MONTHLY PERCENTAGE FREQUENCY OF CEILINGS 2,000 FEET OR HIGHER OVER THE UNITED STATES

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[Manuscript received June 10, 1959; revised August 28, 1959]

ABSTRACT

Maps of the percentage frequency of occurrence of ceilings of 2,000 ft. or higher over the United States, excluding Alaska and Hawaii, are presented for each month. A second set of maps shows for each month the change in percentage from the preceding month.

1. INTRODUCTION

Low ceilings are frequently the cause of interrupted aircraft operations involving either delays or cancellations of flights. The increase in air traffic and the change to jet-type aircraft, which must land at a destination or alternate airport with little or no delay, emphasize the need for extended weather information for planning purposes. Government and military personnel, business executives, and many airline passengers planning important journeys, need some indication of advance aviation weather probabilities to decide upon their mode of transportation and time of departure. An increasing number of requests for information involve aviation weather probabilities for periods beyond those for which conventional aviation weather forecasts can be made at the present time.

If such requests are for periods in the order of 24 to 72 hours in advance, the meteorologist must consider the present synoptic situation and available prognostic material in arriving at some kind of probability guidance. Readily available aviation climatological information can be used to good advantage as background information in such cases. If the request is for an even more extended aviation weather probability, the meteorologist must depend almost entirely on aviation climatological information. The type of information needed is frequently nonexistent or inaccessible.

As an aid to the solution of the problem of providing some type of advance aviation weather information, maps have been constructed showing the percentage frequency of ceilings 2,000 feet or higher over the United States. Aircraft operations over the greater part of the United States are usually not interrupted when ceilings are above 2,000 feet, but the problems involving aircraft operations increase as the ceilings fall below 2,000 feet. Therefore the 2,000-foot limit was used as the basis for these charts, even though it is well-known that terrain, weather, density of air traffic, and possibly other things are contributing factors in determining the flow of air traffic.

2. DATA

The basic data used in construction of these maps were obtained from summaries, covering a 5-year period, of the hourly observations for 115 airport stations in the United States [1]. Supplementary data from [2] and [3] were also used with various climatological charts in [4], [5], [6], and [7] as supporting material. Topographic maps were also used in interpolating over areas where data were sparse. Maps, showing the geographical distribution of 2000-ft. and higher ceilings were constructed for each month of the year (fig. 1) since there is a great variation between seasons and also between months of the same season. In addition, derivative maps, showing the change from the previous month, were constructed for each month of the year (fig. 2).

3. SEASONAL FEATURES

The following paragraphs describe the most prominent seasonal features depicted by figures 1 and 2.

WINTER MONTHS (DECEMBER, JANUARY, AND FEBRUARY)

A high frequency of low ceilings prevails over the Great Lakes Region and along the western slopes of the Appalachian Mountains from Pennsylvania to Georgia. A secondary region of low ceilings occurs from Washington State southward over the Cascade Range and Sierra Nevada and down through the Rocky Mountains. The frequency of low ceilings reaches a peak during the month of January over both of these areas with noticeable improvement beginning during February. Over southern Texas, where a gradual shift in the mean wind to southeasterly advects moisture from the Gulf of Mexico, a high frequency of low ceiling continues during February. Over the remainder of the Plains States and in Florida, rela-

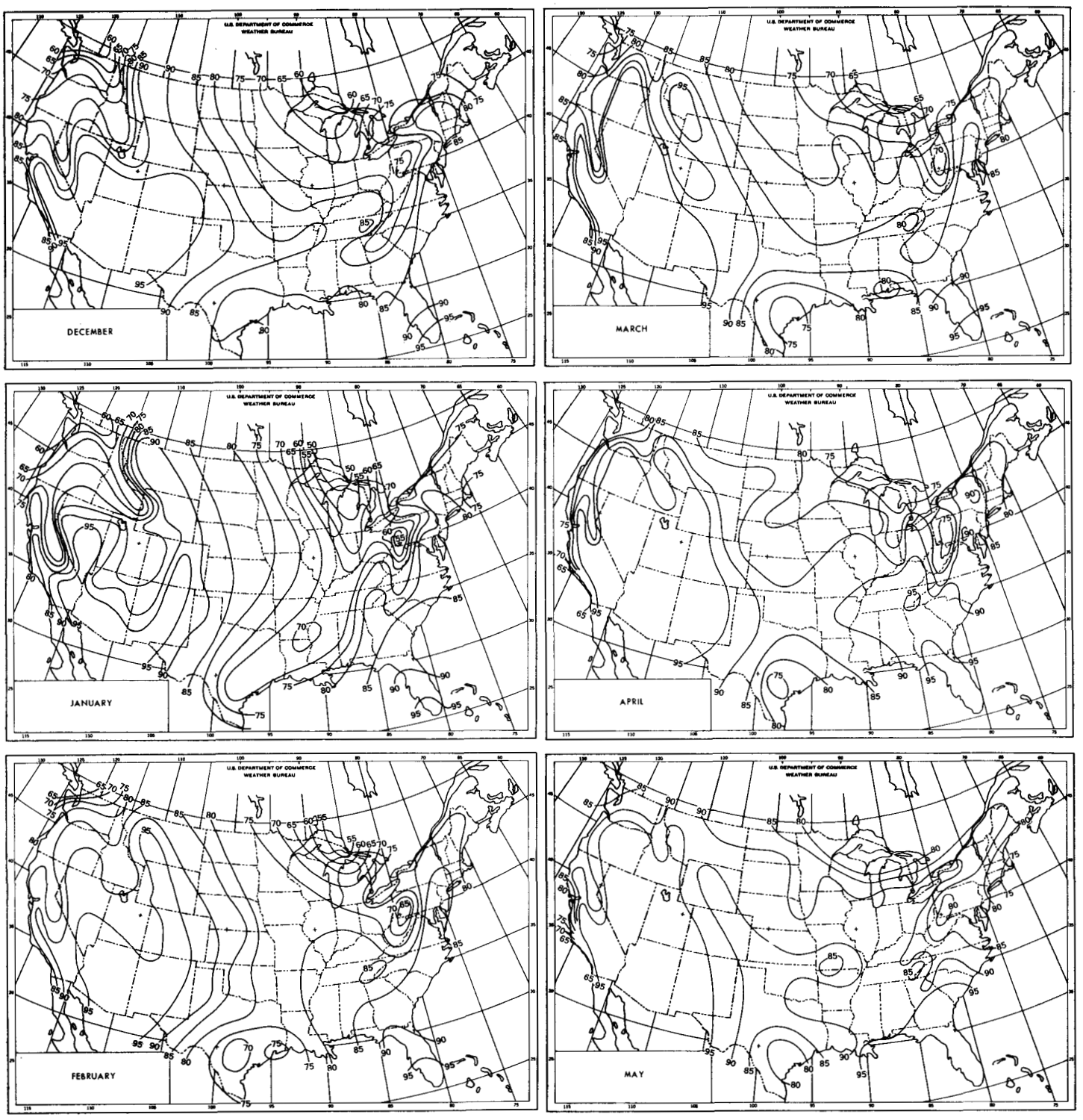

FIGURE 1.—Monthly average percentage frequency of ceilings 2,000 feet or higher.

tively high, frequency of ceilings above 2,000 feet persists during the winter season.

SPRING MONTHS (MARCH, APRIL, AND MAY)

Rapid improvement of low ceilings from Washington State through the Cascade Range, Sierra Nevada, and Rocky Mountains may be noted during March with gradual improvement thereafter. Improvement of the low ceilings over the Great Lakes Region and the western slopes of the Appalachian Mountains occurs throughout the spring months with improvement becoming more rapid during May. Southeasterly advection of moist air over

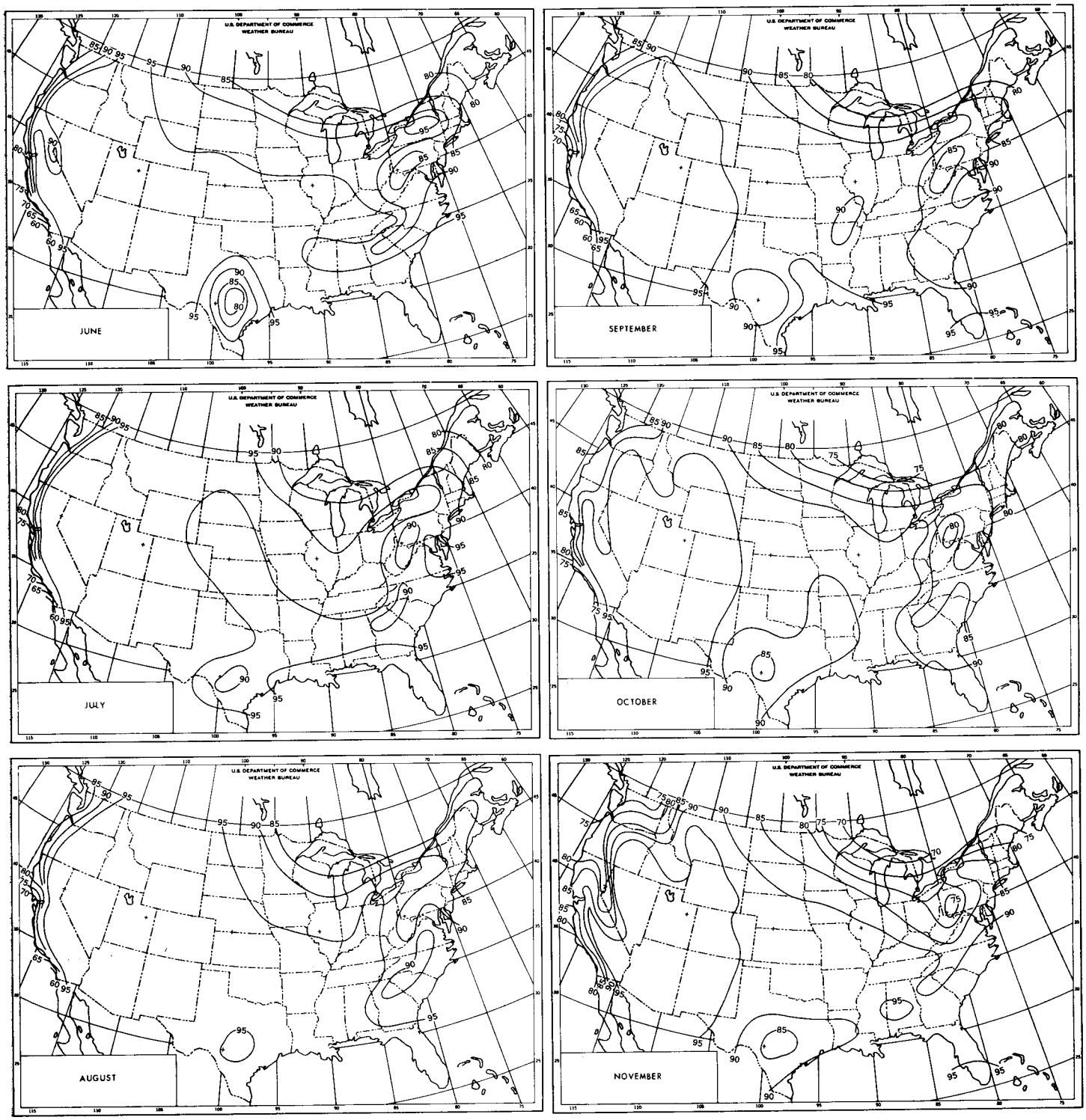

FIGURE 1.—Continued.

eastern Texas and the Southern Plains is evidenced by the relatively high frequency of ceilings below 2,000 feet over this area, especially during the late spring. A rapid increase in the frequency of ceilings below 2,000 feet occurs along the western sections of the Coastal Range in California during April. Elsewhere there is a gradual tendency toward a higher frequency of ceilings above 2,000 feet during the spring.

SUMMER MONTHS (JUNE, JULY, AND AUGUST)

Coastal stratus over the western sections of the Coastal Range in California prevails throughout the summer.

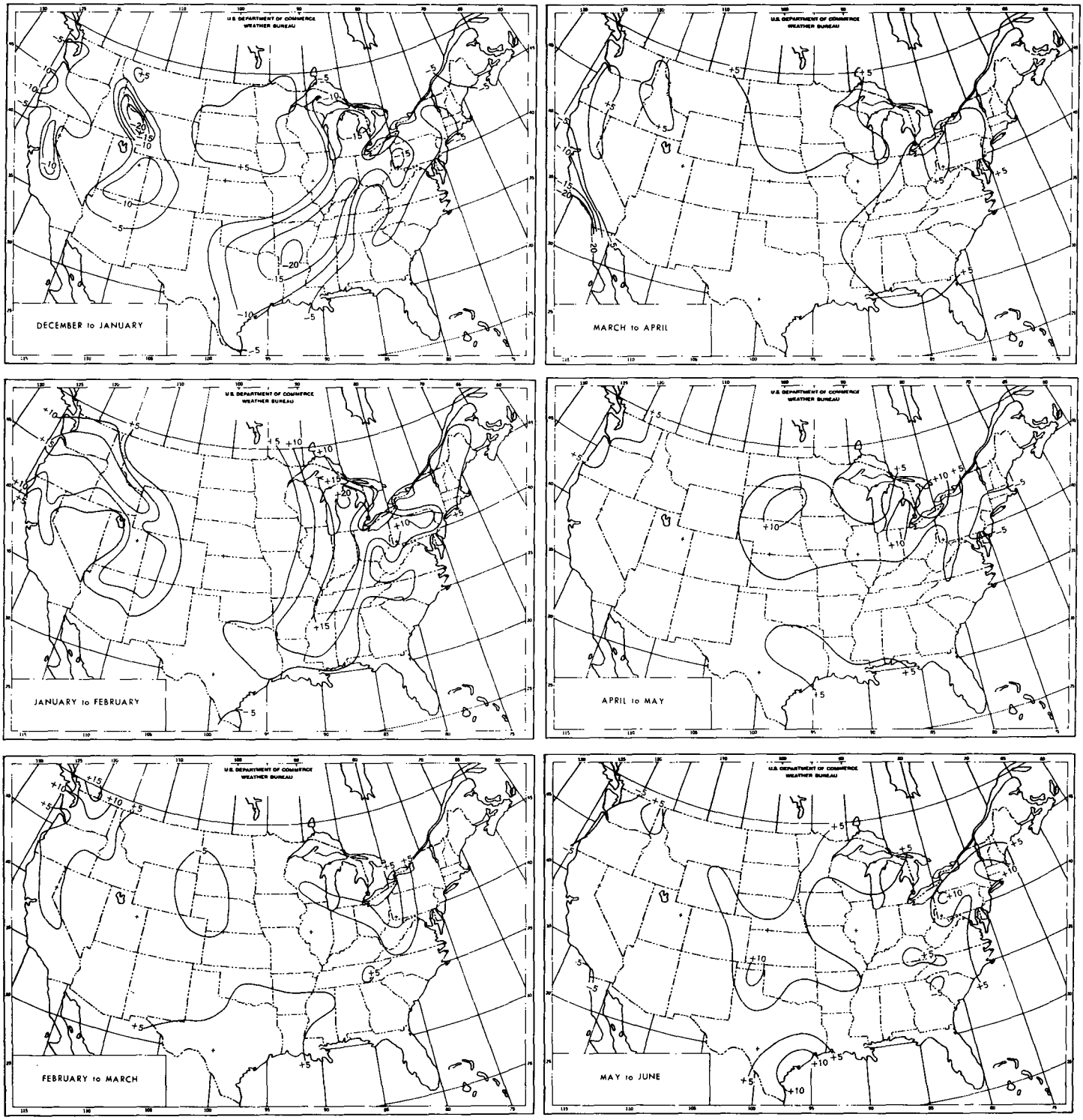

FIGURE 2.– Month-to-month change in percentage frequency of ceilings 2,000 feet or higher.

However, it is interesting to note that the frequency of ceilings below 2,000 feet in this area during the summer is not as great as that experienced over northern Michigan and in part of western Pennsylvania during the winter. The remainder of the United States, including Texas and the Southern Plains where rapid improvement occurs during June, generally has the highest percent of ceilings above 2,000 feet during the summer season.

AUTUMN MONTHS (SEPTEMBER, OCTOBER, AND NOVEMBER)

Very little change occurs during September except the slight increase in frequency of ceilings below 2,000 feet

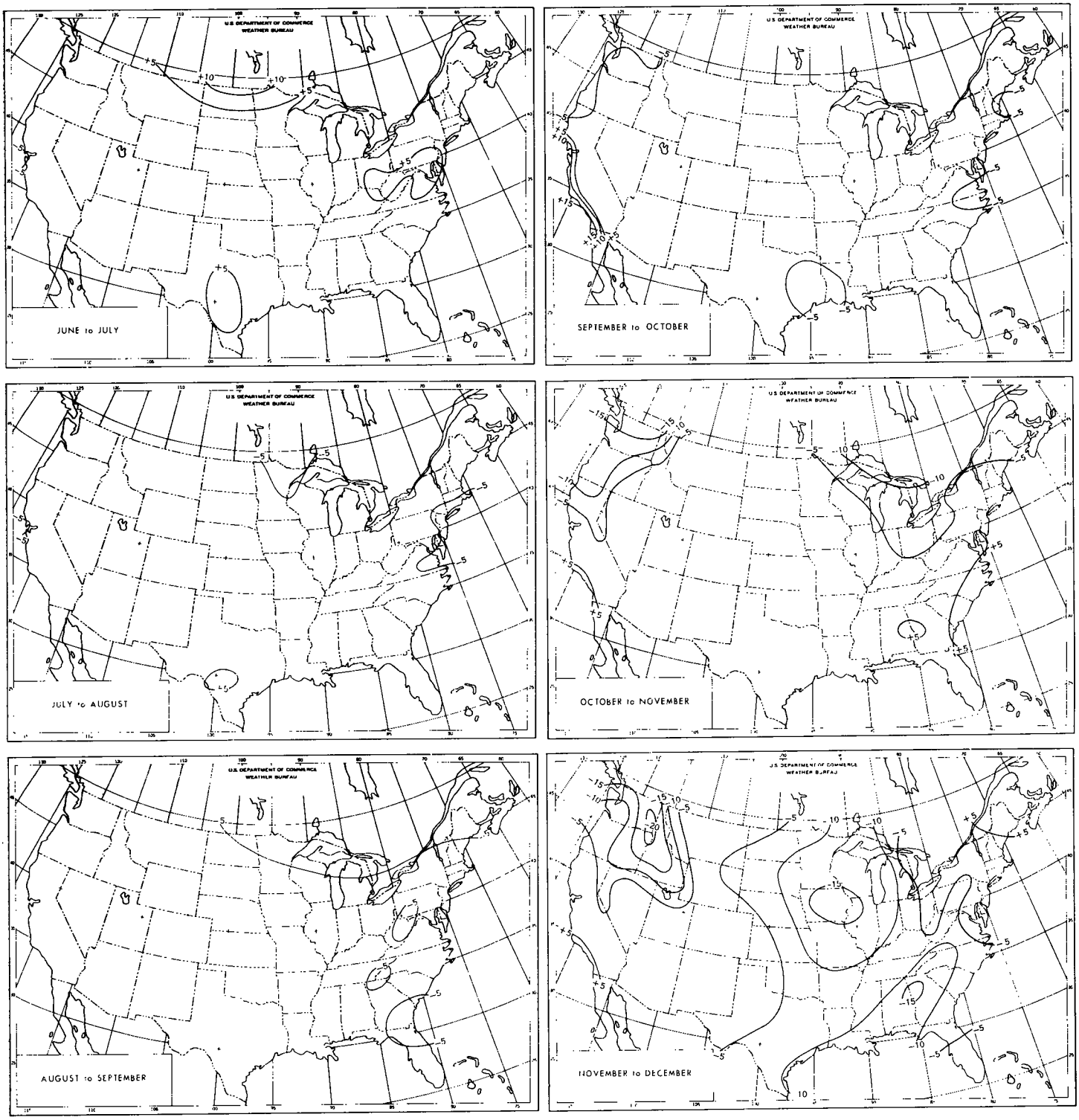

FIGURE 2.—Continued.

over northern Michigan, most of Maine, along sections of the Appalachian Mountains, and northern Florida through coastal areas of Georgia. Rapid improvement of the coastal stratus along California is evident during October. The frequency of ceilings below 2,000 feet increases over northern Michigan, through the northern Appalachians, and from Washington State through the Cascade Range, Sierra Nevada, and Rocky Mountains during November, with the pace becoming more rapid toward the end of the month and through December.

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