

## Climatic Summaries of Ocean Weather Stations

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**U.S. Department of Commerce**  
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Troy S. Parker



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## **Abstract**

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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.



# **1. Introduction**

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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 led 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		Approximate nationality	Status
				Surface	Upper air		
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).<sup>\*</sup> 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<sup>†</sup>**

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

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

<sup>\*</sup> See Diaz *et al.* (1986) for preliminary summaries of station A.

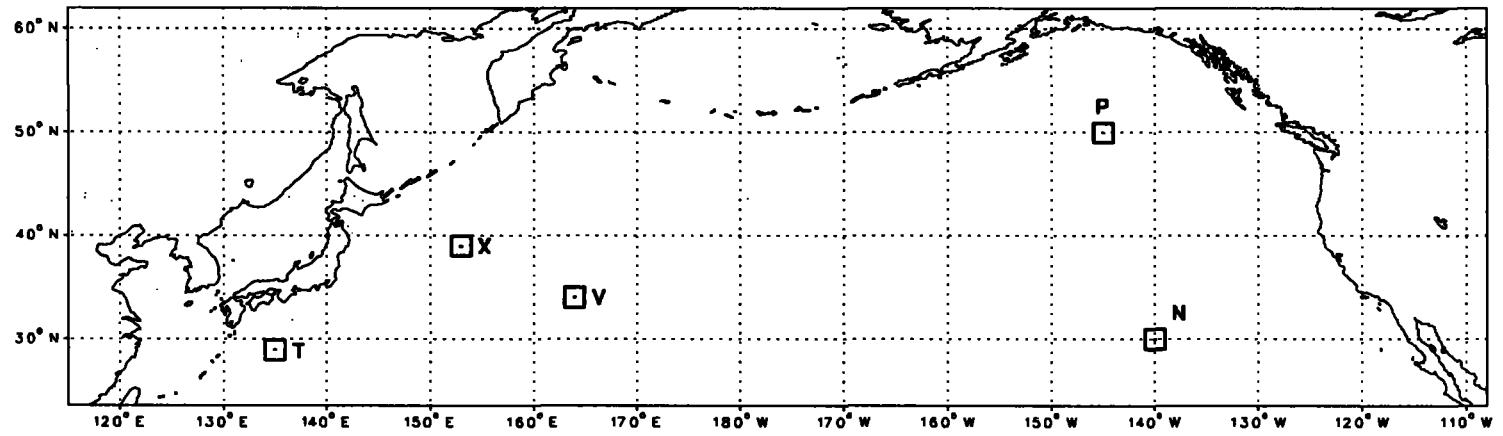
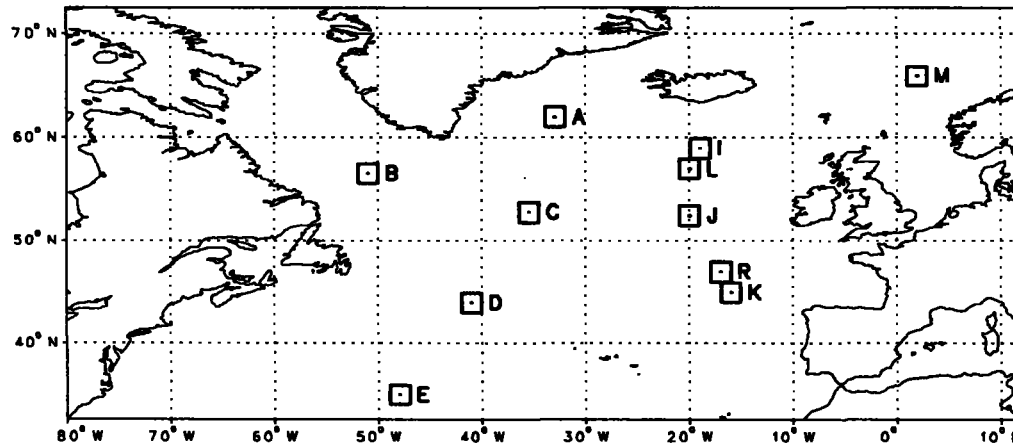


Figure 1. Ocean Weather Station Study Area Locations

## 2. Data

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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

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\* 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.,  $\bar{u}$  indicates the monthly mean of all observations of  $u$ ):

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

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

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

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

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

Long-term monthly means  $\bar{X}_j$  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):

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

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  $\bar{X}_j$  is

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

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

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

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



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  $g - 2.8\sigma_1 \leq x \leq g + 2.8\sigma_5$  (narrow interval), or
- 1 if  $g - 3.5\sigma_1 \leq x \leq g + 3.5\sigma_5$  (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  $\sigma_1$  and  $\sigma_5$  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

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\* 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 3.50 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 3.50 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\***

Deck	INPUT		OUTPUT			
	No. reports	Years	<u>Non-duplicates</u>		<u>Duplicates</u>	
			No. reports	Years	No. reports	Years
<u>OWS A</u>						
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	-
<b>Total</b>	<b>67874</b>		<b>67874</b>		<b>0</b>	

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

Deck	INPUT		OUTPUT			
	No. reports	Years	<u>Non-duplicates</u>		<u>Duplicates</u>	
			No. reports	Years	No. reports	Years
<u>OWS B</u>						
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	-
<b>Total</b>	<b>67593</b>		<b>67593</b>		<b>0</b>	
<u>OWS C</u>						
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	-
<b>Total</b>	<b>86487</b>		<b>86486</b>		<b>1</b>	

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

Deck	INPUT		OUTPUT			
	No. reports	Years	<u>Non-duplicates</u>		<u>Duplicates</u>	
			No. reports	Years	No. reports	Years
<u>OWS D</u>						
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	-
<b>Total</b>	<b>65536</b>		<b>65535</b>		<b>1</b>	
<u>OWS E</u>						
116	38541	1949-1963	38541	1949-1963	0	-
117	209	1952-1964	209	1952-1964	0	-
128	25701	1963-1973	25701	1963-1973	0	-
<b>Total</b>	<b>64451</b>		<b>64451</b>		<b>0</b>	
<u>OWS I</u>						
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	-
<b>Total</b>	<b>59031</b>		<b>59030</b>		<b>1</b>	

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

Deck	INPUT		OUTPUT			
	No. reports	Years	<u>Non-duplicates</u>		<u>Duplicates</u>	
			No. reports	Years	No. reports	Years
<u>OWS J</u>						
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	
<u>OWS K</u>						
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	
<u>OWS L</u>						
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)**

Deck	INPUT		OUTPUT			
	No. reports	Years	<u>Non-duplicates</u>		<u>Duplicates</u>	
			No. reports	Years	No. reports	Years
<u>OWS M</u>						
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	-
<b>Total</b>	<b>80657</b>		<b>80657</b>		<b>0</b>	
<u>OWS N</u>						
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	-
<b>Total</b>	<b>66363</b>		<b>66363</b>		<b>0</b>	
<u>OWS P</u>						
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
<b>Total</b>	<b>88940</b>		<b>88330</b>		<b>610</b>	

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

Deck	INPUT		OUTPUT			
	No. reports	Years	<u>Non-duplicates</u>		<u>Duplicates</u>	
			No. reports	Years	No. reports	Years
<u>OWS R</u>						
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	
<u>OWS T</u>						
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	
<u>OWS V</u>						
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)**

Deck	INPUT		OUTPUT			
	No. reports	Years	<u>Non-duplicates</u>		<u>Duplicates</u>	
			No. reports	Years	No. reports	Years
			<u>OWS X</u>			
116	15623	1947-1953	15623	1947-1953	0	-
<b>Total</b>	<b>15623</b>		<b>15623</b>		<b>0</b>	

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

**Table A4. Surface trimming performance\* (continued)**

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

**Table A4. Surface trimming performance\* (continued)**

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

**Table A4. Surface trimming performance\* (continued)**

	SST	AT	RH	WIND	SLP
<u>OWS M</u>					
Flag = 0 (within $\mp 2.80$ ):	79442	79630	72728	79680	79809
Flag = 1 (within $\mp 3.50$ ):	771	439	3874	793	654
Flag = 2 (outside $\mp 3.50$ ):	177	94	23	77	129
Missing variable:	267	494	3952	107	65
RH not valid:			80		
Percent trimmed at 3.50:	0.2%	0.1%	0.0%	0.1%	0.2%
<u>OWS N</u>					
Flag = 0 (within $\mp 2.80$ ):	65142	66246	65332	65436	66008
Flag = 1 (within $\mp 3.50$ ):	134	85	867	626	282
Flag = 2 (outside $\mp 3.50$ ):	39	18	6	142	53
Missing variable:	1048	14	141	159	20
RH not valid:			17		
Percent trimmed at 3.50:	0.1%	0.0%	0.0%	0.2%	0.1%
<u>OWS P</u>					
Flag = 0 (within $\mp 2.80$ ):	88245	88109	73921	86543	87469
Flag = 1 (within $\mp 3.50$ ):	9	169	14043	1405	432
Flag = 2 (outside $\mp 3.50$ ):	1	50	13	307	82
Missing variable:	75	2	303	75	347
RH not valid:			50		
Percent trimmed at 3.50:	0.0%	0.1%	0.0%	0.3%	0.1%

**Table A4. Surface trimming performance\* (continued)**

	SST	AT	RH	WIND	SLP
<u>OWS R</u>					
Flag = 0 (within $\mp 2.80$ ):	14380	14381	12486	14355	14371
Flag = 1 (within $\mp 3.50$ ):	5	57	1597	104	82
Flag = 2 (outside $\mp 3.50$ ):	14	37		12	20
Missing variable:	79	3	369	7	5
RH not valid:			26		
Percent trimmed at 3.50:	0.1%	0.3%	0.0%	0.1%	0.1%
<u>OWS T</u>					
Flag = 0 (within $\mp 2.80$ ):	36388	36344	23824	35715	36243
Flag = 1 (within $\mp 3.50$ ):	44	103	740	582	179
Flag = 2 (outside $\mp 3.50$ ):	36	47	13	149	87
Missing variable:	51	25	11922	73	10
RH not valid:			20		
Percent trimmed at 3.50:	0.1%	0.1%	0.1%	0.4%	0.2%
<u>OWS V</u>					
Flag = 0 (within $\mp 2.80$ ):	46823	47003	44863	46560	46826
Flag = 1 (within $\mp 3.50$ ):	152	6	2017	229	157
Flag = 2 (outside $\mp 3.50$ ):	6			34	34
Missing variable:	40	12	141	198	4
RH not valid:					
Percent trimmed at 3.50:	0.0%	0.0%	0.0%	0.1%	0.1%

Table A4. Surface trimming performance\* (continued)

	SST	AT	RH	WIND	SLP
<u>OWS X</u>					
Flag = 0 (within $\mp 2.8\sigma$ ):	15321	15565	5788	15230	15508
Flag = 1 (within $\mp 3.5\sigma$ ):	122	13	635	314	75
Flag = 2 (outside $\mp 3.5\sigma$ ):	57	7	4	70	35
Missing variable:	123	38	9192	9	5
RH not valid:			4		
Percent trimmed at $3.5\sigma$ :	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

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### 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,  $\sigma$  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  $\sigma_5$  and  $\sigma_1$  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		Trim	Total	
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem		Trim	Rem
<u>OWS A</u>													
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%
<b>Total</b>	<b>14</b>	<b>1441</b>	<b>7</b>	<b>650</b>	<b>11</b>	<b>1011</b>	<b>16</b>	<b>1006</b>	<b>12</b>	<b>1443</b>	<b>60</b>	<b>5551</b>	<b>1.1%</b>
<b>Percent trimmed</b>	<b>1.0%</b>		<b>1.1%</b>		<b>1.1%</b>		<b>1.6%</b>		<b>0.8%</b>				
<u>OWS B</u>													
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%
<b>Total</b>	<b>9</b>	<b>1805</b>	<b>5</b>	<b>816</b>	<b>10</b>	<b>1308</b>	<b>8</b>	<b>1310</b>	<b>11</b>	<b>1803</b>	<b>43</b>	<b>7042</b>	<b>0.6%</b>
<b>Percent trimmed</b>	<b>0.5%</b>		<b>0.6%</b>		<b>0.8%</b>		<b>0.6%</b>		<b>0.6%</b>				

**Table B1. Upper air trimming performance\* (continued)**

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Trim	Total Rem	%Trim
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem			
<u>OWS C</u>													
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%
<b>Total</b>	<b>14</b>	<b>1812</b>	<b>1</b>	<b>836</b>	<b>7</b>	<b>1323</b>	<b>10</b>	<b>1320</b>	<b>5</b>	<b>1821</b>	<b>37</b>	<b>7112</b>	<b>0.5%</b>
<b>Percent trimmed</b>	<b>0.8%</b>		<b>0.1%</b>		<b>0.5%</b>		<b>0.8%</b>		<b>0.3%</b>				
<u>OWS D</u>													
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%
<b>Total</b>	<b>14</b>	<b>1768</b>	<b>0</b>	<b>861</b>	<b>9</b>	<b>1281</b>	<b>5</b>	<b>1285</b>	<b>10</b>	<b>1772</b>	<b>38</b>	<b>6967</b>	<b>0.5%</b>
<b>Percent trimmed</b>	<b>0.8%</b>		<b>0.0%</b>		<b>0.7%</b>		<b>0.4%</b>		<b>0.6%</b>				

**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
<u>OWS E</u>													
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%
<b>Total</b>	<b>11</b>	<b>1755</b>	<b>5</b>	<b>869</b>	<b>4</b>	<b>1249</b>	<b>7</b>	<b>1246</b>	<b>7</b>	<b>1759</b>	<b>34</b>	<b>6878</b>	<b>0.5%</b>
<b>Percent trimmed</b>	<b>0.6%</b>		<b>0.6%</b>		<b>0.3%</b>		<b>0.6%</b>		<b>0.4%</b>				
<u>OWS I</u>													
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%
<b>Total</b>	<b>5</b>	<b>1872</b>	<b>12</b>	<b>820</b>	<b>6</b>	<b>1455</b>	<b>8</b>	<b>1453</b>	<b>1</b>	<b>1876</b>	<b>32</b>	<b>7476</b>	<b>0.4%</b>
<b>Percent trimmed</b>	<b>0.3%</b>		<b>1.4%</b>		<b>0.4%</b>		<b>0.5%</b>		<b>0.1%</b>				

**Table B1. Upper air trimming performance\* (continued)**

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Trim	Total			
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem		Trim	Rem	%Trim	
<u>OWS J</u>															
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%		
<b>Total</b>	<b>9</b>	<b>1937</b>	<b>8</b>	<b>878</b>	<b>23</b>	<b>1430</b>	<b>10</b>	<b>1443</b>	<b>4</b>	<b>1942</b>	<b>54</b>	<b>7630</b>	<b>0.7%</b>		
<b>Percent trimmed</b>	<b>0.5%</b>		<b>0.9%</b>		<b>1.6%</b>		<b>0.7%</b>		<b>0.2%</b>						
<u>OWS K</u>															
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%		
<b>Total</b>	<b>10</b>	<b>1799</b>	<b>6</b>	<b>839</b>	<b>17</b>	<b>982</b>	<b>4</b>	<b>995</b>	<b>9</b>	<b>1800</b>	<b>46</b>	<b>6415</b>	<b>0.7%</b>		
<b>Percent trimmed</b>	<b>0.6%</b>		<b>0.7%</b>		<b>1.7%</b>		<b>0.4%</b>		<b>0.5%</b>						

**Table B1. Upper air trimming performance\* (continued)**

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Trim	Total	
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem		Rem	%Trim
<u>OWS L</u>													
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%
<b>Total</b>	<b>13</b>	<b>597</b>	<b>4</b>	<b>255</b>	<b>19</b>	<b>590</b>	<b>13</b>	<b>596</b>	<b>8</b>	<b>601</b>	<b>57</b>	<b>2639</b>	<b>2.1%</b>
<b>Percent trimmed</b>	<b>2.1%</b>		<b>1.5%</b>		<b>3.1%</b>		<b>2.1%</b>		<b>1.3%</b>				
<u>OWS M</u>													
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%
<b>Total</b>	<b>12</b>	<b>1686</b>	<b>4</b>	<b>761</b>	<b>3</b>	<b>1140</b>	<b>12</b>	<b>1131</b>	<b>14</b>	<b>1684</b>	<b>45</b>	<b>6402</b>	<b>0.7%</b>
<b>Percent trimmed</b>	<b>0.7%</b>		<b>0.5%</b>		<b>0.3%</b>		<b>1.0%</b>		<b>0.8%</b>				

**Table B1. Upper air trimming performance\* (continued)**

Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Trim	Total	
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem		Rem	%Trim
<u>OWS_N</u>													
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%
<b>Total</b>	<b>7</b>	<b>1633</b>	<b>6</b>	<b>696</b>	<b>4</b>	<b>1337</b>	<b>13</b>	<b>1328</b>	<b>7</b>	<b>1633</b>	<b>37</b>	<b>6627</b>	<b>0.6%</b>
<b>Percent trimmed</b>	<b>0.4%</b>		<b>0.9%</b>		<b>0.3%</b>		<b>1.0%</b>		<b>0.4%</b>				
<u>OWS_P</u>													
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%
<b>Total</b>	<b>20</b>	<b>2323</b>	<b>3</b>	<b>1027</b>	<b>11</b>	<b>1697</b>	<b>10</b>	<b>1698</b>	<b>11</b>	<b>2332</b>	<b>55</b>	<b>9077</b>	<b>0.6%</b>
<b>Percent trimmed</b>	<b>0.9%</b>		<b>0.3%</b>		<b>0.6%</b>		<b>0.6%</b>		<b>0.5%</b>				

**Table B1. Upper air trimming performance\* (continued)**

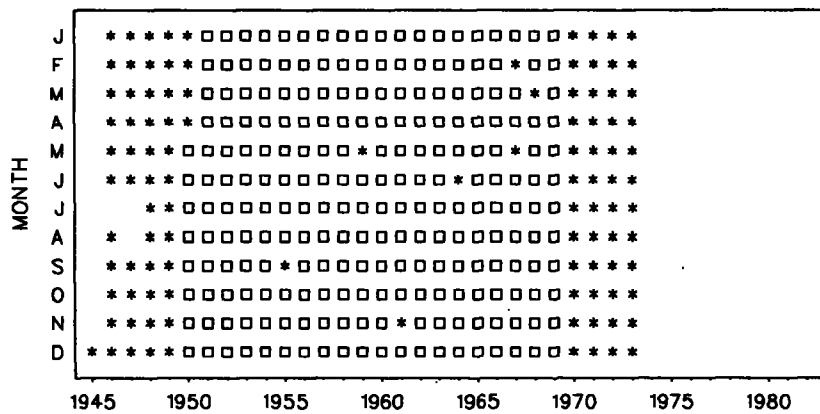
Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Trim	Total			
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem		Trim	Rem	%Trim	
<u>OWS R</u>															
100 mb	1	72				61	1	60	1	72	3	265	1.1%		
150 mb		73				62		62	1	72	1	269	0.4%		
200 mb	1	71			1	62	1	62	1	72	4	267	1.5%		
300 mb	2	71				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%		
<b>Total</b>	<b>9</b>	<b>501</b>	<b>4</b>	<b>208</b>	<b>1</b>	<b>437</b>	<b>4</b>	<b>434</b>	<b>9</b>	<b>502</b>	<b>27</b>	<b>2082</b>	<b>1.3%</b>		
<b>Percent trimmed</b>	<b>1.8%</b>		<b>1.9%</b>		<b>0.2%</b>		<b>0.9%</b>		<b>1.8%</b>						
<u>OWS T</u>															
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%		
<b>Total</b>	<b>3</b>	<b>777</b>	<b>4</b>	<b>301</b>	<b>5</b>	<b>187</b>	<b>5</b>	<b>187</b>	<b>3</b>	<b>777</b>	<b>20</b>	<b>2229</b>	<b>0.9%</b>		
<b>Percent trimmed</b>	<b>0.4%</b>		<b>1.3%</b>		<b>2.6%</b>		<b>2.6%</b>		<b>0.4%</b>						



**Table B1. Upper air trimming performance\* (continued)**

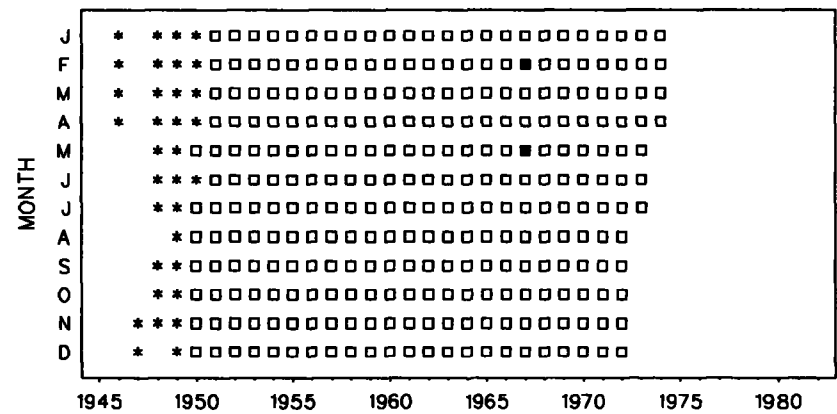
Pressure surface	Air temp		Dew point		u-wind		v-wind		Height		Trim	Total	
	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem	Trim	Rem		Rem	%Trim
<u>OWS V</u>													
100 mb	2	140			1	102	1	102	2	140	6	484	1.2%
150 mb	3	139			1	120	6	115	1	141	11	515	2.1%
200 mb	2	195			1	129		130		197	3	651	0.5%
300 mb		198		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).



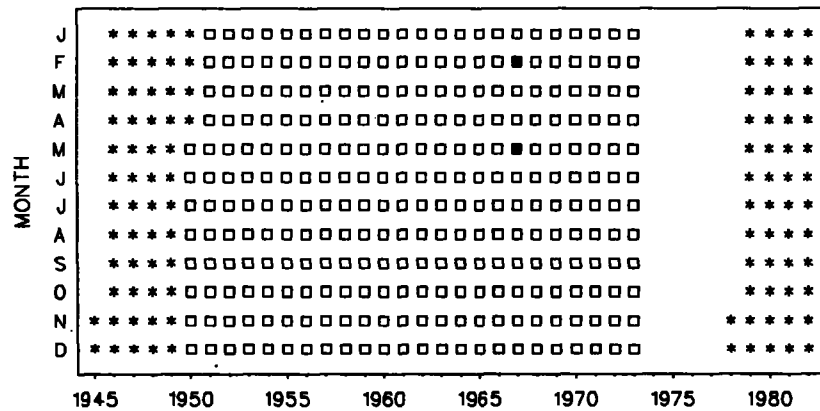
OWS A

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



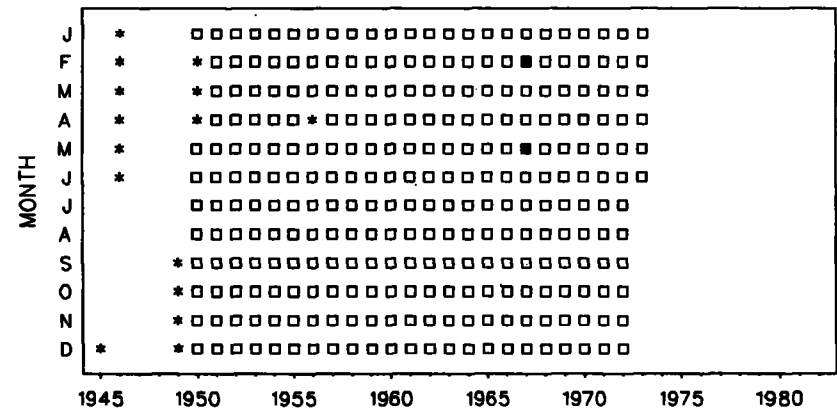
OWS B

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



OWS C

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

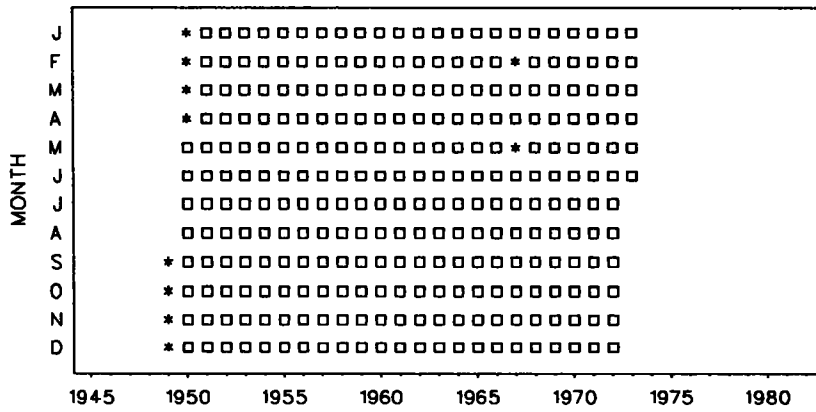


OWS D

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

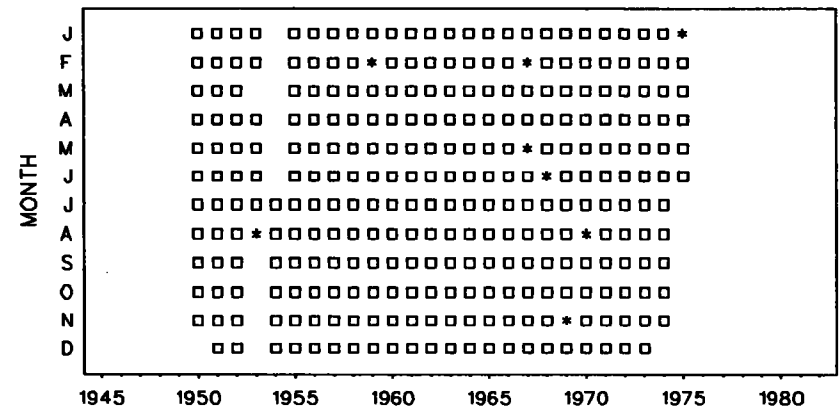
Figure B1. OWS Upper Air Data Sources

□ = Climats      \* = surface data only  
 ■ = NCAR Raobs



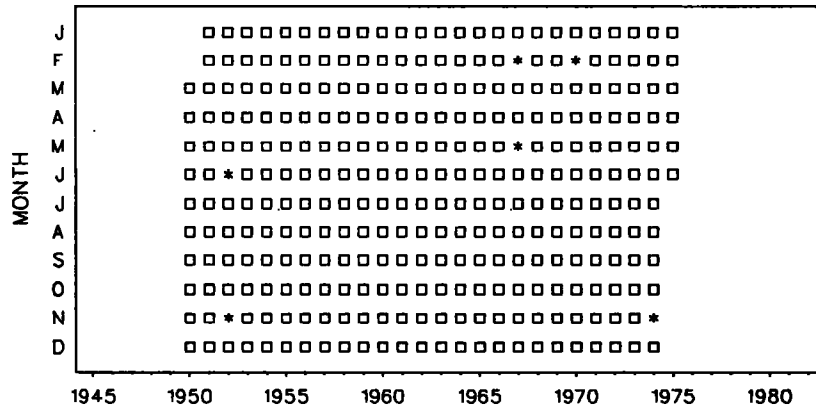
OWS E

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



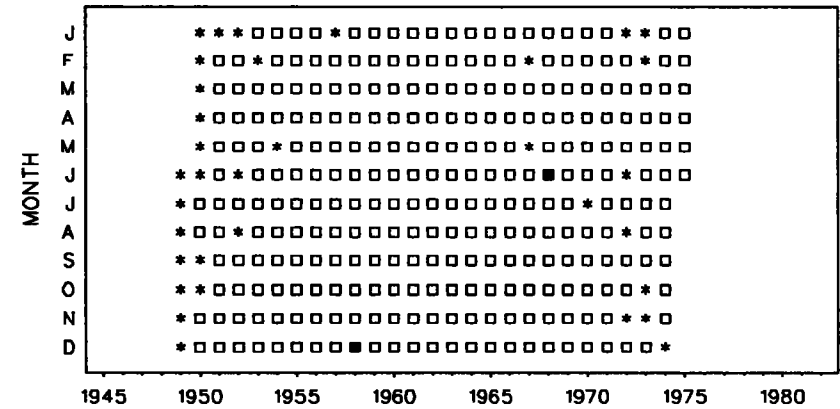
OWS I

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



OWS J

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

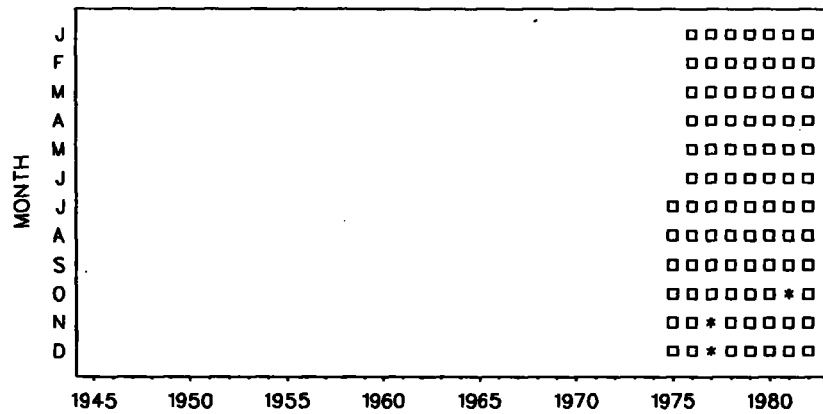


OWS K

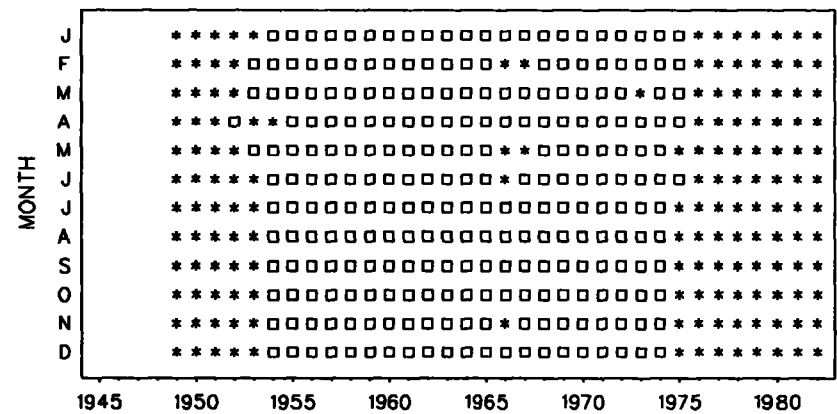
year-months: 277 Climats, 2 NCAR, 34 surface data only

Figure B1 (continued). OWS Upper Air Data Sources

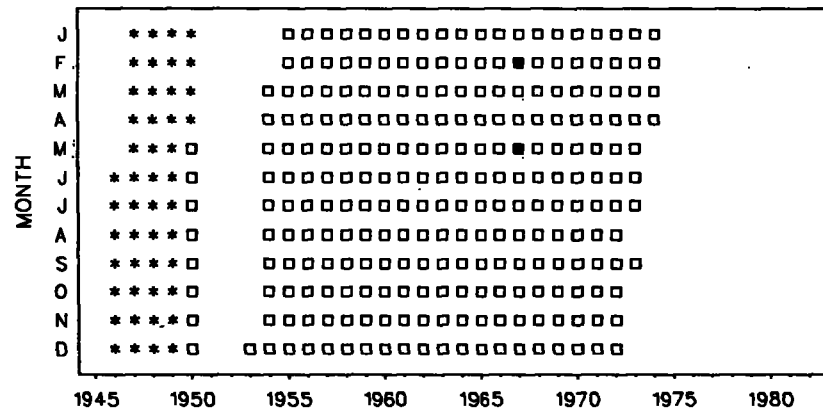
□ = Climats      \* = surface data only  
 ■ = NCAR Raobs



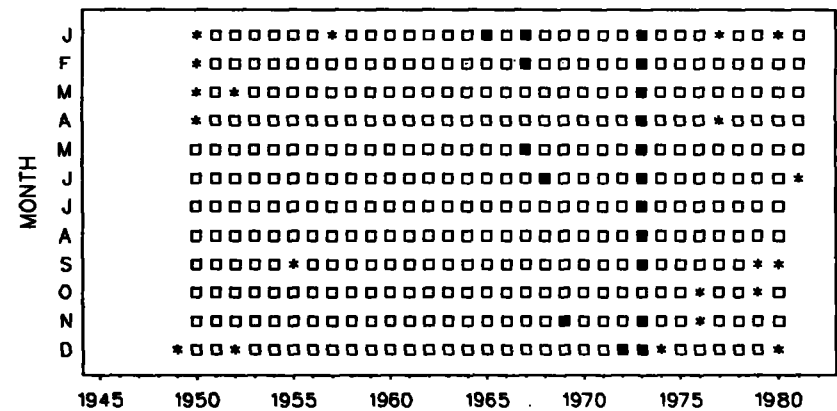
OWS L  
year-months: 87 Climats, 0 NCAR, 3 surface data only



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



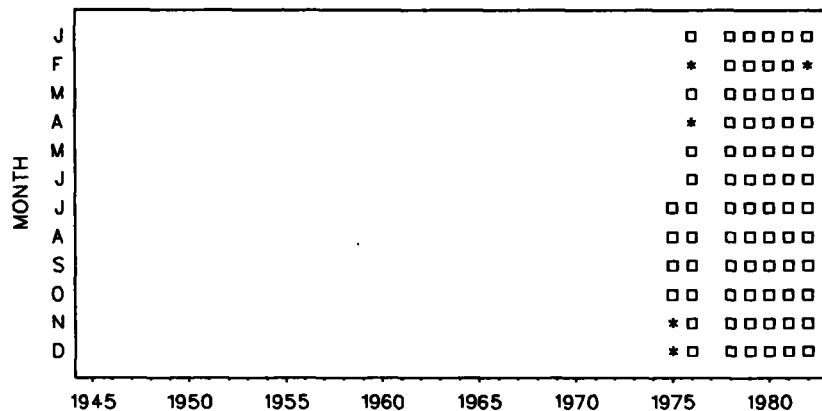
OWS N  
year-months: 245 Climats, 2 NCAR, 47 surface data only



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

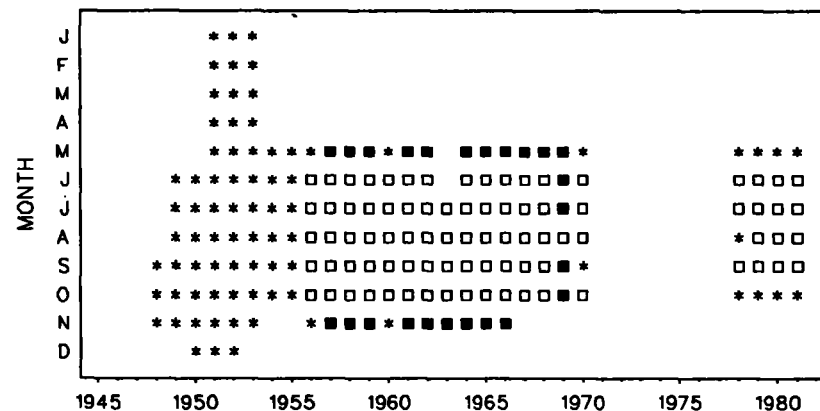
Figure B1 (continued). OWS Upper Air Data Sources

□ = Climats                      \* = surface data only  
■ = NCAR Raobs



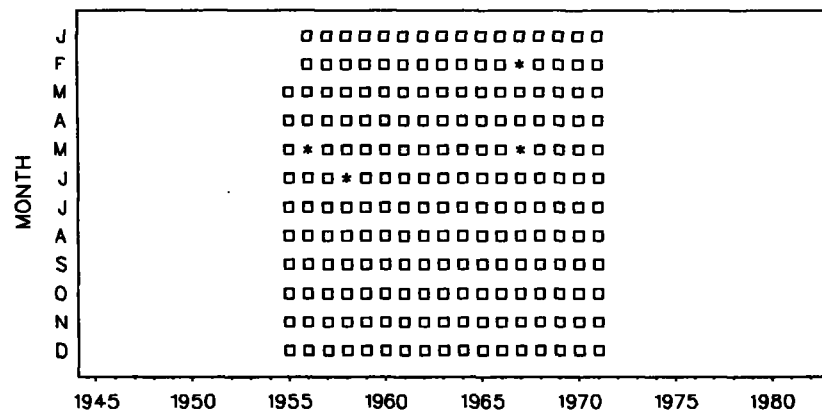
OWS R

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



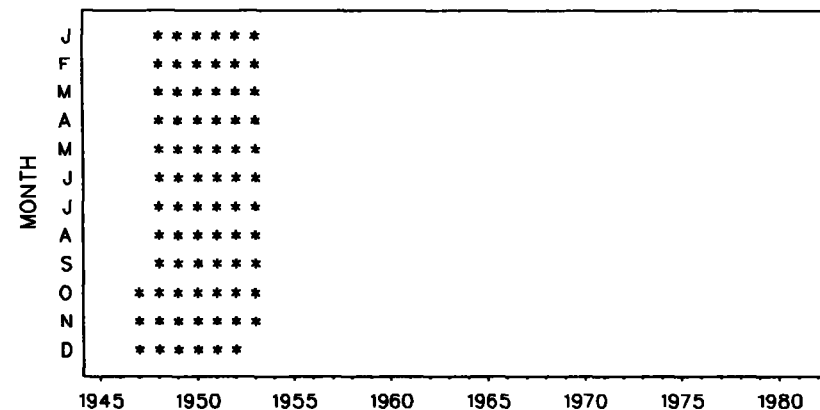
OWS T

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



OWS V

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



OWS X

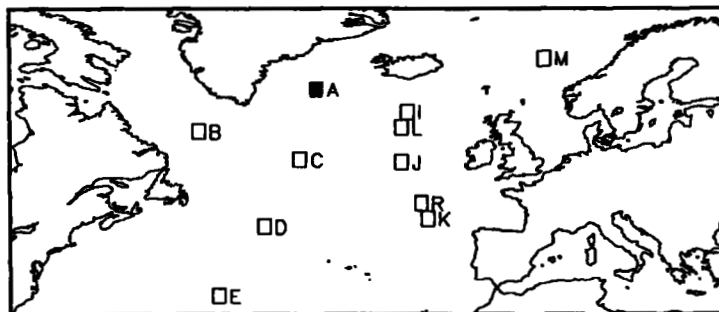
year-months: 0 Climats, 0 NCAR, 74 surface data only

Figure B1 (continued). OWS Upper Air Data Sources

□ = Climats      \* = surface data only  
 ■ = NCAR Roobs

## **Summaries**

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

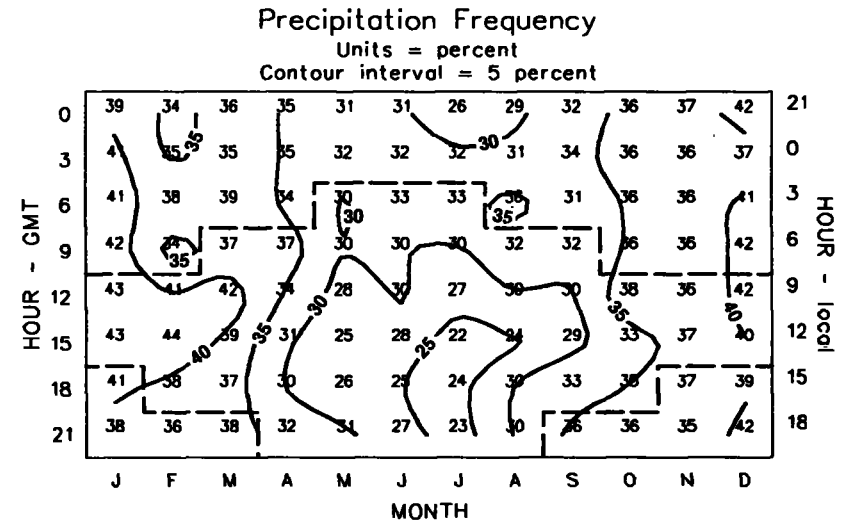
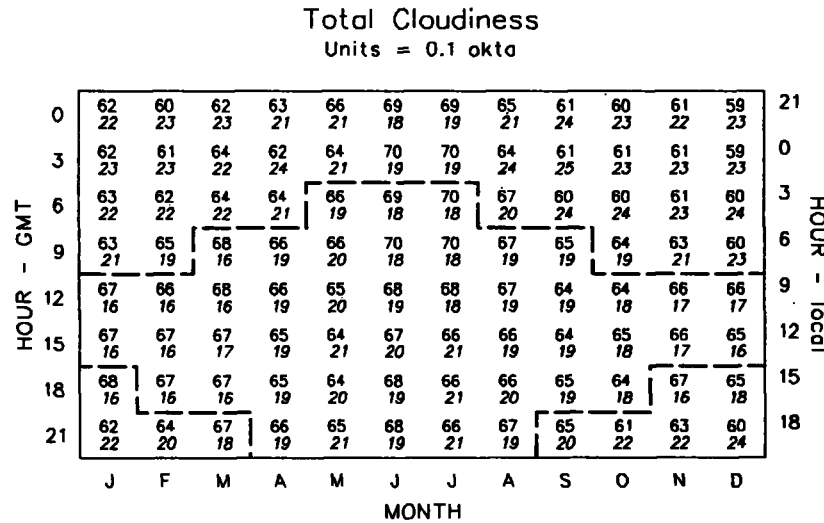
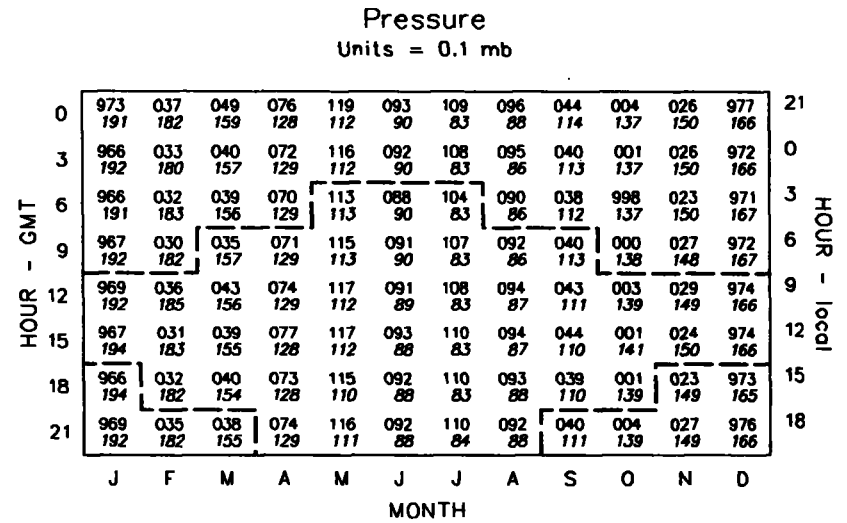
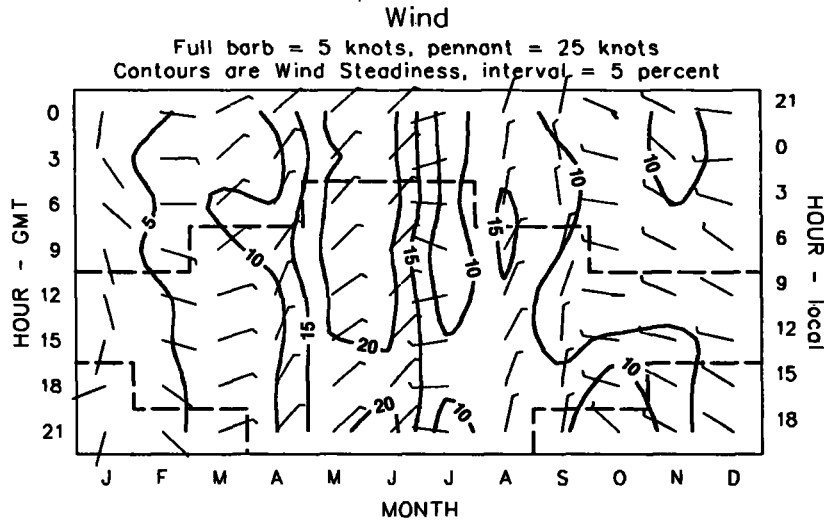
**OWS**  
**A**

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	Sum																					
J	28 0	31 31	31 31	31 31	27 27	18 18	11 10	31 31	30 30	29 29	24 23	29 29	30 30	28 28	24 24	31 31	31 31	24 24	31 31	29 29	31 31	28 28	30 30	30 30	31 31	25 25	25 24	779 748		
F	26 0	28 28	29 29	28 28	28 28	23 23	11 10	28 28	27 27	25 25	28 28	26 26	19 19	25 25	22 22	24 24	28 28	23 23	28 28	27 27	28 28	12 12	27 27	27 27	27 27	9 9	22 17	683 651		
M	31 0	31 31	31 31	28 28	30 30	31 31	31 30	28 25	31 31	27 27	28 28	30 30	28 28	29 29	29 29	30 30	24 24	31 31	31 31	31 31	31 31	26 25	17 17	31 31	30 30	27 27	27 27	808 774		
A	29 0	30 30	30 30	30 30	28 28	30 30	19 18	30 30	29 29	30 30	26 26	26 26	29 29	24 23	30 30	29 29	29 30	29 29	30 30	29 30	30 30	27 27	30 30	29 29	29 28	25 24	22 19	789 753		
M	16 0	31 31	31 31	29 29	31 31	26 26	17 15	31 30	31 29	31 31	31 31	28 28	24 24	24 24	31 31	31 31	29 29	29 28	30 30	31 31	30 30	26 26	28 28	31 31	14 14	16 15	766 744			
J	15 0	29 29	30 30	29 28	30 30	18 18	30 30	30 12	30 30	30 30	29 29	27 27	30 30	30 30	30 29	30 30	7 7	30 30	30 29	30 30	29 29	30 30	30 30	28 28	24 24	20 19	25 25	760 723		
J			31 31	31 30	22 22	31 31	24 24	31 31	30 30	31 31	31 31	29 25	31 31	30 30	31 31	31 31	27 27	31 31	30 30	31 31	31 31	31 31	27 27	27 27	22 22	29 29	15 14	746 726		
A	26 0		31 31	31 31	23 22	28 28	29 22	31 31	27 25	31 31	29 29	31 31	31 31	31 31	31 31	31 31	31 31	30 30	31 31	30 30	31 31	30 30	31 31	21 19	21 21	7 7	766 728			
S	30 0	4 4	30 30	29 29	26 26	20 20	21 4	27 27	30 30	29 29	30 30	28 28	30 30	27 27	30 30	28 28	29 29	30 30	30 30	30 30	29 29	30 30	30 30	14 12	20 20	22 22	743 693			
O	31 0	29 29	31 31	31 31	21 21	31 27	22 20	31 31	31 31	31 31	31 31	27 27	29 29	29 29	31 31	30 30	31 31	30 30	31 31	29 29	31 31	30 30	31 31	30 30	25 25	26 26	13 13	804 767		
N	30 0	30 30	30 30	30 30	28 28	29 13	30 30	19 18	30 30	25 25	30 30	27 27	30 30	30 30	30 30	21 21	30 30	29 29	30 30	28 28	30 30	30 29	30 30	29 28	16 14	14 14	5 4	748 697		
D	1 0	31 0	31 31	31 31	29 29	2 2	31 31	14 14	31 31	31 31	30 30	31 31	31 31	31 31	30 30	31 31	30 30	31 31	29 29	30 30	30 30	31 31	27 27	31 31	30 30	28 14	14 12	12 6	751 713	
Ann	1	293	274	366	356	308	337	283	289	365	346	357	338	340	339	351	337	352	354	327	354	361	352	328	351	347	284	242	211	9143 8717

## 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.



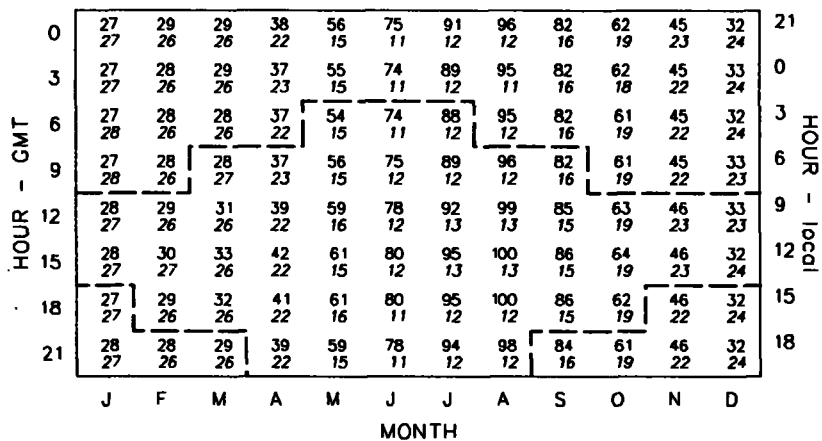


## OWS Study Area A Surface Climatology

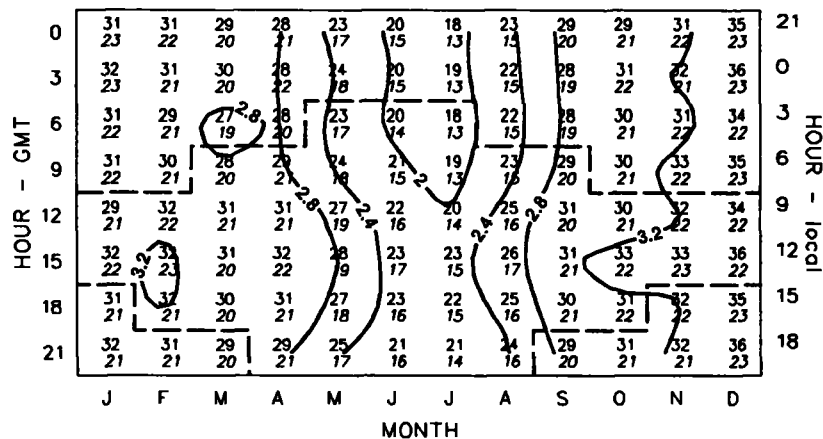
upper number = mean  
lower number = standard deviation

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

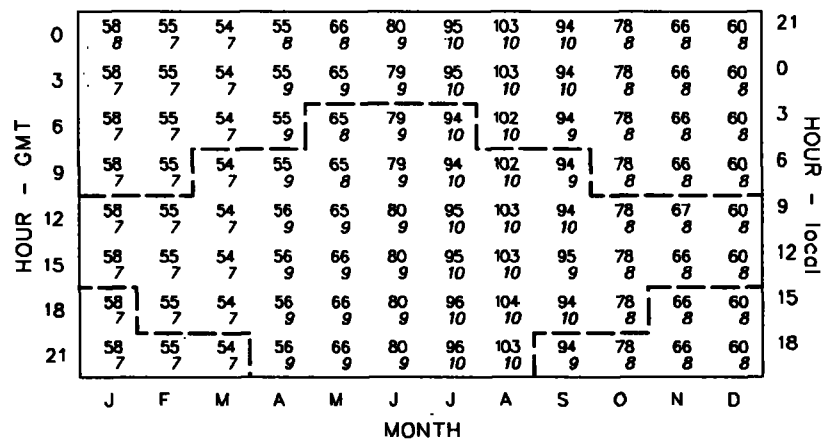
Air Temperature  
Units = 0.1 °C



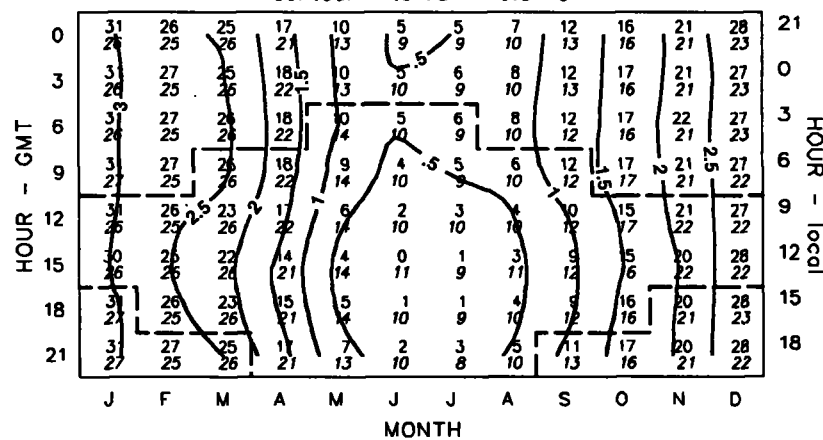
Dew Point Depression  
Units = 0.1 °C  
Contour interval = 0.4 °C



Sea Surface Temperature  
Units = 0.1 °C



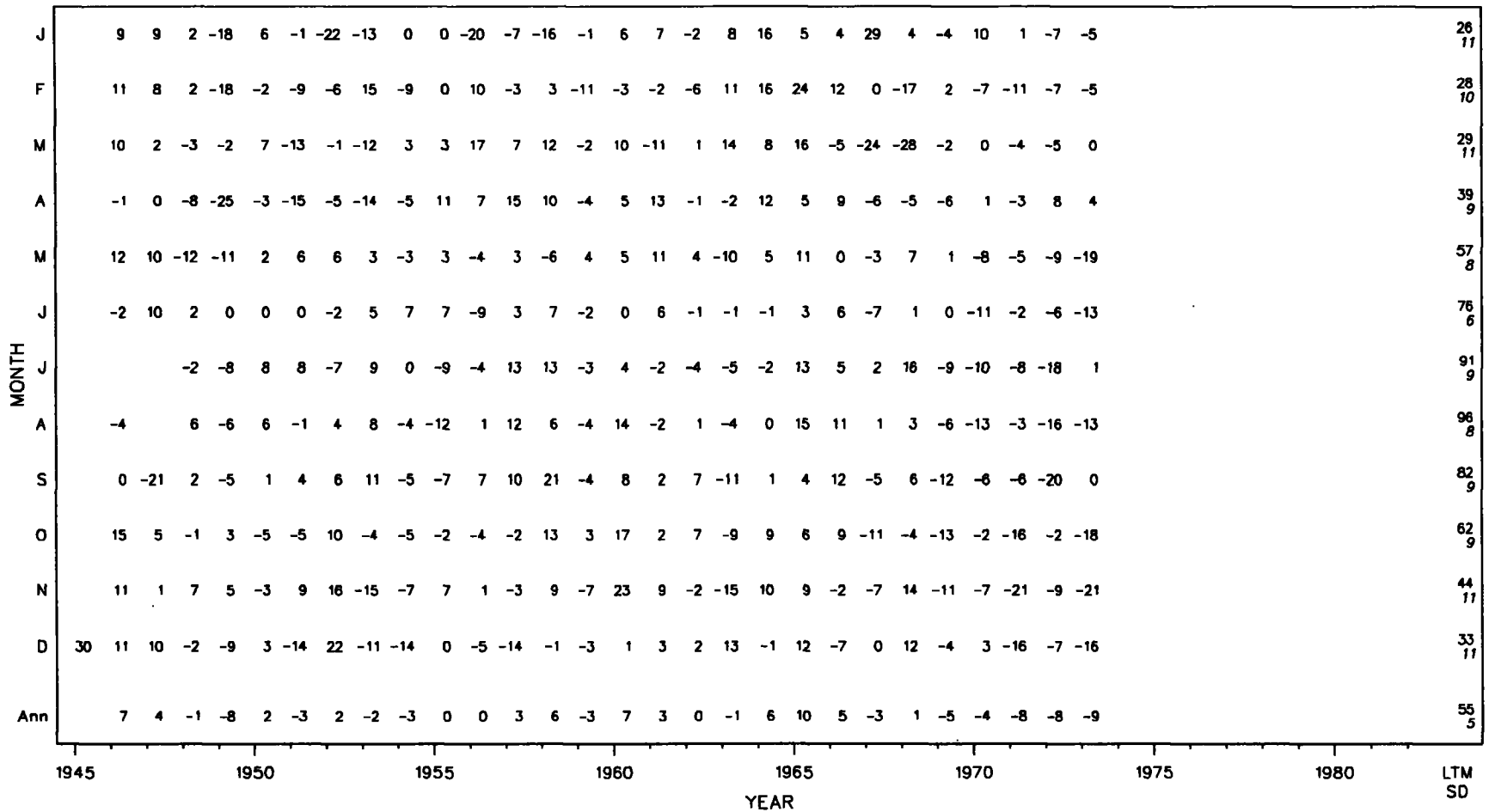
Sea - Air Temperature Difference  
Units = 0.1 °C  
Contour interval = 0.5 °C



### OWS Study Area A Surface Climatology

upper number = mean  
lower number = standard deviation  
———— data contours  
----- sunrise/sunset

Surface Air Temperature  
Units = 0.1 °C



OWS Study Area A Anomalies

### Surface Dew Point Depression

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	-2	-4	-3	-3	-2	7	10	10	7	-3	10	-17	8	-2	-8	-8	5	5	-9	-2	0	-12	3	9	-3	-2	2	2	32	7								
F	-1	-1	-7	-6	14	8	3	0	15	3	-13	-7	-1	5	-7	-1	-1	2	-14	-12	-4	-3	8	0	11	-2	1	10	32	8								
M	-1	10	-4	-9	0	4	1	12	-1	5	0	3	-9	-1	-6	-1	0	1	0	1	-1	4	0	-1	-3	-5	4	-3	30	5								
A	2	-3	11	5	6	7	-3	23	6	-13	1	-8	7	-7	-15	-1	5	4	-1	8	2	3	-6	-5	-1	-6	-5	-17	30	8								
M	-6	-4	6	5	2	-8	11	3	-5	1	-2	-8	9	-3	-8	-2	3	7	-2	-7	7	-6	-1	1	-2	-2	-2	12	26	6								
J	13	-1	3	-7	0	-4	1	-3	-2	-1	6	-1	-5	4	5	9	-4	-7	8	-2	0	4	8	-6	-2	-5	-10	-1	21	6								
J		-4	-10	-3	-4	-1	7	1	-4	-1	-4	10	-5	2	4	-4	-3	-2	-3	2	7	5	10	7	6	-7	-8	20	6									
A	4	-6	-3	1	1	3	5	-5	-7	2	-6	16	-4	-1	-5	0	-2	0	2	6	0	9	-9	-5	5	1	-1	24	6									
S	-6	26	6	4	-5	-9	-3	2	5	-7	-4	8	-9	-13	3	-13	2	6	6	3	5	-4	-2	5	5	-1	0	-10	30	8								
O	-16	-10	6	-7	7	3	-2	17	10	-3	2	-4	2	-14	-1	-14	4	-7	4	-5	10	0	8	1	3	3	1	2	31	8								
N	2	-4	1	1	-4	-1	-8	13	9	-17	-1	-7	3	-3	-1	-8	6	4	-1	2	25	1	-2	6	6	-12	-9	4	31	8								
D	-16	-7	-5	-5	11	2	1	-12	3	7	6	-1	9	1	9	11	7	6	-8	7	-9	9	2	-2	-11	1	1	-1	-14	34	8							
Ann	-1	0	0	-2	2	0	0	8	4	-3	0	-3	3	-3	-2	-3	2	0	0	-2	5	0	2	0	1	-2	-2	-2	28	2								

OWS Study Area A Anomalies

### Sea Surface Temperature

Units = 0.1 °C

J	0	12	11	1	9	0	-5	-8	-4	-7	-5	1	-5	1	-3	2	-3	0	3	8	8	7	-4	1	-1	-2	-2	-11	57 6											
F	7	3	7	2	-3	-2	-9	1	-6	-5	-4	-3	3	-1	-4	4	-3	2	2	7	9	4	-1	-1	-1	2	1	-8	55 5											
M	2	6	3	1	-4	2	-14	-3	-8	-4	-3	1	2	-3	0	3	1	5	6	8	11	3	-5	-1	3	-3	-2	-7	54 5											
A	-9	7	3	0	-13	-6	-7	-15	-10	1	3	2	5	5	4	9	3	4	7	9	11	-1	0	-1	1	-3	-5	-4	55 7											
M	3	6	-1	-2	2	-3	-4	-11	-12	7	-3	-1	4	4	8	13	2	0	3	7	8	-1	-1	1	-3	-6	-10	-9	65 6											
J	0	6	-2	-12	-6	1	-4	-4	18	9	-6	0	9	0	2	9	0	-4	8	8	3	-6	-1	0	-12	-1	-4	-10	80 7											
J			2	-20	9	2	-8	-2	1	-3	-1	10	13	1	4	0	-4	-4	0	13	5	-1	12	-6	-8	0	-14	-1	95 8											
A	-1		8	-18	-6	-2	-2	15	-5	-13	0	15	14	-2	10	-1	3	-2	-2	15	10	2	4	-8	-10	-3	-13	-10	102 9											
S	9	-13	6	-7	-3	1	-14	4	1	-9	4	5	16	-2	7	0	2	-7	5	8	12	-1	4	-4	-4	-2	-11	-6	93 7											
O	8	-3	-1	5	6	3	-4	-7	-5	-7	-4	2	10	-2	11	0	1	-8	3	6	12	-3	5	-6	-1	-9	-2	-11	78 6											
N	8	3	-7	2	3	-10	2	0	-6	-1	-4	-2	3	-3	12	3	-1	-3	10	7	13	-1	7	-9	-4	-10	-10	-4	65 6											
D	-1	7	10	1	-2	-3	-10	14	-10	-7	-3	-8	-5	4	-4	7	-1	-2	4	10	8	8	-3	7	1	-4	-3	-7	-9	59 7										
Ann	3	4	2	-4	-1	-2	-5	-3	-4	-3	-3	2	6	0	5	3	0	-1	4	9	9	0	2	-3	-4	-3	-7	-7	71 4											
	1945				1950					1955					1960					1965								1970				1975				1980				LTM SD

OWS Study Area A Anomalies

### Sea - Air Temperature Difference

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	-8	3	10	19	2	2	16	6	-3	-7	15	8	11	1	-9	-5	-1	-8	-14	2	4	-22	-8	5	-11	-3	5	-9	31	10								
F	-5	-5	6	20	-1	7	-4	-14	3	-6	-14	0	0	9	-1	6	3	-10	-15	-17	-3	4	16	-3	6	13	8	-3	27	9								
M	-7	4	6	2	-11	15	-13	9	-12	-8	-21	-6	-10	-1	-10	13	0	-9	-3	-8	16	28	24	1	3	1	2	-7	25	11								
A	-8	6	10	25	-10	8	-3	-2	-5	-10	-4	-12	-5	8	-1	-4	4	6	-5	4	2	6	5	5	1	0	-13	-8	16	8								
M	-9	-4	12	9	0	-9	-11	-14	-7	4	1	-4	10	0	3	2	-2	10	-2	-5	7	2	-8	0	5	-1	-1	10	8	7								
J	2	-4	-4	-12	-5	2	-2	-9	8	3	2	-3	2	2	2	3	1	-2	10	5	-3	2	-2	0	-1	1	2	2	4	4								
J			4	-13	0	-6	-2	-2	1	5	2	-3	2	3	-1	1	0	1	2	0	-1	-3	-5	3	2	8	4	-3	4	4								
A	2		2	-12	-11	-1	-6	8	-1	-1	-1	4	9	2	-3	1	2	2	-2	0	-1	1	2	-2	3	0	3	3	6	5								
S	9	7	3	-3	-5	-4	-8	-7	6	-3	-3	-6	-5	1	-1	-2	-5	4	3	4	-1	4	-2	8	2	3	8	-6	11	5								
O	-7	-8	0	2	11	7	-14	-3	0	-5	-1	4	-3	-5	-6	-3	-6	1	-6	0	3	8	9	7	1	7	1	7	16	6								
N	-4	2	-15	-3	8	-14	-14	15	1	-9	-6	1	-6	4	-11	-6	1	12	-1	-2	15	7	-7	2	3	11	-1	17	22	9								
D	-32	-3	0	3	7	-6	4	-8	1	6	-4	-3	9	5	-1	6	-4	-4	-9	11	-4	14	-3	-5	5	-7	13	0	7	27	9							
Ann	-4	0	3	3	-2	1	-6	-1	0	-3	-3	-1	1	2	-3	0	-1	0	-2	-2	4	3	2	3	1	4	1	1	16	2								

OWS Study Area A Anomalies

### Surface Scalar Wind

Units = 0.1 m/s

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	20	-5	11	5	-11	22	35	23	-7	-33	-2	22	13	5	1	4	8	-26	-2	-20	3	1	-34	-21	-26	-14	25	3	123	18									
F	0	13	16	12	-3	-13	-28	11	16	-14	-12	33	-13	36	-21	23	15	-4	-34	-10	26	22	-10	-35	2	-9	-2	-15	117	19									
M	-5	-5	20	-2	-10	3	-13	26	-14	-5	10	-2	1	1	12	23	12	4	11	-8	-1	-3	18	-5	-19	-8	-2	-37	111	14									
A	18	9	-14	11	-6	7	4	-1	4	-21	4	5	7	24	13	17	-2	4	-7	-19	-11	12	-19	16	-9	-4	-9	-31	96	14									
M	5	-7	-24	12	-9	-5	-24	8	9	-9	33	8	-15	15	24	-1	-5	23	-4	15	-6	1	-12	-11	3	-18	-13	10	84	14									
J	-12	7	1	-13	-10	-14	4	0	-21	-8	1	5	-2	18	5	0	11	-2	26	12	-1	-1	-2	1	4	-2	-9	1	76	10									
J																																						69	12
A	-7		-18	4	-4	5	-18	-4	5	11	-16	6	4	18	-2	8	-9	-12	-5	-8	-4	-10	22	-3	6	-3	22	10	75	11									
S	-15	33	-13	9	-8	20	-27	-16	0	26	-3	-1	-2	6	3	13	7	2	3	-13	3	2	-9	-16	-11	4	6	-3	91	13									
O	9	-7	-8	-19	-13	-3	24	3	-1	0	18	15	11	5	-23	-9	8	-10	2	-22	-10	-16	28	32	7	-17	-7	4	102	15									
N	-7	-7	-17	-4	2	-24	-15	-2	22	9	17	-15	24	20	-3	8	13	-5	-5	-8	17	17	-15	1	-9	12	7	-35	107	15									
D	-21	20	16	9	1	-24	10	-36	29	-6	24	10	29	10	-6	22	-28	-1	-19	-5	-1	14	1	-17	2	0	-4	-12	-18	112	17								
Ann	2	5	-5	1	-6	1	-7	6	1	1	4	8	2	13	2	5	4	-3	-1	-8	3	1	-4	-3	-5	-5	0	-9	97	5									

### OWS Study Area A 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	-135	-90	-95	-7	-77	-90	-41	-29	32	92	64	-109	17	174	91	-88	-113	271	63	4	102	93	-8	163	-30	20	-145	-132								9960	105		
F		12	174	-71	-160	-112	-62	92	74	-93	81	70	-26	59	-134	95	-163	20	12	-17	187	-3	-136	137	124	21	-82	-56	-42								10033	100	
M	-19	93	-136	45	0	126	21	-20	-56	118	-127	16	83	-165	-42	-14	196	-88	-62	50	21	-62	-114	62	119	44	-92	0									10040	89	
A	-13	-93	8	-49	8	60	-72	88	3	-89	66	-7	-31	-21	-38	-50	-43	15	-3	-37	-27	-20	56	-34	26	43	82	172									10079	59	
M	6	-44	33	38	55	3	131	33	25	1	-92	-9	92	-14	-47	16	41	-68	-65	18	-45	40	45	38	-118	-51	-40	-20										10118	55
J	16	-25	26	8	-7	55	35	-27	16	8	38	59	35	-10	11	-72	-13	29	-55	-30	-28	-65	-17	-31	-16	96	-21	-13										10091	39
J		10	12	-31	-14	8	-6	-9	-76	29	34	50	-30	10	-2	52	10	-72	32	10	3	75	-56	-9	29	-44	-15											10106	37
A	14		-3	8	-44	35	59	-34	-9	-76	61	-21	45	12	77	-44	-7	7	73	-23	56	-29	30	-6	5	-68	-47	-70										10088	44
S	-13	97	27	60	-54	-13	123	-2	20	-75	18	96	-23	-37	-36	-73	0	-57	49	17	26	-13	13	-15	-14	-104	-25	7										10041	53
O	43	10	-9	-5	-42	-30	-51	-48	-41	108	-3	-103	-41	-103	133	-20	-4	-102	16	-21	145	-16	112	-35	57	1	106	-60										9998	69
N	37	90	-50	-73	-18	-3	75	-121	-129	52	-44	49	-94	-39	-68	3	51	17	-12	127	64	-14	-25	66	23	47	-139	129										10026	73
D	17	-112	72	-49	-17	209	-170	70	-111	-63	-7	-146	3	16	-125	-59	135	40	62	37	-64	-28	53	53	45	137	13	-154	143									9985	96
Ann	-15	28	-26	-12	-9	-9	37	-17	-25	11	-6	-2	17	-41	11	-31	18	9	-4	22	24	-14	30	27	17	-1	-48	8										10047	22

OWS Study Area A Anomalies



### Total Cloudiness

Units = 0.1 okta

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	5	2	0	2	3	0	1	6	-1	-2	-4	1	-2	-4	0	-5	-6	-3	1	2	-3	6	-6	-1	0	5	-2	4	64	3								
F	5	-8	3	3	4	-2	2	9	4	2	-3	-2	-2	-3	-6	-4	4	-2	-3	4	-4	1	0	-5	-1	-4	6	2	65	4								
M	-1	-2	3	4	-1	1	6	3	-1	2	-5	2	-3	-4	-2	0	2	-3	-1	1	-5	-4	2	1	4	3	-2	-1	66	3								
A	0	-1	-4	5	-3	3	0	1	-1	3	5	0	-8	1	2	1	-3	-2	0	-6	-2	0	-1	1	1	4	2	5	65	3								
M	2	3	2	3	7	10	-12	-6	7	-6	-2	0	-11	-6	2	-1	-2	-2	1	6	-3	6	2	1	3	3	-1	-4	64	5								
J	-10	4	0	9	3	1	2	7	6	3	-4	-6	3	-6	-6	-8	3	1	-16	0	3	0	-5	3	6	2	5	1	68	6								
J		8	10	6	2	-4	-7	-3	4	1	-2	-9	1	-1	1	-2	0	-4	1	-4	-3	-2	3	-3	-1	2	4	68	4									
A	-4		1	1	6	4	7	0	4	2	-2	1	-12	1	0	1	1	3	-1	-2	-5	-3	-2	8	1	-9	-3	3	66	4								
S	3	-20	1	3	5	10	3	3	-2	2	-2	2	7	-1	-5	4	-2	-2	0	-1	1	-3	2	-3	-3	-2	-6	5	63	5								
O	6	7	0	5	-3	-1	1	-2	-7	-5	-1	-2	-1	1	-3	-1	4	4	-6	2	-5	3	7	1	-3	2	1	-4	63	4								
N	1	8	4	3	2	6	3	-9	-3	4	-1	-6	2	1	-6	0	-2	-2	1	-4	-3	0	0	-7	-2	6	5	0	64	4								
D	10	1	8	0	-1	-25	3	7	2	-7	2	2	-4	0	-4	-5	-3	3	-4	-1	4	0	4	-5	8	2	3	-3	3	61	6							
Ann	1	0	2	4	0	3	1	1	0	1	-1	-1	-3	-2	-2	-1	0	-1	-3	1	-2	1	-1	1	0	1	0	1	65	2								

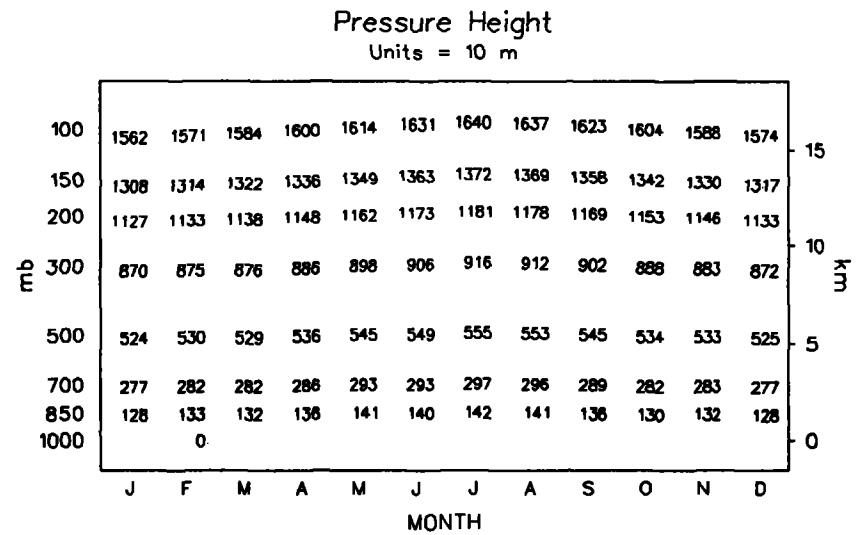
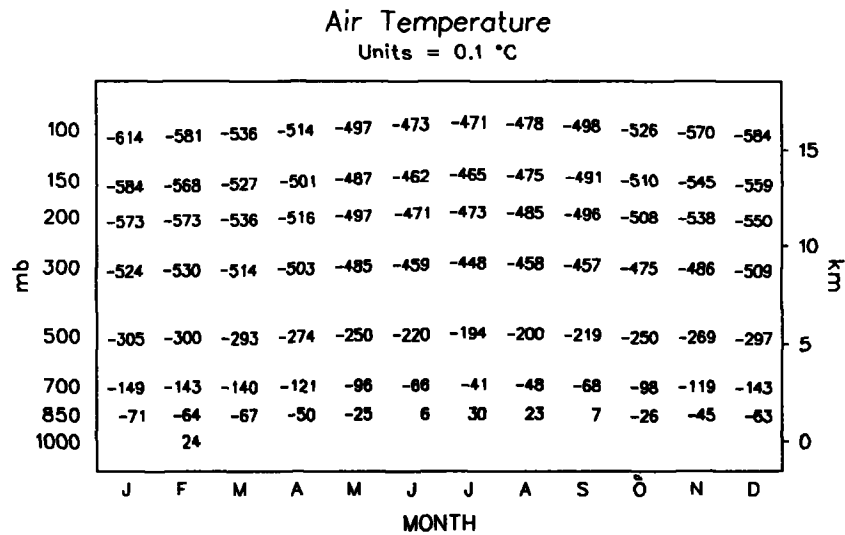
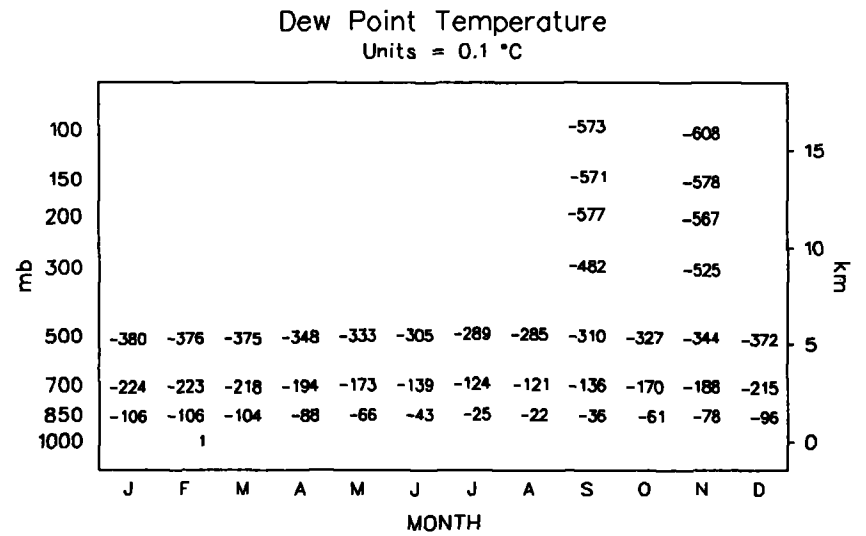
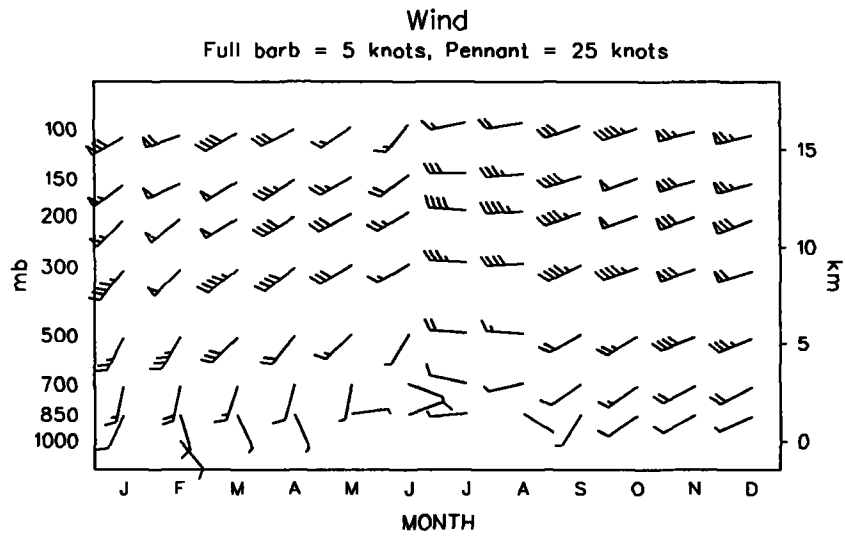
### OWS Study Area A Anomalies

### 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	-71	-112	-98	-51	-49	-21	106	-7	-139	57	18	125	-25	-6	32	114	-72	-7	-33	-108	14	19	61	59	82	-25	136	418	76									
F	-192	-6	106	-34	-32	-55	-50	8	-71	-52	-43	-40	58	-66	33	154	21	-75	53	75	122	-97	-103	95	111	49	31	373	82									
M	-222	-58	19	12	-16	48	95	-18	-23	-66	-65	-69	18	33	28	-15	75	27	-104	49	34	-26	-7	50	154	52	-5	380	71									
A	-107	-97	165	-96	43	65	-83	-87	35	26	-52	-63	-9	90	62	20	-21	12	-17	59	46	-118	81	15	97	36	-101	333	75									
M	-90	-54	13	-10	28	-134	-126	23	-110	29	93	-71	3	111	45	-7	16	-28	85	67	92	23	-84	49	57	39	-60	287	70									
J	-67	-8	-49	-59	-14	23	-8	-81	17	33	-57	47	68	-21	-7	4	14	-56	8	-9	121	-51	42	123	-72	72	-13	296	55									
J	-31	37	-62	-39	-3	-44	-73	111	-51	7	-99	44	-112	51	8	2	34	-13	65	-43	-20	47	-6	-104	1	291	278	81										
A	-128	-69	50	4	-65	11	42	102	-90	106	-150	1	-95	94	47	-63	41	24	-70	-7	16	163	38	-83	23	59	308	78										
S	-212	-168	-57	58	-78	-56	18	-108	-21	2	-142	92	18	113	39	35	93	47	-6	151	-71	51	33	3	88	99	-19	316	89									
O	9	-168	-78	-78	55	29	-135	-41	-125	1	22	20	107	-99	-47	88	62	-3	122	-124	2	68	111	-27	133	-10	105	362	86									
N	-52	-98	-41	-166	52	18	-15	-35	30	35	-36	135	105	31	14	5	-77	102	96	-8	77	25	-203	49	110	-49	-104	361	83									
D	133	-33	-5	-146	90	-134	-4	-35	-7	-2	-75	31	-20	67	-128	27	-109	5	60	92	71	29	102	-64	58	43	-47	396	75									
Ann	-87	-80	-5	-48	4	-24	-20	-34	-17	-6	-19	-3	31	4	18	40	-5	8	23	20	38	-7	20	32	53	28	23	342	33									

### OWS Study Area A Anomalies

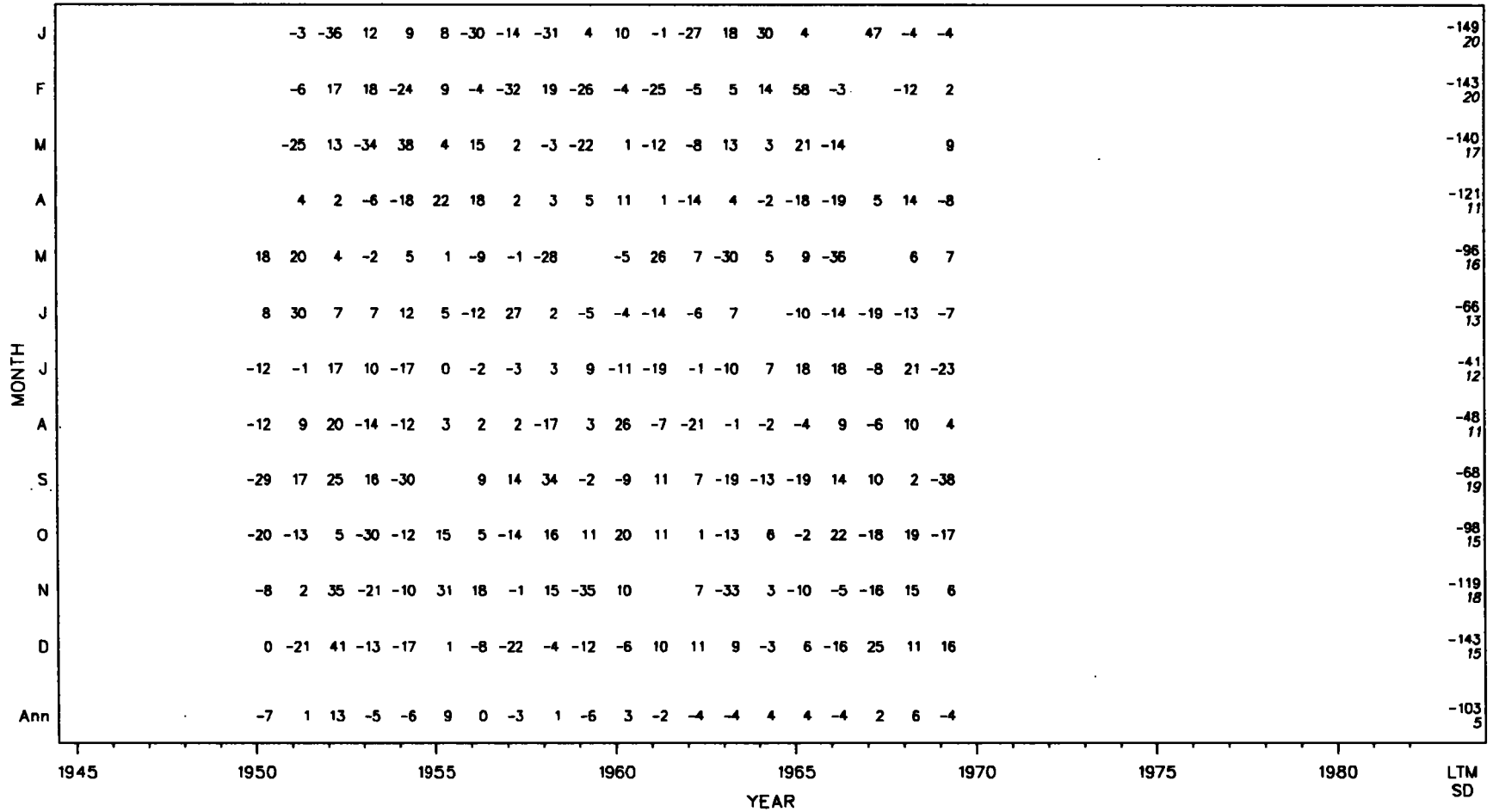


## OWS Study Area A Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

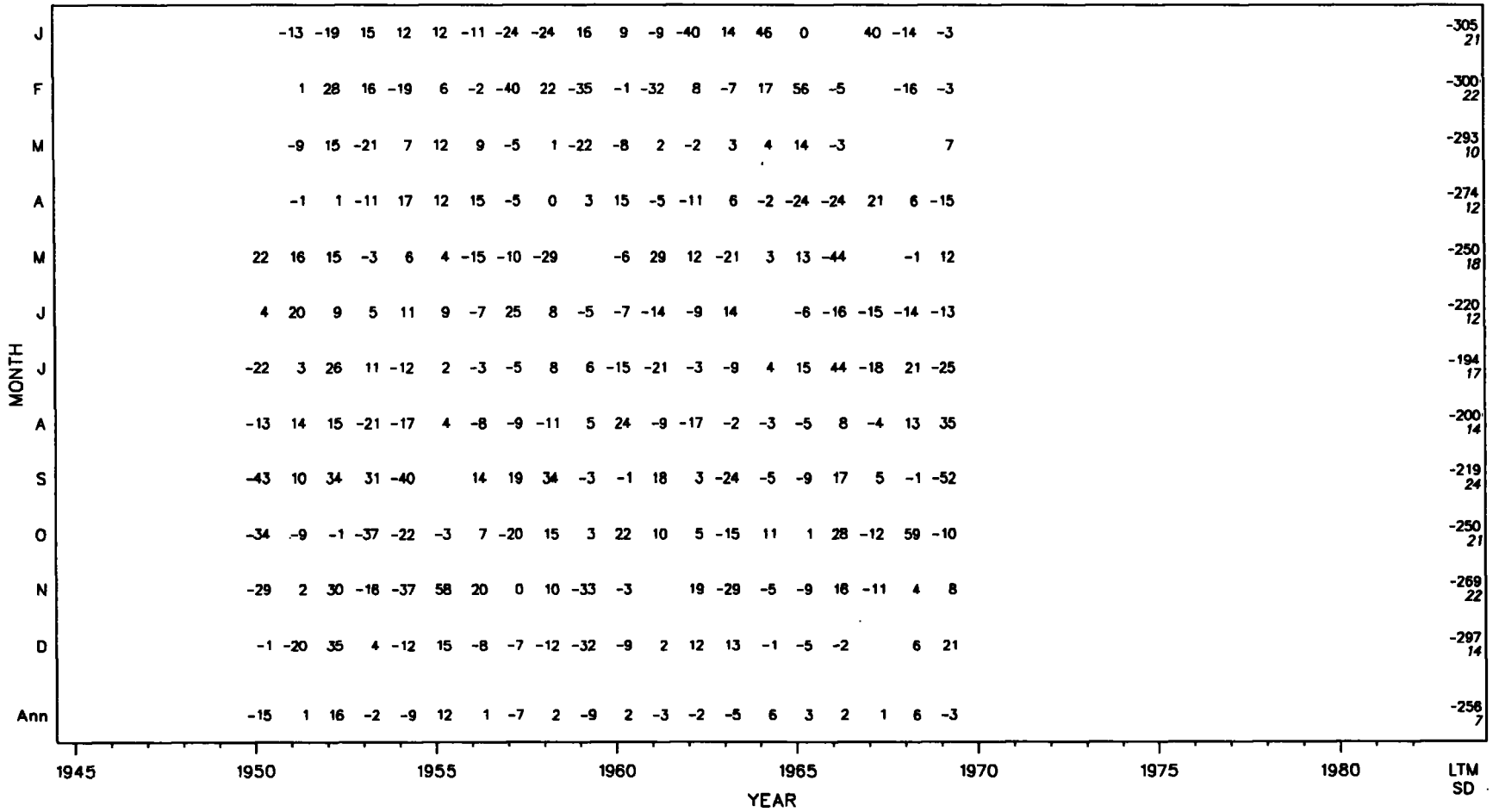
Units = 0.1 °C



OWS Study Area A Anomalies

Air Temperature: 500 mb

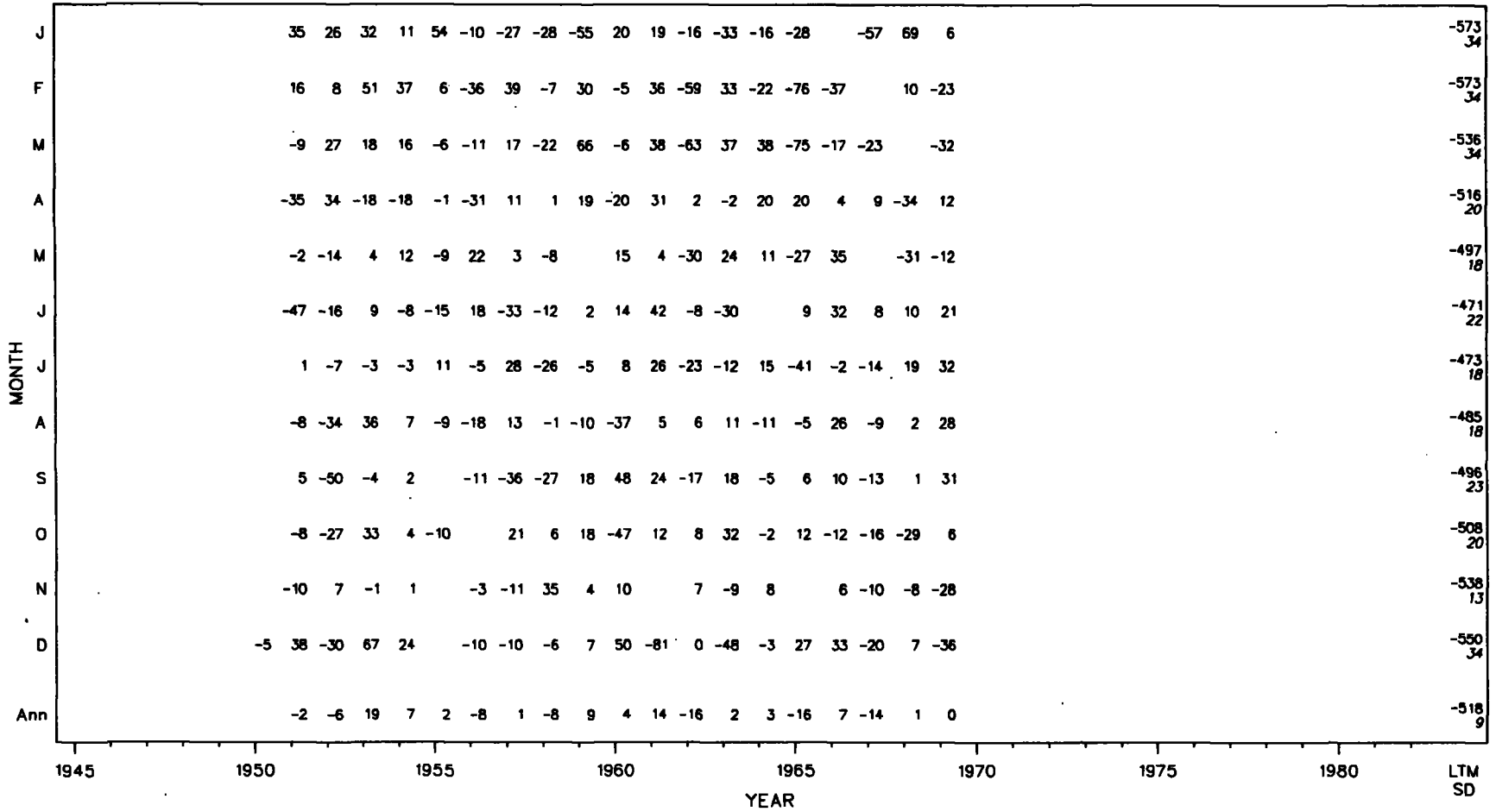
Units = 0.1 °C



OWS Study Area A Anomalies

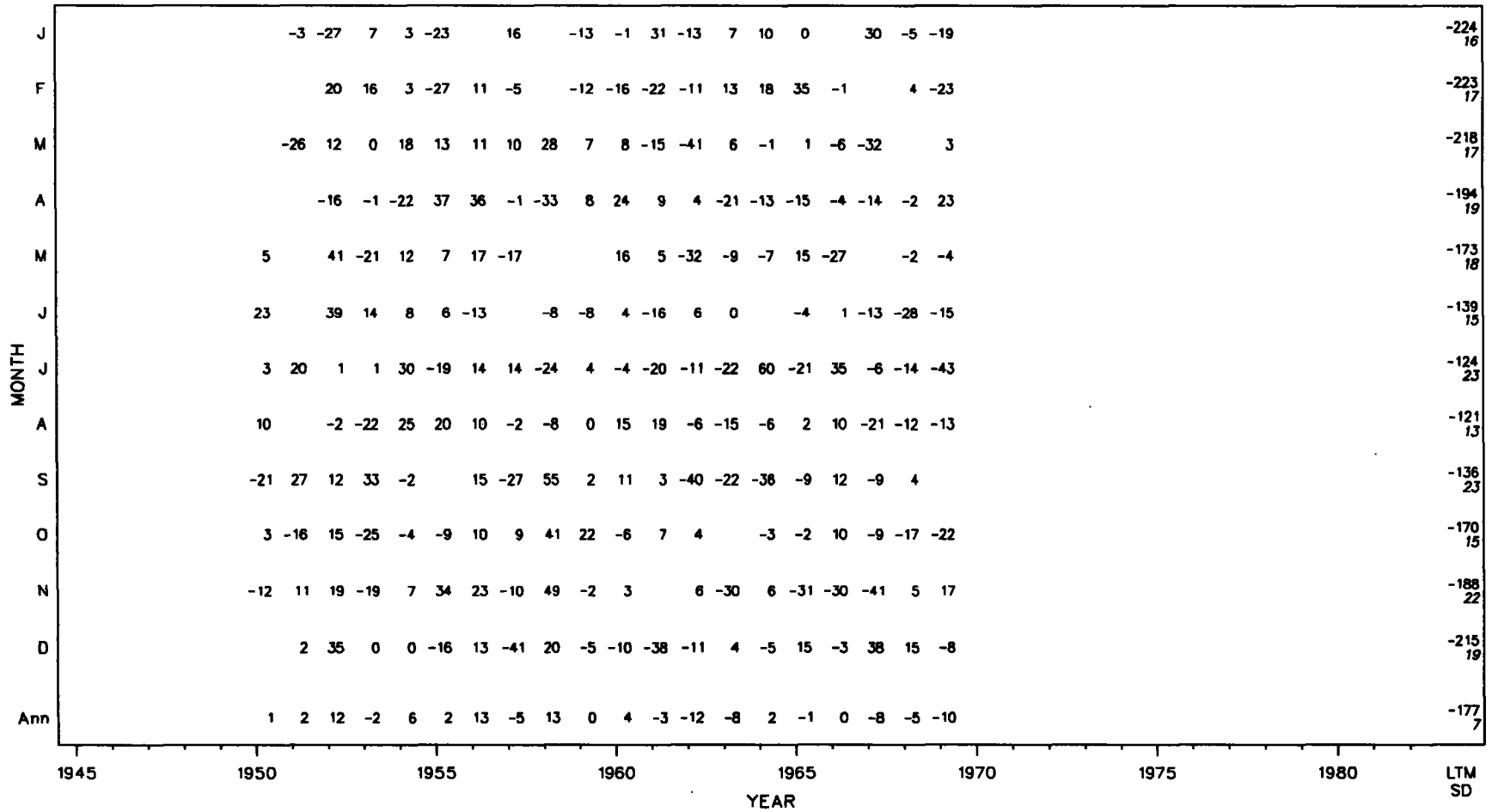
Air Temperature: 200 mb

Units = 0.1 °C



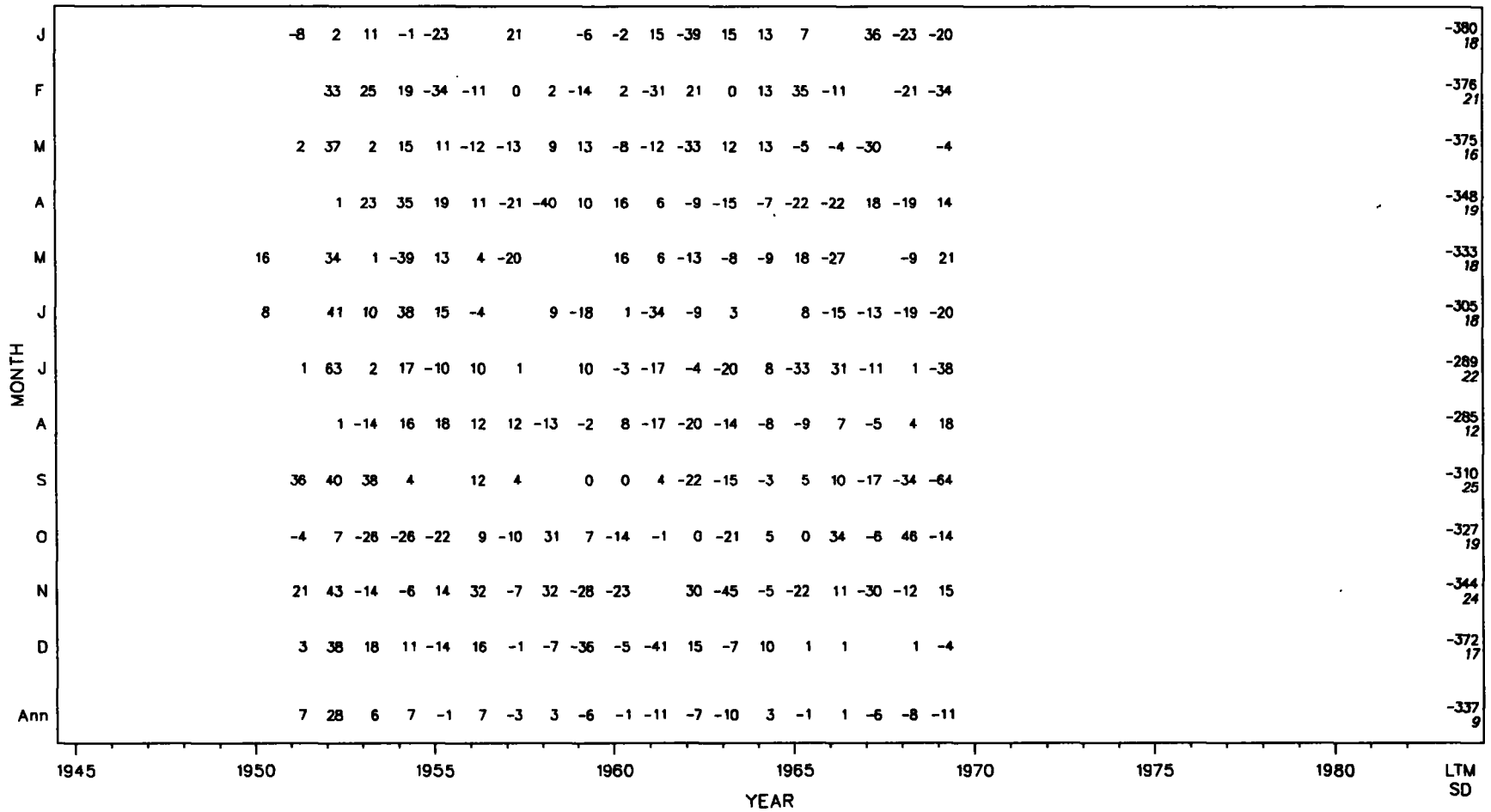
OWS Study Area A Anomalies

Dew Point Temperature: 700 mb  
Units = 0.1 °C



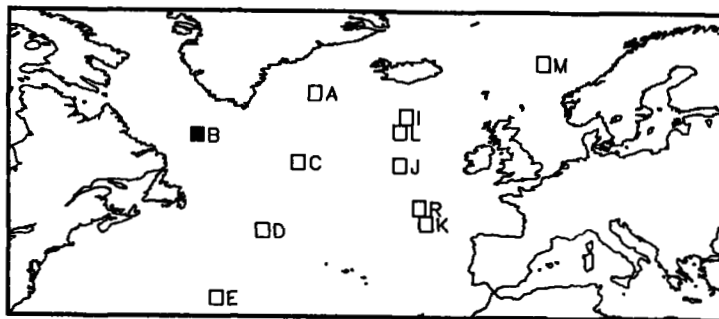
OWS Study Area A Anomalies

Dew Point Temperature: 500 mb  
Units = 0.1 °C



OWS Study Area A Anomalies





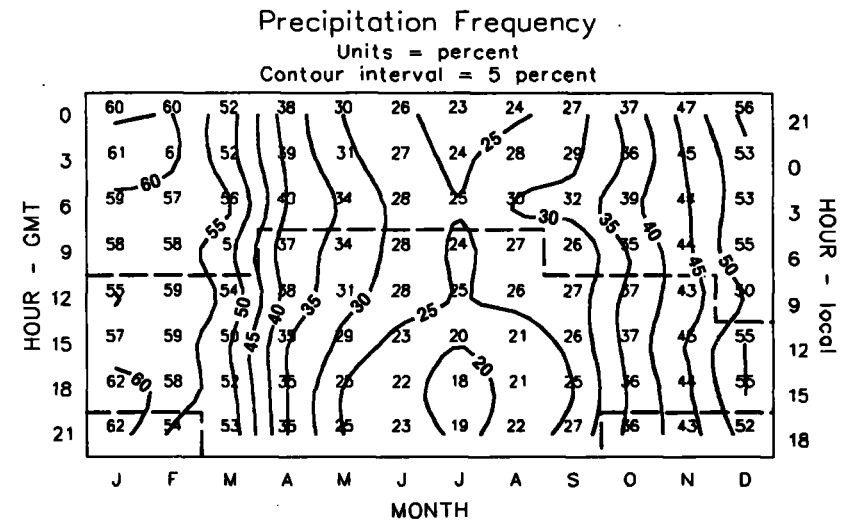
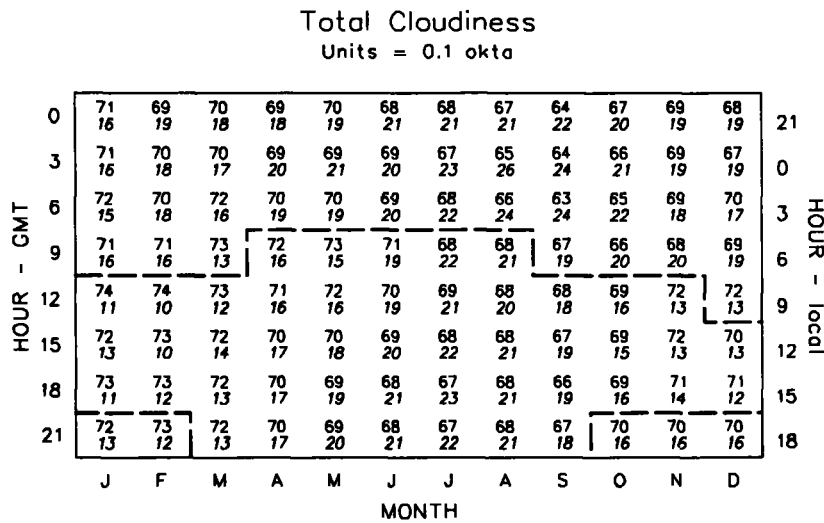
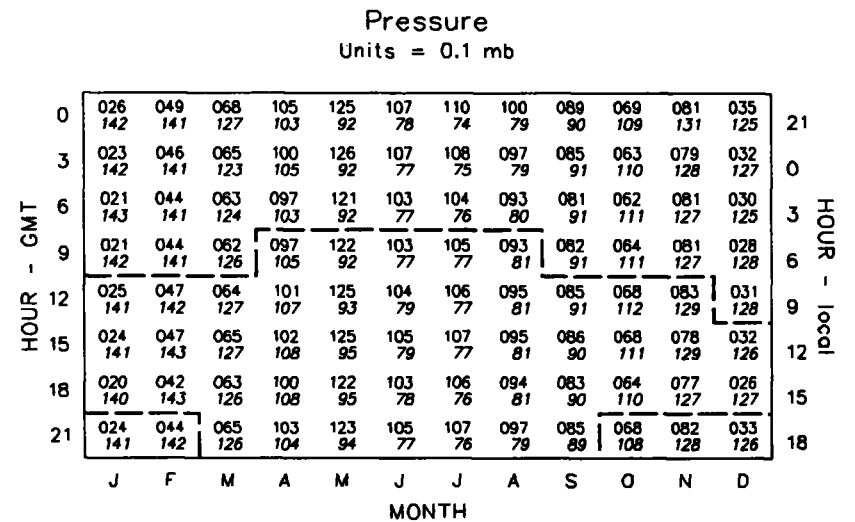
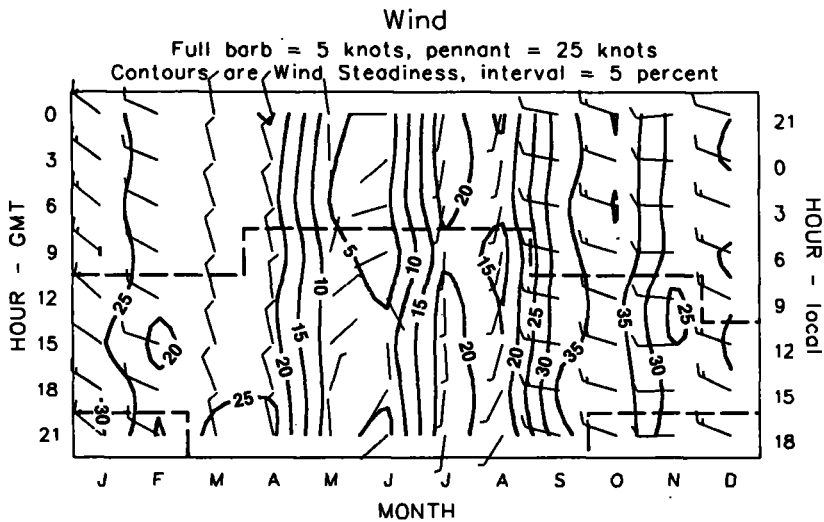
55.5°N – 57.4°N, 51.9°W – 50.0°W  
1946 – 1974

**OWS**  
**B**

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	Sum																				
J	31 29	16 15	31 31	26 26	29 29	18 18	8 8	27 26	31 31	31 30	31 31	31 31	31 24	24 31	31 31	30 25	31 30	31 31	31 31	30 30	31 31	31 31	25 25	16 14	22 22	767 754			
F	28 21	5 5	23 23	19 19	28 28	25 25	17 17	28 27	27 27	29 29	28 28	28 28	12 12	29 29	28 28	23 23	28 28	29 29	28 28	25 25	28 28	29 29	28 28	28 28	20 19	26 26	702 693		
M	31 30	3 2	25 24	27 27	31 31	30 30	26 26	31 30	25 25	31 31	31 31	31 31	30 26	31 31	31 31	31 31	31 31	31 31	27 27	29 29	31 31	31 31	12 12	29 28	27 27	786 777			
A	29 29	11 10	30 30	27 26	30 30	24 24	22 22	30 30	30 30	30 30	30 30	28 28	30 30	30 29	30 30	30 30	30 30	29 29	30 30	26 26	29 29	29 28	28 28	29 29	30 30	18 18	779 775		
M		12 11	26 26	31 31	31 31	16 15	31 31	31 31	31 31	31 31	31 31	31 30	29 29	28 28	31 31	31 31	31 31	29 29	26 25	31 31	31 30	31 31	31 31	31 30	21 20	745 737			
J		12 12	25 25	29 29	30 29	18 18	30 29	30 30	30 30	29 28	30 30	30 30	30 29	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 29	30 29	27 27	21 18	731 722			
J		16 16	30 30	26 26	31 31	31 24	25 30	31 28	28 31	31 31	31 31	31 31	31 29	31 31	31 31	31 31	31 31	31 31	29 28	31 30	31 30	31 30	31 31	30 30	20 20	762 752			
A			12 12	31 31	22 22	28 28	29 29	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 30	31 30	31 31	31 31	31 31	31 31	31 31	31 31	31 31	18 18	697 694				
S		9 9	30 29	25 25	22 22	22 21	21 30	30 29	30 30	30 30	30 30	25 25	30 30	30 30	30 30	30 30	30 30	29 29	30 30	30 30	30 29	29 29	29 29	29 29	690 688				
O		31 29	28 28	23 23	31 31	29 29	31 22	29 29	31 31	31 31	31 31	31 31	31 31	31 31	30 30	30 30	31 31	31 31	31 31	31 31	31 31	31 31	28 28	28 28	755 743				
N		5 5	30 30	30 30	29 29	30 30	30 28	30 30	30 30	30 29	30 30	30 30	30 29	30 30	30 30	30 29	30 30	29 29	30 30	19 17	30 30	30 30	28 28	28 27	738 730				
D		14 14		26 25	4 4	31 31	12 12	31 31	31 31	31 31	31 31	30 30	31 31	31 31	31 31	31 31	30 30	31 31	31 30	31 31	31 31	30 30	31 31	22 20	694 691				
Ann	119 109	19 19	145 139	316 313	298 296	345 344	283 282	301 290	359 353	354 354	366 365	363 361	363 362	334 328	363 360	365 363	359 353	364 361	364 364	358 357	353 352	347 344	364 362	363 359	360 358	307 303	157 149	93 93	8846 8756

## 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.

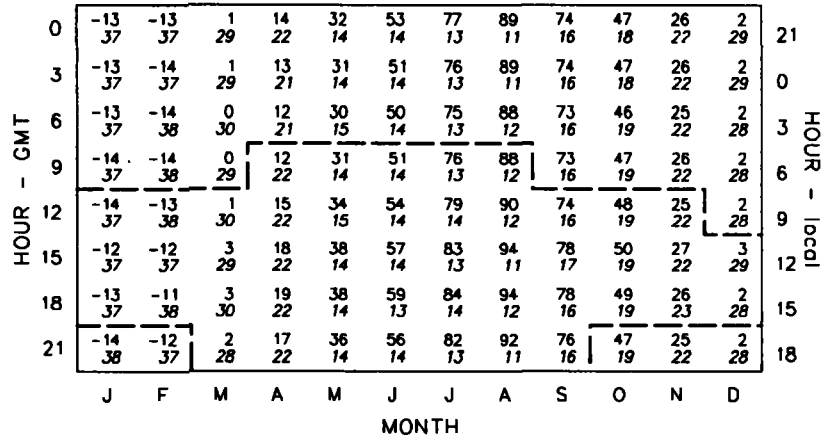


## OWS Study Area B Surface Climatology

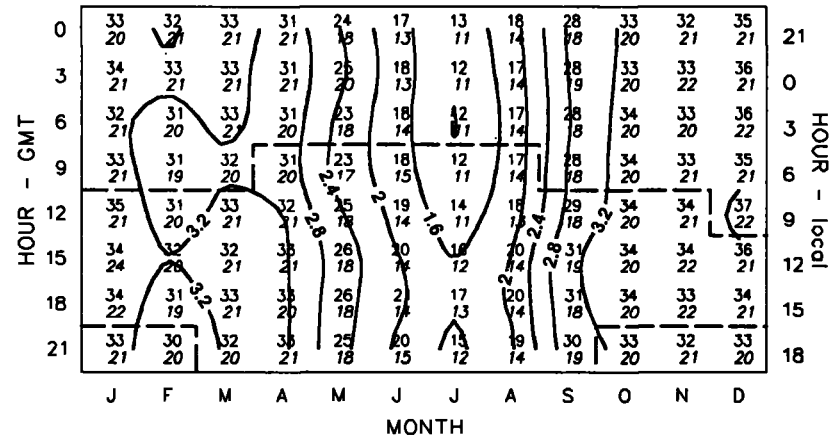
upper number = mean  
lower number = standard deviation

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

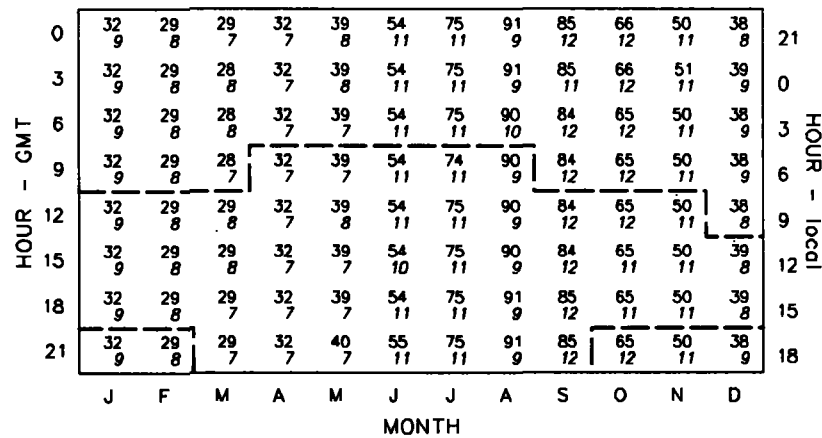
Air Temperature  
Units = 0.1 °C



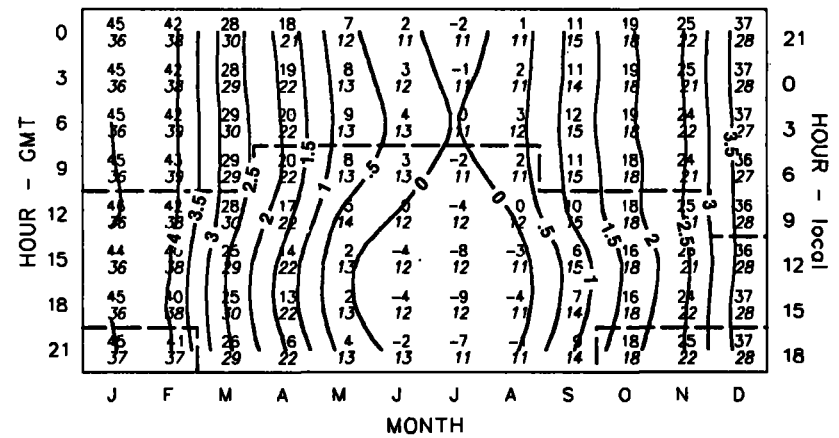
Dew Point Depression  
Units = 0.1 °C  
Contour interval = 0.4 °C



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

Surface Air Temperature

Units = 0.1 °C

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM SD
J	-14	5 -6 -22 -4 -6 -22 -1	26 14 -40	8 10 15 5 -17	4 12 -4 30 20	7 27 26 0 -38 -23 -11			-15 19
F	1	-14 -23 1 -9 16 -16 1	22 2 2 18 -15 22 -14 -3	0 16 15 27 -12 15 17 -7 -21 -32 -4 -3					-14 15
M	-1	-69 12 18 19 13 5 14 -3	1 13 14 -13 -6 -8 32	4 -18 27 17 -33 -5 13 14 8 -33 -16 -17					-3 21
A	-1	-16 -4 7 7 7 20 -20 -5 14	1 -1 9 -2 14 -6 6 2 2 13 -9 6 -21 -2 -1 -17 6 -12						15 10
M		0 -4 -1 2 11 7 4 3 -6 -5 6 2 0 1 -1 3 -5 10 3 6 4 4 -15 -9 -20 2							34 7
J		0 -2 8 5 15 3 7 7 -10 -5 3 -3 -1 1 -7 -2 5 6 2 2 -10 1 -10 -6 -18 8							54 7
J		-2 -3 2 12 7 1 17 2 -7 -2 5 9 3 -7 -3 -8 -3 2 6 2 -4 -2 -8 -6 -15 5							79 7
A		-10 0 7 14 -7 12 4 -7 7 3 4 7 -5 1 -4 -2 2 6 4 -7 0 -7 -8 -12							90 7
S		-5 -5 -1 12 9 0 12 10 -4 4 -2 -11 2 -2 1 -8 6 -1 10 3 2 -4 -8 -5 -13							75 7
O		11 -7 -9 -3 5 -1 -3 14 1 -6 -6 -8 10 3 6 -7 2 -3 15 2 14 -8 -2 -5 -16							47 8
N		5 7 -9 -1 -7 10 -8 -17 25 -8 -4 -4 -6 2 9 3 4 4 1 9 -1 0 3 -7 6 -16							26 9
D		24 -6 40 -16 15 -14 -5 14 -32 -4 0 -6 -1 26 -7 7 -3 7 1 5 2 10 -3 -23 -31							4 17
Ann		-8 -6 4 2 10 -3 2 10 -3 -3 4 -2 4 2 0 0 1 5 12 -1 2 3 -2 -6 -22 -3							33 6

OWS Study Area B Anomalies

### Surface Dew Point Depression

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	-8	-14	-2	-2	-4	4	1	-4	2	9	7	-2	-1	2	1	3	-1	-1	2	10	-8	-4	-3	-5	0	0	14	2	34	6								
F	-9	-9	-2	4	-2	-2	7	0	0	6	3	-2	6	-5	16	2	1	-3	-3	-2	2	2	-7	0	3	-6	1	0	31	5								
M	-8	-7	-1	-3	4	9	6	-4	-1	-3	4	1	8	7	7	-6	4	6	-9	2	10	2	-5	-7	-9	-12	11	-3	32	7								
A	-6	4	-1	1	2	2	-7	1	3	-4	-5	0	-6	-1	7	5	5	-3	2	7	4	1	4	-2	-12	-3	-2	3	32	5								
M		7	1	3	-9	-6	2	0	4	14	-4	-6	-6	-1	5	-5	4	2	-4	0	0	-4	-3	1	-5	7	2	25	5									
J		8	-4	0	-8	-10	5	-2	0	3	-4	-2	4	-6	-2	-1	4	6	-1	8	3	-1	3	3	-5	3	1	19	5									
J		0	-2	2	-1	1	1	3	8	-4	-3	-4	-1	-5	-3	-1	0	4	-3	-2	-1	0	7	1	-2	3	1	14	3									
A			0	2	-1	-6	-2	10	7	-4	1	-4	5	-3	-3	5	1	-3	-2	-2	-2	3	3	0	-2	-1	18	4										
S			-4	-7	-2	-6	-3	-1	-5	-2	1	-11	4	10	-2	2	0	8	-1	7	3	3	-7	10	4	1	-3	29	5									
O			-3	2	-2	-3	-5	6	3	-4	3	5	4	-1	-6	1	-4	4	3	2	-7	-1	-7	0	2	-3	7	34	4									
N			-1	-6	-1	-9	-12	-8	8	4	-7	4	0	-6	4	1	3	2	0	2	-2	8	4	2	-2	4	-7	12	33	6								
D			-6		-1	-17	-1	-6	7	9	0	6	-1	3	8	2	-10	1	-3	5	2	5	-2	2	-1	-5	1	1	34	6								
Ann			-2	-1	-2	-3	-2	3	1	1	3	-1	-1	3	-1	2	0	2	1	-1	2	1	-1	0	0	-3	1	4	28	2								

OWS Study Area B 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	8	-1	-13	-4	-8	1	4	-5	14	4	-1	-2	2	-1	-1	0	9	2	7	6	2	1	-3	-4	-9	1	-10								31	6		
F	-1	8	6	4	3	1	5	-12	-8	0	-6	-4	-5	0	-2	2	0	3	8	6	6	8	8	-7	1	-7	-2	0	-6								29	5	
M	0	4	-6	13	-5	0	3	5	2	-2	-8	-4	-1	-3	-3	2	-1	4	5	5	8	3	-5	-1	-12	-1	0	-4									29	5	
A	-3	5	1	6	-4	-13	6	3	4	4	2	2	0	-1	1	-4	3	0	2	7	4	-1	-1	-3	-7	-3	4	-11									32	5	
M		1	-5	2	-1	5	7	0	5	-7	-3	-1	11	-3	-1	-1	0	-2	4	4	5	-1	1	-7	-7	-9	3										40	5	
J		-6	-7	2	5	18	4	-1	2	-3	6	-2	-5	-4	3	-8	4	7	7	3	1	-5	2	-7	-7	-11	4											54	6
J		-7	-9	-5	15	8	-10	9	-3	-4	-2	6	4	3	-4	2	-4	1	5	2	6	-4	7	-5	-2	-14	4											75	7
A			-13	-2	0	12	-3	18	-1	-10	5	1	1	5	-6	1	-2	-4	5	8	8	-4	1	-5	-4	-12												90	7
S		3	-12	-9	1	6	10	8	9	-7	15	-4	-6	-1	-4	2	-2	2	-2	11	4	-1	0	-5	-2	-16												85	7
O		11	1	-20	3	3	6	19	2	-8	2	-15	-10	-4	-3	8	-1	-1	3	11	9	12	-5	-4	-2	-17												65	9
N		-1	13	16	-5	-2	4	4	2	17	-10	-7	-11	-11	-7	2	4	7	4	-2	7	3	-5	-3	-6	2	-15											50	8
D		4		-3	12	-1	30	5	-1	6	-4	-15	-4	-6	-10	0	2	5	1	-4	4	-1	-5	1	-11	-5	-3											40	9
Ann		4	-3	-1	1	5	3	4	2	-3	-1	-3	-2	-2	-1	1	1	2	3	6	5	0	-1	-5	-5	-9	2											52	3

### OWS Study Area B Anomalies

### Sea - Air Temperature Difference

Units = 0.1 °C

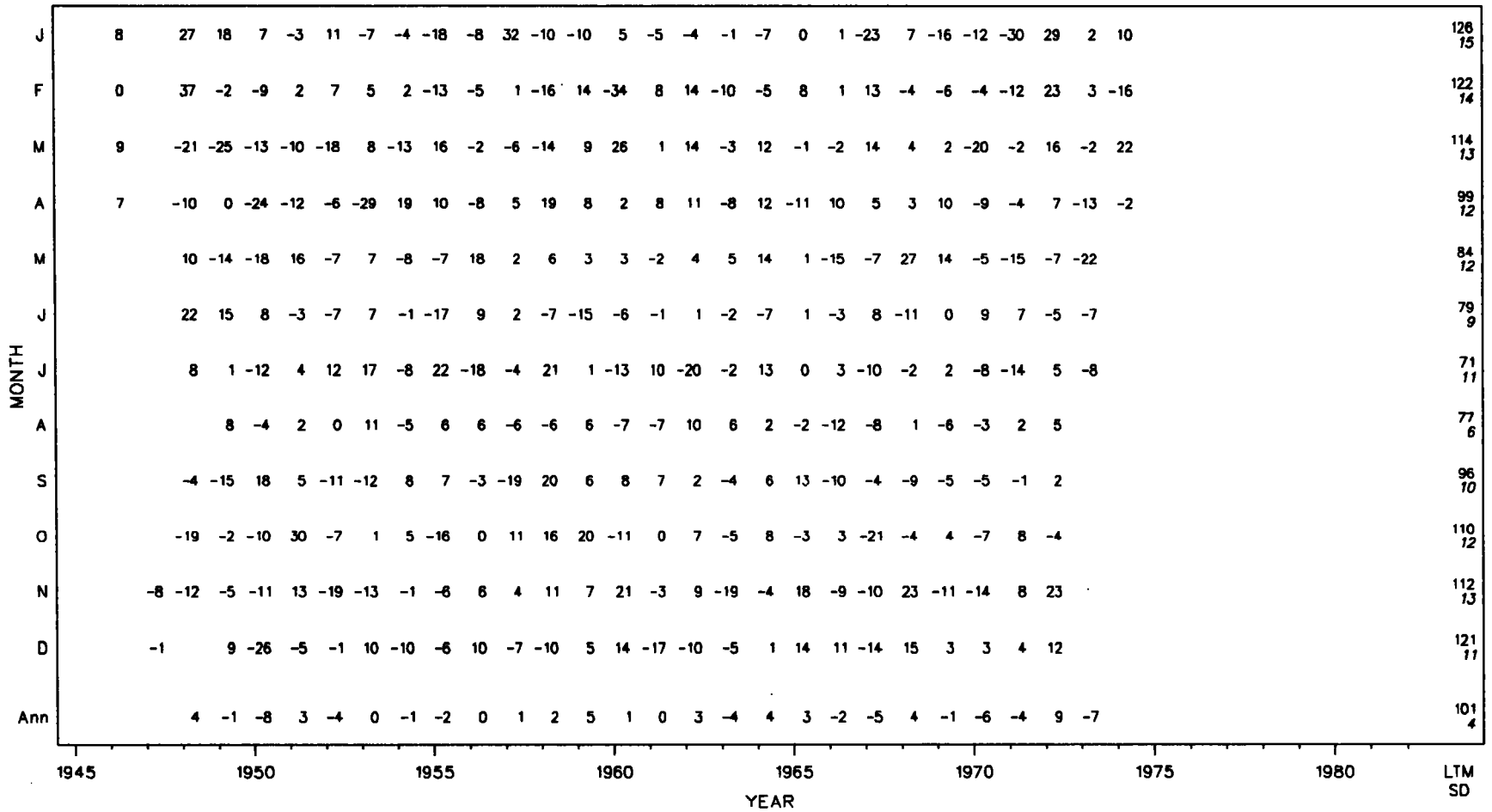
MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD	
J	18	2 5 8 1 -2 23	5 -31 0 44	-9 -13 -14 -6 19	-4 -3 7 -23 -14 -5 -26 -28	-4 29 24 1			47	18	
F	-5	23 29 2 12 -16 21 -13 -29	-2 -8 -22 11 -22 13 6 0 -13 -7 -21 18 -6 -23 8 13 31 4 -4							43	17
M	0	73 -17 -5 -24 -13 -2 -9 5 -3 -21 -18 12 3 .6 -30 -4 22 -22 -12 41 8 -17 -15 -19 32 15 13								32	22
A	-2	21 6 -1 -11 -20 -14 22 9 -10 2 3 -9 0 -13 2 -3 -2 0 -7 12 -7 20 -1 -7 14 -3 1								17	11
M	0	-1 3 -3 -6 0 -5 2 0 3 -7 9 -2 -2 0 -3 3 -6 1 -1 -5 -3 8 1 11 2								5	4
J	-6	-5 -6 1 2 1 -7 -5 5 11 -5 -2 -3 2 -1 6 1 0 1 -1 4 1 3 -2 7 -2								0	5
J	-5	-6 -7 2 2 -10 -8 -4 3 -1 1 -5 0 4 6 5 4 3 -5 4 0 9 3 4 2 -1								-4	5
A		-3 -2 -7 -2 4 6 -5 -2 -3 -2 -3 -1 -1 0 2 -2 2 2 5 3 1 2 4 0								0	3
S	8	-7 -9 -11 -2 9 -4 -1 -3 11 -2 5 -3 -1 1 7 -4 -1 2 1 -3 4 4 3 -3								10	5
O	0	8 -12 6 -1 9 21 -12 -9 8 -9 -2 -15 -7 2 6 -3 6 -5 7 -2 4 -2 3 -1								18	8
N	-5	5 24 -5 5 -7 12 24 -9 -2 -3 -8 -5 -9 -7 1 3 -1 -3 -2 3 -4 -6 0 -4 1								25	9
D	-20	4 -27 15 11 19 4 -7 28 -11 -4 0 -9 -25 9 -2 4 -10 4 -6 -7 -9 -7 19 26								36	15
Ann	12	3 -5 -1 -5 6 3 -7 0 3 -7 0 -6 -3 1 1 0 -3 -5 6 -2 -4 -2 1 13 6								19	5

### OWS Study Area B Anomalies



### Surface Scalar Wind

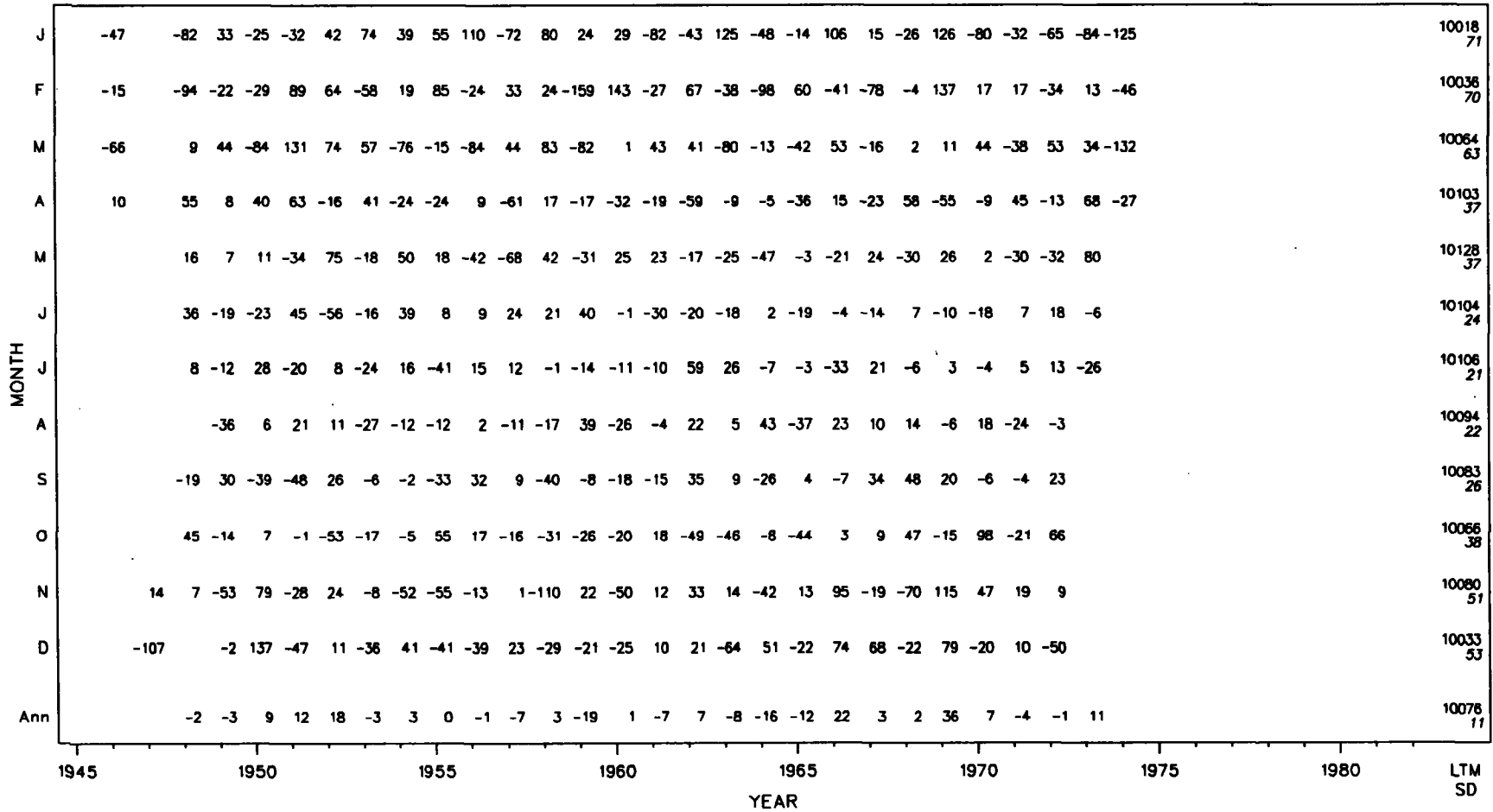
Units = 0.1 m/s



OWS Study Area B Anomalies

### Sea Level Pressure

Units = 0.1 mb



OWS Study Area B Anomalies

### Total Cloudiness

Units = 0.1 okta

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	2	-2	1	4	0	-1	2	3	0	2	1	2	1	0	-3	-2	-4	-3	1	-1	0	2	-3	4	4	0	0	-8	72	3								
F	2	-5	0	2	2	2	1	1	2	0	1	0	-2	-3	-4	3	-1	4	1	2	-2	-2	-5	5	-2	4	1	-3	71	3								
M	0	2	2	4	0	3	1	-1	0	1	4	1	-8	2	-5	-2	1	-4	0	-1	-6	0	2	2	0	4	-1	0	72	3								
A	3	-15	2	-1	-4	1	2	0	2	2	3	0	1	1	1	1	1	2	-1	-2	2	-4	-1	0	4	2	2	-1	70	4								
M		1	-1	0	3	3	3	2	-3	2	5	-9	2	1	-2	3	-1	0	-3	-3	-2	3	-6	1	2	0	-2	70	3									
J		-11	7	-10	-2	6	3	1	3	6	2	1	1	3	-2	3	5	-10	-2	-4	-2	2	-5	-6	6	3	2	69	5									
J		-2	3	1	-4	-6	-1	-2	-3	7	7	5	-2	2	1	2	9	-1	0	-1	2	2	-3	2	3	-11	-6	68	4									
A			1	-2	2	0	6	2	-3	7	-7	4	-3	-5	-7	-2	2	8	-1	7	-2	0	6	-4	-2	-6	67	5										
S			7	3	3	6	-3	3	4	2	-3	2	6	-1	3	-2	2	-3	0	-7	-6	-3	-4	-5	-3	-1	1	66	4									
O			-2	1	1	1	2	2	0	-5	-3	-1	-1	-2	4	-1	2	2	-2	-1	0	-2	4	1	2	0	-1	68	2									
N			3	0	1	0	3	0	-4	-6	1	1	2	-1	-2	1	-3	2	-2	-3	2	-1	1	-6	4	1	3	2	70	3								
D			-3		3	2	2	4	1	-2	-2	-3	2	-1	0	1	3	-3	-3	-1	-5	-3	3	1	5	1	-3	-3	70	3								
Ann			-3	2	0	1	1	2	0	-1	1	2	1	-1	1	-2	1	0	-1	-1	-1	-1	0	-1	0	1	0	-1	69	1								

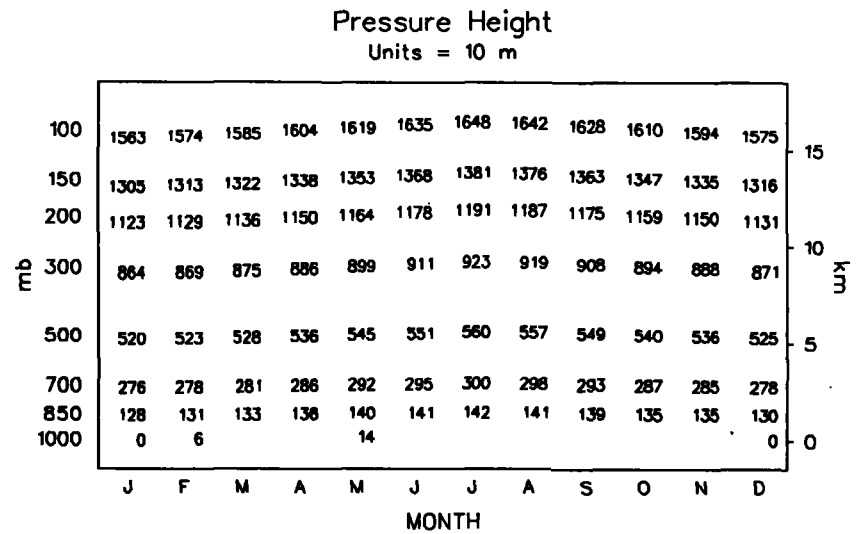
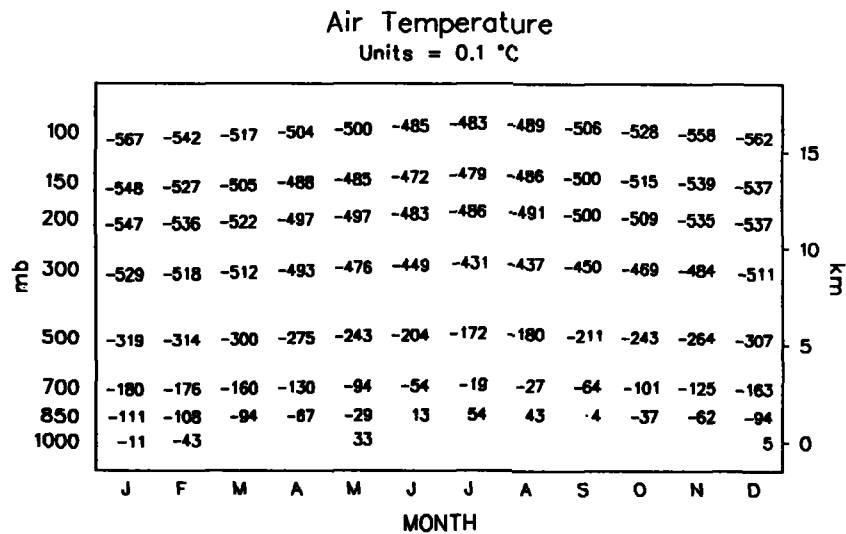
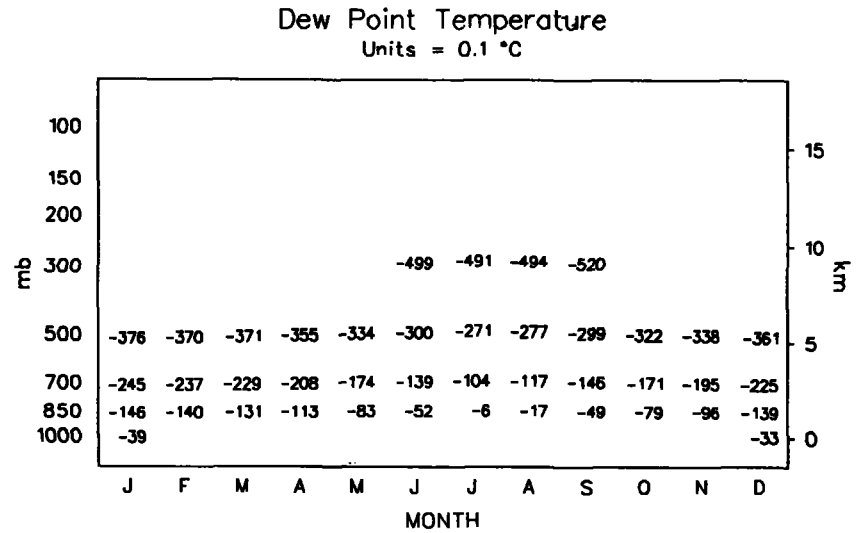
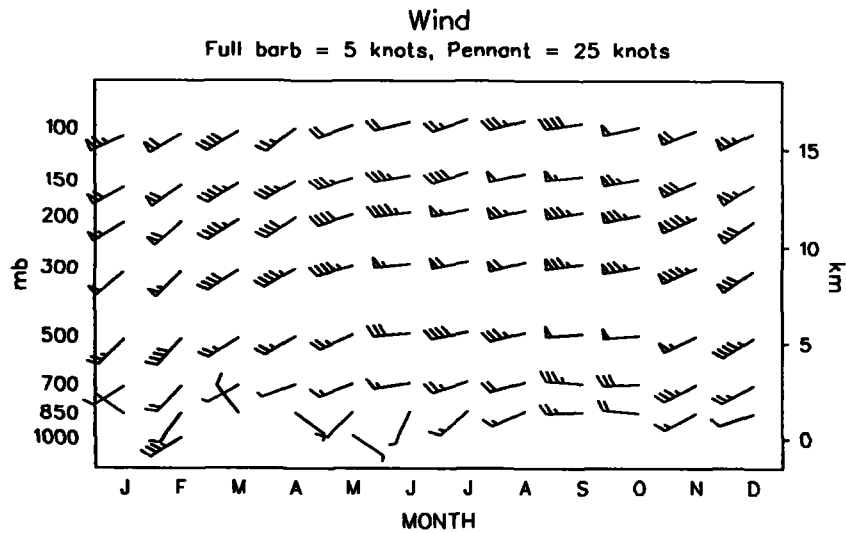
### OWS Study Area B Anomalies

### 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	-27	-247	26	173	46	37	-217	-129	-232	-179	114	-30	-35	-56	152	219	3	108	94	29	72	71	-141	-132	109	116	50	7								586	126	
F	-34	-336	70	-32	51	-10	123	-106	-172	-49	-49	-252	147	-188	304	57	-22	153	62	73	75	-71	-98	30	124	123	91	-62									580	136
M	16	196	-290	19	-77	-123	-119	-147	52	19	-180	-35	125	171	179	-97	51	139	-66	-109	72	158	-136	-95	8	129	89	51									537	126
A	-83	-216	-50	-144	-87	-98	-35	151	102	-79	82	-5	25	146	-65	270	-89	17	50	-132	100	-58	219	-32	-18	50	-27	6									362	111
M		40	-66	-46	16	-1	-65	-158	-136	-23	115	-94	72	-18	-27	126	48	69	5	64	-82	133	-39	78	-73	115	-55										297	81
J		-226	22	-82	-44	7	4	-111	-43	110	5	-44	-39	-10	141	209	88	-26	60	47	-61	-36	-24	-19	169	-51	-82										249	92
J		32	-33	-116	-6	-64	52	-79	-85	3	47	89	-8	88	74	18	123	48	58	-11	35	116	-150	-112	-17	-54	-50										220	74
A		-25	2	65	-68	-13	-68	-82	100	-69	17	-56	-23	-45	28	-30	154	144	70	-45	-26	-46	-22	-29	69												253	67
S		-83	-17	71	37	-28	-72	-10	-3	-87	15	28	5	40	84	-8	91	83	-1	-50	-8	-21	3	-40	-35	2											271	49
O		-193	-32	-18	-3	-1	-25	-64	-141	-122	-130	84	110	9	52	161	119	91	141	30	-27	-5	2	-85	23	23											365	90
N		-158	-92	88	-82	42	-94	-138	-7	-111	-1	-57	127	52	68	25	55	-2	31	161	-95	72	170	-173	-7	77	47										440	96
D		-109	69	77	52	-86	-86	-140	-34	-38	10	-41	-2	169	22	55	36	30	-57	11	-55	64	-1	13	49	-7											536	68
Ann		-112	-20	-15	8	-44	-49	-72	-74	-29	-8	-13	33	33	75	91	35	75	54	-6	13	41	-49	-32	32	47	2									391	49	

OWS Study Area B Anomalies

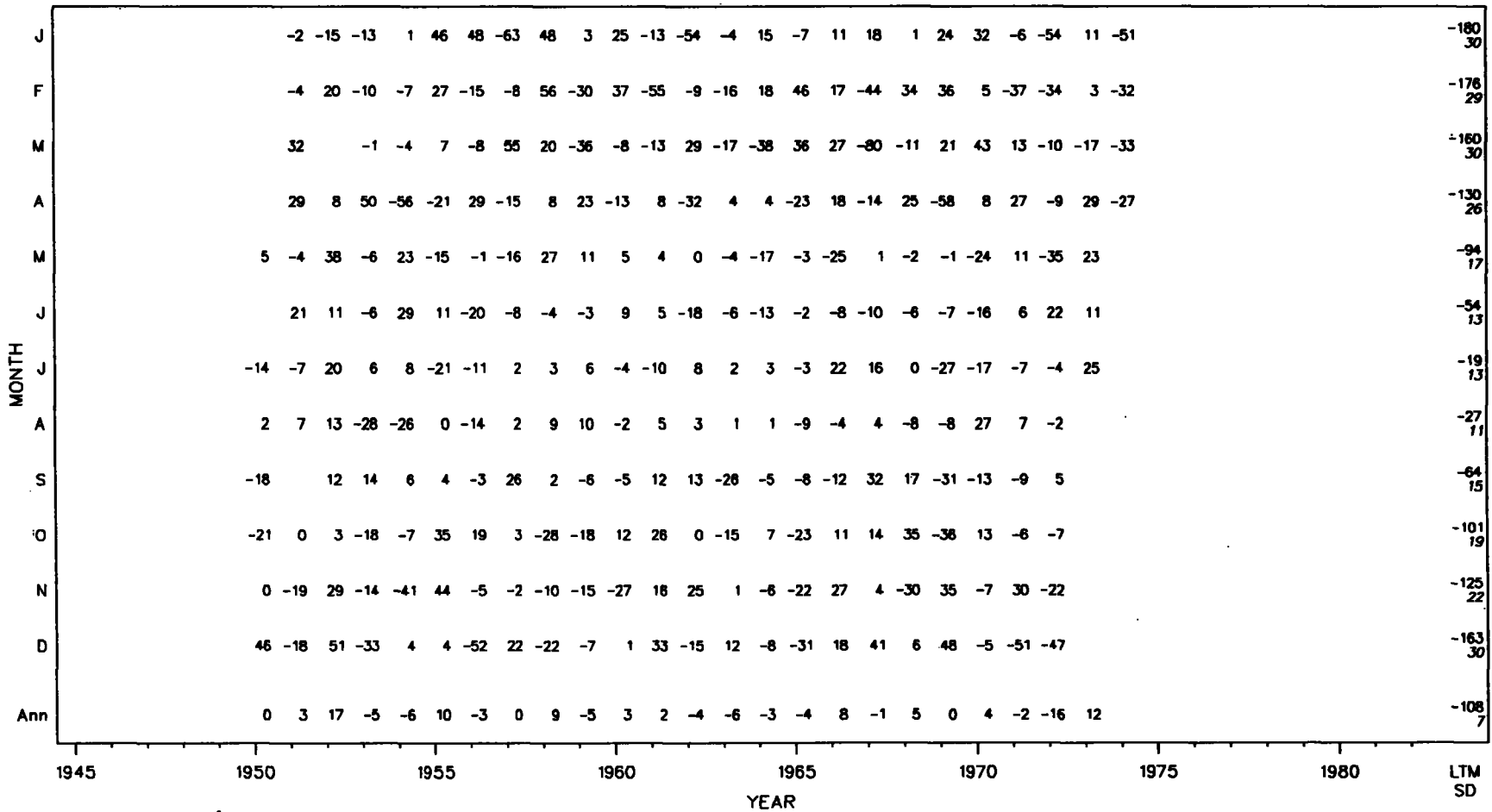


## OWS Study Area B Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

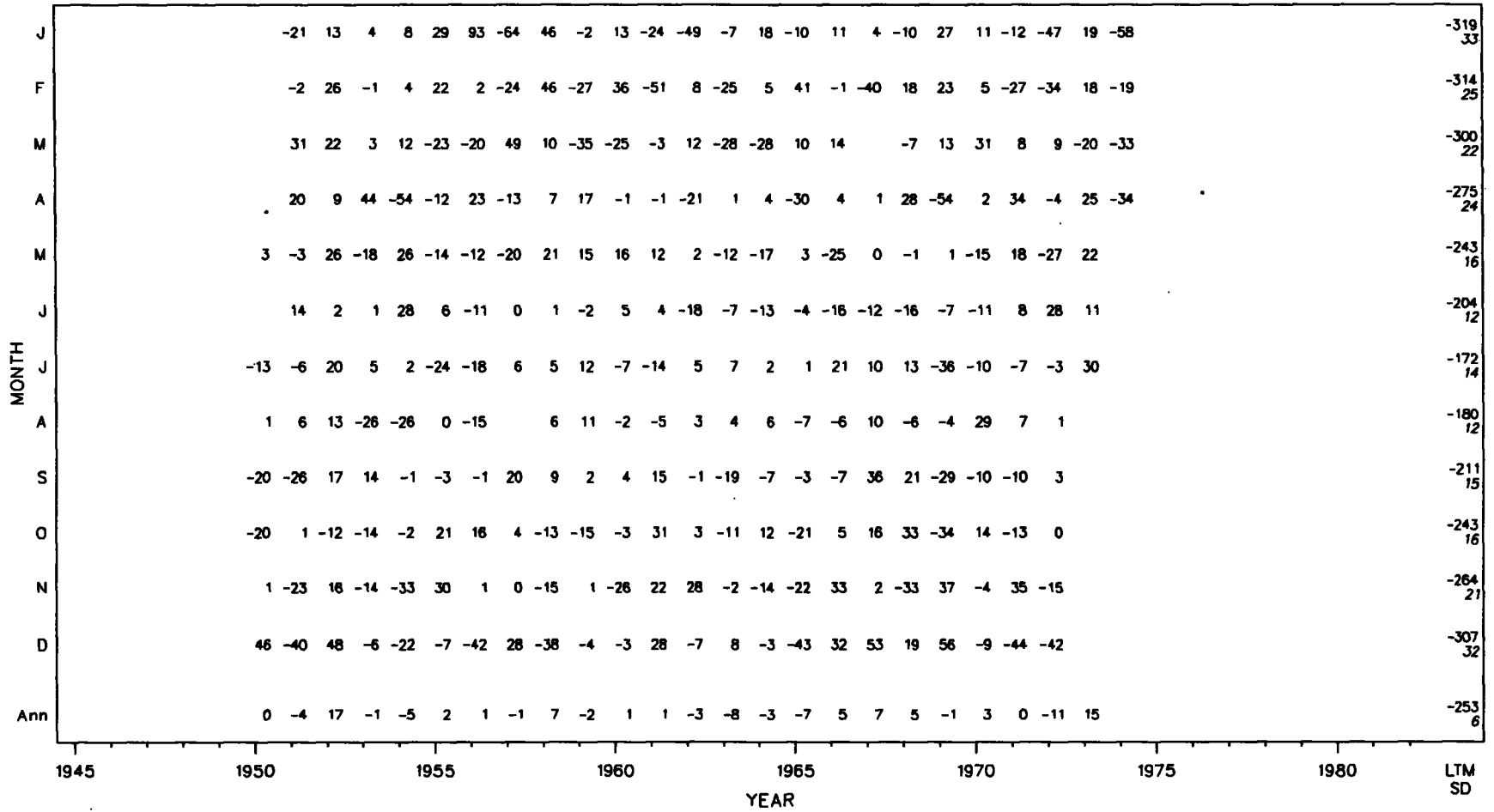
Units = 0.1 °C



OWS Study Area B Anomalies

Air Temperature: 500 mb

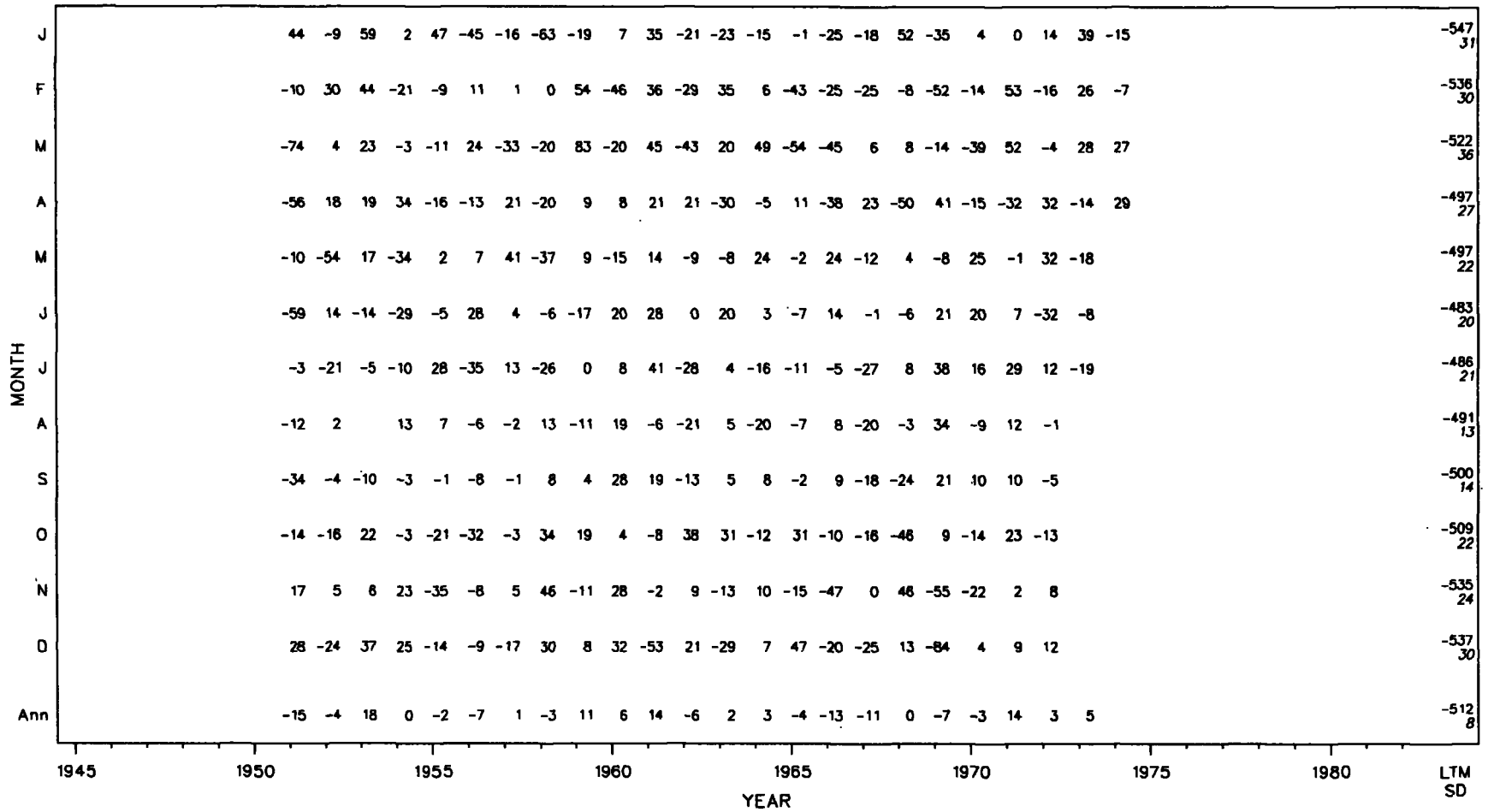
Units = 0.1 °C



OWS Study Area B Anomalies

Air Temperature: 200 mb

Units = 0.1 °C

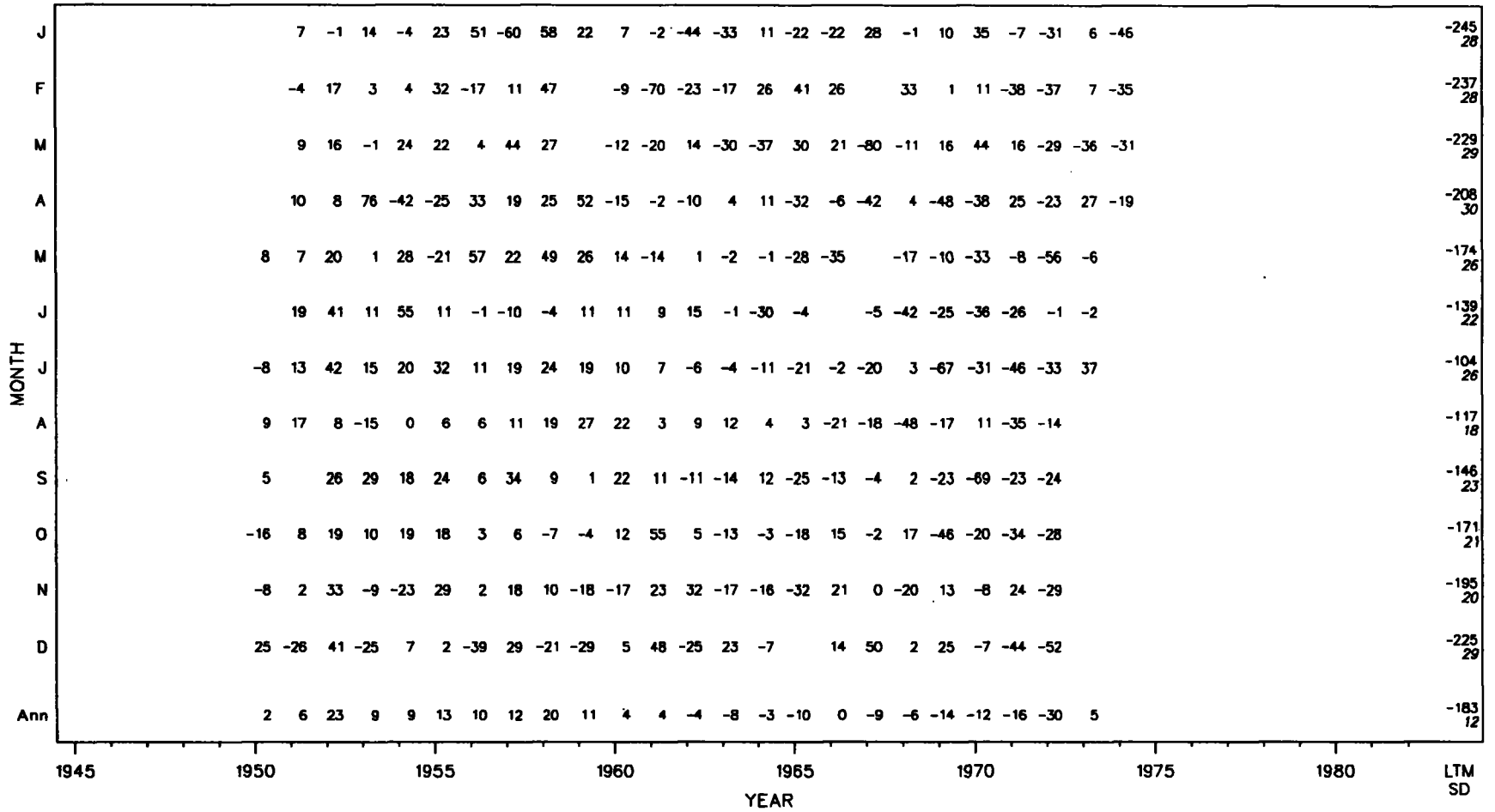


OWS Study Area B Anomalies



### Dew Point Temperature: 700 mb

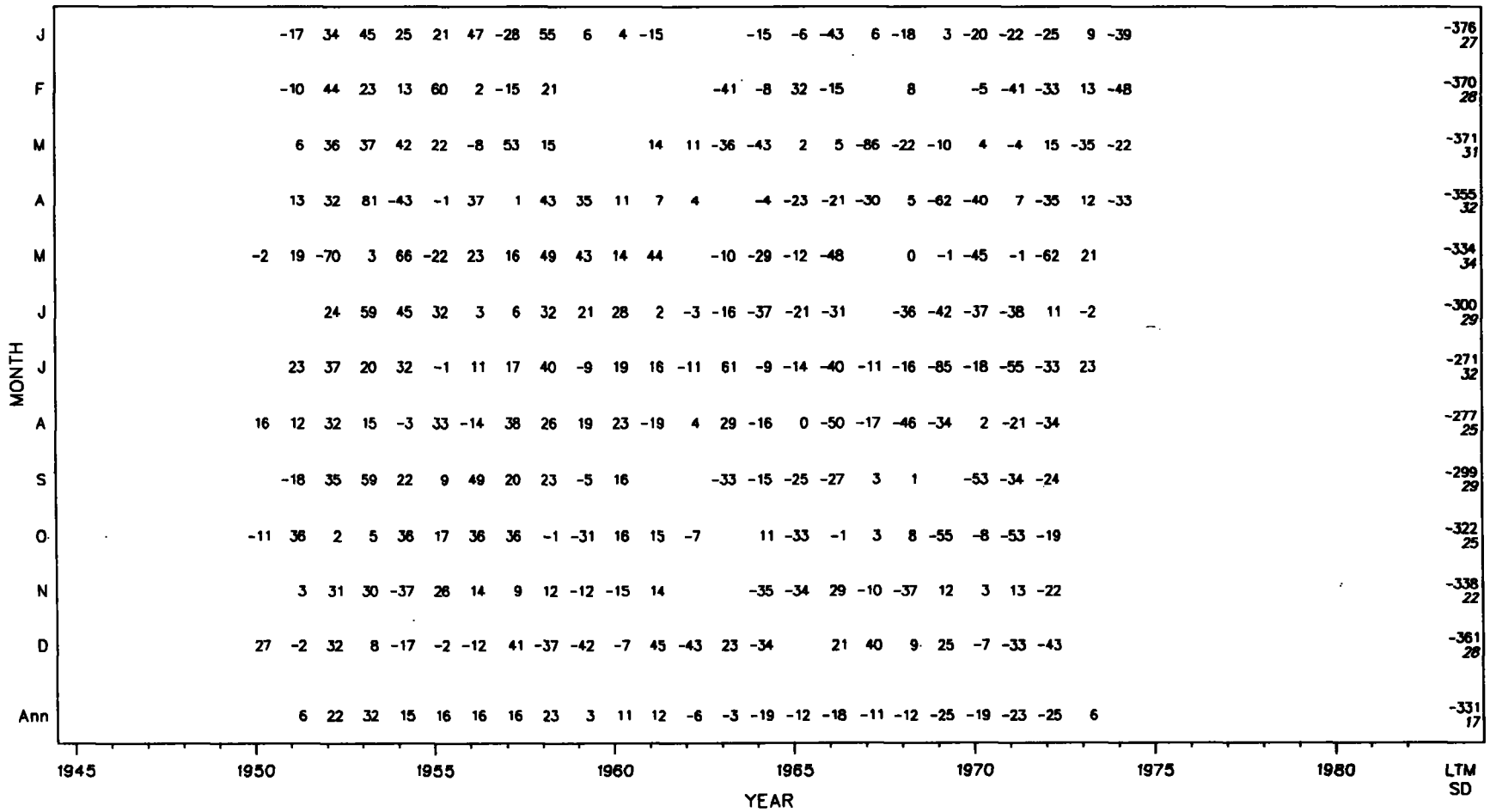
Units = 0.1 °C



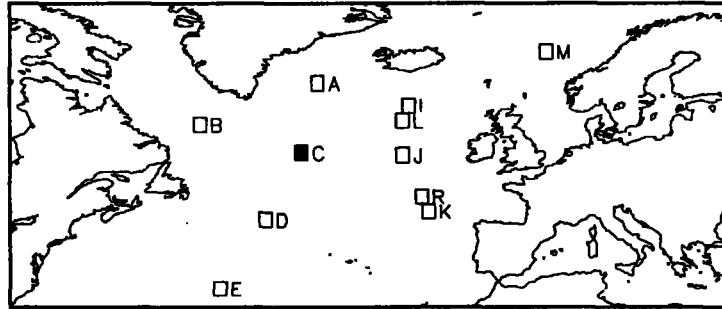
### OWS Study Area B Anomalies

### Dew Point Temperature: 500 mb

Units = 0.1 °C



### OWS Study Area B Anomalies



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

**OWS**  
**C**

J	31	31	30	27	28	31	27	31	29	29	31	25	31	27	31	30	30	31	31	28	31	28	31	31	30	31	26	26	31	4	31	31	920					
	31	31	30	27	28	30	27	31	29	29	31	25	31	27	31	30	30	31	31	28	31	28	31	31	30	31	26	25	31	4	30	31	917					
F	28	28	29	28	25	27	29	28	28	28	29	28	28	28	29	28	28	16	29	28	28	28	29	28	28	25	25	27	28	29	28	28	878					
	26	28	29	28	25	27	29	28	28	28	29	28	28	28	29	28	28	16	28	28	28	28	29	28	28	25	25	27	28	29	28	28	876					
M	31	31	30	26	31	23	31	31	31	31	31	31	31	29	31	31	31	2	31	31	31	31	31	29	28	15	25	31	31	31	31	920						
	31	31	30	26	31	23	31	31	31	31	31	31	31	29	31	31	31	2	31	31	31	31	31	29	28	14	25	31	31	31	29	916						
A	30	30	30	30	30	30	30	30	30	30	30	24	30	30	30	30	30	30	30	30	30	30	30	30	29	19	26	30	30	30	30	938						
	30	30	30	30	30	30	30	30	30	30	30	24	30	30	30	30	30	30	30	30	30	30	30	30	29	18	26	29	30	30	24	927						
M	31	31	31	31	31	31	31	28	31	31	26	31	31	27	30	31	31	31	31	31	30	31	29	30	30	29	31	29	31	31	969							
	31	31	31	31	31	31	31	28	31	31	26	31	31	25	29	30	31	31	31	30	31	31	29	30	30	29	31	29	31	25	967							
J	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	30	30	30	30	30	30	30	30	30	25	25	29	30	30	30	30	948						
	30	30	30	30	30	30	30	27	30	30	30	30	30	30	29	30	30	30	30	30	30	30	30	30	25	25	29	30	28	29	27	937						
J	31	30	31	31	31	31	31	31	31	27	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	30	21	31	30	31	31	975						
	30	30	30	31	31	31	31	30	31	27	30	30	31	31	31	31	31	31	31	31	31	28	31	31	30	29	16	29	30	31	26	951						
A	31	31	31	31	28	31	31	31	31	31	31	31	27	31	31	31	31	31	31	31	31	31	31	30	30	31	29	31	31	31	31	981						
	30	30	31	31	28	29	30	31	31	31	31	31	27	31	30	31	31	31	31	31	31	31	30	30	29	29	31	28	31	31	30	25	961					
S	30	30	30	27	30	30	26	28	28	30	30	30	30	29	30	28	30	29	30	30	30	30	29	25	26	25	23	30	29	26	22	910						
	30	30	30	27	30	29	26	28	28	30	30	29	30	30	29	28	30	29	30	30	30	30	29	25	26	25	23	30	29	26	16	901						
O	31	31	31	31	31	31	31	29	30	26	31	31	31	31	31	31	31	31	31	28	27	31	31	28	31	29	22	30	30	31	31	31	961					
	31	31	31	31	31	31	31	29	30	26	31	31	31	31	31	30	31	31	30	28	27	31	31	28	31	29	20	30	30	31	31	31	957					
N	30	30	30	30	25	30	23	28	30	27	30	30	30	30	30	30	29	29	30	30	30	30	20	30	30	29	14	20	4	30	29	30	937					
	29	30	30	30	25	30	23	28	29	27	30	30	30	30	30	28	29	30	30	30	30	20	30	30	27	14	20	4	30	29	30	932						
D	30	30	31	31	31	27	31	31	26	31	31	31	28	30	31	31	31	31	31	30	31	31	29	30	31	21	6	25	31	1	16	31	947					
	30	29	31	31	31	27	31	31	26	31	31	31	28	30	30	31	31	31	31	30	31	31	29	30	31	20	6	24	31	1	16	31	942					
Ann	60	362	364	364	353	351	352	351	356	355	351	361	353	358	354	363	364	361	323	365	357	361	362	353	359	354	335	268	310	35	334	319	361	355	11284			
	59	359	363	363	353	351	348	346	355	354	350	357	351	358	351	360	360	360	323	363	357	358	361	352	357	352	328	263	301	35	331	317	358	320	11174			
	1945				1950					1955					1960					1965							1970				1975				1980			Sum

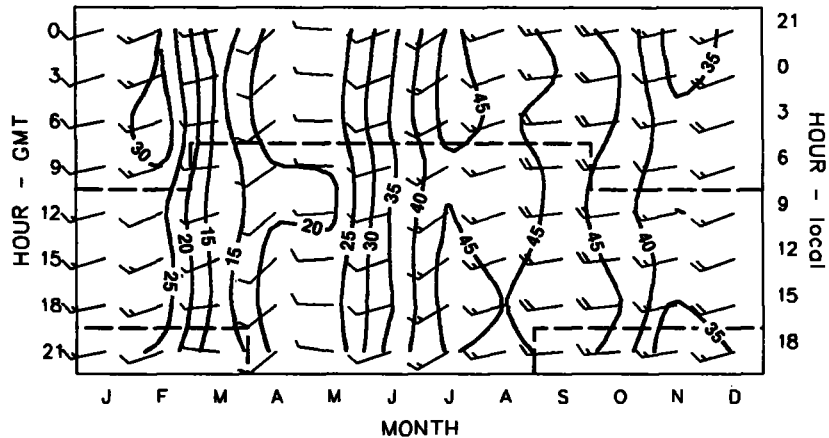
## OWS Study Area C (52.8°N, 35.5°W)

### 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.

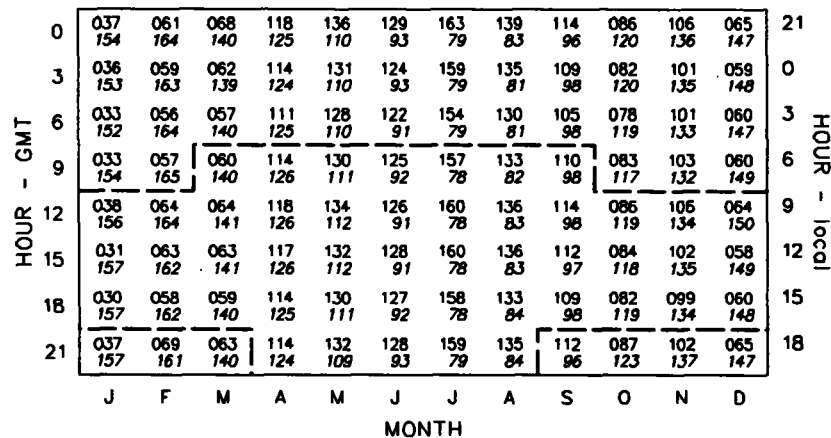
### Wind

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



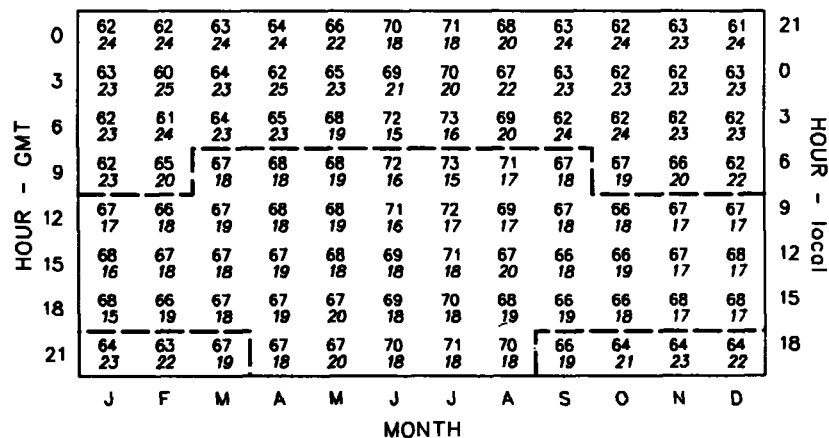
### Pressure

Units = 0.1 mb



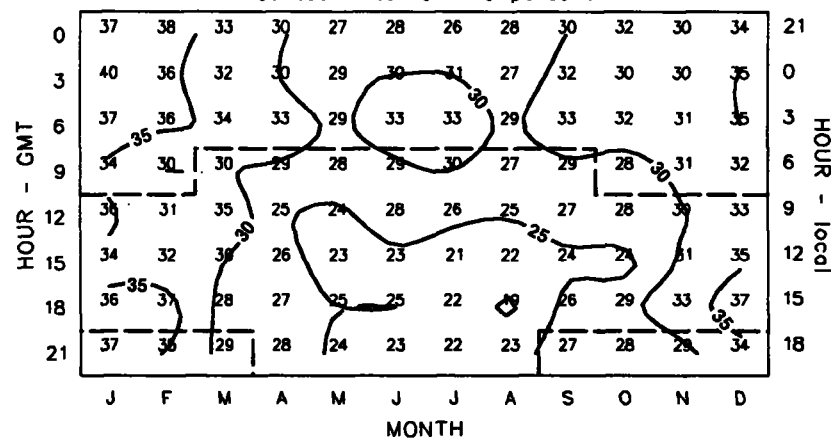
### Total Cloudiness

Units = 0.1 okta



### Precipitation Frequency

Units = percent  
Contour interval = 5 percent

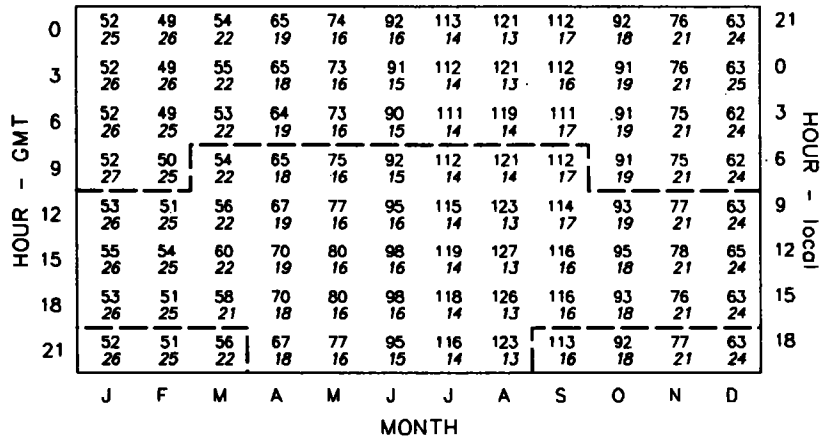


## OWS Study Area C Surface Climatology

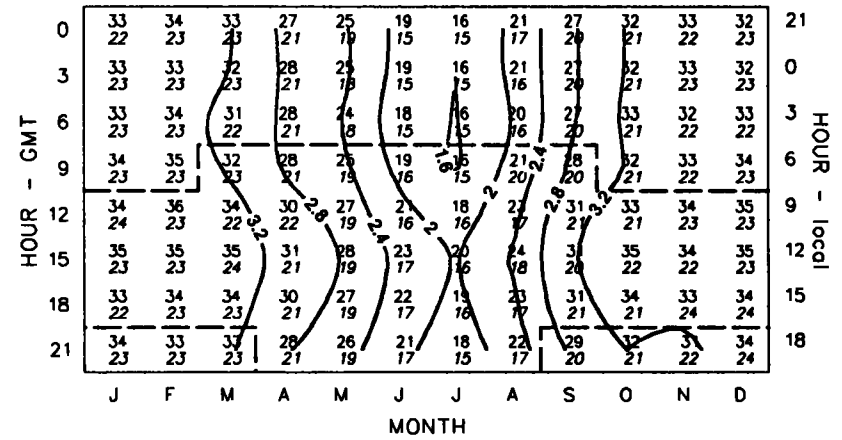
upper number = mean  
lower number = standard deviation

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

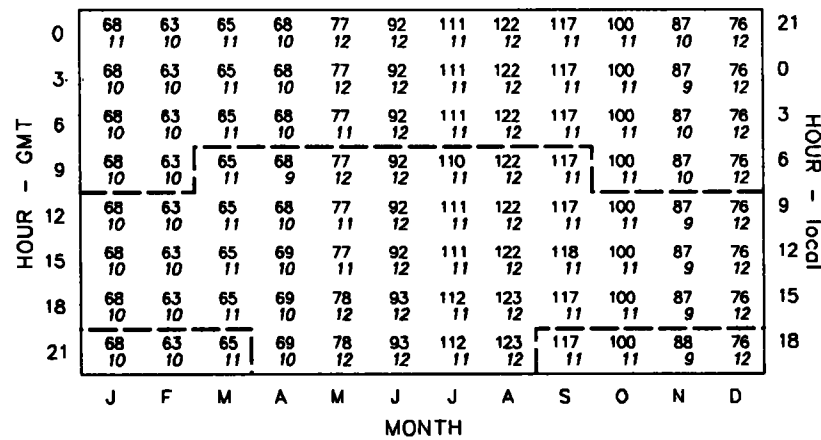
Air Temperature  
Units = 0.1 °C



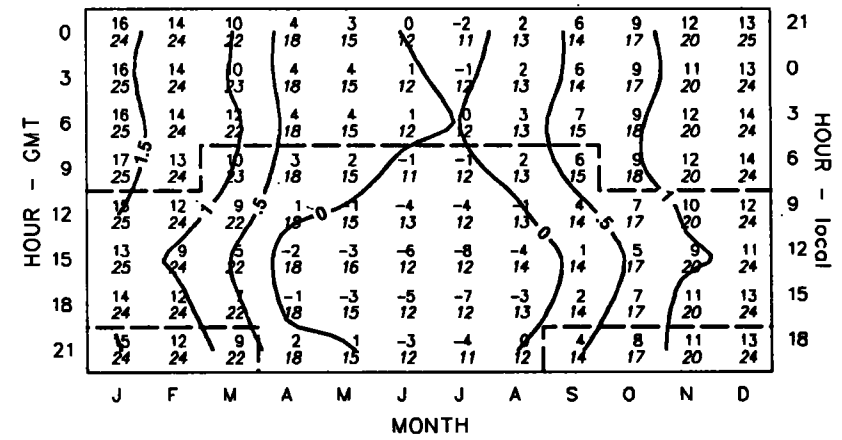
Dew Point Depression  
Units = 0.1 °C  
Contour interval = 0.4 °C



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

Surface Air Temperature  
 Units = 0.1 °C

J	-7	-25	-7	-9	-28	-5	-2	20	-2	12	16	-25	2	8	-3	-10	-13	12	11	7	5	23	8	-1	7	-5	-20	-6	-4	11	18	8	53	
F	16	1	-7	-16	-23	-14	9	16	0	6	24	-8	15	-15	3	-18	12	1	10	26	10	-8	6	10	-1	-3	-17	0	1	-2	-10	-24	50	
M	6	0	-11	17	-3	-8	0	7	2	15	-3	3	8	-20	-10	-4	9	-2	1	11	10	-13	2	14	22	7	-2	-10	-7	-9	-10	-18	55	
A	18	-16	-16	-4	-4	2	-8	7	-7	12	14	-4	4	-6	-2	1	0	2	0	10	2	11	-4	-5	9	-8	-5	4	4	-5	6	-10	66	
M	5	-10	-9	-5	7	6	-2	23	5	7	3	-1	7	0	-3	1	4	1	-6	10	-4	0	3	2	-4	0	-18	-1	5	-5	-10	-13	76	
J	-1	-15	-8	-5	11	17	19	13	6	4	-3	6	10	-6	-5	1	-3	3	11	0	-6	-2	-7	0	-9	5	-21	-2	7	3	-3	-20	94	
J	-12	-20	2	-5	-7	12	27	4	13	0	1	1	10	-6	-1	5	3	-5	7	1	8	-4	0	-5	-7	4	-11	-3	1	-8	-2	-5	114	
A	-7	-17	-3	-1	-9	3	23	-2	8	4	6	12	13	3	4	0	-5	-6	-2	0	14	-7	0	-4	-4	-1	-5	-6	-2	-8	3	-5	122	
S	-7	-10	2	5	-7	1	36	5	8	6	4	13	4	4	-4	-5	-6	-5	5	-2	10	-9	-6	-3	-2	-10	2	-4	1	-9	-6	-13	113	
O	1	-1	4	-4	-10	-2	15	-2	0	18	10	7	1	-12	2	-7	5	-2	3	4	9	-5	1	-8	0	-1	5	0	-8	-7	1	-19	92	
N	4	1	2	-3	-3	-13	0	12	-8	-4	17	14	-1	0	-9	-7	4	6	-6	9	3	17	10	-7	-4	-8	9	-8	8	-15	-12	4	8	-21
D	6	-9	11	-9	-11	4	-12	19	-5	1	10	-13	2	-6	-15	-3	12	10	3	3	-4	14	23	-5	10	9	11	-31	13	-3	-11	-1	1	-24
Ann	0	-8	-5	-3	-7	0	12	7	2	9	6	1	6	-6	-2	-2	2	0	4	6	7	2	-1	1	1	1	-11	-1	-2	-3	0	-14	81	
	1945																																	LTM
																																		SD

OWS Study Area C Anomalies

# Surface Dew Point Depression

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	1981	1982	LTM	SD
J	-10	-11	-2	4	-3	3	2	-4	3	1	-1	10	-1	3	-1	4	8	-2	-2	-2	-5	-6	3	6	5	-4	1	-2	1	5	-4	1	34	5						
F	-5	-9	3	-2	8	-12	-8	4	3	1	3	0	-8	9	1	10	-7	8	-4	-17	-2	12	7	1	-3	5	7	0	-6	-10	12	4	34	7						
M	-1	6	0	-17	-3	2	-8	9	-5	2	12	3	0	13	12	-3	-3	-3	0	1	3	13	-1	-7	-12	-2	-16	-4	0	2	6	1	32	7						
A	-7	5	-1	-1	0	1	4	3	6	3	-6	2	3	-4	0	-2	4	0	0	5	8	-10	10	5	-3	7	-4	-7	-8	-1	-9	-4	28	5						
M	0	-8	-7	5	-4	-8	-3	10	-4	11	4	1	6	-7	-1	-7	-1	2	3	-4	10	0	1	4	7	-3	5	1	-5	-6	1	-2	26	5						
J	-1	-7	-2	-5	-3	2	-3	2	-4	0	3	6	5	4	-3	2	7	-4	-2	3	2	2	5	2	3	-4	2	3	-4	-6	-8	1	20	4						
J	-2	-7	-2	-8	2	-2	-1	6	2	4	4	-3	7	-3	0	-1	5	6	7	2	-12	6	-5	10	-2	3	-4	0	0	0	-2	-8	17	5						
A	-4	-5	3	2	-9	-3	0	5	10	4	8	-3	0	7	-7	3	1	0	-1	1	9	-2	0	-5	-1	-4	-6	3	-1	-2	0	-1	22	5						
S	1	-6	-7	-4	4	-6	-2	-2	4	-2	1	-5	2	8	2	0	2	-4	2	2	-7	-3	2	-2	3	9	-3	-2	0	2	7	4	29	4						
O	-10	-9	-3	-5	2	4	2	1	11	1	-4	3	-1	5	-1	0	-3	3	4	0	6	-2	-8	3	-4	-3	-8	-2	2	2	11	2	33	5						
N	-13	-6	-9	-9	-3	3	6	-1	5	9	0	-1	4	7	5	1	-8	-6	8	-3	3	1	-2	4	4	6	-8	16	-14	-9	4	-3	8	7	33	7				
D	-2	-10	-3	-2	-6	-1	2	2	9	2	10	5	-7	13	7	-3	-1	-4	6	1	4	-1	-13	-1	-3	-3	-6	11	-5	-13	7	-5	3	8	34	7				
Ann	-5	-5	-3	-3	0	-1	-1	4	3	3	2	1	3	4	0	0	0	2	0	0	1	-1	1	1	0	-1	0	-2	-1	-2	2	1	29	2						

## OWS Study Area C Anomalies





### Sea - Air Temperature Difference

Units = 0.1 °C

MONTH	YEAR																								LTM	SD																			
	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	1981	1982	1983	1984	1985	1986	1987
J	8	22	11	-1	28	1	-7	-8	-11	-2	-11	12	1	-10	1	-1	14	-6	-8	-6	-5	-7	-1	-4	4	5	11	3	0	-13	-19	-3	15	10											
F	-14	3	1	13	17	8	-14	0	0	0	-4	1	-14	4	-2	2	-16	5	-5	-21	-4	18	0	-9	2	4	12	-17	1	-3	9	23	13	11											
M	11	1	4	-23	-7	9	1	16	-8	-3	6	11	-7	20	5	-12	-10	4	1	-1	-4	8	-2	-10	-17	-6	-6	-2	5	2	7	10	9	9											
A	1	8	12	1	-5	11	2	4	-8	-2	-11	12	2	0	-2	-8	2	-1	-2	-2	4	-14	6	4	-1	9	-4	-8	-2	-1	-7	2	2	6											
M	3	0	-4	-4	0	-10	-6	-6	-2	3	-8	0	13	-4	4	-8	-4	-5	3	-2	9	-2	-2	0	5	-1	2	7	5	3	6	5	1	5											
J	3	0	-4	1	-9	0	-2	3	-2	-1	-4	-13	-3	-2	-3	4	1	-2	-2	5	2	0	1	1	0	-1	3	14	3	2	-2	7	-2	5											
J	8	3	8	-2	4	-2	-18	-3	1	2	-5	-5	-1	1	-2	1	2	-1	-3	2	-7	1	-1	3	-3	2	-5	3	7	6	-1	4	-3	5											
A	-2	-2	8	-7	3	18	4	0	2	-1	1	-15	0	-6	-4	-3	4	-1	-1	-4	3	-1	5	-6	3	-4	-4	-1	4	5	0	3	0	5											
S	6	-2	-2	-14	6	-8	-3	-1	1	-10	11	-6	8	-2	-5	2	3	1	-1	3	-4	-1	3	1	2	1	-3	3	1	2	8	6	4	5											
O	1	0	5	0	4	-8	15	7	-8	-27	-8	1	-1	4	-5	-2	-2	2	1	2	-2	4	-1	1	-1	2	-4	0	5	0	8	4	8	7											
N	4	2	-3	6	-18	18	3	-2	10	4	-4	-14	1	3	2	2	-9	-5	10	-2	-7	-6	-10	2	-1	6	-7	8	-12	7	8	-5	4	6	12	8									
D	12	1	-13	12	-10	-16	11	-20	21	-2	-12	13	-1	4	3	0	-14	-6	-2	1	2	3	-16	0	-10	-9	-7	31	-8	-4	11	4	14	5	14	11									
Ann	2	1	5	-5	4	3	-4	3	-3	-5	-3	0	0	1	-1	-4	-1	0	-1	-2	-1	-2	1	-3	-1	0	3	-1	4	0	2	6	6	3											

OWS Study Area C Anomalies

### Surface Scalar Wind

Units = 0.1 m/s

MONTH																									LTM SD											
J	11	10	-1	-7	-14	-2	-10	-18	11	25	-11	27	-11	-9	0	13	19	-11	25	19	-8	-10	-10	-17	-17	2	22	1		-22	-4	-10	8	123		
F	-9	-24	5	14	1	-8	-17	-4	-7	-7	18	5	-21	31	-19	11	6	-19	-5	-12	-20	30	-14	-32	3	14	14	12		-3	16	2	38	117		
M	-6	5	15	0	3	-15	-3	-8	-18	-9	3	6	23	14	1	-7	-14	17	5	-31	-12	26	19	-21	-10	-1	-19	-3		-7	2	23	23	112		
A	2	6	1	8	-5	-10	8	-7	8	21	-25	10	10	5	-1	-10	-5	-6	11	-1	3	1	11	9	-3	-15	-12	2		-8	-8	2	-2	99		
M	0	12	-6	-8	-16	-3	-16	7	15	7	12	19	-16	-13	7	-12	3	-5	-11	-2	6	3	-4	-6	-6	3	3	-13		7	17	10	4	86		
J	10	3	4	5	0	-3	-15	17	10	11	-1	-2	0	6	-3	5	-5	-1	-12	-14	6	-7	0	1	-1	0	-6	1		-5	-8	6	-5	79		
J	16	6	-10	0	-9	6	-2	5	-3	14	-15	-14	-7	-1	-4	-5	-9	3	17	-6	0	-15	-3	10	-2	-1	-10	10		12	7	15	-4	75		
A	-6	9	-13	5	3	-1	-10	18	-14	2	-16	-1	-6	0	9	2	13	-6	-5	-1	-17	1	-9	14	-1	0	6	15		-2	-1	9	4	82		
S	-13	-19	-12	-2	11	9	-21	9	-1	7	-8	-25	7	-1	13	17	20	4	-5	-4	-16	1	13	-12	1	7	7	-13		5	24	6	-9	97		
O	-12	0	-11	16	16	0	-3	6	2	-12	1	29	15	2	-13	9	9	9	-8	-8	-24	5	-12	1	-16	-1	-8	-1		14	-8	-6	4	109		
N	-22	2	7	-8	16	4	4	-27	7	9	17	16	-8	-5	13	31	-28	-2	-1	4	-10	-20	-16	15	-25	1	-5	9	-31		41	-3	4	-1	8	112
D	-19	25	-19	24	-17	-28	4	-23	3	1	-10	39	-6	5	27	23	-25	-3	-5	-10	9	-14	-14	-1	-14	6	-2	30	-22		3	34	12	-17	5	125
Ann	2	0	-1	2	-3	-2	-12	3	1	6	1	3	-1	6	4	-2	3	-2	1	-5	-10	0	0	-8	-4	0	3	-3		2	5	3	6	101		

### OWS Study Area C Anomalies

## Sea Level Pressure

Units = 0.1 mb

MONTH	YEAR																													LTM											
	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	1981	1982	1983	1984	1985
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							

OWS Study Area C Anomalies

### Total Cloudiness

Units = 0.1 okta

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	
J	-3	4	2	3	0	2	7	5	1	-2	2	-1	6	1	0	-1	-1	-1	-1	2	-1	1	-3	1	-3	-10	1	-2										64 4
F	2	-11	-5	0	4	5	12	2	3	-2	-7	0	-1	-4	-6	-1	0	-9	-1	-5	-3	1	-1	-3	3	6	1	4										64 5
M	1	-2	-2	9	5	-2	4	-2	-2	-8	-5	0	7	-2	-3	0	-8	1	2	-2	-6	-2	3	3	1	-3	8	3										66 4
A	2	-2	2	0	3	0	-4	3	-2	0	-5	-4	5	3	0	-2	-5	-7	0	-2	1	6	-1	-2	-1	4	3	4										66 3
M	3	5	6	-5	-7	-2	1	-2	-1	-2	0	-2	-4	1	0	3	1	-2	-2	2	-3	-2	1	-2	5	2	-2	4										67 3
J	-1	5	4	0	3	-3	2	3	-4	4	-1	-7	-3	1	1	0	-1	-2	3	2	2	-6	-1	1	2	0	0	0										70 3
J	1	6	4	6	5	-2	-8	1	0	-1	2	5	-5	0	4	-2	-2	5	-2	2	-4	-4	3	-1	-2	-1	-7	2										71 4
A	1	0	3	-2	0	0	-2	-5	-7	-4	-1	-2	2	-7	0	-4	3	3	3	-3	-2	2	-3	2	3	3	4	3										69 3
S	0	1	6	4	-1	4	-5	1	4	-2	-2	5	8	-5	-3	2	-7	2	-9	-4	-2	2	4	3	2	-9	-5	3										65 4
O	0	-1	-3	1	2	0	0	0	-4	-2	1	4	1	-4	-4	4	-3	1	-2	2	-3	-3	5	-2	4	1	3	-5										64 3
N	1	-3	1	-2	2	2	3	1	-3	2	-3	2	-4	-4	1	-1	4	5	-9	-3	-7	3	4	-5	2	4	3	5	3									65 4
D	-4	-2	-3	-5	3	3	2	1	-3	-3	-4	1	5	-5	-1	2	-1	-6	-4	1	-3	2	9	-5	3	-1	8	-1	5									64 4
Ann	0	0	1	2	2	1	1	0	-1	-2	-1	0	1	-1	-1	0	-2	-2	-1	-1	-1	1	0	0	1	0	1	2										66 1

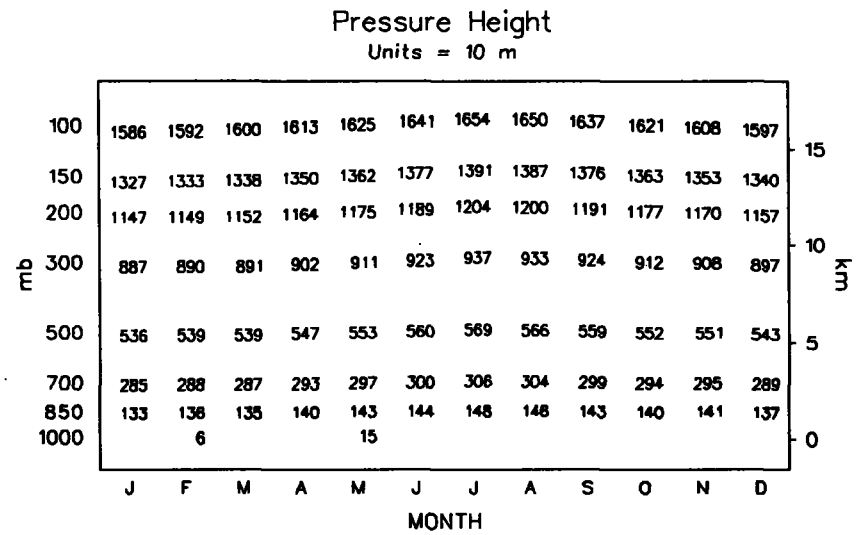
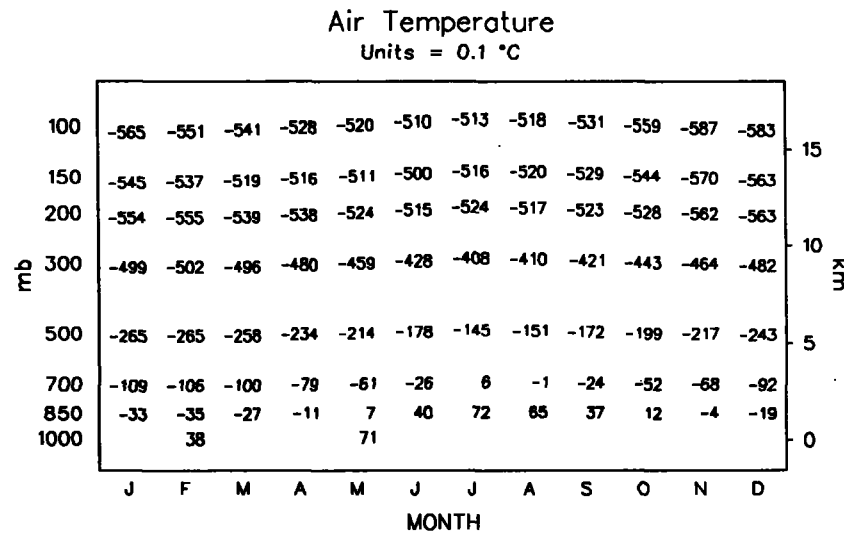
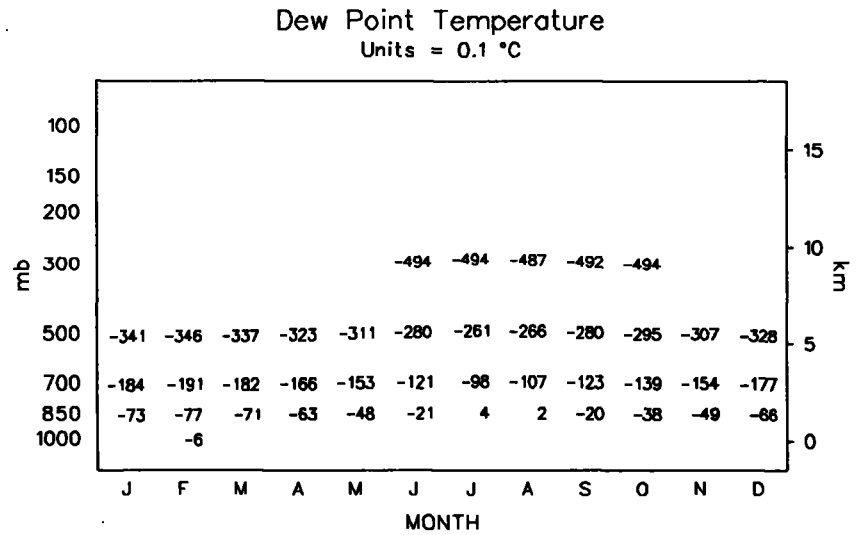
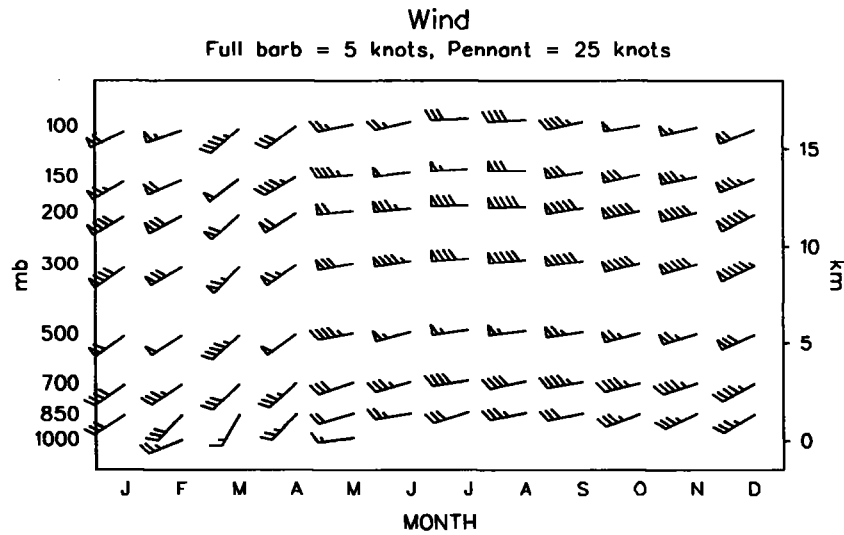
### OWS Study Area C Anomalies

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	1981	1982	LTM	SD
J	-100	-74	-129	-9	210	87	-67	-59	-11	31	-156	167	-25	-95	46	85	183	7	85	77	59	29	-7	-85	-113	4	17	-33	-110	-211	17	178	359	102						
F	-133	-204	4	104	55	99	-42	-67	-135	-146	-118	-31	65	221	-134	131	15	-138	12	-63	53	48	-73	-120	30	93	44	-26	79	96	-28	308	344	114						
M	-60	-188	-21	-62	-31	-144	0	-2	-82	-139	8	-66	123	98	-79	21	-77	179	230	22	-68	91	35	-29	-167	54	-50	32	41	-42	74	299	321	109						
A	-80	-123	21	-55	34	19	-64	-109	-28	-27	-170	70	-58	50	40	185	83	108	117	65	-13	20	-68	65	-15	-56	-1	-145	-12	-3	-22	174	290	84						
M	-33	-10	-21	-66	-99	-20	25	-62	-50	-41	-57	7	-132	20	85	55	148	70	58	98	-14	-87	62	-74	24	-90	66	-53	36	9	-35	182	265	73						
J	-117	-32	-4	43	-21	-115	-32	-12	-55	11	-29	-62	-64	-9	6	64	162	49	103	79	106	-38	11	-98	51	-78	-103	-48	-3	-31	-11	273	276	83						
J	-86	-68	-38	-18	12	-39	-97	-58	-44	-115	-65	13	-64	-25	-1	238	-34	118	-26	8	213	-4	31	-87	-23	37	-84	-82	52	31	99	204	265	90						
A	-169	11	18	-16	-49	-87	-31	-82	-80	25	-87	47	48	-68	56	106	61	20	-11	22	-61	57	-25	58	-50	-52	98	-50	-28	54	41	224	255	75						
S	-89	8	31	-96	-47	-42	-111	-3	-85	-136	25	1	-103	-18	-6	269	62	-7	60	101	15	-22	39	-66	-26	-89	-64	-69	85	58	15	312	291	97						
O	-69	-39	-54	37	20	-20	-28	-21	-110	-114	-70	27	-35	14	-44	137	107	137	23	71	-83	-45	111	-4	-44	22	-172	-22	54	92	-13	134	288	77						
N	-53	-43	-8	-3	-88	-111	-78	-172	-36	-96	-47	-60	-38	62	23	137	93	47	120	-33	46	-54	20	73	-142	-79	29	-97	-7	434	48	-41	27	126	316	108				
D	-168	-109	-129	-108	19	-95	-52	-119	-124	-112	-61	88	-52	-22	-29	207	103	103	44	-16	48	9	-49	-49	-127	-65	127	156	-80	-71	388	68	107	169	362	121				
Ann	-91	-71	-25	-17	-10	-33	-61	-53	-74	-63	-58	7	-17	15	26	124	72	59	50	48	14	2	12	-59	-40	0	-16	-49	52	7	23	215	303	67						

OWS Study Area C Anomalies

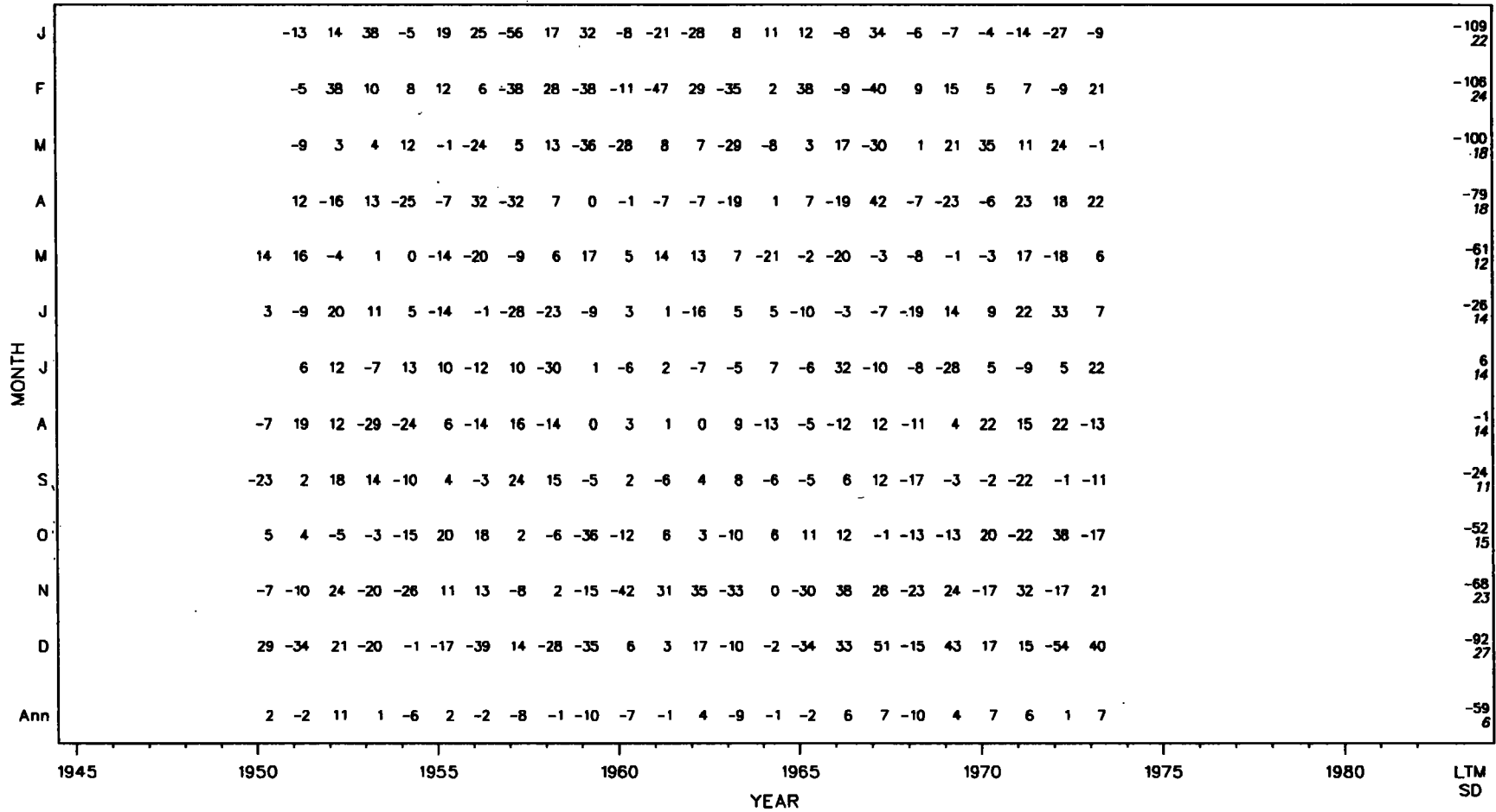


## OWS Study Area C Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

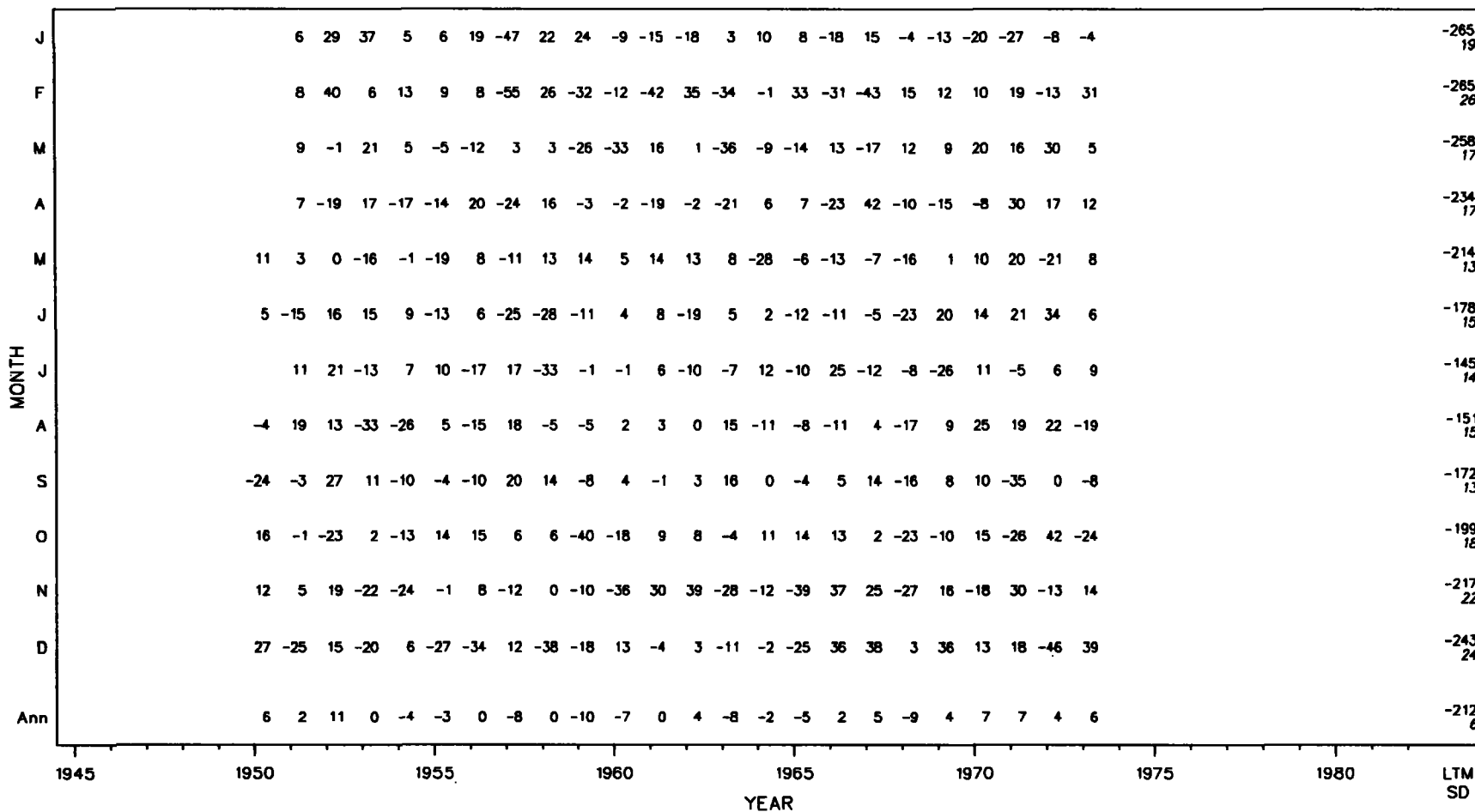
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OWS Study Area C Anomalies



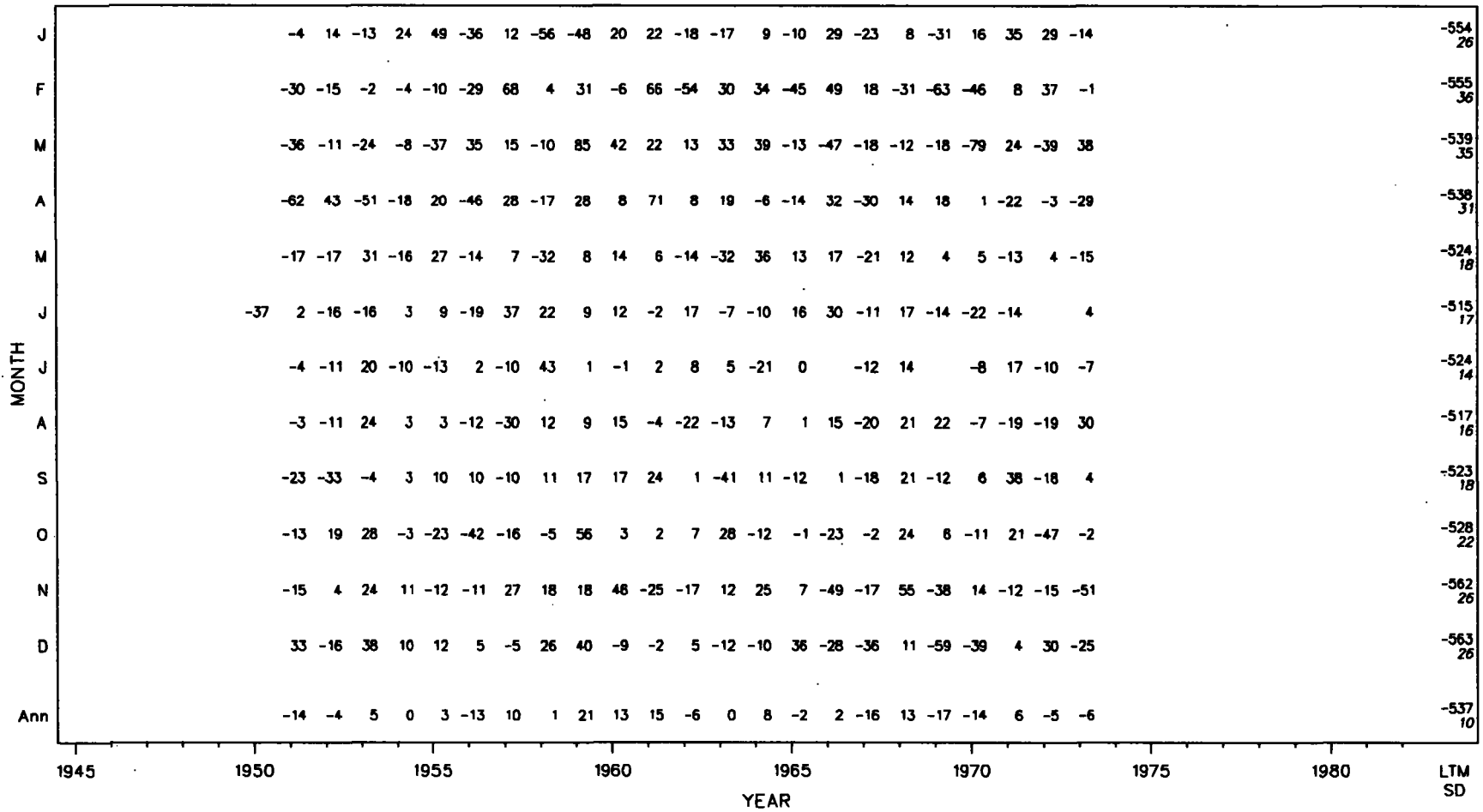
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Units = 0.1 °C



OWS Study Area C Anomalies

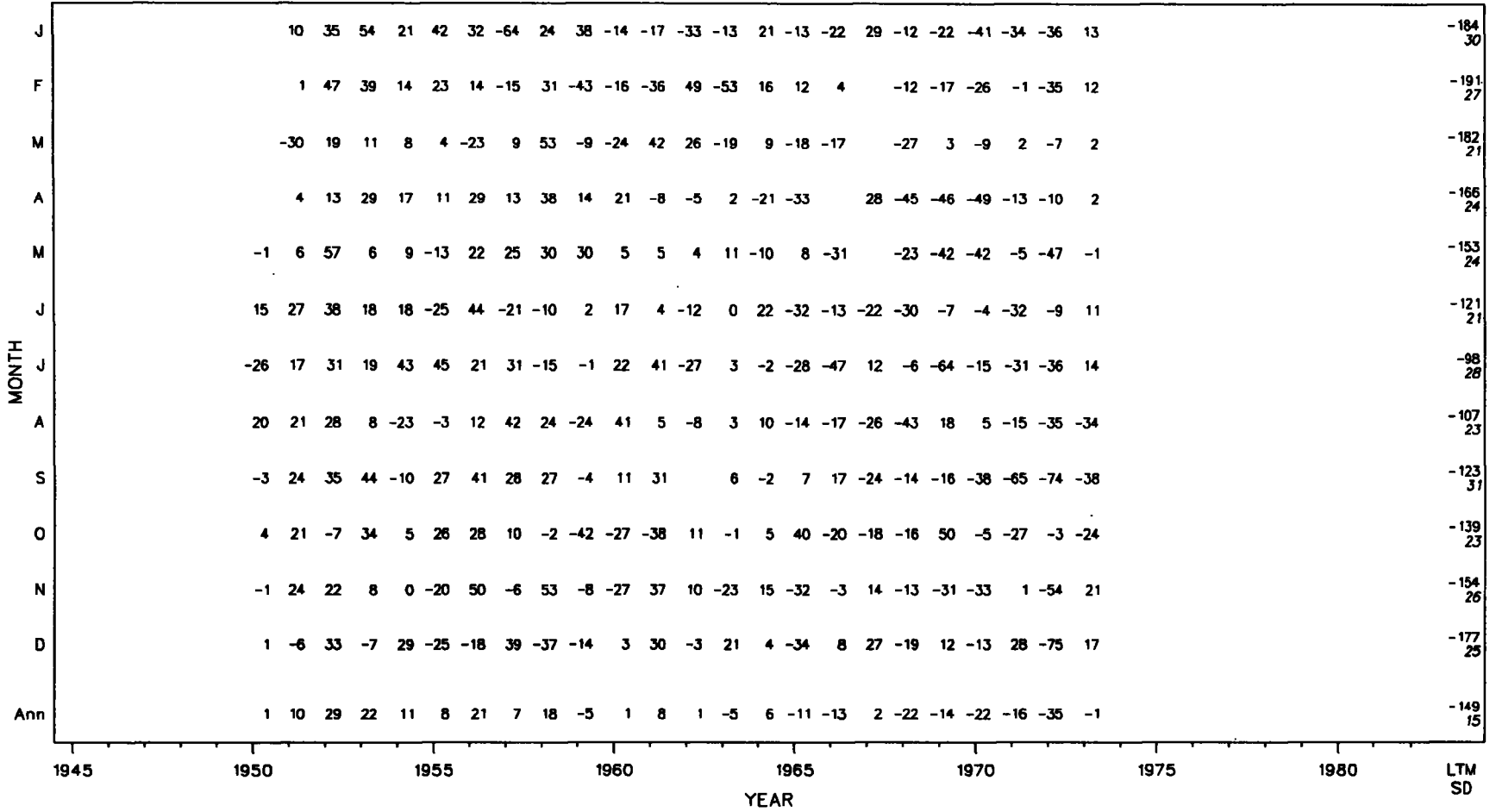
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Units = 0.1 °C



OWS Study Area C Anomalies

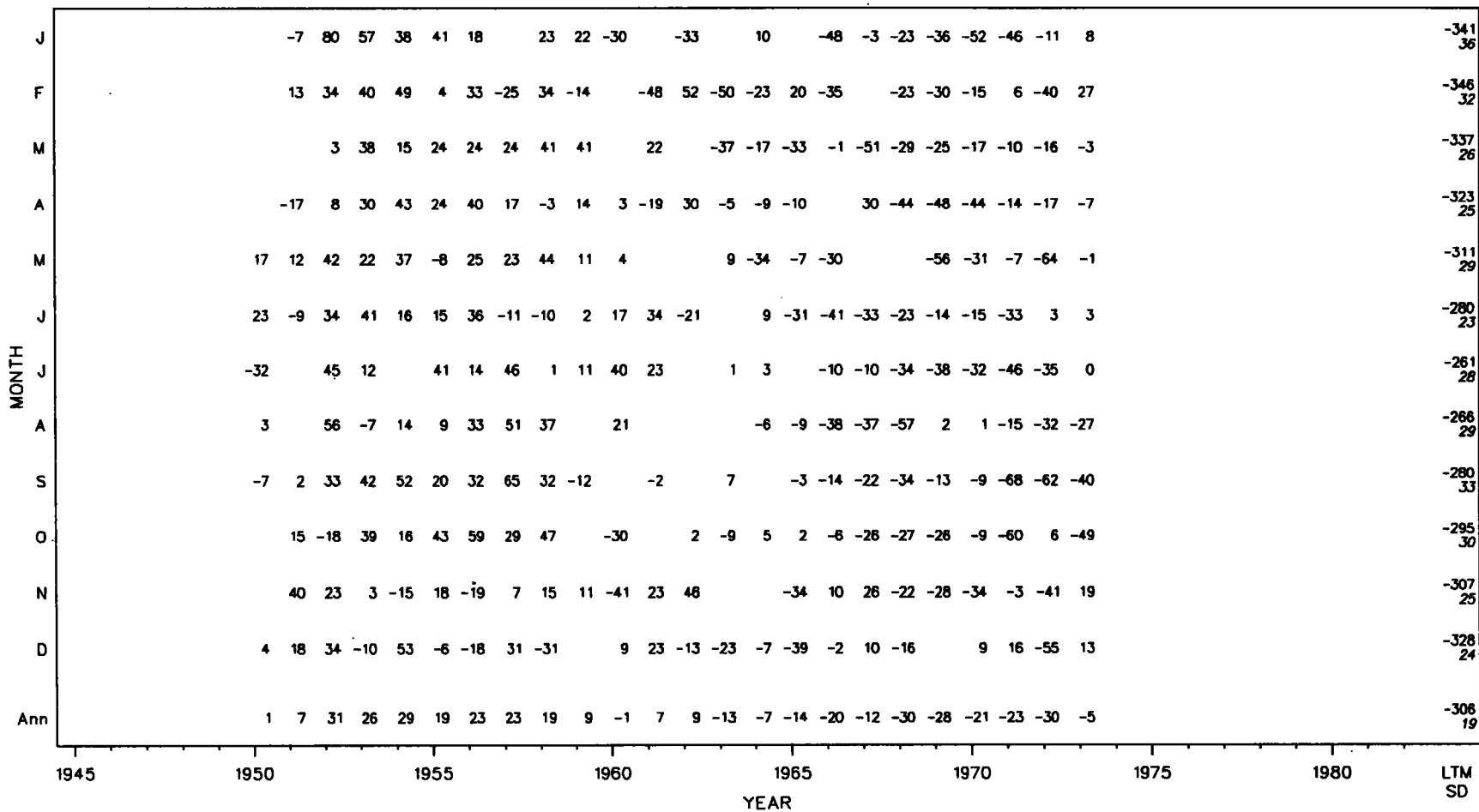
Dew Point Temperature: 700 mb  
Units = 0.1 °C



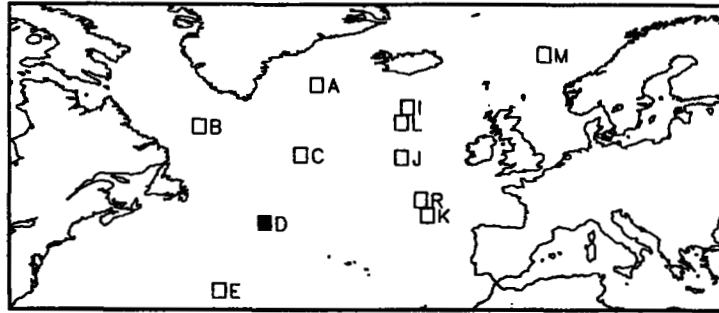
OWS Study Area C Anomalies

### Dew Point Temperature: 500 mb

Units = 0.1 °C



### OWS Study Area C Anomalies



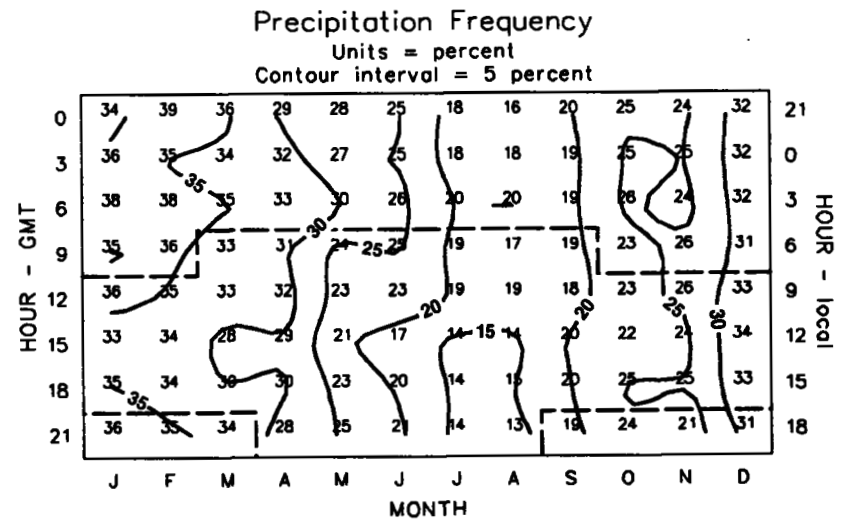
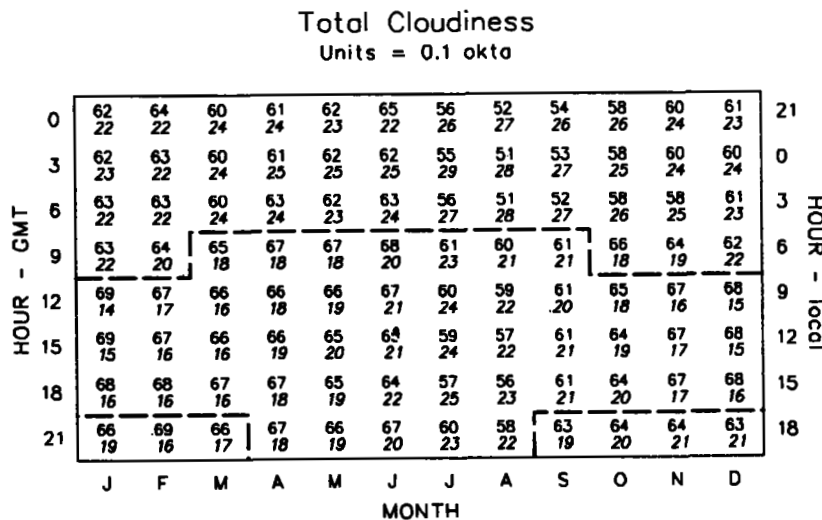
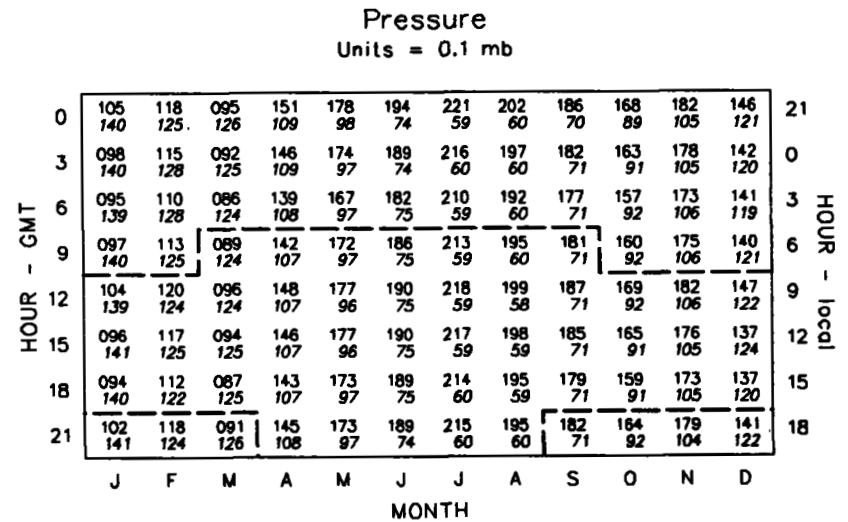
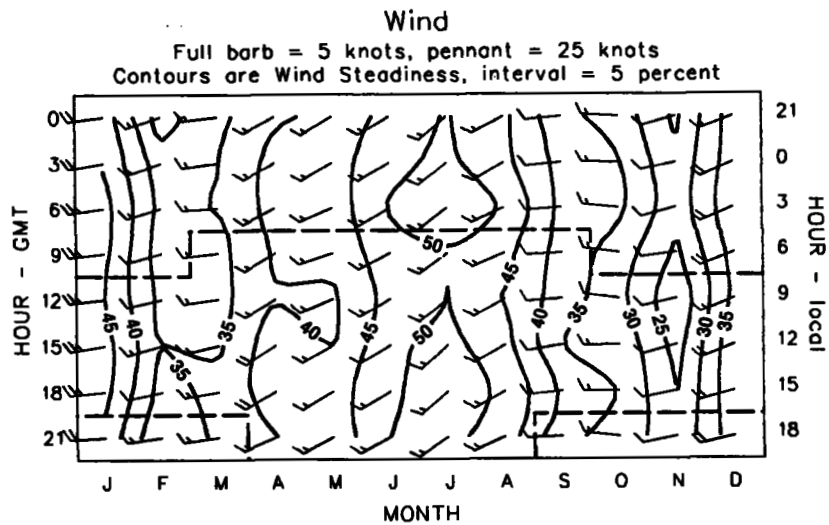
43.0°N - 44.9°N, 41.9°W - 40.0°W  
1945 - 1973

**OWS**  
**D**

MONTH	YEAR																								Sum
	1945	1950	1955	1960	1965	1970	1975	1980	Sum																
J	31 31	24 24	28 28	28 27	28 28	26 26	31 31	24 24	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	25 25	28 28	30 30	29 28	27 27	31 31	731 729	
F	28 27	20 20	26 26	29 29	25 25	28 26	25 25	29 29	27 27	28 28	25 25	29 29	28 28	28 28	29 29	26 26	27 27	28 28	29 29	27 27	28 28	25 25	27 27	676 673	
M	31 31	28 28	29 29	25 25	26 26	31 31	31 31	31 31	31 31	31 31	30 30	30 30	31 31	31 31	31 31	26 26	31 31	31 31	31 31	23 22	31 31	31 31	29 29	12 12	723 722
A	30 30	30 30	30 30	28 28	30 30	30 30	30 30	30 30	30 30	29 29	30 30	29 29	30 30	30 30	30 30	29 29	30 30	30 30	30 30	30 30	30 30	24 24	16 14	725 723	
M	14 14	31 31	31 31	31 31	30 30	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	23 23	13 13	730 730	
J	15 15	30 30	27 27	30 30	30 30	29 29	30 30	30 30	30 30	30 30	30 29	30 30	30 30	30 30	30 29	30 30	30 30	30 30	30 30	30 30	29 28	29 28	2 2	6 6	677 672
J		31 31	31 31	28 28	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 30	31 31	28 27	31 31	31 31	31 31	31 30	29 29	17 17	691 688	
A		30 30	31 31	31 31	31 31	29 29	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	29 29	31 31	31 31	31 31	31 31	31 31	708 708	
S		26 26	29 29	30 30	23 23	28 28	30 30	30 28	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	23 23	27 27	26 26	690 690	
O		31 31	31 31	31 27	31 31	31 30	31 31	31 30	31 31	31 31	31 31	31 31	30 31	31 31	31 31	31 31	31 31	31 31	31 31	28 28	31 31	27 27	29 29	729 727	
N		30 30	29 29	28 28	30 30	30 29	30 30	26 24	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 19	30 30	29 29	30 30	27 27	697 695	
D	1 1	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 29	31 31	31 31	31 31	31 31	31 31	30 30	31 31	31 31	31 31	31 31	27 27	26 26	30 30	18 18	719 719	
Ann	1 149 1 148	118 344 118 344	353 341 353 340	352 357 352 354	380 360 380 360	353 350 353 350	383 363 383 363	363 360 363 359	385 365 385 365	384 384 384 384	364 364 364 362	368 365 368 365	355 354 355 354	363 363 363 363	363 349 363 349	348 344 348 344	350 349 350 349	348 346 348 346	280 280 280 280	105 103 105 103	8496 8476				

## 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.



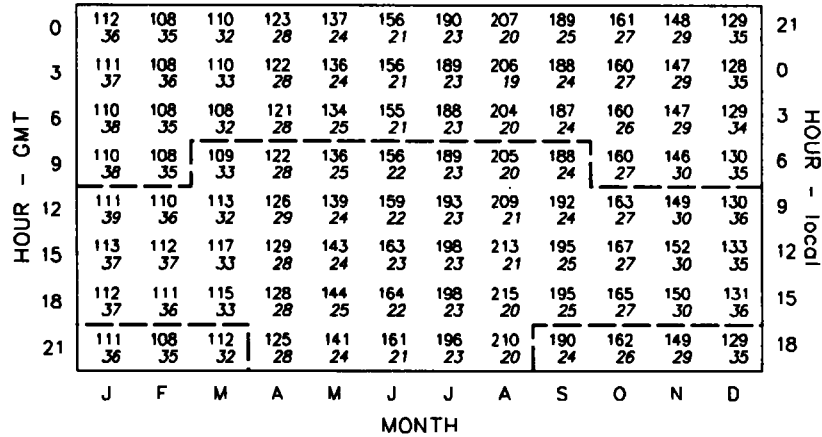
## OWS Study Area D Surface Climatology

upper number = mean  
lower number = standard deviation

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

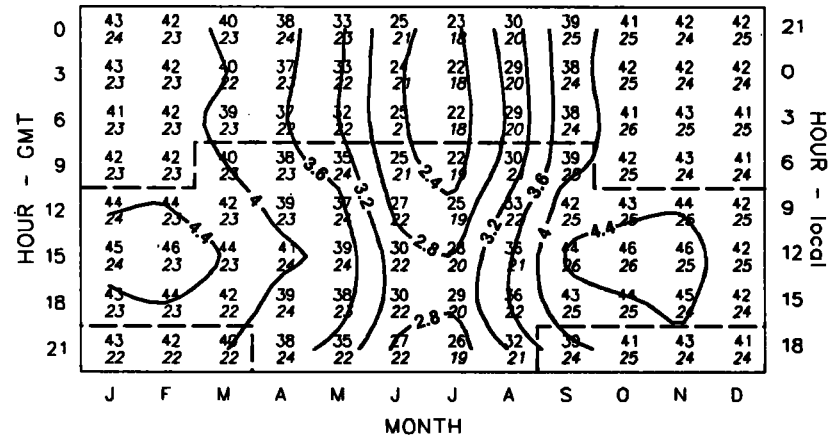
### Air Temperature

Units = 0.1 °C



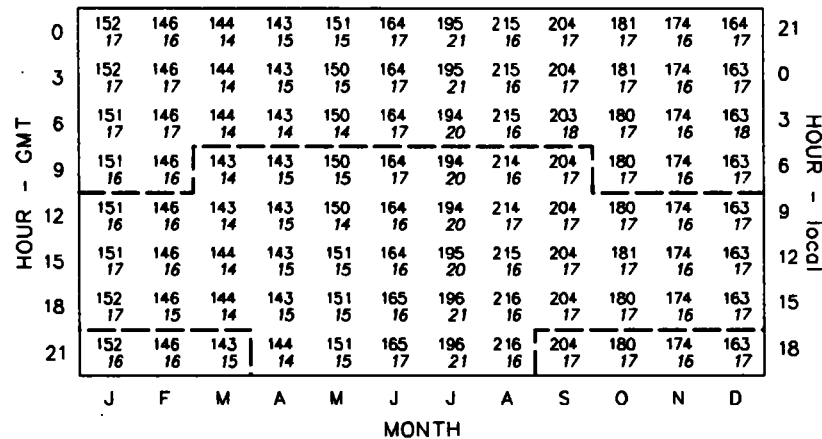
### Dew Point Depression

Units = 0.1 °C  
Contour interval = 0.4 °C



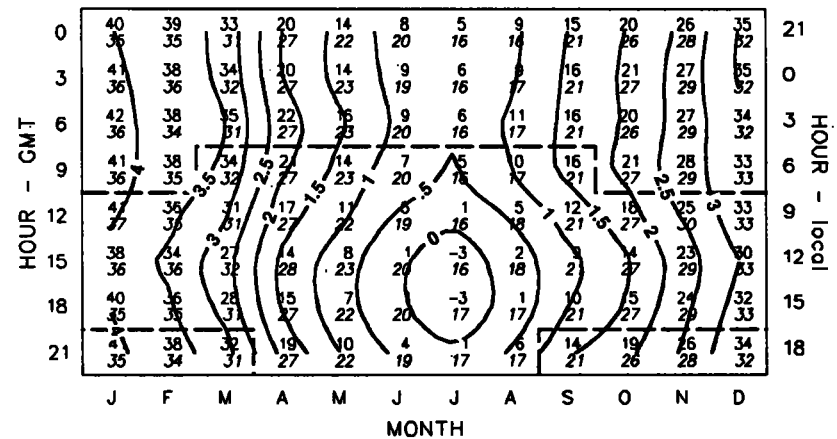
### Sea Surface Temperature

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



### Surface Air Temperature

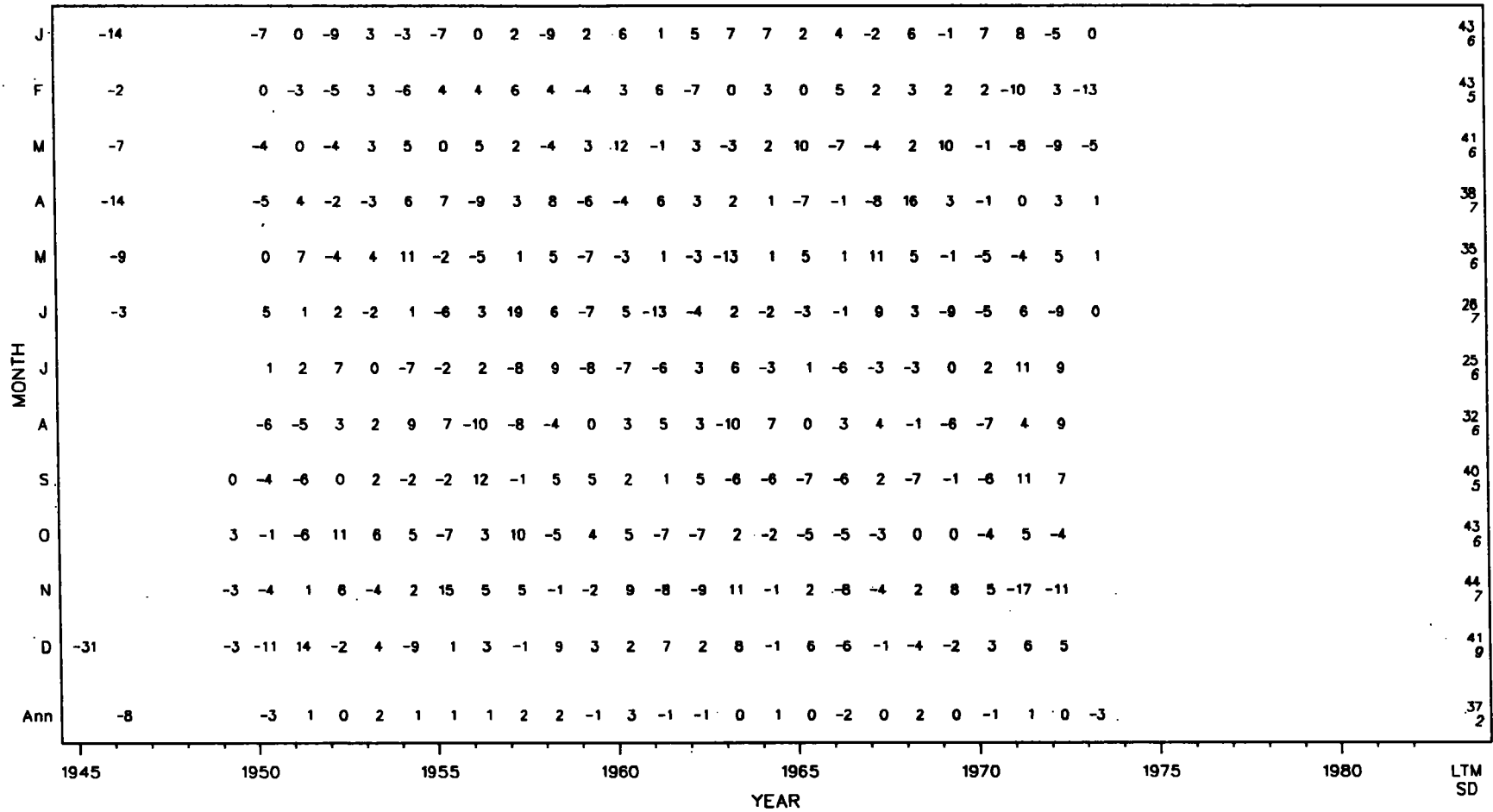
Units = 0.1 °C

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD
J	-19	-21 28 25 13 13 10 16 -16 34 -4 -8 -1 -1 -1 -5 16 -14 8 3 -4 -12 -22 -22 -14	111	16						
F	-2	-3 18 18 8 12 1 -6 -25 21 -20 -6 -22 14 -4 -16 11 -24 -6 15 17 15 -7 -20 13	109	15						
M	-12	-9 29 12 5 8 3 -7 -10 9 -26 -15 5 4 -25 -20 -5 -1 10 12 6 21 1 13 -8	112	14						
A	4	12 30 2 20 -6 -3 2 -13 8 -16 -9 -15 4 -12 -9 9 -15 21 -9 -11 -2 2 -4 7	125	12						
M	-10	0 8 20 -3 -5 -6 11 -5 18 -7 -6 -11 3 12 -13 -13 -9 7 2 1 -4 6 1 5	139	9						
J	-14	0 -1 14 9 5 2 17 -24 -1 -13 -2 13 -16 -3 -8 -14 -9 -3 -17 2 -3 8 55 2	161	15						
J	-19	11 8 10 27 18 3 7 -23 -19 12 9 -6 -12 7 -6 6 -1 -39 -10 -4 -4 22	193	16						
A	-7	25 17 -9 5 9 7 10 -9 -10 11 -1 -4 4 -12 0 -9 9 -34 -16 6 4 4	209	12						
S	1	13 2 5 -7 9 11 -5 7 -8 -12 3 -7 -7 16 -13 5 -8 17 -29 8 5 -8 1	191	11						
O	-5	2 5 2 -2 1 19 2 5 3 -18 -7 8 -1 10 0 2 6 15 -21 -2 -8 -20 5	162	10						
N	12	6 11 9 7 -2 4 -3 -10 -12 -2 -19 12 24 -5 -11 -17 12 18 -38 2 -5 8 1	148	13						
D	-29	11 32 -4 18 -2 10 -9 -6 1 -22 -3 4 -12 -7 -3 5 -2 31 15 -6 28 -6 -15 -29	128	16						
Ann	-9	1 13 12 4 6 5 3 -6 2 -13 -4 -2 1 -2 -8 -1 -3 9 -13 2 0 -4 2 1	149	6						

### OWS Study Area D Anomalies

### Surface Dew Point Depression

Units = 0.1 °C



OWS Study Area D Anomalies

### Sea Surface Temperature

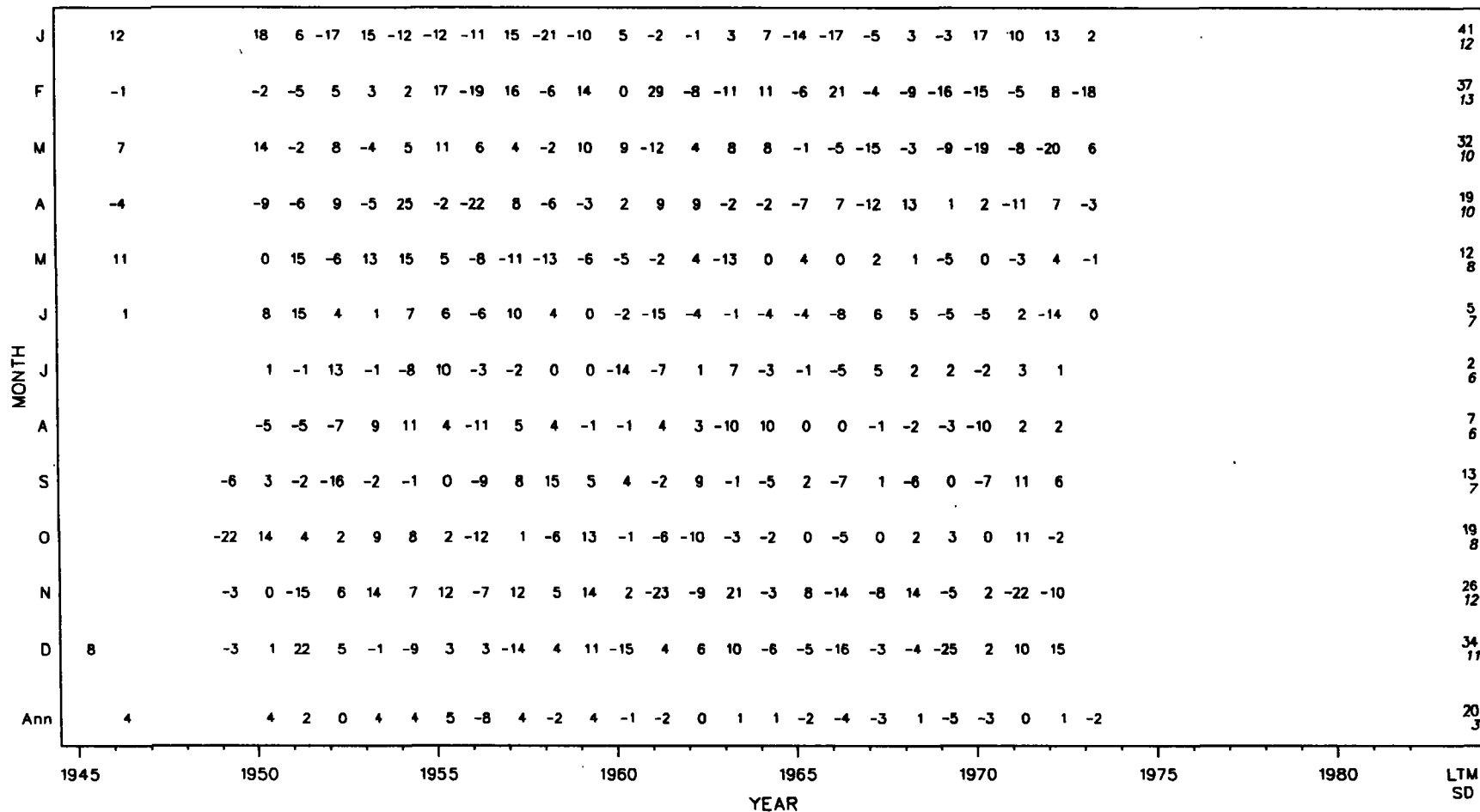
Units = 0.1 °C

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	LTM	SD										
J	-7	-3	32	8	28	1	-2	5	-1	13	-14	-4	-3	-2	2	3	2	-31	4	6	-7	5	-12	-8	-13	152	13	
F	-3	-4	12	23	11	11	18	-25	-10	15	-6	-6	7	6	-15	-5	6	-3	-10	5	1	-1	-11	-12	-5	146	11	
M	-5	5	27	20	2	13	14	0	-6	7	-15	-6	-7	8	-18	-12	-6	-7	-5	9	-3	2	-7	-7	-3	144	11	
A	0	4	25	11	15	19	-5	-20	-4	2	-18	-7	-6	13	-13	-12	1	-7	10	4	-10	1	-9	3	3	143	11	
M	1	0	23	14	10	10	-1	3	-17	5	-13	-10	-13	7	-1	-13	-8	-9	8	3	-4	-4	3	4	4	151	10	
J	-13	8	14	17	10	12	7	11	-14	3	-14	-4	-2	-20	-5	-12	-18	-17	3	-11	-4	-7	10	41	2	166	14	
J		-18	9	22	9	19	28	0	5	-23	-19	-1	2	-5	-5	4	-6	2	5	-37	-8	-6	-1	24		196	15	
A		-11	20	10	0	16	13	-4	15	-5	-11	10	3	-1	-6	-2	-1	-9	9	-35	-18	-4	6	5		215	12	
S		-6	16	1	-11	-8	8	12	-14	14	7	-7	7	-8	2	15	-19	7	-15	18	-35	9	-2	3	7		204	13
O		-27	15	9	3	8	9	21	-10	5	-3	-5	-9	2	-10	7	-2	2	1	15	-18	1	-8	-8	3		181	11
N		9	6	-3	15	20	5	17	-10	2	-7	12	-17	-11	15	17	-14	-9	-2	8	-23	-3	-4	-13	-8		173	12
D	-22	8	32	18	23	-3	1	-6	-3	-14	-18	8	-11	-7	-1	7	-1	-7	15	12	-10	3	-4	-5	-15		162	13
Ann	-4	4	16	13	8	10	10	-5	-2	0	-8	-5	-4	1	-1	-7	-3	-7	6	-12	-4	-3	-4	3	-2		169	7

### OWS Study Area D Anomalies

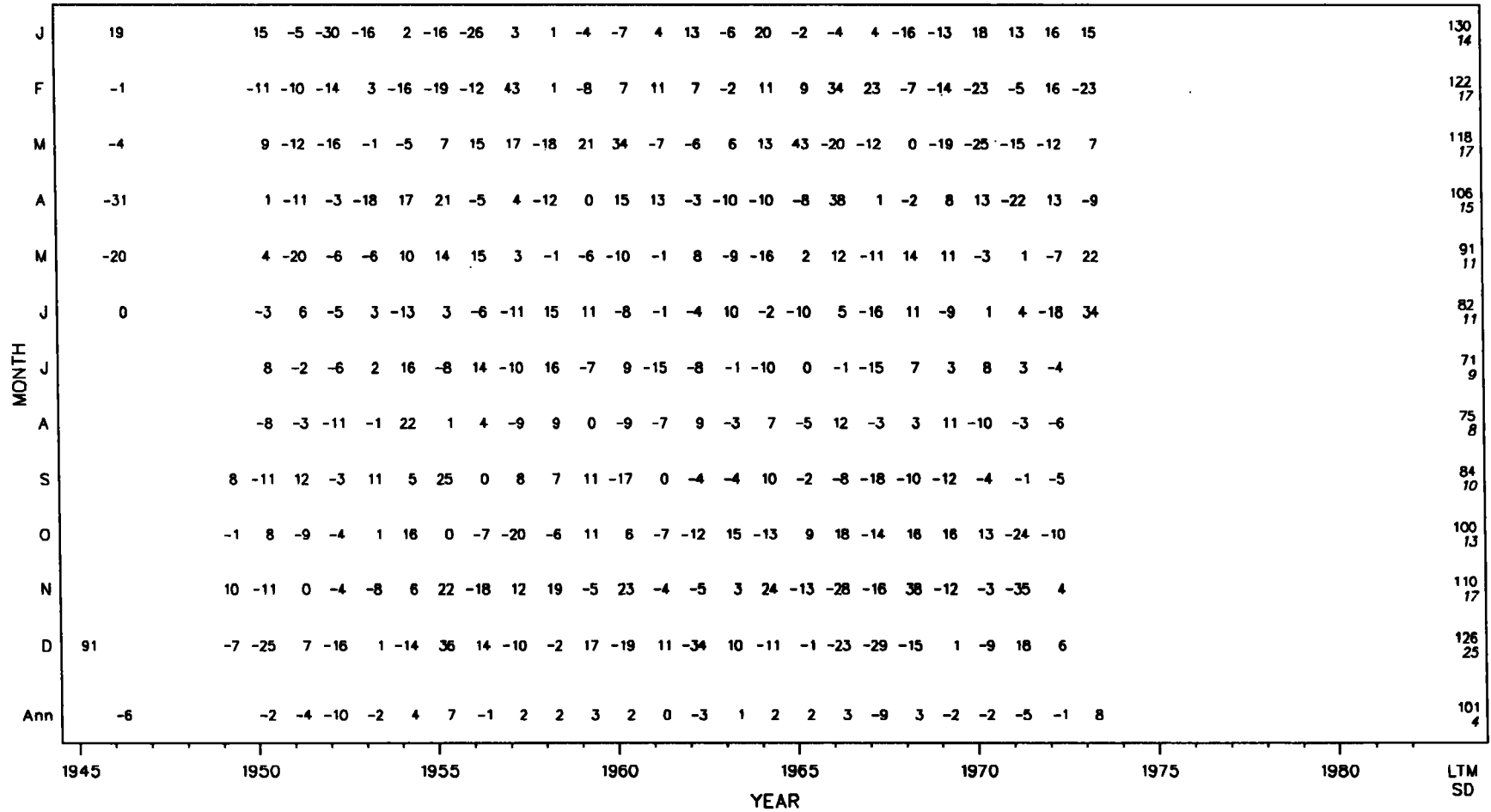
### Sea - Air Temperature Difference

Units = 0.1 °C



OWS Study Area D Anomalies

Surface Scalar Wind  
Units = 0.1 m/s



OWS Study Area D Anomalies

### Sea Level Pressure

Units = 0.1 mb

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD
J	26	6 60 130 56 48 -160 95 62 -8 -23 -86 21 73 43 -57 5 -144 2 57 -9 -141 -80 9 15	10102 75							
F	11	-17 93 -45 7 89 40 -16 -46 -109 -8 -63 -52 73 12 -112 -45 -136 14 -34 18 129 62 26 108	10118 69							
M	52	2 10 -63 39 22 -33 32 -109 -99 26 -38 -30 -123 -22 -62 -69 60 77 106 29 20 59 78 35	10092 62							
A	80	31 -20 32 8 53 -57 -10 5 68 15 -26 -102 30 -89 51 30 -98 -2 18 36 -59 54 -26 -19	10144 51							
M	1	-27 4 -59 -51 -22 -67 62 -24 62 -39 -37 7 -23 85 -33 -50 40 55 -40 -8 54 47 44 18	10175 45							
J	1	4 -71 -1 29 23 -33 35 -39 -30 -37 22 41 -11 -42 -1 -12 15 30 -23 7 44 -7 116 -61	10191 40							
J		-30 18 17 5 22 -2 -18 10 -50 25 12 15 -12 -10 27 -3 38 0 -19 -16 9 19 -59	10214 24							
A		14 36 6 -19 -36 18 5 19 -27 -21 -34 5 17 13 -22 13 -34 28 -35 -17 11 43 19	10197 24							
S		33 16 -46 21 -7 1 28 17 -33 -36 -22 34 12 -12 35 -9 3 -27 6 -7 25 -2 -1 -27	10183 24							
O		-10 16 5 -4 25 -25 -30 10 16 6 -13 -24 28 -1 -10 41 -2 -21 26 -78 -18 -9 15 55	10163 27							
N		16 -1 32 -10 17 23 -63 81 -49 -22 56 -45 -13 8 -30 -87 18 82 38 -108 68 38 22 -70	10176 51							
D	-171	54 71 32 -22 18 39 -86 14 79 7 2 91 -159 12 -28 61 -4 34 -46 -47 82 -34 -35 36	10135 67							
Ann	28	7 13 0 11 20 -37 26 -9 -20 -3 -16 -19 3 -4 -17 -10 -16 19 -17 17 5 17 17 16	10158 16							

OWS Study Area D Anomalies

### Total Cloudiness

Units = 0.1 okta

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																	
J	5	2	0	2	2	-4	-5	-8	5	8	2	-4	-4	2	1	0	-1	-7	0	-4	0	2	-2	-1	5	65	4
F	-1	1	8	-2	2	0	-5	-3	2	-2	2	-3	2	-6	-5	2	-1	0	1	0	-4	0	4	4	3	66	3
M	2	4	-3	-4	-2	0	1	2	4	-6	4	-1	0	-2	1	2	1	-5	7	-1	-5	-3	1	1	4	64	3
A	-3	-1	-10	3	3	-1	4	0	3	-8	7	2	4	-4	-2	-3	-1	-2	2	-2	5	1	-2	4	3	65	4
M	2	3	-4	-3	-2	-8	2	1	3	-3	1	0	-1	2	3	1	2	3	-6	-4	4	1	-4	0	5	65	3
J	6	-1	7	1	2	0	8	5	2	7	5	-11	-1	2	-3	-8	-2	-3	1	5	6	-2	3	-29	0	64	8
J		5	7	-2	0	-9	-9	1	-2	2	4	5	1	10	7	-10	-1	-3	5	6	7	-7	-7	-10		58	6
A		-10	-8	-5	3	0	-12	7	1	7	0	-3	0	1	7	7	-1	-2	-2	9	6	0	-2	-3		55	5
S		-3	3	6	-3	-2	-1	7	-3	2	1	3	-4	-7	0	-2	3	3	2	-5	-1	-2	-1	8	-2	58	4
O		3	1	3	0	-3	-1	-6	-4	2	0	8	-1	-2	-1	-8	-6	4	0	-1	3	8	7	-5	4	62	4
N		2	-6	-3	-1	-3	2	1	-9	3	2	0	3	-5	0	0	2	1	4	1	-3	1	1	3	4	63	3
D	13	0	-2	3	-3	4	-10	5	2	-1	0	5	2	-3	0	-2	-1	0	-5	-5	-2	-5	1	1	1	64	4
Ann	2	0	0	-1	0	-3	-1	-1	2	1	3	-1	-1	0	0	-1	0	-1	0	1	2	0	0	-2	3	62	7

### OWS Study Area D Anomalies

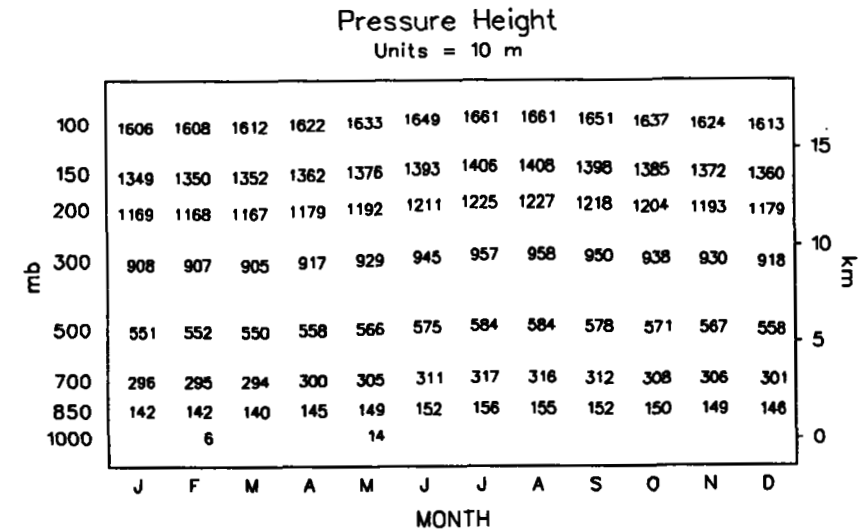
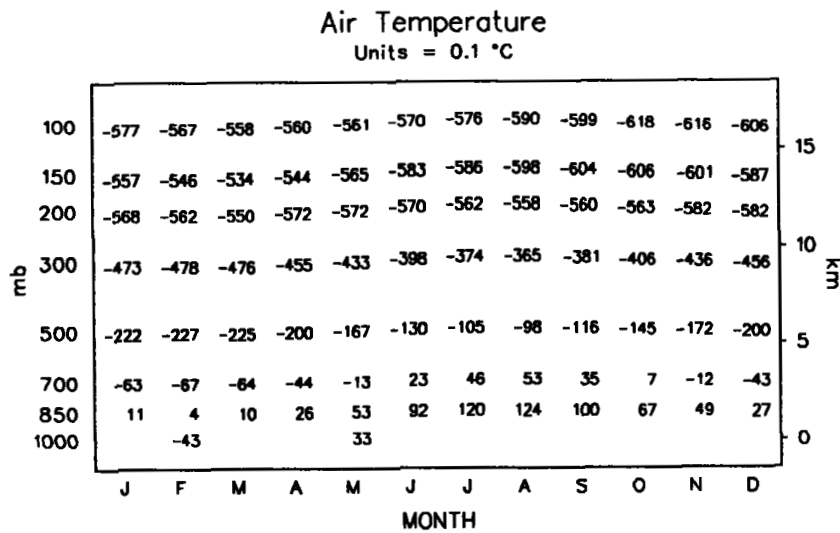
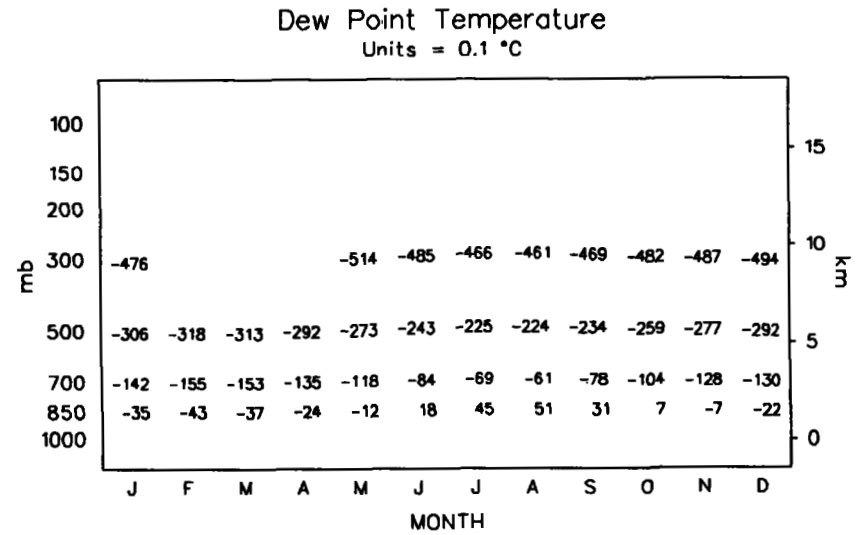
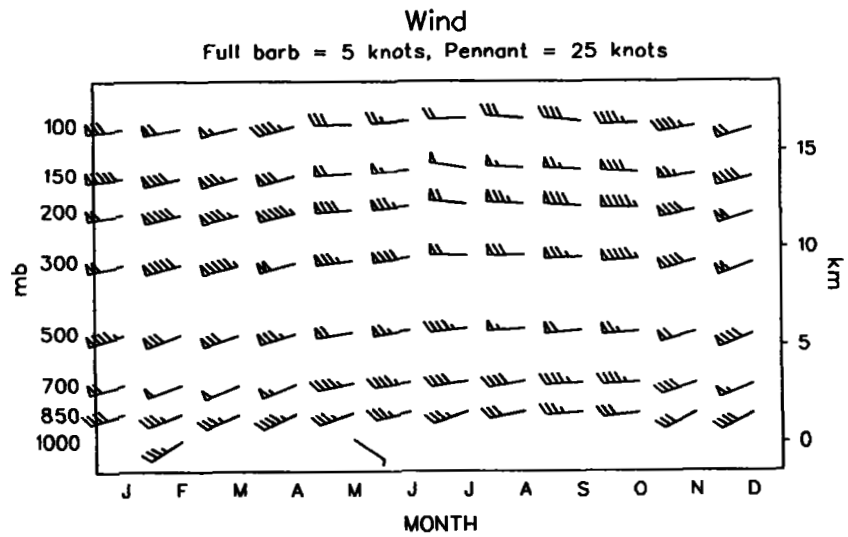
### Precipitation Frequency

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	18	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															281	49	

OWS Study Area D Anomalies



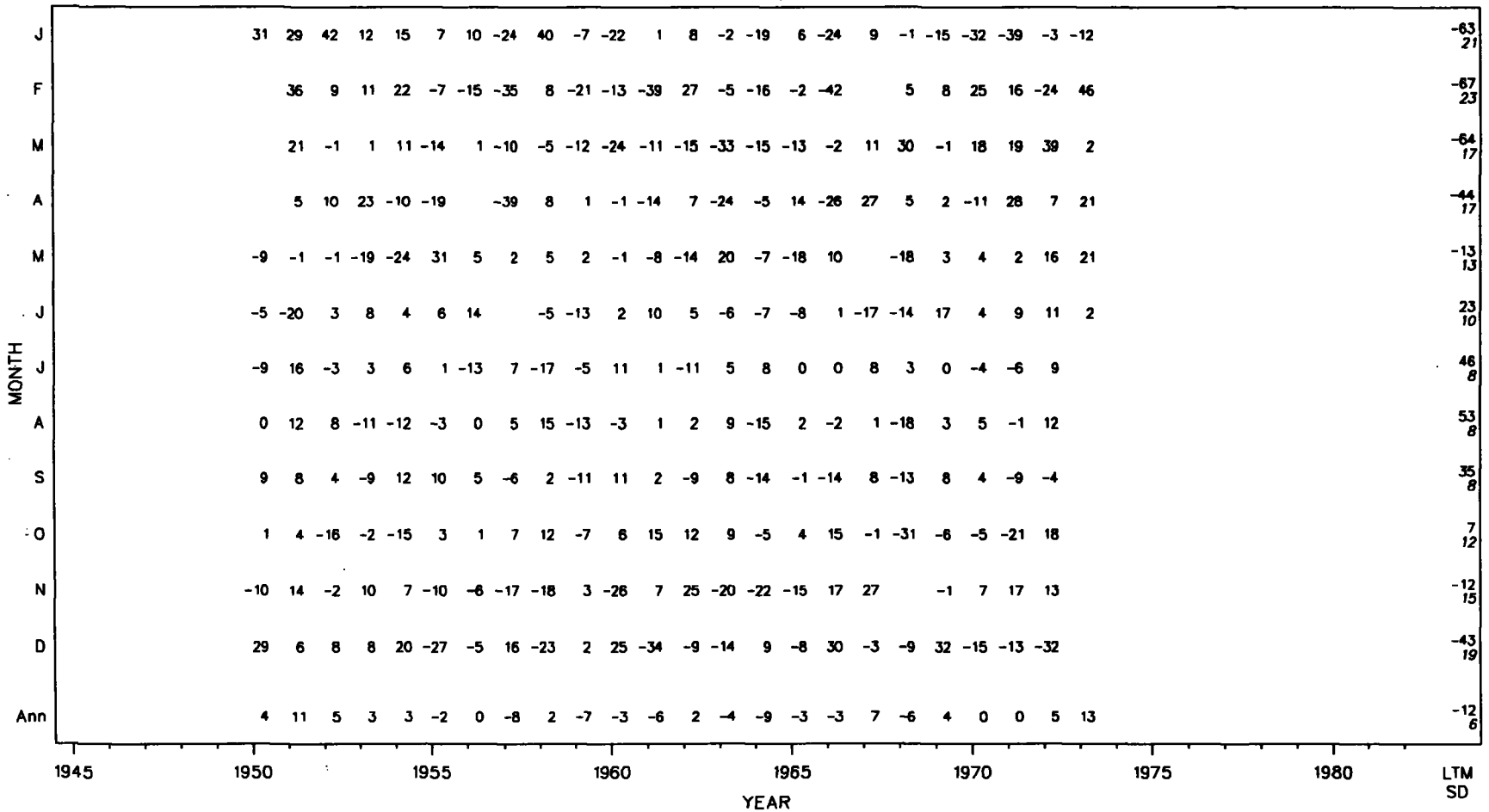


## OWS Study Area D Upper Air Climatology

Mean plotted at actual height

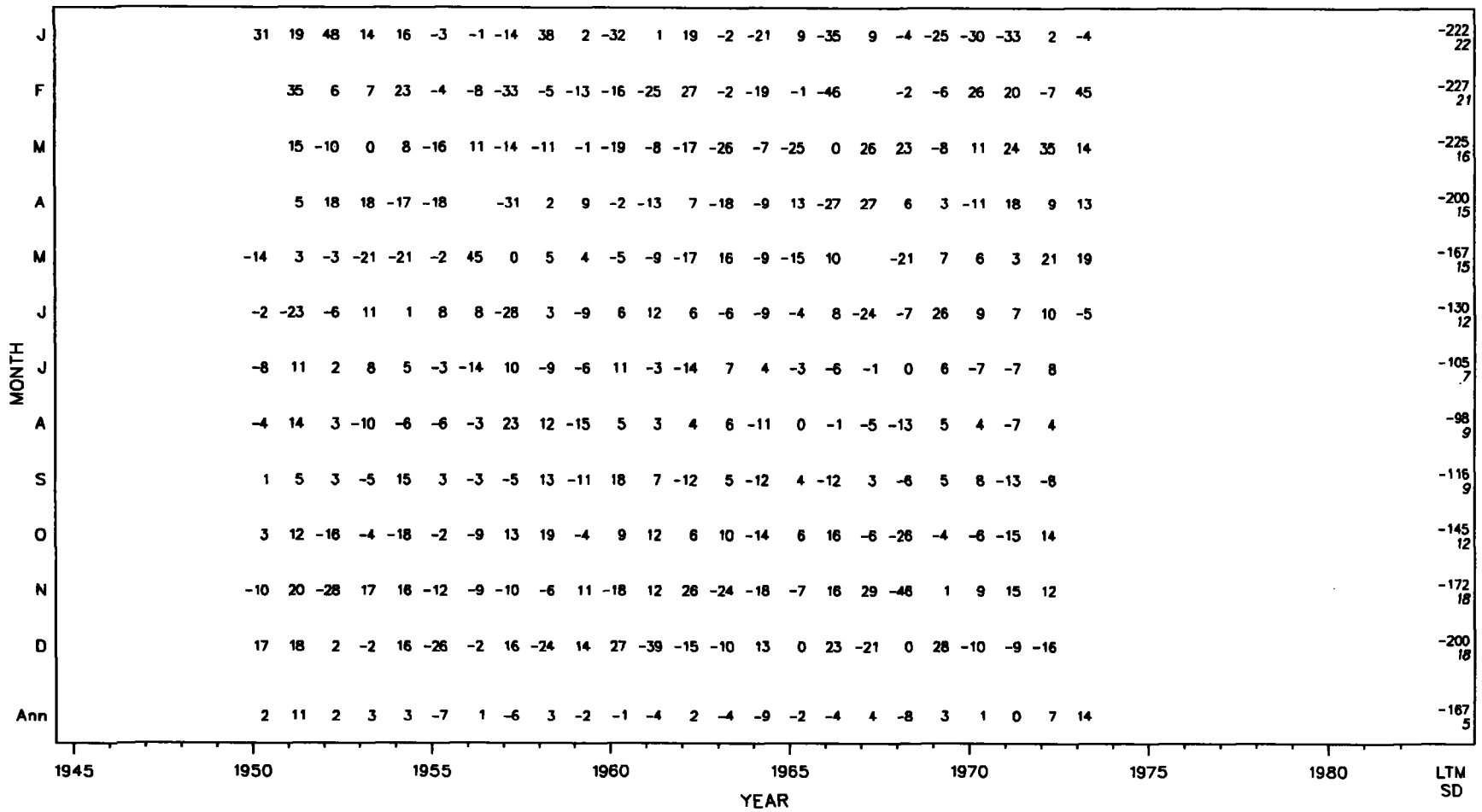
### Air Temperature: 700 mb

Units = 0.1 °C



OWS Study Area D Anomalies

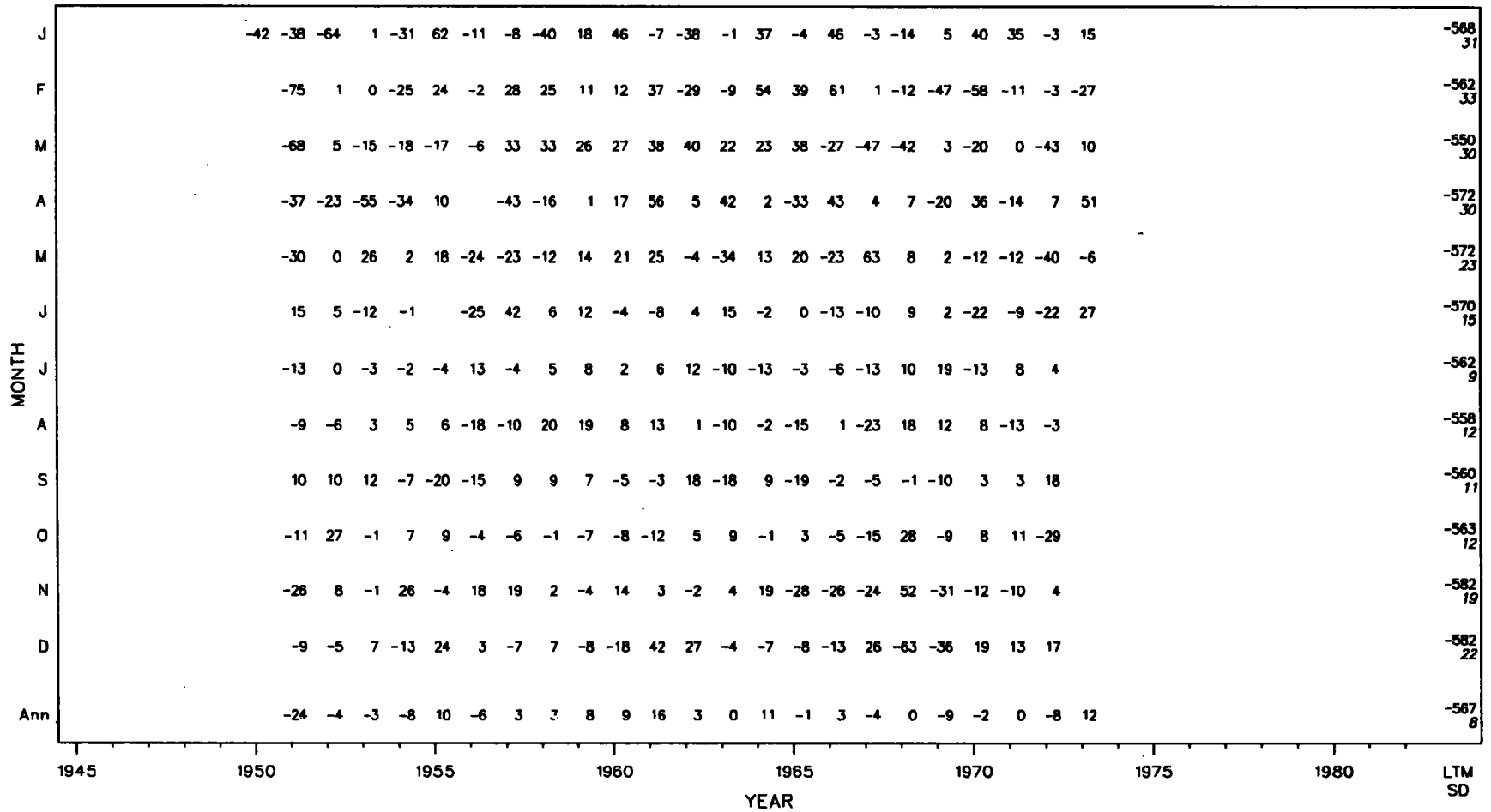
Air Temperature: 500 mb  
Units = 0.1 °C



OWS Study Area D Anomalies

### Air Temperature: 200 mb

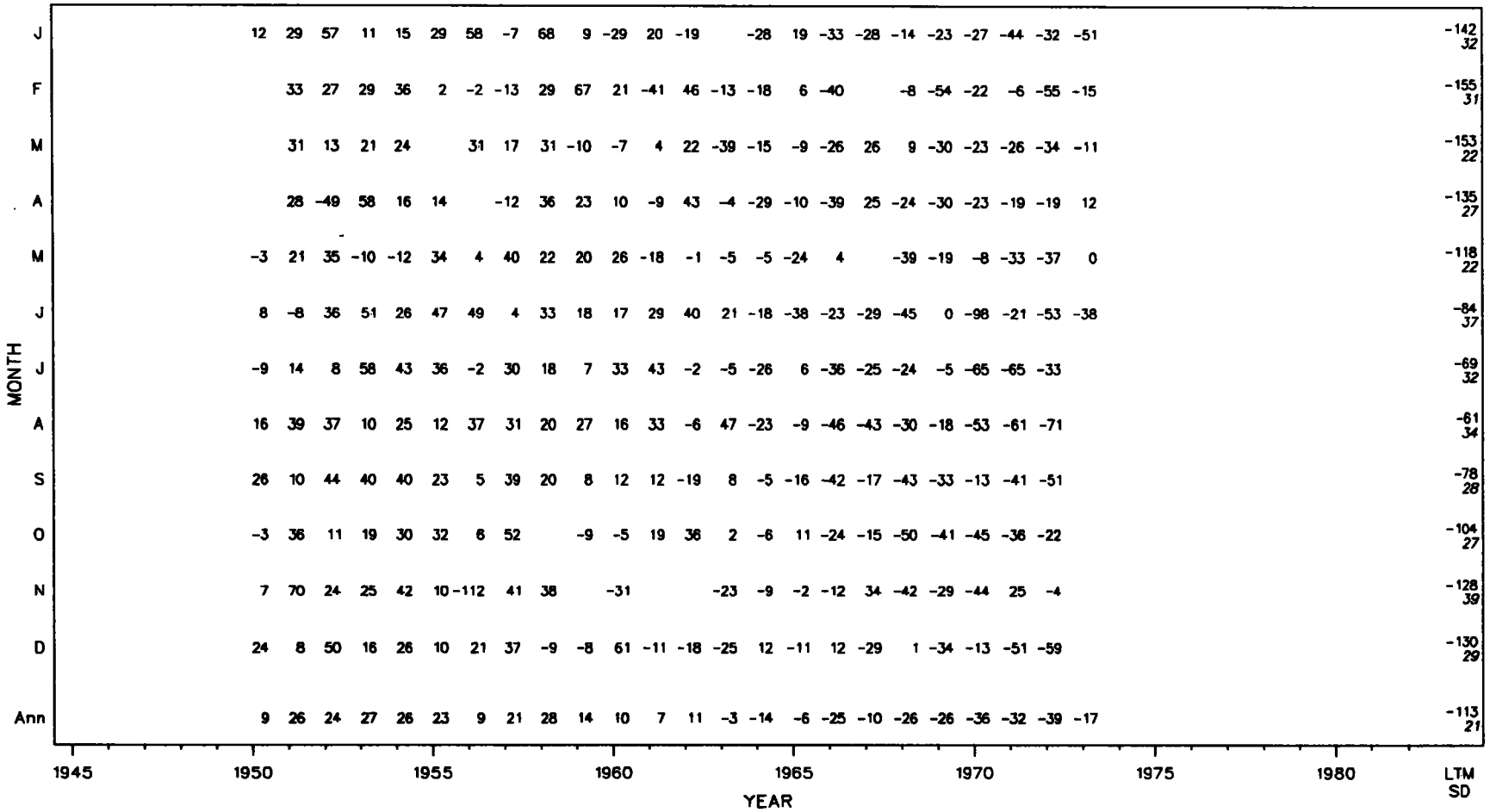
Units = 0.1 °C



OWS Study Area D Anomalies

### Dew Point Temperature: 700 mb

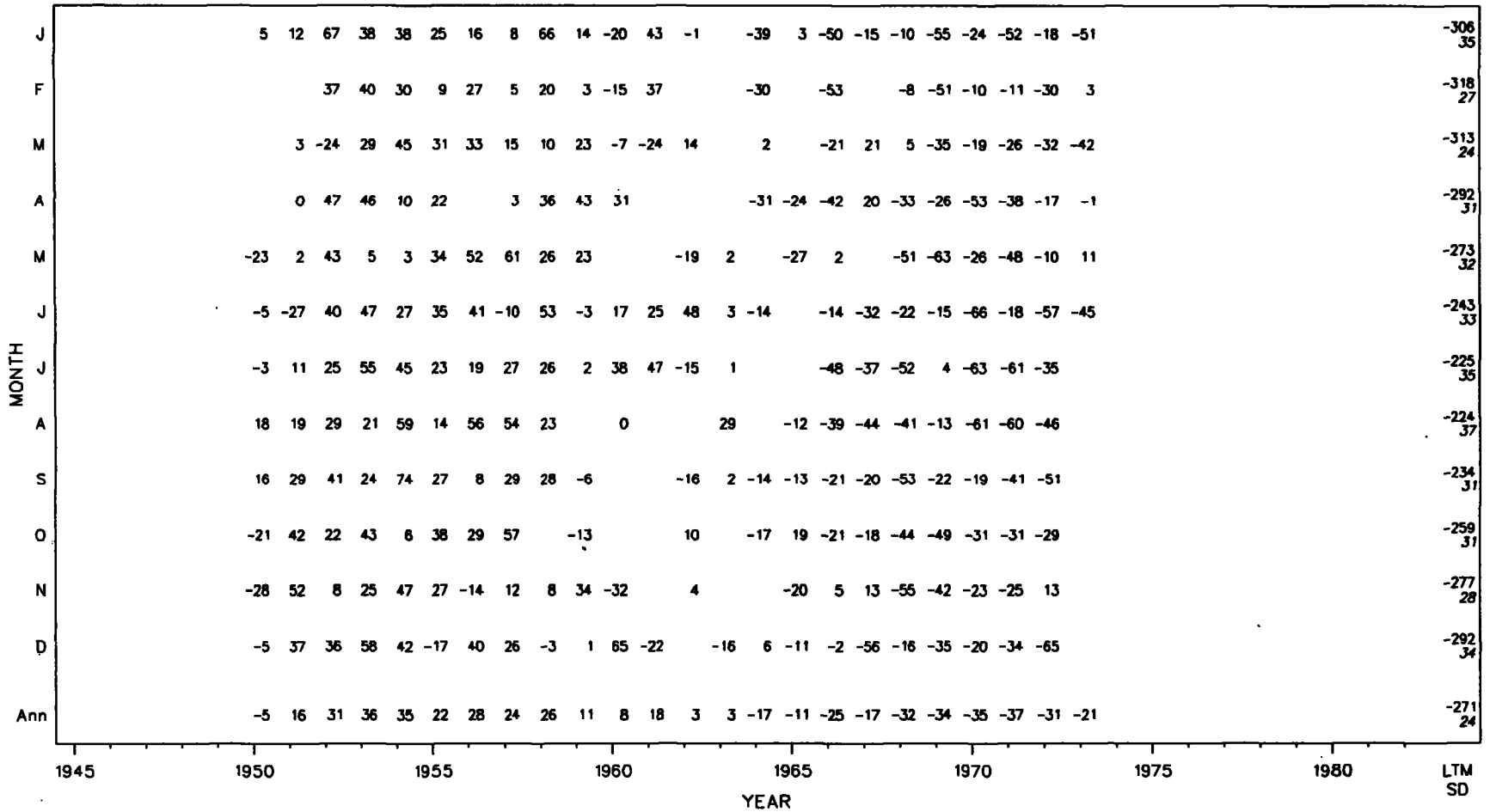
Units = 0.1 °C



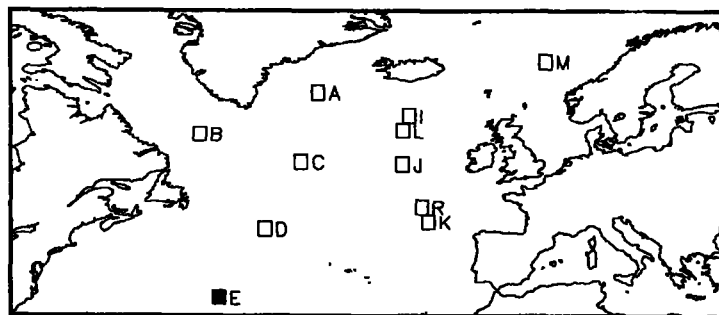
### OWS Study Area D Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C



OWS Study Area D Anomalies



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

**OWS**  
**E**

MONTH	YEAR																												Sum
	1945	1950	1955	1960	1965	1970	1975	1980	Sum																				
J	31 31	31 31	28 27	31 31	31 27	27 31	31 29	29 31	31 31	31 31	31 31	26 26	31 31	31 31	30 30	31 31	28 28	30 30	21 21	31 31	22 22	20 20	695 694						
F	28 28	28 28	29 29	26 26	28 28	28 28	29 29	28 28	28 28	28 28	29 29	28 28	28 28	29 29	28 28	28 28	27 27	28 28	26 26	23 23	19 19	24 24	653 653						
M	31 31	31 31	31 31	26 26	31 31	30 30	30 30	31 31	31 31	29 29	31 31	31 31	30 30	28 28	31 31	31 31	26 26	31 31	29 29	28 28	29 29	30 30	31 31	718 718					
A	30 30	30 30	30 30	30 30	27 27	30 30	30 30	30 30	30 30	29 29	30 30	30 30	30 30	26 26	30 30	28 28	30 30	23 23	25 25	26 26	29 29	29 29	25 25	687 686					
M	31 31	28 28	31 31	31 31	29 29	31 31	31 31	30 30	29 29	26 26	31 31	30 30	31 31	31 31	30 30	29 29	31 31	31 31	24 24	29 29	30 30	27 27	30 29	710 710					
J	30 30	29 29	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	29 29	29 29	30 30	20 20	23 23	30 30	26 26	29 29	21 21	686 686					
J	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	21 21	701 700					
A	31 31	31 31	28 28	30 30	31 31	31 31	31 31	31 31	30 30	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	29 29	31 31	26 26	700 700						
S	28 28	30 30	21 21	30 30	30 30	30 30	30 30	22 21	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	29 29	30 28	21 21	25 25	29 28	24 24	679 675					
O	31 31	23 23	20 19	31 31	30 30	31 31	31 31	31 31	31 31	30 30	31 31	31 31	31 31	31 31	29 29	31 31	31 31	31 31	26 26	31 31	31 31	13 13	698 697						
N	30 30	30 30	30 30	26 26	26 26	24 24	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	29 29	29 29	28 28	29 29	30 30	7 7	678 678						
D	31 31	31 31	31 31	31 31	30 30	25 25	27 24	26 26	31 31	31 31	31 31	31 31	31 31	31 31	27 27	31 31	29 29	31 31	31 31	24 24	26 26	31 31	26 26	705 702					
Ann	120 120	357 357	341 340	356 355	351 351	351 351	353 350	360 360	354 353	361 361	357 356	365 365	364 363	359 359	362 362	357 357	360 360	359 359	358 358	336 334	324 324	332 332	347 346	276 276	150 150	8310 8299			

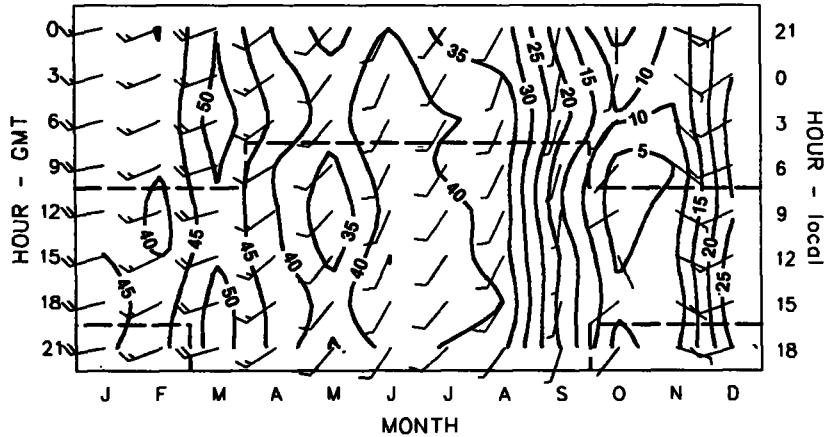
## OWS Study Area E (35.0°N, 48.0°W) Frequency of Surface Observations

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.



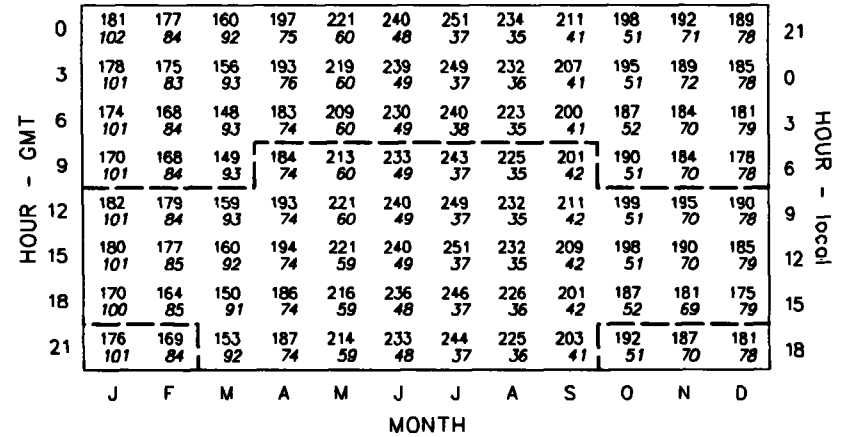
### Wind

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



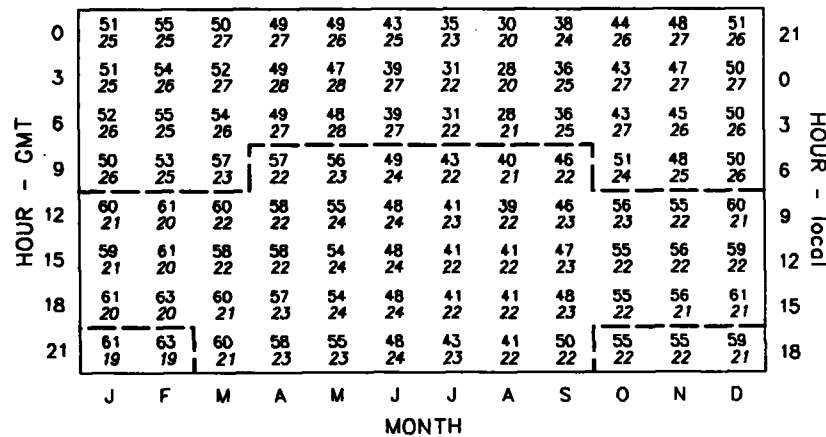
### Pressure

Units = 0.1 mb



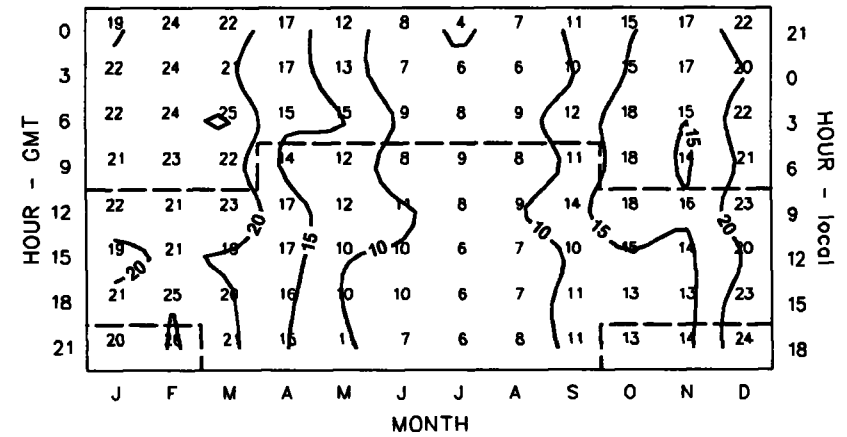
### Total Cloudiness

Units = 0.1 okta



### Precipitation Frequency

Units = percent  
Contour interval = 5 percent

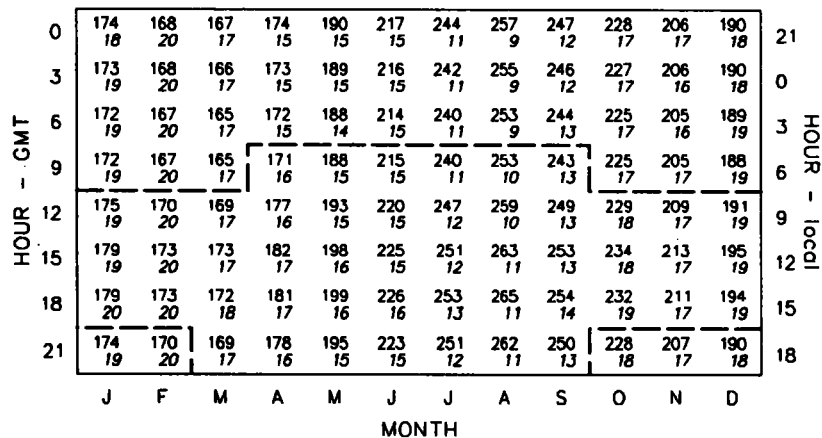


## OWS Study Area E Surface Climatology

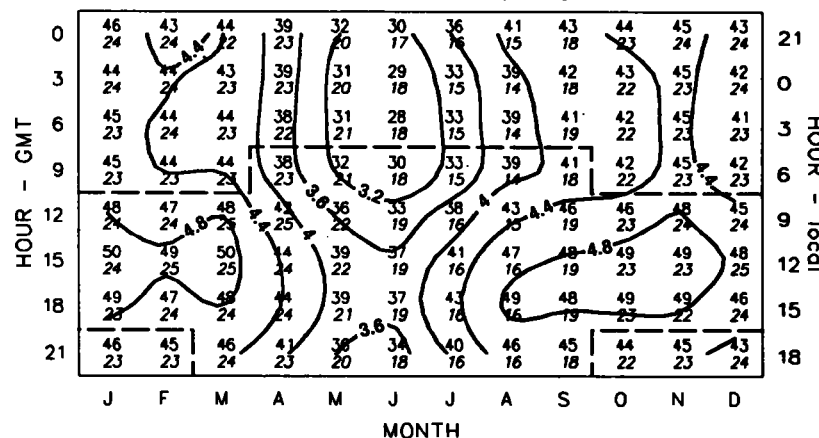
upper number = mean  
lower number = standard deviation

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

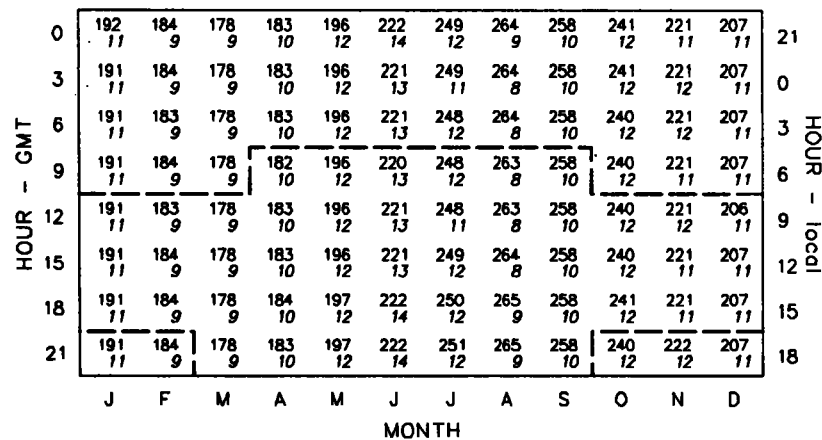
Air Temperature  
Units = 0.1 °C



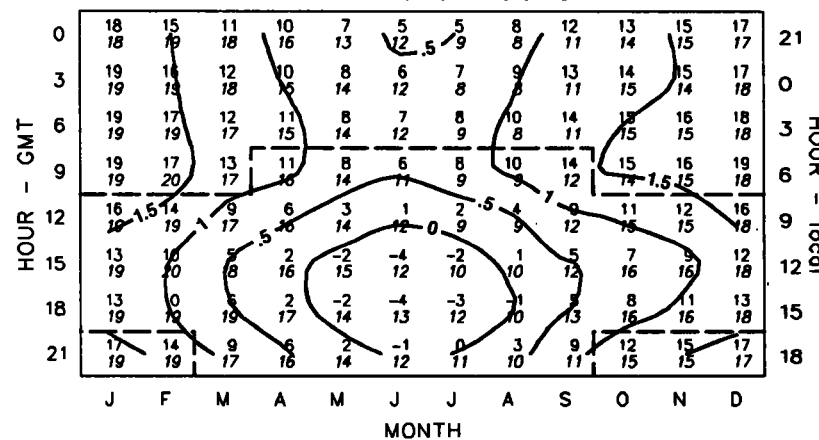
Dew Point Depression  
Units = 0.1 °C  
Contour interval = 0.4 °C



Sea Surface Temperature  
Units = 0.1 °C



Sea - Air Temperature Difference  
Units = 0.1 °C  
Contour interval = 0.5 °C



### OWS Study Area E Surface Climatology

upper number = mean  
lower number = standard deviation  
———— data contours  
----- sunrise/sunset

### Surface Air Temperature

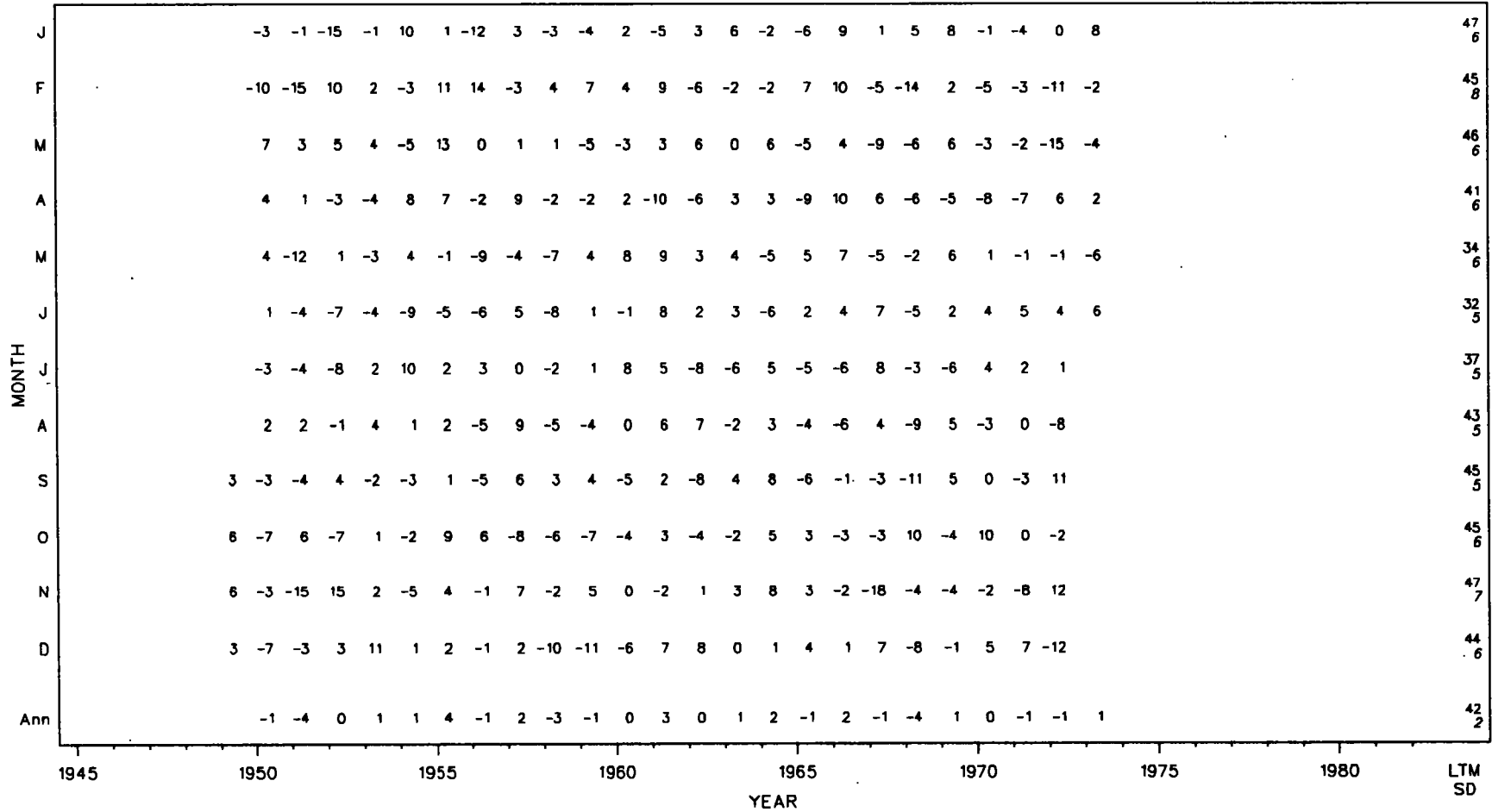
Units = 0.1 °C

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																
J	-6	12	17	-3	8	4	0	-1	4	0	-1	17	6	2	-9	3	-7	1	-10	-10	-9	-6	-1	-9	174	8
F	5	16	1	-4	12	-6	-9	-2	1	-8	-3	-6	11	4	2	-16	-13	4	6	-10	5	-9	5	12	170	9
M	-4	4	3	-1	17	0	6	2	-2	2	-3	-6	-5	1	-11	-5	-8	4	6	-5	0	3	-1	2	168	6
A	5	5	9	11	-2	-8	7	-11	-2	6	-2	3	3	-2	-2	-3	-10	-10	7	-3	-11	7	0	2	176	6
M	7	6	3	7	-4	-2	7	-5	-7	-3	-2	-3	-5	9	1	-8	-2	8	-4	-10	-3	3	2	7	192	6
J	4	-4	0	8	6	5	5	-10	-4	1	3	15	8	3	1	-6	-1	-10	-9	3	-10	-1	0	-7	219	7
J	1	3	1	8	3	8	4	2	7	-16	5	4	-2	-3	4	-4	-6	-1	-11	6	-7	-7	0	246	6	
A	7	5	3	4	3	4	1	2	3	-10	1	4	2	0	-2	2	-4	1	-18	2	-3	-4	-3	258	6	
S	-5	11	10	-3	6	5	9	0	1	0	-8	4	2	2	1	-4	-1	-7	4	-13	0	-1	-7	-3	248	6
O	-11	10	5	10	1	-1	-3	-10	2	6	2	13	6	8	3	-1	1	6	2	-18	1	-11	-19	-1	229	8
N	11	6	7	1	12	5	3	-17	-1	-6	4	5	7	8	-3	-13	2	-1	10	-8	-7	-5	-15	-6	207	8
D	5	6	6	-8	13	4	-4	-2	2	1	8	18	-6	-6	2	-7	2	-2	-9	-8	8	-7	-18	4	191	8
Ann	4	6	3	5	4	1	-1	-2	0	-2	3	3	3	1	-3	-3	-5	0	-7	-2	-5	-6	0	1	207	3

### OWS Study Area E Anomalies

### Surface Dew Point Depression

Units = 0.1 °C



OWS Study Area E Anomalies

### Sea Surface Temperature

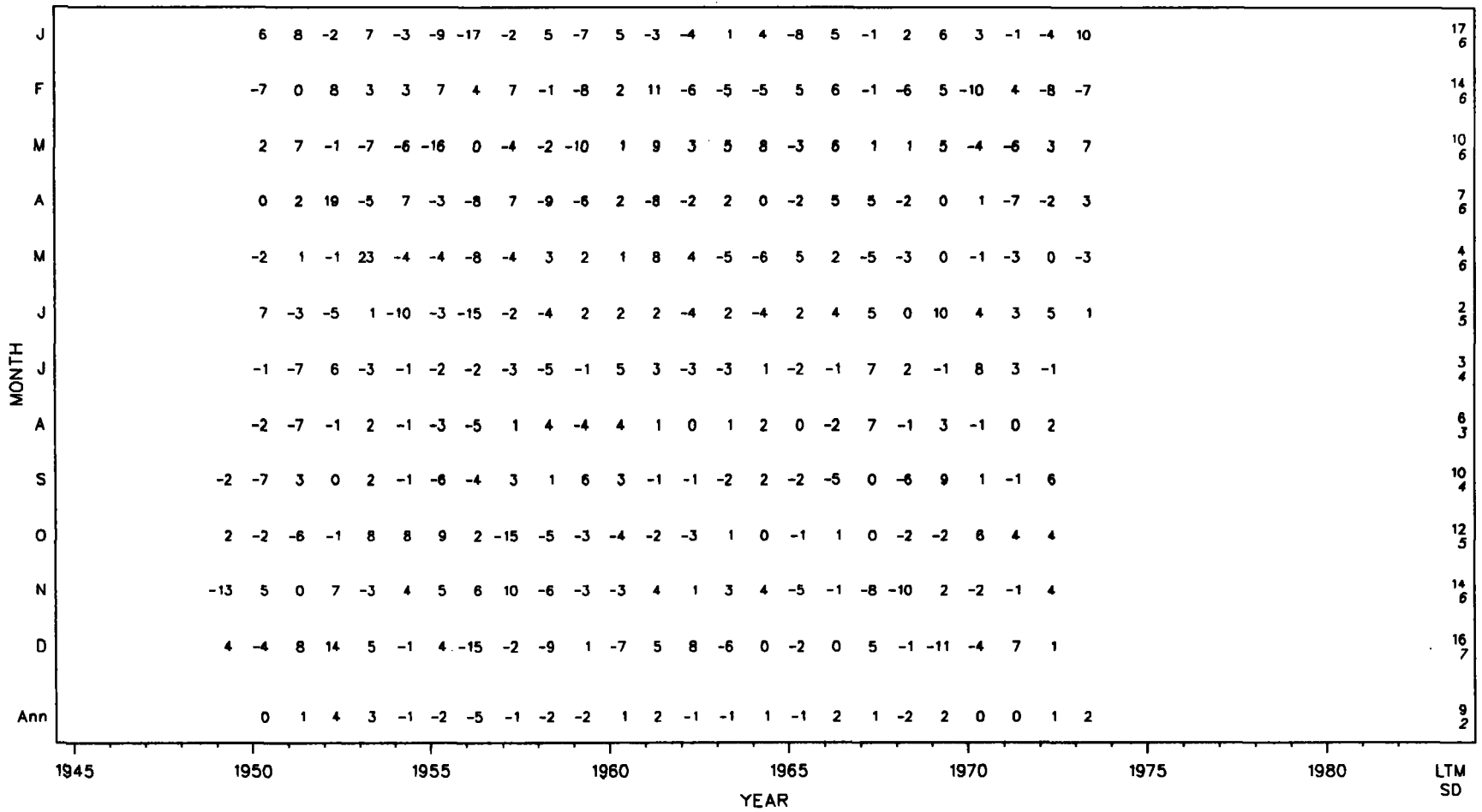
Units = 0.1 °C

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																
J	0	20	15	4	5	-5	-17	-3	8	-8	5	14	2	2	-5	-5	-3	1	-9	-4	-6	-7	-5	1	191	8
F	-1	16	9	-1	15	0	-5	5	0	-15	-1	4	6	-1	-3	-11	-7	3	0	-5	-5	-5	-3	5	183	7
M	-2	11	2	-8	10	-15	5	-2	-3	-8	-2	3	-2	5	-3	-8	-2	6	8	0	-4	-3	2	9	178	6
A	6	7	28	5	4	-10	-1	-4	-10	0	1	-5	1	0	-2	-5	-5	-4	5	-3	-10	0	-2	5	183	8
M	5	7	2	29	-9	-6	-1	-9	-5	-1	-1	5	-1	4	-5	-3	1	3	-7	-10	-4	-1	2	4	196	8
J	11	-7	-5	10	-4	3	-10	-13	-8	3	4	17	4	5	-3	-4	3	-5	-9	12	-6	2	6	-6	221	8
J	1	-5	7	5	2	7	2	-2	2	-16	10	7	-4	-6	5	-6	-7	7	-10	5	1	-4	-1		249	6
A	5	-2	2	6	2	2	-4	3	7	-14	5	6	2	0	0	1	-6	8	-19	5	-4	-4	-1		264	7
S	-7	4	13	-3	7	4	3	-4	4	1	-1	6	1	1	-1	-2	-3	-12	4	-19	9	0	-8	2	258	7
O	-10	8	-1	9	9	8	6	-9	-13	1	0	9	4	6	4	-1	0	7	2	-19	-1	-6	-15	3	240	8
N	-2	11	8	8	9	8	8	-10	9	-11	1	2	11	9	-1	-9	-3	-2	3	-18	-5	-7	-16	-2	221	9
D	9	2	14	6	17	2	-1	-16	0	-8	9	12	0	3	-4	-7	-1	-2	-4	-10	-4	-11	-11	5	207	8
Ann	4	7	7	8	4	-1	-6	-2	-2	-4	4	6	2	1	-3	-4	-3	2	-9	0	-5	-6	1	3	216	4

### OWS Study Area E Anomalies

### Sea - Air Temperature Difference

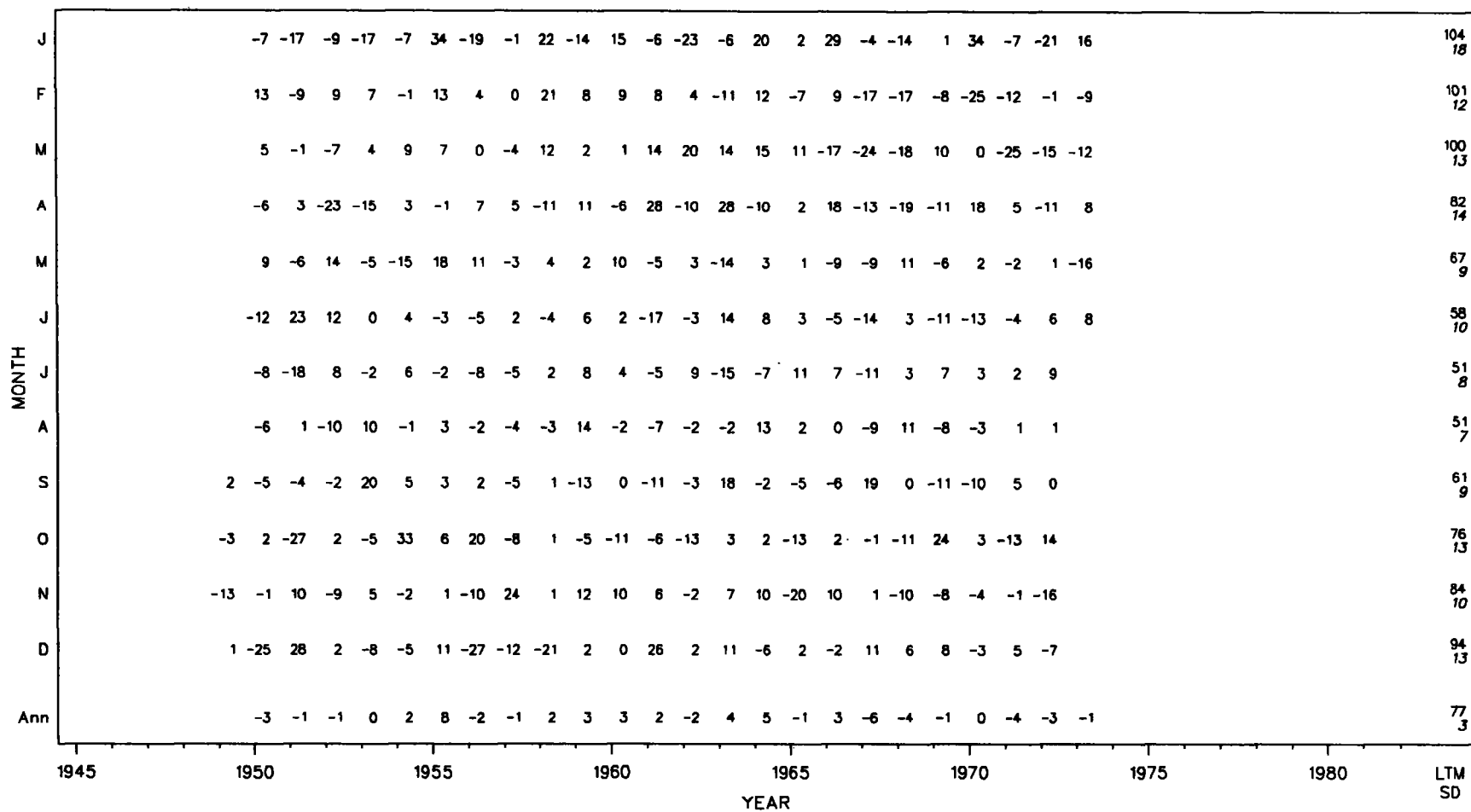
Units = 0.1 °C



OWS Study Area E Anomalies

### Surface Scalar Wind

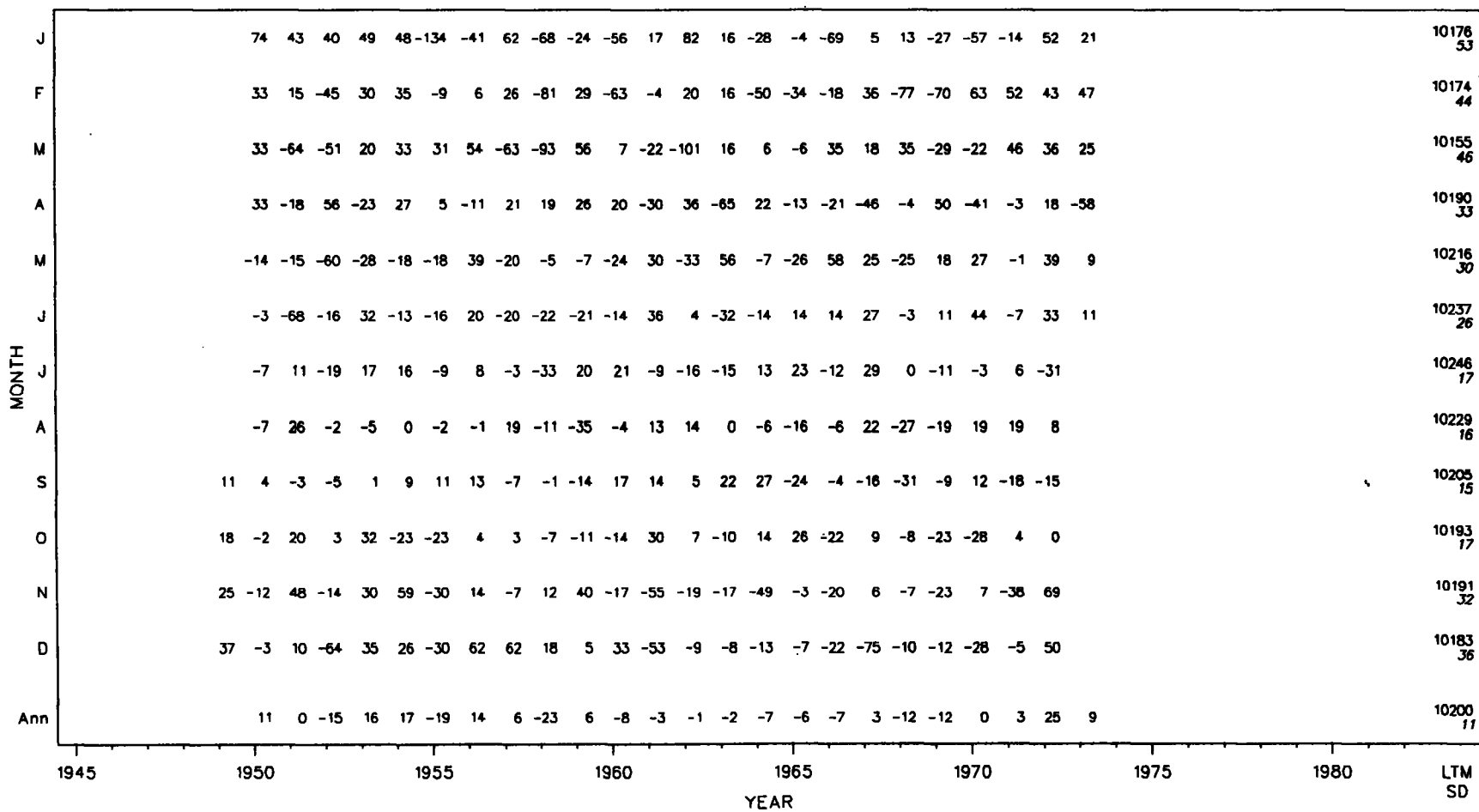
Units = 0.1 m/s



### OWS Study Area E Anomalies

### Sea Level Pressure

Units = 0.1 mb

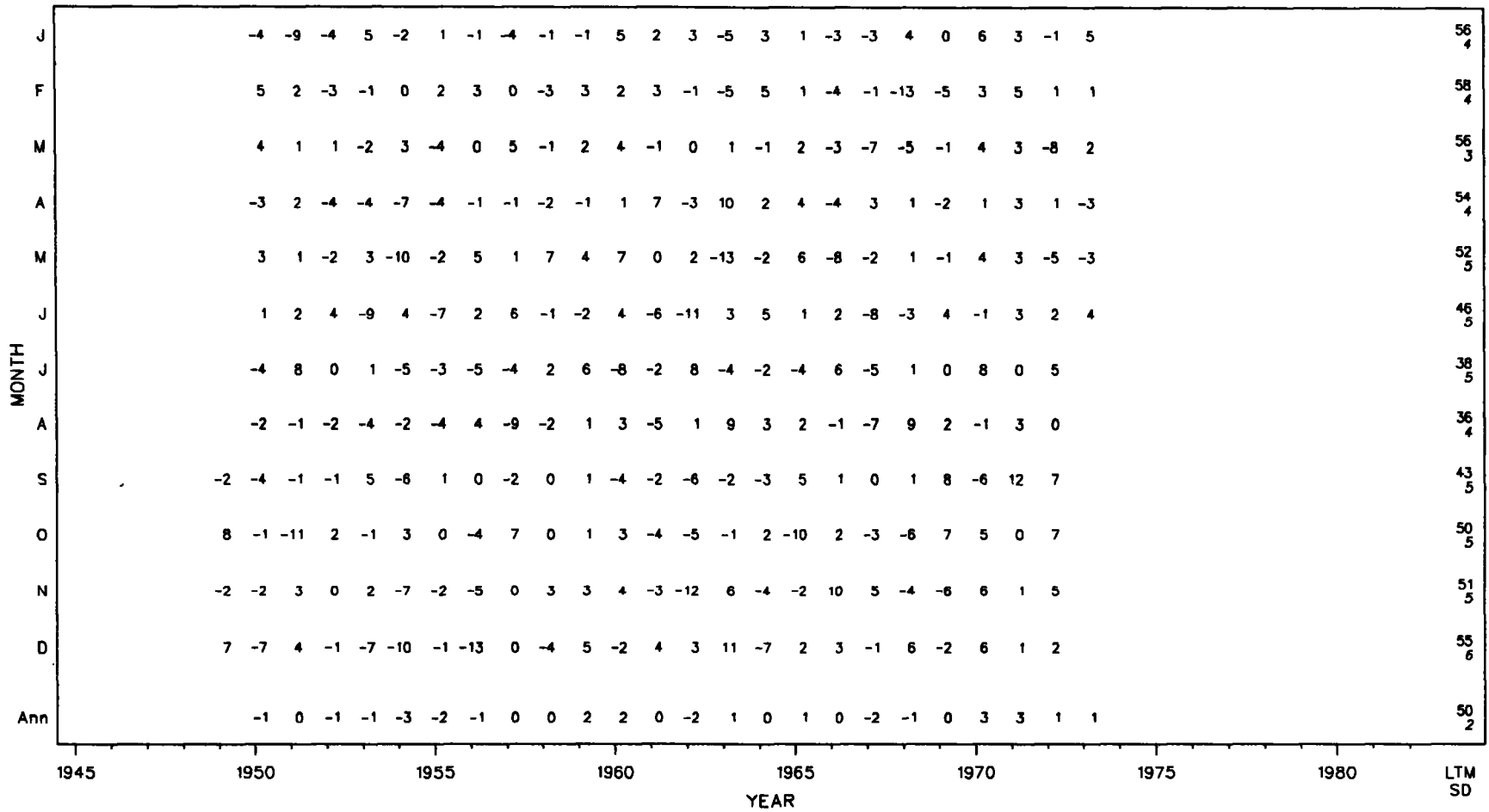


OWS Study Area E Anomalies



### Total Cloudiness

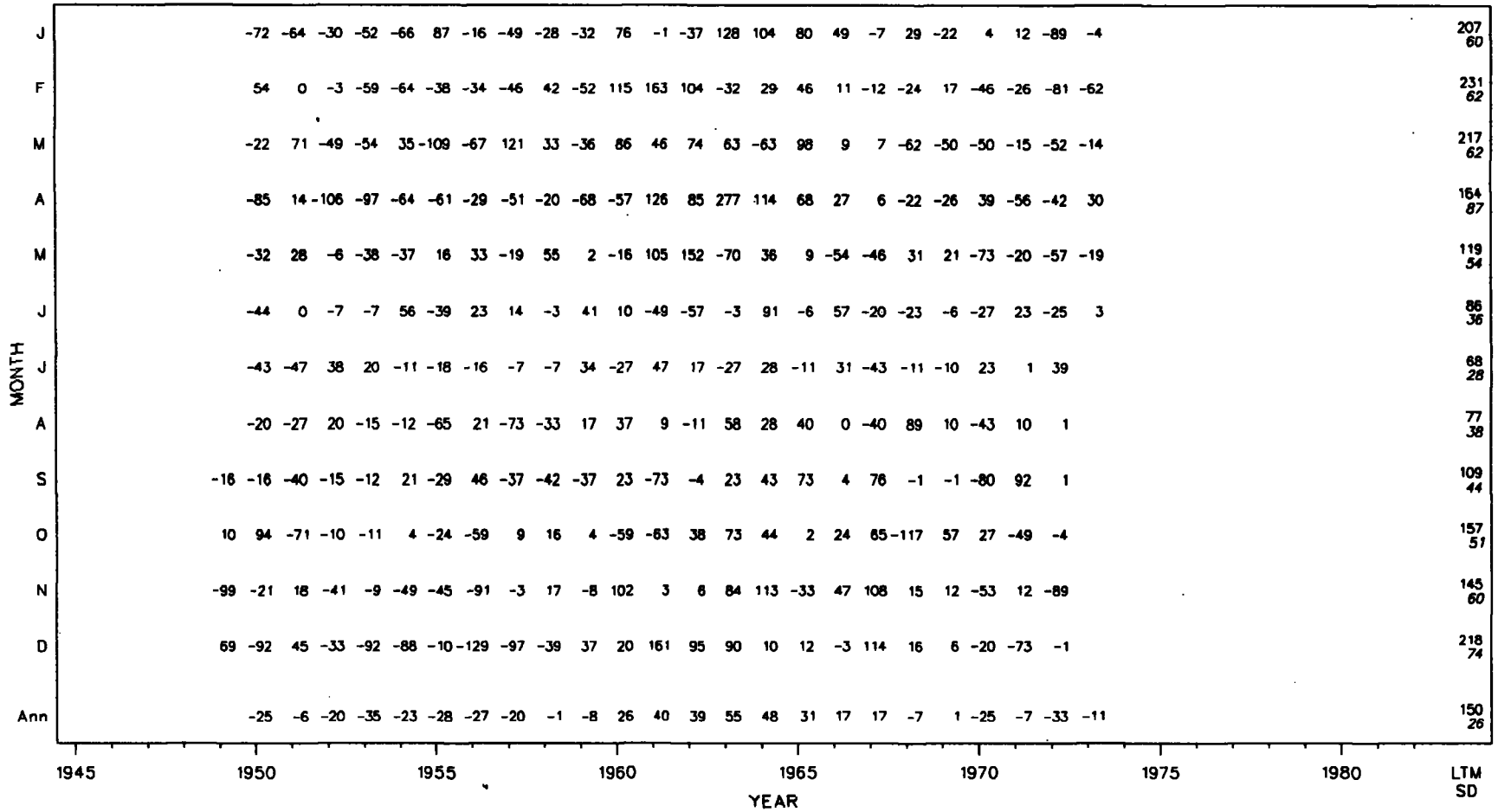
Units = 0.1 okta



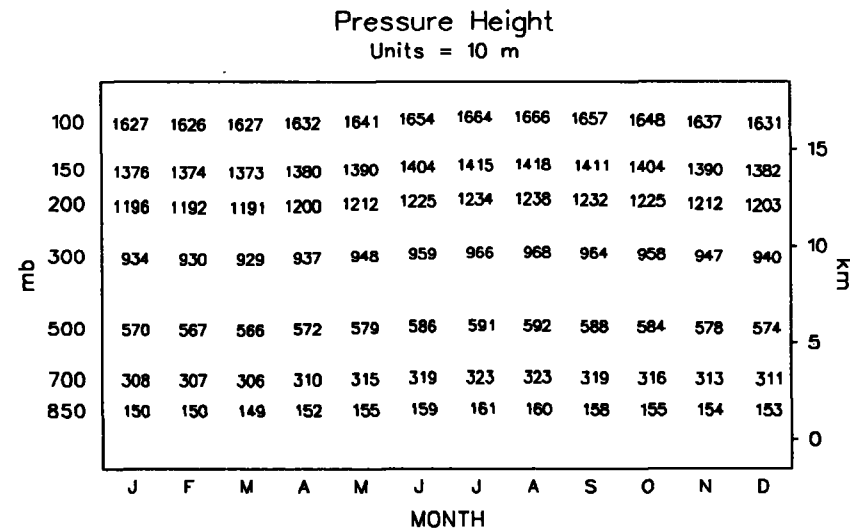
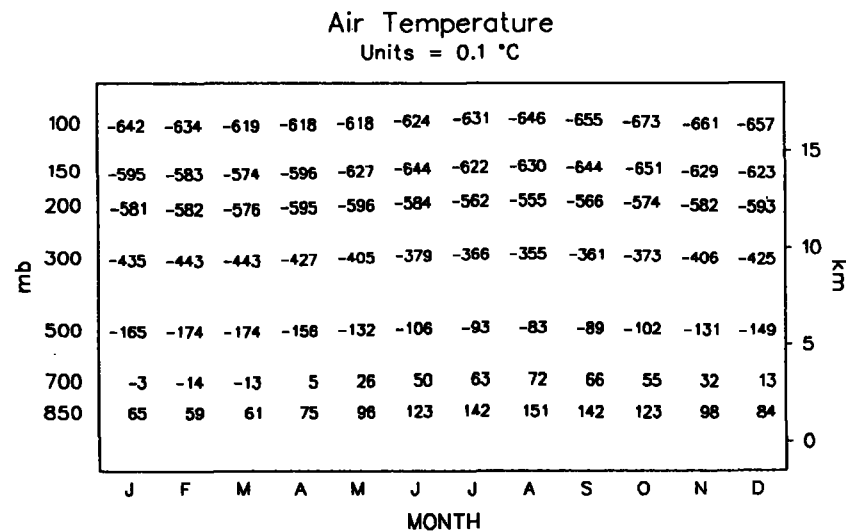
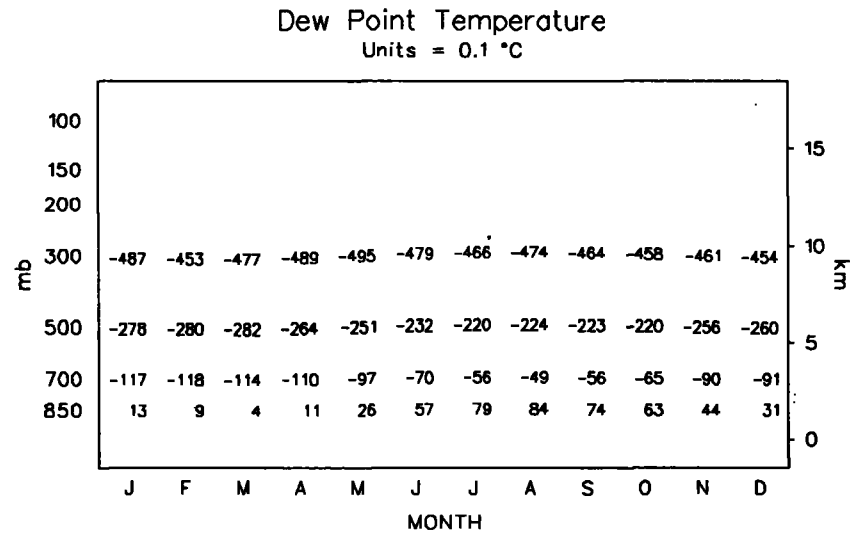
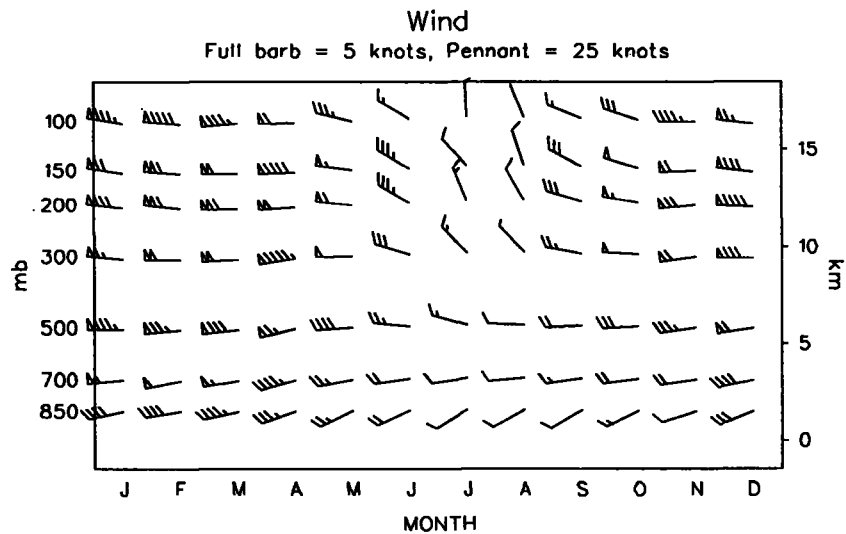
### OWS Study Area E Anomalies

### Precipitation Frequency

Units = 0.1 percent



OWS Study Area E Anomalies

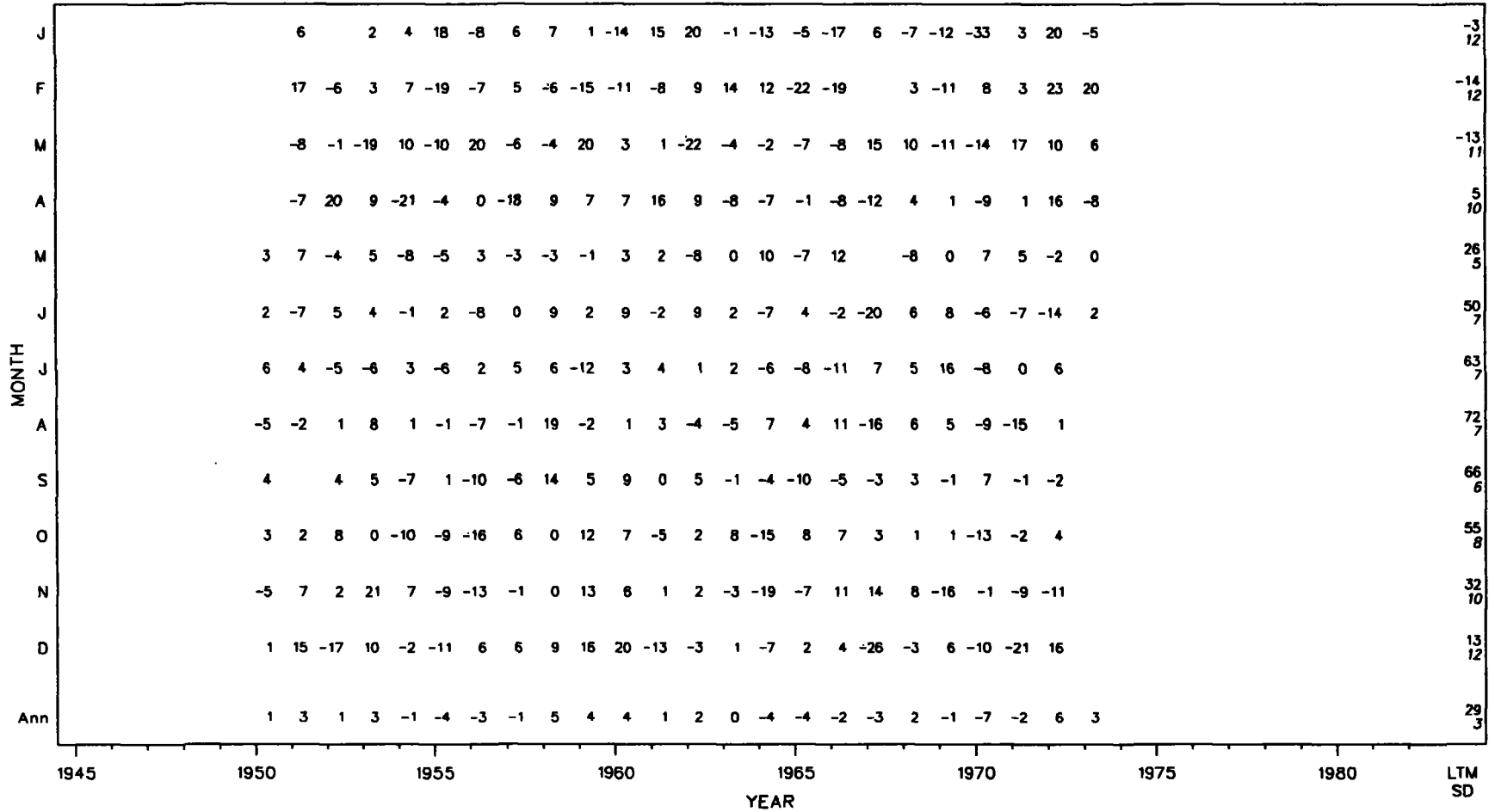


## OWS Study Area E Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

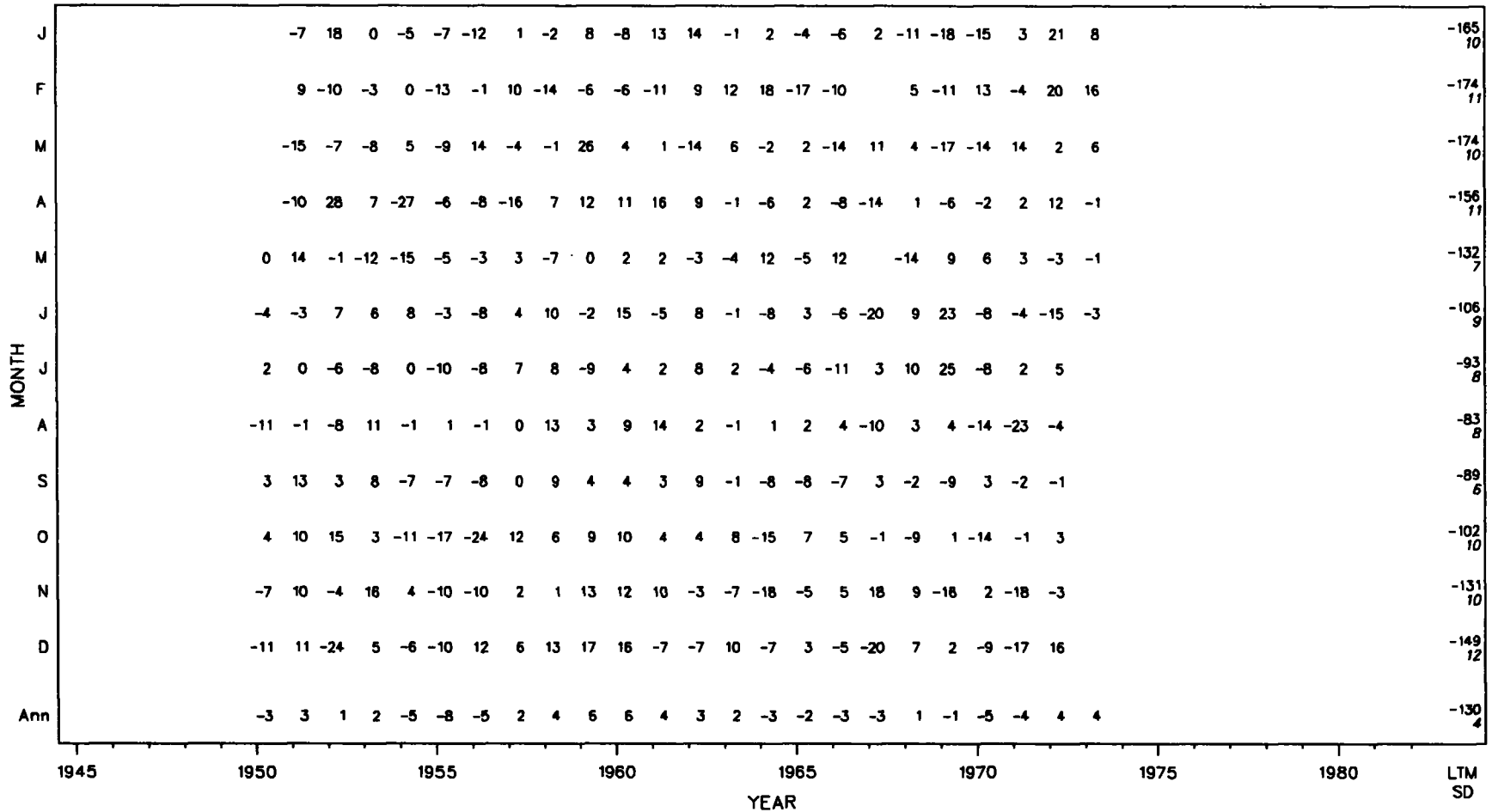
Units = 0.1 °C



OWS Study Area E Anomalies

### Air Temperature: 500 mb

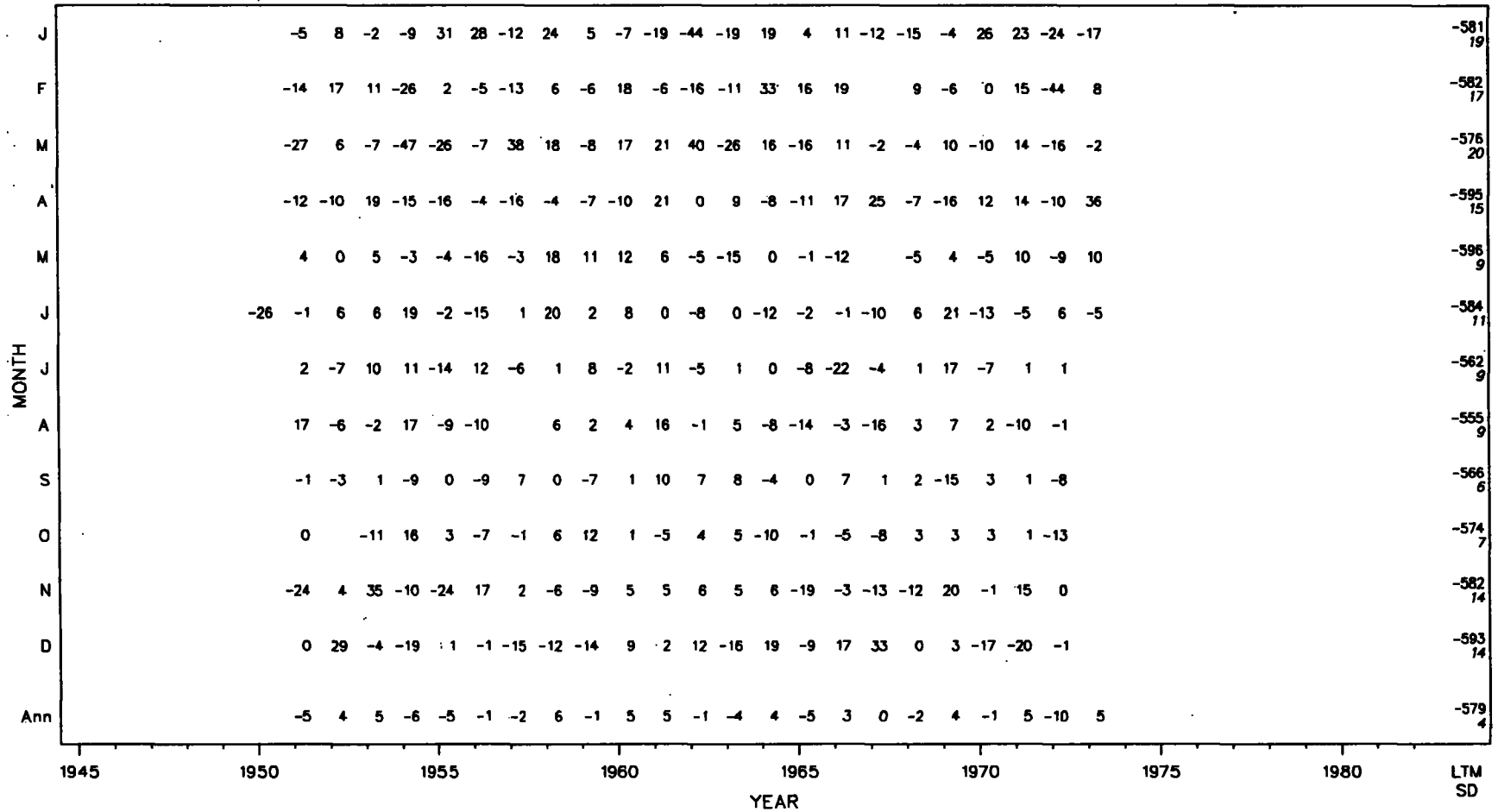
Units = 0.1 °C



### OWS Study Area E Anomalies

### Air Temperature: 200 mb

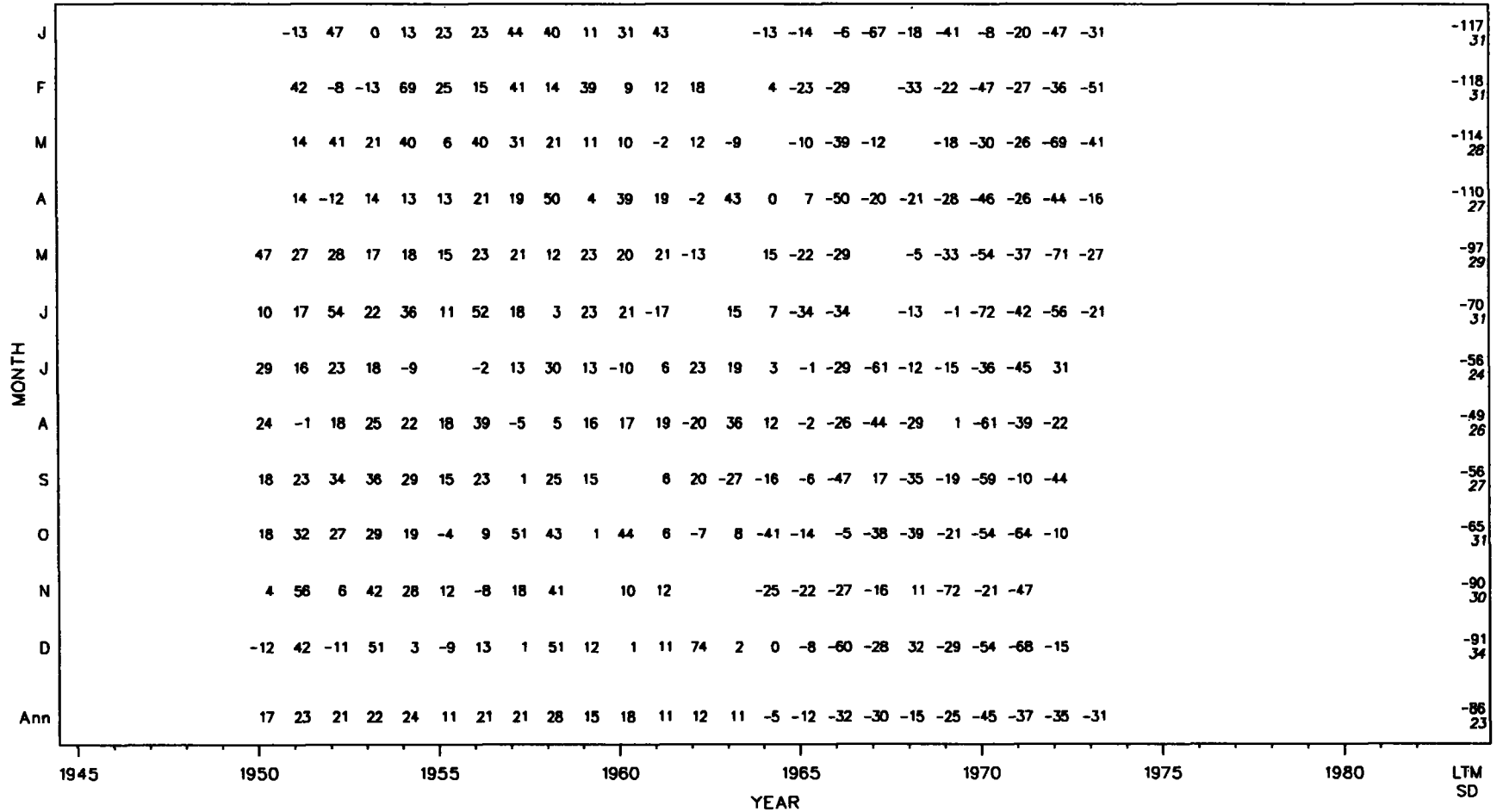
Units = 0.1 °C



OWS Study Area E Anomalies

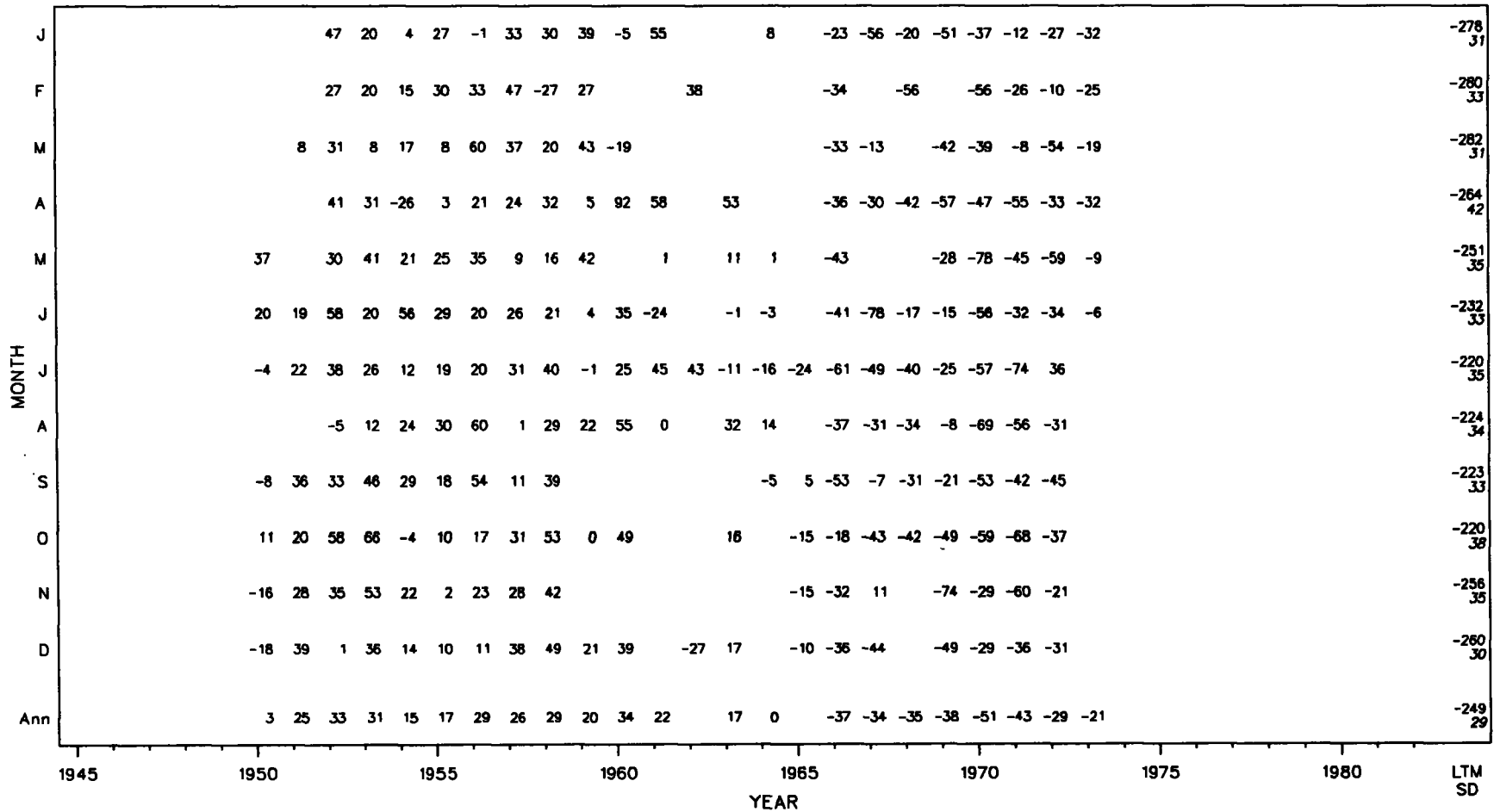
### Dew Point Temperature: 700 mb

Units = 0.1 °C



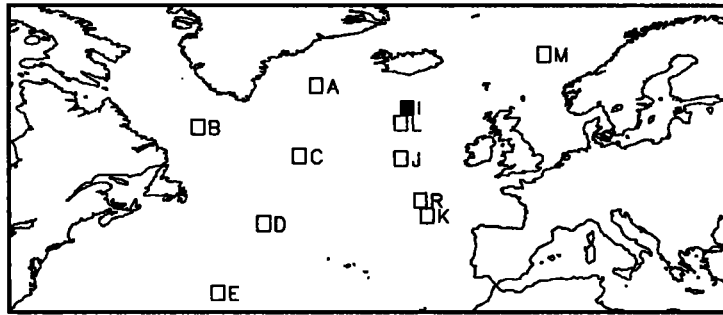
### OWS Study Area E Anomalies

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**

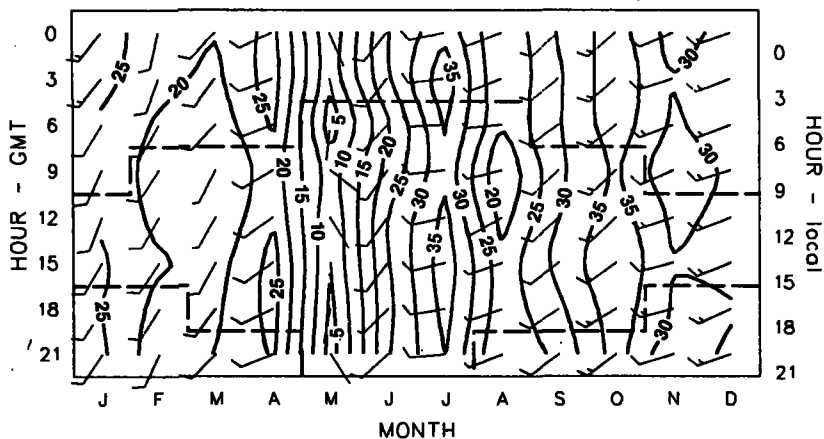
MONTH	YEAR																				Sum						
	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020	2025	2030	2035	2040							
J	20	15	1	31	29	26	31	22	31	31	30	28	31	31	9	30	31	31	31	30	31	29	28	16	654		
F	16	26	17	9	28	17	21	27	16	29	27	28	28	29	28	26	24	29	27	28	27	29	27	23	28	614	
M	18	28	29		30	29	31	31	22	30	31	30	31	31	31	31	29	31	31	31	31	30	31	30	30	707	
A	30	30	30	11	30	30	30	30	20	30	30	28	30	30	30	30	29	29	27	30	30	30	30	26	29	709	
M	31	28	12	17	30	29	31	31	25	31	31	31	31	31	30	31	31	31	30	30	28	30	31	31	26	31	718
J	30	29	14	29	30	30	27	27	28	28	30	30	30	29	30	30	30	30	30	30	30	29	29	26	30	715	
J	21	27	31	22	21	31	29	31	31	31	31	31	27	28	31	31	31	28	31	28	31	31	29	30	724		
A	31	7	31	5	30	28	31	24	25	31	31	31	31	31	29	31	31	31	29	26	31	31	30	21	688		
S	20	11	28		30	29	30	30	27	30	25	28	30	30	29	30	30	28	30	30	30	28	30	25	29	667	
O	4	26	19		31	30	31	31	31	31	30	31	31	31	31	31	31	31	30	31	31	31	31	22	688		
N	12	1	30		28	30	27	27	28	29	30	28	30	29	29	30	30	30	30	20	30	30	28	29	27	642	
D		11	11		27	27	23	28	30	27	31	28	31	30	31	31	31	31	30	27	31	31	31	28	606		
Ann	233	239	253	124	167	352	332	342	340	321	357	356	355	360	362	341	362	353	363	340	356	361	362	349	288	164	8132
	232	239	253	123	167	352	318	342	340	321	357	356	355	359	362	341	362	353	362	340	356	361	359	348	288	164	8110

### 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.

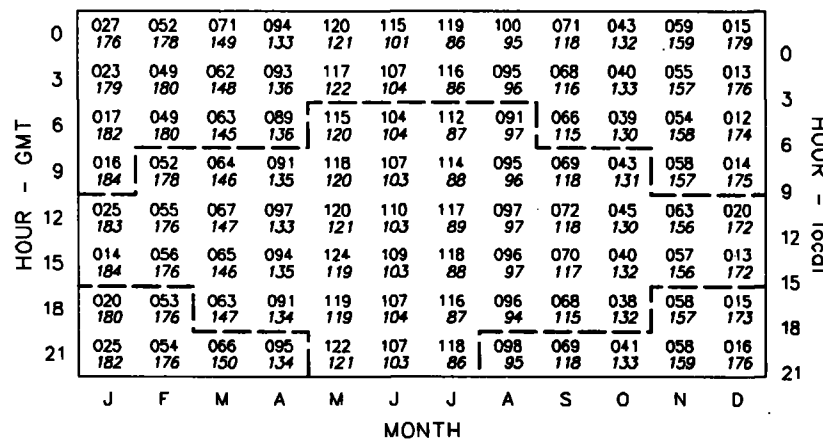
### Wind

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



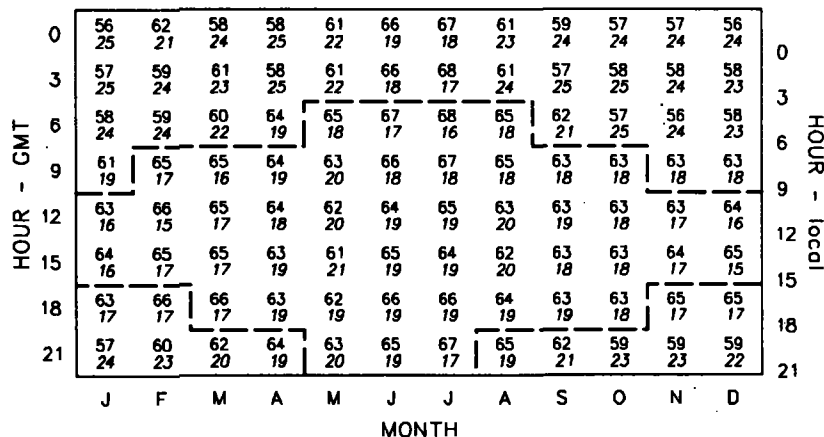
### Pressure

Units = 0.1 mb



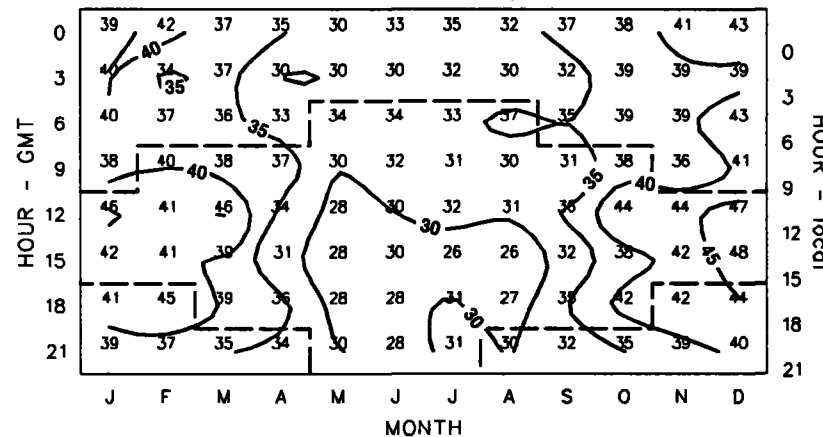
### Total Cloudiness

Units = 0.1 okta



### Precipitation Frequency

Units = percent  
Contour interval = 5 percent



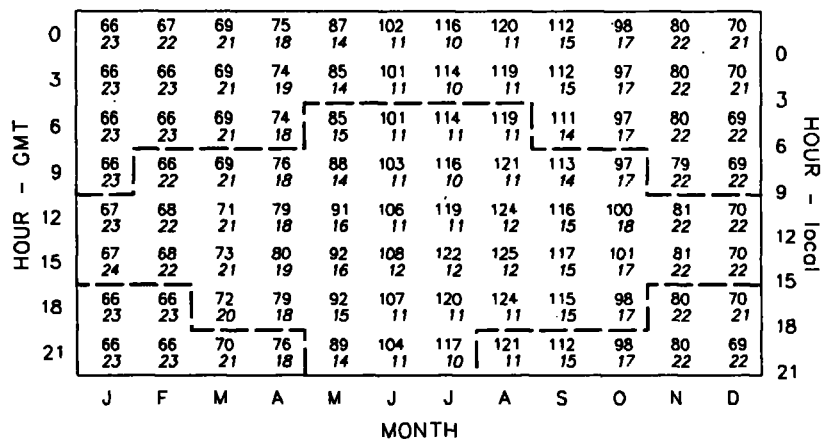
## OWS Study Area I Surface Climatology

upper number = mean  
lower number = standard deviation

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

### Air Temperature

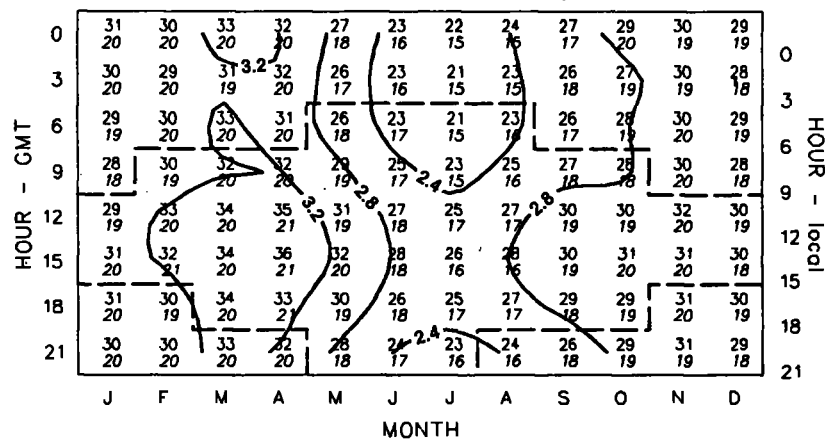
Units = 0.1 °C



### Dew Point Depression

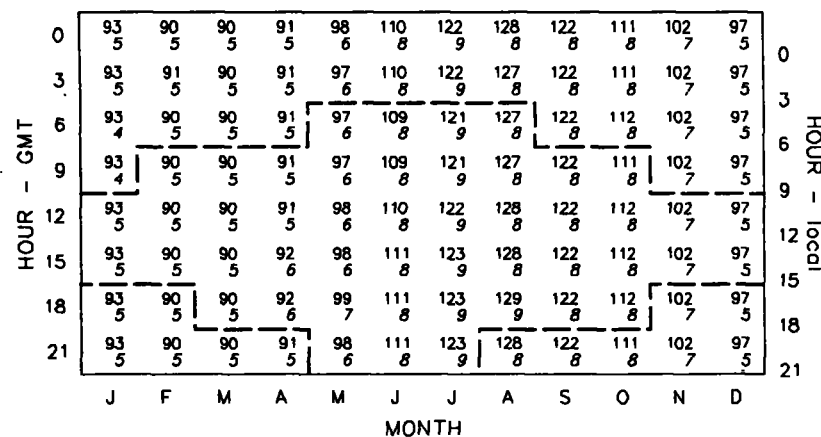
Units = 0.1 °C

Contour interval = 0.4 °C



### Sea Surface Temperature

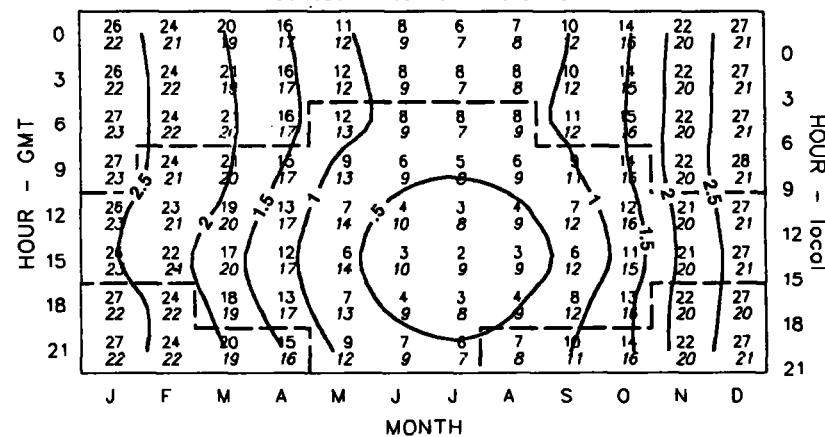
Units = 0.1 °C



### Sea - Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



## OWS Study Area I Surface Climatology

upper number = mean

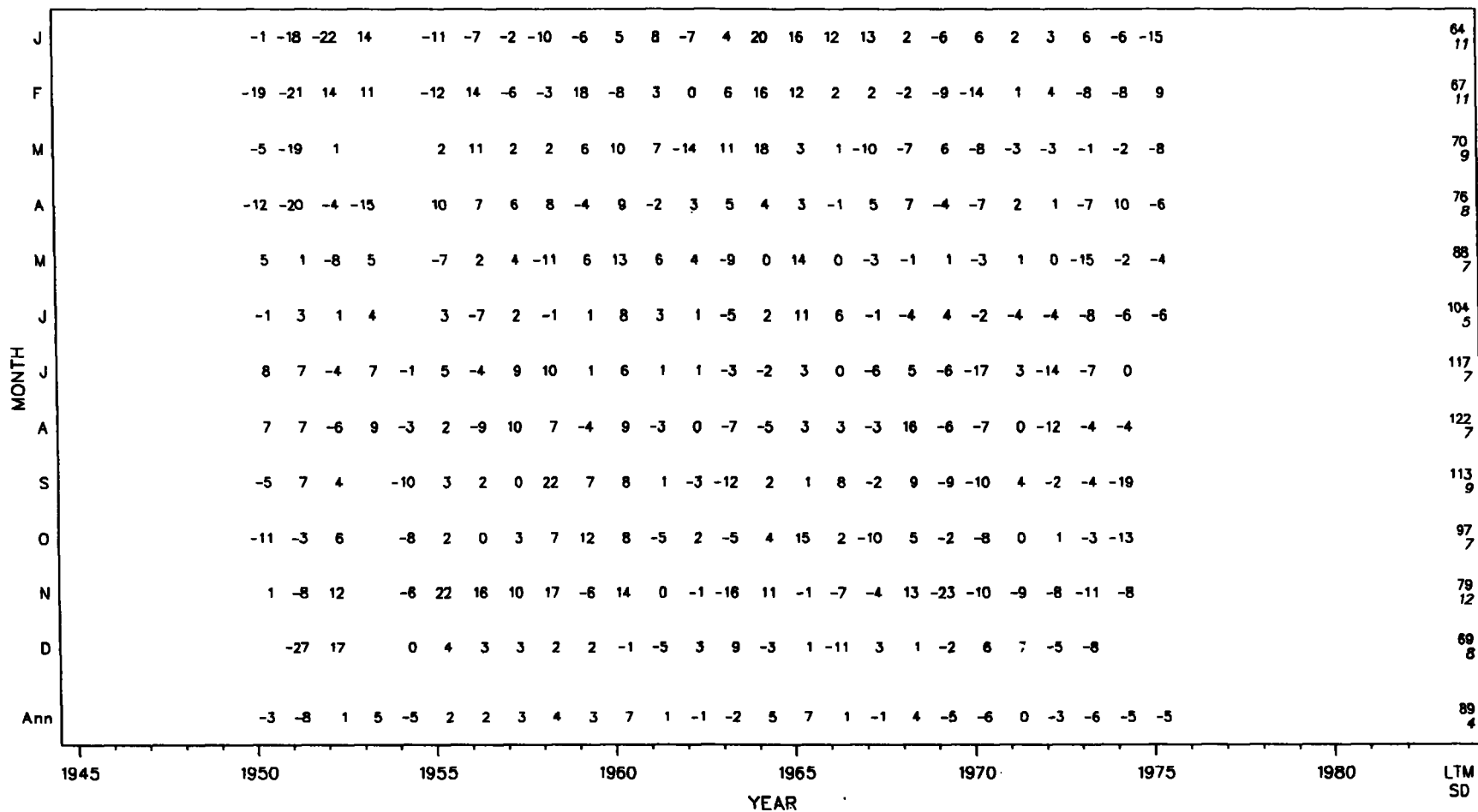
lower number = standard deviation

———— data contours

----- sunrise/sunset

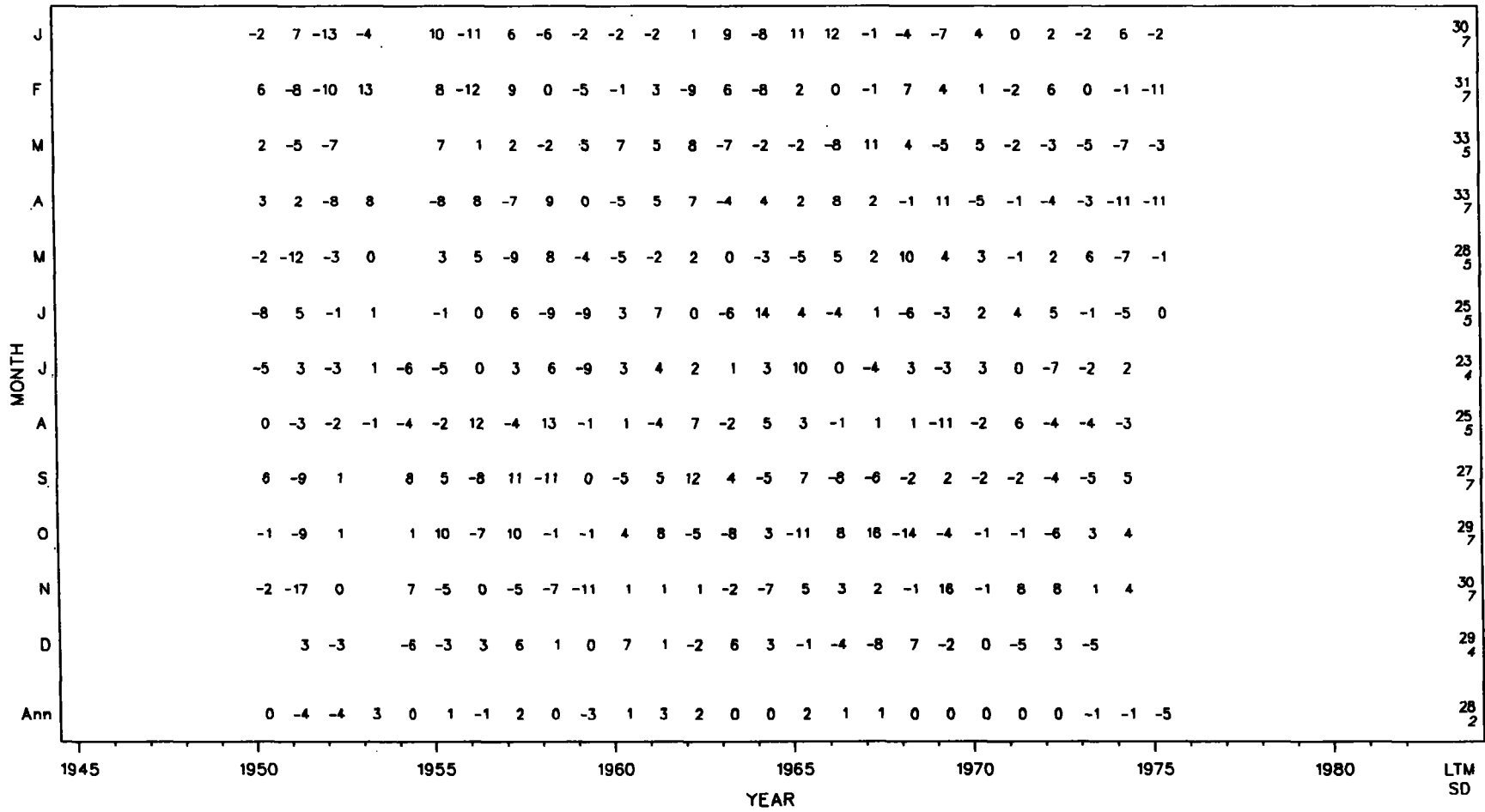
### Surface Air Temperature

Units = 0.1 °C



OWS Study Area I Anomalies

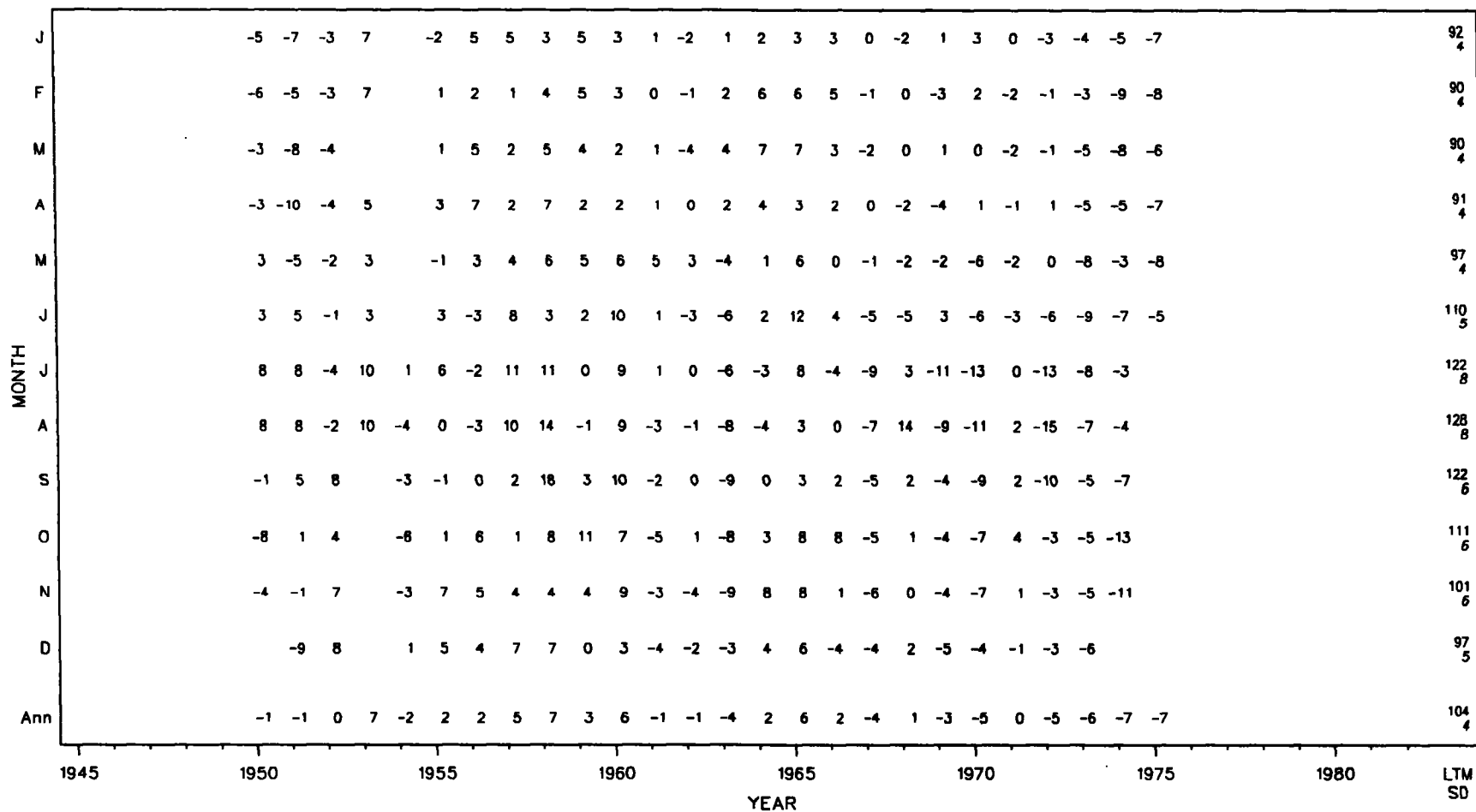
Surface Dew Point Depression  
Units = 0.1 °C



OWS Study Area I Anomalies

### Sea Surface Temperature

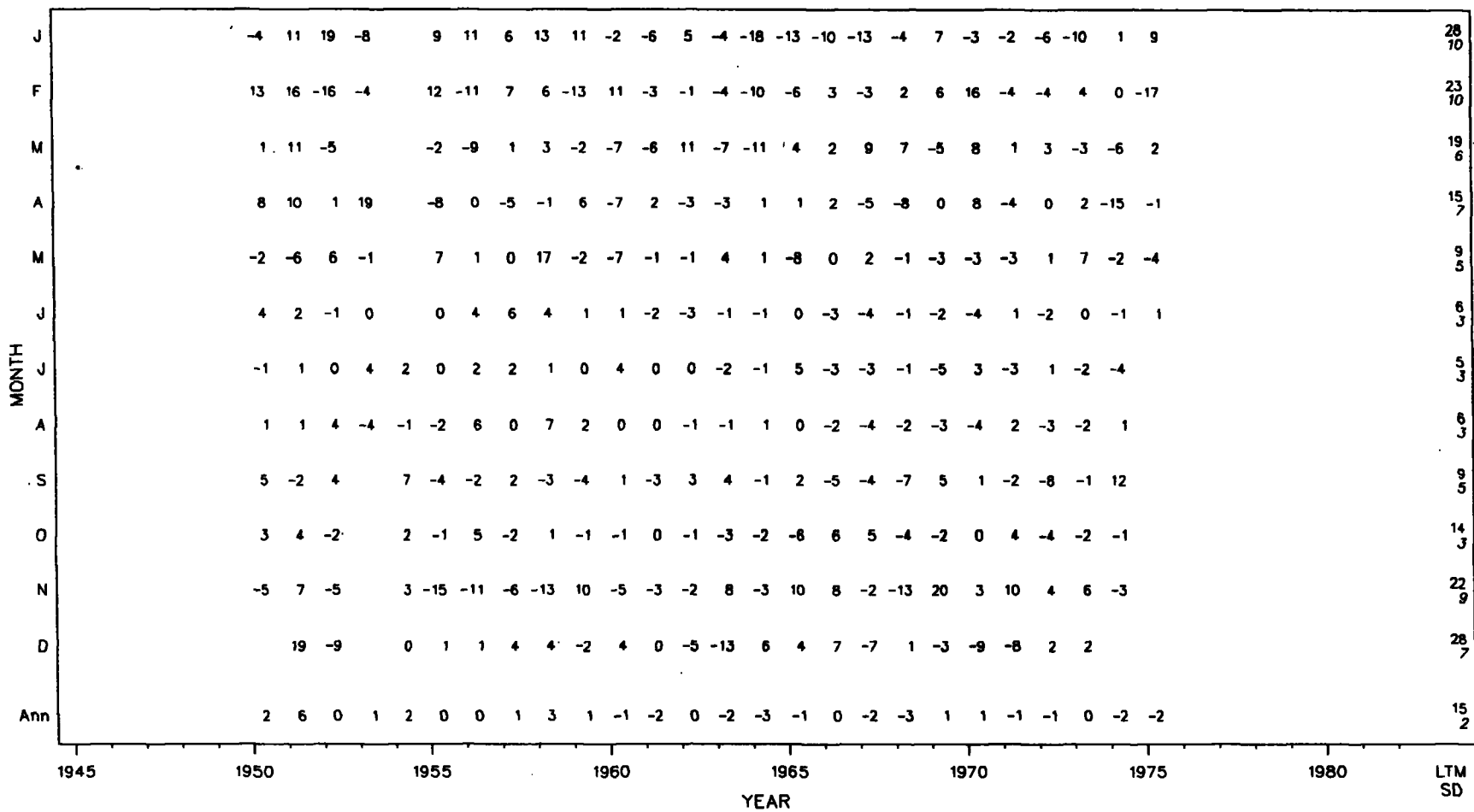
Units = 0.1 °C



OWS Study Area I Anomalies

### Sea - Air Temperature Difference

Units = 0.1 °C



OWS Study Area I Anomalies



### Surface Scalar Wind

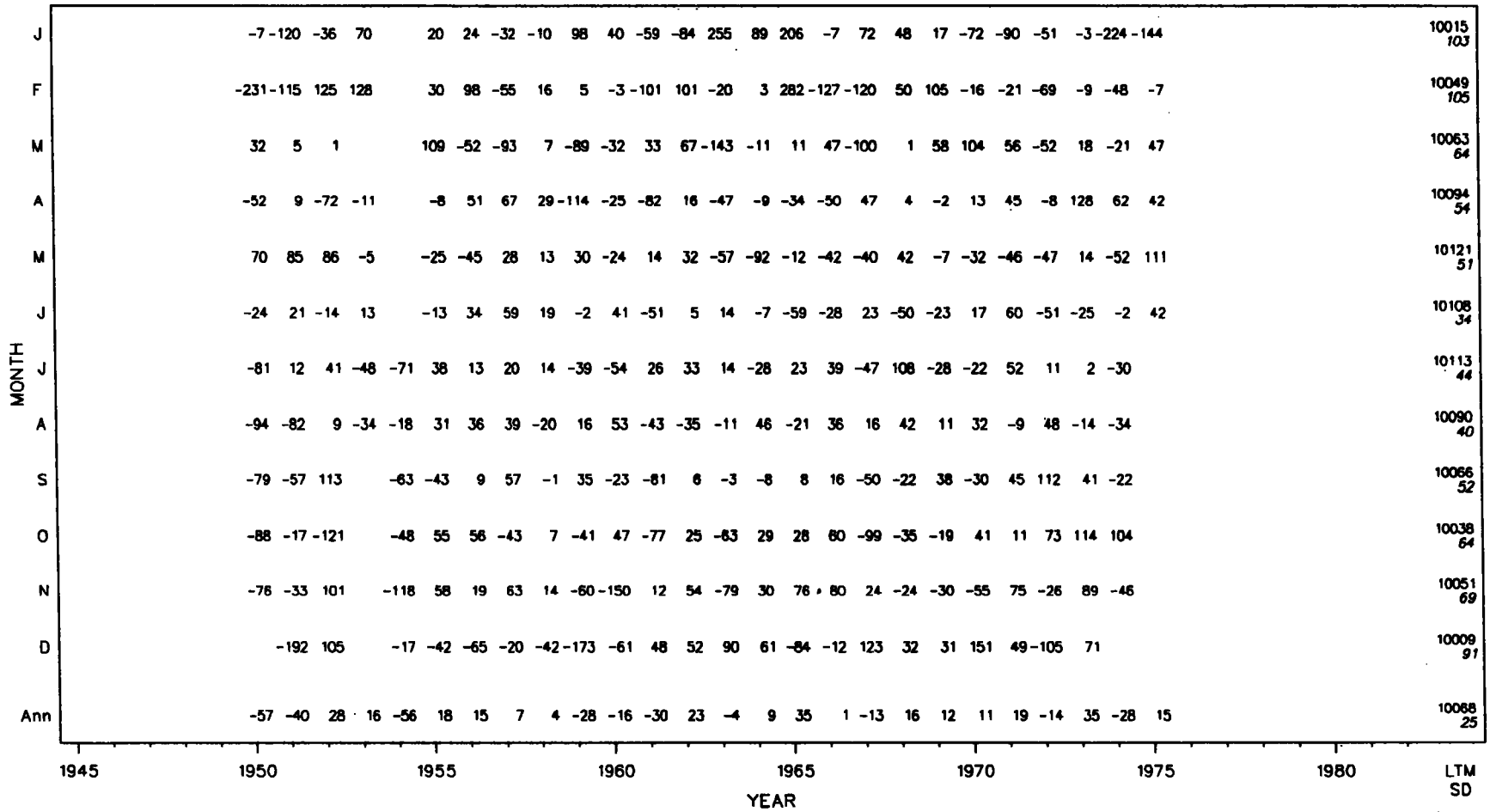
Units = 0.1 m/s

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																		
J	-9	-12	-49	1	-14	24	26	16	13	-6	-2	26	-16	9	-28	-4	-11	14	7	-11	-15	20	14	14	-9	118	18	
F	-17	-26	-7	-23	-12	13	2	-16	16	12	10	20	8	1	-31	31	11	-20	-15	2	2	-5	32	5	8	120	17	
M	-32	22	-6		-15	-5	-8	28	18	-3	13	-5	-4	-6	-7	10	27	6	-13	4	-30	-7	12	3	-3	116	15	
A	6	1	20	15	4	-11	-10	-3	48	26	-19	4	1	-6	7	-2	9	-10	1	-26	-22	-5	-13	-9	-5	104	16	
M	-19	-6	22	24	3	32	10	6	-3	-2	-11	-11	33	-2	-12	4	-8	-5	-11	-9	-15	-13	5	0	-12	89	14	
J	-6	-5	-2	-3	-8	11	-12	11	27	-7	24	-3	-14	7	-6	-5	6	-2	-1	-12	-5	6	-5	-3	7	81	10	
J	-13	1	8	-13	21	15	-2	-9	-22	6	15	4	-9	5	16	-16	10	10	-26	26	0	-14	11	-21	-3	79	14	
A	-20	-22	10	69	2	-3	1	-12	-15	10	-17	19	-7	-2	-5	17	-1	-13	-9	4	3	-2	-4	-1	-3	81	18	
S	4	18	-17		-6	17	-17	11	-3	9	19	13	3	12	-13	-16	-8	-7	1	5	-4	5	-12	-10	-4	95	11	
O	-13	2	11		8	-15	21	28	16	12	-12	-2	0	19	-9	-4	-18	2	-10	0	10	-16	-17	-13	-1	110	13	
N	-13	-51	-9		5	-13	25	-3	19	13	-9	-3	-7	12	9	10	23	15	-12	4	-5	4	-1	-12	1	110	16	
D		32	-15		13	23	11	7	12	-8	7	-23	7	-26	-10	-22	13	0	-8	-9	-10	6	-3	3		124	15	
Ann	-12	-4	-3	10	7	-1	9	3	4	13	2	2	1	2	-1	-9	4	3	-7	0	-5	-9	-2	-1	0	-2	102	6

OWS Study Area I Anomalies

### Sea Level Pressure

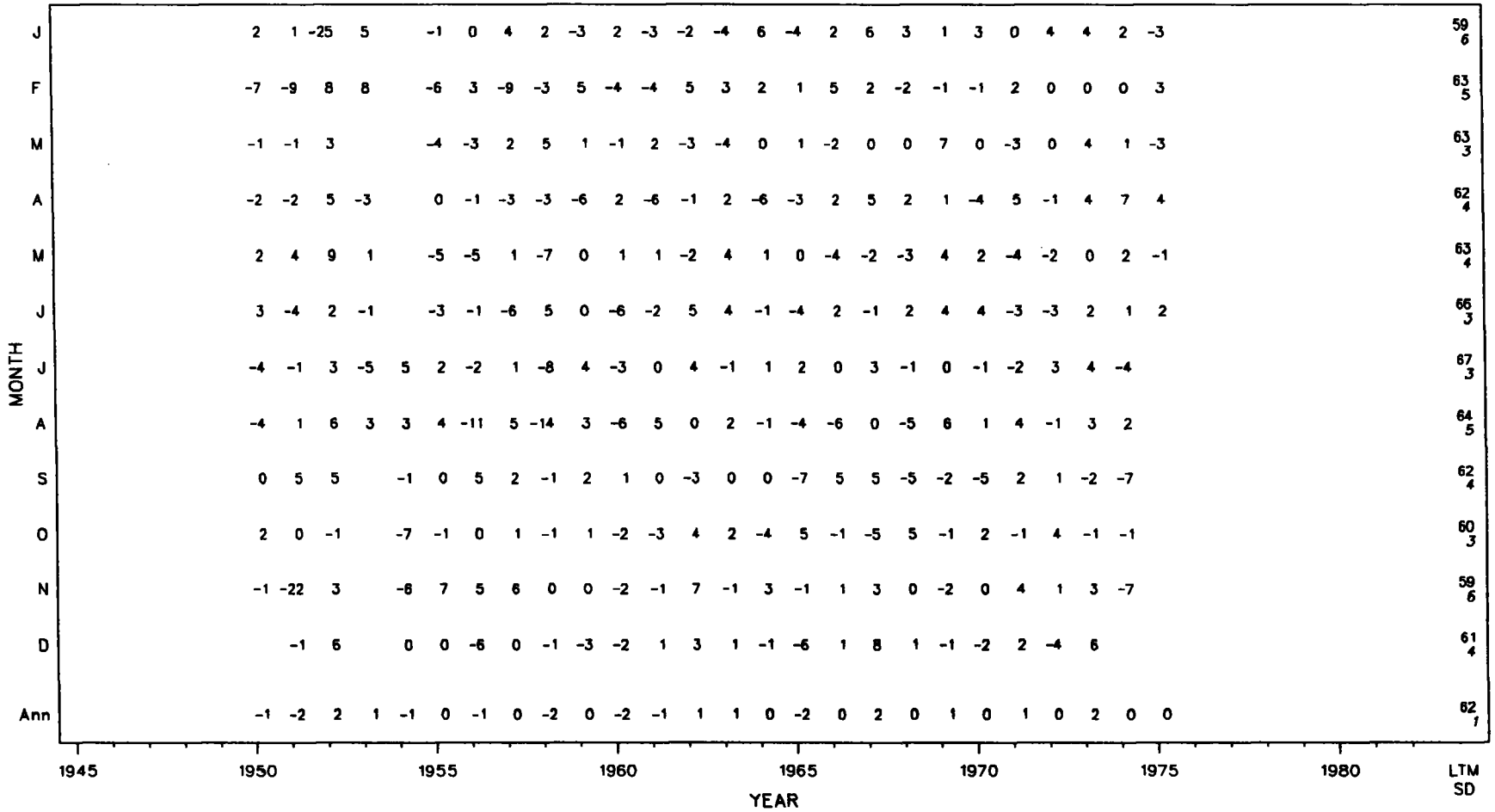
Units = 0.1 mb



### OWS Study Area I Anomalies

### Total Cloudiness

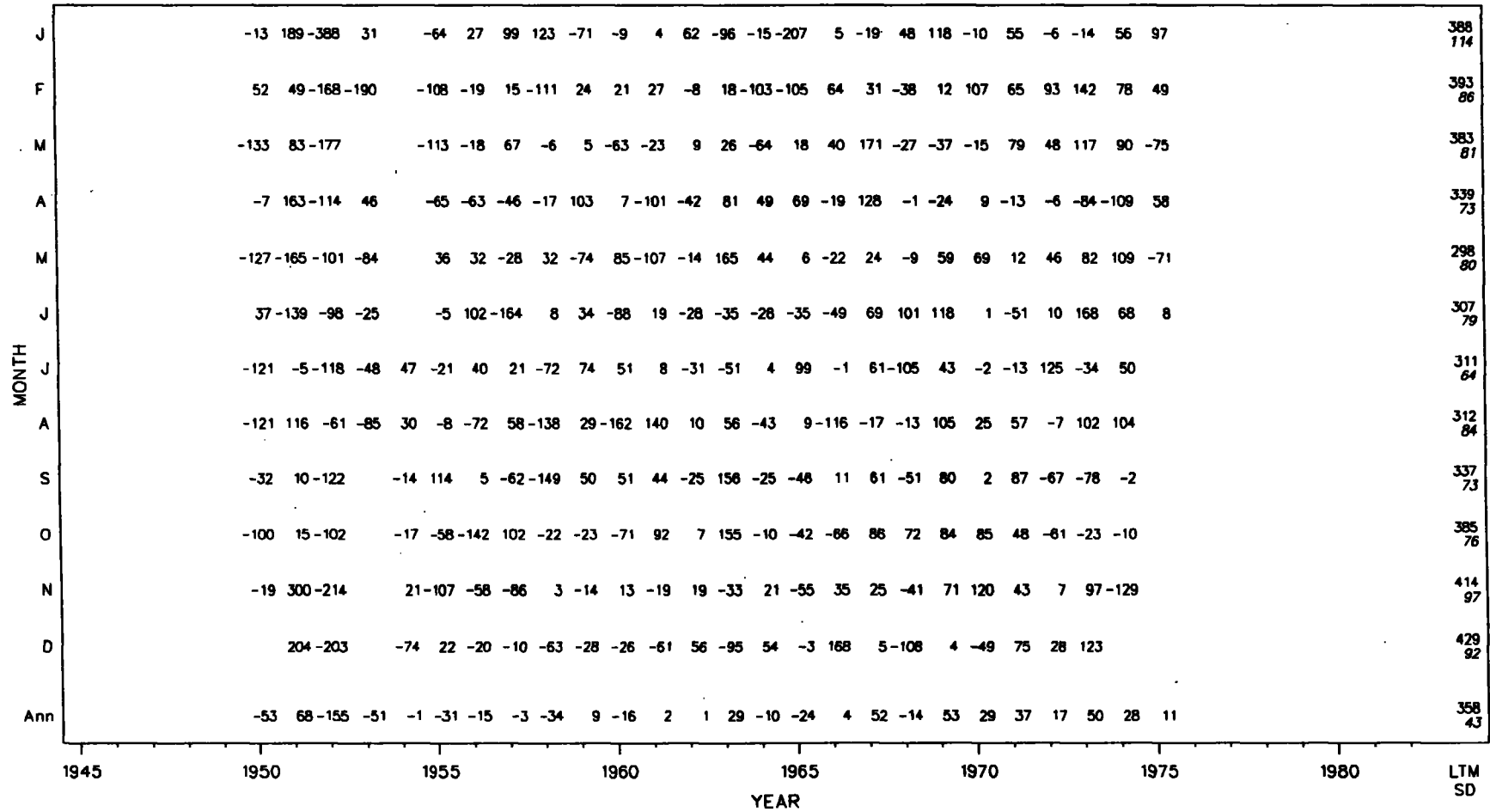
Units = 0.1 okta



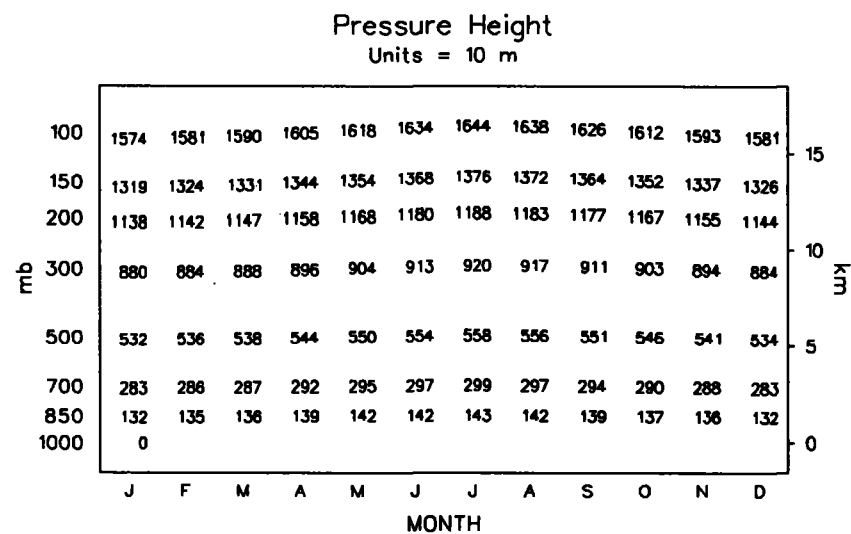
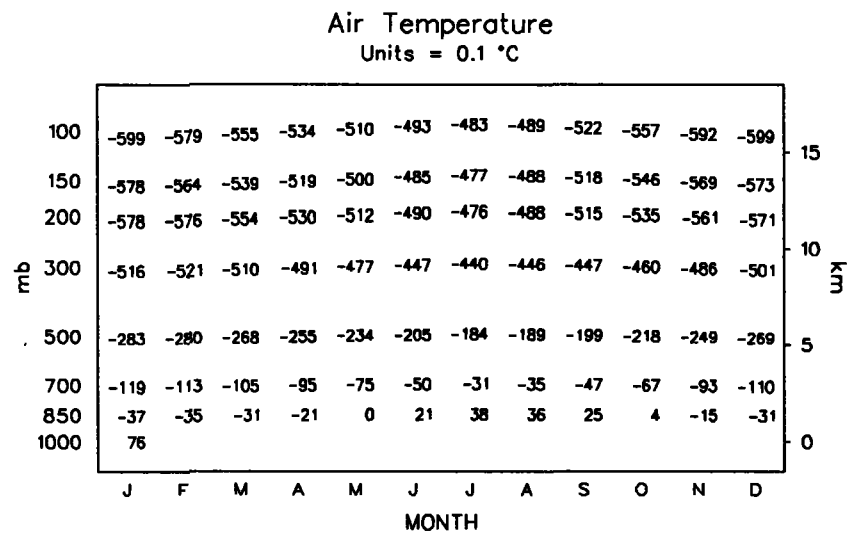
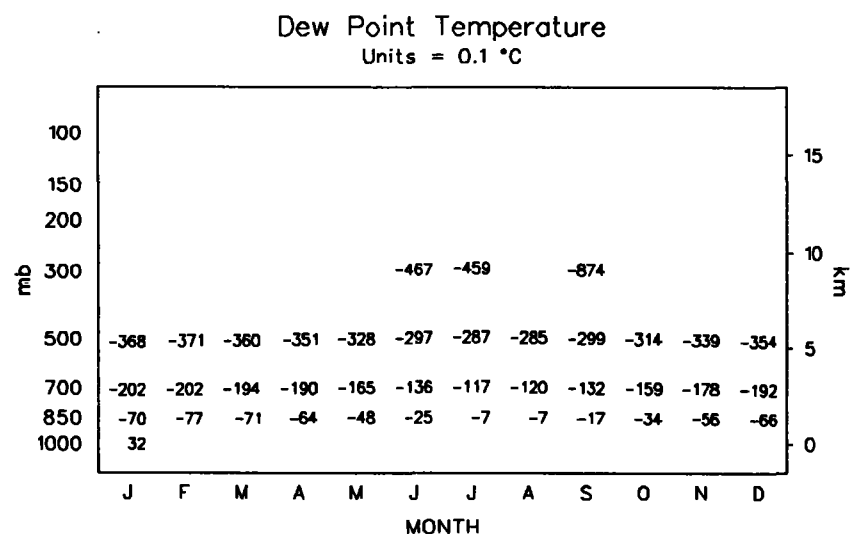
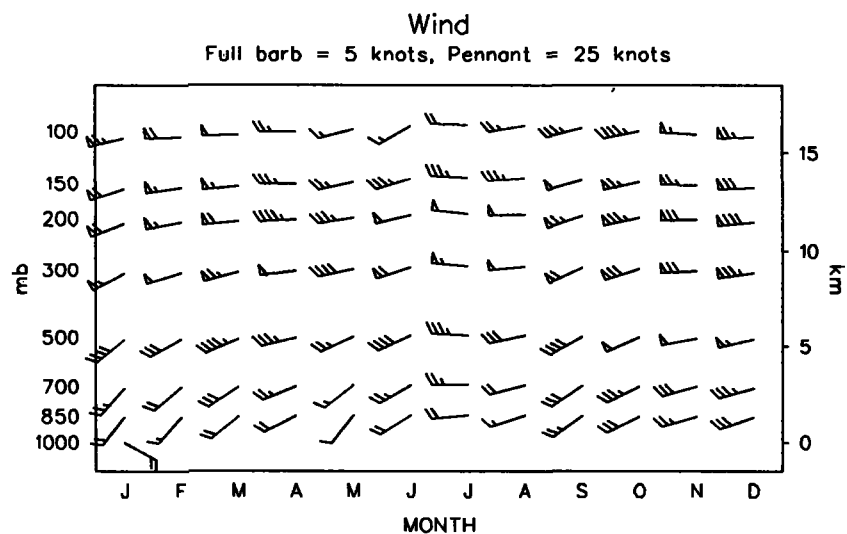
### OWS Study Area I Anomalies

### Précipitation Frequency

Units = 0.1 percent



OWS Study Area I Anomalies

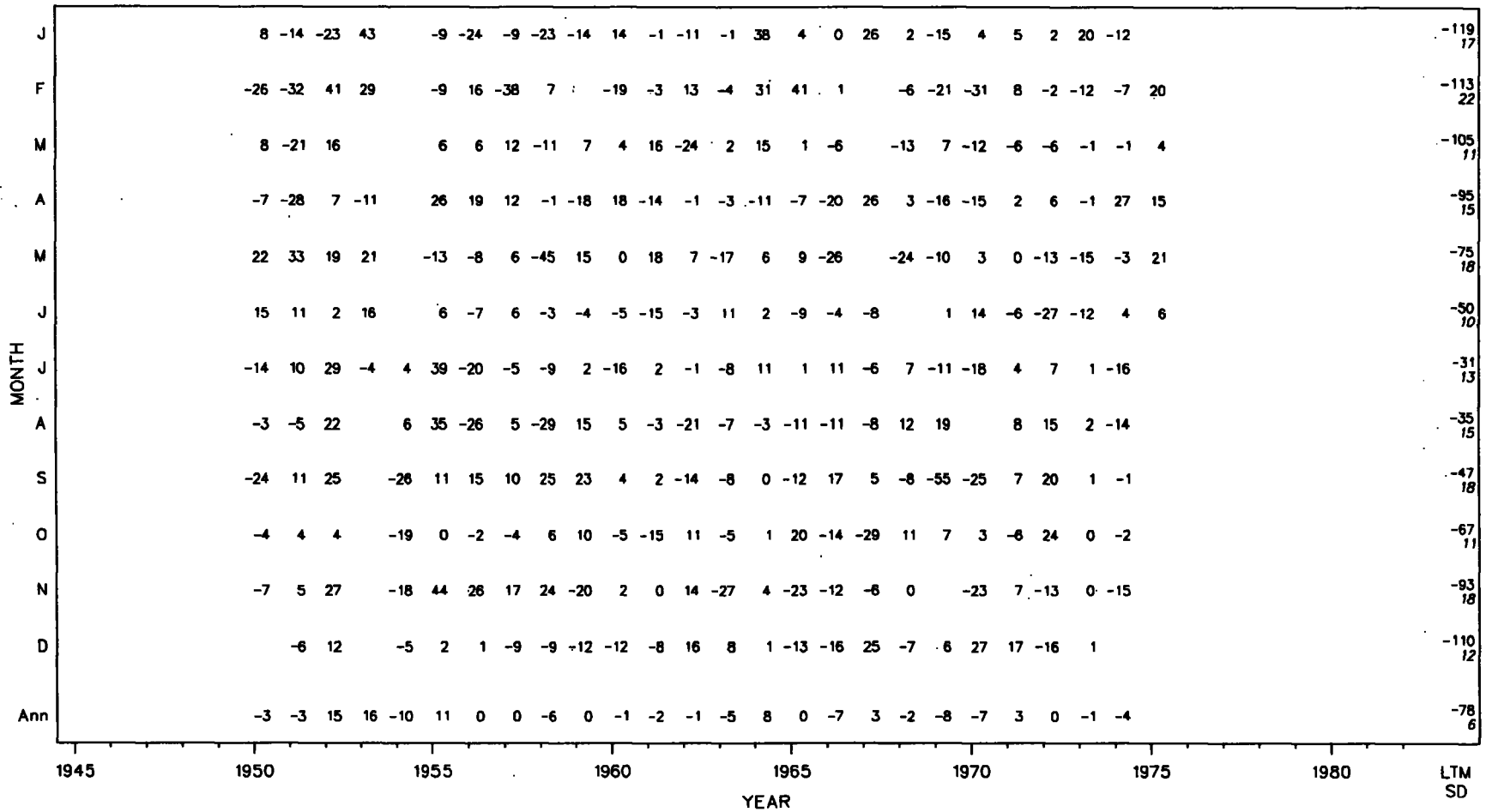


## OWS Study Area I Upper Air Climatology

Mean plotted at actual height

### Air Temperature: 700 mb

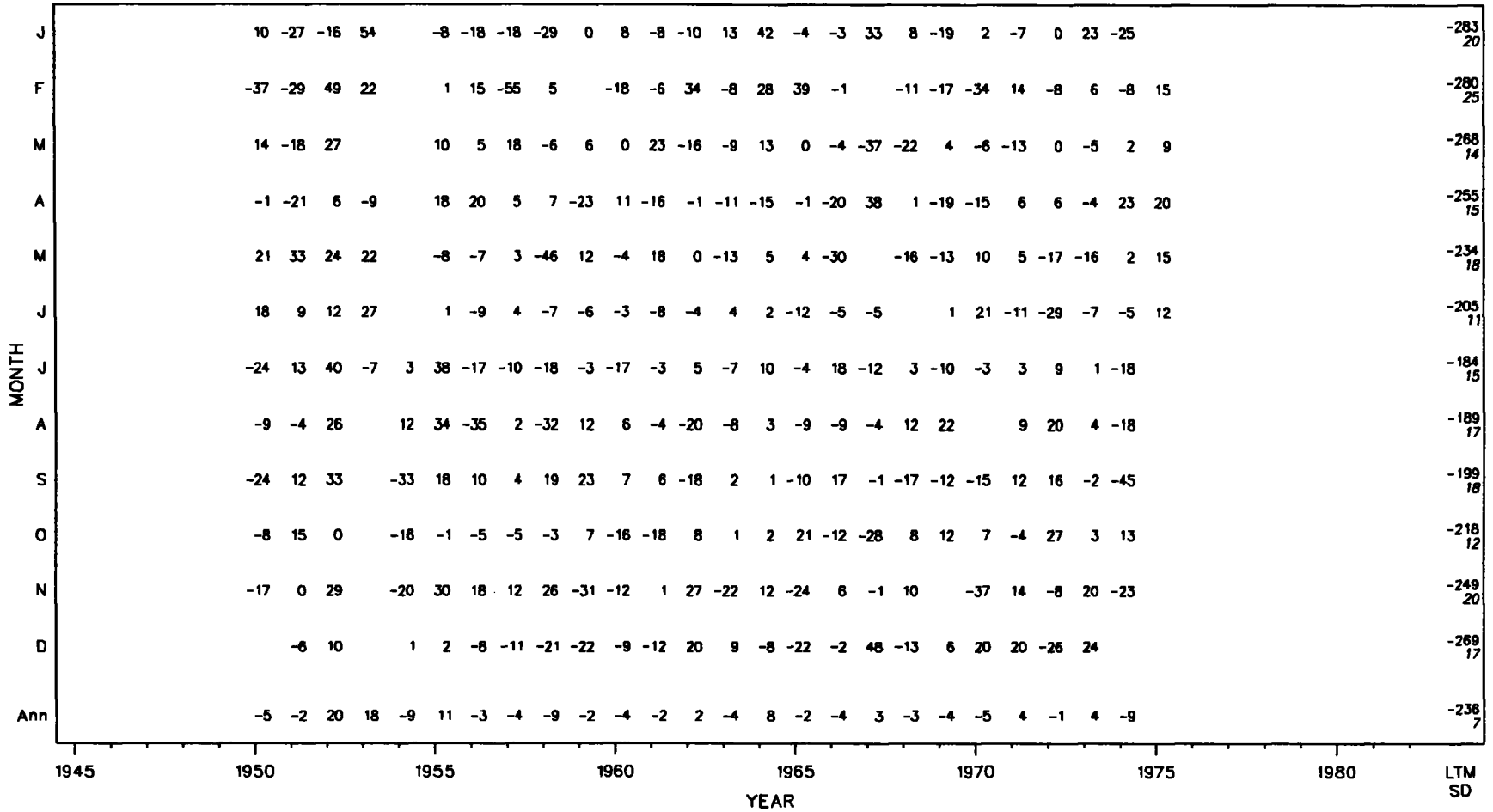
Units = 0.1 °C



OWS Study Area I Anomalies

Air Temperature: 500 mb

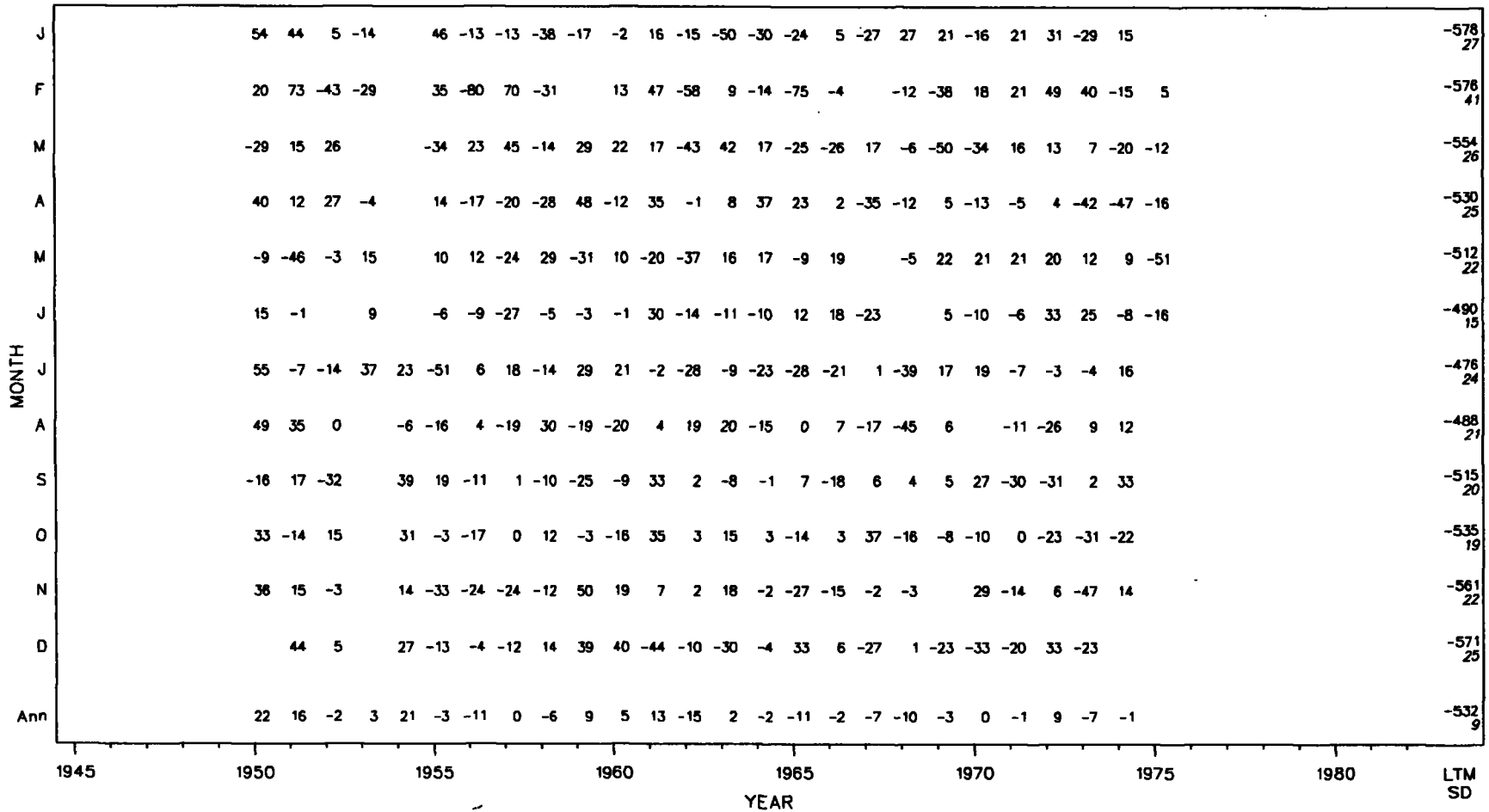
Units = 0.1 °C



OWS Study Area I Anomalies

### Air Temperature: 200 mb

Units = 0.1 °C

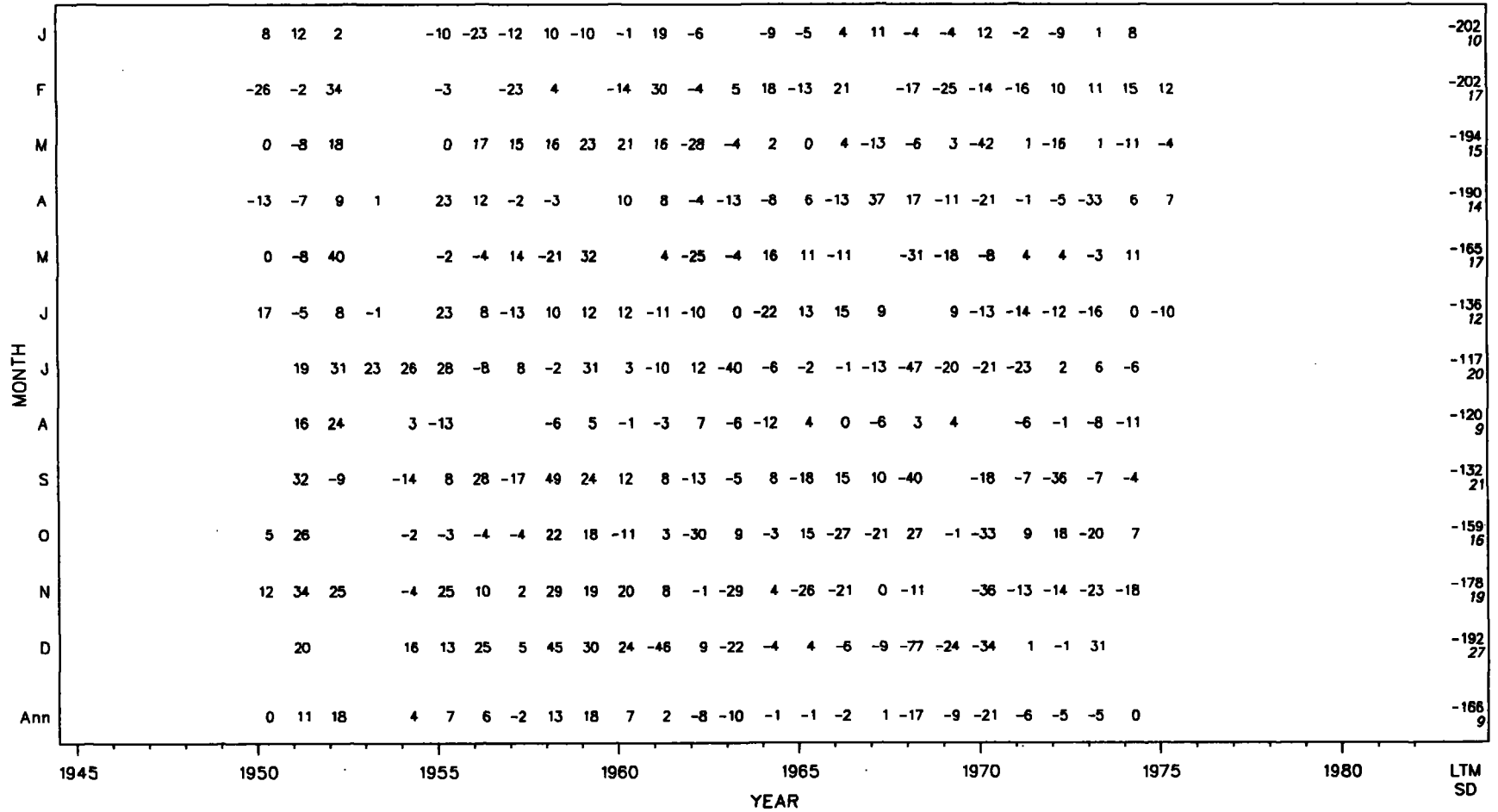


OWS Study Area I Anomalies



### Dew Point Temperature: 700 mb

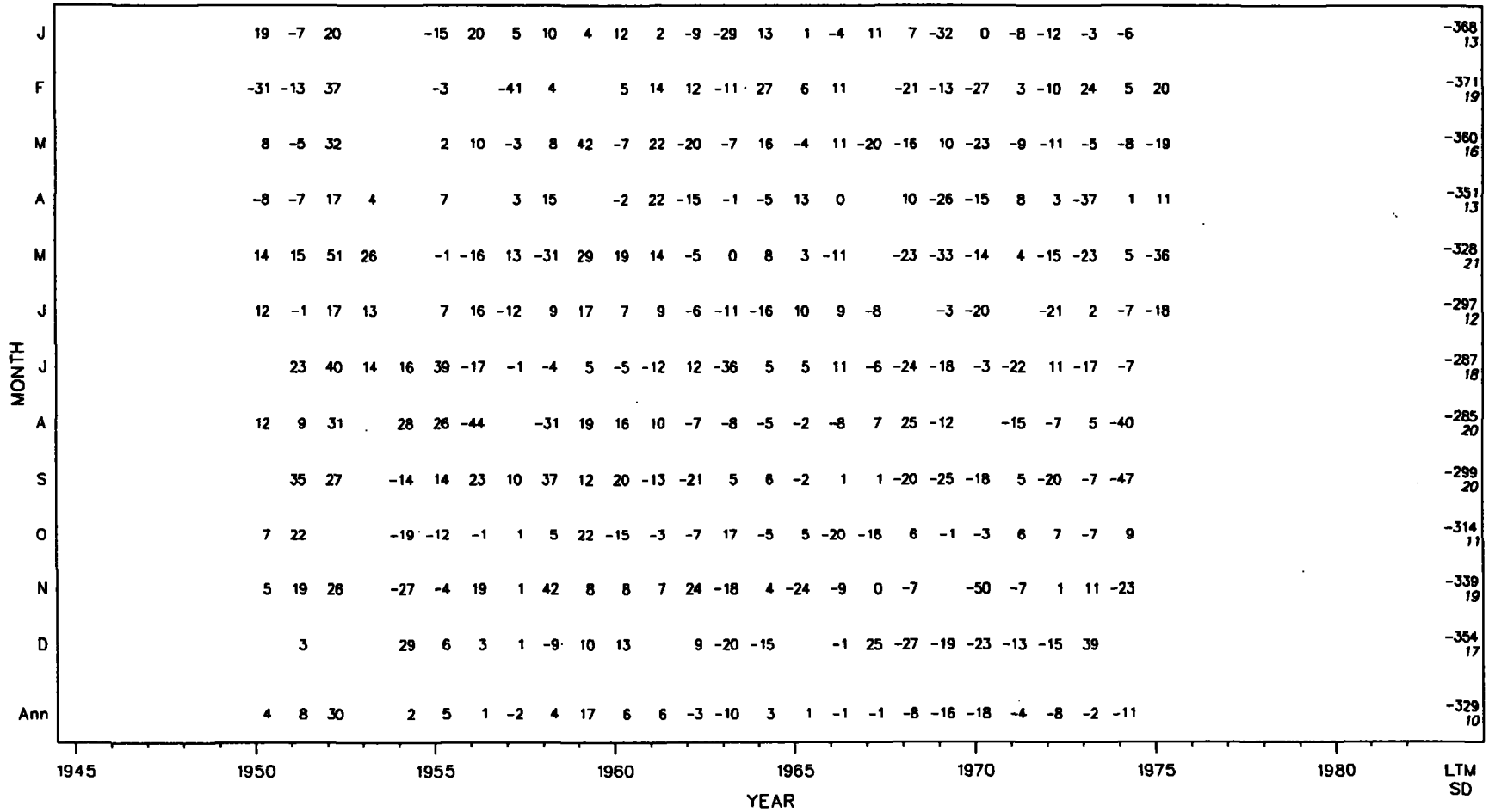
Units = 0.1 °C



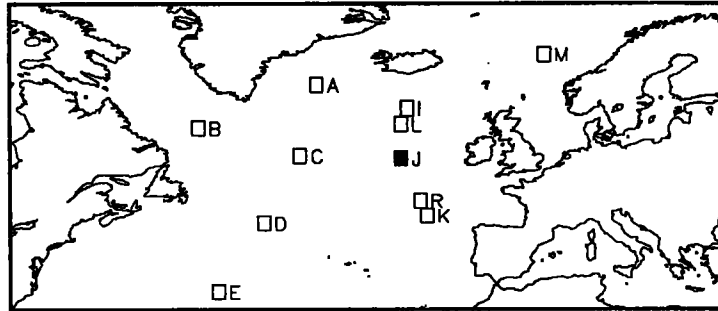
### OWS Study Area I Anomalies

### Dew Point Temperature: 500 mb

Units = 0.1 °C



OWS Study Area I Anomalies



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

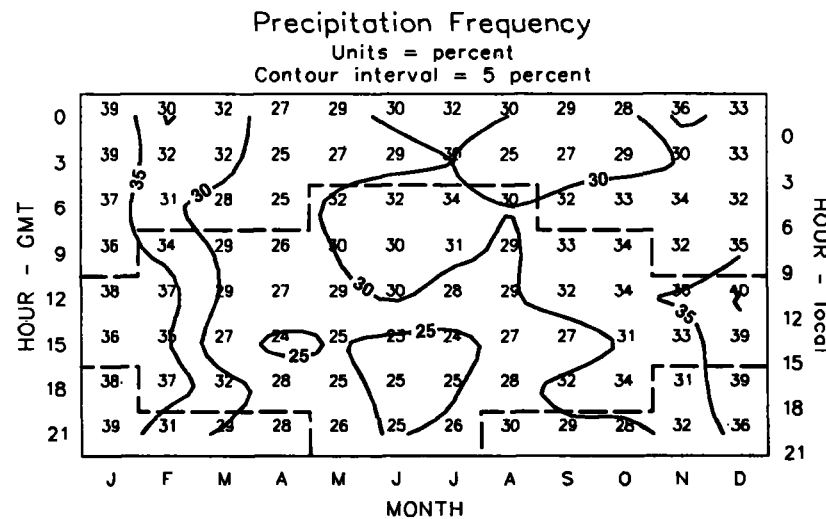
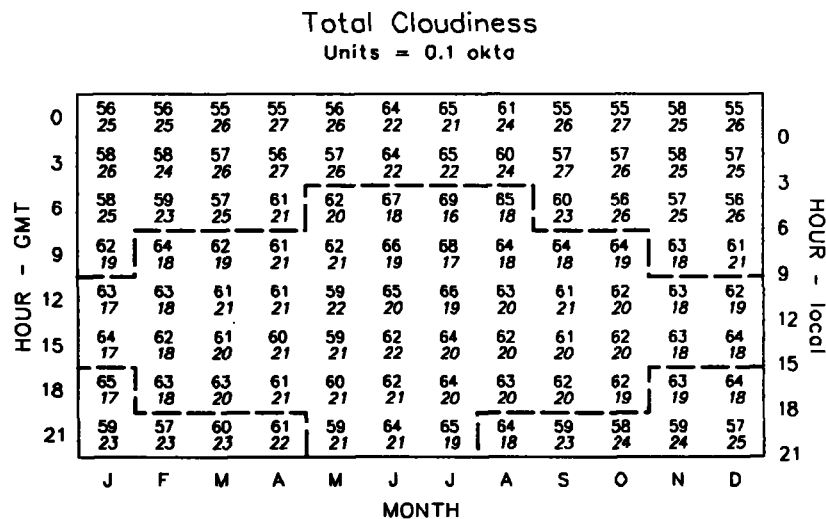
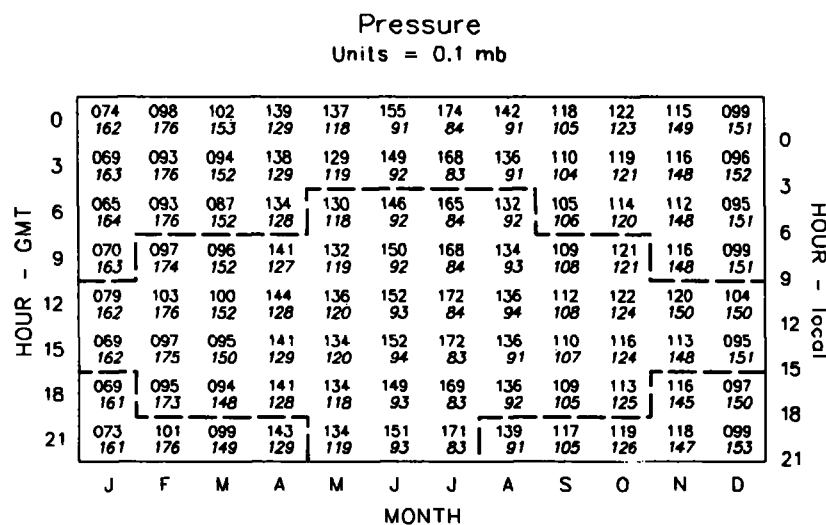
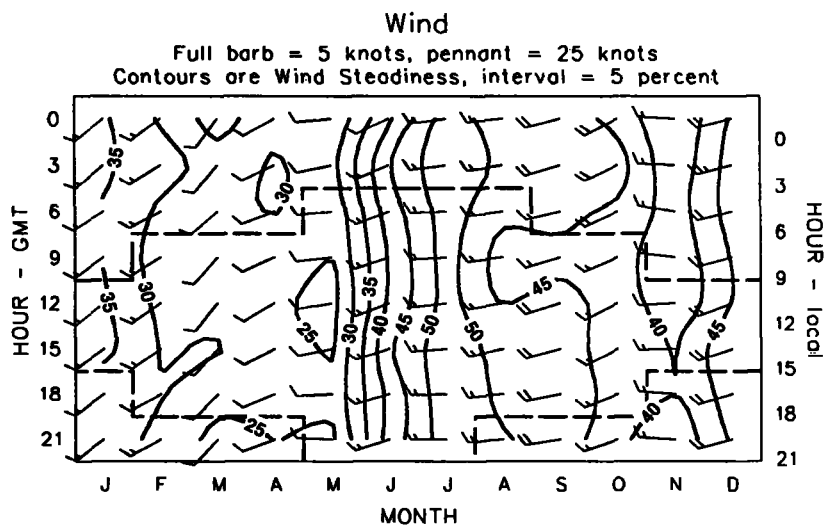
**OWS**  
**J**

J		30	28	31	31	29	27	31	30	30	30	28	30	31	31	30	31	31	30	31	31	31	31	30	28	30	751	
F		27	29	27	28	24	29	27	28	24	29	27	27	23	29	28	28	27	28	27	23	26	29	28	28	28	678	
M		6	24	31	31	30	31	28	30	31	24	31	31	30	29	30	31	30	29	29	29	28	29	31	31	28	741	
A		27	25	30	30	30	30	29	30	30	30	29	30	24	30	29	30	30	30	30	30	28	27	30	29	28	749	
M		24	26	11	31	31	29	30	31	31	21	30	31	31	30	30	31	30	31	31	31	31	29	31	27	31	747	
J		27	28	21	30	30	29	29	30	30	30	30	30	30	24	29	29	29	29	30	30	27	30	28	30	29	748	
J		27	31	19	31	31	30	29	31	31	30	31	31	31	31	31	31	29	30	31	30	31	31	31	30	750		
A		24	31	23	31	30	30	30	30	26	29	29	24	31	31	31	31	31	30	30	31	28	29	31	30	27	728	
S		27	30	15	30	30	30	30	29	29	30	30	30	29	29	30	30	30	30	30	29	29	30	18	28	30	712	
O		28	29	8	31	30	31	24	15	31	31	29	31	31	29	31	31	31	30	28	29	31	31	31	31	27	709	
N		29	27	29	17	29	29	30	30	30	30	25	29	25	29	29	25	30	30	30	30	29	30	30	29	4	684	
D		31	22	29	31	24	29	24	31	28	28	27	30	31	31	31	31	31	31	31	31	30	31	31	27	31	29	730
Ann		250	330	273	351	354	351	337	345	355	337	350	352	350	353	356	358	360	358	357	358	349	351	350	353	323	188	8727
		248	329	273	351	354	351	336	345	355	337	350	352	349	353	356	358	360	358	357	357	349	349	349	353	323	165	8717
	1945																											
		1950																										
			1955																									
				1960																								
					1965																							
						1970																						
							1975																					
								1980																				
									Sum																			

## 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.



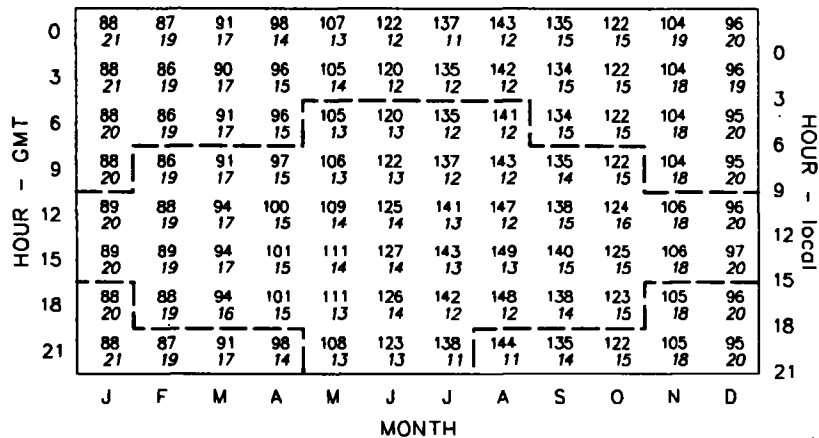
## OWS Study Area J Surface Climatology

upper number = mean  
lower number = standard deviation

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

### Air Temperature

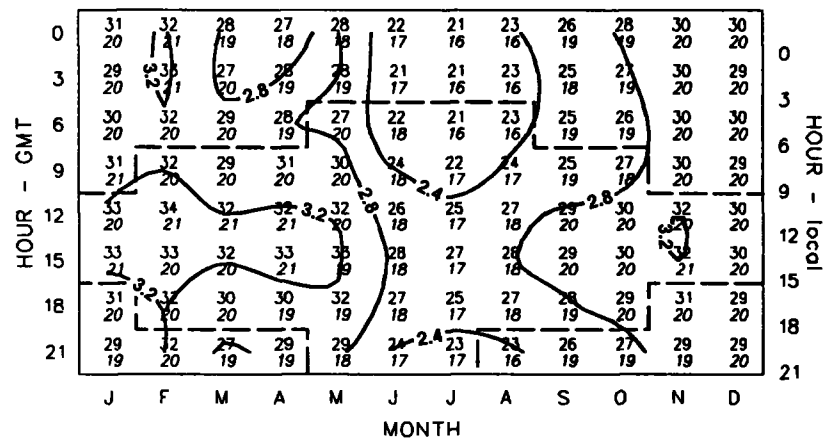
Units = 0.1 °C



### Dew Point Depression

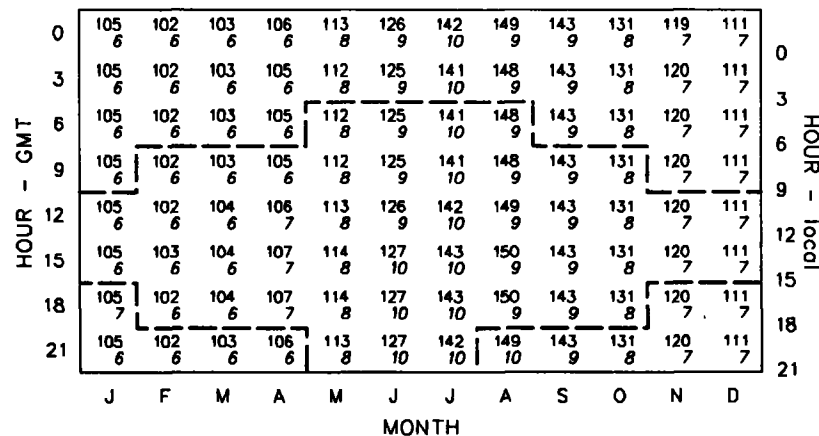
Units = 0.1 °C

Contour interval = 0.4 °C



### Sea Surface Temperature

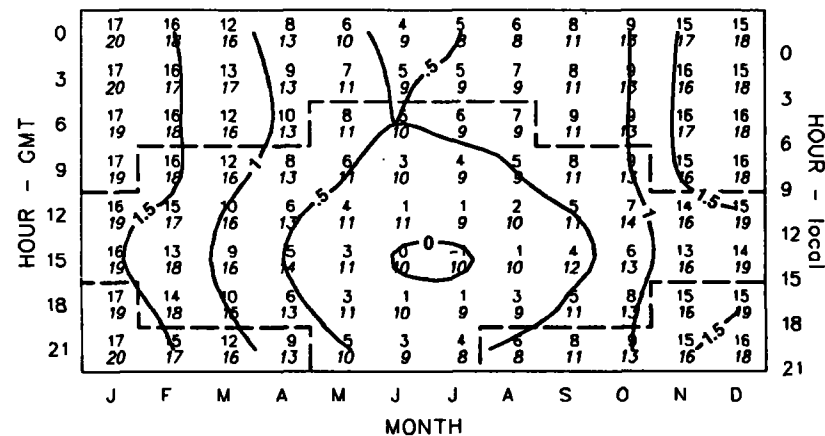
Units = 0.1 °C



### Sea - Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



## OWS Study Area J Surface Climatology

upper number = mean

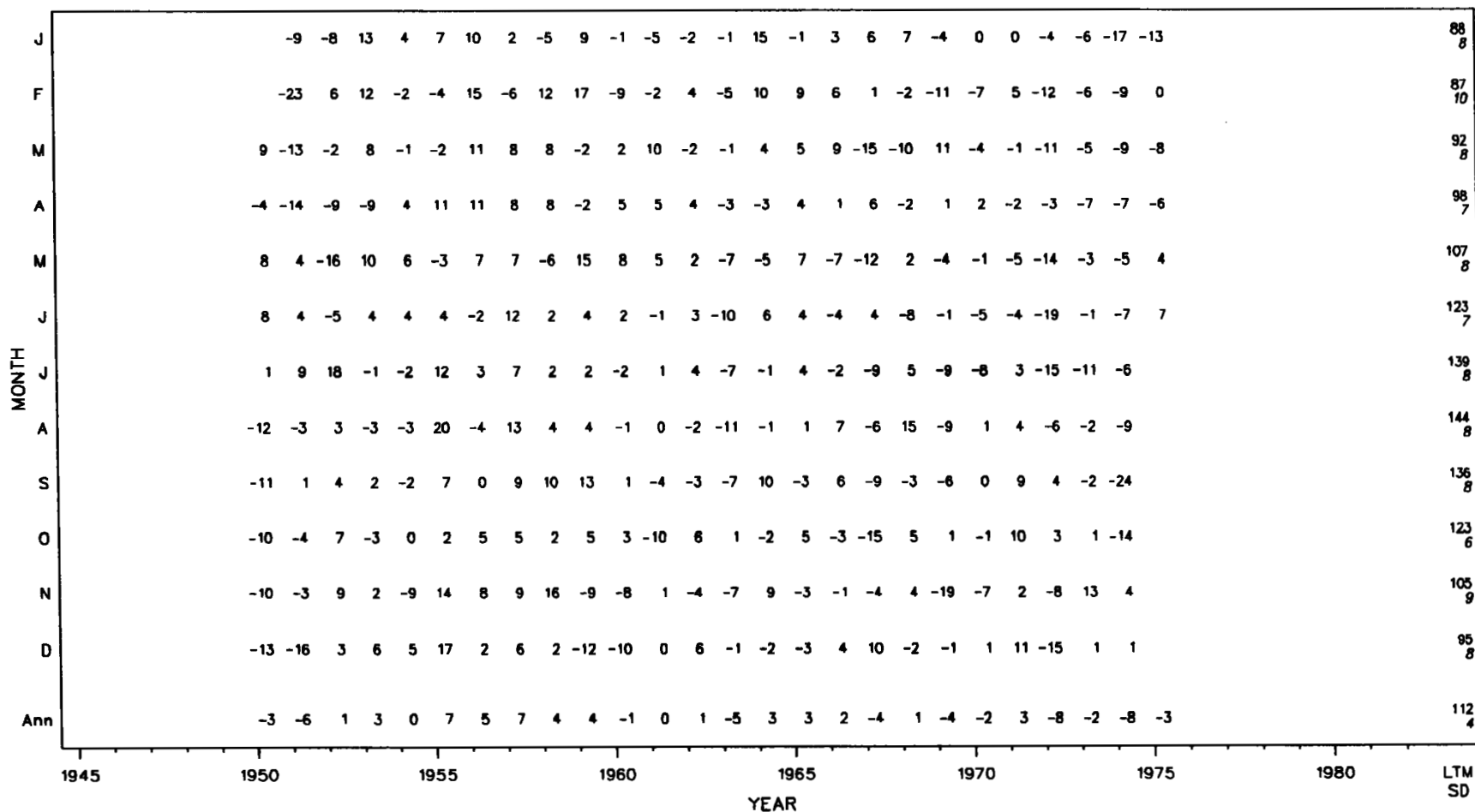
lower number = standard deviation

———— data contours

----- sunrise/sunset

### Surface Air Temperature

Units = 0.1 °C



OWS Study Area J Anomalies

### Surface Dew Point Depression

Units = 0.1 °C

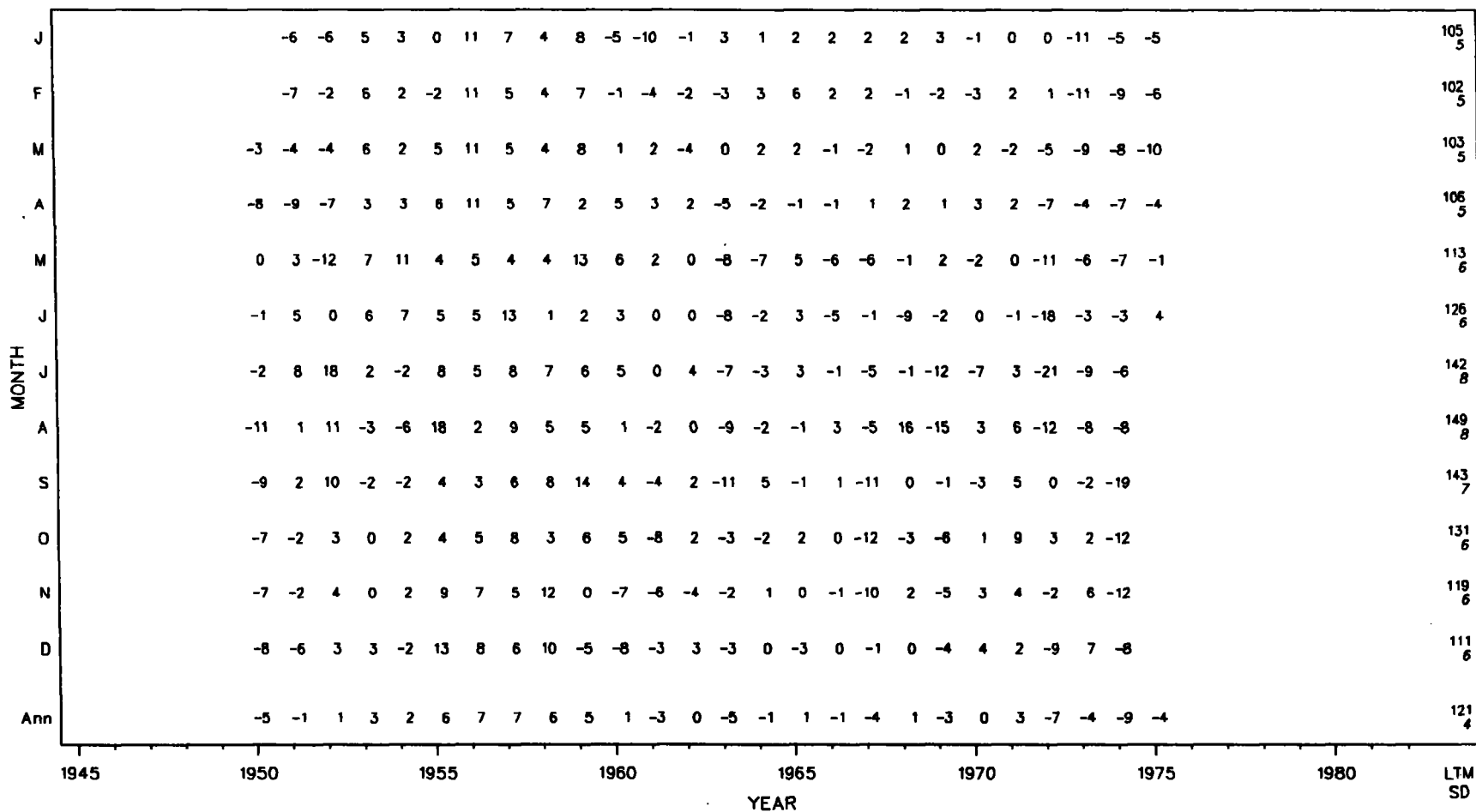
MONTH	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	LTM	SD		
J		-7	-1	-2	1	10	1	-3	-5	3	2	-1	0	10	-3	1	-2	-7	-5	5	9	0	0	0	2	-8						31	5		
F		2	-13	-3	5	17	15	15	-4	-9	7	-11	-6	-1	-12	4	3	-3	2	14	3	-2	-4	-2	-5	-9							32	9	
M		-4	2	-6	-3	2	11	-10	-8	7	-1	-3	-12	-3	4	-4	11	2	5	-9	10	7	2	1	-2	4							30	6	
A		-1	5	-2	6	4	-3	3	6	-4	7	-4	0	-10	-5	-4	-12	-7	0	-1	10	5	4	2	7	-4	-3						30	6	
M		-6	6	-6	-8	6	13	7	7	10	-11	3	2	5	-5	-13	-8	-5	13	4	3	-8	-1	-2	4	-4	-9							29	7
J		1	0	2	6	3	-2	3	-2	1	-7	-2	4	1	-1	-1	4	-8	1	9	2	-3	-1	1	-2	-1	-5							24	4
J		8	2	-8	1	0	-2	-2	3	-2	1	0	-5	-1	3	0	7	-4	1	4	3	-3	-1	-2	-3	-1								23	4
A		5	10	-1	4	-1	1	2	2	-3	-5	-2	2	4	-4	-1	4	7	-4	6	-7	-1	-2	-5	-7	-4								25	5
S		-4	0	15	-6	6	1	5	-2	-15	-2	3	-1	3	-5	1	9	-5	-2	4	5	-4	-7	-2	-1	5								27	6
O		-3	3	4	1	0	4	2	12	-9	4	5	3	-4	-1	-6	2	8	2	-11	-4	-7	-3	3	-5	1								28	5
N		-5	5	-1	0	-3	9	-5	10	-4	14	-5	11	-10	1	-2	-7	1	9	-5	3	-2	4	3	-9	-11								30	7
D		-6	0	2	4	-10	3	-12	0	10	1	-8	2	3	3	6	3	-7	0	1	3	5	9	-5	-3	-5								29	6
Ann		-1	2	-1	0	1	5	1	3	-1	0	0	0	-1	0	-3	0	-1	1	1	2	0	1	-1	-2	-2	-5							28	2

OWS Study Area J Anomalies



### Sea Surface Temperature

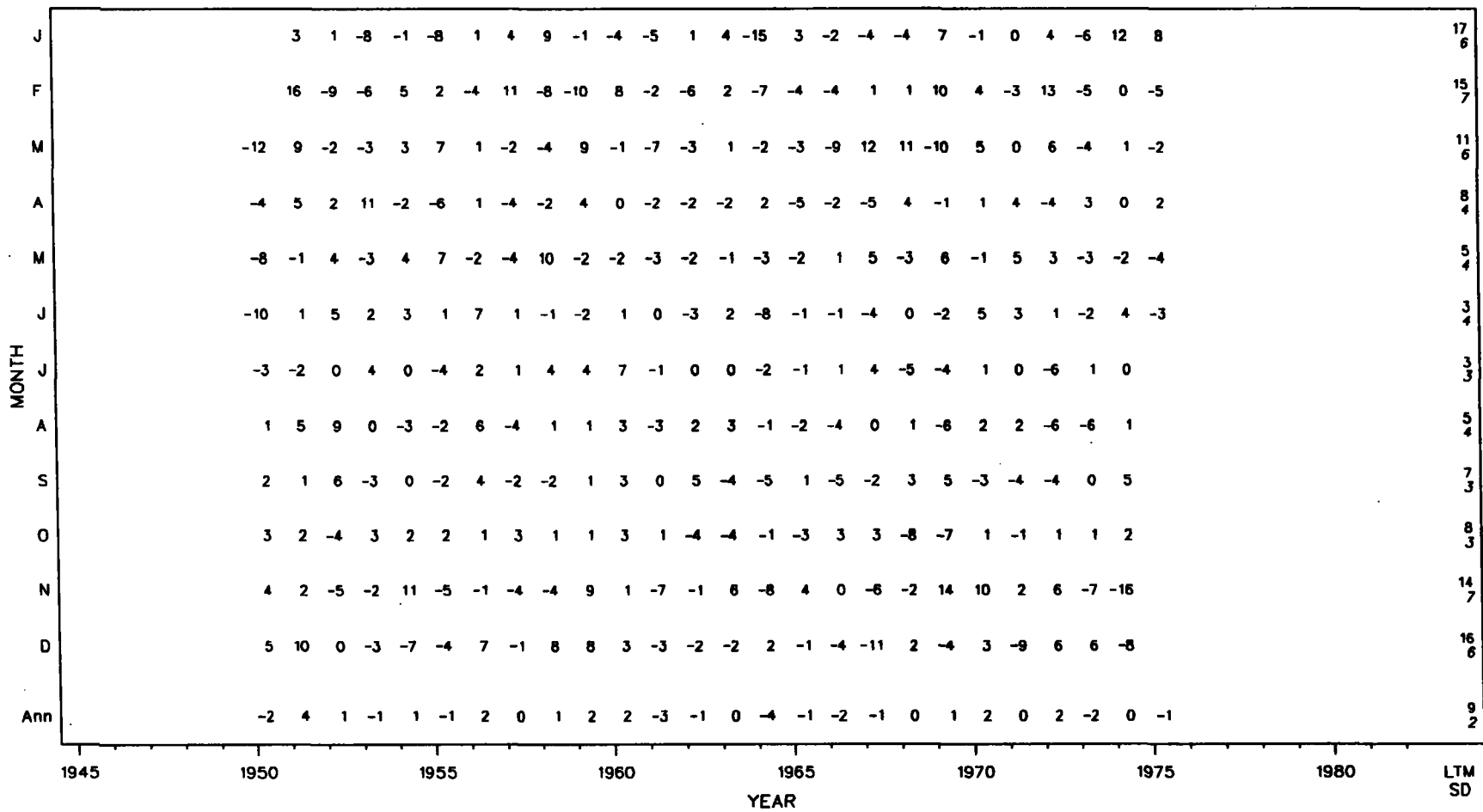
Units = 0.1 °C



OWS Study Area J Anomalies

### Sea - Air Temperature Difference

Units = 0.1 °C



OWS Study Area J Anomalies

### Surface Scalar Wind

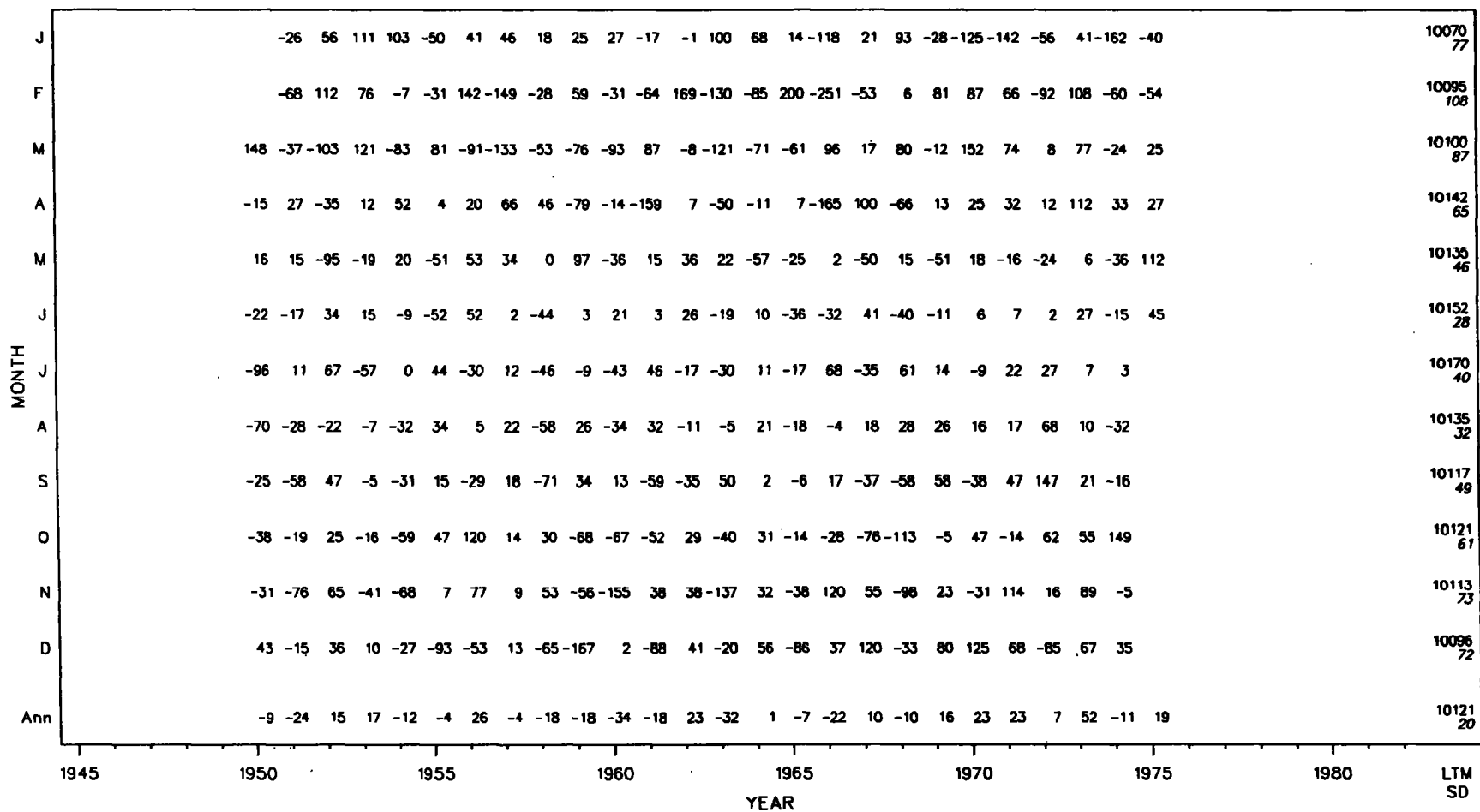
Units = 0.1 m/s

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	LTM	SD
J						-5	9	-34	-22	11	-10	19	4	-7	-9	22	16	-3	9	27	6	-7	-20	-2	-24	9	9	-16	20	0	122	16	
F						-7	-31	-4	17	-10	-5	-2	-9	18	-5	21	11	7	-1	-32	-8	18	11	2	-3	11	4	-2	-2	-2	120	13	
M						-26	5	14	-1	5	-11	14	-3	-6	20	-4	7	-7	14	-5	4	-6	28	-6	-27	-15	3	-6	17	5	-14	102	13
A						-3	-8	11	-11	0	2	-7	5	17	18	3	3	-7	5	11	12	22	-21	0	2	-4	-12	2	-27	-9	-5	94	11
M						-13	-15	35	4	-14	5	10	-8	16	-31	0	1	0	12	7	-8	15	2	-2	-8	3	10	19	-7	-9	-23	89	14
J						-9	2	-2	-5	7	2	1	0	8	12	-3	7	3	-5	-6	3	2	2	4	-4	-4	-13	10	6	-4	-17	80	7
J						7	1	-7	12	6	-22	-9	5	-1	14	27	-1	-2	5	3	-9	3	5	-18	4	1	-19	-7	-5	4	78	11	
A						7	15	-10	7	6	-6	11	3	9	2	4	17	6	10	-4	10	-13	-3	-25	0	-12	-4	-17	-13	0	84	11	
S						6	4	8	8	13	20	3	-1	8	-11	15	11	-3	2	-17	-9	-10	0	5	-4	7	-18	-29	-16	7	97	12	
O						25	-4	25	-4	0	-23	-15	15	11	18	-8	6	-2	25	3	-6	-8	19	10	-1	2	2	-29	-33	-29	105	17	
N						7	5	-24	12	8	-21	9	24	-2	25	22	-12	-16	18	3	-3	-8	-11	-8	-4	-11	-10	0	-25	21	112	15	
D						-21	19	3	-19	28	-2	19	-3	-6	25	14	12	-6	-2	-14	7	1	-18	-15	-12	-21	-5	17	-10	8	124	15	
Ann						-2	1	3	-3	4	-4	2	4	4	9	5	8	-1	7	-1	0	0	1	-5	-5	-7	-4	-2	-11	1	-10	101	5

### OWS Study Area J Anomalies

### Sea Level Pressure

Units = 0.1 mb



OWS Study Area J Anomalies

### Total Cloudiness

Units = 0.1 okta

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	LTM	SD
J		-1	4	0	-2	1	1	1	0	0	-7	-4	3	4	1	-2	2	4	2	-5	-5	0	2	1	1	0						61	3
F		0	0	-5	2	-9	0	-13	6	3	-2	-1	8	-5	5	6	-1	0	1	-2	1	6	-1	4	1	-3						60	5
M		12	4	4	-4	-7	-9	-1	-2	-2	-2	-3	3	4	-3	-3	3	6	2	4	0	-7	0	1	7	2	-9					60	5
A		7	4	-1	-8	-3	-5	2	-3	0	-4	-1	-1	5	-1	0	4	1	-1	2	-3	3	-2	1	0	-3	7					60	4
M		-8	2	2	0	-5	-11	2	-2	-3	-3	1	1	5	6	3	1	0	-6	4	-8	7	4	-2	4	3	4					59	5
J		5	0	3	-1	-2	-3	-4	-7	-6	-7	-2	1	0	1	-2	-2	4	4	0	4	3	-2	2	0	4	9					64	4
J		-4	-1	-2	-4	-2	1	-4	-2	-8	2	1	3	-4	-1	1	-1	6	7	-3	0	5	0	4	4	5						66	4
A		-3	2	6	-3	0	0	-3	-2	-2	2	-2	2	-2	4	1	-1	-5	4	-12	3	5	2	0	2	1						63	4
S		2	1	-7	5	-7	0	-4	7	-2	3	-4	-2	0	6	-1	-8	0	5	-8	5	4	6	-1	-1	1						60	4
O		4	-2	11	1	-4	0	-4	5	1	-1	-9	1	5	-1	-1	-4	-9	-2	0	2	4	1	3	-2	1						60	4
N		1	-1	-2	2	-6	-2	2	3	1	-5	-8	-1	5	-7	0	-3	5	0	-7	-4	-1	8	0	7	11						61	5
D		-2	-2	0	-5	2	-5	-4	-1	-3	-1	2	1	0	1	-1	-2	6	6	-1	4	0	0	-3	5	3						59	3
Ann		1	1	1	-2	-3	-4	-1	-1	-2	-1	-3	0	2	0	0	-1	1	2	-1	0	2	2	1	3	2	2					61	2

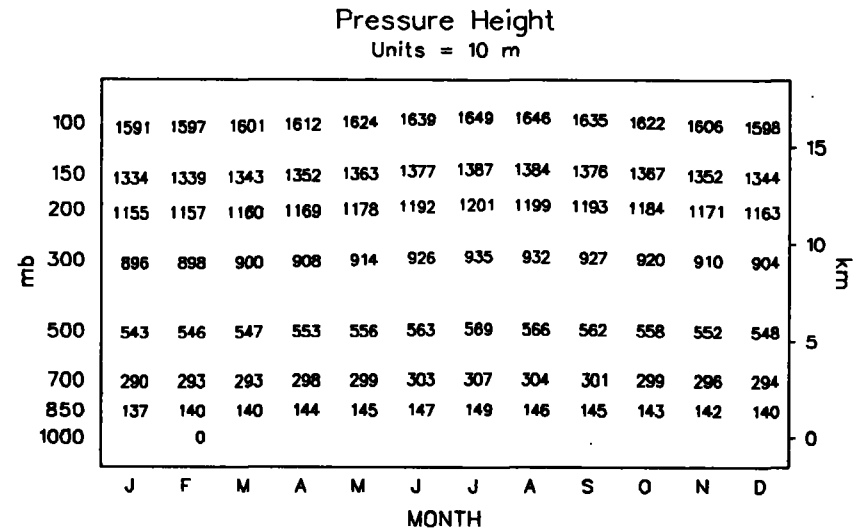
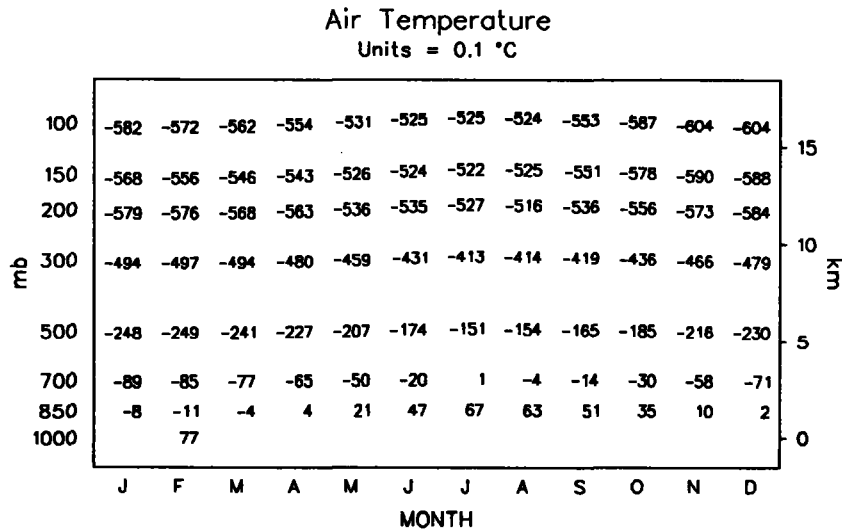
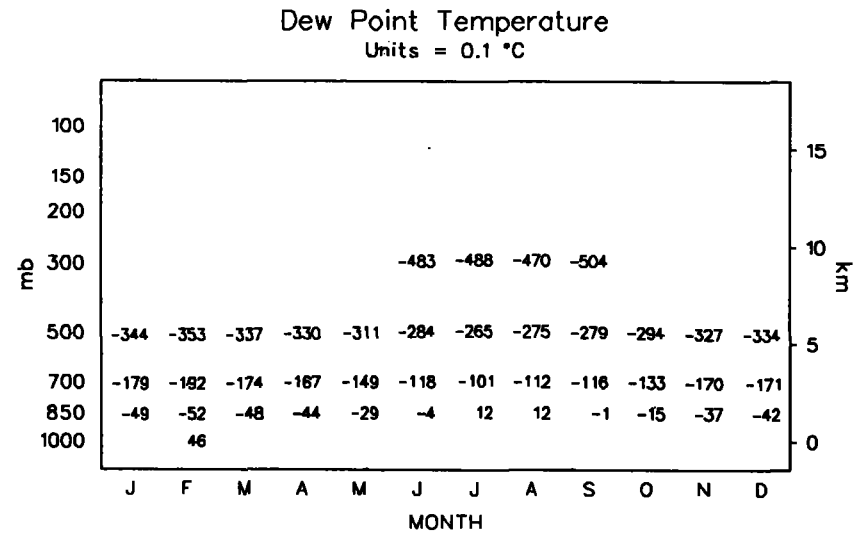
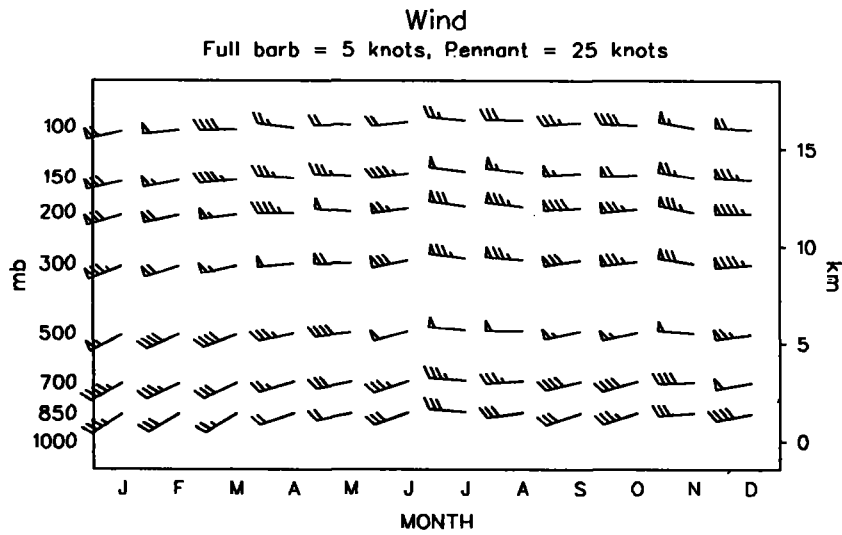
### OWS Study Area J Anomalies

### Precipitation Frequency

Units = 0.1 percent

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																		
J	.73	-151	-63	-64	-139	-121	-73	110	-65	-133	16	80	30	-18	71	80	-7	-3	90	47	13	36	-48	167	72	378	86	
F	109	-253	-62	-24	-147	-162	-60	29	-96	-2	88	-62	76	114	-135	143	88	32	-50	139	23	136	26	44	6	335	105	
M	-290	57	-34	-116	-5	-136	122	44	-2	55	-3	-40	44	37	0	88	-3	157	29	-27	-113	-76	89	3	142	-21	290	95
A	-30	10	-91	-49	1	-80	-21	-33	-51	28	38	50	39	-21	-26	36	152	-121	171	-10	-29	-60	39	-79	-9	145	268	72
M	-85	-93	-43	41	29	27	-6	-55	31	-130	-5	-79	-16	25	63	17	20	31	49	21	87	-42	106	7	59	-61	274	58
J	-121	16	-140	-1	-15	38	22	2	-38	-73	-21	8	34	-15	-24	27	42	-13	42	36	57	28	29	24	35	17	281	49
J	20	41	-117	48	12	-99	14	-25	-3	-30	55	-75	-35	52	42	3	23	53	-74	-17	17	76	-28	9	40	286	51	
A	69	-43	-60	-31	46	-55	6	-105	48	-46	2	-89	46	103	-5	23	-114	-41	-45	127	20	12	-75	48	162	288	71	
S	21	-42	-122	104	15	-16	-22	-12	2	-139	-18	70	46	56	28	-12	-58	49	26	-54	140	72	-181	-40	87	292	75	
O	67	-41	-123	52	38	-29	-111	-67	-80	112	-39	84	-2	-13	85	2	-40	103	45	-63	72	64	-42	28	-84	304	68	
N	-28	-58	-208	30	30	-46	-99	112	-41	61	54	-30	-40	31	8	48	-64	-75	49	88	88	-6	16	-4	87	336	72	
D	-80	55	-149	-113	38	-12	25	-19	-33	95	143	-46	-3	8	24	46	-49	-78	54	10	-24	-85	116	50	26	363	70	
Ann	-46	7	-124	-13	8	-58	-29	-24	-2	-19	6	-4	11	31	23	18	11	12	31	13	42	2	20	2	63	26	308	35

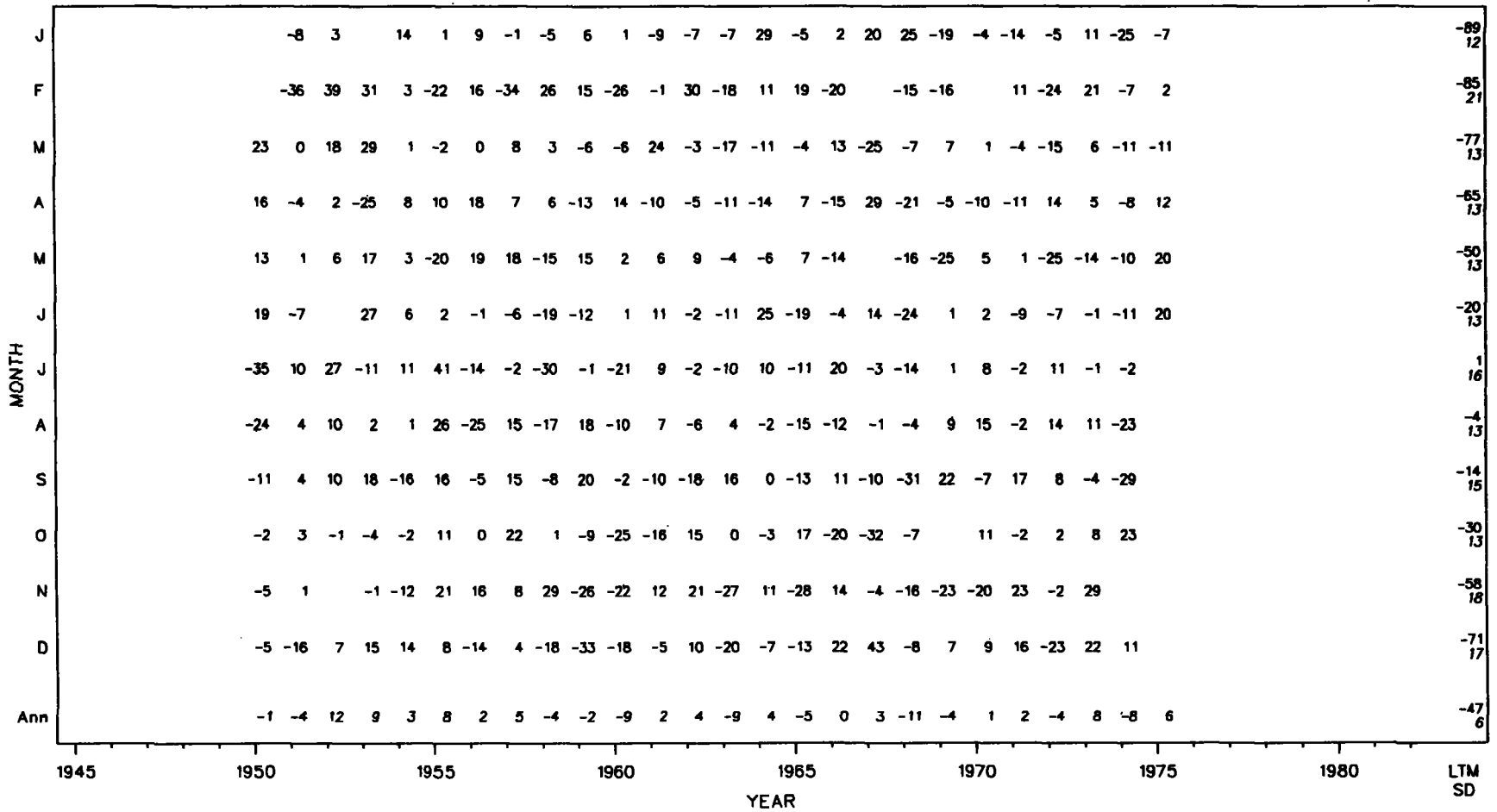
OWS Study Area J Anomalies



## OWS Study Area J Upper Air Climatology

Mean plotted at actual height.

Air Temperature: 700 mb  
Units = 0.1 °C

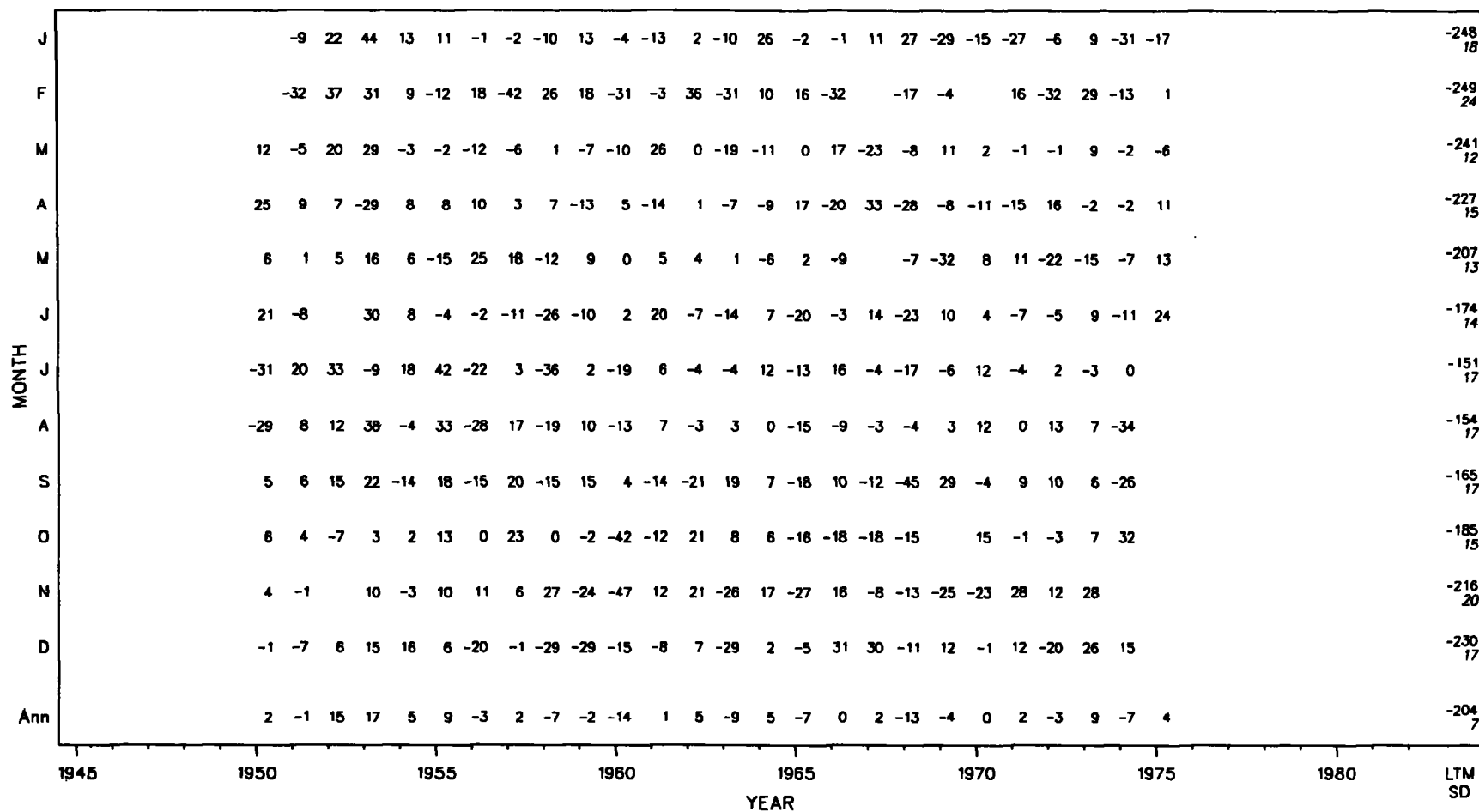


OWS Study Area J Anomalies



Air Temperature: 500 mb

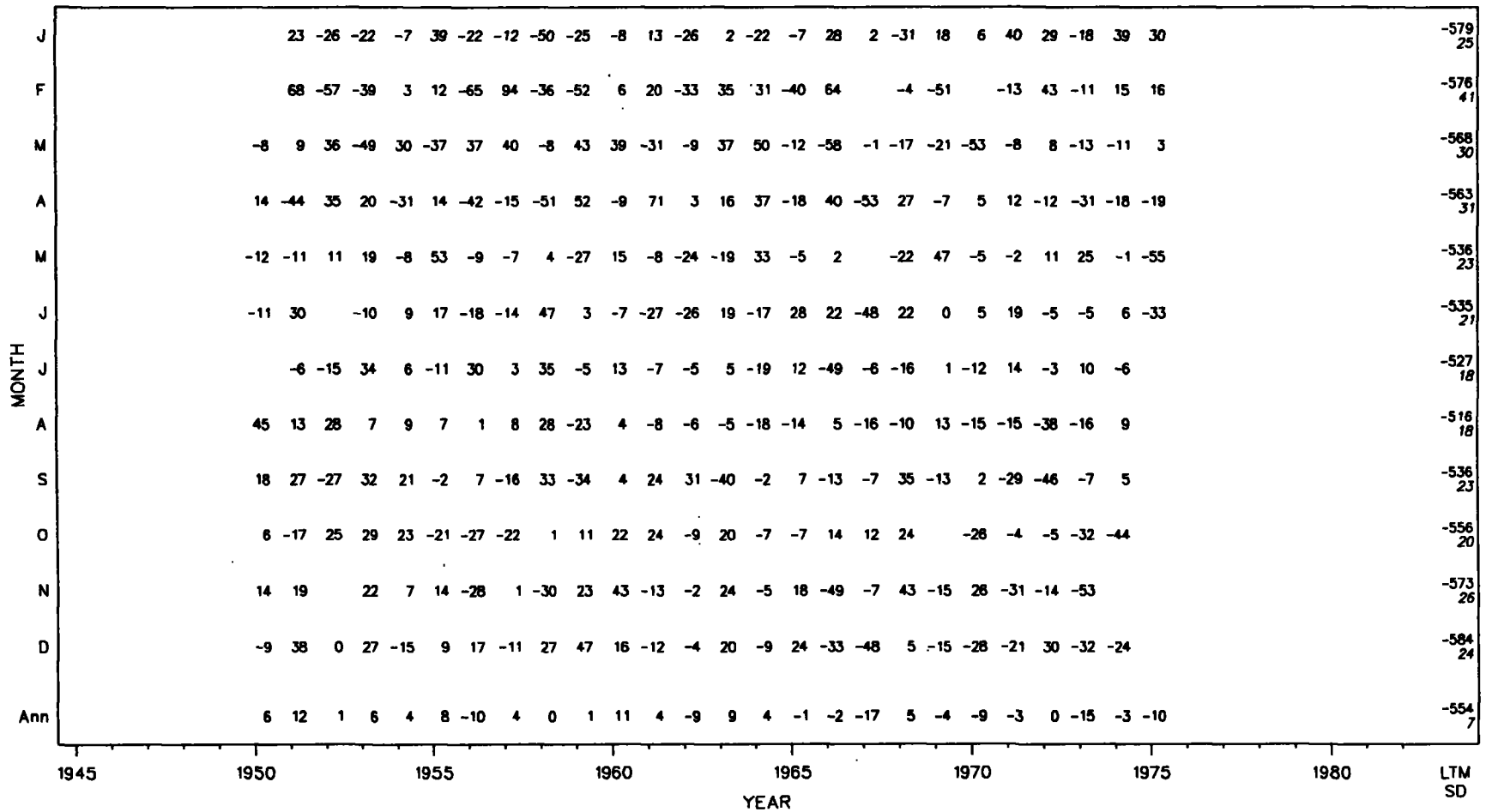
Units = 0.1 °C



OWS Study Area J Anomalies

### Air Temperature: 200 mb

Units = 0.1 °C

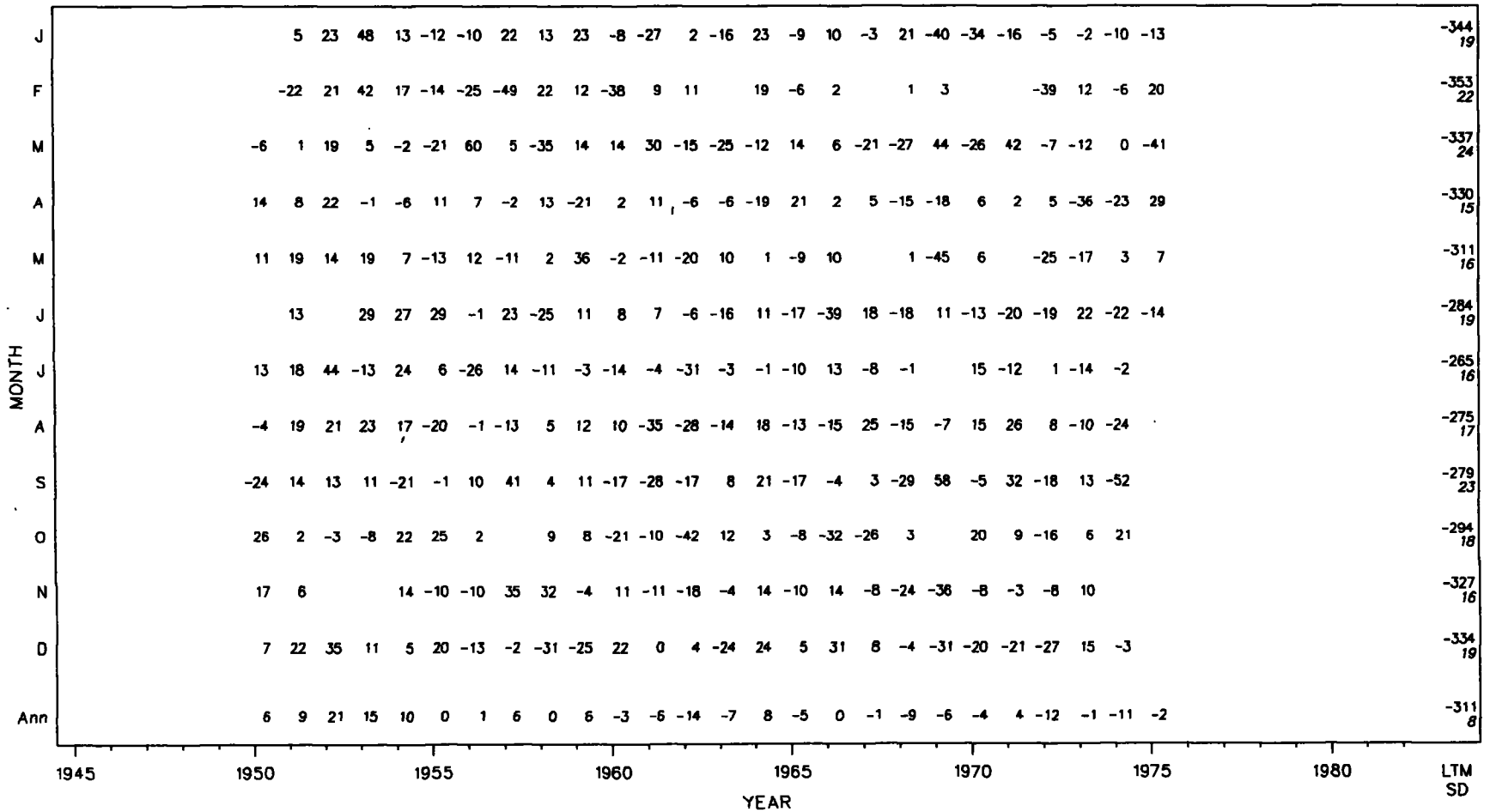


OWS Study Area J Anomalies

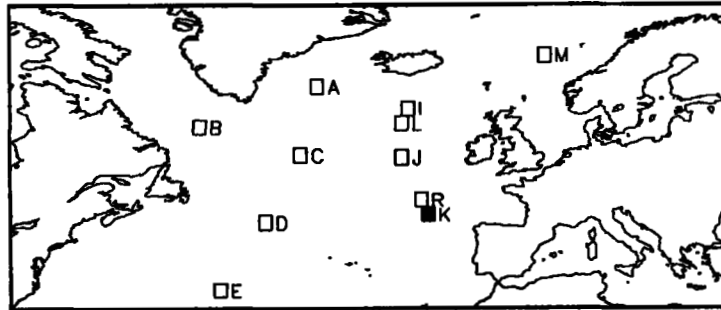


Dew Point Temperature: 500 mb

Units = 0.1 °C



OWS Study Area J Anomalies



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

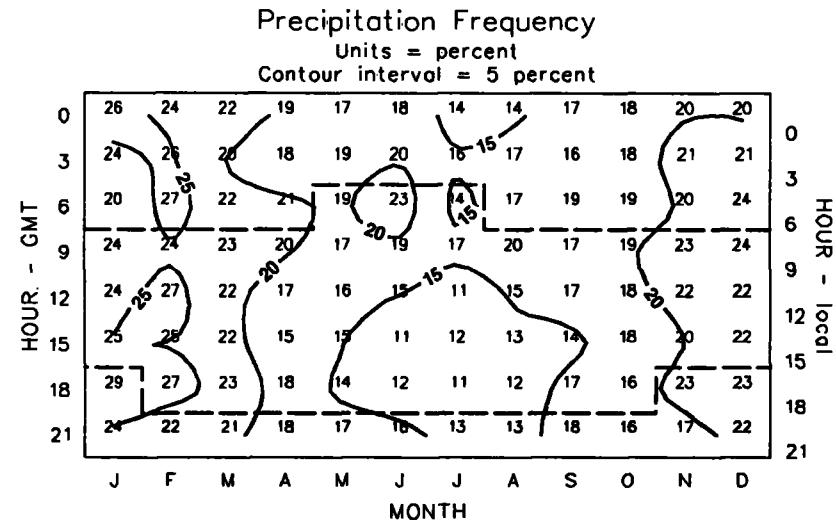
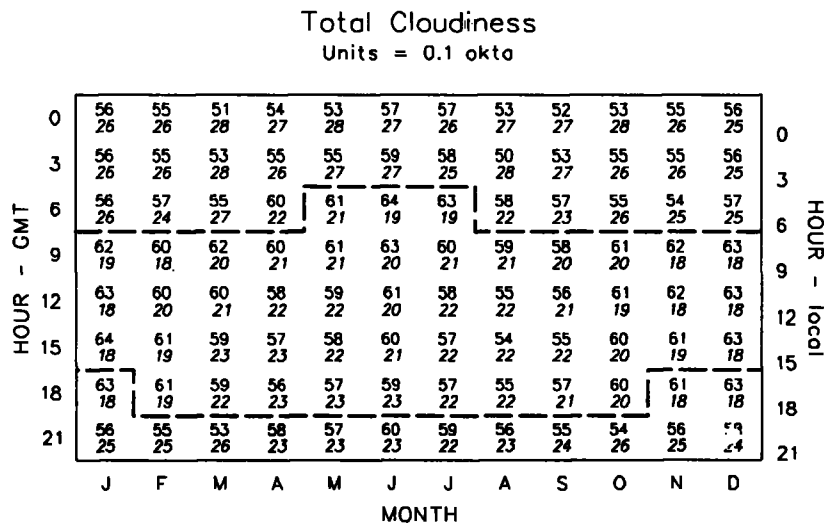
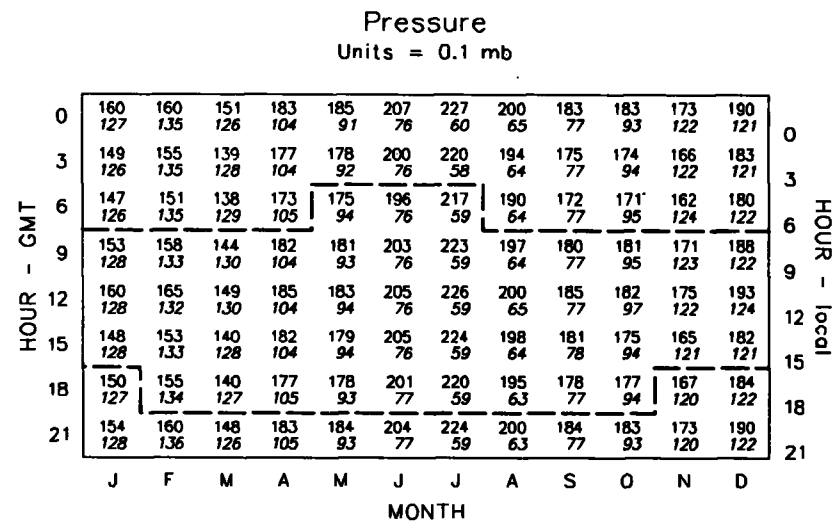
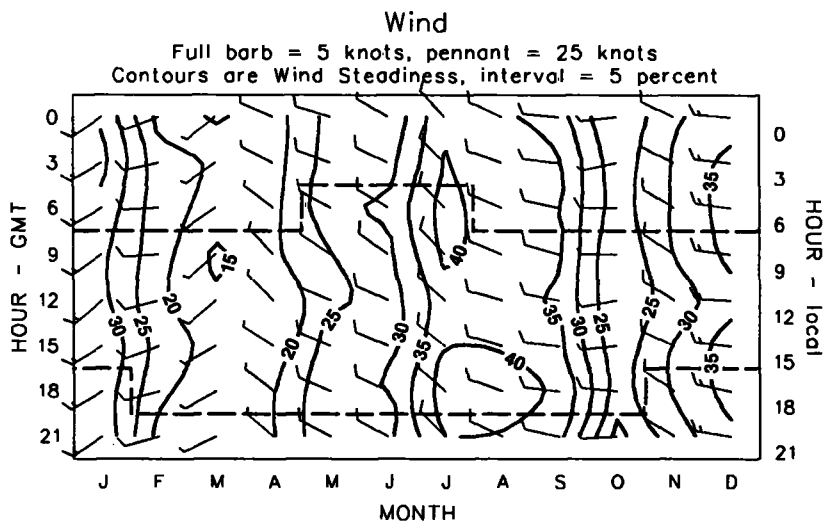
**OWS**  
**K**

MONTH	YEAR																												Sum
	1945	1950	1955	1960	1965	1970	1975	1980	Sum																				
J	30	31	31	31	31	31	31	25	31	22	30	31	30	31	31	31	31	29	31	30	30	29	29	30	26	774			
F	28	28	29	28	28	28	29	28	28	23	27	28	28	23	27	27	27	27	29	28	27	28	29	27	27	25	711		
M	31	31	31	31	31	31	31	31	31	30	30	31	31	30	31	26	30	31	30	30	30	30	28	31	29	26	783		
A	30	30	30	30	30	30	30	30	30	30	30	30	30	30	29	29	28	29	30	30	28	28	30	30	23	762			
M	31	31	28	31	8	31	31	30	31	31	30	29	31	31	31	31	25	31	30	30	31	31	30	27	24	25	750		
J	6	30	30	12	30	24	24	30	30	30	27	29	30	30	29	27	29	30	25	5	29	30	28	30	28	29	27	708	
J	6	30	30	12	30	24	23	30	30	0	26	29	30	30	29	27	29	30	25	5	29	30	27	30	28	29	27	675	
A	31	31	31	31	31	31	31	31	31	31	30	30	31	30	30	29	31	23	28	26	29	30	27	31	28	30	773		
A	25	31	31	31	31	31	31	31	31	0	30	30	30	30	30	29	31	23	28	26	29	30	27	31	28	30	735		
S	31	31	31	31	31	31	31	31	31	31	31	31	30	28	30	29	28	30	28	28	28	30	31	28	22	769			
S	1	23	31	31	31	31	31	31	31	0	31	31	31	30	28	30	29	28	30	25	28	28	30	31	26	22	699		
O	30	30	30	26	30	30	8	30	30	30	30	30	30	29	27	29	30	29	30	27	29	29	29	29	24	28	733		
O	30	17	30	26	30	30	8	30	30	0	30	30	30	29	27	29	30	29	30	27	29	29	29	29	24	28	690		
N	31	31	31	31	31	31	31	29	31	31	31	30	31	31	31	31	31	27	30	30	31	30	30	30	30	24	786		
N	31	31	31	31	31	31	31	28	31	0	31	30	31	31	31	31	31	27	30	30	31	30	30	30	30	24	752		
D	30	30	30	30	30	30	28	30	30	30	28	29	30	29	30	30	29	29	28	29	30	25	26	30	18	28	746		
D	30	30	30	30	30	30	28	30	30	0	28	29	29	29	30	30	29	29	28	29	30	25	26	30	18	28	715		
D	31	30	31	31	31	27	31	31	24	25	28	31	30	29	29	28	31	30	30	25	29	29	26	24	30	21	742		
D	31	30	31	31	31	27	31	31	24	0	28	31	30	29	29	28	31	30	30	25	29	29	26	24	30	21	717		
Ann	190	363	365	341	365	332	335	364	351	359	341	357	362	358	349	353	354	337	350	316	354	347	343	351	328	320	152	9037	
Ann	154	342	365	339	363	332	333	363	351	106	340	356	358	358	349	353	354	337	350	315	354	347	341	350	328	319	152	8709	

## 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.



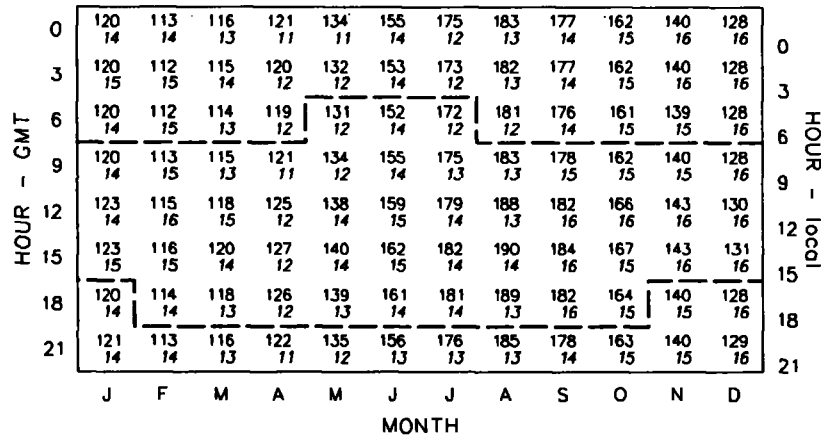
## OWS Study Area K Surface Climatology

upper number = mean  
lower number = standard deviation

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

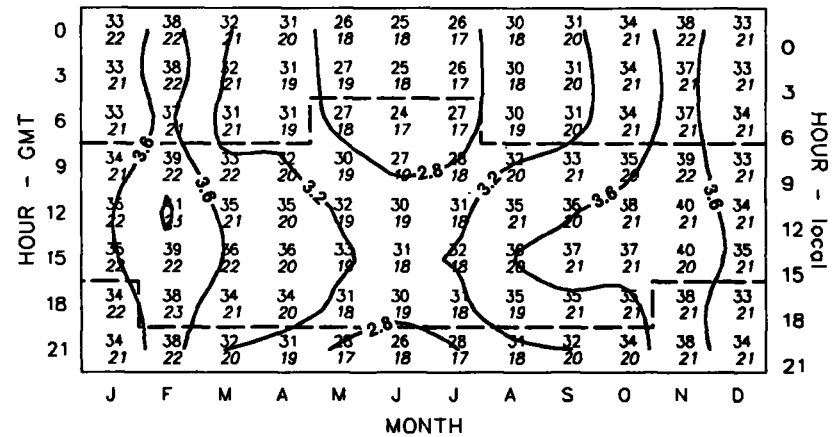
### Air Temperature

Units = 0.1 °C



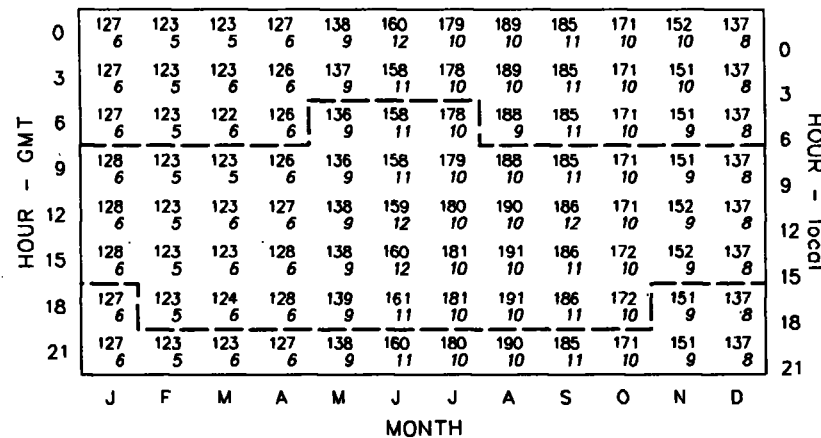
### Dew Point Depression

Units = 0.1 °C  
Contour interval = 0.4 °C



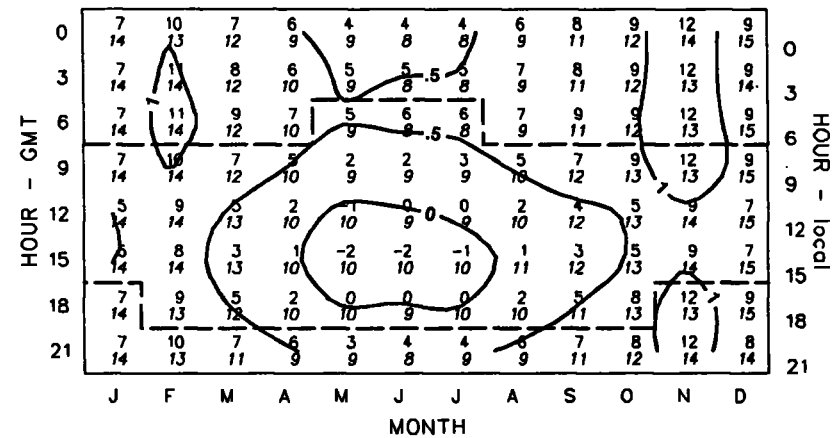
### Sea Surface Temperature

Units = 0.1 °C



### Sea - Air Temperature Difference

Units = 0.1 °C  
Contour interval = 0.5 °C



## OWS Study Area K Surface Climatology

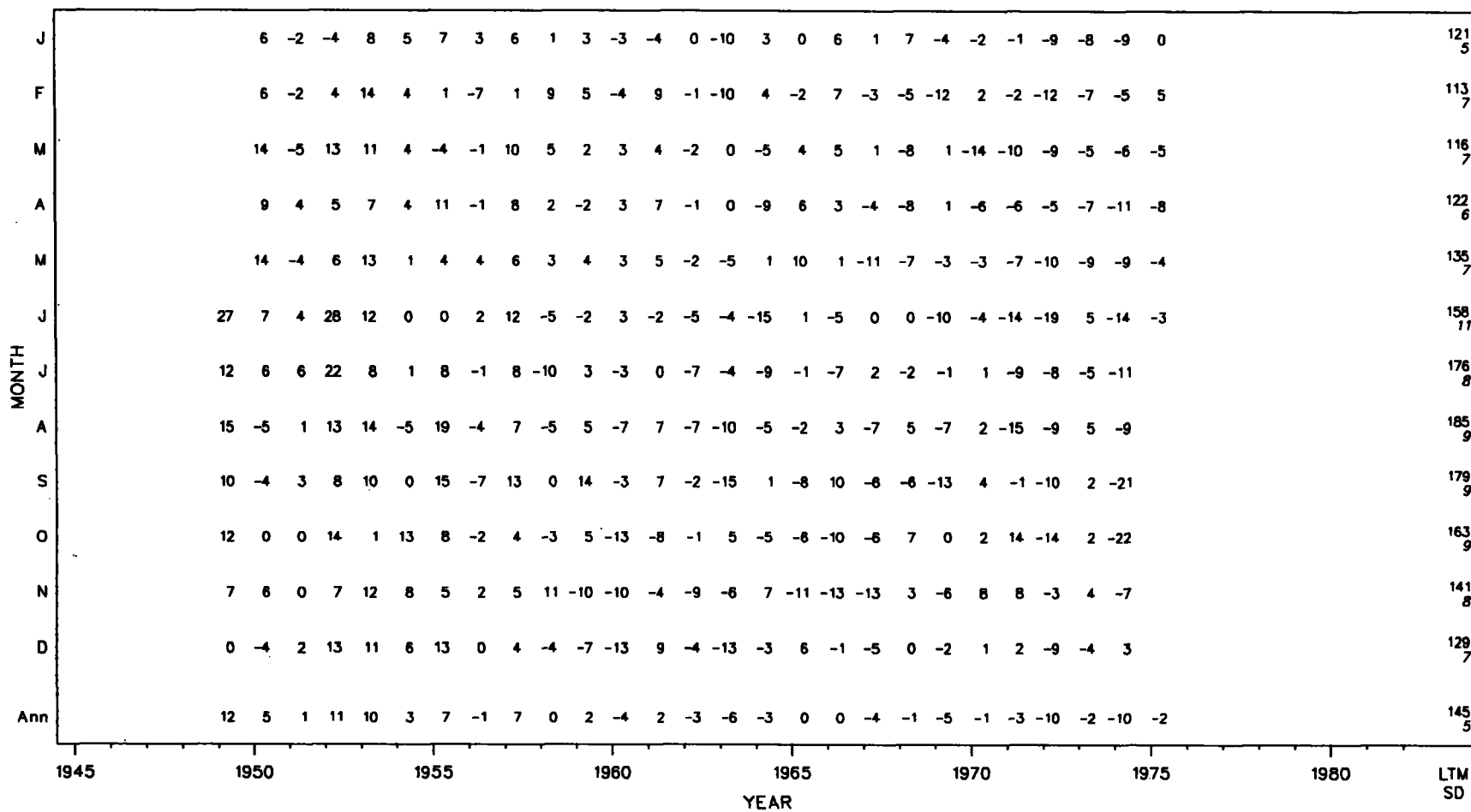
upper number = mean  
lower number = standard deviation

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



### Surface Air Temperature

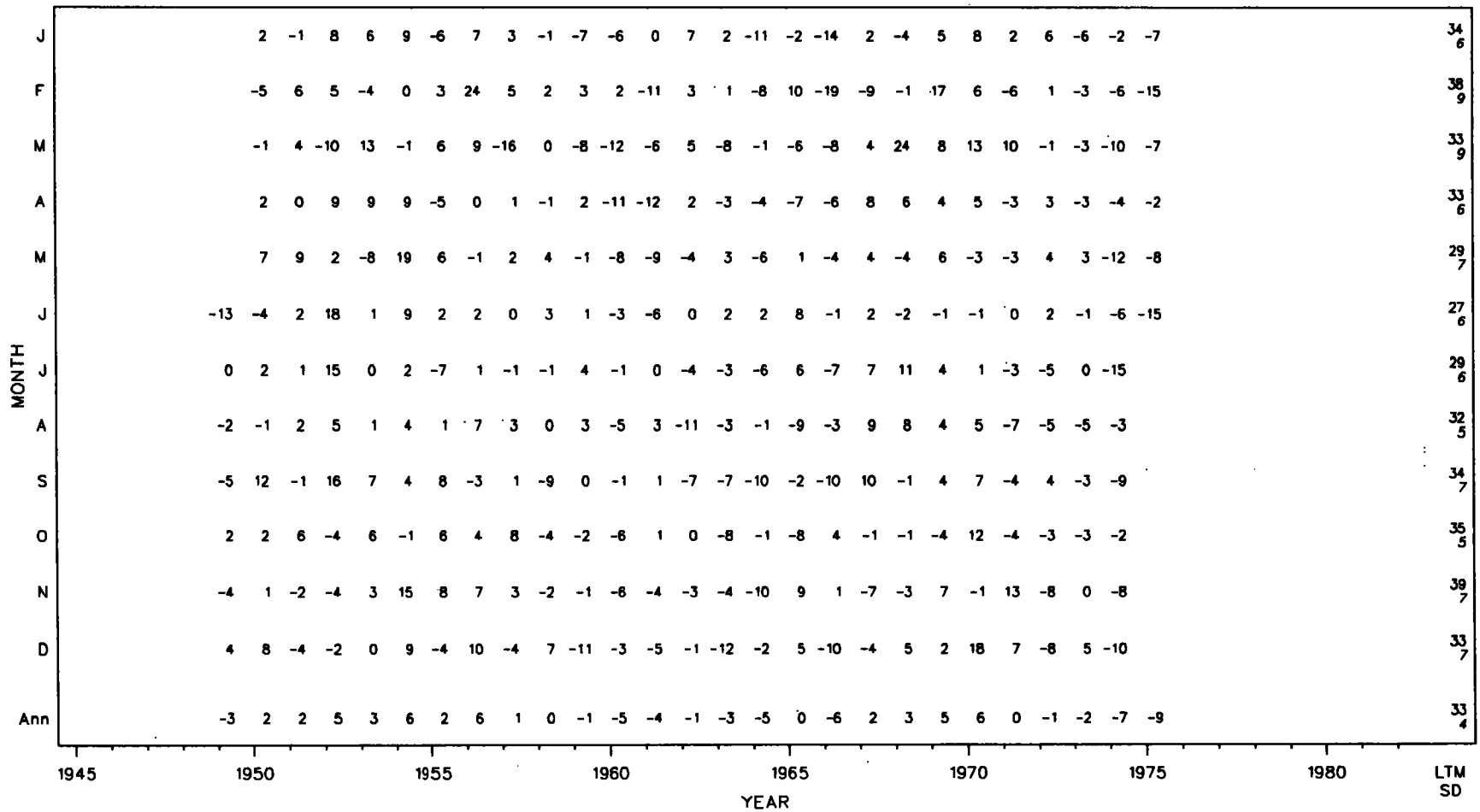
Units = 0.1 °C



OWS Study Area K Anomalies

### Surface Dew Point Depression

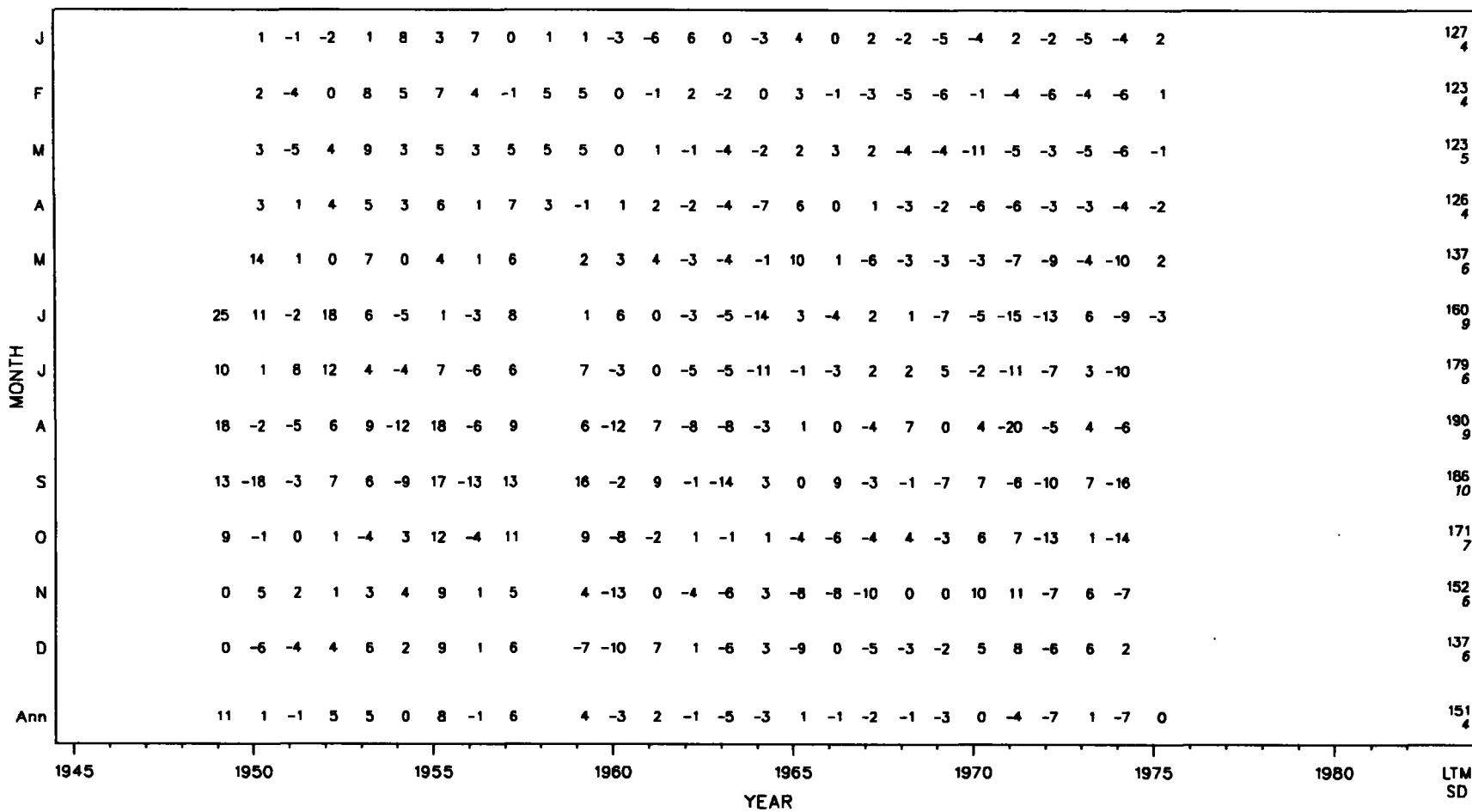
Units = 0.1 °C



OWS Study Area K Anomalies

### Sea Surface Temperature

Units = 0.1 °C



OWS Study Area K Anomalies

### Sea - Air Temperature Difference

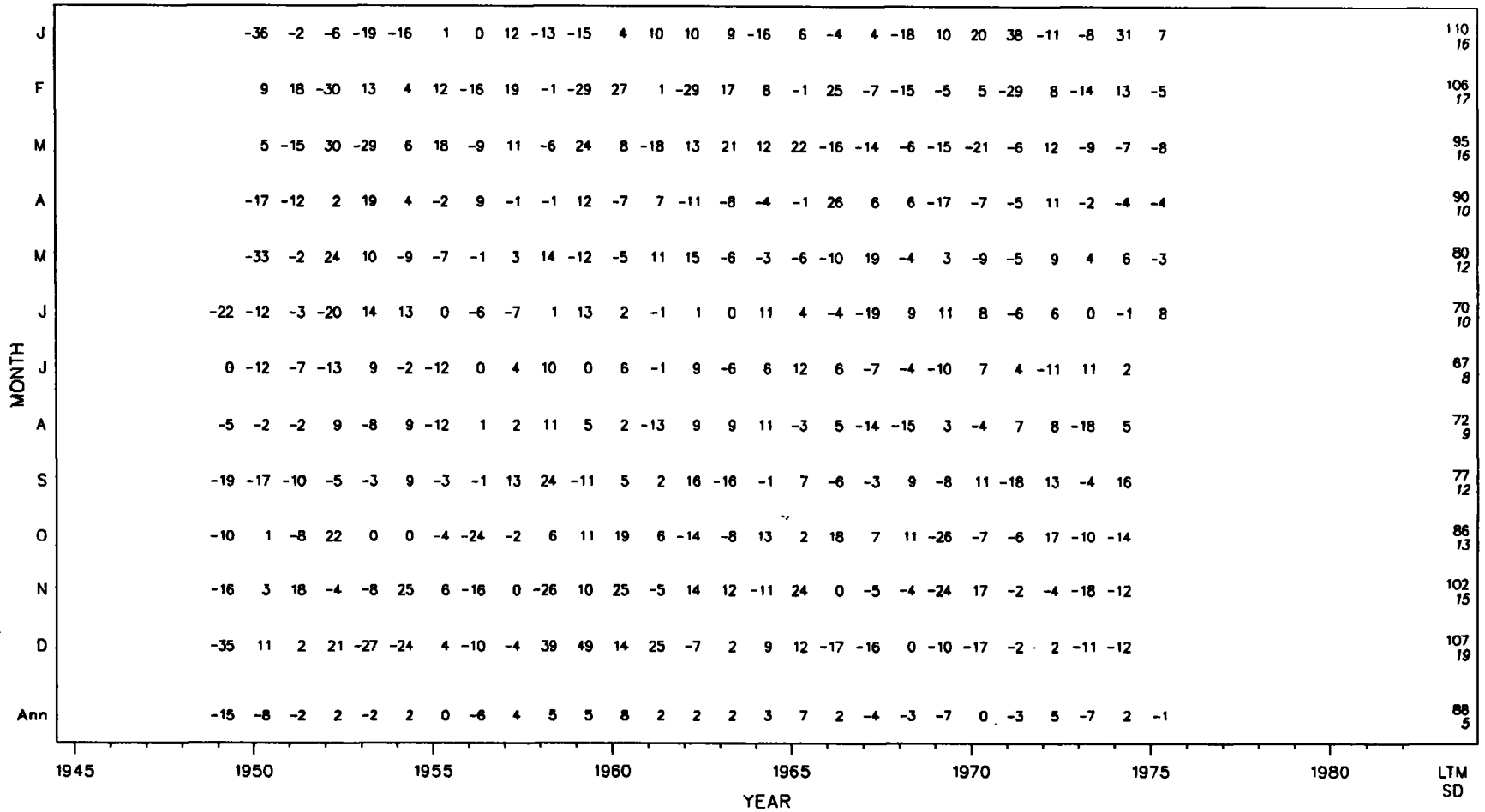
Units = 0.1 °C

MONTH	1945	1950	1955	1960	1965	1970	1975	LTM	SD																			
J	-5	1	3	-8	4	-4	4	-5	0	-2	-1	-3	6	10	-6	4	-6	1	-9	-2	-2	3	7	3	5	2	7	5
F	-5	-2	-4	-6	1	8	10	-1	-4	0	4	-10	3	8	-4	5	-8	0	0	6	-3	-2	6	3	-1	-4	10	5
M	-11	0	-8	-2	-1	9	4	-4	0	3	-3	-3	1	-3	3	-2	-1	1	4	-4	3	5	5	-1	1	4	7	4
A	-6	-3	-1	-1	-1	-5	2	-1	5	1	-2	-5	-1	-3	1	0	-3	5	5	-3	0	-1	2	4	7	5	5	4
M	0	4	-6	-7	-1	0	-3	0	-2	1	-2	-1	2	-3	-1	0	4	3	0	-1	0	2	5	-1	6	2	3	
J	-2	4	-6	-11	-6	-5	1	-5	-3	2	3	3	2	0	1	2	1	2	1	3	-1	-1	6	1	6	0	2	4
J	2	-4	2	-10	-4	-5	0	-4	-1	4	0	0	3	-1	-1	1	5	0	4	6	-3	-2	2	8	2	3	4	
A	6	2	-5	-7	-5	-7	-1	-2	2	1	-5	1	-1	3	2	4	-3	3	3	7	2	-5	4	-1	4	5	4	
S	3	-11	-6	-2	-4	-9	2	-6	0	2	2	2	0	1	2	8	-1	2	4	6	2	-5	0	6	5	6	5	
O	-3	-1	0	-12	-5	-10	3	-2	8	4	8	6	2	-6	5	2	4	1	-3	-3	4	-7	0	-1	8	8	5	
N	-7	-1	2	-6	-9	-4	4	-1	-1	13	-4	3	5	-1	-4	2	4	3	-3	6	1	2	-4	1	-1	12	5	
D	0	-2	-5	-9	-4	-3	-4	0	2	0	3	-2	5	7	6	-14	1	-1	-3	1	4	6	3	10	-2	8	5	
Ann	0	-3	-2	-6	-5	-4	1	0	0	2	0	-1	2	1	0	1	-1	2	1	2	1	0	3	3	3	2	8	2

OWS Study Area K Anomalies

### Surface Scalar Wind

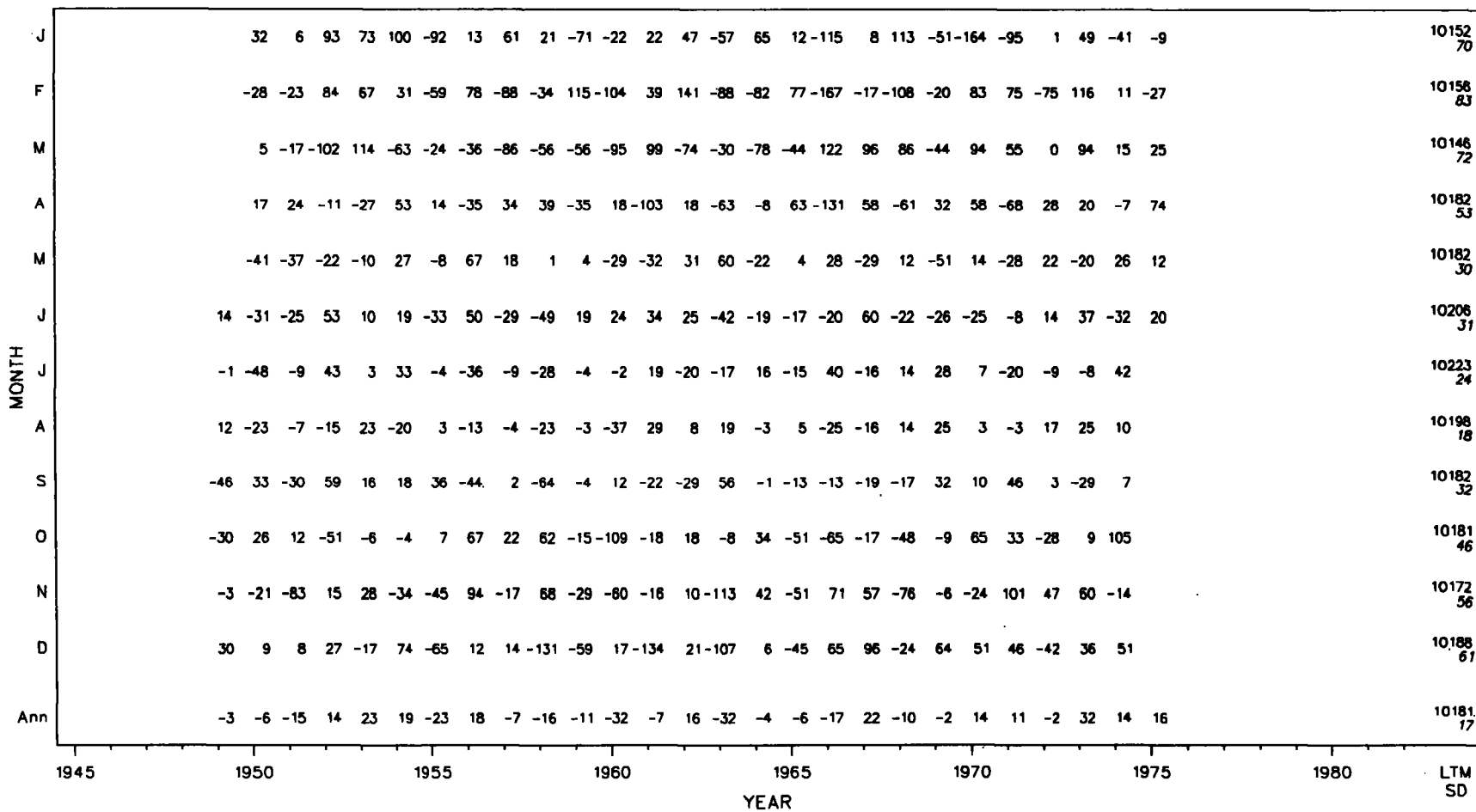
Units = 0.1 m/s



OWS Study Area K Anomalies

### Sea Level Pressure

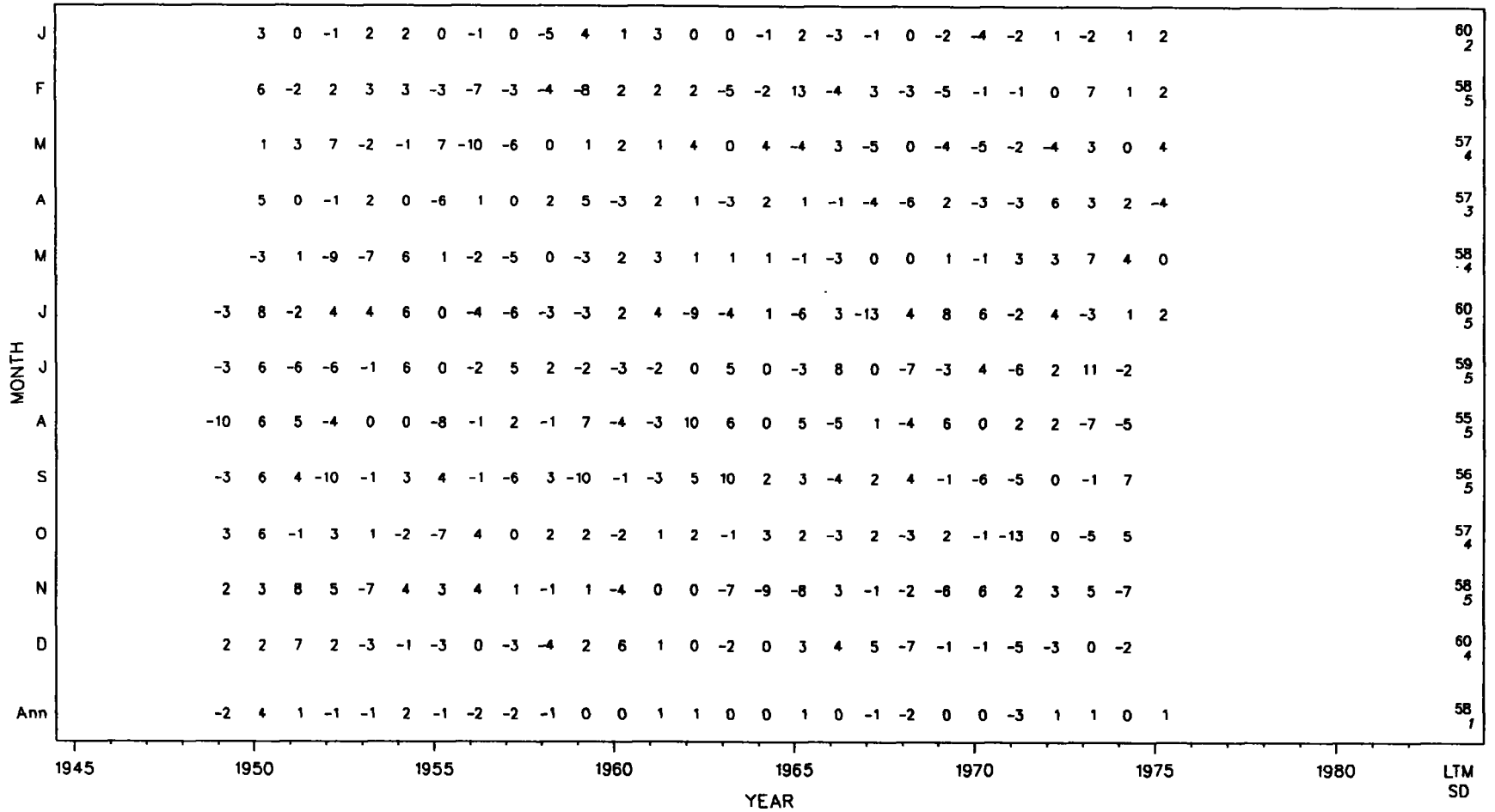
Units = 0.1 mb



OWS Study Area K Anomalies

### Total Cloudiness

Units = 0.1 okta



OWS Study Area K Anomalies

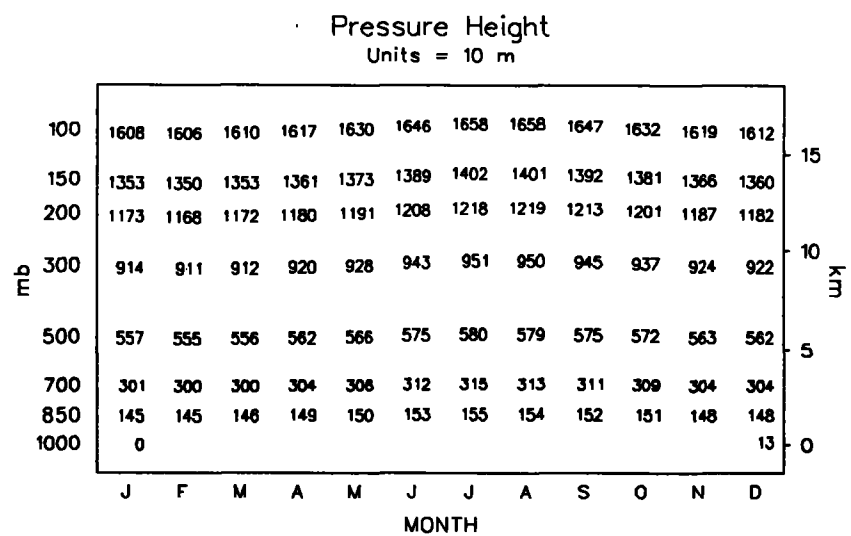
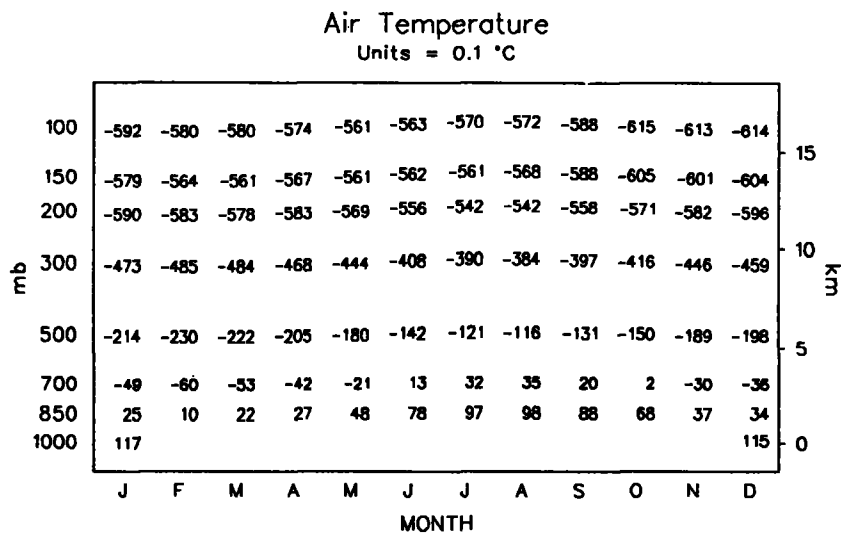
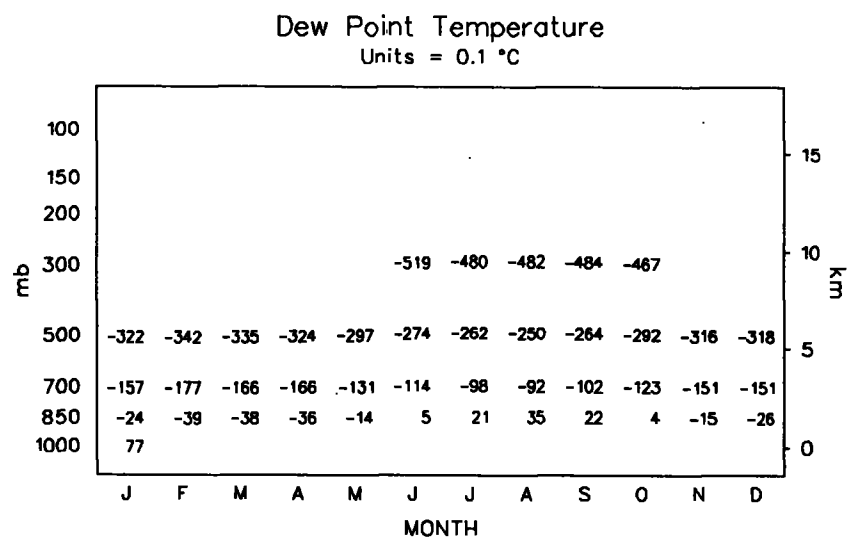
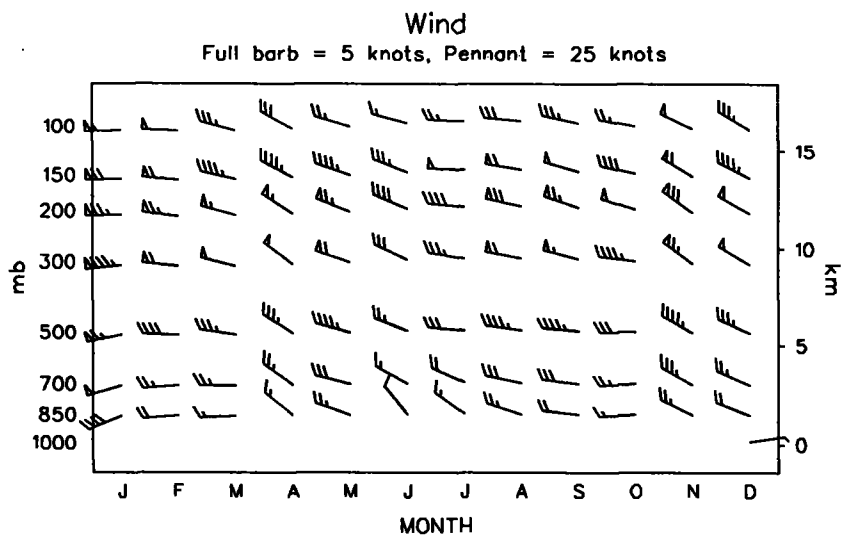
### Precipitation Frequency

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	LTM	SD	
J	-79	19	9	-112	-153	78	-50	-12	-78	158	29	107	-19	43	-58	-40	107	12	-143	65	12	74	5	-83	63	44						249	79	
F	95	30	-127	-116	115	37	-94	106	-96	-174	152	-19	41	160	-5	-164	249	25	76	-83	-113	-78	96	-75	-41	3							255	110
M	-30	22	118	-185	0	117	6	65	40	28	70	-172	90	75	39	36	-139	-49	-60	-58	-80	-27	54	-112	17	136							222	87
A	-137	-49	52	-32	-88	-74	35	-115	0	77	-85	46	-51	34	209	-38	109	-78	129	62	-33	84	19	-38	25	-65							184	83
M	-35	-57	-32	-9	-44	18	-58	-65	20	-88	14	12	28	-13	22	4	41	51	21	100	27	100	0	-45	15	-29							167	46
J	-78	52	41	-61	-11	48	35	-85	-43	34	-46	-29	9	-35	-25	82	-2	65	-118	85	-40	82	88	6	-95	-25	65						165	60
J	-27	82	-6	-43	-3	11	-15	14	34	26	29	-5	-23	17	-5	0	55	-18	-17	-73	-62	-1	-10	30	6	6							133	33
A	-68	27	14	-27	-52	-23	-36	-17	62	-31	49	12	3	70	25	-14	117	-12	27	-55	-41	8	3	-22	-65	46							150	45
S	16	-47	-35	-81	-85	3	-12	-2	-58	85	-56	9	-12	134	-35	-35	81	-23	53	87	34	-27	-90	-48	160	3							169	65
O	10	-73	35	80	-42	-45	-44	-91	-44	-66	74	199	57	-80	3	-1	0	87	87	31	47	-50	-74	-3	-57	-58							175	69
N	-4	33	84	-27	-83	-17	-47	-101	-6	-84	126	100	-45	0	94	-80	76	-7	13	34	43	116	-95	-33	-35	-56							206	68
D	-75	30	74	-59	-76	-32	-72	-22	-45	16	154	131	94	5	141	20	85	-32	-92	2	-3	-15	-133	80	-20	-157							217	82
Ann	-32	-7	14	-17	-67	-19	-1	-39	-10	-11	28	50	5	18	41	15	16	36	-7	11	5	-6	-13	15	-38	-14	26						191	25

OWS Study Area K Anomalies



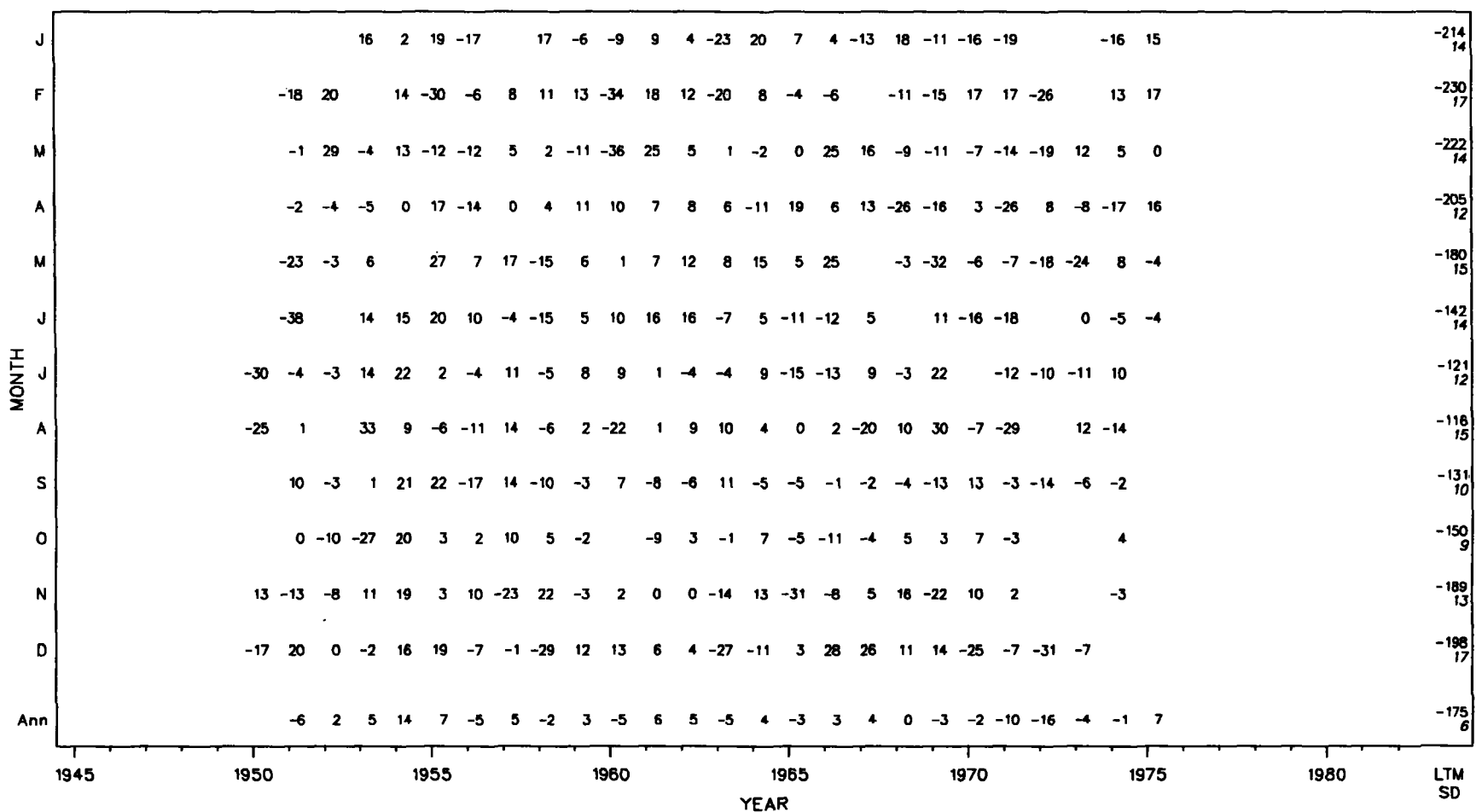


## OWS Study Area K Upper Air Climatology

Mean plotted at actual height



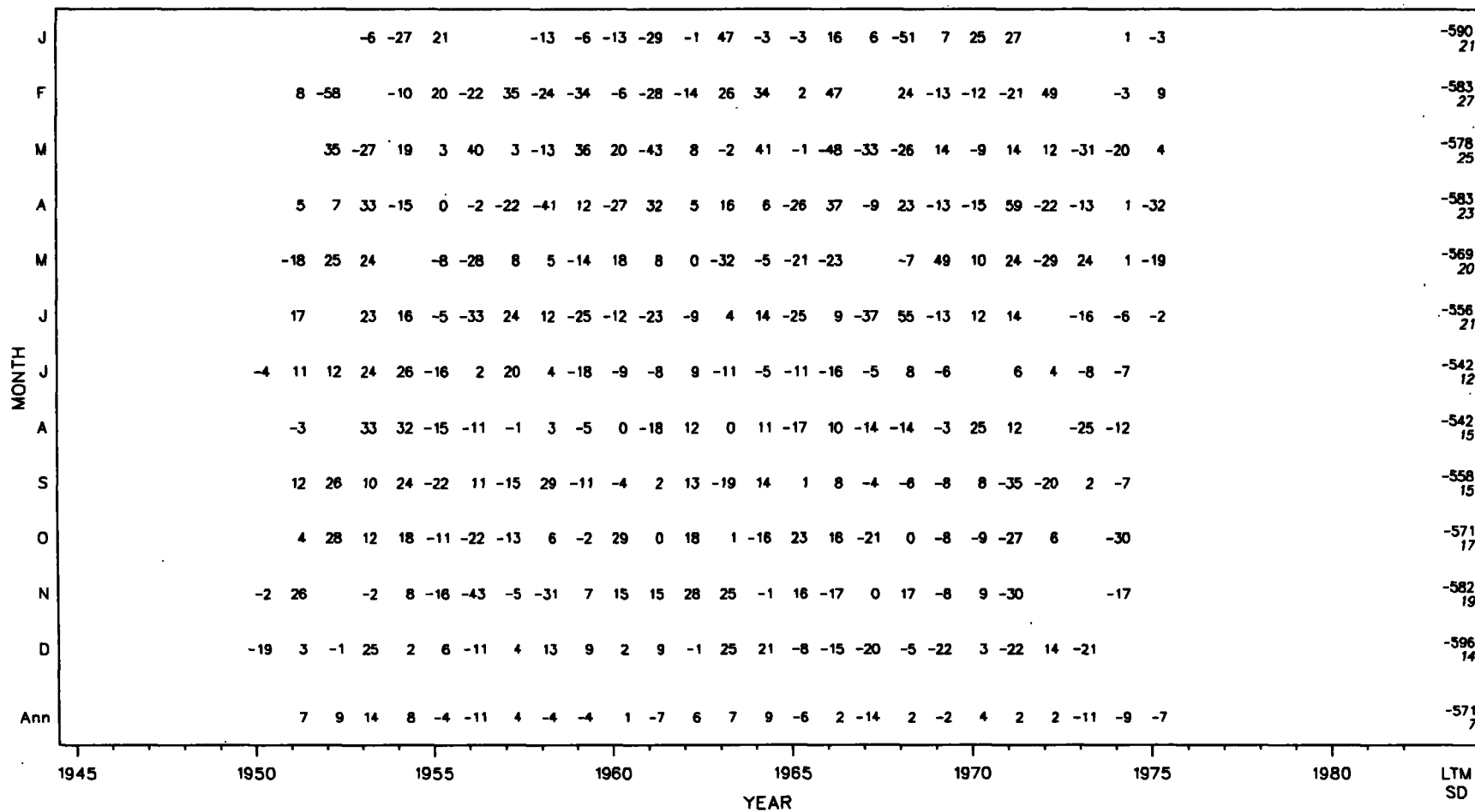
Air Temperature: 500 mb  
Units = 0.1 °C



OWS Study Area K Anomalies

### Air Temperature: 200 mb

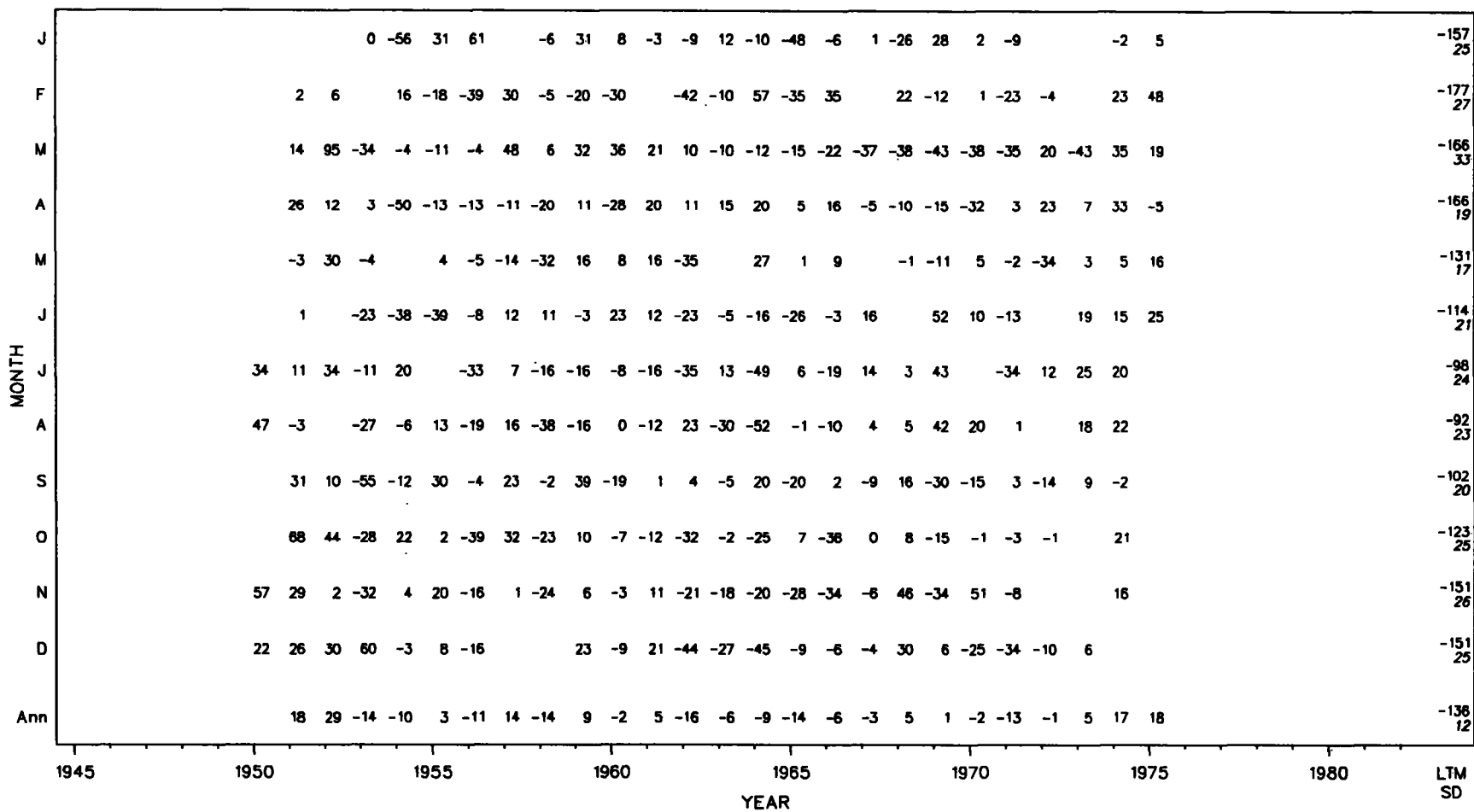
Units = 0.1 °C



OWS Study Area K Anomalies

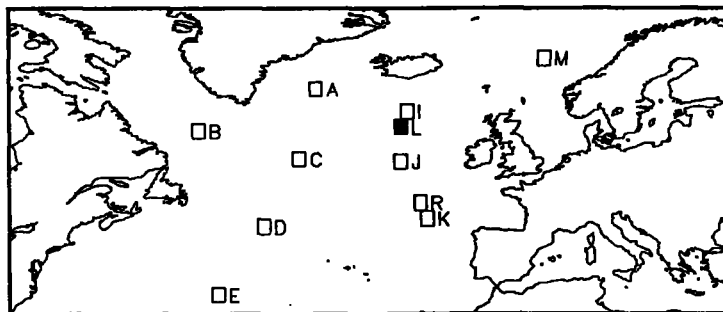
### Dew Point Temperature: 700 mb

Units = 0.1 °C



### OWS Study Area K Anomalies





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

**OWS**  
**L**

MONTH	YEAR											Sum		
	1945	1950	1955	1960	1965	1970	1975	1980						
J							31	30	28	31	31	27	31	209
F							31	30	28	31	31	27	29	207
M							29	28	28	28	29	28	25	195
A							29	28	28	28	29	28	25	195
M							29	30	28	31	31	31	28	206
A							29	30	26	31	31	31	25	203
M							23	26	29	30	30	30	28	196
J							23	26	29	30	30	30	25	193
J							31	28	31	28	31	31	29	209
A							31	28	31	28	31	31	29	209
S							29	30	30	30	30	30	29	208
O							29	30	30	30	30	30	29	208
N							16	31	30	31	31	31	31	232
D							16	31	30	31	31	31	30	231
Ann							22	31	31	31	31	29	30	236
							22	31	31	31	31	29	30	236
							22	29	27	29	30	30	28	225
							22	29	27	29	30	30	28	225
							31	31	30	30	31	30	31	244
							31	31	30	30	31	30	31	244
							30	29	17	25	30	27	30	215
							30	29	17	25	30	27	30	215
							30	31	22	31	31	30	31	236
							30	31	22	31	31	30	30	235
							151	354	329	349	362	361	359	2611
							151	354	329	349	362	361	358	2601

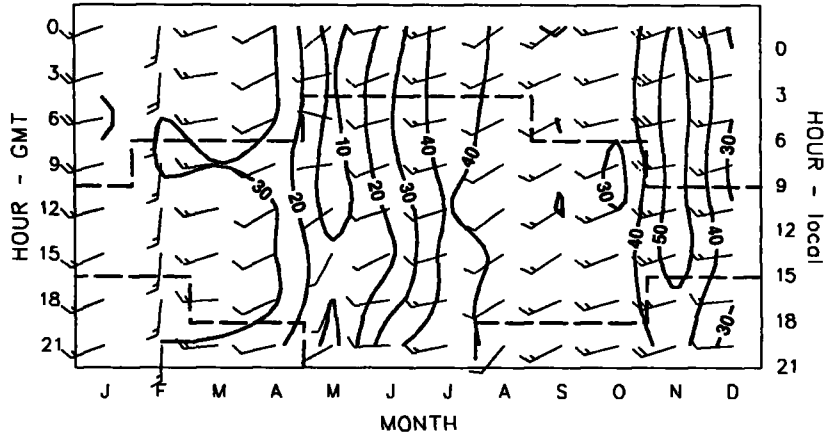
### OWS Study Area L (57.0°N, 20.0°W) Frequency of Surface Observations

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.



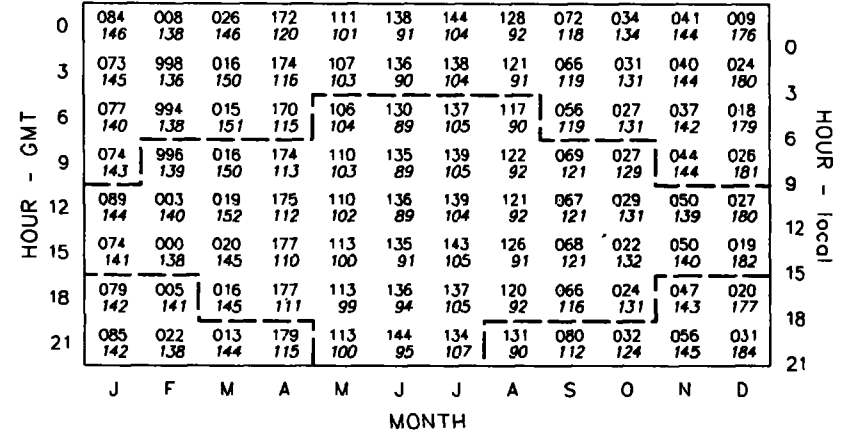
### Wind

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



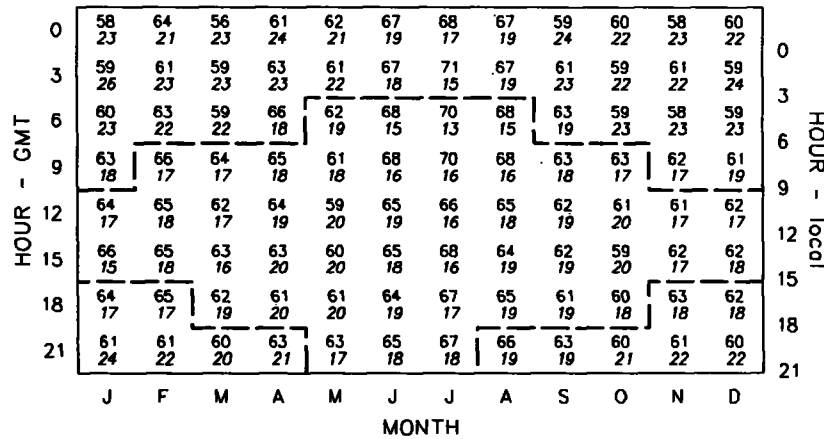
### Pressure

Units = 0.1 mb



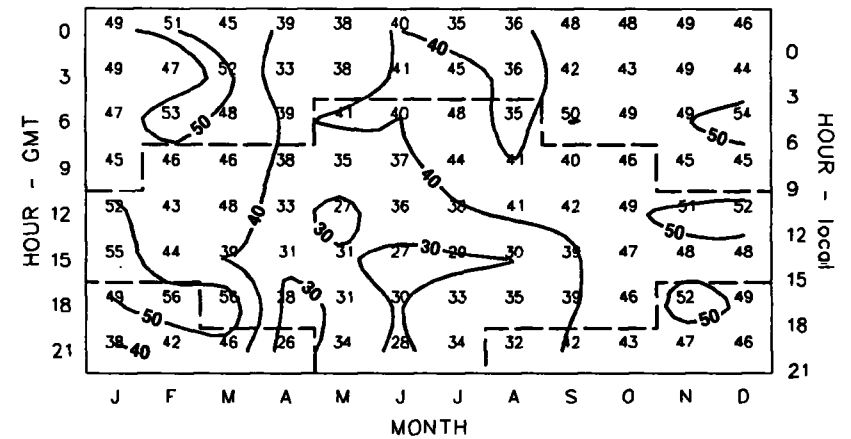
### Total Cloudiness

Units = 0.1 okta



### Precipitation Frequency

Units = percent  
Contour interval = 10 percent

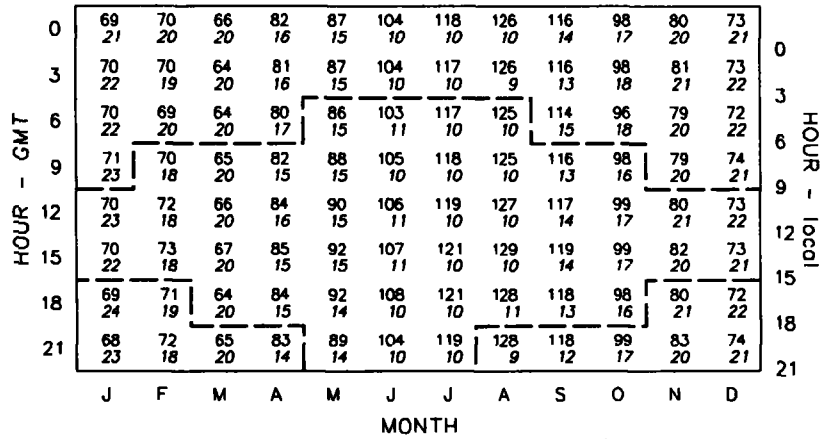


## OWS Study Area L Surface Climatology

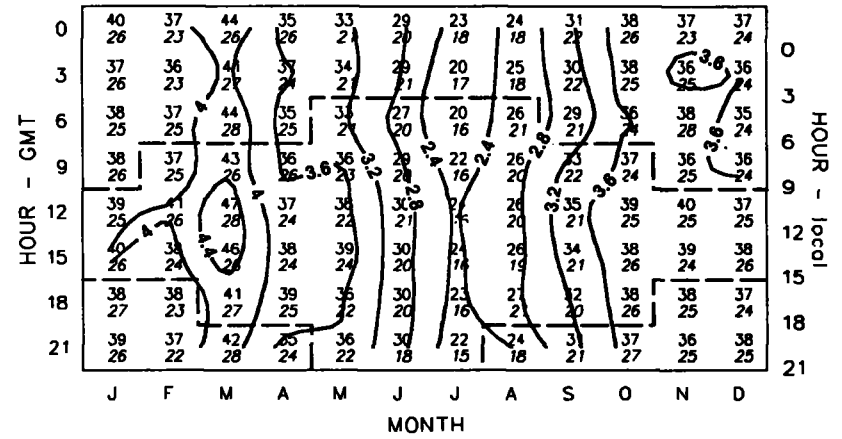
upper number = mean  
lower number = standard deviation

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

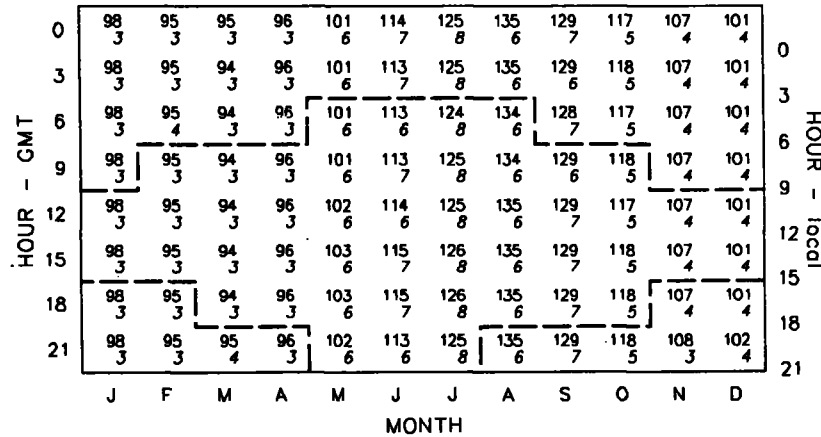
Air Temperature  
Units = 0.1 °C



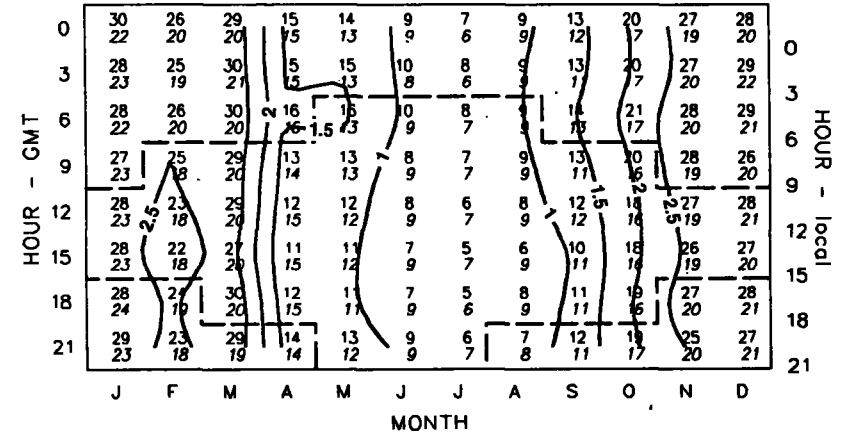
Dew Point Depression  
Units = 0.1 °C  
Contour interval = 0.4 °C



Sea Surface Temperature  
Units = 0.1 °C



Sea - Air Temperature Difference  
Units = 0.1 °C  
Contour interval = 0.5 °C



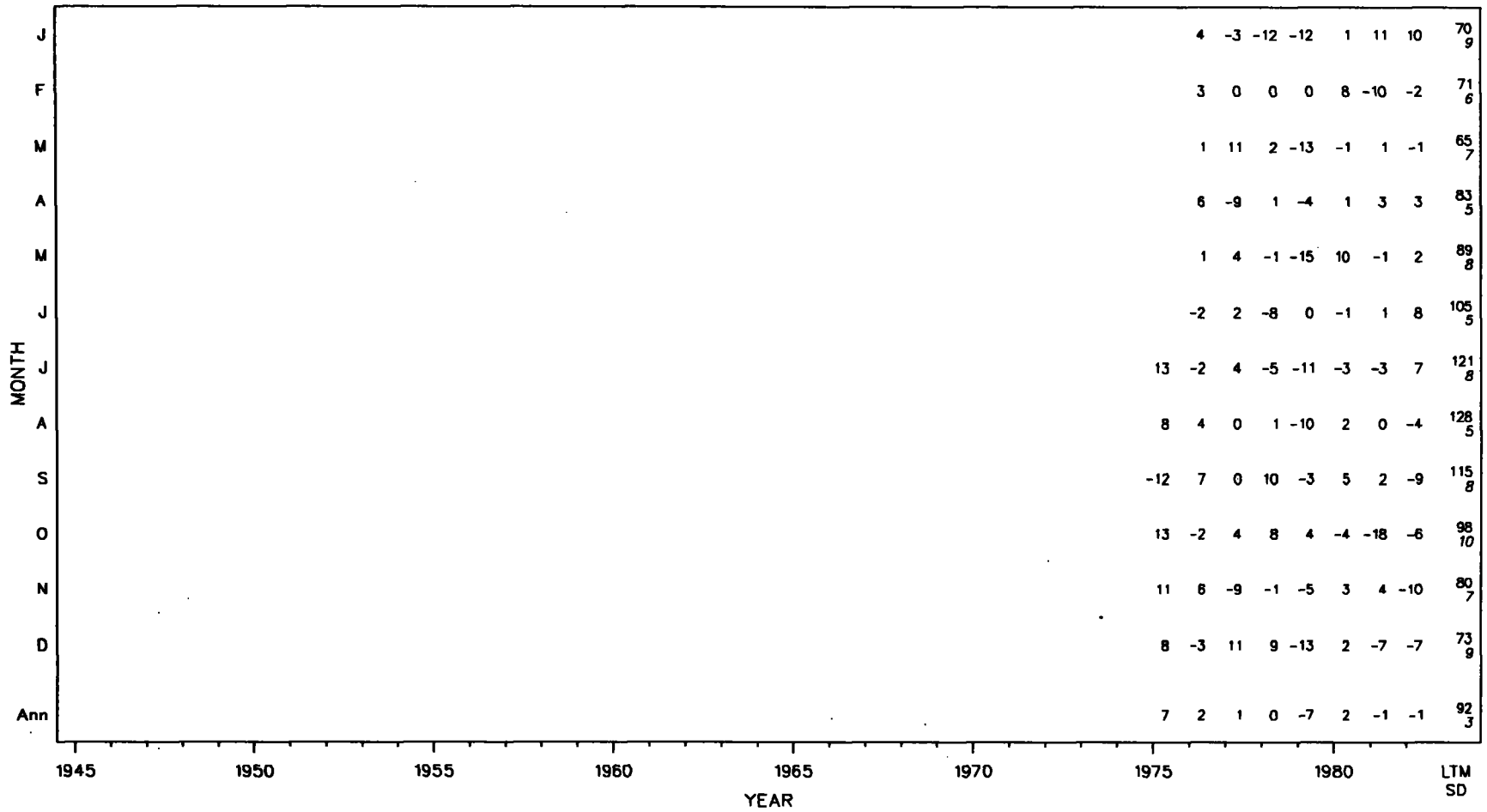
### OWS Study Area L Surface Climatology

upper number = mean  
lower number = standard deviation

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

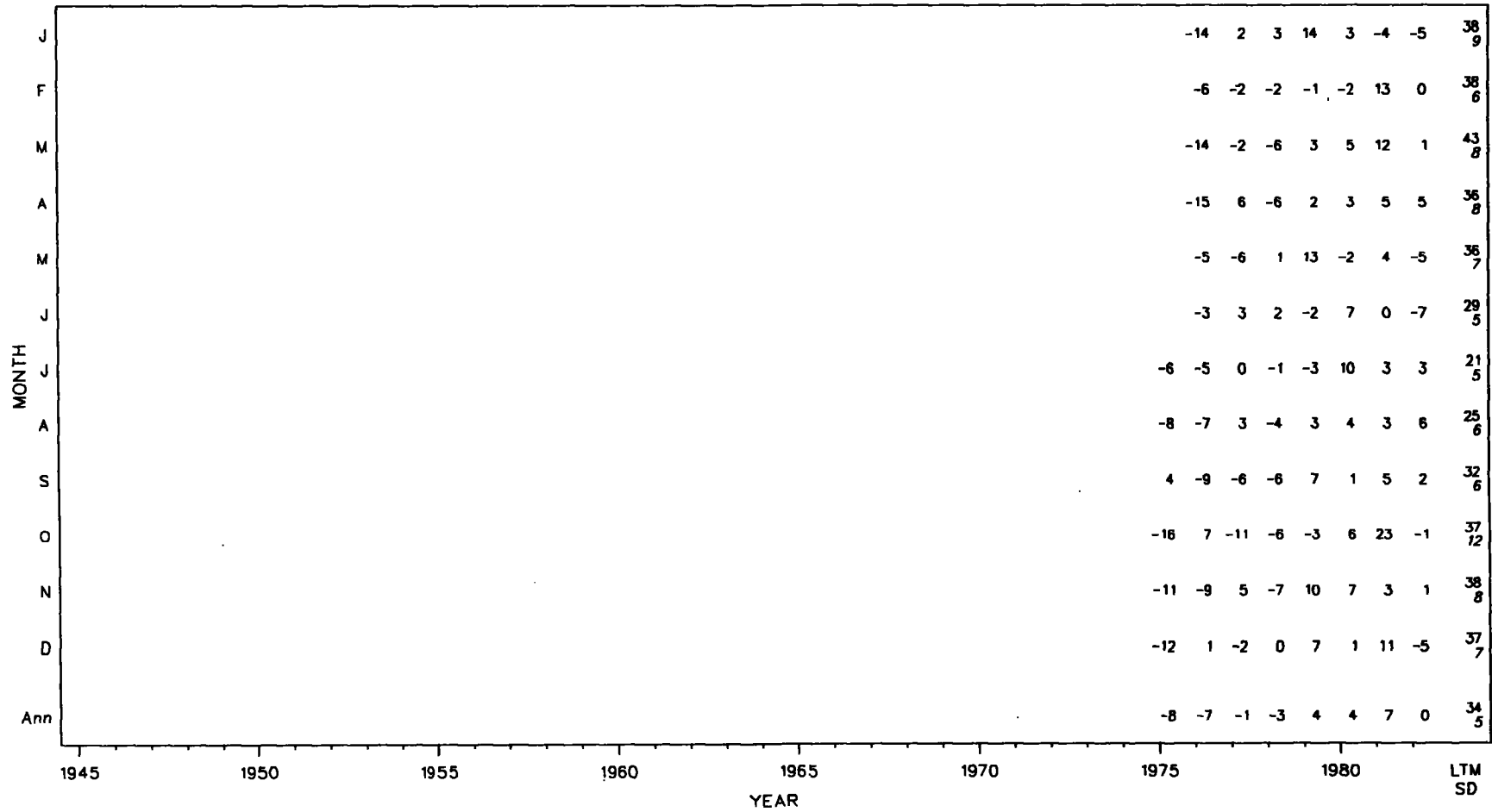
# Surface Air Temperature

Units = 0.1 °C



OWS Study Area L Anomalies

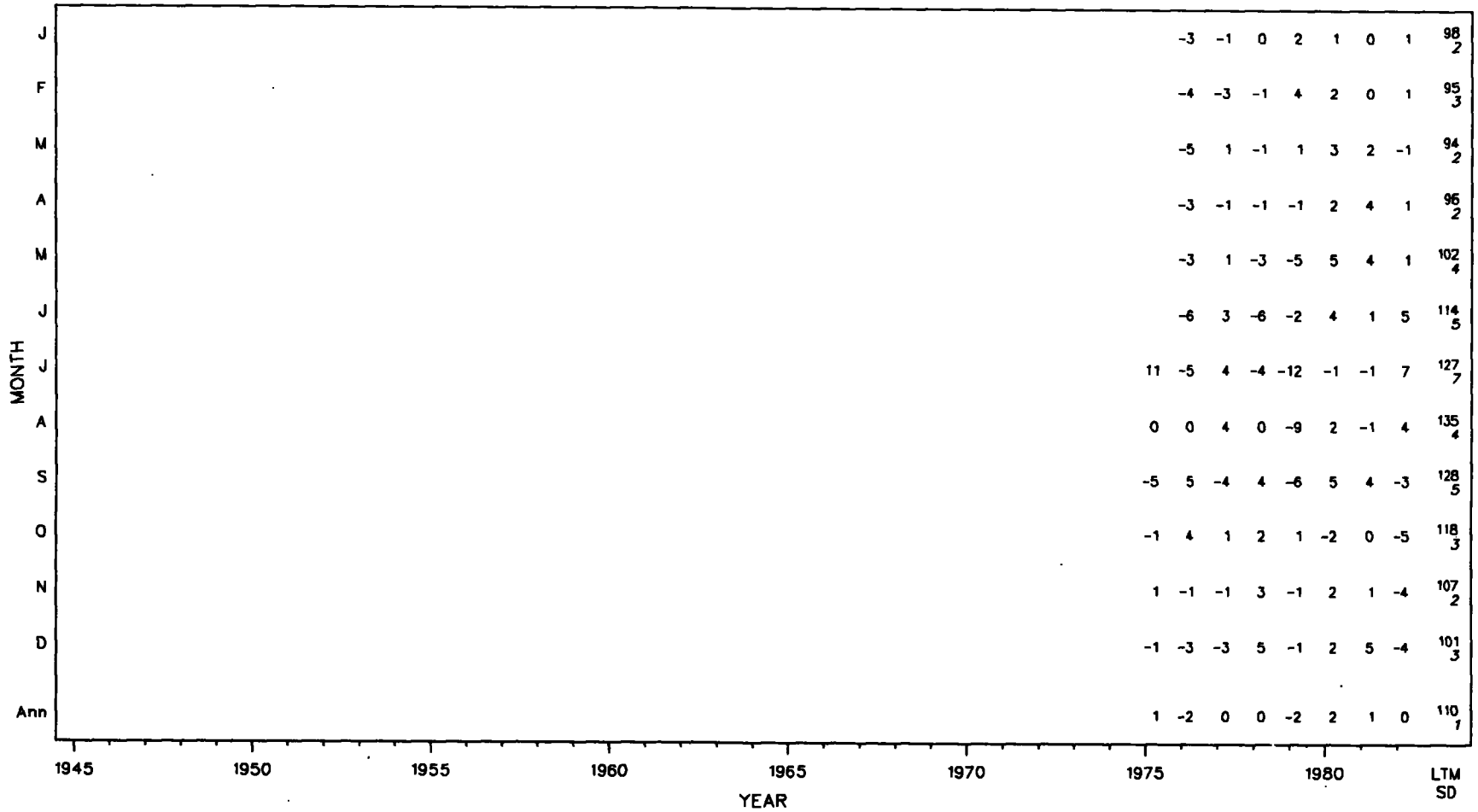
Surface Dew Point Depression  
 Units = 0.1 °C



OWS Study Area L Anomalies

# Sea Surface Temperature

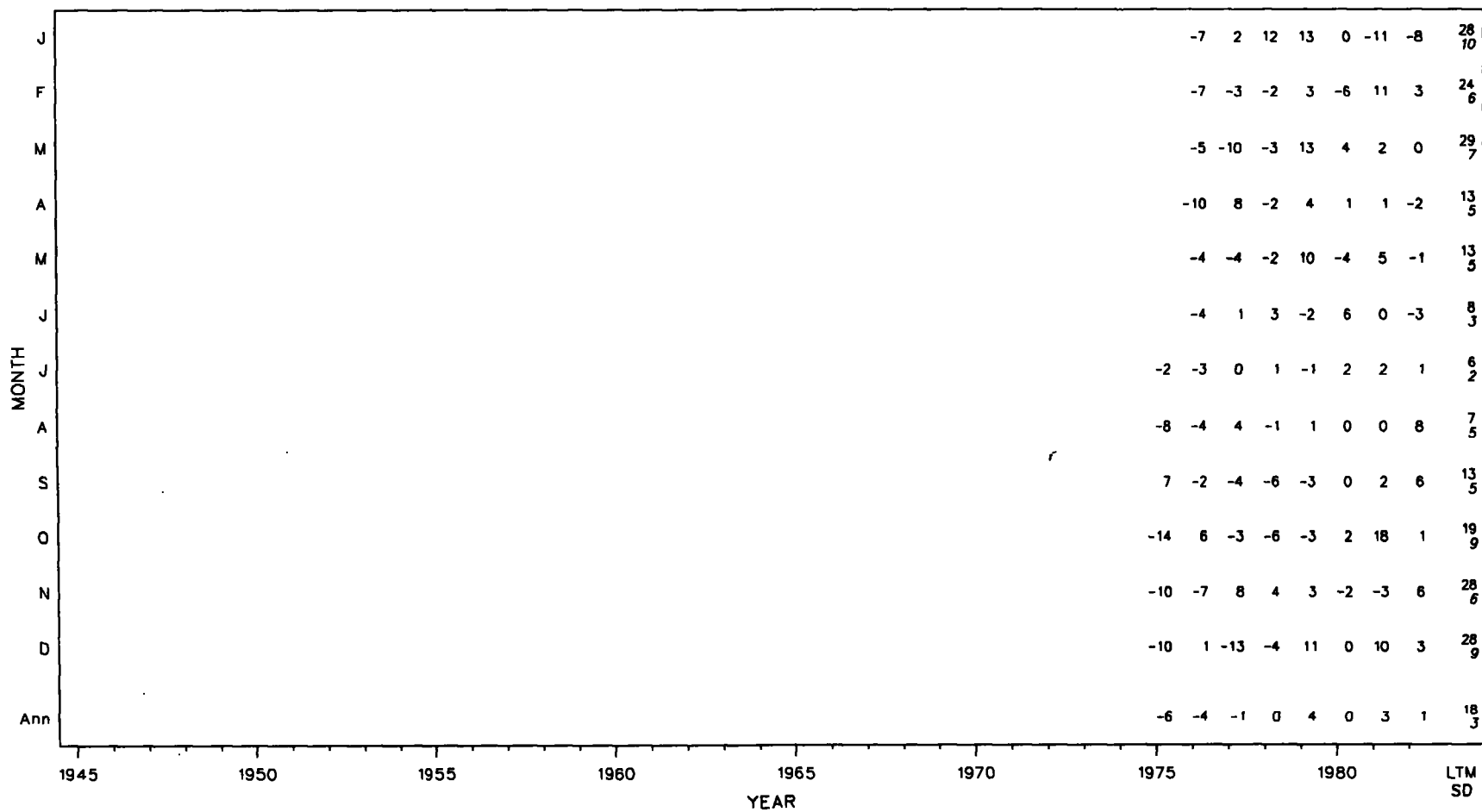
Units = 0.1 °C



OWS Study Area L Anomalies

# Sea - Air Temperature Difference

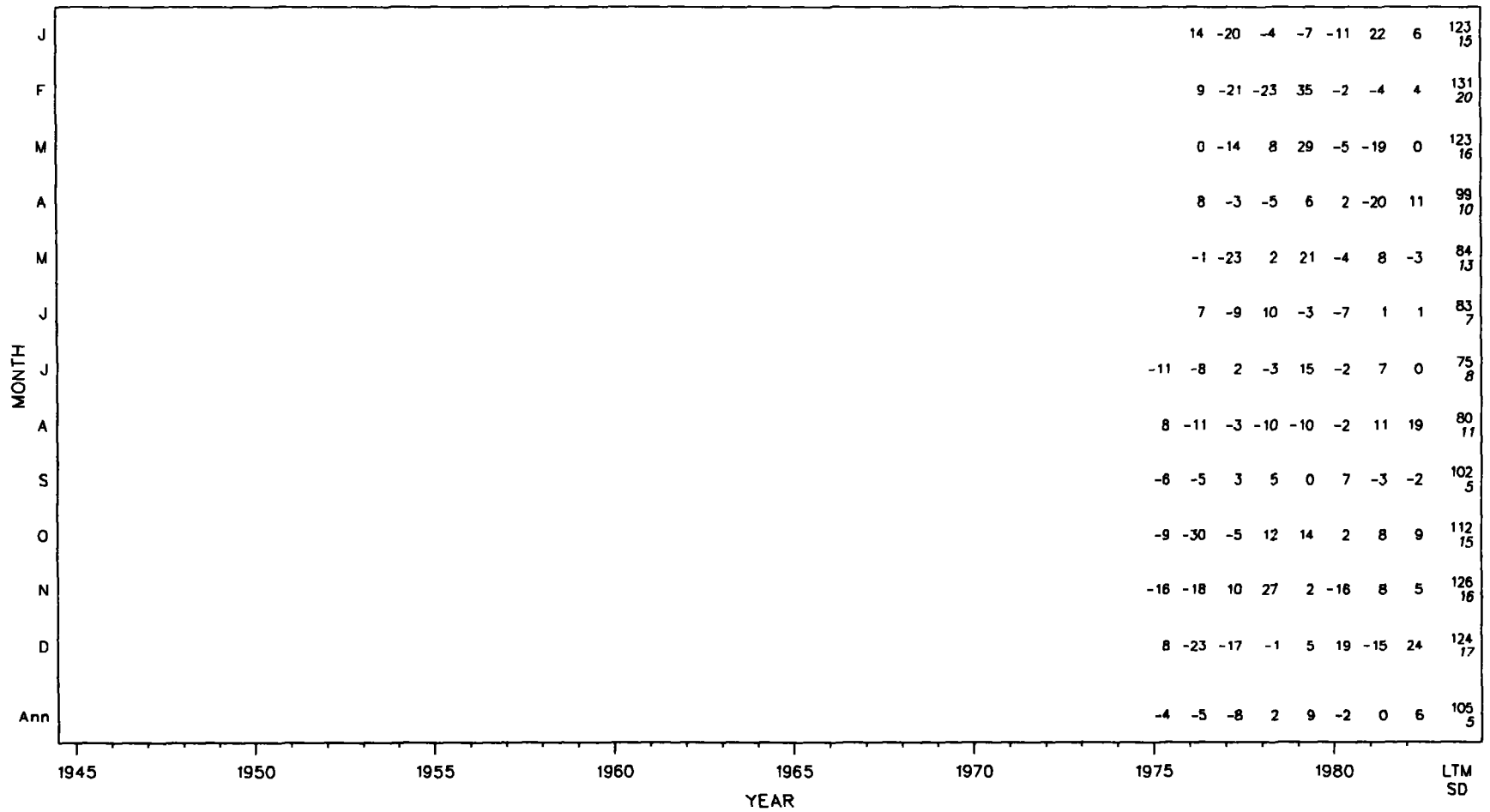
Units = 0.1 °C



OWS Study Area L Anomalies

# Surface Scalar Wind

Units = 0.1 m/s



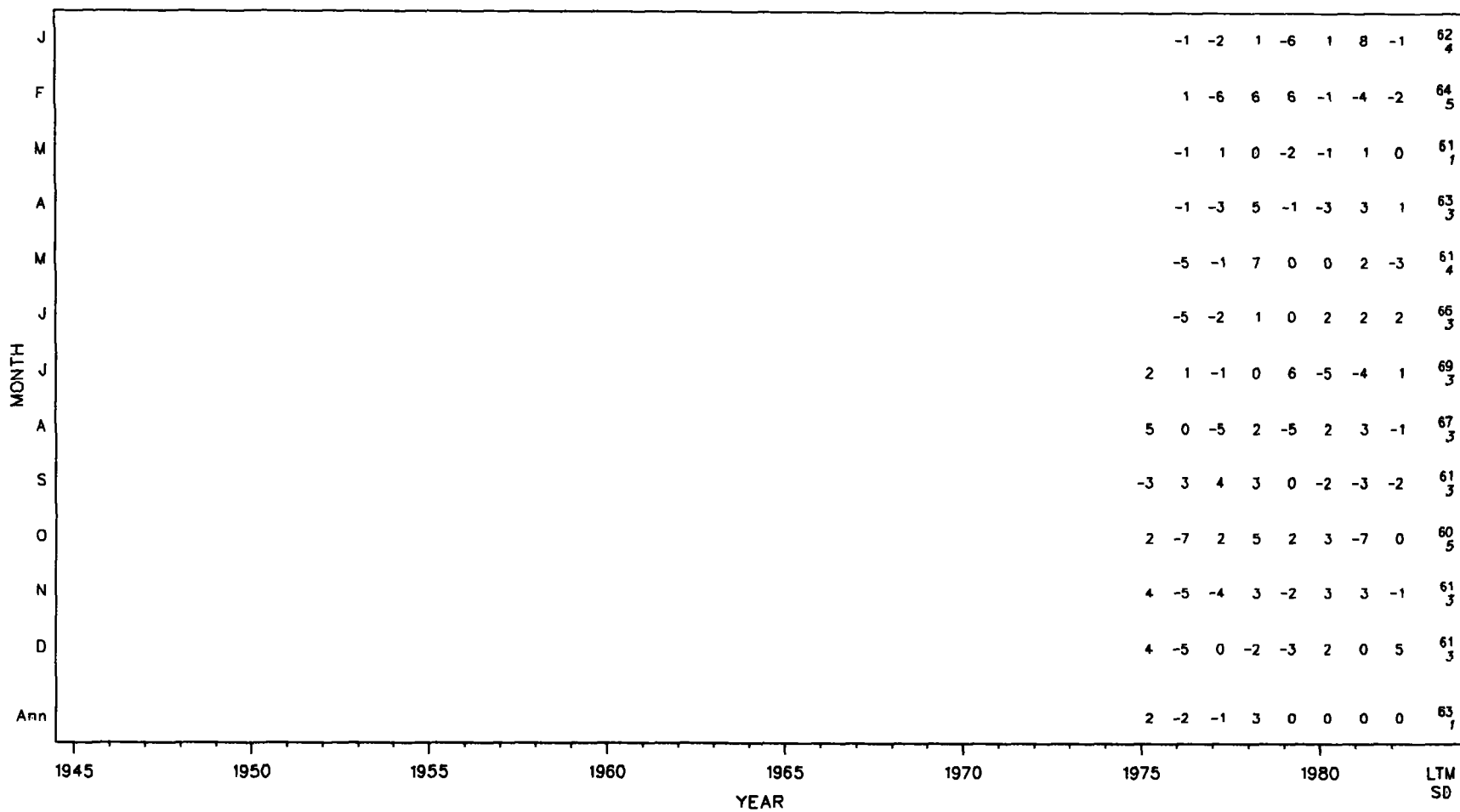
OWS Study Area L Anomalies





# Total Cloudiness

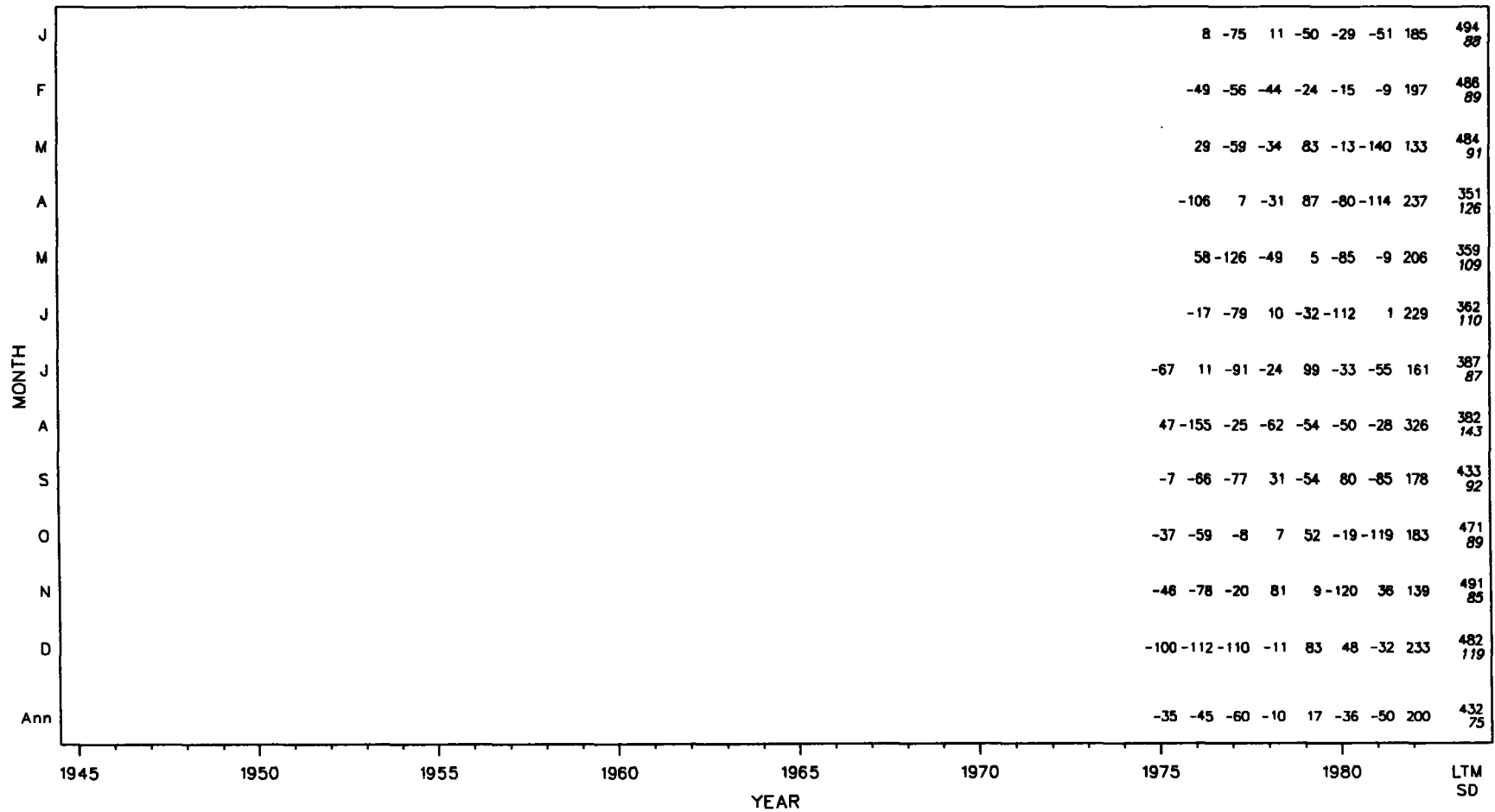
Units = 0.1 okta



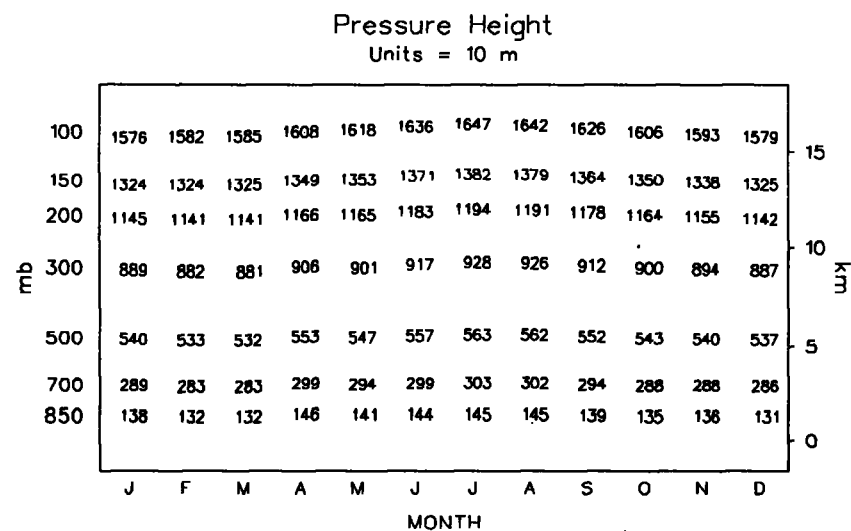
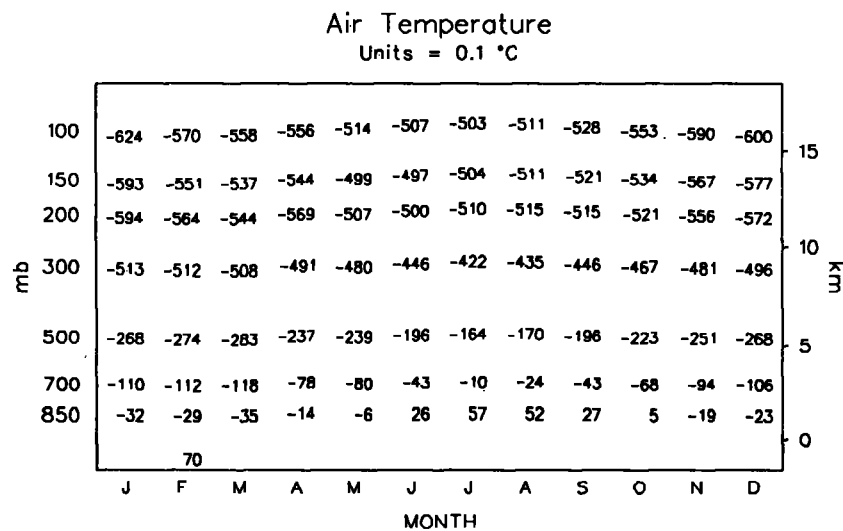
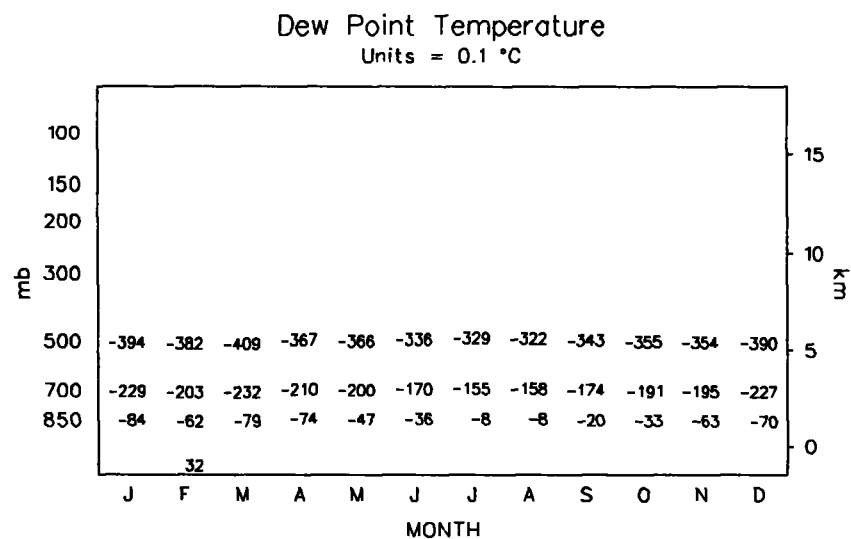
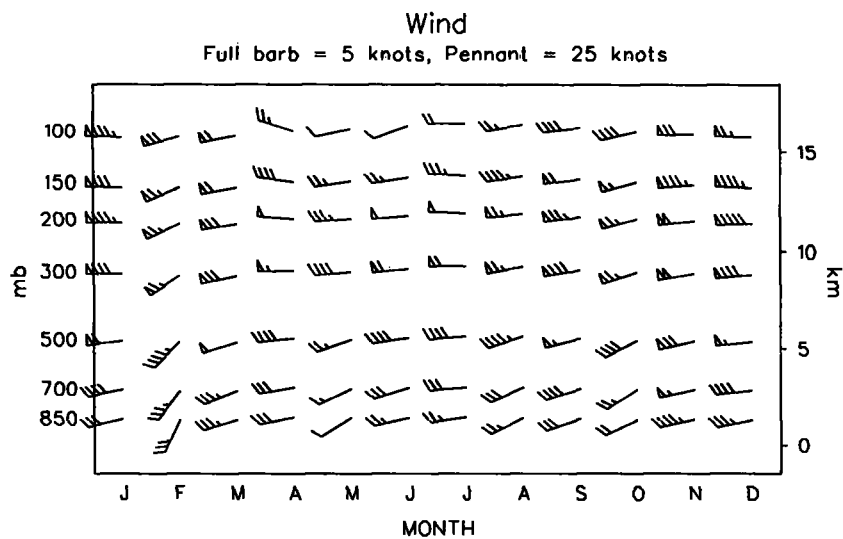
OWS Study Area L Anomalies

### Precipitation Frequency

Units = 0.1 percent



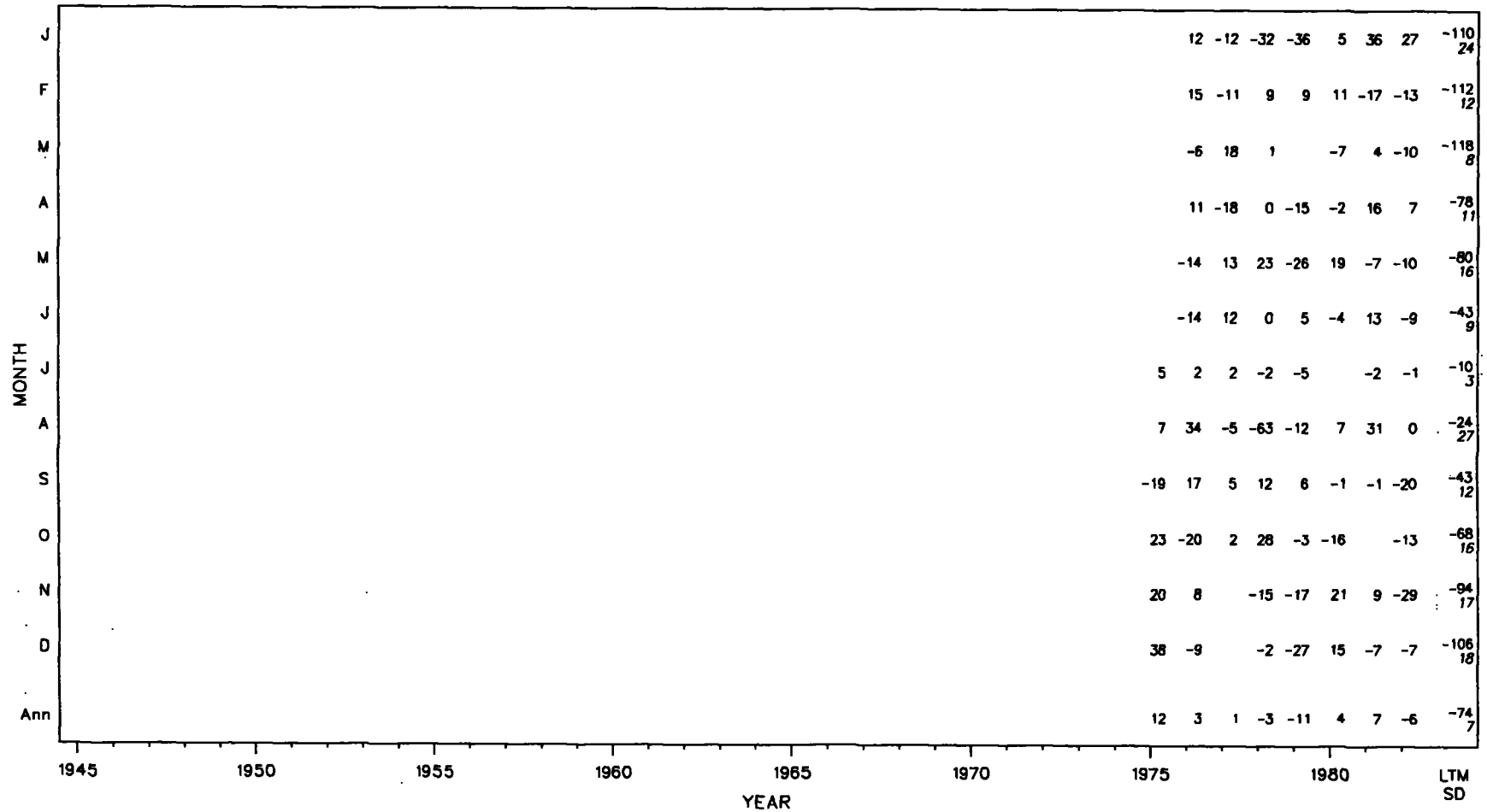
OWS Study Area L Anomalies



## OWS Study Area L Upper Air Climatology

Mean plotted at actual height

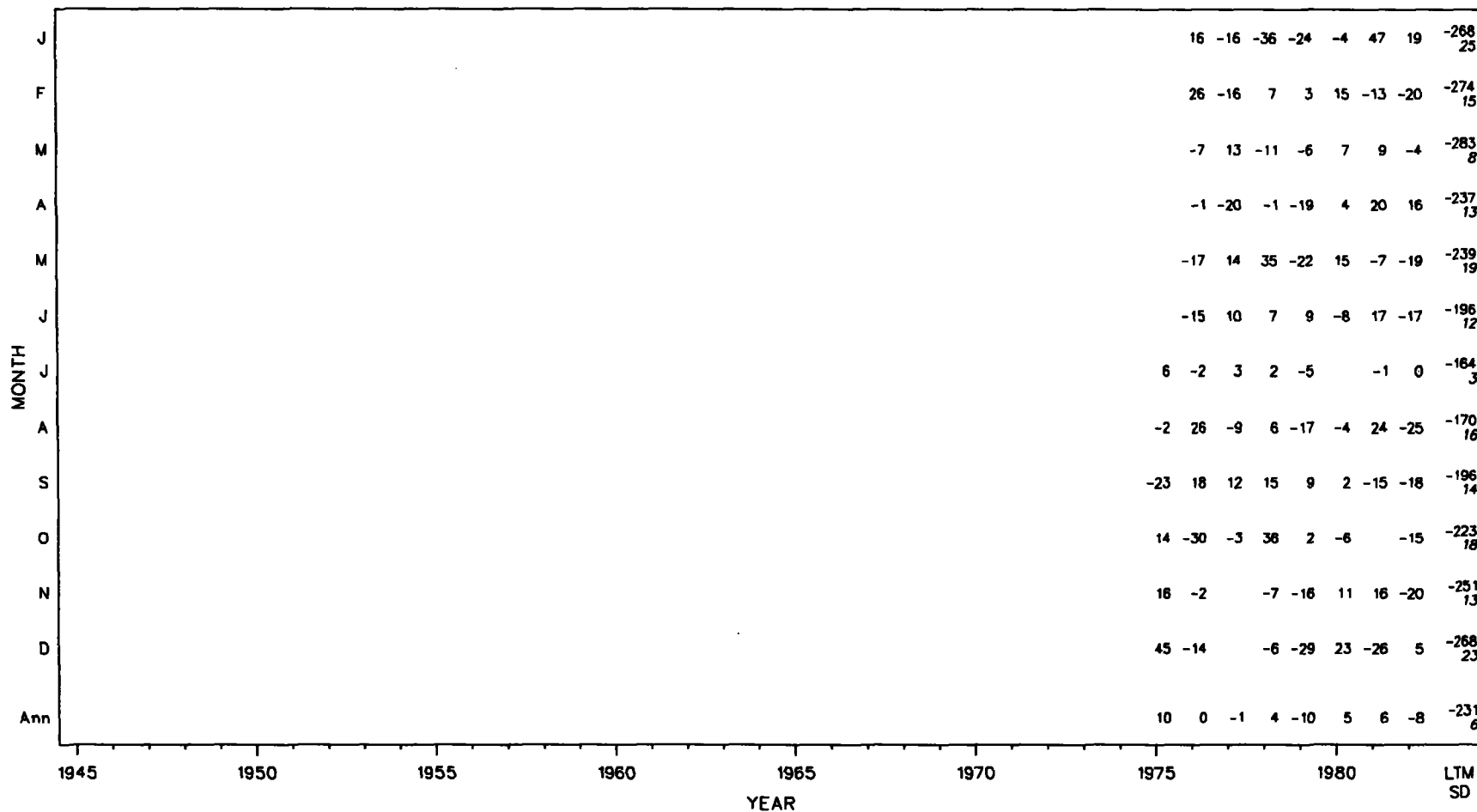
Air Temperature: 700 mb  
Units = 0.1 °C



OWS Study Area L Anomalies

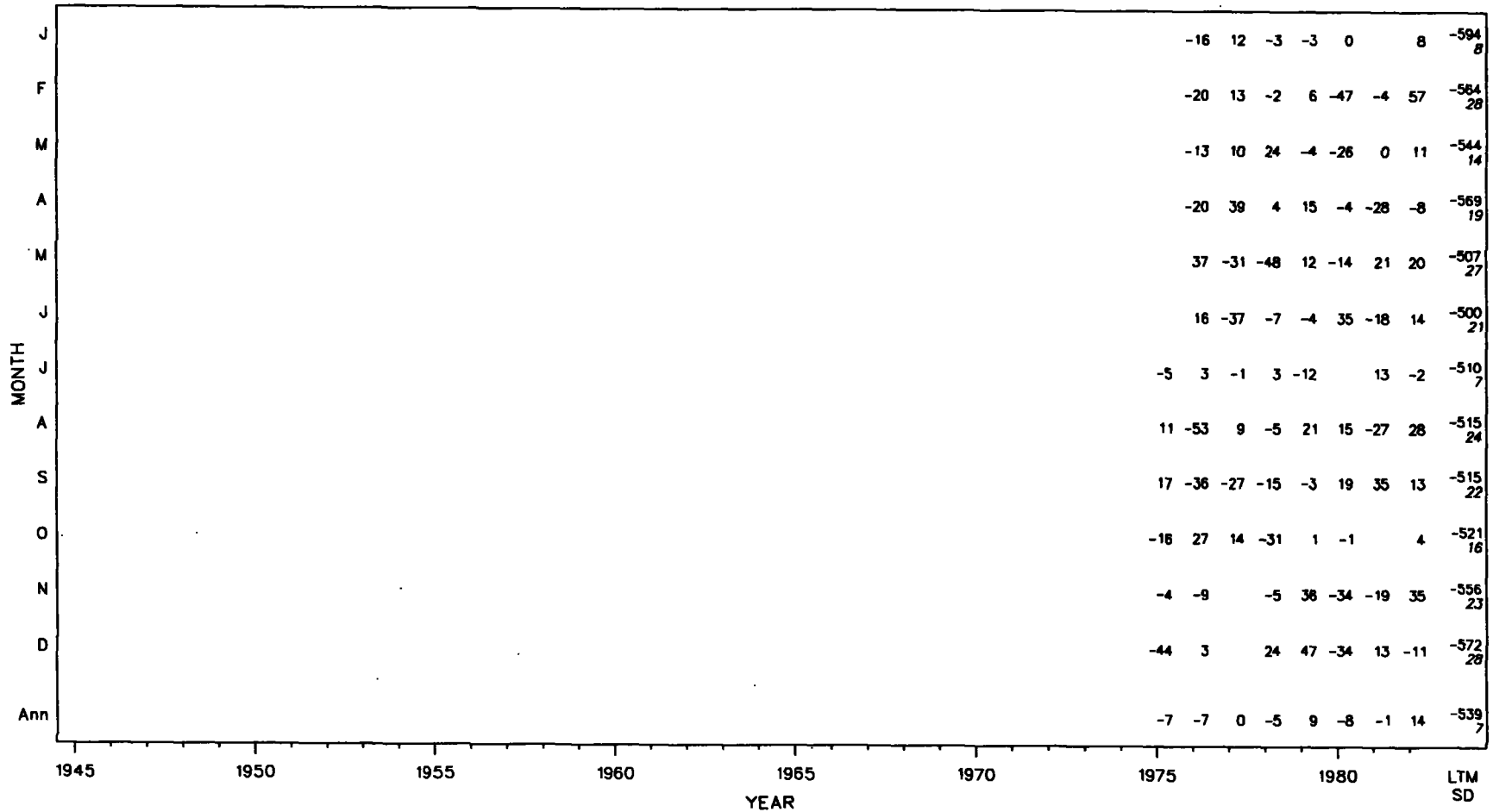
Air Temperature: 500 mb

Units = 0.1 °C



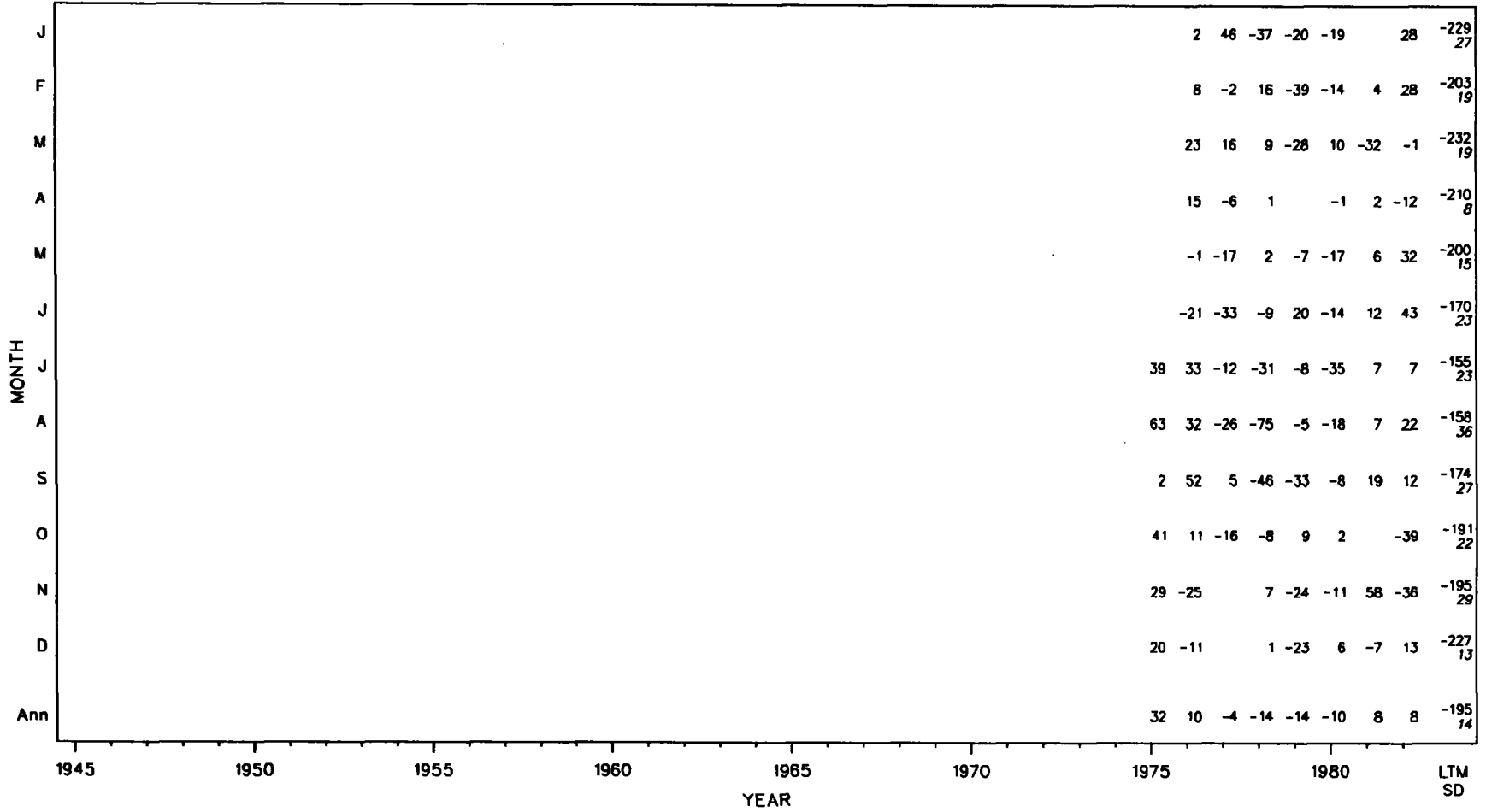
OWS Study Area L Anomalies

Air Temperature: 200 mb  
Units = 0.1 °C



OWS Study Area L Anomalies

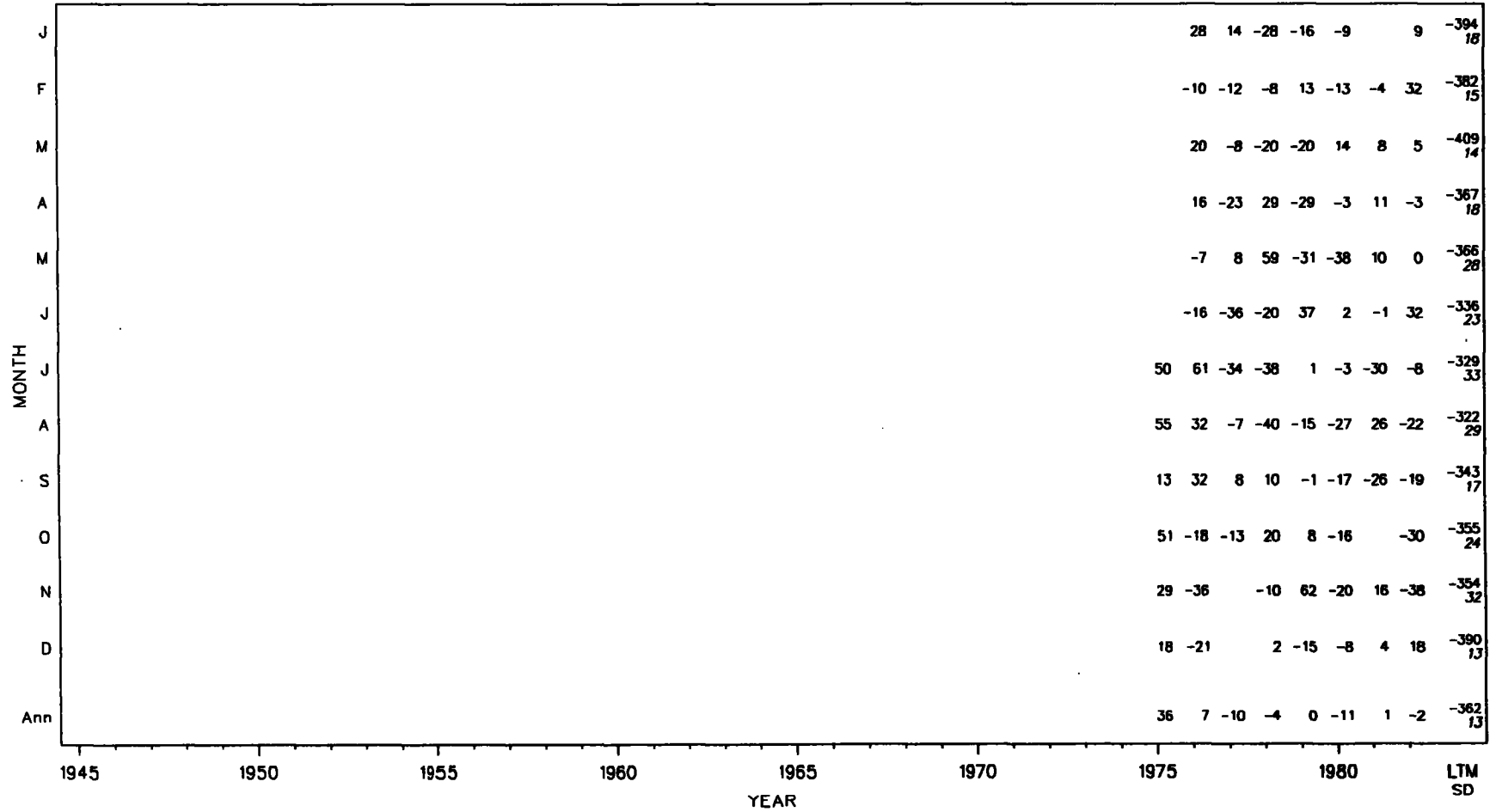
Dew Point Temperature: 700 mb  
 Units = 0.1 °C



OWS Study Area L Anomalies

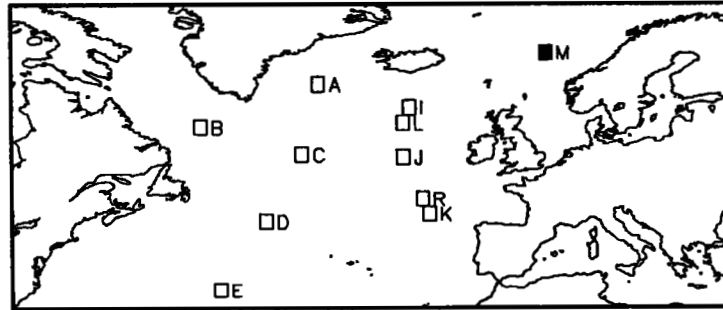
Dew Point Temperature: 500 mb

Units = 0.1 °C



OWS Study Area L Anomalies





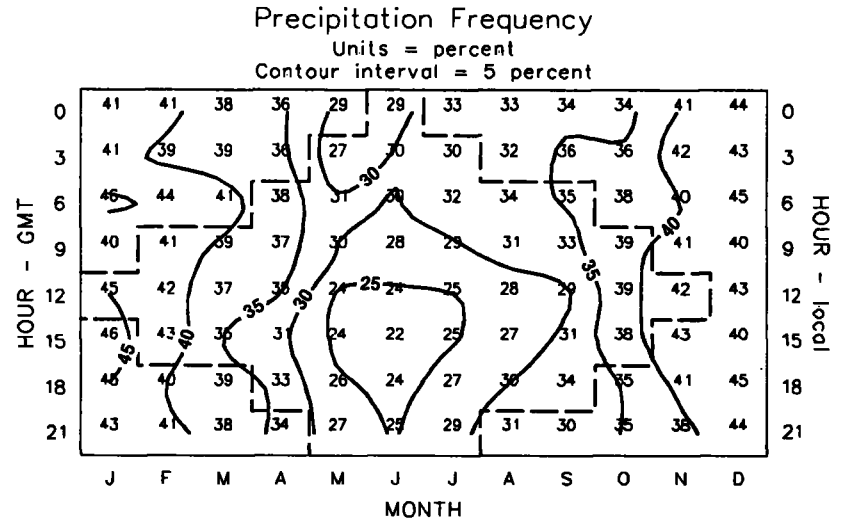
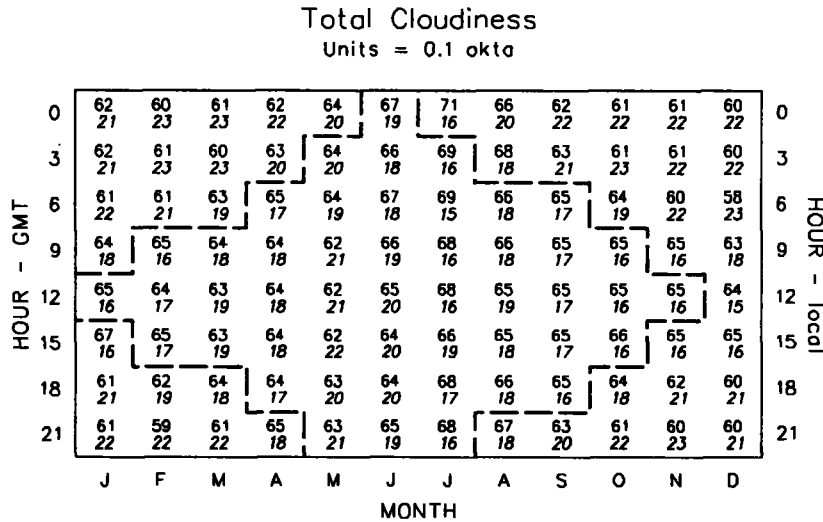
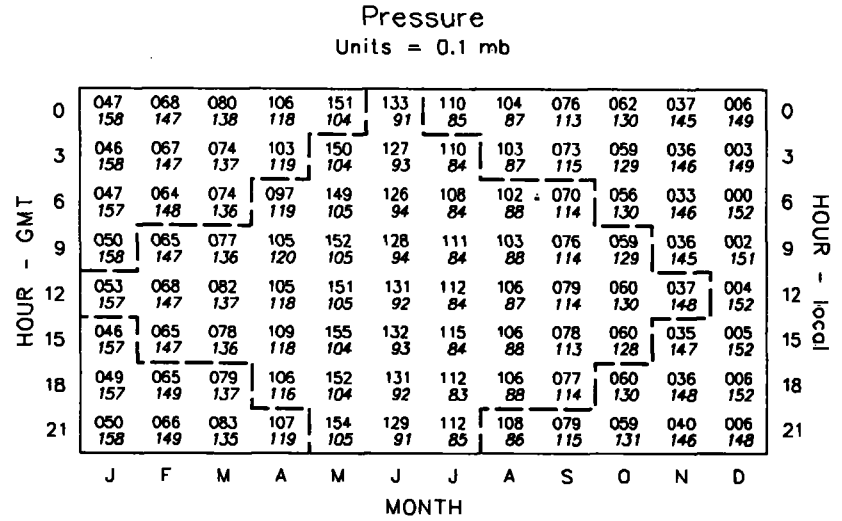
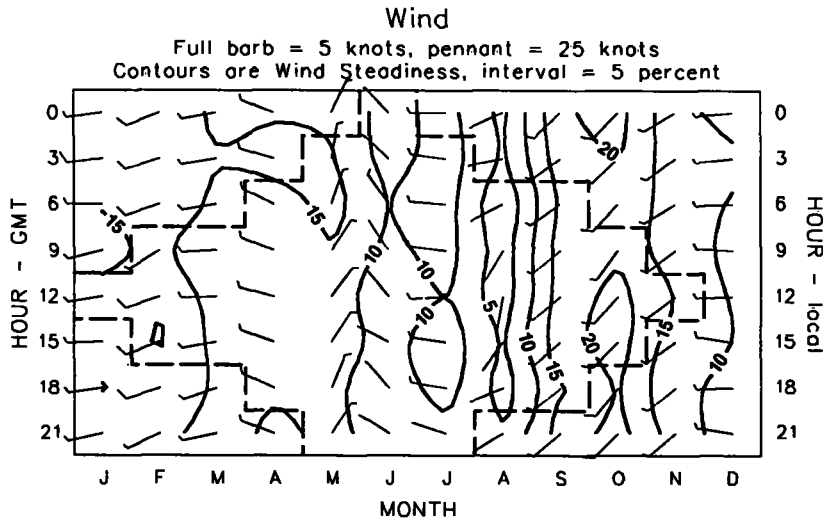
65.0°N – 66.9°N, 1.0°E – 2.9°E  
1949 – 1982

**OWS**  
**M**

J	24 0	31 31	30 30	31 31	30 30	31 31	31 31	31 31	27 27	31 30	31 31	31 31	31 31	31 30	31 31	31 31	31 31	27 27	30 30	14 14	27 22	13 13	30 30	31 31	14 14	18 15	21 18	31 31	31 31	31 31	31 31	28 28	952 916	
F	20 0	25 25	27 27	29 29	28 28	28 26	28 27	29 29	28 28	28 28	28 28	29 29	28 28	28 28	25 25	28 28	19 19	28 28	15 15	26 26	6 6	25 25	28 28	20 19	19 18	23 21	27 27	28 28	29 29	28 28	25 24	867 839		
M	31 0	29 29	31 31	29 29	31 31	31 31	31 31	31 31	29 29	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	22 21	27 27	29 29	30 30	22 22	12 11	17 17	12 12	26 25	27 22	31 31	31 31	31 31	31 31	30 28	961 918	
A	28 0	30 30	30 30	29 29	30 30	27 26	29 29	30 30	30 30	30 30	30 30	30 30	29 29	30 30	30 30	30 30	30 30	28 27	24 24	28 28	30 30	13 13	21 20	26 24	17 14	21 20	27 20	30 30	30 30	28 28	30 28	28 28	943 896	
M	31 0	31 31	31 31	30 29	31 30	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	26 26	29 29	31 31	13 12	27 27	27 27	17 17	22 21	30 30	31 31	31 31	31 30	31 31	30 26	994 952	
J	30 0	30 30	30 30	28 28	30 26	30 30	30 30	30 30	30 29	30 30	30 29	30 30	30 30	30 30	30 30	30 30	30 30	26 25	30 30	22 22	13 13	30 30	30 30	17 17	18 17	26 26	30 30	30 29	30 30	30 30	29 23	959 914		
J	31 0	31 31	30 30	31 31	31 31	29 30	30 30	31 31	31 31	29 28	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 29	31 31	27 27	31 31	26 26	21 25	25 20	20 15	26 26	20 20	31 31	31 31	30 30	31 29	975 941		
A	31 31	29 29	31 31	31 31	31 31	31 31	29 29	31 31	31 31	28 28	31 30	31 31	31 31	31 31	31 31	31 31	29 29	31 31	29 29	29 28	25 25	25 31	20 20	20 19	23 21	23 22	31 31	31 31	31 31	31 31	30 24	990 978		
S	30 30	29 29	30 30	30 30	30 30	30 30	30 30	30 30	30 30	28 28	30 30	29 29	30 30	30 30	29 29	30 30	29 29	30 29	29 27	27 27	29 29	22 22	30 30	18 18	16 16	27 27	26 26	30 30	30 30	30 29	29 26	961 960		
O	29 29	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	31 30	31 31	31 31	31 31	31 31	29 29	31 31	31 31	10 10	27 27	28 28	20 20	31 31	20 20	23 23	25 25	24 24	31 31	31 31	26 26	30 30	31 27	972 967	
N	30 30	30 30	30 30	27 27	25 25	30 30	30 30	30 30	30 30	27 27	30 30	30 30	30 30	30 30	30 30	30 30	30 30	14 14	29 29	28 28	27 27	7 6	17 17	30 25	21 21	15 14	22 20	27 23	30 30	30 30	30 30	28 28	914 901	
D	31 31	30 30	30 30	31 31	26 26	29 29	31 31	31 31	31 31	31 31	31 31	31 31	31 31	20 20	30 30	31 31	31 31	31 31	28 28	28 28	27 27	24 24	19 19	28 28	30 28	25 16	30 25	20 20	31 31	31 31	31 30	27 25	977 956	
Ann	346 151	356 356	361 361	357 356	354 349	358 355	363 362	364 364	359 359	354 351	365 363	365 361	364 364	354 354	363 363	365 365	364 364	359 359	345 343	335 333	310 309	313 312	305 299	204 203	320 310	288 284	211 196	277 257	294 272	364 364	365 357	358 362	343 316	11465 11138
	1945	1950	1955	1960	1965	1970	1975	1980	Sum																									

## 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.

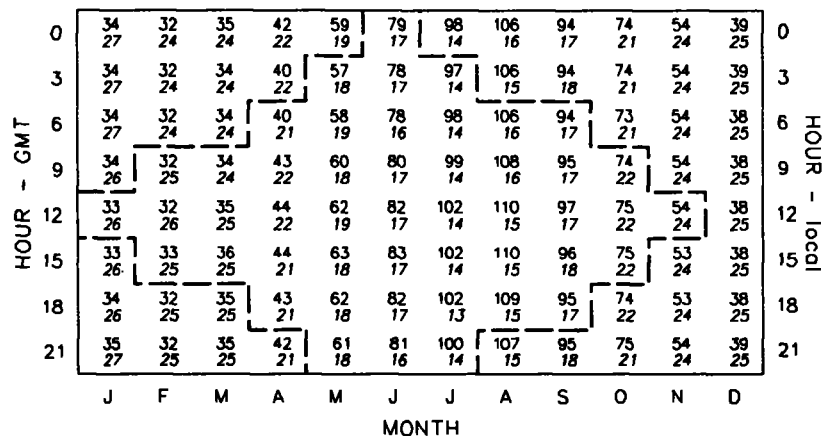


## OWS Study Area M Surface Climatology

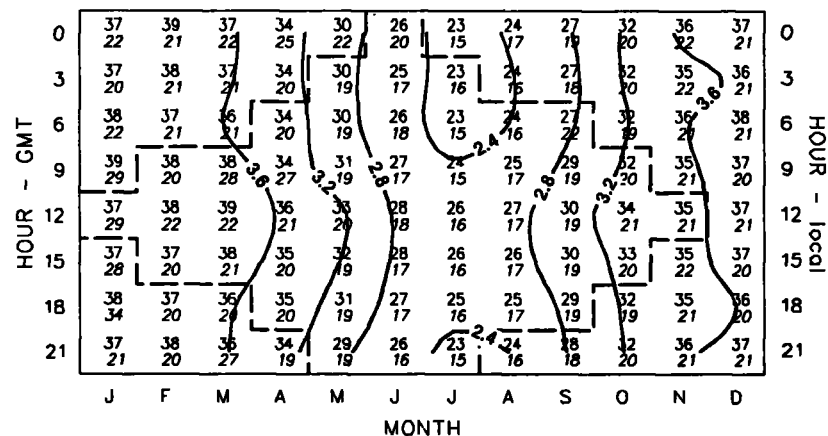
upper number = mean  
lower number = standard deviation

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

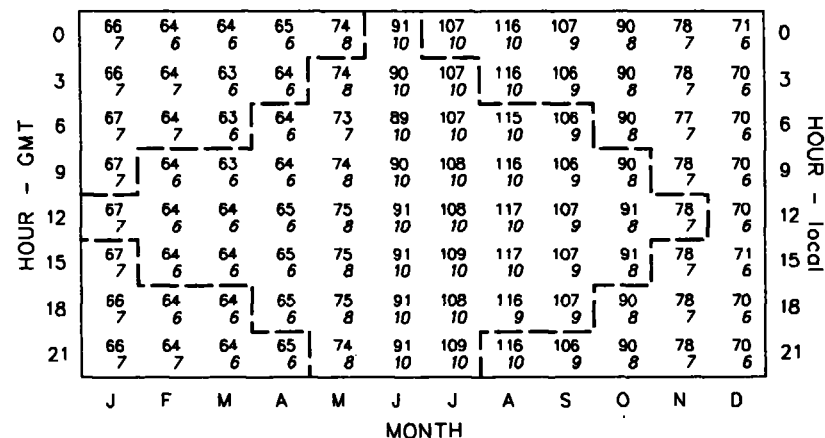
Air Temperature  
Units = 0.1 °C



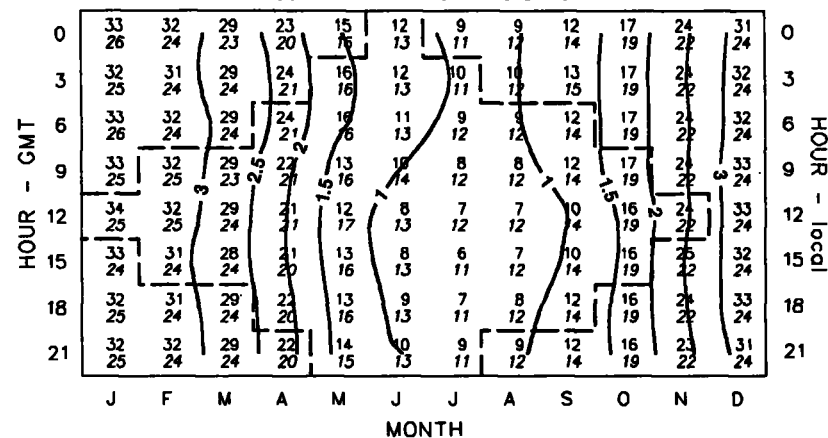
Dew Point Depression  
Units = 0.1 °C  
Contour interval = 0.4 °C



Sea Surface Temperature  
Units = 0.1 °C



Sea - Air Temperature Difference  
Units = 0.1 °C  
Contour interval = 0.5 °C



### OWS Study Area M Surface Climatology

upper number = mean  
lower number = standard deviation  
———— data contours  
----- sunrise/sunset

### Surface Air Temperature

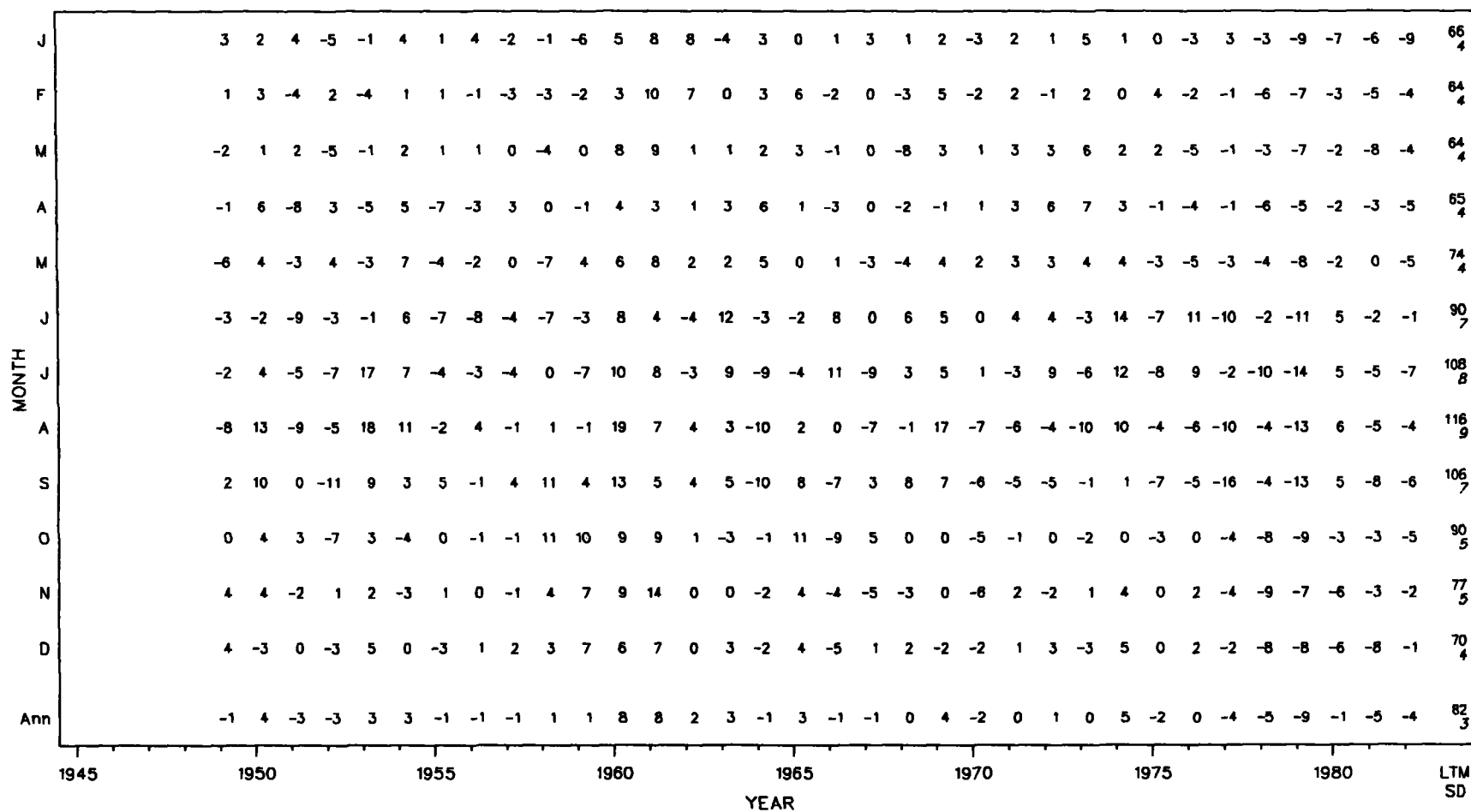
Units = 0.1 °C

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	1981	1982	1983	1984	1985	LTM	SD
J	3	11	3	-5	-4	2	-9	-3	11	-5	-13	2	14	10	-13	8	-2	-11	-6	-3	7	10	9	20	18	20	6	-8	1	-13	-14	-3	-19	-23	35	11							
F	15	6	8	-9	-7	12	-8	-8	0	-16	18	-6	16	-3	-12	6	1	-25	11	-7	-14	-2	10	19	-13	2	11	11	-1	-22	-11	4	-5	18	33	12							
M	4	-1	-11	-2	9	-1	-9	10	2	-12	23	24	-2	-27	13	23	-11	-8	-5	-11	1	-7	-3	-7	-1	11	8	5	7	1	-12	0	-19	6	35	11							
A	-7	7	-11	10	-9	1	-6	-6	13	5	4	11	-4	4	11	12	9	-3	-2	1	13	0	-2	5	-8	10	-9	-10	-14	-10	0	3	-10	-7	42	8							
M	2	-5	-6	-4	-8	15	-14	6	-8	-6	5	10	6	-2	12	5	-3	-2	3	-7	-1	7	11	7	5	10	-5	0	-12	-2	-15	-6	4	-6	60	8							
J	-3	4	-14	-5	8	2	-10	-12	-8	-7	1	6	2	-8	10	-5	-3	10	4	9	16	9	2	7	3	12	-16	16	-11	0	-5	8	-13	-13	80	9							
J	-4	8	-5	-4	19	7	-1	0	-7	-6	2	16	7	-6	1	-6	-11	8	-3	0	8	1	-6	13	-7	4	-5	8	-6	-5	-8	-2	-8	0	100	7							
A	-9	24	0	-11	18	6	3	-1	-5	3	-2	16	6	0	5	-11	-2	-3	-8	1	24	-7	-5	-5	-7	9	-4	0	-12	-9	-13	9	-6	-1	107	10							
S	7	12	7	-16	11	-3	12	2	1	14	8	19	11	4	3	-13	9	-18	10	0	-5	-7	-7	-7	0	6	-8	-19	-11	-4	-17	7	4	-11	94	10							
O	-5	10	11	2	14	-9	-9	1	-2	14	17	0	24	-3	7	4	14	-9	-5	-14	-12	-12	-3	0	-15	1	2	10	6	-13	-4	-17	-5	-1	74	10							
N	19	3	-7	-3	8	8	3	6	5	14	19	13	13	-5	-7	-5	-11	-6	10	3	-22	-11	4	10	-20	13	0	10	0	-14	-7	-21	-14	-8	54	11							
D	5	-4	4	2	20	6	-15	11	1	-3	18	9	-8	2	4	-3	-16	1	-8	0	2	6	-6	23	-8	6	-11	6	15	-6	-1	-20	-26	-6	36	11							
Ann	2	6	-2	-4	7	4	-5	0	0	0	8	10	7	-3	3	1	-2	-5	0	-2	1	-1	0	7	-4	9	-2	2	-3	-8	-9	-3	-10	-4	63	5							

### OWS Study Area M Anomalies



Sea Surface Temperature  
Units = 0.1 °C



OWS Study Area M Anomalies

### Sea - Air Temperature Difference

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	1981	1982	1983	1984	1985	LTM	SD							
J	0	-10	1	0	3	2	10	8	-14	5	7	4	-6	-2	10	-5	2	12	10	3	-5	-13	-7	-19	-13	-19	-6	4	2	10	4	-4	13	15									32	9						
F	-14	-3	-11	11	3	-11	8	7	-3	14	-20	10	-6	10	12	-3	4	22	-11	5	18	1	-8	-20	15	-3	-8	-13	0	16	4	-7	1	-23											30	12				
M	-5	2	12	-4	-11	3	10	-9	-3	8	-23	-17	10	28	-12	-21	14	7	5	3	2	8	6	10	7	-9	-6	-10	-7	-3	5	-2	11	-10												29	11			
A	6	-1	2	-8	4	4	0	3	-10	-5	-5	-7	7	-3	-8	-5	-7	0	1	-3	-13	2	5	2	15	-7	8	7	14	4	-4	-6	7	2													23	7		
M	-8	8	3	8	5	-8	10	-8	8	-2	-1	-4	2	4	-10	-1	3	3	-6	3	5	-5	-8	-3	-1	-6	2	-5	9	-2	6	4	-4	1													14	6		
J	0	-6	5	2	-4	4	2	4	3	-1	-4	1	2	4	2	1	1	-3	-4	-3	-7	-9	2	-3	-6	2	9	-5	0	-3	-6	-4	10	11													10	5		
J	2	-4	0	-2	-1	1	-2	-3	3	7	-8	-5	1	3	8	-3	7	3	-6	3	-2	0	3	-3	2	7	-3	1	4	-5	-6	6	3	-7														8	4	
A	1	-11	-10	6	1	5	-5	5	4	-2	1	4	1	4	-2	2	4	3	2	-2	-7	0	0	1	-2	1	0	-6	2	5	0	-3	1	-3														8	4	
S	-5	-1	-7	5	-2	6	-6	-3	3	-3	-3	-6	-7	0	1	3	-1	11	-8	8	12	1	2	2	-1	-6	1	14	-5	0	5	-2	-12	5														12	6	
O	5	-7	-9	-9	-11	5	9	-2	0	-2	-7	9	-15	4	-10	-5	-3	0	10	14	12	7	2	0	13	0	-5	-10	-10	5	-5	14	2	-3														17	8	
N	-15	1	5	4	-6	-11	-2	-6	-5	-10	-12	-4	1	5	7	3	15	2	-14	-6	22	5	-2	-12	20	-9	0	-8	-4	5	0	15	12	6														23	9	
D	-1	2	-3	-5	-15	-6	12	-10	0	5	-11	-3	15	-2	-2	2	20	-7	9	2	-4	-8	7	-19	6	-2	11	-3	-16	-2	-7	13	18	5															17	7
Ann	-3	-2	-1	1	-3	-1	4	-1	-1	1	-7	-2	0	4	0	-3	5	5	-1	2	3	-1	0	-6	5	-4	0	-3	-1	2	0	2	5	0															20	3

OWS Study Area M Anomalies



### Surface Scalar Wind

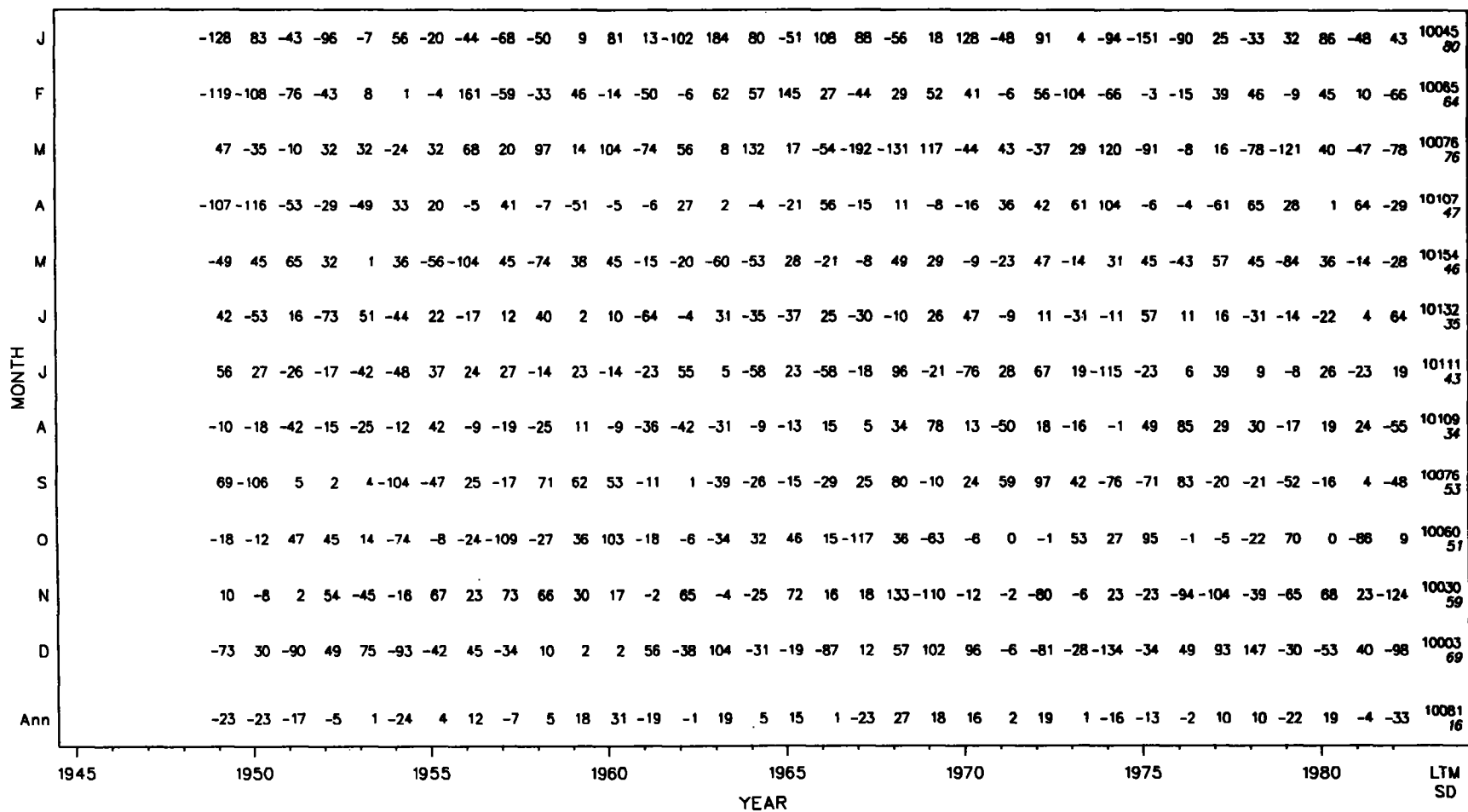
Units = 0.1 m/s

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																										
J	33	-28	-21	-22	-15	6	9	4	29	7	14	-24	-13	13	8	14	-20	2	-14	8	-22	-25	-17	9	-3	16	37	25	-5	0	-21	-5	23	-1	112	18
F	26	1	-38	-5	-9	10	-14	-25	-14	5	37	14	10	12	-17	-17	7	-2	11	21	-18	-36	6	16	-14	-3	15	19	-24	-19	13	3	8	20	112	18
M	23	-17	-13	10	12	-16	12	-15	-7	-16	1	-14	38	1	-8	-26	-6	13	28	-4	-9	-17	-2	38	-20	-14	1	23	-7	0	7	-22	10	13	104	17
A	13	-7	-8	-14	-4	15	-4	-21	15	4	20	22	-6	6	3	-13	-1	-8	18	1	-16	-9	-3	-5	-9	-11	-3	-4	-14	-4	-15	26	11	25	94	13
M	13	-25	-25	-19	0	-9	9	17	6	14	-5	-6	-1	13	4	10	5	1	-2	1	-6	-2	6	3	-4	-12	13	5	-16	-12	16	-13	0	25	79	12
J	-7	-8	-22	-9	-19	-7	-4	1	10	3	19	1	3	9	-18	8	7	-11	11	-2	-13	2	-1	6	19	-2	10	10	-19	0	8	7	8	2	74	11
J	6	-24	-11	-20	-4	1	-3	-5	-6	-3	-10	3	1	-5	17	11	7	-8	6	-17	5	-1	15	16	-8	-1	4	0	-10	13	11	4	-6	23	71	11
A	10	-3	-22	-1	-14	-6	4	-1	3	-8	-4	8	11	-12	-7	1	2	-10	-2	-1	-21	-7	12	12	19	-4	1	20	7	-5	-2	7	3	12	74	10
S	-4	-27	-18	-16	6	-1	1	0	-5	-6	0	-3	9	5	20	-6	-6	2	-2	-24	7	-4	10	1	-18	1	11	0	25	-2	20	8	1	14	90	12
O	-2	-17	-10	-31	2	-2	-4	23	18	4	-25	-27	-9	26	9	-6	4	-23	6	-12	17	-13	3	6	9	7	-5	0	-7	15	0	6	22	14	101	14
N	-40	-30	-29	-27	37	6	3	29	-2	23	1	-6	20	-3	-5	1	-7	1	31	-17	5	-19	4	2	3	-24	-8	9	-2	22	-5	3	17	5	107	18
D	-15	-32	1	-22	-6	-15	4	-9	-6	-15	21	-3	6	19	11	1	-10	6	16	-4	-9	-12	5	-4	19	22	40	-23	-8	-11	11	-5	4	21	113	15
Ann	5	-18	-18	-15	-1	-2	1	0	4	1	6	-3	6	7	2	-2	-2	-3	9	-4	-7	-12	3	8	-1	-2	10	7	-7	0	3	2	8	14	94	7

### OWS Study Area M Anomalies

### Sea Level Pressure

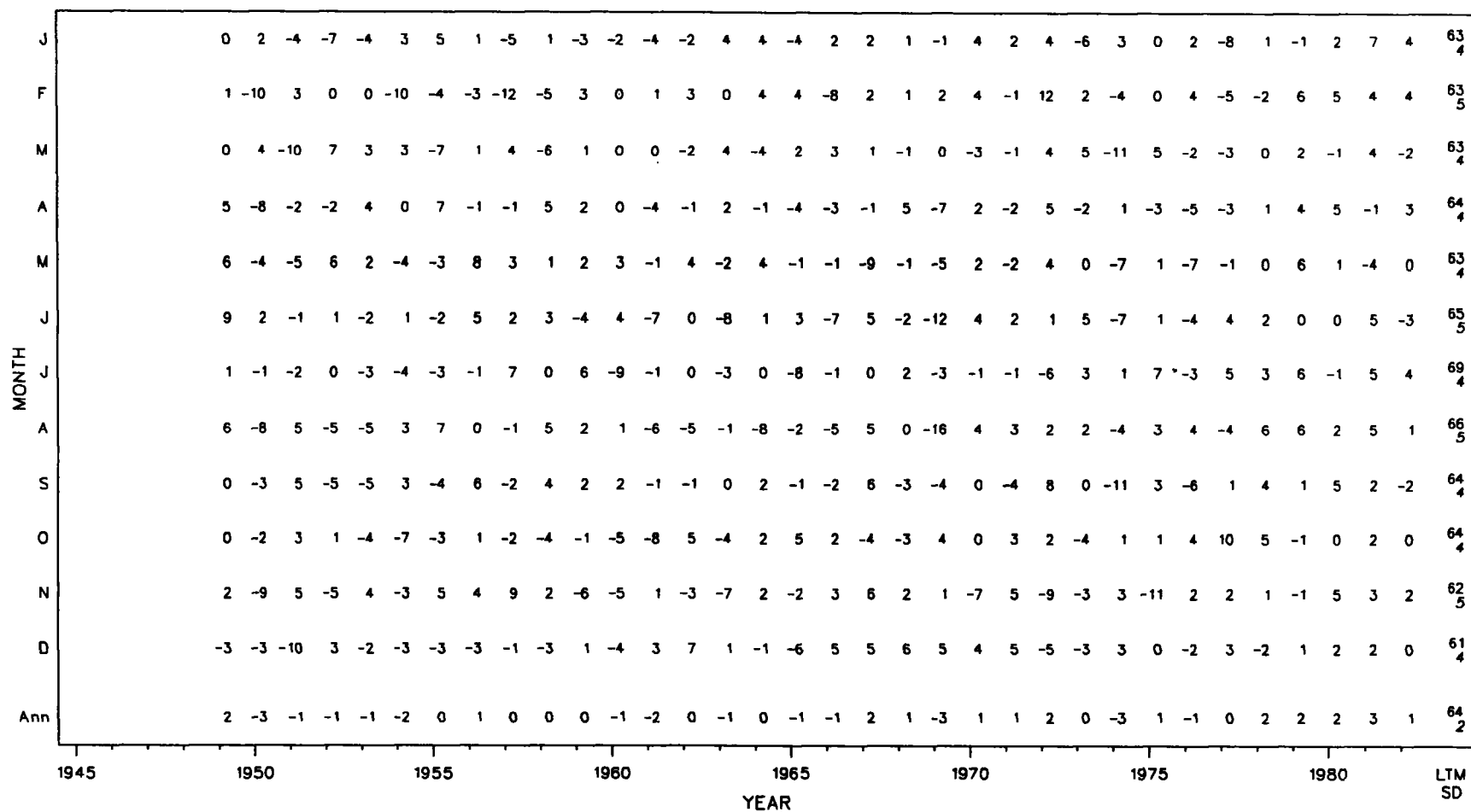
Units = 0.1 mb



OWS Study Area M Anomalies

### Total Cloudiness

Units = 0.1 okta



### OWS Study Area M Anomalies

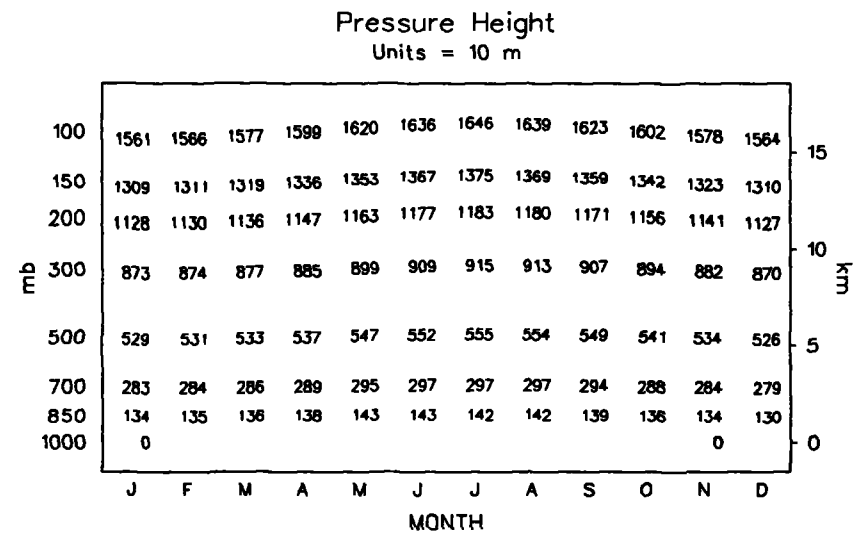
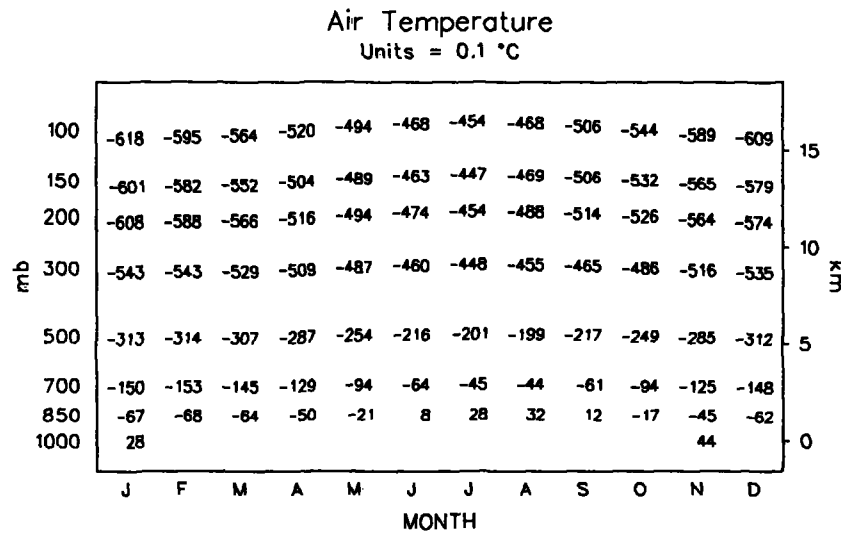
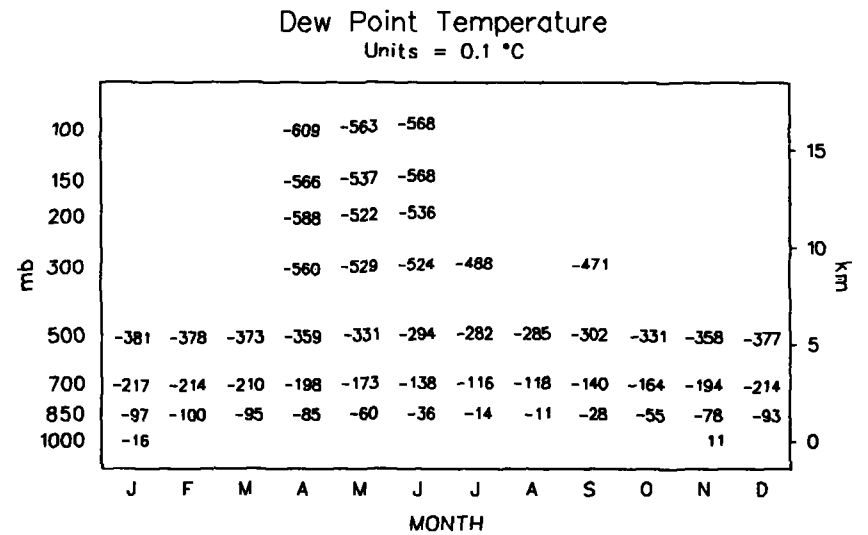
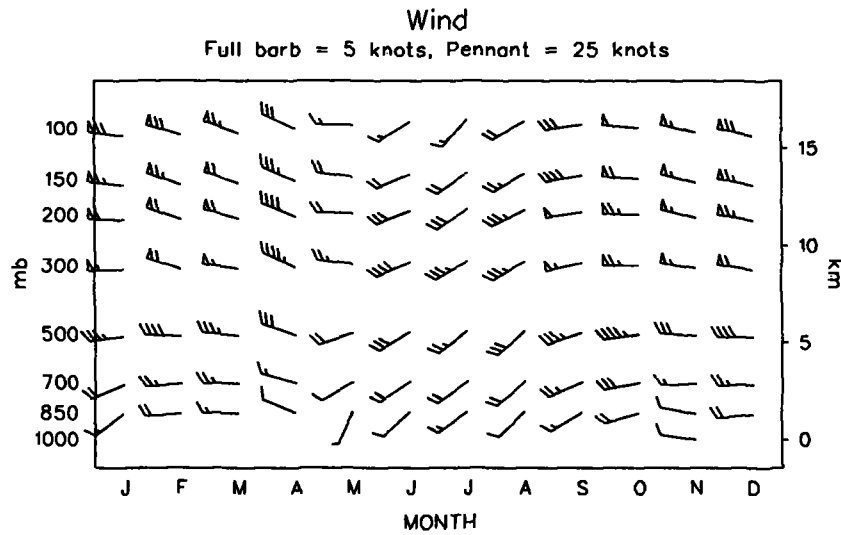
M10

### Precipitation Frequency

Units = 0.1 percent

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																										
J	-27	-66	-43	-66	-84	-79	-52	-5	-161	46	-61	21	-12	-60	-48	240	10	12	-77	61	-70	-166	60	-119	-66	-4	100	198	-85	73	-12	79	187	272	437	105
F	-106	-95	-56	19	-48	-63	-39	-120	-115	16	-88	42	26	-1	31	-43	-10	-4	-14	8	14	-91	-27	82	127	-6	-20	82	-90	134	162	116	11	168	418	79
M	-54	-54	-33	142	-50	-121	-11	-172	2	-84	-152	-181	193	132	-62	-217	-18	167	184	-15	-30	-28	43	110	71	-143	110	-178	0	-1	121	-30	110	251	391	121
A	-50	-16	-34	-27	8	6	6	11	-92	34	-33	76	-83	-55	-106	-13	25	-69	79	-28	-149	-58	10	-36	-4	-130	16	83	80	-9	16	177	100	266	355	83
M	96	-86	-29	-60	20	-107	-53	84	-12	77	26	-51	-4	-18	-4	28	-8	102	-56	-41	-14	-4	-17	-144	22	-110	187	24	-125	-63	292	-57	-45	150	274	91
J	-99	-9	-93	121	-102	-11	10	60	31	-51	-10	-12	6	116	-148	27	-21	-137	165	-31	-109	-34	88	-78	199	-17	178	-143	-85	35	15	19	108	13	264	91
J	-52	-160	54	7	-103	-22	-32	-100	-63	-50	-83	-121	-8	-81	92	74	-65	35	10	-50	28	90	-83	-3	-34	101	201	56	-33	78	79	30	42	165	299	82
A	100	-108	-69	-8	-96	64	-81	-64	-63	6	37	34	-47	-74	-150	-21	31	-80	112	-11	-170	36	12	77	52	-62	-12	91	80	57	85	-21	79	183	317	81
S	-66	-27	-11	-141	-184	80	-88	-17	-61	-64	-72	-106	17	16	138	9	-46	10	-83	-54	41	13	17	20	-92	-35	213	30	51	73	110	115	106	86	339	85
O	29	-39	-95	-252	-109	-88	-72	35	-13	-39	-154	-90	-49	95	16	-54	-20	-32	42	71	216	61	118	97	95	-114	-52	91	7	163	-97	57	123	53	377	99
N	-162	-77	-104	-45	-40	-103	1	15	16	-82	-97	-151	41	-3	-193	56	123	52	106	-95	85	-126	-30	2	69	23	-134	79	184	97	129	57	31	278	415	106
D	21	-3	-75	-93	-155	-56	-3	-157	-4	-29	-73	-105	83	83	62	-22	54	47	189	-19	-107	-26	-23	-44	132	-29	238	-28	-79	-99	24	127	85	103	434	92
Ann	-31	-62	-49	-34	-78	-42	-34	-36	-45	-18	-64	-54	14	11	-31	5	5	9	55	-17	-22	-28	14	-3	48	-44	85	32	-8	45	77	56	78	166	360	51

OWS Study Area M Anomalies

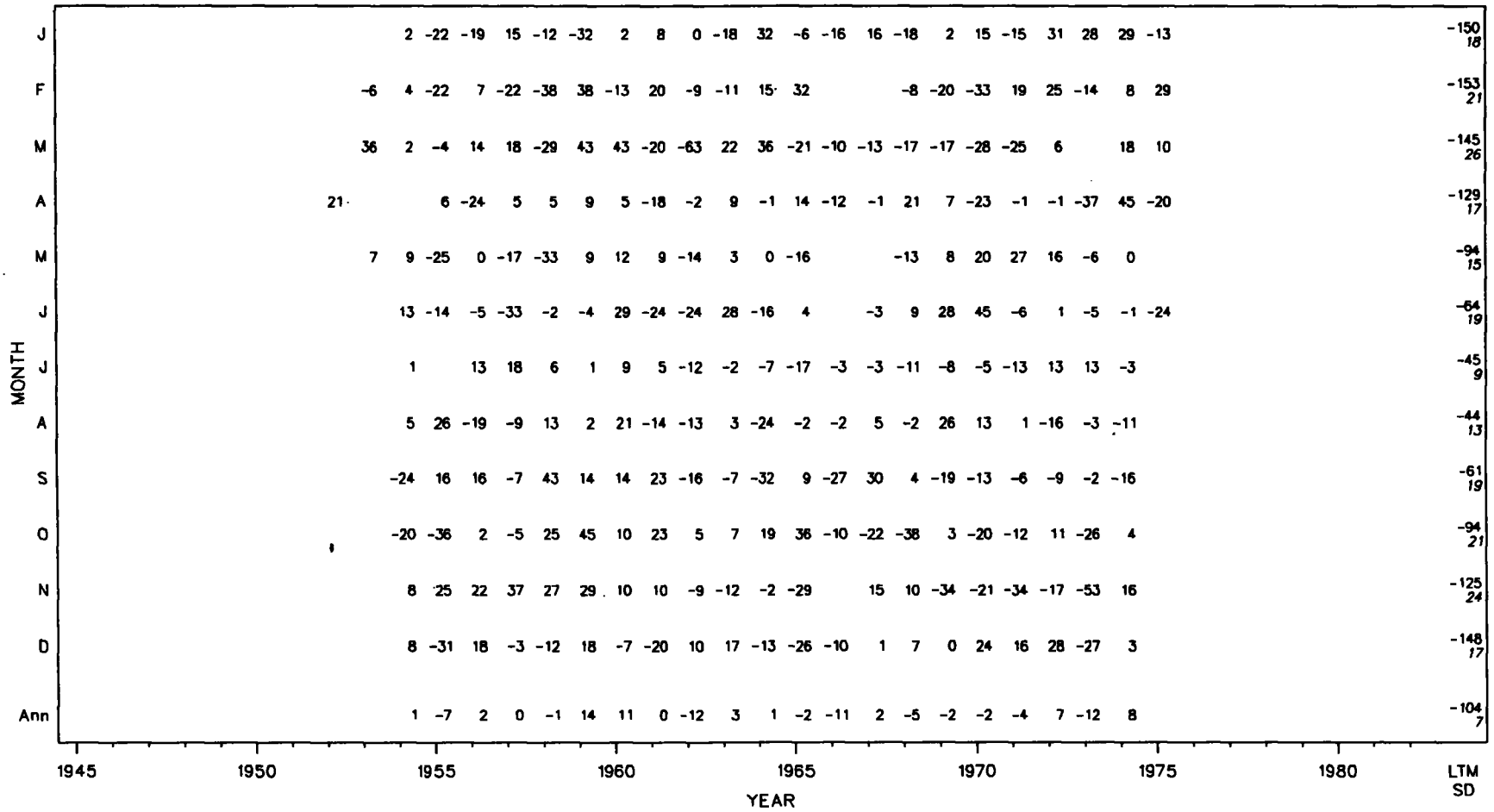


## OWS Study Area M Upper Air Climatology

Mean plotted at actual height

### Air Temperature: 700 mb

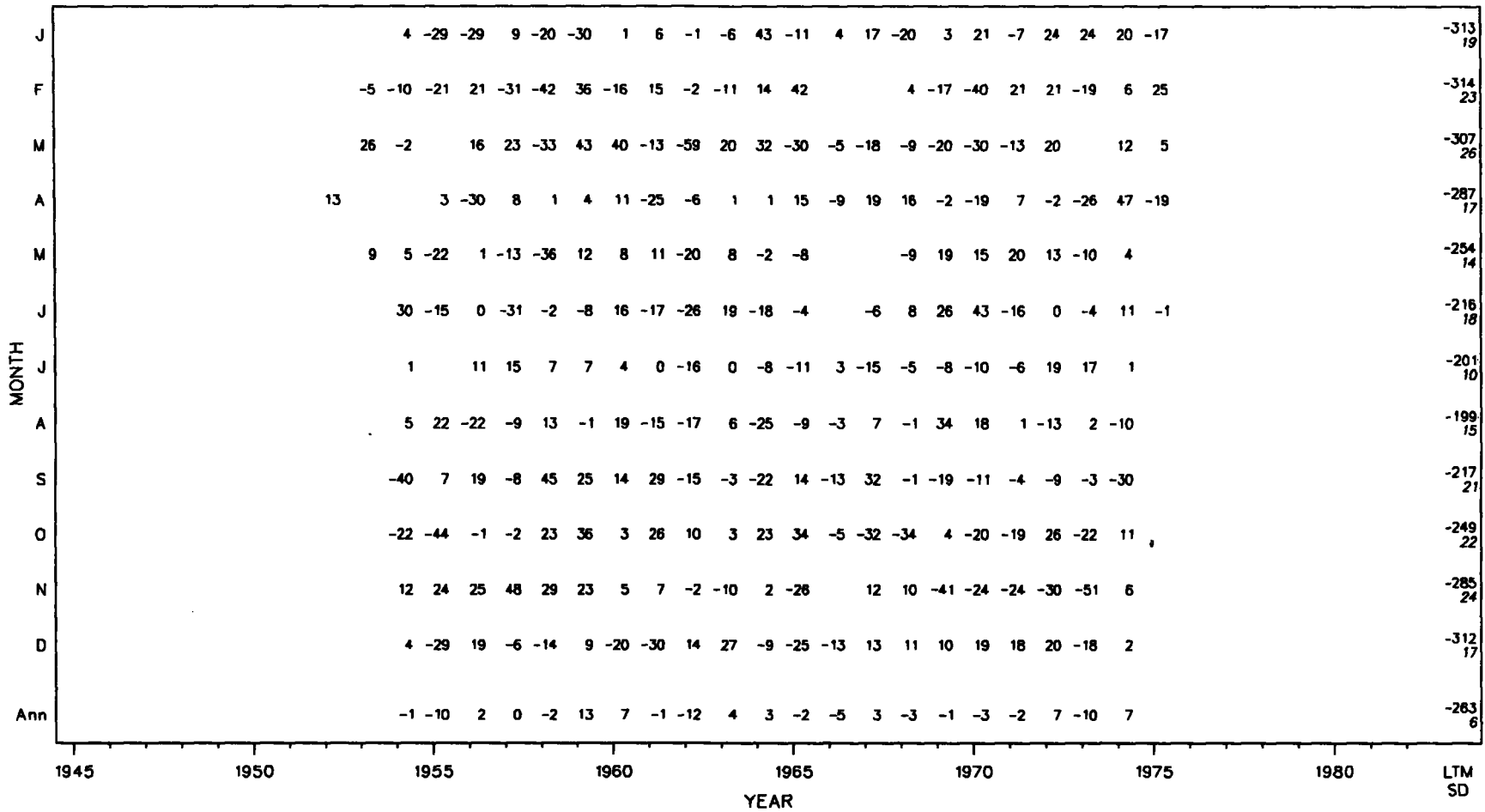
Units = 0.1 °C



OWS Study Area M Anomalies

Air Temperature: 500 mb

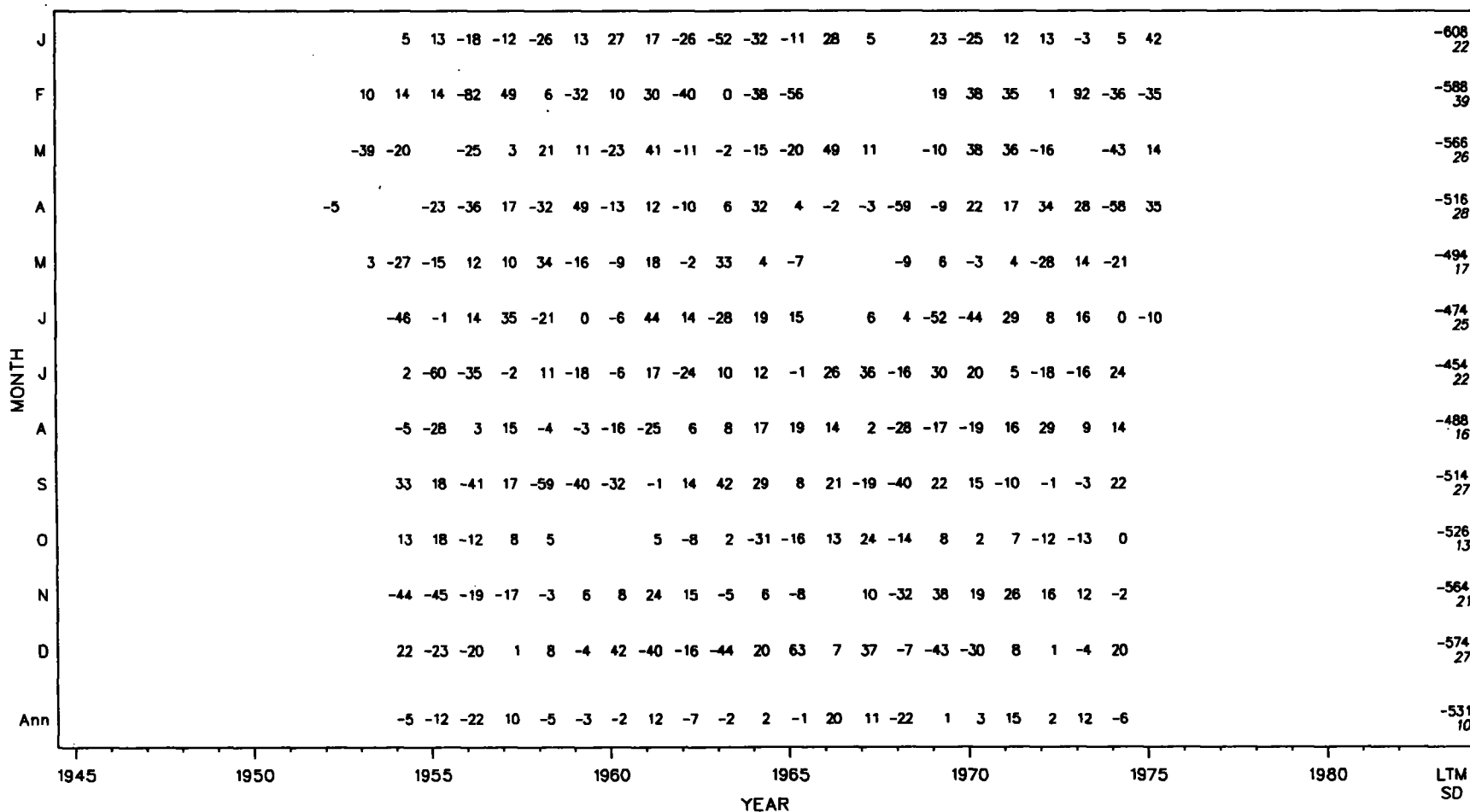
Units = 0.1 °C



OWS Study Area M Anomalies

### Air Temperature: 200 mb

Units = 0.1 °C



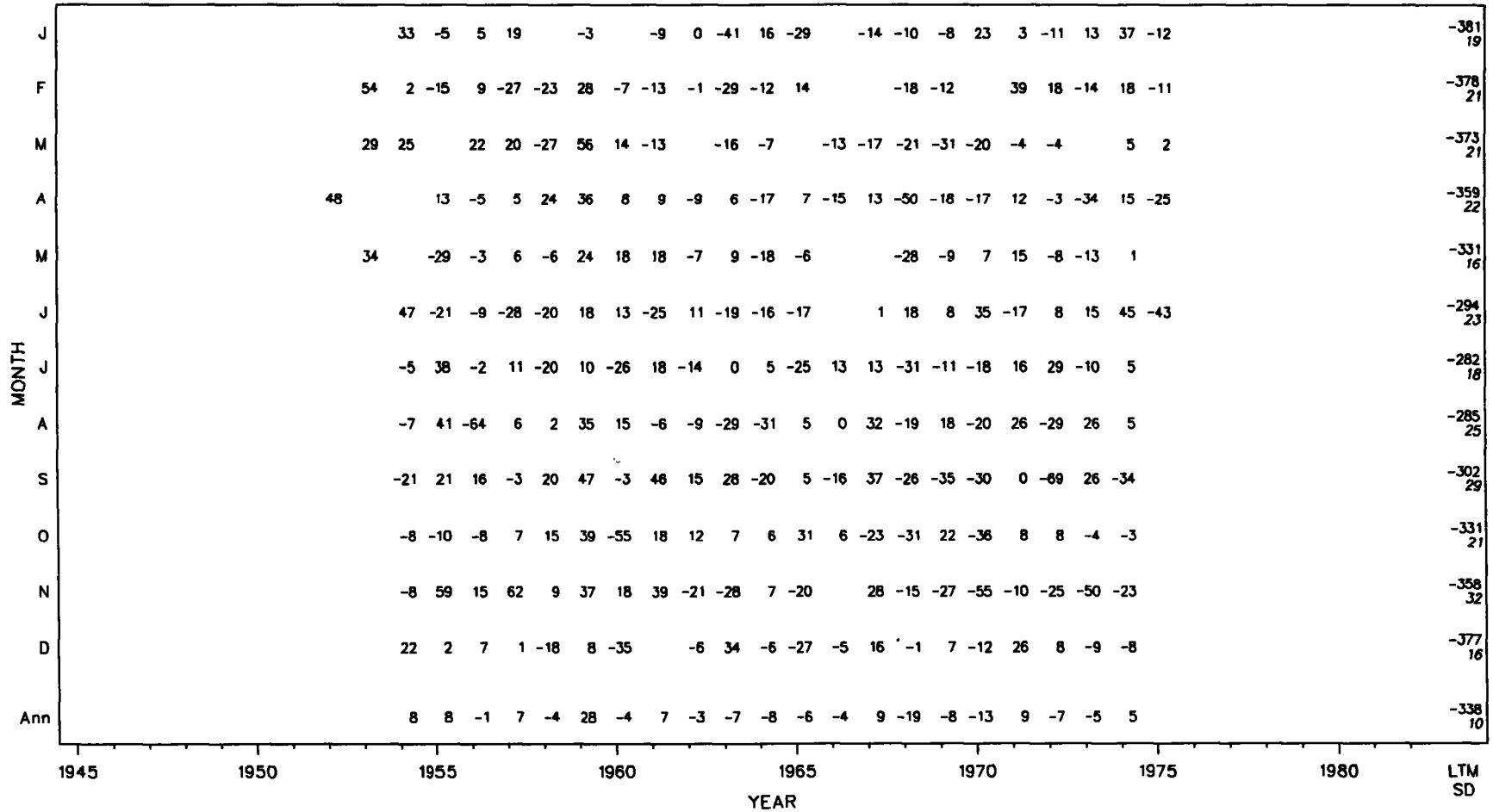
OWS Study Area M Anomalies



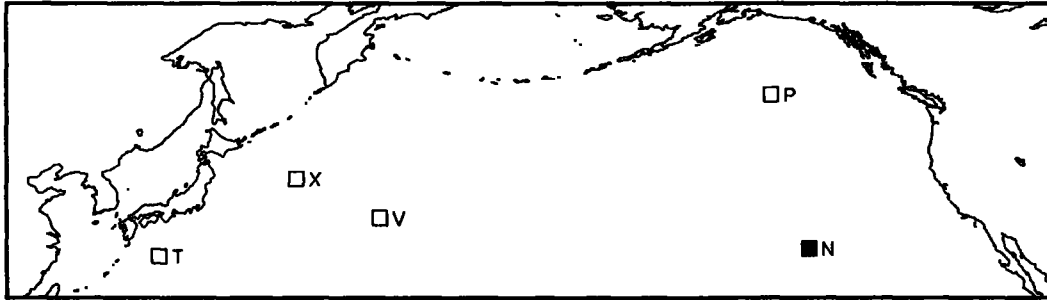


# Dew Point Temperature: 500 mb

Units = 0.1 °C



OWS Study Area M Anomalies



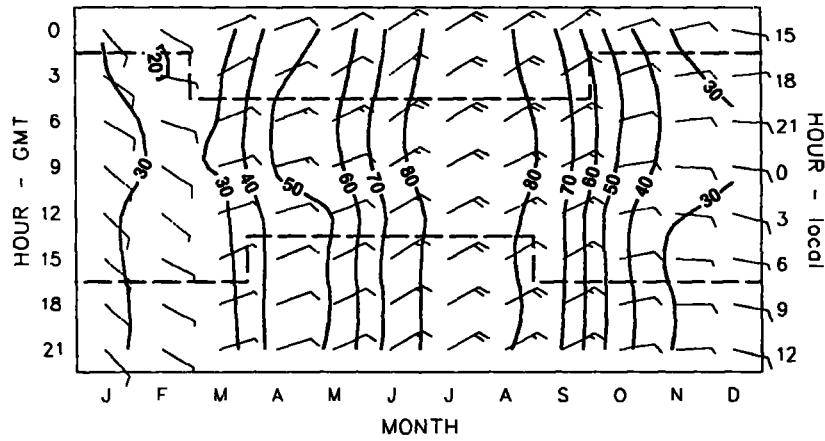
29.0°N – 30.9°N, 140.9°W – 139.0°W  
1946 – 1974

**OWS**  
**N**



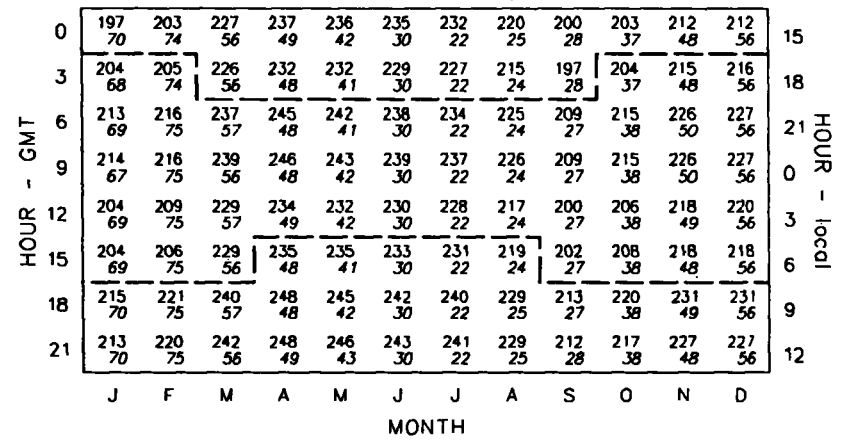
### Wind

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



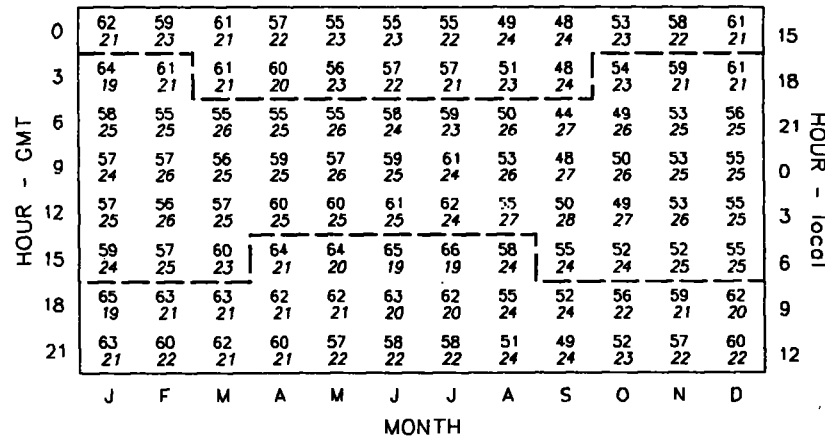
### Pressure

Units = 0.1 mb



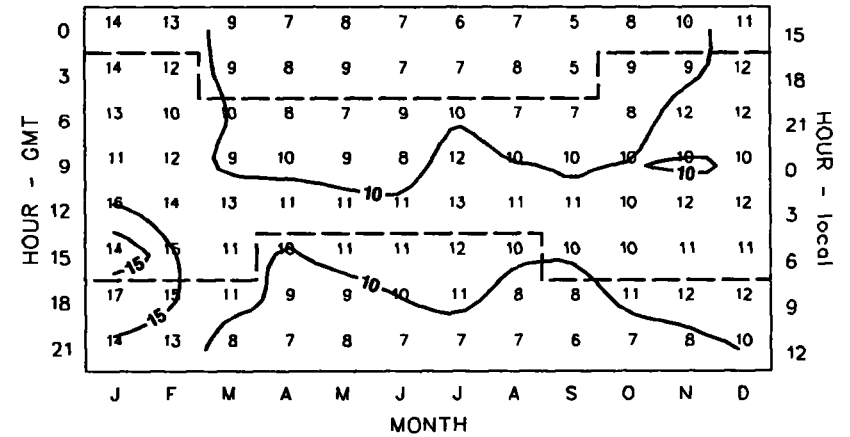
### Total Cloudiness

Units = 0.1 okta



### Precipitation Frequency

Units = percent  
Contour interval = 5 percent



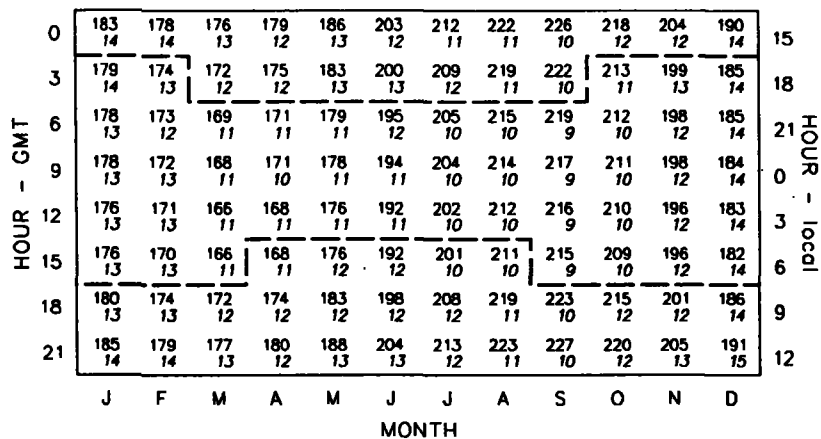
## OWS Study Area N Surface Climatology

upper number = mean  
lower number = standard deviation

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

### Air Temperature

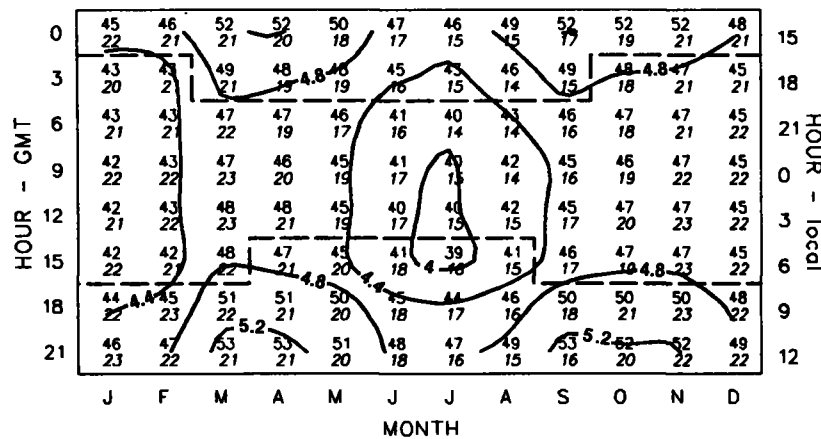
Units = 0.1 °C



### Dew Point Depression

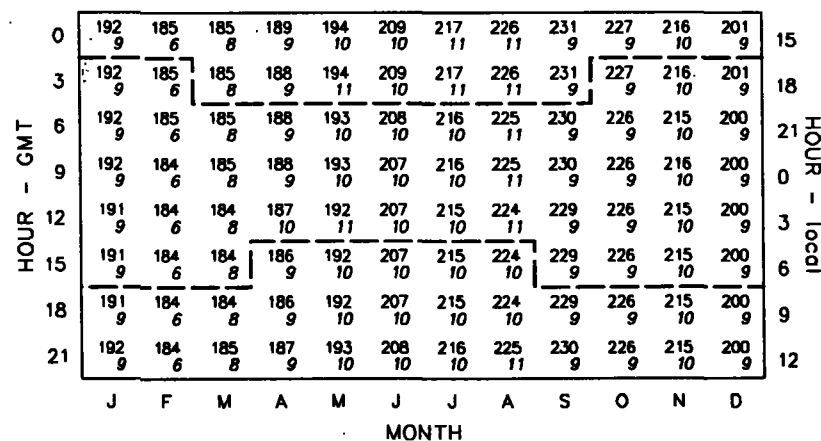
Units = 0.1 °C

Contour interval = 0.4 °C



### Sea Surface Temperature

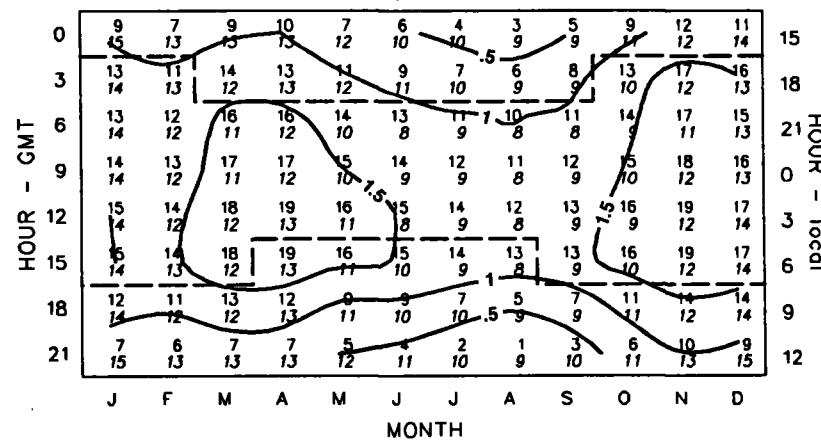
Units = 0.1 °C



### Sea - Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



## OWS Study Area N Surface Climatology

upper number = mean  
lower number = standard deviation

— data contours  
- - - sunrise/sunset

### Surface Air Temperature

Units = 0.1 °C

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM																	
J	0	5	-13	0	-9	-6	-11	5	14	-9	-2	-3	6	0	7	-12	2	1	11	8	5	-11	7	6	180 8	
F	2	3	-6	2	-5	-10	-2	2	-4	8	0	0	11	-2	7	-10	-2	16	-6	-3	3	-3	-2	2	174 6	
M	0	-3	-5	6	-8	-4	-7	3	-6	3	5	2	-5	-2	2	9	-1	-4	3	-2	-1	2	17	-8	2	171 6
A	3	2	-2	5	11	-10	-8	-1	1	3	2	5	6	-4	-5	3	8	-12	0	-6	-6	0	-2	0	9	173 6
M	0	6	6	-3	3	-13	-6	5	-4	2	6	1	0	1	-11	0	-3	-5	11	2	0	-2	1	3	181 5	
J	10	0	5	-5	-1	-1	-19	-8	15	-13	8	-5	2	-2	-6	-4	-1	0	-10	18	11	5	1	-2	-1	197 8
J	14	10	1	-10	3	-1	-11	-9	1	-7	2	-5	-2	-5	-5	-1	1	-4	-6	19	1	4	8	-7	10	207 8
A	-1	5	-4	-3	9	-9	-15	-4	-6	1	-5	-8	-4	2	-4	5	12	-7	6	15	-7	6	13	4	217 8	
S	0	-1	1	4	7	-7	-11	2	6	2	-4	-12	-4	4	6	-7	-1	-7	14	14	-5	-1	3	-1	221 7	
O	-4	5	-2	0	7	2	-7	-2	5	-2	0	-8	-8	6	-2	-7	4	1	15	12	3	-1	-3	-13	213 6	
N	-7	-1	-1	0	9	7	-3	1	8	3	4	-7	-7	3	3	-9	-6	-6	-1	16	3	0	-4	-5	200 6	
D	-7	-1	-13	-3	11	-13	-8	5	3	-1	13	2	-1	-10	5	12	8	-13	2	2	11	9	-8	-11	8	185 9
Ann	1	2	0	-3	5	-1	-9	-4	2	-1	2	-3	-2	1	1	-3	2	-3	0	11	1	0	1	-1	1	193 3

OWS Study Area N Anomalies

### Surface Dew Point Depression

Units = 0.1 °C

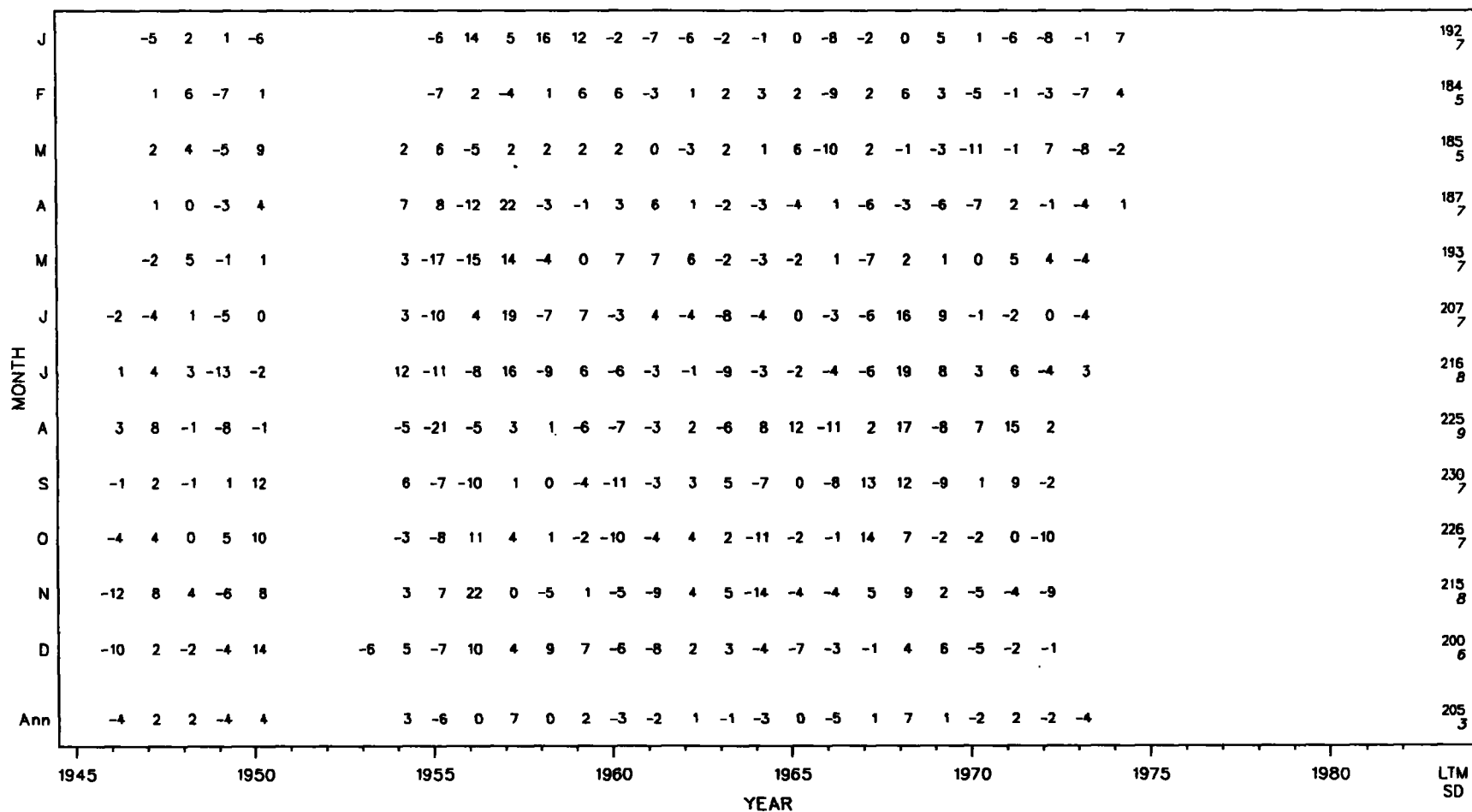
MONTH	1945	1946	1947	1948	1949	1950	1951	1952	1953	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	LTM	SD	
J		-9	-11	-1	-3						10	0	7	3	1	10	4	-1	-2	10	-4	13	-4	-4	-2	-11	-1	2	1	-8							43	7	
F		-1	8	6	-4						4	6	-7	-5	7	-8	0	-5	-11	10	-4	2	-3	-15	15	-4	-4	-6	13	7							45	8	
M		5	2	-2	-3						9	0	6	-8	13	-5	-1	-1	9	6	5	-2	-3	-2	4	-6	-6	-3	-16	-1	0						49	6	
A		-4	1	-3	-2						-7	2	0	1	2	2	7	1	-1	6	2	-2	-10	10	-6	3	-9	6	2	-4	2						49	5	
M		0	7	9	-10						-7	2	-2	-1	0	6	-3	4	-1	2	3	3	7	-2	-13	-2	-3	-1	1	-1							48	5	
J		-22	-5	8	6	-1					4	2	-3	5	7	4	-1	4	8	-2	0	8	3	5	-3	-5	-5	-8	-1	-10							42	7	
J		-1	7	1	-8	1					0	-1	2	5	-4	0	2	2	1	-1	1	-3	-1	-1	-1	-3	0	1	-3	4							42	3	
A		1	6	7	-2	4					6	-2	-4	0	-5	2	-2	-1	-6	1	3	0	-8	0	3	0	3	-4	-2									45	4
S		-8	-4	-2	-3	-5					-1	-4	0	-7	-4	-4	-3	-5	-3	-7	4	-3	-10	-11	2	-5	-5	1	-1	88							52	19	
O		8	1	4	1	3					6	-1	2	5	4	2	-2	-7	-3	1	-7	-3	-3	2	5	-11	-10	0	5								49	5	
N		-15	5	0	-11	-13					-4	9	-1	1	-2	8	10	4	4	4	2	4	4	10	-4	-11	-3	6	-5								49	7	
D		-4	9	2	-10	-23					0	-4	-5	3	13	-6	9	-4	3	8	-6	-11	11	-8	7	5	1	13	11	-12							46	9	
Ann		-6	1	2	-1	-5					0	1	1	1	0	3	0	1	1	-1	2	0	-1	1	-2	-2	-3	0	-3	11							48	3	

OWS Study Area N Anomalies



### Sea Surface Temperature

Units = 0.1 °C



OWS Study Area N Anomalies

### Sea - Air Temperature Difference

Units = 0.1 °C

MONTH	YEAR																				LTM SD														
	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
J	-7	-3	14	-6							3	20	16	11	-2	7	-5	-3	-8	-1	-7	4	-4	-1	-6	-8	-11	3	-8	1	12 8				
F	-1	3	-1	-2							-2	11	-2	-1	11	-2	-3	1	-8	5	-4	2	4	-10	9	-1	-4	0	-5	2	11 5				
M	2	7	0	3							10	10	2	-1	7	-1	-3	-2	1	4	-1	-3	-9	5	-4	-1	-10	-3	-10	0	-4	14 5			
A	-2	-2	-1	-1							-3	18	-5	23	-4	-4	1	1	-5	2	2	-7	-7	6	-2	1	-1	2	1	-4	-8	14 7			
M	-2	-1	-7	4							0	-3	-10	8	0	-2	1	5	6	-3	8	-2	4	-2	-9	-1	-1	6	3	-7	12 5				
J	-12	-4	-4	-1	1						4	9	12	4	6	-1	1	2	-2	-2	0	1	-3	5	-2	-2	-6	-3	2	-4	10 5				
J	-14	-6	1	-3	-5						13	-1	1	15	-2	4	-1	-1	4	-4	-1	-3	1	0	0	7	-1	-2	3	-7	9 6				
A	2	4	4	-5	-9						4	-5	-1	9	-1	0	1	2	0	-3	3	0	-3	-3	2	-1	1	2	-2	8 4					
S	-1	3	-1	-4	6						13	4	-11	-5	-2	0	1	1	-1	-1	-1	1	-1	-1	-1	-3	1	6	-1	9 4					
O	-2	-1	2	5	4						-6	0	13	-1	-3	-2	-2	4	-1	4	-4	-6	-2	-1	-4	-5	-1	3	3	13 4					
N	-5	8	5	-8	-1						-3	10	20	-9	-8	-3	2	-2	1	2	-5	2	2	5	-7	-1	-5	-1	-4	15 7					
D	-2	2	12	0	3						7	13	-12	7	5	-4	5	-5	2	-3	-9	-12	6	-5	-3	-7	-3	4	9	-9	15 7				
Ann	-5	0	2	-1	0						4	3	5	5	1	0	0	0	0	0	-2	-1	-2	-1	1	-4	0	-2	0	-1	-5	12 2			

OWS Study Area N Anomalies

### Surface Scalar Wind

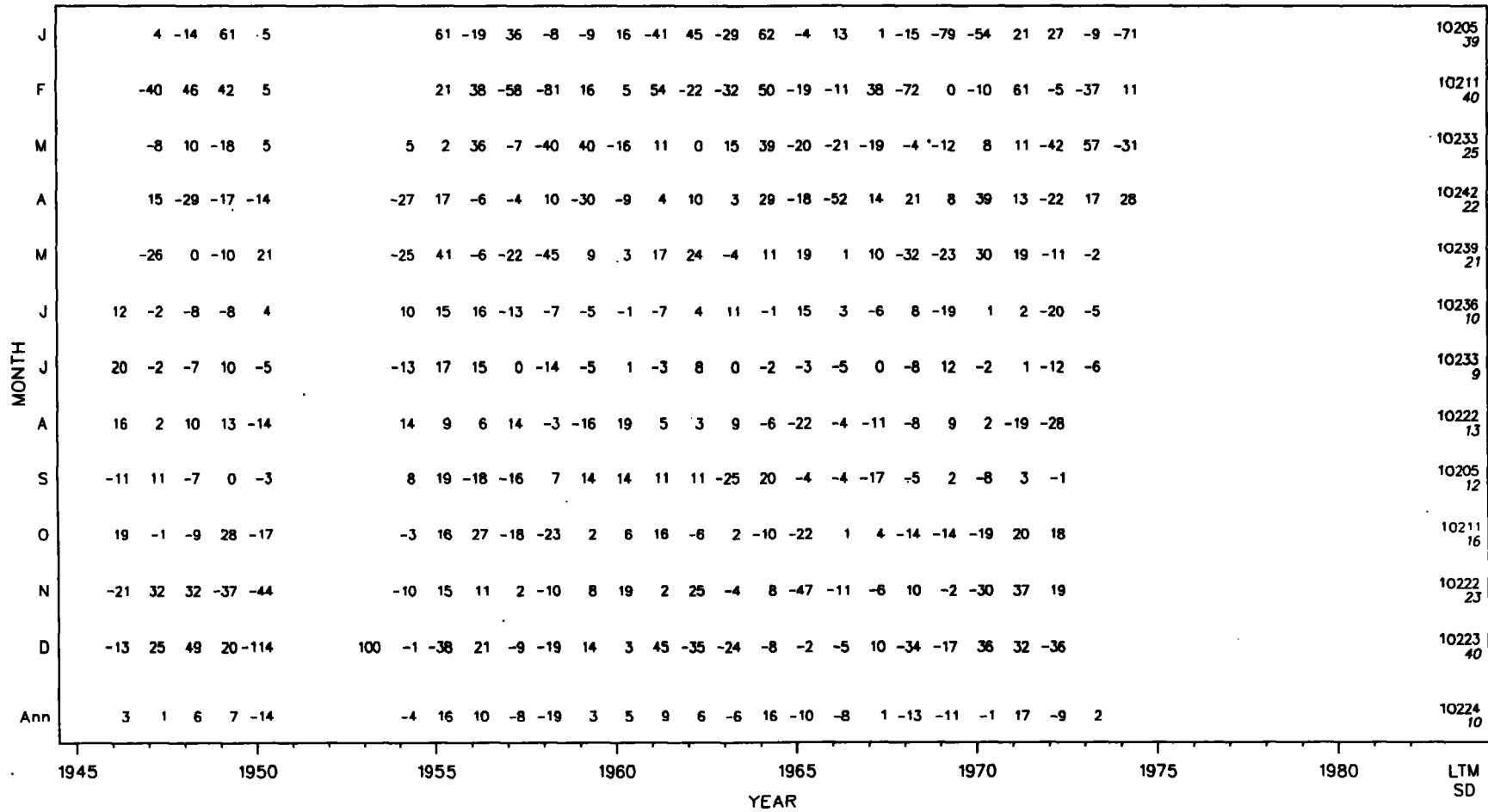
Units = 0.1 m/s

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	15	-2	-1	-11							-16	-13	-6	-2	2	-1	3	-7	6	-16	-13	-6	6	10	13	10	8	-2	2	20							78	10				
F	7	4	-12	-29							-4	-3	11	16	7	11	-8	5	-9	-4	10	19	-4	-7	1	-2	-7	-11	23	-14								75	12			
M	-2	1	2	-12							6	22	-8	-8	10	-3	0	-5	-16	-6	7	1	-5	11	6	-8	-2	1	5	-3	6								66	8		
A	-7	-7	-1	1							-4	3	3	8	8	17	-2	0	-10	-7	5	8	0	19	11	-16	-2	-16	3	7	-21								63	10		
M	7	-2	-7	15							-1	8	3	-7	6	0	-8	-12	2	-10	6	-1	5	-1	4	-3	-11	22	-3	-12									57	8		
J	-18	15	1	9	-5						4	11	8	-3	1	-5	24	4	-10	6	-6	-4	-11	-3	2	-2	2	-16	5	-9									57	10		
J	-14	-20	6	11	10						7	5	4	18	4	11	-10	4	-1	-5	-8	-3	1	-2	-4	24	-18	-8	1	-12										59	11	
A	8	7	0	-17	-12						13	10	-5	8	9	17	22	-10	-6	-14	-17	-11	12	-2	-13	9	3	-10	1											54	11	
S	5	-6	5	-19	-1						-7	4	-8	-12	7	13	4	14	-12	-1	7	12	-10	-13	-11	-5	11	3	4	13										54	10	
O	13	-5	5	10	-5						1	-14	3	-2	-1	-4	-1	12	5	-2	4	2	-11	-10	-5	-9	0	10	5											57	7	
N	25	7	2	1	4						12	3	7	3	6	-9	-8	0	-14	-16	0	9	-7	9	7	-13	-4	-12	-8												66	10
D	2	11	7	-10	13						18	-8	0	-6	-6	-11	-13	-2	-7	0	-21	-19	6	-7	-6	22	11	-13	-3	43											75	14
Ann	3	2	2	-3	-3						3	3	-1	0	4	3	2	0	-5	-7	-3	1	-2	0	2	0	-2	-2	4	1											63	3

### OWS Study Area N Anomalies

### Sea Level Pressure

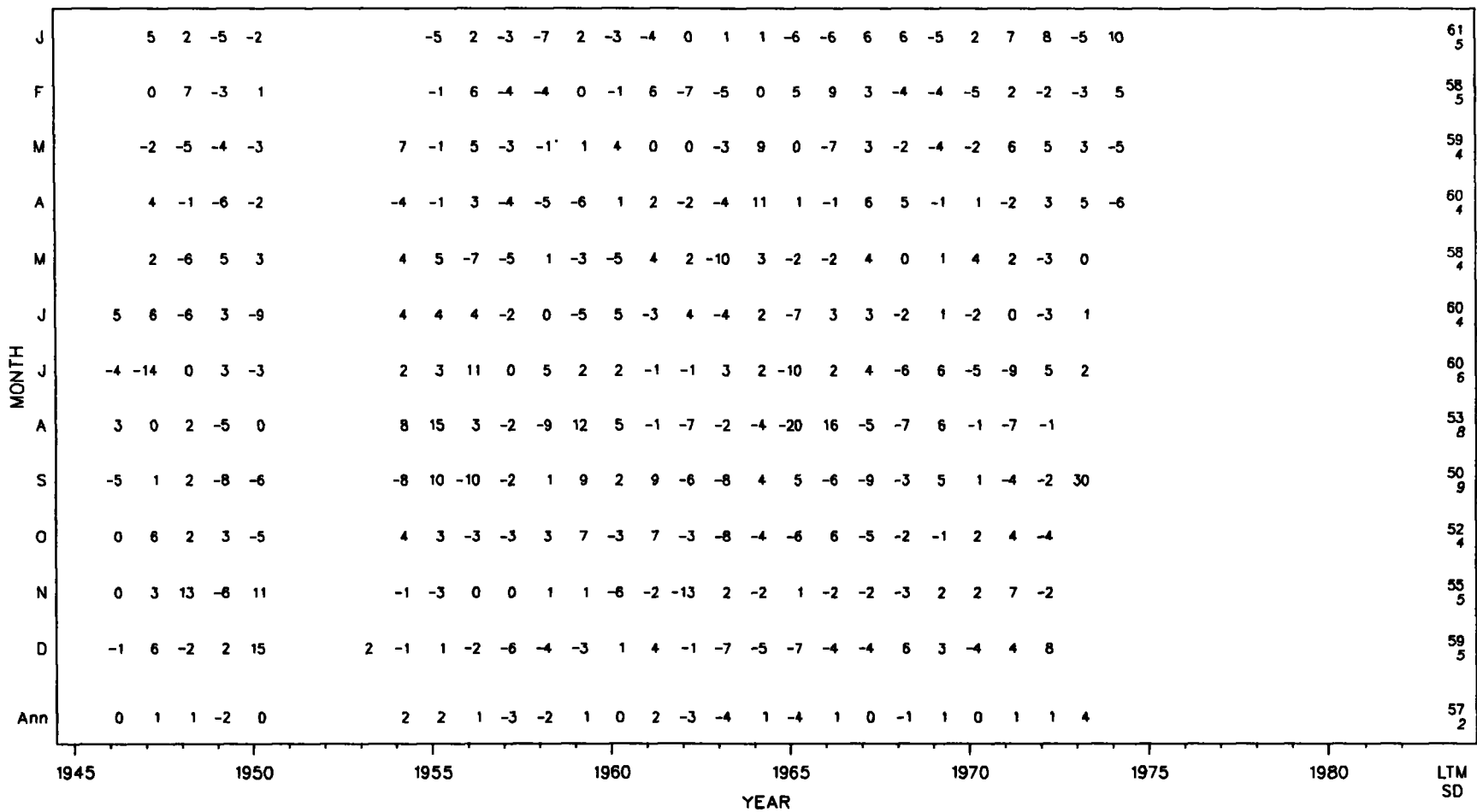
Units = 0.1 mb



OWS Study Area N Anomalies

### Total Cloudiness

Units = 0.1 okta



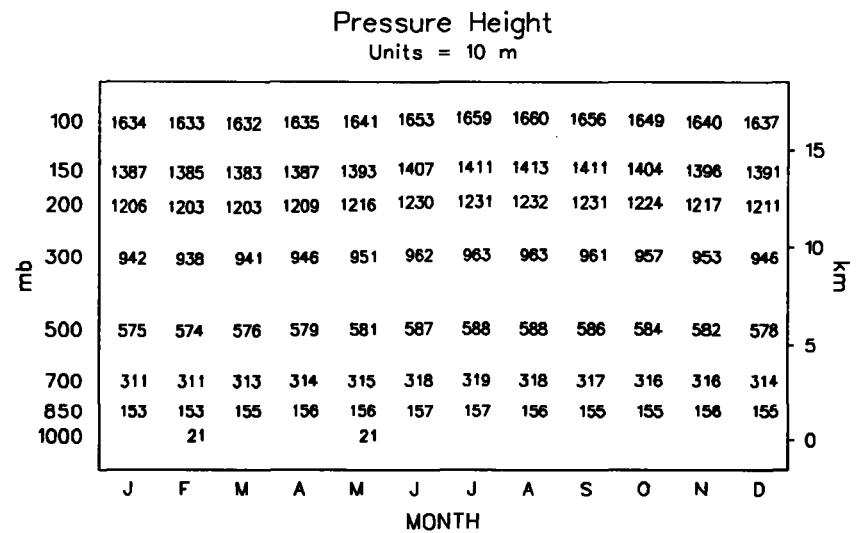
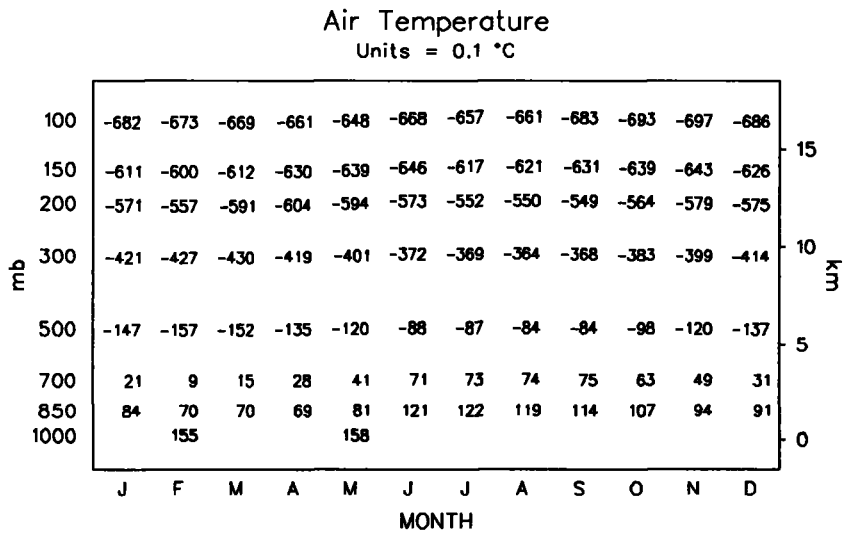
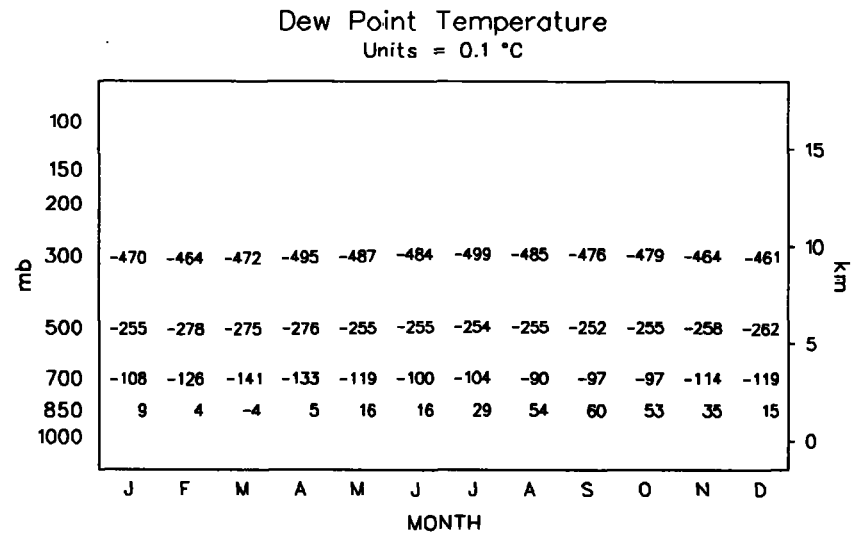
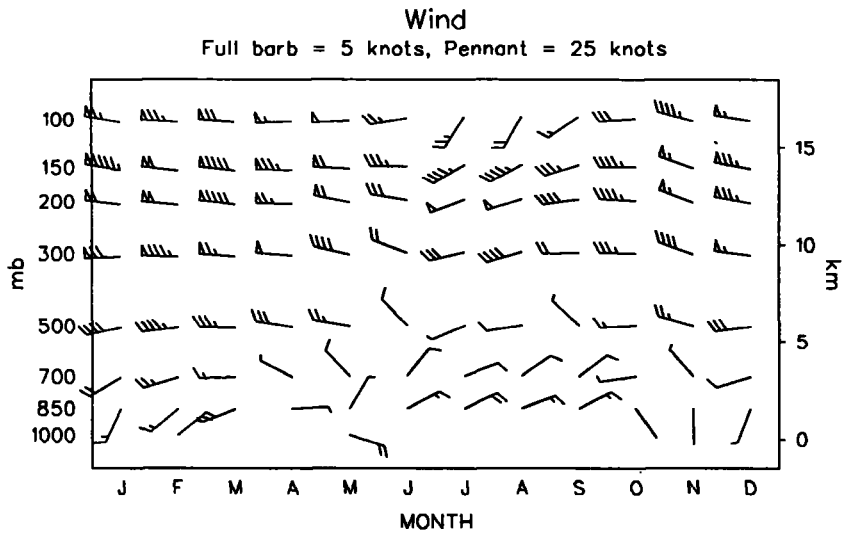
### OWS Study Area N Anomalies

### 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	44	15	-1	-38							-74	-7	-17	-45	28	-19	12	-98	53	-75	-58	-55	2	81	-10	53	-1	15	-14	208						147	63	
F	14	-19	-54	63							1	-9	32	56	-3	24	-40	-9	38	-35	-5	89	-45	23	-35	39	-84	-25	-5	-10							130	40
M	-21	-41	49	35							4	11	-45	21	1	-53	36	5	-4	-28	-53	32	-18	13	-10	47	-43	-3	97	-67	35						102	39
A	-53	22	3	43							-7	-2	42	-36	-22	17	9	-11	13	45	77	6	52	-54	25	-19	-64	-25	-3	-8	-50						86	36
M	47	-8	-26	-4							37	-18	12	14	58	-37	-21	-13	32	-9	26	-38	-22	-12	126	-20	-21	-23	-47	-34							87	39
J	-48	1	-26	-3	-50						-1	78	2	-21	33	-58	4	-16	3	13	24	-55	-5	-29	16	-20	62	78	40	-22						84	38	
J	-33	-43	-15	39	-15						38	59	-47	-4	27	28	-13	4	19	13	54	17	50	-47	35	-13	-3	-56	-59	-34							96	36
A	93	-41	-13	-1	-11						32	28	3	-17	-4	11	2	6	27	-40	-17	0	5	-37	-5	-25	-12	2	16								86	28
S	-28	0	5	-20	17						-7	-2	1	26	27	18	-32	1	-14	10	-20	55	17	21	-20	32	43	-29	-28	-75							75	28
O	11	-59	-39	-5	-8						-9	8	20	2	-8	-25	-28	22	55	-9	35	15	-22	-25	-48	18	107	45	-50								90	37
N	80	-27	-60	53	36						3	-15	-21	42	4	-55	-53	-40	-25	32	-39	74	15	11	-16	-11	49	3	-43								106	41
D	-3	-11	-46	-61	290						-115	90	57	-53	34	8	-56	15	-19	66	-6	-43	-30	-15	-54	4	-54	-66	-22	91							115	79
Ann	10	-12	-19	-2	30						18	11	-8	6	11	-15	-6	-7	5	9	-5	1	8	-21	18	-9	12	-10	0	-32							100	14

OWS Study Area N Anomalies

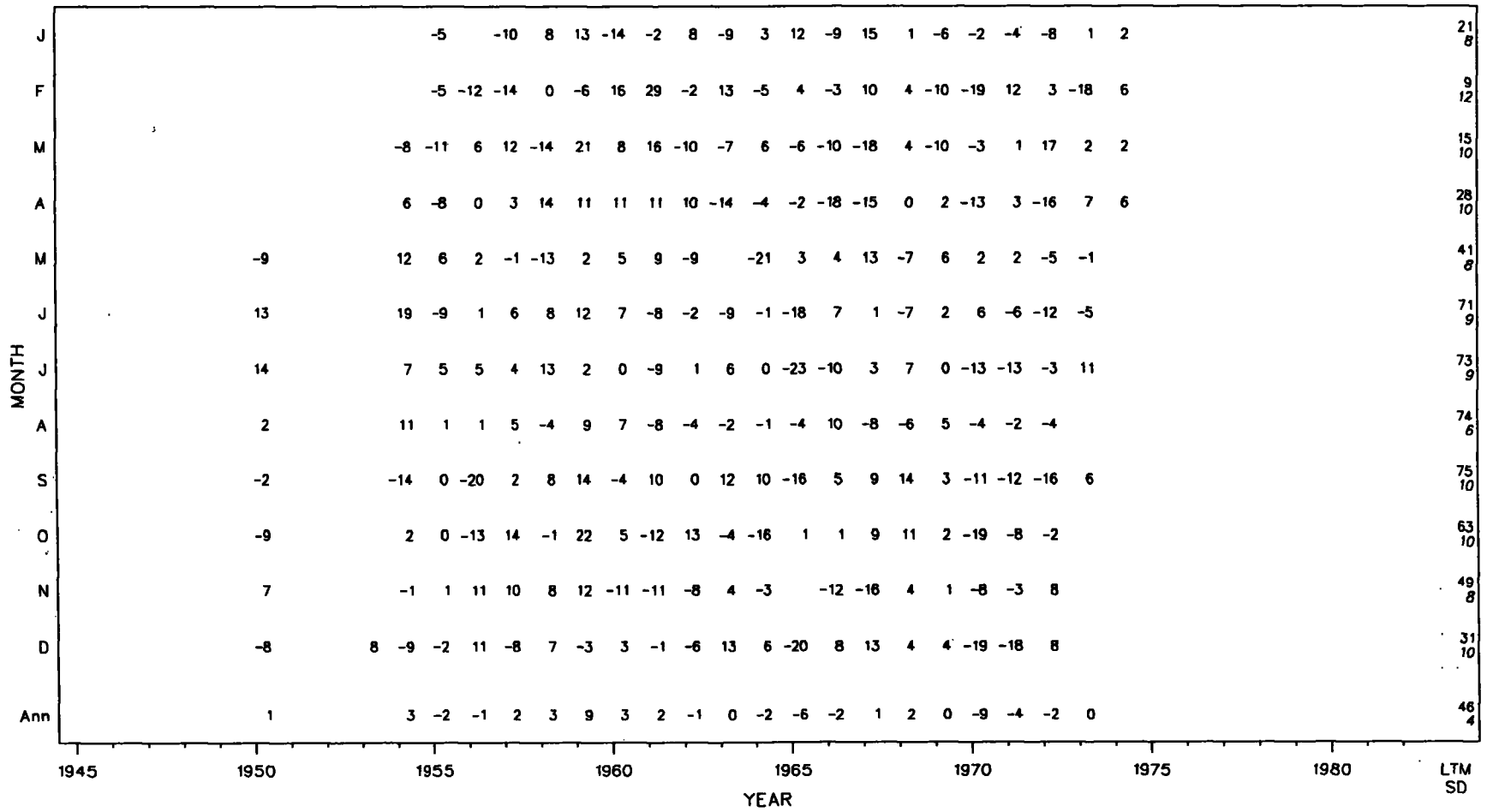


## OWS Study Area N Upper Air Climatology

Mean plotted at actual height

Air Temperature: 700 mb

Units = 0.1 °C

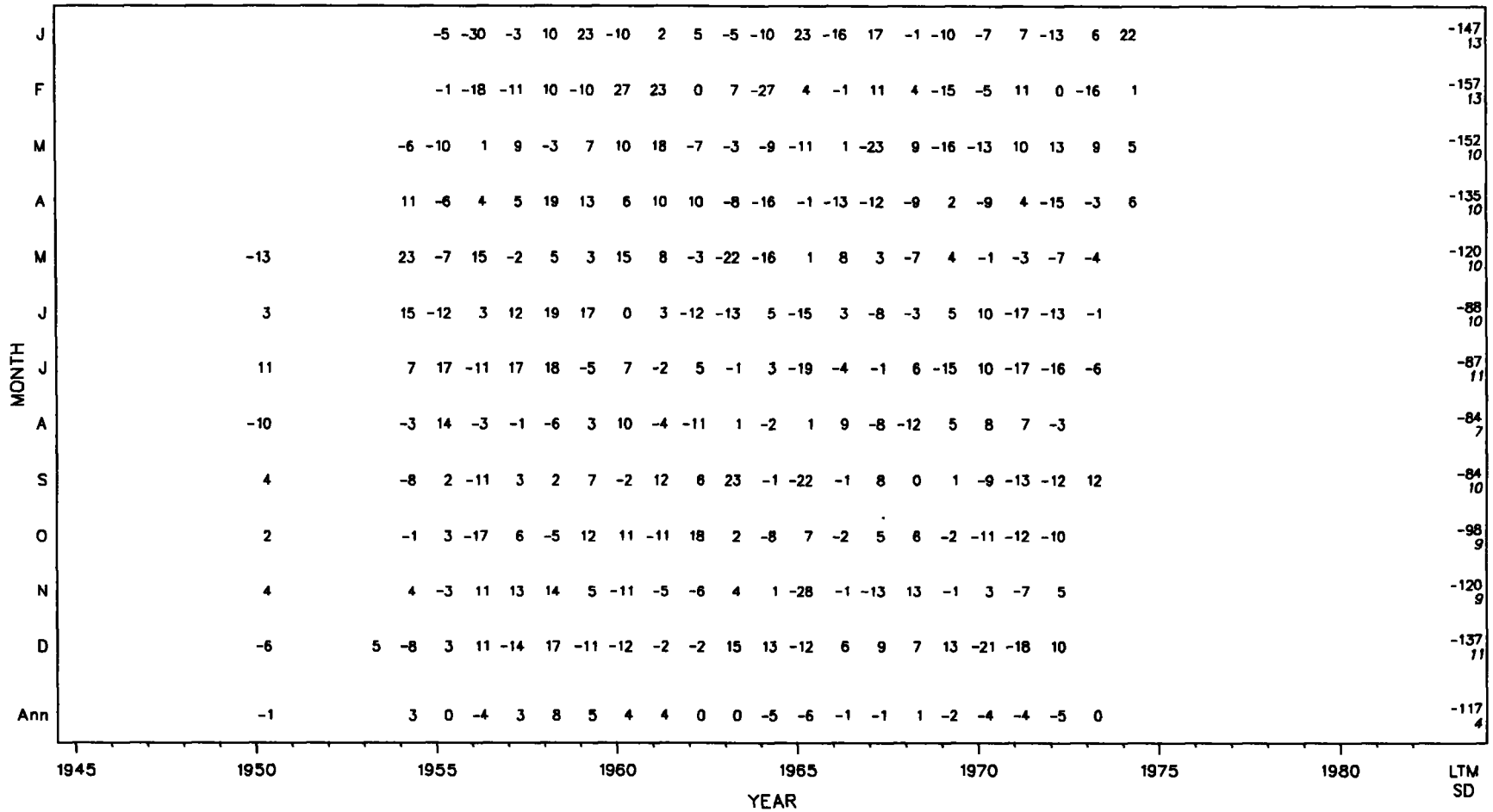


OWS Study Area N Anomalies



Air Temperature: 500 mb

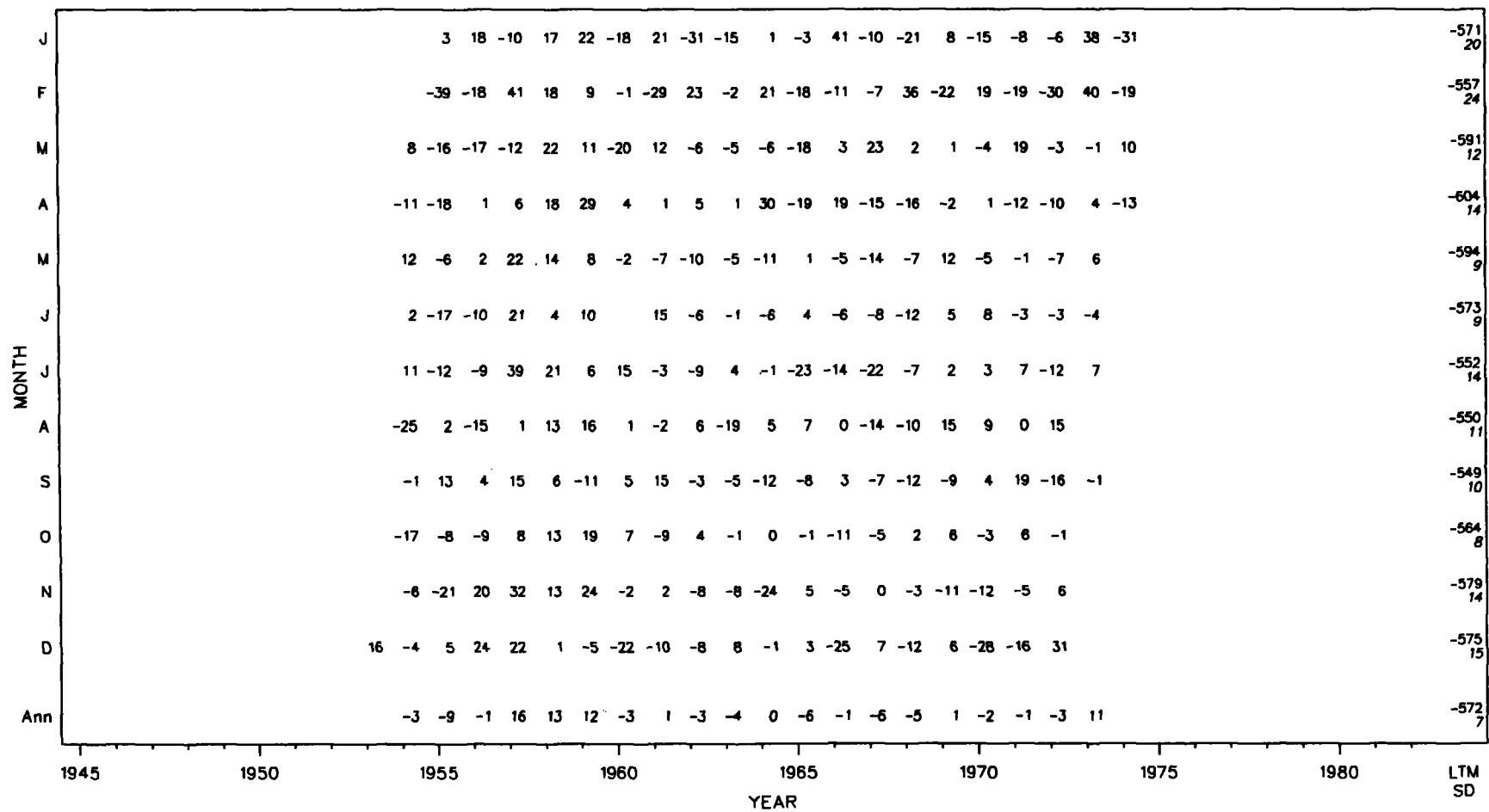
Units = 0.1 °C



OWS Study Area N Anomalies

### Air Temperature: 200 mb

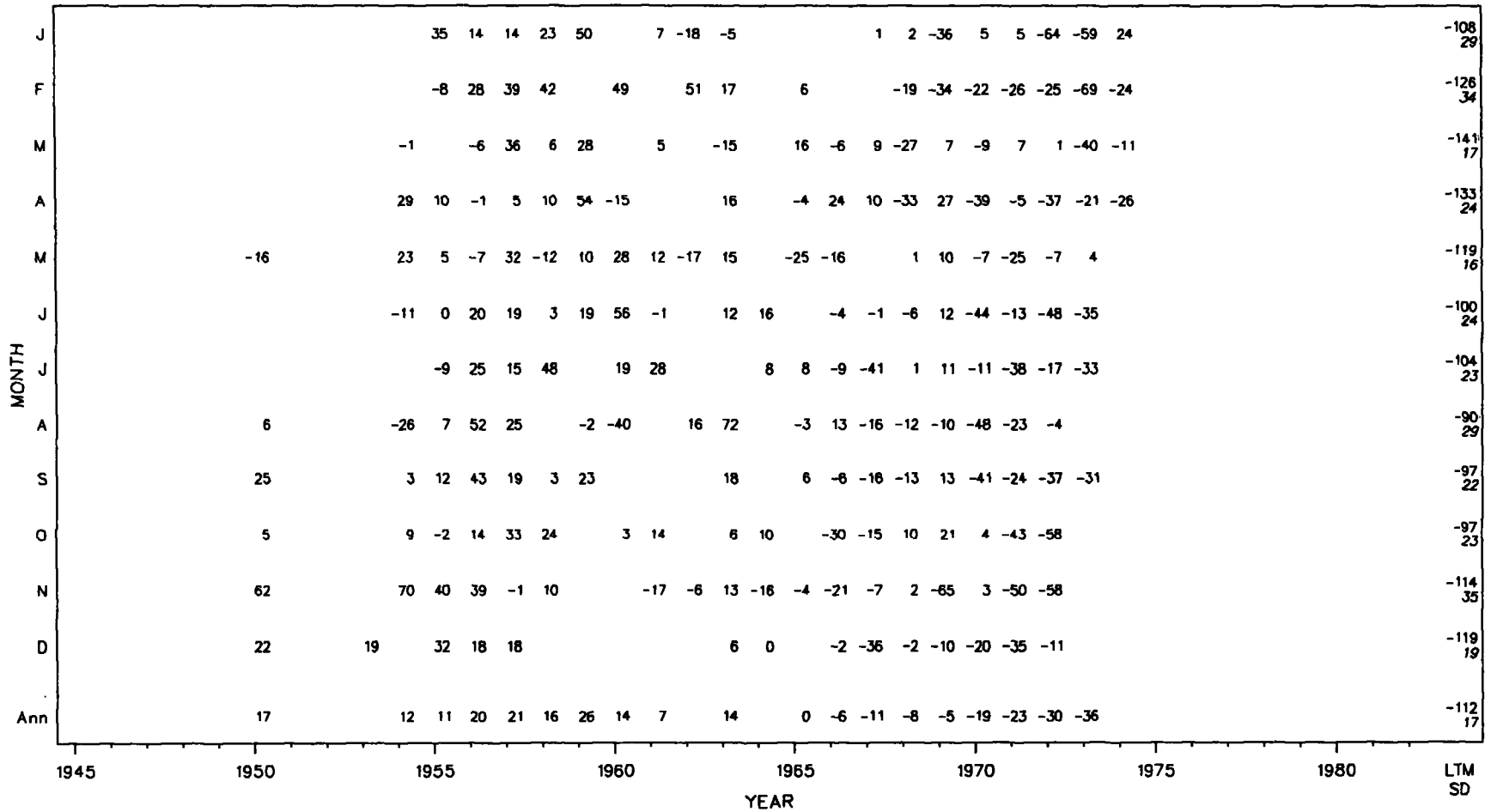
Units = 0.1 °C



OWS Study Area N Anomalies

### Dew Point Temperature: 700 mb

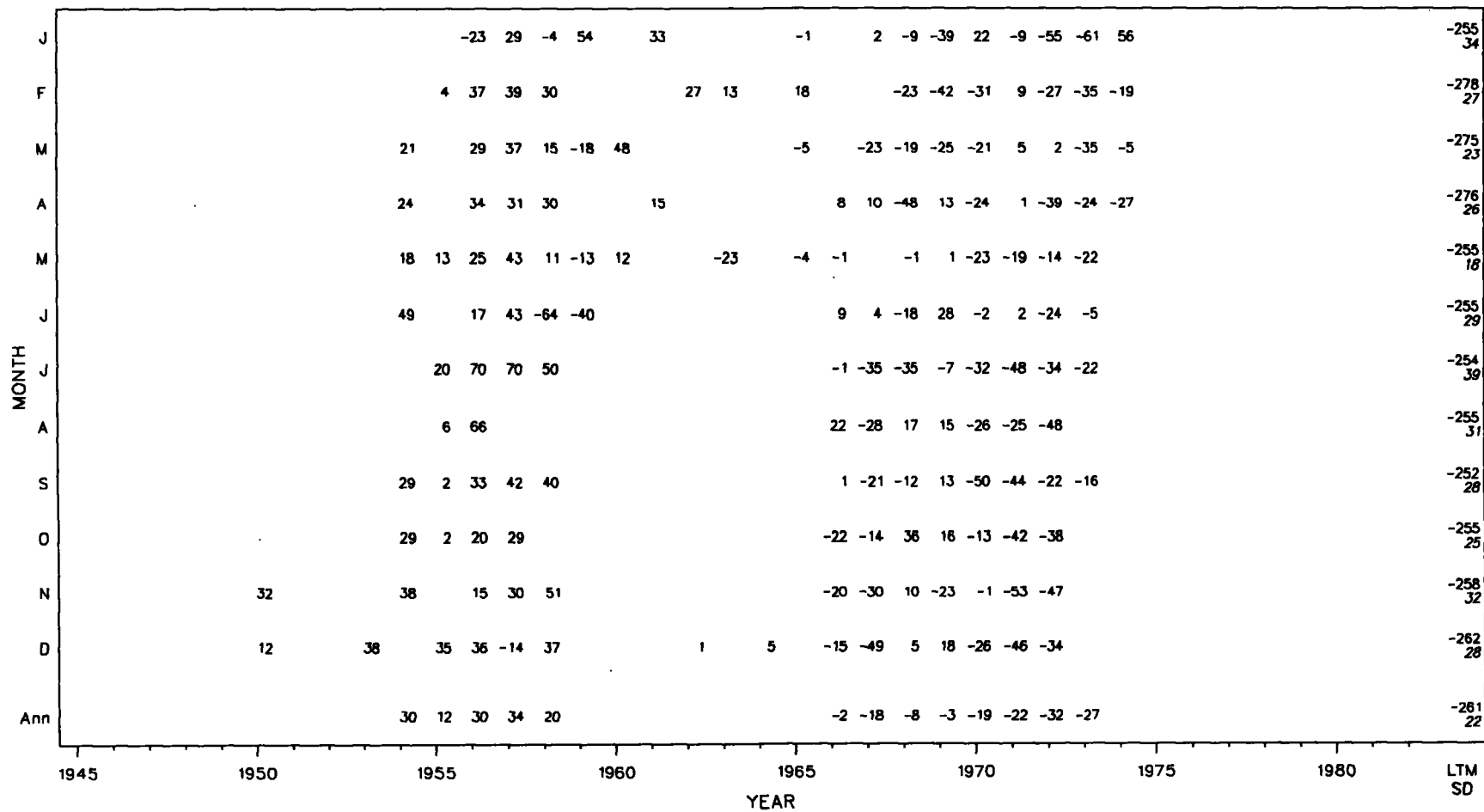
Units = 0.1 °C



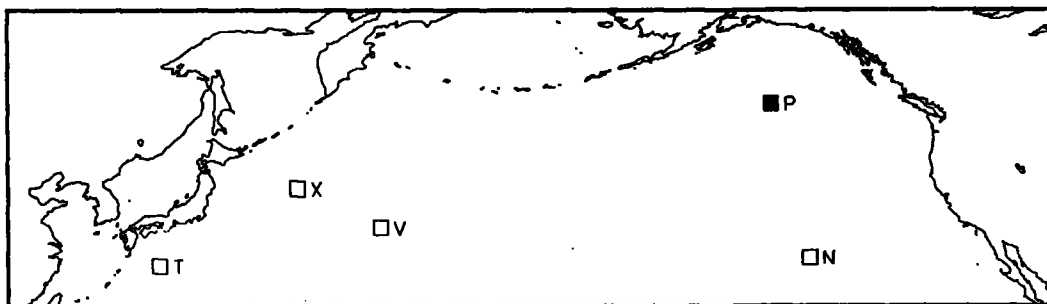
### OWS Study Area N Anomalies

### Dew Point Temperature: 500 mb

Units = 0.1 °C



OWS Study Area N Anomalies



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

**OWS**  
**P**

MONTH	YEAR																																Sum	
	1945	1950	1955	1960	1965	1970	1975	1980	Sum																									
J	30 30	31 31	20 20	31 31	30 30	31 31	31 31	31 7	31 31	31 30	31 31	31 31	31 31	31 27	25 25	30 30	23 23	31 31	31 31	31 31	31 31	28 28	31 29	28 28	27 27	31 31	31 31	31 31	18 16	26 26	935 903			
F	28 28	28 28	29 29	28 28	28 28	29 29	28 28	28 28	28 28	29 29	28 28	28 28	28 25	29 29	28 28	28 28	28 28	29 29	28 28	28 26	28 28	26 26	28 27	28 25	27 27	27 27	27 27	27 26	29 29	27 27	895 886			
M	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 26	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	26 26	31 30	29 29	24 24	30 30	31 31	31 31	30 30	978 970				
A	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 29	30 30	30 30	30 30	30 24	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	25 25	30 30	30 30	29 29	30 30	29 29	30 30	954 947			
M	31 31	31 30	30 30	31 31	31 31	31 31	31 31	31 23	31 23	31 31	31 31	31 31	31 28	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	982 978			
J	30 30	30 30	18 18	30 30	30 30	30 30	30 29	30 30	29 29	30 30	30 30	30 29	30 23	30 29	30 30	29 29	30 30	30 30	30 30	30 30	30 30	28 28	30 30	30 30	30 30	30 29	30 30	30 30	21 21	934 924				
J	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	31 31	31 27	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	27 27	31 31	31 31	31 31	956 951				
A	31 31	31 30	31 31	31 31	31 30	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 23	31 31	31 23	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	28 28	31 31	950 939				
S	30 30	30 30	30 30	30 30	30 30	28 28	30 30	30 30	30 30	30 30	30 30	30 30	30 23	30 30	29 29	30 30	30 30	30 30	30 30	30 30	30 30	28 28	30 30	27 27	29 29	30 30	30 30	30 30	26 24	917 907				
O	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	31 31	30 30	26 26	31 29	27 26	30 30	31 31	31 31	31 31	31 31	31 31	29 29	29 29	31 31	31 27	27 27	30 30	30 30	29 29	933 929					
N	30 30	30 30	30 30	29 29	30 28	28 28	30 28	30 30	30 30	30 30	30 30	30 30	30 24	30 30	30 30	30 30	30 30	30 30	30 30	30 30	28 27	30 30	30 30	30 30	23 23	29 29	30 30	30 30	29 29	916 905				
D	12 12	31 31	31 29	29 31	30 30	30 14	31 31	31 31	31 31	31 31	31 31	30 30	30 27	31 31	28 28	31 31	26 26	31 31	31 31	31 31	31 31	26 26	28 28	23 23	31 31	30 30	31 27	27 30	27 27	933 913				
Ann	12 12	364 364	365 363	340 340	365 365	362 362	364 361	362 345	365 338	357 356	362 361	366 366	363 363	359 358	364 306	362 360	346 346	363 363	352 352	368 366	365 365	365 365	363 358	358 358	351 351	352 349	359 358	345 343	343 342	357 357	359 358	341 337	164 164	11281 11152

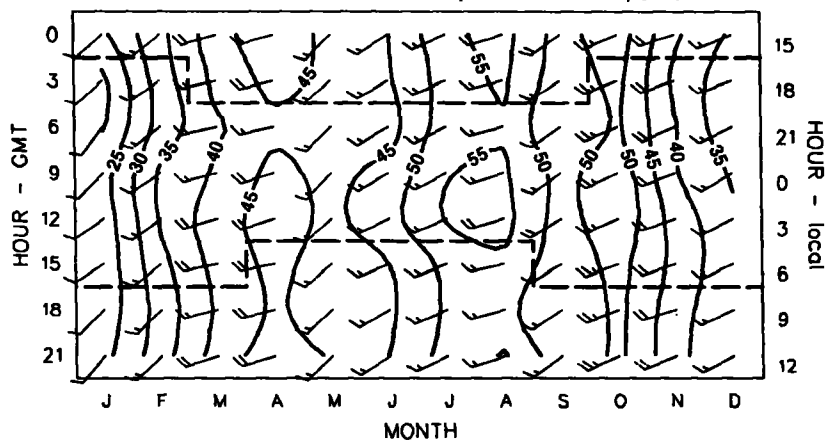
## OWS Study Area P (50.0°N, 145.0°W)

### 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.

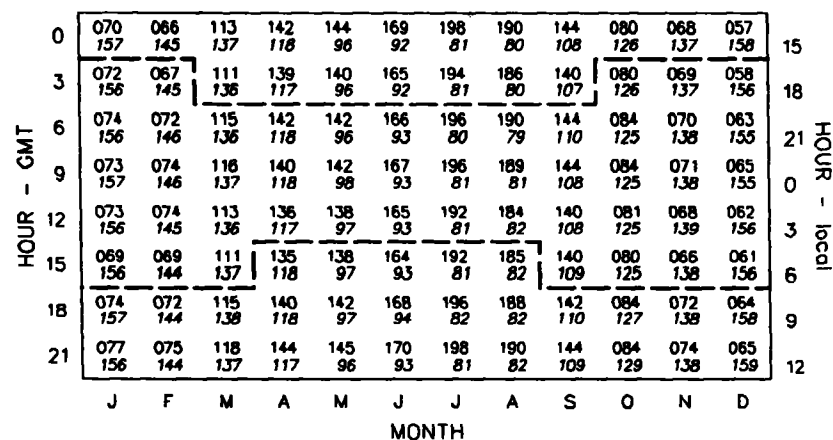
### Wind

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



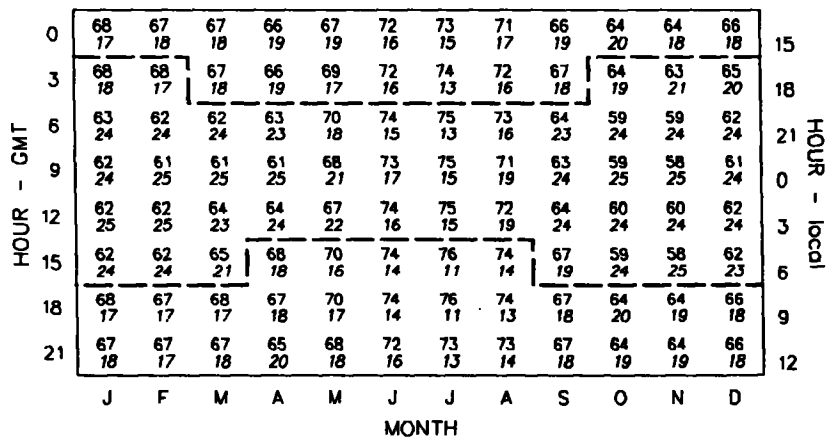
### Pressure

Units = 0.1 mb



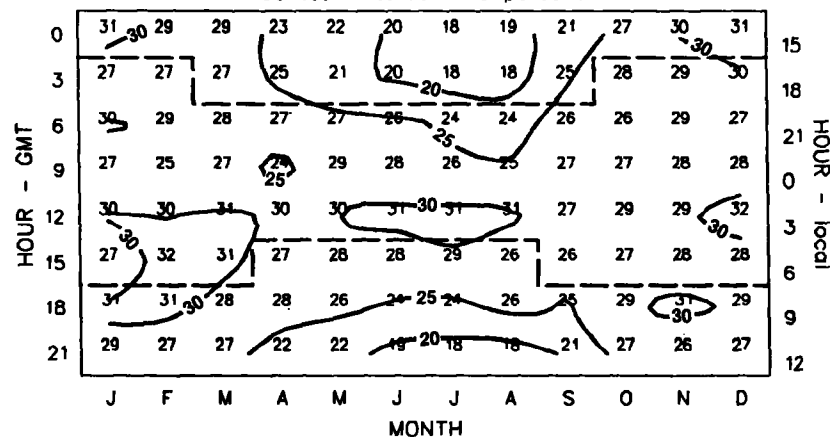
### Total Cloudiness

Units = 0.1 okta



### Precipitation Frequency

Units = percent  
Contour interval = 5 percent

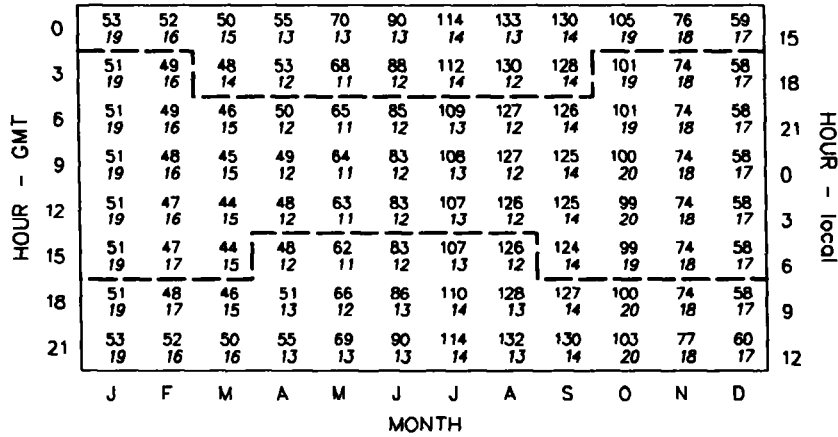


## OWS Study Area P Surface Climatology

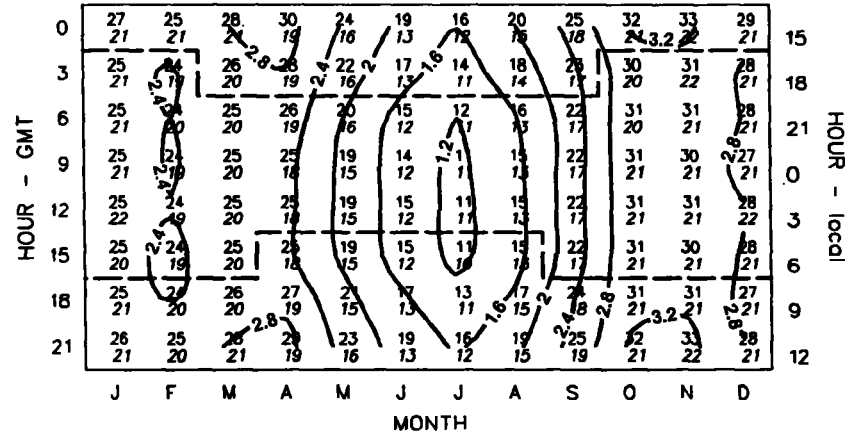
upper number = mean  
lower number = standard deviation

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

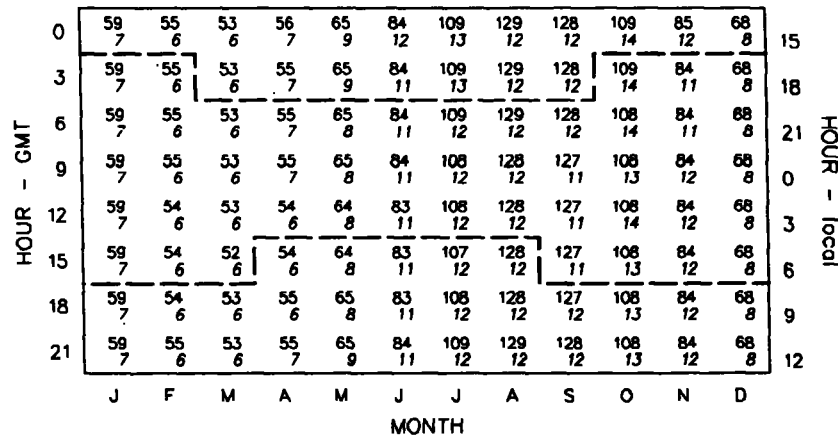
Air Temperature  
Units = 0.1 °C



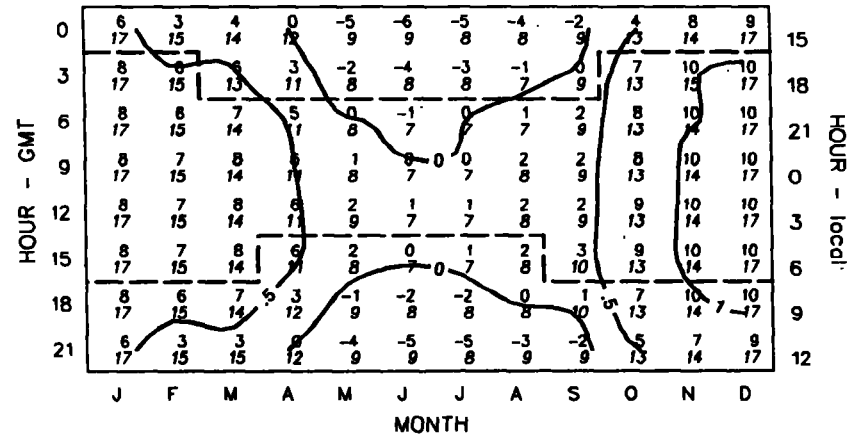
Dew Point Depression  
Units = 0.1 °C  
Contour interval = 0.4 °C



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

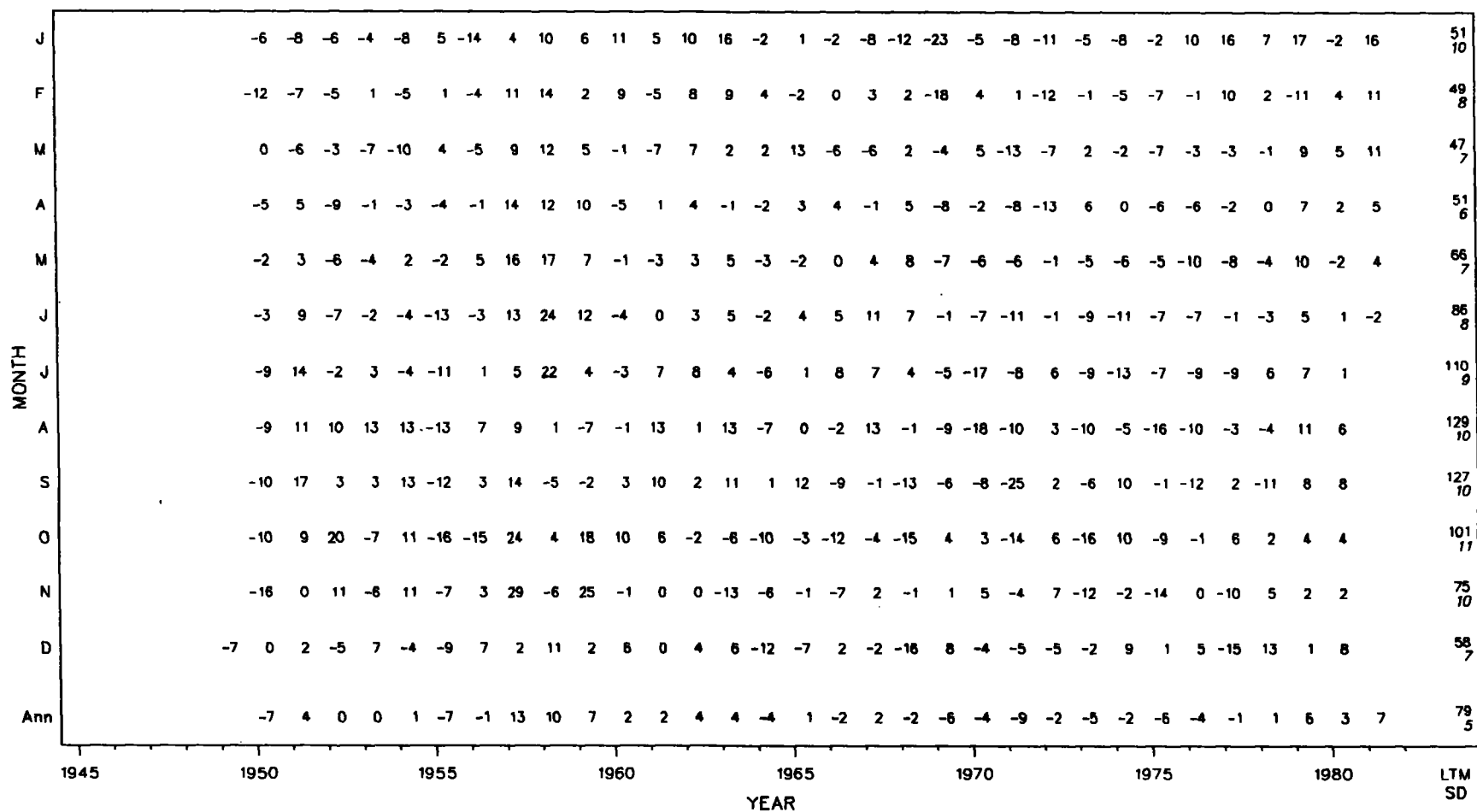
upper number = mean  
lower number = standard deviation

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



### Surface Air Temperature

Units = 0.1 °C



OWS Study Area P Anomalies

### Surface Dew Point Depression

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	14	2	-14	7	6	-3	1	-5	2	-4	-4	-7	-3	-12	-1	-5	-2	11	11	9	2	2	3	4	-4	3	-5	-6	-4	-5	6	-2	28	7				
F	6	0	-2	-5	5	7	-10	3	-5	8	-1	5	-10	-7	-8	-3	2	3	-12	5	-3	-1	11	5	-2	8	3	-1	-2	8	0	-7	24	6				
M	-7	2	-6	3	7	-4	-2	-6	9	-4	10	2	-1	1	-5	-12	7	8	6	-6	-4	8	4	-4	-5	8	3	-2	-3	-6	-4	2	26	6				
A	4	-6	3	-5	-1	7	-8	-4	4	-4	5	0	2	2	-2	5	-3	6	-2	-2	-1	3	7	-1	-6	5	5	-3	-1	-8	-2	3	27	4				
M	3	-3	-4	-2	-1	0	-9	3	-8	0	1	-4	3	0	-1	5	7	-5	2	-2	3	2	0	4	-3	4	7	3	0	2	0	-6	21	4				
J	-3	-4	-5	4	-2	1	3	-4	3	-2	3	2	2	-1	-3	1	2	-3	4	-5	2	4	3	1	3	-4	3	0	0	-2	-4	0	16	3				
J	1	3	-5	-2	-1	-5	2	4	1	3	0	0	-3	2	0	2	-2	4	-1	-1	3	-3	-2	3	7	3	2	-3	-2	-3	-4	13	3					
A	-3	2	-5	-1	0	-1	0	1	4	2	2	4	-5	-3	-2	7	2	6	6	5	-3	-2	0	1	-3	-3	3	-4	-5	6	-10	17	4					
S	3	-3	-6	6	-2	-4	4	-9	1	-4	-2	-2	9	3	-6	-3	-3	5	0	-3	-3	-7	4	6	-2	-5	5	5	8	5	3	23	5					
O	4	2	-4	-8	-8	2	-5	5	-5	-3	-4	2	-2	6	5	3	-4	7	6	-8	5	-2	-4	3	-1	9	-6	2	-4	-1	4	31	5					
N	10	0	-2	-6	3	-12	-9	-2	12	-7	-2	2	-3	-1	2	-2	3	-7	-6	-3	2	-1	-2	13	9	4	0	4	-7	4	6	31	6					
D	7	-3	-10	1	-4	-5	0	-7	11	-2	5	-8	-10	-10	-9	6	3	-3	-5	7	-4	9	4	19	5	2	4	-4	3	4	-1	-4	28	7				
Ann	2	-1	-4	-1	0	-1	-3	0	1	-1	0	0	-2	-2	-1	0	0	2	2	-1	1	1	4	3	0	3	1	0	-1	0	-1	-2	24	2				

OWS Study Area P 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	-4	-6	-6	5	4	-5	2	10	-1	9	-5	0	6	-5	-10	-1	-1	-9	-9	0	-3	-3	1	-2	2	-1	1	-2	11	6	13	59	6				
F	-3	-3	-10	-11	0	2	4	6	9	0	6	-4	6	7	-5	-8	2	-2	-5	-11	0	-3	-1	-1	-3	1	2	2	0	6	6	11	55	6				
M	-1	3	-8	-10	-2	6	-6	8	12	-2	5	-5	7	7	-5	1	-1	0	-2	-10	1	-9	-2	0	-3	-2	-1	-2	1	4	5	11	53	6				
A	-5	-5	-12	-7	3	-2	-5	11	8	4	1	-3	7	4	-4	3	3	-2	-2	-8	1	-6	-4	3	-1	-4	-4	1	2	10	4	11	55	6				
M	-10	-3	-11	-7	2	-3	3	12	14	9	1	-4	7	4	-4	-1	2	2	7	-8	-4	-6	1	-2	-3	-5	-7	-4	-2	13	-1	7	65	6				
J	-10	1	-16	-5	-2	-9	-5	13	24	11	-4	-1	6	4	-2	2	5	12	6	-5	-6	-9	1	-7	-9	-11	-6	-1	2	9	8	3	84	8				
J	-14	9	-9	0	1	-10	2	5	20	3	-4	5	9	5	-6	2	9	9	3	-4	-16	-7	8	-6	-8	-8	-8	-7	8	10	2	108	8					
A	-13	8	8	12	17	-12	10	6	0	-6	-1	9	2	14	-11	-1	-3	14	-1	-8	-19	-5	4	-6	1	-19	-11	-10	-1	18	5	129	10					
S	-16	15	-5	5	18	-11	6	11	-4	-4	1	8	7	11	1	13	-11	-1	-16	-8	-10	-25	3	-3	10	-6	-11	3	-4	13	9	128	10					
O	-8	12	10	-9	10	-18	-10	23	0	14	8	8	-4	-2	-7	3	-12	-4	-16	0	4	-15	7	-2	8	-10	-3	6	-3	5	4	108	10					
N	-8	5	10	-2	9	-3	-11	25	-5	21	-5	1	1	-13	-8	3	-6	-1	-12	-2	7	-8	9	-4	6	-9	-7	-11	4	7	7	84	9					
D	10	-2	1	0	-1	3	1	-1	17	-2	14	-8	-2	1	-6	-10	2	-2	-14	-9	-1	0	-4	2	-1	3	-3	-3	-6	8	7	8	68	7				
Ann	-7	3	-4	-3	5	-5	-1	11	7	5	1	0	4	3	-6	1	-1	1	-5	-6	-3	-8	2	-2	0	-6	-5	-2	1	9	5	9	83	5				

### OWS Study Area P Anomalies

### Sea - Air Temperature Difference

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

OWS Study Area P Anomalies

### Surface Scalar Wind

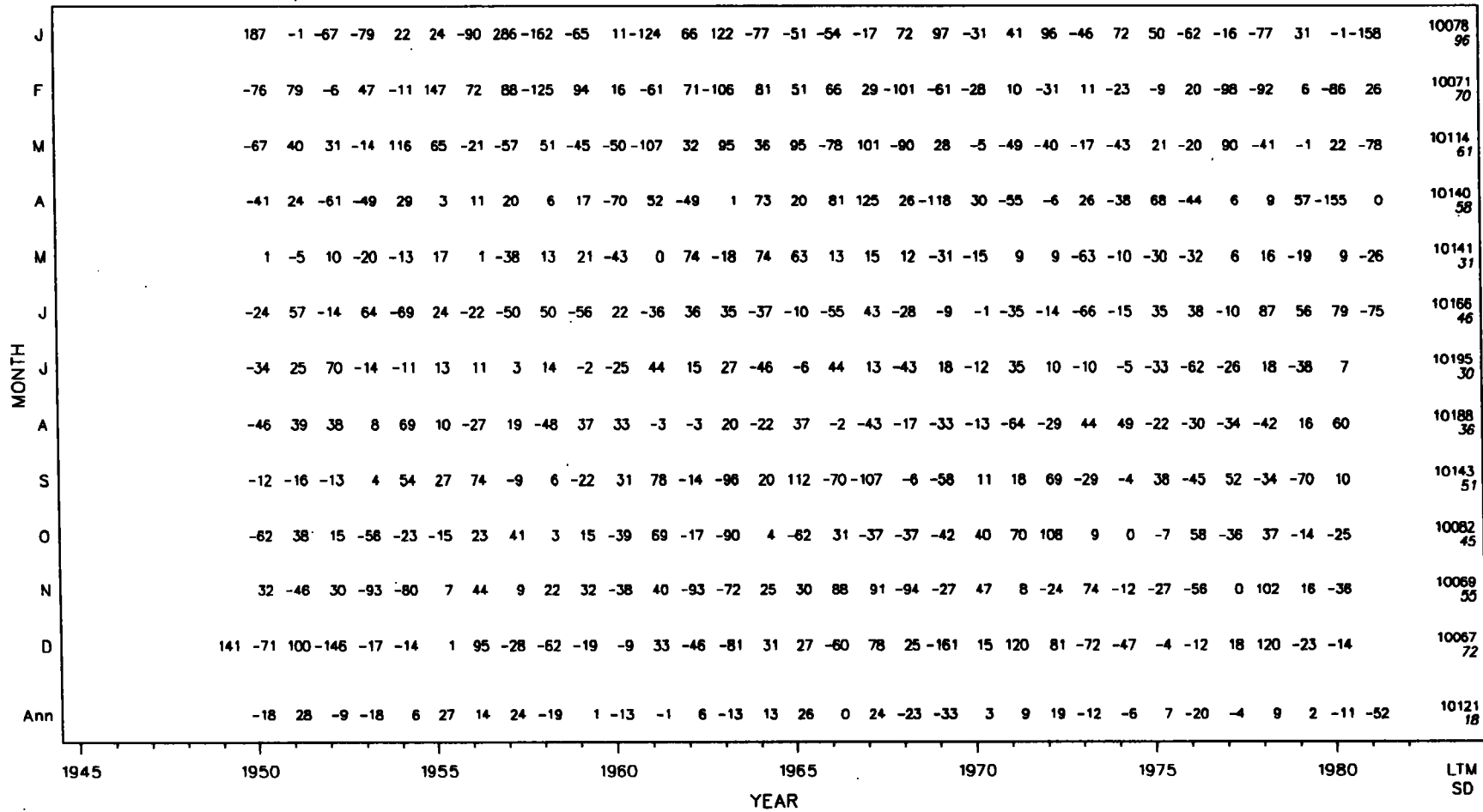
Units = 0.1 m/s

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																								
J	-19	17	17	-9	15	-2	16	-6	-6	3	7	9	-9	1	20	7	-19	8	-11	-9	-19	19	1	-5	-3	0	1	-1	-14	-8	-1	2	117	11
F	1	1	13	-2	15	-13	19	12	14	-2	0	1	-45	-18	17	-4	-15	19	-15	10	-6	18	6	-20	7	4	2	7	5	-5	-14	-12	116	14
M	5	5	-6	7	-20	-2	2	-10	-18	27	9	-1	-14	6	5	-10	5	-1	0	-21	0	6	-10	13	-2	-3	11	12	-8	-3	4	10	109	10
A	8	-13	1	-13	15	1	-2	-17	-8	-10	12	2	-16	-3	9	9	-25	-7	1	8	11	6	18	11	0	-1	13	2	-3	-24	12	0	102	11
M	5	-13	-6	-1	-8	14	6	-6	-11	-9	3	-1	-15	-4	-3	-1	1	-8	-27	-1	9	13	-9	21	6	2	10	2	13	2	8	5	91	10
J	-9	-8	-2	-2	9	1	5	5	-9	7	6	-5	-19	0	-8	-5	-10	-18	14	2	15	1	2	12	6	10	-11	3	-2	6	-9	14	81	9
J	-9	-14	-6	-15	0	-5	-10	0	9	27	-1	-10	-12	-7	5	9	-12	-5	-5	22	10	-1	8	6	-14	1	6	-6	13	11	6	72	11	
A	-5	-22	-10	6	-13	-4	-1	-17	19	12	17	-4	-7	-27	10	-15	7	-2	12	5	9	14	5	4	-13	12	8	2	2	-20	12	80	12	
S	3	15	-14	13	-5	2	-18	0	-1	7	0	-1	-14	-1	-2	-29	11	6	12	2	-1	17	0	2	-3	-4	7	-17	6	12	-2	94	10	
O	-4	-17	-18	7	-3	25	10	-14	5	-12	7	11	-13	24	-5	16	-5	1	-1	-4	-9	7	-9	2	12	0	-23	6	2	-5	9	116	12	
N	-30	-1	-4	-10	7	8	2	10	0	6	32	3	25	-1	10	-4	7	-20	17	7	-11	10	-6	-9	9	-16	-1	6	-18	-24	-2	122	13	
D	-13	-18	-6	37	21	1	21	4	8	-3	5	2	-19	-12	-4	2	1	-11	-1	5	13	14	11	-42	6	9	-10	-15	-10	3	0	-1	122	14
Ann	-6	-5	0	0	1	4	3	-3	-1	5	8	-1	-13	-3	5	-2	-5	-2	0	3	2	10	-3	4	1	0	1	0	0	-5	2	3	102	4

### OWS Study Area P Anomalies

### Sea Level Pressure

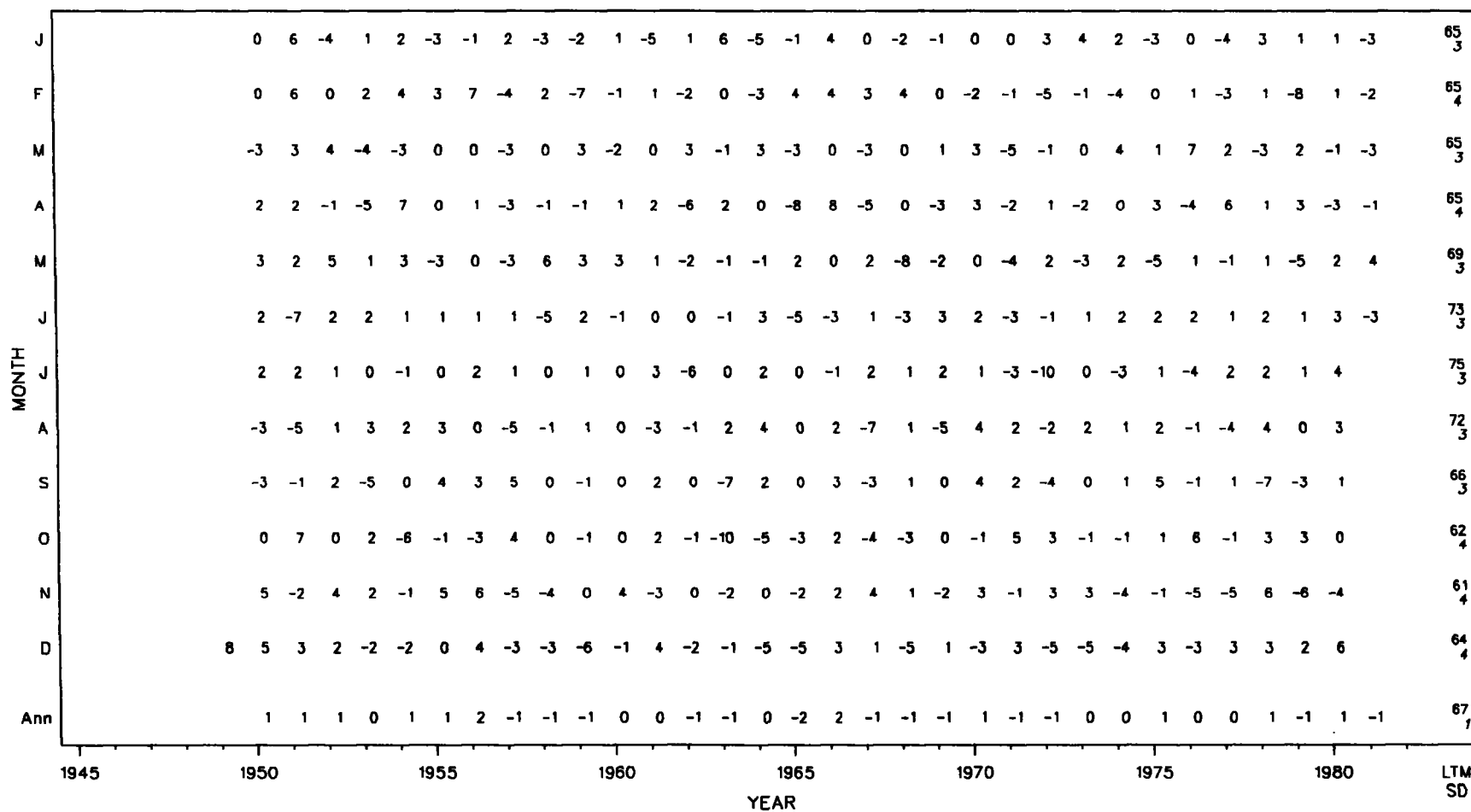
Units = 0.1 mb



OWS Study Area P Anomalies

### Total Cloudiness

Units = 0.1 okta



### OWS Study Area P Anomalies

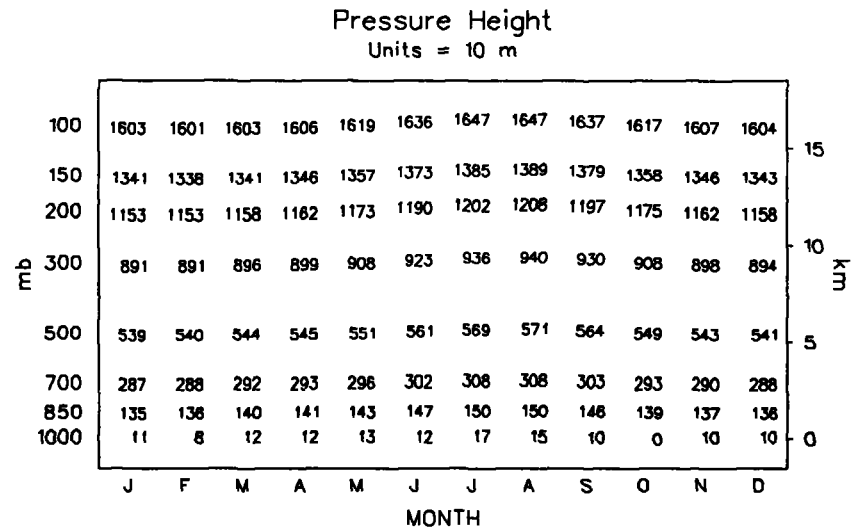
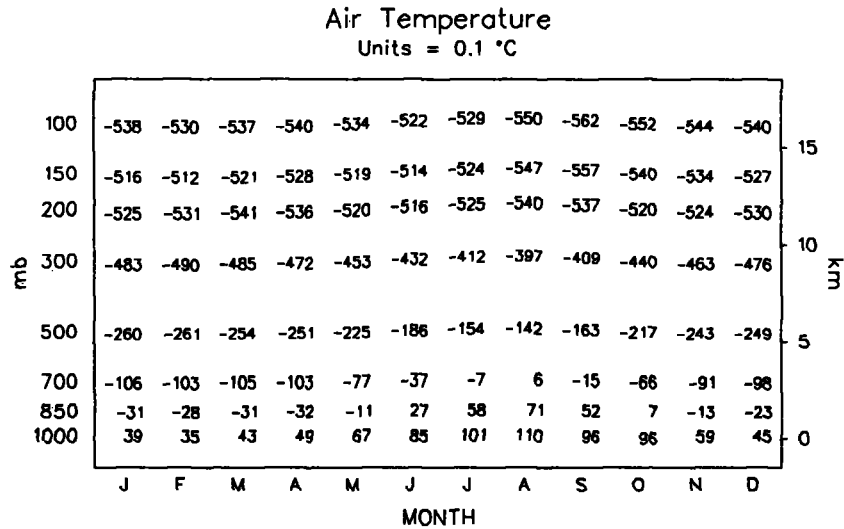
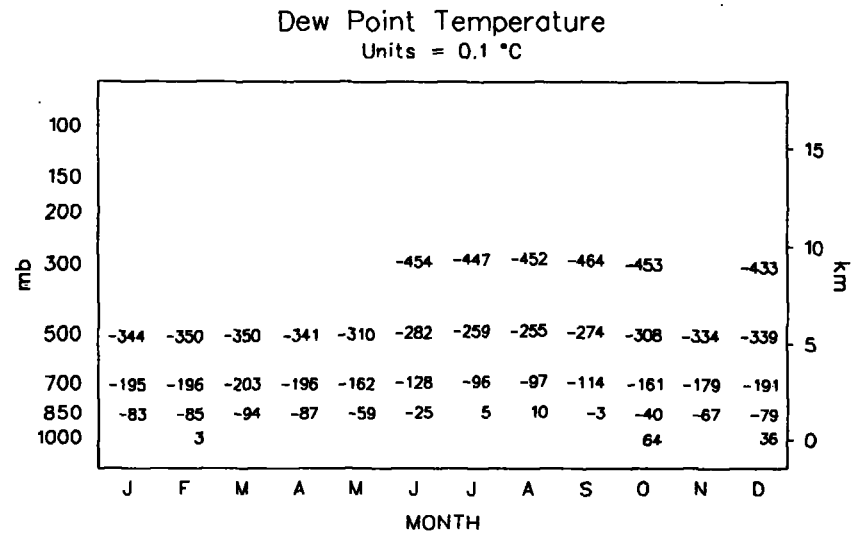
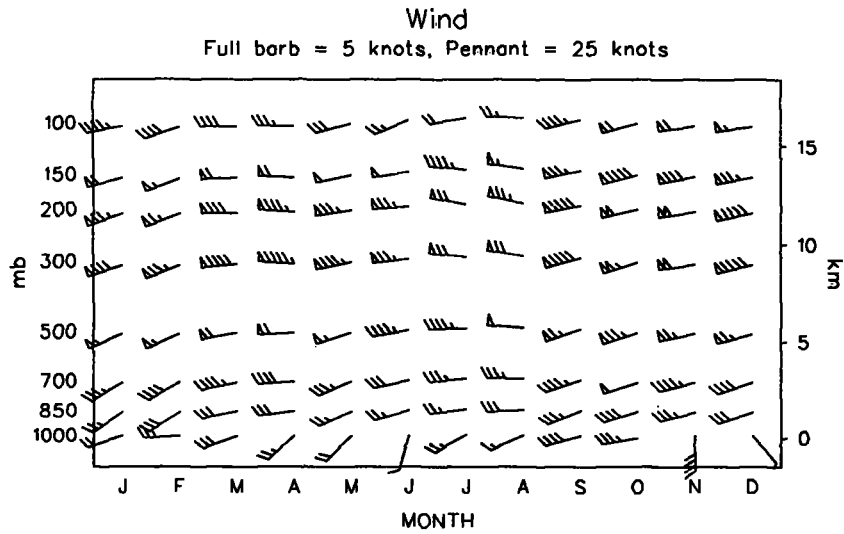
### Precipitation Frequency

Units = 0.1 percent

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																								
J	-21	27	65	18	18	-27	10	-133	40	83	-7	31	-20	26	51	-47	56	57	-44	-90	-97	62	-22	85	-16	-10	3	-49	9	57	-51	-64	292	54
F	58	-25	-21	-65	97	-105	-6	-97	55	-73	8	59	-74	183	-59	-45	22	41	-14	61	-16	-60	25	-75	-4	35	86	-13	-44	107	26	-68	291	67
M	3	25	25	33	-4	-6	18	-34	-71	65	-2	25	-41	143	-5	-75	19	-179	19	-30	-94	6	27	27	-32	-36	97	-12	69	-34	73	-20	268	59
A	8	-6	94	-12	44	-14	24	-55	-75	-15	48	-45	-86	204	-47	-64	-59	-71	-30	5	39	-14	27	23	-13	6	-3	-23	10	-49	136	14	261	61
M	12	45	42	-103	67	-27	-21	-15	-1	-70	32	5	-51	358	-102	-49	-60	-21	-64	-101	57	12	-38	65	34	5	4	-35	17	-52	24	36	262	81
J	143	-75	34	-111	31	-39	-43	-17	20	-17	62	-46	-80	273	-15	-42	-47	-17	8	-57	-14	35	30	80	-1	40	-40	19	-73	-81	-5	46	251	73
J	22	107	-131	42	31	-10	-57	-26	49	46	50	13	-72	78	-30	31	-30	-11	65	-33	-21	-61	12	36	-142	52	-13	25	-93	35	37	238	59	
A	51	9	-127	-27	-21	11	-42	-59	115	-40	-9	-20	-20	170	8	-21	32	-77	53	-53	27	39	92	-82	-111	11	80	1	94	-80	-5	237	67	
S	50	33	-111	9	-88	-30	-63	52	49	-26	72	13	-26	358	9	-61	44	-61	20	-1	-55	-36	-107	-10	3	28	28	-56	-8	-21	-7	255	82	
O	63	55	-5	-13	-55	-81	8	-103	19	-7	-23	48	-28	133	-28	94	33	-41	-68	-27	-58	-27	-63	94	-63	-15	-21	81	14	46	53	277	57	
N	8	90	-80	7	-44	-58	56	86	-8	-108	-5	-53	108	340	-8	-92	-49	-42	29	8	-60	-53	71	-89	-4	25	13	-36	49	-67	-33	296	85	
D	75	-29	-46	-123	44	21	-92	-9	78	11	40	-41	0	8	181	-96	19	-29	82	-37	44	-4	-4	-195	96	24	13	-18	-31	22	41	-44	294	70
Ann	31	20	-28	-15	8	-40	-10	-27	17	-10	15	2	-32	204	-27	-29	-6	-28	-5	-23	-24	-8	-12	21	-27	13	18	-12	5	-8	17	-9	270	40

OWS Study Area P Anomalies





## OWS Study Area P Upper Air Climatology

Mean plotted at actual height

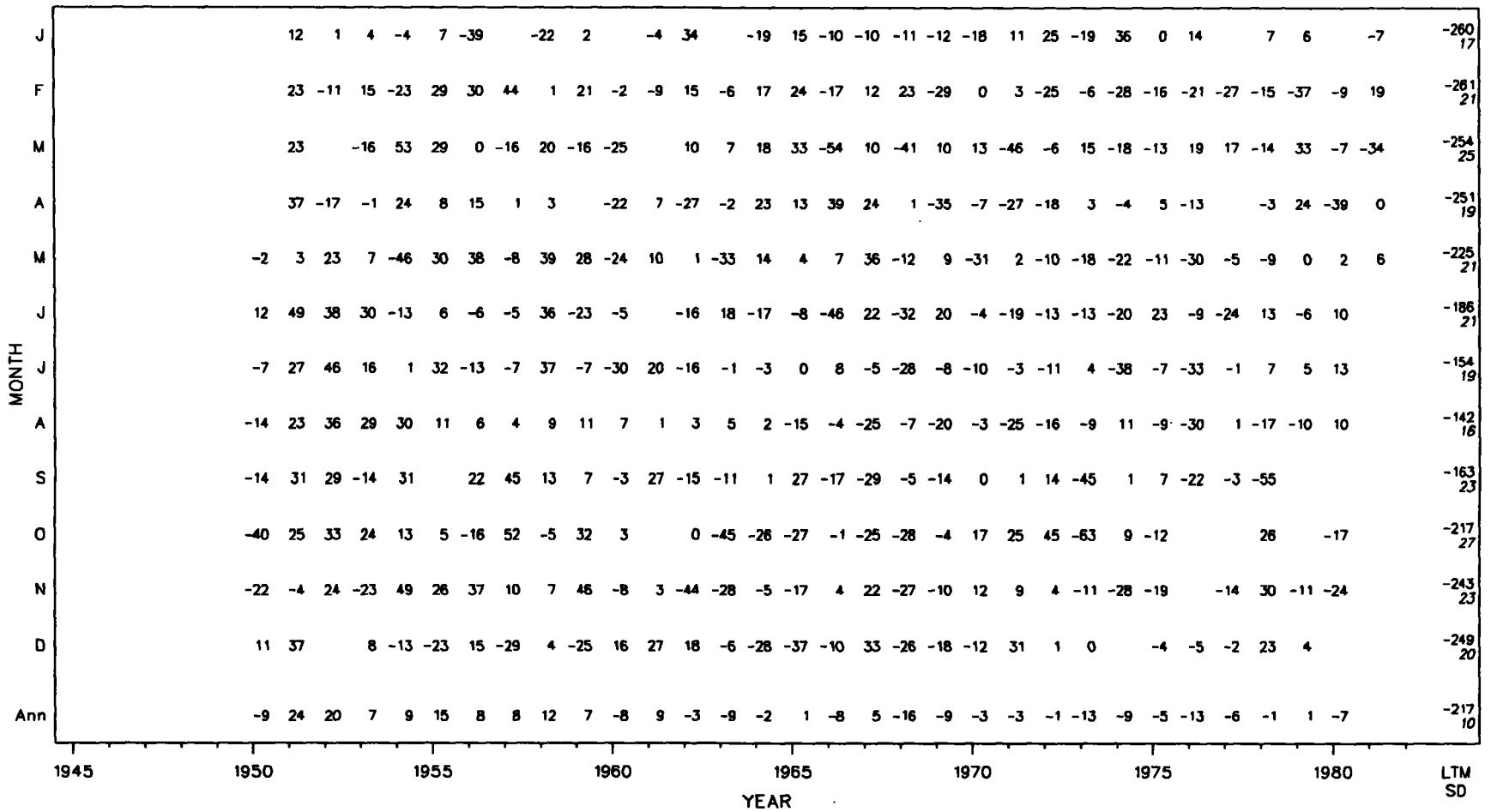
Air Temperature: 700 mb  
Units = 0.1 °C

MONTH	1945	1950	1955	1960	1965	1970	1975	1980	LTM	SD																										
J	-4	4	-1	-12	12	-38	-18	9	-5	34	-25	13	-9	-19	-14	-19	-3	-3	22	-13	32	-15	14	22	21	13	-106	17								
F	11	-5	8	3	17	30	47	3	18	0	-17	25	13	17	12	-10	1	26	-34	11	5	-38	-12	-25	-25	-16	-12	-14	-53	-3	19	-103	21			
M	8	-19	-1	27	-5	-2	16	-9	-32	16	11	22	46	-50	-2	-25	13	22	-42	-2	9	-9	-25	10	18	-12	36	-5	-16	-105	21					
A	29	-19	3	16	-3	20	10	8	-20	10	-23	-5	18	5	39	24	-3	-34	-7	-25	-23	6	2	-4	-13	-6	23	-27	-2	-103	17					
M	-1	3	16	8	4	-2	16	-3	32	23	-18	2	3	-26	12	2	2	40	-1	8	-27	4	1	-11	-14	-15	-29	-6	-14	1	-2	5	-77	15		
J	14	35	24	19	-18	3	-5	4	39	-20	-12	-10	14	-15	-13	-34	25	-19	21	-6	-18	-15	-8	-27	20	-5	-19	7	1	19	-37	19				
J	-4	-9	32	4	1	20	-2	-7	32	-7	-22	22	-10	5	-9	-7	14	3	-23	-2	-9	7	0	8	-36	-1	-26	5	12	5	16	-7	15			
A	-10	21	11	19	27	5	12	4	7	6	-4	3	8	15	-1	-14	-8	-20	-8	-19	-3	-18	-12	-14	18	-5	-25	4	-10	-1	19	6	13			
S	-15	21	22	-22	23	22	51	8	-2	1	20	-12	-12	-1	47	-22	-37	-15	-24	13	-1	14	-49	11	17	-21	-3	-43				-15	24			
O	-24	17	29	10	21	-15	-14	55	2	26	4	10	0	-35	-23	-22	-3	-27	-32	7	19	20	39	-61	1	-14		13		-7			-66	24		
N	-19	-4	17	-14	53	22	30	19	-16	17	-6	-17	-33	-15	-3	-15	1	20	-11	-5	18	8	9	-20	-23	-16		-12	30	-7	-10			-91	19	
D	1	35	10	-9	-16	18	-41	12	-39	4	24	24	7	-31	-39	0	28	-28	-4	-8	13	3	-2		2	2	-3	19	12					-98	20	
Ann	-7	14	13	2	9	6	7	12	10	2	-9	5	2	-3	-3	1	-7	3	-13	-8	2	-4	0	-14	-6	-7	-11	-3	0	4	0				-67	7

OWS Study Area P Anomalies

### Air Temperature: 500 mb

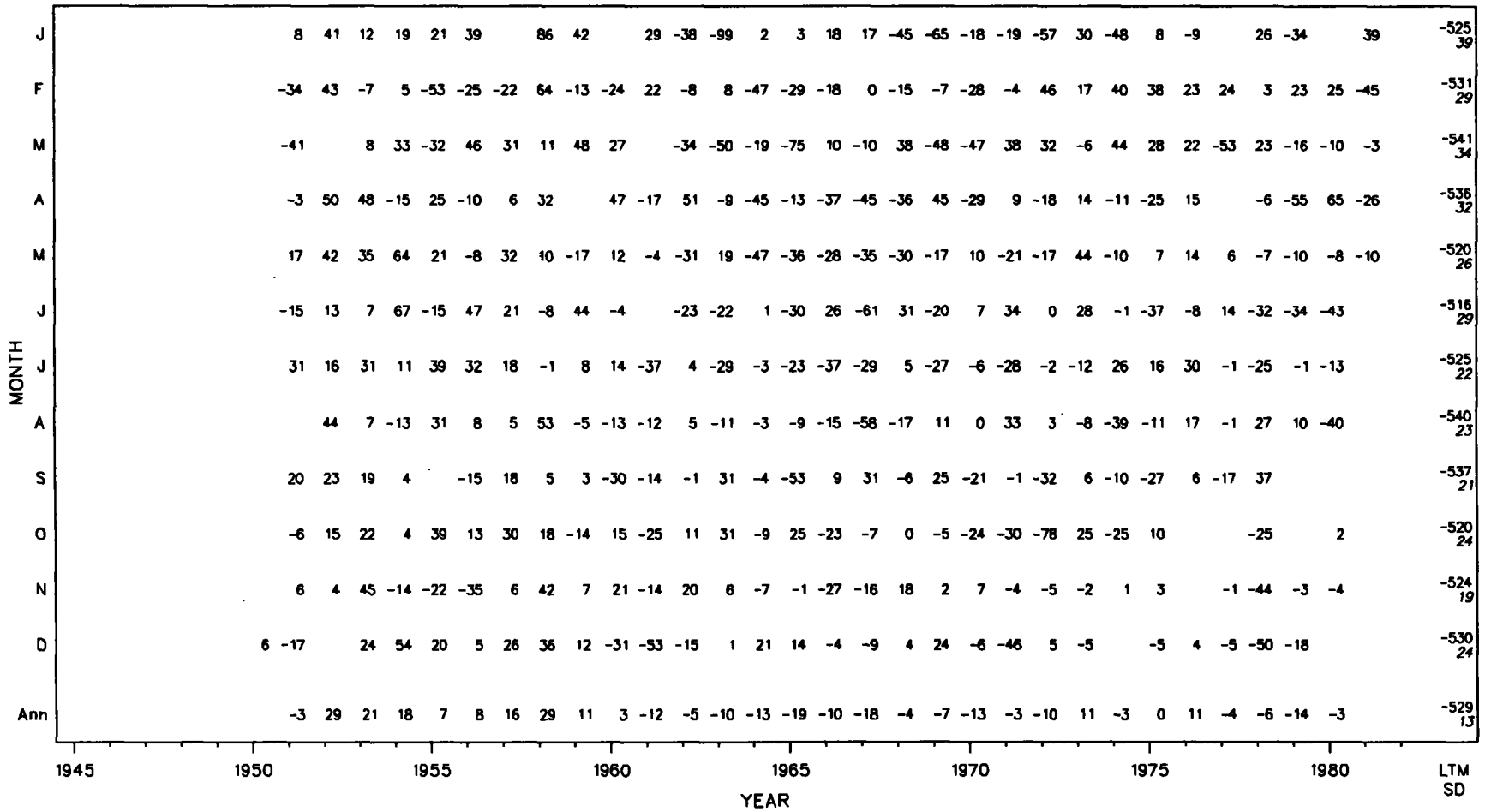
Units = 0.1 °C



OWS Study Area P Anomalies

### Air Temperature: 200 mb

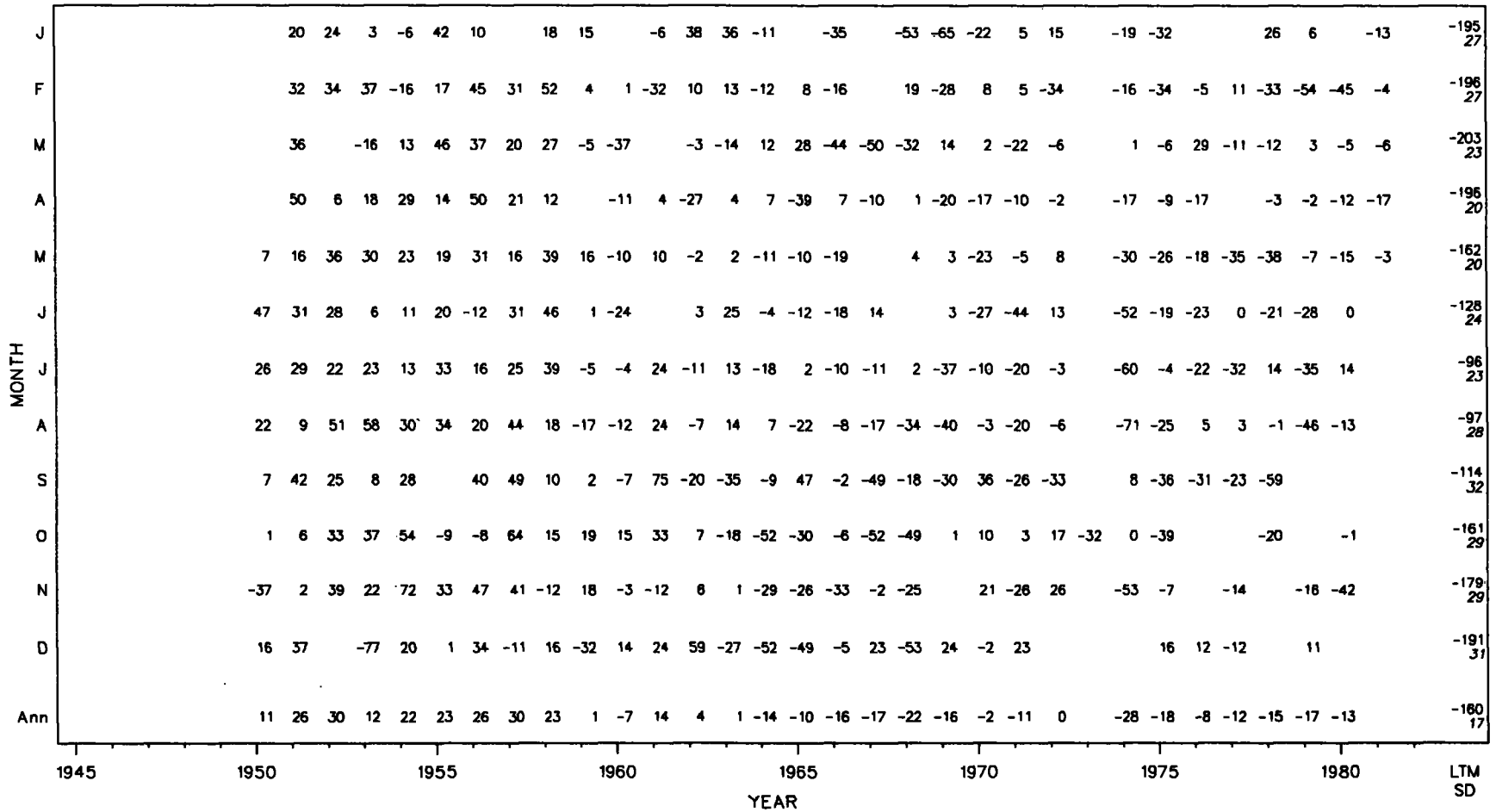
Units = 0.1 °C



OWS Study Area P Anomalies

### Dew Point Temperature: 700 mb

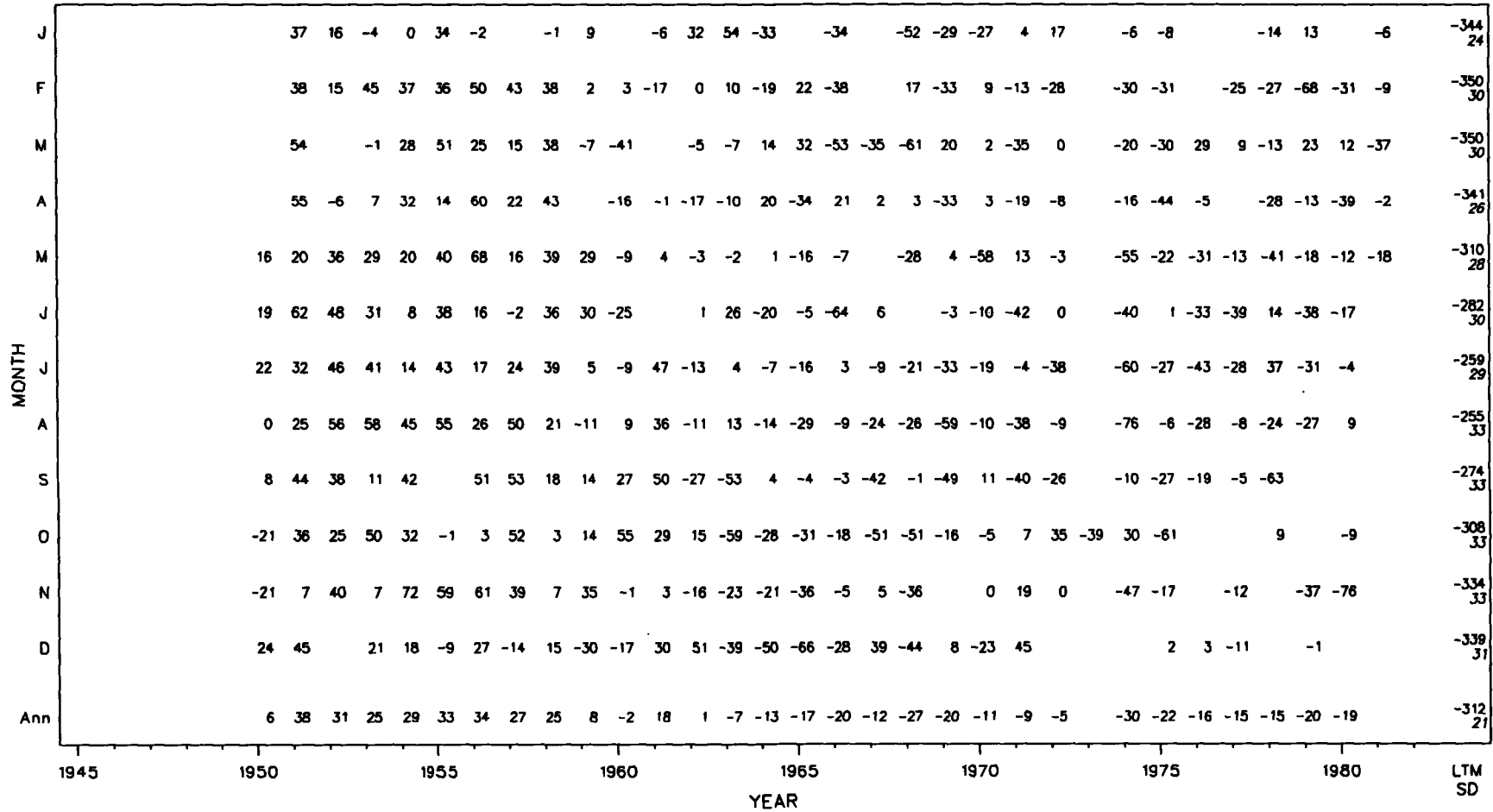
Units = 0.1 °C



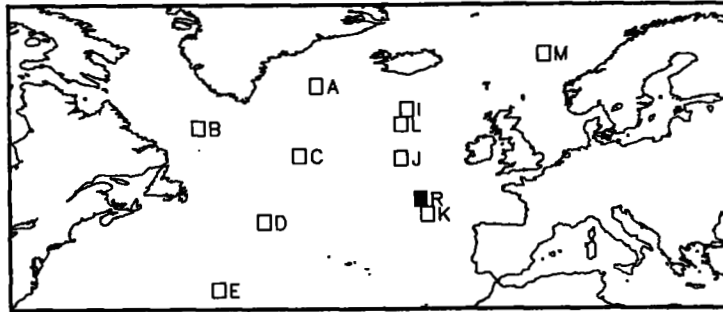
### OWS Study Area P Anomalies

### Dew Point Temperature: 500 mb

Units = 0.1 °C



OWS Study Area P Anomalies



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

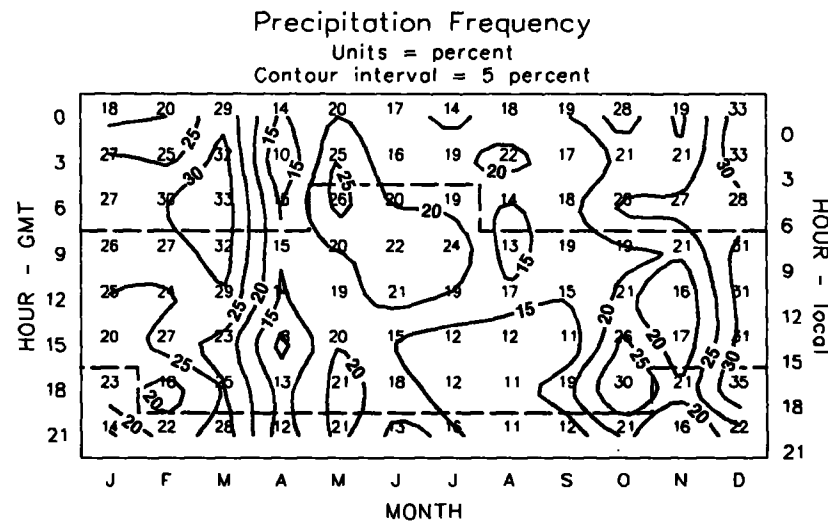
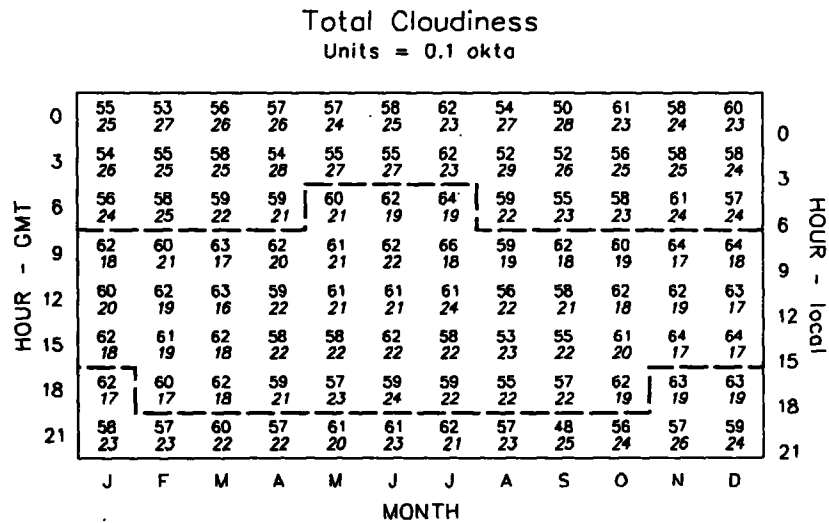
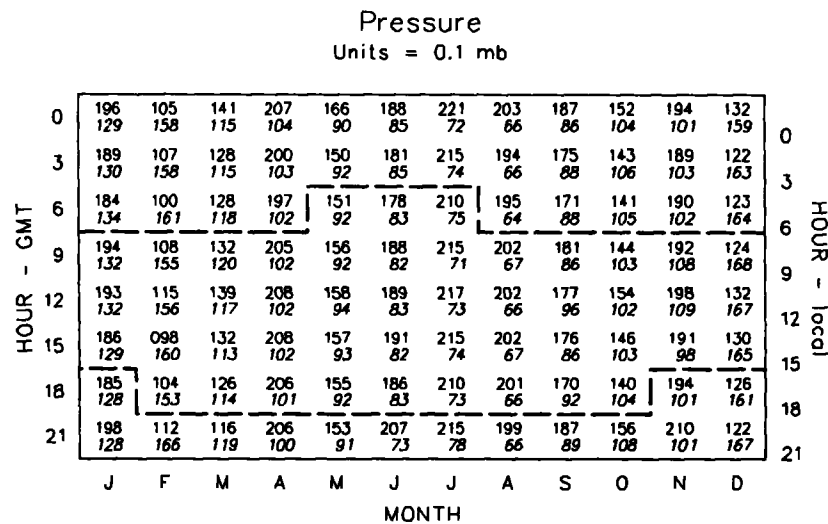
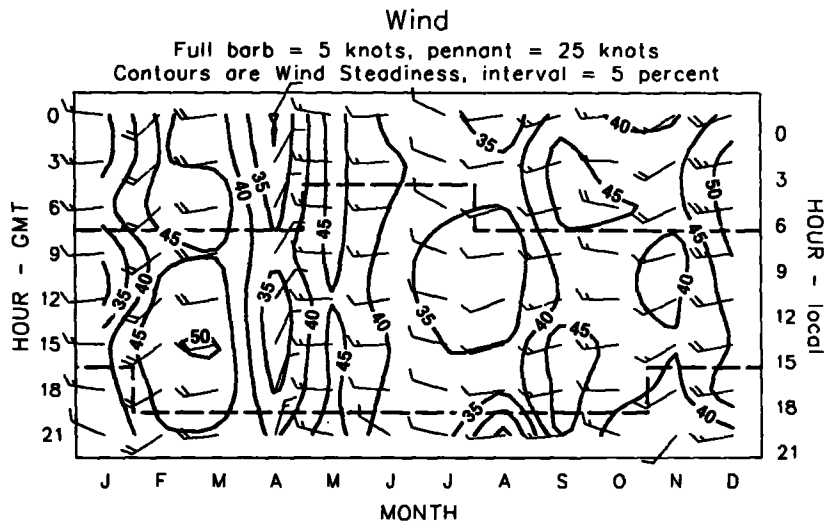
**OWS**  
**R**

MONTH	YEAR											Sum		
	1945	1950	1955	1960	1965	1970	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	30 20	196 186	
A							19 19	30 30	31 31	31 31	31 31	29 19	202 192	
S							13 13	26 26	30 30	27 27	30 30	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 26	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.



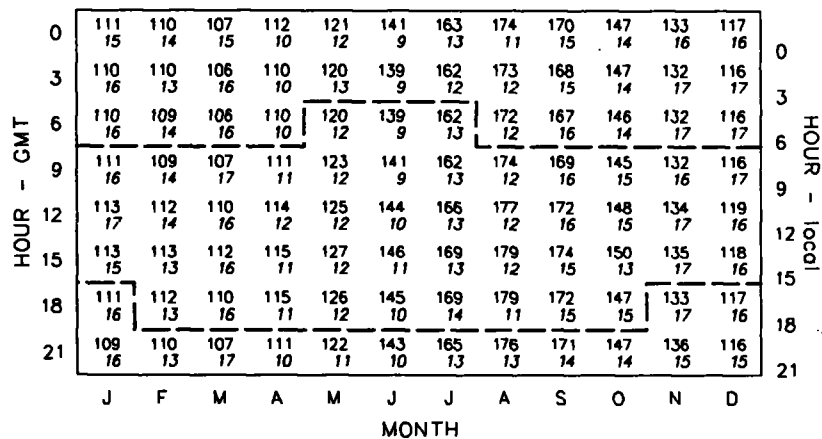


## OWS Study Area R Surface Climatology

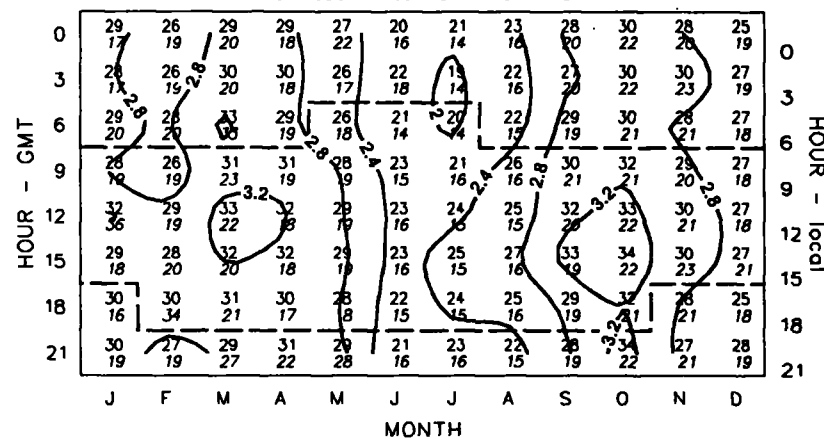
upper number = mean  
lower number = standard deviation

— data contours  
- - - sunrise/sunset

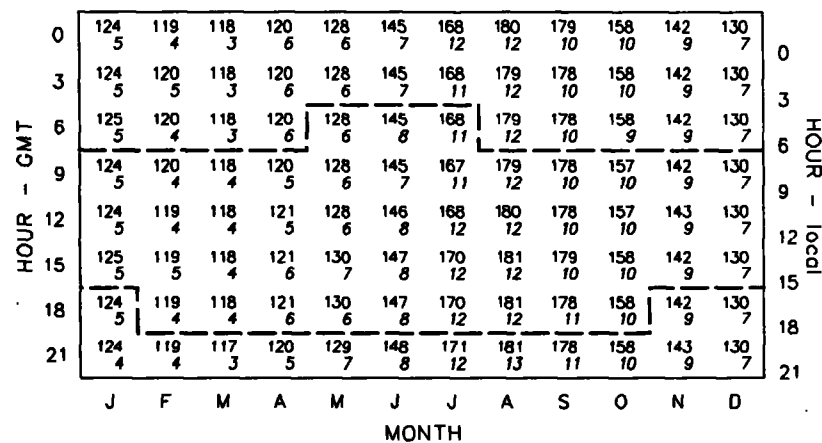
Air Temperature  
Units = 0.1 °C



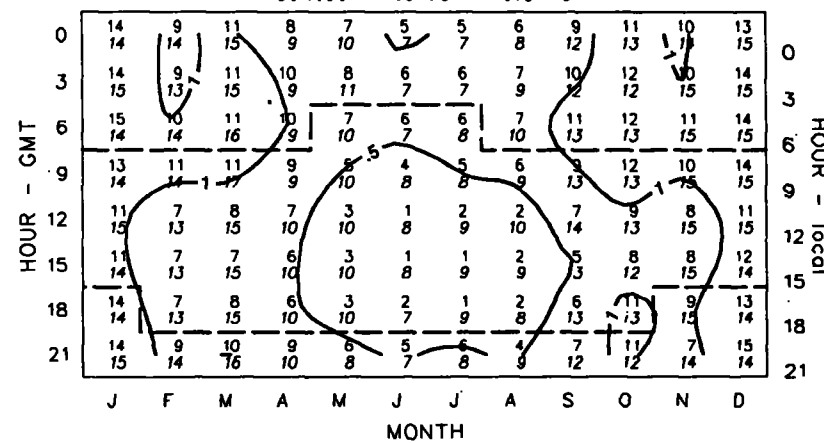
Dew Point Depression  
Units = 0.1 °C  
Contour interval = 0.4 °C



Sea Surface Temperature  
Units = 0.1 °C



Sea - Air Temperature Difference  
Units = 0.1 °C  
Contour interval = 0.5 °C

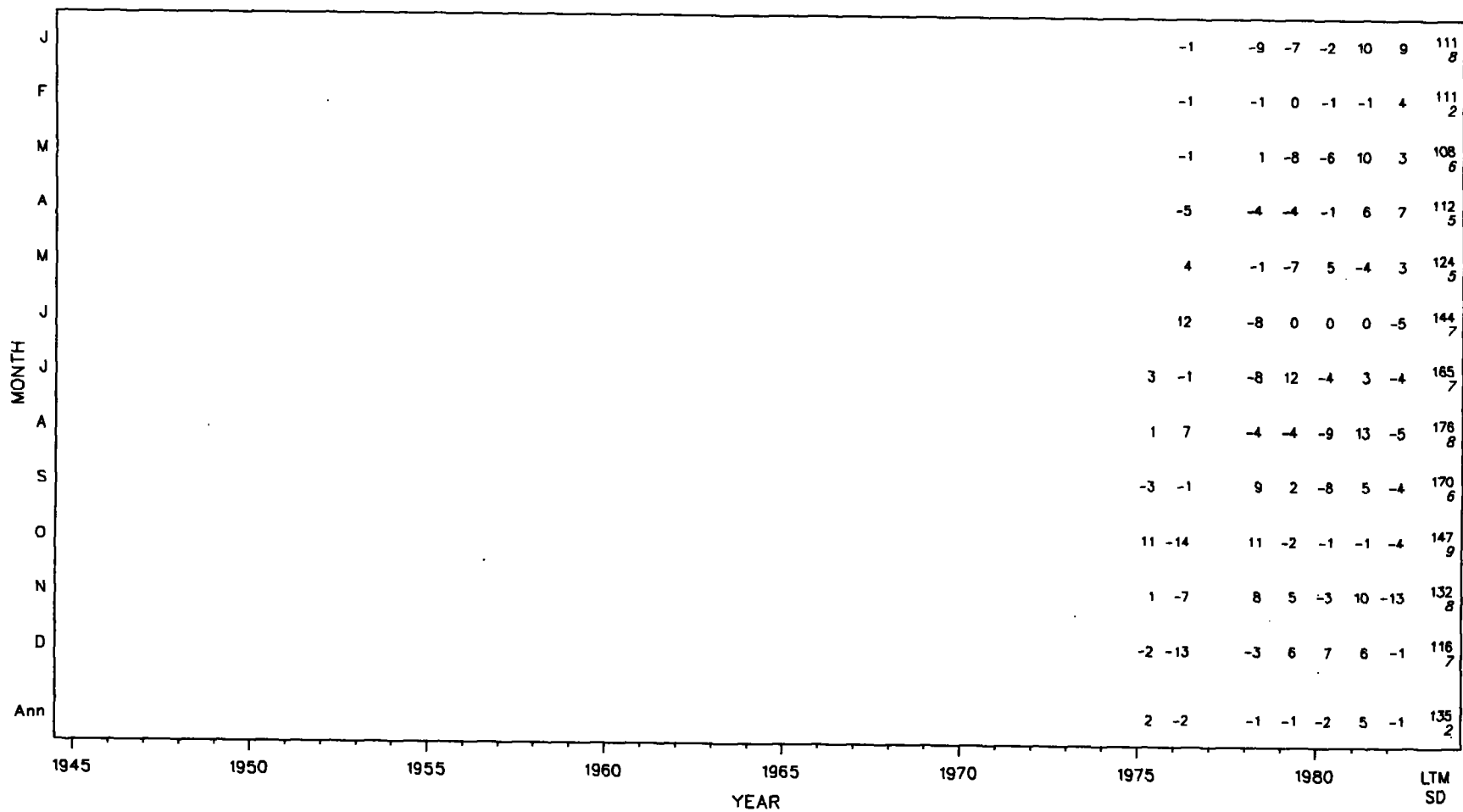


### OWS Study Area R Surface Climatology

upper number = mean  
lower number = standard deviation  
———— data contours  
----- sunrise/sunset

# Surface Air Temperature

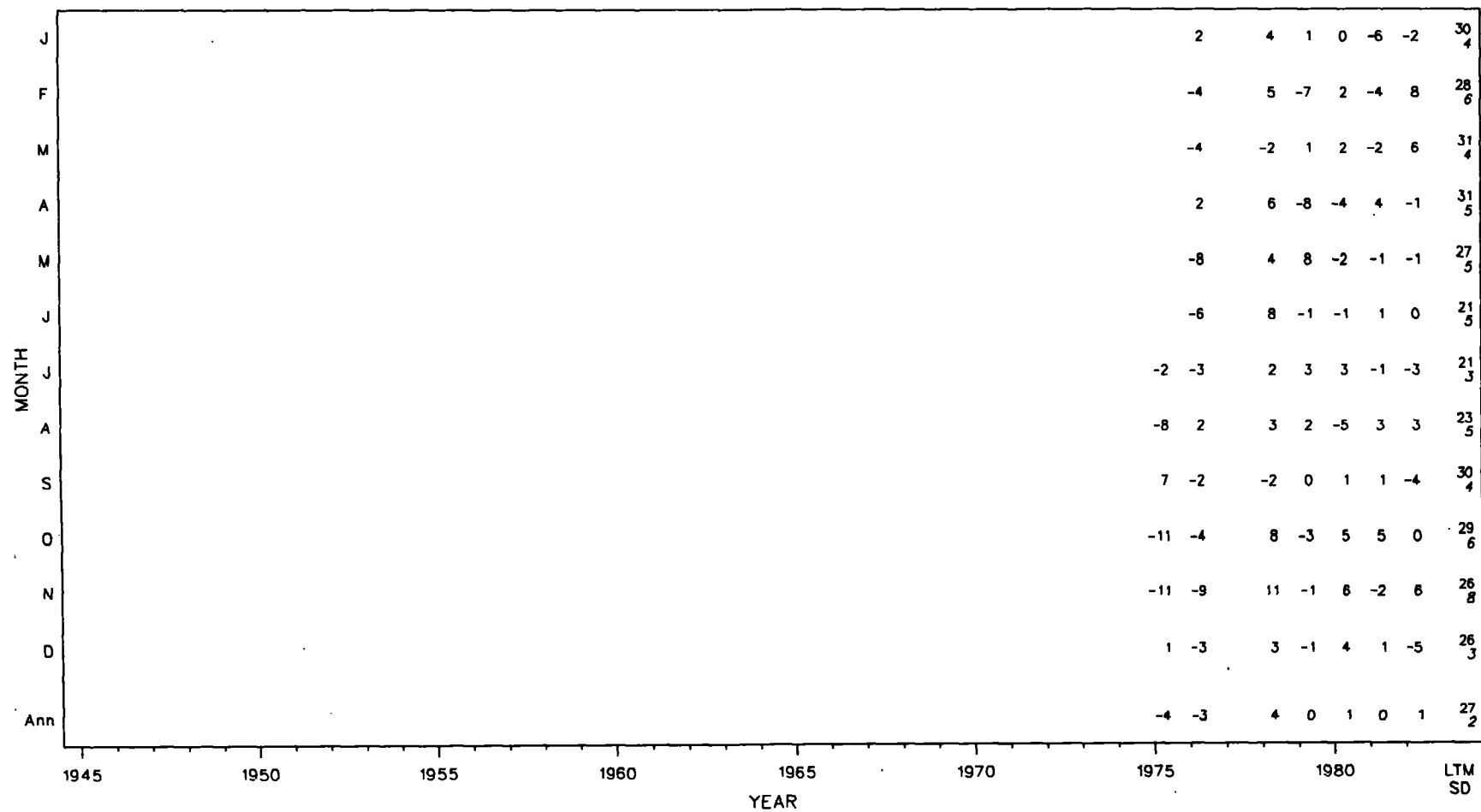
Units = 0.1 °C



## OWS Study Area R Anomalies

### Surface Dew Point Depression

Units = 0.1 °C

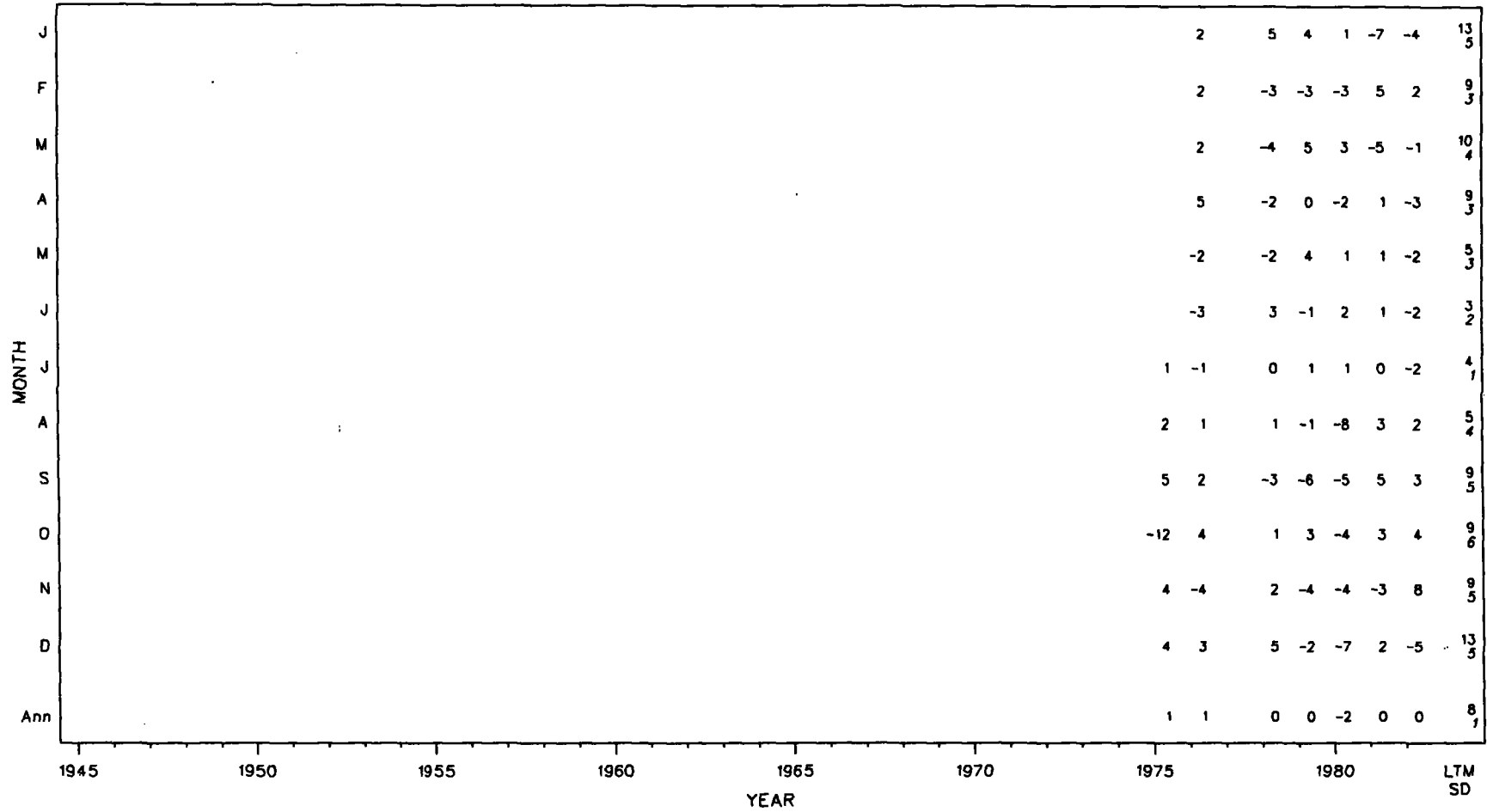


OWS Study Area R Anomalies



### Sea - Air Temperature Difference

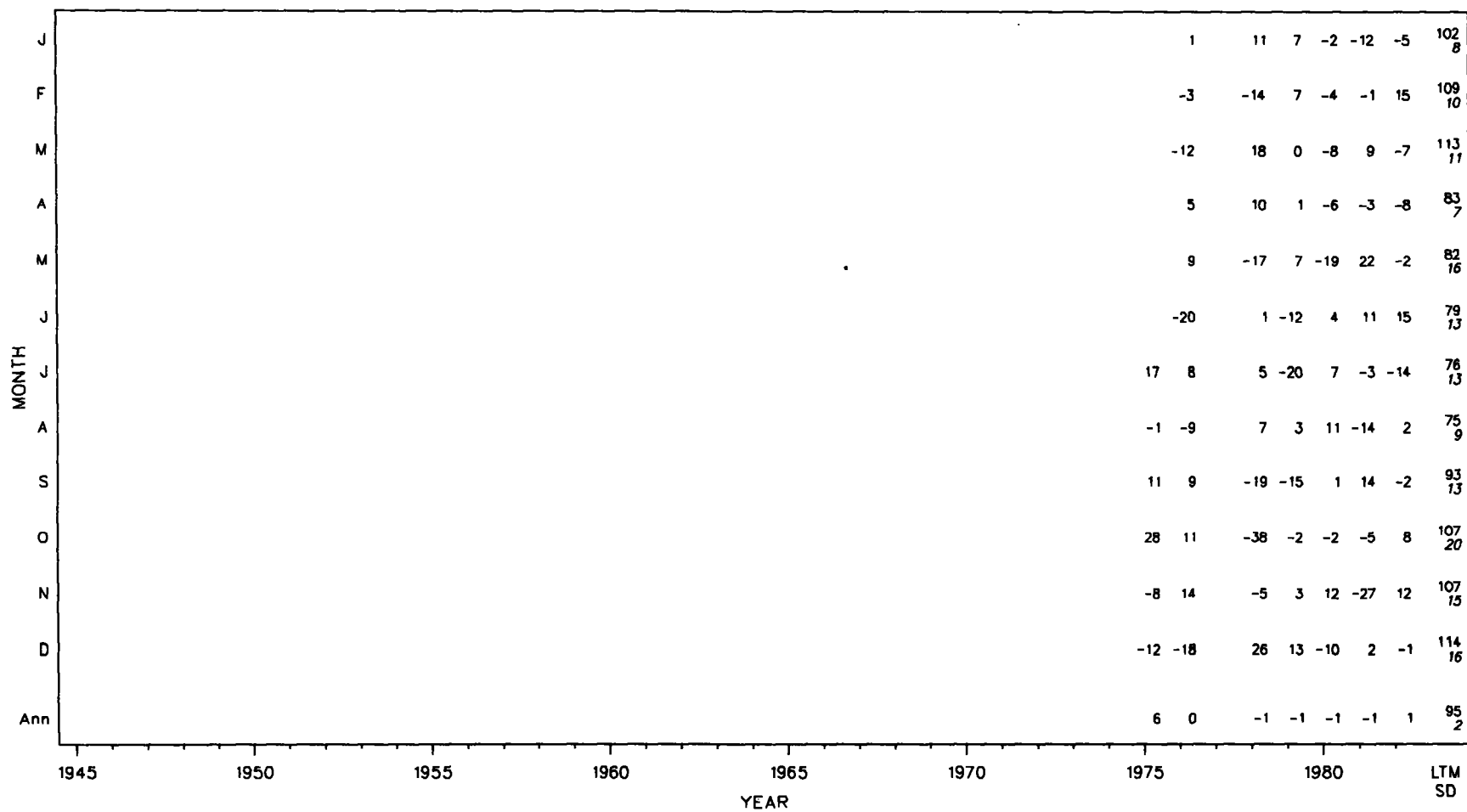
Units = 0.1 °C



OWS Study Area R Anomalies

### Surface Scalar Wind

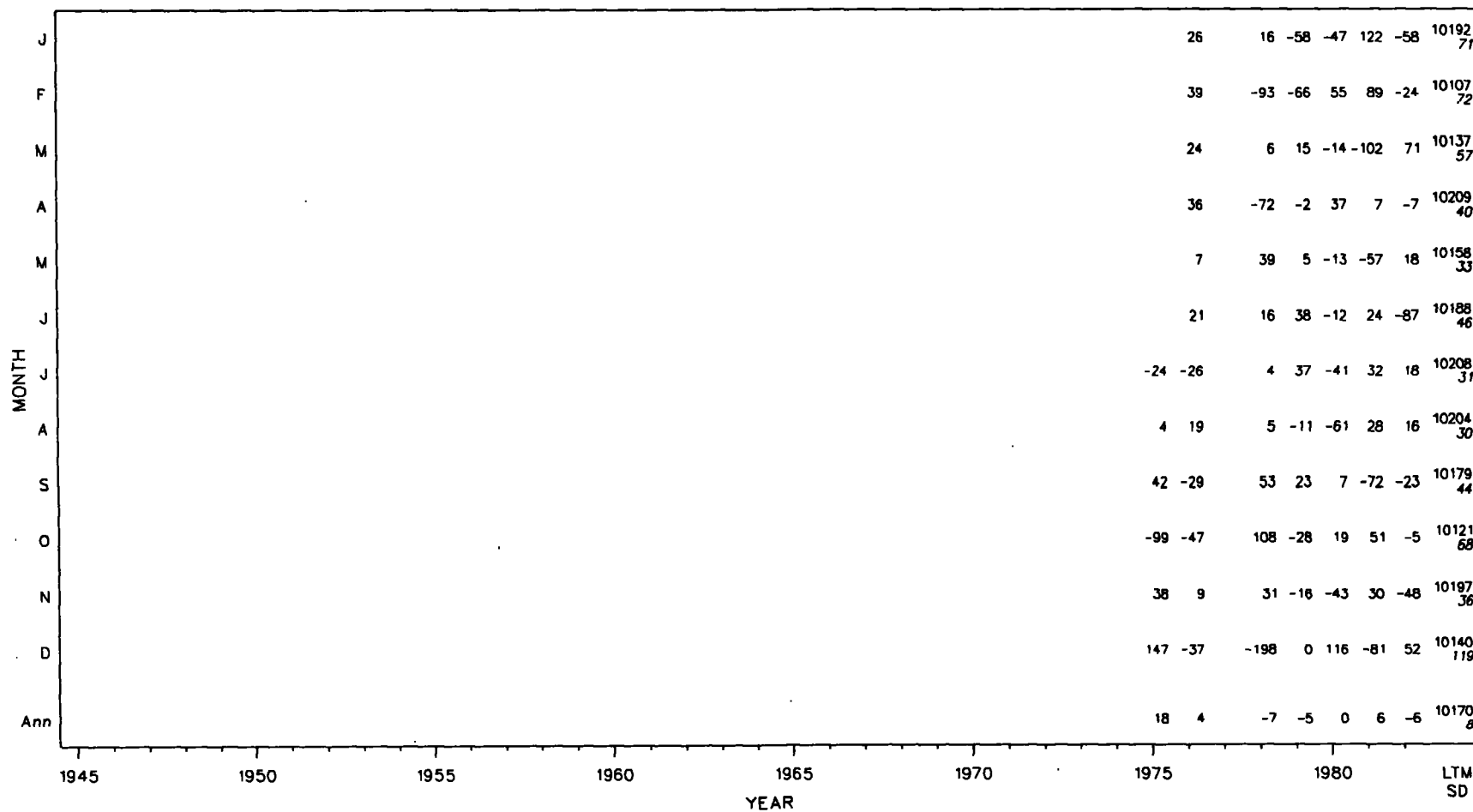
Units = 0.1 m/s



OWS Study Area R Anomalies

# Sea Level Pressure

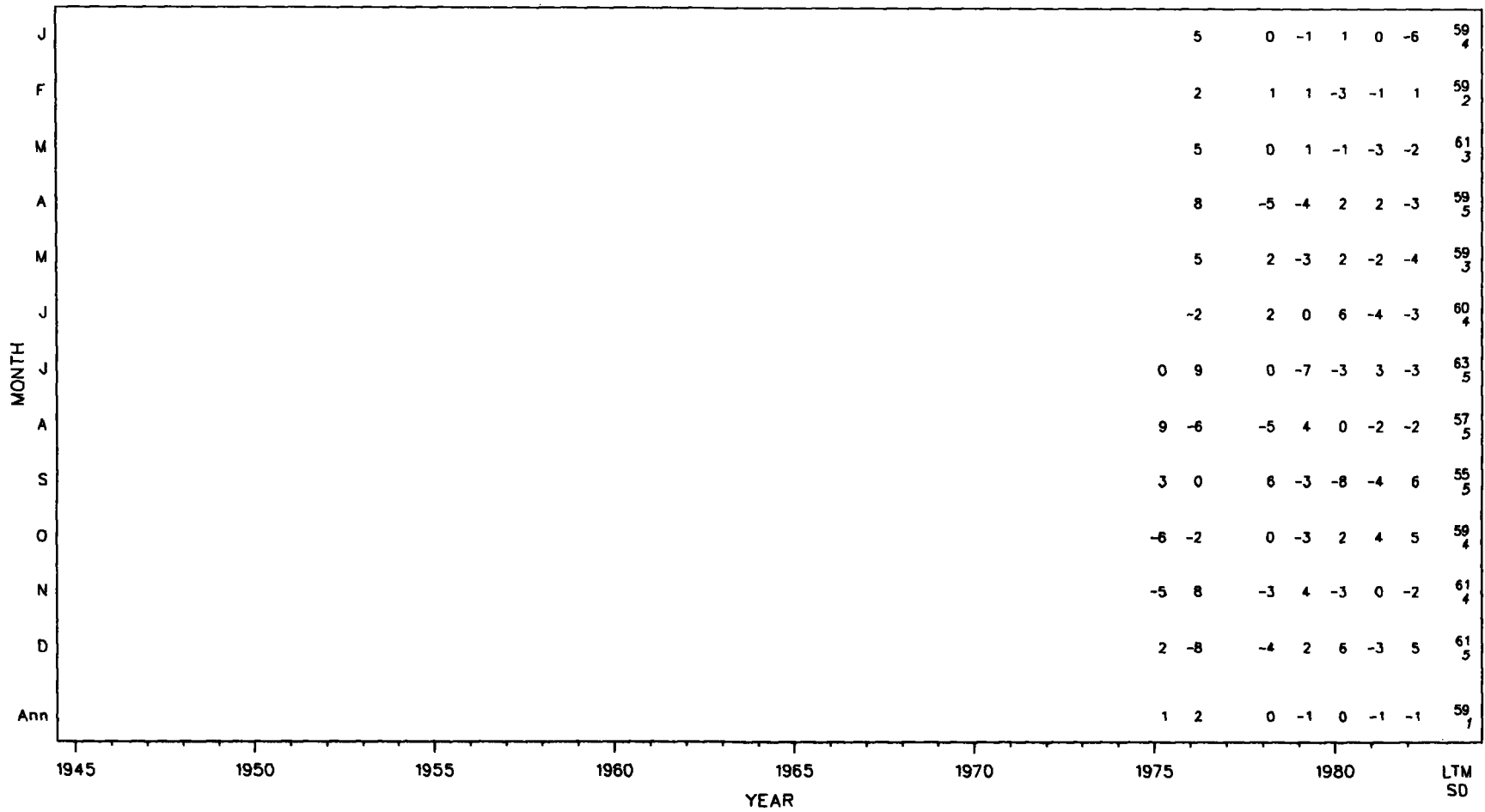
Units = 0.1 mb



OWS Study Area R Anomalies



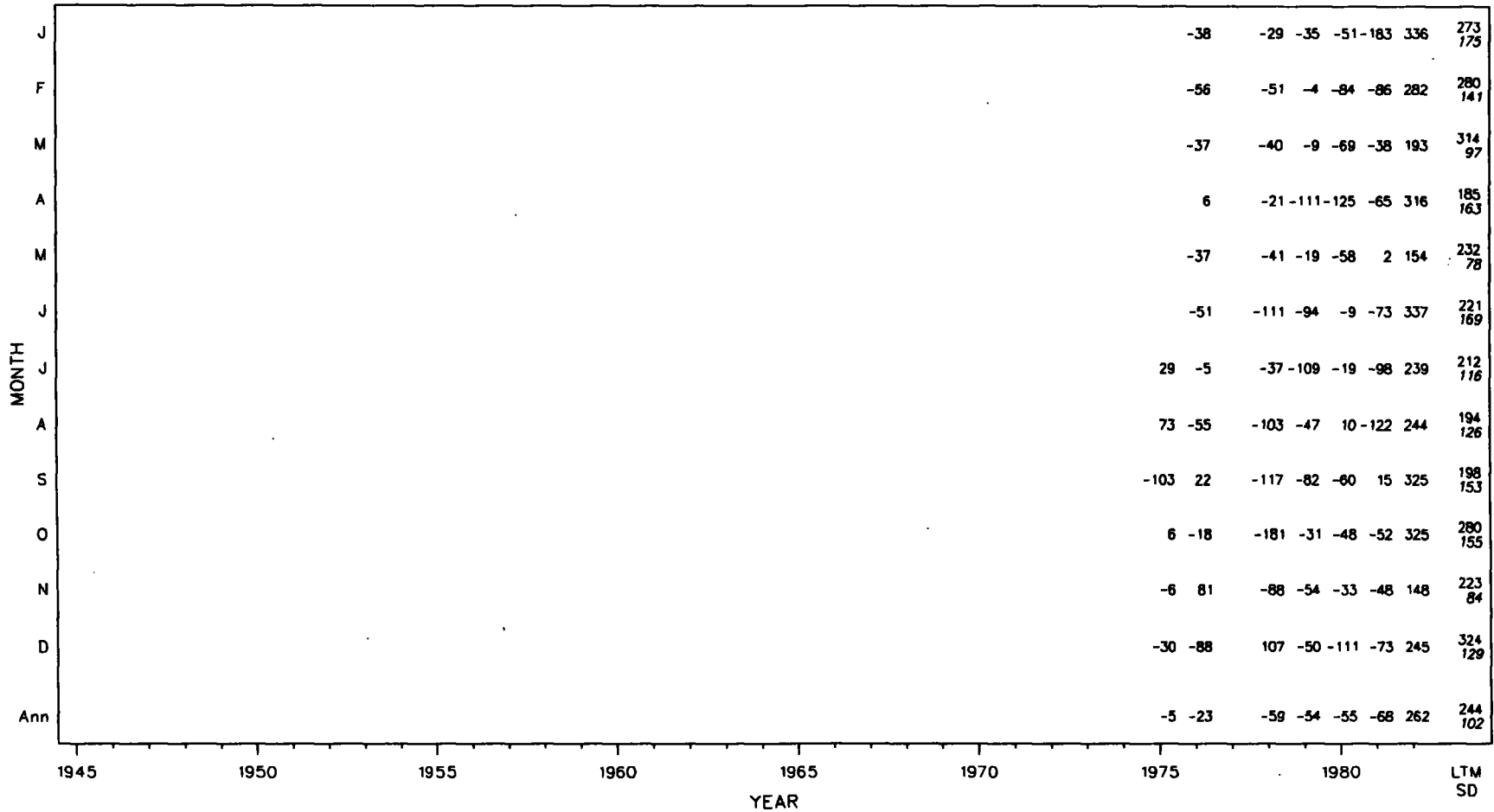
Total Cloudiness  
Units = 0.1 okta



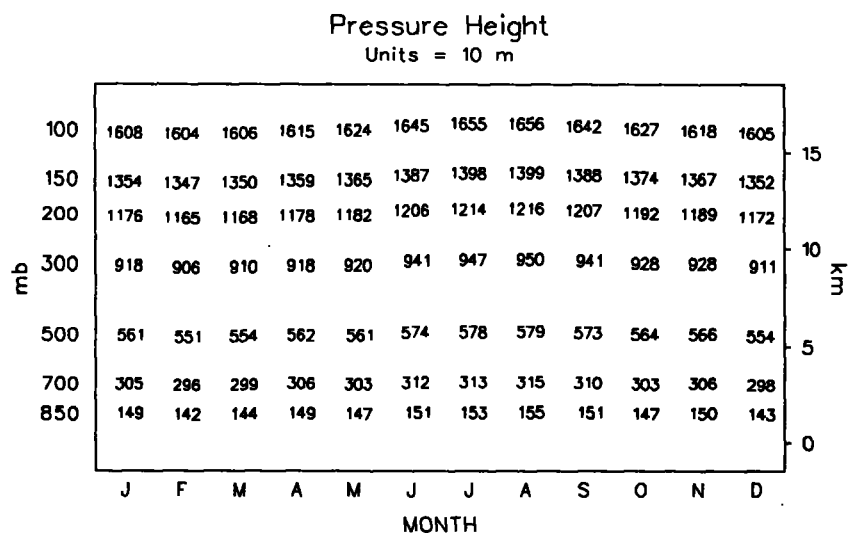
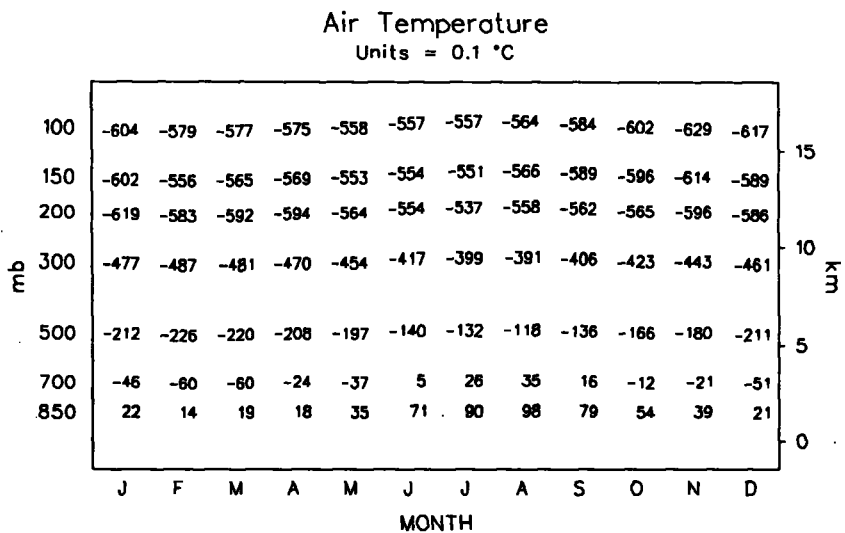
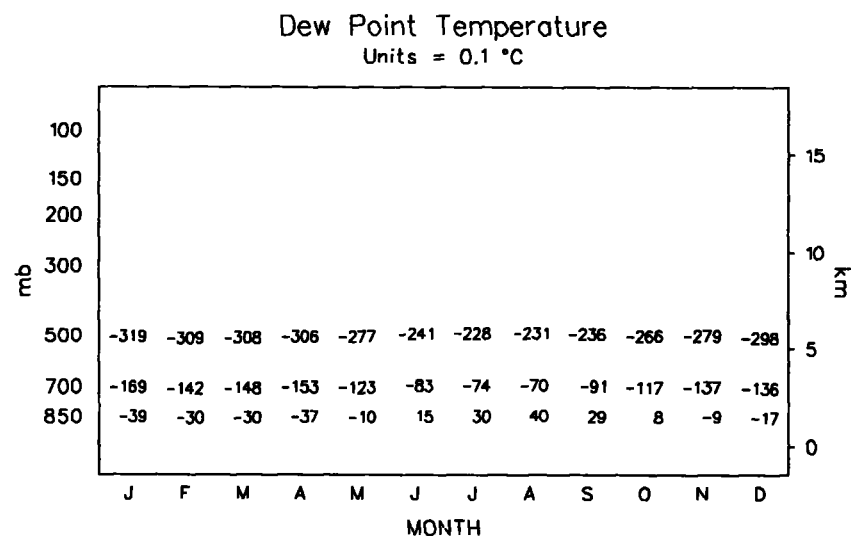
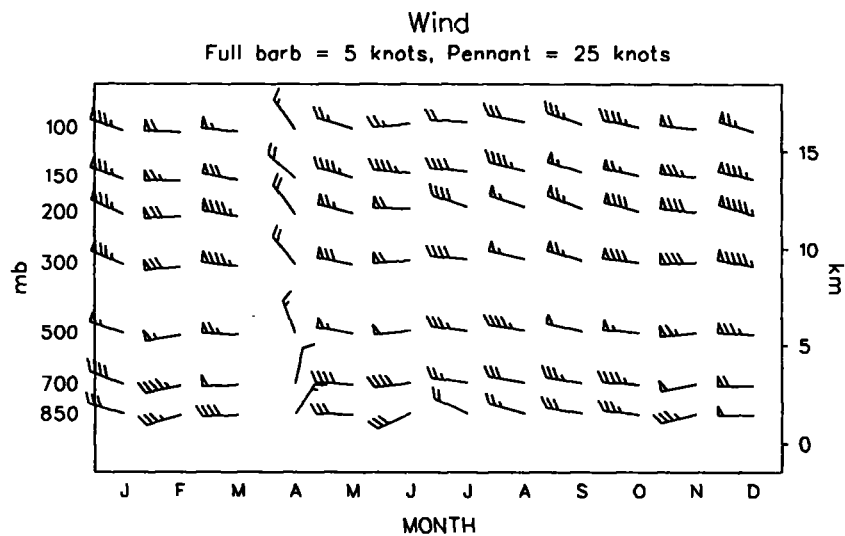
OWS Study Area R Anomalies

### Precipitation Frequency

Units = 0.1 percent



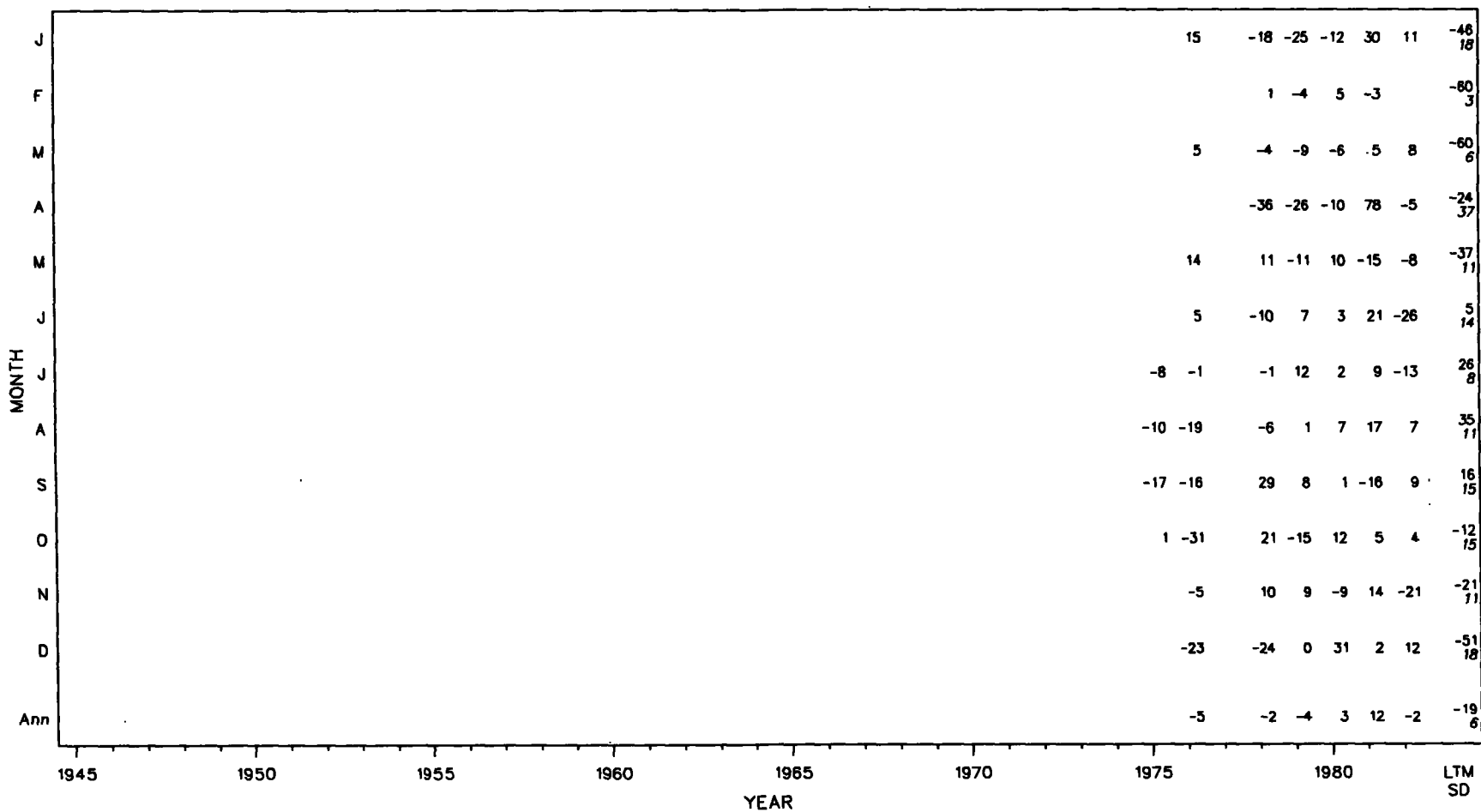
OWS Study Area R Anomalies



## OWS Study Area R Upper Air Climatology

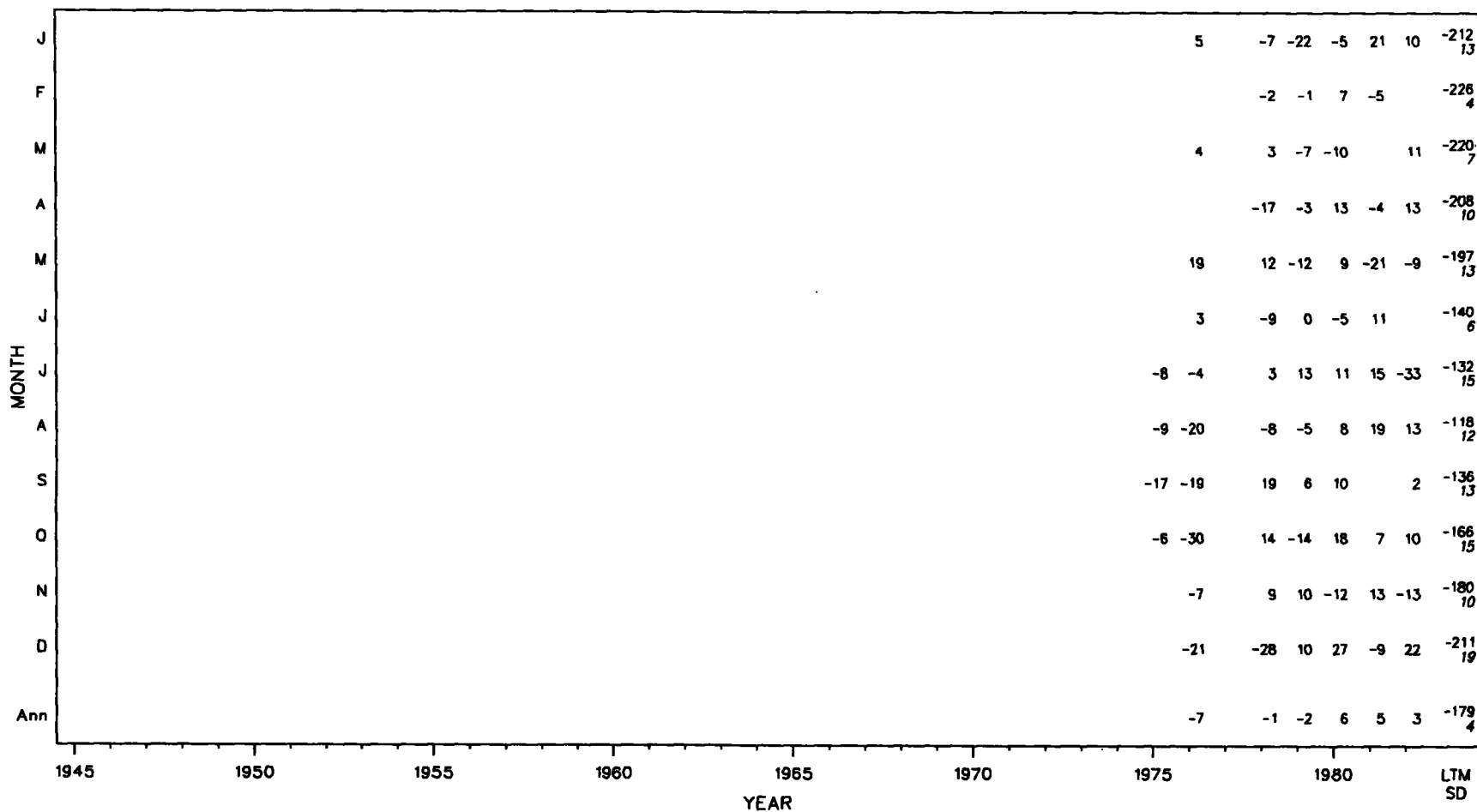
Mean plotted at actual height

Air Temperature: 700 mb  
Units = 0.1 °C



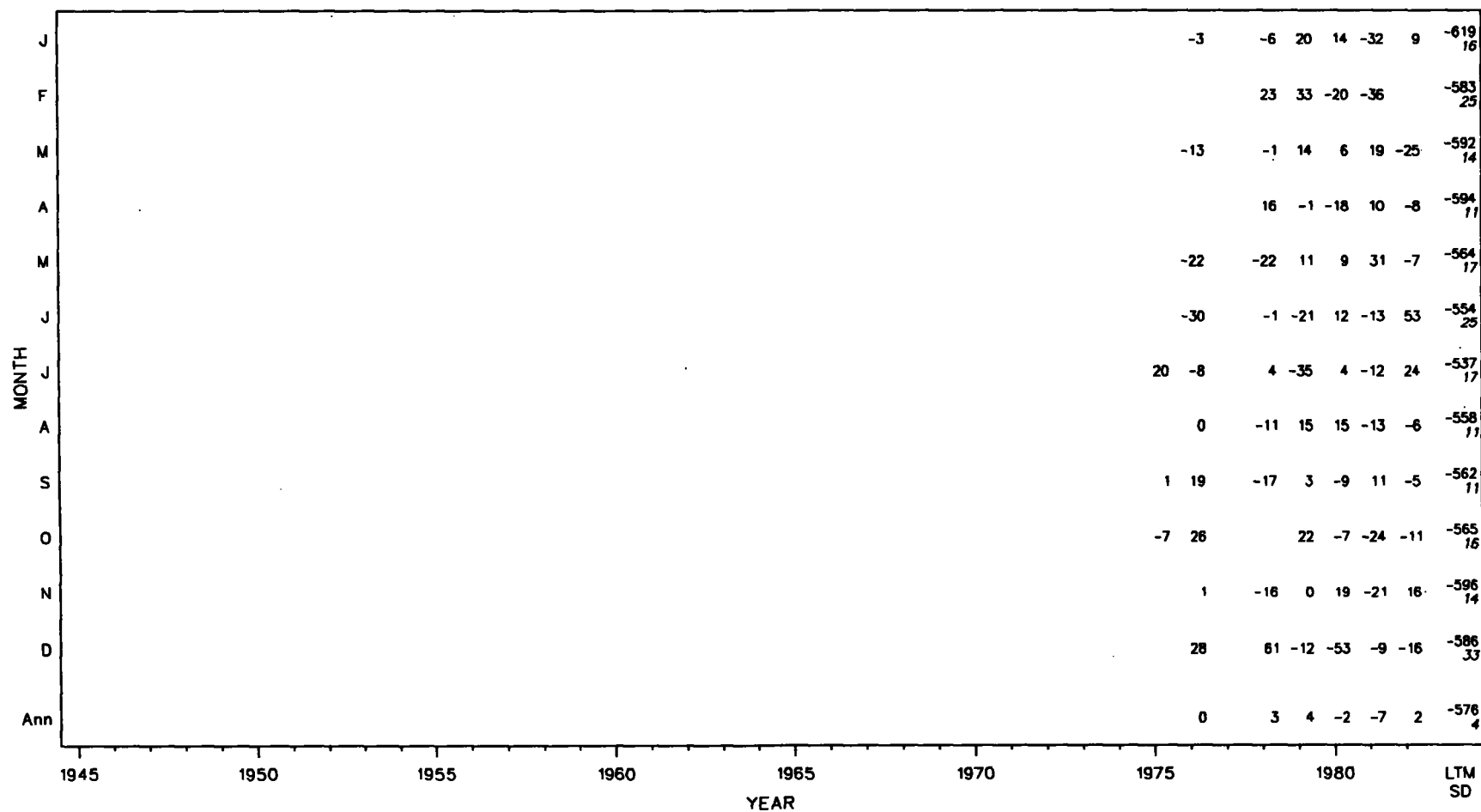
OWS Study Area R Anomalies

Air Temperature: 500 mb  
 Units = 0.1 °C



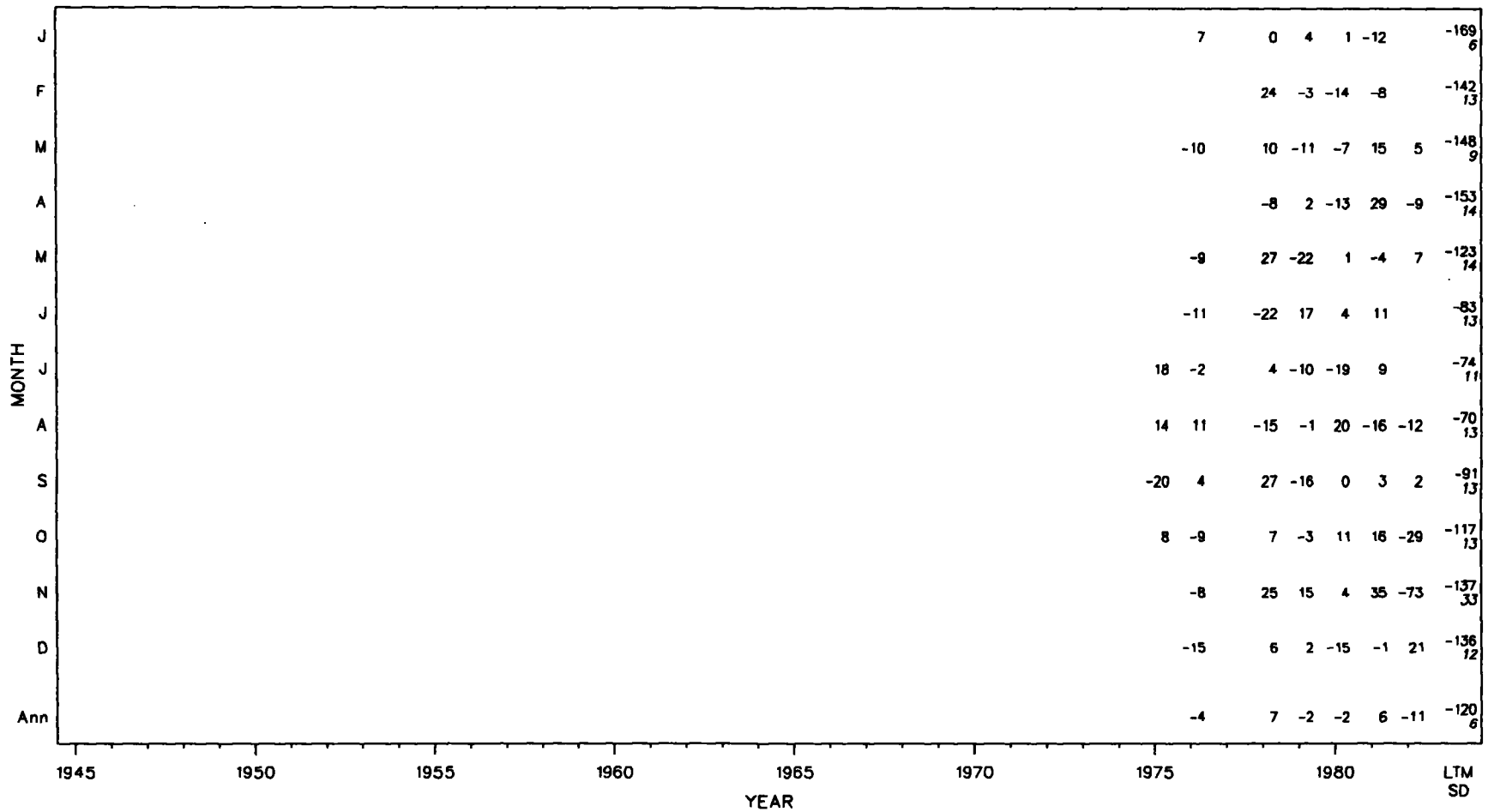
OWS Study Area R Anomalies

Air Temperature: 200 mb  
Units = 0.1 °C



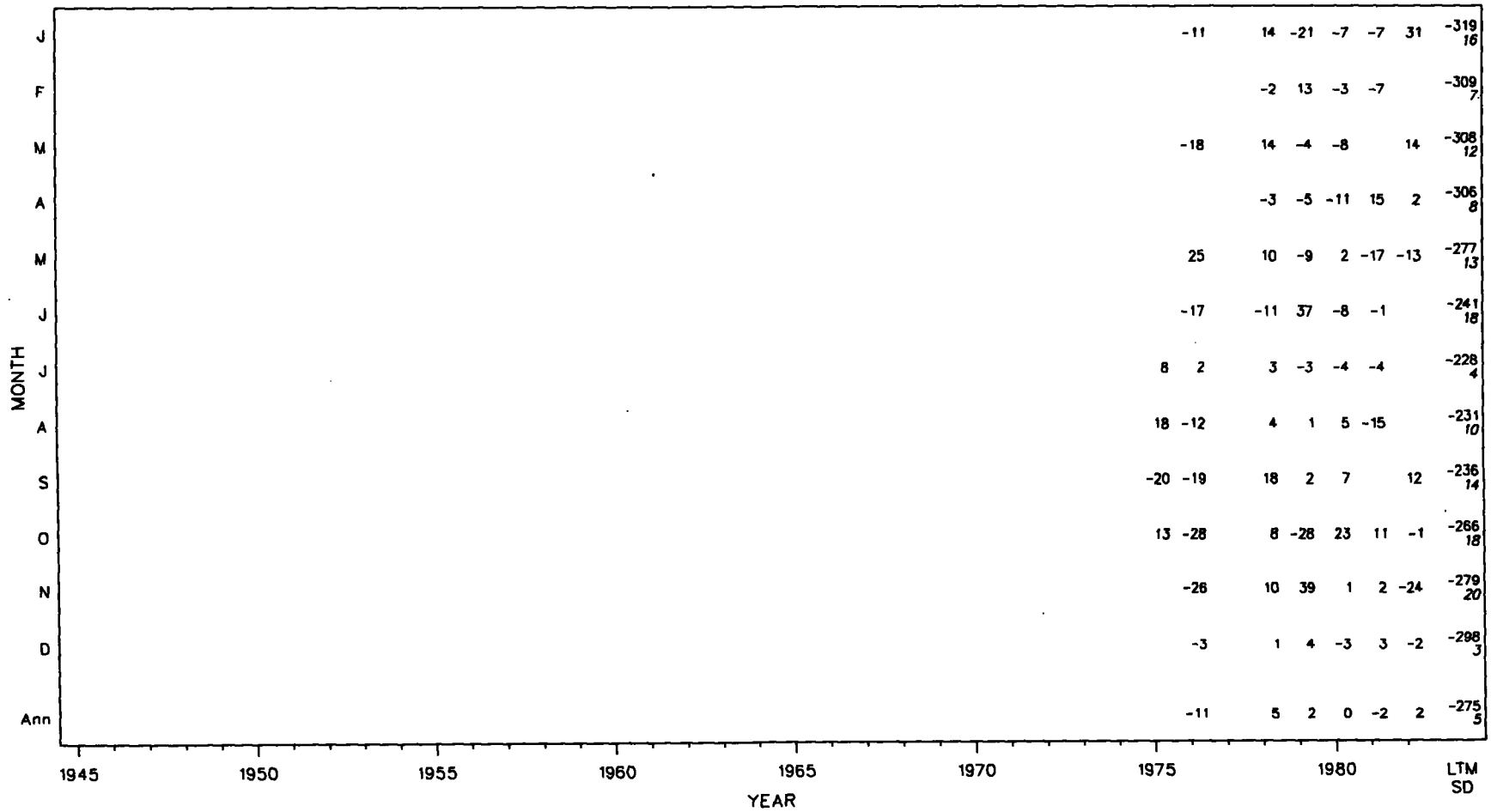
OWS Study Area R Anomalies

Dew Point Temperature: 700 mb  
 Units = 0.1 °C



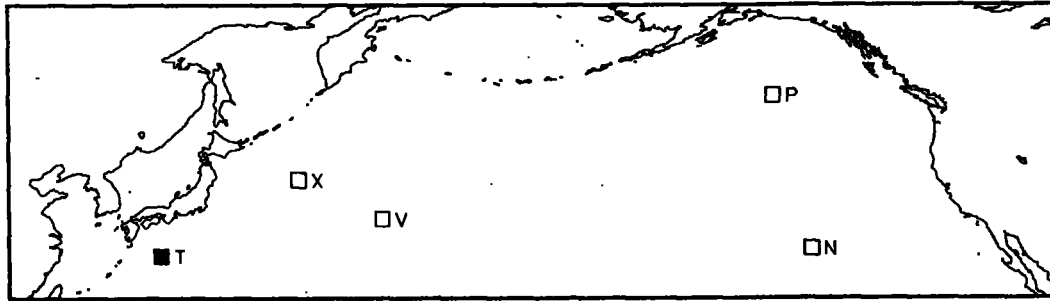
OWS Study Area R Anomalies

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**

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	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	Sum			
J						31	31	31																																							93			
F						28	29	28																																									83	
M						31	31	31																																									93	
A						30	30	29																																								89		
M						31	31	31	17	16	11	9	6	8	6	7	7		8	9	8	11	11	12	11																							299		
J						16	30	30	30	29	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	735
J						31	31	31	31	31	31	30	31	31	29	31	31	30	31	23	31	31	31	31	29	31	31	29	31	31	29	31	31	29	31	31	29	31	31	29	31	31	29	31	31	29	31	31	790	
A						29	22	30	30	31	31	31	31	31	31	30	29	31	31	29	30	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	31	780		
S						12	29	21	30	28	28	25	30	30	27	27	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	758	
O						28	30	31	31	31	30	24	22	31	31	31	30	31	29	29	30	31	31	31	28	28	30	31	23	17	16	17	23	17	16	17	23	17	16	17	23	17	16	17	23	17	16	17	752	
N						1	2	29	30	24	25			3	3	3	2	2	4	3	3	3	3	2	3																								142	
D						31	31	31																																									93	
Ann						41	137	195	384	357	322	158	159	167	162	157	161	159	161	115	163	164	162	157	159	164	164																						4707	
						11	137	194	364	118	322	158	157	167	160	153	160	159	156	161	115	162	164	162	157	159	164	164																						4421

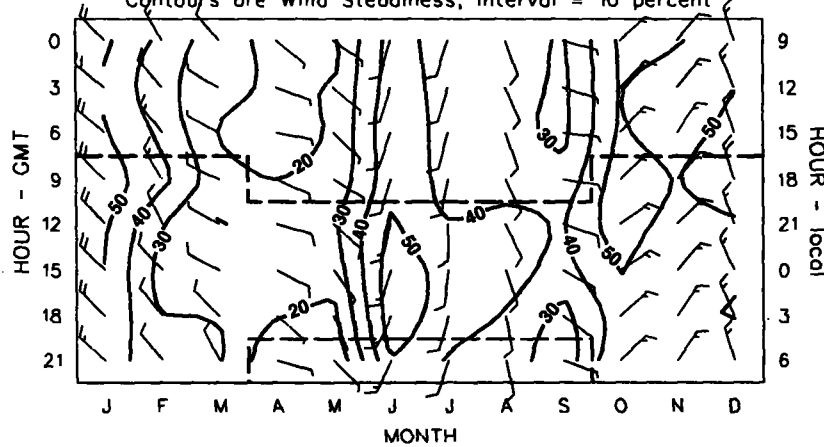
## OWS Study Area T (29.0°N, 135.0°E)

### 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.

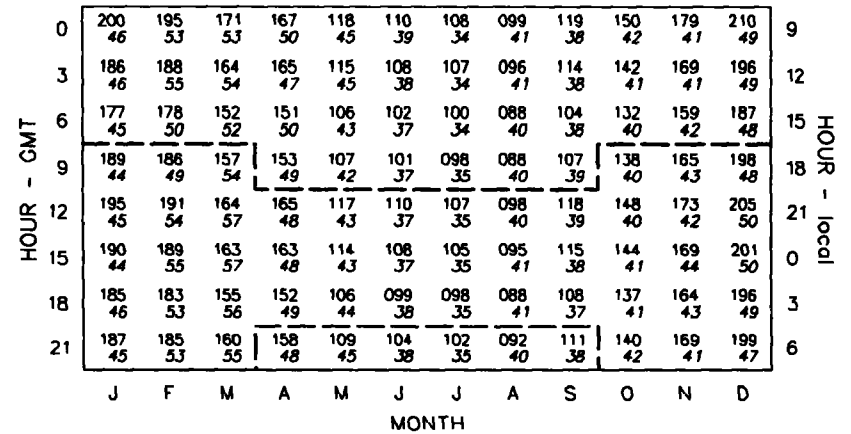
### Wind

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



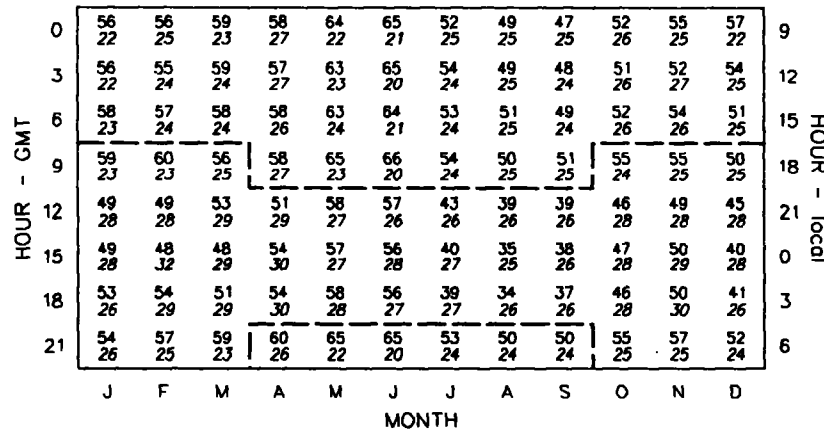
### Pressure

Units = 0.1 mb



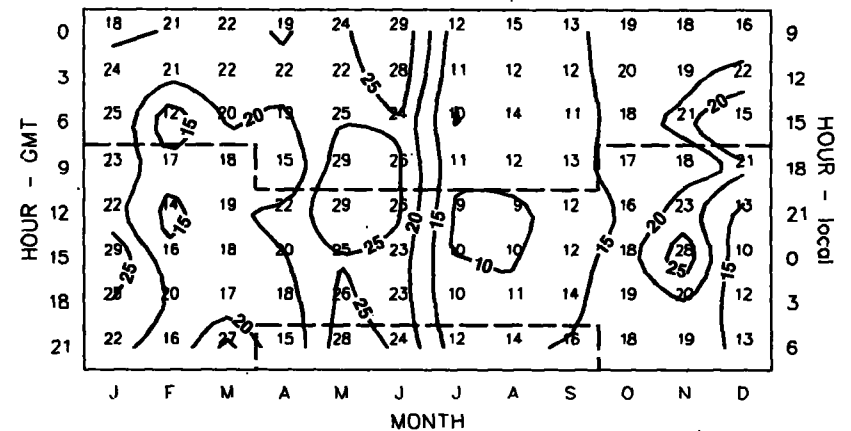
### Total Cloudiness

Units = 0.1 okta



### Precipitation Frequency

Units = percent  
Contour interval = 5 percent



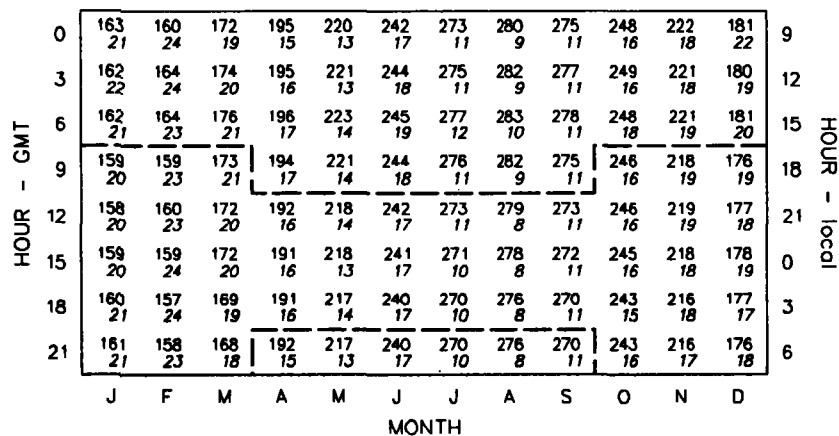
## OWS Study Area T Surface Climatology

upper number = mean  
lower number = standard deviation

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

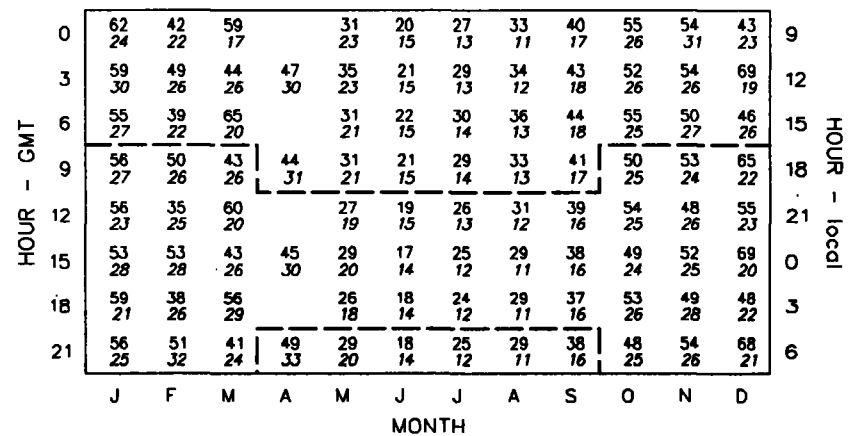
### Air Temperature

Units = 0.1 °C



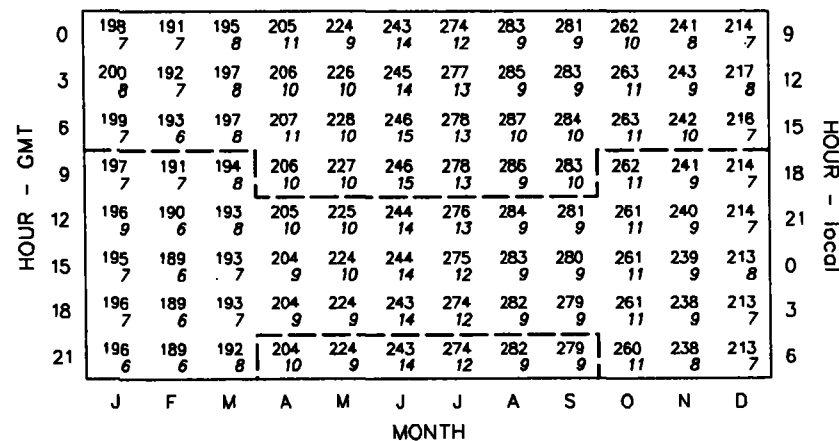
### Dew Point Depression

Units = 0.1 °C



### Sea Surface Temperature

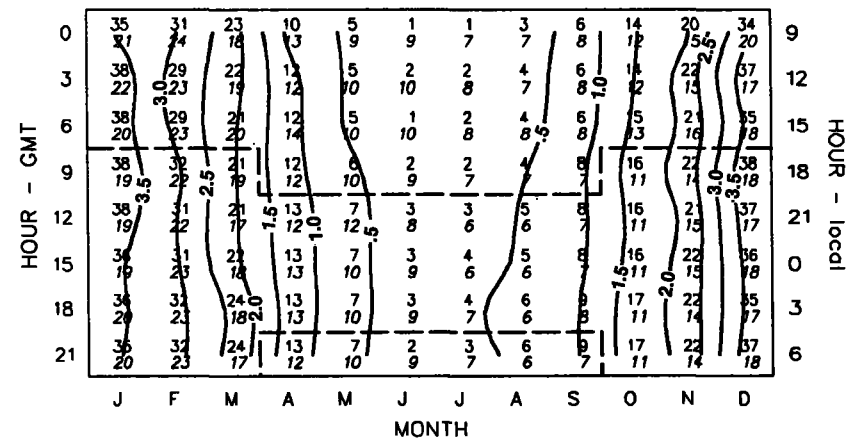
Units = 0.1 °C



### Sea - Air Temperature Difference

Units = 0.1 °C

Contour interval = 0.5 °C



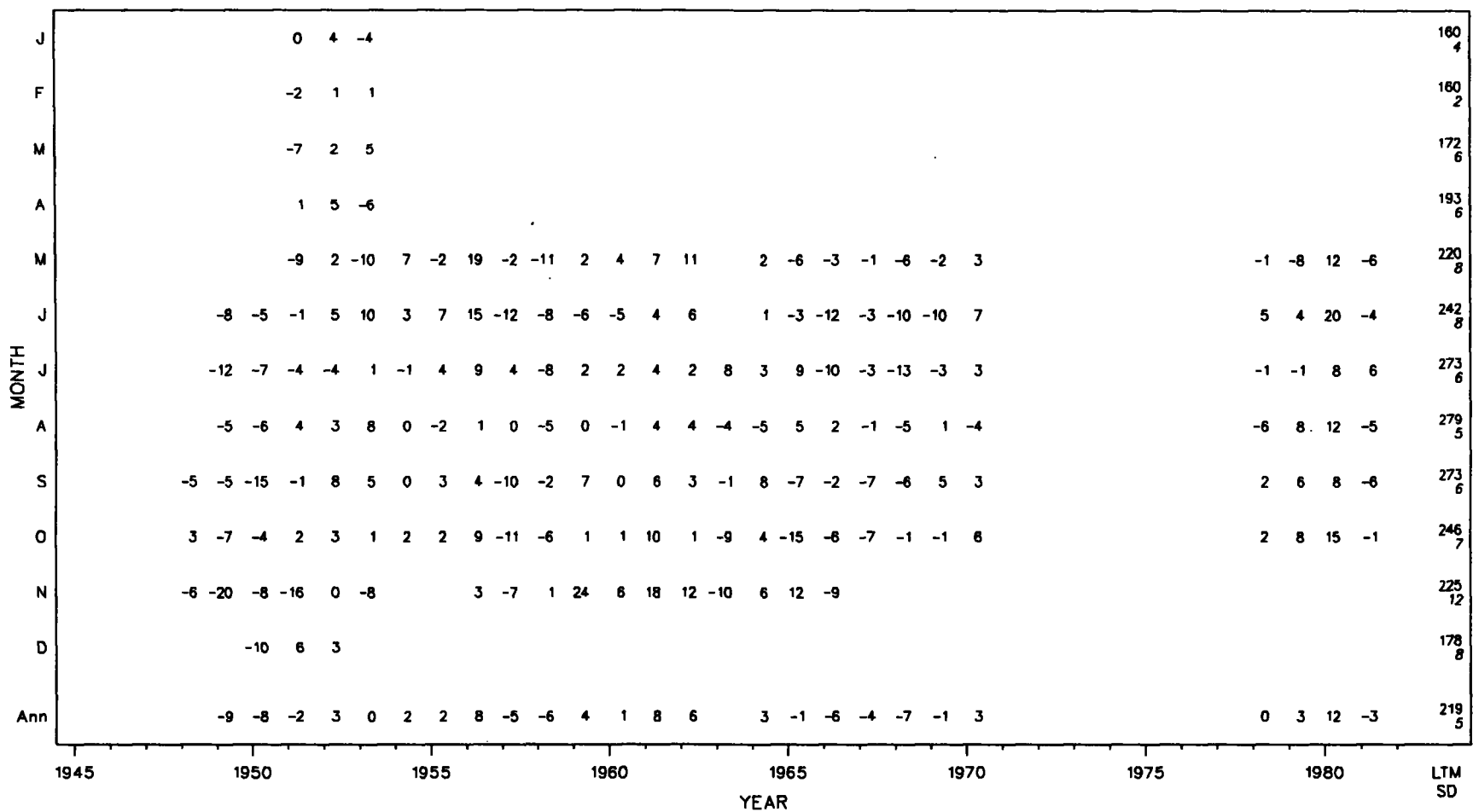
## OWS Study Area T Surface Climatology

upper number = mean  
lower number = standard deviation

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

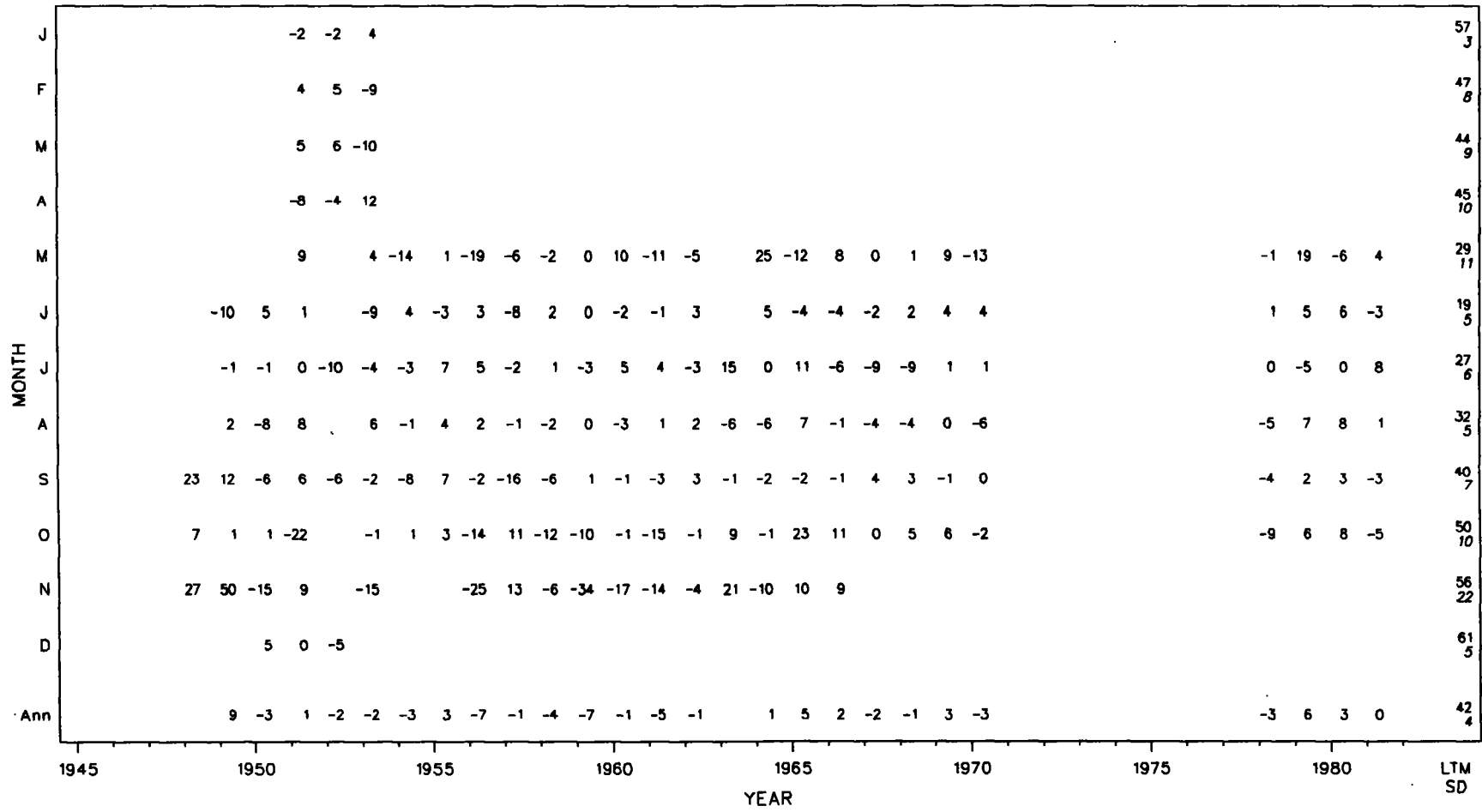
### Surface Air Temperature

Units = 0.1 °C



OWS Study Area T Anomalies

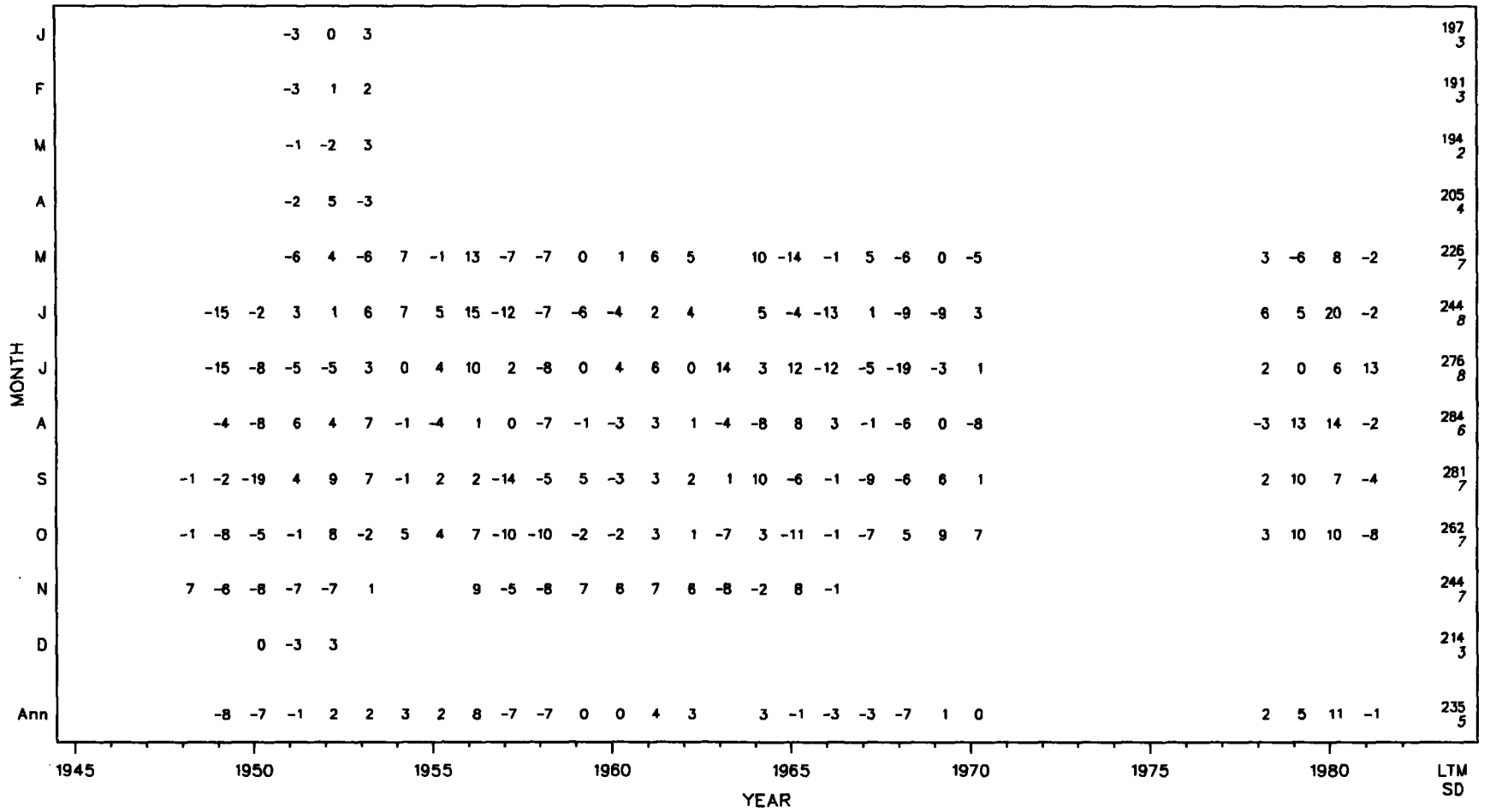
Surface Dew Point Depression  
Units = 0.1 °C



OWS Study Area T Anomalies

# Sea Surface Temperature

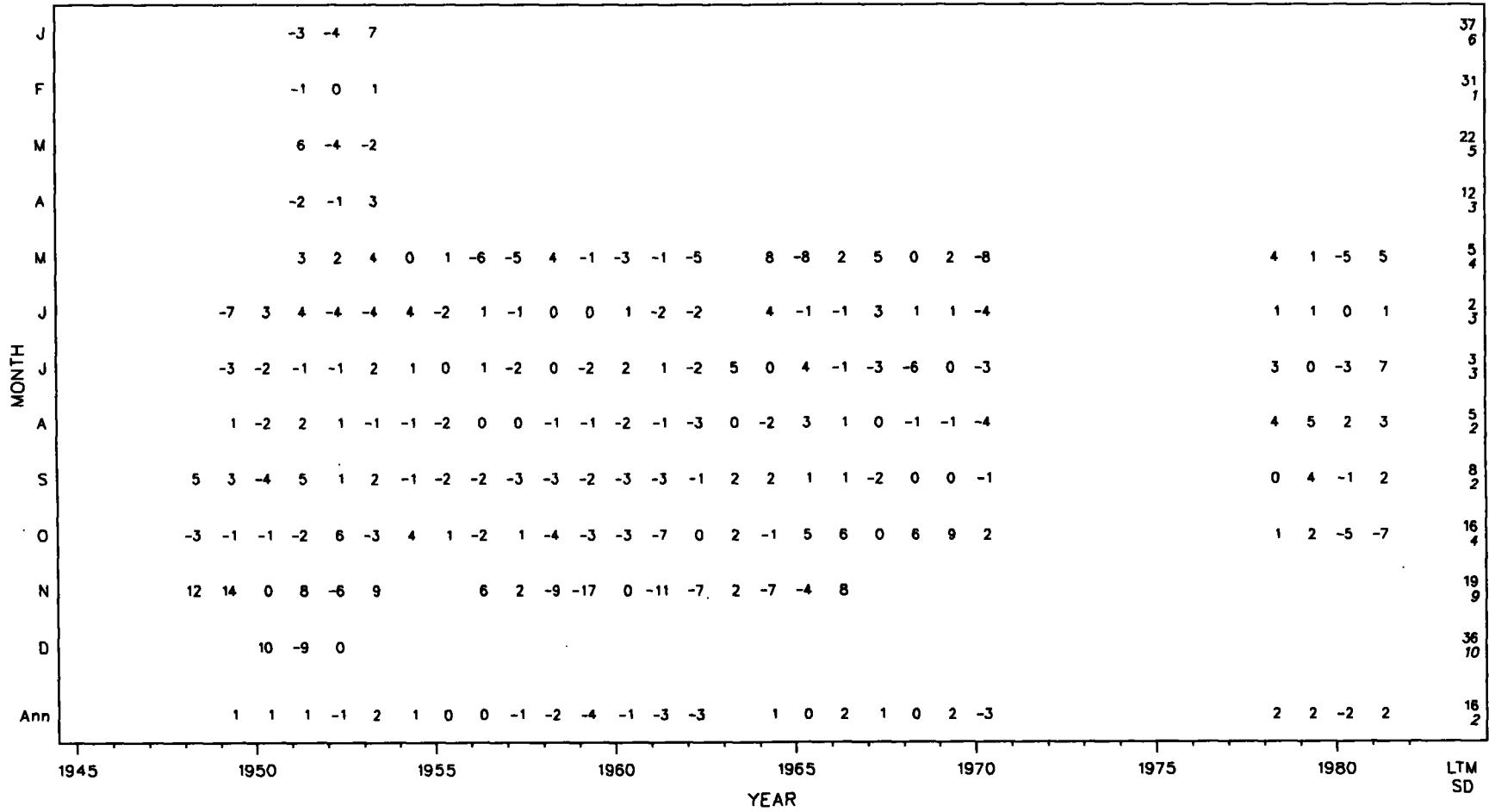
Units = 0.1 °C



OWS Study Area T Anomalies

Sea - Air Temperature Difference

Units = 0.1 °C

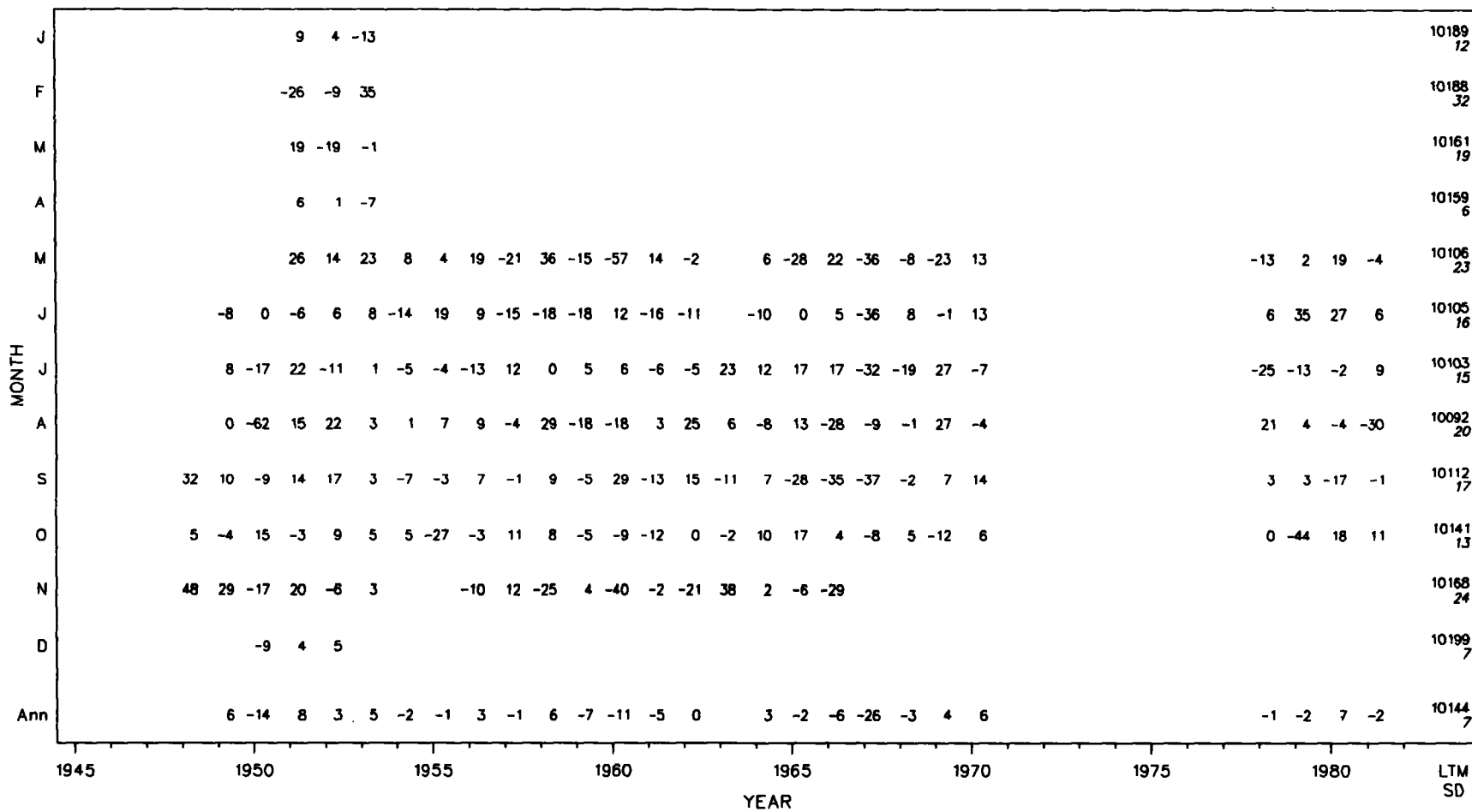


OWS Study Area T Anomalies



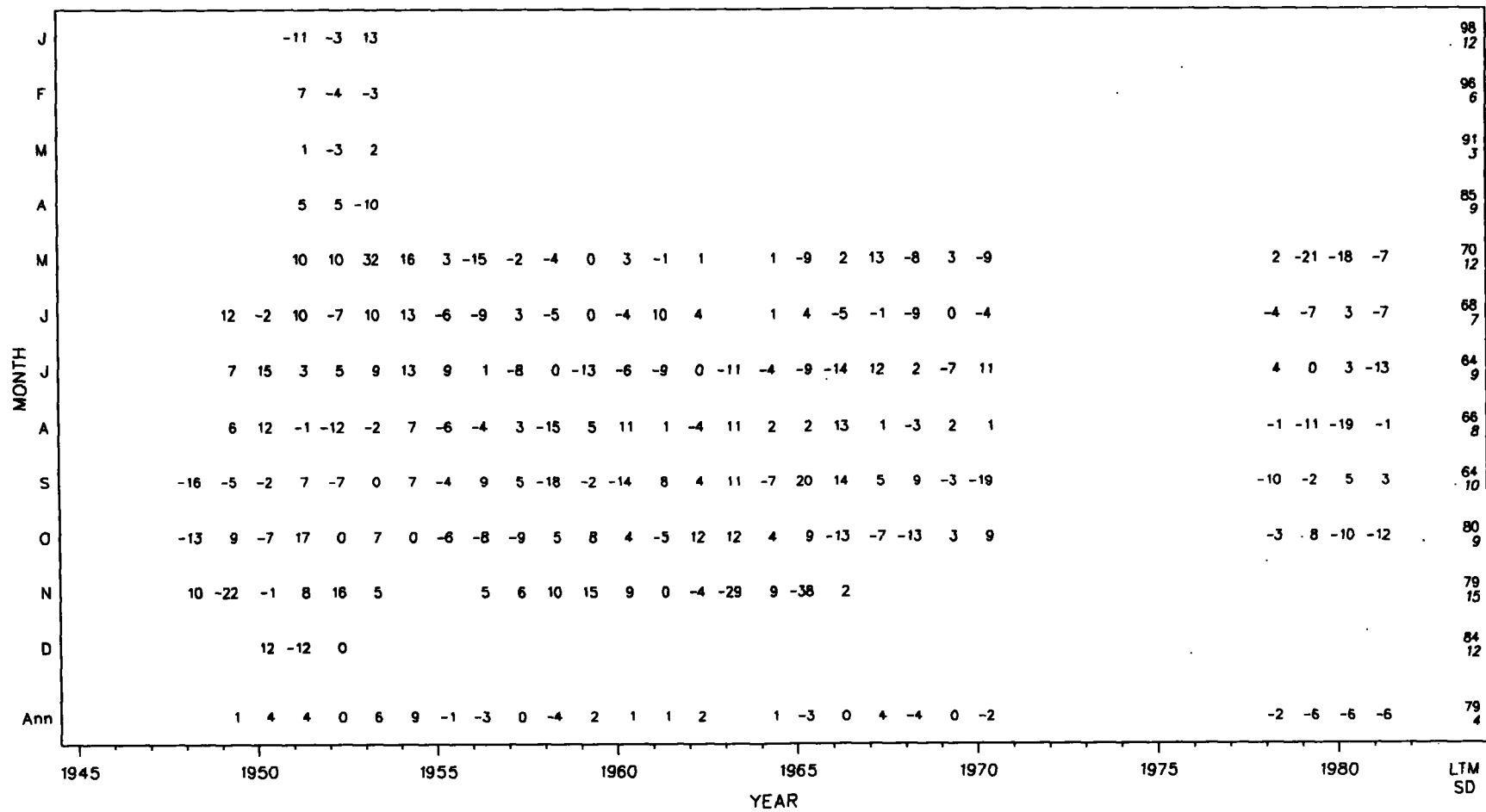
### Sea Level Pressure

Units = 0.1 mb



OWS Study Area T Anomalies

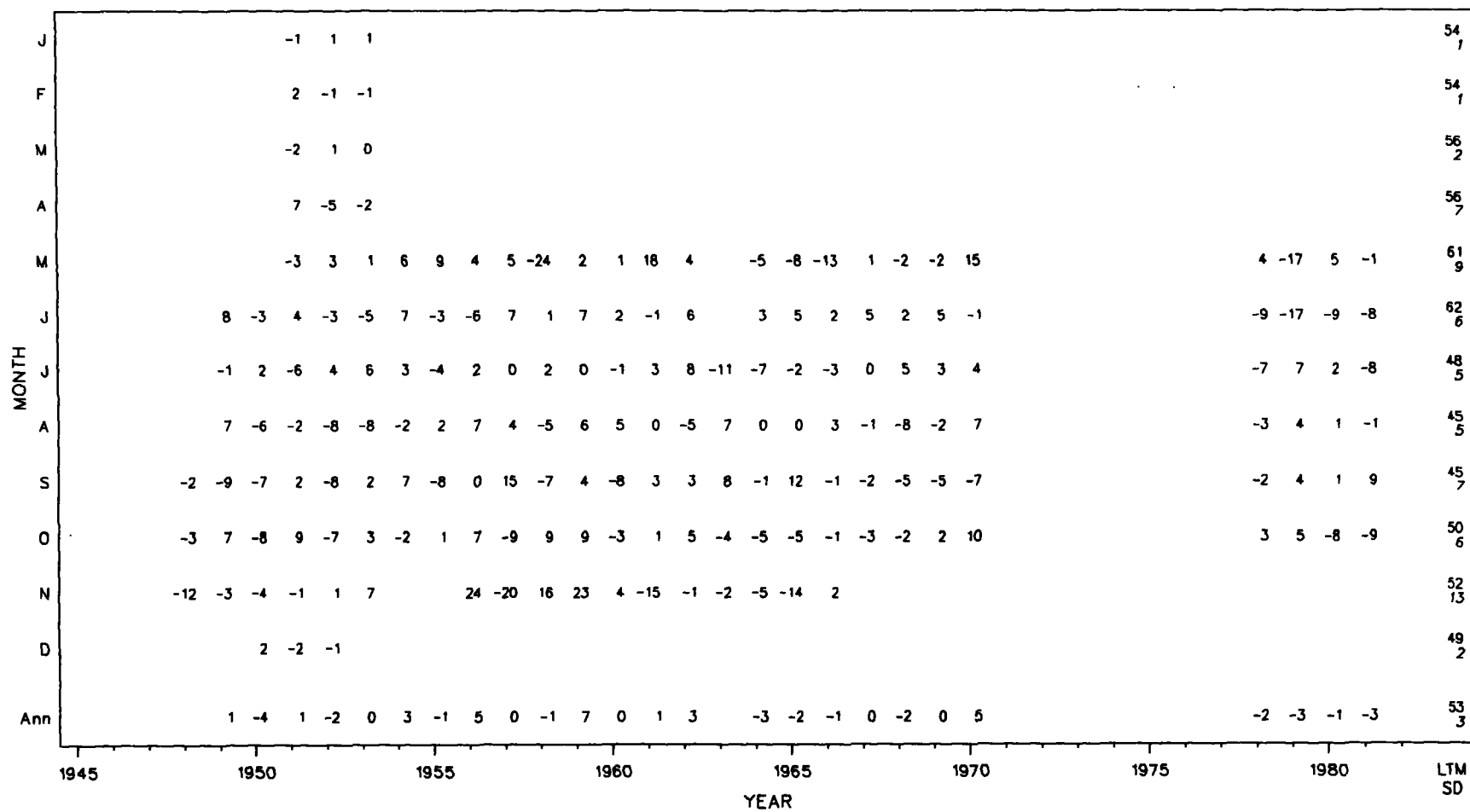
Surface Scalar Wind  
Units = 0.1 m/s



OWS Study Area T Anomalies

### Total Cloudiness

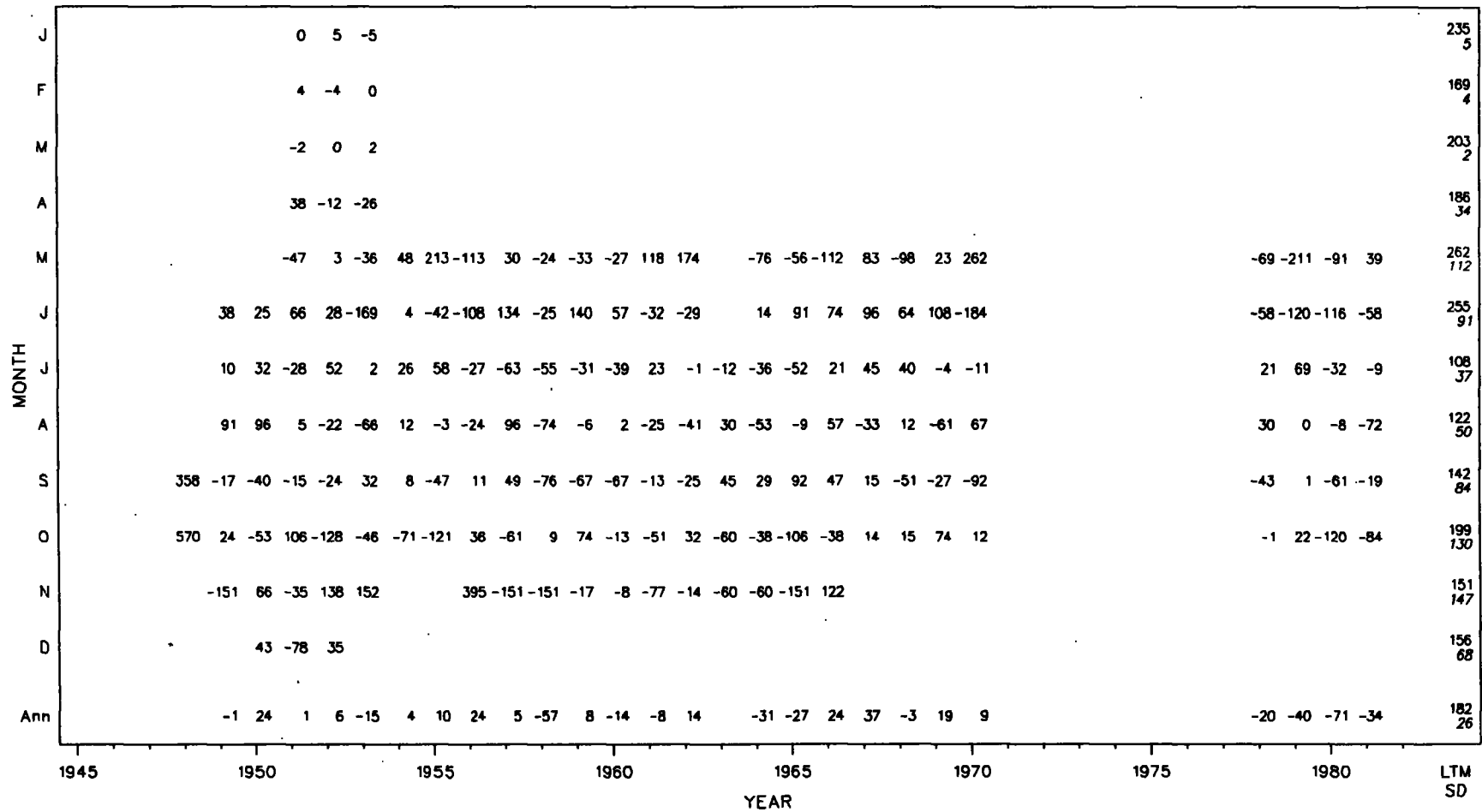
Units = 0.1 okto



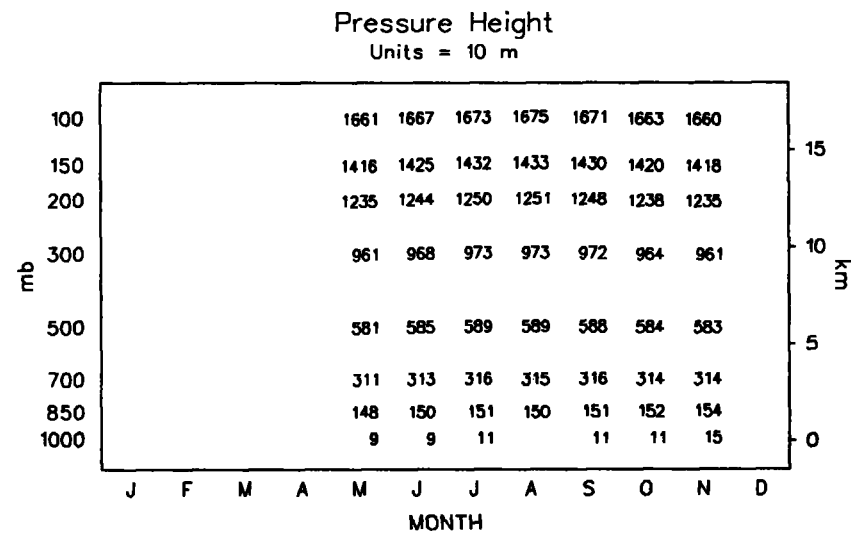
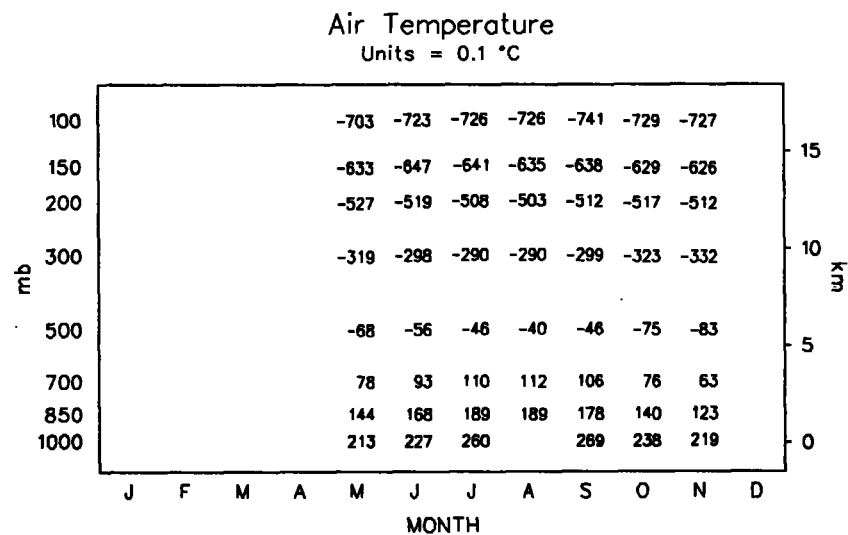
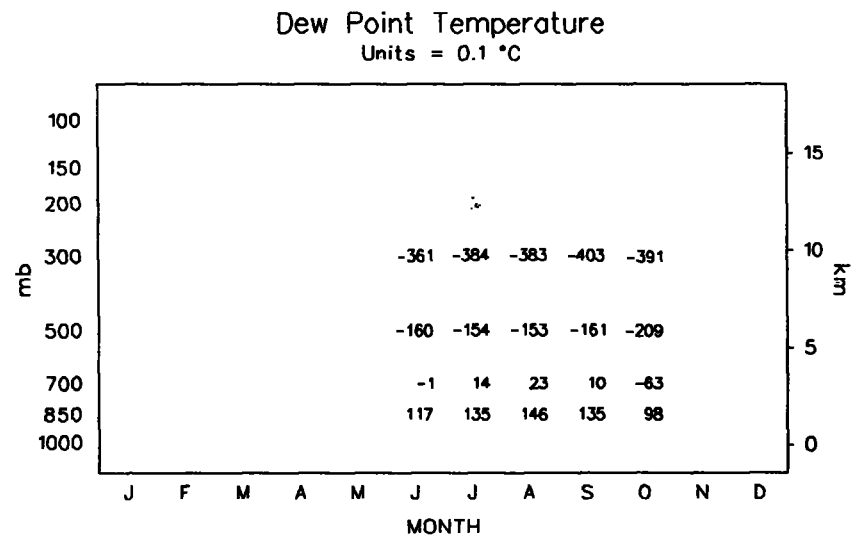
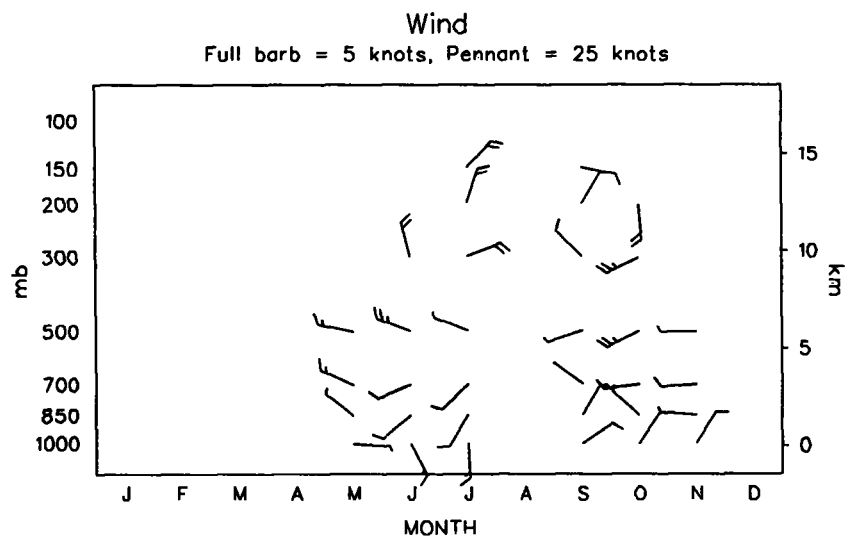
### OWS Study Area T Anomalies

### Precipitation Frequency

Units = 0.1 percent



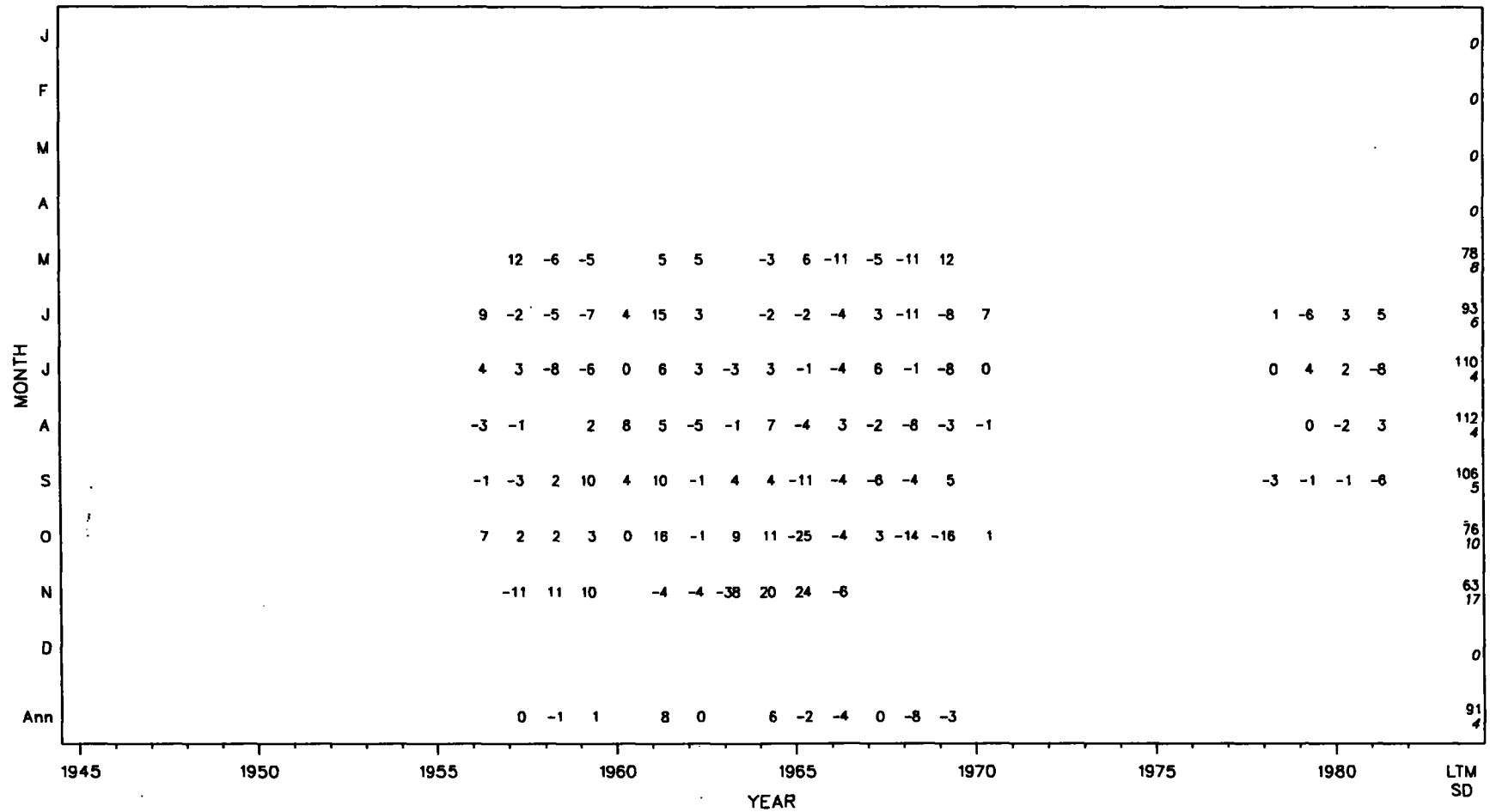
OWS Study Area T Anomalies



## OWS Study Area T Upper Air Climatology

Mean plotted at actual height

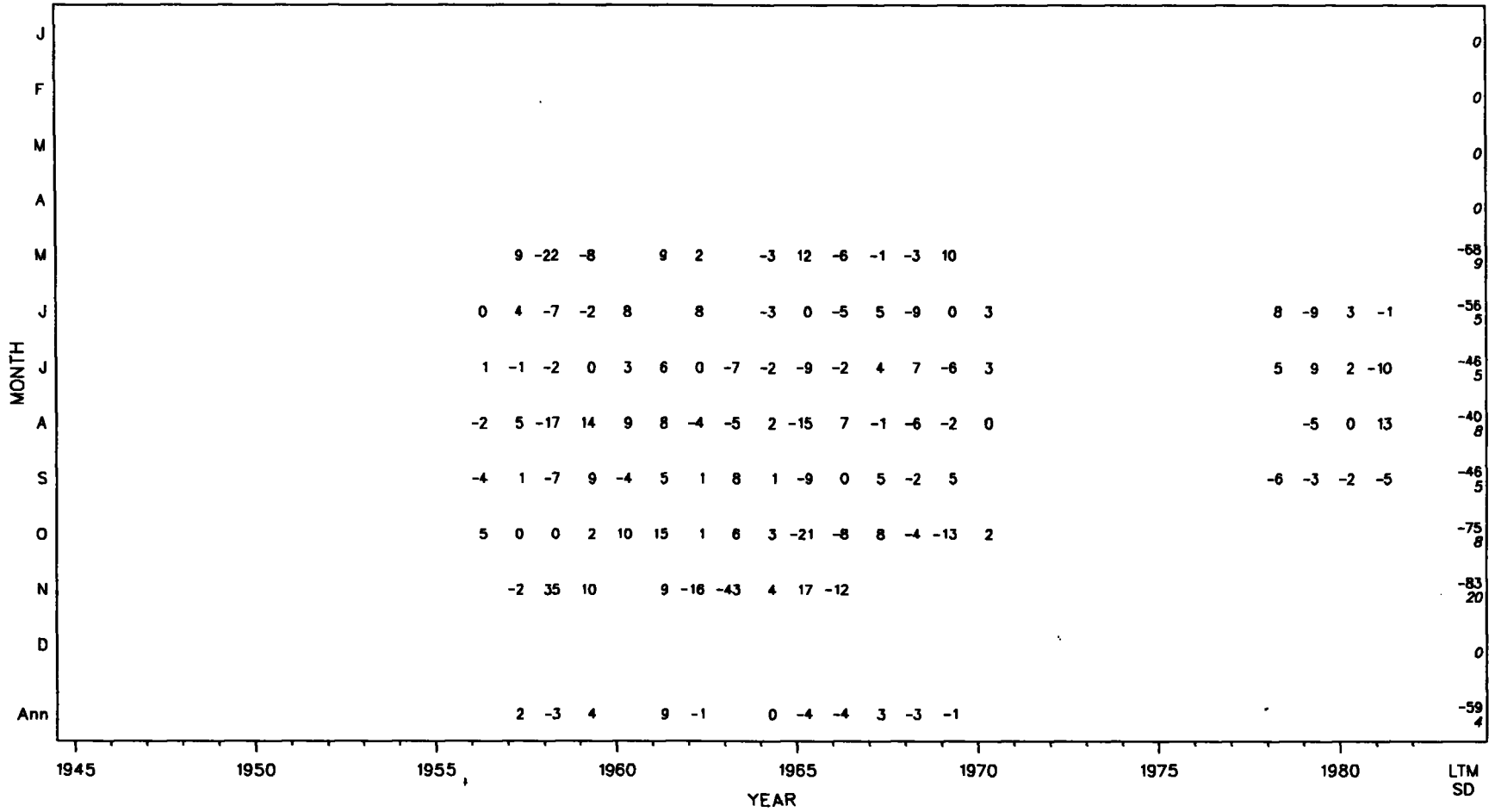
Air Temperature: 700 mb  
Units = 0.1 °C



OWS Study Area T Anomalies

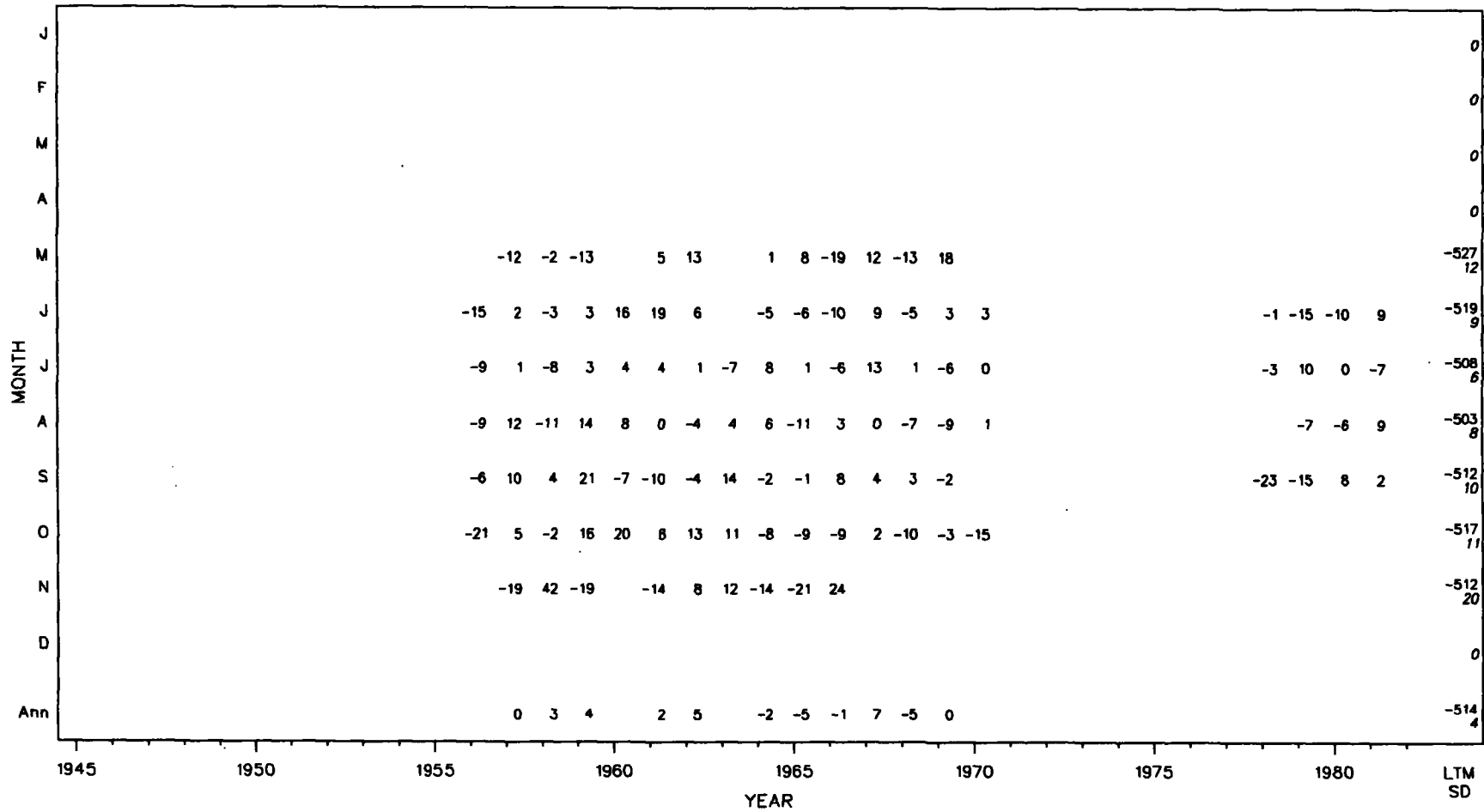
Air Temperature: 500 mb

Units = 0.1 °C



OWS Study Area T Anomalies

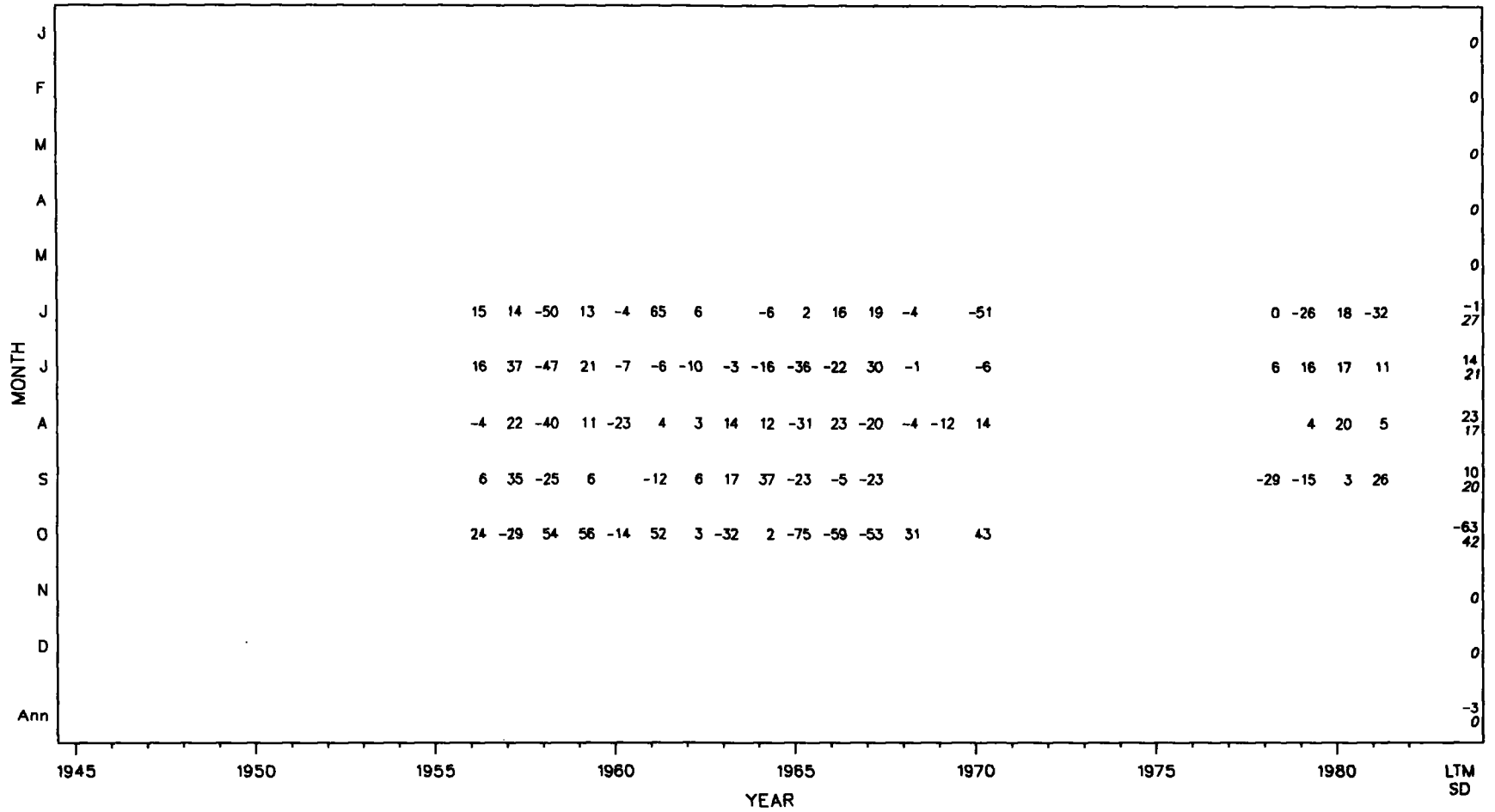
Air Temperature: 200 mb  
Units = 0.1 °C



OWS Study Area T Anomalies



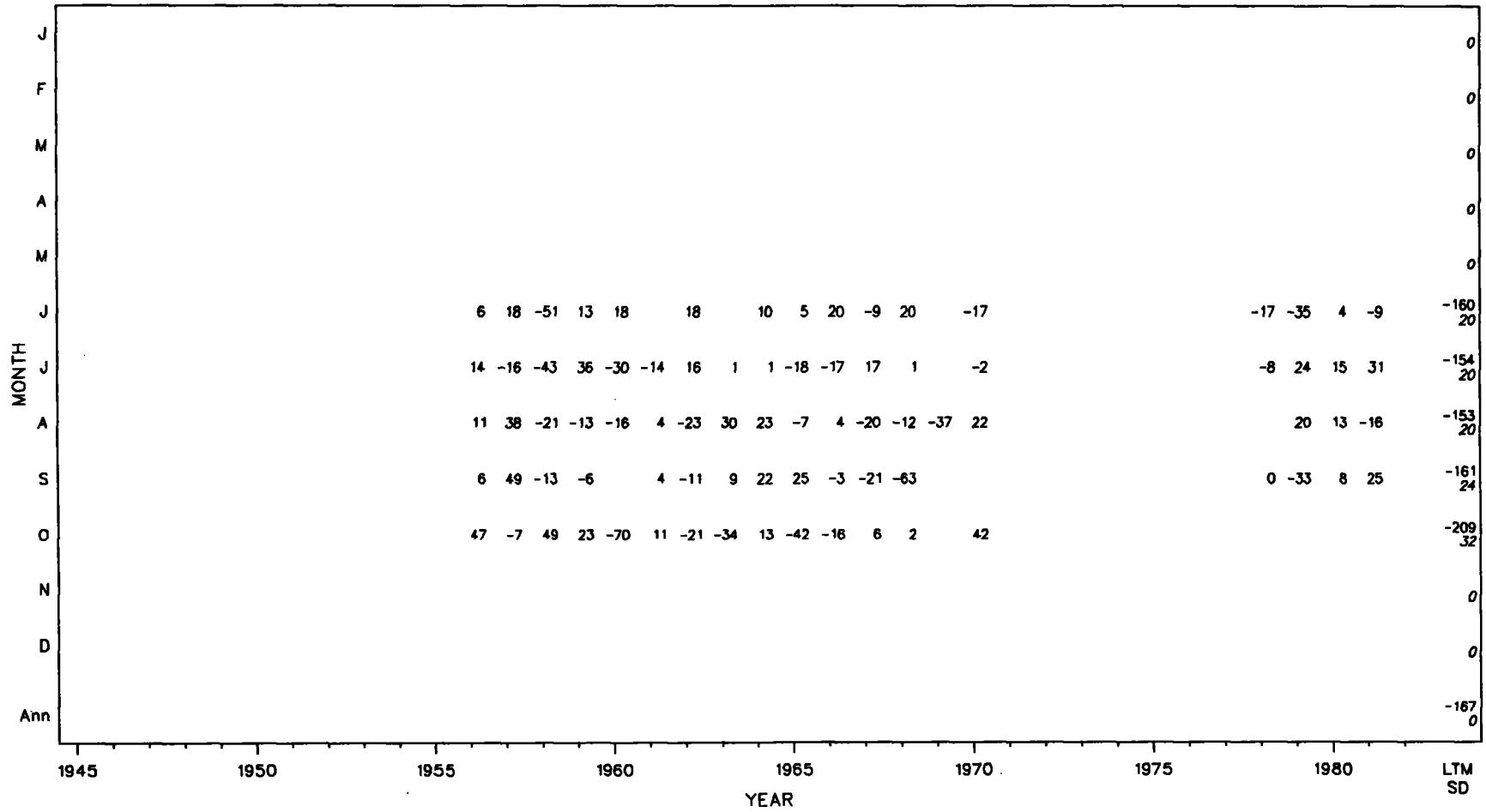
Dew Point Temperature: 700 mb  
 Units = 0.1 °C



OWS Study Area T Anomalies

Dew Point Temperature: 500 mb

Units = 0.1 °C



OWS Study Area T Anomalies



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

**OWS**  
**V**

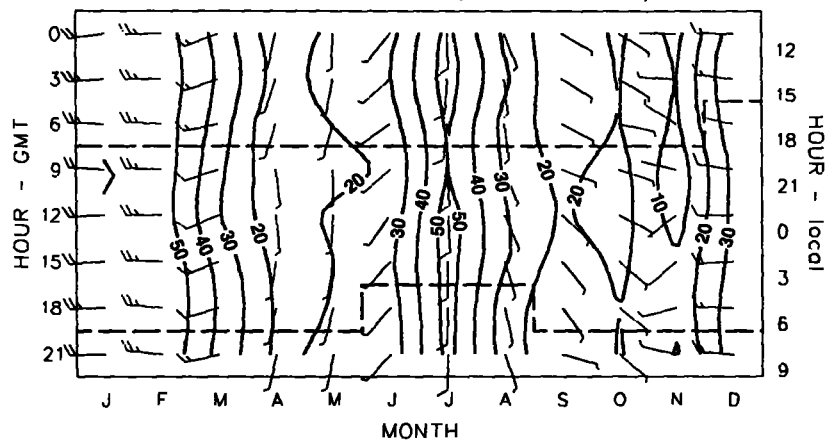
MONTH	YEAR																Sum			
	1945	1950	1955	1960	1965	1970	1975	1980	1985	1990	1995	2000	2005	2010	2015	2020				
J			31 30	31 31	24 24	31 31	31 31	31 31	31 31	31 31	30 30	27 27	31 31	31 31	31 31	25 25	30 30	477 476		
F			29 29	28 28	27 27	28 28	29 29	28 28	28 28	28 28	24 24	13 13	28 28	28 28	28 28	22 22	28 28	424 424		
M			19 19	31 31	31 31	31 31	31 31	31 31	31 31	31 31	24 24	31 31	31 31	31 31	31 31	25 25	30 30	501 501		
A			30 30	30 30	30 30	26 26	30 29	30 30	30 30	30 30	30 30	30 30	30 30	29 29	30 30	30 30	30 30	505 504		
M			27 26	31 31	31 31	30 30	31 31	31 31	31 31	30 30	31 31	31 31	31 31	31 31	31 31	18 18	31 31	508 507		
J			30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	29 29	30 30	30 30	30 30	30 30	30 30	509 509		
J			31 31	31 31	31 31	31 31	31 30	31 31	31 31	31 31	31 31	31 31	31 31	31 31	31 31	30 30	31 31	526 525		
A			31 31	31 31	31 31	31 30	31 31	31 31	30 30	31 31	31 31	31 31	31 31	31 31	31 31	28 28	31 31	523 522		
S			30 30	30 30	28 28	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 29	30 30	508 507		
O			31 31	31 31	31 31	31 31	31 31	26 26	30 30	27 27	30 30	31 31	31 31	30 30	31 31	28 28	31 31	512 512		
N			30 30	27 25	30 30	30 30	30 30	30 30	27 27	30 30	30 30	30 30	30 30	30 30	30 30	30 30	30 30	504 502		
D			31 31	31 31	31 31	31 31	29 29	31 31	30 30	29 29	31 31	31 31	31 31	30 30	20 20	26 26	18 18	492 492		
Ann			290 289	363 360	363 363	357 357	360 360	366 364	363 362	360 360	359 359	353 353	338 338	364 364	365 365	362 362	354 354	322 321	350 350	5989 5987

### 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.

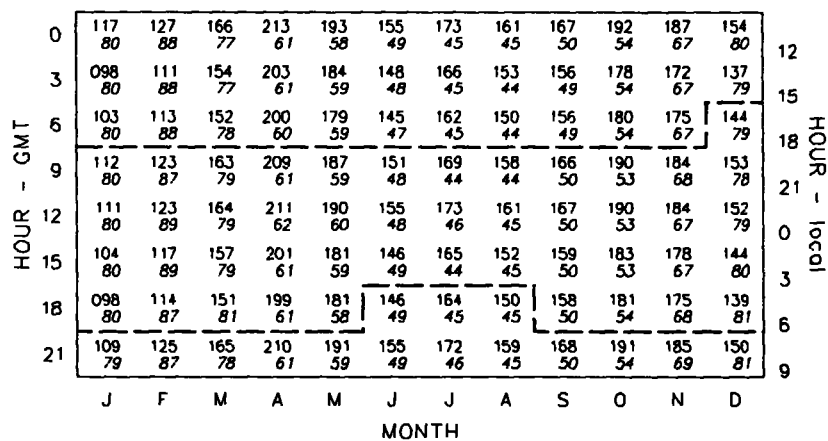
### Wind

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



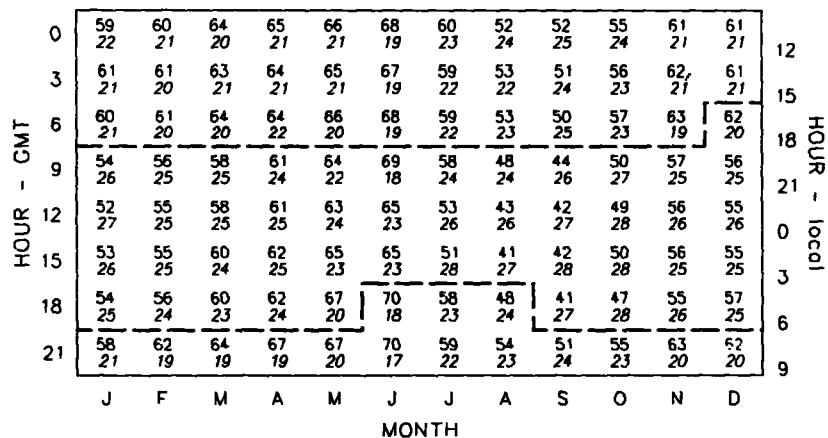
### Pressure

Units = 0.1 mb



### Total Cloudiness

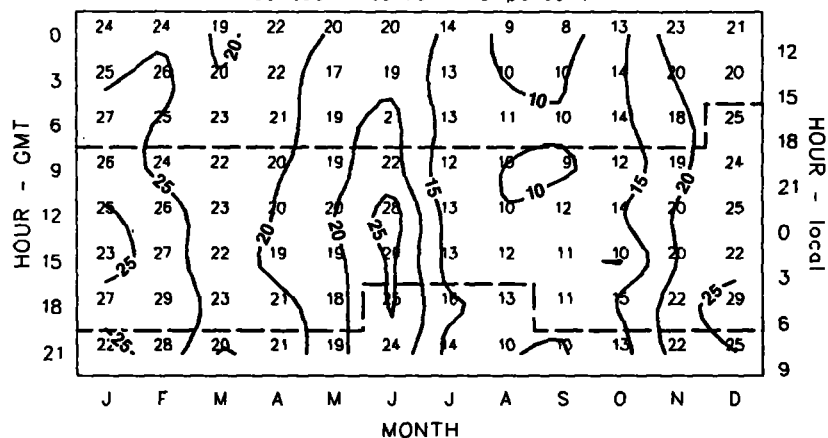
Units = 0.1 okta



### Precipitation Frequency

Units = percent

Contour interval = 5 percent

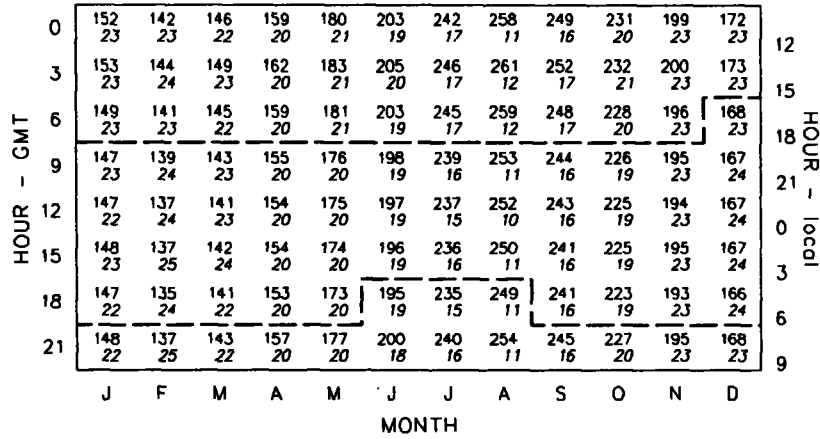


## OWS Study Area V Surface Climatology

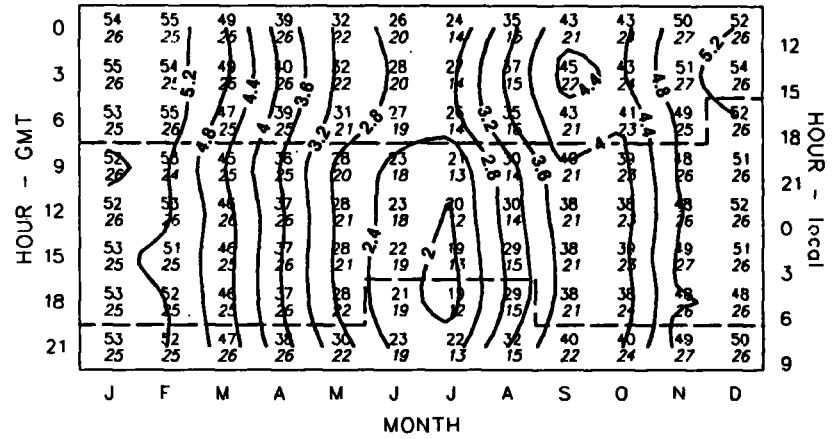
upper number = mean  
lower number = standard deviation

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

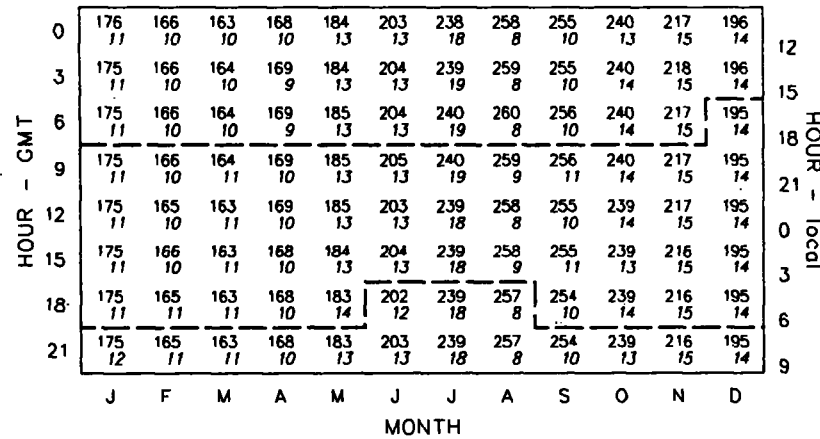
Air Temperature  
Units = 0.1 °C



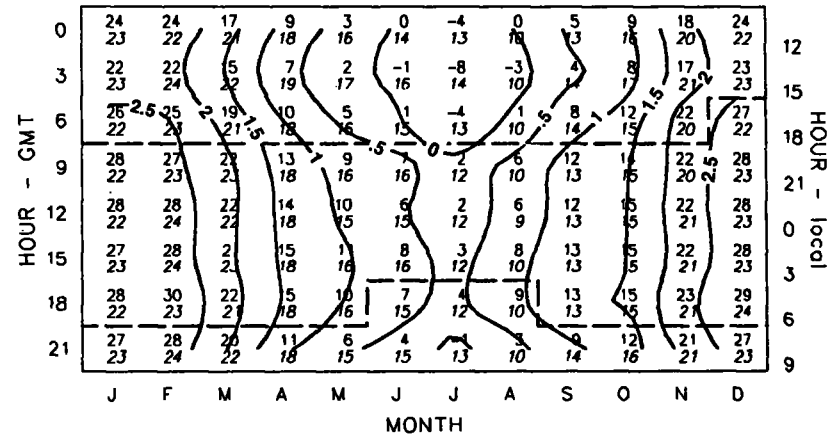
Dew Point Depression  
Units = 0.1 °C  
Contour interval = 0.4 °C



Sea Surface Temperature  
Units = 0.1 °C



Sea - Air Temperature Difference  
Units = 0.1 °C  
Contour interval = 0.5 °C

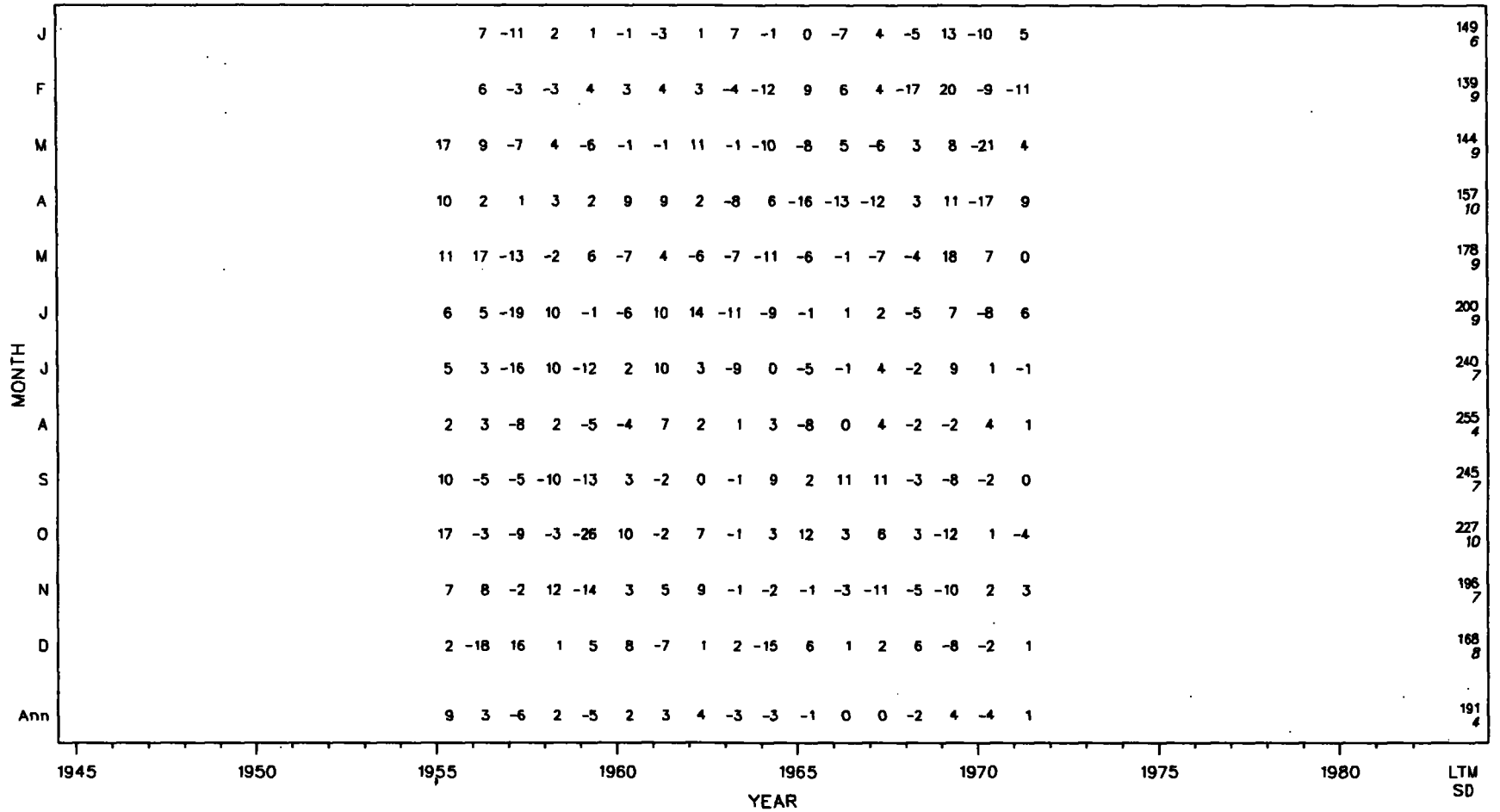


### OWS Study Area V Surface Climatology

upper number = mean  
lower number = standard deviation  
———— data contours  
----- sunrise/sunset

### Surface Air Temperature

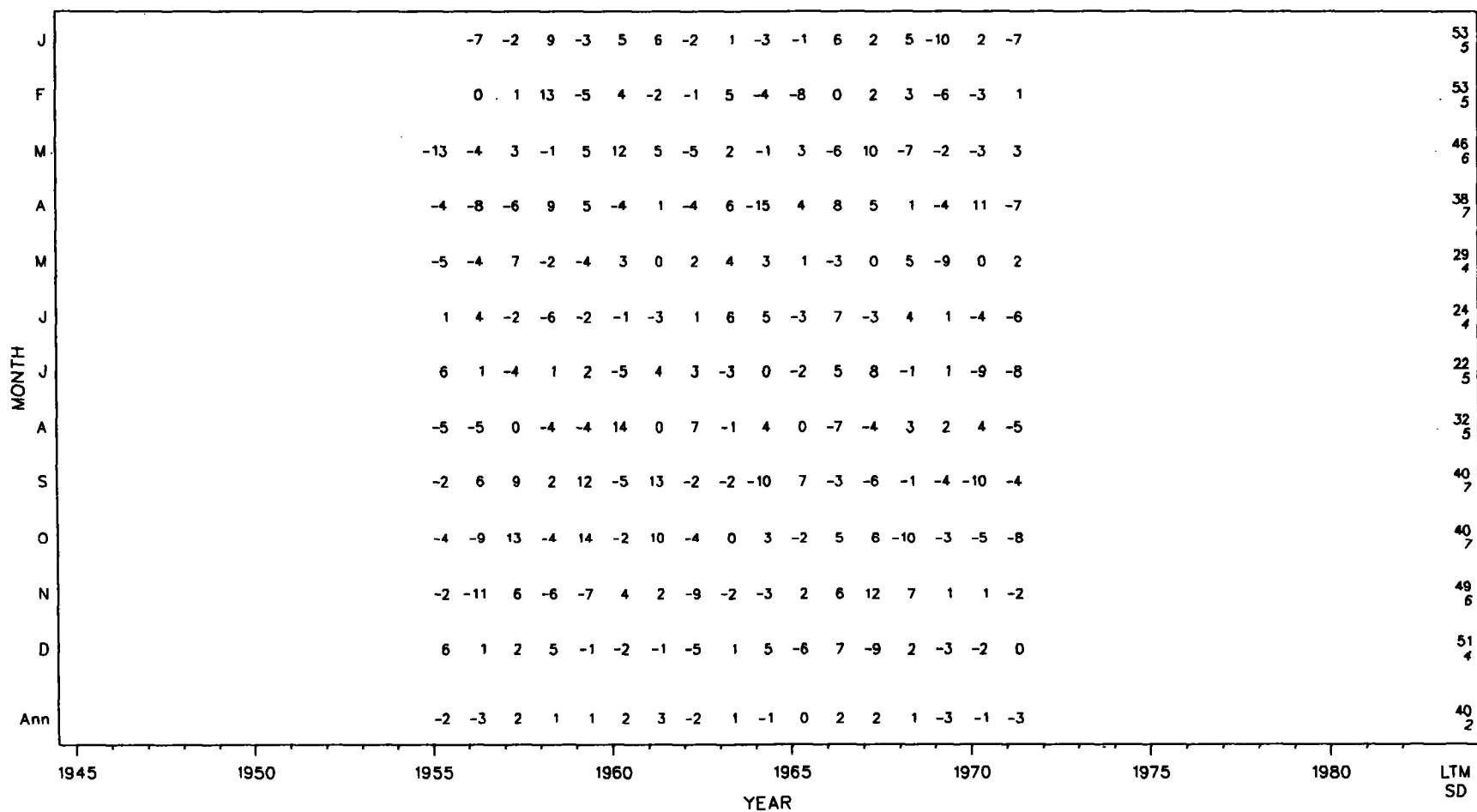
Units = 0.1 °C



### OWS Study Area V Anomalies

### Surface Dew Point Depression

Units = 0.1 °C

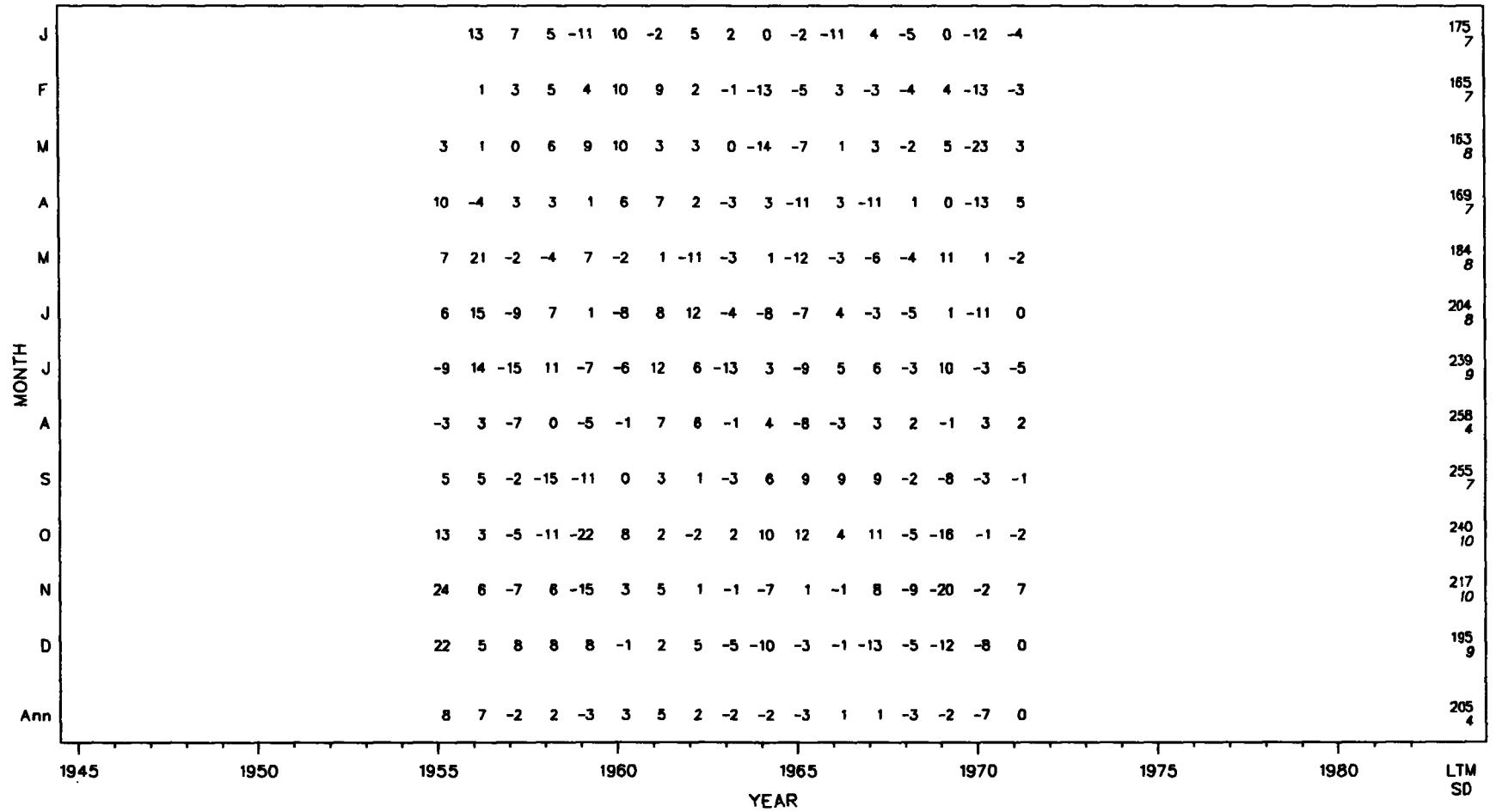


OWS Study Area V Anomalies



### Sea Surface Temperature

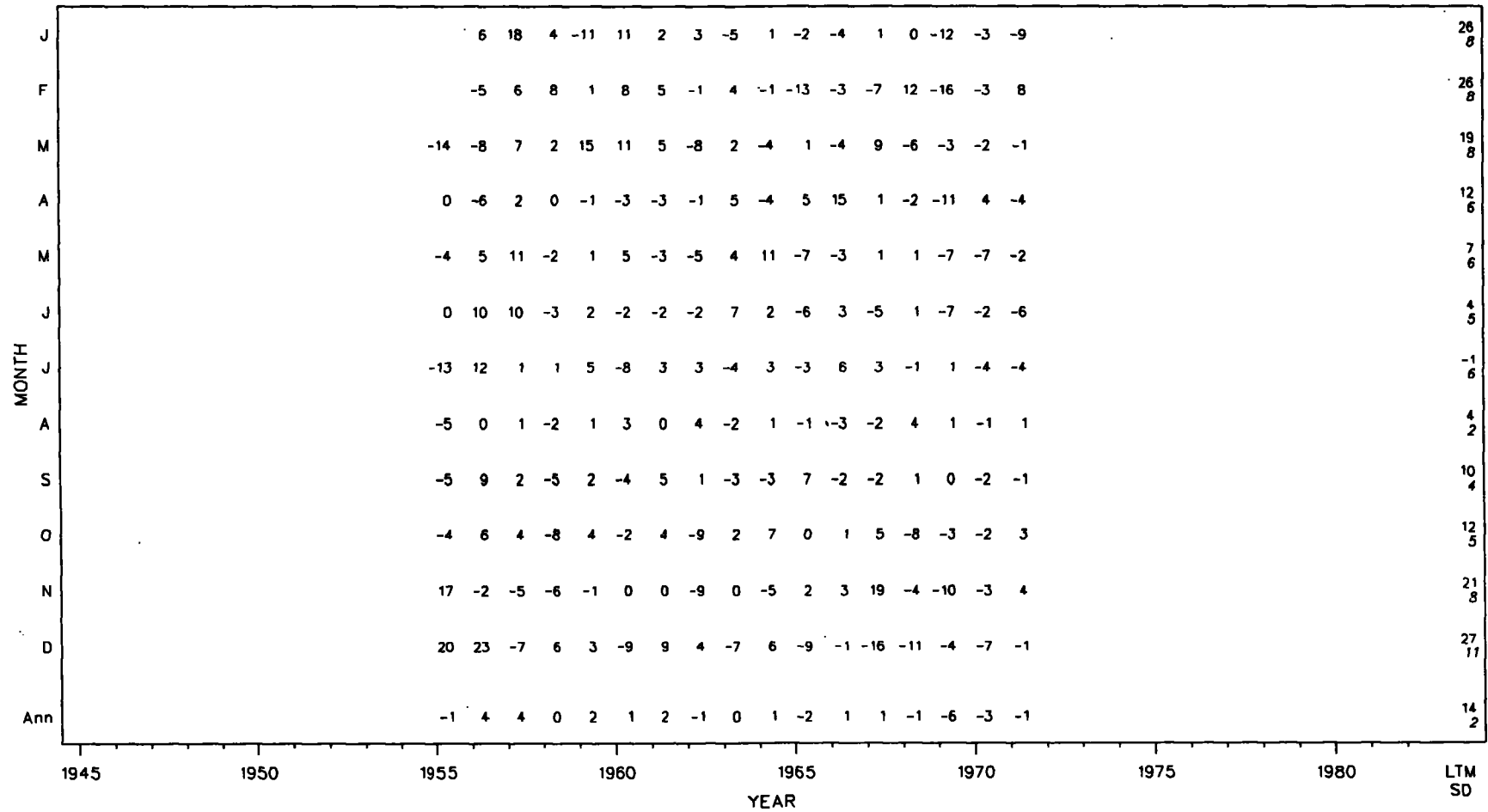
Units = 0.1 °C



OWS Study Area V Anomalies

### Sea - Air Temperature Difference

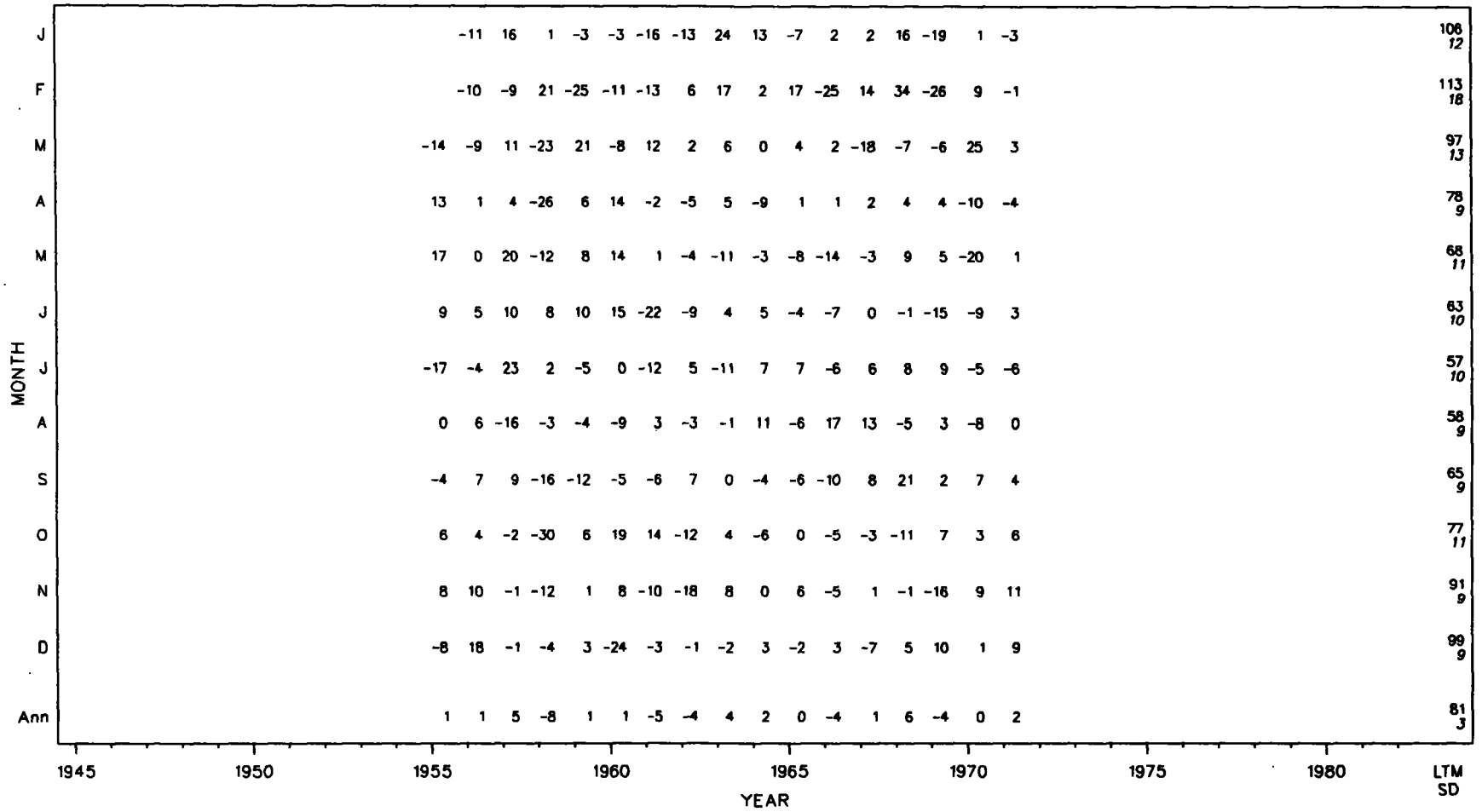
Units = 0.1 °C



OWS Study Area V Anomalies

### Surface Scalar Wind

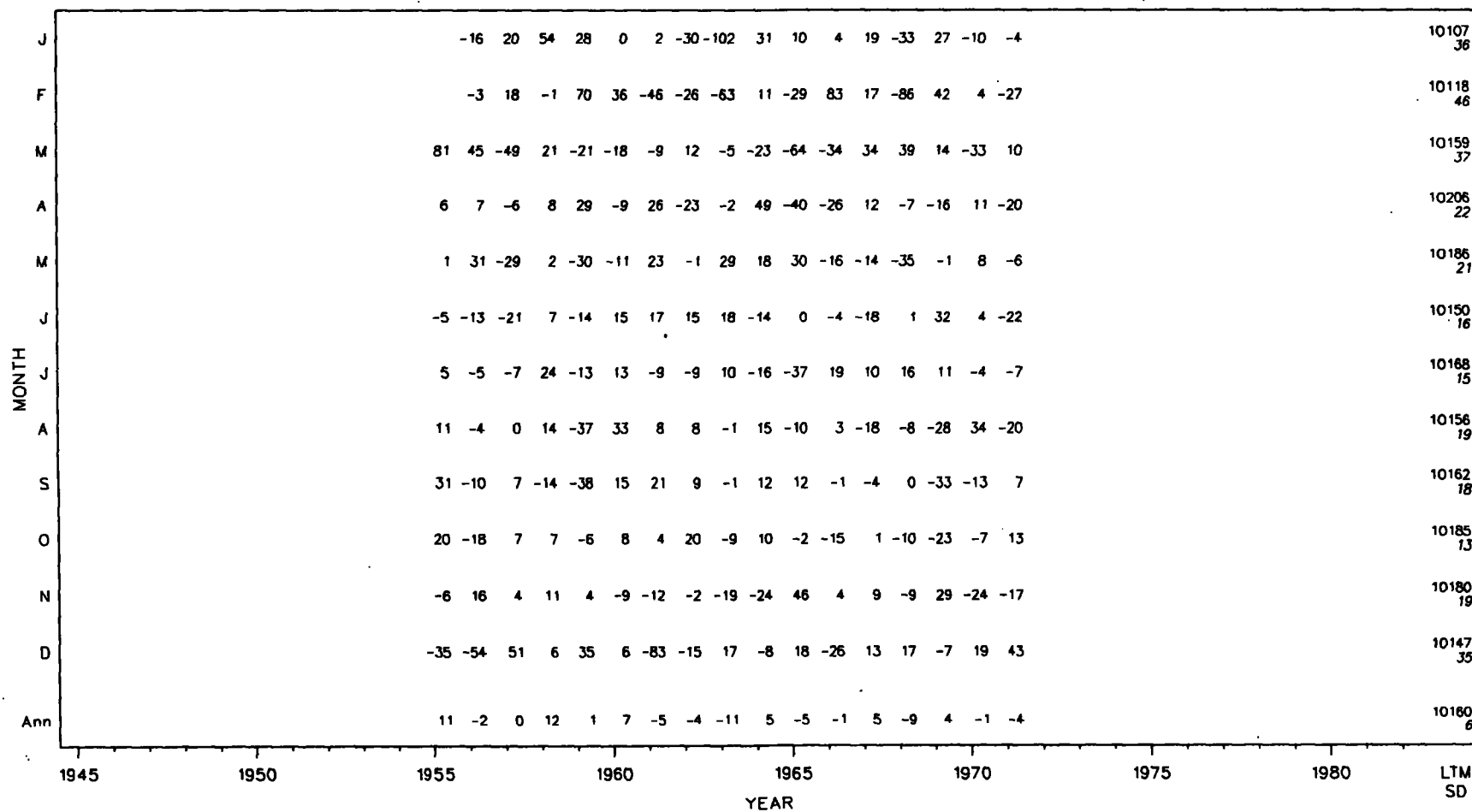
Units = 0.1 m/s



### OWS Study Area V Anomalies

### Sea Level Pressure

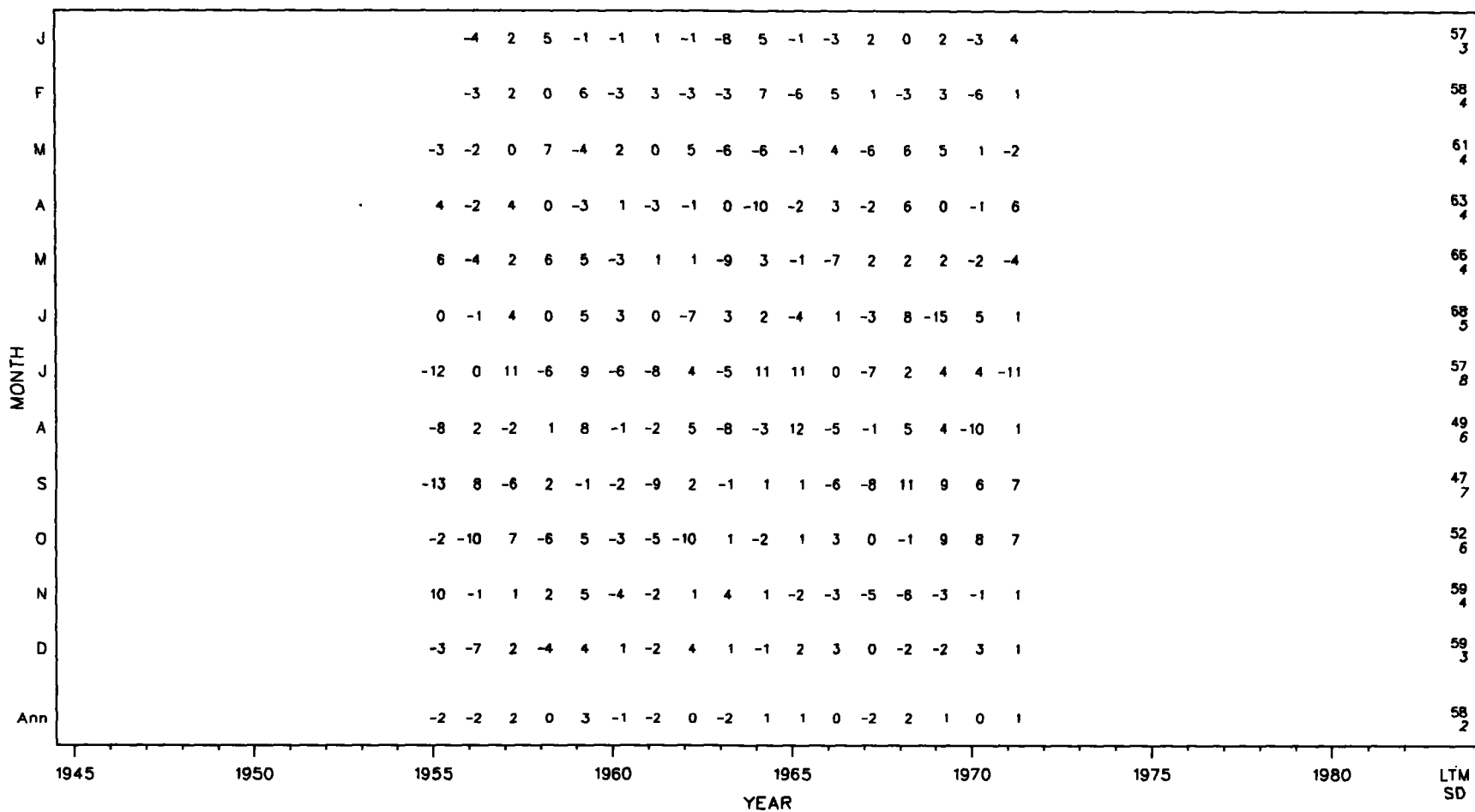
Units = 0.1 mb



OWS Study Area V Anomalies

### Total Cloudiness

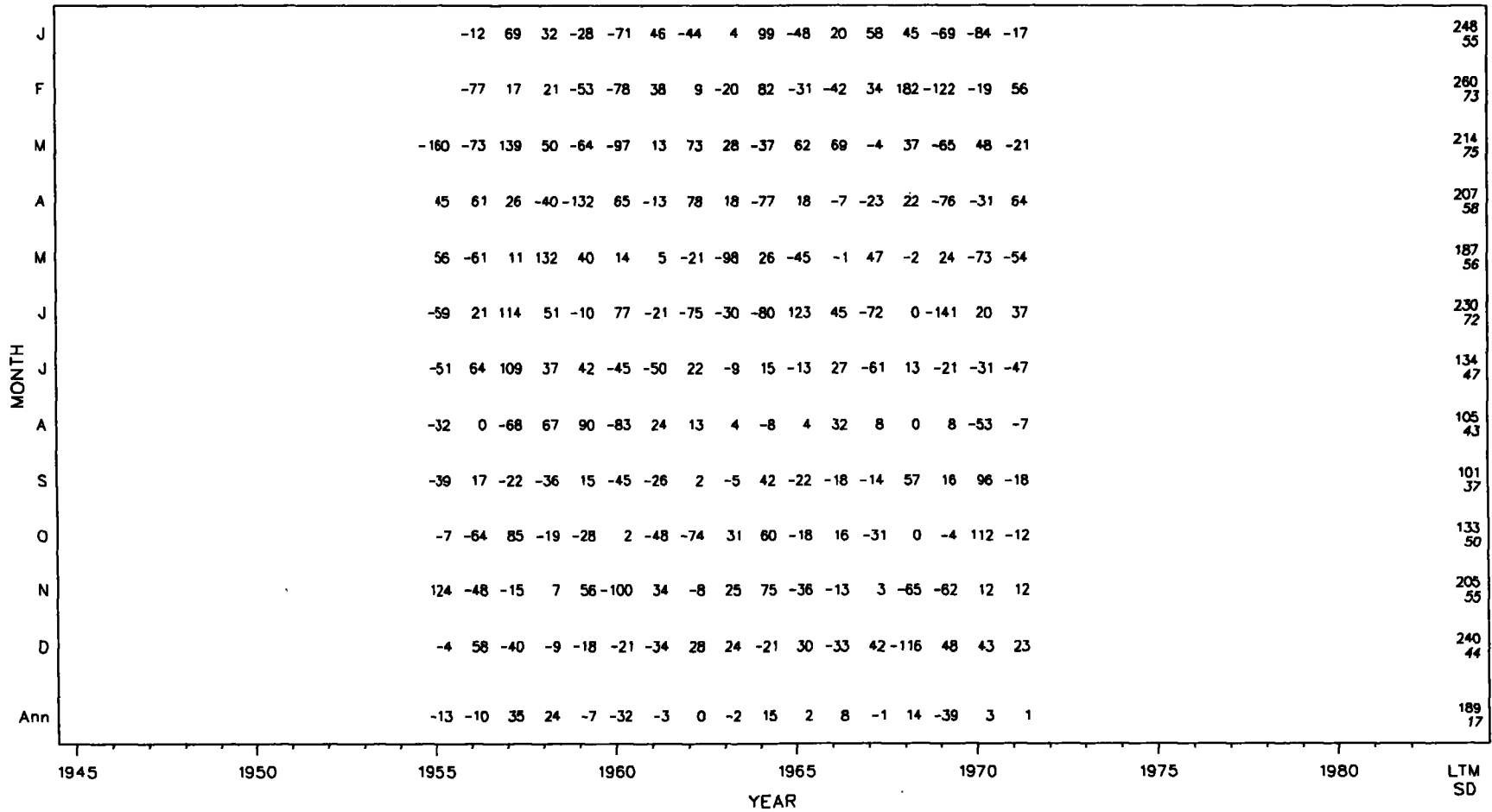
Units = 0.1 okta



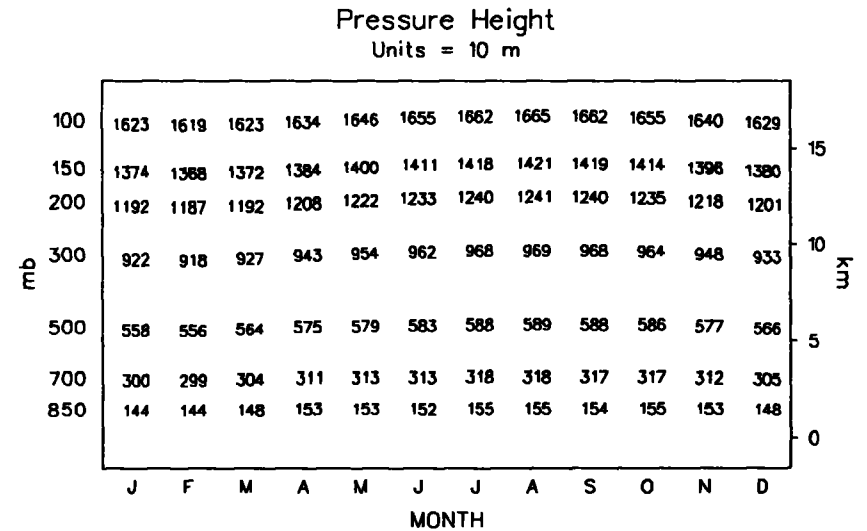
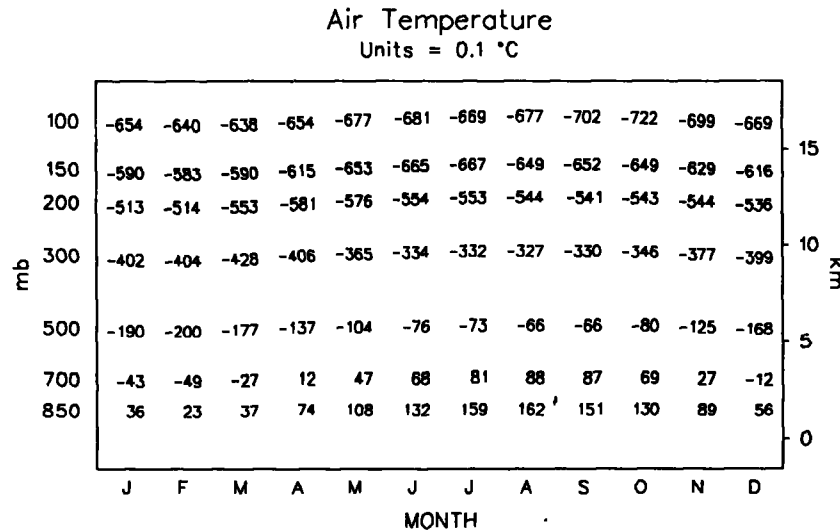
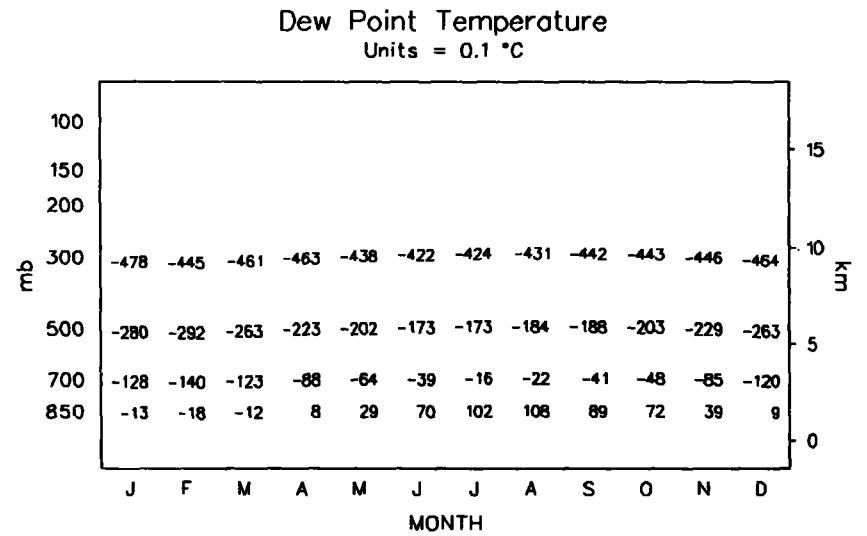
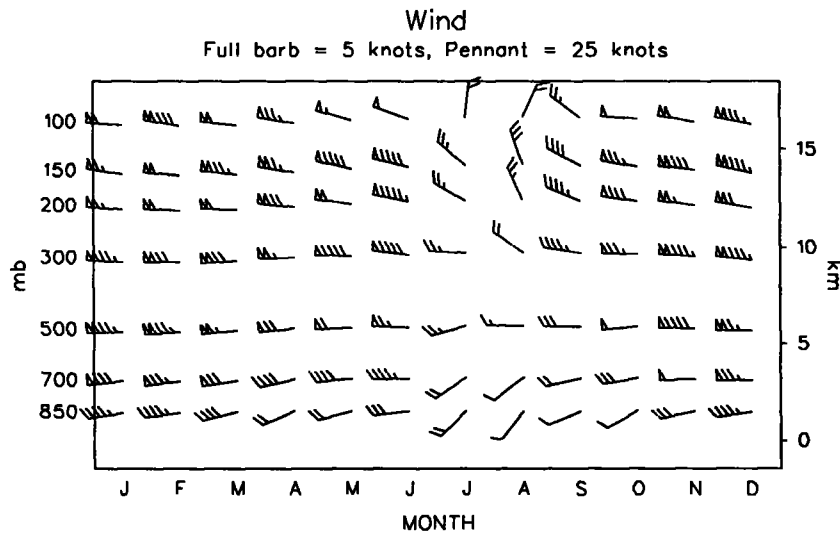
### OWS Study Area V Anomalies

### Precipitation Frequency

Units = 0.1 percent



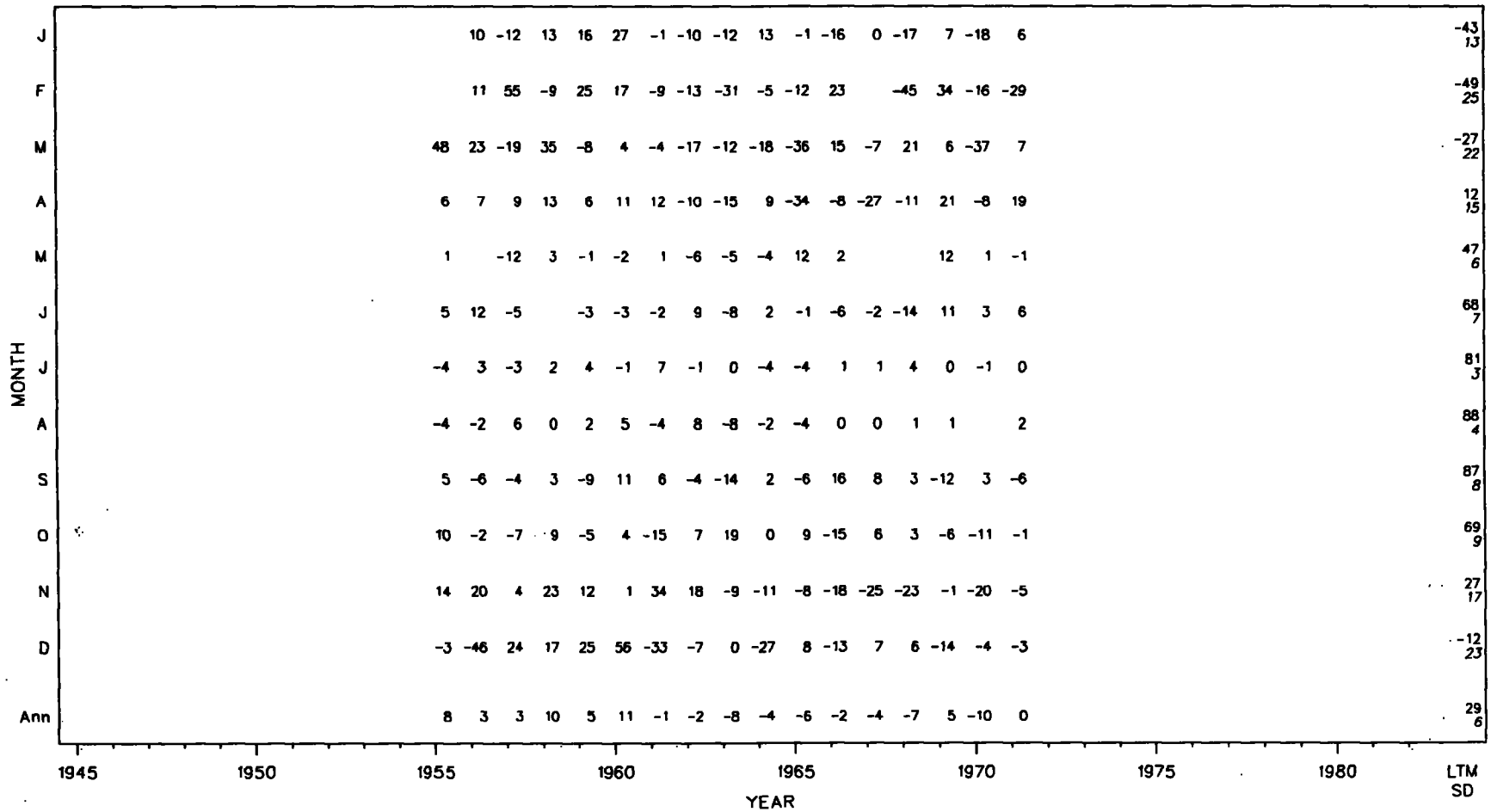
OWS Study Area V Anomalies



## 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



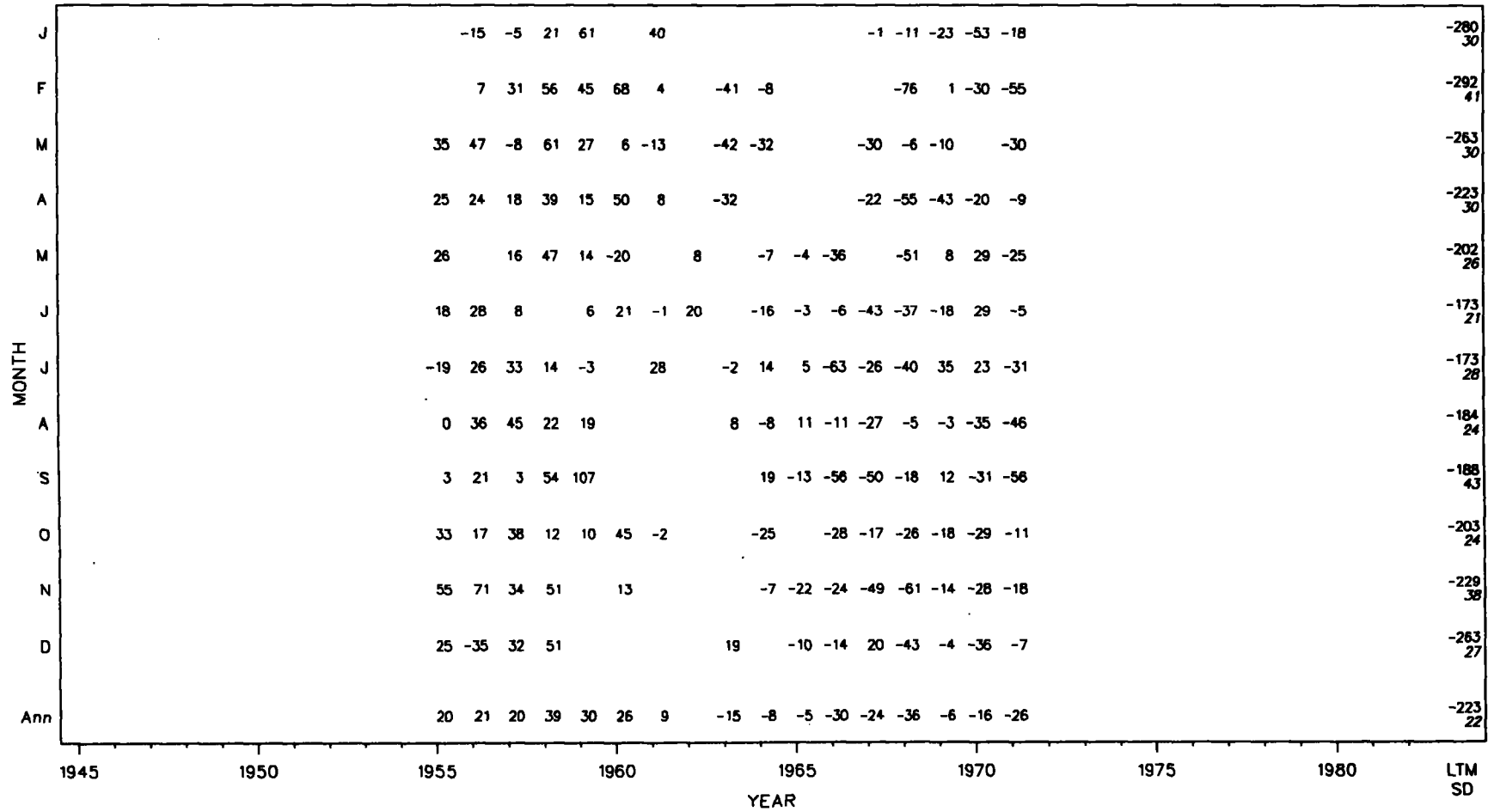




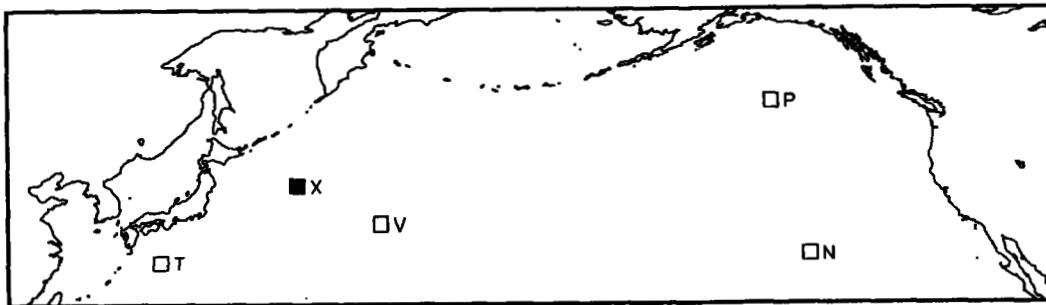


### Dew Point Temperature: 500 mb

Units = 0.1 °C



OWS Study Area V Anomalies



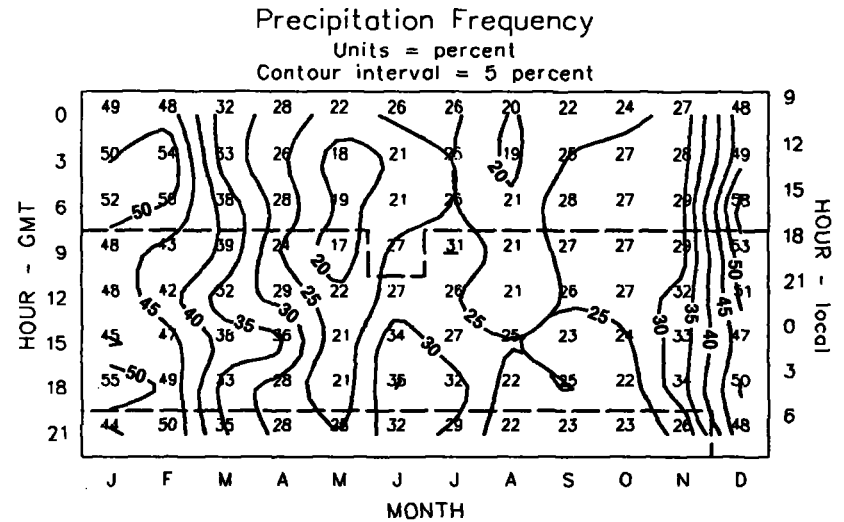
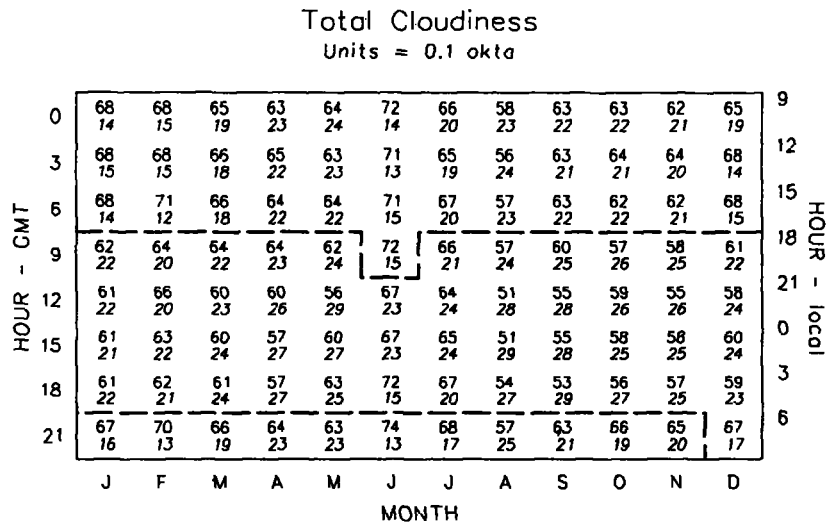
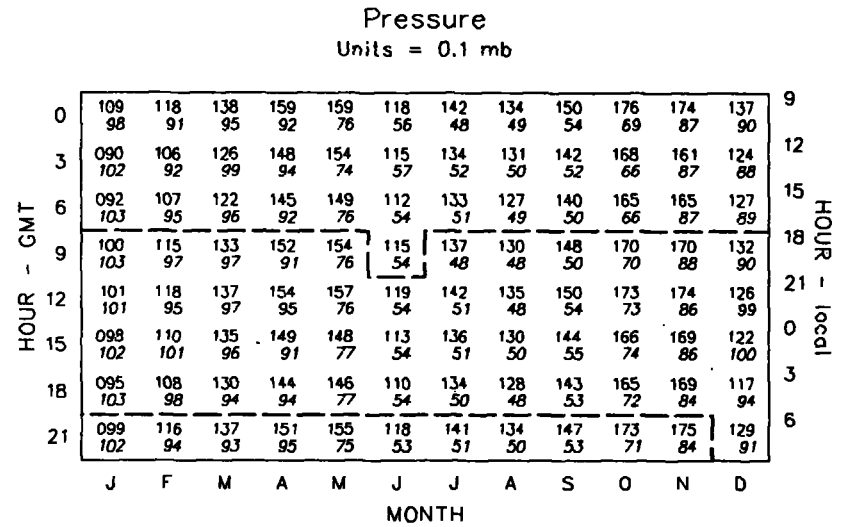
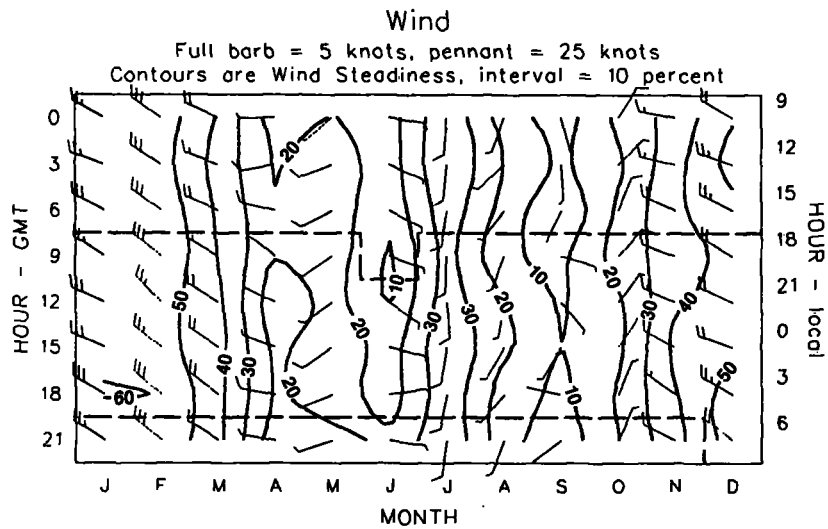
38.0°N - 39.9°N, 152.0°E - 153.9°E  
1947 - 1953

**OWS**  
**X**

MONTH														
	1945	1950	1955	1960	1965	1970	1975	1980	Sum					
J	12 9	31 31	30 30	31 31	30 16	31 31								165 148
F	19 4	15 15	28 27	28 28	25 13	28 28								143 115
M	28 19	31 31	31 31	31 31	30 0	31 31								182 143
A	30 16	30 30	30 30	30 30	30 0	30 30								180 136
M	31 17	31 31	31 31	31 31	29 0	30 29								183 139
J	27 18	30 29	5 5	30 30	30 0	30 30								152 112
J	30 20	31 31	29 29	31 31	31 0	31 31								183 142
A	24 10	31 31	31 31	31 31	31 0	31 31								179 134
S	7 5	27 26	30 30	30 30	30 0	30 30								154 121
O	11 5	15 10	30 30	31 31	31 0	30 30								178 137
N	18 10	28 22	30 30	25 25	30 0	30 24								187 141
D	20 17	30 26	31 31	31 31	31 30	31 7								174 142
Ann	49 32	281 176	348 346	332 331	365 364	357 36	328 325							2060 1610

### 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.

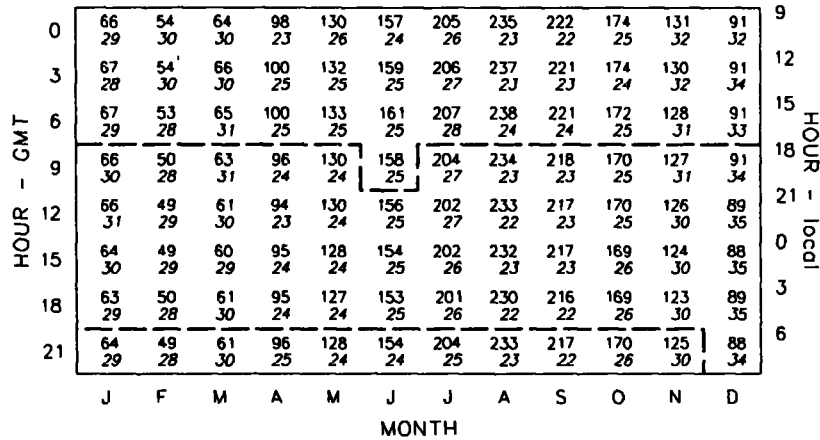


## OWS Study Area X Surface Climatology

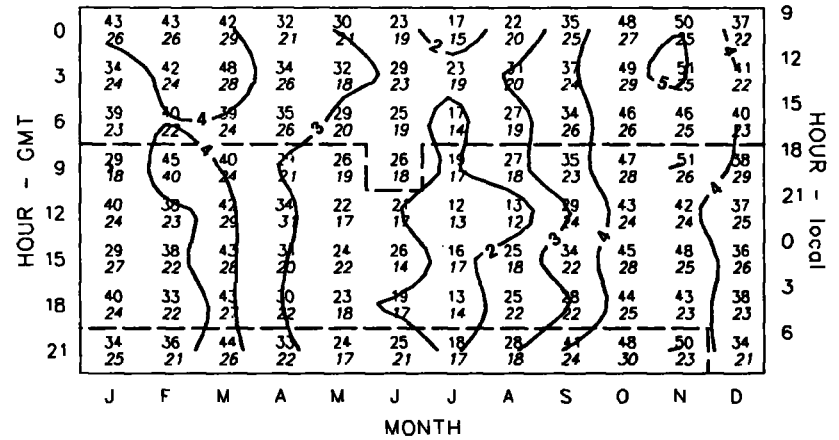
upper number = mean  
lower number = standard deviation

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

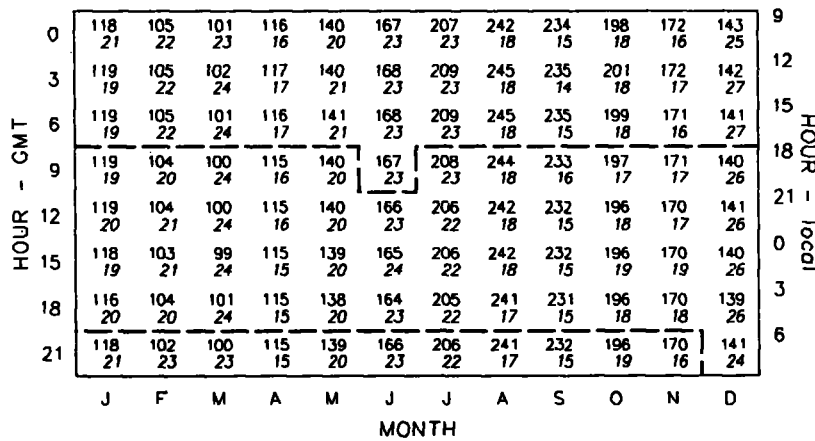
Air Temperature  
Units = 0.1 °C



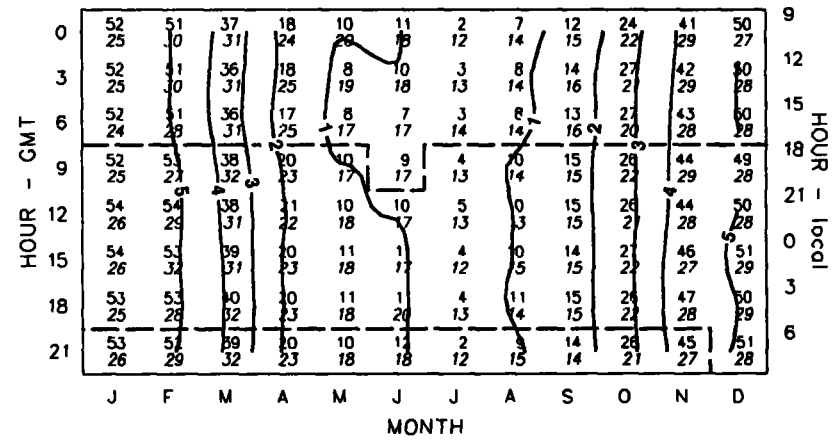
Dew Point Depression  
Units = 0.1 °C  
Contour interval = .1 °C



Sea Surface Temperature  
Units = 0.1 °C



Sea - Air Temperature Difference  
Units = 0.1 °C  
Contour interval = 1 °C



### OWS Study Area X Surface Climatology

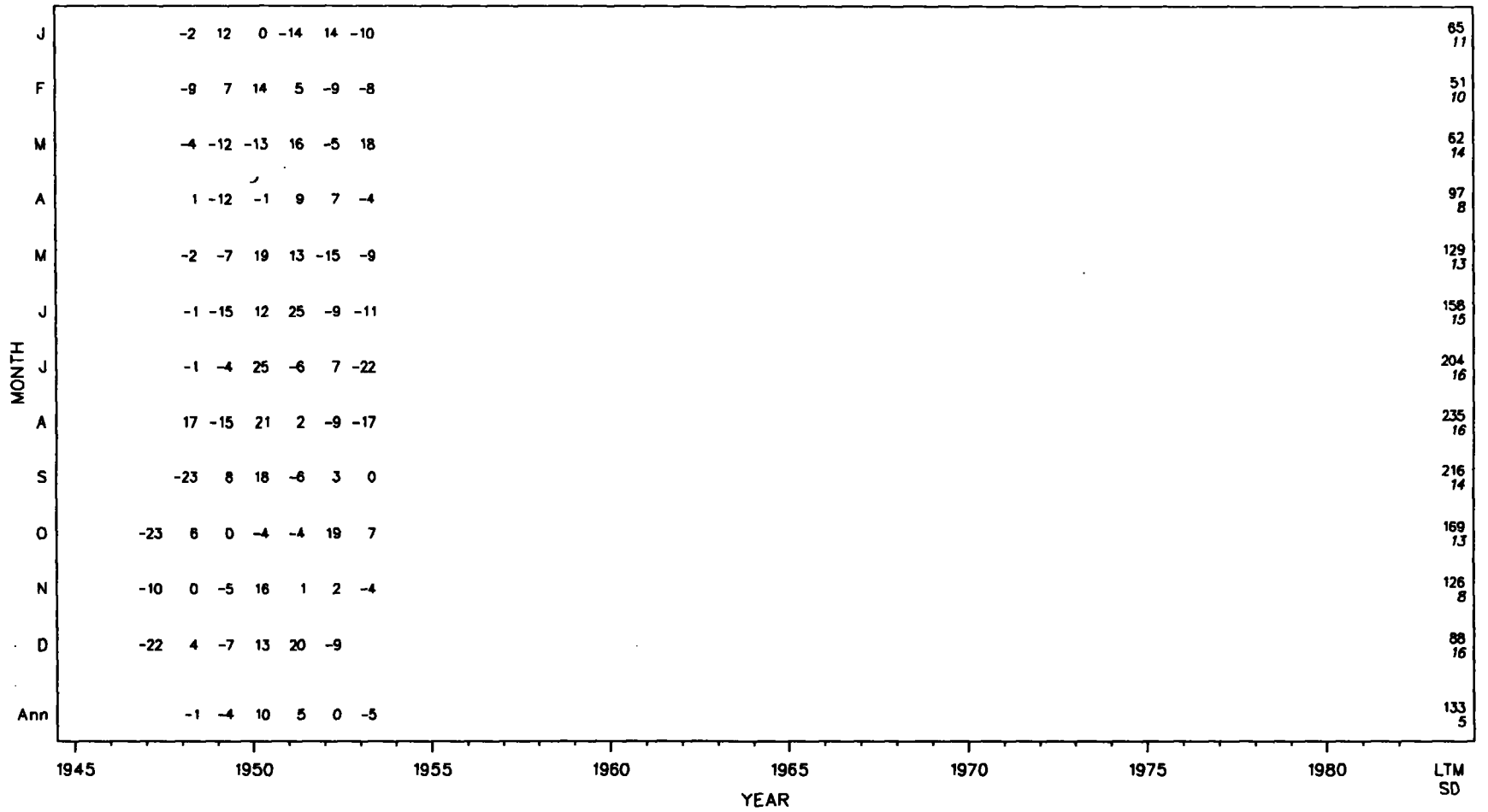
upper number = mean  
lower number = standard deviation

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



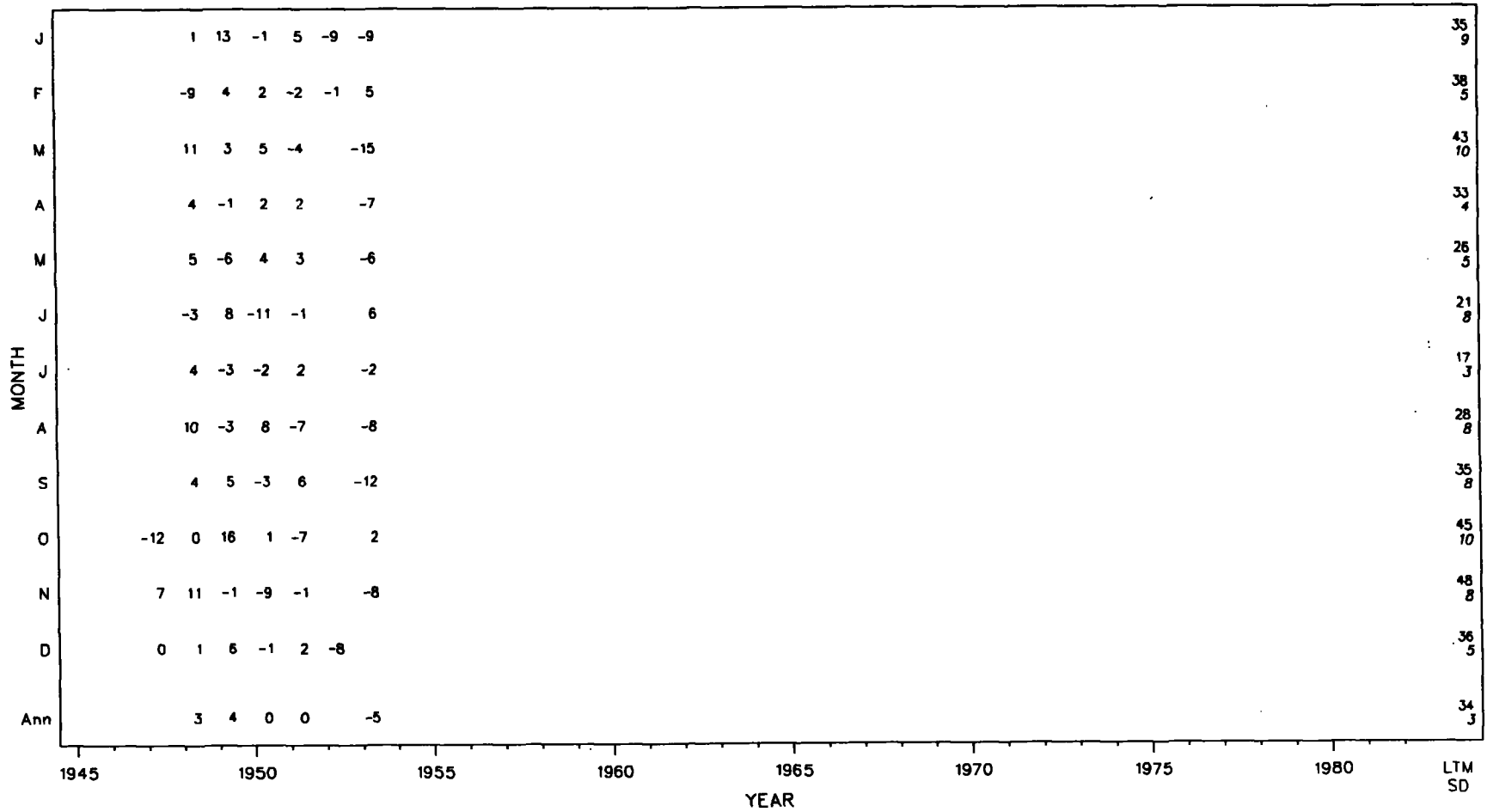
# Surface Air Temperature

Units = 0.1 °C



OWS Study Area X Anomalies

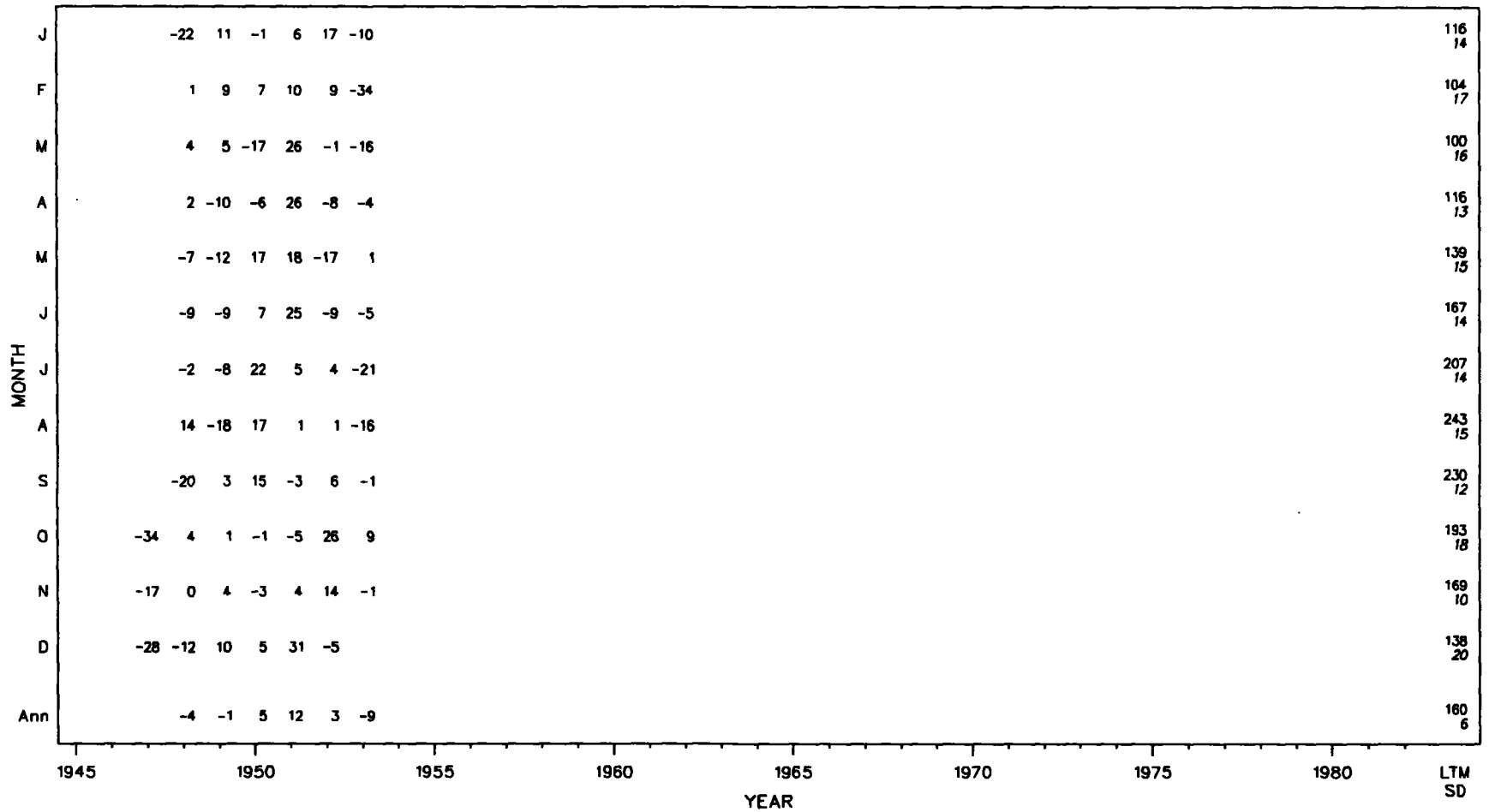
Surface Dew Point Depression  
Units = 0.1 °C



OWS Study Area X Anomalies

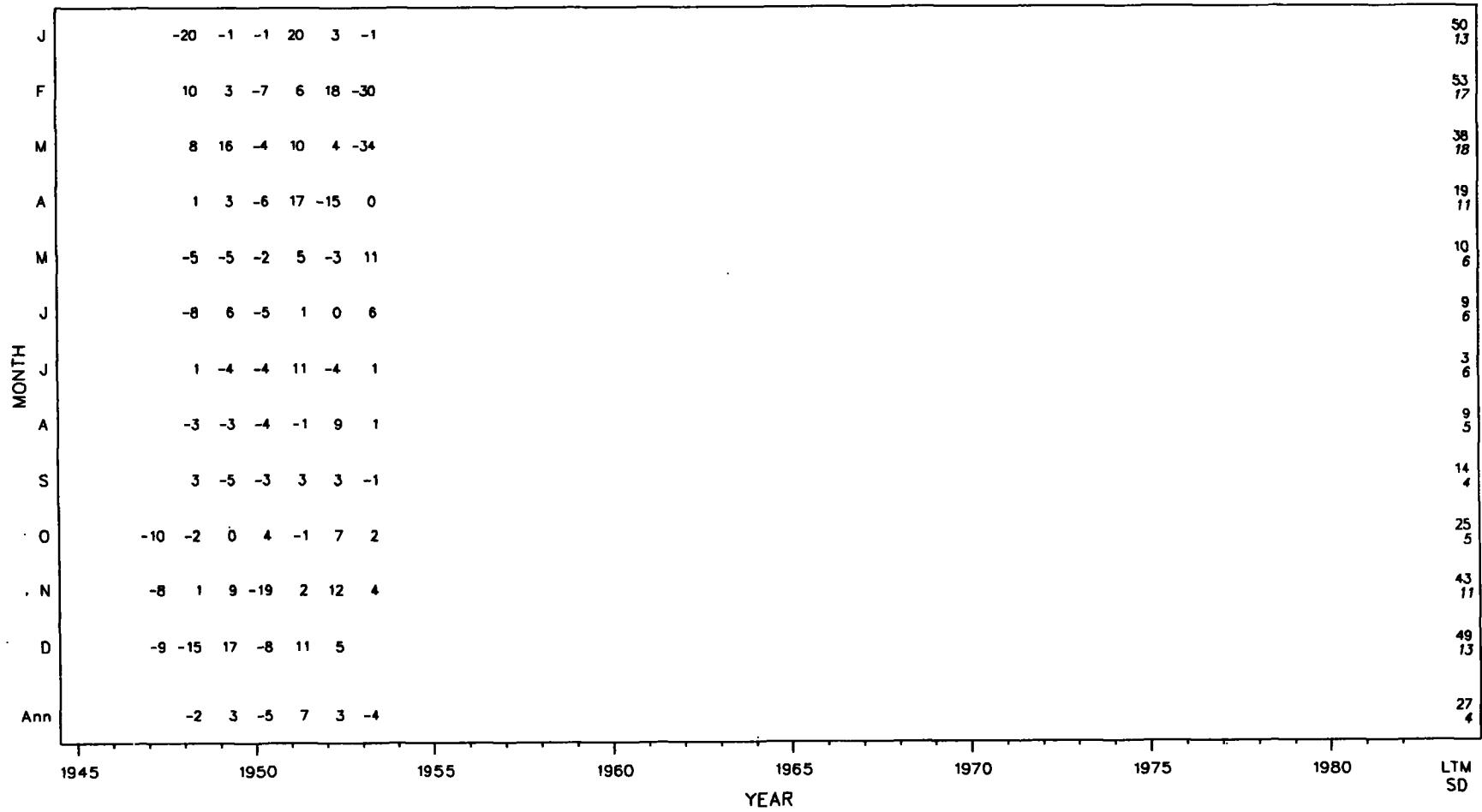
# Sea Surface Temperature

Units = 0.1 °C



OWS Study Area X Anomalies

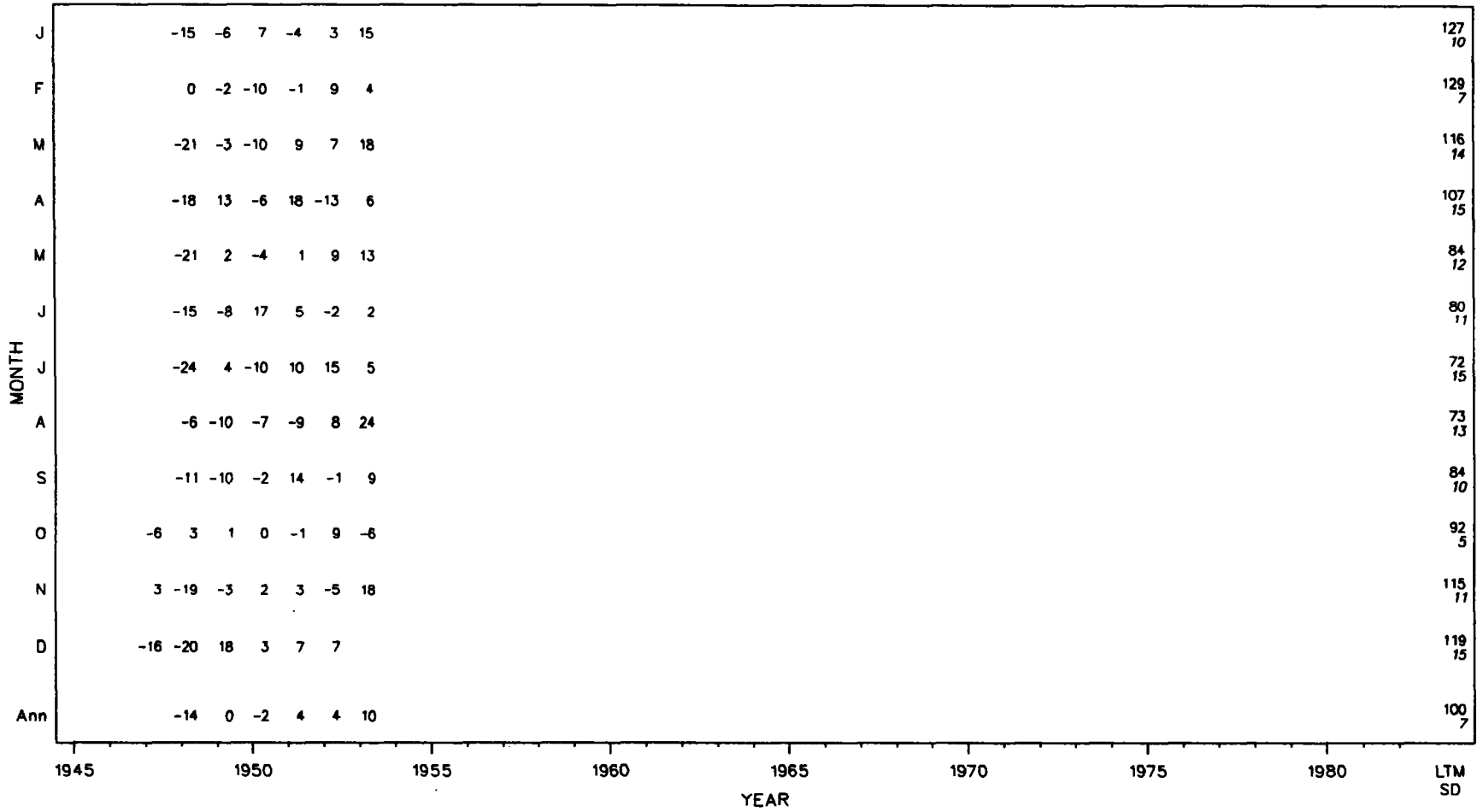
Sea - Air Temperature Difference  
 Units = 0.1 °C



OWS Study Area X Anomalies

### Surface Scalar Wind

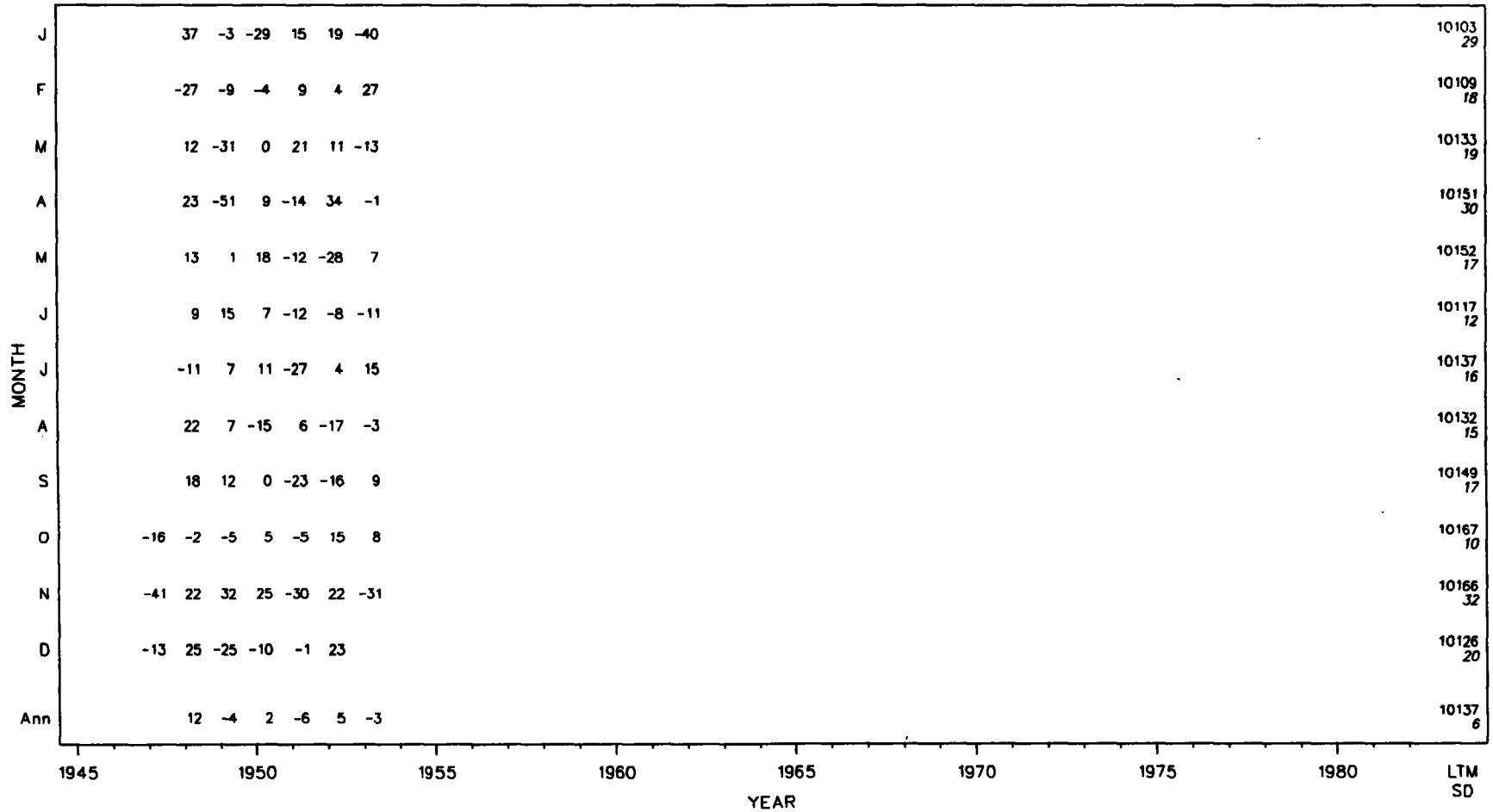
Units = 0.1 m/s



OWS Study Area X Anomalies

# Sea Level Pressure

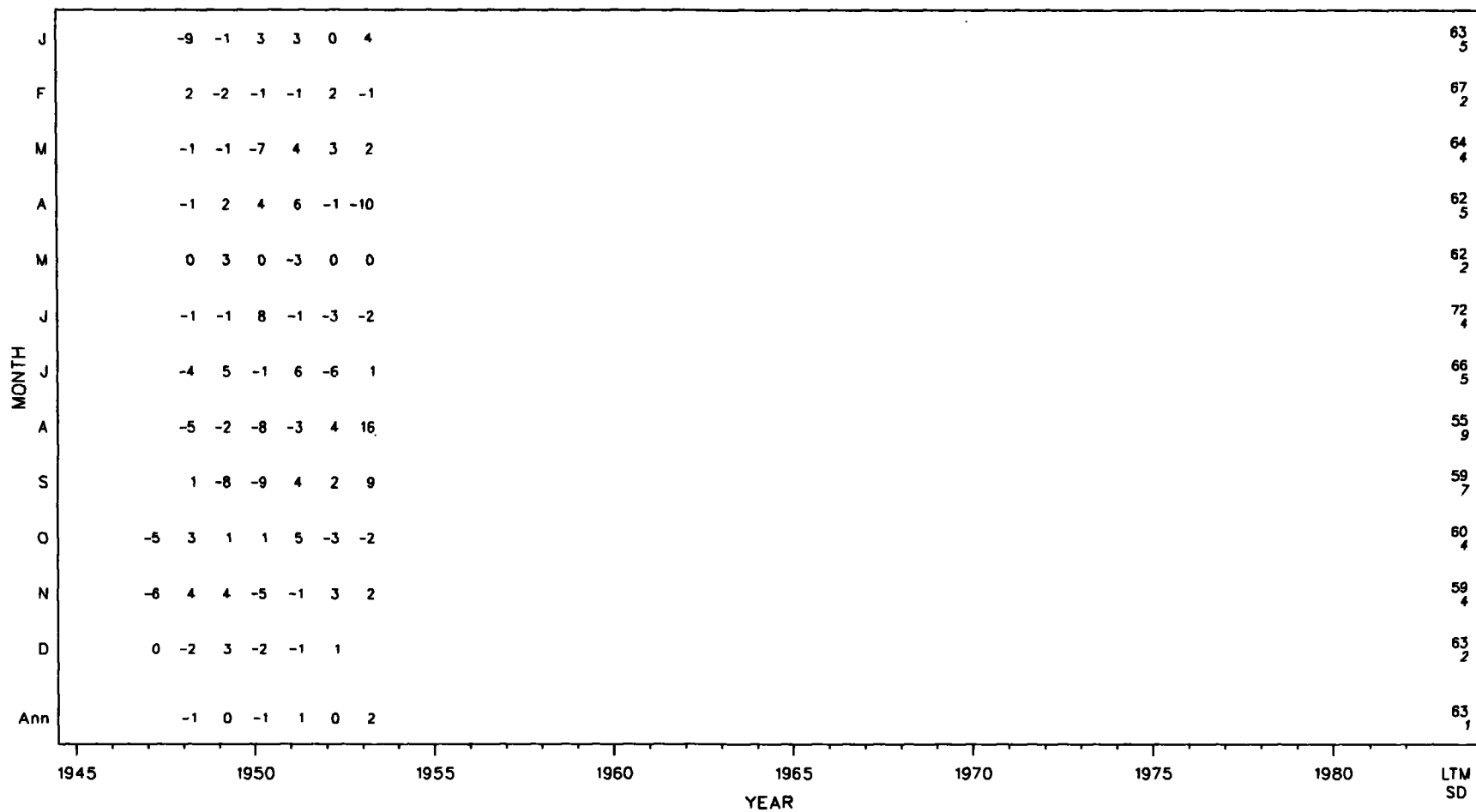
Units = 0.1 mb



OWS Study Area X Anomalies

### Total Cloudiness

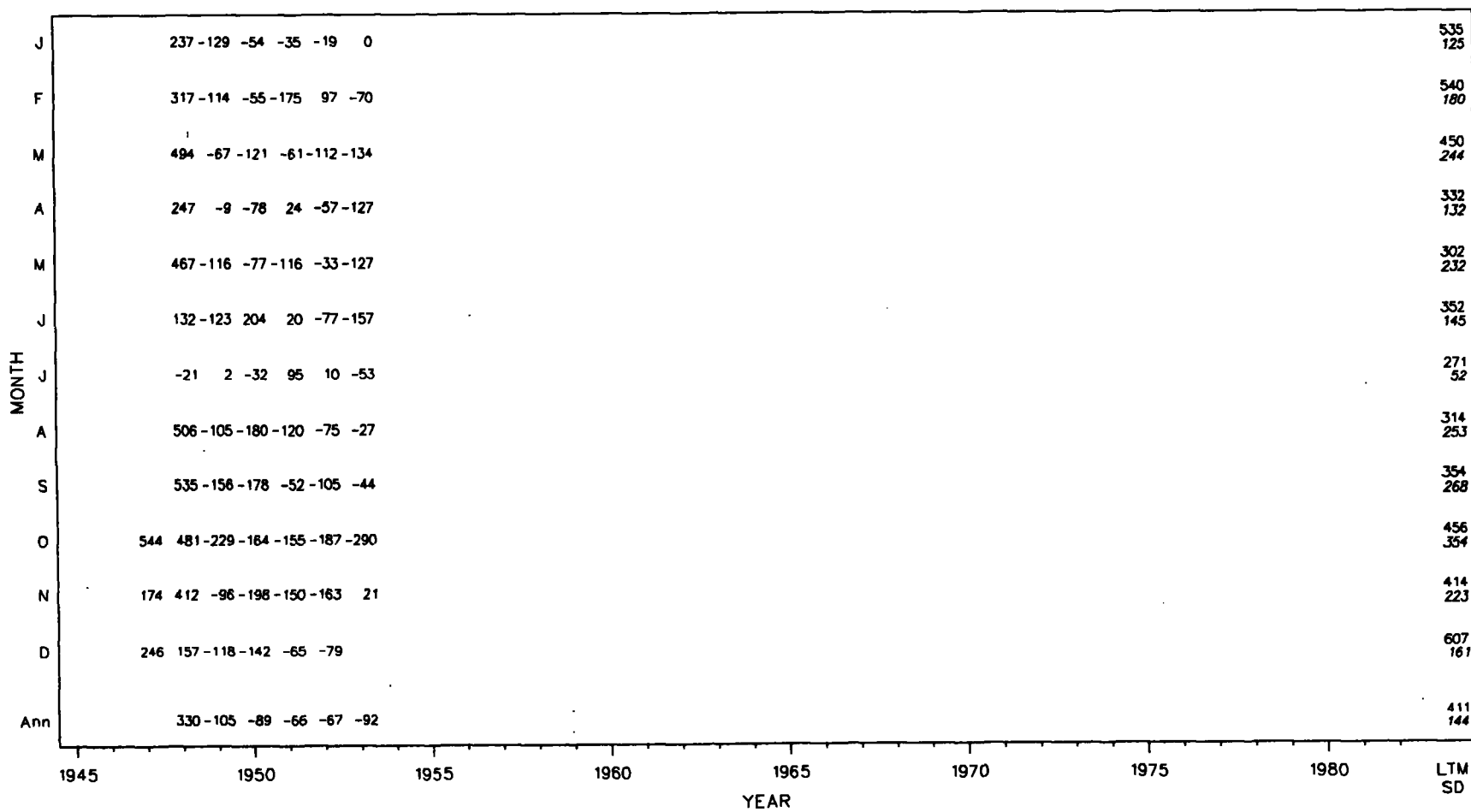
Units = 0.1 okta



OWS Study Area X Anomalies

# Precipitation Frequency

Units = 0.1 percent



OWS Study Area X Anomalies