What are the weather map symbols

Weather maps come in myriads of styles with each providing different levels of information. However, there are some common features typically found of these images. In the section about the origin of Wind we have already seen the source of the "highs" and "lows". But how are the boundaries between air masses depicted? We draw lines, called "fronts". Fronts are usually detectable at the surface in a number of ways. Winds often "converge" or come together at the fronts. Also, temperature differences can be quite noticeable from one side of a front to the other side. Finally, the pressure on either side of a front can vary significantly. Fronts Cold Front Cold fronts are depicted by blue line with triangles pointing in the direction of motion. Cold fronts demarcate the leading edge of a cold air mass displacing a warmer air mass. Phrases like "ahead of the front" and "behind of the front" refer to its motion. So being "ahead of the cold front" is being in the "warm" air mass and "behind of the cold front" is in the cold air mass. Also remember however, the terms "cold" and "warm" are relative. So, it is still called a cold front even in summer if the temperature only lowers from, for example, 95°F (35°C) ahead of the front to near 90°F (32°C) behind the front. Cold fronts nearly always extend anywhere from a south direction to a west direction from the center of low-pressure areas and never from the center of high-pressure systems. Warm Front A warm front is the leading edge of a relatively warmer air mass replacing a colder air mass. A warm front is depicted by a red line with half-moons located on the side of the direction of its motion. Like cold front, warm fronts also extend from the center of low-pressure areas but on nearly always on the east side of the low. Here is an example of a location that experiences typical warm frontal passage followed by a cold frontal passage: Clouds lower and thicken as the warm front approaches with several hours of light to moderate rain. Temperatures are in the 50s with winds from the east. As the warm front passes, the rain ends, skies become partly cloudy and temperatures warm into the mid 70s. Winds become gusty from the south. A few hours later, a line of thunderstorms sweeps across the area just ahead of the cold front. After the rain ends and the front passes, winds shift to the northwest and temperatures fall into the 40s and skies clear. Stationary Front If the front is essentially not moving (i.e. the two air masses on either side are not moving perpendicular to the front) it is called a stationary front. A stationary front is depicted by an alternating red and blue line with a triangle on the blue portion and half-moon on the opposite side of the red portion of the line. A cold front (or warm front) that stops moving becomes a stationary front. The difference in temperature and wind direction from one side of a stationary front to the other is generally not large but there can be times where the difference is stark. Occluded Front Cold fronts typically move faster than warm fronts, so in time they can "catch up" to warm fronts. As they do the warm air mass is forced up forming an occlusion. The surface location of the occluded front is directly below the convergence point of the warm, cool and cold air masses. Occluded fronts point to a decrease in intensity of the parent weather system and are indicated by a purple line with alternating triangles and half-moons on the side of its motion. While there is no difference in how they are depicted on a weather map, there are two types of occlusions; cold and warm. Cold occlusions are the most common where the cold front over takes the warm front and also undercuts the cooler air mass ahead of the warm front. Warm occlusions occur when the air associated with the "cold" front is actually not a cold as the air mass associated with the warm front. The warm air is forced up as before but the colder, denser air mass, ahead of the warm front, remains at the surface forcing the air mass associated with the cold front up as well. Other Boundaries Dry Line A dry line marks the boundary between a moist air mass and dry air mass. It typically lies north-south across the central and southern high Plains states during the spring and early summer, where it separates moist air from the Gulf of Mexico (to the east) and dry desert air from the southwestern states (to the west). The dry line typically advances eastward during the afternoon and retreats westward at night. However, a strong storm system can sweep the dry line eastward into the Mississippi Valley, or even further east, regardless of the time of day. A typical dry line passage results in a sharp drop in humidity, a rise in temperatures, clearing skies, and a wind shift from south or southeasterly to west or southwesterly. (Blowing dust and rising temperatures also may follow, especially if the dry line passes during the daytime.) These changes occur in reverse order when the dry line retreats westward. Since drier air is more dense than moist air, as the dryline moves east it forces moist air up into the atmosphere. Therefore, severe and sometimes tornadic thunderstorms can develop along a dry line or in the moist air just to the east of it. Squall Line This is a line of thunderstorms that generally form along a front but the storms move ahead of the front. As the rain cooled air under the thunderstorms begins to surge forward new thunderstorms form on the leading edge of the outflow. The outflow acts like a cold front with an increase of forward speed and therefore an increase in forward speed of the line of thunderstorms. Squall lines are most notably seen in derechos. Other Symbols Trough A trough is not a boundary but an elongated area of lower air pressure. There are changes in wind direction across a trough but there is no change in air mass. While not specifically a surface boundary, troughs reflect the change in atmospheric conditions in the upper atmosphere. As such, troughs can be areas where showers and thunderstorms can form. Precipitation Historically, areas of precipitation have been shaded green regardless if it the precipitation is frozen or not. The type of precipitation on weather maps itself also comes in numerous forms. Sometimes the precipitation type is spelled out or, as more often the case, use a wide variety of graphics to indicate type. Below are some of the more traditional meteorological symbols used on maps to indicate precipitation types. Rain Snow Drizzle Rain Showers Snow Showers Thunder- storm Fog Take it to the MAX! The 'Plot' Thickens The wind direction is plotted as the shaft of an arrow extending from the station circle toward the direction from which the wind is blowing. The wind speed is plotted as feathers and half-feathers representing 10 and 5 knots, on the shaft on the wind direction arrow. See the following table. The visibility plotted in fractions of a mile. For values above 10 miles, the values are omitted from the map. The barometric pressure in tenths of millibars reduced to sea level. The initial 9 or 10 and the decimal points are omitted. ex: plotted = 982, actual = 998.2 mb ex: plotted = 012, actual = 1001.2 mb The pressure change in the past 3 hours preceding the observation. Plotted to the nearest tenth of a millibar. The plotted symbol characterizes the change in pressure according to the below chart. The most significant past weather since the last observation. The symbols are shown in the following table. The amount of precipitation during the past 6-hours in millimeters. 11 millimeters equals approximately 0.45 inches. The predominate cloud type for the three levels (low clouds, middle clouds, high clouds). Each type are plotted with a symbol found in the following table. Low Clouds Middle Clouds High Clouds The fraction of the sky covered by low and middle clouds. Observed in tenth and plotted according to the code table below. The height above the ground of the base of the lowest cloud. Observed in feet and plotted according to the code table below. If you’ve looked at a weather forecast on your TV, computer or phone, you’ve probably seen a weather map that looks something like this: Meteorologists at the National Weather Service use information from ground stations and weather satellites to make these maps. Words like “rain” and “snow” are pretty obvious, but what exactly do the symbols on a weather map tell you about the weather? Use our handy dandy guide below to find out! High and Low Pressure Areas Earth’s atmosphere is a jacket of gases that surrounds the planet. Although it seems like these gases could easily float away into space, gravity is constantly pulling the atmosphere toward Earth’s surface. The force with which our atmosphere pushes down on a specific location on Earth is called atmospheric pressure. Atmospheric pressure is mainly dependent on two things: the weight of the atmosphere in a specific location and the temperature of the air. If you’re at a low elevation—such as in a valley—there is a lot of atmosphere above you and the weight is very heavy. That means that you experience higher atmospheric pressure at lower elevations and lower atmospheric pressure in higher elevations. When you're at a low elevation, you experience high atmospheric pressure because more of the atmosphere is pushing down on you. Warm air can also cause the atmospheric pressure to rise. When the air is warm, gas molecules move around quickly in the air pushing out on the area around them. This causes high atmospheric pressure. In cold air the gas molecules slow down, causing low atmospheric pressure. Water vapor in the atmosphere can also change the atmospheric pressure. Very moist air that has lots of water vapor is actually lighter and less dense than dry air. This is because water molecules are lighter than molecules of nitrogen or oxygen—the most abundant gases in our atmosphere. So, very moist air in the atmosphere can lead to low atmospheric pressure and very dry air can lead to high atmospheric pressure. Atmospheric pressure is measured with an instrument on the ground called a barometer, and these measurements are collected at many locations across the U.S. by the National Weather Service. On weather maps, these readings are represented as a blue “H” for high pressure or a red “L” for low pressure. What it Means on the Weather Map Low pressure systems—like this one in the Tennessee valley—can cause the formation of clouds and storms. A high pressure system is a dense air mass that is usually cooler and drier than the surrounding air. A low pressure system is a less dense air mass that is usually wetter and warmer than the surrounding air. In general, areas that experience high atmospheric pressure also experience fair weather. Low pressure systems can cause the formation of clouds and storms. Air usually flows from areas of high pressure to areas of low pressure. From high above Earth, satellites such as GOES-16 keep an eye on the weather brought by low pressure systems. The red “L” on the map above indicates a low pressure system in the Tennessee Valley region. In the video below from GOES-16, you can see what that same low pressure system looks like from a weather satellite. Cold Fronts and Warm Fronts A warm front is the transition area where a mass of warm air moves to replace a mass of cold air. On a weather map, a warm front is usually drawn using a solid red line with half circles pointing in the direction of the cold air that will be replaced. Warm fronts usually move from southwest to northeast. A warm front can initially bring some rain, followed by clear skies and warm temperatures. A cold front is the transition area where a mass of cold air moves in to replace a mass of warm air. On a weather map, a cold front is usually drawn using a solid blue line with triangles pointing in the direction of the warm air that will be replaced. Cold fronts typically move from northwest to southeast. A cold front can bring cold temperatures, torrential rains and high wind speeds. A stationary front happens when a cold front and a warm front meet up, but neither moves out of the way. On a weather map, a stationary front is usually drawn using alternating cold front and warm front symbols. Stationary fronts bring long rainy periods that stay in one spot. Cold fronts move faster than warm fronts, and sometimes a cold front catches up to a warm front. When this happens, it’s called an occluded front. Occluded fronts are drawn as a solid purple line with half circles and triangles pointing in the direction that the front is moving. An occluded front usually brings dry air. Cold Fronts and Warm Fronts: From Space GOES-16 and other weather satellites are also on the lookout for cold fronts and warm fronts and the weather they produce. Below, you can see the comparison of a cold front on a forecast map and a cold front in a satellite image. On the left is a National Weather Service forecast map from March 24, 2017. The forecast map shows two cold fronts moving southeast over Texas. On the right is an actual GOES-16 image of atmospheric water vapor from the same afternoon. Weather Satellites Information from weather satellites, such as the GOES-R series and JPSS will help improve our understanding of Earth’s weather. For example, the GOES-R series provides information about atmospheric water vapor and cloud height right now. This can help meteorologists monitor and track severe weather events, such as storms and hurricanes as they happen. JPSS satellites survey the entire planet and continuously provide global atmospheric temperature and water vapor information. This information is needed to create reliable weather forecasts up to seven days in advance! On the left is an image of water vapor captured by GOES satellites on May 30, 2017. GOES satellites, such as GOES-16, keep an eye on current weather. On the right is a forecast map predicting precipitation 6—10 days in advance. Polar orbiting satellites—such as JPSS—provide an outlook of weather events up to seven days in the future. JPSS and the GOES-R series work together for weather applications. JPSS is critical for getting ready for severe weather events, while GOES-R monitors severe weather as it unfolds for real-time warnings.

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