



### Adiabatic Temperature Change

Warming or cooling of air that happens when air is compressed or expands without heat being added or subtracted.

### Air Parcel

An imaginary volume of air to which may be assigned any or all of the basic dynamic or thermodynamic properties of the atmospheric air; often used as a convenient tracer of air movement or atmospheric processes.

### Air Pressure

The force per unit area exerted by the overlying atmosphere. Air pressure is measured by a barometer commonly in units of millibars or inches of mercury. The barometer can track the changes in air pressure.

### Breaking Wave

An advancing ridge or swell on the surface of a fluid that eventually reaches its maximum peak and then collapses.

### Cardinal Direction Points

The four principal compass points: north, south, east, and west.

### Celsius Temperature

A temperature scale applied to pure water at standard atmospheric pressure, which is considered to be at sea level. Zero degrees is the freezing point and 100 degrees is the boiling point.

### Chlorofluorocarbons (CFCs)

A group of chemicals used as propellants for aerosol sprays in the production of some plastics, as cleaning solvents, and



**Climate**

in air conditioning and refrigeration equipment. Chlorine atoms from CFCs are involved in the removal of ozone from the stratosphere.

The sum of all statistical weather information that helps describe a place or region over a specific period of time from months to centuries.

**Clouds**

A visible collection of particles of condensed water vapor (as liquid or ice) suspended in the atmosphere.

**Condensation**

The process by which water vapor undergoes a change in state from a gas to a liquid.

**Convection**

Bulk motion in a fluid that results in mixing. It is an important means of energy transfer. In meteorology, convection is a term that is generally applied to atmospheric motions that are mostly vertical.

**Dewpoint**

The temperature to which a given air parcel must be cooled at constant pressure and constant water vapor content in order for saturation to occur.

**Diurnal**

Pertaining to actions or events that occur during a twenty-four hour cycle, or recurs every twenty-four hours.

**Doppler Effect**

An apparent change in the frequency of light or sound waves when the observer and the source are in motion relative to each other. As the source approaches, the frequency increases; as the source moves away, the frequency decreases.

**Dry Adiabats**

On a thermodynamic diagram (sounding or skew-t chart), a line that describes the temperature change experienced by an unsaturated air parcel as it rises or sinks. As the parcel is moved vertically in the atmosphere, it undergoes expansion and cooling during ascent and compressional heating on the descent.

**El Niño**

Abnormal warming of the surface ocean waters in the eastern tropical Pacific caused in part by a suppression of wind-driven upwelling of cold water along the equator and off the coast of Ecuador and northern Peru. An example of an El Niño induced



**ENSO**  
(El Niño/Southern Oscillation)

weather change is heavy rainfall in the central Pacific and the coastal regions of western South America.

The term for the coupled ocean-atmosphere interaction in the tropical Pacific characterized by episodes of abnormally high (El Niño) and low (La Niña) sea surface temperatures in the equatorial and tropical eastern Pacific; associated with large-scale swings in surface air pressure between the western and eastern tropical Pacific; the most prominent source of inter-annual variability in weather and climate around the world.

**GPS (Global Positioning System)**

A network of earth orbiting satellites used for precise position finding in surveying and navigation.

**Global Warming**

The most commonly cited example of this is the gradual increase in global average surface temperature. The warming is concentrated near the surface and does not extend through the troposphere.

**Greenhouse Effect**

The process by which some of the heat radiated from Earth's surface is trapped and re-radiated back to Earth by gases in the atmosphere.

**Gregorian Calendar**

A calendar in general use introduced in 1582 by Pope Gregory XIII as a revision of the Julian calendar. It was adopted in Great Britain and the American colonies in 1752, marked by the suppression of 10 days, or after 1700 11 days, and having leap years in every year divisible by four with the restriction that centesimal years are leap years only when divisible by 400.

**Halo**

A narrow white or colored ring or arc around the sun or moon. Haloes are seen as light that is refracted through an ice-crystal cloud or when the sky is filled with falling ice crystals.

**Heat**

A form of energy transferred from one body to another when one body is at a higher temperature than the other. The mode of energy transfer can be via radiation, conduction, or convection.



**Instability**

Refers to the potential for the atmosphere to support deep vertical motions. Signs of an unstable atmosphere are a rapid decrease of temperature with height (about 1° C per 100 meters of altitude as the upper limit) and copious low-level moisture.

**International System (SI)**

The internationally accepted and perhaps the most readily understandable form of the metric system whose fundamental units are the meter, kilogram, second, ampere, Kelvin, and candela.

**Isotherm**

A contour passing through points of equal temperature.

**Julian Calendar**

A calendar introduced in Rome in 46 B.C. establishing the 12-month year of 365 days with each fourth year having 366 days and the months each having 31 or 30 days except for February which has 28 or in leap years 29 days.

**Kelvin Helmholtz Billows**

Clouds in a shallow layer affected by vertical wind shear that exhibit wave motion. Best viewed near the horizon, these billows resemble water waves. Over a few minutes, a series of cloud waves form: a half dozen crests and troughs may appear. These waves break in a manner similar to the way ocean waves break near the shoreline.

**La Niña**

An episode of strong trade winds and unusually low sea surface temperatures in the central and eastern tropical Pacific. The direct opposite of El Niño. La Niña and El Niño form extremes of the ENSO cycle.

**Lapse Rate**

The change of an atmosphere variable, usually temperature, with height. A steep lapse rate implies a rapid decrease in temperature with height and is a sign of instability.

**Latent Heat**

The energy released or absorbed during a change of state. Condensation of water vapor releases latent heat. Evaporation of water requires heat.

**Latitude**

Distance north or south of the equator measured in degrees of arc.



**Longitude**

Distance east or west of the prime meridian, expressed in degrees of arc.

**Marine**

Anything relating to the sea (ocean), whether it be animals, fish, climate, ships, navigation, etc.

**Meteorologist**

A scientist who studies the atmosphere and atmospheric phenomena.

**Meteorology**

The study of the atmosphere, its processes and weather.

**Millibar (mb)**

A pressure unit of 100 newtons per square meter, convenient for reporting atmospheric pressure; one millibar corresponds to 0.02953 inches of mercury, another measure of pressure.

**Montreal Protocol**

A landmark international agreement designed to protect the stratospheric ozone layer. The treaty was signed in 1987 and amended in subsequent years to strengthen the provisions.

The Montreal Protocol stipulates the conditions on the production and consumption of compounds that deplete the ozone in the stratosphere. CFCs, halons, carbon tetrachloride and metal chloroform were to be phased out by 2000.

**NOAA**

National Oceanic and Atmospheric Administration, an agency within the United States Department of Commerce.

**Ocean-Atmosphere**

The system comprising the ocean and atmosphere. The transfer of heat and moisture at the interface between ocean and atmosphere has a strong influence on weather and climate.

**Oscillating**

Occurring or recurring at regular intervals.

**Ozone**

An atmospheric gas containing three atoms of oxygen ( $O_3$ ).

**Partial Pressure**

In a mixture of ideal gases, the pressure exerted by one of the gas species.



**Parts Per Billion (ppb)**

Units for expressing the amount of trace gas relative to a total of a billion parts; a ratio of the volume of a dissolved substance to the sum of the volume of dissolved substance plus the volume of the dissolving substance.

**Phytoplankton**

The photosynthetic plants floating in the waters of seas, rivers, ponds, and lakes.

**Precipitable Water Vapor**

The total mass of water vapor in a vertical atmospheric column of unit area, or its height if condensed in liquid form.

**Precipitation**

Any and all forms of water, liquid or solid, that fall from clouds and reach the ground. The amount of fall is usually expressed in inches of liquid water depth of the substance that has fallen at a given point over a specified time period.

**Radar**

An electronic instrument used to detect and compute the distance to objects by reflecting radio energy. On certain frequency bands, radar can detect precipitation and clouds and tell if the moisture is moving toward or away from the radar.

**Radar Reflectivity**

A measure of the amount of power emitted by the radar that is returned to the radar by objects within the radar beam.

Sensitive radars can detect motions in clear air, especially if insects are in the air, carried by the wind. Sensitive radars can also detect clouds. Precipitation is a target of great interest. These types of precipitation are detectable by weather radars in order of increasing reflectivity: drizzle, snow, rain, thundershowers, and hail.

**Rainbow**

A luminous arc featuring all colors of the visible light spectrum (red, orange, yellow, green, blue, and violet). It is formed by the refraction and reflection of light in drops of water. The bow is always observed in the opposite side of the sky from the sun.

**Radiosonde**

A small balloon-borne instrument package equipped with a radio transmitter that measures vertical profiles (soundings) of temperature, pressure, and humidity in the atmosphere.

## Range Rings

On radar images, concentric circles that represent the distance from the radar antenna.

## Rawinsonde

A small balloon-borne instrument package equipped with a radio transmitter that measures vertical profiles (soundings) of winds (“rawin” - **radio win**d), temperature, pressure, and humidity in the atmosphere.

## Relative Humidity

The ratio of the amount of water vapor in the air at a given temperature compared to the maximum amount that could exist at that temperature, usually expressed in percent.

## Saturated Air

Air that includes the maximum possible amount of water vapor (relative humidity = 100%). At that point, the rate at which water molecules enter the air by evaporation exactly balances the rate at which they leave by condensation.

## Skew-T (sounding)

Also known as skew-T/log p diagram. A diagram that allows one to plot a vertical profile of the temperature, humidity, and atmosphere above a particular point on the earth’s surface.

## Smog

A naturally-occurring fog that is contaminated by industrial pollutants - a mixture of **smoke** and **fog**. Today, it is the common term applied to largely urban air pollution, with or without the naturally-occurring fog.

## Spectrum

The entire range of wavelengths or frequencies of electromagnetic radiation extending from gamma rays to the longest radio waves and including visible light.

## Standard Air Pressure at Sea Level 1013 (mb)

Atmospheric pressure at sea surface (mean sea level) in a standard atmosphere. It is defined as 1,013.25 millibars, 29.92 inches of mercury, or 14.7 pounds per square inch.

Note that the average pressure at sea level worldwide is less than the standard pressure.

## Stratosphere

The atmospheric layer directly above the troposphere that shows a slight increase



## Supercell

in temperature with increasing altitude, low moisture content, and near absence of clouds. Earth's ozone layer is in the stratosphere.

A severe thunderstorm characterized by a rotating long-lived intense updraft. Although not very common, supercells produce a relatively large amount of severe weather, in particular, extremely large hail, damaging straight-line winds, and practically all strong tornados.

## TAO (Tropical Atmosphere Ocean Project)

An array consisting of approximately seventy moored ocean buoys in the tropical Pacific Ocean. This array measures oceanographic and meteorological data in real time via satellite. The TAO array is a major component of the global climate monitoring system.

## Temperature

A measure of molecular motion of a substance. It is measured on an arbitrary scale from absolute zero, where molecules theoretically stop moving. In surface observations, it refers primarily to the free air or ambient temperature close to the Earth's surface.

## Thermocline

A region over which ocean temperature decreases rapidly with depth. The principal thermoclines in the ocean are either seasonal, due to heating of the surface of the water in summer, or permanent.

## Thunderstorm

A local storm produced by a cumulonimbus cloud and always accompanied by lightning and thunder.

## TOGA Project (Tropical Oceans - Global Atmosphere)

A 10-year (1985-1994) international oceanographic and meteorological program to better describe, understand, and predict El Niño, La Niña, and the southern oscillation.

## Tornado

A violently rotating column of air that extends downward from a cumulonimbus cloud and moves in a narrow path along the ground.

## Tropics (Tropical Climate)

The region of the Earth between 23°27'N and 23°27'S latitudes; a climate zone with continually high temperatures and considerable precipitation, at least during part of the year.



**Tropopause**

The boundary zone or transition layer between the troposphere and the stratosphere.

**Troposphere**

The lowermost layer of the atmosphere in which we live, where clouds and weather occur, and where temperature ordinarily decreases with increasing altitude.

**Ultraviolet Radiation**

Electromagnetic radiation beyond the short wavelength (violet) end of the visible light spectrum, emitted from the sun. It occupies that region of the electromagnetic spectrum between visible light and X-rays.

**Upwelling**

The rising of cold, nutrient rich water toward the surface from deep subsurface layers.

**UTC**

(Coordinated Universal Time); also called Greenwich Mean Time (GMT.) It is the standard time zone that meteorologists use to synchronize events and observations. It is the same as standard time at the 0° meridian in Greenwich, England.

**Velocity Radar (Doppler Radar)**

A weather radar used to detect the motion within a storm relative to the radar, based on the Doppler Effect; air approaching the radar causes an increase in frequency, receding air causes a decrease in frequency. It can detect rotary motion within a storm, for example, a tornado.

**Wave Amplitude**

Half the vertical distance between the trough and the crest of a wave.

**Wavelength**

The distance between a point on one wave and the identical point on the next wave; for example, the distance between two crests or two troughs.

**Weather**

The state of the atmosphere with respect to heat or cold, wetness or dryness, calm or storm, clearness or cloudiness.

**Weather Balloon**

A balloon that carries electronic equipment to relay meteorological data to receiving stations on Earth; a typical balloon, filled with helium, rises from the surface to its maximum altitude in about an hour.



**Weather Forecaster**

A person who tries to predict the weather using principles of physics, computer models, and a variety of statistical and empirical techniques.

**Wet Adabat**

On a thermodynamic diagram, a line that describes the change in temperature of a saturated air parcel as it is lifted in the atmosphere and undergoes expansional cooling.

**Wind**

Flowing air that is in motion relative to the Earth's surface and named after the direction from which it blows. For example, a "north" wind or "northerly" wind is air moving from north to south.

**Wind Direction**

The direction from which wind is blowing.

**Wind Shear**

A change in direction and/or speed of the wind from one point to another. Vertical wind shear is mentioned most often: this is a change of the wind direction and/or speed with altitude. Strong vertical shear can cause turbulence that affects aircraft and favors severe thunderstorm development when the atmosphere is unstable.

**Zenith**

The point which rises 90 degrees above all points on an observer's horizon. The point that lies directly above an observer.

**Zero Velocity (Radar)**

Air that has no velocity relative to the radar.

