U.S. DEPARTMENT OF COMMERCE
JOHN T. CONNOR, *Secretary*
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
ROBERT M. WHITE, *Administrator*
WEATHER BUREAU
GEORGE P. CRESSMAN, *Director*

TECHNICAL PAPER NO. 56

Interdiurnal Variability of Pressure and Temperature in the Conterminous United States

H. E. LANDSBERG
Environmental Data Service

WASHINGTON, D.C.
1966

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402 - Price 40 cents

CONTENTS

Interdiurnal Variability of Pressure and Temperature in the Conterminous United States

H. E. LANDSBERG
Environmental Data Service, Environmental Sciences Services Administration, Washington, D.C.

1. Introduction

The diurnal rhythm of the climatic environment has a profound influence on all living beings. Plants, animals, and man reflect this periodicity in their physiological clocks in the form of circadian rhythms. In meteorology, too, the diurnal swings are of considerable interest. They fix the values of temperature extremes and their approximate time of occurrence; they have a profound influence on the timing of showers and thunderstorms, on the daily fluctuation of the wind, and on low-level stability. These regular swings account for a fair percentage of the successes of short range forecasts. Another element in the forecaster's arsenal is persistence from day to day. But, although Markovian processes are deeply embedded in all meteorological events, the nonperiodic and nonpersistent phenomena are, generally, of greater interest to the forecaster and the biometeorologist alike. The latter concerns himself with the problems of adaptability of organisms to the rapid changes which are so characteristic of the extratropical latitudes.

2. Scope of Study

In view of such a diversified interest in aperiodic changes it seemed desirable to examine their climatological aspects again. As a measure of change the interdiurnal variability[1] was chosen. Although this may not reflect the entire magnitude of a change which may last less or more than 24 hours, it is easily obtained from the data. It also permits a ready comparison with the regular daily fluctuations, such as are presented by the mean daily range. For the present study 75 stations in the conterminous United States were selected. They represent all major climatic regions of the country. The element reflecting interdiurnal variations most is, of course, the atmospheric pressure and this was one of the elements chosen for study. The differences between two successive midnight (local standard time) barometer readings will be shown both in tabular and map form.

The temperature is the other element depicted. The differences between successive daily maxima and minima, separately, were chosen. The reason for using both these differences was the fact that they often show divergent behavior. In general, the differences between maxima reflect the changes of air masses better than those between minima. They also are more likely to be more related to the human biometeorological effects, because man is more apt to be exposed to the outdoor air in daytime than at night. The daily minimum temperature is highly sensitive to radiation conditions and primarily governed by nocturnal cloudiness with a secondary influence—not entirely uncoupled from the radiative processes—of the wind speed.

The study covers a 5-year interval, 1957–61. Previous work had shown that even as short a series as this will give quite satisfactory results and that both the means and the frequency distribution converge rapidly to stable values. More on this will become evident from the next section.

---

[1] This term refers to the day-to-day changes of a given meteorological element. This may be taken as the numerical difference between successive daily extremes or the difference between values 24 hours apart.

3. Historical Aspects of the Problem

The earliest systematic survey of interdiurnal temperature and pressure was presented by L. F. Kämtz [10] in his famous textbook. He indicated there that he started his study in 1827 in Halle, Germany. His aim was to learn more about atmospheric perturbations by elimination of periodic influences. Data were scarce then and it is not too surprising that he restricted the tedious work to two stations for temperature and six stations for pressure. Rather fortunately, some data included in this work were taken from Williams' observations at Cambridge, Mass., as published in the Mannheim *Ephemerides*. They covered the years 1785–86. A comparison of these very early data with values later obtained by Woeikof [16] for the Blue Hill Observatory near Boston for the interval 1891–95 and by this study for the Weather Bureau Airport station at Boston is shown in table 1.

Considering the fact that the first of these series comprises only two years the constancy of the data is remarkable. Differences of 0.01 in. are to be expected a priori from rounding errors in the conversion from the original data. These were given by Kämtz in Paris lines and by Woeikof in millimeters. The two 5-year series show only two monthly mean values as far as 0.03 in. apart. This shows a very high stability of the annual variation of interdiurnal pressure changes in New England over the past two centuries. Kämtz' interdiurnal temperature variations for Cambridge are shown in table 2.

The first monographic study of interdiurnal temperature variation was published by Hann [7]. He refers to Dove's [6] analysis of monthly pressure and temperature unrest as expressed by the monthly ranges of these elements. But Hann clearly recognized the biometeorological implication of the day-to-day changes. He stated in the introduction of his study: "The more or less jumpy variations are, particularly in an etiological context, an important climatic factor." He later expressed the thought that the monthly mean variability values might be directly comparable to the frequency of various disease types. Hann also introduced the term *interdiurnal variability* into the literature.

Hann's study covers irregular intervals for 90 stations all over the world. He gives data for 14 stations in the United States and acknowledges the help of Woeikof in obtaining the information; Woeikof at the time was a guest investigator at the Smithsonian Institution in Washington. The data covered different time intervals and approximated, to the best of Hann's judgment, the differences of the successive daily mean temperatures. Even though they are for this reason not strictly comparable to the data in this study they are given, for 10 stations, in table 2 because of their historical interest. For the recent interval the averages of the variabilities between successive maximum and minimum values at the nearest stations treated in this study are shown. This table also shows the previously mentioned data obtained by Kämtz for Cambridge.

Considering the differences in the methodology and the time intervals the broad general correspondence is quite evident. In the case of Yuma the two series are hardly distinguishable.

Woeikof, in a letter to Hann, commented on the causes for the main differences found in the absolute values and the annual variation. He listed maritime, radiative, and latitudinal influences as causes for the different values observed at various stations. Hann quotes this with full assent. In extensive tables Hann also gives frequency distributions of various steps of temperature changes from day to day and the probability of having changes of more than 2° and 4° C.

Woeikof [16] picks the theme up again in 1906. At that time he undertook a study of interdiurnal pressure changes. This was the first extension of Kämtz' early work. Woeikof used primarily stations on the Eurasian continent. The data include the Blue Hill, Mass., observations already referred

Table 1.—*Interdiurnal pressure variation (in inches) at stations in the Boston, Mass. area, by various authors*

Station, years, and author	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Cambridge 1785–86 Kämtz [10]	0.32	0.24	0.21	0.23	0.15	0.11	0.13	0.12	0.15	0.18	0.23	0.27
Blue Hill 1891–95 Woeikof [16]	0.24	0.29	0.22	0.19	0.15	0.10	0.11	0.11	0.15	0.19	0.23	0.24
Boston 1957–61 Landsberg	0.25	0.28	0.22	0.18	0.14	0.13	0.10	0.11	0.13	0.18	0.21	0.27

TABLE 2.—*Interdiurnal temperature variations found in earlier studies with comparative values from present study (°F).*

Station and reference	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Brunswick, Maine, 1835–44, Hann [7]	7.7	7.6	5.2	4.7	4.7	4.7	3.5	3.3	4.1	4.8	4.9	7.6
Portland, Maine, 1957–61*	7.2	8.0	5.4	6.2	6.3	5.4	4.8	5.3	6.2	6.0	6.2	6.5
Cambridge, Mass., 1785–86, Kämtz [10]	9.4	6.5	6.1	7.0	4.1	4.7	4.9	4.9	5.6	7.8	6.9	7.9
Boston, Mass., 1957–61*	6.5	6.3	5.5	5.6	5.7	5.2	4.3	4.7	5.0	5.7	6.1	5.4
Providence, R.I., 1835–40, Hann [7]	6.4	6.2	4.9	4.9	4.7	3.8	3.2	3.5	4.3	5.7	5.8	6.7
Washington, Ark., 1840–49, Hann [7]	6.6	6.6	5.9	4.8	3.6	2.5	2.0	2.1	2.8	4.6	6.3	6.6
Little Rock, Ark., 1957–61*	6.9	6.6	5.5	6.3	4.0	3.0	2.6	2.7	3.4	4.9	6.7	6.3
Marquette, Mich. (3 years), Hann [7]	7.4	8.6	6.7	5.0	6.5	7.6	7.2	7.4	6.8	7.0	4.3	7.9
Marquette, Mich., 1857–61*	5.2	5.8	4.7	6.0	6.8	7.1	5.9	5.9	5.9	5.5	5.3	4.9
St. Louis, Mo. (6½ years), Hann [7]	6.8	7.4	7.6	6.3	4.7	4.0	3.4	3.2	4.5	4.7	6.7	7.6
St. Louis, Mo., 1957–61*	7.1	6.8	5.9	6.5	6.0	4.6	3.4	3.3	4.6	4.8	6.8	6.8
Santa Fe, N. Mex. (7 years), Hann [7]	4.1	3.6	4.9	4.3	4.7	3.6	3.4	2.9	2.7	3.6	3.2	3.1
Albuquerque, N. Mex., 1957–61*	4.4	4.7	5.4	5.2	4.1	3.2	2.8	2.6	3.7	4.1	4.7	4.2
New Orleans, La. (2 years), Hann [7]	6.5	5.6	4.7	4.3	2.7	3.1	2.0	2.0	1.4	4.0	4.2	5.2
New Orleans, La., 1957–61*	6.7	5.7	5.3	3.5	2.9	1.9	1.7	1.8	2.2	3.6	5.8	6.5
Yuma, Ariz. (9 years), Hann [7]	3.1	3.5	3.5	3.6	3.2	2.7	2.7	2.8	2.9	3.3	3.5	3.1
Yuma, Ariz., 1957–61*	3.1	3.5	3.5	3.6	3.1	2.7	2.7	2.8	2.8	3.3	3.5	3.2
San Francisco, Calif. (9 years), Hann [7]	2.5	2.7	2.2	2.3	2.2	1.8	1.3	1.4	2.2	2.9	2.5	2.5
San Francisco, Calif., 1957–61*	2.9	2.9	3.2	3.5	2.9	3.3	2.8	2.7	3.5	3.3	2.9	2.7
Sacramento, Calif. (3 years) Hann [7]	3.1	2.0	2.9	2.9	3.2	3.4	3.4	3.4	3.1	2.3	2.2	2.0
Sacramento, Calif., 1957–61*	2.9	3.0	3.2	3.6	2.9	3.3	2.8	2.9	3.5	3.4	2.9	2.7

*For the series of 1957–61 data the mean interdiurnal difference of temperature is approximated by averaging the values obtained separately for mean variability for successive daily maxima and successive daily minima.

to in table 1 and a series from the New York Central Park Observatory, which is shown in table 3. Both cover the interval 1891–95 which Woeikof, in the interest of comparability, used throughout his work. He established the facts about the locations of greatest barometric unrest in the Far East.

Woeikof also quite clearly enunciated: "A period of five years is sufficient for studies of the phenomena of pressure variability in their great outline. . . ." This statement is the first explicit judgment on the length of interval required for satisfactory climatic summarization of this important climatic element.

Shortly thereafter Bahr [2] elaborated on this in his dissertation by applying statistical tests to data derived from series of different length. He arrived at the fact that the means of interdiurnal pressure variability stabilize to within 0.1 mm. in summer and 0.2 mm. in winter for a series of 10 years. For a 5-year series the values are about double, that is, the reliability is within 0.01 or 0.02 in. Bahr drew maps of values for Europe for the midmonths of the winter and summer seasons, calling the lines "isometaboles" (μεταβολη=change). He noted the increase of the values with latitude and their decrease in that part of the world with distance from the ocean. Two United States stations are included in his work, also shown in table 3.

Aside from some temperature data which I worked out for State College, Pa. [13] very little was done on these elements in the United States. I satisfied myself by tests on the frequency distributions that successive 5-year intervals could satisfactorily have been drawn from the same population and that little additional information (except for absolute extremes) is obtained by using longer intervals.

Calef [4] came essentially to the same conclusion when comparing interdiurnal variabilities for minimum temperatures in January and maximum temperatures in July. He mapped these for 99 stations for the United States. He stated that in 84 percent of the cases the difference between 5- and 10-year means was 0.4° F. or less.

TABLE 3.—*Interdiurnal pressure variations (in.) found in earlier studies with comparative values from present study*

Station and reference	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
New York, N.Y., 1891–95, Woeikof [16]	0.25	0.30	0.22	0.20	0.14	0.10	0.10	0.11	0.13	0.18	0.22	0.21
New York, N.Y., 1891–1900, Bahr [2]	0.25	0.28	0.24	0.17	0.14	0.10	0.10	0.09	0.13	0.16	0.21	0.21
New York (LaGuardia) 1957–61	0.23	0.25	0.21	0.18	0.13	0.12	0.09	0.11	0.12	0.15	0.19	0.23
Iowa City, Iowa, 1878–87, Bahr [2]	0.23	0.22	0.22	0.16	0.12	0.10	0.07	0.08	0.12	0.16	0.19	0.21
Des Moines, Iowa, 1957–61	0.19	0.20	0.15	0.16	0.14	0.11	0.08	0.07	0.13	0.14	0.22	0.22

Shortly afterwards Arakawa and Tsutsumi [1] published a brief study on interdiurnal temperature variability in Japan. This covered data for 1937–46. They showed the maximum variabilities in Hokkaido in January (up to 3.3° C. in Asahigawa), but in April in the Tokyo area (2.2° C.). This was followed up by Nagao [15] who presented maps for that area of East Asia.

A very detailed study on interdiurnal temperature variability for Alaska was made by Cushman [5] as a University of Washington thesis but unfortunately did not find its way into the literature, except in abstract form (MAB 7.10–8). The report covers data from 1943–52 at 15 stations. The effects of continental and maritime climatological regimes were noted. Extensive tables accompany the work which is available at least in microfilm form.

Another unpublished study for interdiurnal temperature variability of daily mean temperatures has been made by the Weather Bureau State Climatologist for New Mexico, Mr. Frank E. Houghton [8]. This covers 8 stations with varying length of record, between 3 and 5 years in the interval 1956–62. Mr. Houghton's courtesy in making his manuscript available to me is very much appreciated.

Two relatively recent studies deal with problems of atmospheric pressure variability on a hemispheric scale. Klein [11] studied the distribution of three elements: the 1-day lag autocorrelation of daily pressure anomaly, the standard deviation of interdiurnal pressure change, and the standard deviation of daily pressure anomaly. Aside from locating the primary centers of variability in the Northern Hemisphere and extending his inquiry to higher levels, he is mostly concerned with the synoptic processes involved. E. Berger [3] also analyzed the Northern Hemisphere pressure variability conditions on a very broad scale for the 2 months of January and July. She based her study on 339 grid point intersections in the Northern Hemisphere by forming the interdiurnal pressure differences during these 2 months from the daily synoptic map series for the 7 years from 1951–57. Her patterns are obviously quite smoothed and, aside from the major centers of action, reveal primarily meridional differences. Both the papers by Klein and Berger include very good bibliographies.

4. Major Results of Present Study

The results of this study are summarized in a series of charts, showing isometaboles for each month of the year for the three elements under scrutiny. The basic data for these charts are given in a table in the appendix, because these data may be of some local interest.

One conclusion is clear: The interdiurnal variabilities of pressure, and maximum and minimum temperatures do not show coinciding geographic patterns. In broad outline the pressure isometaboles reflect the primary cyclone tracks, they show quiescence in the regions frequently governed by anticyclones, and they have a very pronounced annual variation in nearly all parts of the area shown.

The changes of maximum temperatures reflect the sources of air masses and their major paths. These latter are, of course, often at considerable angles to the tracks of the cyclonic storms. This accounts in part for the dissimilar patterns of the isometaboles of pressure and daily maximum temperature. For example, a deep low pressure system may move west to east with highest pressure changes along this track. The warm and cold air masses associated with the Low may at the surface move from southwest to northeast and northwest to southeast respectively, causing a pattern of temperature changes quite different from the pressure changes.

The changes in the minimum temperatures are much more affected by very local conditions than are the maxima. Proximity to water bodies and mountains, orographic tendencies for inversion formation, and other environmental characteristics impress themselves upon the minima. These come characteristically into play when the synoptic conditions favor low cloudiness and little wind. This can bring about more profound day-to-day changes than succession of different air masses.

These differences in patterns of the various elements are well illustrated by the charts. A few comments on the major seasonal features will follow.

WINTER. All winter months show the greatest interdiurnal pressure variation over the Northeast. This unrest over New England is an extension of the variability center that Klein located over the Newfoundland region. This maximum extends deep into eastern North Carolina. A second area of high variability is located east of the Rocky Mountains in the northern Great Plains. In these as well as in most of the other charts the effect of the Rockies as a major meteorological influence is quite evident. A third patch of atmospheric unrest lies over the Pacific Northwest. Quiescent areas are located over southern California, southern Arizona, and the lower Florida peninsula. These patterns continue right into March, even though the absolute values are a little lower than in midwinter.

For the isometaboles of the daily maxima the most pronounced feature, also extending into March, is the extraordinarily high changeability in the Great Plains, reaching deep into Texas. This is the battleground of polar continental Canadian and tropical maritime air par excellence. There may also be some chinook effects hidden in these patterns. A similar center of high winter variability is also shown in the South Atlantic States, where Atlantic maritime influences struggle for supremacy with Canadian air outbreaks. The Great Lakes clearly exercise a mitigating influence. The predominant smoothing effects of the Pacific and Gulf waters are notable in the West and South. Southern California and southern Florida make this particularly evident.

These same maritime effects are quite notable in the distribution of mean interdiurnal variability of minimum temperatures. In this element the greatest values are in northern New England and northern Minnesota and adjacent inland areas. This may well be an effect of the radiative properties of the prevalent snow covers which can affect surface temperature profoundly and vary rapidly with the cloud succession of traveling cyclones. This cloud effect may well be reflected also in the February minimum of variability over Michigan, where cloudiness from the lake influence is notable.

SPRING. As indicated, March, except for lower values, shows in the interdiurnal pressure variations the same pattern as winter. As the season progresses a more zonal pattern establishes itself, with a very marked southward inflected variability zone east of the Rocky Mountains. The absolute value of the pressure variabilities, compared with winter also decreases.

In the maximum temperature changes the Great Plains center of highest variability persists into April. A secondary maximum centered over West Virginia also remains. Near all water bodies, including the Great Lakes the variability shows minima. In May the maximum temperature variability looks amazingly like that of pressure with a center of high changeability over Lake Superior and the southward inflection over the Great Plains. On the California and Gulf coasts and in all of Florida the day-to-day changes have given way to monotony.

The isometaboles of the minimum temperature show a very spotty picture in March and April. The absolute values are generally smaller than those of the maxima. The oceanic influences are most pronounced. In May a somewhat more coherent picture presents itself. Strong coastal influences are reflected in the pattern. A center of high variability in the northern Great Plains may be a result of the retreating polar air outbreaks with strong nocturnal radiation.

SUMMER. As this season progresses the isometaboles of pressure show continuous decline in absolute value. They also develop more and more into a zonal pattern, which reaches its height in August. In June and July a variability ridge is still notable in the Great Plains but this is barely indicated in August. At that time the mean position of the polar front is usually north of the Canadian border. The atmospheric quiescence is shown by the lack of contrasts over considerable spaces of latitude.

Except for a belt along the Pacific coast, the variability of minimum temperatures shows also essentially a zonal pattern. The monotony in the South is notable but even in the northernmost areas the mean values hardly exceed 5° F. from day to day.

In general terms the zonal summer pattern is also reflected in the interdiurnal changes of the maximum temperatures. However, the contrasts here are larger than in the minima. Interesting features are the very small values in July and August along the northern California coast, the combined effect of onshore winds and low cloudiness. Coastal effects are seen elsewhere, especially in the Carolinas and New England. These would undoubtedly stand out more if stations directly on the coast had been chosen. But these effects are essentially of a mesoclimatic character and would have to be the subject of local studies. Very high variability is still indicated in the northern Great Lakes region. This is a result of the summer storm track along that sector of the Canadian border. It coincides with the position of the jet stream (Landsberg and Ratner [14]). In the southern regions the periodic diurnal variation is essentially the only fluctuation to be expected. Aperiodic elements are essentially absent in this season.

AUTUMN. This season shows a progressive steepening of the gradient of pressure isometaboles. In the south the absolute values increase only very slightly. In contrast, the values double in the northern tier. Equally notable is the gradual establishment of two ridges of high changeability. One is over the Great Plains, the other in northern New England. These are zones of high cyclogenetic activity.

The Great Plains activity zone is very plainly depicted also in the maximum temperature variability. The early polar air outbreaks of the season make their way southward here. Yet warm tropical maritime air is very active too. In some of the deep November storms terrific contrasts can exist between front and rear of the cyclone and the greatest day-to-day changes may be experienced. The mitigating coastal influences become established.

In the isometaboles of the minima this coastal effect is again seen. Some effect of the Great Lakes in smoothing out the daily effects is noted. Perhaps most interesting is the gradient that establishes itself over the Florida peninsula. The northern part in late autumn becomes essentially continental in its response but the southern areas maintain their tropical character of little day-to-day changes.

ANNUAL VARIATION. The local annual variations of interdiurnal changes show, in essence, three major annual patterns over the area under investigation. Prototypes of these are shown in figure 1. This shows the pressure variability in the left panel and the variability of the maximum temperatures at the right. The data for San Diego, Calif., show minimal annual variation in both elements as well as very low absolute values. This reflects a climate of great stability throughout the year. The oceanic influence and the relatively low latitude of the station combine to produce this result.

Quite in contrast to the southern California coast is the climate of the mid-continent. This is shown by the data for Oklahoma City, Okla., which is typical of the regime in the Great Plains, already alluded to. Here the annual march of pressure variability is well pronounced with a minimum in July and August, and a maximum in November and December when intense baroclinic situations lead to rapid cyclogenesis in this area. The interdiurnal variation of maximum temperature shows a very wide swing throughout the year. There is a broad maximum from November through April. July and August show a minimum for this element, the same as for the pressure.

The third pattern is primarily found in the Northeast, as exemplified by data from Boston. In that area the amplitudes of the annual march of the pressure variability are largest of all regions in the conterminous States. There is a maximum in December, with only slightly lower values in January and February. From this the magnitude drops gradually to a July minimum with a quick increase through the autumn to the early winter high. Quite in contrast the maximum temperatures show only a slight and irregular annual march of variability. If anything, slight maxima exist in spring and autumn with somewhat lower values in summer and winter. Yet the amplitude is not pronounced. This reflects the proverbial fickleness of New England weather, perhaps reflecting the frequent shifts of onshore to offshore winds.

All other patterns of annual changes of variability show only slight variants of these major examples.

STANDARD DEVIATIONS. The standard deviation for the pressure variability shows fairly wide swings throughout the year which will be discussed in more detail below. These standard deviations are very conservative over large areas and have therefore been pooled for groups of stations. The individual monthly standard deviations were squared, summed, and the square root obtained for the pooled values. These are shown in table 4–A.

The standard deviations for maximum temperature variability follow the annual patterns of the absolute values of this element. The groupings are different from those of pressure variability. While the latter needed only 20 groups, the temperature maxima required 27. In some of these only a single station is represented but grouping in those cases would have lumped heterogeneous patterns together. Table 4–B shows these values.

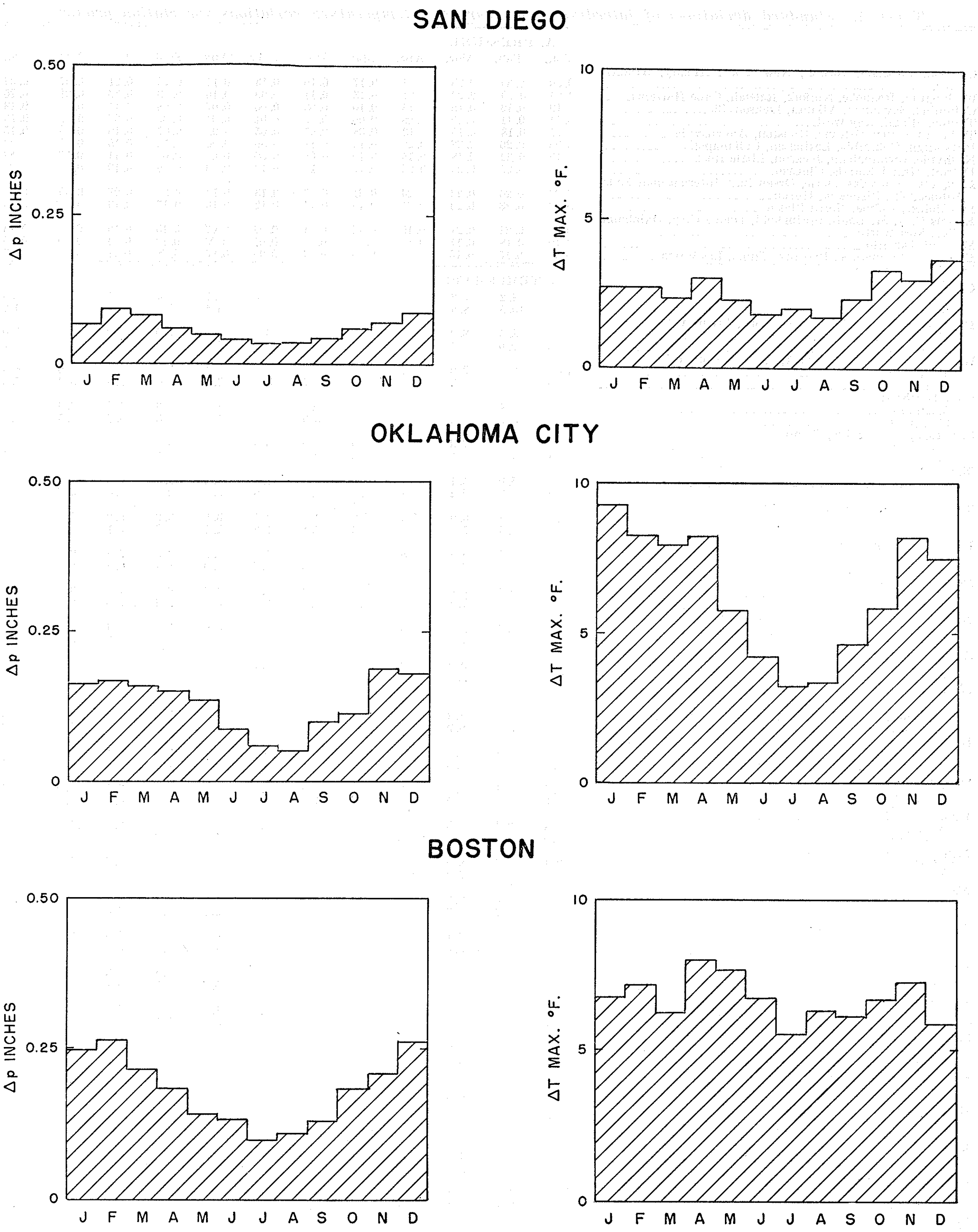


FIGURE 1.—Mean interdiurnal variability (by months) of pressure (left) and daily maximum temperature (right) in three different climatic regimes.

TABLE 4.—*Standard deviations of interdiurnal pressure and temperature variations for station groups*

	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
A. PRESSURE												
Caribou, Portland, Boston, New York, Albany, Atlantic City	0.30	0.34	0.28	0.24	0.17	0.16	0.13	0.14	0.18	0.21	0.27	0.32
Washington, Roanoke, Norfolk, Raleigh, Cape Hatteras	0.26	0.29	0.22	0.21	0.13	0.11	0.09	0.10	0.13	0.16	0.21	0.26
Columbia, Savannah, Atlanta, Jacksonville	0.19	0.19	0.16	0.15	0.10	0.08	0.06	0.07	0.08	0.11	0.14	0.18
Tampa, Miami, Key West	0.11	0.11	0.10	0.08	0.06	0.05	0.04	0.04	0.07	0.07	0.07	0.10
Tallahassee, New Orleans, Houston, Brownsville	0.17	0.18	0.15	0.13	0.08	0.07	0.05	0.05	0.07	0.10	0.14	0.15
Pittsburgh, Columbia, Lexington, Indianapolis	0.26	0.26	0.22	0.20	0.13	0.11	0.09	0.09	0.12	0.15	0.21	0.23
Nashville, Birmingham, Jackson, Little Rock	0.19	0.22	0.18	0.15	0.10	0.08	0.06	0.06	0.08	0.11	0.17	0.19
Detroit, Grand Rapids, Chicago	0.28	0.27	0.25	0.22	0.17	0.14	0.12	0.10	0.16	0.19	0.26	0.26
Marquette, Sault Ste. Marie, Green Bay, International Falls, Minneapolis, Bismarck, Huron	0.26	0.26	0.22	0.23	0.21	0.17	0.13	0.14	0.21	0.23	0.30	0.28
Des Moines, Moline, North Platte	0.23	0.23	0.20	0.21	0.18	0.14	0.12	0.10	0.17	0.19	0.26	0.26
Kansas City, St. Louis, Springfield, Dodge City, Oklahoma City, Fort Worth	0.22	0.24	0.21	0.19	0.15	0.11	0.09	0.07	0.13	0.16	0.24	0.23
Midland, Del Rio	0.19	0.18	0.17	0.15	0.13	0.08	0.07	0.06	0.10	0.14	0.20	0.19
El Paso, Albuquerque, Phoenix, Yuma, Las Vegas	0.13	0.15	0.13	0.11	0.09	0.07	0.06	0.06	0.08	0.11	0.13	0.13
B. TEMPERATURE												
Caribou:												
Maximum	9.7	8.2	7.2	8.0	8.7	8.7	7.0	7.1	8.6	7.4	7.7	8.5
Minimum	10.5	10.5	8.8	5.8	6.1	5.8	5.2	6.4	6.6	6.8	7.2	9.2
Portland, Boston, Albany, New York, Atlantic City:												
Maximum	8.7	8.6	8.0	9.5	9.5	8.0	6.7	6.8	7.0	7.9	8.5	8.0
Minimum	8.8	9.0	6.6	5.9	6.2	5.4	4.7	5.4	6.1	7.4	7.6	8.1
Washington, Roanoke, Norfolk, Raleigh, Columbia:												
Maximum	10.5	10.0	9.0	9.4	7.9	6.5	5.0	5.4	5.8	7.1	8.6	8.9
Minimum	7.9	7.8	6.3	7.4	5.7	4.7	3.7	3.4	4.6	5.8	8.3	7.8
Cape Hatteras:												
Maximum	10.1	8.8	7.6	6.7	5.3	4.2	2.7	3.2	3.6	5.4	7.6	9.2
Minimum	6.6	6.7	7.2	6.6	5.0	5.0	3.6	4.5	4.3	6.7	8.5	7.3
Savannah, Jacksonville, Tampa:												
Maximum	8.3	8.2	7.3	5.9	4.9	3.9	3.3	3.7	3.9	4.9	6.7	7.6
Minimum	8.1	7.3	6.7	6.3	3.9	2.8	2.2	2.3	2.7	3.8	7.6	7.5
Miami, Key West:												
Maximum	5.5	5.0	5.1	3.7	2.5	2.0	1.8	2.2	2.3	2.6	3.3	5.5
Minimum	5.2	5.3	5.2	4.1	3.0	2.8	2.6	2.9	2.9	3.0	3.7	5.7
Tallahassee, New Orleans, Houston:												
Maximum	9.0	7.9	6.9	5.2	4.2	3.4	3.1	3.5	3.9	5.2	7.6	7.9
Minimum	8.0	7.3	7.2	5.7	4.3	2.4	1.8	2.1	2.7	5.1	7.5	7.6
Pittsburgh, Columbus, Detroit:												
Maximum	8.8	9.1	8.7	9.8	8.9	7.2	5.5	5.1	7.2	7.6	9.5	8.7
Minimum	8.6	8.2	6.5	7.0	7.3	6.3	4.5	5.0	6.4	6.8	8.0	8.4
Indianapolis, Lexington:												
Maximum	9.8	9.4	8.6	9.4	8.6	6.3	4.3	4.2	6.0	7.3	9.7	9.5
Minimum	8.9	8.2	7.4	6.8	6.3	5.1	3.8	3.8	5.6	6.9	8.1	8.7
Nashville, Atlanta, Birmingham, Jackson, Little Rock:												
Maximum	9.8	9.4	8.2	8.2	5.7	4.8	3.7	3.9	5.2	6.4	8.2	8.8
Minimum	8.3	8.2	7.2	6.9	5.4	3.8	2.9	3.0	4.1	6.3	8.3	7.9
St. Louis, Kansas City, Springfield:												
Maximum	10.8	9.0	9.0	10.0	7.7	6.6	5.7	5.1	7.1	8.1	9.7	9.8
Minimum	8.5	8.4	6.7	7.2	6.5	4.8	4.1	4.0	5.7	6.7	7.9	8.3
Chicago, Grand Rapids, Green Bay, Marquette, Sault Ste. Marie:												
Maximum	7.8	7.5	7.2	8.9	10.2	8.7	7.0	7.4	7.9	8.0	8.4	8.0
Minimum	8.6	8.5	6.9	6.4	7.2	6.4	5.2	5.8	6.6	6.6	7.1	8.2
International Falls, Minneapolis, Des Moines, Moline, Huron:												
Maximum	10.1	8.7	7.9	9.5	9.1	7.5	6.1	6.9	8.7	8.6	9.2	9.9
Minimum	9.9	9.3	8.0	7.2	7.2	6.0	5.4	6.2	7.0	7.1	8.3	9.4
Oklahoma City, Fort Worth:												
Maximum	11.5	10.1	9.6	9.6	6.8	5.7	4.5	4.5	6.2	7.1	10.0	9.3
Minimum	8.3	7.2	6.9	7.5	5.7	3.9	3.1	3.2	5.1	6.5	7.9	7.1
Dodge City, North Platte, Denver:												
Maximum	10.4	10.4	10.3	10.1	9.3	8.4	6.9	7.0	9.8	9.7	11.2	10.4
Minimum	7.5	7.3	7.1	6.6	5.8	5.0	4.6	4.6	6.3	6.2	7.9	7.6
Miles City, Bismarck, Casper, Helena:												
Maximum	9.4	9.2	8.5	9.8	9.2	8.4	7.6	8.2	10.6	10.3	10.1	9.5
Minimum	9.4	9.0	7.2	6.8	6.0	5.8	5.4	6.3	6.9	7.0	8.7	8.7
Midland, Del Rio, El Paso:												
Maximum	8.6	9.5	8.9	8.2	6.4	4.5	4.2	3.5	5.7	6.7	9.2	8.8
Minimum	6.8	6.7	6.9	6.4	5.7	4.0	2.9	2.7	4.2	5.4	6.7	6.2
Albuquerque, Grand Junction, Salt Lake City:												
Maximum	5.6	6.0	7.1	7.8	6.6	5.7	4.5	5.2	6.1	6.6	6.5	5.5
Minimum	5.7	6.2	5.6	6.0	5.3	4.9	4.4	4.4	5.2	5.3	5.5	5.5
Ely, Las Vegas:												
Maximum	6.4	6.1	6.7	7.1	6.3	4.8	4.4	4.4	5.8	6.3	6.9	5.7
Minimum	7.1	7.0	6.2	6.5	5.8	5.5	5.5	5.7	5.9	6.1	6.0	6.1
Phoenix, Yuma:												
Maximum	3.9	4.4	5.1	5.4	4.9	3.8	3.9	4.2	3.7	5.4	4.9	4.0
Minimum	4.3	5.2	4.2	4.3	3.9	3.4	3.6	3.9	3.9	4.3	4.4	4.4
San Diego, Los Angeles:												
Maximum	4.5	4.4	4.9	4.4	3.3	3.4	3.3	2.7	4.6	5.3	4.6	5.6
Minimum	3.5	3.3	2.8	2.7	2.3	1.7	1.7	1.8	2.3	3.1	3.7	3.7
Fresno, San Francisco, Sacramento:												
Maximum	5.1	4.2	4.7	5.9	6.1	6.1	5.2	5.3	5.7	5.5	4.7	4.5
Minimum	4.9	4.3	4.5	3.5	3.4	3.4	3.1	3.2	3.2	3.6	3.8	4.1
Boise, Pendleton, Spokane, Medford:												
Maximum	6.8	5.8	5.7	6.8	7.9	7.5	5.7	6.0	7.2	6.7	7.2	6.6
Minimum	6.4	5.5	4.8	5.3	4.7	5.1	5.0	4.7	5.5	5.3	6.4	4.7
Eureka:												
Maximum	4.0	4.3	4.4	3.6	3.4	2.9	2.6	2.3	4.2	5.0	4.9	4.2
Minimum	4.6	4.5	3.9	3.7	2.9	2.4	2.0	2.3	3.0	3.7	4.9	3.9
Seattle:												
Maximum	4.6	4.3	4.4	5.6	6.9	6.8	6.7	5.9	5.6	5.4	4.9	5.2
Minimum	4.6	3.7	3.7	3.9	3.2	2.9	3.1	3.6	3.6	4.4	5.1	4.5
Brownsville:												
Maximum	8.7	8.2	6.8	5.4	3.7	2.4	1.9	2.6	3.4	4.9	7.8	8.0
Minimum	7.6	8.3	7.0	5.0	4.1	2.3	1.9	2.1	2.5	5.5	7.1	7.9
Reno:												
Maximum	6.4	6.4	7.1	6.7	7.1	5.6	4.1	4.9	6.3	6.5	7.2	6.5
Minimum	6.5	6.6	8.0	6.1	5.8	4.9	5.0	5.0	6.0	6.2	5.9	5.8

The same 27 groupings as for the maxima were used for the minima. However, in these a single annual wave with highest values in winter and lowest values in summer is the common pattern. These form the second line in table 4–B.

From table 4 several characteristics of the standard deviation of interdiurnal variability can be noted. For the pressure variations, by and large, a simple annual march is shown. The largest standard deviations are observed in one or more of the winter months. The smallest values fall into midsummer. This is entirely according to expectation and requires no further comment.

For the two temperature values again three major patterns of annual march are noted. Most common is a course similar to that of the standard deviations of pressure variability, i.e., a winter maximum and summer minimum. The clearest examples are found in the area south of Washington, D.C., throughout the South and Gulf coast area. The second pattern shows maxima of standard deviation of temperature variability in spring and autumn. Typical of this annual course are the data from the Mountain States (see the series for Albuquerque, Grand Junction, Salt Lake City). It is more pronounced in the maxima than in the minima and shows that these seasons produce the greatest instability of weather patterns in these areas. The third course, with a minimum of the standard deviation of temperature variability in winter, is shown for the Pacific Northwest coastal area. Onshore winds and much cloudiness cause this relative steadiness. The summer regime with alternating breezes from ocean or continent, as well as wider ranges of cloudiness, produces the more unstable condition in the summer months.

5. Implications

Information of the type presented here is of value to the forecaster as part of the climatological background, which can set up a useful framework of reference for his activity. The detailed monthly frequency distribution for the 3 elements for the 75 stations, including the extreme values during the 5-year interval are available from the National Weather Records Center.[2] No claim is made that the extremes of interdiurnal variability can be established in 5 years.

Aside from the forecaster, the data are of interest to the biometeorologist. It has been claimed for a long time that changes in the biometeorological environment have direct effects on human health, well-being, and productivity. These changes are generally characterized by fluctuations of barometric pressure and temperature. No conclusive proof has been produced that there is a direct link between these specific elements and the reactions shown to take place in the body. It is more likely that the changes in these meteorological elements reflect simply a general change in atmospheric conditions.

Among the responses that have been cited are scar and arthritic pains, triggering of births and deaths, and onset of a wide assortment of diseases. This is not the place to review the vast literature that has accumulated in this field. Suffice it to say that little is firmly established and much is based on vague correlations. The charts presented here may offer some leads to the student of epidemiology. They also answer some persistent queries on the least variable areas in the country with more precision than was possible heretofore. This type of information appears to have some utility in the management of certain arthritic symptoms and in gerontology.

The charts also can throw some light on the controversial subject of climatic determinism. This hypothesis attaches great weight to the stimulating effect of high atmospheric variability on mental and cultural achievement (see e.g., Huntington, [9]). Based on the elements chosen for this study no claim can be made for the validity of climatic determinism, as discussed elsewhere (Landsberg [12]).

Acknowledgment

The basic data for this study were compiled at the National Weather Records Center under the supervision of Mr. Hugo V. Lehrer.

References

1. H. Arakawa and K. Tsutsumi, "Interdiurnal Temperature Variabilities and Temperature Singularities in Japan," *Papers in Meteorology and Geophysics*, vol. 2, No. 1, Mar. 1951, pp. 40–44.
2. Heinrich Bahr, "Die interdiurne Veränderlichkeit des Luftdrucks," Dissertation, Berlin, 1910, 100 pp.

---

[2] These may be obtained at cost of reproduction by addressing the Director, National Weather Records Center, Asheville, N.C., and referring to Job No. 5122.

3. Ellensigrit Berger, "Siebenjährige Mittelkarten der interdiurnen Veränderlichkeit des Luftdruckes am Boden über dem Gebiet Nordamerika-Nordatlantik-Eurasien für die Monate Januar und Juli 1951–1957," *Meteorologische Abhandlungen*, Institut für Meteorologie und Geophysik; Freie Universität, Berlin, Bd. 14, No. 5, 1961, 28 pp.
4. W. Calef, "Interdiurnal Variability of Temperature Extremes in the United States," *Bulletin of the American Meteorological Society*, vol. 31, No. 8, Oct. 1950, pp. 300–302.
5. Charles S. Cushman, "Interdiurnal Temperature Changes in Alaska," University of Washington, Thesis, 1953, 115 pp.
6. H. W. Dove, "Über die mittlere und absolute Veränderlichkeit der Temperatur der Atmosphäre," *Monatsberichte* Königliche Akademie der Wissenschaften, Berlin, 1866, pp. 691–707.
7. J. Hann, "Untersuchungen über die Veränderlichkeit der Tagestemperatur," *Sitzberichte*, Königliche Akademie der Wissenschaften, Wien, sect. II, vol. 71, 1875, 87 pp.
8. Frank E. Houghton, "Interdiurnal Temperature Changes in New Mexico," Weather Bureau Manuscript, 1963, 9 pp.
9. E. Huntington, *Mainsprings of Civilization*, New York, 1945, 660 pp.
10. L. F. Kämtz, *Lehrbuch der Meteorologie*, vol. II, sect. 6, Leipzig, 1832, pp. 305–308.
11. William H. Klein, "A Hemispheric Study of Daily Pressure Viriability at Sea Level and Aloft," *Journal of Meteorology*, vol. 8, No. 5, Oct. 1951, pp, 332–346.
12. H. E. Landsberg, "Atmospheric Variability and Climatic Determinism," Blumenstock Memorial Volume, in press.
13. H. Landsberg, *Physical Climatology*, Gray Printing Co., Dubois, Pa., 1941, 2d ed., 1958, pp. 115–117.
14. H. E. Landsberg and B. Ratner, "Note on Frequency of High Winds over the United States," *Monthly Weather Review*, vol. 87, No. 5, May 1959, pp. 185–187.
15. T. Nagao, "Interdiurnal Variability of Temperature in Japan and Her Neighborhood, Part 4," *Journal of Meteorological Research*, Tokyo, vol. 4, No. 6, Sept. 1952, pp. 325–331.
16. A. I. Woeikof, "La variabilité interdiurne de la pression atmosphérique principalement en Asie," *Mémoires* Académie Imperiale des Sciences, St. Petersbourg, ser. VIII, vol. 19, No. 6, 1906, 40 pp.

Appendix

Charts 1–12: Mean monthly interdiurnal variability of pressure, in inches.

Charts 13–24: Mean monthly interdiurnal variability of daily maximum temperature in °F.

Charts 25–36: Mean monthly interdiurnal variability of daily minimum temperature in °F.

Table A–1: Mean interdiurnal variability of pressure, maximum and minimum temperature for 75 United States Stations.

MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
JANUARY

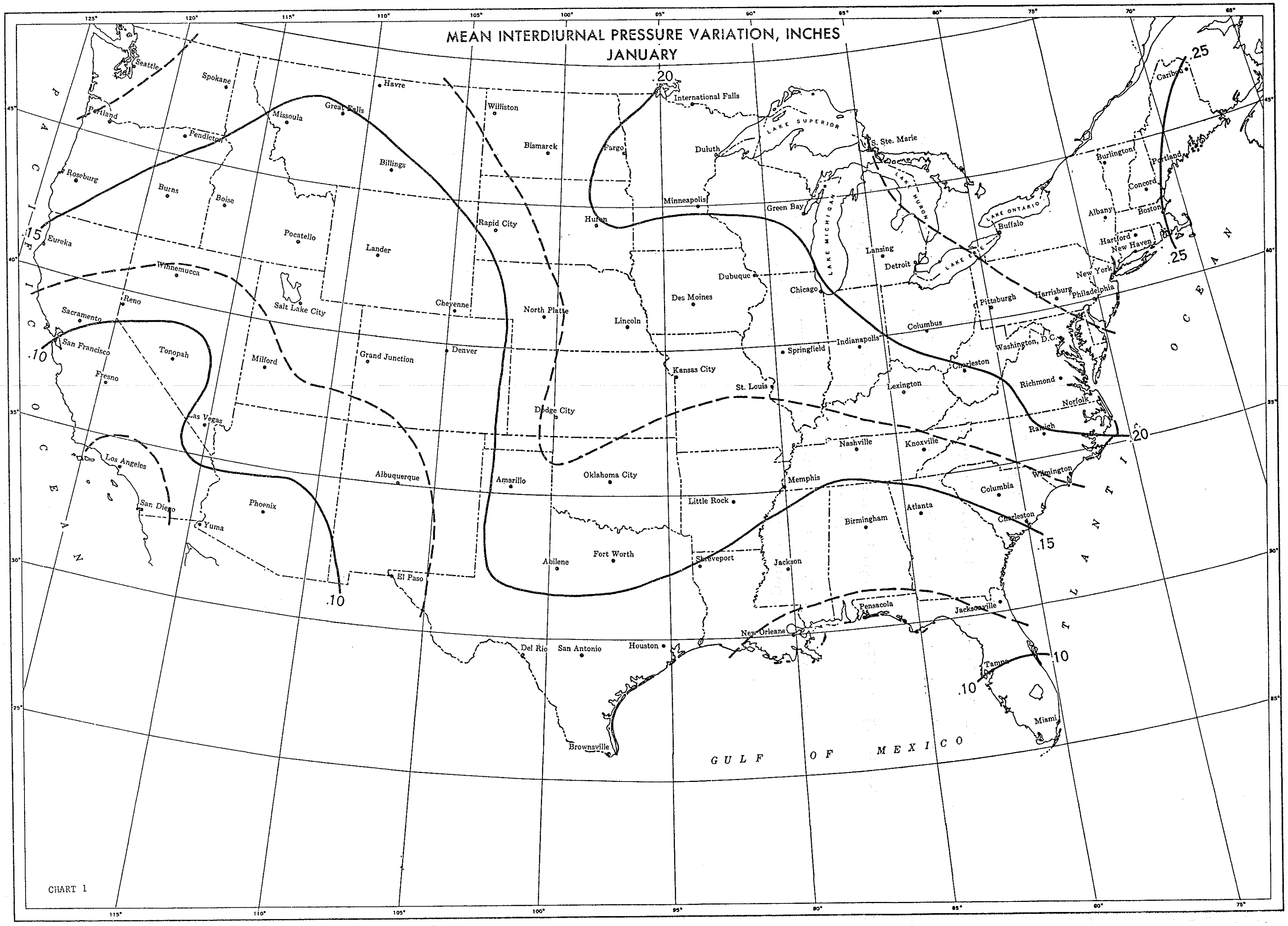
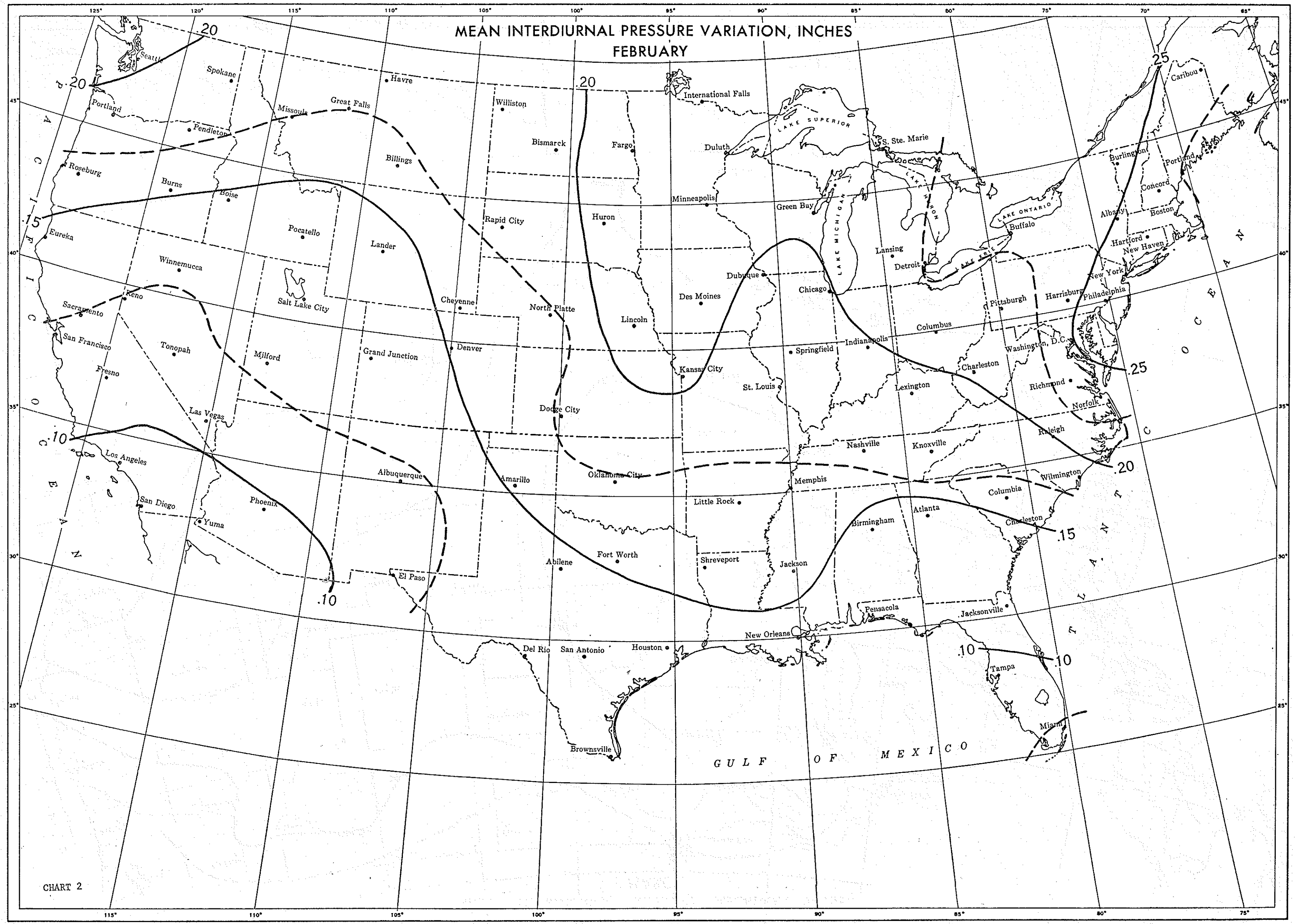
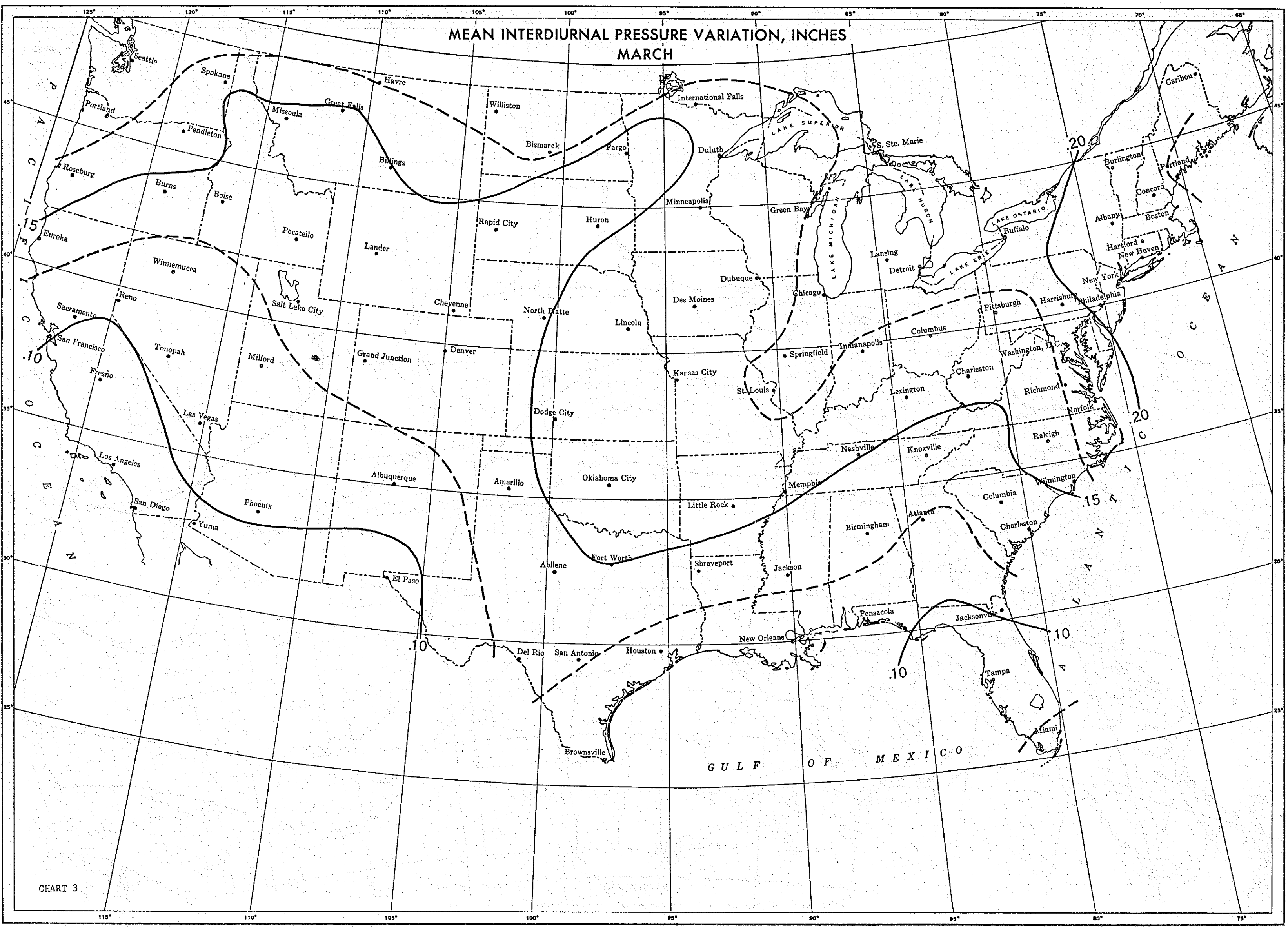


CHART 1



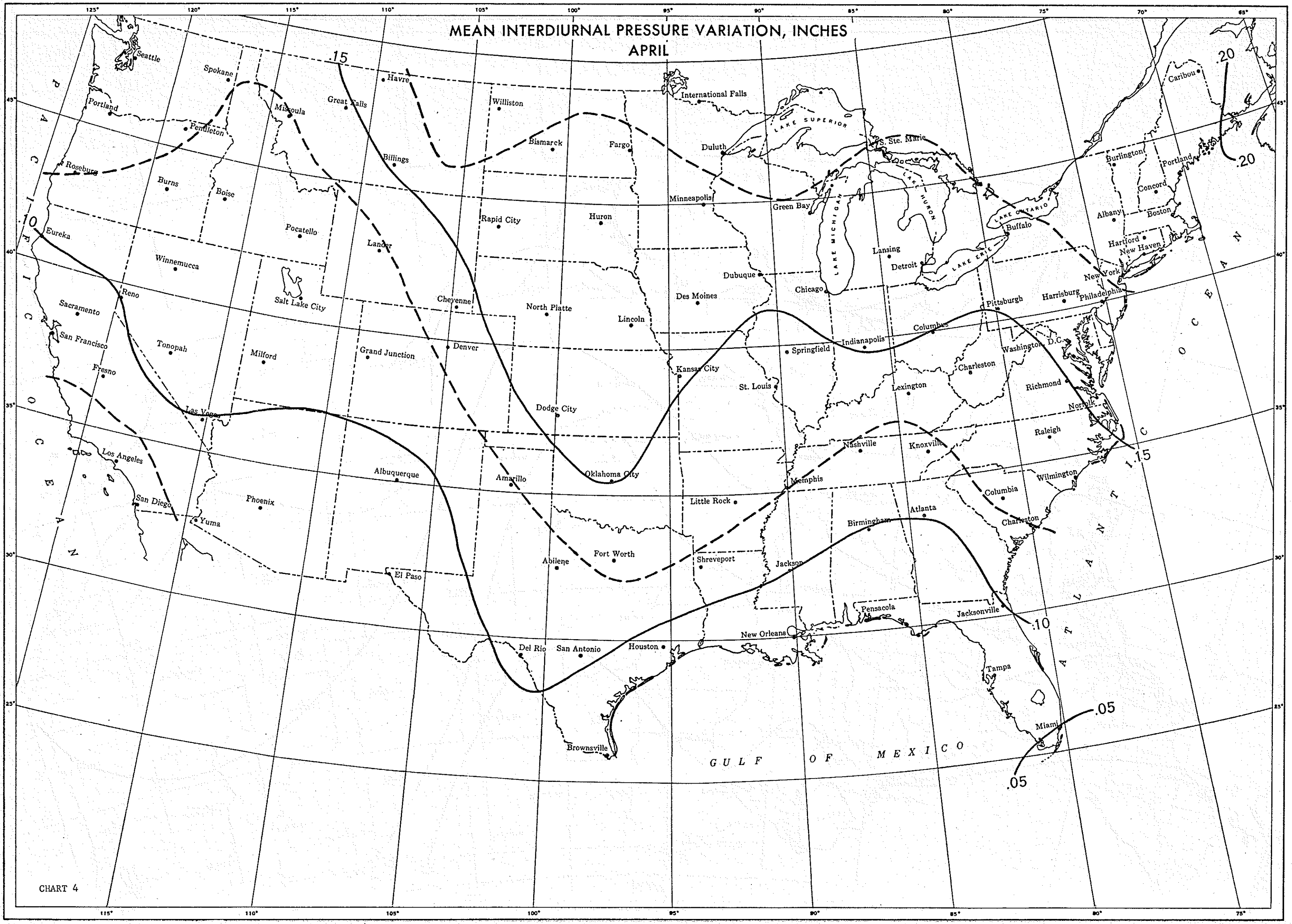
MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
FEBRUARY

CHART 2



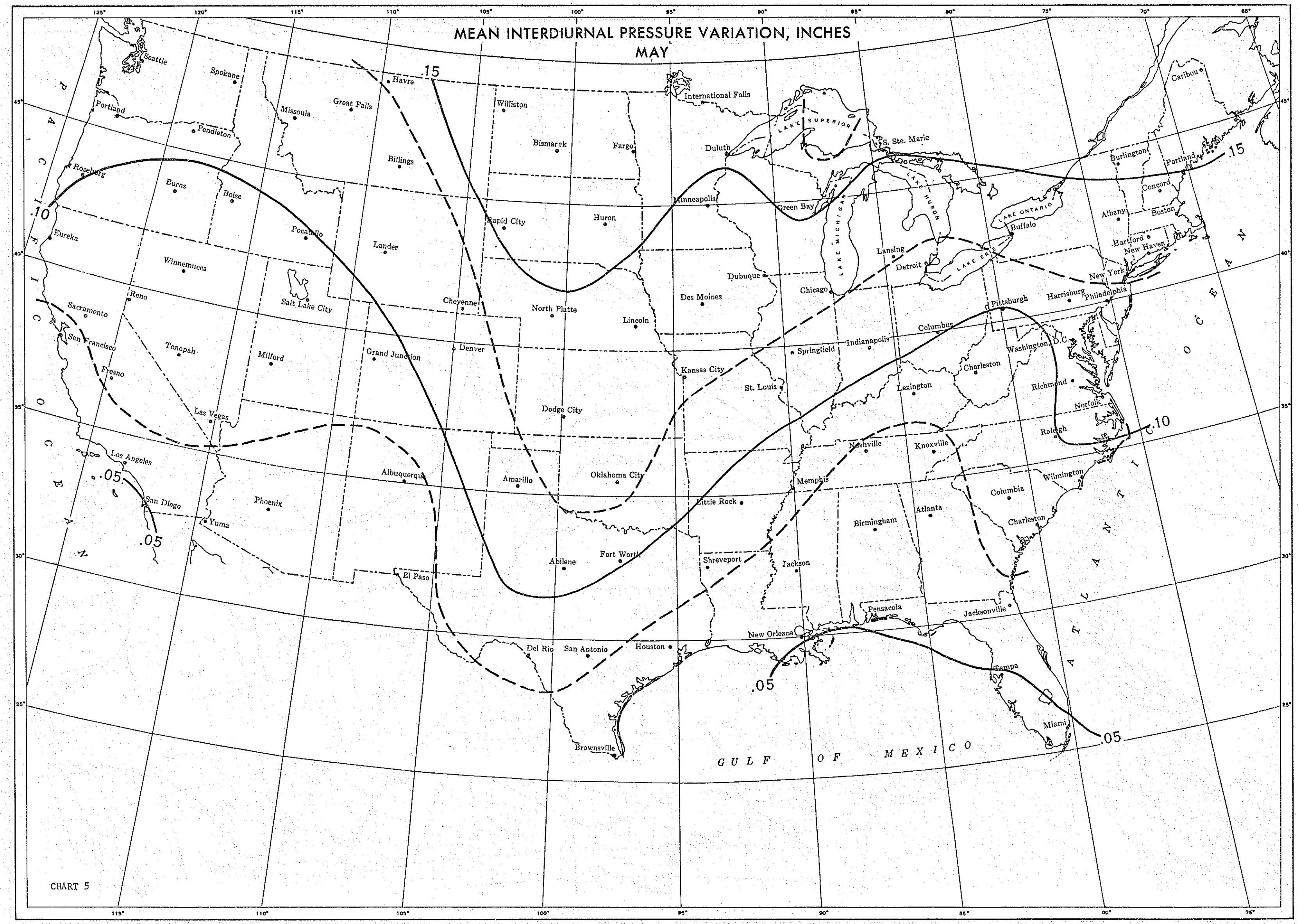
MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
MARCH

CHART 3



MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
APRIL

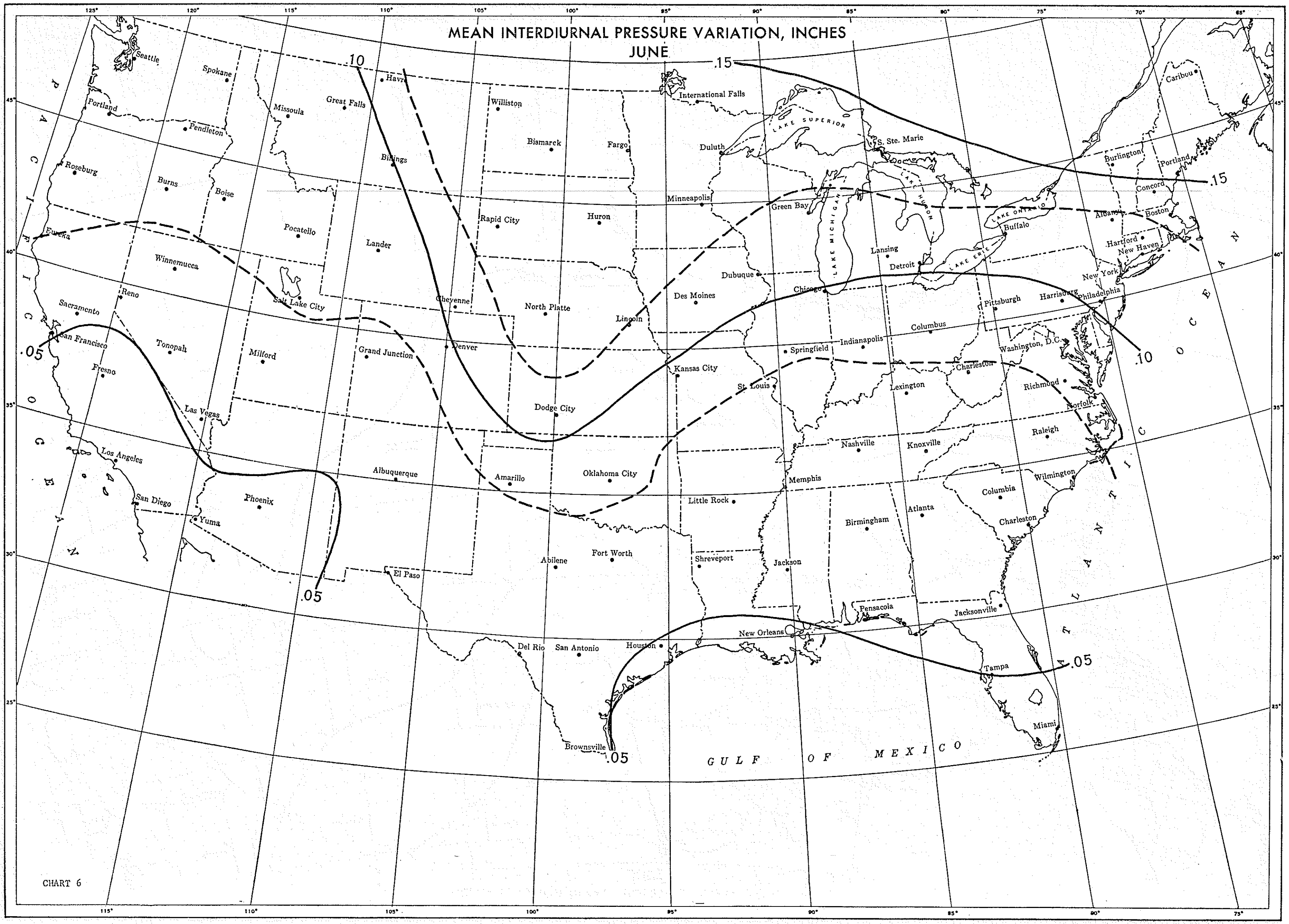
CHART 4



MEAN INTERDIURNAL PRESSURE VARIATION, INCHES

MAY

CHART 5



MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
JUNE

CHART 6

MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
JULY

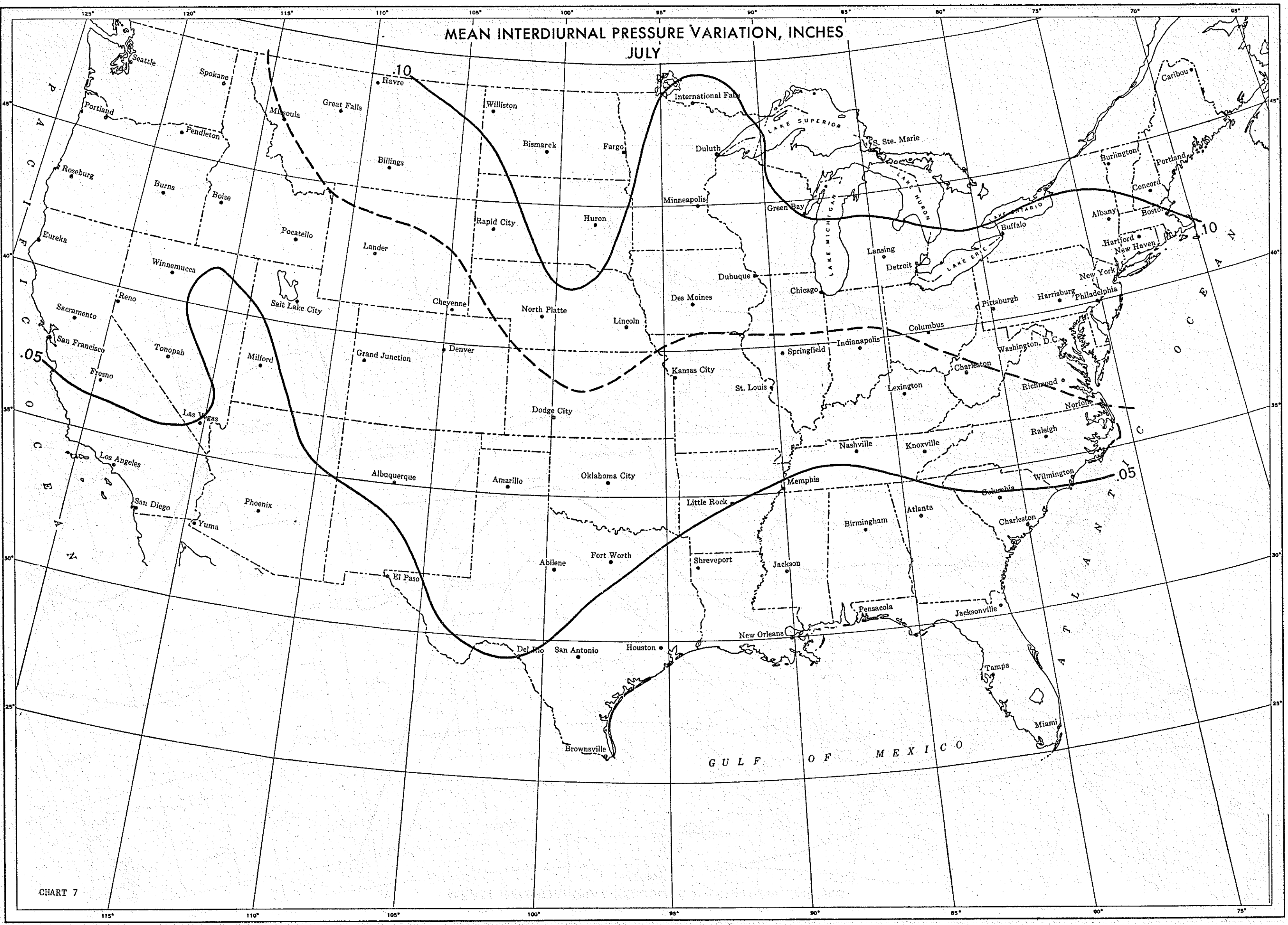
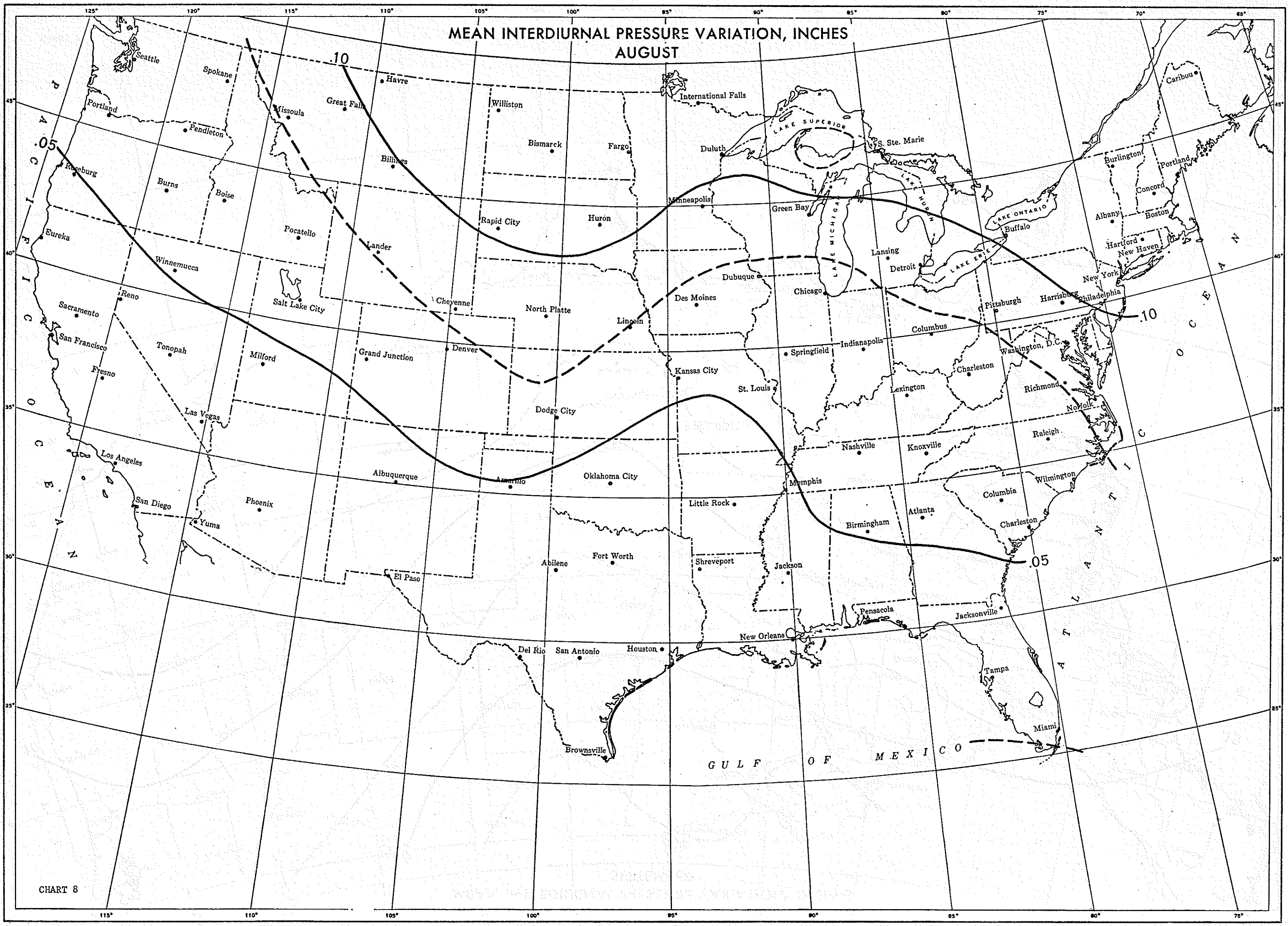
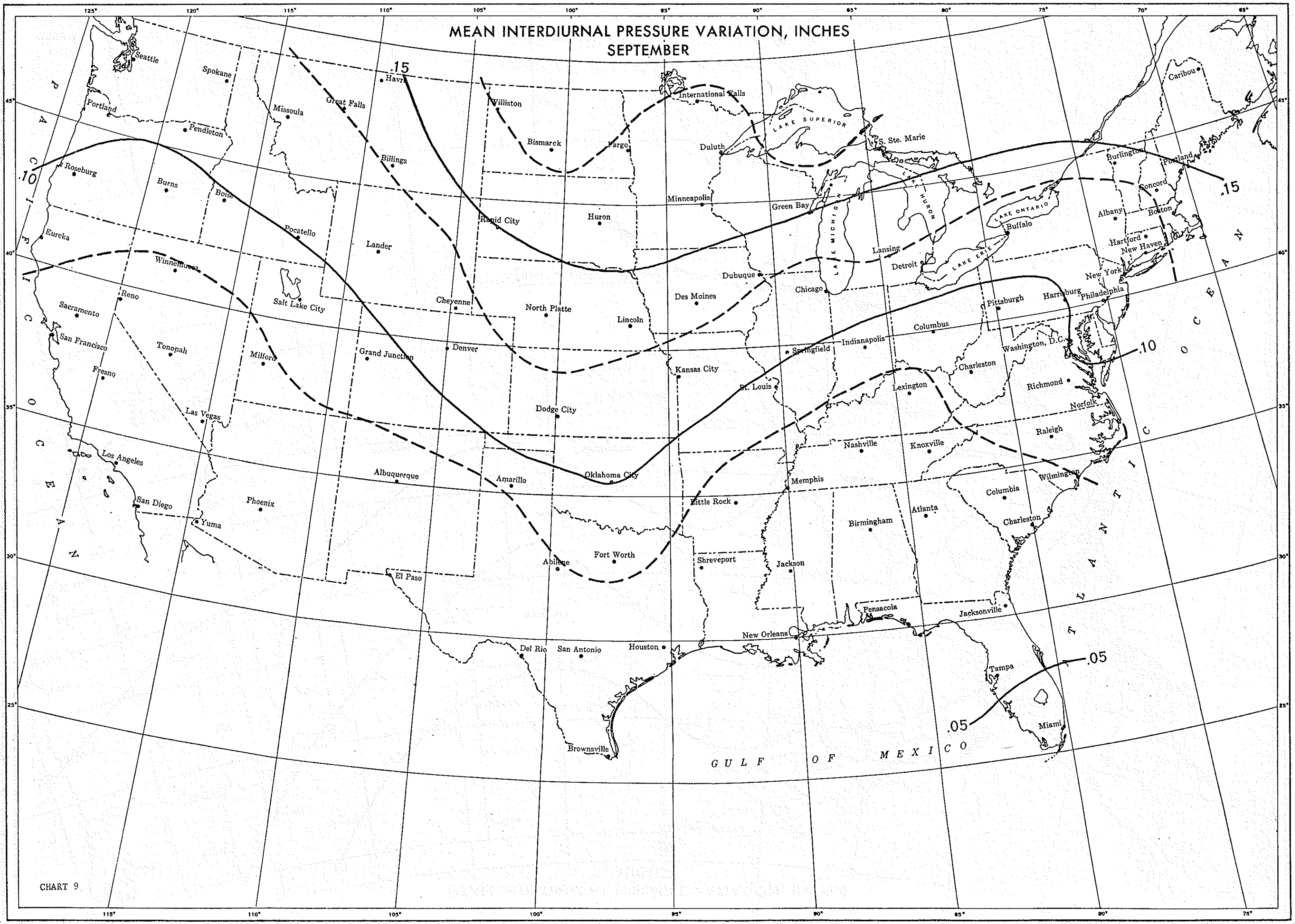


CHART 7



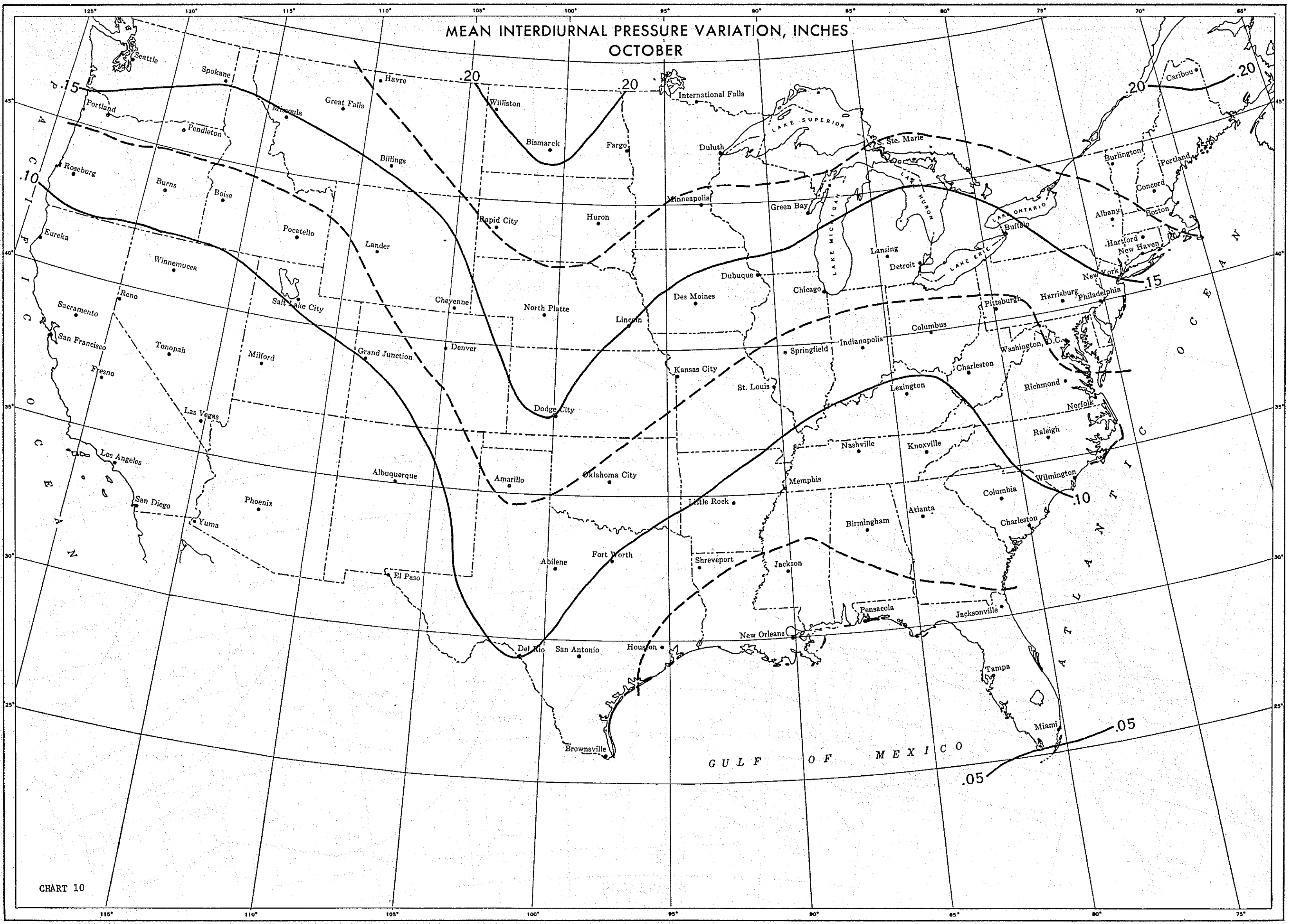
MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
AUGUST

CHART 8



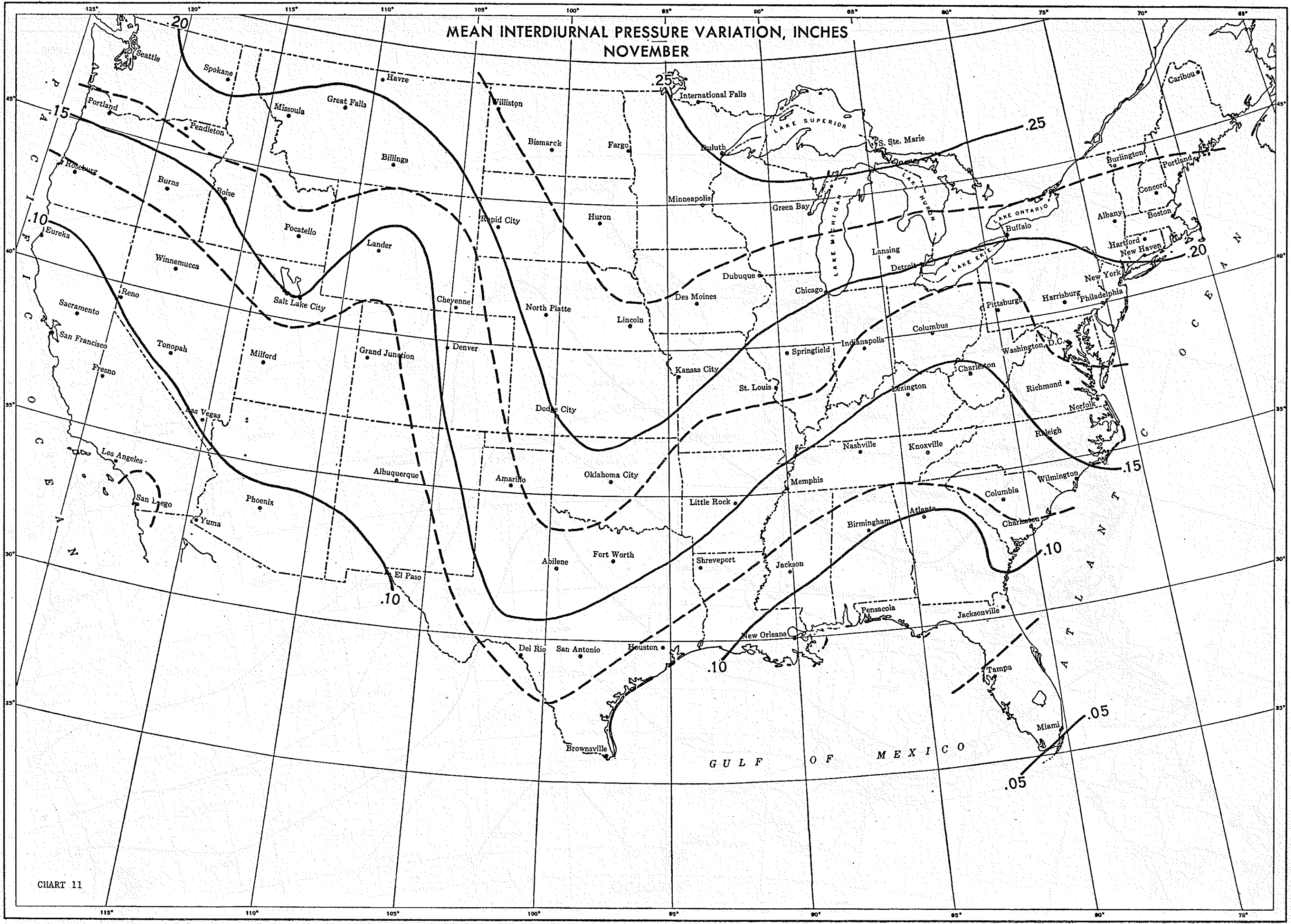
MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
SEPTEMBER

CHART 9



MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
OCTOBER

CHART 10



MEAN INTERDIURNAL PRESSURE VARIATION, INCHES NOVEMBER

CHART 11

MEAN INTERDIURNAL PRESSURE VARIATION, INCHES
DECEMBER

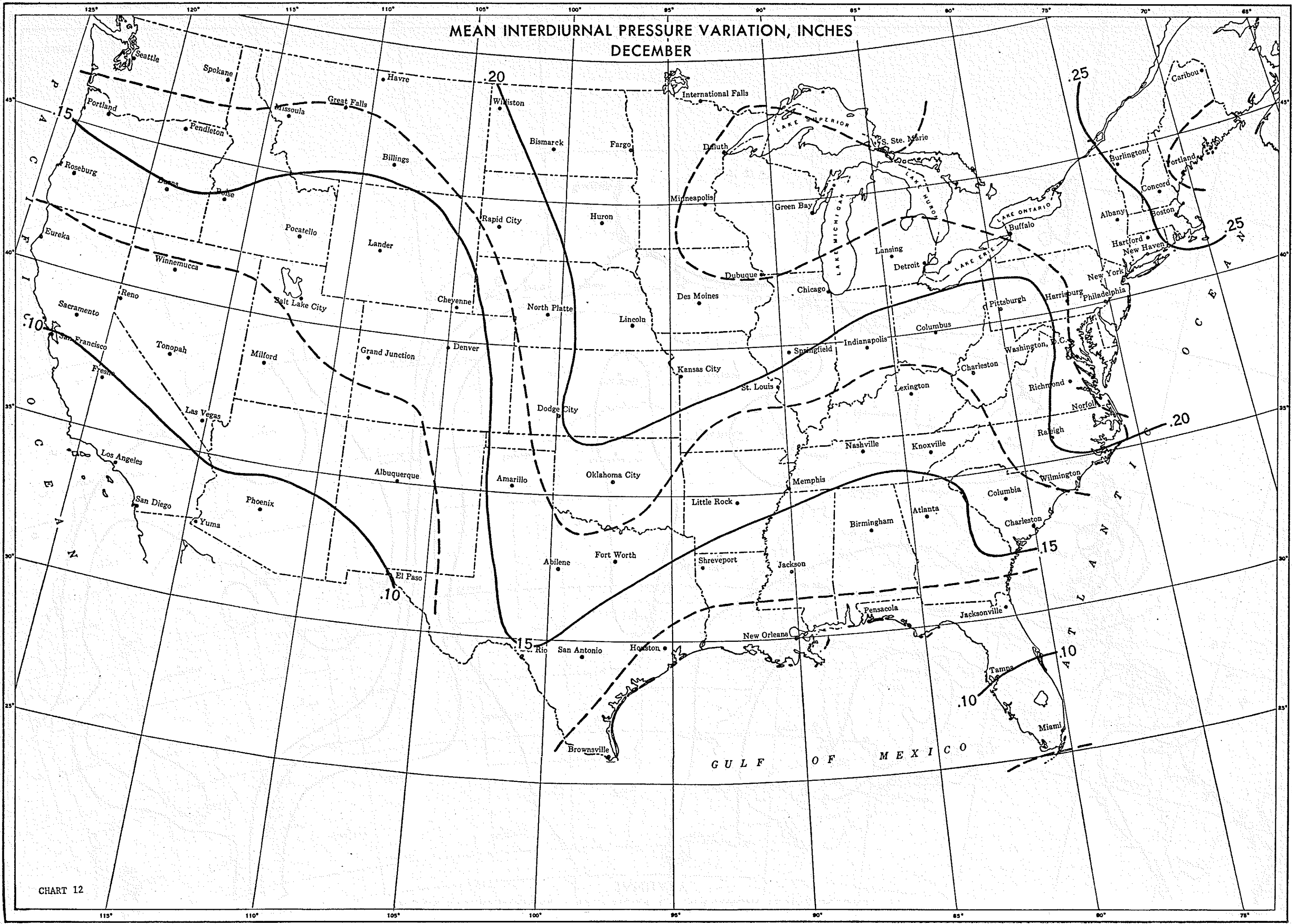


CHART 12

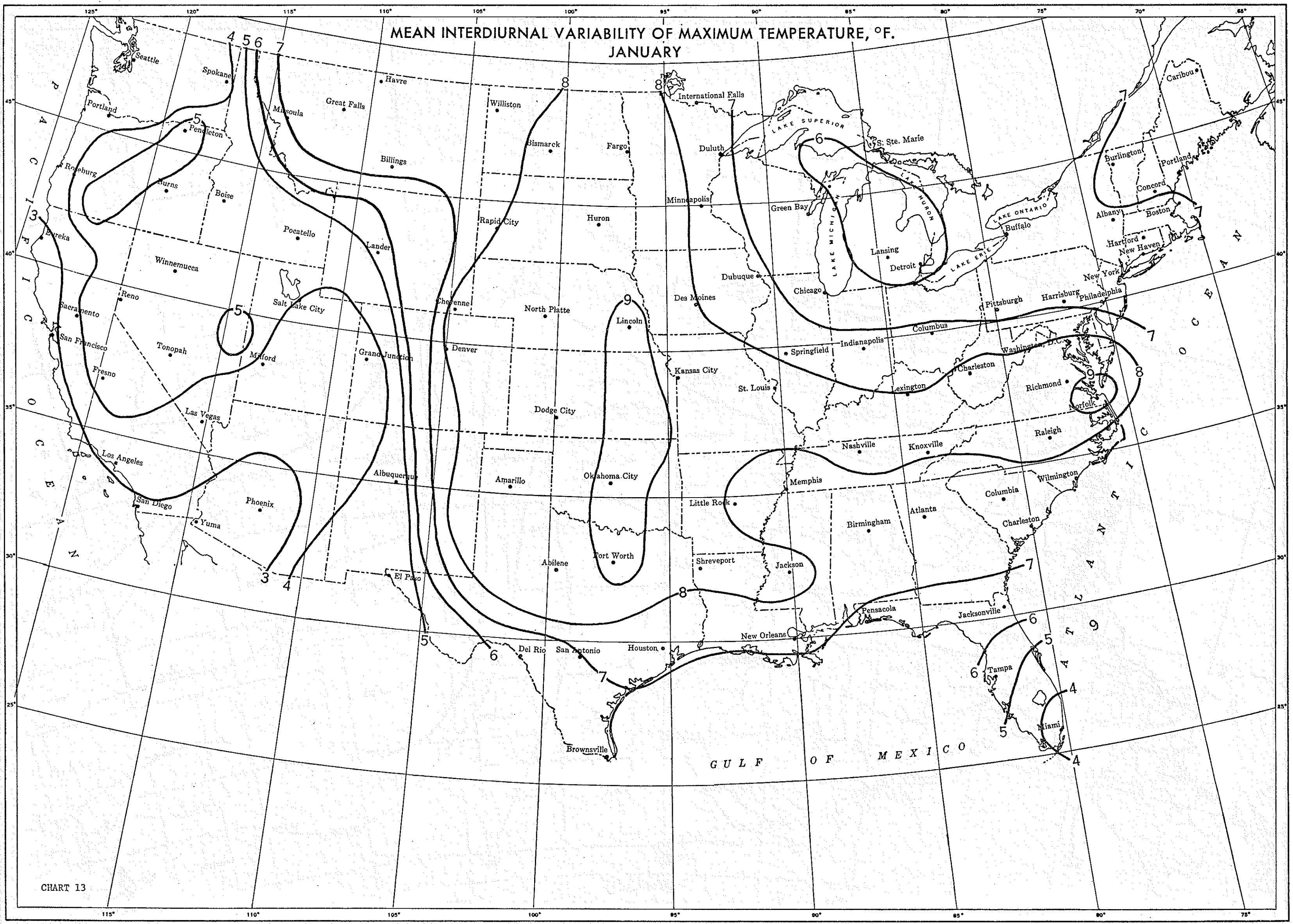


CHART 13

MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
JANUARY

MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
FEBRUARY

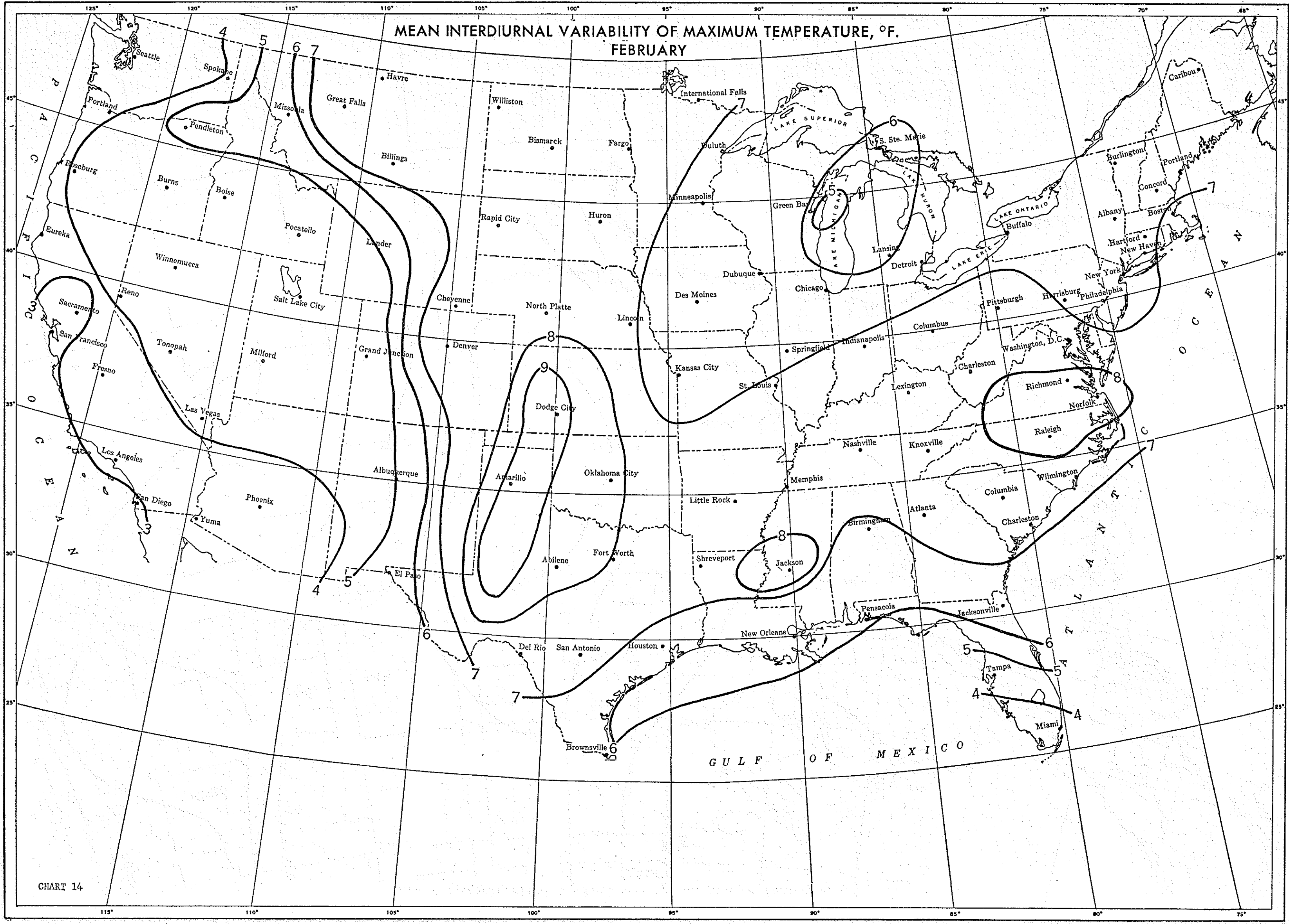


CHART 14

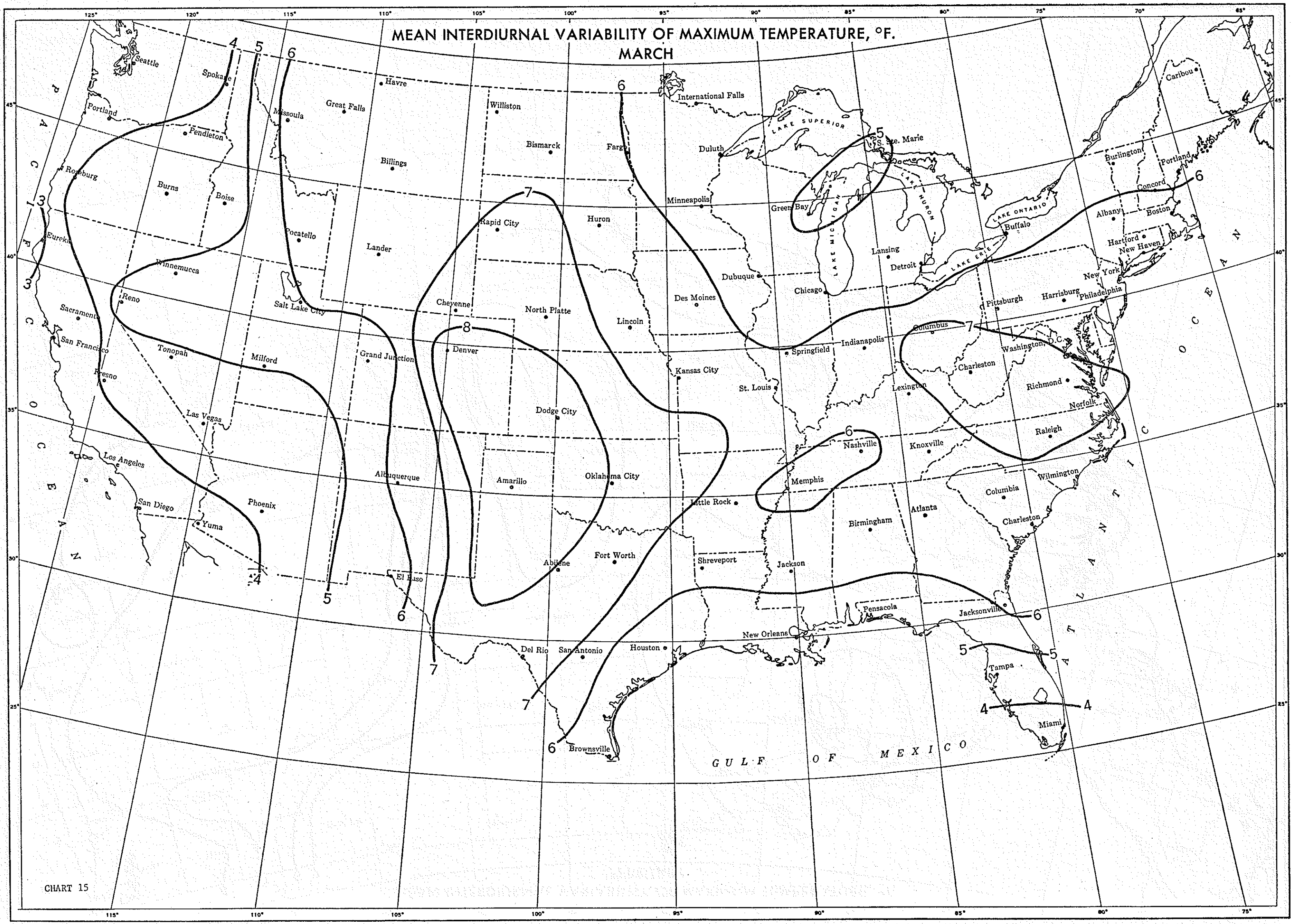
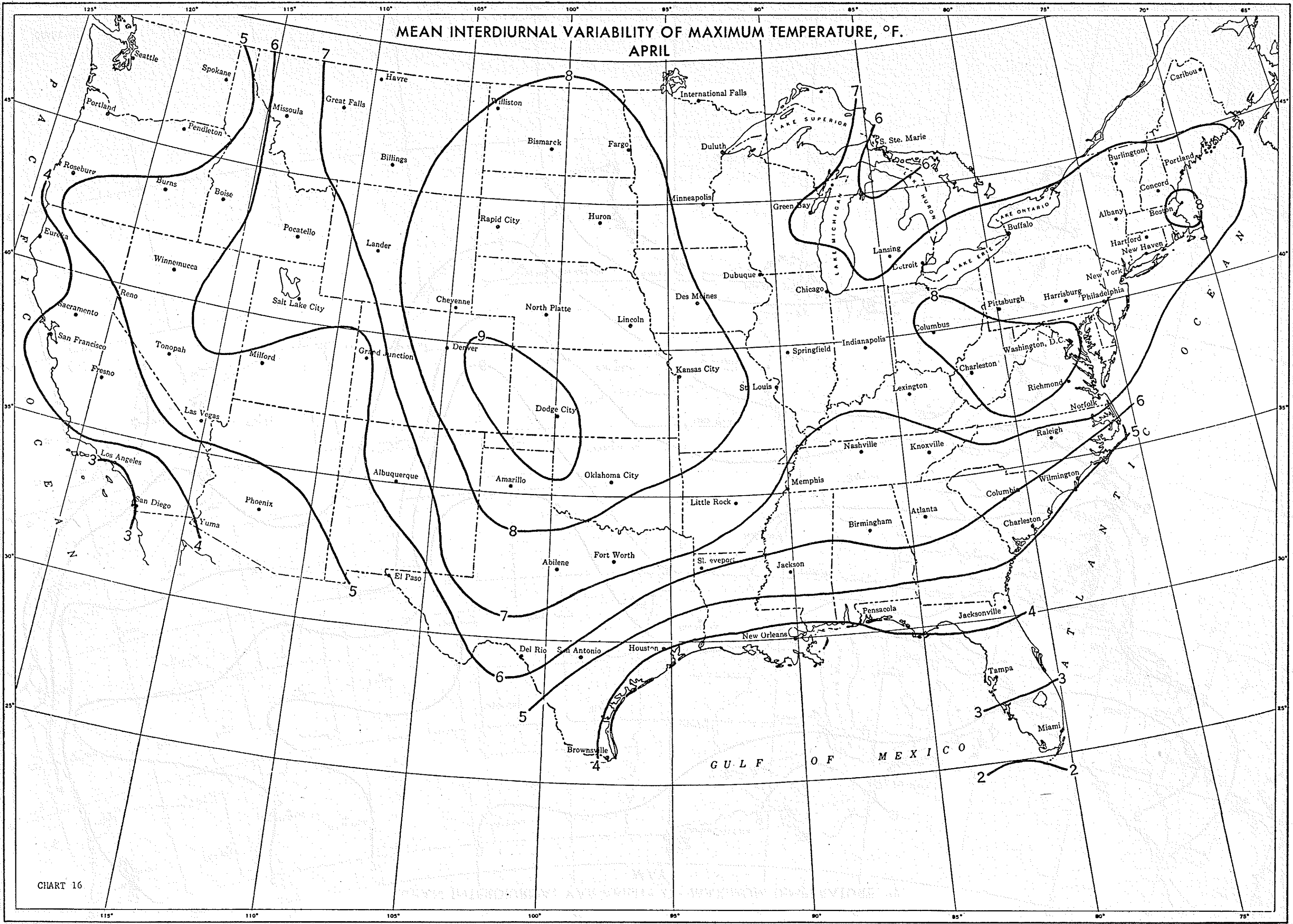


CHART 15

MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
MARCH



MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
APRIL

CHART 16

MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
MAY

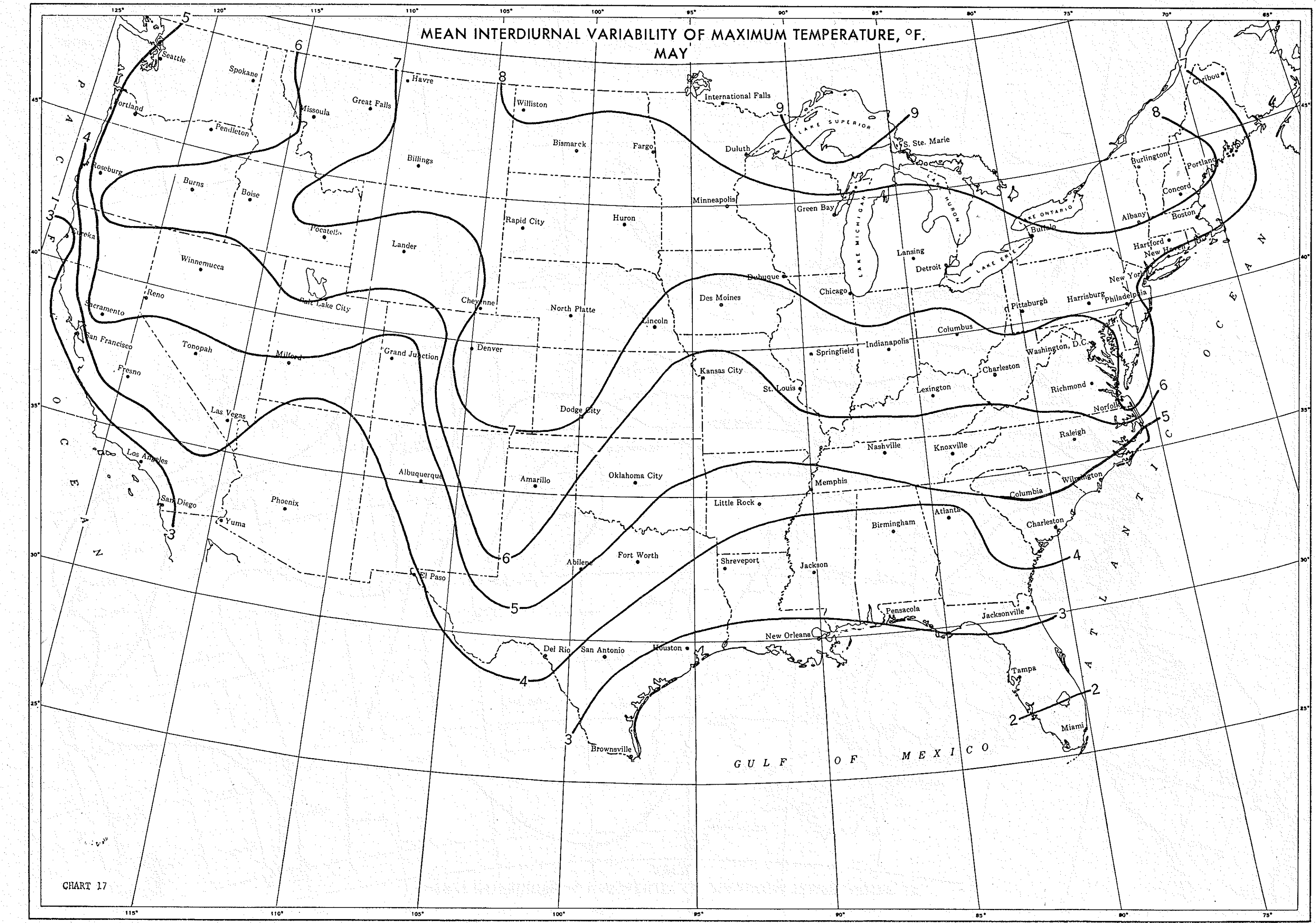


CHART 17

MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
JUNE

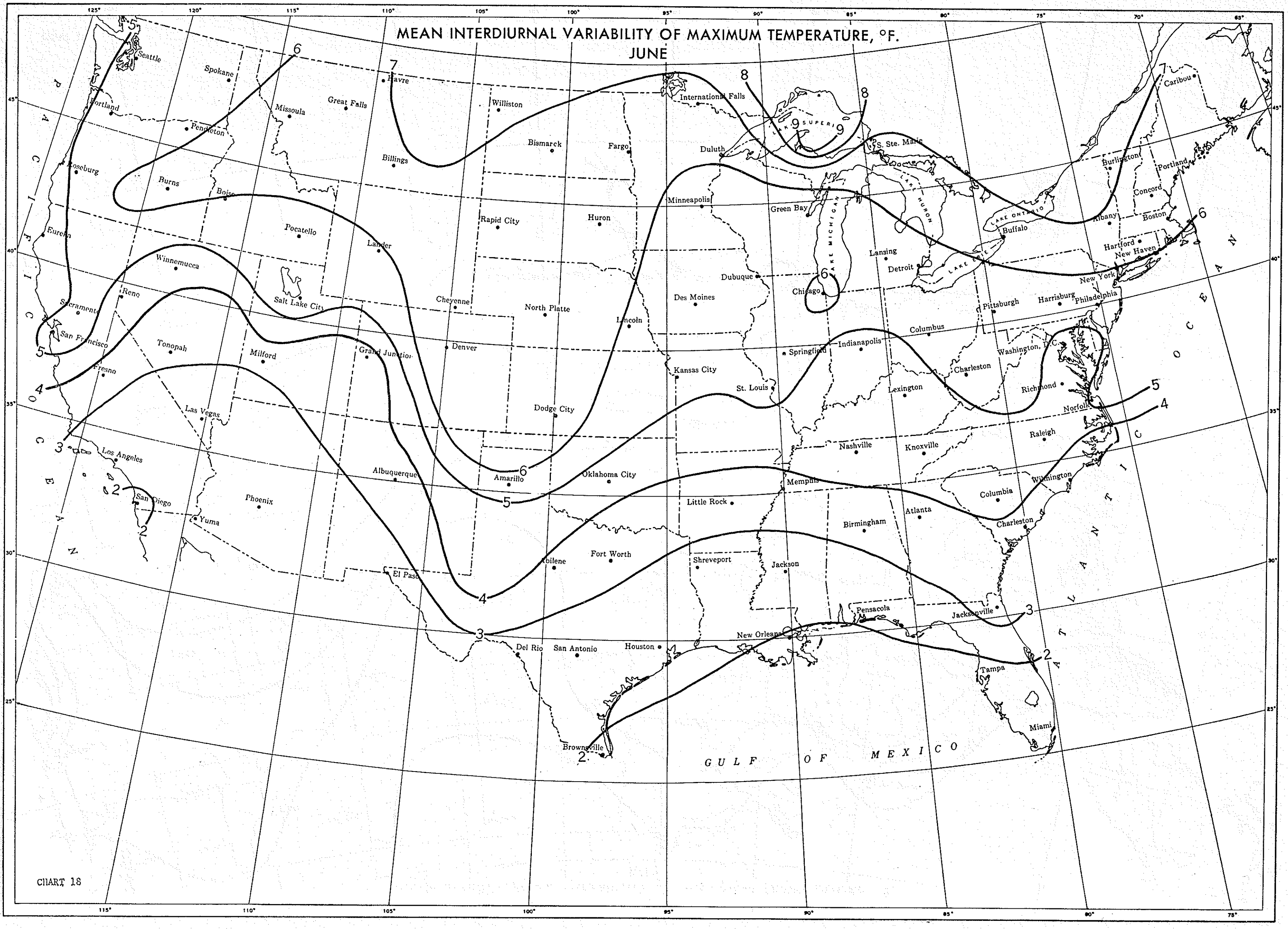
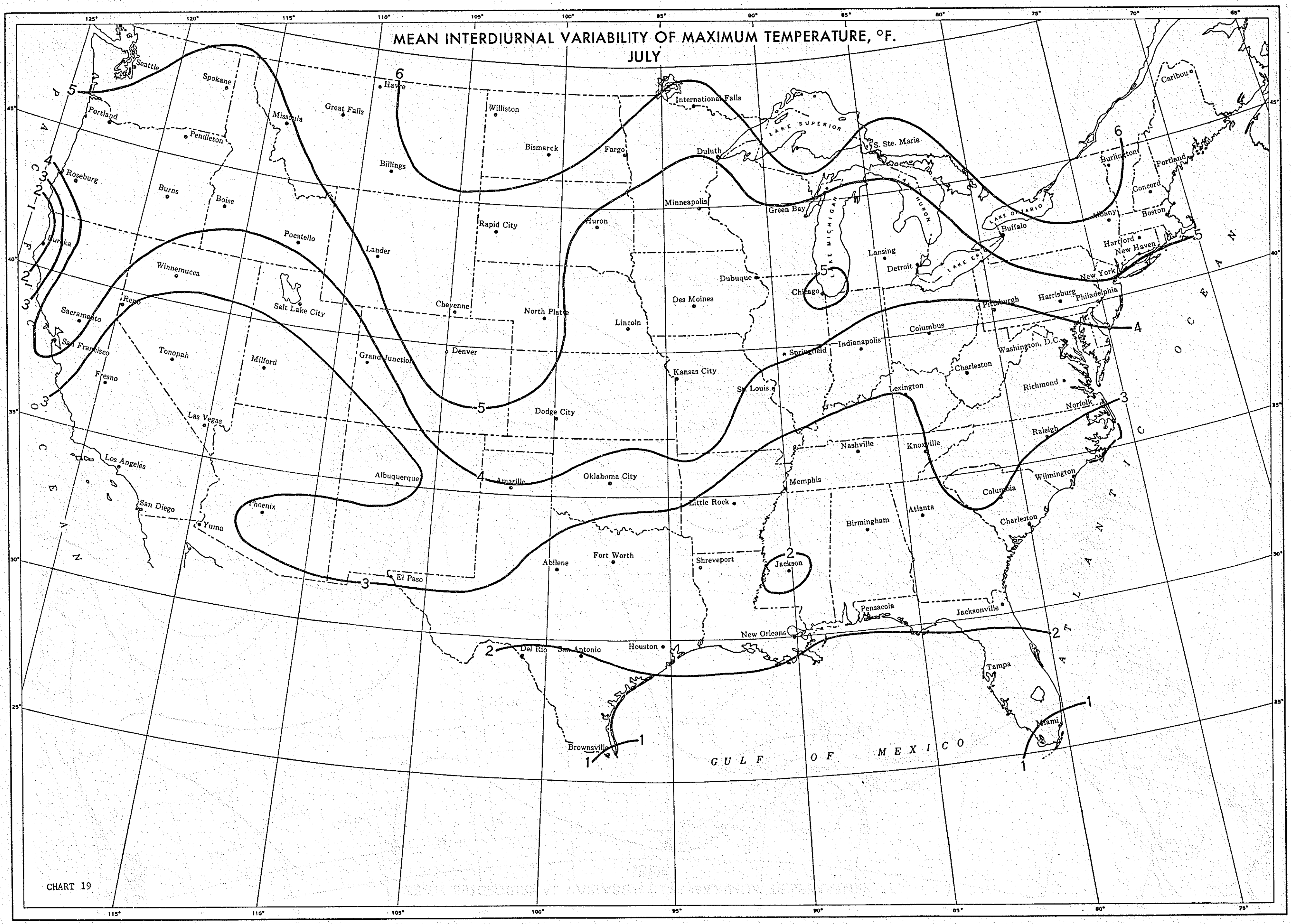
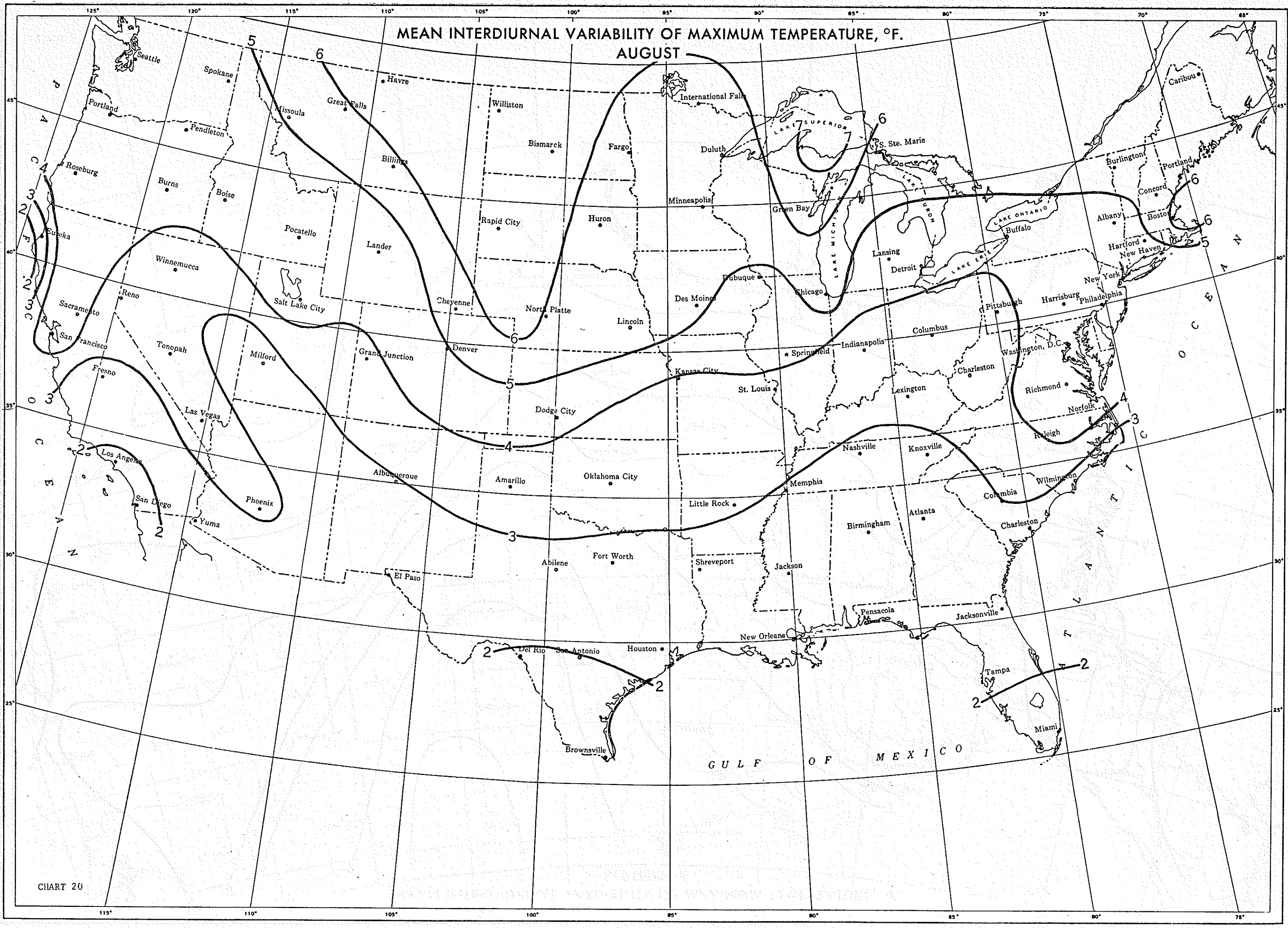


CHART 18



MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
JULY

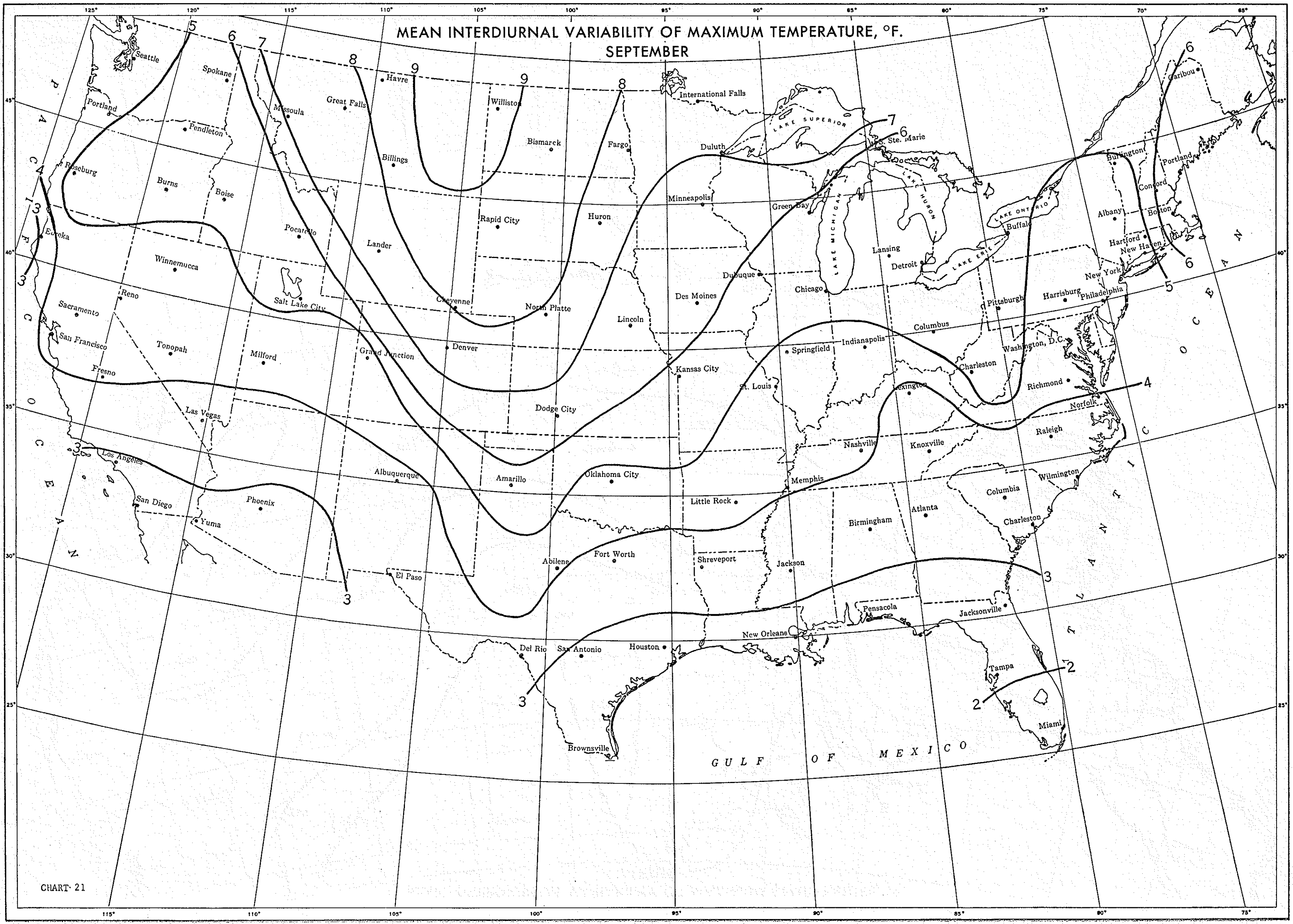
CHART 19



MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.

AUGUST

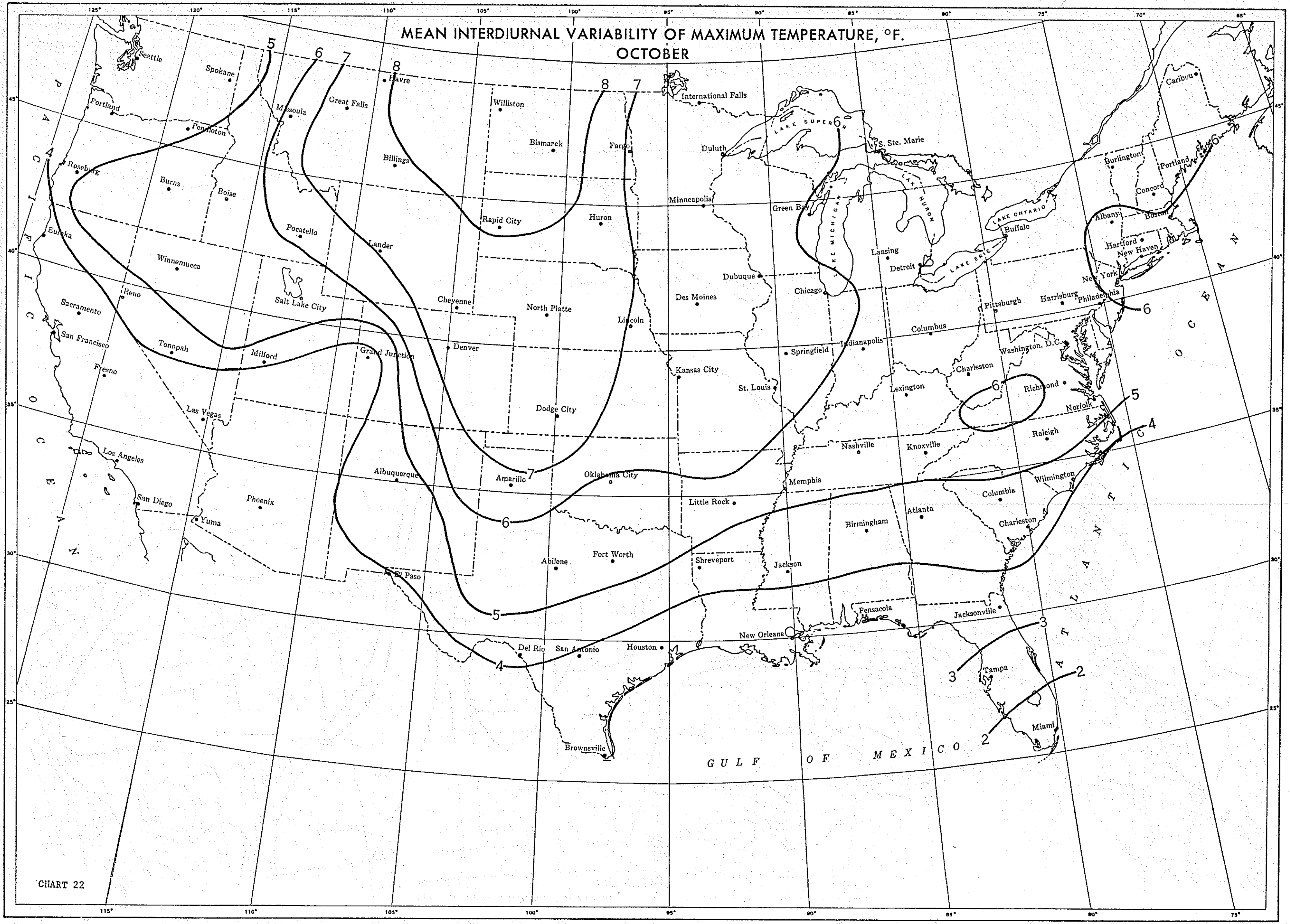
CHART 20

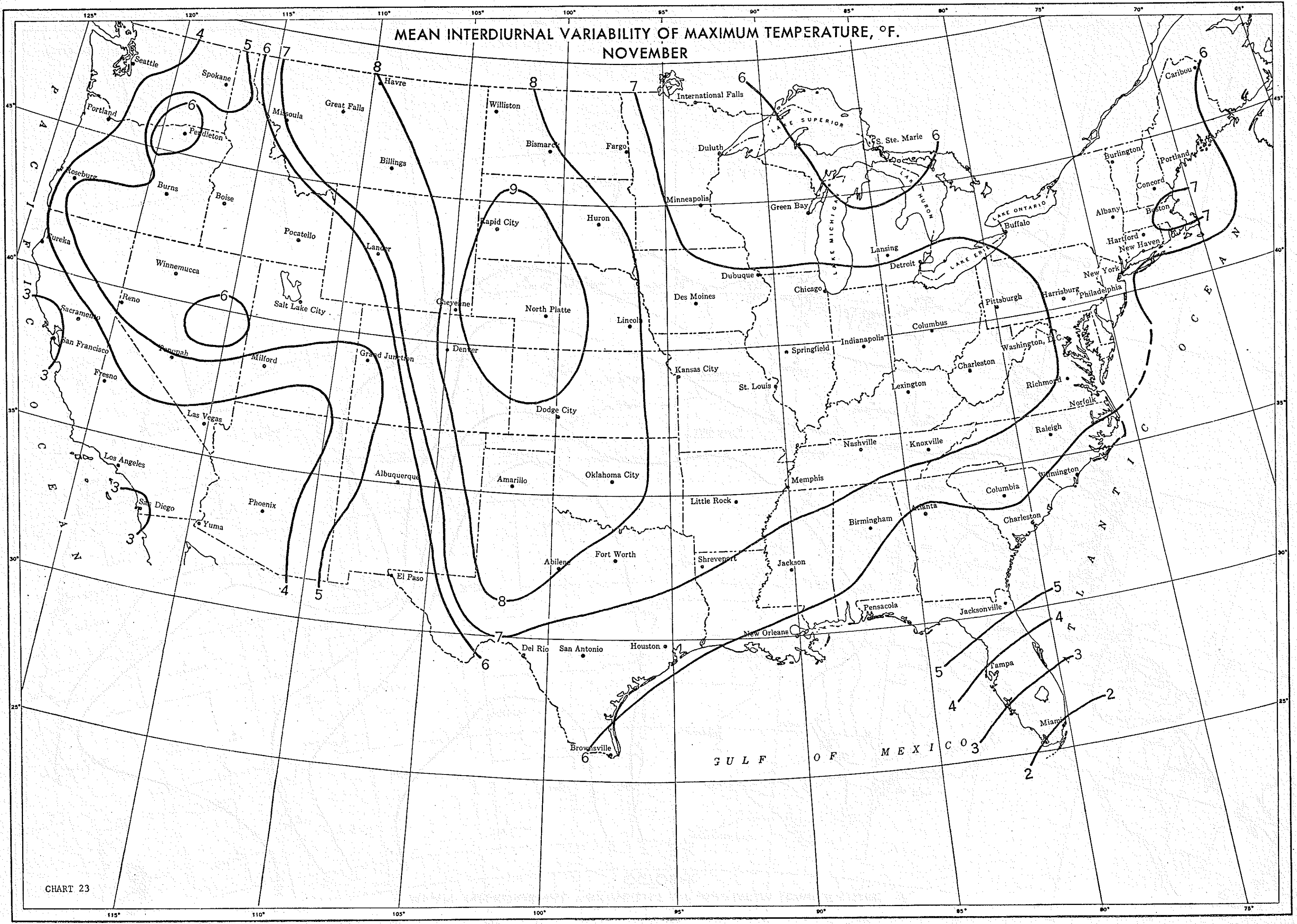


MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
SEPTEMBER

CHART· 21

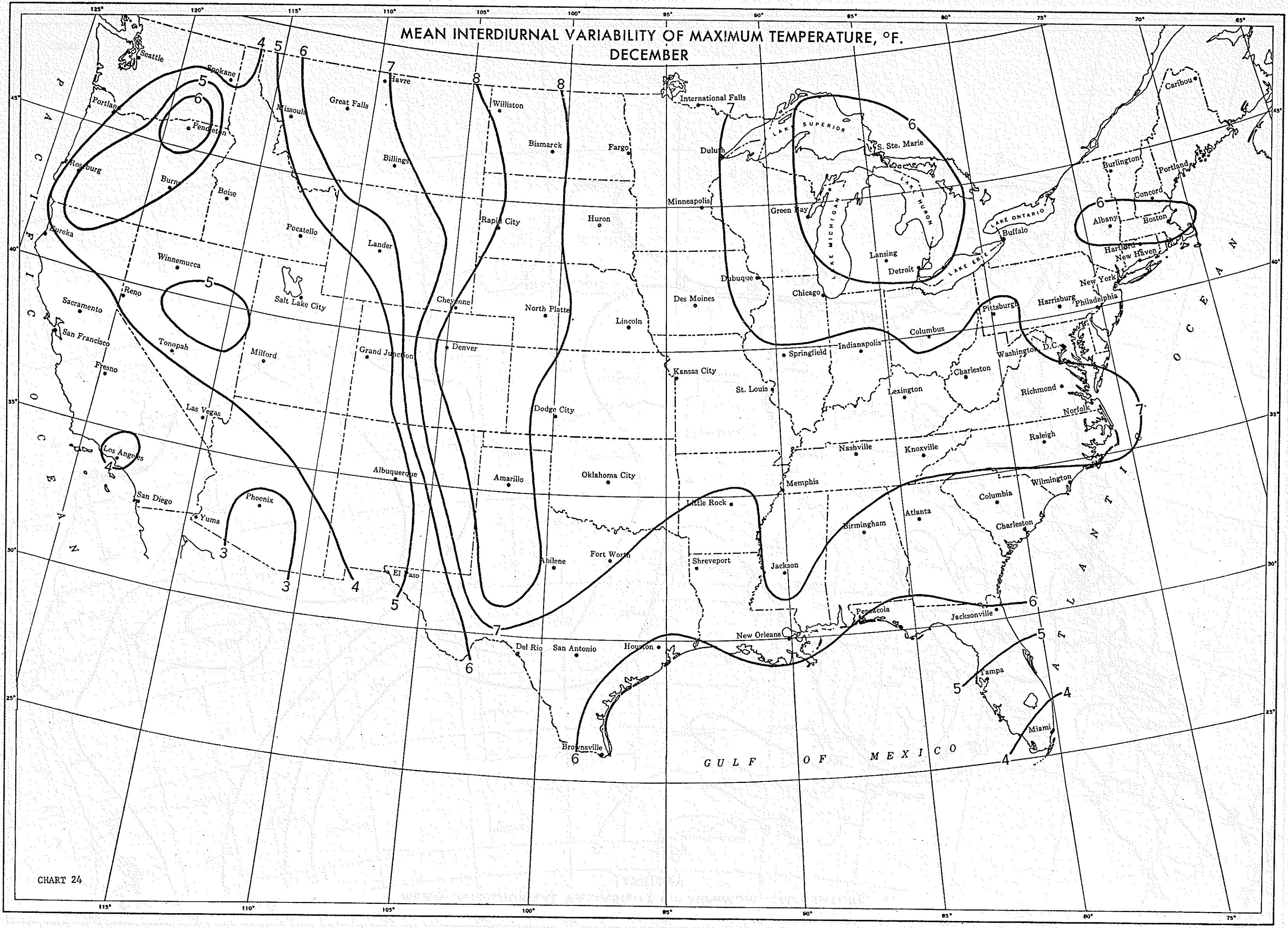
MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
OCTOBER





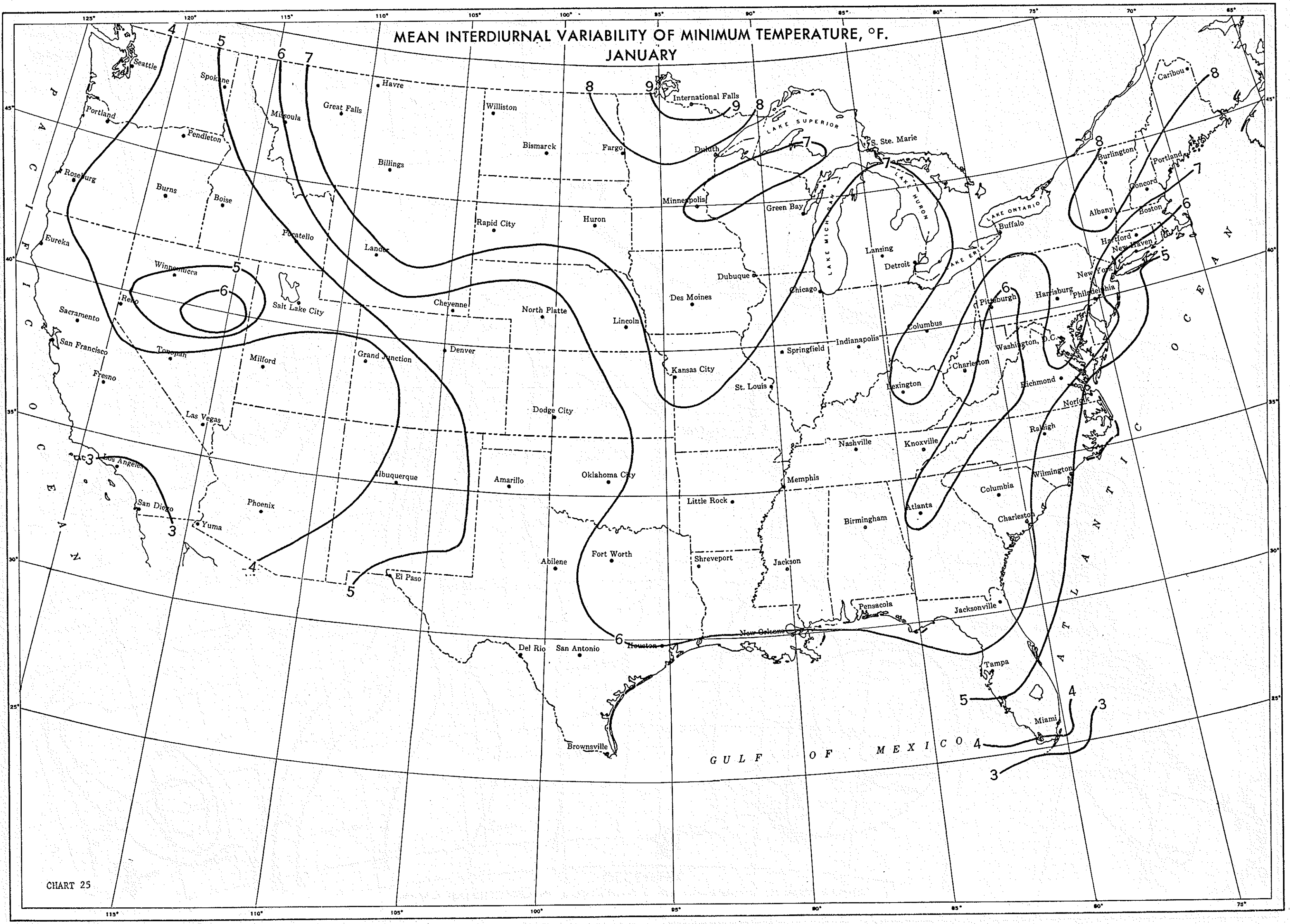
MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F. NOVEMBER

CHART 23



MEAN INTERDIURNAL VARIABILITY OF MAXIMUM TEMPERATURE, °F.
DECEMBER

CHART 24



MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F.
JANUARY

CHART 25

MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F.
FEBRUARY

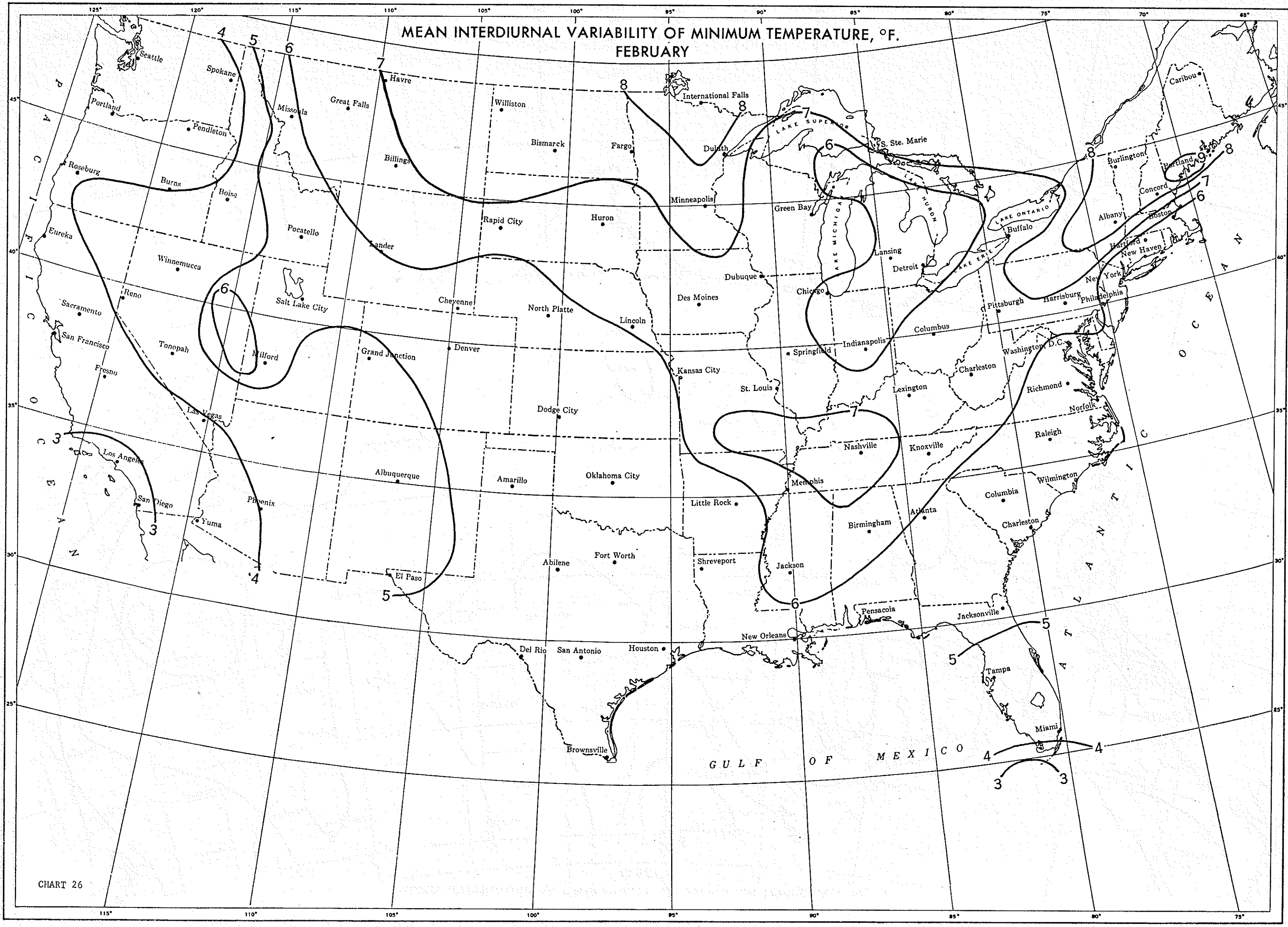


CHART 26

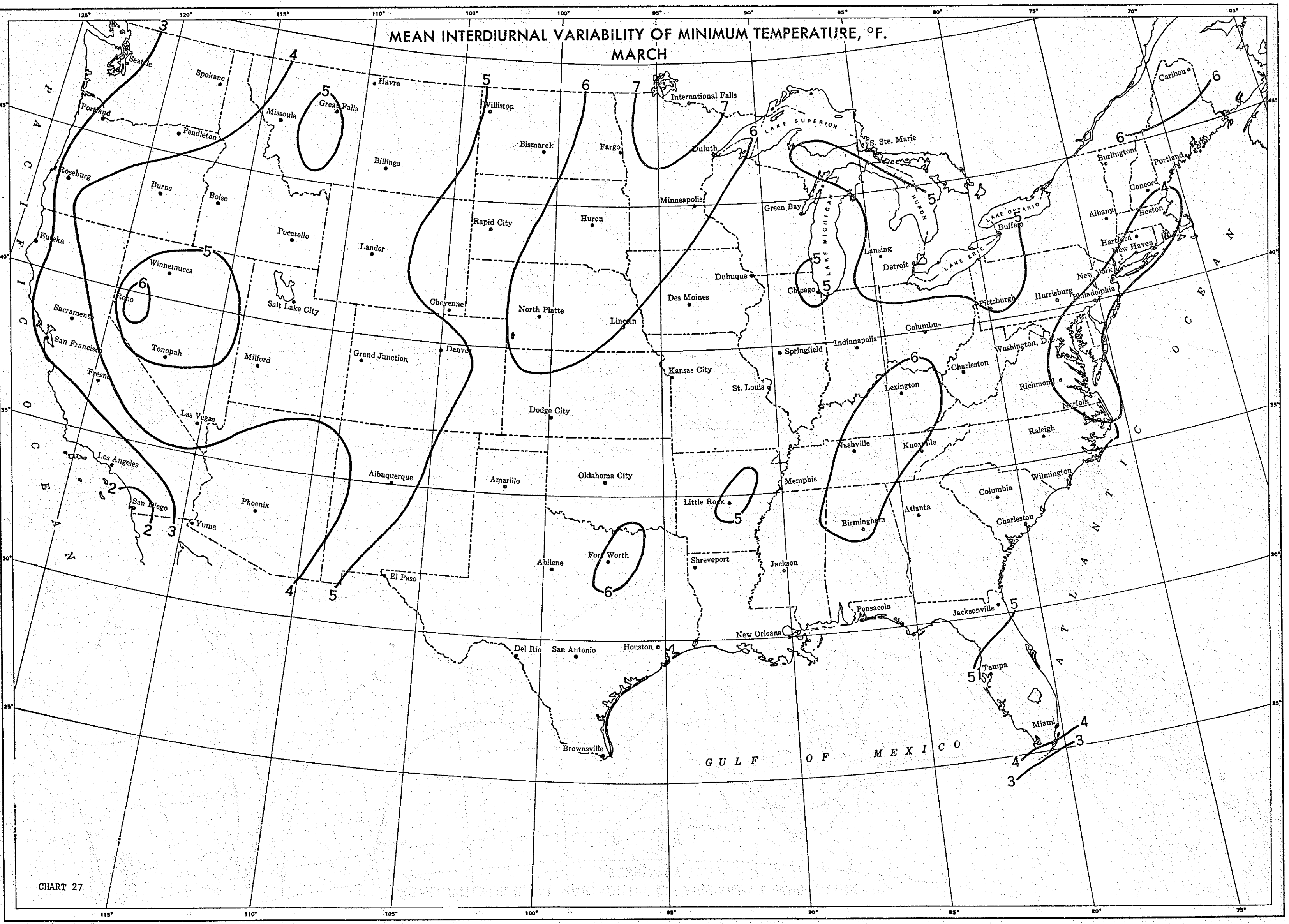
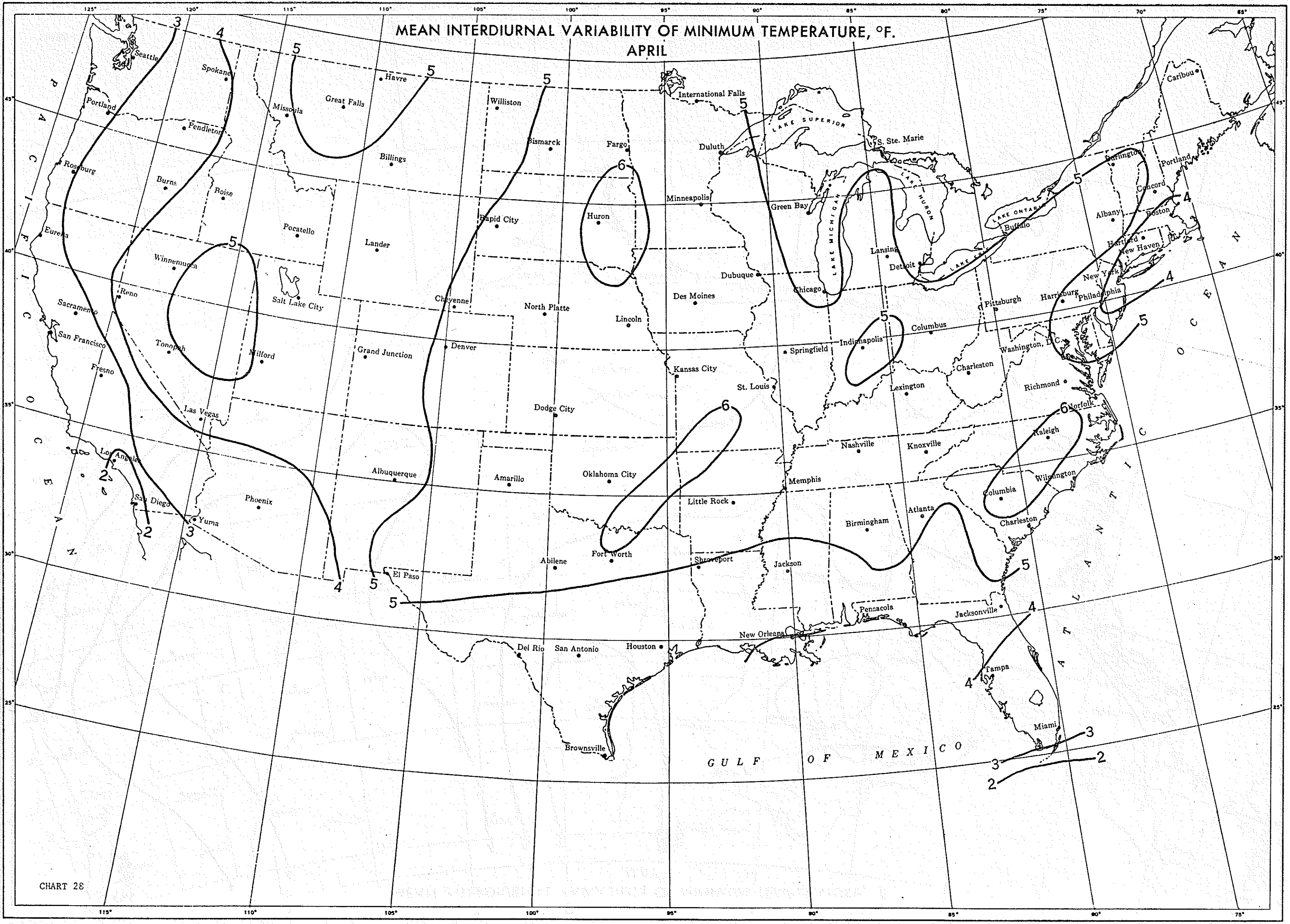
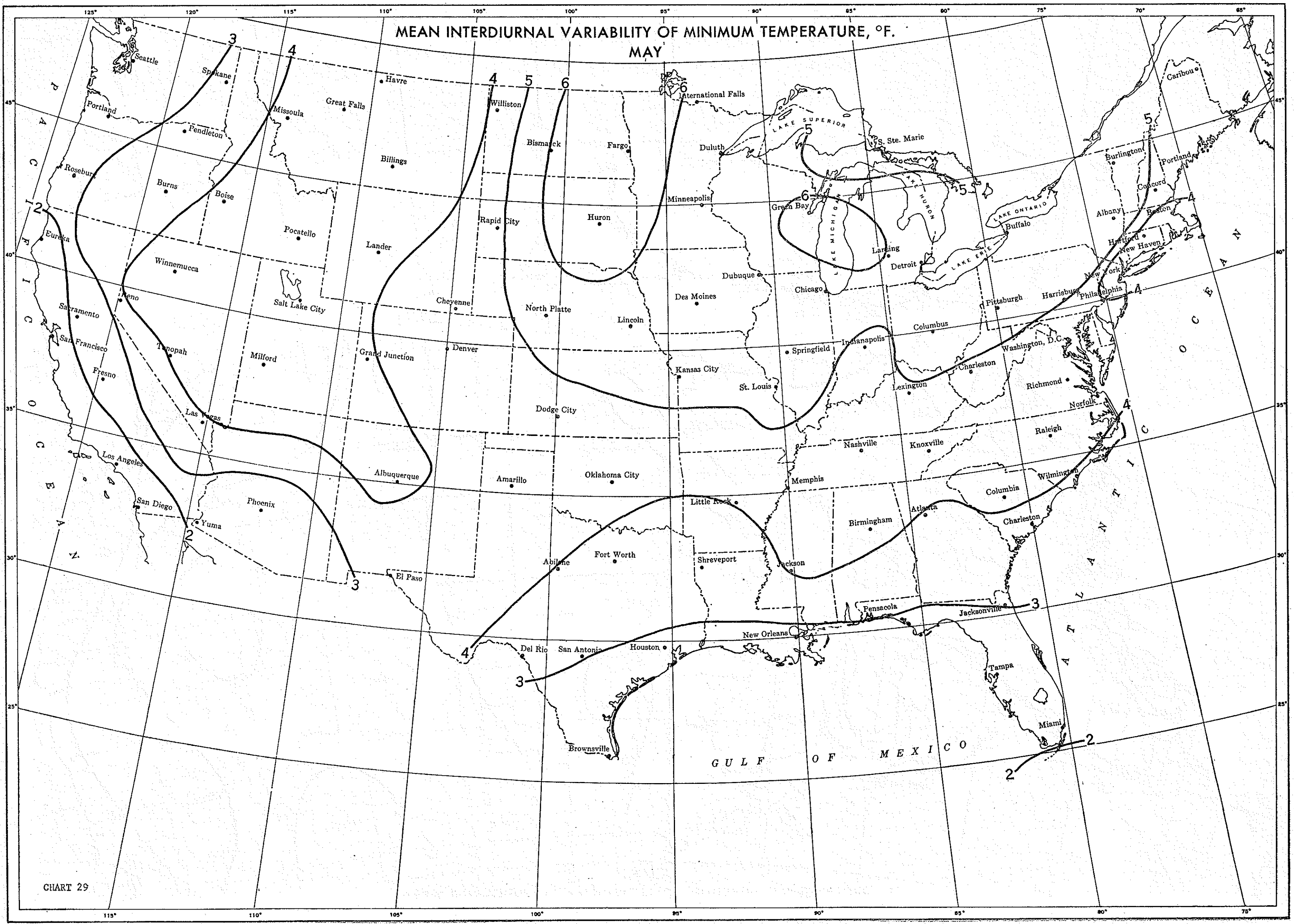

MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F.
MARCH
125°
120°
115°
110°
105°
100°
95°
90°
85°
80°
75°
70°
65°
45°
40°
35°
30°
25°
2
3
4
5
6
7
Seattle
Portland
Spokane
Pendleton
Missoula
Great Falls
Havre
Williston
Bismarck
Fargo
International Falls
Duluth
Roseburg
Burns
Boise
Billings
Eureka
Pocatello
Lander
Rapid City
Huron
Minneapolis
Winnemucca
Reno
Sacramento
San Francisco
Salt Lake City
Cheyenne
North Platte
Lincoln
Des Moines
Dubuque
Tonopah
Milford
Grand Junction
Denver
Fresno
Las Vegas
Dodge City
Kansas City
St. Louis
Los Angeles
San Diego
Yuma
Phoenix
Albuquerque
Amarillo
Oklahoma City
Little Rock
Memphis
El Paso
Abilene
Fort Worth
Shreveport
Jackson
Del Rio
San Antonio
Houston
New Orleans
Brownsville
Green Bay
Chicago
Springfield
Indianapolis
Lansing
Detroit
S. Ste. Marie
Buffalo
Pittsburgh
Columbus
Lexington
Nashville
Knoxville
Birmingham
Atlanta
Pensacola
Jacksonville
Tampa
Miami
Charleston
Columbia
Wilmington
Raleigh
Richmond
Norfolk
Washington, D.C.
Harrisburg
Philadelphia
New York
New Haven
Hartford
Albany
Boston
Concord
Portland
Burlington
Caribou
LAKE SUPERIOR
LAKE MICHIGAN
HURON
LAKE ONTARIO
LAKE ERIE
PACIFIC OCEAN
ATLANTIC OCEAN
GULF OF MEXICO

CHART 27



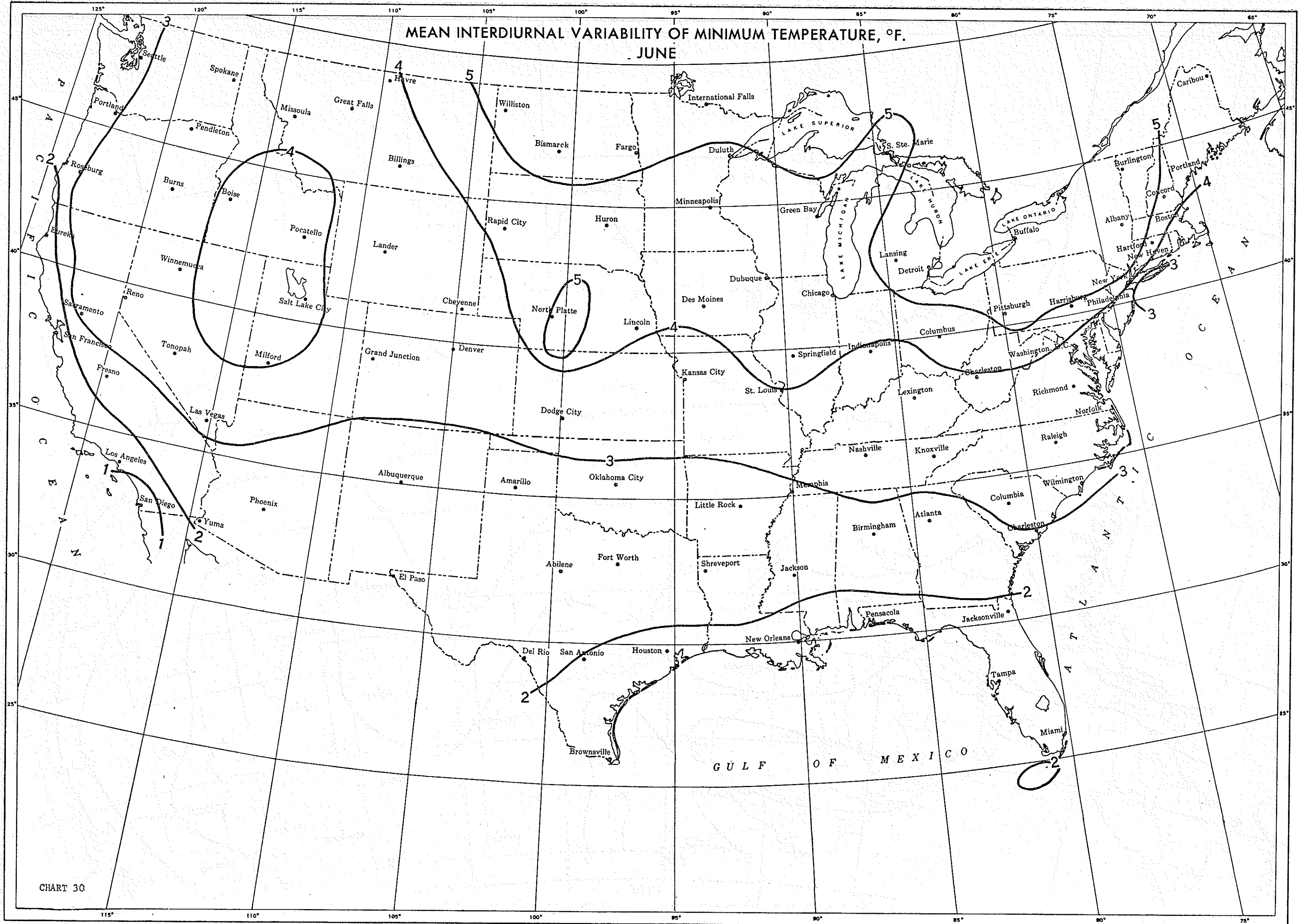
MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F.
APRIL

CHART 28



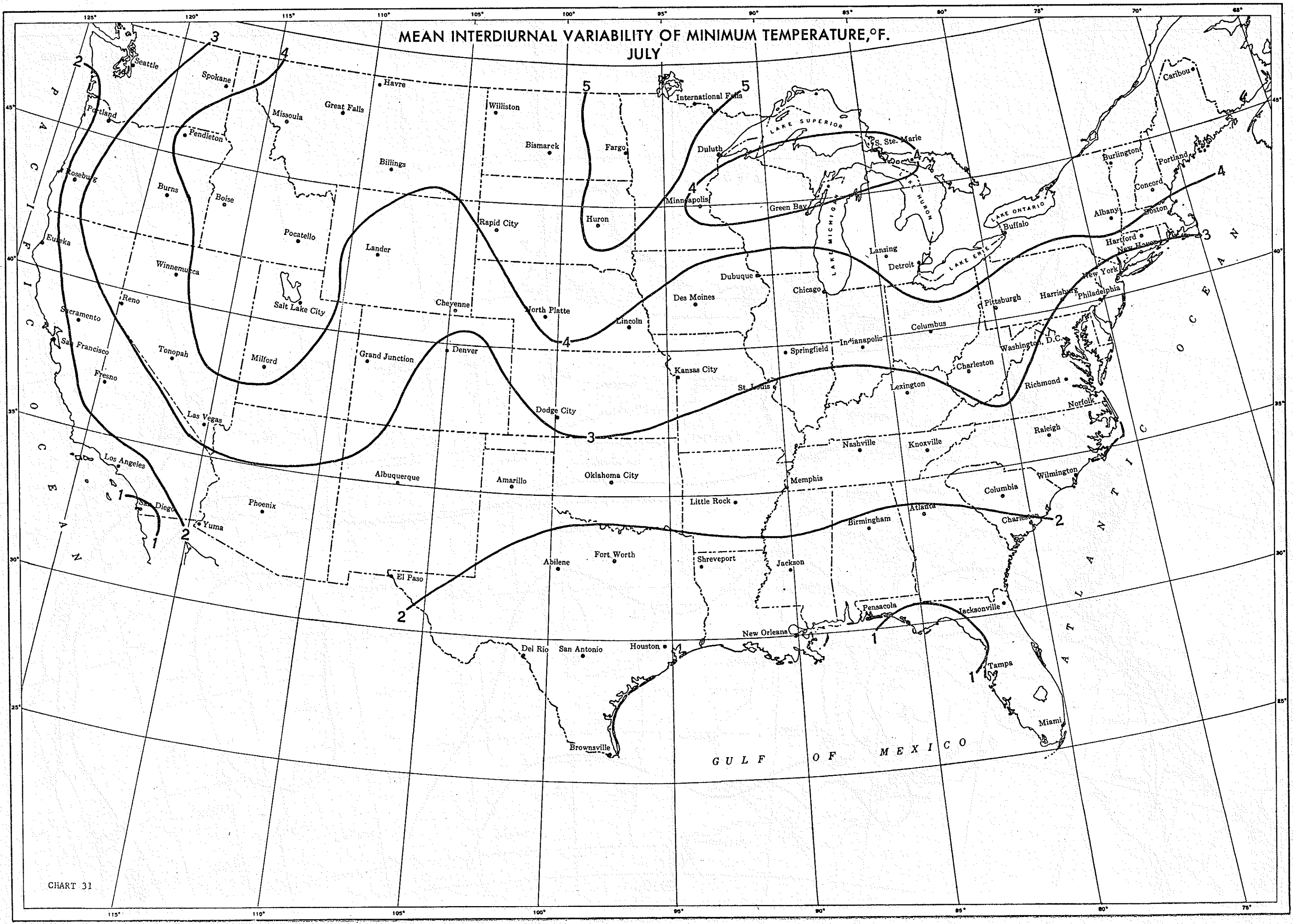
MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F.
MAY

CHART 29



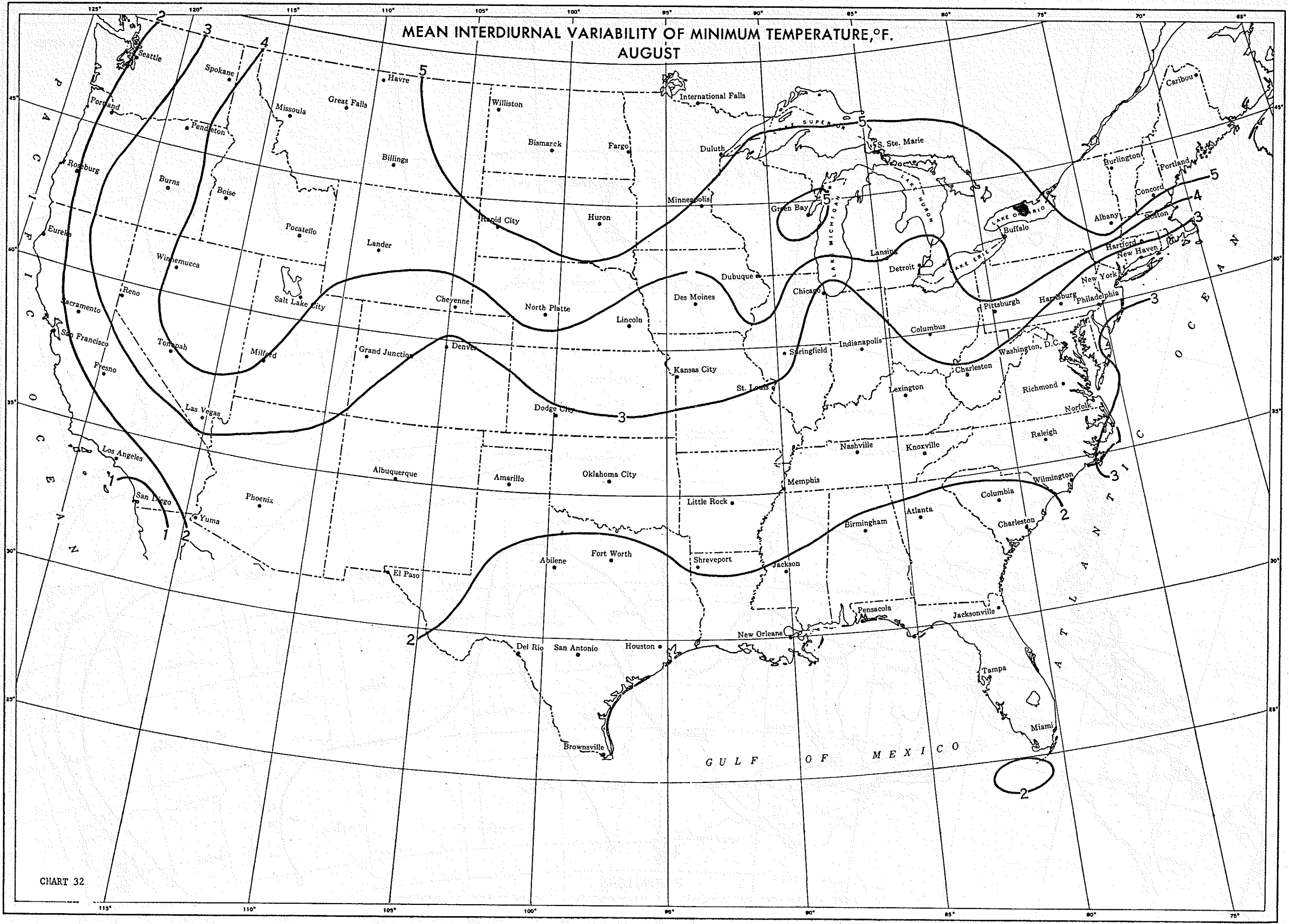
MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F.
JUNE

CHART 30



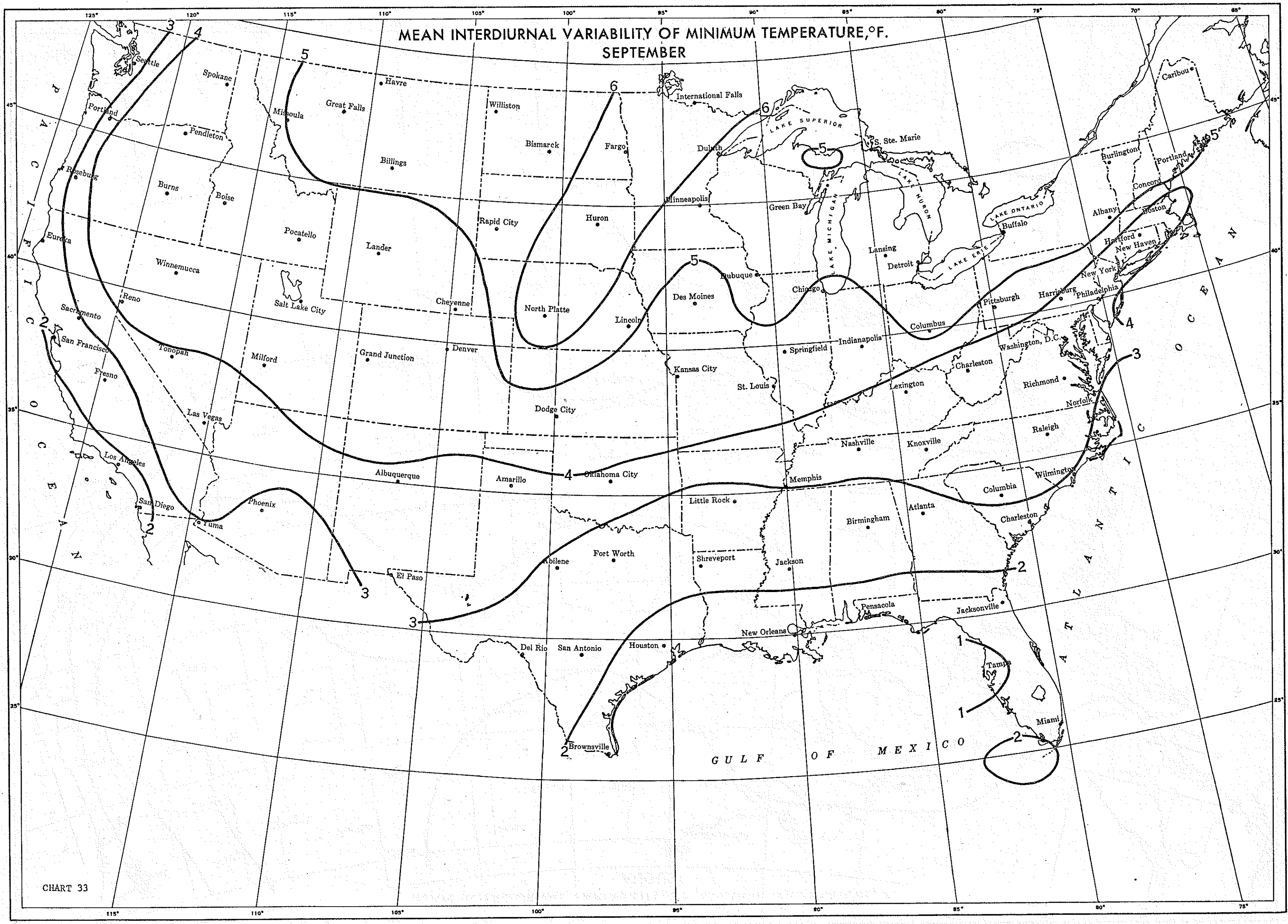
MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F.
JULY

CHART 31



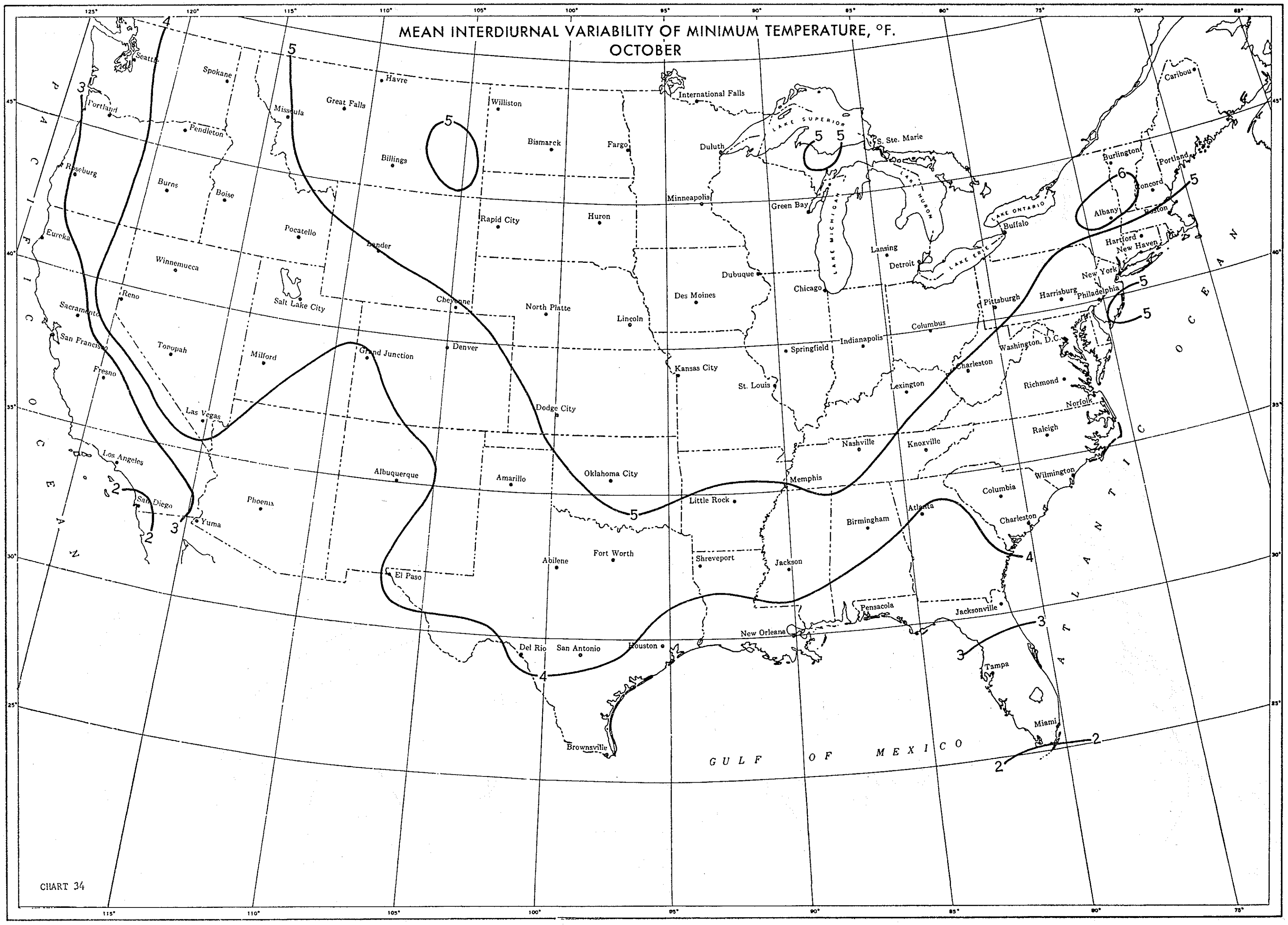
MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE,°F.
AUGUST

CHART 32



MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F. SEPTEMBER

CHART 33



MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F.
OCTOBER

CHART 34

MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F. NOVEMBER

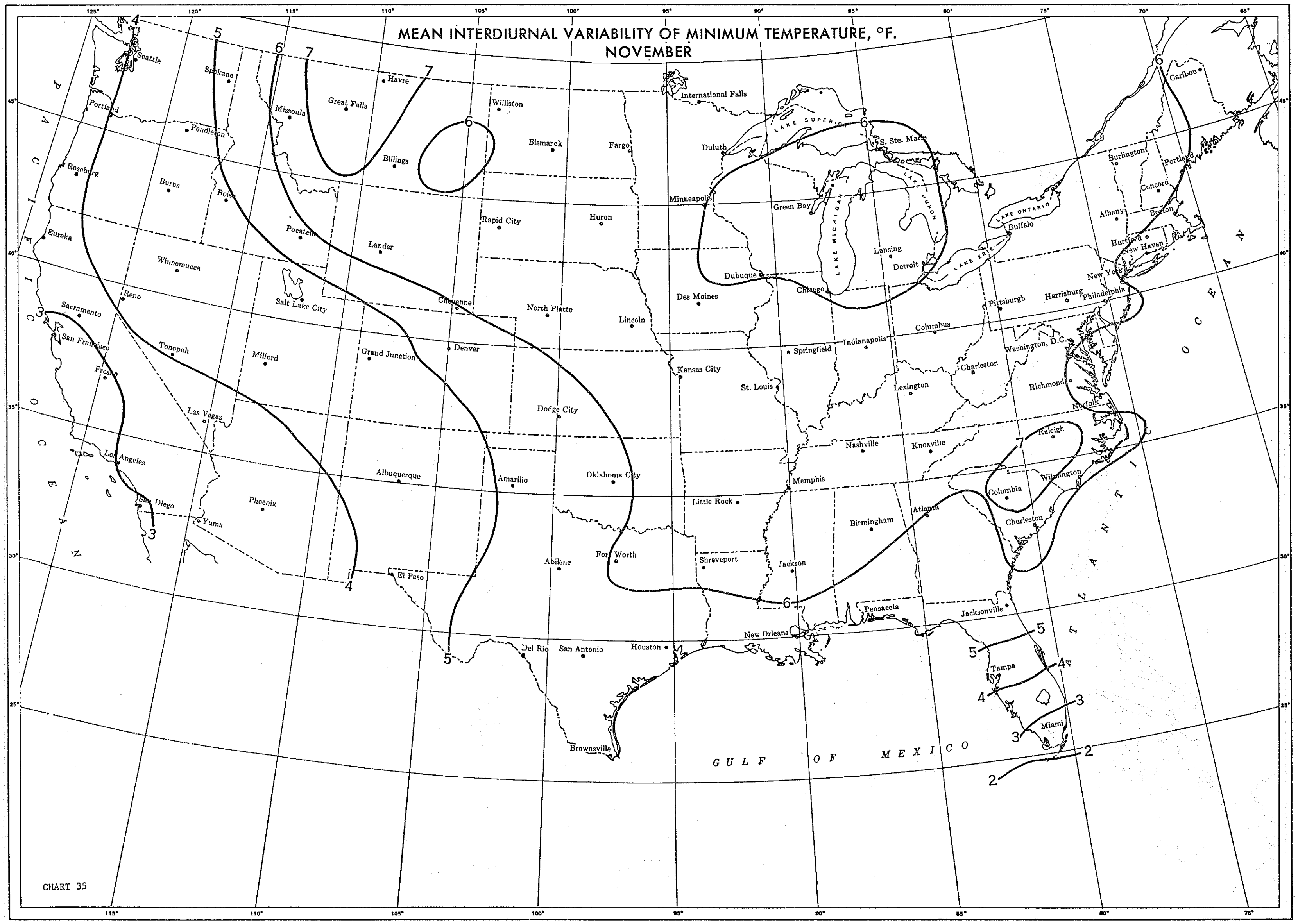
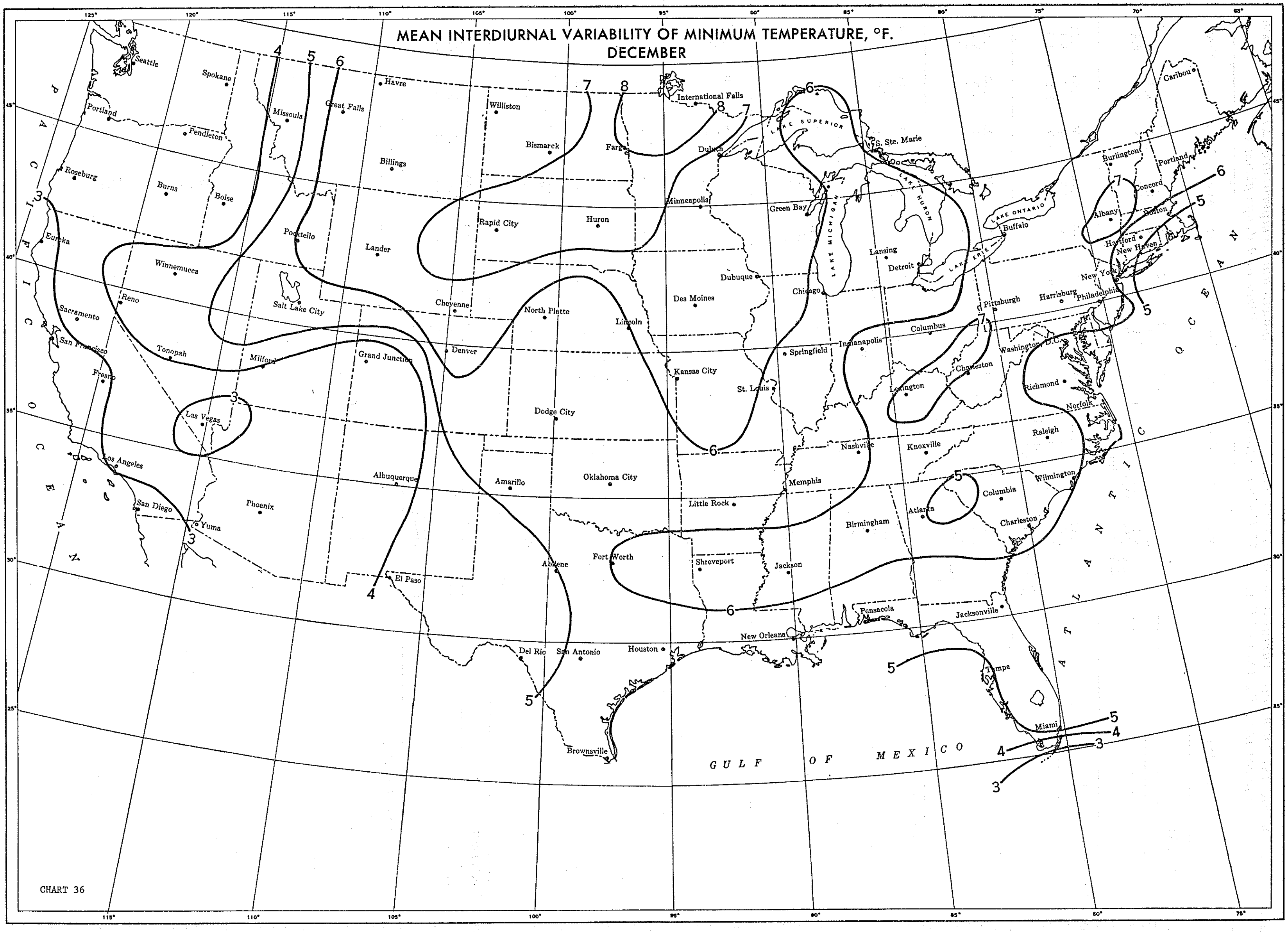


CHART 35



MEAN INTERDIURNAL VARIABILITY OF MINIMUM TEMPERATURE, °F.
DECEMBER

CHART 36

TABLE A–1.—*Mean interdiurnal variability of pressure, Δp (inches), maximum temperature ΔT_M, and minimum temperature ΔT_m (both °F.), for 75 United States stations. Rises and drops given in °F*

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Albany, New York:												
Δp	.23	.25	.20	.18	.13	.12	.09	.10	.12	.16	.20	.24
ΔT_M	6.5	6.2	6.1	7.2	8.0	6.0	4.9	4.7	5.3	6.4	6.2	6.0
ΔT_m	8.1	8.3	5.7	5.2	6.1	5.2	4.4	5.5	5.8	6.8	6.4	7.2
Largest Rise: Maximum 29—Minimum 35												
Largest Drop: Maximum 36—Minimum 32												
Albuquerque, New Mexico:												
Δp	.12	.12	.11	.09	.07	.05	.05	.04	.06	.09	.11	.12
ΔT_M	4.6	5.0	6.0	6.2	4.1	3.4	2.8	2.7	3.6	4.7	5.1	4.5
ΔT_m	4.2	4.3	4.8	4.2	4.2	2.9	2.8	2.5	3.9	3.5	4.4	3.9
Largest Rise: Maximum 21—Minimum M<16												
Largest Drop: Maximum 27—Minimum M<16												
Atlanta, Georgia:												
Δp	.14	.14	.11	.10	.07	.06	.04	.05	.06	.08	.09	.14
ΔT_M	7.3	6.7	6.7	6.2	3.7	3.6	2.7	2.3	3.3	4.3	5.3	6.6
ΔT_m	5.5	5.8	4.8	4.7	3.4	2.3	1.4	1.6	2.4	3.8	5.8	5.0
Largest Rise: Maximum 20—Minimum 21												
Largest Drop: Maximum 30—Minimum 33												
Atlantic City, New Jersey:												
Δp	.23	.27	.20	.17	.12	.11	.09	.10	.11	.14	.19	.24
ΔT_M	6.9	6.8	6.4	7.1	7.0	5.4	4.1	4.6	4.1	5.9	6.5	6.3
ΔT_m	6.3	5.9	4.8	4.8	4.9	3.9	3.0	3.8	4.3	5.7	6.7	6.6
Largest Rise: Maximum 25—Minimum 31												
Largest Drop: Maximum 31—Minimum 22												
Birmingham, Alabama:												
Δp	.14	.16	.13	.10	.06	.06	.04	.05	.05	.08	.10	.14
ΔT_M	7.2	7.1	6.6	6.2	3.9	3.3	2.3	2.4	3.5	4.6	5.7	6.2
ΔT_m	6.5	6.4	6.3	5.8	4.4	2.8	1.8	2.2	2.9	4.5	6.7	6.5
Largest Rise: Maximum 22—Minimum 30												
Largest Drop: Maximum 38—Minimum 27												
Bismarck, North Dakota:												
Δp	.19	.19	.18	.17	.17	.14	.10	.12	.18	.20	.23	.21
ΔT_M	8.1	7.6	6.5	8.1	7.7	6.9	6.5	7.3	8.7	8.7	8.0	8.3
ΔT_m	7.4	7.5	5.8	5.5	6.0	5.4	4.8	6.2	5.7	5.7	6.1	6.8
Largest Rise: Maximum 32—Minimum 40												
Largest Drop: Maximum 42—Minimum 32												
Boise, Idaho:												
Δp	.14	.15	.14	.12	.10	.09	.07	.07	.10	.11	.15	.15
ΔT_M	4.4	4.0	4.7	5.8	6.8	6.0	4.2	4.5	5.6	5.3	5.3	4.3
ΔT_m	4.6	4.4	4.2	4.6	4.7	4.6	4.7	4.0	4.9	4.5	5.0	3.6
Largest Rise: Maximum 23—Minimum 25												
Largest Drop: Maximum 35—Minimum 20												
Boston, Massachusetts:												
Δp	.25	.27	.22	.18	.14	.13	.10	.11	.13	.18	.21	.27
ΔT_M	6.8	7.1	6.2	8.0	7.7	6.8	5.5	6.2	6.1	6.6	7.2	5.9
ΔT_m	6.1	5.5	3.7	3.2	3.8	3.5	3.1	3.2	3.9	4.7	5.1	5.0
Largest Rise: Maximum 30—Minimum 26												
Largest Drop: Maximum 37—Minimum 28												
Brownsville, Texas:												
Δp	.13	.13	.12	.11	.07	.05	.03	.03	.05	.08	.11	.12
ΔT_M	6.5	6.0	5.3	3.7	2.3	1.4	1.0	1.4	2.2	3.1	5.3	5.9
ΔT_m	5.6	6.2	5.4	3.4	2.6	1.4	1.1	1.2	1.6	3.9	5.0	6.0
Largest Rise: Maximum 23—Minimum 28												
Largest Drop: Maximum 36—Minimum 28												
Cape Hatteras, North Carolina:												
Δp	.20	.21	.19	.15	.10	.08	.06	.08	.09	.12	.16	.20
ΔT_M	7.8	7.1	6.0	5.0	4.1	3.0	1.7	2.2	2.5	4.0	5.8	7.4
ΔT_m	4.8	5.0	5.2	4.5	3.8	3.5	2.4	3.0	2.7	4.6	6.1	5.5
Largest Rise: Maximum 28—Minimum 31												
Largest Drop: Maximum 37—Minimum 22												
Caribou, Maine:												
Δp	.25	.27	.22	.19	.16	.16	.12	.12	.17	.20	.24	.27
ΔT_M	7.3	6.2	5.6	6.5	6.9	6.9	5.4	5.5	6.9	5.9	6.0	6.5
ΔT_m	8.2	8.3	6.7	4.5	4.6	4.7	4.1	5.2	5.3	5.4	5.6	6.9
Largest Rise: Maximum 30—Minimum 42												
Largest Drop: Maximum 37—Minimum 36												
Casper, Wyoming:												
Δp	.11	.15	.13	.13	.11	.10	.07	.08	.11	.14	.15	.13
ΔT_M	6.5	6.1	6.9	8.2	6.8	6.2	5.3	5.0	8.3	7.7	7.3	6.6
ΔT_m	7.1	6.3	5.6	5.0	3.5	3.5	3.4	4.4	4.7	5.2	6.9	7.0
Largest Rise: Maximum 38—Minimum 43												
Largest Drop: Maximum 39—Minimum 31												
Chicago, Illinois:												
Δp	.20	.20	.18	.17	.13	.10	.09	.07	.11	.14	.20	.21
ΔT_M	6.3	6.3	5.7	7.8	8.5	6.3	5.5	5.3	5.9	6.7	7.2	6.6
ΔT_m	6.3	5.7	4.7	4.9	5.5	4.2	3.0	2.9	4.1	4.7	5.8	5.9
Largest Rise: Maximum 32—Minimum 26												
Largest Drop: Maximum 33—Minimum 32												

TABLE A–1.—*Mean interdiurnal variability of pressure, Δp (inches), maximum temperature ΔT_M, and minimum temperature ΔT_m (both °F.), for 75 United States stations. Rises and drops given in °F*—Continued

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Columbia, South Carolina:												
Δp	.17	.17	.14	.13	.09	.07	.05	.06	.07	.09	.13	.17
ΔT_M	7.7	7.3	6.6	6.0	5.0	4.2	3.0	3.0	3.8	4.7	6.2	6.5
ΔT_m	6.4	6.6	5.7	6.3	4.2	3.2	2.2	1.9	3.2	4.4	7.5	7.0
Largest Rise: Maximum 26—Minimum 28												
Largest Drop: Maximum 33—Minimum 28												
Columbus, Ohio:												
Δp	.21	.21	.17	.15	.10	.08	.08	.07	.09	.11	.16	.19
ΔT_M	7.1	7.3	7.1	8.3	6.7	5.1	3.9	3.4	5.2	5.6	7.6	6.6
ΔT_m	7.2	6.2	5.3	5.6	5.4	4.4	3.9	3.8	5.2	5.7	6.7	7.9
Largest Rise: Maximum 27—Minimum 28												
Largest Drop: Maximum 36—Minimum 28												
Del Rio, Texas:												
Δp	.14	.14	.13	.11	.09	.06	.05	.04	.07	.10	.14	.15
ΔT_M	6.3	7.1	7.2	6.3	4.2	2.4	1.9	2.0	3.1	4.1	6.7	6.7
ΔT_m	5.0	5.4	5.4	4.3	3.4	2.2	1.3	1.4	2.3	4.0	5.4	4.8
Largest Rise: Maximum 25—Minimum 20												
Largest Drop: Maximum 40—Minimum 22												
Denver, Colorado:												
Δp	.13	.15	.13	.13	.11	.10	.06	.07	.11	.14	.16	.14
ΔT_M	8.5	7.9	8.1	8.9	7.3	6.2	5.3	5.0	7.8	7.4	8.9	8.5
ΔT_m	5.6	5.3	4.9	5.2	3.4	3.5	2.8	2.8	4.1	3.9	5.7	6.4
Largest Rise: Maximum 47—Minimum 30												
Largest Drop: Maximum 47—Minimum 27												
Des Moines, Iowa:												
Δp	.19	.20	.15	.16	.14	.11	.08	.07	.13	.14	.22	.22
ΔT_M	7.9	6.8	6.6	8.0	6.5	5.6	4.6	5.1	6.8	6.6	7.3	7.8
ΔT_m	7.6	6.4	5.0	5.5	5.3	4.0	3.1	3.7	4.4	5.5	6.0	6.9
Largest Rise: Maximum 31—Minimum 27												
Largest Drop: Maximum 30—Minimum 26												
Detroit, Michigan:												
Δp	.22	.23	.19	.17	.12	.11	.09	.09	.12	.14	.20	.21
ΔT_M	5.8	6.5	5.8	7.4	7.3	5.9	4.6	4.7	5.8	5.9	7.1	5.7
ΔT_m	6.2	5.6	4.6	4.7	5.3	5.3	4.3	3.8	5.2	5.2	5.2	5.4
Largest Rise: Maximum 32—Minimum 20												
Largest Drop: Maximum 30—Minimum 30												
Dodge City, Kansas:												
Δp	.18	.18	.16	.16	.14	.11	.07	.06	.11	.15	.20	.20
ΔT_M	8.3	9.1	8.3	9.2	7.0	6.4	4.9	4.7	6.7	7.7	8.8	7.9
ΔT_m	5.4	5.6	5.2	5.0	4.7	3.4	3.3	3.0	4.1	5.0	5.6	5.1
Largest Rise: Maximum 28—Minimum 27												
Largest Drop: Maximum 40—Minimum 28												
El Paso, Texas:												
Δp	.11	.11	.09	.08	.07	.06	.04	.04	.06	.09	.10	.10
ΔT_M	4.8	5.1	5.4	5.3	4.0	2.8	3.3	2.4	3.5	4.0	5.8	4.9
ΔT_m	5.5	4.9	5.5	5.2	4.5	3.7	2.7	2.2	3.2	4.2	4.8	5.2
Largest Rise: Maximum 17—Minimum 26												
Largest Drop: Maximum 28—Minimum 18												
Ely, Nevada:												
Δp	.10	.13	.11	.10	.08	.07	.04	.05	.07	.08	.11	.12
ΔT_M	5.9	4.6	5.9	6.0	5.3	3.9	2.8	2.8	4.6	5.1	6.3	5.4
ΔT_m	6.7	6.5	5.1	5.5	4.8	4.7	4.6	5.0	5.3	4.9	5.5	5.8
Largest Rise: Maximum 20—Minimum 36												
Largest Drop: Maximum 32—Minimum 29												
Eureka, California:												
Δp	.13	.14	.14	.11	.09	.06	.05	.05	.08	.09	.09	.12
ΔT_M	2.9	3.2	3.0	2.2	2.2	1.8	1.8	1.5	2.9	3.7	3.7	3.1
ΔT_m	3.5	3.6	2.9	2.8	2.0	1.6	1.2	1.5	2.1	2.6	3.3	2.8
Largest Rise: Maximum 20—Minimum 17												
Largest Drop: Maximum <16—Minimum <16												
Fort Worth, Texas:												
Δp	.16	.16	.15	.13	.10	.06	.05	.04	.08	.10	.16	.16
ΔT_M	9.3	8.0	7.3	7.4	4.7	3.5	2.3	2.7	3.8	5.1	7.2	7.0
ΔT_m	6.9	5.9	6.2	6.0	3.9	2.7	1.5	1.9	3.2	4.8	6.4	6.2
Largest Rise: Maxium 30—Minimum 24												
Largest Drop: Maxium 45—Minimum 33												
Fresno, California:												
Δp	.09	.12	.09	.08	.08	.04	.05	.04	.06	.07	.09	.10
ΔT_M	4.1	3.8	4.1	4.4	4.6	3.7	2.7	2.9	3.9	3.9	3.4	3.4
ΔT_m	3.9	3.3	4.0	2.7	2.7	2.8	2.7	2.6	2.7	2.7	2.8	2.8
Largest Rise: Maximum 21—Minimum 17												
Largest Drop: Maximum 25—Minimum <16												
Grand Junction, Colorado:												
Δp	.13	.14	.13	.12	.09	.07	.04	.05	.08	.10	.13	.13
ΔT_M	3.8	4.0	5.1	5.9	4.4	3.4	3.2	3.9	4.5	4.0	4.3	3.6
ΔT_m	3.9	4.5	4.0	4.4	3.6	3.5	3.0	3.3	3.1	3.3	3.4	3.6
Largest Rise: Maximum <16—Minimum 19												
Largest Drop: Maximum 27—Minimum 24												

TABLE A–1.—*Mean interdiurnal variability of pressure, Δp (inches), maximum temperature ΔT_M, and minimum temperature ΔT_m (both °F.), for 75 United States stations. Rises and drops given in °F*—Continued

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Grand Rapids, Michigan:												
Δp	.21	.20	.18	.17	.13	.11	.09	.08	.13	.14	.20	.21
ΔT_M	5.1	5.2	5.5	6.9	7.1	5.3	4.1	4.2	5.4	5.8	6.5	5.7
ΔT_m	6.5	6.3	5.1	5.6	6.4	5.3	4.6	4.4	5.9	5.4	5.7	6.0
Largest Rise: Maximum 23—Minimum 26												
Largest Drop: Maximum 30—Minimum 24												
Green Bay, Wisconsin:												
Δp	.20	.20	.18	.17	.16	.12	.10	.09	.15	.16	.23	.23
ΔT_M	6.3	5.0	4.5	6.4	7.8	5.9	4.8	6.2	5.9	5.9	6.6	6.0
ΔT_m	7.3	7.4	5.5	4.3	6.1	4.9	4.4	5.4	5.8	5.6	6.2	6.9
Largest Rise: Maximum 25—Minimum 36												
Largest Drop: Maximum 30—Minimum 34												
Helena, Montana:												
Δp	.14	.16	.14	.13	.12	.09	.08	.08	.12	.15	.18	.17
ΔT_M	7.1	7.2	6.4	7.0	6.4	6.2	5.4	5.9	7.4	7.8	7.6	6.4
ΔT_m	7.4	6.5	5.6	5.7	4.8	3.9	4.1	4.4	5.9	5.5	7.2	5.9
Largest Rise: Maximum 47—Minimum 43												
Largest Drop: Maximum 52—Minimum 40												
Houston, Texas:												
Δp	.13	.13	.12	.09	.07	.05	.04	.04	.06	.07	.12	.12
ΔT_M	7.3	6.6	5.6	3.8	2.8	2.5	2.1	2.7	2.7	3.8	6.1	5.9
ΔT_m	6.0	5.7	5.4	4.2	2.9	1.5	1.0	1.2	1.7	3.6	5.2	5.8
Largest Rise: Maximum 21—Minimum 27												
Largest Drop: Maximum 33—Minimum 30												
Huron, South Dakota:												
Δp	.20	.20	.15	.18	.17	.14	.10	.11	.16	.19	.24	.22
ΔT_M	8.6	7.4	6.1	8.4	7.1	6.4	4.9	5.9	7.9	7.9	8.2	7.6
ΔT_m	7.3	6.9	6.3	6.4	6.5	4.8	5.1	6.0	6.2	5.7	6.8	7.0
Largest Rise: Maximum 35—Minimum 49												
Largest Drop: Maximum 37—Minimum 30												
Indianapolis, Indiana:												
Δp	.19	.20	.17	.15	.11	.08	.07	.06	.09	.11	.17	.18
ΔT_M	7.1	7.3	6.4	7.5	6.4	4.8	3.1	3.0	4.9	5.9	7.4	7.2
ΔT_m	6.4	5.9	5.3	4.9	4.9	3.8	3.1	2.8	4.5	5.4	6.1	6.3
Largest Rise: Maximum 31—Minimum 27												
Largest Drop: Maximum 38—Minimum 29												
International Falls, Minnesota:												
Δp	.21	.20	.15	.18	.15	.14	.09	.11	.17	.19	.25	.22
ΔT_M	7.9	7.2	5.4	7.4	8.3	6.1	5.6	5.6	7.1	6.4	6.1	7.2
ΔT_m	9.3	8.7	7.5	5.4	5.8	5.6	5.4	5.7	6.1	5.6	6.4	8.8
Largest Rise: Maximum 31—Minimum 45												
Largest Drop: Maximum 44—Minimum 29												
Jackson, Mississippi:												
Δp	.14	.16	.13	.10	.06	.05	.04	.04	.05	.07	.11	.13
ΔT_M	8.4	8.2	6.9	5.3	3.7	2.3	1.9	2.3	3.2	4.1	6.7	7.4
ΔT_m	6.5	6.2	5.7	4.8	4.0	2.4	1.5	2.0	2.8	4.9	6.9	6.8
Largest Rise: Maximum 29—Minimum 28												
Largest Drop: Maximum 41—Minimum 34												
Jacksonville, Florida:												
Δp	.13	.12	.11	.10	.07	.05	.04	.04	.05	.07	.09	.12
ΔT_M	6.7	6.9	6.1	4.6	3.5	3.1	2.4	2.7	2.3	3.6	5.4	6.0
ΔT_m	6.4	5.8	5.8	4.8	3.0	1.7	1.5	1.7	1.6	3.5	5.9	5.8
Largest Rise: Maximum 24—Minimum 25												
Largest Drop: Maximum 26—Minimum 31												
Kansas City, Missouri:												
Δp	.19	.21	.17	.15	.13	.09	.07	.05	.11	.13	.21	.20
ΔT_M	8.8	6.6	6.6	8.2	5.7	5.3	4.8	4.0	5.9	6.1	7.7	7.4
ΔT_m	7.1	6.0	5.2	5.5	5.2	3.9	2.9	3.2	4.4	5.2	6.2	6.7
Largest Rise: Maximum 28—Minimum 25												
Largest Drop: Maximum 39—Minimum 32												
Key West, Florida:												
Δp	.07	.07	.06	.05	.04	.03	.03	.02	.04	.04	.05	.07
ΔT_M	4.3	3.4	3.3	2.0	1.4	1.2	1.0	1.3	1.3	1.6	2.0	3.8
ΔT_m	3.0	2.7	3.0	2.0	1.8	2.1	1.9	2.2	2.4	1.6	1.7	2.8
Largest Rise: Maximum <16—Minimum 18												
Largest Drop: Maximum 19—Minimum 19												
Las Vegas, Nevada:												
Δp	.11	.13	.12	.10	.08	.06	.05	.05	.07	.09	.11	.12
ΔT_M	3.3	4.5	4.5	5.1	4.1	2.9	2.8	3.3	3.5	3.9	3.8	3.2
ΔT_m	3.4	3.9	4.5	4.9	4.2	3.9	3.7	3.1	3.6	4.1	3.4	2.5
Largest Rise: Maximum 18—Minimum 18												
Largest Drop: Maximum 28—Minimum 18												
Lexington, Kentucky:												
Δp	.18	.19	.16	.14	.09	.07	.06	.05	.07	.09	.14	.17
ΔT_M	8.0	7.3	6.9	7.4	6.9	4.9	3.0	3.0	3.9	5.8	8.0	7.5
ΔT_m	7.0	6.9	6.0	5.5	4.9	3.6	2.6	2.5	3.6	5.2	6.6	7.1
Largest Rise: Maximum 28—Minimum 27												
Largest Drop: Maximum 46—Minimum 29												

TABLE A–1.—*Mean interdiurnal variability of pressure, Δp (inches), maximum temperature ΔT_M, and minimum temperature ΔT_m (both °F.), for 75 United States stations. Rises and drops given in °F*—Continued

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Little Rock, Arkansas:												
Δp	.16	.17	.16	.13	.09	.06	.05	.04	.07	.09	.15	.16
ΔT_M	7.7	7.4	6.1	7.2	4.1	3.4	2.8	3.2	4.1	5.1	7.2	6.7
ΔT_m	6.0	5.8	4.8	5.4	3.8	2.7	2.4	2.1	2.8	4.7	6.2	5.9
Largest Rise: Maximum 25—Minimum 27												
Largest Drop: Maximum 38—Minimum 31												
Los Angeles, California:												
Δp	.07	.09	.08	.06	.06	.04	.03	.04	.04	.07	.08	.08
ΔT_M	3.9	3.2	3.6	3.0	2.2	2.1	2.1	1.8	2.9	3.6	3.7	4.5
ΔT_m	2.9	2.6	2.2	2.0	1.8	1.1	1.1	1.2	1.6	2.2	3.0	3.1
Largest Rise: Maximum 23—Minimum <16												
Largest Drop: Maximum 21—Minimum <16												
Marquette, Michigan:												
Δp	.21	.22	.17	.21	.19	.14	.12	.13	.18	.19	.25	.23
ΔT_M	5.4	6.3	5.1	7.5	9.0	9.2	6.9	7.3	7.1	6.6	6.0	5.2
ΔT_m	5.1	5.3	4.3	4.5	4.6	5.1	3.9	4.4	4.7	4.4	4.5	4.6
Largest Rise: Maximum 38—Minimum 24												
Largest Drop: Maximum 38—Minimum 24												
Medford, Oregon:												
Δp	.15	.15	.15	.12	.10	.08	.06	.05	.08	.10	.11	.13
ΔT_M	5.4	4.4	4.5	5.5	6.0	5.9	4.0	4.4	5.9	5.2	5.2	5.7
ΔT_m	4.0	4.0	4.3	4.3	3.5	3.8	3.1	3.0	4.0	3.8	4.4	3.4
Largest Rise: Maximum 24—Minimum 18												
Largest Drop: Maximum 29—Minimum <16												
Miami, Florida:												
Δp	.07	.07	.07	.05	.05	.03	.03	.03	.04	.05	.05	.08
ΔT_M	3.8	3.7	3.8	2.8	1.7	1.2	.9	1.3	1.4	1.8	1.9	3.9
ΔT_m	4.8	4.6	4.5	3.4	2.2	1.6	1.4	1.3	1.4	2.2	2.9	5.3
Largest Rise: Maximum <16—Minimum 21												
Largest Drop: Maximum 24—Minimum 18												
Midland, Texas:												
Δp	.15	.14	.14	.11	.10	.06	.05	.04	.07	.11	.16	.15
ΔT_M	8.6	9.1	8.1	7.2	5.9	4.2	3.0	2.3	4.8	6.6	8.4	8.6
ΔT_m	5.3	5.6	5.4	5.9	4.9	2.6	1.9	1.7	3.3	4.0	5.5	4.5
Largest Rise: Maximum 42—Minimum 18												
Largest Drop: Maximum 38—Minimum 24												
Miles City, Montana:												
Δp	.17	.19	.16	.18	.15	.13	.10	.12	.16	.19	.20	.19
ΔT_M	7.7	7.7	6.8	8.0	7.9	7.3	6.1	6.9	9.3	8.7	8.0	7.4
ΔT_m	7.1	7.1	4.7	4.7	4.3	4.6	4.7	5.1	5.5	4.5	5.7	6.2
Largest Rise: Maximum 40—Minimum 47												
Largest Drop: Maximum 44—Minimum 28												
Minneapolis, Minnesota:												
Δp	.20	.20	.15	.17	.15	.13	.08	.09	.16	.16	.23	.23
ΔT_M	7.2	6.4	5.4	7.1	7.1	5.9	4.7	5.2	6.6	6.4	6.8	7.3
ΔT_m	6.8	7.1	6.0	4.9	5.3	4.5	3.9	4.5	5.3	5.6	5.7	6.6
Largest Rise: Maximum 27—Minimum 29												
Largest Drop: Maximum 33—Minimum 29												
Moline, Illinois:												
Δp	.19	.18	.16	.15	.14	.10	.08	.07	.12	.14	.21	.22
ΔT_M	7.2	6.1	5.7	7.3	6.9	5.8	4.1	4.2	5.4	6.0	7.2	6.5
ΔT_m	7.5	6.6	5.7	5.3	5.6	4.6	3.8	4.0	5.2	5.3	6.9	7.0
Largest Rise: Maximum 37—Minimum 35												
Largest Drop: Maximum 35—Minimum 30												
Nashville, Tennessee:												
Δp	.16	.18	.15	.12	.07	.06	.05	.05	.06	.09	.14	.16
ΔT_M	8.3	7.6	5.9	6.6	5.6	4.3	2.9	2.7	4.1	5.4	7.2	7.2
ΔT_m	6.6	7.1	6.5	5.5	4.3	3.4	2.4	2.6	3.6	5.2	6.9	6.6
Largest Rise: Maximum 28—Minimum 29												
Largest Drop: Maximum 45—Minimum 32												
New Orleans, Louisiana:												
Δp	.12	.14	.11	.09	.05	.05	.03	.04	.05	.06	.09	.12
ΔT_M	7.4	6.2	5.1	3.4	2.8	2.0	2.1	2.2	2.6	3.5	5.8	6.7
ΔT_m	6.0	5.3	5.5	3.6	2.9	1.7	1.2	1.4	1.8	3.6	5.8	6.4
Largest Rise: Maximum 24—Minimum 28												
Largest Drop: Maximum 32—Minimum 26												
New York, New York (LaGuardia):												
Δp	.23	.25	.21	.18	.13	.12	.09	.11	.12	.15	.19	.23
ΔT_M	5.9	6.3	6.5	7.2	6.8	5.4	5.0	4.5	4.5	6.1	6.0	6.1
ΔT_m	5.3	5.1	3.8	3.4	3.8	2.9	2.8	2.8	3.5	4.3	4.9	5.0
Largest Rise: Maximum 29—Minimum 21												
Largest Drop: Maximum 34—Minimum 23												
Norfolk, Virginia:												
Δp	.22	.24	.19	.17	.11	.09	.08	.09	.09	.12	.17	.23
ΔT_M	9.0	8.3	7.7	7.5	7.4	5.8	3.9	4.4	4.0	5.2	6.6	8.0
ΔT_m	4.5	5.4	4.4	5.6	4.2	3.2	2.4	2.3	3.0	4.3	5.9	5.7
Largest Rise: Maximum 31—Minimum 26												
Largest Drop: Maximum 35—Minimum 23												

TABLE A-1.—*Mean interdiurnal variability of pressure, Δp (inches), maximum temperature ΔT_M, and minimum temperature ΔT_m (both °F.), for 75 United States stations. Rises and drops given in °F*—Continued

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
North Platte, Nebraska:												
Δp	.17	.17	.15	.17	.15	.13	.09	.09	.14	.16	.21	.19
ΔT_M	8.0	7.7	7.8	8.1	7.0	6.7	5.4	6.0	8.0	7.3	9.8	8.1
ΔT_m	5.8	5.9	6.1	5.3	5.2	4.3	4.0	4.5	6.3	5.5	6.5	5.4
Largest Rise: Maximum 42—Minimum 31												
Largest Drop: Maximum 40—Minimum 29												
Oklahoma City, Oklahoma:												
Δp	.16	.17	.16	.15	.13	.08	.06	.05	.10	.12	.19	.18
ΔT_M	9.3	8.2	8.0	8.3	5.8	4.2	3.3	3.4	4.6	5.9	8.2	7.5
ΔT_m	5.8	5.5	5.2	5.3	4.5	2.9	2.5	2.4	4.0	5.2	5.6	5.1
Largest Rise: Maximum 29—Minimum 24												
Largest Drop: Maximum 38—Minimum 32												
Pendleton, Oregon:												
Δp	.16	.18	.17	.13	.11	.09	.07	.07	.11	.13	.19	.16
ΔT_M	5.8	5.1	4.5	4.8	5.7	5.5	4.7	4.5	5.1	4.6	6.1	6.3
ΔT_m	4.7	3.8	3.4	3.7	3.2	3.9	4.1	3.9	4.1	4.2	4.8	3.5
Largest Rise: Maximum 30—Minimum 38												
Largest Drop: Maximum 30—Minimum 27												
Phoenix, Arizona:												
Δp	.09	.10	.10	.08	.06	.05	.04	.05	.05	.08	.08	.09
ΔT_M	2.7	3.4	4.1	4.0	3.7	2.4	2.8	3.1	2.3	3.8	3.4	2.9
ΔT_m	3.3	4.0	3.2	3.3	2.8	2.5	2.7	2.8	2.6	3.0	3.3	3.4
Largest Rise: Maximum <16—Minimum 20												
Largest Drop: Maximum 20—Minimum <16												
Pittsburgh, Pennsylvania:												
Δp	.22	.22	.17	.15	.10	.09	.08	.08	.09	.12	.16	.19
ΔT_M	6.9	7.6	6.6	7.6	6.8	5.2	4.0	3.4	5.3	5.9	7.4	7.3
ΔT_m	5.9	6.8	4.9	5.5	5.9	4.9	3.7	3.9	4.6	5.2	6.3	6.6
Largest Rise: Maximum 29—Minimum 26												
Largest Drop: Maximum 37—Minimum 33												
Portland, Maine:												
Δp	.26	.28	.23	.19	.15	.15	.11	.12	.15	.19	.22	.28
ΔT_M	7.1	6.7	5.3	7.6	8.1	6.8	5.4	5.3	6.6	5.7	6.3	6.3
ΔT_m	7.3	9.3	5.5	4.9	4.7	4.0	4.2	5.2	5.8	6.4	6.0	6.7
Largest Rise: Maximum 37—Minimum 47												
Largest Drop: Maximum 32—Minimum 25												
Raleigh, North Carolina:												
Δp	.20	.20	.16	.14	.10	.07	.06	.07	.09	.11	.15	.20
ΔT_M	8.7	8.1	7.2	6.5	5.2	4.4	3.0	4.0	3.9	5.3	6.8	7.3
ΔT_m	5.9	6.7	5.1	6.1	4.9	3.5	2.3	2.3	3.6	5.2	7.2	6.8
Largest Rise: Maximum 30—Minimum 27												
Largest Drop: Maximum 30—Minimum 30												
Reno, Nevada:												
Δp	.11	.12	.12	.10	.08	.06	.05	.05	.06	.08	.11	.12
ΔT_M	4.8	4.7	5.5	5.0	5.3	4.2	3.0	3.4	4.5	4.8	5.3	4.8
ΔT_m	4.9	4.8	6.2	4.7	4.3	3.8	3.9	3.9	4.2	4.7	4.5	4.3
Largest Rise: Maximum 23—Minimum 26												
Largest Drop: Maximum 29—Minimum 30												
Roanoke, Virginia:												
Δp	.20	.21	.15	.14	.09	.07	.07	.07	.09	.11	.15	.19
ΔT_M	8.5	8.6	7.5	8.7	6.6	5.1	3.9	4.0	5.0	6.2	7.3	7.0
ΔT_m	5.7	6.0	5.0	5.2	4.5	3.6	3.3	2.8	3.6	4.3	6.3	5.9
Largest Rise: Maximum 27—Minimum 25												
Largest Drop: Maximum 33—Minimum 36												
Sacramento, California:												
Δp	.10	.13	.10	.09	.08	.05	.05	.05	.06	.07	.09	.11
ΔT_M	4.0	2.9	3.1	4.2	5.3	5.0	4.3	4.4	4.1	3.6	3.7	3.4
ΔT_m	3.6	3.2	3.7	2.7	2.9	3.0	2.5	2.8	3.0	2.7	3.5	3.1
Largest Rise: Maximum 19—Minimum <16												
Largest Drop: Maximum 21—Minimum<16												
St. Louis, Missouri:												
Δp	.19	.19	.18	.14	.11	.07	.07	.05	.09	.11	.19	.20
ΔT_M	8.2	7.2	6.4	7.9	6.6	5.1	3.8	3.6	4.8	6.5	7.6	8.0
ΔT_m	6.0	6.4	5.3	5.1	5.3	4.1	2.9	3.0	4.5	5.1	6.0	5.8
Largest Rise: Maximum 32—Minimum 27												
Largest Drop: Maximum 39—Minimum 33												
Salt Lake City, Utah:												
Δp	.13	.15	.13	.12	.09	.08	.06	.06	.09	.11	.15	.14
ΔT_M	3.9	4.3	6.0	6.3	6.0	5.3	3.8	4.3	5.4	5.2	5.5	4.2
ΔT_m	4.6	5.1	4.3	4.6	4.7	4.5	4.1	4.0	4.9	4.8	4.7	5.1
Largest Rise: Maximum 17—Minimum 24												
Largest Drop: Maximum 35—Minimum 26												

TABLE A-1.—*Mean interdiurnal variability of pressure, Δp (inches), maximum temperature ΔT_M, and minimum temperature ΔT_m (both °F.), for 75 United States stations. Rises and drops given in °F*—Continued

Station	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
San Diego, California:												
Δp	.07	.09	.08	.06	.05	.04	.03	.03	.04	.06	.07	.08
ΔT_M	2.8	2.8	3.4	3.0	2.3	1.9	2.0	1.8	2.4	3.2	3.0	3.6
ΔT_m	2.4	2.4	1.8	1.8	1.4	.9	.8	.9	1.5	2.0	2.6	2.5
Largest Rise: Maximum 21—Minimum <16												
Largest Drop: Maximum 24—Minimum <16												
San Francisco, California:												
Δp	.10	.12	.10	.09	.07	.05	.05	.04	.06	.07	.09	.10
ΔT_M	2.6	2.6	3.2	4.6	3.9	5.3	4.3	4.1	4.8	4.3	3.0	2.7
ΔT_m	3.3	3.3	3.1	2.5	1.8	1.3	1.3	1.4	2.3	2.4	2.9	2.6
Largest Rise: Maximum 31—Minimum 19												
Largest Drop: Maximum 25—Minimum <16												
Sault Ste. Marie, Michigan:												
Δp	.23	.21	.19	.17	.16	.14	.11	.11	.16	.17	.25	.22
ΔT_M	6.1	5.9	4.9	5.9	8.2	6.9	5.8	5.5	5.9	5.7	5.6	5.9
ΔT_m	7.5	7.3	5.6	4.4	4.9	4.7	3.7	4.9	5.5	5.0	5.0	7.4
Largest Rise: Maximum 30—Minimum 34												
Largest Drop: Maximum 30—Minimum 31												
Savannah, Georgia:												
Δp	.15	.14	.13	.12	.08	.06	.04	.05	.06	.08	.11	.15
ΔT_M	7.1	7.3	6.3	5.0	4.1	3.2	2.4	2.8	3.1	4.1	5.7	6.5
ΔT_m	6.7	5.8	5.5	5.7	3.2	2.3	1.5	1.8	2.2	4.3	6.7	6.5
Largest Rise: Maximum 26—Minimum 26												
Largest Drop: Maximum 28—Minimum 32												
Seattle, Washington:												
Δp	.18	.21	.18	.14	.11	.09	.07	.07	.11	.16	.19	.18
ΔT_M	3.6	3.3	3.2	4.4	5.1	5.1	5.0	4.5	4.2	4.2	3.7	3.9
ΔT_m	3.5	2.9	2.8	2.8	2.4	2.1	2.2	2.5	2.7	3.4	4.0	3.5
Largest Rise: Maximum 19—Minimum <16												
Largest Drop: Maximum 27—Minimum <16												
Spokane, Washington:												
Δp	.16	.18	.15	.12	.11	.09	.07	.07	.11	.15	.21	.18
ΔT_M	3.9	4.0	4.0	4.7	5.6	5.5	4.6	4.7	5.3	4.9	4.3	3.6
ΔT_m	5.0	3.9	3.1	4.0	3.2	3.7	3.8	4.0	4.4	4.2	5.0	3.6
Largest Rise: Maximum 21—Minimum 23												
Largest Drop: Maximum 29—Minimum 23												
Springfield, Missouri:												
Δp	.16	.18	.16	.14	.10	.07	.06	.04	.08	.11	.17	.17
ΔT_M	8.5	7.5	7.4	8.0	5.7	4.7	4.3	3.3	5.1	6.6	7.7	7.7
ΔT_m	6.5	7.2	5.3	6.0	4.9	3.3	3.0	2.9	4.1	5.8	6.3	6.5
Largest Rise: Maximum 28—Minimum 23												
Largest Drop: Maximum 33—Minimum 31												
Tallahassee, Florida:												
Δp	.12	.13	.10	.08	.06	.05	.04	.04	.05	.07	.08	.12
ΔT_M	6.5	5.8	5.3	4.3	3.3	2.5	2.1	2.5	2.7	3.5	5.3	5.6
ΔT_m	6.5	5.5	5.8	5.0	2.9	1.5	.9	1.2	1.8	3.6	5.8	5.8
Largest Rise: Maximum 20—Minimum 25												
Largest Drop: Maximum 23—Minimum 30												
Tampa, Florida:												
Δp	.10	.10	.09	.07	.05	.05	.04	.04	.05	.06	.07	.10
ΔT_M	5.3	4.2	4.2	3.2	2.3	1.9	1.8	2.2	2.1	2.5	3.5	4.9
ΔT_m	5.5	4.8	4.7	3.4	2.1	1.7	1.3	1.1	1.0	2.3	4.3	5.0
Largest Rise: Maximum <16—Minimum 18												
Largest Drop: Maximum 22—Minimum 23												
Yuma, Arizona:												
Δp	.08	.10	.10	.08	.06	.05	.04	.04	.04	.07	.09	.09
ΔT_M	3.0	3.2	3.8	4.0	3.3	2.9	2.9	2.8	2.6	3.6	3.8	3.1
ΔT_m	3.2	3.9	3.2	3.2	3.0	2.5	2.6	2.9	3.0	3.0	3.2	3.2
Largest Rise: Maximum 18—Minimum 17												
Largest Drop: Maximum 24—Minimum <16												
Washington, D.C.:												
Δp	.22	.26	.18	.17	.12	.09	.08	.09	.10	.14	.18	.23
ΔT_M	8.1	7.3	6.5	8.0	6.5	4.5	3.7	4.5	4.3	5.4	6.8	6.8
ΔT_m	7.4	5.4	3.5	4.8	4.3	3.3	2.7	2.6	3.3	4.5	5.7	4.9
Largest Rise: Maximum 32—Minimum 40												
Largest Drop: Maximum 36—Minimum 25												

U.S. GOVERNMENT PRINTING OFFICE: 1966