INTRODUCTION

This series of Northern Hemisphere Weather Maps begins with the maps for January 1949, and is produced by the United States Weather Bureau. Each volume of the series consists of Northern Hemisphere maps for one month, there being one sea-level map and one upper-air-constant-pressure-surface map (500 millibars) for each day. Beginning with the July 1955 issue, data tabulations of synoptic surface reports (1230 GMT only) and upper-air reports (0300 GMT for the entire Northern Hemisphere, and all observational times for the North American area) are included in Part II as a daily series under separate binding. Data tabulations for issues January 1949 through December 1953 contain synoptic surface reports for 1230 GMT and synoptic upper-air reports for 0300 GMT only. For issues January 1949 through December 1951 both parts are bound under one cover; for issues January 1952 through December 1953, Parts I and II are bound separately. The series is interrupted for the period January 1954 through June 1955 as a result of a change in schedule, effective with the July 1955 issue, for the purpose of obtaining more nearly current publication. It is planned to publish issues for this period later, as facilities permit.

SEA-LEVEL MAPS

DATA

The sea-level maps in this series were prepared from data observed at or near 1230 GMT. In localities where weather observations are taken only once a day, 1200 or 1230 GMT is the usual time of the observation. Thus the greatest number of data for the entire Northern Hemisphere have been made available. Furthermore, the use of 1230 GMT data provides continuity with other series of Northern Hemisphere Historical Weather Maps that have already been completed, or that are in the process of being completed.[1]

Synoptic reports were plotted from every available source: Special forms, listings, or punched cards furnished for this publication by cooperating National Meteorological Services; data and charts published by those Services; punched cards prepared by selected stations in the United States and Alaska, and for the ocean weather stations; weather logs of commercial ships under United States registry; and collections of radio and teletype reports from all available areas of the Northern Hemisphere.

An abbreviated International Plotting Code model is used in plotting the maps. The positions of the elements in relation to the land and ship station circles have been printed on each map. Complete synoptic reports of the stations plotted may be found in Part II, and a description of the elements plotted and/or listed may be found in the WMO publication No. 9. TP. 4, Volume B.

ANALYSIS

In the analysis of the Northern Hemisphere sea-level charts, all frontal structures with well-established histories were retained until the data showed that frontolysis had taken place. In those cases, frontolysis has been shown and the front has been dropped from the maps. Every effort has been made to carry all major frontal systems. Minor fronts were carried on the maps only when the data indicated that a minor front did exist and the resulting weather was significant. Every effort was made to distinguish between a cold front and a polar trough, both over land and over water. Great care was exercised to include all frontal boundaries causing significant weather. However, it is physically beyond the scope of these charts, presented in 24-hour intervals, to indicate in detail each secondary or swiftly redeveloped frontal system whose inception, growth, and full development may easily have taken place in the interval between maps. Representation of these features must necessarily be shown, in some cases, as merely an indication of what took place in the interim. These indications have been considered a major part of the analysis and have been represented in the most feasible fashion in accordance with the particular situation being analyzed.

Analysis of the sea-level (and upper-air) charts was aided by a careful study of weather maps published by various National Meteorological Services, and by a study of intermediate charts prepared by the Weather Bureau and the National Weather Analysis Center. The original observation forms of the weather reporting ships at sea, in addition to transocean flight reports, were available and were used by the analysis unit as an aid to continuity.

Analysis in tropical areas are necessarily incomplete. In areas of few or no data a reasonable isobaric pattern has been carried for completeness in lieu of entering the mean position of the Intertropical Convergence Zone for that particular time of year. Whenever available data made it possible to determine the position of the zone of convergence, that position was entered.

Easterly waves, westerly troughs, and shear lines were entered only when the data definitely supported these phenomena and intermediate charts confirmed them.

Instability or squall-lines were entered on the charts when the associated weather warranted them and after close study of 6-hourly intermediate charts, when available.

In areas of relatively sparse data, the sequence of weather reports was carefully studied to obtain the best possible solution. The analysts preparing this series of charts have had considerable experience in Northern Hemisphere analysis and in maintaining continuity in areas of sparse data coverage. With minor exceptions, in areas of few data, every attempt was made to check the data and the many sources of data for accuracy and representativeness and then to analyze accordingly, with established mean patterns used only as a control factor.

500-MILLIBAR MAPS

The maps for the 500-millibar surface have been included in this series for their value in portraying the upper-air patterns associated with sea-level systems.

DATA

Beginning with January 1, 1950, the time of the published 500-millibar map was changed from 0300 GMT to 1500 GMT. This was done primarily to make the sea-level and upper-level charts more nearly synoptic thus enhancing their usefulness to all users of the charts. In addition, in areas where sea-level data were adequate, but upper-air data sparse, an upper-air pattern reasonably consistent with the sea-level pressure field could be obtained with less difficulty by means of computed 500-millibar values and other known relationships between the two levels.

The large amount of data available for this series permitted a more detailed analysis than had been possible on earlier series of a similar type. All of the major circulation systems were shown in this series together with a large percentage of the lesser systems which could be logically identified on successive maps. The regular reports were considered adequate for North America and Europe, and most of the Atlantic Ocean, but it was necessary to make extrapolations of heights in other regions where observations were sparse.

ANALYSIS

Each map was analyzed a sufficiently long time after the map date to allow the use of late reports and data received by mail. This procedure resulted in better continuity and consistency of analysis. The 0300 GMT upper-air maps were used as an aid to continuity.

Over the Asiatic Continent and the Pacific Ocean it was necessary to analyze vast areas with very few upper-air reports. Over Siberia extrapolated heights for several stations were often received in addition to data from the regularly reporting radiosonde stations. These extrapolated heights were used as an aid in analysis when continuity and extrapolations from sea-level reports showed them to be reasonably correct. To supplement data over Asia, heights were extrapolated by building lapse rates from surface data. When performing these extrapolations, care was taken to consider the elevation of each station as well as reported weather, clouds, and the pressure pattern prevailing at the time of the observation.

In the areas where upper-level data were sparse, upper-level temperatures were estimated by trajectory movements and extrapolation using continuity as a prime requisite. As an aid in drawing isotherms over Eastern Asia, where data were very sparse, thermal winds were computed between 15 and 20 thousand feet for selected Indian and Russian stations which border on this area.

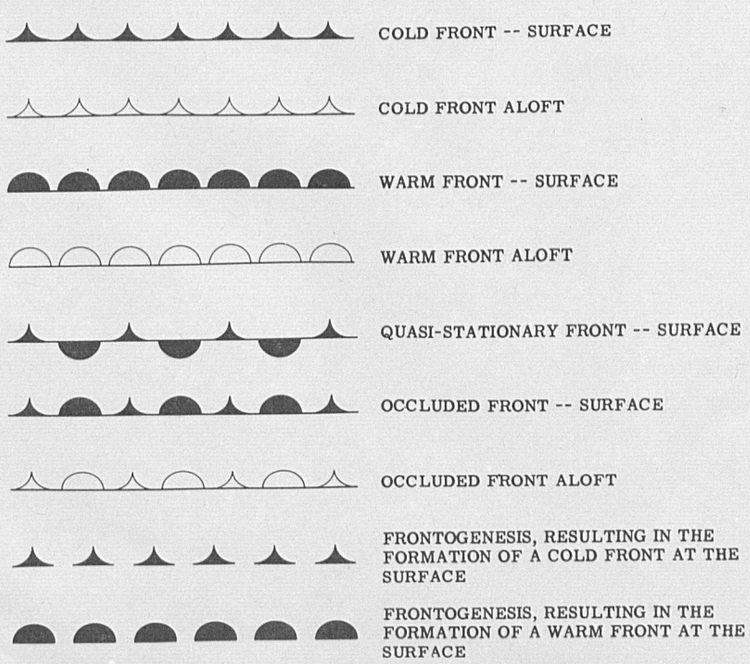
Height contours were drawn as solid lines at intervals of 200 feet. Isotherms at 5°C intervals were drawn as single dashed lines. Representation of troughs by a double solid line was discontinued with the June 1953 volume.

Surface and upper-air analyses have been closely coordinated, particularly in areas where data were sparse, in order to insure that the final analysis would be the best possible in view of the limited data and would be completely consistent with the surface analysis.

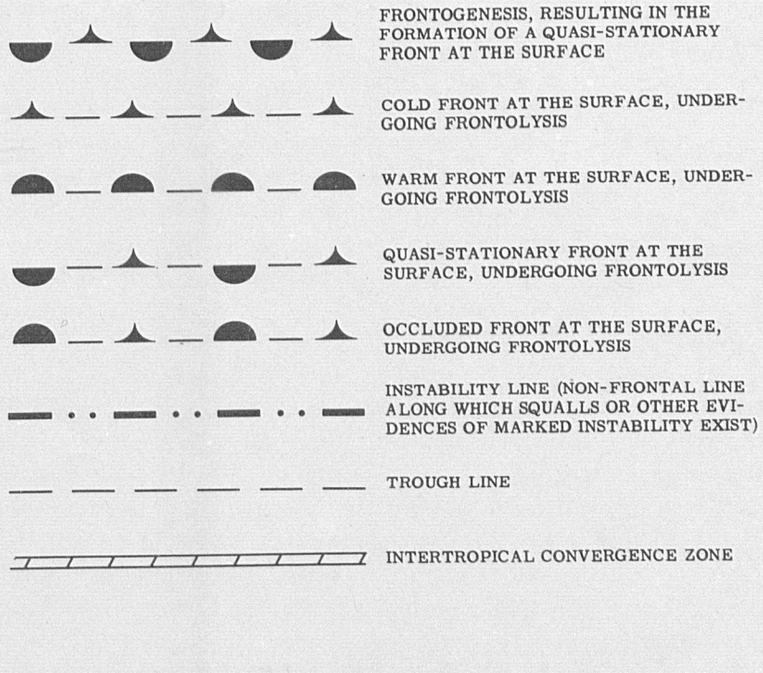
1. (a) U. S. Weather Bureau, Daily Synoptic Series Historical Weather Maps, Northern Hemisphere Sea Level, January 1899 to June 1939, inclusive.
   (b) U. S. Weather Bureau, Daily Series Synoptic Weather Maps, Northern Hemisphere Sea Level Charts, January 1943 to November 1944, inclusive (being completed).
   (c) U. S. Weather Bureau, Daily Series Synoptic Weather Maps, Northern Hemisphere Sea Level and 500 Millibar Charts, December 1944 to September 1945, inclusive (being completed).
   (d) Headquarters, Air Weather Service, AAF, Northern Hemisphere Historical Weather Maps, Sea Level and 500 Millibars, October 1945 to December 1948, inclusive.
   (e) U. S. Weather Bureau, Daily Series Synoptic Weather Maps, Northern Hemisphere Sea Level and 500 Millibar Charts, January 1949 et seq. (except January 1954 to June 1955 inclusive).

LIST OF SYMBOLS USED ON MAPS

SEA-LEVEL MAPS



SEA-LEVEL MAPS



500-MILLIBAR MAPS