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The New CartoPhilatelist©

COLLECTORS OF MAPS ON STAMPS

Philatelic Weather Maps.

Summarizing the State of the Atmosphere.

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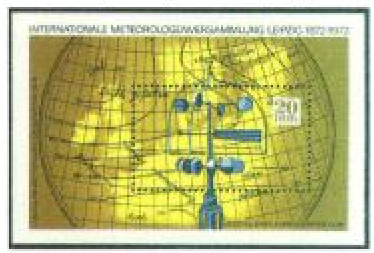
A weather map is a graphical means of displaying the meteorological data over a given (usually extensive) area of the Earth's surface and of bringing those data together to form a "snapshot" of the atmosphere at a given time. Such maps in effect summarize meteorological information obtained from simultaneous (synoptic) observations at many different locations. Most weather maps on stamps contain either small portions of weather maps, or maps with few details covering larger areas. In this article we discuss several philatelic items with relatively clear and detailed representations of the weather. A checklist of all known postal items featuring weather maps is available at the authors' website http://www.cira.colostate.edu/ramm/hillger/wx-maps.htm.

In 1686 Edmund Halley (1656 – 1742) [Ascension Scott 386] drew what is considered to be the first meteorological chart.

Ascension, Scott 386

It was a map of a large part of the world showing the trade winds and the monsoon winds in a way that, as he explained, "may be better understood than by any verbal description whatsoever" (A Historical Account of the Trade Winds, and Monsoons, Observable in the Seas Between and Near the Tropicks; With an Attempt to Assign the Phisical Cause of Said Winds, Philosophical Transactions, 183 (1686), pp 153-168).

The earliest postal item known to show a weather map is a souvenir sheet issued by East Germany in 1972 [Scott 1362] for the centenary of a meeting in Leipzig that led to the formation of the International Meteorological Organization (IMO).



East Germany, Scott 1362

The weather map, apparently drawn in 1876, is credited to the climatologist Vladimir Koeppen (1846 – 1940). It shows constant pressure lines, or isobars, in units of millimeters of mercury (mm Hg). The modern (SI-metric) standard

Inside this issue:

Special points of interest:

(Continued from page 1.)

measures atmospheric pressure in units of hPa (hectopascals, formerly known as millibars), as seen in a companion East German souvenir sheet [Scott 1364].

East Germany, Scott 1364.

A stamp from France issued in 1983 [Scott 1903] shows a detailed weather map along with Meteosat, a European weather satellite. The map contains isobars, fronts, weather symbols, and arrows indicating the direction of flow.

France, Scott 1903.

The lines representing the fronts are distinguished by the international standard of filled-in triangles as barbs for the cold front, and filled-in semi-circles as barbs for the warm front. The barbs are found on the leading edge of the fronts and point in their direction of motion. Since this case shows a mature weather system, an occluded front (one in which the cold front has caught up to the warm front) is also present. Occluded fronts are symbolized by alternating filled-in triangles and semi-circles on the same side of the front. Certain other fronts have little or no motion; they are termed quasi-stationary, and are drawn with the cold and warm barbs on opposite sides of the front (Argentina Scott C85 and C86).

Argentina, Scott C85 and C86.

Syria, Scott 1206.

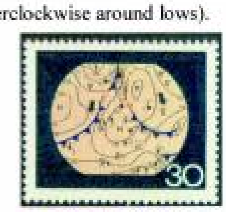
A 1990 issue from Syria [Scott 1206] contains a weather map with a low (L) pressure center defined by the closed isobars that form a rough oval shape. Low pressure areas are often associated with fronts. Standard frontal symbols as described above define the cold and warm fronts in this stamp, but in addition the cold front is blue and the warm front is red. Although the different barbs are sufficient to define the different fronts, color has become common in modern weather maps; older weather maps were always monochrome. Arrows on the isobars show the direction of flow of the wind around the low pressure center. Such arrows are non-standard symbols for weather maps. In the absence of surface friction, the winds would be parallel to the isobars, as implied by the arrows; in reality, the winds always converge to some degree into lows due to frictional effects.

A first day cover cancel used by Great Britain for the 2001 set of four "barometer" stamps shows isobars and a low (L) pressure center and associated warm and cold fronts, not unlike those on the stamp from Syria previously dis-

Great Britain 2001 Cancel.

cussed, but with the two fronts much closer to each other. In this case an occluded front is probably just beginning to form near the center of the low, though it is still too small to define it with the appropriate barb symbols.

A detailed weather map appears on a West German stamp from 1973 [Scott 1102]. Besides isobars and cold and warm fronts, the map shows high (H for Hoch) and low (T for Tief) pressure centers, with observed winds at synoptic reporting stations. The thick arrows indicating the direction of flow are a non-standard symbol for weather maps. They emphasize here the usual wind direction in the Northern Hemisphere (clockwise circulation around highs, counterclockwise around lows).



West Germany, Scott 1102.

Three stamps from Kuwait [Scott 577-579] were issued in 1973 for the 100th anniversary of formation of the IMO, the forerunner of the current World Meteorological Organization (WMO). Each stamp contains the same weather map. Isobars and low and high pressure centers are the main features of the map. The isobars are labeled with the pressure in units of hectopascals with the leading

(Continued on page 3.)

(Continued from page 2.)

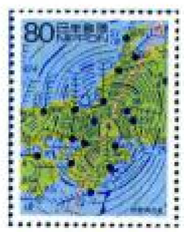
Kuwait, Scott 577-579.

two digits (10) truncated if the pressure is 1000 hPa or greater, and the leading single digit (9) truncated if the pressure is less than 1000 hPa. Typical sea level atmospheric pressures are in the range of 1000 hPa plus or minus about 40 hPa, though extremes can fall outside of this range.

Malagasy issued a stamp in stamp in 1992 [Scott 1062] with a detailed weather map over the island of Madagascar. The map shows isobars and low (d for dépression) and high (a [or A] for anticyclone) pressure areas. Two temperatures are also indicated: 25°C in the south and 35°C in the north. The temperatures are accompanied by small thermometer icons, non-standard designations, but likely included for artistic reasons.


Malagasy, Scott 1062.

A busy weather map is shown on a stamp from Japan issued in 2000 [Scott 2698d]. A large number of closely-spaced isobars surrounds a typhoon which is indicated by the standard symbol of a small black circle with two small curved "arms" (this type of storm is named 'typhoon' in the western Pacific, and 'hurricane' in the eastern Pacific and in the Atlantic). The pressure is extremely low in the typhoon. Wind direction in weather maps is indicated by a "shaft" leading to each observing station, and speed by the number and size of the barbs (ticks) on the shaft. The standard is that the barbs face toward lower pressure (to the left with the wind at one's back in the Northern Hemisphere). However, on this item some wind shafts have barbs on both sides. This is non-standard and clutters the map unnecessarily.



Japan, Scott 2698d.

Another issue from Japan [Scott 1564] from 1984 contains a nicely-detailed weather map overlaid on a map of Japan. Isobars are labeled in units of hPa, and Japanese symbols presumably for low and high pressure centers are also included, along with a small amount of plotted weather data (mainly observed winds). Also on this stamp is a Japanese Geostationary Meteorological Satellite (GMS).

Japan, Scott 1564.

It is similar in design to the U.S. geostationary weather satellites that were in use at the time.

Most of the weather maps shown to this point have contained abbreviated sets of weather elements (temperatures, pressures, winds, etc.) in a standard form known as the surface weather station plotting model. Only two stamps are known to show large and reasonably complete examples of the station plotting model.

One of these stamps was issued by Canada in 1990 [Scott 1287] for the 150th anniversary of the first weather observations in Canada. The main weather elements are clustered in standard positions around the circle that represents the position of the observing station. At the upper left is the temperature (in this case 26°C). At the lower left is the dew point temperature (14°C). Partially-truncated atmospheric pressure in hPa is at the upper right (1012.7 hPa - the first two digits and the decimal point are implied).

Canada, Scott 1287.

The number below the pressure is the pressure tendency during the previous three hours (0.7 hPa, falling and then steady based on the symbol to the right of the number, which is a downward-sloping line segment followed by a horizontal line segment). The wind direction is represented by the shaft leading to the station and the wind barbs represent the wind speed in knots (in this case 20 knots from the southwest (two long barbs, each representing 10 knots). The meanings of other numbers and symbols around the center circle can be found online or in an article by (Toth, 1999)

(Continued on page 4.)

(Continued from page 3.)

The other stamp with a large station plotting model was issued by Jersey (Great Britain) Scott 1299, in 2008 (the "weather signals" issue). On this stamp, the temperature is 12°C and the dew point temperature is 11°C (resulting in a rather high relative humidity), the pressure is 1016.4 hPa, and the pressure tendency is 0.5 hPa falling steadily for the past 3 hours. The wind is 25 knots (two long barbs and one short 5-knot barb) from the northeast. Also shown on this stamp is an aneroid barometer.

Jersey, Scott 1299

Standard weather symbols are used by meteorologists around the world. Some of them also appear on a few postal items, though not directly associated with a weather map. An issue from Brazil in 1962 [Scott 936] has a nice set of four weather symbols in the lower right. The upper symbol represents a thunderstorm with no precipitation at the time of observation; the three lower symbols from left to right represent a rain shower, a severe dust storm or sandstorm, and haze.

Brazil, Scott 936

Another weather stamp issued by Jersey (Great Britain) in 2008 [Scott 1298] shows plotted winds corresponding to the Beaufort wind scale values of 6, 7, and 8, and a mariners' strong winds signal, the black ball and triangle. the same symbol with red and green balls that represents the nighttime illumination of the signal. The Beaufort wind scale was devised by and named after Sir Francis Beaufort (1774 - 1857).

Jersey, Scott 1298

Upper-level weather maps, as opposed to the surface weather maps discussed up to this point, represent the state of the atmosphere aloft. However, an upper-level weather map gives the height of a constant atmospheric pressure surface rather than the pressure itself. Common pressures for upper-level weather maps are 250, 500, 700, and 850 hPa. The data for upper-level weather maps are traditionally obtained from radiosonde instrument packages on weather balloons, and more recently through the remote sensing capabilities of satellites. Only a few stamps are known to show upper-level weather maps.

One such example is found in a Cayman Islands stamp issued in 1991 [Scott 629], in which the upper-level maps are hanging on the wall behind the meteorologist and his workstation.

Cayman Islands, Scott 629

At one time all weather maps were available only via facsimile transmission from central locations where the data were gathered and the maps were plotted by hand. A revolution in computer technology in the past 25 years has allowed weather maps to not only be plotted by computers in each weather office, but also to be displayed on computer monitors such those in front of the meteorologist in this stamp. In a modern weather office, meteorologists refer to many different maps on their computer screens, but other maps useful for general consultation are suspended on the walls.

Another example of an upper-level weather map is shown on a stamp issued by Central Africa in 1973 [Scott C115].

Central Africa, Scott C115

This hemispheric map is centered on one of the poles, and the lines are isoheights for a constant pressure level (possibly one of the four common levels already mentioned). Such maps can be very useful in weather diagnosis and forecasting, since the upper levels contain the strongest winds (the jet streams) that circulate around the Earth, and also the upper "disturbances" or flow patterns that determine in part the weather at the surface.

Streamlines represent the direction of the wind at any given time. Counterclockwise streamlines around a low (L) pressure center are nicely drawn on a 1991 stamp from Iceland [Scott 738].

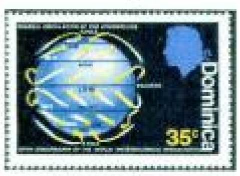
Iceland, Scott 738

(Continued from page 4.)

Similarly, the clockwise streamlines around a high (A for Alto) pressure center are drawn on a 2008 meteorological issue from Spain [Scott 3544]. The stamp also shows a portion of a Celsius thermometer.

Spain, Scott 3544

Finally, **other types of weather maps** are also found in a few postal items. Dominica issued a stamp in 1973 [Scott 358] for the centenary of the IMO/WMO. Nicely shown are the global general circulation: the general wind patterns over the Earth related to lower pressures near the equator and in the upper mid-latitudes, and higher pressures in the lower mid-latitudes and the polar areas. Winds attempt to flow directly from higher to lower pressures, but a force known as the Coriolis force, caused by the Earth's rotation, deviates the winds to the right in the Northern Hemisphere and to the left in the Southern Hemisphere. The result is that, ignoring frictional effects, the winds move parallel to the isobars.



Dominica, Scott 358

Grenada issued a stamp in 1973 [Scott 497] containing a world rainfall/ precipitation map.

Grenada, Scott 497

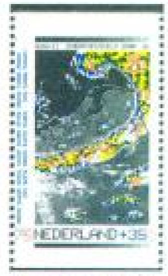
A more detailed regional rainfall map is shown on a stamp issued by Upper Volta in 1963 [Scott 107]. Contours on this map are in millimeters, since metric units are the standard for worldwide weather measurements outside the U.S. However, it is interesting to note that even in the U.S. metric units have always been used for upper-level weather measurements.

Upper Volta, Scott 107

Satellites are having a tremendous impact on weather maps, primarily by showing the location and extent of cloudiness in satellite imagery. A stamp issued by Qatar in 1972 [Scott 327] show the warm, cold, and occluded fronts associated with a low pressure center plotted over a satellite image of the clouds at the same time.

Qatar, Scott 327

Similarly, the Netherlands issued a stamp in 1990 [*Scott* B652] with warm, cold, and occluded fronts superimposed on a NOAA-11 color-enhanced satellite image of the clouds. Satellite images can be quite useful for determining the location of meteorological features such as fronts and lows, especially where conventional observations are sparse or lacking entirely.



Netherlands, B652

We have seen that weather maps represent the current analyzed state of the atmosphere. The most common form familiar to the public is the surface weather map, often shown by TV meteorologists and found in newspapers, but other types of weather maps are equally if not more important in the process of analyzing the three-dimensional state of the atmosphere at any time, and by extension in forecasting the weather. In other words, weather maps of all kinds are a fundamental tool for meteorologists. In addition, in simplified form weather maps provide useful information to the public and other users of weather forecasts.

References

Toth, G., 1999: Weather maps and the plotting model for surface observations, *Nature's Wonders*, 22(2), (June), 20-21.

Biographical sketches:

The authors have researched and written extensively on the subjects of weather and un-manned satellites on stamps and covers.

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