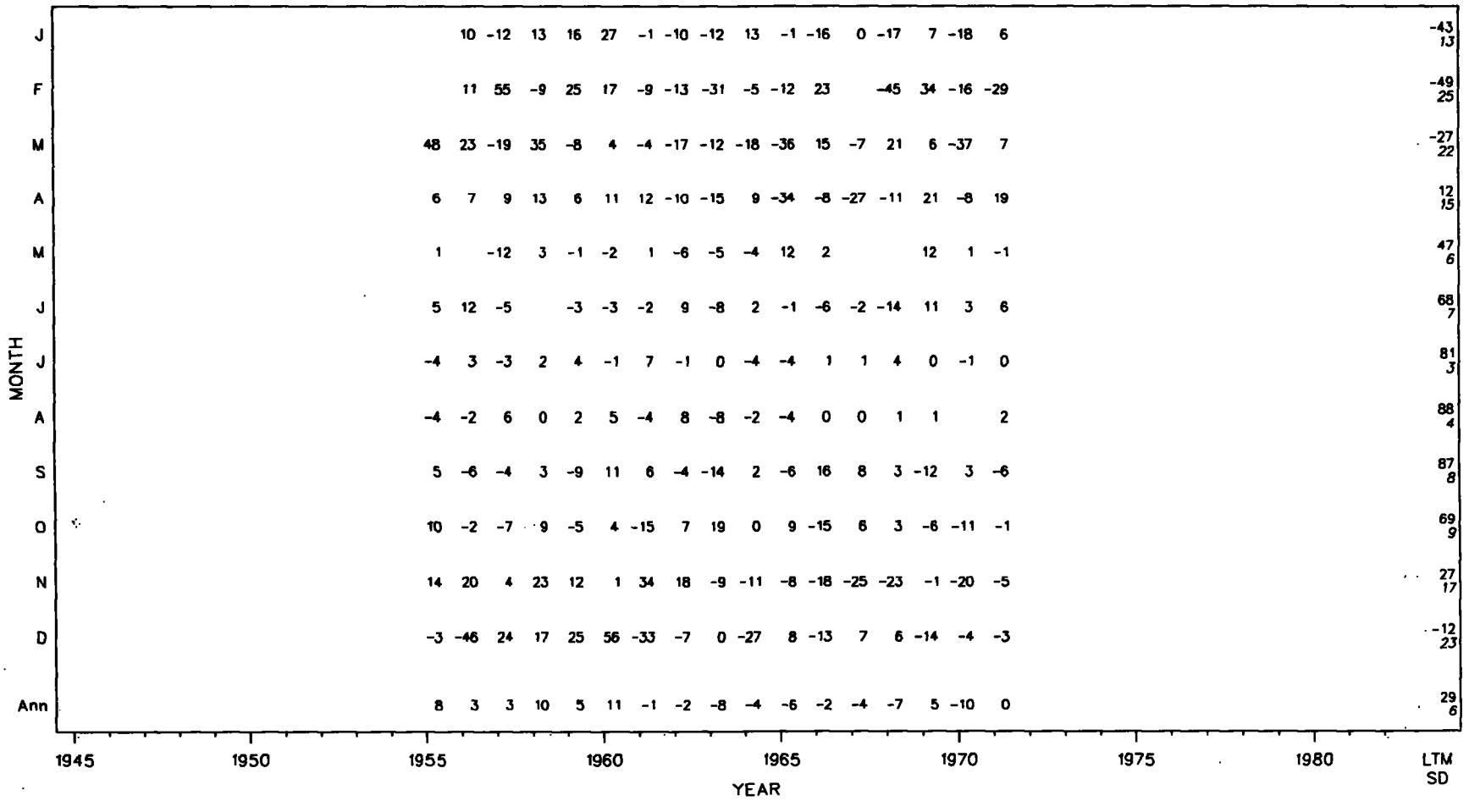


OWS Study Area V Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

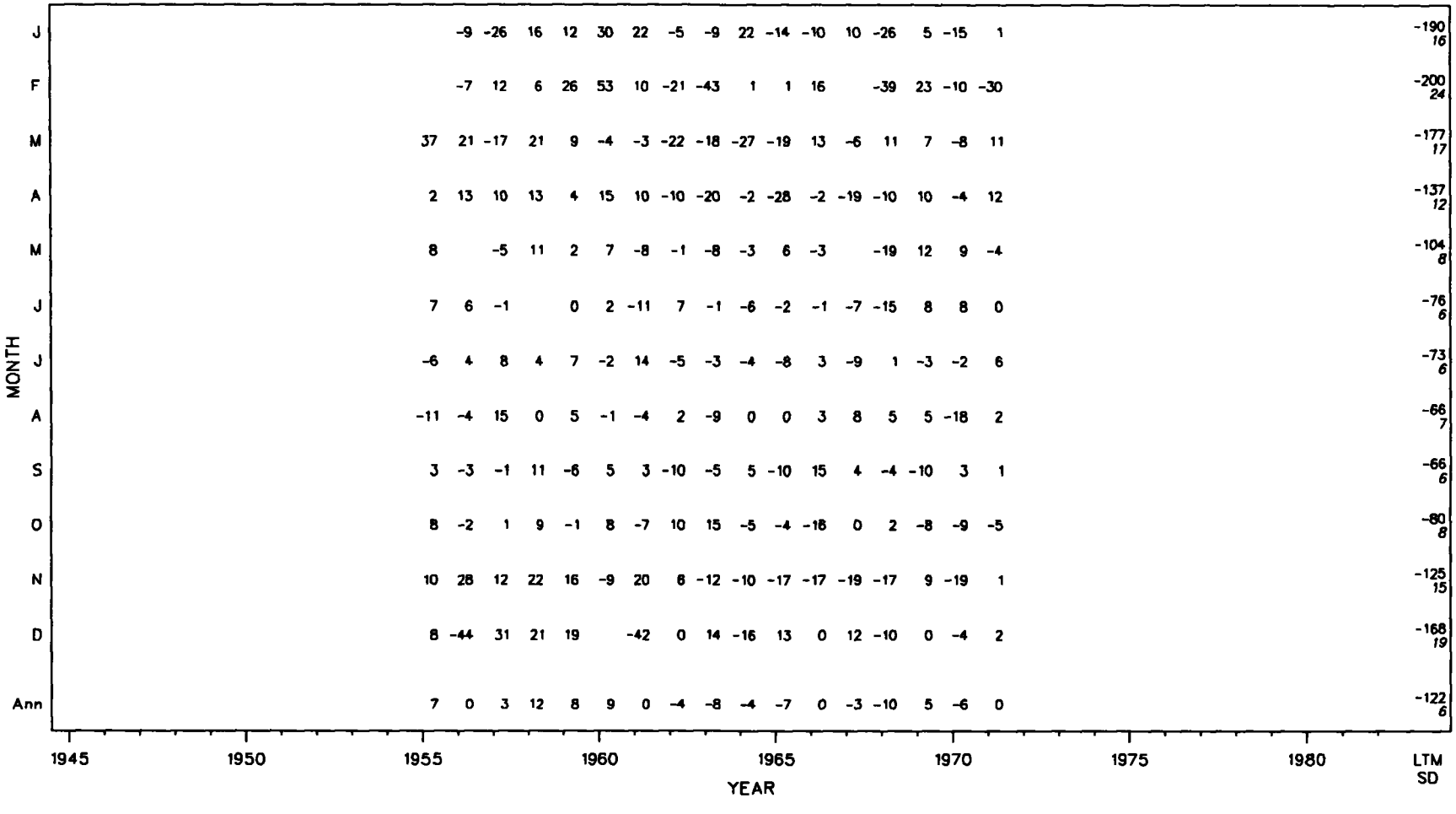
Units = 0.1 °C



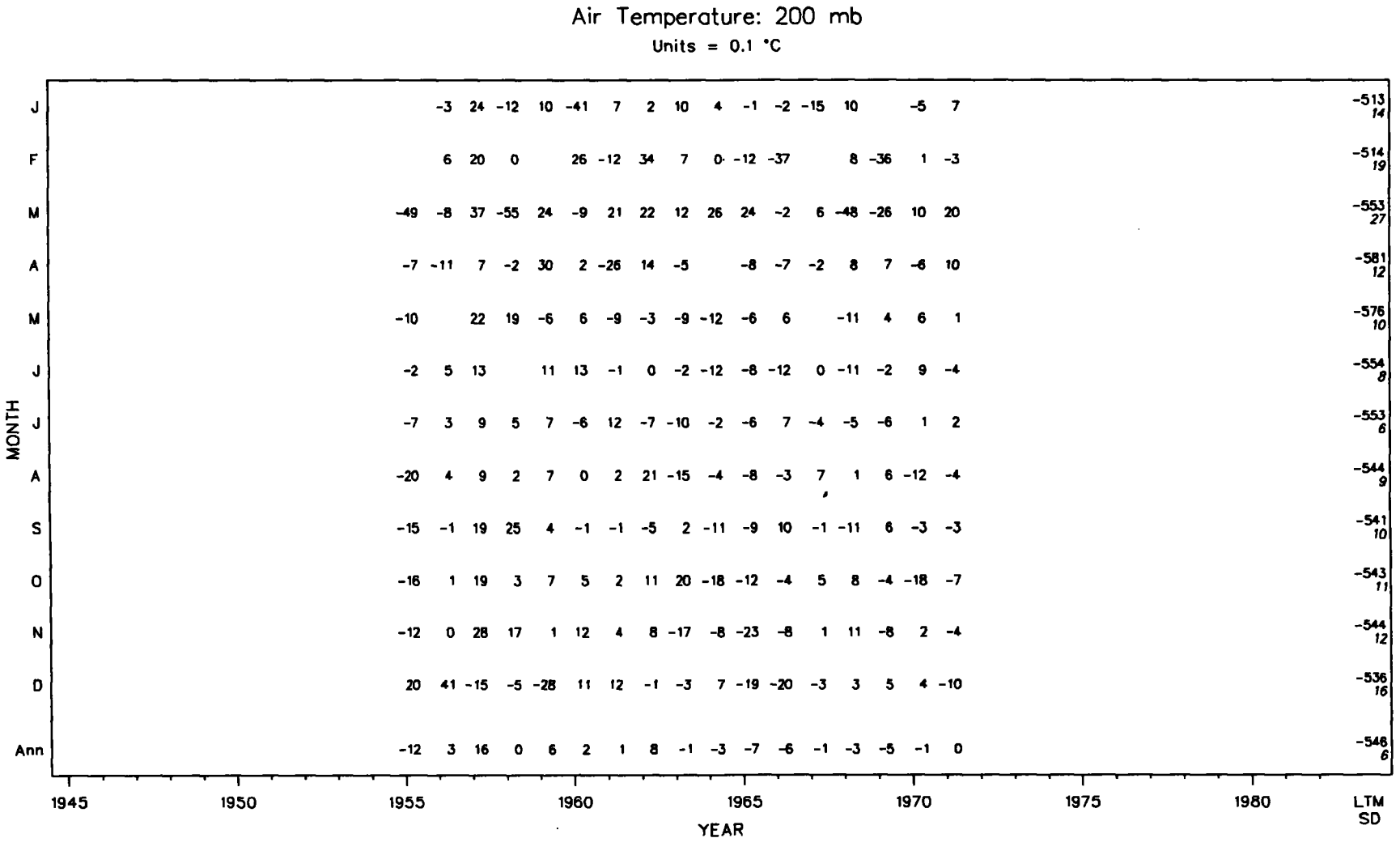
OWS Study Area V Anomalies

Air Temperature: 500 mb

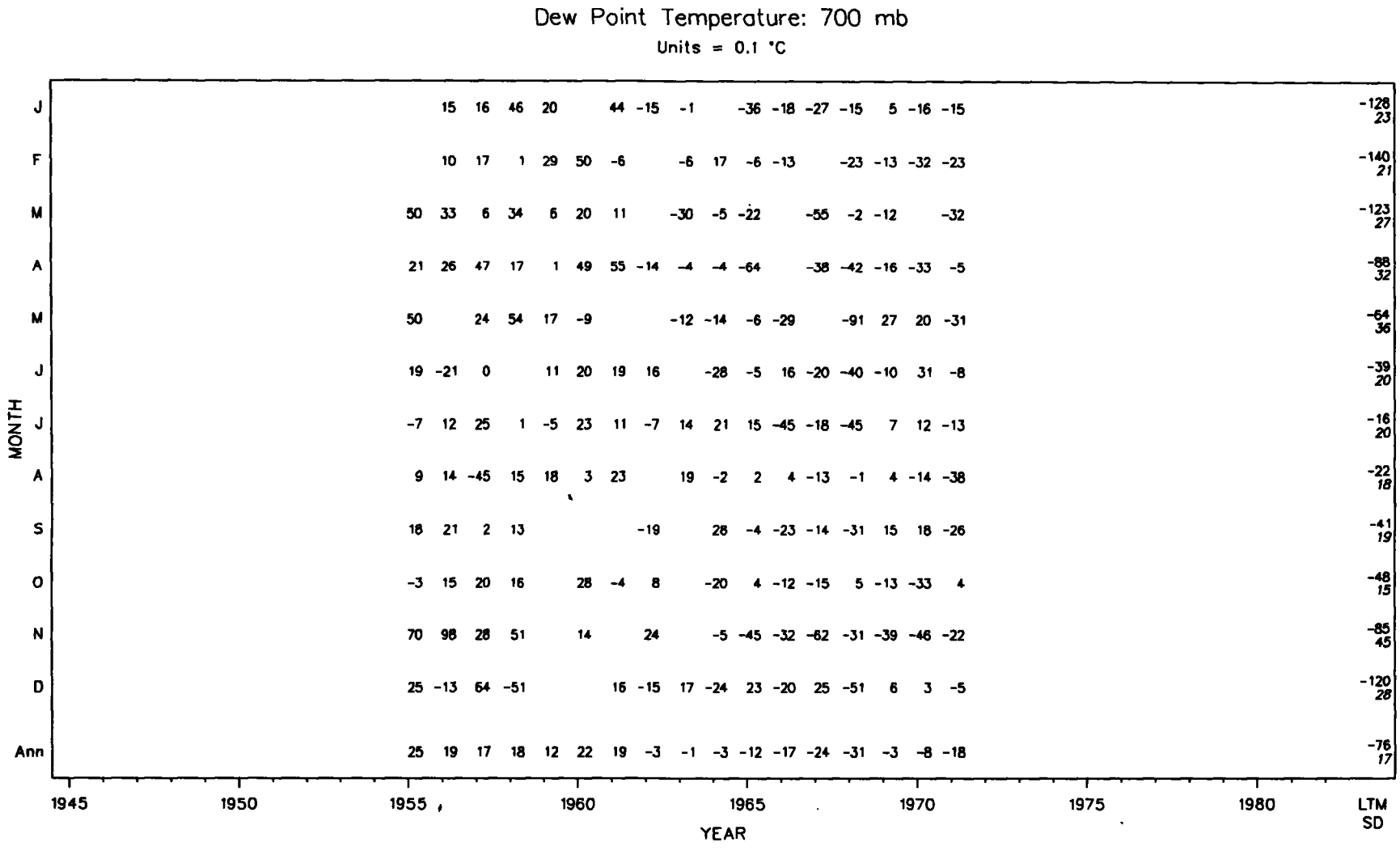
Units = 0.1 °C



OWS Study Area V Anomalies



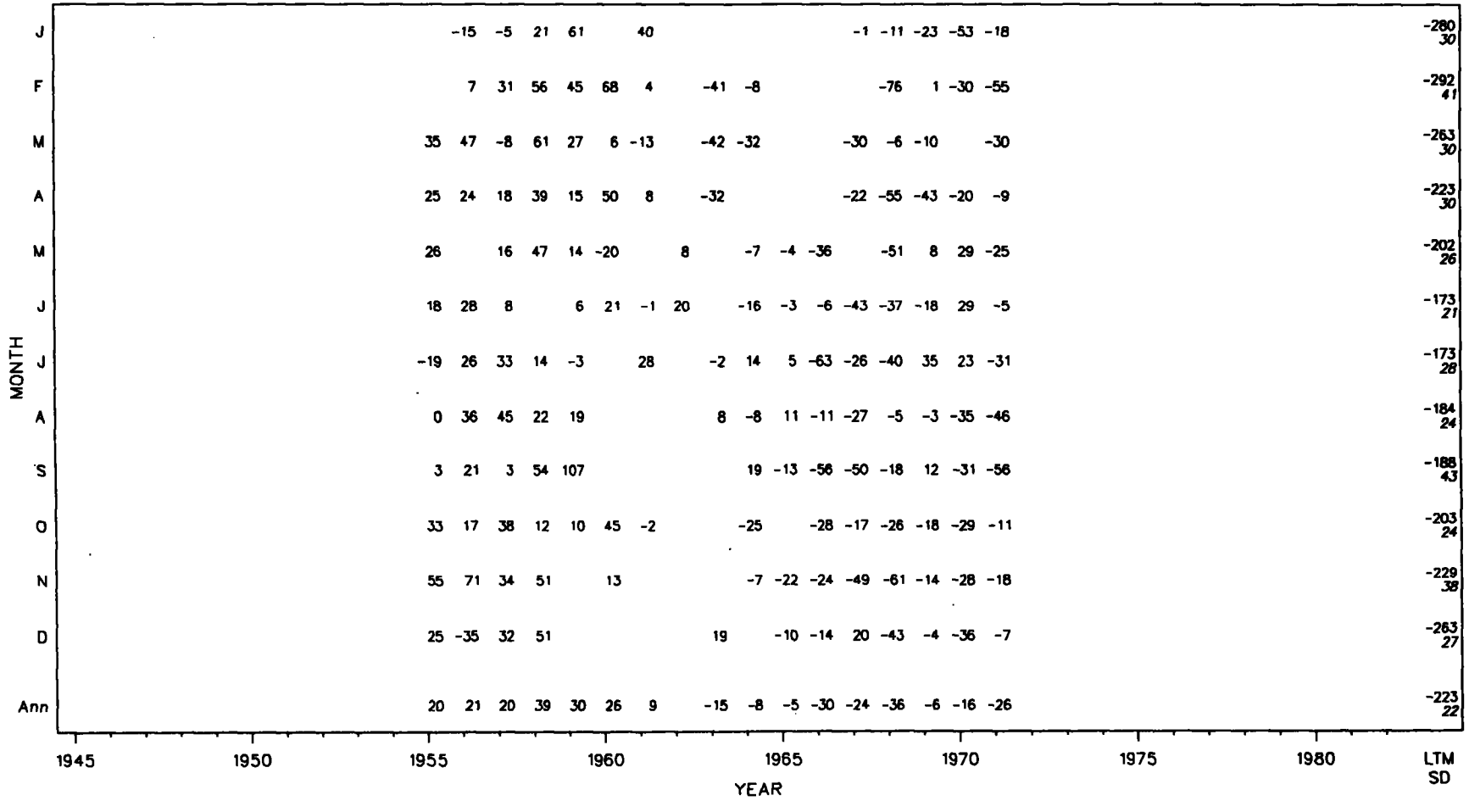
OWS Study Area V Anomalies



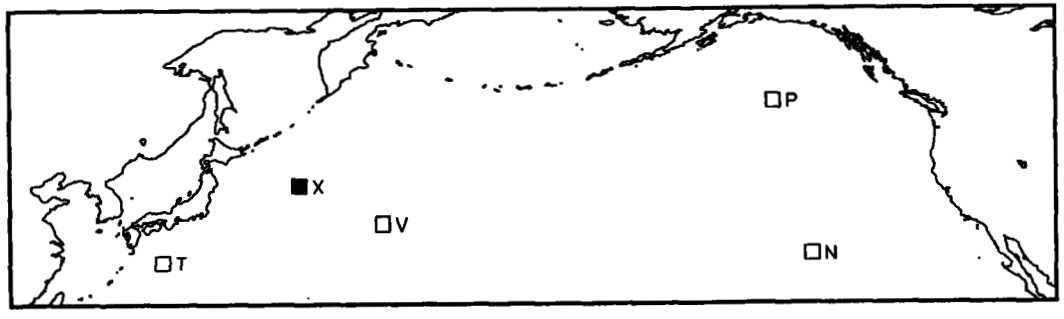
OWS Study Area V Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C



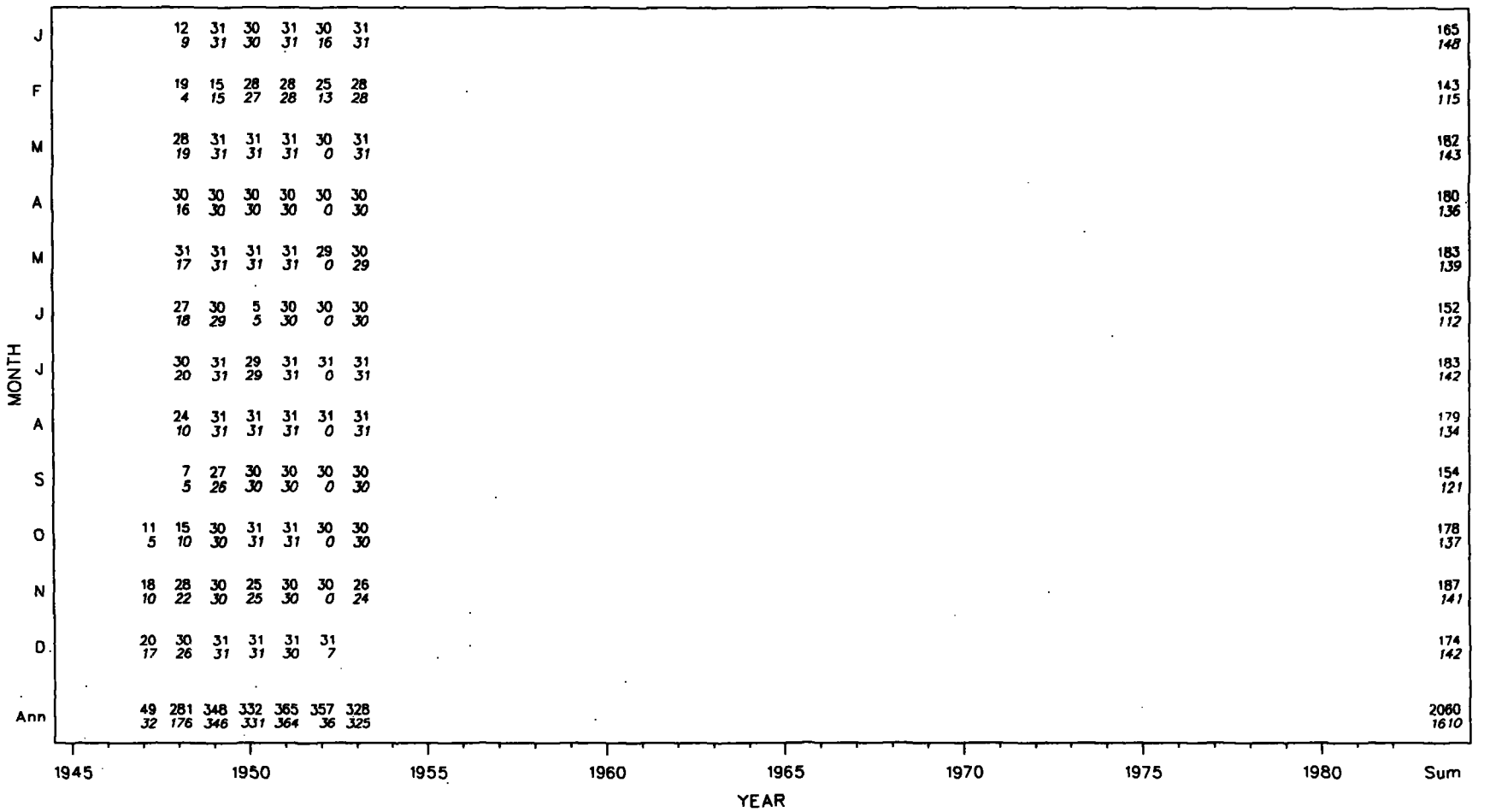
OWS Study Area V Anomalies



OWS

X

38.0°N – 39.9°N, 152.0°E – 153.9°E
1947 – 1953

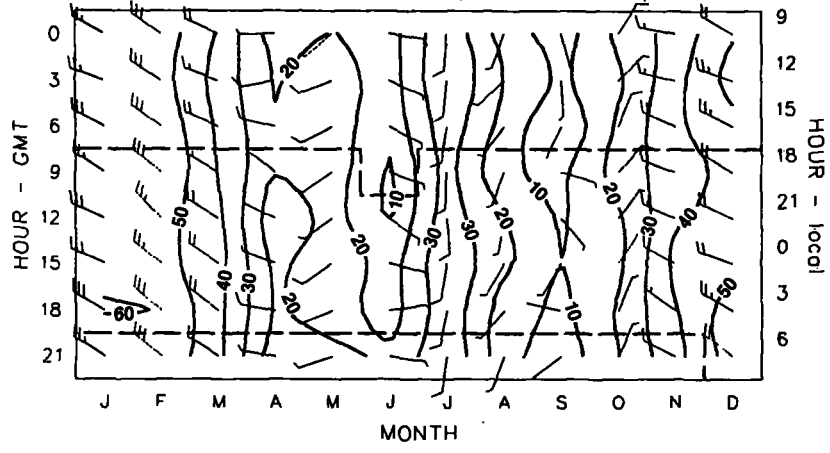


OWS Study Area X (39.0°N, 153.0°E)
Frequency of Surface Observations

Each of the 11 variables was observed on X days of each month.
The upper number is the maximum X from among all the variables.
The lower number is the minimum X from among all the variables.

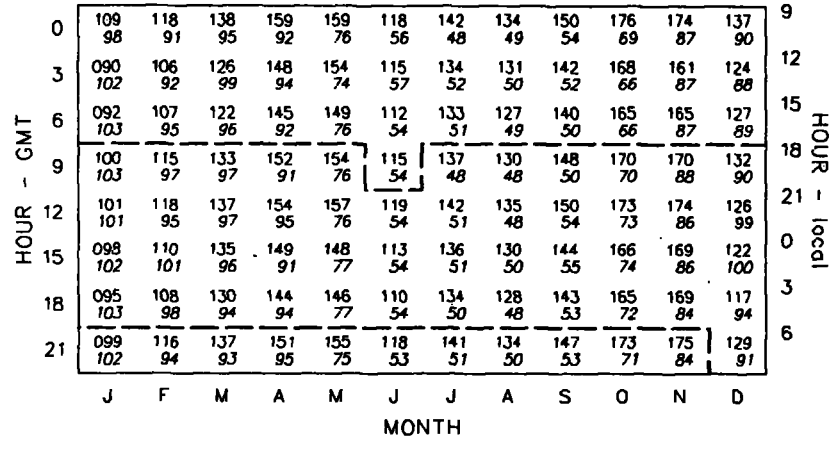
Wind

Full barb = 5 knots, pennant = 25 knots
Contours are Wind Steadiness, interval = 10 percent



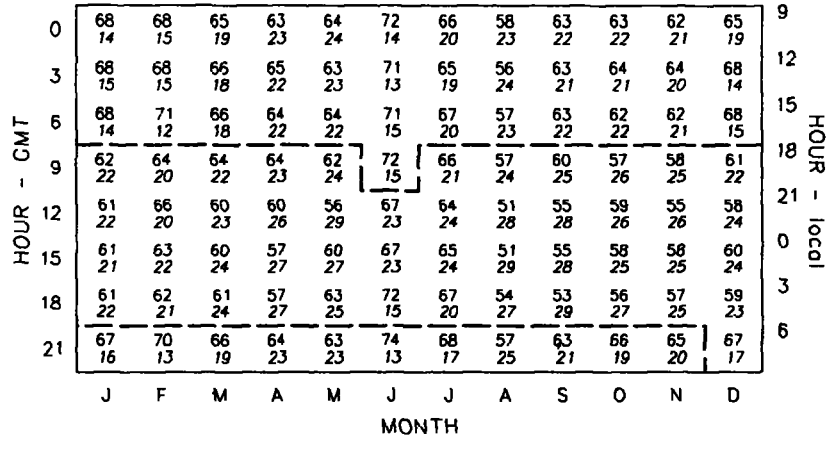
Pressure

Units = 0.1 mb



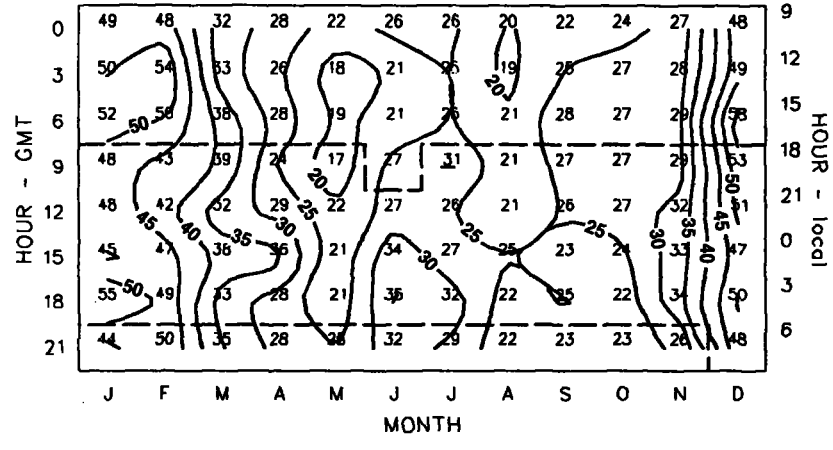
Total Cloudiness

Units = 0.1 okta



Precipitation Frequency

Units = percent
Contour interval = 5 percent



OWS Study Area X Surface Climatology

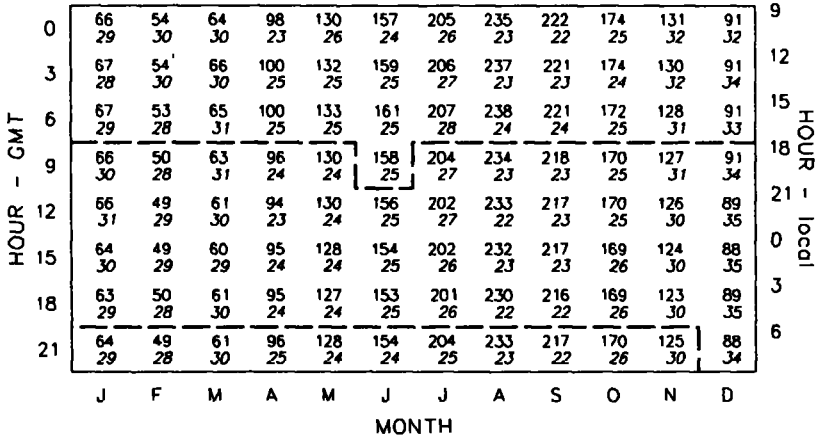
upper number = mean
lower number = standard deviation

data contours
sunrise/sunset

X2

Air Temperature

Units = 0.1 °C

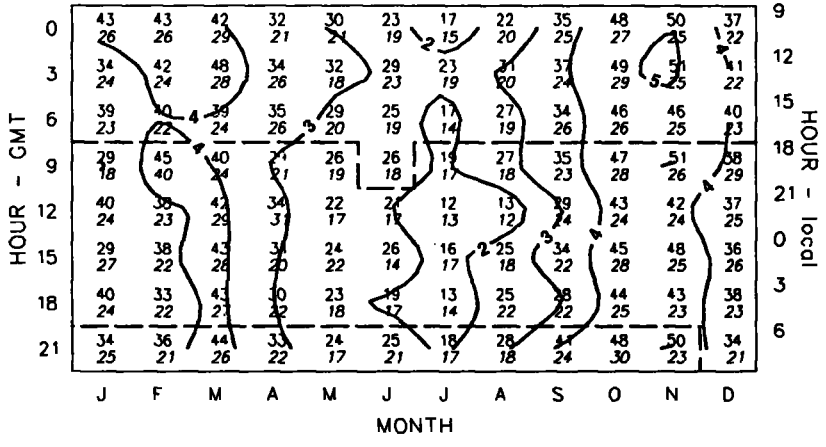


GMT	J	F	M	A	M	J	J	A	S	O	N	D
0	66 / 29	54 / 30	64 / 30	98 / 23	130 / 26	157 / 24	205 / 26	235 / 23	222 / 22	174 / 25	131 / 32	91 / 32
3	67 / 28	54 / 30	66 / 30	100 / 25	132 / 25	159 / 25	206 / 27	237 / 23	221 / 23	174 / 24	130 / 32	91 / 34
6	67 / 29	53 / 28	65 / 31	100 / 25	133 / 25	161 / 25	207 / 28	238 / 24	221 / 24	172 / 25	128 / 31	91 / 33
9	66 / 30	50 / 28	63 / 31	96 / 24	130 / 24	158 / 25	204 / 27	234 / 23	218 / 23	170 / 25	127 / 31	91 / 34
12	66 / 31	49 / 29	61 / 30	94 / 23	130 / 24	156 / 25	202 / 27	233 / 22	217 / 23	170 / 25	126 / 30	89 / 35
15	64 / 30	49 / 29	60 / 29	95 / 24	128 / 24	154 / 25	202 / 26	232 / 23	217 / 23	169 / 26	124 / 30	88 / 35
18	63 / 29	50 / 28	61 / 30	95 / 24	127 / 24	153 / 25	201 / 26	230 / 22	216 / 22	169 / 26	123 / 30	89 / 35
21	64 / 29	49 / 28	61 / 30	96 / 25	128 / 24	154 / 24	204 / 25	233 / 23	217 / 22	170 / 26	125 / 30	88 / 34

Dew Point Depression

Units = 0.1 °C

Contour interval = .1 °C



GMT	J	F	M	A	M	J	J	A	S	O	N	D
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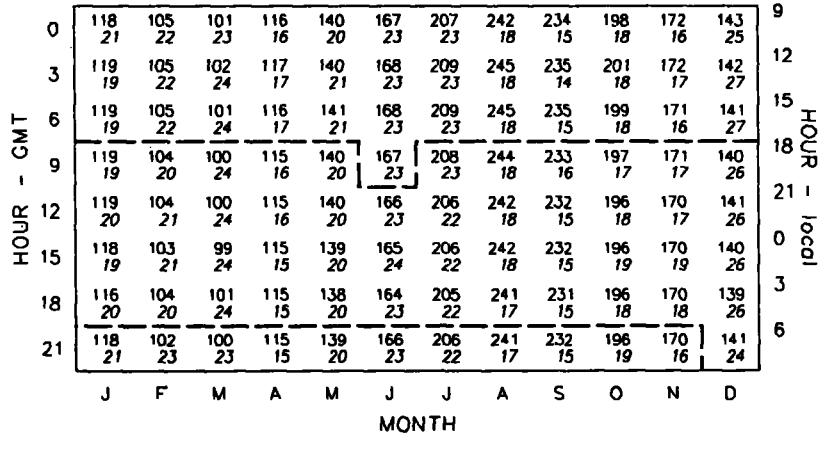
3	34 / 24	42 / 24	48 / 28	34 / 26	32 / 18	29 / 23	23 / 19	31 / 20	37 / 24	49 / 29	51 / 25	41 / 22
6	39 / 23	40 / 22	39 / 24	35 / 26	29 / 20	25 / 19	17 / 14	27 / 19	34 / 26	46 / 26	46 / 25	40 / 23
9	29 / 18	45 / 40	40 / 24	31 / 21	26 / 19	26 / 18	19 / 17	27 / 18	35 / 23	47 / 28	51 / 26	38 / 29
12	40 / 24	38 / 23	42 / 29	34 / 31	22 / 17	20 / 19	12 / 13	13 / 12	29 / 24	43 / 24	42 / 24	37 / 25
15	29 / 27	38 / 22	43 / 28	31 / 20	24 / 22	26 / 14	16 / 17	25 / 18	34 / 22	45 / 28	48 / 25	36 / 26
18	40 / 24	33 / 22	43 / 27	30 / 22	23 / 18	19 / 17	13 / 14	25 / 22	38 / 22	44 / 25	43 / 23	38 / 23
21	34 / 25	36 / 21	44 / 26	33 / 22	24 / 17	25 / 21	18 / 17	28 / 18	44 / 24	48 / 30	50 / 23	34 / 21

Sea Surface Temperature

Units = 0.1 °C



GMT	J	F	M	A	M	J	J	A	S	O	N	D
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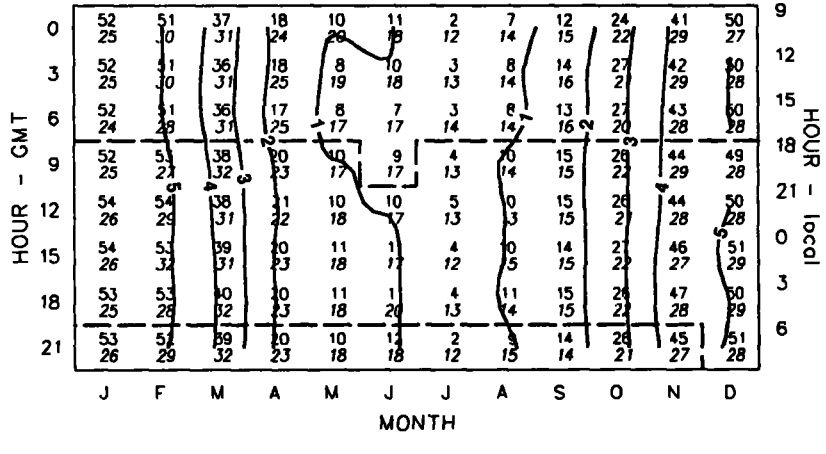
3	119 / 19	105 / 22	102 / 24	117 / 17	140 / 21	168 / 23	209 / 23	245 / 18	235 / 14	201 / 18	172 / 17	142 / 27
6	119 / 19	105 / 22	101 / 24	116 / 17	141 / 21	168 / 23	209 / 23	245 / 18	235 / 15	199 / 18	171 / 16	141 / 27
9	119 / 19	104 / 20	100 / 24	115 / 16	140 / 20	167 / 23	208 / 23	244 / 18	233 / 16	197 / 17	171 / 17	140 / 26
12	119 / 20	104 / 21	100 / 24	115 / 16	140 / 20	166 / 23	206 / 22	242 / 18	232 / 15	196 / 18	170 / 17	141 / 26
15	118 / 19	103 / 21	99 / 24	115 / 15	139 / 20	165 / 24	206 / 22	242 / 18	232 / 15	196 / 19	170 / 19	140 / 26
18	116 / 20	104 / 20	101 / 24	115 / 15	138 / 20	164 / 23	205 / 22	241 / 17	231 / 15	196 / 18	170 / 18	139 / 26
21	118 / 21	102 / 23	100 / 23	115 / 15	139 / 20	166 / 23	206 / 22	241 / 17	232 / 15	196 / 19	170 / 16	141 / 24

Sea - Air Temperature Difference

Units = 0.1 °C

Contour interval = 1 °C



GMT	J	F	M	A	M	J	J	A	S	O	N	D
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3	52 / 25	51 / 30	36 / 31	18 / 25	8 / 19	10 / 18	3 / 13	8 / 14	14 / 16	27 / 2	42 / 29	50 / 28
6	52 / 24	51 / 28	36 / 31	17 / 25	8 / 17	7 / 17	3 / 14	8 / 14	13 / 16	27 / 20	43 / 28	50 / 28
9	52 / 25	51 / 27	38 / 32	20 / 23	10 / 17	9 / 17	4 / 13	10 / 14	15 / 15	28 / 22	44 / 29	49 / 28
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18	53 / 25	53 / 28	40 / 32	20 / 23	11 / 18	11 / 20	4 / 13	11 / 14	15 / 15	28 / 22	47 / 28	50 / 29
21	53 / 26	53 / 29	39 / 32	20 / 23	10 / 18	12 / 18	2 / 12	9 / 15	14 / 14	28 / 21	45 / 27	51 / 28

OWS Study Area X Surface Climatology

upper number = mean

lower number = standard deviation

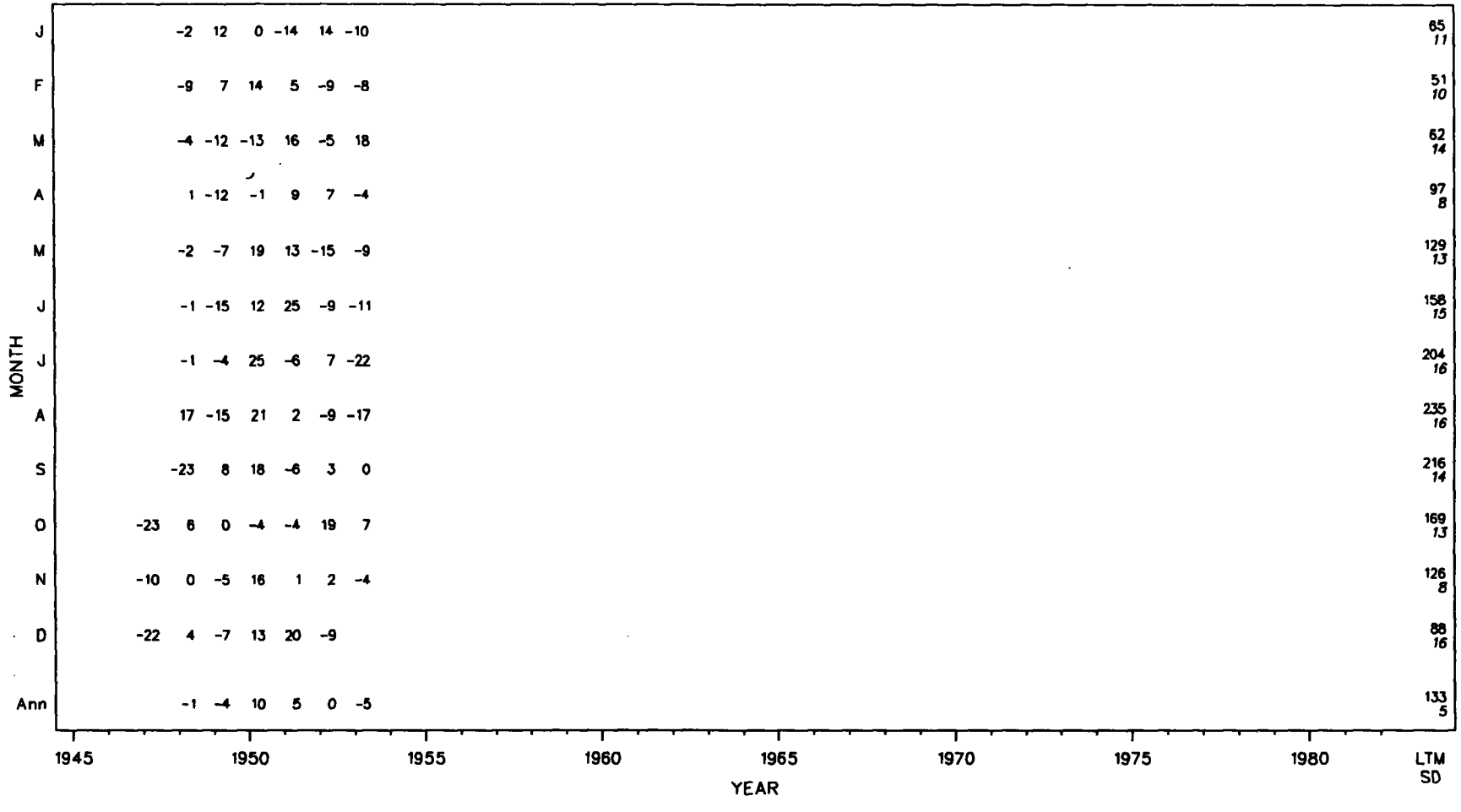
——— data contours

— — — sunrise/sunset

X3

Surface Air Temperature

Units = 0.1 °C

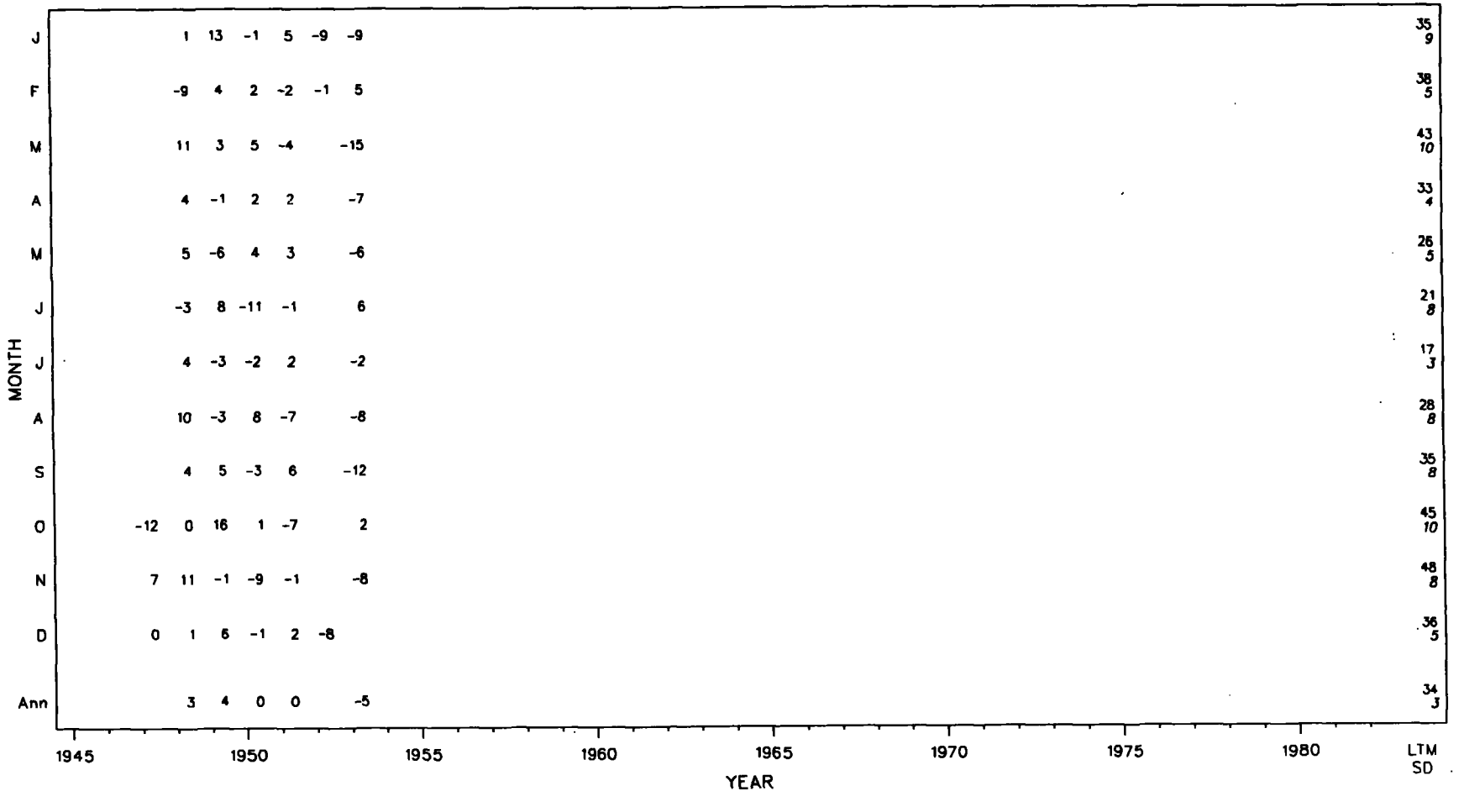


OWS Study Area X Anomalies

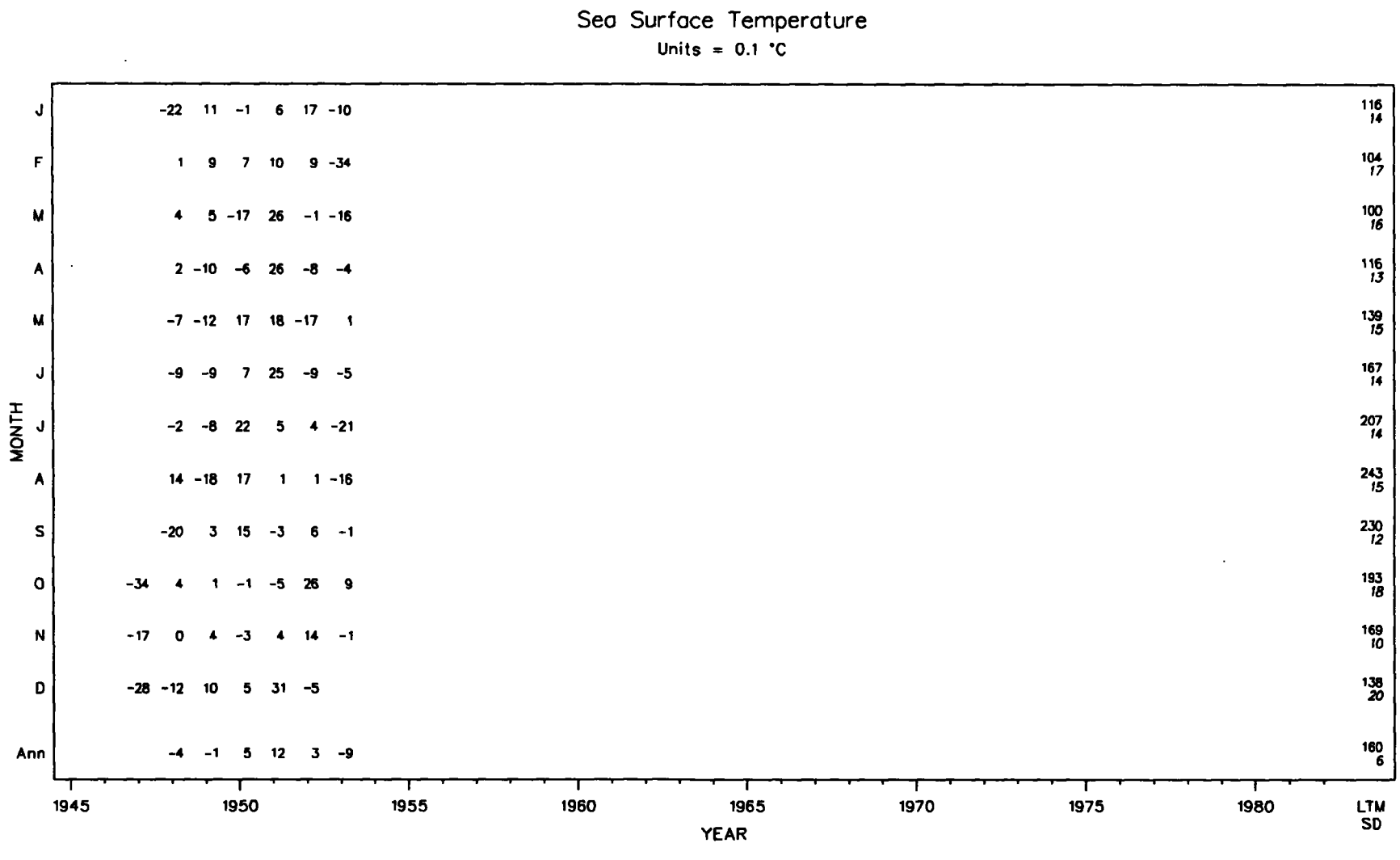
X4

Surface Dew Point Depression

Units = 0.1 °C



OWS Study Area X Anomalies

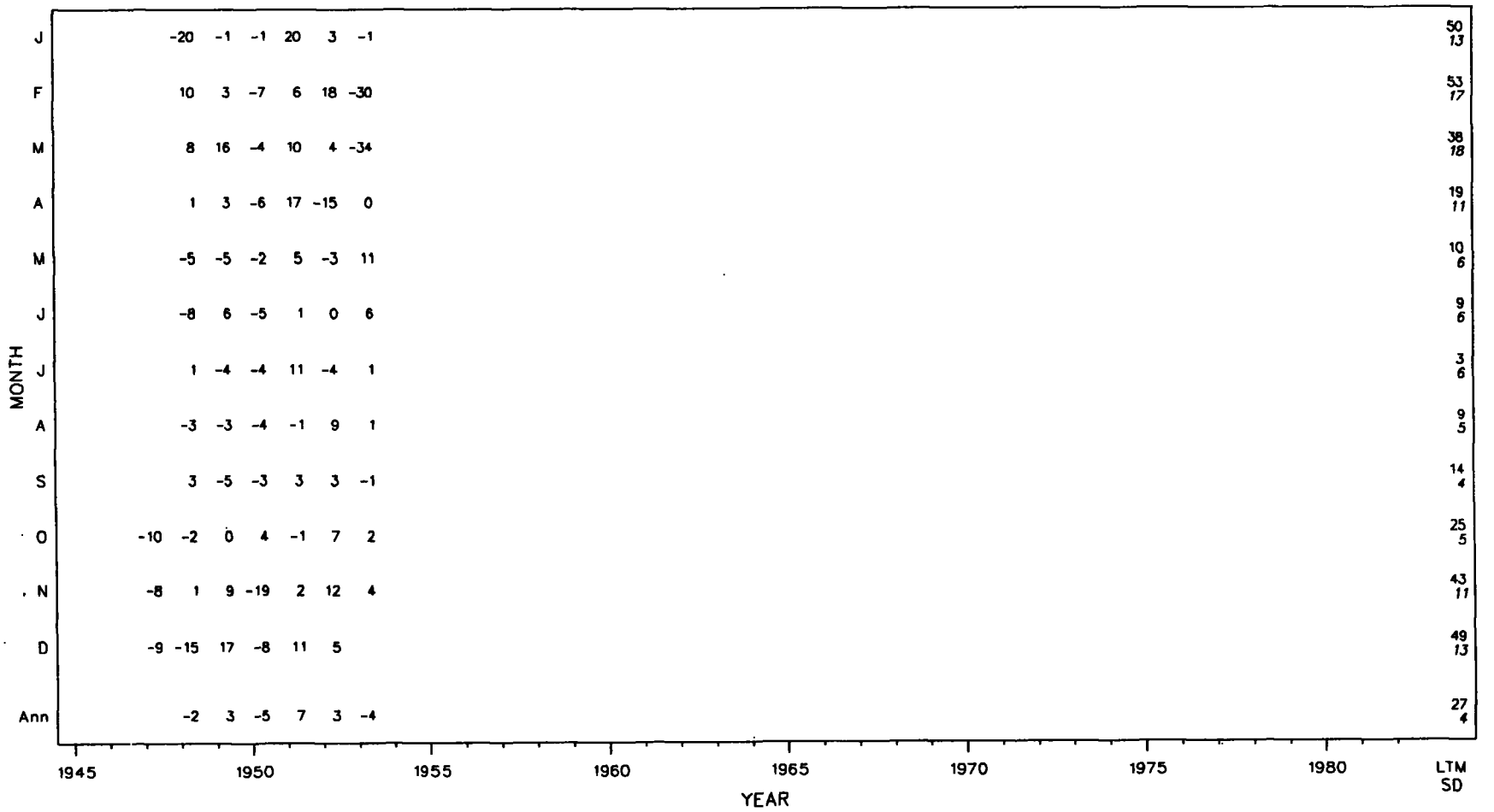


OWS Study Area X Anomalies

X6

Sea - Air Temperature Difference

Units = 0.1 °C

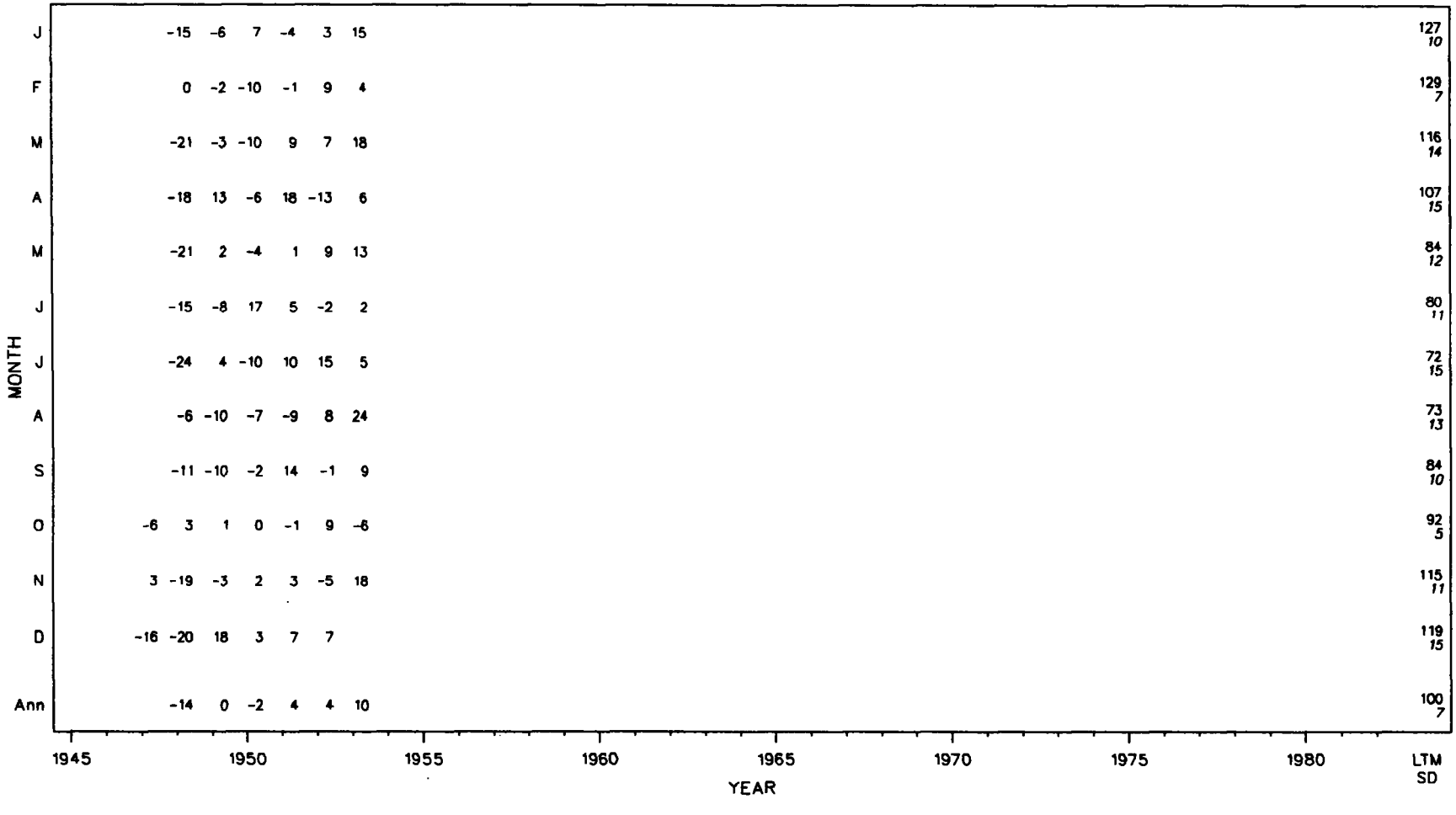


OWS Study Area X Anomalies

X7

Surface Scalar Wind

Units = 0.1 m/s

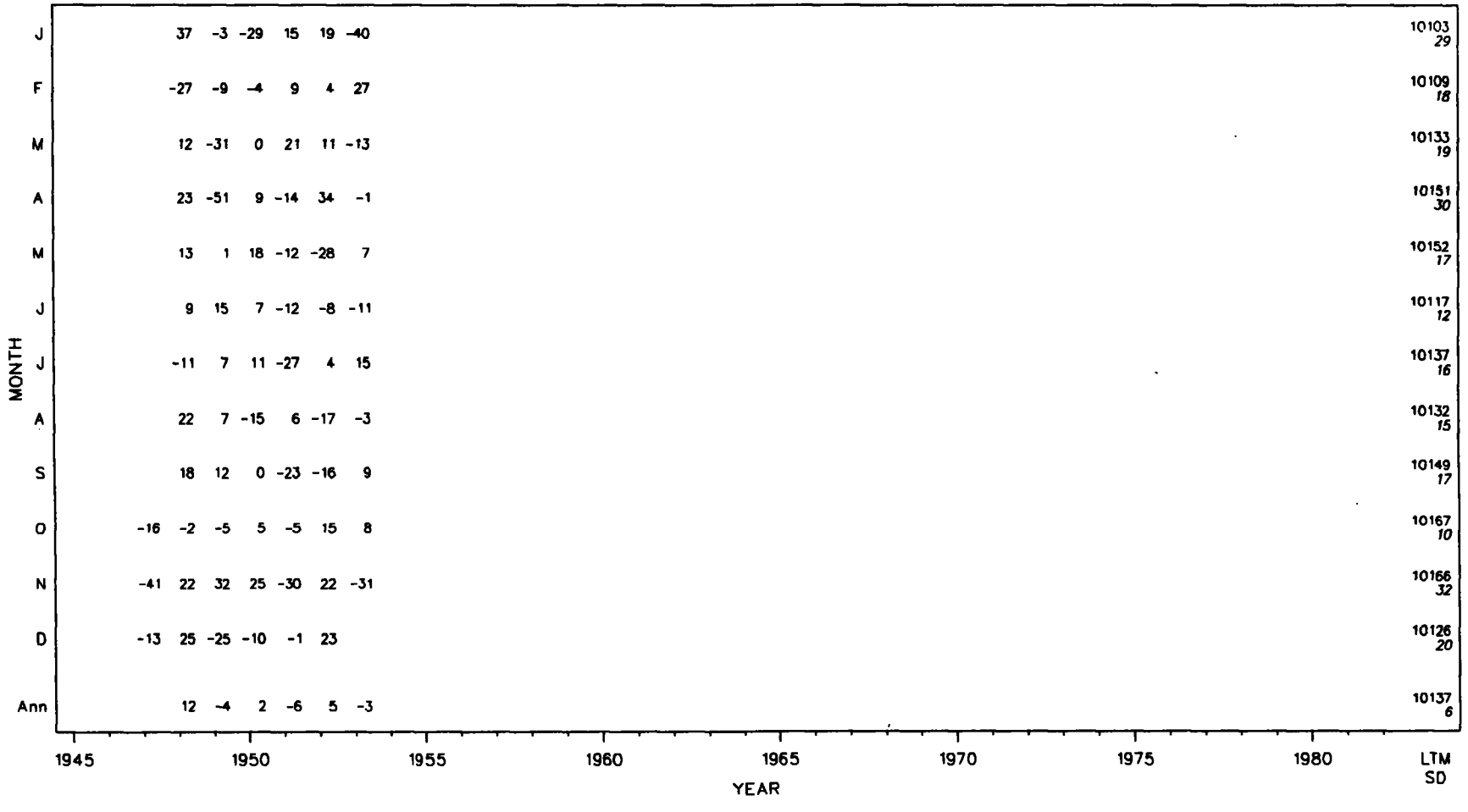


OWS Study Area X Anomalies

X8

Sea Level Pressure

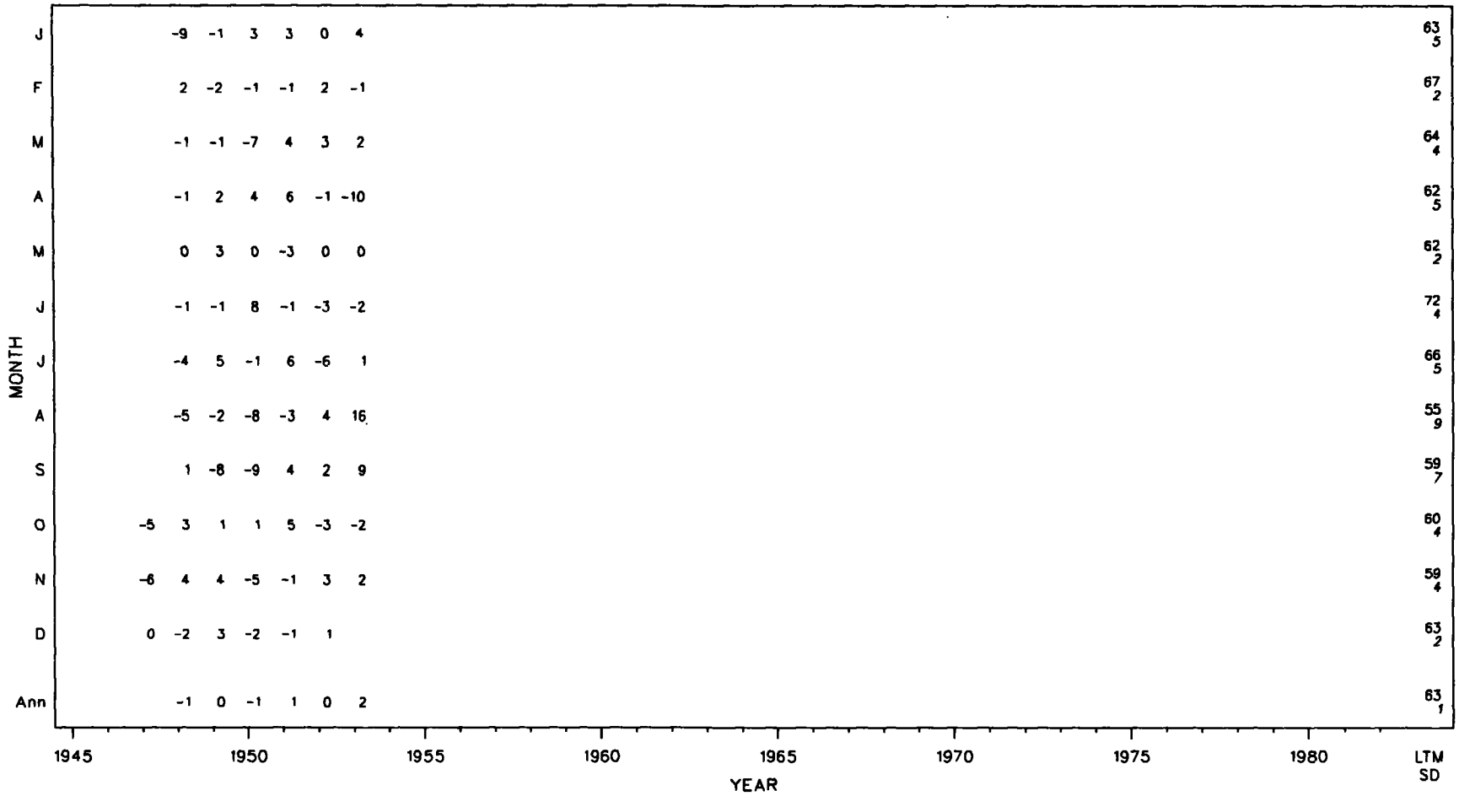
Units = 0.1 mb



OWS Study Area X Anomalies

Total Cloudiness

Units = 0.1 okta

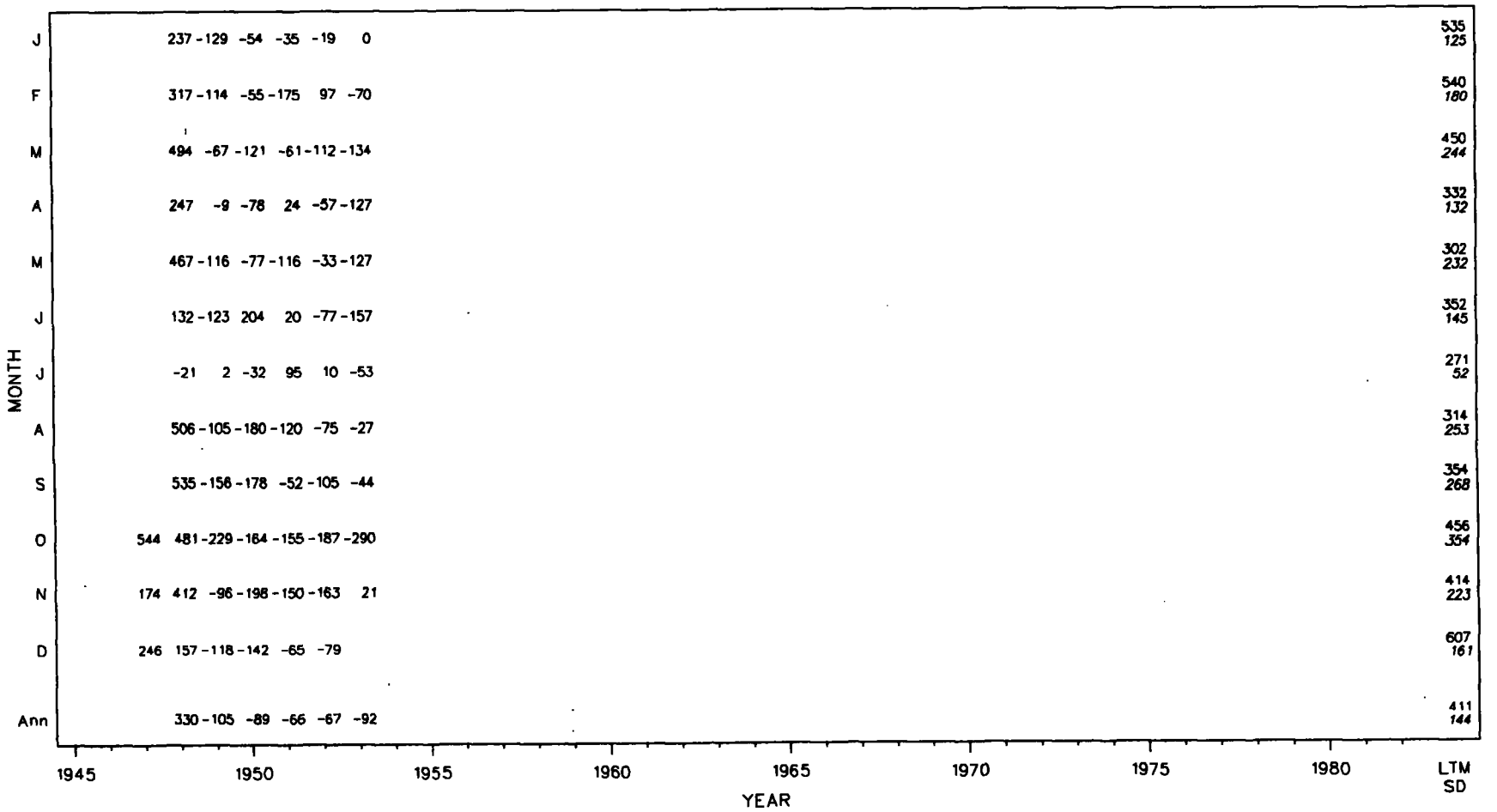


OWS Study Area X Anomalies

X10

Precipitation Frequency

Units = 0.1 percent



OWS Study Area X Anomalies