# Appendix B - Weather Glossary

**Acid Rain**: Cloud or rain droplets containing pollutants, such as oxides of sulfur and nitrogen, to make them acidic (eg. pH <7.0). < 7.0)

**ACCAS**: An acronym for Altocumulus Castellanus.

**Adiabatic Process**: The change of temperature of air without transferring heat. In an adiabatic process compression results in warming, and expansion results in cooling.

**Advanced Weather Information Processing System (AWIPS)**: NWS computer workstations that integrate graphics, including computer models, satellite and radar imagery.

**Advection**: The horizontal transport of air or atmospheric properties. Commonly used with temperatures, i.e., "warm air advection".

**Advection Fog**: Fog that forms as warmer, moist air moves over a cold surface. The air is cooled to saturation by the loss of heat to the cold surface.

**Advisory**: Advisories are issued for weather situations that cause significant inconveniences but do not meet warning criteria and, if caution is not exercised, could lead to life-threatening situations. Advisories are issued for significant events that are occurring, are imminent, or have a very high probability of occurrence.

**Air Mass**: A large body of air having similar horizontal temperature and moisture characteristics.

**Air Mass Thunderstorm**: Generally, a thunderstorm not associated with a front or other type of synoptic-scale forcing mechanism. Air mass thunderstorms typically are associated with warm, humid air in the summer months; they develop during the afternoon in response to insolation, and dissipate rather quickly after sunset. They generally are less likely to be severe than other types of thunderstorms, but they still are capable of producing downbursts, brief heavy rain, and (in extreme cases) hail over 3/4" in diameter. Also, see Pulse Thunderstorm, Popcorn Convection and Single Cell Thunderstorm.

**AIRMET (AIRman's METeorological Information)**: This NWS aviation product advises of weather that maybe hazardous, other than convective activity, to single engine, other light aircraft, and Visual Flight Rule (VFR) pilots. However, operators of large aircraft may also be concerned with these phenomena.

**Air Parcel**: An imaginary small body of air that is used to explain the behavior of air. A parcel is large enough to contain a very great number of molecules, but small enough so that the properties assigned to it are approximately uniform throughout.

**Air Pressure**: The force exerted on a surface by the weight of the air above it. The internationally recognized unit for measuring this pressure is the kilopascal.

**Air Stagnation**: A meteorological situation in which there is a major buildup of air pollution in the atmosphere. This usually occurs when the same air mass is parked over the same area for several days. During this time, the light winds cannot "cleanse" the buildup of smoke, dust, gases, and other industrial air pollution.

**Air Transportatable Mobile Unit (ATMU)**: A modularized transportable unit containing communications and observational equipment necessary to support a meteorologist preparing on-site forecasts at a wildfire or other incident.

**Albedo**: The percentage of incoming radiation reflected by a surface.

**ALERT Flood Warning System**: A cooperative, community-operated flood warning system; the acronym stands for Automated Local Evaluation (in) Real Time. See also Automated Local Evaluation in Real Time (ALERT).

**Aleutian Low**: A semi-permanent, subpolar area of low pressure located in the Gulf of Alaska near the Aleutian Islands. It is a generating area for storms and migratory lows often reach maximum intensity in this area. It is most active during the late fall to late spring. During the summer, it is weaker, retreating towards the North Pole and becoming almost nonexistent. During this time, the North Pacific High pressure system dominates.

**Algorithm**: A computer program (or set of programs) which is designed to systematically solve a certain kind of problem. Numerical Prediction models have algorithms programmed into them to determine derived fields, such as precipitation or rising motion. WSR-88D radars (NEXRAD) employ algorithms to analyze radar data and automatically determine storm motion, probability of hail, VIL, accumulated rainfall, and several other parameters.

**Altimeter**: An instrument that indicates the altitude of an object above a fixed level. Pressure altimeters use an aneroid barometer with a scale graduated in altitude instead of pressure.

**Altimeter Setting**: That pressure value to which an aircraft altimeter scale is set so that it will indicate the altitude above mean sea-level of an aircraft on the ground at the location for which the value was determined.

**Altitude**: Height expressed as the distance above a reference point, which is normally sea level or ground level.

**Altocumulus (Ac)**: These clouds are composed of mainly water. They appear as white or gray colored roll like elements or bands. The individual elements are large and darker than in cirrocumulus clouds. These clouds form between 6,500 and 23,000 feet.

**Altocumulus Castellanus (ACCAS)**: They are middle level convective clouds and possibly they should be classified as clouds with extensive vertical development. They are composed of mainly water vapor. They are characterized by their billowing tops and comparatively high bases. These clouds form between 6,500 and 23,000 feet. These clouds are a sign of instability aloft, and may

precede the rapid development of thunderstorms.

**Altocumulus Standing Lenticular (ACSL)**: These clouds are formed on the crests of waves crested by barriers in the wind flow, such as mountains. The clouds show little movement and have the shape of a lens, hence the name standing lenticular. Wind, however, can be quite strong blowing through the cloud. They are characterized by their smooth, polished edges and may look like a stack of pancakes or a UFO. These may also form on wave crests. They are composed of mainly water vapor and form between 6,500 and 23,000 feet.

**Altostratus (As)**: It is a bluish veil or layer of clouds having a fibrous appearance. The outline of the sun may show dimly as through frosted glass. It often merges gradually into cirrostratus. As with cirrostratus, it often is part of a cloud shield associated with a front. This type of cloud is composed of mainly water vapor and result from lifting a layer. These clouds form between 6,500 and 23,000 feet.

**Anabatic Wind**: A wind which blows up a steep slope or mountain side. It is also known as an upslope flow. These winds typically occur during the daytime in calm sunny weather. A hill or mountain top will be radiatively warmed by the sun which in turn heats the air just above it. See Katabatic Wind.

**Anemometer**: An instrument that measures wind speed.

**Aneroid Barometer**: An instrument designed to measure atmospheric pressure. It contains no mercury (Hg).

**Anticyclone**: An area of high pressure around which the wind blows clockwise in the Northern Hemisphere and counterclockwise in the Southern Hemisphere. At the center of the circulation, there is sinking air. Generally, this sinking air provides clear skies.

**Anvil**: The flat, spreading top of a Cumulonimbus Cloud (Cb). Thunderstorm anvils may spread hundreds of miles downwind from the thunderstorm itself, and sometimes may spread upwind.

**Apparent Temperature**: A measure of human discomfort due to combined heat and humidity. It measures the increased physiological heat stress and discomfort associated with higher than comfortable humidity. The apparent temperature is less than the actual air temperature when the humidity is relatively low and that the apparent temperature indicates the reduced stress and increased comfort associated with the higher rate of evaporative cooling of the skin.

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**Arctic Air**: A mass of very cold, dry air that usually originates over the Arctic Ocean north of Canada and Alaska.

**Arctic High**: A very cold high pressure that originates over the Arctic Ocean.

**Area Forecast Discussion (AFD)**: This NWS product is intended to provide a well-reasoned discussion of the meteorological thinking which went into the preparation of the Zone Forecast Product. The forecaster will try to focus on the most particular challenges of the forecast. At the

end of the discussion, there will be a list of all advisories, watches and warnings that are not short-fused (lasting less than 6 hours).

**Arid**: An adjunctive applied to regions where precipitation is so deficient in quantity, or occurs at such times, that agriculture is impracticable without irrigation.

**Arroyo**: A water-carved channel or gully in arid country, usually rather small with steep banks, dry most of the time, due to infrequent rainfall and the shallowness of the cut which does not penetrate below the level of permanent ground water.

**ASOS**: An acronym for **A**utomated **S**urface **O**bserving **S**ystem.

**Atmosphere**: The gaseous envelope surrounding the earth, composed primarily of nitrogen and oxygen.

**Atmospheric Pressure**: The pressure asserted by the mass of the column of air directly above any specific point (also called air pressure or barometric pressure).

**Atmospheric Stability**: An indication of how easily a parcel of air is lifted. If the air is very stable it is difficult to make the parcel rise. If the air is very unstable the parcel may rise on its own once started.

**Aurora**: A glowing light display in the nighttime sky cause by excited gases in the upper atmosphere giving off light. In the Northern Hemisphere, it is called the aurora borealis (northern lights). In the Southern Hemisphere, it is called aurora australis (southern lights).

**Automated Local Evaluation in Real Time (ALERT)**: A local flood warning system where river and rainfall data area collected via radio signals in real-time at an ALERT base station.

**Automated Surface Observing System**: ASOS serves as the nation's primary surface weather observing network. It is designed to support weather forecast activities and aviation operations and, at the same time, support the needs of the meteorological, hydrological, and climatological research communities.

**Avalanche**: A mass of snow, rock, and/or ice falling down a mountain or incline. In practice, it usually refers to the snow avalanche. In the United States, the term snow slide is commonly used to mean a snow avalanche.

**Aviation Area Forecast (FA)**: This NWS aviation product is a forecast of clouds and weather conditions over an area as large as the size of several states. It must be used in conjunction with Airmet bulletins for the same area in order to get a complete picture of the weather. The area forecast together with the Airmet Sierra bulletin are used to determine forecast enroute weather and to interpolate conditions at airports which do not have terminal forecasts (FT's) issued.

**Aviation Weather Center (AWC)**: One of the National Centers for Environmental Prediction. The Aviation Weather Center (AWC), located in Kansas City, Mo., enhances aviation safety by

issuing accurate warnings, forecasts and analyses of hazardous weather for aviation interests. The Center identifies existing or imminent weather hazards to aircraft in flight and creates warnings for transmission to the aviation community. The Center also originates operational forecasts of weather conditions that will affect domestic and international aviation interests.

**AWIPS**: Advanced Weather Information Processing System. NWS computer workstations that integrate graphics, including computer models, satellite and radar imagery.

**Back-Building Thunderstorm**: A thunderstorm in which new development takes place on the upwind side (usually the west or southwest side), such that the storm seems to remain stationary or propagate in a backward direction.

**Back Door Cold Front**: A cold front moving south or southwest, the opposite of typical cold fronts which move eastward.

**Backing**: A counterclockwise change in wind direction with increasing height in the atmosphere. For example, the wind direction would change from the north at the ground to the northwest aloft. This is indicative of the airmass cooling or cold air advection (CAA).

**Bar**: An obstacle formed at the shallow entrance to the mouth of a river or bay.

**Baroclinic Zone**: A region in which a temperature gradient exists on a constant pressure surface. Baroclinic zones are favored areas for strengthening and weakening systems; barotropic systems, on the other hand, do not exhibit significant changes in intensity. Also, wind shear is characteristic of a baroclinic zone. See Barotropic System.

**Barometer**: An instrument for measuring atmospheric pressure. The two most common types are the mercury barometer and the aneroid barometer.

**Barometric Pressure**: The actual pressure value indicated by a pressure sensor.

**Barotropic System**: A weather system in which temperature and pressure surfaces are coincident, i.e., temperature is uniform (no temperature gradient) on a constant pressure surface. Barotropic systems are characterized by a lack of wind shear. See Baroclinic Zone.

**Base Reflectivity (R)**: This WSR-88D radar product depicts a full 360° sweep of echo intensity data. It is available for every elevation angle that is sampled in a volume scan. It is used to observe precipitation intensity and movement; determine storm structure; estimate hail potential; locate boundaries (cold front, outflow, sea breeze, etc.); identify cloud layers; and detect light snow, drizzle, birds, insects, and smoke plumes.

**Base Velocity (V)**: This WSR-88D radar product depicts a full 360° sweep of radial velocity data. It is available for every elevation angle that is sampled in a volume scan. It is used to estimate wind speed and direction; determine regions of significant shear (convergence, etc.); locate boundaries (cold front, outflow, sea breeze, etc.); identify areas of circulation; and determine storm structure.

**Beach Erosion**: The carrying away of beach materials by wave action, currents, tides, or wind.

**Bermuda High**: A semi-permanent, subtropical area of high pressure in the North Atlantic Ocean off the East Coast of North America that migrates east and west with varying central pressure. Depending on the season, it has different names. When it is displaced westward, during the Northern Hemispheric summer and fall, the center is located in the western North Atlantic, near Bermuda. In the winter and early spring, it is primarily centered near the Azores in the eastern part of the North Atlantic. Then it may be referred to as the Azores High.

**Best Track**: A subjectively smoothed path, versus a precise and very erratic fix-to-fix path, used to represent tropical cyclone movement. It is based on an assessment of all available data.

**Black Ice**: Thin, new ice on fresh or saltwater, appearing dark in color because of its transparency; also popularly applied to thin hazardous ice coverings on roads.

**Blizzard**: A winter storm which produces the following conditions for at least 3 hours:

* Sustained winds or frequent gusts to 35 miles per hour or greater, and
* Considerable falling and/or blowing snow reducing visibility to less than 1/4 mile.

**Blizzard Warning**: This product is issued by the NWS when blizzard conditions are life threatening. The criteria for this warning varies from state to state.

**Blocking High**: The development of a warm ridge or cutoff high aloft at high latitudes which becomes associated with a cold high at the surface, causing a split in the westerly winds. Such a high will move very slowly, tending to move west during intensification and east during dissipation. It prevents the movement of migratory cyclones across its latitudes. Two examples are a cut-off high and an Omega block.

**Blowing**: A descriptor used to amplify observed weather phenomena (dust, sand, snow, and spray) whenever the phenomena are raised to a height of 6 feet or more above the ground and reduces horizontal visibility to less than 7 statue miles.

**Blowing Dust (BLDU)**: Wind-driven dust that significantly reduces surface visibility to less than 7 miles.

**Blowing Snow (BLSA)**: Wind-driven sand that significantly reduces surface visibility to less than 7 miles.

**Blowing Snow (BLSN)**: Wind-driven snow that significantly reduces surface visibility to less than 7 miles. BLIZZARD: Snow with winds in excess of 35 mph and visibilities of 1/4 mile or less, for an extended period of time (e.g. > 3 hours).

**Boundary Layer**: In general, a layer of air adjacent to a bounding surface. Specifically, the term most often refers to the planetary boundary layer, which is the layer within which the effects of friction are significant. For the earth, this layer is considered to be roughly the lowest one or two

kilometers of the atmosphere. It is within this layer that temperatures are most strongly affected by daytime insolation and nighttime radiational cooling, and winds are affected by friction with the earth's surface. The effects of friction die out gradually with height, so the "top" of this layer cannot be defined exactly.

**Broken (BKN)**: An official sky cover classification for aviation weather observations, descriptive of a sky cover of 5/8 to 7/8.

**CAA**: An acronym for Cold air advection.

**Cap or Cap Strength**: It measures the ability of stable air aloft (a layer of relatively warm air) to inhibit low-level parcel ascent. Empirical studies show that a cap greater than 2°C often precludes thunderstorms in the absence of a strong dynamical or forced lift. This occurs even when the instability is excessive. A strong cap prevents widespread convection from occurring. Also called a lid.

**Calm**: A condition when *no* air motion is detected.

**CAPE**: An acronym for Convective Available Potential Energy.

**Categorical**: An NWS precipitation descriptor for a 80%, 90%, or 100% chance of measurable precipitation (0.01"). See Precipitation Probability (PoP).

**Cb**: An acronym for cumulonimbus.

**Ceiling**: The height of the lowest layer of clouds, when the sky is broken or overcast.

**Ceilometer**: A device used to evaluate the height of clouds or the vertical visibility into a surface-based obscuration.

**Cell**: Convection in the form of a single updraft, downdraft, or updraft/downdraft couplet, typically seen as a vertical dome or tower as in a cumulus or towering cumulus cloud. Some thunderstorms consist of several cells (see multi-cellular thunderstorm).

**Celsius**: A temperature scale in which 0° is the freezing point of water and 100° is the boiling point.

**Chaff**: Small strips of metal foil usually dropped in large quantities from aircraft or balloons. Chaff typically produces a radar echo which closely resembles precipitation. Chaff drops once were conducted by the military in order to confuse enemy radar, but now are conducted mainly for radar testing and calibration purposes.

**Chance**: An NWS precipitation descriptor for 30%, 40%, or 50% chance of measurable precipitation (0.01"). When the precipitation is convective in nature, the term scattered is used. See Precipitation Probability (PoP).

**Chinook Wind**: A warm, dry foehn wind that descends the eastern slope of the Rocky Mountains. The warmth and dryness of this wind can quickly melt and evaporate snowcover. Another kind of foehn wind is the Santa Ana.

**Cirriform**: High altitude ice clouds with a very thin wispy appearance.

**Cirrocumulus(Cc)**: They are thin clouds, the individual elements which appear as small white flakes or patches of cotton, usually showing brilliant and glittering quality suggestive of ice crystals. They form at altitudes between 16,500 to 45,000 feet above ground.

**Cirrocumulus Standing Leticular (CCSL)**: These clouds are formed on the crests of waves crested by barriers in the wind flow. The clouds show little movement hence the name standing. Wind, however, can be quite strong blowing through the cloud. They are characterized by their smooth, polished edges. They may also form on wave crests. They are ice crystal clouds and generally are whiter than ACSL. These clouds from between 16,500 and 45,000 feet.

**Cirrostratus (Cs)**: They are thin, whitish cloud layers appearing like a sheet or veil. They are diffuse, sometimes partially striated or fibrous. Due to their ice crystal makeup, these clouds are associated with halos - large, luminous circles or arcs of circles surrounding the sun or moon. The layer frequently is the edge of a frontal shield. They form at altitudes between 16,500 to 45,000 feet above ground.

**Cirrus (Ci)**: They are thin, feather like clouds composed entirely of ice crystals. They form at altitudes between 16,500 to 45,000 feet above ground. Thunderstorm anvils are a form of cirrus cloud, but most cirrus clouds are not associated with thunderstorms.

**Civil Emergency Message (CEM)**: These NWS statements are issued when a local or state official wants a warning disseminated regarding nuclear accidents, spills of toxic material, and other similar situations.

**Clear**: Sky condition of less than 1/10 cloud coverage.

**Climate**: The historical record of average daily and seasonal weather events.

**Climatological Data (CD)**: This National Climatic Data Center (NCDC) publication, also produced monthly and annually, contains daily temperature and precipitation data for over 8,000 locations.

**Climate Diagnostics Center (CDC)**: The CDC is part of the National Oceanic & Atmospheric Administration (NOAA). Their mission is to identify the nature and causes of climate variations on time scales ranging from a month to centuries. The goal of this work is to develop the ability to predict important climate variations on these time scales.

**Climate Prediction Center (CPC)**: The CPC is one of nine national centers that comprises the National Centers for Environmental Prediction (NCEP). Their mission is to maintain a continuous watch on short-term climate fluctuations and to diagnose and predict them. These

efforts are designed to assist agencies both inside and outside the federal government in coping with such climate related problems as food supply, energy allocation, and water resources.

**Closed Low**: A low pressure area with a distinct center of cyclonic circulation which can be completely encircled by one or more isobars or height contour lines. The term usually is used to distinguish a low pressure area aloft from a low-pressure trough. Closed lows aloft typically are partially or completely detached from the main westerly current or jet stream, and thus move relatively slowly and erratically. See Cutoff Low.

**Cloud**: A visible aggregate of minute water droplets or ice particles in the atmosphere above the Earth's surface.

**Cloud Height**: The height of the base of a cloud or cloud layer above the surface of the earth.

**Cloud Layer**: An array of clouds whose bases are at approximately the same level.

**Cloud Seeding**: An experimental process used to weaken hurricanes or enhance rainfall in dry areas.

**Cloud Streets**: Rows of cumulus or cumulus-type clouds aligned parallel to the low-level flow. Cloud streets sometimes can be seen from the ground, but are seen best on satellite photographs.

**Cloudy**: When the predominant/average sky condition is covered completely by opaque (not transparent) clouds.

**Clutter**: Radar echoes that interfere with observation of desired signals on the radar display.

**Coalescence**: The process by which water droplets in a cloud collide and come together to form raindrops.

**Coastal Convergence**: The convergence or running together of land and sea winds, creating a stronger band of wind near the shore. Factors such as the shape of the shoreline and the angle between the wind and the shore determine the severity of this effect. See also Island Effect and Convergence Zone.

**Coastal Flood Statement**: This NWS product keeps the public and cooperating agencies informed of the status of existing coastal flood watches and warnings as well as provides an update on local conditions. It is also used to cancel a Coastal Flood Watch or a Coastal Flood Warning.

**Coastal Flood Warning**: This NWS product alerts residents along the Atlantic, Pacific, and Gulf Coasts that coastal flooding is either imminent or occurring.

**Coastal Flood Watch**: This NWS product alerts residents along the Atlantic, Pacific, and Gulf Coasts to the possibility of coastal flooding.

**Coastal Flooding**: Flooding that occurs where water is driven onto land from an adjacent body of water, usually caused by a combination of high surf and high tides. The high surf can come from strong winter storms or tropical cyclones.

**Coastal Waters Forecast (CWF)**: A forecast of wind, wave and weather conditions between the coastline and 60 miles offshore.

**Cold Air Advection**: Transport of cold air into a region by horizontal winds.

**Cold Core Low**: A low pressure area which is colder at its center than at its periphery. Mid-latitude cyclones exhibit this temperature pattern. They usually produce much of their cloud cover and precipitation during the daytime when the instability is the greatest. At night, the clouds and precipitation usually diminishes significantly.

**Cold Front**: The leading edge of a relatively colder airmass which separates two air masses in which the gradients of temperature and moisture are maximized. In the northern hemisphere winds ahead of the front will be typically southwest and shift into the northwest with frontal passage.

**Cold Pool**: A region of relatively cold air, represented on a weather map analysis as a relative minimum in temperature surrounded by closed isotherms. Cold pools aloft represent regions of relatively low stability, while surface-based cold pools are regions of relatively stable air.

**Combined Seas**: Generally referred to as "Seas". It is used to describe the combination or interaction of wind waves and swells. In some prediction techniques, its height is the square root of the sum of the squares of the wind wave and swell heights. It is generally equal to the height of the swell plus 1/3 the height of the wind waves.

**Comma Cloud**: A synoptic scale cloud pattern with a characteristic comma-like shape, often seen on satellite photographs associated with large and intense low-pressure systems.

**Composite Reflectivity(CR)**: This WSR-88D radar product displays the maximum reflectivities for each resolution grid box for all elevation angles in a volume scan. Available with combined attribute table which provides valuable information concerning storm characteristics, such as storm tops, maximum radial velocity and reflectivity, and possible existence of hail and mesocyclones. It is used to observe the highest reflectivities in a storm from any scanned elevation angle; determine intensity trends; and generate cross section through maximum reflectivity.

**Condensation**: The process of gas or vapor changing to liquid.

**Condensation Funnel**: A funnel-shaped cloud associated with rotation and consisting of condensed water droplets (as opposed to smoke, dust, debris, etc.). Compare with debris cloud.

**Continental Air Mass**: A dry air mass originating over a large land area.

**CONUS**: An acroynm for Continental United States.

**Convection**: Generally, transport of heat and moisture by the movement of a fluid. In meteorology, the term is used specifically to describe vertical transport of heat and moisture, especially by updrafts and downdrafts in an unstable atmosphere. The terms "convection" and "thunderstorms" often are used interchangeably, although thunderstorms are only one form of convection. Cumulonibus (Cb), towering cumulus clouds, and Altocumulus Castellanus (ACCAS) clouds all are visible forms of convection. However, convection is not always made visible by clouds. Convection which occurs without cloud formation is called dry convection, while the visible convection processes referred to above are forms of moist convection.

**Convective Available Potential Energy (CAPE)**: It defines the vertically integrated positive buoyancy of an adiabatically rising air parcel on a sounding. This is proportional to the amount kinetic energy that the air parcel gains while it is warmer that the surrounding environment. As a result, CAPE provides the best measure of the potential instability available in the atmosphere. Increasing values of CAPE generally lead to progressively vigorous convection. However, severe thunderstorms can form in environments showing weak to moderate CAPE, especially if the Storm Relative Helicity values are high.

**Convective Clouds**: The vertically developed family of cumulus and cumulonimbus clouds. The height of their bases range from as low as 1,000 feet to a bit more than 10,000 feet. Clouds with extensive vertical development are positive indications of unstable air. Strong upward currents in vertically developed clouds can carry high concentrations of supercooled water to high levels where temperatures are quite cold. Upper portions of these clouds may be composed of water and ice.

**Convective Outlook (SWO)**: A forecast containing the area(s) of expected thunderstorm occurrence and expected severity over the contiguous United States, issued several times daily by the SPC in Norman, Oklahoma. They are sent out as both a narrative and a graphic covering a period of up to 52 hours in advance. This product serves as guidance to the local NWS Office for use in the preparation of forecast products issued; to advise the public, media, and other interests of the possibility of severe weather; and to assist with preliminary staffing should severe weather be anticipated. The terms approaching, slight risk, moderate risk, and high risk are used to describe severe thunderstorm potential.

**Convective Rain**: Rain associated with convective or cumuliform clouds characterized by vertical development in the form of rising mounds, domes, or towers.

**Convective SIGMETs**: These NWS aviation products are issued in the conterminous U.S. for any of the following. Severe thunderstorm due to: surface winds greater than or equal to 50 knots, hail at the surface greater than or equal to 3/4" in diameter, tornadoes, embedded thunderstorms, line of thunderstorms, or thunderstorms greater than or equal to VIP level 4 affecting 40% or more of an area at least 3000 square miles. Any Convective SIGMET implies severe or greater turbulence, severe icing, and low level wind shear.

**Convergence**: A contraction of a vector field; the opposite of divergence. Convergence in a horizontal wind field indicates that more air is entering a given area than is leaving at that level. To compensate for the resulting "excess," vertical motion may result: upward forcing if convergence is at low levels, or downward forcing (subsidence) if convergence is at high levels. Upward forcing from low-level convergence increases the potential for thunderstorm development (when other factors, such as instability, are favorable).

**Convergence Line or Zone**: A horizontal line or zone along which horizontal convergence of the airflow is occurring. Common forms of convergence lines are sea-breeze fronts, cold-air outflow from thunderstorms, and synoptic fronts. In areas of complex terrain, these are often produced by air moving around terrain features. The effect is rising air motion along a line of convergence in the lee of the features, causing convective showers, thunderstorms, waterspouts or funnel clouds. See also Island Effect.

**Cooling Degree Day**: see Degree Day.

**Cooperative Observer**: An individual (or institution) who takes precipitation and temperature observations-and in some cases other observations such as river stage, soil temperature, and evaporation-at or near their home, or place of business. Many observers transmit their reports by touch-tone telephone to an NWS computer, and nearly all observers mail monthly reports to the National Climatic Data Center to be archived and published.

**Coriolis Effect**: The effect caused by the Earth's rotation which deflects air moving between two places. It causes an object to move to the right in the Northern Hemisphere and to the left in the Southern Hemisphere.

**County Warning Area (CWA)**: The area assigned to a specific NWS Forecast Office for the purpose of warnings issuance and hazard awareness responsibility.

**Creek**: A small stream of water which serves as the natural drainage course for a small drainage basin.

**CU**: An acronym for cumulus.

**Cumuliform**: Descriptive of all clouds with vertical development in the form of rising mounds, domes, or towers.

**Cumulonimbus Cloud (Cb)**: They are the ultimate manifestation of instability. They are vertically developed clouds of large dimensions with dense "boiling" tops often crowned with thick veils of dense cirrus (anvil). This is also called a "thunderstorm cloud". It can produce very heavy precipitation, lightning, large hail (greater than ¾"), damaging winds, and tornadoes.

**Cumulonimbus Mammatus Cloud (CBMAM)**: It is associated with a cumulonimbus cloud. It indicates extreme instability. This cloud is characterized by hanging festoons or protuberances underneath the anvil of the Cumulonimbus Cloud (Cb). The festoons may be at any level of the cloud from the underside of the anvil to the base of the cloud.

**Cumulus Cloud (Cu)**: These clouds form in convective currents and are characterized by relatively flat bases and dome-shaped tops. Fair weather cumulus do not show extensive "towers" or vertical development and do not produce precipitation. A cumulus may, however, be an early stage in the development of towering cumulus or cumulonimbus. More often fair weather cumulus indicate a relatively shallow layer of instability.
**Cumulus Congestus**: Same as towering cumulus. Sometimes referred to just as congestus.

**Cutoff Low**: A closed low which has become completely displaced (cut off) from basic westerly current (such as the jet stream), and moves independently of that current. Cutoff lows may remain nearly stationary for days, or on occasion may move westward opposite to the prevailing flow aloft (i.e., retrogression), or erratically. "Cutoff low" and "closed low" often are used interchangeably to describe low pressure centers aloft. However, not all closed lows are completely removed from the influence of the basic westerlies. Therefore, the recommended usage of the terms is to reserve the use of "cutoff low" only to those closed lows which clearly are detached completely from the westerlies. See also Closed Low.

**Cyclone**: An area of low atmospheric pressure that has a closed circulation. Cyclones (or more commonly called "low pressure areas") rotate counter-clockwise in the Northern Hemisphere and clockwise in the Southern Hemisphere. They often bring about clouds and precipitation. Also the term used for a hurricane in Australia and the Indian Ocean.

**Cyclonic Circulation (or Cyclonic Rotation)**: Circulation (or rotation) which is in the same sense as the Earth's rotation, i.e., counterclockwise (in the Northern Hemisphere) as would be seen from above. Nearly all mesocyclones and strong or violent tornadoes exhibit cyclonic rotation, but some smaller vortices, such as gustnadoes, occasionally rotate anticyclonically (clockwise). Compare with anticyclonic rotation.

**Daily Climate Report**: As the name indicates, this tabular climatological product is issued daily by each NWS office. It is organized so that similar items are grouped together (i.e., temperature, precipitation, wind, sunrise and sunset times, etc.).

**dBZ**: A logarithmic expression for reflectivity factor, referenced to ($1\ mm^6 / 1\ m^3$). $dBZ = 10 \log ( z / 1\ mm^6\ m^3)$. See decibel.

**Dead Fuel Moisture**: Dead fuel moisture responds solely to ambient environmental conditions and is critical in determining fire potential. Dead fuel moistures are classed by time lag. Dead fuels in NFDRS have four classes. 1-hr fuels are fine flashy fuels, less than 1/4" diameter, that respond quickly to weather changes and are computed from observation time temperature, humidity and cloudiness. 10-hr fuels are 1/4" to 1" in diameters and are computed from observation time temperature, humidity, and cloudiness, or may be a standard set of "10-Hr Fuel Sticks" that are weighed as part of the fire weather observation. 100-hr fuels are 1" to 3" in diameter and computed from 24 hour average boundary condition composed of day length, hours of rain, and daily temperature/humidity ranges. 1000-hr fuels are 3" to 6" in diameter and computed from a 7-day average boundary condition composed of day length, hours of rain, and daily temperature/humidity ranges.

**Debris Cloud**: A rotating "cloud" of dust or debris, near or on the ground, often appearing beneath a condensation funnel and surrounding the base of a tornado. Note that a debris cloud appearing beneath a thunderstorm will confirm the presence of a tornado, even in the absence of a condensation funnel.

**Decibel (dB)**: This is a logarithmic expression comparing the energy that the radar emits ($Z_1$) to the energy that radar receives back from a radar target ($Z_2$). It is expressed mathematically as $Z\ (dBZ) = 10 \log (Z_1/Z_2)$ The solution to this equation lets the radar operator know the strength of a target. The value of Z is a function of the amount of radar beam energy that is back scattered by a target and detected as a signal (or echo). Higher values of Z (and dBZ) thus indicate more energy being back scattered by a target. See also dBZ.

**Decouple**: The tendency for the surface wind to become much lighter than wind above it at night when the surface temperature cools.

**Degree Day**: It gauges the amount of heating or cooling needed for a building using 65°F as a baseline. To compute heating/cooling degree-days, take the average temperature for a day and subtract the reference temperature of 65°F. If the difference is positive, it is called a *Cooling Degree Days*. If the difference is negative, it is called a *Heating Degree Days*. The magnitude of the difference is the number of days. For example, if your average temperature is 50°F for a day in December, the difference of the average temperature for that day and the reference temperature of 65°F would yield a minus 15°. Therefore, you know that you are going to have 15 Heating Degree Days that day. Electrical, natural gas, power, and heating, and air conditioning industries utilize heating and cooling degree information to calculate their needs.

**Dense Fog**: A fog in which the visibility is <¼ mile.

**Dense Fog Advisory**: This product is issued by the NWS when widespread fog reduces visibility to less than or equal to ¼ mile.

**Dew**: Water droplets that form upon surfaces on or near the ground when air is cooled toward its dew point.

**Dew Point (Dew-Point Temperature)**: A measure of atmospheric moisture. The temperature to which air must be cooled, at constant pressure and moisture content, in order for saturation to occur. The higher the dew point, the greater amount of water vapor in the air mass.

**Directional Shear**: The component of wind shear which is due to a change in wind direction with height, e.g., southeasterly winds at the surface and southwesterly winds aloft. A veering wind with height in the lower part of the atmosphere is a type of directional shear often considered important for tornado development.

**Dirty Ridge**: Most of the time, upper-level ridges bring fairly clear weather as the storms are steered around the ridge. Sometimes, however, strong storms undercut the ridge and create

precipitation. Ridges that experience this undercutting by storms are known as dirty ridges because of the unusual occurrence of precipitation.

**Diurnal**: Daily; related to actions which are completed in the course of a calendar day, and which typically recur every calendar day (e.g., diurnal temperature rises during the day, and diurnal falls at night).

**Divergence**: A measure of the expansion or spreading out of a vector field; usually said of horizontal winds. It is the opposite of convergence. Divergence at upper levels of the atmosphere enhances upward motion, and hence the potential for thunderstorm development (if other factors also are favorable).

**Doppler Radar**: A **W**eather **S**urveillance **R**adar (WSR-88D) system developed in 1988. About 120 systems were installed at Weather Forecast Offices. An additional 24 systems were installed at Department of Defense (Air Force Bases) sites. This powerful and sensitive Doppler system generates many useful products for meteorologists, among them: standard reflectivity echoes, wind velocity or atmospheric air motion pictures, and areal 1-hour, 3-hour, or storm-total precipitation images. This radar can also measure radial velocity, the instantaneous component of motion parallel to the radar beam (i.e., toward or away from the radar antenna).

**Doppler Shift**: The change in observed frequency of wave energy due to the relative motion of the observer and wave source. For example, as a train approaches your location, you hear a higher pitch sound. After the train has passed your location, you will hear a lower pitch sound. The Doppler radar uses this change in frequency to determine the velocity and direction of the wind.

**Downburst**: A strong down draft, initiated by a thunderstorm, that induces an outburst of damaging straight line winds on or near the ground. Downburst winds can produce damage similar to a strong tornado. The damage from aloft often looks like a star with debris spreading out from the center in straight lines. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder. Downbursts come in the following to 2 categories: microburst and macroburst.

**Downdraft**: A small-scale column of air that rapidly sinks toward the ground as in a shower or thunderstorm. A downburst is the result of a strong downdraft.

**Downslope Flow**: Air that descends down a mountain chain or over sloping terrain (pressurized air moving from high pressure to low pressure), resulting in subsequent drying, and in some cases, dramatic warming of air that can quickly melt a snowcover. Local names for downslope winds or "foehn winds" in the western United States are Chinook Winds, East Winds, North Winds, Mono Winds and Santa Ana Winds. Usually associated with little or no clouds.

**Drainage Basin or Area**: A part of the surface of the earth that is occupied by a drainage system, which consists of a surface stream or a body of impounded surface water together with all tributary surface streams and bodies of impounded surface water.

**Drizzle (DZ)**: Fairly uniform precipitation composed exclusively of fine drops with diameters less than 0.02" (0.5 mm) which are very close together. Drizzle appears to float while following air currents, although unlike fog droplets, it falls to the ground. The intensity of drizzle is based solely on visibility.

**Drought**: A period of abnormally dry weather sufficiently prolonged from the lack of precipitation to cause a serious hydrologic imbalance.

**Drought Index**: Computed value which is related to some of the cumulative effects of a prolonged and abnormal moisture deficiency. (An index of hydrological drought corresponding to levels below the mean in streams, lakes, and reservoirs.).

**Dryline**: A boundary separating moist and dry air masses and an important factor in severe weather frequency in the Great Plains. 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).

**Dry Microburst**: A microburst with little or no precipitation reaching the ground, most common in semi-arid regions. They may or may not produce lightning. Dry microbursts may develop in an otherwise fair-weather pattern; visible signs may include a cumulus cloud or small Cb with a high base and high-level virga, or perhaps only an orphan anvil from a dying rain shower. At the ground, the only visible sign might be a dust plume or a ring of blowing dust beneath a local area of virga. Compare with wet microburst.

**Dry Slot**: A zone of dry (and relatively cloud-free) air which wraps east or northeast into the southern and eastern parts of a large or small scale low pressure system. A dry slot generally is seen best on satellite photographs.

**Dust Devil**: A small, vigorous whirlwind, usually of short duration, rendered visible by dust, sand, and debris picked up from the ground. They range from 10 feet to greater than 100 feet in diameter, and can extend up to 1000 feet above the ground. They are caused by intense surface heating. This heating causes the air to rapidly rise and thus, a mini low pressure system is formed. They are usually found in desert or dry climatic regions where dust and dirt can be easily lifted. Only rarely do they cause any damage. Wind speeds can reach 30 to 60 mph.

**Dynamics**: Generally, any forces that produce motion or effect change. In operational meteorology, dynamics usually refer specifically to those forces that produce vertical motion in the atmosphere.

**Easterly Wave**: A wavelike disturbance in the tropical easterly winds that usually moves from east to west. Such waves can grow into tropical depressions.

**Ebb Current**: A receding tidal current that moves water away from shore or down a tidal river or estuary.

**Echo**: Energy back scattered from a target (precipitation, clouds, etc.) and received by and displayed on a radar screen.

**ECMWF**: An acronym for European Centre for Medium-Range Weather Forecasting model. See European Model.

**Eddy**: A small rotating area of water.

**EF Scale**: See Enhanced Fujita Scale (EF-scale).

**El Niño**: The warm phase of the Southern Oscillation (SO). Characterized by the warming of the sea surface temperatures (SST) in the central and eastern equatorial Pacific Ocean, beginning at about Christmas time (hence the name "El Niño", which is Spanish for "Christ child"). This causes the sardine population to die off the Peru coast. The anomalously warm water also causes the deep convection to shift from its normal position near Indonesia to the east. This is also preceded and accompanied by anomalous westerly wind at low levels. During the warm phase of the SO severe drought occurs over Indonesia and Australia. The warming of the ocean in the tropical Pacific increases the strength of the Hadley circulation (a global wind pattern) and causes the entire tropics to warm. The strengthened hemispheric north-south temperature gradient adds energy to the atmosphere. In particular, the subtropical jet is stronger and its maximum wind extends farther to the east than is normal. This is often related to the deeper than normal Aleutian low, a split jet-level flow over the western U.S. and a trough in the southeastern U.S.. This pattern is called the "Pacific North American Teleconnection pattern". When established, it leads to warm, dry conditions over the northern U.S., particularly the Northwest, and to unusually wet conditions over the southern U.S.. The El Niño typically lasts from 12 to 18 months. See Southern Oscillation, ENSO, and La Niña.

**El Niño Southern Oscillation (ENSO)**: An acronym designed to stress the special importance of the warm phase (El Niño) of the Southern Oscillation. See El Niño and Southern Oscillation.

**Emergency Managers Weather Information Network (EMWIN)**: A means of providing the emergency management community with access to a set of NWS warnings, watches, forecasts, and other products at no recurring cost. EMWIN is a suite of data access methods which make available a live stream of weather and other critical emergency information, including: 1. Radio - Digital weather information is transmitted using inexpensive radio broadcast and personal computer (PC) technologies. 2. Internet - The Interactive Weather Information Network (IWIN) page uses HTML formatting and additional hyperlinks to an EMWIN server that ingests the data. 3. Satellite - Satellite broadcast makes the datastream available nationwide, but not to provide detailed support (i.e. funding, manpower, or equipment) for state and local efforts to redistribute the datastream after downlink. The NWS broadcasts EMWIN on GOES 10 and GOES 12 satellites. Note: The above methods are intended to provide data to users at little or no cost. There are other methods available, at higher cost to the end-user, including various commercial weather distribution systems. EMWIN is a supplement to other NWS dissemination services, which include: NOAA Weather Radio (NWR), NOAA Weather Wire System (NWWS), Family of Services (FOS), NOAAPORT, and NEXRAD Information Dissemination Service (NIDS).

**Enhanced Fujita Scale (EF-scale)**: A system originally developed as the Fujita Scale by Dr. Theodore Fujita of the University of Chicago to classify tornadoes based on wind damage. The Enhanced Fujita Scale is an adaptation implemented by the NWS in 2007 to more accurately rate tornadoes from EF0 for weakest to EF5 for strongest tornadoes. See also Fujita F Scale.

**Environmental Modeling Center (EMC)**: This is one of 9 centers that comprises the National Centers for Environmental Prediction (NCEP). This center improves numerical weather, marine and climate predictions, through a broad program of research in data assimilation and modeling. In support of the NCEP operational forecasting mission, the EMC develops, improves and monitors data assimilation systems and models of the atmosphere, ocean and coupled system, using advanced methods developed internally as well as cooperatively with scientists from Universities, NOAA Laboratories and other government agencies, and the international scientific community.

**European Model**: One of medium-range (3 to 7 days) forecast models that forecasters use to write their extended forecasts. It has a resolution of 75 kilometers and covers the entire northern hemisphere. This model comes from European Centre for Medium-Range Weather Forecasts (ECMWF) which is an international organization supported by 18 European Member States. See GFS and UKMET.

**Evaporation**: A process by which liquid changes into a gas or vapor.

**Evapotranspiration**: Combination of evaporation from free water surfaces and transpiration of water from plant surfaces to the atmosphere.
**Excessive Heat Warning**: This product is issued by the NWS when excessive heat is life threatening. The criteria for this warning varies from state to state.

**Extratropical**: A term used in advisories and tropical summaries to indicate that a tropical cyclone has lost its "tropical" characteristics. The term implies both poleward displacement of the cyclone and the conversion of the cyclone's primary energy source from the release of latent heat of condensation to baroclinic (the temperature contrast between warm and cold air masses) processes. It is important to note that cyclones can become extratropical and still retain winds of hurricane or tropical storm force.

**Eye**: The relatively calm center in a hurricane that is more than one half surrounded by wall cloud. The winds are light, the skies are partly cloudy or even clear (the skies are usually free of rain) and radar depicts it as an echo-free area within the eye wall. The hurricane eye typically forms when the maximum sustained tangential wind speeds exceeds about 78 miles an hour. The eye diameter, as depicted by radar, ranges typically from as small as 5 to 10 miles upwards to about 100 miles. The average hurricane eye diameter is a little over 20 miles. When the eye is shrinking in size, the hurricane is intensifying.

**F Scale**: See Fujita Scale.

**Fahrenheit (F)**: The standard scale used to measure temperature in the United States, in which the freezing point of water is 32° and the boiling point is 212°.

**Fair**: It is usually used at night to describe less than 3/8 opaque clouds, no precipitation, no extremes of visibility, temperature or winds. It describes generally pleasant weather conditions.

**Fetch**: The area in which ocean waves are generated by the wind. Also refers to the length of the fetch area, measured in the direction of the wind.

**Few (FEW)**: An official sky cover classification for aviation weather observations, descriptive of a sky cover of 1/8 to 2/8. This is applied only when obscuring phenomenon aloft are present--that is, not when obscuring phenomenon are surface-based, such as fog. Also, an NWS convective precipitation descriptor for a 10% chance of measurable precipitation (0.01"). Few is used interchangeably with isolated. See Precipitation Probability (PoP).

**Fire Behavior**: A complex chain-reaction process that describes the ignition, buildup, propagation, and decline of any fire in wildland fuels.

**Fire Danger**: The result of both constant factors (fuels) and variable factors (primarily weather), which affects the ignition, spread, and difficulty of control of fires and the damage they cause.

**Fire Danger Rating**: A fire control management system that integrates the effects of selected fire danger factors into one or more qualitative or numerical indices from which ease of ignition and probable fire behavior may be estimated.

**Fire Weather Services**: Routine daily forecasts; spot forecasts; prescribed burn forecasts; smoke management forecasts and information, advisories, observations, summaries, and briefings produced in and by an NWS office during normal working hours, plus warnings of critical weather conditions. Generally, these basic services are tailored to meet the specific needs of user agencies.

**Fire Weather Watch**: A product issued by the NWS when fuel conditions and weather portray a high or extreme fire danger, usually when very low humidity and strong winds are forecast. This is usually followed by a Red Flag Warning.

**Flash Flood**: A flood which follows within a few hours (usually less than 6 hours) of heavy or excessive rainfall, or dam or levee failure. This is a dangerous situation that threatens lives and property.

**Flash Flood Statement (FFS)**: This product is issued after either a Flash Flood Watch or a Flash Flood Warning has been issued by a local NWS Forecast Office. It will provide the latest information on the flash flooding situation or event. It will also be used to remove parts of the geographical area covered by the original watch or warning when the flash flooding event is no longer a threat or has ended in a certain area. Finally, this statement can be used to terminate the original watch or warning when it is no longer valid.

**Flash Flood Warning (FFW)**: This warning signifies a short duration of intense flooding of communities, streams, or urban areas with high peak rate of flow. Flash floods may result from

such things as torrential downpours or dam and levee breaks. They are issued by the local NWS Office for 4 hours or less. \

**Flash Flood Watch (FFA)**: This product is issued by the local NWS office for events that have the potential for short duration (usually less than 6 hours) intense flooding of communities, streams or areas for which the occurrence is neither certain nor imminent. This watch indicates that flash flooding is a possibility in or close to the watch area. Those in the affected area are urged to be ready to take action if a Flash Flood Warning is issued or flooding is observed. A Flash Flood Watch may be issued for potential flooding from eitherdam breaks, or torrential downpours.

**Flood**: The inundation of a normally dry area caused by high flow, or overflow of water in an established watercourse, such as a river or stream. This is a duration type event with a slower onset than flash flooding, normally greater than 6 hours.

**Flood Stage**: A gage height at which a watercouse overtops its banks and begins to cause damage to any portion of the defined reach.

**Flood Statement (FLS)**: This product is issued after either a Flash Flood Watch or a Flash Flood Warning has been issued by a local NWS Forecast Office. It will provide the latest information on the flash flooding situation or event. It will also be used to remove parts of the geographical area covered by the original watch or warning when the flash flooding event is no longer a threat or has ended in a certain area. Finally, this statement can be used to terminate the original watch or warning when it is no longer valid.

**Flood Warning (FLW)**: This warning signifies a longer duration and more gradual flooding of communities, streams, or urban areas. Floods usually begin after 6 hours of excessive rainfall.

**Flood Watch (FLA)**: This watch is issued by a local NWS Office to indicate that there is a potential of flooding in or close to the watch area. Those in the affected area are urged to be ready to take action if a flood warning is issued or flooding is observed. In flooding, the onset of flooding take place much slower (usually greater than 6 hours) than a flash flood.

**Flow**: 1. The general movement of air, either in the upper or lower atmosphere, e.g. “onshore flow” is air moving from the ocean to land. 2. Volume of water in a river or stream, passing a specific observation site, during a specific time period. It is typically expressed in units of cubic feet per second.

**Flurries**: Light snowfall that generally does not produce a measurable accumulation.

**Fog (FG)**: A visible aggregate of minute water particle (droplets) which are based at the Earth's surface and reduces horizontal visibility to less than 5/8 statue mile, and unlike drizzle, it does not fall to the ground. It occurs most frequently in coastal regions because of the great water vapor content of the air. However, it can occur anywhere. The rapidity with which fog can form makes it especially hazardous. It forms by any atmospheric process that does one of the following: Cools the air to its dew point, or raises the dew point to the air temperature. Names

given to fog types identify their methods of formation. The principle types are radiation fog, ice fog, advection fog, upslope fog, rain induced fog, and steam fog. These types of fog are called "dense" when the surface visibility is equal to or less than 1/4 mile. A Dense Fog Advisory will be issued when the dense fog becomes widespread.

**Foëhn**: A warm dry wind on the lee side of a mountain range. The heating and drying are due to adiabatic compression as the winds descend downslope. Foëhn winds are Mistrals in France, Sciroccos in North Africa, Chinooks in the northern plains of the U.S., Mono Winds in Northern California, Diablo Winds in the San Francisco Bay Area, and Santa Ana Winds in Southern California.

**Forecast Models**: Forecasters use numerical weather models to make their forecasts. These numerical models are classified into four main classes. The first is global models, which focus on the entire northern hemisphere. The second is national models, which focus on the USA. The third is regional models. These regional models have a finer grid than national models and are run out for smaller periods of time. The final class of models is relocatable models, which do not focus on any permanent geographical location. Relocatable models are very limited on the size of the geographical area for which they can forecast, but these models have very high resolutions, or very small forecast grid boxes.

**Freeze**: It is when the surface air temperature is expected to be 32°F or below over a widespread area for a climatologically significant period of time. Use of the term is usually restricted to advective situations or to occasions when wind or other conditions prevent frost. Adjectives such as "killing", "severe", or "hard" will be used when appropriate. "Killing" may be used during the growing season when the temperature is expected to be low enough for a sufficient duration to kill all but the hardiest herbaceous crops or plants.

**Freezing Level**: The lowest altitude in the atmosphere, or a given location, at which the air temperature is 32°F.

**Freezing Rain or Drizzle**: This occurs when rain or drizzle freezes on surfaces (such as the ground, trees, power lines, motor vehicles, streets, highways, etc.) that have a temperature of 32°F or below. Small accumulations of ice can cause driving and walking difficulties. Meanwhile, heavy accumulations of ice can pull down trees and utility lines. In this situation, it would be called an Ice Storm.

**Front**: A boundary or transition zone between two air masses of different density, and thus (usually) of different temperature. A moving front is named according to the advancing air mass, e.g., cold front if colder air is advancing. See cold front, occluded front, stationary front, and warm front.

**Frost**: The formation of ice crystals on the ground or other surfaces in the form of scales, needles, feathers, or fans. Frost develops under conditions similar to dew, except the temperatures of the Earth's surface and earthbound objects fall below 32°F. As with the term "freeze", this condition is primarily significant during the growing season. If a frost period is sufficiently severe to end the growing season or delay its beginning, it is commonly referred to

as a "killing frost". Some objects cool more efficiently than the air, and can cause frost to form on objects, even when air temperatures are well above freezing.

**Frost/Freeze Advisory**: This product is issued by the NWS when freezing temperatures or conditions conducive to the formation of frost occur during the growing season.

**Frost Point**: Dew point below freezing.

**Fractus**: Ragged, detached cloud fragments; same as scud.

**Fuel Moisture**: The water content of fuel particle expressed as a percent of the oven dried weight of the fuel particle. Fuel moisture observations are generally for the 10-hour time lag fuels (medium-sized roundwood 1/4" to 1" in diameter).

**Fujita Scale (F-scale)**: A scale used to classify the strength of a tornado. It was devised by Dr. Theodore Fujita from the University of Chicago. The F-scale gives tornadoes a numerical rating from F0 to F5 based on wind damage. This system was adjusted by the NWS as the Enhanced Fujita Scale and implemented in 2007.

**Funnel Cloud (FC)**: A condensation funnel extending from the base of a towering cumulus or Cb, associated with a rotating column of air that is not in contact with the ground (and hence different from a tornado). A condensation funnel is a tornado, not a funnel cloud, if either it is in contact with the ground, or a debris cloud or dust whirl is visible beneath it.

**Gale**: Wind speeds from 39 to 54 mph (34 to 47 knots).

**Gale Warning**: The NWS will issue marine warnings for 1-minute sustained winds between 34 (39 mph) and 47 knots (54 mph) are expected in coastal waters.

**Geostationary Satellite**: Satellites orbiting at 22,370 miles above the Earth's surface with the same rotational velocity as the Earth; therefore, the satellite remains over the same location on the Earth 24 hours a day.

**GFS**: An acronym for Global Forecast System.

**Glaze**: Ice formed by freezing precipitation covering the ground or exposed objects.

**Global Forecast System (GFS)**: The MRF and AVN forecast models from NCEP were combined into a single system and renamed the Global Forecast System (GFS). The GFS produces forecasts out to 16 days, four times per day.

**Global Warming**: An overall increase in world temperatures which may be caused by additional heat being trapped by greenhouse gases.

**GOES**: **G**eostationary **O**perational **E**nvironmental **S**atellite.

**Gradient**: The time rate or spatial rate of change of an atmospheric property.

**Graupel**: Small pellets of ice created when supercooled water droplets coat, or rime, a snowflake. The pellets are cloudy or white, not clear like sleet, and often are mistaken for hail. Also called soft hail, snow pellets, or tapioca snow.

**Gravity Wave**: A wave disturbance in which buoyancy acts as the restoring force on parcels displaced from hydrostatic equilibrium. Waves on the ocean are examples of gravity waves.

**Greenhouse Effect**: The heating effect caused by gases in the atmosphere absorbing heat (solar radiation) instead of letting it escape back into space. There are 2 types: **Natural** - It is what keeps the Earth's average temperature at 59°F instead of 0°F. In this case, the most abundant greenhouse gas is water vapor. **Anthropogenic** - Additional warming caused by having too much carbon dioxide ($CO_2$).

**Ground Clutter**: A pattern of radar echoes from fixed ground targets (buildings, hills, etc.) near the radar. Ground clutter may hide or confuse precipitation echoes near the radar antenna. It is usually more noticeable at night when the radar beam is encountering superrefractive conditions.

**Ground Fog**: Fog produced over the land by the cooling of the lower atmosphere as it comes in contact with the ground. Also known as radiation fog, and in Central California as tule fog. Groung fog has little vertical extent (usually 20 feet or less).
Gust: A brief sudden increase in wind speed. Generally the duration is less than 20 seconds and the fluctuation greater than 10 mph.

Gust Front: Formed when the down draft and rain-cooled air of a thunderstorm reach the ground, and then spread out along the ground. Usually marked by a sudden wind shift, sharply falling temperatures, and possibly heavy downpours and/or hail. If two or more of these gust fronts intersect each other, a new thunderstorm could possibly develop. Sometimes it is associated with a shelf cloud or roll cloud. Also, see downburst, gustnado, and outflow boundary. .

Gustnado: Slang for a gust front tornado. A small tornado, usually weak and short-lived, that occurs along the gust front of a thunderstorm. Often it is visible only as a debris cloud or dust whirl near the ground. Gustnadoes are not associated with storm-scale rotation (i.e. mesocyclones).

**Gyre**: A circular or spiral motion, primarily referring to water currents.

**Hail (GR)**: Precipitation in the form of balls or lumps usually consisting of concentric layers of ice. A thunderstorm is classified as severe when it produces hail 3/4" or larger in diameter.

**Haines Index**: This is also called the Lower Atmosphere Stability Index. It is computed from the morning (12Z) soundings from RAOB stations across North America. The index is composed of a stability term and a moisture term. The stability term is derived from the temperature difference at two atmosphere levels. The moisture term is derived from the dew point depression at a single atmosphere level. This index has been shown to be correlated with large fire growth on initiating

and existing fires where surface winds do not dominate fire behavior. The Haines Indexes range from 2 to 6 for indicating potential for large fire growth: 2 – Very Low Potential (Moist Stable Lower Atmosphere), 3 – Very Low Potential, 4 – Low Potential, 5 – Moderate Potential, 6 – High Potential (Dry unstable lower atmosphere.

**Halos**: Rings or arcs that seem to encircle the sun or moon. They are caused by the refraction of light through the ice crystals in cirrus clouds.

**Haze (HZ)**: A concentration of salt particles or other dry particles not readily classified as dust or other phenomenon. Occurs in stable air usually only a few thousand feet thick, but may extend as high as 15,000 feet. Haze layers often have definite tops above which the visibilities are good. However, the visibility in the haze layer can be very poor.

**Heat Advisory**: This product is issued by the NWS when excessive heat may pose a hazard or is life threatening if action is not taken. The criteria for this advisory varies from state to state.

**Heating Degree Day**: see Degree Day.

**Heat Index**: The Heat Index (HI) or the "Apparent Temperature" is an accurate measure of how hot it really feels when the Relative Humidity (RH) is added to the actual air temperature. As an example, if the air temperature is 90°F and the Relative Humidity (RH) is 70%, the Heat Index (HI)--or how hot it actually feels--is 106°F. This index was devised for shady, light wind conditions. Exposure to full sunshine can increase Heat Index (HI) values by up to 15°F. Also strong winds, particularly with very hot, dry air, can be extremely dangerous. Any value Heat Index (HI) greater than 105°F is in the Danger Category. When the Heat Index is between 105-115°F for 3 hours or more, a Heat Advisory will be issued by the local NWS Forecast Office. See also Apparent Temperature.

**Heat Island**: A dome of elevated temperatures over an urban area caused by the heat absorbed by structures and pavement.

**Heat Lightning**: Lightning that occurs at a distance such that thunder is no longer audible.

**Heavy Snow**: Depending on the region of the USA, this generally means that four or more inches of snow has accumulated in 12 hours, or six or more inches of snow in 24 hours.

**Height**: The altitude above sea level at which a specified pressure is present, e.g. a 500 millibar height may be 5640 meters in altitude. Lower values indicate an upper trough of low pressure while higher values indicate an upper ridge of high pressure.

**Helicity**: A property of a moving fluid which represents the potential for helical flow (i.e. flow which follows the pattern of a corkscrew) to evolve. Helicity is proportional to the strength of the flow, the amount of vertical wind shear, and the amount of turning in the flow (i.e. vorticity). Atmospheric helicity is computed from the vertical wind profile in the lower part of the atmosphere (usually from the surface up to 3 km), and is measured relative to storm motion. This value allows the forecaster to determine the rotational tendency of a thunderstorm. Higher values

of helicity (generally, around 150 m2/s2 or more) favor the development of mid-level rotation (i.e. mesocyclones). Extreme values can exceed 600 m2/s2. It is dependent on the local environmental wind profile in which a thunderstorm develops and the thunderstorm motion.

**High**: A region of high pressure, marked as a blue "H" on a weather map. A high is usually associated with fair weather. See anticyclone.

**High Clouds**: These clouds have bases between 16,500 and 45,000 feet in the mid latitudes. At this level they are composed of primarily of ice crystals. Some clouds at this level are cirrus, cirrocumulus, and cirrostratus.

**High Wind Advisory**: This product is issued by local NWS Forecast Offices when high wind speeds may pose a hazard. The criteria for this advisory varies from state to state.

**High Wind Watch**: This product is issued by local NWS Forecast Offices when there is the potential of high wind speeds developing that may pose a hazard or is life threatening.

**High Wind Warning**: This product is issued by local NWS Forecast Offices when high wind speeds may pose a hazard or is life threatening. The criteria for this warning varies from state to state.

**Hook or Hook Echo**: A pendant or hook on the right rear of a radar echo that often identifies mesocyclones on the radar display. The hook is caused by precipitation drawn into a cyclonic spiral by the winds, and the associated notch in the echo is caused by precipitation-free, warm, moist air flowing into the storm. A hook often is associated with a mesocyclone, and indicates favorable conditions for tornado development.

**HMT (Hydrometeorological Technicians)**: Individuals who, at the technical level, have knowledge in meteorology and hydrology. Among their duties are data collection, quality control, gage network maintenance, as well as the gathering and disseminating of data and products.

**HP (High Precipitation) Storm or HP (High Precipitation) Supercell**: A supercell thunderstorm in which heavy precipitation (often including hail) falls on the trailing side of the mesocyclone. Precipitation often totally envelops the region of rotation, making visual identification of any embedded tornadoes difficult and very dangerous. HP storms often produce extreme and prolonged downburst events, serious flash flooding, and very large damaging hail events.

**HPC**: An acronym for the Hydrometeorological Prediction Center.

**Humidity**: Generally, a measure of the water vapor content of the air. Popularly, it is used synonymously with relative humidity.

**Hurricane**: A warm-core tropical cyclone in which the maximum sustained surface wind (using the U.S. 1-minute average) is 64 kt (74 mph or 119 kph) or more. The term hurricane is used for

Northern Hemisphere cyclones east of the International Dateline to the Greenwich Meridian. It has a diameter of 250 to 500 miles and a cyclonic circulation typically extending to near 50,000 feet. It is called a Typhoon in the western Pacific north of the Equator and west of the International Dateline, a Cyclone in the Indian Ocean, and Baguio in the Philippines area. See Saffir-Simpson Hurricane Intensity Scale.

**Hurricane Local Statement (HLS)**: This product is issued by a local NWS office when it is in or near an area threatened by a tropical storm or a hurricane. This statement will take the place of Special (SPS) and Severe (SVS) Statements, Flash Flood/Flood (FFS) Statements, Coastal Flood Statements, and Marine Weather (MWS) Statements. This statement does not replace the tropical storm or hurricane advisory from a hurricane center; rather, it complements the advisory with crucial local information. Inland offices close to the coast may use HLSs if tropical storm or hurricane conditions are forecasted or observed.

**Hurricane Season**: The portion of the year having a relatively high incidence of hurricanes. The hurricane season in the Atlantic, Caribbean, and Gulf of Mexico runs from June 1 to November 30. The hurricane season in the Eastern Pacific basin runs from May 15 to November 30. The hurricane season in the Central Pacific basin runs from June 1 to November 30.

**Hurricane Warning**: A warning that sustained winds 64 kt (74 mph or 119 kph) or higher associated with a hurricane are expected in a specified coastal area in 24 hours or less. A hurricane warning can remain in effect when dangerously high water or a combination of dangerously high water and exceptionally high waves continue, even though winds may be less than hurricane force.

**Hurricane Watch**: An announcement of specific coastal areas that a hurricane or an incipient hurricane condition poses a possible threat, generally within 36 hours.

**Hydrologic Cycle**: The constant movement of water above, on, and below the Earth's surface. Processes such as precipitation, evaporation, condensation, infiltration, and runoff comprise the cycle. Within the cycle, water changes forms in response to the Earth's climatic conditions.

**Hydrologic Services**: A general term referring to the operations, products, verbal communications, and related forms of support provided by the NWS for the Nation's streams, reservoirs, and other areas affected by surface water.

**Hydrology**: The applied science concerned with the waters of the earth, their occurrences, distribution, and circulation through the unending hydrologic cycle of: Precipitation, consequent runoff, infiltration, and storage; eventual evaporation; and so forth. It is concerned with the physical and chemical reaction of water with the rest of the earth, and its relation to the life of the earth.

**Hydrometeor**: A particle of condensed water (liquid, snow, ice, graupel, hail) in the atmosphere.

**Hydrometeorological Prediction Center (HPC)**: This is one of 9 centers that comprises the National Centers for Environmental Prediction (NCEP). This national center provides basic

hydrometeorological analysis and forecasts for NWS Field Offices and the entire meteorological community. HPC meteorologists serve as experts in quantitative precipitation forecasting and numerical model interpretation. Products provided by the HPC include surface analyses, outlooks for heavy rain and snow, as well as guidance weather forecasts through five days.

**Hydrometeorologists**: Individuals who have the combined knowledge in the fields of both meteorology and hydrology which enables them to study and solve hydrologic problems where meteorology is a factor.

**Hydrometeorology**: The interdisciplinary science involving the study and analysis of the interrelation between the atmospheric and land phases of water as it moves through the hydrologic cycle.

**Hygrometer**: An instrument which measures the humidity of the air.

**Ice Crystals (IC)**: A fall of unbranched (snow crystals are branched) ice crystals in the form of needles, columns, or plates. They are also referred to as *Diamond Dust*.

**Ice Fog**: Occurs when the temperature is much below freezing and water vapor condenses directly as ice crystals (sublimation). It is a radiational fog and the conditions for its formation are the same as for radiational fog except that the temperature must be cold. It occurs mostly in Arctic regions, but it is not unknown in middle latitudes during the cold season.

**Ice Pellets (PL)**: Precipitation of transparent and translucent pellets of ice, which are round or irregular, rarely conical, and which have a diameter of 0.2" (5 mm), or less. Ice Pellets bounce when they make contact with the ground. It is sometimes called "Sleet". There are two main types: 1 – Hard grains of ice consisting of frozen raindrops, or largely melted and refrozen snowflakes. 2 – Pellets of snow encased in a thin layer of ice which have formed from the freezing, either of droplets intercepted by the pellets, or of water resulting from the partial melting of the pellets.

**Ice Storm**: Occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in the loss of power and communications. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulation are accumulations of ¼" or greater.

**Ice Storm Warning**: This product is issued by the NWS when freezing rain produces a significant and possibly damaging accumulation of ice. The criteria for this warning varies from state to state.

**Impulse**: See upper level system.

**Indian Summer**: An unseasonably warm and calm period near the middle of autumn, usually following a substantial period of cool weather. Usually referred to in northern climates.

**Infrared (IR) Satellite Imagery**: This satellite imagery senses surface and cloud top temperatures by measuring the wavelength of electromagnetic radiation emitted from these objects. This energy is called "infrared". High clouds are very cold, so they appear white. Mid-level clouds are somewhat warmer, so they will be a light gray shade. Low clouds are warmer still, so they appear as a dark shade of gray or black. Often, low clouds are the same temperature as the surrounding terrain and cannot be distinguished at all. This imagery can be used both during the day and night.

**Insolation**: Incoming solar radiation. Solar heating; sunshine.

**Instability (Unstable Air)**: A state of atmosphere in which the vertical distribution of temperature allows rising, warm air to continue to rise and accelerate. This kind of motion is conducive for thunderstorm development. Instability is a prerequisite for severe weather - the greater the instability, the greater the potential for severe thunderstorms. See lifted index and sounding.

**Intertropical Convergence Zone (ITCZ)**: The boundary zone separating the northeast trade winds of the Northern Hemisphere from the southeast trade winds of the Southern Hemisphere. This region often contains convection along the zone.

**Inversion**: Generally, a departure from the usual increase or decrease in an atmospheric property with altitude. Specifically it almost always refers to a temperature inversion, i.e., an increase in temperature with height, or to the layer within which such an increase occurs. This occurs when warm air sits over cold air, possibly trapping moisture and pollutants in the surface air layer. An inversion is present at the top of the marine layer and in the lower part of a cap.

**IR**: An acronym for Infrared. See Infrared Satellite Imagery.

**Iridescent Clouds**: Clouds that exhibit brilliant bright spots, bands, or borders of colors, usually red and green, observed up to about 30 degrees from the sun. The coloration is due to the diffraction with small cloud particles producing the effect. It is usually seen in thin cirrostratus, cirrocumulus, and altocumulus clouds.

**Island Effect (Bands)**: The effect that produces lines of convection in the lee of islands. As winds are forced around the islands, they collide on the lee side and air is forced upward. In an unstable air mass, this can produce convective showers, thunderstorms, waterspouts and funnel clouds. See also Convergence Zone.

**Isobar**: A line of equal barometric pressure on a weather map.

**Isolated**: An NWS convective precipitation descriptor for a 10% chance of measurable precipitation (0.01"). Isolated is used interchangeably with few. See Precipitation Probability (PoP).

**Isolated Storm**: An individual cell or a group of cells that are identifiable and separate from other cells in a geographic area.

**Isotach**: A line on a weather map connecting points of equal wind speed.

**Isotherm**: A line on a weather map connecting points of equal temperature.

**Isothermal**: Of equal or constant temperature with respect to either space or time.

**Isothermal Atmosphere**: An atmosphere in hydrostatic equilibrium in which the temperature is constant with altitude and in which, the pressure decreases exponentially upward.

**Isothermal Layer**: Any layer where the temperature is constant with altitude, such that the temperature lapse rate is zero. Specifically, the approximately isothermal region of the atmosphere immediately above the tropopause.

**ITCZ**: Acronym for Inter-tropical Convergence Zone.

**Jet Max (or Speed Max, Jet Streak)**: A point or area of relative maximum wind speeds within a jet stream.

**Jet Streak**: A concentrated region within the jet stream where the wind speeds are the strongest. It sets up unique wind currents in its vicinity which either enhance or diminish the likelihood of clouds and precipitation. It will propagate downstream along the jet stream axis.

**Jet Stream**: A narrow band of strong winds in the atmosphere that controls the movement of high and low pressure systems and associated fronts. Jet Streams meander from time to time. Wind speeds can reach 200 mph or higher in certain cases. It is usually found at 30,000 to 40,000 feet above the earth's surface. It owes its existence to the large temperature contrast between the polar and equatorial regions. The position and orientation of jet streams vary from day to day. General weather patterns (hot/cold, wet/dry) are related closely to the position, strength and orientation of the jet stream (or jet streams).

**Jetty**: A structure (e.g.; a pier, or mole of wood or stone) extending into a sea, lake, or river to influence the current or tide or to protect a harbor.

**Katabatic Wind**: A wind that blows down a topographic incline such as a hill, mountain, or glacier as a result of cold, dense air flowing downhill.

**Knot**: Unit of speed used in aviation and marine activities which is equal to 1 nautical mile per hour or about 1.15 statue miles an hour.

**Land Breeze**: A wind that blows from the land towards a body of water and caused by the difference in surface temperature (heating) of the land and water. Also known as an offshore breeze.

**Landspout**: Slang for a tornado that does not arise from organized storm-scale rotation and therefore is not associated with a wall cloud (visually) or a mesocyclone (on radar). Landspouts

typically are observed beneath Cbs or towering cumulus clouds (often as no more than a dust whirl), and essentially are the land-based equivalents of waterspouts. It is believed that most California tornadoes are of the landspout variety.

**La Niña**: The cool phase of the Southern Oscillation (SO), or the opposite of El Niño. Characterized by the cooling of the sea surface temperatures (SST) in the central and eastern equatorial Pacific Ocean. See El Niño, Southern Oscillation and ENSO.

**Lapse Rate**: The rate of change of an atmospheric variable, usually temperature, with height. A steep lapse rate implies a rapid decrease in temperature with height (a sign of instability) and a steepening lapse rate implies that destabilization is occurring.

**Large-scale**: See synoptic-scale.

**Lee Effect**: The effect of topography on winds to the lee (downwind) side of an obstacle such as a steep island, cliff, or mountain range.

**Leeside**: The downwind side of a mountain chain.

**Leeside Low**: Extratropical cyclones that form on the downwind (lee) side of a mountain chain. In the United States, they frequently form on the eastern side of the Rockies and Sierra Nevada.

**Left Front Quadrant**: The area downstream from and to the left of an upper-level jet max (as would be viewed looking along the direction of flow). Upward motion and severe thunderstorm potential sometimes are increased in this area relative to the wind speed maximum. Also, see right rear quadrant.

**Lightning**: A sudden visible flash of energy and light caused by electrical discharges from thunderstorms.

**Lightning Flash**: The total luminous phenomenon accompanying a lightning discharge. It may be composed of one to a few tens of strokes that use essentially the same channel to ground.

**Lightning Stroke**: Any of a series of repeated electrical discharges comprising a single lightning discharge (strike). Specifically, in the case of a cloud-to-ground discharge, a leader plus its subsequent return streamer.

**Likely**: An NWS precipitation descriptor for a 60% or 70% chance of measurable precipitation (0.01"). When the precipitation is showery or convective in nature, the term numerous will occasionally be used. See Precipitation Probability (PoP).

**Loaded Gun (Sounding)**: Slang for a sounding characterized by extreme instability but containing a cap, such that explosive thunderstorm development can be expected if the cap can be weakened or the air below it heated sufficiently to overcome it.

**Local Flooding**: Flooding conditions over a relatively limited (localized) area.

**Local Storm Report (LSR)**: A product issued by local NWS offices to inform users of reports of severe and/or significant weather-related events.

**Longwave Trough**: A trough in the prevailing westerly flow aloft which is characterized by large length and (usually) long duration. Generally, there are no more than about five longwave troughs around the Northern Hemisphere at any given time. Their position and intensity govern general weather patterns (e.g., hot/cold, wet/dry) over periods of days, weeks, or months. Smaller disturbances (e.g., shortwave troughs) typically move more rapidly through the broader flow of a longwave trough, producing weather changes over shorter time periods (a day or less).

**Low**: A region of low pressure, marked as "L" on a weather map. A low center is usually accompanied by precipitation, extensive cloudiness, and moderate winds. See cyclone.

**Low Clouds**: The bases of these clouds range from near the surface to about 6,500 feet in middle latitudes. These clouds are almost entirely of water, but the water may be supercooled at sub-freezing temperatures. Low clouds at sub-freezing temperatures can also contain snow and ice particles. The two most common members of this family are stratus and stratocumulus.

**Macroburst**: One of 2 categories of downbursts (the other category is called a microburst). This Downburst has an affected outflow area of at least 2.5 miles wide and peak winds lasting between 5 and 20 minutes. Intense macrobursts may cause tornado-force damage up to F-3.

**Main Stem**: The reach of a river/stream formed by the tributaries that flow into it.

**Major Flooding**: A general term including extensive inundation and property damage. (Usually characterized by the evacuation of people and livestock and the closure of both primary and secondary roads.)

**Mammatus Clouds**: Rounded, smooth, sack-like protrusions hanging from the underside of a cloud (usually a thunderstorm anvil). Mammatus clouds often accompany severe thunderstorms, but do not produce severe weather; they may accompany non-severe storms as well.

**Marine Inversion**: A temperature inversion created by the cooling of a warm air mass from below by the cooler ocean.

**Marine Weather Statement**: The NWS will issue this statement: 1. To provide follow-up information on Special Marine Warnings and to cancel all or part of a warning. 2. To describe short duration, non-severe, but potentially hazardous conditions which sustained winds or frequent gusts are less than 34 knots for 2 hours or less. Short-lived increases in winds, although below threshold for Special Marine Warnings, that may make small craft handling difficult especially for inexperienced boaters. 3. To provide information for a variety of conditions not covered by warnings or routine forecasts (e.g., low water conditions, dense fog, etc.). 4. To discuss increasing or decreasing winds and to convey details on possible later warnings.

**Maritime Air Mass**: A moist air mass originating over the ocean.

**MB**: An acronym for millibars.

**Mean Low Water (MLW)**: The average height of the daily low tides recorded over a 19-year period at a specific location.

**Mean Lower Low Water (MLLW)**: The average height of the lower of the two low tides occurring during a tidal cycle recorded over a 19-year period at a particular location.

**Mean Sea Level (MSL)**: The average height of the surface of the sea at a particular location for all stages of the tide over a 19-year period. This is usually determined from the hourly height readings of the tide gage at that site.

**Mean Temperature**: The average of a series of temperatures taken over a period of time, such as a day or a month.

**Measurable**: Precipitation of 0.01" or more.

**Medium Range**: In forecasting, (generally) three to seven days in advance.

**Melting Level**: The altitude which ice crystals and snowflakes melt as they descend through the atmosphere.

**Meniscus**: The curved surface of the liquid at the open end of a capillary column, as in a rain gage.

**Meridional Flow**: Large-scale atmospheric flow in which the north-south component (i.e., longitudinal, or along a meridian) is pronounced. The accompanying zonal (east-west) component often is weaker than normal. Compare with zonal flow.

**Mesocyclone (MESO)**: A storm-scale region of rotation, typically around 2-6 miles in diameter and often found in the right rear flank of a supercell (or often on the eastern, or front, flank of an HP storm). The circulation of a mesocyclone covers an area much larger than the tornado that may develop within it. Properly used, mesocyclone is a radar term; it is defined as a rotation signature appearing on Doppler radar that meets specific criteria for magnitude, vertical depth, and duration.

**Mesonet**: A regional network of observing stations (usually surface stations) designed to diagnose mesoscale weather features and their associated processes.

**Mesoscale**: Size scale referring to weather systems smaller than synoptic-scale systems but larger than storm-scale systems. Horizontal dimensions generally range from around 50 miles to several hundred miles. Squall lines and large thunderstorm complexes are examples of mesoscale weather systems.

**METAR**: A weather observation near ground level. It may include date and time, wind, visibility, weather and obstructions to vision, sky condition, temperature and dew point, sea level pressure, precipitation amount and other data used for aircraft operations.

**Meteorology**: The study of the atmosphere and atmospheric phenomena.

**Microburst**: One of 2 categories of downbursts (the other category is called a macroburst). This downburst has an affected outflow area of less than 2.5 miles wide and peak winds lasting less than 5 minutes. They may induce dangerous horizontal/vertical wind shears, which can adversely affect aircraft performance and cause property damage. They can be sub-classified into either dry or wet microburst depending on how much (or little) rain accompanies the microburst when it reaches the ground. Most microbursts are rather short-lived (5 minutes or so), but on rare occasions they have been known to last up to 6 times that long.

**Middle Clouds**: In the middle family are the altostratus, altocumulus, and nimbostratus clouds. The height of the bases of these clouds ranges from 6,500 to 23,000 feet in middle latitudes. These clouds are primarily water; however, much of the water may be supercooled and the clouds can contain some ice crystals.

**Mid-Latitude Areas**: Areas between 30° and 60° north and south of the Equator.

**Millibar (mb)**: Unit of atmospheric pressure. It is equal to 0.03" of mercury and 100 Pa (pascal). One thousand millibars equals 29.55" of mercury on a barometer. Normal surface pressure is approximately 1013 millibars.

**Minor Flooding**: A general term indicating minimal or no property damage but possibly some public inconvenience.

**Minor Tidal Overflow**: Minor flooding caused by high tides, which results in little if any damage.

**Mist (BR)**: A visible aggregate of minute water particles suspended in the atmosphere that reduces visibility to less than 7 statue miles, but greater than or equal to 5/8 statue miles.

**Mixing**: Air movements (usually vertical) that make the properties of a parcel of air homogeneous. It may result in a lapse rate approaching the moist or dry adiabatic rate.

**Model**: A mathematical representation of a process, system, or object developed to understand its behavior or to make predictions. The representation always involves certain simplifications and assumptions. Models are one of the primary forecasting tools used in the NWS.

**Model Output Statistics (MOS)**: A set of statistical equations that use model output to forecast the probability of precipitation, high and low temperature, cloud cover, and precipitation amount for many cities across the USA. The statistical equations were specifically tailored for each location, taking into account factors such as each location's climate.

**Monsoon**: A persistent seasonal wind, often responsible for seasonal precipitation regime or a wind which blows from opposite directions between winter and summer. Usually the wind blows from land to sea in winter and from sea to land in summer. In the Southwest U.S. the "Southwest Monsoon" occurs during late summer, producing usually diurnal thunderstorms. For many desert locations, this is the cause of the majority of the annual rainfall.

**MOS**: An acronym for Model Output Statistics.

**Mostly Clear**:When the predominant/average sky condition is covered 1/8 to 2/8 with opaque (not transparent) clouds. Sometime called Mostly Sunny if it is during the day.

**Mostly Cloudy**: When the predominant/average sky condition is covered by more than half, but not completely covered by opaque (not transparent) clouds. In other words, 5/8 to 7/8 of the sky is covered by opaque clouds.

**Mostly Sunny**: When the predominant/average daytime sky condition is covered 1/8 to 2/8 with opaque (not transparent) clouds. Same as mostly clear.

**MRF - Medium-Range Forecast model**: The MRF was one of the main models forecasters use for the medium range time period beyond 48 hours into the future. It is has been replaced by the Global Forecast System (GFS).

**MSLP**: Acronym for Mean sea level pressure.

**Muggy**: Colloquially descriptive of warm and especially humid weather.

**Multicell Thunderstorms**: These thunderstorms are organized in clusters of at least 2-4 short-lived cells. Each cell generates a cold air outflow and these individual outflows combine to form a large gust front. Convergence along the gust front causes new cells to develop every 5 to 15 minutes. The cells move roughly with the mean wind.

**NAM**: An acronym for the North American model. generated every 6 hours by NCEP.

**National Environmental Satellite, Data, and Information Service (NESDIS)**: NESDIS collects, processes, stores, analyzes, and disseminates various types of hydrologic, meteorologic, and oceanic data. NESDIS is also responsible for the development of analytical and descriptive products so as to meet the needs of its users.

**National Oceanographic and Atmospheric Administration (NOAA)**: A branch of the US Department of Commerce, NOAA is the parent organization of the NWS. Other agencies within NOAA include: National Environmental Satellite, Data, and Information Service, the National Marine Fisheries Service, and the National Ocean Service.

**National Centers for Environmental Prediction (NCEP)**: The National Oceanic and Atmospheric Administration created the National Centers for Environmental Prediction (NCEP) to take advantage of improving technology and better serve the public and modernized NWS.

The NCEP's goal is to protect life and property, as well as mitigate economic loss, by providing accurate forecasts and forecast guidance products to weather service field offices. The NCEP prepares and makes available national forecasts and outlooks of weather and climate. Meteorologists currently generate weather forecasts to seven days. Climate predictions are made for two weeks out to a year. Nine national centers comprise the NCEP: Aviation Weather Center, Climate Prediction Center, Environmental Modeling Center, Hydrometeorological Prediction Center, NCEP Central Operations, Ocean Prediction Center, Space Environmental Center, Storm Prediction Center, and Tropical Prediction Center.

**National Climatic Data Center (NCDC)**: Located in Asheville, North Carolina, the agency that archives and distributes climatic and forecast data.

**National Fire Danger Rating System (NFDRS)**: A system that directly integrates the effects of fuels, topography, and weather into components that associates with occurrence and fire behavior potential. The system uses the components to derive indices that indicate the number of fires, difficulty of containment, and finally, the total fire control job in a rating area. The system is intended to provide guidance for short-range planning by evaluating the near upper limits of the behavior of fires that might occur in an area during the rating period. It is not designed to serve as a direct fire behavior forecast.

**National Hurricane Center (NHC)**: This center maintains a continuous watch on tropical cyclones over the Atlantic, Caribbean, Gulf of Mexico, and the Eastern Pacific from 15 May through November 30. The Center prepares and distributes hurricane watches and warnings. During the "off-season" NHC provides training for U.S. emergency managers and representatives from many other countries that are affected by tropical cyclones. NHC also conducts applied research to evaluate and improve hurricane forecasting techniques, and is involved in public awareness programs.

**National Weather Service (NWS)**: The National Weather Service (NWS) provides weather, hydrologic, and climate forecasts and warnings for the United States, its territories, adjacent waters and ocean areas, for the protection of life and property and the enhancement of the national economy. NWS data and products form a national information database and infrastructure which can be used by other governmental agencies, the private sector, the public, and the global community. This mission is accomplished by providing warnings and forecasts of hazardous weather, including thunderstorms, flooding, hurricanes, tornadoes, winter weather, tsunamis, and climate events. The NWS is the sole United States *official* voice for issuing warnings during life-threatening weather situations.

**Neap Tide**: A minimum tide occurring at the first and third quarters of the moon.

**Negative-Tilt Trough**: An upper level system which is tilted to the west with increasing latitude (i.e., with an axis from southeast to northwest). A negative-tilt trough often is a sign of a developing or intensifying system.

**Negative Vorticity Advection (NVA)**: A region of negative vorticity usually several hundred of kilometers wide on a upper level chart that moves with the general wind flow. It aids in weather prediction by showing where regions of sinking air. This is typically associated with clear skies.

**NESDIS**: An acronym for National Environmental Satellite, Data, and Information Service.

**NEXRAD**: An acronym that stands for **NEX**t generation of weather **RAD**ar. It is a technologically-advanced weather radar. NEXRAD is a high-resolution Doppler radar with increased emphasis on automation, including use of algorithms and automated volume scans. NEXRAD units are known as WSR-88D.

**Nimbostratus (Ns)**: A dark, gray cloud characterized by more or less continuously falling precipitation. It is not accompanied by lightning, thunder, or hail. They normally occur between 6,500 and 23,000 feet above the ground.

**NOAA**: An acronym for National Oceanographic and Atmospheric Administration.

**NOAAPORT Broadcast System**: This provides a one-way broadcast communication of NOAA environmental data and information in near-real time to NOAA and external users. This broadcast service is implemented by a commercial provider of satellite communications utilizing C-band. Weather data is collected by GOES satellite environmental sensors and NWS observing systems, and processed to create products. The products are fed to the AWIPS Network Control Facility (NCF) which routes the products to the appropriate NOAAPORT channel for uplink and broadcast.

**NOAA All-Hazards Radio**: It is the voice of the NWS. NOAA All-Hazards Radio broadcasts NWS warnings, watches, forecasts and other hazard information from other government agencies 24 hours a day. It is provided as a public service by the Department of Commerce's National Oceanic and Atmospheric Administration. The NOAA All-Hazards Radio network has more than 700 stations.

**NOAA Weather Wire Service (NWWS)**: The NOAA Weather Wire Service is the primary telecommunications network for NWS forecasts, warnings and other products to the mass media (newspapers, radio stations, TV, etc.) and emergency management agencies. The NWWS is a satellite communications system that transmits NWS products directly from NWS offices to external users. The NWWS satellite communications system is operated by GTE Corp., under contract to the NWS. The system uses satellite transmitting (i.e. "uplink") equipment at more than 58 major NWS forecast offices.

**Noctilucent Clouds**: Wavy, thin, bluish-white clouds that are best seen at twilight in polar latitudes. They form at altitudes about 80 to 90 km above the Earth's surface.

**North American Model (NAM)**: The North American model, which is generated every 6 hours by NCEP. This model is more regional in nature and contains a higher spatial resolution than the more global GFS model.

**Normal**: The long-term average value of a meteorological element for a certain area. For example, "temperatures are normal for this time of year". Usually averaged over 30 years.

**Nowcast**: A weather forecast, generally out to six hours or less. This is also called a Short Term Forecast.

**NVA**: An acronym for Negative Vorticity Advection.

**NSSL (National Severe Storms Laboratory)**: NSSL is one of NOAA's internationally known Environmental Research Laboratories, leading the way in investigations of all aspects of severe weather. Headquartered in Norman OK with staff in Colorado, Nevada, Washington, Utah, and Wisconsin, the people of NSSL, in partnership with the NWS, are dedicated to improving severe weather warnings and forecasts in order to save lives and reduce property damage.

**Nucleus**: A particle of any nature upon which molecules of water or ice accumulate.

**Numerical Weather Prediction (NWP)**: Forecasting weather by the use of numerical models, run on high speed computers. Most of the NWP for the NWS is done at the National Centers for Environmental Prediction (NCEP).

**Numerous**: An NWS convective precipitation descriptor for a 60% or 70% chance of measurable precipitation (0.01"). See Precipitation Probability (PoP).

**NWP**: An acronym for Numerical Weather Prediction.

**NWS**: An acronym for the National Weather Service.

**Occluded Front (Occlusion)**: A complex frontal system that ideally forms when a cold front overtakes a warm front. When the air is colder than the air ahead of it, the front is called a *cold occlusion*. When the air behind the front is milder than the air ahead of it, it is called a *warm occlusion.* These processes lead to the dissipation of the front in which there is no gradient in temperature and moisture.

**Ocean Prediction Center (OPC)**: This is one of 9 centers that comprise the National Centers for Environmental Prediction (NCEP). The Ocean Prediction Center (OPC) is an integral component of NCEP. OPC is located at the NOAA Science Center in Camp Springs, MD. The primary responsibility is the issuance of marine warnings, forecasts, and guidance in text and graphical format for maritime users. Also, the OPC quality controls marine observations globally from ship, buoy, and automated marine observations for gross errors prior to being assimilated into computer model guidance. In addition OPC coordinates with the National Hurricane Center (NHC) with forecast points for tropical cyclones in the Atlantic Ocean E of 65°W.

**Offshore Flow**: Air movement from the interior toward the ocean, usually associated with dry weather. Can be caused by any combination of offshore pressure gradients (higher pressure over the interior and lower pressure off the coast), temperature gradients (colder air over the interior and warmer air off the coast), and/or northeast winds aloft that transfer to the surface. See Foehn and Santa Ana.

**Offshore Forecast (OFF)**: This marine forecast is designed to serve users who operate beyond the coastal waters where it usually requires more than a day or more of sailing to and from port (from 60 to 250 nautical miles). These users are mainly commercial fishermen and merchant shipping and, to a lesser extent, government and research vessels and large recreational craft.

**Omega**: A term used to describe vertical motion in the atmosphere. Omega is determined by the amount of spin (or large scale rotation) and warm (or cold) advection present in the atmosphere. On a weather forecast chart, high values of omega (or a strong omega field) relate to upward vertical motion in the atmosphere. If this upward vertical motion is strong enough and in a sufficiently moist air mass, precipitation results.

**Omega High**: A blocking ridge of high pressure that forms in the middle or upper troposphere. It looks like the Greek letter omega (**Ω**).

**Onshore Flow**: Air movement from the ocean across land. A sea breeze is indicative of onshore flow. It usually indicates an increase in moisture. Can be caused by onshore pressure gradients (higher pressure over the ocean and lower pressure over land).

**Orographic**: Related to, or caused by, physical geography (such as mountains or sloping terrain).

**Orographic Lifting (Upslope Flow)**: Occurs when air is forced to rise and cool due to terrain features such as hills or mountains. If the cooling is sufficient, water vapor condenses into clouds. Additional cooling results in rain or snow. It can cause extensive cloudiness and increased amounts of precipitation in higher terrain.

**Orographic Precipitation**: Precipitation which is caused by hills or mountain ranges deflecting the moisture-laden air masses upward, causing them to cool and precipitate their moisture.

**Orphan Anvil**: Slang for an anvil from a dissipated thunderstorm, below which no other clouds remain.

**Outflow Boundary**: A storm-scale or mesoscale boundary separating thunderstorm-cooled air (outflow) from the surrounding air; similar in effect to a cold front, with passage marked by a wind shift and usually a drop in temperature. Outflow boundaries may persist for 24 hours or more after the thunderstorms that generated them dissipate, and may travel hundreds of miles from their area of origin. New thunderstorms often develop along outflow boundaries, especially near the point of intersection with another boundary (cold front, dry line, another outflow boundary, etc.)

**Overcast (OVC)**: An official sky cover classification for aviation weather observations, when the sky is completely covered by an obscuring phenomenon. This is applied only when obscuring phenomenon aloft are present--that is, not when obscuring phenomenon are surface-based, such as fog.

**Overrunning**: A weather pattern in which a relatively warm air mass is in motion above another air mass of greater density at the surface. Embedded thunderstorms sometimes develop in such a pattern; severe thunderstorms (mainly with large hail) can occur, but tornadoes are unlikely. Overrunning often is applied to the case of warm air riding up over a retreating layer of colder air, as along the sloping surface of a warm front. Such use of the term technically is incorrect, but in general it refers to a pattern characterized by widespread clouds and steady precipitation on the cool side of a front or other boundary.

**Overshooting**: The failure of the radar to detect a target due to the radar beam passing above the target.

**Overshooting Top (or Penetrating Top)**: A dome-like protrusion above a thunderstorm anvil, representing a very strong updraft and hence a higher potential for severe weather with that storm. A persistent and/or large overshooting top (anvil dome) often is present on a supercell. A short-lived overshooting top, or one that forms and dissipates in cycles, may indicate the presence of a pulse storm or a cyclic storm.

**Ozone**: A nearly colorless (but faintly blue) gaseous form of oxygen, with a characteristic odor like that of weak chlorine. Its chemical formula is $O_3$. It is usually found in trace amounts in the atmosphere, but it is primarily found at 30,000 to 150,000 feet above the ground. Its production results from photochemical process involving ultraviolet radiation. Because it absorbs harmful radiation at those heights, it is a very beneficial gas. However, photochemical processes involving industrial/vehicle emissions can produce ozone near the ground. In this case, it can be harmful to people with respiratory or heart problems.

**Pacific High**: A semipermanent anticyclone located in the Eastern North Pacific.

**Palmer Drought Severity Index**: An index whereby excesses or deficiencies of precipitation are determined in relation to average climate values. The index takes in to account precipitation, potential and actual evapotranspiration, infiltration of water into the soil, and runoff.

**Partly Cloudy**: When the predominant/average sky condition is covered 3/8 to 4/8 with opaque (not transparent) clouds. Same as Partly Sunny.

**Partly Sunny**: When the predominant/average sky condition is covered 3/8 to 4/8 with opaque (not transparent) clouds. Same as Partly Cloudy.

**Patchy** or **Patches of**: Used with fog to denote random occurrence over relatively small areas.

**Peak Wind Speed**: The maximum instantaneous wind speed since the last observation that exceeded 25 knots.
**Pineapple Connection** or **Pineapple Express**: Slang for a water vapor plume from the tropics. Usually used on the West Coast describing a plume of water vapor extending from Hawaii.

**Polar Front**: A semipermanent, semicontinuous front that separates tropical air masses from polar air masses.

**Polar Jet Stream**: A jet stream that is associated with the polar front in the middle and high latitudes. It is usually located at altitudes between 9,000 and 12,000 km.

**Polar Orbiting Satellite**: A weather satellite which travels over both poles each time it orbits the Earth. It orbits about 530 miles (850 km) above the Earth's surface.

**Ponding**: In flat areas, runoff collects, or ponds in depression and cannot drain out. Flood waters must infiltrate slowly into the soil, evaporate, or be pumped out.

**Popcorn Convection**: Slang for showers and thunderstorms that form on a scattered basis with little or no apparent organization, usually during the afternoon in response to diurnal heating. Individual thunderstorms typically are of the type sometimes referred to as air-mass thunderstorms. These thunderstorms are small, short-lived, very rarely severe, and they almost always dissipate near or just after sunset. See Pulse Thunderstorm, Air Mass Thunderstorm and Single Cell Thunderstorm.

**Pops**: An acronym for **P**robability **o**f **P**recipitation or **P**recipitation **P**robabilities.

**Positive-Tilt Trough**: An upper level system which is tilted to the east with increasing latitude (i.e., from southwest to northeast). A positive-tilt trough often is a sign of a weakening weather system, and generally is less likely to result in severe weather than a negative-tilt trough if all other factors are equal.

**Positive Vorticity Advection (PVA)**: A region of positive vorticity usually several hundred of kilometers wide on an upper level chart that moves with the general wind flow. It aids in weather prediction by showing where regions of rising air occur. This usually results in clouds and precipitation.

**Precipitable Water (PW)**: It measures the depth of liquid water at the surface that would result after precipitating all of the water vapor in a vertical column usually extending from the surface to 300 mb.

**Precipitation**: 1. The process where water vapor condenses in the atmosphere to form water droplets that fall to the Earth as rain, sleet, snow, hail, etc. 2. As used in hydrology, precipitation is the discharge of water, in a liquid or solid state, out of the atmosphere, generally onto a land or water surface. It is the common process by which atmospheric water becomes surface, or subsurface water. The term "precipitation" is also commonly used to designate the quantity of water that is precipitated. Precipitation includes rainfall, snow, hail, and sleet, and is therefore a more general term than rainfall.

**Prescribed Burn**: Fire applied to wildland fuels, in a definite place for a specific purpose under exacting weather and fuel conditions (the prescription), to achieve a specific objective of resource management.

**Present Movement**: The best estimate of the movement of the center of a tropical cyclone at a given time and given position. This estimate does not reflect the short-period, small scale oscillations of the cyclone center.

**Pressure**: The force exerted by the weight of the atmosphere, also known as atmospheric pressure. When measured on a barometer, it is referred to as barometric pressure and it is expressed in inches of mercury, millibars, or kiloPascals.

**Pressure Gradient**: The amount of pressure change occurring over a given distance.

**Pressure Gradient Force**: A three-dimensional force vector operating in the atmosphere that accelerates air parcels away from regions of high pressure and toward regions of low pressure in response to an air pressure gradient. Usually resolved into vertical and horizontal components.

**Pressure Tendency**: The character and amount of atmospheric pressure change during a specified period of time, usually 3-hour period preceding an observation.

**Prevailing Visibility**: The visibility that is considered representative of conditions at the station; the greatest distance that can be seen throughout at least half the horizon circle, not necessarily continuous.

**Prevailing Westerlies**: Winds in the middle latitudes (approximately 30° to 60° N/S) that generally blow from west to east.

**Prevailing Wind**: A wind that consistently blows from one direction more than from any other.

**Precipitation Probabilities (PoP)**: It is defined as the likelihood of occurrence (expressed as a percent) of a measurable amount of liquid precipitation (or the water equivalent of frozen precipitation) during a specified period of time at any given point in the forecast area. Measurable precipitation is defined as equal to or greater than 0.01" or 0.2 mm. Normally, the period of time is 12 hours, unless specified otherwise.

**Profiler**: An instrument designed to measure horizontal winds directly above its location, and thus measure the vertical wind profile. Profilers operate on the same principles as Doppler radar.

**Psychrometer**: An instrument used to measure the water vapor content of the air. It consists of two thermometers, one of which is an ordinary glass thermometer, while the other has its bulb covered with a jacket of clean muslin which is saturated with distilled water prior to use. After whirling the instrument, the dew point and relative humidity can be obtained with the aid of tables.

**Public Information Statement (PNS)**: This narrative statement can be used for a current or expected nonhazardous event of general interest to the public that can usually be covered with a single message. This may include: Unusual atmospheric phenomena such as sun dogs, halos, rainbows, aurora borealis, lenticular clouds, and stories about a long-term dry/cold/wet/warm spell; public educational information and activities, such as storm safety rules, awareness

activities, storm drills, etc, or information regarding service changes, service limitations, interruptions due to reduced or lost power or equipment outages, or special information clarifying interpretation of NWS data. For example, this product may be used to inform users of radar equipment outages or special information clarifying interpretation of radar data originating from an unusual source which may be mistaken for precipitation (such as chaff drops, smoke plumes, etc., that produces echoes on the radar display.

**Pulse Thunderstorm**: A thunderstorm within which a brief period (pulse) of strong updraft occurs, during and immediately after which the storm produces a short episode of severe weather. These storms generally are not tornado producers, but often produce large hail and/or damaging winds. Also, see Air Mass Thunderstorm, Popcorn Convection and Single Cell Thunderstorm.

**PVA**: An acronym for Positive Vorticity Advection.

**QPF (Quantitative Precipitation Forecast)**: A spatial and temporal precipitation forecast that will predict the potential amount of future precipitation for a specified region, or area.

**RADAR**: An instrument used to detect precipitation by measuring the strength of the electromagnetic signal reflected back. (RADAR= **Ra**dio **D**etection **a**nd **R**anging)

**Radar Beam**: The straight line that a radar pulse travels along. As the radar beam gets further away from the radar, it gets wider and wider. In order for a precipitation target to be detected by the radar, it must fill the entire radar beam; therefore, the radar will have a difficult time detecting small showers and thunderstorms at a great distance from the radar.

**Radar Reflectivity**: The sum of all backscattering cross-sections (e.g., precipitation particles) in a pulse resolution volume divided by that volume.

**Radiation**: Energy emitted in the form of electromagnetic waves. Radiation has differing characteristics depending upon the wavelength. Radiation from the sun has a short wavelength (ultra-violet) while energy re-radiated from the Earth's surface and the atmosphere has a long wavelength (infra-red).

**Radiation Fog**: Fog produced from the air near the ground being cooled to saturation by contact with the cold ground. The cooling of the ground results from night time loss of heat from the Earth to space (terrestrial radiation). Favorable conditions for radiation fog are clear sky, little or no wind, and high relative humidity. It occurs in stable air and is primarily a night time or early morning phenomenon. As the Earth and the lower layers of the atmosphere warm during the day, air that was stable during the early morning hours may become unstable - at least in the lower levels. For this reason visibility usually improves as the temperature rises during the day. Mixing in the lower levels disperses the fog into a thicker layer, and eventually it evaporates into the warmer air. When cloud layers form aloft over a radiation fog and retard heating from the sun, visibility improvement is very slow. It is also known as Ground Fog and Valley Fog, and in Central California as tule fog.

**Radiation Inversion**: It is a thermally produced, surface-based inversion formed by rapid radiational cooling of the Earth's surface at night. It does not usually extend above the lower few hundred feet. Conditions which are favorable for this type of inversion are: long nights, clear skies, dry air, little or no wind, and a cold or snow covered surface.

**Radiational Cooling**: The cooling of the Earth's surface. At night, the Earth suffers a net heat loss to space due to terrestrial cooling. This is more pronounced when you have a clear sky.

**Radiosonde**: An instrument attached to a weather balloon that transmits pressure, humidity, temperature, and wind data to a ground-based receiving station as it ascends.

**Rain (RA)**: Precipitation, either in the form of drops larger than 0.02" (0.5 mm), or smaller drops, which in contrast to drizzle, are widely separated.

**Rain Shadow**: Areas of the leeward side of a mountain or mountain range which often receive much less rain than the windward side.

**Rainbow**: An arc that exhibits in concentric bands the colors of the spectrum and is formed opposite the sun by refraction and reflection of the sun's rays in rain drops.

**RAOB**: An acronym for Radiosonde Observation. See Radiosonde.

**Record Report**: This non-routine narrative product is issued by the NWS to report meteorological and hydrological events that equal or exceed existing records.

**Red Flag**: This a fire weather program which highlights the onset of critical weather conditions conducive to extensive wildfire occurrences.

**Red Flag Warning**: A term used by fire-weather forecasters to call attention to weather conditions that may result in extreme burning conditions. It is issued when it is an on-going event or the fire weather forecaster has a high degree of confidence that Red Flag criteria will occur within 24 hours of issuance. Red Flag criteria occurs whenever the following forecast weather parameters are forecasted to met: 1. A sustained wind average 15 mph or greater, 2. Relative humidity less than or equal to 25%, and when dry lightning is expected.

**Reflectivity**: A radar product designed to determine the strength or the intensity of a precipitation target. In order for the radar to calculate the reflectivity, it sends out a small burst of energy. This energy strikes the small water particles located in the precipitation target. The more of these particles located in the precipitation target, the greater the return of energy returned back to the radar. One will see a greater reflectivity return from heavy rain than light rain. Reflectivity is expressed in the units of dBZ where dB stands for decibels and the Z stands for reflectivity. See dBZ.

**Relative Humidity**: A dimensionless ratio, expressed in percent, of the amount of atmospheric moisture present relative to the amount that would be present if the air were saturated. Since the latter amount is dependent on temperature, relative humidity is a function of both moisture

content and temperature. As such, relative humidity by itself does not directly indicate the actual amount of atmospheric moisture present. See dew point.

**Retrogression (or Retrograde Motion)**: Movement of a weather system in a direction opposite to that of the basic flow in which it is embedded, usually referring to a closed low or a longwave trough which moves westward.

**Return Flow**: South winds on the back (west) side of an eastward-moving surface high pressure system.

**Rex Block**: A blocking pattern where there is an upper level high located directly north of a closed low.

**RFC (River Forecast Center)**: Centers that serve groups of Weather Service Forecast offices in providing hydrologic guidance and is the first echelon office for the preparation of river and flood forecasts and warnings.

**Ridge**: An elongated area of high pressure in the atmosphere. Opposite of trough.

**Right Rear Quadrant**: The area upstream from and to the right of an upper-level jet max (as would be viewed looking along the direction of flow). Upward motion and severe thunderstorm potential sometimes are increased in this area relative to the wind speed maximum. Also, see left front quadrant.

**Rip Current**: A strong, narrow current of surface water that flows seaward through the surf into deeper water. Waves approaching the shoreline create a water buildup which results in a return flow. This return flow (rip current) transports the excess water into deeper waters. Bubbles and debris usually float on the surface of the rip current. Although this current is extremely localized, they result in numerous deaths every year. These deaths are contributed to swimmers becoming exhausted by trying to swim against the rip current. If you are a swimmer caught in a rip current, wade sideways parallel to the beach until you are out of its pull. Another means of escape for those who are good swimmers is to ride the current out beyond the surf zone where the rip current dissipates then swim to shore outside the effects of the narrow current. This phenomenon is sometimes mistakenly called a “rip tide” or an "undertow".

**River Basin**: Drainage area of a river and its tributaries.

**River Flood Statement (FLS)**: This product is used by the local NWS to update and expand the information in the River Flood Warning. This statement may be used in lieu of a warning if flooding is forecasted, imminent, or existing and it presents no threat to life or property. The statement will also be used to terminate a River Flood Warning.

**River Flood Warning (FLW)**: This is product is issued by the local NWS when forecast points (those that have formal gaging sites and established flood stages) at specific communities or areas along rivers where flooding has been forecasted, is imminent, or is in progress. Flooding is defined as the inundation of normally dry areas as a result of increased water levels in an

established water course. The flood warning normally specifies crest information. It usually occurs 6 hours or later after the causative event and it is usually associated with widespread heavy rain and/or snow melt or ice jams.

**River Flooding**: The rise of a river to an elevation such that the river overflows its natural banks causing or threatening damage.

**River Gage**: A device for measuring the river stage.

**Roll Cloud**: A low, horizontal tube-shaped cloud associated with a thunderstorm gust front (or sometimes with a cold front). Roll clouds are relatively rare; they are completely detached from the thunderstorm base or other cloud features, thus differentiating them from the more familiar shelf clouds. Roll clouds usually appear to be "rolling" about a horizontal axis, but should not be confused with funnel clouds.

**Rope (or Rope Funnel)**: A narrow, often contorted condensation funnel usually associated with the decaying stage of a tornado. See rope stage.

**Rope Cloud**: In satellite meteorology, a narrow, rope-like band of clouds sometimes seen on satellite images along a front or other boundary. The term sometimes is used synonymously with rope or rope funnel.

**Rope Stage**: The dissipating stage of a tornado, characterized by thinning and shrinking of the condensation funnel into a rope (or rope funnel). Damage still is possible during this stage.

**Rotor Cloud**: A turbulent cloud formation found in the lee of some large mountain barriers. The air in the cloud rotates around an axis parallel to the mountain range.

**RUC - Rapid Update Cycle**: A numerical model run at NCEP that focuses on short-term (up to 12 hours) forecasts and small-scale weather features. Forecasts are prepared every 3 hours.

**Runoff**: That part of precipitation that flows toward streams on the surface of the ground or within the ground. Runoff is composed of base flow and surface runoff.

**Saffir-Simpson Hurricane Intensity Scale**: This scale was developed in an effort to estimate the possible damage a hurricane's sustained winds and storm surge could do to a coastal area. The scale of numbers is based on actual conditions at some time during the life of the storm. As the hurricane intensifies or weakens, the scale number is reassessed accordingly.

**Sandstorm (SS)**: Particles of sand carried aloft by strong wind. The sand particles are mostly confined to the lowest ten feet, and rarely rise more than fifty feet above the ground.

**Santa Ana Wind**: A strong, hot, dry foehn-like wind that blows from the north, northeast, or east into Southern California. Occasionally, the term is used even if the temperatures are low. The winds are generated by surface high pressure (an anticyclone) located over the high deserts

of the Great Basin (Nevada) and produce warmth and dryness from compressional heating as the air descends to lower elevations near the coast.

**Scattered (SCT)**: 1. An official sky cover classification for aviation weather observations, descriptive of a sky cover of 3/8 to 4/8. This is applied only when obscuring phenomenon aloft are present--that is, not when obscuring phenomenon are surface-based, such as fog. 2. A NWS convective precipitation descriptor for a 30%, 40%, and 50% chance of measurable precipitation (> Trace). See Probability of Precipitation (PoP).

**Scud (or Fractus)**: Small, ragged, low cloud fragments that are unattached to a larger cloud base and often seen with and behind cold fronts and thunderstorm gust fronts. Such clouds generally are associated with cool moist air, such as thunderstorm outflow.

**Sea Breeze**: A wind that blows from a sea or ocean towards a land mass as a result of temperature and pressure gradients along the coastal interface. Also known as an onshore breeze.

**Seas**: This term is used in NWS Marine Forecasts to describe the combination or interaction of wind waves and swells (combined seas) in which the separate components are not distinguished. This includes the case when swells are negligible or are not considered in describing sea state.

**Sea Level Pressure**: The pressure value obtained by the theoretical reduction or increase of barometric pressure to sea-level.

**Sea Surface Temperature (SST)**: Surface temperature of ocean water. This data is collected using IR satellite imagery, buoy and ship data.

**Severe Thunderstorm**: A strong thunderstorm with a tornado, wind gusts in excess of 58 mph (50 knots), and/or hail with a diameter of 3/4" or more.

**Severe Thunderstorm Warning (SVR)**: This is issued when either a severe thunderstorm is indicated by the WSR-88D radar or a spotter reports a thunderstorm producing a hail ¾" or larger in diameter and/or winds equal or exceed 50 kts (58 mph); therefore, people in the affected area should seek safe shelter immediately.

**Severe Thunderstorm Watch (WWA)**: This is issued by the NWS when conditions are favorable for the development of severe thunderstorms in and close to the watch area. The size of the watch can vary depending on the weather situation. They are usually issued for a duration of 4 to 8 hours. They are normally issued well in advance of the actual occurrence of severe weather. During the watch, people should review severe thunderstorm safety rules and be prepared to move a place of safety if threatening weather approaches. The Watch is issued by the Storm Prediction Center in Norman, Oklahoma. Prior to the issuance, SPC will usually contact the affected local NWS Forecast Office and they will discuss what their current thinking is on the weather situation. Afterwards, SPC will issue a preliminary Severe Thunderstorm Watch and then the affected NWFO will then adjust the watch (adding or eliminating counties) and issue it to the public by way of a Watch Redefining Statement. During the watch, the local forecast office will keep the you informed on what is happening in the watch area and also let the you

know when the watch has expired or been cancelled.

**Severe Weather Statement (SVS)**: An NWS product which provides follow up information on severe weather conditions (severe thunderstorm or tornadoes) which have occurred or are currently occurring.

**Shear**: Variation in wind speed (speed shear) and/or direction (directional shear) over a short distance. Shear usually refers to vertical wind shear, i.e., the change in wind with height.

**Sheet Flow**: Water flow that occurs overland in places where there are no defined channels; the flood water spreads out over a large area at a uniform depth.

**Shelf Cloud**: A low, horizontal wedge-shaped arcus cloud, associated with a thunderstorm gust front (or occasionally with a cold front, even in the absence of thunderstorms). Unlike the roll cloud, the shelf cloud is attached to the base of the parent cloud above it (usually a thunderstorm). Rising cloud motion often can be seen in the leading (outer) part of the shelf cloud, while the underside often appears turbulent, boiling, and wind-torn. It is accompanied by gusty, straight-line winds and is followed by precipitation.

**Shoaling**: The process whereby waves coming into shallow waters are slowed by bottom friction and become closer together and steeper.

**Short-Fuse Warning**: A warning issued by the NWS for a local weather hazard of relatively short duration. Short-fuse warnings include tornado warnings, severe thunderstorm warnings, and flash flood warnings. Tornado and severe thunderstorm warnings typically are issued for periods of an hour or less, flash flood warnings typically for three hours or less.

**Short Term Forecast**: This NWS narrative summary describes the weather in the local area and includes a short-range forecast (not more than 6 hours). This product will be updated more frequently when it is used during active weather. This product is also sometimes referred to as a nowcast.

**Shortwave (or Shortwave Trough)**: A disturbance in the mid or upper part of the atmosphere which induces upward motion ahead of it. If other conditions are favorable, the upward motion can contribute to thunderstorm development ahead of a shortwave.

**Shower (SH)**: It implies short duration, intermittent, and scattered precipitation (rain, snow, ice pellet) of a more unstable, convective nature.

**SIGMET (SIGnificant METeorlogical Information)**: This NWS aviation product advises of weather potentially hazardous to all aircraft other than convective activity. In the conterminous U.S., SIGMETS covered are severe icing, severe or extreme turbulence, duststorms and sandstorms lowering visibilities to less that three (3) miles, and/or volcanic ash.

**Significant Wave Height**: The average height (trough to crest distance) of the one-third highest waves. An experienced observer will most frequently report heights equivalent to the average of

the highest one-third of all waves observed.

**Single Cell Thunderstorm**: Generally, a thunderstorm not associated with a front or other type of synoptic-scale forcing mechanism. Air mass thunderstorms typically are associated with warm, humid air in the summer months; they develop during the afternoon in response to insolation, and dissipate rather quickly after sunset. They generally are less likely to be severe than other types of thunderstorms, but they still are capable of producing downbursts, brief heavy rain, and (in extreme cases) hail over 3/4" in diameter. Also, see Air Mass Thunderstorm, Popcorn Convection and Pulse Thunderstorm.

**Sky Condition**: Used in a forecast to describe the predominant/average sky condition based upon octants (eighths) of the sky covered by opaque (not transparent) clouds. The usual descriptors are: clear or sunny, 0/8, mostly clear or mostly sunny, 1/8 to 2/8, partly cloudy or partly sunny, 3/8 to 4/8, mostly cloudy, 5/8 to 7/8, and cloudy, 8/8.

**Sleet (PL)**: Describes solid grains of ice formed by the freezing of raindrops or the refreezing of largely melted snowflakes. These grains usually bounce upon impact with the ground or pavement. Heavy sleet is a relatively rare event defined as an accumulation of ice pellets covering the ground to a depth of 1/2" or more. See Ice Pellets.

**Slight Chance**: An NWS precipitation descriptor for a 20 percent chance of measurable precipitation (0.01"). When the precipitation is convective in nature, the term widely scattered or isolated is used. See Precipitation Probability (PoP).

**Small Craft Advisory**: This is issued by the NWS to alert small boats to sustained (more than 2 hours) hazardous weather or sea conditions. These conditions may be either present or forecasted. Winds in excess of 22 knots (25 mph), and less than 34 knots (39 mph), that may cause hazardous conditions for operators of small vessels. The advisory may be issued for winds, hazardous seas, or both.

**Small Stream Flooding**: Flooding of small creeks and streams.

**Smog**: Originally smog meant a mixture of smoke and fog. Now, it means air that has restricted visibility due to pollution or pollution formed in the presence of sunlight--photochemical smog.

**Smoke (FU)**: A suspension in the air of small particles produced by combustion. A transition to haze may occur when smoke particles have traveled a great distance (25 to 100 miles or more) and when the larger particles have settled out and the remaining particles have become widely scattered through the atmosphere.

**Snow (SN)**: Precipitation of frozen crystals, mostly branched in the form of six-pointed stars. It usually falls steadily for several hours or more. Like drizzle, its intensity is based on visibility. The amount of snow that falls is highly dependent upon temperature. For example, at 10°F, one inch of precipitation will produce 30" of snow. At 20°F, one inch of precipitation will produce 20" of snow. At 30°F, one inch of precipitation produces 10" of snow. At freezing, one inch precipitation will produce approximately 6" of snow.

**Snow Advisory**: This product is issued by the NWS when a low pressure system produces snow that may cause significant inconvenience, but do not meet warning criteria and if caution is not exercised could lead to life threatening situations. The advisory criteria vary from area to area.

**Snow and Blowing Snow Advisory**: This product is issued by the NWS during situations that cause significant inconvenience, but do not meet warning criteria and if caution is not exercised could lead to life threatening situations. The warning criteria in this definition vary from area to area.

**Snow Depth**: The combined total depth of both the old and new snow on the ground.

**Snow Flurries**: Intermittent light snowfalls of short duration (generally light snow showers) with no measurable accumulation.

**Snow Grains (SG)**: Precipitation of very small, white, and opaque grains of ice. They can be distinguished from ice pellets, because ice pellets bounce and snow grains do not bounce at all.

**Snow Pack**: The combined layers of snow and ice on the ground at any one time. It is also called snowcover.

**Snow Pellets (GS)**: Precipitation of white, opaque grains of ice. The grains are round or sometimes conical. Diameters range from about 0.08" to 0.2" (2mm to 5 mm).

**Snow Shower (SHSN)**: It is a moderate snowfall of short duration. Some accumulation is possible.

**Sounding**: A plot of the vertical profile of temperature and dew point (and often winds) above a fixed location. Soundings are used extensively in weather forecasting, e.g., to determine instability, locate temperature inversions, measure the strength of the cap, obtain the convective temperature, measure the depth of the marine layer, etc.

**Southern Oscillation (SO)**: A "see-saw" in surface pressure in the tropical Pacific characterized by simultaneously opposite sea level pressure anomalies at Tahiti, in the eastern tropical Pacific and Darwin, on the northwest coast of Australia. The SO was discovered by Sir Gilbert Walker in the early 1920s. Later, the three-dimensional east-west circulation related to the SO was discovered and named the "Walker Circulation". The SO oscillates with a period of 2-5 years. During one phase, when the sea level pressure is low at Tahiti and High at Darwin, the El Niño occurs. The cold phase of the SO, called La Niña, is characterized by high pressure in the eastern equatorial Pacific, low in the west, and by anomalously low sea surface temperature (SST) in the central and eastern Pacific. This is called El Niño Southern Oscillation or ENSO.

**Space Environment Center (SEC)**: This center provides real-time monitoring and forecasting of solar and geophysical events, conducts research in solar-terrestrial physics, and develops techniques for forecasting solar and geophysical disturbances. SEC's Space Weather Operations is jointly operated by NOAA and the U.S. Air Force and is the national and world warning center for disturbances that can affect people and equipment working in the space environment.

**SPC**: An acronym for the Storm Prediction Center.

**Special Marine Warning (SMW)**: This is issued by the NWS for hazardous weather conditions over water (thunderstorms, funnel clouds, or waterspouts) usually of short duration (2 hours or less) and producing sustained winds or frequent gusts of 34 knots or more.
These are tone alerted on NOAA All-Hazards Radio. Boaters can also get this information by tuning into Coast Guard and commercial radio stations that transmit marine weather information.

**Special Weather Statement (SPS)**: This is issued by the NWS to provide additional information about expected or ongoing significant weather changes not covered in other statements. This would include non-severe convective, winter weather, and non-precipitation events.

**Specific Humidity**: In a system of moist air, the ratio of the mass of water vapor to the total mass of the system.

**Speed Shear**: The component of wind shear which is due to a change in wind speed with height, e.g., southwesterly winds of 20 mph at 10,000 feet increasing to 50 mph at 20,000 feet. Speed shear is an important factor in severe weather development, especially in the middle and upper levels of the atmosphere.

**Spot Forecasts**: These are NWS site-specific fire weather forecasts. They are issued upon request of User Agencies for wildfires, prescribed burns, hazardous material incidents, or special projects.

**Spray (PY)**: An ensemble of water droplets torn by the wind from the surface of the of an extensive body of water, generally from crests of waves, and carried a short distance into the air.

**Spring Tide**: A tide higher than normal which occurs around the time of the new and full moon.

**Squall (SQ)**: A strong wind characterized by a sudden onset in which the wind speed increases at least 16 knots and is sustained more than 22 knots or more for at least one minute.

**Squall Line**: A line or narrow band of active thunderstorms. The line may extend across several hundred miles. It forms along and ahead of an advancing cold front.

**Stable**: An atmospheric state with warm air above cold air which inhibits the vertical movement of air.

**Stable Air**: Air with little or no tendency to rise.

**Station Pressure**: The pressure that is read from a barometer but is not adjusted to sea level.

**Stationary Front**: A front that barely moves with winds blowing in almost parallel, but in opposite directions on each side of the front. Occasionally, these fronts can cause widespread

flooding, because showers and thunderstorms moving along them will continue to move across the same area. This weather situation is called "train echoing".

**Steam Fog**: It forms as cold air moves over warm water. Water evaporates from the warm water surface and immediately condenses in the cold air above. Heat from the water warms the lower levels of the air creating a shallow layer of instability. It rises like smoke from the warm surface. The low level convection can become quite turbulent. Steam fog is most common in Arctic regions where it is called "Arctic Sea Smoke", but it can and does occur occasionally at all latitudes.

**Steering Winds (or Steering Currents)**: A prevailing synoptic scale flow which governs the movement of smaller features embedded within it.

**Storm**: Any disturbed state of the atmosphere, especially affecting the Earth's surface, and strongly implying destructive and otherwise unpleasant weather. Storms range in scale from tornadoes and thunderstorms through tropical cyclones to widespread extratropical cyclones. In marine usage, winds 48 knots (55 mph) or greater.

**Storm Motion**: The speed and direction at which a thunderstorm travels.

**Storm Prediction Center (SPC)**: A national forecast center in Norman, Oklahoma, which is part of NCEP. The SPC is responsible for providing short-term forecast guidance for severe convection, excessive rainfall (flash flooding), and severe winter weather over the contiguous United States. This includes the issuance of Tornado and Severe Thunderstorm Watches.

**Storm Relative**: Measured relative to a moving thunderstorm, usually referring to winds, wind shear, or helicity.

**Storm Surge**: A rise above the normal water level along a shore caused by strong onshore winds and/or reduced atmospheric pressure. The surge height is the difference of the observed water level minus the predicted tide. Most hurricane deaths are caused by the storm surge. It can be 50 or more miles wide and sweeps across the coastline around where the hurricane makes landfall. The maximum rises in sea-level move from under the storm to the right of the storm's track, reaching a maximum amplitude of 10 to 30 feet at the coast. The storm surge may even double or more in height when the hurricane's track causes it to funnel water into a bay. The storm surge increases substantially as it approaches the land because the normal water depth decreases rapidly as it approaches the beaches. The moving water contains the same amount of energy; thus, resulting in an increase of storm surge. Typically, the stronger the hurricane, the greater the storm surge.

**Storm Tide**: The actual sea level resulting from astronomical tide combined with the storm surge. This term is used interchangeably with *"hurricane tide"*.

**Storm Track**: The path that a low pressure area follows.

**Storm Warning**: A marine warning of sustained surface winds of 48 kt (55 mph or 88 kph) or greater, either predicted or occurring, not directly associated with tropical cyclones.

**Straight Line Winds**: Generally, any wind that is not associated with rotation, used mainly to differentiate them from tornadic winds.

**Stratiform**: Descriptive of clouds of extensive horizontal development, as contrasted to the more narrow and vertically developed cumuliform type. Stratiform clouds cover large areas but show relatively little vertical development. Stratiform precipitation, in general, is relatively continuous and uniform in intensity (i.e., steady rain versus rain showers).

**Stratiform Rain**: Horizontally widespread rain, uniform in character, typically associated with macroscale fronts and pressure systems.

**Stratocumulus (Sc)**: It has globular masses or rolls unlike the flat, sometimes definite, base of stratus. This cloud often forms from stratus as the stratus is breaking up or from spreading out of cumulus clouds. They usually consist of mainly water vapor and are located between the ground and 6,500 feet. Stratocumulus often reveals the depth of the moist air at low levels, while the speed of the cloud elements can reveal the strength of the low-level jet.

**Stratosphere**: The layer of the atmosphere above the troposphere, where temperature increases with height.

**Stratus (St)**: It is a low, uniform sheet-like cloud. Stratus may appear in the form of ragged patches, but otherwise does not exhibit individual cloud elements as do cumulus and stratocumulus clouds. It usually is located between the ground and 6,500 feet. It usually consists of mainly water vapor. Fog is a stratus cloud with its base located at the ground.

**Stream Gage**: A site along a stream where the stage (water level) is read either by eye or measured with recording equipment.

**Sublimation**: The change from ice (a solid) directly to water vapor (a gas) without going through the liquid water phase. It is the opposite of Deposition.

**Subrefraction**: The bending of the radar beam in the vertical which is less than under standard refractive conditions. This causes the beam to be higher than indicated, and lead to the underestimation of cloud heights.

**Subsidence**: The slow sinking of air usually associated with high pressure areas. It is usually over a broad area and is associated with warming air and little if any cloud formation.

**Subsidence Inversion**: It is produced by adiabatic heating of air as it sinks and is associated with anticyclones (high pressure) and/or stable air masses. These inversions form between sinking heated air and air below and they are characterized by temperature increase with height through the inversion, while above the inversion, the temperature cools. The dew point temperature, relative humidity, and mixing ratio values all decrease with height through the inversion.

**Subtropical Jet**: This branch of the jet stream is usually found between 20° and 30° latitude at altitudes between 12 and 14 km.

**Supercell**: A thunderstorm with a persistent rotating updraft. Supercells are responsible for a remarkably high percentage of severe weather events - especially tornadoes, extremely large hail and damaging straight-line winds. They frequently travel to the right of the main environmental winds (i.e., they are right movers). Visual characteristics often include a rain-free base (with or without a wall cloud), tail cloud, flanking line, overshooting top, and back-sheared anvil, all of which normally are observed in or near the right rear or southwest part of the storm. Storms exhibiting these characteristics often are called classic supercells; however HP storms and LP storms also are supercell varieties.

**Supercooled Liquid Water**: In the atmosphere, liquid water can survive at temperatures lower than 0°C (32°F); many vigorous storms contain large amounts of supercooled liquid water at low temperatures. Important in the formation of graupel and hail.

**Supersaturation**: The condition which occurs in the atmosphere when the relative humidity is greater than 100%.

**Superrefraction**: Bending of the radar beam in the vertical which is greater than sub-standard refractive conditions. This causes the beam to be lower than indicated, and often results in extensive ground clutter as well as an overestimation of cloud top heights.

**Surface Pressure**: The pressure that is read from a barometer but is not adjusted to sea level.

**Surface Runoff**: The part of runoff, caused by precipitation and/or snowmelt, that moves over the soil surface to the nearest stream channel. Rain that falls on the stream channel is often lumped with this quantity.

**Sunny**: When there are no opaque (not transparent) clouds. Same as clear.

**Swell**: Wind-generated waves that have traveled out of their generating area. Swells characteristically exhibit smoother, more regular and uniform crests and a longer period than wind waves.

**Synoptic Chart**: Chart showing meteorological conditions over a region at a given time; a weather map.

**Synoptic Scale (or Large Scale)**: The typical weather map scale that shows features such as high and low pressure areas and fronts over a distance spanning a continent. Compare with mesoscale and storm-scale.

**TAF**: An acronym for Terminal Aerodrome Forecast

**TCU**: An acronym for Towering Cumulus.

**T. D.**: An acronym for Tropical Depression.

**Teleconnection**: A strong statistical relationship between weather in different parts of the globe. For example, there appears to be a teleconnection between the tropics and North America during El Niño.

**Temperature**: A measure of the warmth of the ambient air measured by a suitable instrument such as a thermometer.

**Terminal Aerodrome Forecast (TAF)**: This NWS aviation product is a concise statement of the expected meteorological conditions at an airport during a specified period (usually 24 hours). TAFs use the same weather code found in METAR weather reports.

**Thermal**: A relatively small-scale, rising air current produced when the Earth's surface is heated. Thermals are a common source of low level turbulence for aircraft.

**Thermal Highs**: Areas of high pressure that are shallow in vertical extent and are produced primarily by very low surface temperatures.

**Thermal Lows**: Areas of low pressure that are shallow in vertical extent and are produced primarily by high surface temperatures.

**Thermodynamic Chart (or Thermodynamic Diagram)**: A chart containing contours of pressure, temperature, moisture, and potential temperature, all drawn relative to each other such that basic thermodynamic laws are satisfied. Such a chart typically is used to plot atmospheric soundings, and to estimate potential changes in temperature, moisture, etc. if air were displaced vertically from a given level. A thermodynamic chart thus is a useful tool in diagnosing atmospheric stability.

**Thermodynamics**: In general, the relationships between heat and other properties (such as temperature, pressure, density, etc.) In forecast discussions, thermodynamics usually refers to the distribution of temperature and moisture (both vertical and horizontal) as related to the diagnosis of atmospheric instability.

**Thermometer**: An instrument for measuring temperature.

**Thunder**: The sound emitted by the rapidly expanding gases along the channel of a lightning discharge. Thunder is seldom heard farther than about 15 miles from the lightning discharge, with 25 miles an approximate upper limit and 10 miles a typical value.

**Thunderstorm (TS)**: A local storm produced by cumulonimbus clouds. It is always accompanied by lightning and thunder. It is estimated that nearly 2,000 thunderstorms occur simultaneously around the Earth at any given instant. There are 3 types of thunderstorms:
1. Single Cell Thunderstorms, 2. Multicell Thunderstorms, and 3. Supercell Thunderstorm.

**Tides**: They are the periodic (occurring at regular intervals) variations in the surface water level of the oceans, bays, gulfs, and inlets. Tides are the result of the gravitational attraction of the sun and the moon on the earth, but mostly from the moon. Every 27.3 days, the earth and the moon revolve around a common point. This means that the oceans and other water bodies which are affected by the earth-moon system experience a new tidal cycle every 27.3 days. Because of the physical processes which occur to produce the tidal system, there are two high tides and two low tides each day. Because of the angle of the moon with respect to the earth, the two high tides and the two low tides each day do not have to be of equal height. Tides also differ in height on a daily basis, due to the changing distance between the earth and the moon. Scientists use measurements of the height of the water level to examine tides and the various phenomena which influence tides, such as hurricanes and winter storms.

**Tilted Storm or Tilted Updraft**: A thunderstorm or cloud tower which is not purely vertical but instead exhibits a slanted or tilted character. It is a sign of vertical wind shear, a favorable condition for severe storm development.

**Tipping-Bucket Rain Gage**: A precipitation gage where collected water is funneled into a two compartment bucket; 0.01", 0.1 mm, or some other designed quantity of rain will fill one compartment and overbalance the bucket so that it tips, emptying into a reservoir and moving the second compartment into place beneath the funnel. As the bucket is tipped, it actuates an electric circuit, recording the rainfall.

Tornado (+FC): A violently rotating column of air in contact with the ground and extending from the base of a thunderstorm. A condensation funnel does not need to reach to the ground for a tornado to be present; a debris cloud beneath a thunderstorm is all that is needed to confirm the presence of a tornado, even in the total absence of a condensation funnel. It nearly always starts as a funnel cloud and may be accompanied by a loud roaring noise. Tornadoes are classified by the amount of damage that they cause. See Fujita Scale and Enhanced Fujita Scale.

**Tornado Alley**: The area of the United States in which tornadoes are most frequent. It encompasses the great lowland areas of the Mississippi, the Ohio, and lower Missouri River Valleys. Although no state is entirely free of tornadoes, they are most frequent in the Plains area between the Rocky Mountains and Appalachians.

**Tornado Warning (TOR)**: This is issued when a tornado is indicated by the WSR-88D radar or sighted by spotters; therefore, people in the affected area should seek safe shelter immediately. They can be issued without a Tornado Watch being already in effect. They are usually issued for a duration of around 30 minutes. A Tornado Warning is issued by the local NWS office. It will include where the tornado was located and what towns will be in its path. After it has been issued, it will be followed up by periodic Severe Weather Statements. These statements will contain updated information on the tornado and they will also let the public know when warning is no longer in effect.

**Tornado Watch (SEL)**: This is issued by the NWS when conditions are favorable for the development of tornadoes in and close to the watch area. The watch is in a form of a rectangle whose size and orientation varies depending on the weather situation. They are usually issued for

a duration of 4 to 8 hours. They normally are issued well in advance of the actual occurrence of severe weather. During the watch, people should review tornado safety rules and be prepared to move a place of safety if threatening weather approaches.

**Tower**: Short for towering cumulus.

**Towering Cumulus (TCU)**: It signifies a relatively deep layer of unstable air. The bases are flat and usually appear darker than the bases of fair weather cumulus. They show considerable vertical development and have billowing "cauliflower" tops. Showers can result from these clouds. Same as cumulus congestus.

**TPC**: An acronym for the Tropical Prediction Center.

**Trace**: A rainfall amount less than 0.01".

**Track**: The path that a storm or weather system follows.

**Trade Winds**: The winds that occupy most of the tropics and blow from subtropical highs to the equatorial low.

**Transcribed WEather Broadcasts (TWEBs)**: This NWS aviation product is similar to the Area Forecast (FA) except information is contained in a route format. Forecast sky cover (height and amount of cloud bases), cloud tops, visibility (including vertical visibility), weather, and obstructions to vision are described for a corridor 25 miles either side of the route.

**Transpiration**: Water discharged into the atmosphere from plant surfaces.

**Tropical Cyclone**: It is a warm-core low pressure system which is non-frontal. It originates over tropical and subtropical waters and a has an organized cyclonic (counter-clockwise) surface wind circulation.

**Tropical Depression**: Cyclones that have maximum sustained winds of surface wind speed (using the U.S. 1-minute average) is 33 kt (38 mph or 62 kph) or less. They are either located in the tropics or subtropics. They characteristically have one or more closed isobars. They usually intensify slowly and may dissipate before reaching Tropical Storm intensity.

**Tropical Disturbance**: A discrete tropical weather system of apparently organized convection--generally 100 to 300 nautical miles in diameter---originating in the tropics or subtropics, having a nonfrontal migratory character, and maintaining its identity for 24 hours or more. It may or may not be associated with a detectable perturbation of the wind field. In successive stages of intensification, it may be subsequently classified as a tropical wave, tropical depression, tropical storm, or hurricane.

**Tropical Prediction Center (TPC)**: One of NOAA's 9 National Centers for Environmental Prediction (NCEP). The mission of the Tropical Prediction Center (TPC) is to save lives and protect property by issuing watches, warnings, forecasts, and analyses of hazardous weather

conditions in the tropics. TPC products are generated for use in both the domestic and international communities. To fulfill its mission, the TPC is comprised of the following branches: The National Hurricane Center, Tropical Analysis and Forecast Branch (TAFB), and the Technical Support Branch (TSB).

**Tropical Storm**: It is a warm-core tropical cyclone that has maximum sustained surface wind speed (using the U.S. 1-minute average) ranges from 34 kt (39 mph or 63 kph) to 63 kt (73 mph or 118 kph).

**Tropical Storm Warning**: A warning for tropical storm conditions including sustained winds within the range of 34 to 63 kt (39 to 73 mph or 63 to 118 kph) that are expected in a specified coastal area within 24 hours or less.

**Tropical Storm Watch**: An announcement that a tropical storm poses or tropical storm conditions pose a threat to coastal areas generally within 36 hours. A tropical storm watch should normally not be issued if the system is forecast to attain hurricane strength.

**Tropical Wave**: A trough or cyclonic curvature maximum in the trade wind easterlies and it is not classified as a tropical cyclone. The wave may reach maximum amplitude in the lower middle troposphere.

**Tropics**: Areas of the Earth within 20°North/South of the Equator.

**Tropopause**: The upper boundary of the troposphere, usually characterized by an abrupt change in lapse rate from positive (decreasing temperature with height) to neutral or negative (temperature constant or increasing with height). It is also the boundary between the troposphere and the stratosphere.

**Troposphere**: The layer of the atmosphere from the earth's surface up to the tropopause, characterized by decreasing temperature with height (except, perhaps, in thin layers - see inversion, cap), vertical wind motion, appreciable water vapor content, and sensible weather (clouds, rain, etc.).

**Trough**: An elongated area of relatively low atmospheric pressure, usually not associated with a closed circulation, and thus used to distinguish from a closed low. The opposite of ridge.

**T.S.**: An abbreviation for Tropical Storm.

**Tsunami**: An ocean wave produced by a sub-marine earthquake, landslide, or volcanic eruption. These waves may reach enormous dimensions and have sufficient energy to travel across entire oceans. (Sometimes referred to incorrectly as a tidal wave).

**Tule Fog**: Radiation fog in California’s Central Valley. It forms during night and morning hours in late fall and winter months following rainfall. A leading cause of weather related casualties in California.

**Turbulence**: Disrupted flow in the atmosphere that produces gusts and eddies.

**Turkey Tower**: Slang for a narrow, individual cloud tower that develops and falls apart rapidly. The sudden development of turkey towers from small cumulus clouds may signify the breaking of a cap.

**TWEB**: Accronym for Transcribed WEather Broadcast.

**Twister**: In the United States, a colloquial term for a tornado.

**Typhoon**: A tropical cyclone of hurricane strength in the Western Pacific Ocean (west of the international dateline).

**UKMET**: A medium-range (3 to 7 day) numerical weather prediction model operated by the United Kingdom METeorological Agency. It has a resolution of 75 kilometers and covers the entire northern hemisphere. Forecasters use this model along with the ***European*** and ***GFS*** in making their extended forecasts (3 to 7 days).

**Ultraviolet Radiation**: The energy range just beyond the violet end of the visible spectrum. Although ultraviolet radiation constitutes only about 5 percent of the total energy emitted from the sun, it is the major energy source for the stratosphere and mesosphere, playing a dominant role in both energy balance and chemical composition.

**Unstable Air**: An atmospheric state of warm air below cold air. Since warm air naturally rises above cold air (due to warm air being less dense than cold air), vertical movement and mixing of air layers can occur.

**Updraft**: Current(s) of air with marked vertical upward motion. If the air is sufficiently moist, then the moisture condenses to become a cumulus cloud or an individual tower of a towering cumulus or cumulonimbus.

**Upper-Level Disturbance**: A disturbance in the upper atmospheric flow pattern which is usually associated with clouds and precipitation. This disturbance is characterized by distinct cyclonic flow, a pocket of cold air, and sometimes a jet streak. These features make the air aloft more unstable and conducive to clouds and precipitation.

**Upper Level System**: A general term for any large-scale or mesoscale disturbance capable of producing upward motion (lift) in the middle or upper parts of the atmosphere. This term sometimes is used interchangeably with impulse or shortwave.

**Upslope Flow**: Air that flows toward higher terrain, and hence is forced to rise. The added lift often results in widespread low cloudiness and stratiform precipitation if the air is stable, or an increased chance of thunderstorm development if the air is unstable.

**Upwelling**: The process by which cold waters from the depths of a lake or ocean rise to the surface. This often occurs along the California coast during the summer and is an important

component in the development of coastal stratus clouds.

**Urban & Small Stream Flood Advisory (FLS)**: This advisory alerts the public to flooding which is generally only an inconvenience (not life-threatening) to those living in the affected area. Issued when heavy rain will cause flooding of streets and low-lying places in urban areas. Also used if small rural or urban streams are expected to reach or exceed bankfull. Some damage to homes or roads could occur.

**Urban Flooding**: Flooding of streets, underpasses, low lying areas, or storm drains. This type of flooding is mainly an inconvenience and is generally not life threatening.

**Urban Heat Island**: The increased air temperatures in urban areas in contrast to cooler surrounding rural areas due to the increased heat retention properties of concrete and pavement.

**UTC**: Coordinated Universal Time. The time in the zero degree meridian time zone.

**UV (Ultraviolet) Index**: This index provides important information to help you prevent overexposure to the sun's rays. It was designed by the National Weather Service and the Environmental Protection Agency (EPA). It is computed using forecasted ozone levels, a computer model that relates ozone levels to UV incidence on the ground, forecasted cloud amounts, and the elevation of the forecast cities.

**Valley Winds**: The tendency of wind to funnel down a pronounced valley. Also the movement of air down the slopes of a valley at night (katabatic winds) or up the slopes of valley during the day (anabatic winds).

**Veering Wind**: Wind which changes in a clockwise direction with time at a given location (e.g., from southerly to westerly), or which change direction in a clockwise sense with height (e.g., southeasterly at the surface turning to southwesterly aloft). Veering winds with height are indicative of warm air advection (WAA).

**Vertical Wind Shear**: The rate of change of wind speed or direction, with a given change in height. This is a critical factor in determining whether severe thunderstorms will develop.

**Vertically Stacked System**: A low-pressure system, usually a closed low or cutoff low, which is not tilted with height, i.e., located similarly at all levels of the atmosphere. Such systems typically are weakening and are slow-moving, and are less likely to produce severe weather than tilted systems. However, cold pools aloft associated with vertically-stacked systems may enhance instability enough to produce severe weather.

**Virga**: Precipitation that evaporates before it reaches the ground. It appears as wisps or streaks of rain or snow falling out of a cloud. As the precipitation evaporates, it cools the air and starts a down draft. In certain cases, shafts of virga may precede a microburst.

**Visible (VIS) Satellite Imagery**: This type of satellite imagery uses reflected sunlight (this is actually reflected solar radiation) to see things in the atmosphere and on the Earth's surface.

Clouds and fresh snow are excellent reflectors, so they appear white on the imagery. Clouds can be distinguished from snow, because clouds move and snow does not move. Meanwhile, the ground reflects less sunlight, so it appears black on the imagery. The satellite uses its 0.55 to 0.75 micrometer (um) channel to detect this reflected sunlight. Since this imagery relies on reflected imagery, it cannot be used during night.

**Visibility**: The greatest distance an observer can see and identify prominent objects.

**Visual Flight Rules (VFR)**: Refers to the general weather conditions pilots can expect at the surface. VFR is ceiling greater than or equal to 1,000 feet and visibility greater than or equal to 3 miles. Marginal VFR (MVFR) is a sub-category of VFR (ceiling 1,000 - 3,000 feet and/or visibility 3 to 5 miles).

**Vort Max**: This short for vorticity maximum. It is a center, or maximum, in the vorticity field of a fluid.

**Vortex**: In its most general use, any flow possessing vorticity. More often the term refers to a flow with closed streamlines.

**Vorticity**: A vector measure of the local rotation in a fluid flow. In weather analysis and forecasting, it usually refers to the vertical component of rotation (i.e., rotation about a vertical axis) and is used most often in reference to synoptic scale or mesoscale weather systems. By convention, positive values indicate cyclonic rotation.

**WAA**: An acronym for Warm Air Advection.

**Wall Cloud**: It is formed in a supercell thunderstorm. A localized, persistent, often abrupt lowering from a rain-free base. Wall clouds can range from a fraction of a mile up to nearly five miles in diameter, and normally are found on the south or southwest (inflow) side of the thunderstorm, attached to the rain free cloud base, and marks the strongest updraft in the thunderstorm. Eventually, this updraft will pull air from the rain cooled area of the thunderstorm. Since the rain cooled air is very humid, it will quickly condense in the updraft at a lower altitude than the rain free cloud base. When seen from within several miles, many wall clouds exhibit rapid upward motion and cyclonic rotation. However, not all wall clouds rotate. Rotating wall clouds usually develop before strong or violent tornadoes, by anywhere from a few minutes up to nearly an hour. Wall clouds should be monitored visually for signs of persistent, sustained rotation and/or rapid vertical motion.

**Warm Air Advection**: Transport of warm air into an area by horizontal winds.

**Warm Core Low**: A low pressure area which is warmer at its center than at its periphery. Tropical cyclones exhibit this temperature pattern. Unlike cold core lows, these lows produce much of their cloud cover and precipitation during the nighttime.

**Warm Front**: A front that moves in such a way that warm air replaces cold air.

**Warning**: A type of product issued by NWS offices indicating that a particular weather hazard is either imminent or has been reported. A warning indicates the need to take action to protect life and property. The type of hazard is reflected in the type of warning (e.g., tornado warning, blizzard warning). See short-fuse warning.

**Warning Stage**: The level of a river or stream which begins to cause flooding, and at which concerned interests should take action.

**Watch**: A type of NWS product indicating that a particular hazard is possible, i.e., that conditions are more favorable than usual for its occurrence. A watch is a recommendation for planning, preparation, and increased awareness (i.e., to be alert for changing weather, listen for further information, and think about what to do if the danger materializes).

**Watch Redefining Statement (SLS)**: This product tells the public which areas are included in the watch and is issued by the local NWS Forecast Office.

**Water Equivalent**: The liquid content of solid precipitation that has accumulated on the ground (snow depth). The accumulation may consist of snow, ice formed by freezing precipitation, freezing liquid precipitation, or ice formed by the refreezing of melted snow.

**Watershed**: The total area drained by a river and its tributaries. Sometimes called a basin.

**Water Vapor (WV) Satellite Imagery**: This satellite imagery uses that detects moisture between 700 and 200 mb; therefore, it is good for determining mid and upper level moisture in the atmosphere. Abundant water vapor appears white in this imagery. Meanwhile, dry air appears black in this satellite imagery. This satellite imagery can be used both day and night.

**Water Vapor Plume**: This appears in the water vapor satellite imagery. It is a plume-like object that extends from the Intertropical Convergence Zone (ITCZ) northward or southward into the higher latitudes and is a favored region for very heavy rain. It is thought that the ice crystals located in this plume help thunderstorms to become highly efficient rainfall producers. In North America, this is sometimes called the "Mexican Connection" for moisture moving into the southwestern US from Mexico or the "Pineapple Connection" for moisture moving into the west coast from the tropics.

**Waterspout**: A violently rotating column of air, usually a pendant to a cumulus or cumulonimbus cloud, over a body of water with its circulation reaching the water. Waterspouts can be generated by thunderstorms, or can be cold air funnels, being generated by a cold air mass passing over much warmer waters. Such waterspouts are generally much less intense than tornadoes.

**Wave**: An identifiable, periodic disturbance or motion in a medium that shows displacement. The most commonly referred medium is water, followed by the atmosphere. The forecasted heights of waves in the oceans are those heights expected at the end of the fetch for that body of water.

**Weather Forecast Office (WFO)**: This National Weather Service office is responsible for issuing advisories, warnings, statements, and short term forecasts for its county warning area. There are 122 WFOs that cover the entire U.S. and its territories.

**Weather balloon**: Large balloon filled with helium or hydrogen that carries a radiosonde (weather instrument) aloft to measure temperature pressure and humidity as the balloon rises through the air. It is attached to a small parachute so that when the balloon inevitably breaks, the radiosonde doesn't hurtle back to earth dangerously quickly.

**Weather synopsis**: A description of weather patterns affecting a large area.

**West Coast and Alaska Tsunami Warning Center (WCATWC)**: The WCATWC provides tsunami warning guidance for all U.S. coastal states (except Hawaii), and the Canadian coastal provinces. It is located in Palmer, AK. A tsunami warning for California will come from this center and will be relayed by the local NWS office.

**Wet-Bulb Temperature**: The lowest temperature that can be obtained by evaporating water into air.

**Wet-Bulb Zero (WBZ)**: The height where the wet-bulb temperature goes below 0°F. WBZ heights between 7000 ft and 10,500 ft (above ground level) correlate well with large hail at the surface when storms develop in an air mass primed for strong convection. It is also a good indicator of the elevation of snowfall.

**Wet Microburst**: A microburst accompanied by heavy precipitation at the surface. A rain foot may be a visible sign of a wet microburst. See dry microburst.

**WFO**: A National Weather Service Weather Forecast Office.

**Whirlwind**: A small, rotating column of air; may be visible as a dust devil.

**Wildfire**: Any free burning uncontainable wildland fire not prescribed for the area which consumes the natural fuels and spreads in response to its environment.

**Willy-Willy**: A tropical cyclone of hurricane strength near Australia.

**Wind**: The horizontal motion of the air past a given point. Winds begin with differences in air pressures. Pressure that's higher at one place than another sets up a force pushing from the high toward the low pressure. The greater the difference in pressures, the stronger the force. The distance between the area of high pressure and the area of low pressure also determines how fast the moving air is accelerated. Meteorologists refer to the force that starts the wind flowing as the pressure gradient force. High and low pressure are relative. There's no set number that divides high and low pressure. Wind is used to describe the prevailing direction from which the wind is blowing with the speed given usually in miles per hour or knots.

**Wind Advisory**: Issued for sustained winds strong enough to cause inconvenience or minor damage. Criteria for Southern California are sustained winds 30 to 39 mph and/or gusts to 57 mph in coastal and valley areas, and sustained winds 35 to 44 mph and/or gusts to 57 mph in the mountains and deserts.

**Wind Aloft**: The wind speeds and wind directions at various levels in the atmosphere above the area of surface.

**Wind Chill**: The wind chill is the effect of the wind on people and animals. The wind chill temperature is based on the rate of heat loss from exposed skin caused by wind and cold and gives an approximation of how cold the air feels on your body. As the wind increases, it removes heat from the body, driving down skin temperature and eventually the internal body temperature. Therefore, the wind makes it *FEEL* much colder. If the temperature is 0°F and the wind is blowing at 15 mph, the wind chill temperature is -19°F. At this level, exposed skin can freeze in just a few minutes. The only effect wind chill has on inanimate objects, such as car radiators and water pipes, is to shorten the amount of time for the object to cool. The inanimate object will not cool below the actual air temperature. For example, if the temperature outside is -5°F and the wind chill temperature is -31°F, then your car's radiator temperature will be no lower than the air temperature of -5°F.

**Wind Chill Advisory**: The NWS issues this product when the wind chill becomes dangerous. The criteria for this warning vary from state to state.

**Wind Chill Warning**: The NWS issues this product when the wind chill is life threatening. The criteria for this warning vary from state to state.

**Wind Direction**: The true direction FROM which the wind is moving at a given location. It is normally measured in tens of degrees from 10° to 360°.

**Wind Gust**: They are rapid fluctuations in the wind speed with a variation of 10 knots or more between peaks and lulls. The speed of the gust will be the maximum instantaneous wind speed.

**Wind Rose**: A diagram that shows the percent of time that the wind blows from different directions at a given location over a given time.

**Wind Shear**: The rate of change of wind speed and/or direction over a given distance. Also, see shear.

**Wind Shift**: A change in wind direction of 45° or more in less than 15 minutes with sustained wind speeds of 10 knots or more throughout the wind shift.
**Wind Sock**: A tapered fabric shaped like a cone that indicates wind direction by pointing away from the wind. It is also called a *wind cone*.

**Wind Speed**: The rate at which air is moving horizontally past a given point. It may be a 2-minute average speed (reported as wind speed) or an instantaneous speed (reported as a peak wind speed, wind gust, or squall).

**Wind Vane**: An instrument that determines the direction from which a wind is blowing.

**Wind Waves:** Local, short period waves generated from the action of wind on the water surface (as opposed to *swell*). Commonly referred to as waves.

**Winter Storm Warning**: Issued when more than one type of hazardous winter weather is occurring, imminent, or highly likely over part or all of the forecast area. Winter storm warnings are normally issued for the first period of the forecast but can be extended into the second period. They are reissued whenever there is a change to the timing, areal extent, or expected condition.

**Winter Storm Watch**: Issued when conditions are favorable for hazardous winter weather conditions to develop over part or all of the forecast area in the next 6-36 hours, but the occurrence is still uncertain. Watches will be reissued whenever there is a change in the timing, areal extent, or expected conditions. Winter storm watches either evolve into winter storm warnings or advisories, or they are canceled.

**WSR-88D**: Weather Surveillance Radar - 1988 Doppler; NEXRAD unit.

**Zone Forecast Product (ZFP)**: This NWS product will provide the general public with a clear statement of the expected weather conditions within a given zone. The forecast will include: sky condition, temperature, type of precipitation and its probability, and wind direction and speed (probability of precipitation and winds are normally given only during the first 5 periods of the forecast).

**Zonal Flow**: Large-scale atmospheric flow in which the east-west component (i.e., latitudinal) is dominant. The accompanying meridional (north-south) component often is weaker than normal. Compare with meridional flow.

**Zulu (Z) Time**: For practical purposes, the same as Coordinated Universal Time (UTC). The notation formerly used to identify time Greenwich Mean Time. The word "Zulu" is notation in the phonetic alphabet corresponding to the letter "Z" assigned to the time zone on the Greenwich Prime Meridian.