# INTRODUCTION

The present series of Northern Hemisphere Historical Weather Maps, beginning 1 September 1945, is produced by units of the Air Weather Service.

Each volume of the series consists of a Northern Hemisphere sea-level map and an upper-air constant-pressure-surface (500 millibars) map for each day of the month, plus a complete set of teletype weather reports received for each of these maps.

## SEA-LEVEL MAPS

The observation time of 1230Z was selected for the historical series because, in localities where observations are taken once a day, 1230Z is the usual time selected. Thus, the greatest amount of data for the entire Northern Hemisphere has been made available, and continuity has been provided for the 40-year series that has already been completed. However, over the U.S.S.R., where 1230Z reports were not available, 1300 MST reports were plotted, generally for the area west of 100° E. Over the remainder of the U.S.S.R., 1900 MST reports were plotted.

Synoptic reports were plotted from every available source. Most reports were received via radio and teletype, but over areas where this coverage was inadequate other sources were used. Many of the Indian reports, for example, were plotted from the data available on the Indian National Maps.

Where applicable, the International Plotting Code models were used in plotting the maps. Station models for land, ship, and aircraft reports have been printed on each map, with complete code forms preceding the data sheets. There are still stations in a few parts of the world such as Spain and North Africa which report actual station pressures instead of sea-level pressures. Usually if the station elevation is above 1,000 meters the pressure has been reduced to a standard surface. Such reports appear on the maps without reduction to sea level.

In the analysis of the Northern Hemisphere sea-level synoptic 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. For example, along the polar front in the vicinity of Japan in June and July, only a weak wind shear is observed; but the resultant weather is extensive and of considerable meteorological importance.

Analysis of the charts was aided by a careful study of analyses prepared by other weather centrals and received via radio and teletype; by a study of facsimile maps received at the Central; and by a study of Russian, Japanese, Indian, and other published national maps available at the Central. These last-mentioned maps were especially helpful in determining the isobaric analysis over Asia where the data available on the working charts were often inadequate. The analysis of the 1230Z chart was greatly aided by the analysis of the maps for the intermediate synoptic hours, by a careful study of the three-hourly continuity of ship reports where such reports were available, and by a study of aircraft flights.

Analyses in tropical areas are necessarily incomplete. In areas of little or no data, the Intertropical Convergence Zone has been carried at a position roughly approximating the one generally accepted for that time of the year. This boundary has been carried for completeness rather than for an accurate tropical analysis. In the cases where data were available and it was possible to determine the position of the zone of convergence, that position was entered. Here again the analyst was aided by tropical analyses prepared by other weather centrals and available to this unit.

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 maintaining continuity in areas of sparse data coverage. In ocean areas, 3-hourly synoptic reports from ships and islands were carefully evaluated in the map analysis. Reconnaissance flight reports were extremely helpful in presenting a logical solution in areas where surface reports were inadequate.

## CONSTANT-PRESSURE-SURFACE MAPS

The 500-millibar surface maps have been included in this historical series for their value in portraying the upper-air pattern associated with the sea-level systems. The regular reports were considered adequate for North America and Western Europe and fairly adequate for the Atlantic Ocean. Various aids were necessarily used on other regions where observations were sparse. The map time of 0400Z was chosen because more data were available at that time than at 1600Z. However, Indian radiosonde observations are normally taken for 1300Z, and since coverage over Asia is so poor, it was found advisable to spot these off-time reports.

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 method gave better continuity and consistency of analysis. The 1600Z upper-air maps were also analyzed as an aid to continuity.

The regions most difficult to analyze were the Asiatic Continent and the Pacific Ocean, where it was necessary to draw vast areas with very few reports. As an aid, lapse rates were built from surface reports with consideration for reported weather; and clouds, pressure patterns, and upper-level temperatures were estimated by trajectory movements and extrapolation. Throughout this sector, continuity was the prime requisite.

Height contours were drawn as solid lines at intervals of 200 feet. Trough lines were represented by a double solid line drawn through the isolines connecting points of greatest curvature or, in the case of constant curvature, connecting the southernmost points of the contours. The position of a trough 24 hours before map time was represented by a double-dashed line, while a dotted line was used to indicate the position of a trough 48 hours previously. Isotherms at 5° intervals were drawn as single-dashed lines.

The initial trough line west of 0° on the first day of each month was identified by the letter A at the bottom of the line. Proceeding westward, trough lines were labelled with succeeding letters. Trough lines on the first day of each month were connected to those on the last day of the preceding month by a letter at the top of each line. When a new trough developed from one already established, the prime symbol (′) was used with the identifying letter of the original trough. In moving these upper troughs, careful consideration was given to the relation of upper-air and synoptic situations. 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.