INTRODUCTION

This series of Northern Hemisphere Weather Maps begins with the
maps for January 1949, as a cooperative project of the National Weather
Bureau. Each volume contains 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 1953 issue, data
tabulations of synoptic surface reports (1200 GMT only) and upper-air reports
(0300 GMT for the entire Northern Hemisphere, and all observational
values 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 1200 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 retaining more complete current information; it is planned
to publish issues for this period later, as facilities permit.

SEA-LEVEL MAPS

The sea-level maps in this series were prepared from data ob-
served at or near 1200 GMT. In localities where weather observa-
tions are not taken only a day, 1200 or 1230 GMT is the usual time
of the observation. Thus the greatest number of data for the en-
tire 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.

Synoptic reports were plotted from every available source:
Special forms, lists, or punched cards furnished for this pub-
lication by the National Weather Service; telegrams from stations
and published in Weather Bulletin; and reports from the National
Weather Service, including information from Russia, the Soviet
Union, and other parts of the world.

The maps of the sea-level surface were plotted from
July 1955 on in a new phase in which the maps are
plotted on a non-frontal line along which squalls or other evidence
of marked instability exist.

FRONTOGENSES, RESULTING IN THE
FORMATION OF A COLD FRONT AT THE
SURFACE

FRONTOGENSES, RESULTING IN THE
FORMATION OF A WARM FRONT AT THE
SURFACE

HEIGHT CONTOUR

ISOTHERM

1-2 KNOT WIND

3-7 KNOT WIND

10 KNOT WIND

55 KNOT WIND

INTERTROPICAL CONVERGENCE ZONE

LIST OF SYMBOLS USED ON MAPS

SEALEVEL MAPS

COLD FRONT -- SURFACE

COLD FRONT ALOFT

WARM FRONT -- SURFACE

WARM FRONT ALOFT

QUASI-STATIONARY FRONT -- SURFACE

QUASI-STATIONARY FRONT -- ALOFT

OCCULDED FRONT -- SURFACE

OCCULDED FRONT ALOFT

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FRONTOGENSES, RESULTING IN THE
FORMATION OF A WARM FRONT AT THE
SURFACE

SEALEVEL MAPS

COLD FRONT AT THE SURFACE, UNDERGOING FRONTOSYNE

COLD FRONT AT THE SURFACE, UNDERGOING FRONTOSYNE

WARM FRONT AT THE SURFACE, UNDERGOING FRONTOSYNE

QUASI-STATIONARY FRONT AT THE SURFACE, UNDERGOING FRONTOSYNE

OCCULDED FRONT AT THE SURFACE, UNDERGOING FRONTOSYNE

INSTABILITY LINE (NON-FRONTAL LINE ALONG WHICH SQUALLS OR OTHER EVIDENCE OF MARKED INSTABILITY EXIST)

TROUGH LINE

SOO-MILLIBAR MAPS

ANALYSIS

Each map was analyzed 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 with the 1200 GMT maps. Analysis was simplified
by the use of 0300 GMT upper-air reports. Over the
Atlantic Ocean and the Pacific Ocean it was necessary to
analyse 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
pressures were estimated by trajectory movements and extrapo-
lation 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. Isotachs at 5°C intervals were drawn as single dashed lines.
Representation of troughs by a double solid line was discontinued
when the trough was shallow.

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 Synoptic Series Historical
Weather Maps, Northern Hemisphere Sea Level Charts, January 1942
to November 1944, inclusive (being completed).

(c) U. S. Weather Bureau, Daily Synoptic Series Historical
Weather Maps, Northern Hemisphere Sea Level and 500 Millibars
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 Synoptic Weather Maps, Northern
Hemisphere Sea Level and 500 Millibars, Charts, January 1949 et seq. (except January 1954 to June 1955 inclusive).

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.

1. In the analysis of the Northern Hemisphere sea-level charts, all
fronts were included which were apparent on the charts. 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 the two 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
stations were used in addition to those 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 approximation of the features
was 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 analysis preparing this series of charts has had considerable
experience in Northern Hemisphere analysis and in maintaining con-
tinuity 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.

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 to 1200 GMT to improve continuity
primarily to make the sea-level and upper-level charts more nearly
synoptic than enhancing their usefulness to all users of the charts.
In addition, in areas where the squalls pattern has been carried
by 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 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.