Isopleths

The following is a list of all the important isopleths encountered in operational meteorology. An isopleth is a line or curve of equal values.

Constant Pressure Surface

Most analysis and model images are shown using a pressure surface. The most common are the 1000 mb, 850 mb, 700 mb, 500 mb, and 300 mb surfaces. Every location on the image has the same pressure, however, heights will vary (thus the contouring of height contours). Below is a listing of pressure surfaces and their approximate height above zero geopotential meters.

Isallobar / Height change contours

A line of equal pressure change. They are used to forecast the propagation of low and high pressure systems. Low pressure tends to develop toward regions of the greatest pressure falls (height falls). Heights and pressures fall due to the evacuation of mass in the upper levels of the atmosphere and the chilling of air within a vertical atmospheric column.

Isobar

A line of constant pressure. Isobars are found ONLY on surface charts. They most commonly connect lines of equal pressure in the units of millibars. High pressure isobars generally occurs with isobars above 1010 mb while low pressure isobars occur with lower than 1010 millibars. Isobars "kink" along fronts and otherwise have a smooth curved trajectory. Isobars represent the pressure at zero geopotential meters. This is done to compensate for elevation changes. Isobars of close proximity represent higher wind speeds than isobars of wide spacing. When isobars are "pack together", this represents an increase in the pressure gradient force and thus stronger winds. The pressure on an analysis chart in Colorado may be near 1028 mb on the chart when in reality the surface pressure is closer to 850 mb. This surface chart has isobars (solid lines).

Isodop

Contour of constant doppler velocity values.

Isodrosotherms

A line of equal dewpoint. They are contoured most often in the low levels of the atmosphere. Isodrosotherms can be used to locate frontal boundaries, regions of moist air or dry air advection, and mesoscale precipitation boundaries. The following image is an example of isodrosotherms (the colored lines). The highest dewpoints are often found bordering the Gulf of Mexico.

Isohyet

Contour of constant rainfall. Used to assess soil moisture, flooding potential, mesoscale wet/dry boundaries, and rainfall coverage as well as intensity. This image shows an example of isohyets.

Isohypse (aka height contour)

A line of equal geopotential height. Geopotential assumes the earth is perfectly flat and a perfect sphere. The geopotential height is the distance above the Earth's surface if it was a perfect and flat sphere. Isohypse are shown on a constant pressure surface. For example, when looking at a 850 mb chart, all isohypses no matter their value are located at 850 mb. Regions of low isohypse values are correlated with low pressure (trough) while high isohypse values are correlated with high pressure (ridge). This 850 chart has height contours. The lines are the isohypses. Above 850 mb, the wind flows close to parallel to the height contours. A curving down of the height contours represents a trough while a curving up a ridge.

Isopleth

A broad term for any line on a weather map connecting points with equal values of a particular atmospheric variable (temperature, dew point, etc.). Isotherms, isotachs, etc. are all examples of isopleths.

Isotachs

These are lines of equal wind speed. They are most often contoured in the upper levels of the atmosphere, especially at the jet stream level. They are important for locating the jet stream and jet streaks within a jet stream. This 300 mb image is an example of isotachs.

Isotherm

A line of equal temperature. Each of the analysis charts will show isotherms in either a 2,4,5 or 10 degree increment. They are most commonly used at pressure surfaces below 500 millibars and on surface charts. Isotherms are used to find regions with warm air advection and cold air advection as well as short waves, fronts, temperature gradient boundaries, and instability zones. This 850 mb model panel shows isotherms.

Streamlines

Lines of equal wind direction. They are not a pure isopleth by definition. Streamlines are used primarily in tropical regions since the pressure gradient is weak. They show areas of convergence, divergence and pressure circulation.

Thickness lines

Same as an isohypse except they represent the distance from one pressure level to a selected pressure level (usually 1000 to 500 mb thickness). They are used to forecast snow, cold air advection, and warm air advection. This image is an example of thickness lines (dashed lines). Colder air (since it is denser) will have a smaller thickness than warm air.