

Glossary

Air pressure: the force exerted by the weight of a column of air above a particular location. To conceptualize the notion of air pressure, imagine a sealed container full of air. When the molecules of air collide with the inside surfaces of the container they exert a pressure. The amount of pressure they exert depends on the number of collisions that occur between the molecules and the inside surface of the container. We can change the pressure in two ways. First, we can increase the density of the air by either putting more air molecules into the container or reducing the volume of the container. Secondly, we can increase the temperature of the air to make the molecules move faster and thus collide with the sides more often. Therefore, changes in air pressure can come about by changes in air density or temperature.

http://www.uwsp.edu/geo/faculty/ritter/geog101/textbook/circulation/air_pressure_p_1.html

Anomaly: The difference between the value of a variable (for example temperature) at a given location and its long term average at that location

Anticyclone A high pressure area where winds blow clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere. See cyclone, wind.

Atmosphere: The Earth is surrounded by a blanket of air, which we call the atmosphere. It reaches over 560 kilometers (348 miles) from the surface of the Earth, so we are only able to see what occurs fairly close to the ground. Early attempts at studying the nature of the atmosphere used clues from the weather, the beautiful multi-colored sunsets and sunrises, and the twinkling of stars. With the use of sensitive instruments from space, we are able to get a better view of the functioning of our atmosphere.

from http://www.nasa.gov/audience/forstudents/9-12/features/912_liftoff_atm.html

Atmospheric Pressure – The pressure exerted by the atmosphere at a given point. Its measurement can be expressed in several ways, including millibars and inches of mercury (Hg). Average sea level pressure is 1013.25 millibars or 29.92 inches of mercury. A drop in atmospheric pressure usually indicates the approach of a storm, such as a hurricane.

Barometric Pressure – The pressure exerted by the atmosphere at a given point (as measured by a barometer). It can be measured in millibars or inches of mercury, among others. Watching a barometer for a drop in atmospheric pressure helps forecasters determine when a hurricane is approaching.

Biomass: The amount of living material in unit area or volume, usually expressed as mass or weight.

Calorie: The amount of heat needed to raise the temperature of one gram of water at 15° centigrade one degree centigrade. Compare with British Thermal Unit.

Climate: The average of weather over at least a 30-year period. Note that the climate



taken over different periods of time (30 years, 1000 years) may be different. The old saying is climate is what we expect and weather is what we get.

from <http://www.cpc.ncep.noaa.gov/products/outreach/glossary.shtml#C>

Climatology: A quantitative description of climate showing the characteristic values of climate variables over a region. Climate refers to the statistical collection of weather conditions over a specified period of time. Note that the climate taken over different periods of time (30 years, 1000 years) may be different.

Conduction: The transfer of heat from one substance to another by direct contact. Denser substances are better conductors; the transfer is always from warmer to colder substances.

Convection: The rising of warm air and the sinking of cool air. Heat mixes and moves air. When a layer of air receives enough heat from the Earth's surface, it expands and moves upward. Colder, heavier air flows under it which is then warmed, expands, and rises. The warm rising air cools as it reaches higher, cooler regions of the atmosphere and begins to sink. Convection causes local breezes, winds, and thunderstorms.

Coriolis Force – The apparent tendency of a freely moving particle to swing to one side when its motion is referred to a set of axes that is itself rotating in space, such as Earth. The acceleration is perpendicular to the direction of the speed of the article relative to the Earth's surface and is directed to the right in the northern hemisphere. Winds are affected by rotation of the Earth so that instead of a wind blowing in the direction it starts, it turns to the right of that direction in the northern hemisphere; left in the southern hemisphere.

Current: A horizontal movement of water, such as the Gulf Stream off the east coast of North America, or air, such as the jet stream.

Declination: The angular distance from the equator to the satellite, measured as positive north and negative south.

Density: The ratio of the mass of a substance to the volume it occupies. In oceanography, it is equivalent to specific gravity and represents the ratio of the weight of a given volume of sea water to that of an equal volume of distilled water at 4.0°C or 39.2°F.

Eddy: a circular movement of water usually formed where currents pass obstructions, or between two adjacent currents flowing in opposite directions, or along the edge of a permanent current.

Energy: the capacity of a physical system to perform work. Energy exists in several forms such as heat, kinetic or mechanical energy, light, potential energy, electrical, or other forms. (from <http://physics.about.com/od/glossary/g/energy.htm>)
The sun is the major source of energy (in the form of heat) that powers much of the phenomena on earth (one example is air convection).

El Nino and ENSO: El Nino, an abnormal warming of surface ocean waters in the eastern tropical Pacific, is one part of what's called the Southern Oscillation. The Southern Oscillation is the see-saw pattern of reversing surface air pressure between the eastern and western tropical Pacific; when the surface pressure is high in the eastern tropical Pacific it is low in the western tropical Pacific, and vice-versa. Because the ocean warming and pressure reversals are, for the most part, simultaneous, scientists call this phenomenon the El Nino/Southern Oscillation or ENSO for short (from <http://kids.earth.nasa.gov/archive/nino/intro.html>). El Niño refers to the oceanic component of the El Niño/Southern Oscillation system, the Southern Oscillation to the atmospheric component and ENSO to the coupled system. In practice, El Niño is sometimes used to refer to the entire system.

Evaporation: The physical process by which a liquid or solid is changed to a gas; the opposite of condensation.

Front - A front is defined as the transition zone or boundary between two [air masses](#) of different density. Fronts extend not only in the horizontal direction, but in the vertical as well. Therefore, when referring to the frontal surface (or frontal zone), we referring to both the horizontal and vertical components of the front.

Heat: A form of energy transferred between two systems by virtue of a difference in temperature. The first law of thermodynamics demonstrated that the heat absorbed by a system may be used by the system to do work or to raise its internal energy.
<http://www.weather.com/glossary/h.html>

Heat transfer: the movement of heat from one place to another. The transfer of heat is normally from a high temperature object to a lower temperature object. Heat transfer changes the internal energy of both systems involved according to the First Law of Thermodynamics.
<http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/heatra.html>

Isopycnals: a line drawn on a map connecting all points having the same density, as of water or air

Jet Stream: Rivers of high-speed air in the atmosphere. Jet streams form along the boundaries of global air masses where there is a significant difference in atmospheric temperature. The jet streams may be several hundred miles across and 1–2 miles deep at an altitude of 8–12 miles. They generally move west to east, and are strongest in the winter with core wind speeds as high as 250 mph. Changes in the jet stream indicate changes in the motion of the atmosphere and weather.

Longitude: The angular distance from the Greenwich meridian (0°), along the equator. This can be measured either east or west to the 180th meridian (180°) or 0° to 360° W.

Low Pressure System: An area of a relative pressure minimum that has converging winds and rotates in the same direction as the earth. This is counterclockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere. Also known as a cyclone.

Mixed layer: The surface layer of water, seasonally varying in thickness, that is at almost uniform temperature owing to agitation by waves and wind

Thermocline: As one descends from the surface of the ocean the temperature remains nearly the same as it was at the surface. Soon, however, one encounters a zone in which temperature starts decreasing rapidly with depth. This zone is called the thermocline. The thermocline is important because it can support large scale waves which play a major role in ENSO. In studying the tropical Pacific Ocean, the depth of 20C water ("the 20C isotherm") is often used as a proxy for the depth of the thermocline. Along the equator, the 20C isotherm is typically located at about 50m depth in the eastern Pacific, sloping downwards to about 150 m in the western Pacific.

Troposphere: The lowest portion of the atmosphere which lies next to the earth's surface where most weather occurs.

Tropical Storm Formation: Tropical storms generally form in the eastern portion of tropical oceans and track westward. Hurricanes, typhoons, and willy-willies all start out as weak low pressure areas that form over warm tropical waters (e.g., surface water temperature of at least 80 °F). Initially, winds and cloud formations over the warm tropical waters are minimal. Both intensify with time. Formation of tropical storms also requires a significant Coriolis effect to induce proper spin in the wind formation. As the storm begins to organize itself into a coherent pattern, it will experience increased activity and intensity. When a storm develops a clearly recognizable pattern, it is referred to as a tropical depression. When wind speeds reach 35 knots (40.3 mph), it is called a tropical storm and is given a name. When wind speed equals or exceeds 74 mph, the storm is called a hurricane. In the western Pacific, a hurricane is referred to as a typhoon. In waters around Australia it is called a cyclone or willy-willy. Hurricanes intensify when moving over areas of increased water temperatures, and weakened over colder water surfaces.

Upwelling: In ocean dynamics, the upward motion of sub-surface water toward the surface of the ocean. This is often a source of cold, nutrient-rich water. Strong upwelling occurs along the equator where easterly winds are present. Upwelling also can occur along coastlines, and is important to fisheries in California and Peru.

Weather: Atmospheric condition at any given time or place. Compare with climate.

Winds: Air that flows in relation to the earth's surface, generally horizontally. There are four areas of wind that are measured: direction, speed, character (gusts and squalls), and shifts. Surface winds are measured by wind vanes and anemometers, while upper level winds are detected through pilot balloons or aircraft reports.

Wind Shear: The rate of change of wind speed or direction with distance. Vertical wind shear is the rate of change of the wind with respect to altitude. Horizontal wind shear is the rate of change on a horizontal plane. In a hurricane, vertical wind shear can cause significant weakening of the system.