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PAPER SERIES

A SYNOPTIC TYPE CATALOG
FOR SOUTHWESTERN CANADA
AND ADJACENT AREAS,
1946 to 1978.
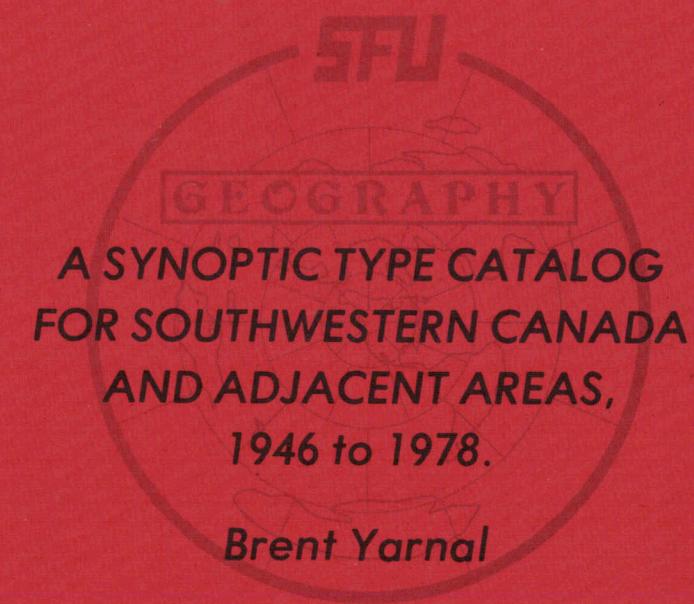
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A Synoptic Type Catalog for Southwestern

Canada and Adjacent Areas, 1946 to 1978

by

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Abstract

A catalog of daily 500mb synoptic types for southwestern Canada and adjacent areas is presented for the years 1946 to 1978. The 18 synoptic types are categorized objectively by the application of the Kirchhofer sums of squares technique to gridded data from the National Center for Atmospheric Research. Small-scale, high-wavenumber types are used because they explain the climate of the region better than larger, more generalized synoptic-scale patterns.

Introduction

Synoptic climatology is concerned with understanding local or regional climate by examining the relationship between local weather elements and the circulation of the atmosphere over that area. Based on this definition, Barry and Perry (1973) have identified two stages in any synoptic climatology. The first stage involves the categorization of atmospheric circulation patterns, usually in the form of synoptic weather maps. The second stage is the assessment of the relationship of these categories with local weather elements.

Much of the work in synoptic climatology has been directed towards the formulation of effective synoptic type categories. Although there is a wide range of research dealing with this topic, the resulting classification techniques can be grouped under the headings of subjective and objective procedures.

There are two major problems with subjective typing techniques. First, although some subjectively derived classifications are well established with accepted criteria for the determination of synoptic types, such as the surface airflow-type catalog for the British Isles (Lamb, 1972), most subjective classifications are unique, with typing criteria derived only for the research at hand. Consequently, the results of one study are not easily compared to the findings of another. Second, atmospheric features are continuous in time and space, so that the identification of synoptic type boundaries must be arbitrary. Even when clearly defined criteria are applied, replication of type categories and type member frequencies is difficult since the judgement of any two investigators will differ.

Due to the problems associated with subjective procedures, the develop-

ment and application of objective classification techniques is the most important advance in synoptic climatology in the last few years (Barry, 1980). An objective synoptic climatology takes advantage of the large data handling capacity of modern computers, allowing the machine to determine statistically similar and significant synoptic groupings. When based on standardized criteria and data, results can be replicated and studies can be compared. Since standardized data are easily analyzed by computer methods, gridded climatological data sets, like those prepared by the National Center for Atmospheric Research (NCAR; Jenne, 1975) are ideally suited to objective synoptic typing (Barry, 1980).

Three main types of objective classification techniques have been developed and applied: the correlation method (Lund, 1963; Suckling and Hay, 1978; Singh, et al., 1978; Overland and Hiester, 1980; Petzold, 1982), variable reducing procedures (Christiansen and Bryson, 1966; Kutzbach, 1967, 1970; Dixon, et al., 1972; Blasing, 1975; Rogers, 1978; Ladd and Driscoll, 1980) and the sums of squares technique (Kirchhofer, 1973; Barry and Keen, 1978; Moritz, 1979; Bradley and England, 1979; Keen, 1980; Barry, et al., 1981; Yarnal, 1982; Yarnal, in press [a]). The correlation method and variable reducing procedures typically classify 60% to 80% of the maps analyzed, although Petzold (1982) has developed a technique to improve significantly the percentage of maps classified by the correlation method. The sums of squares technique is an improvement over the above techniques, typically categorizing more than 90% of the weather maps.

The second stage in a synoptic climatology, evaluation of the relationship of synoptic type categories with local weather elements, has led to many diverse studies. In southwestern Canada, synoptic climatologies have been

concerned with spatial distributions of precipitation (Walker, 1961), vertical distributions of precipitation (Fitzharris, 1975), solar radiation regimes (Suckling and Hay, 1978), frequencies of major avalanches (Fitzharris, 1981), glacier katabatic winds (Stenning, et al., 1981) and glacier-climate relationships (Yarnal, 1982). Only Suckling and Hay (1978) and Yarnal (1982) have used an objective synoptic typing methodology.

The present paper expands on the work of Yarnal (1982) to produce a catalog of daily 500mb synoptic types for southwestern Canada and adjacent areas (Figure 1) for the 33-year period, 1946 to 1978. The catalog facilitates synoptic climatological research for the region by eliminating the large expenditures of time and money associated with synoptic typing. Because of both the problems associated with subjective typing procedures and the better categorization performance record of the sums of squares technique over other objective methods, the Kirchhofer sums of squares technique is used with NCAR data in this work. Yarnal (in press [a]) has confirmed the hypothesis of Suckling and Hay (1978) that synoptic patterns occurring in a much larger area are less satisfactory for explaining the climatic conditions of the region. Thus, the small-scale, high-wavenumber synoptic types presented in the catalog are "tuned" to the climate of the study area.

The Climatological Setting

The climate of southwestern Canada and adjacent areas is dominated by the westerly flow of maritime airstreams (Bryson and Hare, 1974). The northerly portion of this flow crosses the Pacific Ocean from Asia and is most prominent in the winter, while the southern portion is associated with the Pacific Anticyclone and is most prominent in summer. Northern Pacific westerlies are cool, with a near-moist adiabatic lapse rate and a high

moisture content through a considerable depth. The warm summer anti-cyclonic airstream is stable and arrives at the British Columbian coast with a shallow moist layer.

Eastward travelling cyclonic disturbances embedded in the westerly flow bring heavy precipitation to the southwestern coast of British Columbia. The core area affected by the storms varies from about 45°N in the winter months to about 54°N in summer (Hare and Hay, 1974). The cyclones are usually near the peak of their development upon reaching coastal British Columbia, especially in winter. Summer cyclones are less frequent and vigorous, and several warm anticyclonic spells may be expected during the summer months. The net result of the intense cyclonic activity and the rugged topography of the Coast Mountain Range is large annual deposits of snow that, because of sudden orographic uplift and frictional drag associated with the change from ocean to land surface, increase dramatically with elevation (Walker, 1961).

After a storm strikes the Coast Mountains, the mid-tropospheric trough associated with the surface fronts usually continues eastward across the southwest Canadian Cordillera. Although it is difficult to follow surface fronts across the complex topography of the interior, the passage of a system shows itself in the observed weather (Hare and Hay, 1974). A front may produce little or no precipitation in the deep valleys or upland plateaus, but the higher mountain ranges (the Purcell, Monashee, Selkirk, Cariboo and Rocky Mountains) do receive heavy falls of rain and snow, especially in winter. Summer convective storms are common in all interior areas experiencing a mid-tropospheric disturbance.

Methodology

The objective technique of Kirchhofer (1973) is used to classify the synoptic types. This approach has been employed by Kirchhofer (1976) for Switzerland, by Barry and Keen (1978), Moritz (1979), Bradley and England (1979) and Keen (1980) for areas of the North American Arctic, by Barry, et al. (1981) for the American west and by Yarnal (1982; in press [a]) for southwestern Canada.

The classification procedure (Yarnal, in press [b]) uses prepared sets of gridded atmospheric data. Reasonably priced data are available on magnetic tape from NCAR (Jenne, 1975), where several atmospheric pressure surfaces have been fit to the 1977-point National Meteorological Center (NMC) grid of the Northern Hemisphere. The data come in packed binary form and are unpacked using subroutines provided by NCAR (Jenne and Joseph, 1974), although modifications to the FORTRAN ASSEMBLER language are probably necessary.

Before the classification procedure can be applied, daily 1200 GMT synoptic-scale 500mb pressure grids are compiled from the NMC grid. The mid-tropospheric 500mb pressure surface is used because it is above the direct topographic influence of the Cordillera of southwestern Canada. A synoptic-scale set of 27 contiguous NMC grid points is used to synthesize 30 equally spaced points of latitude and longitude covering an area approximately 2200 km by 1800 km (Figure 2).

To apply the Kirchhofer technique, the gridded data sets are first normalized using the z-transformation:

$$Z_i = \frac{(x_i - \overline{x})}{s} \tag{1}$$

where Z_i = normalized value of grid point i;

x_i = data value at grid point i;

$\overline{x}$ = mean of the N-point grid;

s = standard deviation of the grid.

Each normalized grid is compared to all other grids by the sums of squares equation:

$$S = \sum_{i=1}^{N} (Z_{ai} - Z_{bi})^2 \tag{2}$$

where S = Kirchhofer score;

Z_{ai} = normalized grid value of point i on day a;

Z_{bi} = normalized grid value of point i on day b;

N = number of data points.

It is possible for a comparison of any two grids to generate a low S value, denoting overall statistical similarity, and yet have widely varying patterns in specific sectors of the map. Therefore, to ensure pattern similarity in all areas of the grids, subscore values for each row and column of the 5 by 6 matrices are calculated using Equation 2.

Grids are considered similar if S <15 (in other words, 0.5N) and row and column scores S_R and S_C $1.0N_R$ and $1.0N_C$, where N_R and N_C equals the number of points in the row or column, respectively. MSL pressure surfaces using the Kirchhofer method (such as Moritz, 1979) have used thresholds for S of 1.0N and for row and column scores of $1.8N_R$ and $1.8N_C$. However, to provide a comparably high percentage of classified days and a useful number of patterns, a lower threshold score must be used for upper air maps (Barry, et al., 1981).

Due to computer storage limitations and cost considerations, it is necessary to use a sample of the days of the study period. In the original research for which the present classification was developed, a synoptic climatology of the 9 glaciological years of the International Hydrological Decade (1965-1974) was performed (Yarnal, 1982). Based on the statistical criteria of Dixon and Leach (1978) used in that study, 4 years was taken as a suitable sample size. The glaciological years 1 October to 30 September 1965-66, 1966-67, 1969-70 and 1973-74 were chosen because it was assumed that a wide range of synoptic weather patterns occurred during these years. 39 of the 1463 daily grids of the sample years were eliminated due to missing or bad data in the NCAR 500mb data set, leaving 1424 sample grids for analysis. Because of the success of the 9-year classification, this sample is extended to the present 33-year study. A comparison of the results of the 9-year and 33-year classifications supports this reasoning (see below).

S, S_R and S_C values are calculated for every pair of grids in the sample. If the previously mentioned threshold requirements are met, the pair of grids is considered significantly similar and the S value is entered into memory. The daily grid with the most S values associated with it is designated Keyday 1. That keyday is then removed from the analysis along with all grids associated with the keyday and all days associated with those days. This process is repeated to determine subsequent keydays until all days are classified into m groups of 5 days or more. Remaining days are termed "unclassified."

In the final step, S, S_R and S_C values are again calculated, this time for each of the m keydays with each day of the total population (12,053) of daily grids. The lowest significant Kirchhofer score is recorded for each daily grid, with the associated keyday denoting the synoptic type of the day.

Because it is possible for any day to be related significantly to more than one keyday, days misclassified by early removal during the keyday determination procedure described above are reclassified.

Results

Table 1 summarizes the results of the synoptic type classification. The 18 synoptic types recognized account for 94.3% of the days in the 33-year study period. 4.3% of the days are not classified, while 1.4% of the days were eliminated before classification due to missing or bad data in the NCAR data set. The first 8 types account for over 79% of the days, with higher order types being much less important in terms of frequency. Mean Kirchhofer scores are well below the threshold value of 15.0 and Kirchhofer score standard deviations are relatively small, suggesting the classification fit is good. Kirchhofer scores are related inversely to frequency, indicating greater pressure pattern diversity in less frequent types (Bradley and England, 1979). The keyday maps for each of the 18 synoptic types are shown in Figures 3 to 5. The catalog of synoptic types for all 33-years of the study is presented in the Appendix.

The results of the 9-year classification (Yarnal, 1982) are shown in Table 2 for comparison with the 33-year classification. The similarity between the two sets of results suggests that the extension of the 4 sample glaciological years to the present study is valid. Nevertheless, certain infrequently occurring synoptic patterns that were diminished in number or absent during the sample years, yet may be important to the climate of the region, will have been overlooked by the classification. This should not detract from the utility of the catalog in most instances.

Summary

A catalog of daily 500mb synoptic types occurring over southwestern Canada and adjacent areas during the years 1946 to 1978 was presented. The 18 synoptic types were categorized objectively by the application of the Kirchhofer sums of squares technique to NCAR gridded data. Small-scale, high-wavenumber types were used because they explain the climate of the region better than larger, more generalized synoptic scale patterns. The catalog will facilitate synoptic climatological research for the region by eliminating the large expenditures of time and money associated with synoptic typing.

Acknowledgements

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Table 1. Summary of the synoptic type classification, 1946 to 1978.

TYPE	FREQUENCY (%)	MEAN KIRSHHOFER SCORE	KIRCHHOFER SCORE STANDARD DEVIATION
1	24.4	4.6	2.4
2	16.9	5.0	2.7
3	6.1	7.1	2.7
4	9.0	5.0	2.7
5	8.2	5.2	2.8
6	8.6	6.7	2.4
7	1.9	8.1	2.9
8	4.1	6.8	2.6
9	2.0	7.3	3.1
10	1.8	7.6	3.0
11	1.0	8.9	3.3
12	2.7	8.4	2.5
13	0.5	9.2	2.9
14	1.3	8.1	3.0
15	2.3	6.8	3.0
16	2.5	6.8	2.7
17	0.2	10.3	3.1
18	0.8	8.7	3.1
Unclassified	4.3	--	--
Missing data	1.4	--	--

Table 2. Summary of the synoptic type classifications,
1 October 1965 to 30 September 1974 (from Yarnal, 1982).

TYPE	FREQUENCY (%)	MEAN KIRCHHOFER SCORE	KIRCHHOFER SCORE STANDARD DEVIATION
1	24.2	4.5	2.4
2	14.2	5.3	2.8
3	6.5	7.0	2.7
4	10.5	4.9	2.7
5	7.1	5.4	2.9
6	8.3	6.7	2.5
7	2.0	7.7	2.8
8	4.8	6.6	2.4
9	1.7	8.3	3.2
10	2.0	7.7	3.2
11	1.2	8.7	3.6
12	2.5	8.4	2.8
13	0.6	9.4	3.3
14	1.7	8.3	3.3
15	2.6	6.5	2.9
16	2.7	6.9	2.7
17	0.3	10.6	4.2
18	0.8	8.4	3.6
Unclassified	3.7	--	--
Missing data	2.6	--	--
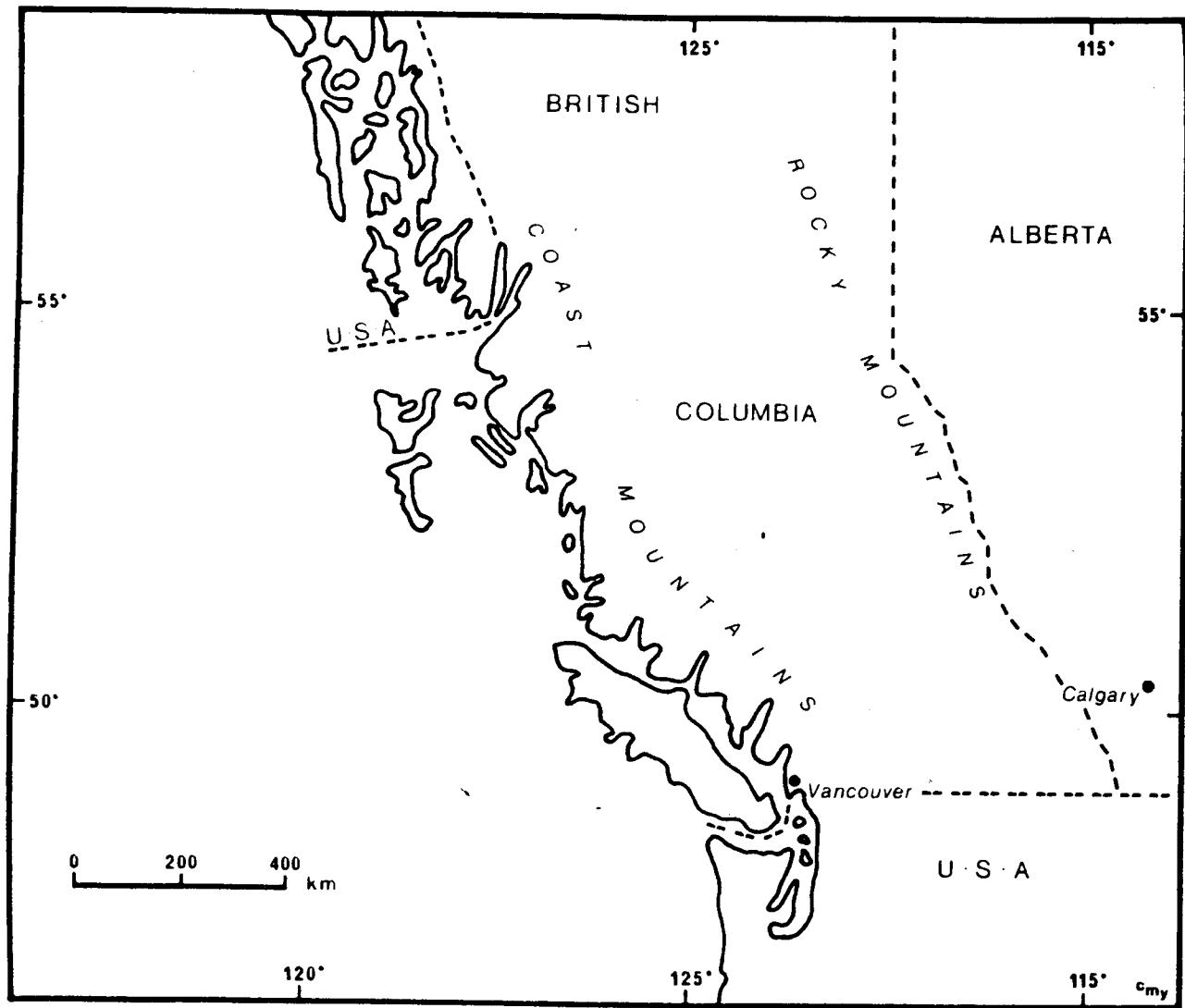
Figure 1. The study area.
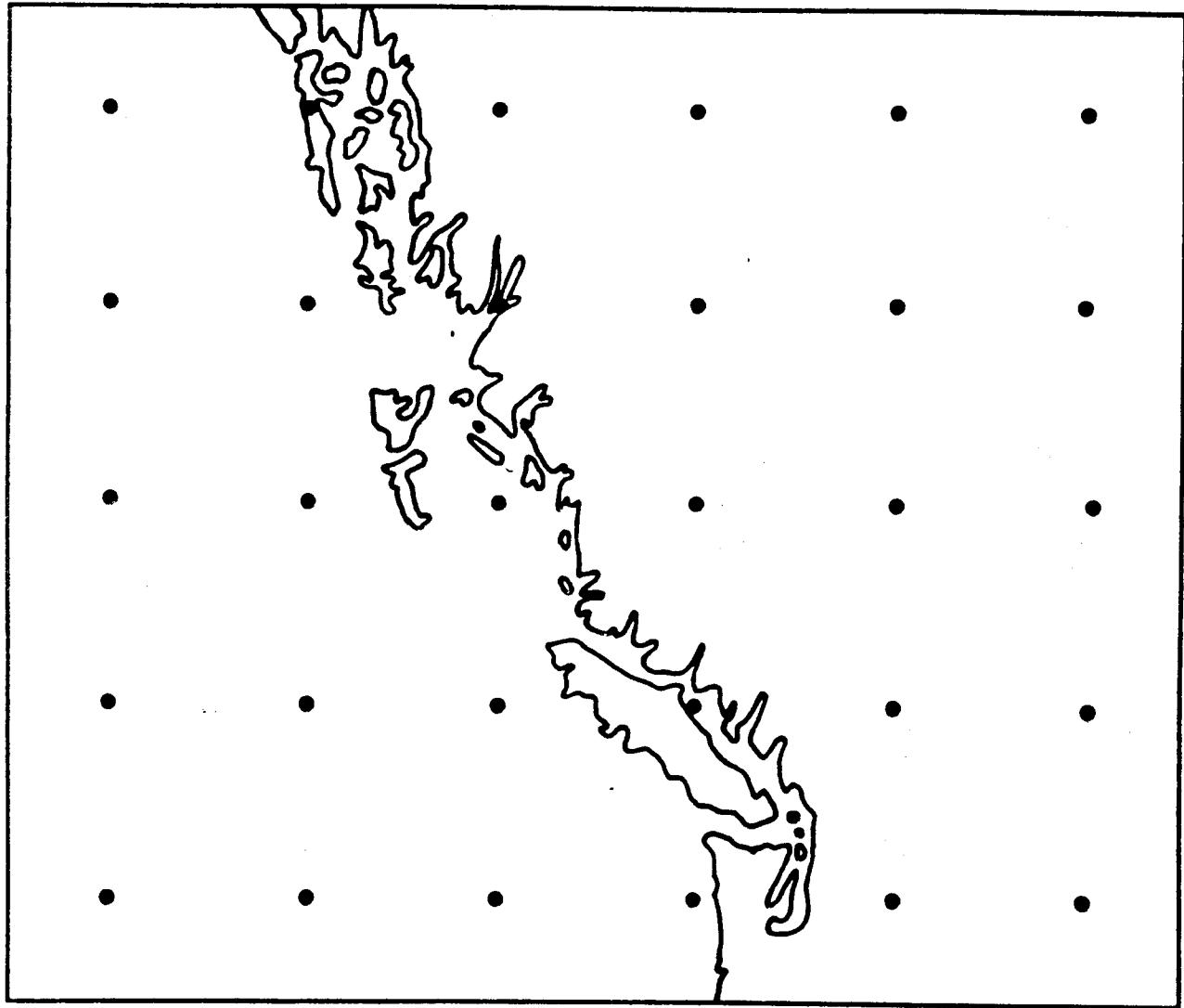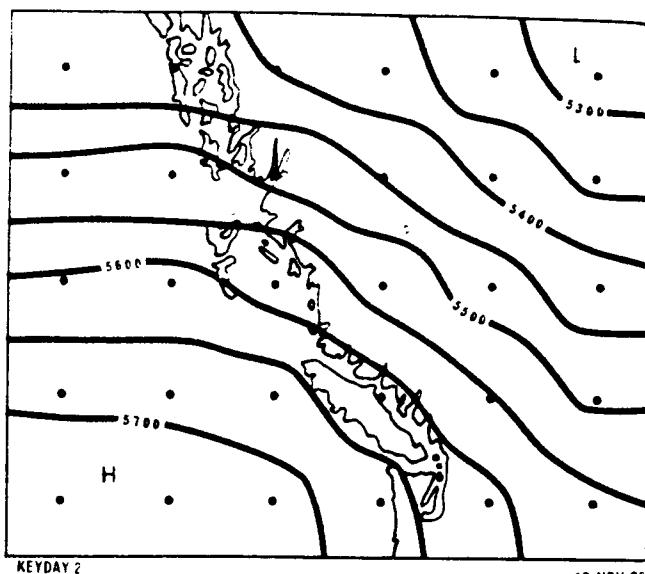
Figure 2.   500mb grid synthesized from National Meteorological Center
            (NMC) grid points.
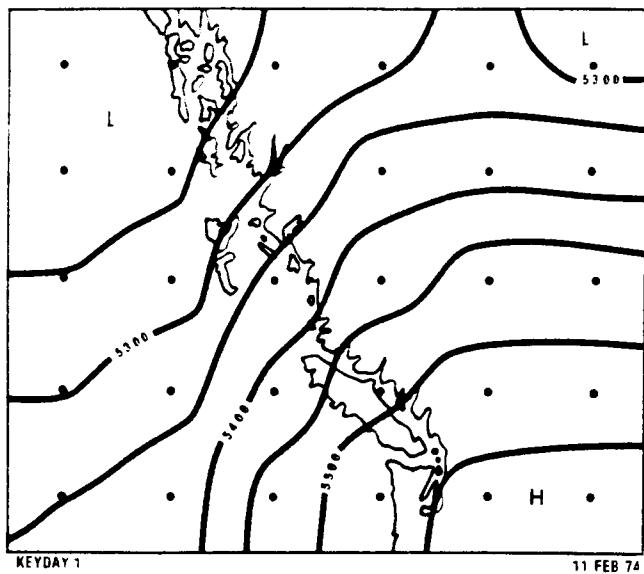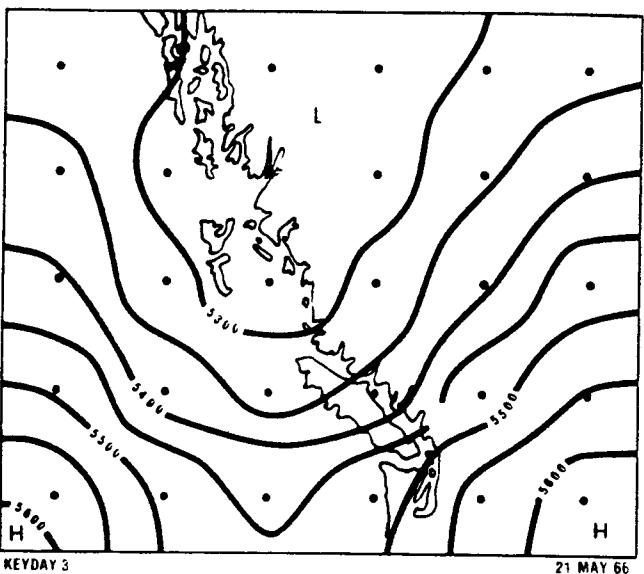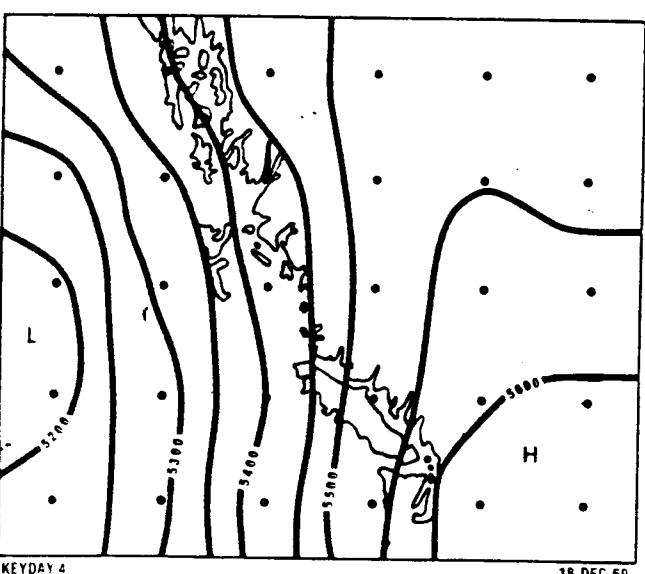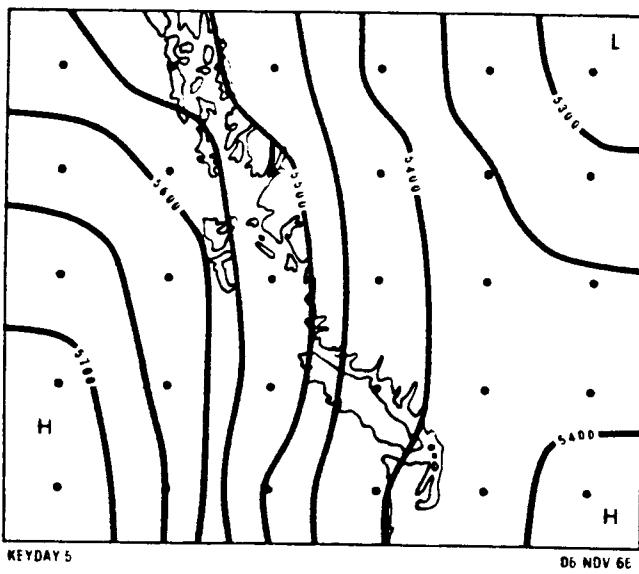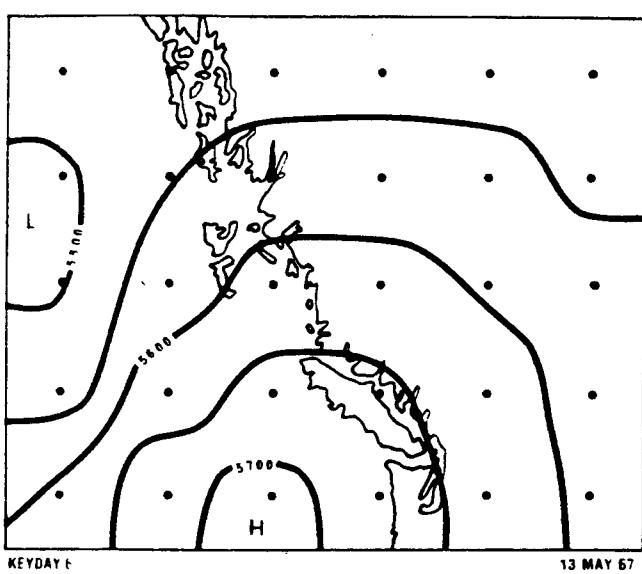
Figure 3. 500mb pressure distributions on Keydays 1 to 6.
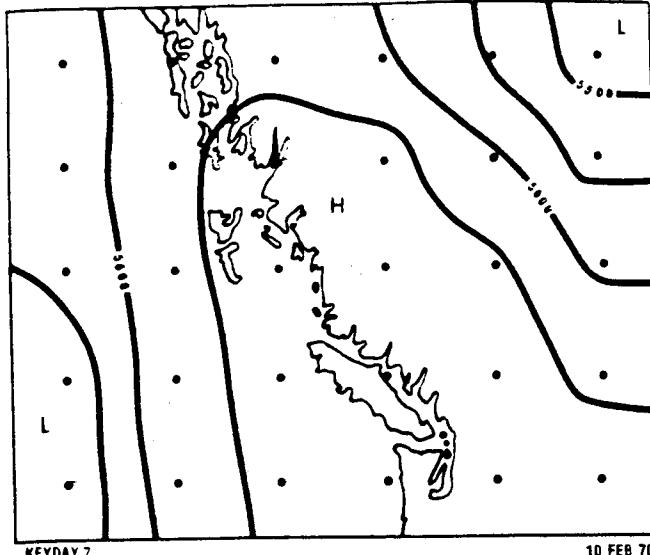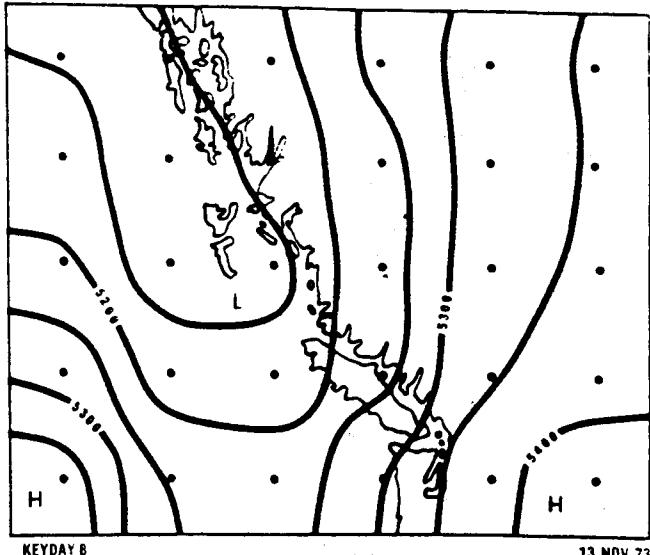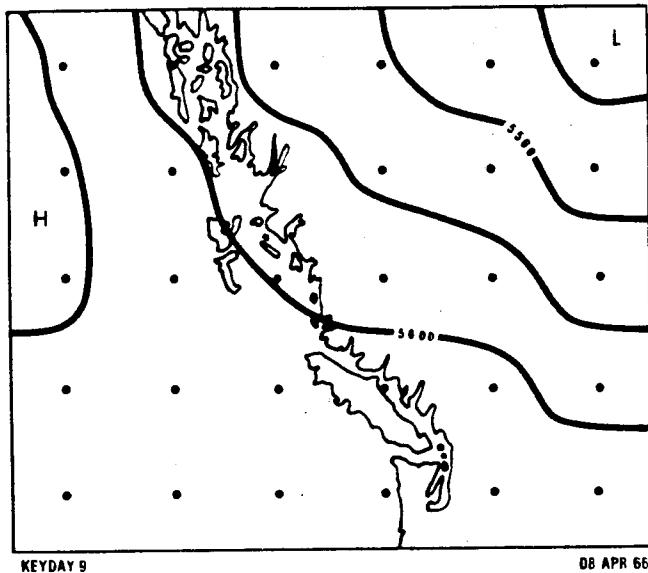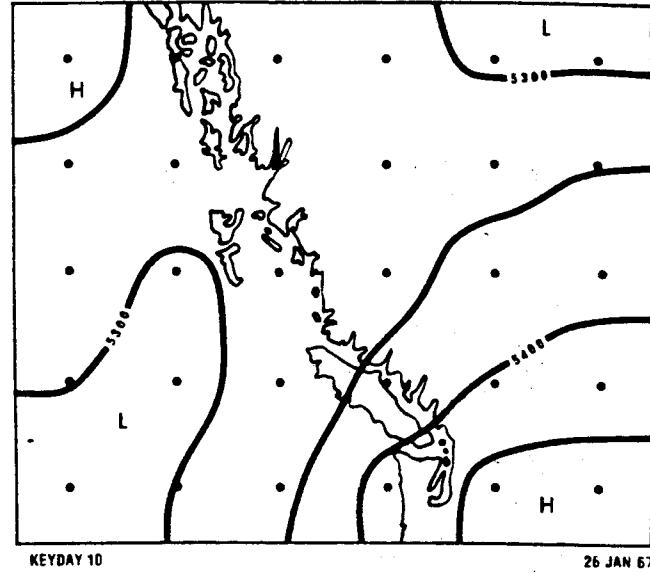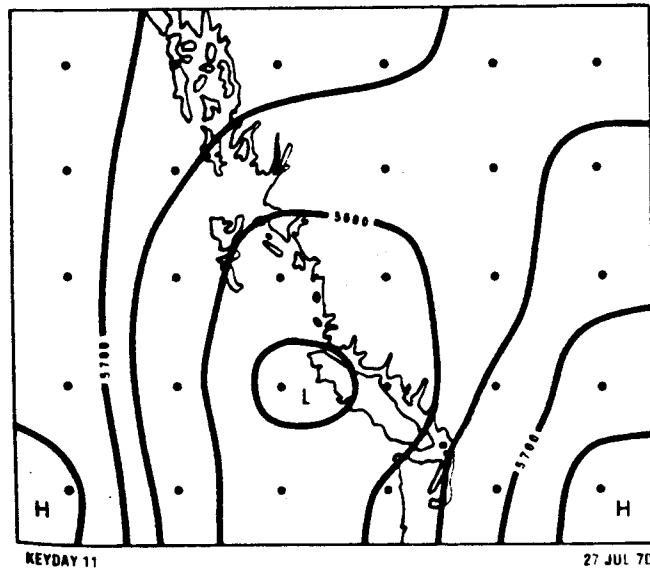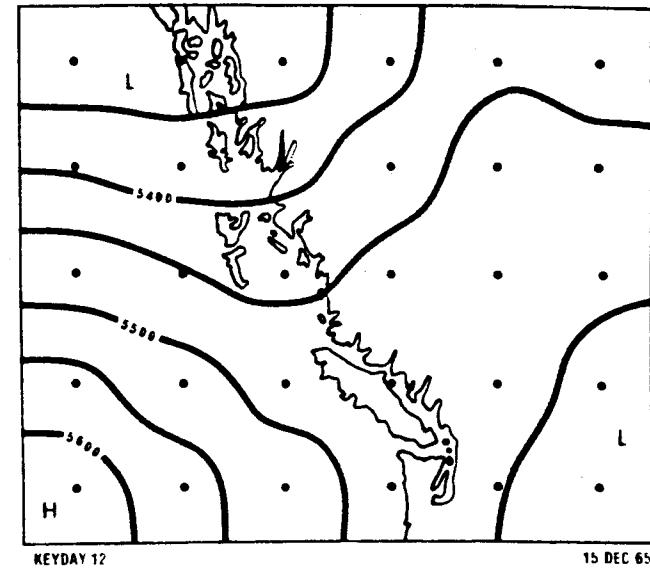
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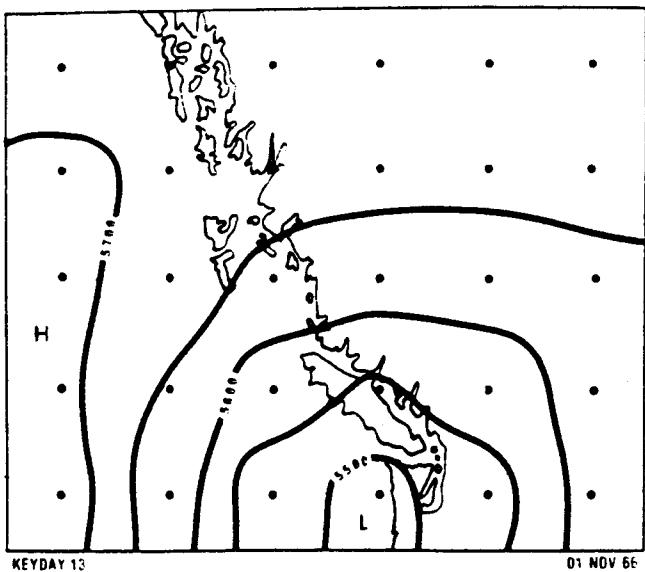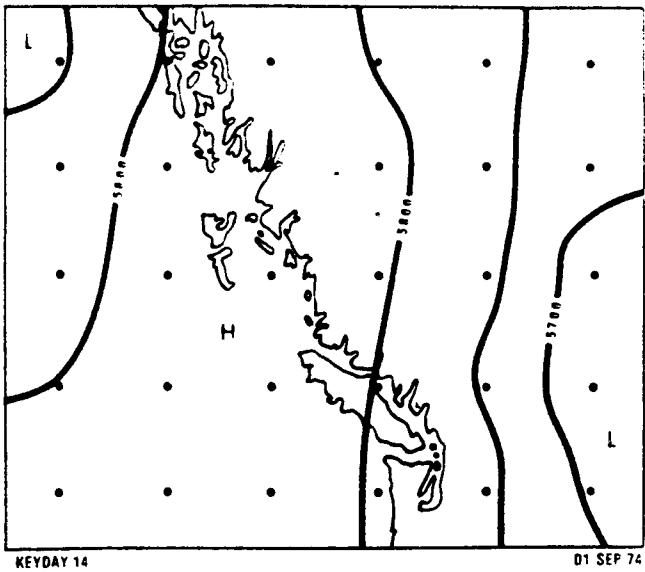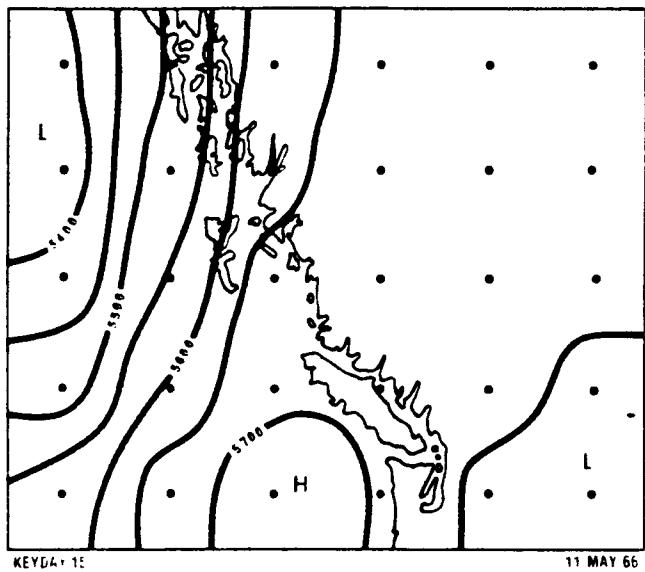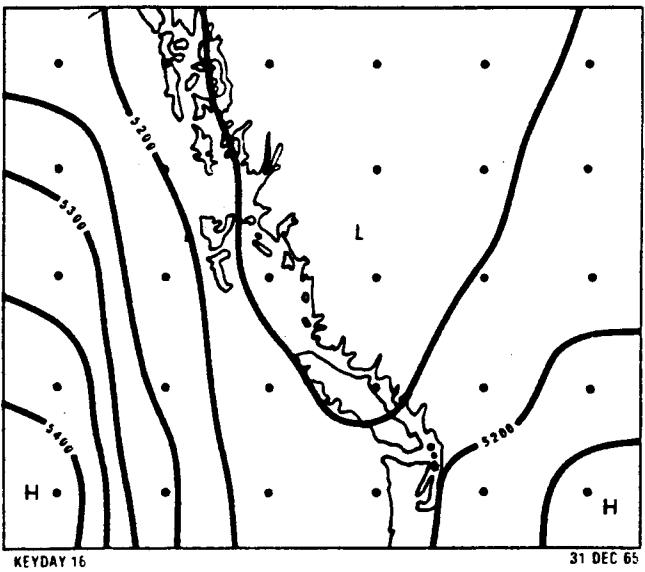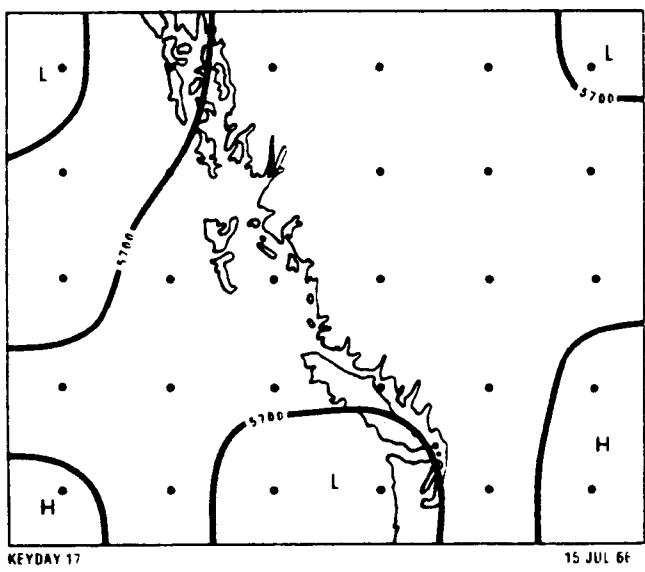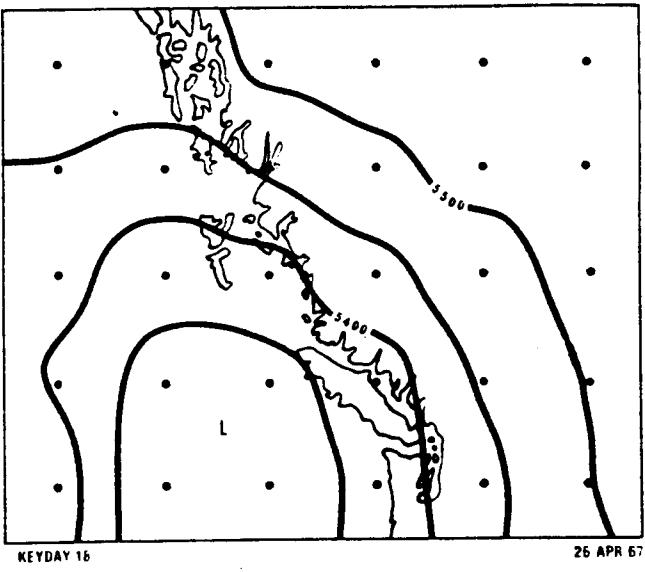
Figure 5.   500mb pressure distributions on Keydays 13 to 18.

1946

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	1	1	1	1	M	6	1	M	1	3	2	6	6	6	1	1	1	1	1	6	1	1	6	1	5	2	2	2	5	2	2
FEB	2	3	16	2	1	8	2	6	1	2	2	2	6	1	2	6	1	6	4	4	4	4	1	1	1	6	1	7			
MAR	1	1	2	2	2	2	2	2	6	3	3	1	1	6	1	6	1	8	1	2	1	1	1	12	6	1	1	1	8	U	5
APR	12	2	12	9	2	16	2	8	8	2	1	1	12	6	1	1	1	1	8	1	1	1	1	1	1	8	3	1	8	12	
MAY	15	4	4	U	U	U	13	U	7	U	14	2	5	2	2	6	6	2	6	12	5	5	14	4	4	4	4	8	15	6	15
JUN	4	4	4	4	4	18	13	U	11	11	U	18	3	8	U	5	6	15	15	1	3	5	13	U	U	U	U	5	U	4	
JUL	4	8	8	1	1	3	3	3	2	1	4	8	11	11	U	U	7	6	1	1	1	2	2	6	1	1	1	1	8	8	3
AUG	1	2	6	1	1	11	2	2	3	3	3	12	2	2	2	2	6	1	1	1	1	1	1	3	9	5	2	13	18	18	U
SEP	U	17	12	16	5	5	14	14	U	4	4	4	4	1	8	U	2	12	15	1	2	2	1	1	1	3	2	2	1	8	
OCT	3	6	12	2	2	6	12	12	2	2	2	2	2	5	5	2	2	6	1	1	1	1	2	2	2	5	5	5	5	5	12
NOV	16	2	1	1	1	1	2	2	2	2	5	U	6	12	2	2	9	3	11	11	U	U	10	5	2	1	1	1	1	1	
DEC	1	1	4	4	8	1	1	3	2	6	2	2	2	1	3	2	2	2	2	2	1	2	2	2	2	2	5	2	5	2	2

U = unclassified

M = missing NCAR data

Appendix

1947

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	5	2	6	1	1	5	2	6	1	3	2	16	5	5	2	6	6	1	3	2	1	1	1	1	1	1	2	16	2	2	2
FEB	2	1	2	6	1	7	7	4	4	4	7	1	1	1	U	5	2	2	2	2	2	6	1	2	14	5	U	14			
MAR	9	7	9	2	2	6	U	9	6	3	2	6	6	15	4	15	1	7	6	6	1	1	2	2	2	2	6	1	1	1	15
APR	1	3	3	2	6	6	1	1	12	1	6	1	6	2	2	7	1	1	1	2	5	5	2	2	6	1	1	1	1	6	
MAY	1	1	1	3	2	1	1	4	8	1	15	1	12	2	1	3	6	2	2	6	2	2	2	7	7	7	7	U	7	U	9
JUN	10	U	16	U	15	4	4	4	4	4	15	15	4	3	1	1	15	1	3	2	2	2	2	2	2	2	16	5	2	6	
JUL	1	3	1	1	8	8	8	8	3	8	1	8	1	1	8	4	10	4	4	4	4	10	8	18	11	11	18	11	16	10	17
AUG	2	2	3	2	2	3	8	3	16	2	16	5	2	2	2	2	2	2	16	5	16	5	5	5	2	2	2	2	2	17	12
SEP	1	1	1	1	3	3	6	12	12	2	6	1	2	2	2	2	5	5	U	2	2	2	2	9	1	6	6	1	6	15	
OCT	8	1	6	3	2	4	1	4	4	8	12	6	6	1	1	1	3	1	1	1	3	1	4	15	1	1	1	1	1	4	1
NOV	1	3	1	2	2	2	2	2	5	2	5	2	2	2	2	2	6	2	2	5	5	14	14	6	6	6	6	6	1	1	
DEC	2	2	16	5	2	5	2	2	2	2	2	2	6	2	2	6	1	1	1	1	1	1	1	1	1	1	1	1	2	2	1

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FEB	5	5	5	5	5	5	2	3	11	5	14	6	2	6	3	1	2	3	2	2	1	6	2	2	6	3	2	5	2		
MAR	1	2	2	6	1	1	6	2	5	14	1	8	3	16	2	8	2	2	16	2	6	3	U	8	8	2	3	9	2	5	2
APR	6	16	11	11	5	16	9	U	5	5	5	2	16	9	9	1	1	2	6	1	4	8	8	15	1	16	13	U	8	8	
MAY	15	15	1	8	1	4	8	5	U	4	15	4	18	U	1	4	8	8	2	12	15	15	15	4	4	4	4	4	U	U	4
JUN	1	1	1	8	6	6	1	1	2	U	18	18	18	18	18	18	U	U	15	1	12	2	2	2	2	6	6	2	1	1	
JUL	3	5	2	3	11	13	U	U	U	8	4	8	U	6	6	14	6	4	12	12	1	1	3	2	2	1	8	5	2	2	6
AUG	6	12	8	8	U	5	5	5	5	12	15	8	8	13	13	13	13	16	5	2	5	5	2	2	2	3	3	3	10	8	1
SEP	1	1	8	2	2	2	2	2	6	1	6	1	1	8	11	16	5	12	1	1	1	8	3	5	2	15	15	1	U	7	
OCT	1	1	1	1	3	2	1	2	1	1	3	1	1	1	2	2	1	1	1	1	1	1	1	1	1	3	6	1	2	1	3
NOV	2	1	8	6	1	6	5	2	2	2	14	6	2	1	1	1	3	6	1	12	2	1	6	3	12	12	2	1	2	6	
DEC	2	1	3	3	3	12	2	2	2	2	2	3	16	5	12	16	5	2	2	2	2	5	6	1	16	3	1	6	1	6	1

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FEB	5	2	16	16	5	3	16	2	2	1	5	5	5	2	2	2	3	2	2	9	U	10	1	1	1	4	1	4			
MAR	4	4	16	9	7	1	9	5	5	5	5	U	5	U	U	10	4	4	10	3	4	U	6	12	3	6	3	2	6	3	2
APR	1	3	1	1	1	6	1	1	1	4	1	2	2	6	1	6	1	1	4	8	1	6	1	1	1	1	4	4	8	12	
MAY	1	8	1	12	6	1	1	1	1	1	1	6	1	1	1	2	5	2	3	11	U	U	9	7	1	10	10	3	3	1	4
JUN	15	6	15	6	6	1	1	1	1	1	3	6	6.	2	2	5	5	5	2	5	2	5	2	2	2	16	12	16	5	12	
JUL	3	2	2	3	3	U	10	7	4	1	15	6	6	1	1	3	2	3	16	12	12	12	3	3	2	2	5	12	12	1	1
AUG	1	1	1	8	8	3	3	12	3	3	3	8	16	12	1	1	8	1	10	10	11	3	U	16	11	U	11	9	U	U	4
SEP	1	2	2	5	5	14	U	4	3	9	5	6	1	1	4	8	6	1	1	6	6	1	1	1	2	6	15	4	4	8	
OCT	2	2	2	1	3	2	5	2	6	2	2.	3	2	1	3	2	5	5	2	2	2	2	1	1	7	1	1	1	2	6	1
NOV	6	1	4	4	1	1	1	1	4	8	4	1	2	1	1	1	1	1	9	7	4	4	1	1	1	1	1	6	6	1	
DEC	1	1	6	1	8	6	2	2	2	5	5	2	2	2	3	5	16	5	5	2	2	2	2	2	2	2	2	9	3	3	3

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FEB	5	2	1	1	4	8	1	1	6	1	12	1	1	1	4	1	1	1	1	2	6	1	1	1	1	3	2	6			
MAR	1	1	1	1	3	9	7	9	16	5	5	9	9	2	6	1	1	1	1	1	1	8	1	U	12	U	6	6	1	2	1
APR	3	2	2	1	4	18	11	16	6	1	4	4	1	1	1	1	2	6	15	1	1	16	2	1	12	3	5	15	15	4	
MAY	18	18	U	15	U	5	14	14	15	1	15	1	1	1	6	4	16	2	2	6	1	2	2	6	1	1	1	6	1	6	2
JUN	2	6	1	1	3	5	13	4	5	13	5	14	12	5	14	14	U	4	4	15	1	3	5	14	15	4	4	4	4	1	
JUL	1	1	1	4	4	1	1	3	8	16	2	1	3	2	2	2	2	1	2	6	4	4	15	15	4	8	8	16	12	2	6
AUG	1	3	16	2	2	16	3	4	10	10	10	10	10	10	10	9	9	7	7	7	7	7	1	1	15	4	1	1	6	1	1
SEP	1	1	8	1	1	3	2	9	14	14	14	14	15	U	U	12	15	1	15	1	4	4	4	1	1	3	2	5	5	5	
OCT	14	U	4	4	4	6	1	3	1	1	1	1	1	3	3	10	10	3	9	2	2	3	2	1	8	1	1	1	10	1	1
NOV	6	6	1	1	6	3	2	14	6	2	5	2	16	16	8	4	10	U	9	3	2	2	1	1	1	1	4	10	9	5	
DEC	5	2	9	2	1	1	1	4	1	1	4	2	6	4	4	4	1	1	1	1	1	1	1	1	6	1	1	6	1	16	2

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JAN	2	2	2	2	2	1	1	6	6	1	12	6	1	1	3	3	3	1	3	1	8	6	6	1	1	2	5	5	5	5	6
FEB	2	10	2	2	2	2	1	1	2	9	9	9	1	1	16	1	3	2	1	5	5	5	2	3	16	5	12	5			
MAR	5	5	5	16	16	11	U	11	16	2	1	1	2	6	3	2	2	7	1	3	2	6	1	3	2	2	1	8	12	1	
APR	4	1	1	3	2	6	2	6	2	2	6	1	9	9	2	9	9	5	5	5	5	5	7	1	1	1	1	8	8	15	
MAY	15	4	4	4	18	4	4	4	4	4	8	U	U	6	1	1	3	2	6	15	1	1	8	1	6	1	3	U	5	5	2
JUN	2	2	5	5	U	U	14	6	1	1	1	1	1	1	2	2	2	2	2	2	5	2	5	5	2	5	2	5	5	5	
JUL	5	2	3	16	11	5	5	5	5	14	7	7	1	4	10	10	10	8	3	2	6	1	3	1	1	3	3	1	1	3	1
AUG	1	1	1	3	3	2	6	2	2	5	16	U	15	1	1	6	2	2	6	1	3	16	5	2	5	5	5	5	5	5	5
SEP	5	14	14	U	4	4	1	6	1	2	2	2	2	7	1	1	6	2	2	5	5	5	2	2	16	2	1	1	1	1	
OCT	1	3	12	2	1	1	1	4	1	4	8	6	1	3	5	2	2	1	3	5	2	6	3	5	2	2	6	2	5	9	14
NOV	14	1	1	2	6	1	1	1	U	10	1	12	12	2	2	7	1	1	10	U	5	2	2	6	1	1	1	1	1	1	
DEC	1	1	1	1	12	2	6	2	2	2	2	2	5	2	2	2	2	16	5	2	2	2	2	2	1	10	U	2	5	5	5

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JAN	2	6	3	1	3	2	2	6	1	3	16	5	8	11	11	5	6	2	3	3	U	U	2	9	7	1	1	1	1	1	1
FEB	1	1	1	1	1	1	2	1	1	1	4	1	1	1	3	12	11	16	5	5	2	12	2	1	1	2	5	2	5		
MAR	5	2	2	2	1	16	2	2	2	16	2	16	1	16	2	2	1	8	8	2	2	6	2	2	2	6	1	3	2	3	1
APR	1	8	1	1	1	3	5	2	2	2	6	1	4	4	1	1	1	1	12	7	1	1	4	1	1	1	1	8	1	4	
MAY	4	10	10	3	2	2	17	15	4	4	4	4	8	12	14	15	1	1	1	12	6	1	6	1	2	7	1	8	12	8	3
JUN	1	1	1	1	1	3	2	2	1	U	13	13	12	U	2	3	2	1	1	3	U	U	U	U	12	12	U	8	8	3	
JUL	6	1	1	3	3	2	6	6	2	9	9	2	2	2	2	2	2	2	12	16	5	U	16	5	9	9	9	9	U	1	1
AUG	6	2	2	5	5	5	5	5	5	5	5	5	2	2	2	2	1	3	2	1	1	1	1	3	5	2	2	2	5	2	5
SEP	2	2	9	2	1	3	3	16	5	2	12	2	2	1	3	6	6	6	6	7	1	1	1	1	1	1	6	6	1	2	
OCT	6	2	9	6	15	1	1	1	2	2	2	2	2	2	2	1	1	4	1	1	1	1	1	9	7	4	1	1	1	1	3
NOV	6	1	1	2	2	6	2	6	1	1	1	1	10	8	16	6	2	6	1	2	2	2	14	14	14	14	2	2	1	4	
DEC	8	1	1	1	8	1	8	1	1	3	1	1	1	1	1	2	7	4	4	1	1	6	6	4	4	4	1	1	4	8	1

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JAN	6	1	6	9	U	9	3	1	1	3	1	3	9	2	6	2	2	6	1	3	1	1	1	1	3	1	2	6	2	2	1
FEB	6	1	1	3	6	6	3	2	6	3	6	1	6	1	6	1	2	5	14	2	6	5	6	2	2	2	2	5			
MAR	5	5	2	2	2	2	2	1	1	1	1	3	2	1	4	8	1	1	8	1	U	6	1	8	1	1	8	3	15	1	2
APR	2	15	1	1	3	12	16	U	U	5	5	5	5	2	2	U	15	4	1	1	1	1	2	7	4	4	4	4	4	18	
MAY	4	6	4	1	1	4	4	8	6	12	15	4	4	U	U	7	15	4	4	4	18	18	18	13	U	12	12	12	12	16	13
JUN	8	18	4	18	4	4	18	13	5	16	17	8	3	2	2	12	2	16	5	U	U	11	5	5	5	U	5	5	16	3	
JUL	3	2	2	2	2	2	U	4	1	4	4	4	4	8	2	6	1	3	2	2	1	3	U	U	U	11	10	10	10	11	16
AUG	2	5	5	5	18	8	8	2	5	2	2	2	2	1	1	4	4	4	8	8	8	10	16	16	U	16	12	16	2	2	2
SEP	2	2	2	6	6	1	1	1	1	1	4	1	1	6	1	2	2	2	2	6	1	3	2	6	2	3	1	3	1	10	
OCT	1	12	1	15	4	1	1	1	4	8	15	1	1	1	4	1	4	8	1	2	2	15	1	2	2	6	1	1	2	1	1
NOV	1	6	1	1	8	1	4	1	4	4	4	4	4	4	1	1	5	6	8	12	1	1	1	6	3	1	1	1	1	3	
DEC	2	2	3	2	1	1	2	6	1	2	1	2	6	2	7	4	4	1	10	2	6	1	1	6	6	2	2	2	2	6	2

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FEB	6	1	1	1	4	1	1	1	2	9	9	10	3	3	1	1	1	12	1	1	1	6	1	2	2	2	2	2			
MAR	2	6	6	1	3	6	1	1	4	U	U	6	1	6	U	11	4	8	16	5	5	5	5	5	2	5	5	5	5	5	9
APR	9	9	3	9	3	1	1	8	12	2	1	1	1	2	1	1	2	2	2	2	2	5	2	2	16	16	9	5	5	5	
MAY	2	1	1	4	1	6	2	7	1	1	8	U	2	1	1	1	1	1	1	3	2	6	4	4	8	U	U	4	4	4	8
JUN	15	15	4	18	U	14	U	U	15	4	4	4	1	1	8	U	U	U	4	1	1	1	3	2	10	8	U	15	4	4	
JUL	15	4	4	4	4	4	4	4	8	10	10	3	1	4	1	1	4.	4	8	16	2	2	2	2	3	3	16	9	5	9	2
AUG	2	U	U	5	2	2	U	11	11	U	U	5	5	U	12	12	2	5	5	5	2	2	5	5	13	13	U	U	8	10	4
SEP	10	3	5	5	15	15	1	4	10	11	U	U	3	11	13	5	5	5	5	2	1	6	6	6	1	2	2	5	5	5	
OCT	5	5	2	9	7	4	3	1	6	1	6	2	2	1	1	4	1	1	4	1	1	1	2	6	6	1	2	2	2	2	6
NOV	1	6	1	1	1	1	4	4	8	1	4	1	1	1	1	1	1	1	1	1	1	1	1	4	1	6	2	5	6	12	
DEC	5	2	1	4	1	3	6	1	8	6	1	1	6	1	2	6	1	4	1	1	1	1	4	1	12	2	6	2	2	6	2

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JAN	2	2	2	1	2	6	2	9	5	14	6	1	2	2	U	1	1	U	6	2	2	6	2	7	6	6	6	1	1	1	1
FEB	12	2	2	12	2	1	3	3	5	6	1	1	1	3	1	3	5	2	5	2	2	5	2	5	5	5	2	3			
MAR	2	16	5	5	5	2	6	9	5	2	6	3	16	5.2	5	2	2	5	2	2	5	5	2	6	6	1	1	18	15	1	
APR	8	12	5	6	15	1	1	1	1	1	1	8	3	5	12	16	5	U	U	U	8	12	3	3	1	16	U	U	5	2	
MAY	2	1	1	1	3	6	1	2	6	6	1	16	5	U	15	15	15	1	1	1	2	2	5	12	6	8	15	1	1	16	5
JUN	2	2	6	6	2	2	6	15	4	4	15	1	1	8	12	1	3	3	9	10	4	18	U	U	U	15	1	17	12	16	
JUL	5	U	5	13	13	U	U	U	U	15	15	1	1	1	U	U	U	8	3	3	10	4	8	8	11	11	16	2	2	2	3
AUG	3	2	2	2	6	1	1	2	6	1	1	2	1	1	3	3	6	1	3	9	9	10	16	16	U	12	2	2	4	4	4
SEP	1	1	6	6	6	2	9	5	9	7.8	1	4	8	16	5	2	6	2	5	5	6	2	12	6	2	2	2	2	2		
OCT	1	1	8	3	2	1	1	1	1	8	1	6	1	1	1	6	1	3	2	1	2	6	1	1	1	3	6	2	1	16	U
NOV	U	3	1	3	6	6	1	6	6.2	5	5	5	5	14	U	12	1	10	3	2	2	2	1	3	9	7	4	1	1		
DEC	12	5	2	6	1	1	6	1	1	1	1	5	2	6	9	9	5	6	1	1	1	3	16	1	8	3	5	5	2	15	4

U = unclassified

M = missing NCAR data

1956

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	4	4	1	1	4	8	U	10	4	4	4	4	4	7	10	1	1	1	1	1	1	4	4	4	U	U	16	5	5	14	14
FEB	6	6	6	3	2	2	2	6	2	2	2	2	2	5	5	2	5	12	8	4	18	11	16	5	5	2	2	3	2		
MAR	2	6	1	8	16	2	1	2	5	5	14	2	5	2	2	2	6	1	3	9	4	4	1	1	1	3	6	1	1	3	5
APR	2	2	6	2	2	6	12	1	3	4	12	6	6	1	1	1	15	1	1	1	4	U	5	5	5	9	2	2	2	5	
MAY	5	5	5	13	18	4	2	2	15	12	16	5	2	6	6	1	1	1	4	4	1	4	4	1	1	8	6	12	2	15	1
JUN	4	4	8	U	U	1	1	4	8	8	16	U	1	8	8	15	15	4	8	8	15	1	3	3	6	1	1	3	5	5	
JUL	5	U	8	8	8	15	1	1	1	1	12	2	9	2	4	7	4	1	1	4	1	1	1	1	2	3	3	U	U	10	3
AUG	16	12	U	1	1	1	1	2	5	5	5	5	2	1	4	4	4	4	4	1	6	1	1	8	U	12	2	6	2	2	1
SEP	2	5	2	2	2	1	1	8	18	11	5	5	5	5	9	U	1	1	1	3	12	6	1	6	1	3	2	2	3	2	
OCT	6	2	1	1	6	1	6	4	4	U	12	12	2	2	1	1	1	1	1	1	6	8	16	3	3	16	5	12	1	8	12
NOV	12	6	1	1	1	6	6	1	1	1	6	1	2	6	1	6	2	5	2	2	6	2	1	1	1	1	U	15	1	6	
DEC	1	6	3	5	5	5	2	6	6	2	2	2	2	2	2	2	1	2	1	1	2	1	1	6	1	1	6	1	1	1	1

U = unclassified

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JAN	3	6	12	5	2	6	16	5	9	9	9	U	5	9	U	U	7	1	9	5	5	5	5	5	5	5	5	5	5	2	5
FEB	5	9	5	2	9	9	9	2	2	1	12	2	1	2	2	2	2	5	5	5	9	9	3	3	1	1	2	6			
MAR	1	U	14	U	8	15	1	4	8	1	1	8	12	8	16	13	14	12	1	8	12	6	1	1	3	2	2	7	10	4	1
APR	6	6	2	6	2	5	2	2	2	2	9	U	10	U	4	8	8	1	4	12	1	1	12	12	2	2	1	1	1	4	
MAY	4	4	4	4	1	1	9	U	7	U	7	4	8	4	4	15	4	4	U	U	15	U	2	7	1	1	1	1	1	7	7
JUN	10	U	10	10	10	7	7	9	9	2	1	1	3	5	5	7	4	1	1	8	U	1	1	2	6	6	6	3	3	3	
JUL	16	5	2	6	1	3	1	10	3	10	10	8	4	8	3	16	5	5	2	2	3	1	1	1	1	3	3	1	3	8	U
AUG	11	U	18	11	3	3	8	11	11	11	11	U	9	9	U	U	4	4	8	3	1	1	8	16	5	5	5	5	U	U	15
SEP	1	1	6	4	4	4	3	2	2	2	2	5	2	2	2	5	5	5	2	2	2	2	2	7	4	4	U	U	2	1	
OCT	1	3	16	13	13	U	U	13	U	4	4	4	8	2	6	3	14	U	14	2	5	5	11	4	4	1	6	6	1	3	2
NOV	5	U	6	1	1	2	2	6	1	1	6	1	U	12	12	12	6	2	2	14	2	2	2	1	1	2	6	2	6	1	
DEC	3	6	1	3	2	6	6	1	2	1	1	2	1	3	1	1	1	3	1	1	1	1	1	3	1	3	1	1	3	6	1

U = unclassified

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JAN	4	4	1	1	6	4	4	1	1	1	6	1	6	1	1	1	1	15	4	8	12	6	1	1	1	1	1	4	4	U	7
FEB	7	10	U	U	U	9	1	4	1	1	4	1	9	7	1	1	4	4	4	1	4	1	1	4	4	1	12	6			
MAR	12	5	5	2	16	2	8	U	U	16	5	13	13	16	U	18	U	2	10	10	10	U	4	4	4	15	12	4	U	11	4
APR	7	4	18	18	18	8	15	8	6	6	15	1	1	1	1	1	4	1	1	1	2	5	5	5	5	5	5	U	5	2	
MAY	2	2	1	1	1	15	4	12	6	1	8	1	15	4	1	2	2	7	4	4	1	1	7	2	2	2	U	U	11	U	U
JUN	U	U	U	U	9	U	U	U	U	2	5	2	2	2	2	2	2	2	5	14	6	6	1	4	4	8	8	U	5	U	
JUL	14	U	6	7	U	14	5	5	2	2	1	2	5	14	2	2	6	1	6	6	1	2	2	6	2	2	2	2	6	1	1
AUG	1	1	3	6	1	1	1	3	3	1	4	4	1	1	1	1	1	1	1	6	2	2	6	6	1	2	2	6	3	6	1
SEP	3	2	12	2	2	6	1	1	4	4	U	8	2	2	6	1	3	6	3	6	3	3	5	6	2	2	6	2	2	2	
OCT	2	2	2	6	3	2	12	2	2	2	1	1	1	10	9	1	1	4	3	6	4	8	3	1	4	4	1	1	1	4	4
NOV	1	1	1	2	6	1	6	6	3	6	3	1	3	16	5	6	1	1	6	1	1	2	2	2	2	5	14	6	1	1	
DEC	1	1	2	5	9	2	9	2	2	1	1	2	6	1	1	6	1	2	1	4	1	1	4	1	1	10	10	6	1	6	1

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JAN	2	5	5	9	9	1	1	4	4	4	1	8	3	2	1	1	1	2	5	5	2	2	1	1	1	1	1	2	2	2	2
FEB	14	2	2	2	2	16	5	5	16	16	5	1	10	U	U	U	U	U	4	1	1	1	1	6	1	2	6	1			
MAR	2	6	2	6	12	1	6	3	3	2	1	1	2	2	2	1	1	3	2	1	1	1	2	6	1	8	1	1	6	16	1
APR	1	2	1	6	1	2	6	7	15	4	4	3	12	16	5	2	5	5	2	2	9	9	5	2	2	1	3	6	1	3	
MAY	3	16	12	16	2	6	1	3	2	2	2	4	4	4	4	4	4	U	U	2	5	5	2	2	5	5	5	5	5	2	6
JUN	1	4	1	1	8	8	1	4	U	U	8	8	10	11	U	U	U	1	10	4	1	1	1	10	10	U	U	5	2	6	
JUL	1	3	2	1	8	16	14	7	7	4	1	1	2	1	1	1	1	1	6	2	2	1	1	1	1	3	16	5	2	6	1
AUG	1	3	1	3	2	1	1	2	6	3	9	5	2	2	2	3	16	5	5	2	12	2	2	5	5	2	16	16	2	1	2
SEP	2	1	3	3	3	2	3	2	1	1	4	4	4	18	8	U	18	18	3	2	2	2	6	1	2	2	5	5	5	5	
OCT	5	2	2	2	2	2	2	3	2	2	2	2	6	1	2	2	1	1	1	3	1	1	6	1	2	1	6	2	14	6	2
NOV	6	2	2	2	6	2	2	2	2	2	2	5	2	2	5	6	1	1	1	1	6	1	6	6	2	6	15	1	1	6	
DEC	1	1	2	2	6	1	2	6	1	1	4	3	6	1	1	1	1	4	4	1	15	4	1	8	8	15	1	6	6	16	5

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JAN	2	5	14	2	6	2	2	16	2	3	3	2	1	8	12	2	15	U	U	U	U	U	9	9	9	9	9	7	1	1	4
FEB	4	4	4	1	1	4	1	10	5	2	1	1	6	1	3	2	7	5	2	6	5	5	14	5	5	5	5	5	5		
MAR	5	5	9	10	10	1	4	8	3	6	6	1	1	12	2	2	6	6	1	4	1	1	6	1	1	1	1	1	1	1	1
APR	6	1	1	1	1	1	4	4	4	1	4	1	1	8	12	6	4	1	1	1	16	5	5	U	18	18	4	4	15	4	
MAY	1	7	U	2	7	4	4	10	4	4	10	10	2	6	4	1	U	U	1	8	13	13	13	U	U	4	1	1	1	1	6
JUN	1	6	2	2	3	3	2	2	6	1	1	6	1	6	1.	3	2	8	11	5	14	12	1	16	5	5	2	6	15	1	
JUL	1	1	6	6	1	1	1	3	M	1	4	4	4	4	4	4	1	M	1	1	3	9	2	2	2	2	2	7	1	1	
AUG	1	15	1	12	2	5	14	14	15	4	4	1	3	16	12	2	6	1	3	1	M	16	16	16	16	5	2	1	3	3	3
SEP	3	M	1	8	3	2	2	6	1	M	7	4	M	12	M	M	6	M	M	2	M	M	6	1	2	6	7	9	2	M	
OCT	M	M	1	9	1	4	8	16	2	15	8	2	6	6	1	6	7	7	7	1	1	1	1	1	4	1	6	2	6	1	1
NOV	6	2	2	2	1	1	5	2	2	7	10	U	8	16	2	2	1	1	1	1	3	4	1	4	3	3	7	4	4	4	
DEC	8	2	3	5	2	6	7	4	4	4	4	1	3	2	7	U	U	7	2	6	6	1	1	1	7	6	2	6	1	2	2

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	2	6	1	1	1	1	4	1	1	1	1	1	1	1	1	1	3	7	7	4	4	4	4	7	U	14	9	9	9	10	1
FEB	1	1	6	1	1	4	1	4	1	1	8	1	3	1	3	2	16	2	2	1	1	2	1	1	2	6	2	6			
MAR	1	2	5	2	3	2	1	4	8	1	4	1	1	4	4	1	4	M	4	8	1	M	8	8	4	18	U	6	2	7	15
APR	1	1	3	2	2	2	2	2	5	2	6	16	2	2	1	1	8	3	12	1	11	U	5	5	14	14	U	U	M	4	
MAY	4	8	U	12	16	5	1	10	10	11	5	2	1	2	14	14	U	15	15	1	4	18	18	4	4	4	4	4	8	12	M
JUN	15	15	15	4	4	4	4	4	4	4	4	15	4	4	1	1	1	4	4	1	1	1	1	4	1	3	U	11	18	U	
JUL	3	3	3	1	4	U	8	1	1	2	2	2	M	3	3	16	2	2	U	15	3	2	3	M	2	9	5	5	2	11	U
AUG	10	10	10	1	4	6	12	2	5	2	6	1	1	1	1	16	5	M	11	10	4	1	1	1	1	1	2	M	M	1	1
SEP	16	16	2	1	3	2	5	2	2	5	14	U	15	4	18	3	2	2	12	5	5	5	2	2	2	2	2	16	2	2	
OCT	2	6	6	1	1	2	5	2	1	3	1	6	1	1	1	3	2	6	16	5	5	2	M	6	1	8	16	5	2	2	6
NOV	2	2	2	2	1	2	1	1	1	1	2	2	6	2	5	6	1	3	2	M	M	M	M	M	M	M	M	9	10	9	
DEC	9	2	2	1	2	2	5	5	5	M	M	M	M	2	12	2	12	12	1	1	3	1	1	1	12	2	6	1	1	6	M

U = unclassified

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	M	M	3	6	1	2	2	2	14	1	1	5	5	2	5	2	U	5	5	5	5	5	2	2	2	6	2	1	6	1	1
FEB	1	1	3	9	7	7	4	4	4	1	1	10	10	7	10	10	7	2	5	5	5	5	5	5	5	5	5	5			
MAR	16	5	5	U	10	M	2	2	5	16	5	2	1	2	1	4	16	2	2	3	2	3	1	1	1	3	16	14	14	7	6
APR	2	6	15	1	6	1	2	5	2	2	6	4	4	4	1	1	4	4	1	1	1	1	1	4	1	1	8	16	12	1	
MAY	1	1	10	10	U	3	9	9	M	M	M	U	12	16	5	15	12	16	13	16	6	3	11	U	16	5	12	1	4	4	8
JUN	M	8	16	12	12	6	15	1	3	16	16	5	5	12	12	1	1	10	10	10	U	6	1	4	4	8	2	1	1	8	
JUL	3	2	2	2	11	5	2	9	9	2	1	1	M	6	U	3	16	5	U	1	M	4	15	M	1	6	7	7	7	7	4
AUG	4	8	11	U	12	3	11	3	1	1	4	4	10	10	4	8	3	3	6	1	2	2	6	1	3	M	5	5	5	5	2
SEP	M	9	5	2	2	2	5	2	1	3	2	2	1	1	M	M	1	1	1	15	15	1	6	15	4	1	1	4	15	1	
OCT	1	4	8	U	1	8	1	1	4	4	4	8	8	M	2	12	6	M	2	6	6	2	2	6	4	1	15	M	1	1	6
NOV	6	1	4	4	1	6	1	1	4	1	1	1	1	1	1	2	2	2	6	6	6	2	1	1	1	1	1	1	1	1	
DEC	1	10	12	6	1	6	6	2	1	1	4	4	4	4	1	1	4	1	6	2	5	5	5	5	2	2	2	1	1	3	

U = unclassified

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	1	1	12	6	1	2	6	2	5	5	5	5	2	5	5	5	5	5	2	9	9	9	5	5	5	5	5	5	U	9	
FEB	9	6	1	1	1	4	4	4	4	4	U	4	M	4	7	U	2	2	7	7	1	6	6	M	1	1	6	1			
MAR	6	5	5	12	5	9	9	5	2	2	5	5	6	16	6	16	2	2	6	1	1	8	10	10	U	9	1	4	4	10	16
APR	5	12	1	1	1	10	U	16	5	4	4	4	4	8	U	12	8	U	13	5	5	6	4	8	4	4	4	4	4		
MAY	U	U	U	U	4	10	10	U	U	16	U	U	15	1	1	6	7	7	4	4	4	4	1	1	1	7	1	7	1	1	1
JUN	1	3	15	1	12	2	2	12	5	2	1	6	1	1	1	1	6	4	8	3	U	5	12	1	3	3	16	16	16	13	
JUL	11	18	U	18	18	18	8	U	3	5	2	6	3	3	5	5	2	U	1	8	M	8	3	16	5	6	3	2	2	9	5
AUG	5	2	9	U	2	U	1	4	1	10	U	18	18	18	U	U	11	11	18	12	2	5	5	5	5	5	5	5	U	U	4
SEP	4	4	4	4	1	1	1	1	4	4	4	4	8	12	3	16	2	6	6	4	1	4	1	4	1	1	10	4	,4	1	
OCT	1	1	1	10	11	U	17	4	1	4	4	1	4	4	8	1	1	1	1	4	1	1	1	1	1	1	1	1	1	1	15
NOV	4	1	1	8	1	3	1	1	1	4	4	4	10	10	12	2	3	3	3	2	2	1	1	2	1	1	3	6	1	6	
DEC	15	1	1	1	1	2	6	11	5	5	5	14	2	2	9	7	7	1	1	11	6	1	1	1	1	1	6	1	15	1	1

U = unclassified

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	1	6	1	2	1	2	2	6	8	12	2	1	1	2	1	1	8	3	1	1	8	16	2	6	1	15	1	1	8	1	4
FEB	2	6	1	1	2	6	2	2	6	1	2	1	2	1	12	6	2	6	2	6	2	14	2	5	14	2	6	3	2		
MAR	3	2	2	6	5	5	5	6	2	6	8	3	2	1	2	6	3	2	6	3	16	5	5	5	2	2	2	M	1	1	1
APR	8	16	6	3	5	14	12	6	1	1	3	2	2	1	3	5	5	5	2	2	2	5	5	2	12	12	3	1	8	8	
MAY	8	U	U	12	16	5	2	12	1	12	1	8	U	U	2	1	4	4	8	8	3	5	12	16	5	6	15	4	U	U	4
JUN	4	4	4	4	4	4	U	13	5	U	12	7	4	4	4	4	15	U	15	12	12	1	1	10	10	11	U	2	3	2	
JUL	6	17	U	15	1	1	4	4	4	1	1	1	1	8	18	4	U	8	1	4	8	3	2	2	2	2	6	1	8	11	M
AUG	U	U	4	8	6	4	8	1	3	6	4	4	12	6	1	1	8	3	2	2	2	2	2	3	5	3	5	12	5	5	
SEP	5	5	U	5	5	2	16	5	5	9	7	4	4	1	1	1	3	2	6	2	6	2	2	2	5	2	2	6	1	1	
OCT	2	3	2	6	7	4	4	4	1	1	4	4	1	1	1	2	2	1	1	1	7	1	1	1	3	10	2	1	1	1	1
NOV	1	1	4	1	2	1	3	3	1	8	8	8	16	5	14	2	2	14	14	7	1	4	1	3	6	16	16	2	6	1	
DEC	1	12	6	15	6	1	4	1	6	1	16	12	2	2	5	5	2	3	10	4	10	10	2	9	2	4	4	3	3	16	12

U = unclassified

M = missing NCAR data

1965

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	1	8	11	3	1	11	2	2	6	2	2	2	6	6	1	1	1	4	4	1	4	1	10	16	2	2	2	6	6	1	2
FEB	2	7	1	1	3	2	6	2	2	2	2	6	2	2	2	2	6	1	1	2	1	5	2	6	1	1	3	2			
MAR	6	15	4	1	4	U	12	2	14	14	5	14	2	2	2	5	5	5	5	5	9	5	5	5	5	5	5	6	3	2	1
APR	8	16	6	1	16	U	8	1	8	U	12	1	3	U	U	U	9	9	9	10	1	15	1	1	6	15	4	1	1	8	
MAY	16	2	1	3	16	14	15	12	12	1	1	1	1	1	4	8	U	10	U	5	17	12	12	5	6	6	1	1	8	5	14
JUN	2	1	2	6	12	9	7	M	4	4	4	8	15	8	12	12	15	12	2	6	2	6	4	1	8	8	U	U	U	14	
JUL	15	1	15	15	6	6	3	16	13	13	5	14	7	1	1	1	8	3	3	3	U	2	2	1	1	4	4	4	4	4	15
AUG	15	1	15	U	4	4	4	4	18	U	1	8	9	9	9	2	2	7	4	4	4	4	U	12	15	4	3	16	5	2	6
SEP	2	2	5	5	5	5	2	5	5	5	5	2	2	2	2	5	5	5	5	5	5	5	5	2	5	5	14	12	6	6	
OCT	1	1	4	4	4	1	1	1	3	7	1	1	6	1	12	6	1	1	1	1	1	1	1	1	1	1	4	1	1	M	1
NOV	1	1	4	1	10	10	U	4	4	10	9	9	9	9	2	1	4	4	3	12	6	8	11	16	5	U	6	1	4	1	
DEC	1	1	1	1	4	4	4	1	3	15	8	2	5	6	12	2	6	1	6	1	2	6	1	10	3	10	U	11	3	3	-16

U = unclassified

M = missing NCAR data

1966

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JAN	6	3	3	8	1	1	1	8	2	1	2	6	1	12	6	6	1	5	5	2	2	2	5	6	7	7	6	7	10	8	1
FEB	7	1	1	1	3	U	12	2	2	2	3	5	5	5	14	2	M	2	1	1	1	4	4	4	8	1	3	1			
MAR	16	16	6	4	4	4	1	1	1	1	2	4	4	4	4	18	15	4	8	3	2	6	1	6	6	1	1	1	1	1	6
APR	1	2	14	6	2	9	9	9	M	3	3	3	1	1	3	5	5	5	5	2	2	2	2	6	3	5	2	2	6	1	
MAY	1	4	1	6	1	4	4	4	8	12	15	8	16	12	1	3	2	6	12	M	3	2	6	6	1	8	8	3	3	11	13
JUN	13	13	U	U	9	7	1	4	4	4	U	6	M	6	15	4	4	4	4	4	8	3	3	2	1	4	4	8	10	10	
JUL	11	U	U	5	5	13	16	2	2	16	5	5	13	U	17	4	4	4	3	9	7	7	U	11	5	5	M	12	3	1	1
AUG	1	1	1	3	U	15	4	1	12	3	2	2	3	6	3	3	2	2	14	6	8	17	17	17	1	1	8	11	17	12	6
SEP	1	6	6	1	1	1	1	4	4	8	16	U	U	4	4	4	4	8	6	6	1	1	4	4	4	15	1	6	2	6	
OCT	2	5	2	1	1	1	1	2	6	1	3	16	6	12	2	1	2	1	1	8	12	6	1	1	1	1	6	1	1	6	6
NOV	1	2	2	2	2	5	5	2	2	2	2	1	1	4	4	4	10	10	4	10	16	5	2	2	2	6	1	1	7	10	
DEC	18	4	4	U	8	8	3	2	1	1	4	1	1	1	1	1	1	1	1	1	15	1	4	8	5	14	6	2	2	2	6

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JAN	2	6	1	3	5	2	6	2	1	1	1	6	2	2	1	2	5	6	1	1	1	10	10	10	10	10	1	1	1	1	6
FEB	1	6	2	3	2	2	2	1	6	2	1	1	3	2	16	2	6	5	2	M	14	6	1	4	1	4	4	1			
MAR	3	5	5	5	5	2	2	2	3	11	11	5	16	U	10	4	4	8	1	M	1	1	8	3	3	2	1	8	12	16	5
APR	5	5	2	5	5	5	2	6	8	3	2	1	8	11	12	11	13	5	5	5	5	4	1	8	8	18	13	13	M	13	
MAY	14	14	14	5	2	2	2	3	11	16	13	2	6	6	6	1	1	6	6	1	1	1	3	16	U	1	4	4	8	U	U
JUN	12	12	5	5	2	2	2	5	5	2	5	5	2	2	6	2	2	7	7	4	U	5	5	14	6	1	6	1	3	2	
JUL	6	6	1	3	2	3	M	3	2	1	4	4	4	1	1	1	8	1	8	16	5	2	9	9	9	2	6	1	1	3	9
AUG	2	2	1	10	16	U	2	6	15	1	1	10	10	7	10	7	4	1	1	1	1	1	1	2	6	1	1	4	4	4	4
SEP	8	6	1	1	4	1	1	1	1	1	3	6	15	15	M	4	4	15	6	6	1	2	1	M	M	6	1	1	4	8	
OCT	8	18	U	1	8	1	1	1	1	4	1	6	3	2	1	1	1	1	6	1	1	1	2	1	3	1	1	2	6	1	1
NOV	2	2	2	14	4	4	1	1	1	1	1	10	4	4	3	12	M	16	5	2	2	2	2	2	2	2	M	6	8	3	
DEC	1	4	1	1	8	4	8	6	6	1	2	5	14	6	1	2	2	5	5	16	2	1	1	2	2	2	2	5	5	5	2

U = unclassified

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JAN	5	5	14	2	5	2	3	2	10	3	6	1	4	4	4	4	1	1	1	1	6	1	1	3	16	5	5	5	5	16	3
FEB	6	1	1	1	2	1	1	15	15	4	4	U	14	U	U	7	7	7	1	1	4	1	1	M	4	6	U	4	4		
MAR	4	1	1	1	8	4	4	15	15	6	4	4	10	U	U	3	12	12	6	4	4	4	1	1	8	1	1	1	3	2	9
APR	16	14	15	4	12	2	2	2	1	1	3	5	2	1	16	5	2	1	16	5	2	7	8	6	2	2	6	1	1	1	
MAY	1	6	1	3	5	2	6	U	U	U	16	16	5	5	5	2	7	4	4	4	18	4	4	4	4	1	4	4	10	1	1
JUN	4	1	1	1	1	U	15	U	15	4	4	18	U	U	6	1	1	1	1	M	1	2	2	6	1	1	1	5	14	U	
JUL	4	7	4	4	1	1	7	1	4	4	4	8	1	10	3	1	1	10	U	U	3	2	6	7	7	6	1	1	2	14	2
AUG	2	2	2	2	16	11	9	9	10	8	1	1	3	U	U	17	8	8	11	13	12	1	4	8	8	8	1	6	6	6	1
SEP	2	2	2	2	6	2	6	1	1	1	4	1	1	4	12	6	3	3	16	12	12	6	6	1	1	1	2	6	1	6	
OCT	2	6	4	8	1	16	5	6	3	3	10	8	1	8	12	6	1	6	1	3	1	1	1	1	M	6	1	1	8	3	6
NOV	4	4	U	4	4	4	4	1	1	1	1	3	2	2	16	2	7	1	1	1	1	1	3	2	1	2	15	1	3		
DEC	12	2	1	6	1	6	1	1	4	4	16	6	4	M	4	U	15	16	5	5	5	U	10	10	U	5	5	5	5	14	1

U = unclassified

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JAN	2	6	1	1	1	1	M	2	3	8	8	8	8	8	3	16	2	16	16	5	5	5	5	5	9	11	5	5	5	5	2
FEB	2	6	1	1	1	3	1	4	8	4	4	8	3	10	4	4	4	4	8	15	15	4	U	U	11	13	U	U			
MAR	U	4	8	6	3	5	14	5	U	U	4	15	6	1	1	1	10	3	9	2	2	2	2	2	2	2	2	2	7	4	4
APR	4	4	M	4	8	8	15	4	4	4	1	4	4	3	6	4	1	15	1	6	1	4	4	18	15	15	1	8	U	15	
MAY	17	15	12	12	6	2	6	6	7	15	1	1	3	9	2	U	U	9	9	6	7	7	4	4	4	10	10	1	1	2	6
JUN	6	6	1	1	1	7	4	18	U	14	14	14	U	U	U	U	7	7	2	6	M	6	1	12	U	U	13	U	5	9	
JUL	9	3	16	16	5	5	2	6	1	8	1	3	3	9	9	9	2	6	1	3	2	2	6	8	16	12	3	3	2	1	1
AUG	1	M	M	11	U	5	U	1	1	M	3	2	1	1	8	3	1	8	1	1	1	1	1	4	4	4	11	16	2	2	6
SEP	1	8	5	2	U	1	1	1	4	15	1	1	3	5	6	1	4	8	8	12	6	4	8	6	1	1	3	1	1	3	
OCT	3	16	5	14	15	4	4	4	15	5	15	U	U	U	U	18	18	U	2	1	1	1	10	11	U	4	18	14	1	1	6
NOV	15	4	1	4	8	1	8	3	12	2	2	2	6	6	3	16	M	6	1	4	6	M	1	6	1	15	1	15	1	1	
DEC	1	4	4	2	7	15	15	4	4	4	4	4	4	1	U	7	M	4	4	4	4	4	1	15	1	16	2	6	2	6	2

U = unclassified

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JAN	2	2	5	16	1	15	1	1	3	2	2	2	1	1	2	9	2	1	4	4	4	1	10	10	1	1	16	2	7	6	1
FEB	2	6	3	2	1	1	1	1	1	7	7	7	7	7	1	4	3	2	15	1	7	4	4	15	9	9	5	5			
MAR	5	5	5	9	7	1	1	7	U	7	7	4	1	4	15	3	5	14	6	2	M	2	6	2	6	5	2	5	5	5	14
APR	M	2	M	1	1	1	6	1	1	1	2	5	5	14	U	14	6	1	12	16	12	M	12	3	3	16	5	2	2	2	
MAY	6	6	M	4	1	1	15	4	8	18	18	18	U	1	1	1	3	1	3	M	4	1	6	6	1	3	3	2	2	6	15
JUN	1	1	4	8	1	4	4	4	8	3	2	5	U	U	12	14	4	2	6	1	1	6	1	3	1	1	8	8	12	15	
JUL	4	4	4	1	M	1	1	1	1	1	3	2	2	1	1	1	M	4	1	1	16	2	1	3	3	3	11	11	16	5	5
AUG	U	15	15	4	4	4	8	2	2	1	1	1	3	6	1	3	2	2	6	2	6	2	2	U	3	2	3	3	6	1	1
SEP	1	M	8	16	2	2	2	2	2	M	5	5	5	5	2	1	1	1	3	12	12	M	2	2	6	M	1	1	1	6	
OCT	2	2	1	3	16	5	5	2	2	2	2	2	5	6	1	1	1	1	1	M	8	15	8	3	16	6	15	1	4	4	4
NOV	4	4	4	4	18	18	1	4	3	15	4	15	4	1	1	3	2	2	2	2	5	2	1	3	5	2	16	M	2	8	
DEC	3	8	3	2	1	M	1	1	6	1	12	1	M	1	1	M	16	5	5	5	5	14	5	14	2	1	1	1	3	1	1

U = unclassified

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	2	5	14	14	M	2	2	2	2	3	11	11	16	3	1	1	1	1	1	2	2	2	2	2	2	1	6	1	6	2	6
FEB	1	12	2	2	5	14	7	15	1	1	6	1	6	1	1	1	7	4	5	15	1	3	6	1	12	12	16	5			
MAR	14	1	3	2	12	1	8	1	1	1	1	4	15	4	1	2	14	6	1	2	2	1	4	8	6	3	1	M	1	3	6
APR	1	1	6	1	1	4	1	4	4	8	16	7	1	1	3	7	12	12	1	8	4	4	8	U	U	14	12	6	4	1	
MAY	1	2	6	12	3	2	15	12	M	1	4	4	4	1	1	12	6	15	8	5	6	6	1	1	8	3	M	15	8	U	16
JUN	U	15	12	U	U	4	18	U	U	8	1	4	4	U	5	14	U	4.4	4	4	4	4	U	11	16	5	U	1	1		
JUL	3	2	6	8	3	5	U	10	U	11	11	U	U	U	8	1	7	1	1	1	6	6	2	2	2	2	M	14	2	7	4
AUG	4	8	1	4	8	8	3	9	9	7	7	10	10	8	3	3	1	1	4	4	8	8	1	1	1	1	1	1	4	4	18
SEP	8	16	15	1	8	3	1	1	1	4	1	1	2	2	2	14	14	2	2	5	2	6	8	16	16	5	2	16	16	5	
OCT	6	1	1	M	1	1	6	15	1	1	1	6	3	16	5	5	12	3	1	3	1	8	3	12	2	2	5	14	12	16	2
NOV	2	2	1	9	9	7	8	1	4	10	3	1	8	2	2	2	2	6	6	1	2	4	8	3	1	1	3	12	6		
DEC	4	8	3	2	2	5	2	2	16	5	2	16	2	16	5	6	1	5	2	2	10	8	10	9	5	5	5	2	12	12	M

U = unclassified

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	2	5	2	2	2	2	1	2	2	2	2	2	2	2	1	1	3	2	3	1	1	3	9	9	5	13	13	5	14	2	5
FEB	5	9	9	2	2	1	6	3	15	M	3	1	3	6	6	3	1	1	4	4	4	4	U	5	2	3	1	1	3		
MAR	2	1	2	2	1	2	2	6	1	1	1	1	1	1	6	1	1	1	1	1	1	4	4	8	13	5	5	5	2	2	1
APR	3	2	2	1	4	4	4	4	4	3	3	16	2	6	3	3	5	2	1	1	3	6	4	8	12	6	4	8	U	6	
MAY	1	1	6	9	14	U	13	18	4	15	15	M	1	1	1	1	3	5	14	15	15	12	3	2	6	15	4	4	4	4	4
JUN	1	1	1	1	4	1	4	4	4	18	18	U	7	4	4	8	2	2	2	16	2	16	5	U	12	2	6	1	1	2	
JUL	2	14	9	7	7	4	4	18	11	M	4	1	1	2	2	2	2	5	5	5	5	2	3	3	8	1	1	1	1	6	1
AUG	2	6	6	1	6	6	6	1	1	10	10	11	11	11	11	M	18	M	11	4	4	4	15	15	1	1	1	1	1	2	M
SEP	2	5	M	6	2	2	6	3	16	5	5	5	2	2	2	2	2	3	8	6	8	3	16	5	2	M	5	2	6	6	
OCT	2	1	1	M	M	M	M	M	3	5	5	2	M	5	5	U	U	M	6	6	6	M	2	6	3	5	2	M	14	6	6
NOV	1	1	1	8	1	M	3	1	4	8	8	15	17	2	M	12	7	18	U	15	15	1	1	2	1	2	2	2	2	2	
DEC	2	5	5	5	5	5	5	5	5	M	9	5	2	2	1	4	1	1	1	1	1	2	1	3	1	1	3	2	15	1	6

U = unclassified

M = missing NCAR data

1973

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	1	5	5	5	5	14	5	U	U	U	4	1	1	1	1	1	1	4	12	1	2	M	M	1	3	6	4	4	10	1	6
FEB	1	3	U	5	U	U	18	4	1	9	3	2	1	1	1	1	1	6	3	6	1	1	M	1	1	1	4	1			
MAR	1	6	8	12	6	2	1	12	2	3	5	12	5	12	1	1	3	1	8	1	3	2	15	1	3	2	16	2	15	1	8
APR	12	6	15	6	2	5	14	6	15	15	1	3	2	6	12	1	3	12	12	2	6	2	2	2	6	1	3	2	2	14	
MAY	15	4	8	12	15	8	1	4	1	U	4	4	4	4	4	1	1	1	3	2	6	1	4	4	8	U	15	6	15	8	16
JUN	5	2	2	1	1	1	1	1	3	2	4	4	18	8	15	U	U	4	4	1	M	4	4	4	1	1	1	3	3	16	
JUL	2	1	1	4	3	3	10	10	10	10	2	2	6	12	2	2	2	6	1	8	3	11	11	10	1	6	7	1	1	1	1
AUG	1	1	1	12	2	5	14	1	1	2	2	1	1	1	1	3	16	9	9	11	11	11	8	16	M	2	2	2	6	3	5
SEP	6	1	6	1	1	4	12	6	1	1	1	9	9	M	14	7	4	4	4	8	1	1	1	12	2	6	1	1	1	3	
OCT	5	M	6	1	3	3	12	16	2	2	12	6	1	1	4	1	1	1	1	1	4	4	8	8	6	6	1	1	6	2	2
NOV	5	5	5	5	11	11	3	M	10	10	10	1	8	8	8	3	2	16	6	3	16	5	6	5	16	2	1	1	10	10	
DEC	8	6	3	6	1	1	1	6	1	1	4	4	M	1	1	1	1	6	4	4	1	1	6	1	2	2	7	U	2	14	U

U = unclassified

M = missing NCAR data

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	5	5	5	5	5	5	5	5	5	5	2	2	3	1	1	1	1	4	1	3	2	2	2	6	16	2	2	2	2	2	10
FEB	2	2	6	M	2	2	2	6	2	1	1	3	1	1	4	3	M	1	2	15	4	8	6	4	4	10	1	10			
MAR	1	16	2	2	2	2	16	6	1	4	M	4	8	6	1	1	5	2	5	2	9	9	2	9	7	10	4	4	1	10	1
APR	4	3	M	1	1	1	1	1	1	1	1	2	15	4	8	1	1	1	6	2	1	8	16	U	17	U	12	2	7	1	
MAY	16	2	2	1	1	1	1	1	8	12	8	3	12	8	U	13	13	5	2	1	4	4	8	1	1	3	2	2	5	U	6
JUN	1	1	1	3	6	12	2	2	6	1	1	1	7	1	8	1	6	1	1	1	4	8	8	3	1	4	8	6	1	3	
JUL	2	2	1	3	9	16	U	8	8	4	8	4	4	4	8	8	10	8	8	10	1	1	1	1	2	1	1	1	1	2	7
AUG	4	15	15	1	3	2	5	5	2	2	5	5	5	5	5	9	9	M	5	2	2	1	3	2	2	2	9	9	9	9	14
SEP	14	U	1	1	1	3	6	4	1	5	5	14	6	1	1	1	1	2	2	7	7	2	2	6	6	2	2	2	2	6	
OCT	1	1	2	2	5	2	6	1	1	1	6	1	2	6	M	1	1	1	4	3	2	1	3	15	4	1	4	8	6	4	8
NOV	12	6	15	4	1	1	3	6	1	6	1	9	6	2	12	1	1	3	1	1	3	1	1	1	M	1	6	15	1	1	
DEC	1	M	4	8	1	1	15	1	1	1	3	1	6	3	2	1	2	1	6	6	3	5	2	6	2	1	3	2	1	2	1

U = unclassified

M = missing NCAR data

1975

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	1	1	6	12	1	3	2	3	2	2	2	1	1	M	M	6	6	2	1	2	6	1	1	6	2	5	2	5	5	6	8
FEB	8	8	U	18	U	U	U	9	9	3	2	1	3	2	1	2	1	6	1	2	6	1	1	2	6	4	1	M			
MAR	1	8	3	2	2	2	1	1	1	5	14	3	2	6	1	3	1	1	1	12	4	U	1	M	2	5	5	2	2	2	5
APR	M	8	11	13	5	5	U	5	14	U	15	1	3	13	5	5	14	1	M	2	1	4	4	8	16	15	12	12	15	15	
MAY	15	4	11	5	12	1	1	4	4	4	4	1	7	4	4	M	M	M	M	5	12	12	3	5	14	2	7	15	6	2	7
JUN	4	8	12	6	1	1	2	2	6	1	2	6	6	6	2	5	5	5	5	12	12	8	11	8	8	U	5	U	5	5	
JUL	U	17	17	1	1	3	10	4	4	4	4	4	8	8	17	15	15	8	1	1	1	1	4	1	1	1	1	3	16	5	12
AUG	1	3	6	10	8	3	3	2	1	3	2	7	7	7	1	4	4	17	12	6	3	2	16	2	2	10	8	8	11	U	5
SEP	12	2	2	2	6	1	1	2	2	9	9	U	1	1	1	2	5	14	U	U	7	4	4	1	6	15	1	2	6	1	
OCT	1	4	4	3	1	M	3	10	4	11	5	6	6	1	6	1	1	1	1	1	U	5	5	2	1	U	3	8	1	3	1
NOV	1	1	1	1	1	4	1	3	2	12	6	1	1	M	M	1	2	7	4	4	1	1	6	2	2	5	5	5	5	2	
DEC	2	6	1	3	2	6	6	1	1	2	2	2	5	2	2	14	6	1	1	1	4	4	6	1	1	4	6	6	1	16	5

U = unclassified

M = missing NCAR data

1976

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	2	6	12	1	2	2	6	1	2	1	3	2	7	1	6	1	1	2	6	6	1	1	2	2	2	6	1	1	1	6	1
FEB	6	2	5	5	5	2	2	1	2	2	2	2	1	3	12	3	1	2	2	6	1	1	1	1	1	4	4	U	9		
MAR	5	5	5	5	2	2	5	2	2	2	2	1	2	2	2	1	4	1	12	3	7	4	1	1	6	8	2	2	6	1	3
APR	6	1	1	1	4	4	4	4	4	4	8	8	12	6	16	U	1	12	6	8	1	12	4	8	16	14	U	U	18	4	
MAY	4	4	15	4	12	1	1	1	4	4	1	1	3	2	4	4	8	U	1	15	4	4	8	4	6	1	8	3	8	8	18
JUN	11	16	5	5	16	16	16	3	3	8	8	3	U	6	6	2	6	1	1	1	1	12	6	3	5	U	U	4	18	18	
JUL	8	8	10	10	4	4	4	4	8	8	8	8	3	6	1	1	1	1	10	8	8	1	1	1	1	3	2	2	5	U	11
AUG	18	4	4	4	U	U	5	12	6	15	4	1	8	8	8	U	2	2	12	2	1	10	10	10	8	6	1	1	1	1	
SEP	1	6	1	1	1	3	2	2	1	1	3	1	4	8	15	1	1	6	15	4	4	15	1	15	4	4	4	1	1	1	
OCT	1	3	2	6	2	6	6	1	1	1	6	6	1	2	6	2	14	2	7	7	2	2	2	1	12	1	1	1	1	1	1
NOV	1	1	1	1	1	6	1	6	1	4	4	15	4	4	1	6	1	1	6	7	1	1	1	1	2	5	14	14	2	7	
DEC	1	2	2	2	2	2	2	3	2	2	2	1	1	1	1	1	1	6	4	1	7	1	2	6	6	1	7	4	4	15	12

U = unclassified

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	U	U	5	5	14	6	5	14	2	9	9	9	2	7	7	6	1	.1	7	7	6	6	7	2	14	9	2	2	6	1	3
FEB	2	15	7	4	4	4	1	1	1	1	6	1	6	15	1	1	1	6	4	4	4	1	1	12	6	2	1	8			
MAR	12	2	12	6	1	1	1	1	3	2	1	3	5	5	5	5	2	2	5	2	2	1	8	16	2	6	16	5	5	2	2
APR	5	5	2	7	6	1	4	4	3	1	2	1	8	6	1	1	1	2	2	7	U	4	4	4	4	18	1	M	3	2	
MAY	1	4	8	8	13	13	12	12	15	8	8	1	1	3	16	5	5	U	6	1	1	1	8	8	4	8	U	U	U	4	4
JUN	8	3	1	4	4	4	1	3	2	2	3	2	16	3	U	6	4	15	4	8	1	1	1	1	3	1	6	1	2	6	
JUL	3	3	3	17	8	U	1	8	3	6	3	M	M	M	M	1	3	16	2	8	8	1	1	4	4	4	4	18	U	4	1
AUG	1	2	9	5	5	2	6	7	7	7	6	2	9	9	2	2	9	9	9	U	7	7	4	M	M	2	2	1	2	2	2
SEP	2	10	1	4	1	1	3	2	2	2	2	2	2	16	16	16	18	1	8	3	5	12	3	U	M	16	5	5	12	12	
OCT	3	2	2	2	1	3	2	2	2	2	1	1	M	7	1	2	1	1	1	1	1	1	4	4	1	1	4	4	8	12	12
NOV	1	3	1	1	3	6	2	2	2	1	4	1	M	1	1	2	16	5	5	5	5	9	2	6	1	6	2	6	6	2	
DEC	2	6	3	2	2	3	2	2	2	1	1	1	1	1	4	1	4	1	6	1	9	9	9	9	2	2	2	7	9	5	U

U = unclassified

M = missing NCAR data

1978

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
JAN	U	7	9	9	U	3	6	1	4	4	4	7	7	4	4	U	U	7	4	1	4	2	2	7	1	2	7	U	9	9	9
FEB	9	9	2	M	4	4	4	4	4	4	15	4	4	4	U	6	15	6	1	1	1	1	9	9	5	5	5	5			
MAR	5	12	1	1	1	1	4	1	2	6	2	2	6	2	6	1	1	2	2	6	2	6	4	4	4	1	1	1	1	3	1
APR	8	1	1	U	U	5	12	2	6	1	2	2	16	11	11	8	4	4	4	18	U	18	U	1	1	15	4	4	4	4	
MAY	15	1	2	2	2	2	7	1	9	7	10	1	4	4	11	6	12	6	15	1	8	11	5	U	15	15	1	1	2	14	15
JUN	15	15	4	15	2	U	7	1	3	2	10	10	11	5	5	5	12	9	5	2	2	16	5	2	2	2	6	1	1	8	
JUL	1	1	U	U	U	6	2	6	11	5	5	2	6	1	1	12	2	5	5	5	2	2	2	2	6	1	1	1	4	7	7
AUG	7	4	4	4	1	1	6	1	1	1	1	11	2	2	2	5	2	3	16	5	2	3	18	18	8	1	10	4	4	1	4
SEP	4	10	10	10	11	11	8	4	4	8	12	15	15	1	3	2	5	5	15	1	1	8	1	1	1	10	4	1	1	8	
OCT	2	6	3	2	6	1	1	1	1	1	2	2	2	6	1	6	2	1	1	3	2	1	1	2	6	2	1	1	2	2	1
NOV	M	1	1	2	2	6	1	3	5	5	12	5	5	6	1	12	2	5	5	5	5	5	2	6	2	2	6	2	2	2	
DEC	5	2	6	2	5	5	5	6	1	6	3	6	1	6	2	1	11	5	2	2	2	2	2	2	2	2	5	5	5	5	14

U = unclassified

M = missing NCAR data