The maps reproduced in this volume are from the series of Historical Weather Maps in process of preparation through a cooperative project of the Army, Navy, and Weather Bureau, with the assistance of University Meteorologists and students in the Weather Department, the University of Michigan.

The Historical Maps Series will include:

Northern Hemisphere Synoptic charts for, as long a period as practicable, to be published by months. By April 1, 1943, 83 months of daily maps had been analyzed for the years from 1601 through 1938.

Northern Hemisphere Monthly Mean charts from about August 1932, to be published by months. By April 1, 1943, 32 months of daily maps had been analyzed.

North American High-Level Series (10, 16, and 18 kilometers), from about July 1939, to be published by months. By April 1, 1943, 8 months of monthly maps had been published.

Northern Hemisphere Monthly Mean, for sea level and 3-kilometer, several years of which will be combined for publication.

The program plans for the High-Level charts, which are long series of carefully analyzed weather maps covering as much of the Northern Hemisphere as available data permit, and utilizing present day techniques of weather analysis, was initiated in October 1938, is meeting urgent needs based on wartime needs. Meteorologists have long needed such series of weather maps in the development of scientific methods of forecasting than has been possible heretofore, and in extending the period for which reliable weather forecasts can be made. The maps constitute a record of weather behavior in the Northern Hemisphere, presented in a readily usable form both for the forecaster who is interested in improving the accuracy of his forecasts and for the research meteorologist who wants to test physical hypotheses as well as empirical forecasting techniques.

### USES OF HISTORICAL MAPS

Many practical uses can be found for these materials for the forecaster and the research meteorologist. The maps should be very helpful to the forecaster in reinforcing his memory of the changes in weather that have taken place in the Northern Hemisphere over extensive areas and the basic features of the general circulation. They will aid him in becoming familiar with the synoptic meteorology of new regions, in developing new reference charts, and in making certain that he is not overlooking important features in the state of the atmosphere.

### PREPARATION OF HISTORICAL MAPS

The plotting of these various maps, including the assembling and preparation of synoptic data and the checking of the plotted maps, is done in plotting units and under the direction of the Chief of the Historical Maps Program.

Code and Station Model

The International Code and Station Model for use on the Historical Weather Maps with but few supplemental symbols and with ocean swell depicted in the Bergezon symbols. (See below, "Table of Symbols").

### GENERAL PURPOSE

The purpose of the Historical Maps Program is to provide a comprehensive picture of the state of the atmosphere and the manner in which the upper air processes are related to surface processes over the Northern Hemisphere.

### ORGANIZATION OF THE PLOTTING UNIT

The entry of observational data on the Historical Weather Maps is organized on a regional basis. Local data are collected and processed in the plotting units, and then the data are assembled and then transmitted to the National Center for plotting.

### PRESSURE REDUCTIONS

For stations reporting only station pressure, or pressure reduced to standard mean sea level, the corresponding pressures were reduced to sea-level in the map plotting unit. For stations reporting pressure values at elevations greater than 100 meters, a constant correction for each station was determined, and applied to station pressure values. Calculation of such corrections for stations were based on the "Simpsonsonian Meteorological Tables." For stations reporting pressure at altitudes in excess of 100 meters, a table has been prepared giving sea-level pressure as a function of the height of the station above sea-level and temperature. These tables were compiled on the assumption of a uniform lapse rate of five-tenths the dry adiabatic in obtaining the mean temperature of the air at the pressure surfaces. In some instances adjacent altitudes were reported at various times by the same station, one of which may have been more accurate than the other, and it would have been desirable to select the more accurate. In these cases the altitude correction was calculated for both values and a weighted average of the two was accepted.

### VERIFICATION

The map preparation procedure includes verification of plotted data, checking for the elimination of systematic errors in the data, and checking for the elimination of systematic errors in the data.
TABLE OF SYMBOLS

<table>
<thead>
<tr>
<th>SYMBOL a</th>
<th>BAROMETRIC TENDENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code figure</td>
<td>Description</td>
</tr>
<tr>
<td>0</td>
<td>Rising, then falling</td>
</tr>
<tr>
<td>1</td>
<td>Rising, steady</td>
</tr>
<tr>
<td>2</td>
<td>Rising, steady, or rising more slowly</td>
</tr>
<tr>
<td>3</td>
<td>Rising steadily, or slowly</td>
</tr>
<tr>
<td>4</td>
<td>Falling, then steady, or falling more slowly</td>
</tr>
<tr>
<td>5</td>
<td>Falling, steady, or steadyly falling</td>
</tr>
<tr>
<td>6</td>
<td>Falling, falling more slowly</td>
</tr>
<tr>
<td>7</td>
<td>Falling constantly, or steady</td>
</tr>
<tr>
<td>8</td>
<td>Steady, or rising, or falling, or falling more quickly</td>
</tr>
<tr>
<td>9</td>
<td>Barometer now higher than, or the same as, 3 hours ago</td>
</tr>
<tr>
<td>10</td>
<td>Barometer now lower than 3 hours ago</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SYMBOL $C_i$</th>
<th>FORM OF LOW CLOUD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code figure</td>
<td>Form of cloud</td>
</tr>
<tr>
<td>0</td>
<td>No low clouds.</td>
</tr>
<tr>
<td>1</td>
<td>Cumulus of fine weather.</td>
</tr>
<tr>
<td>2</td>
<td>Cumulus heavy and swelling, without anvils.</td>
</tr>
<tr>
<td>3</td>
<td>Cumulonimbus.</td>
</tr>
<tr>
<td>4</td>
<td>Stratocumulus formed by the flattening of cumuli.</td>
</tr>
<tr>
<td>5</td>
<td>Layer of stratus or stratocumulus.</td>
</tr>
<tr>
<td>6</td>
<td>Low broken up to bad weather.</td>
</tr>
<tr>
<td>7</td>
<td>Cumulus of fine weather and stratocumulus.</td>
</tr>
<tr>
<td>8</td>
<td>Heavy or swelling cumulus, or cumulonimbus, and stratuscumulus.</td>
</tr>
<tr>
<td>9</td>
<td>Heavy or swelling cumulus (or cumulonimbus) and low ragged clouds of bad weather.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SYMBOL $C_B$</th>
<th>FORM OF MIDDLE CLOUD</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Form of cloud</td>
</tr>
<tr>
<td>0</td>
<td>No middle clouds.</td>
</tr>
<tr>
<td>1</td>
<td>Typical altostratus.</td>
</tr>
<tr>
<td>2</td>
<td>Typical altostratus, thick (or nimbostratus).</td>
</tr>
<tr>
<td>3</td>
<td>Altocumulus, or high stratuscumulus, sheet at one level only.</td>
</tr>
<tr>
<td>4</td>
<td>Altocumulus in small isolated patches; individual clouds often show signs of evaporation and settle more or less horizontally in shape.</td>
</tr>
<tr>
<td>5</td>
<td>Altocumulus arranged in more or less parallel bands, or an ordered layer spreading over sky.</td>
</tr>
<tr>
<td>6</td>
<td>Altocumulus arranged with altostratus or altocumulus, sheet at the tops of cumulus.</td>
</tr>
<tr>
<td>7</td>
<td>Altocumulus associated with altostratus or altocumulus with a partially altostratus character.</td>
</tr>
<tr>
<td>8</td>
<td>Altocumulus castellatus, or scattered cumiform tops.</td>
</tr>
<tr>
<td>9</td>
<td>Altocumulus in several sheets at different levels, generally assume the veils of cloud and chaotic appearance of the sky.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SYMBOL $F$</th>
<th>WIND FORCE, BEAUFORT SCALE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Code figure</td>
<td>Explanatory title</td>
</tr>
<tr>
<td>0</td>
<td>Calm</td>
</tr>
<tr>
<td>1</td>
<td>Light air</td>
</tr>
<tr>
<td>2</td>
<td>Slight breeze</td>
</tr>
<tr>
<td>3</td>
<td>Gentle breeze</td>
</tr>
<tr>
<td>4</td>
<td>Moderate breeze</td>
</tr>
<tr>
<td>5</td>
<td>Fresh breeze</td>
</tr>
<tr>
<td>6</td>
<td>Strong breeze</td>
</tr>
<tr>
<td>7</td>
<td>High wind</td>
</tr>
<tr>
<td>8</td>
<td>Gale</td>
</tr>
<tr>
<td>9</td>
<td>Strong gale</td>
</tr>
<tr>
<td>10</td>
<td>Hurricane</td>
</tr>
</tbody>
</table>

Wind force is represented by the number of feathers on the wind arrow, each having a value of one, and each long feather having a value of two. The wind force is indicated by a concentric circle around the station circle. The wind force zero with direction given is shown as an arrow without feathers. Variable winds are indicated by feathers placed directly on the wind arrow. Wind force missing is indicated by an "x" placed at the end of the arrow. When both force and direction are missing, the wind arrow is omitted.


discussion continues on the next page
### SYMBOL TT—AIR TEMPERATURE

**SYMBOL T.T.—DEWPOINT TEMPERATURE**

All temperatures are entered in whole degrees of the Fahrenheit scale. Missing air temperatures are indicated by "M" only if T.T. is also reported; otherwise no indication is made.

### SYMBOL w—WATER TEMPERATURE

Water temperatures are entered in whole degrees of the Fahrenheit scale and are obtained directly from T.T., the coded difference between air and water temperature. The following values are used for Tw:

<table>
<thead>
<tr>
<th>Code No.</th>
<th>Tw Difference, °F</th>
<th>Code No.</th>
<th>Tw Difference, °F</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>-10</td>
<td>3</td>
<td>-3</td>
</tr>
<tr>
<td>1</td>
<td>-8</td>
<td>4</td>
<td>-1</td>
</tr>
<tr>
<td>2</td>
<td>-5</td>
<td>5</td>
<td>-4</td>
</tr>
<tr>
<td>3</td>
<td>-3</td>
<td>6</td>
<td>-2</td>
</tr>
<tr>
<td>4</td>
<td>-1</td>
<td>7</td>
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<td>5</td>
<td>1</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>8</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

The difference is applied to air temperature to obtain water temperature.

### SYMBOL V—HORIZONTAL VISIBILITY

<table>
<thead>
<tr>
<th>Visibility in meters</th>
<th>Visibility in miles</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>50 (55 yds.)</td>
</tr>
<tr>
<td>200</td>
<td>(220 yds.)</td>
</tr>
<tr>
<td>500</td>
<td>(650 yds.)</td>
</tr>
<tr>
<td>1,000</td>
<td>(1,100 yds.)</td>
</tr>
<tr>
<td>2,000</td>
<td>(2,200 yds.)</td>
</tr>
<tr>
<td>4,000</td>
<td>(4,400 yds.)</td>
</tr>
<tr>
<td>8,000</td>
<td>(8,800 yds.)</td>
</tr>
<tr>
<td>12,000</td>
<td>(12,120 yds.)</td>
</tr>
<tr>
<td>16,000</td>
<td>(16,160 yds.)</td>
</tr>
<tr>
<td>20,000</td>
<td>(20,200 yds.)</td>
</tr>
<tr>
<td>25,000</td>
<td>(25,250 yds.)</td>
</tr>
<tr>
<td>30,000</td>
<td>(30,300 yds.)</td>
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</tbody>
</table>

### SYMBOL W—PAST WEATHER

<table>
<thead>
<tr>
<th>Weather Description</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear or scattered clouds</td>
<td>0</td>
</tr>
<tr>
<td>Broken not continuous or varied</td>
<td>1</td>
</tr>
<tr>
<td>Overcast</td>
<td>2</td>
</tr>
<tr>
<td>Sandstorm or duststorm, or storm of drifting snow</td>
<td>3</td>
</tr>
<tr>
<td>Fog or thick haze (visibility less than 1,000 meters, 1,100 yards)</td>
<td>4</td>
</tr>
<tr>
<td>Drizzle</td>
<td>5</td>
</tr>
<tr>
<td>Rain</td>
<td>6</td>
</tr>
<tr>
<td>Snow or sleet</td>
<td>7</td>
</tr>
<tr>
<td>Showers</td>
<td>8</td>
</tr>
<tr>
<td>Thunderstorm</td>
<td>9</td>
</tr>
</tbody>
</table>

### Figures 00 to 19: Abbreviated description of sky and special phenomena

- 00 Cloudless (from no clouds up to but not including 1/10)
- 01 Partly cloudy (from exactly 1/10 to exactly 5/10)
- 02 Cloudy (over 5/10 up to and including exactly 9/10)
- 03 Overcast (over 9/10)
- 04 Low fog, whether on ground or at sea
- 05 Haze (but visibility 1,000 meters, 1,100 yards or more)
- 06 Dust devils seen
- 07 Distant lightning
- 08 Lightning (visibility 1,000 meters, 1,100 yards or more)
- 09 Fog at a distance, but not at station (or ship)
- 10 Precipitation within sight
- 11 Thunder, without precipitation at station (or ship)
- 12 Duststorm within sight, but not at station (or ship)
- 13 Ugly, threatening sky
- 14 Squally weather
- 15 Heavy squalls in last 3 hours
- 16 Water spouts seen in last 3 hours
- 17 Visibility reduced by smoke
- 18 Blowing dust (visibility 1,000 meters, 1,100 yards or more)
- 19 Signs of tropical storm or hurricane

### Figures 20 to 29: Precipitation in last hour (But not at time of observation)

- 20 Precipitation in any form
- 21 Drizzle
- 22 Continuous or intermittent rain
- 23 Continuous or intermittent snow
- 24 Continuous or intermittent rain and snow
- 25 Rain showers
- 26 Snow showers
- 27 Hail, or rain and hail, showers
- 28 Light or moderate thunderstorm
- 29 Heavy thunderstorm

### Figures 30 to 39: Duststorms and storms of drifting snow (Visibility less than 1,000 meters, 1,100 yards)

- 30 Duststorm or sandstorm
- 31 Duststorm or sandstorm has decreased
- 32 Duststorm or sandstorm, no appreciable change
- 33 Duststorm or sandstorm has increased
- 34 Line of duststorm
- 35 Storm of drifting snow
- 36 Light or moderate storm of drifting snow
- 37 Heavy storm of drifting snow
- 38 Light or moderate storm of drifting snow
- 39 Heavy storm of drifting snow

### Figures 40 to 49: Fog (Visibility less than 1,000 meters, 1,100 yards)

- 40 Fog
- 41 Moderate fog in last hour
- 42 Thick or dense fog in last hour
- 43 Fog, sky not discernible
- 44 Fog, sky not discernible
- 45 Fog, sky discernible
- 46 Fog, sky not discernible
- 47 Fog, sky discernible
- 48 Fog, sky not discernible
- 49 Fog, sky discernible

### Figures 50 to 59: Drizzle

- 50 Drizzle
- 51 Continuous
- 52 Drizzle
- 53 Continuous
- 54 Continuous
- 55 Continuous
- 56 Continuous
- 57 Drizzle and fog
- 58 Light or moderate drizzle and rain
- 59 Heavy drizzle and light rain

### Figures 60 to 69: Rain

- 60 Rain
- 61 Continuous
- 62 Continuous
- 63 Continuous
- 64 Continuous
- 65 Continuous
- 66 Continuous
- 67 Rain and snow
- 68 Light or moderate
- 69 Heavy

### Figures 70 to 79: Snow

- 70 Snow
- 71 Continuous
- 72 Continuous
- 73 Continuous
- 74 Continuous
- 75 Continuous
- 76 Continuous
- 77 Snow and fog
- 78 Snow
- 79 Ice crystals; or sleet

### Figures 80 to 89: Showers

- 80 Showers
- 81 Showers of light or moderate
- 82 Showers of heavy
- 83 Showers of light or moderate
- 84 Showers of heavy
- 85 Showers of light or moderate
- 86 Showers of heavy
- 87 Showers of snow pellets
- 88 Showers of light or moderate
- 89 Showers of heavy

### SYMBOLS USED FOR DESIGNATING FRONTS:

- **COLD FRONT**
- **WARM FRONT**
- **OCCLUDED FRONT**
- **STATIONARY FRONT**
- **COLD FRONTGENESIS**
- **WARM FRONTGENESIS**
- **STATIONARY FRONTGENESIS**
- **COLD FRONTLYSIS**
- **WARM FRONTLYSIS**
- **OCCLUDED FRONTLYSIS**
- **STATIONARY FRONTLYSIS**
- **COLD FRONT ALOFT**
- **WARM FRONT ALOFT**
- **OCCLUDED FRONT ALOFT**
- **STATIONARY FRONT ALOFT**

### HATCHING DENOTES AREA OF PRECIPITATION (other than drizzle) OR GENERAL AREA OF MIXED PRECIPITATION TYPES.
### OUTLINE OF DATA SOURCES, MAY 1932

#### LAND AREAS

<table>
<thead>
<tr>
<th>Area</th>
<th>Sources No.</th>
<th>Special Code</th>
<th>Period of precipitation</th>
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</thead>
<tbody>
<tr>
<td>Africa</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>French North Africa</td>
<td>1</td>
<td>A, C</td>
<td>No report</td>
</tr>
<tr>
<td>Egypt</td>
<td>2</td>
<td>B, D</td>
<td>24 hours</td>
</tr>
<tr>
<td>Rio de Oro and Cape</td>
<td>12</td>
<td>A</td>
<td>No report</td>
</tr>
<tr>
<td>Juby</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>China</td>
<td>5</td>
<td>B, D</td>
<td>No report</td>
</tr>
<tr>
<td>India and Burma</td>
<td>4</td>
<td>C, G</td>
<td>24 hours</td>
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<tr>
<td>Indo China</td>
<td>5</td>
<td>B, D</td>
<td>No report</td>
</tr>
<tr>
<td>Japan and Korea</td>
<td>B, C</td>
<td>F, F</td>
<td>24 hours</td>
</tr>
<tr>
<td>Pelew, Saipan and</td>
<td>7</td>
<td>B</td>
<td>A 12 hours</td>
</tr>
<tr>
<td>Ponap</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Philippines and Yap</td>
<td>8</td>
<td>B</td>
<td>A 12 hours</td>
</tr>
<tr>
<td>Siberia</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Asia Minor</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Turkey, Iraq, and</td>
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<td></td>
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<tr>
<td>Palestine, Europe</td>
<td></td>
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<tr>
<td>England</td>
<td>10, 12</td>
<td>A, C, H</td>
<td>No report</td>
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<tr>
<td>France</td>
<td>11, 12</td>
<td>A, B, C</td>
<td>No report</td>
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<tr>
<td>Greece</td>
<td>10</td>
<td></td>
<td>No report</td>
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<tr>
<td>Candia and Athens</td>
<td>2</td>
<td>B, D</td>
<td>24 hours</td>
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<td>Limnosel, Cyprus</td>
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<td>B, D</td>
<td>24 hours</td>
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<td>Norway</td>
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<td>A</td>
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<td>Russia</td>
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<td>No report</td>
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<td>13</td>
<td>E</td>
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<td>E</td>
<td>No report</td>
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<td>E</td>
<td>No report</td>
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<tr>
<td>and Bermuda</td>
<td></td>
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<tr>
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<td>13</td>
<td>E</td>
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<td>B, C</td>
<td>24 hours</td>
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<td>Myoglobin</td>
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<td>A</td>
<td>No report</td>
</tr>
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<td>21</td>
<td>B, D</td>
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<td>Godthib, and</td>
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<td></td>
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<tr>
<td>Magmasik and</td>
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#### OCEAN AREAS

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<th>Special Code</th>
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<td>A, C, E, F, H</td>
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<tr>
<td>Pacific</td>
<td>13, 15</td>
<td>C, E, F, H</td>
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<tr>
<td>Indian</td>
<td>15</td>
<td>C, F, H</td>
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</table>

#### SPECIAL STATION LOCATIONS

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<th>Station</th>
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<th>Special Code</th>
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<td>Ankara, Turkey</td>
<td>23</td>
<td>B, C</td>
<td>No report</td>
</tr>
<tr>
<td>Beirut, Syria</td>
<td>16</td>
<td>B, C</td>
<td>No report</td>
</tr>
<tr>
<td>Belgrade, Yugoslavia</td>
<td>12, 17</td>
<td>A, B, C</td>
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<td>Bolana, Port Guinea</td>
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<td>C</td>
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<td>Greece</td>
<td>3</td>
<td>B, C</td>
<td>24 hours</td>
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<td>Nanking, China</td>
<td>24</td>
<td>B, C, F</td>
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<td>Severnaya, Zenleya</td>
<td>29</td>
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<td>Zagreb, Yugoslavia</td>
<td>9, 12</td>
<td>A, B, C</td>
<td>No report</td>
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#### SOURCES OF DATA

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14. Meteorologische Aarbeke, Part II, Meteorologische Institut, Denmark.
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23. meteorologiisa Harstalari, Meteorologisk Institute, Turkey.
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