

# Some terms used in water resource management, forecasting, sewage treatment

Sources: Environment Canada, Australian Bureau of Meteorology, United States National Weather Service

## **Ablation**

Depletion of snow and ice by melting and evaporation.

## **Action Stage**

The stage which, when reached by a rising stream, represents the level where the NWS or a partner/user needs to take some type of mitigation action in preparation for possible significant hydrologic activity. The appropriate action is usually defined in a weather forecast office (WFO) hydrologic services manual. Action stage can be the same as forecast issuance stage .

## **Advection**

(Abbrev. ADVCTN)- Transport of an atmospheric property by the wind.

## **ADVIS**

In hydrologic terms, a program which combines the Antecedent Precipitation Index (API) method of estimating runoff with unit hydrograph theory to estimate streamflow for a headwater basin.

## **Angels**

Radar echoes caused by birds, insects, and localized refractive index discontinuities.

## **ANOMALOUS PROPAGATION (AP)**

Non-standard atmospheric temperature or moisture gradients will cause all or part of the radar beam to propagate along a non-normal path. When non-standard index-of-refraction distributions prevail, "abnormal" or "anomalous" propagation occurs. When abnormal downward bending occurs, it is called "super-refraction." If the beam is refracted downward sufficiently, it will illuminate the ground and return signals to the radar from distances further than is normally associated with ground targets. The term "subrefraction" is applied when there is abnormal upward bending of the radar beam.

## **Anomaly**

The deviation of a measurable unit (e.g., temperature or precipitation) over a period in a given region from the long-term average, often the thirty-year mean, for that region.

## **Antecedent Precipitation Index**

(Abbrev. API) - an index of moisture stored within a drainage basin before a storm.

## **AP**

Anomalous Propagation. Radar term for false (non-precipitation) echoes resulting from nonstandard propagation of the radar beam under certain atmospheric conditions.

## **Aquifer**

In hydrologic terms, permeable layers of underground rock, or sand that hold or transmit groundwater below the water table that will yield water to a well in sufficient quantities to produce water for beneficial use.

## **Artesian Well**

In hydrologic terms, a well drilled into a confined aquifer with enough hydraulic pressure for the water to flow to the surface without pumping. Also called a flowing well.

## **Attenuation**

It refers to the reduction of the radar beam power due to the reflection or absorption of energy when it strikes a target. The greatest attenuation occurs when the radar beam goes through very heavy rain.

## **Backflow**

In hydrologic terms, the backing up of water through a conduit or channel in the direction opposite to normal flow.

## **Backwater Curve**

In hydrologic terms, the longitudinal profile of the surface of a liquid in a non-uniform flow in an open channel, when the water surface is not parallel to the invert owing to the depth of water having been increased by the interposition of an obstruction such as a dam or weir. The term is sometimes used in a generic sense to denote all water surface profiles; or for profiles where the water is flowing at depths greater than the critical.

## **Backwater Effect**

In hydrologic terms, the effect which a dam or other obstruction has in raising the surface of the water upstream from it.

## **Backwater Flooding**

Hydrologic terms, upstream flooding caused by downstream conditions such as channel restriction and/or high flow in a downstream confluence stream.

## **Bank**

In hydrologic terms, the margins of a channel. Banks are called right or left as viewed facing in the direction of the flow.

## **Bank Storage**

In hydrologic terms, water absorbed and stored in the void in the soil cover in the bed and banks of a stream, lake, or reservoir, and returned in whole or in part as the level of water body surface falls.

## **Bankfull**

The water level, or stage, at which a stream, river or lake is at the top of its banks and any further rise would result in water moving into the flood plain.

## **Bankfull Stage**

An established gage height at a given location along a river or stream, above which a rise in water surface will cause the river or stream to overflow the lowest natural stream bank somewhere in the corresponding reach. The term "lowest bank" is however, not intended to apply to an unusually low place or a break in the natural bank through which the water inundates a small area. Bankfull stage is not necessarily the same as flood stage.

## **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, and thus are generally

unfavorable areas for severe thunderstorm development. See baroclinic zone.

Usually, in operational meteorology, references to barotropic systems refer to equivalent barotropic systems - systems in which temperature gradients exist, but are parallel to height gradients on a constant pressure surface. In such systems, height contours and isotherms are parallel everywhere and winds do not change direction with height.

As a rule, a true equivalent barotropic system can never be achieved in the real atmosphere. While some systems (such as closed lows or cutoff lows) may reach a state that is close to equivalent barotropic, the term barotropic system usually is used in a relative sense to describe systems that are really only close to being equivalent barotropic, i.e., isotherms and height contours are nearly parallel everywhere and directional wind shear is weak.

### **Barrage**

In hydrologic terms, any artificial obstruction placed in water to increase water level or divert it. Usually the idea is to control peak flow for later release.

### **Base Flood**

In hydrologic terms, the national standard for floodplain management is the base, or one percent chance flood. This flood has at least one chance in 100 of occurring in any given year. It is also called a 100 year flood.

### **Base Reflectivity**

One of the three fundamental quantities (along with base [radial] velocity and spectrum width) that a Doppler radar measures. Reflectivity is related to the power, or intensity, of the reflected radiation that is sensed by the radar antenna. Base reflectivity is expressed on a logarithmic scale in units called dBZ. The term "base" refers to the product being "basic", with little advanced processing performed on the data. Base reflectivity is related to rainfall intensity (e.g., drop size and rainfall rate) and hail size (for large values of reflectivity).

### **Base Station**

In hydrologic terms, a computer which accepts radio signals from ALERT gaging sites, decodes the data, places the data in a database, and makes the data available to other users.

### **Base Width**

In hydrologic terms, the time duration of a unit hydrograph.

### **Baseflow**

In hydrologic terms, streamflow which results from precipitation that infiltrates into the soil and eventually moves through the soil to the stream channel. This is also referred to as ground water flow, or dry-weather flow.

### **Basin**

An area having a common outlet for its surface runoff. Also called a "Drainage Basin."

### **Basin Boundary**

The topographic dividing line around the perimeter of a basin, beyond which overland flow (i.e.; runoff) drains away into another basin.

### **Basin Lag**

In hydrologic terms, the time it takes from the centroid of rainfall for the hydrograph to peak.

### **Basin Recharge**

In hydrologic terms, rainfall that adds to the residual moisture of the basin in order to help recharge the water deficit. i.e.; water absorbed into the soil that does not take the form of direct runoff.

### **Bathymetry**

The science of measuring depths of the oceans, lakes, seas, etc.

### **Bed Load**

In hydrologic terms, sand, silt, gravel, or soil and rock detritus carried by a stream on or immediately above its bed. The particles of this material have a density or grain size such as to preclude movement far above or for a long distance out of contact with the stream bed under natural conditions of flow.

### **Beginning of Freezup**

In hydrologic terms, date on which ice forming a stable winter ice cover is first observed on the water surface

### **Beginning of the Breakup**

In hydrologic terms, date of definite breaking, movement, or melting of ice cover or significant rise of water level.

### **Benchmark**

(Abbrev. BM) - In hydrologic terms, a permanent point whose known elevation is tied to a national network. These points are created to serve as a point of reference. Benchmarks have generally been established by the USGS, but may have been established by other Federal or local agencies. Benchmarks can be found on USGS maps.

### **Bergeron Process**

The process by which ice crystals in a cloud grow at the expense of supercooled liquid water droplets.

### **BL**

Abbreviation for **Boundary Layer**; 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.

### **Black Ice**

1. Slang reference to patchy ice on roadways or other transportation surfaces that cannot easily be seen.
2. In hydrologic terms, transparent ice formed in rivers and lakes.

### **Blackwater**

Used water from sanitary appliances that contains human fecal matter or human urine.

### **Border Ice**

In hydrologic terms, an ice sheet in the form of a long border attached to the bank or shore ice.

## **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 increasing height, so the "top" of this layer cannot be defined exactly.

There is a thin layer immediately above the earth's surface known as the **surface boundary layer** (or simply the surface layer). This layer is only a portion of the planetary boundary layer, and represents the layer within which friction effects are more or less constant throughout (as opposed to decreasing with height, as they do above it). The surface boundary layer is roughly 10 meters thick (from the surface up to 10 m above the ground), but again the exact depth is indeterminate. Like friction, the effects of insolation and radiational cooling are strongest within this layer.

## **Bounded Weak Echo Region (BWER)**

(Also known as a vault.) Radar signature within a thunderstorm characterized by a local minimum in radar reflectivity at low levels which extends upward into, and is surrounded by, higher reflectivities aloft. This feature is associated with a strong updraft and is almost always found in the inflow region of a thunderstorm. It cannot be seen visually.

## **Bow Echo**

A radar echo which is linear but bent outward in a bow shape. Damaging straight-line winds often occur near the "crest" or center of a bow echo. Areas of circulation also can develop at either end of a bow echo, which sometimes can lead to tornado formation - especially in the left (usually northern) end, where the circulation exhibits cyclonic rotation.

## **Braided Stream**

In hydrologic terms, characterized by successive division and rejoining of streamflow with accompanying islands. A braided stream is composed of anabranches.

## **Brash Ice**

In hydrologic terms, accumulation of floating ice made up of fragments not more than 2 meters across; the wreckage of other forms of ice.

## **Breach**

In hydrologic terms, the failed opening in a dam.

## **Breakers**

Waves that break, displaying white water. Depends on wave steepness and bottom bathymetry.

## **Breakup**

In hydrologic terms, the time when a river whose surface has been frozen from bank to bank for a significant portion of its length begins to change to an open water flow condition. Breakup is signaled by the breaking of the ice and often associated with ice jams and flooding.

## **Breakup Date**

In hydrologic terms, date on which a body of water is first observed to be entirely clear of ice and remains clear thereafter.

## **Breakup Jam**

In hydrologic terms, an ice jam that occurs as a result of the accumulation of broken ice pieces.

## **Breakup Period**

In hydrologic terms, the period of disintegration of an ice cover.

## **Bright Band**

A distinct feature observed by a radar that denotes the freezing level of the atmosphere. The term originates from a horizontal band of enhanced reflectivity that can result when a radar antenna scans vertically through precipitation. The freezing level in a cloud contains ice particles that are coated with liquid water. These particles reflect significantly more radiation (appearing to the radar as large raindrops) than the portions of the cloud above and below the freezing layer. The bright band can affect the ability of the NEXRAD algorithms to produce accurate rainfall estimates at far ranges because the algorithm may interpret reflectivity from the bright band as an overestimate of precipitation reaching the surface.

## **Bright Band**

The enhanced radar echo of snow as it melts to rain.

## **Cap**

(also called "Lid") A layer of relatively warm air aloft, usually several thousand feet above the ground, which suppresses or delays the development of thunderstorms. Air parcels rising into this layer become cooler than the surrounding air, which inhibits their ability to rise further and produce thunderstorms. As such, the cap often prevents or delays thunderstorm development even in the presence of extreme instability. However, if the cap is removed or weakened, then explosive thunderstorm development can occur.

The cap is an important ingredient in most severe thunderstorm episodes, as it serves to separate warm, moist air below and cooler, drier air above. With the cap in place, air below it can continue to warm and/or moisten, thus increasing the amount of potential instability. Or, air above it can cool, which also increases potential instability. But without a cap, either process (warming/moistening at low levels or cooling aloft) results in a faster release of available instability - often before instability levels become large enough to support severe weather development.

## **Cap Cloud**

A stationary cloud directly above an isolated mountain peak, with cloud base below the elevation of the peak.

## **CAPE**

Convective Available Potential Energy. A measure of the amount of energy available for convection. CAPE is directly related to the maximum potential vertical speed within an updraft; thus, higher values indicate greater potential for severe weather. Observed values in thunderstorm environments often may exceed 1000 joules per kilogram (J/kg), and in extreme cases may exceed 5000 J/kg.

However, as with other indices or indicators, there are no threshold values above which severe weather becomes imminent. CAPE is represented on an upper air sounding by the area enclosed between the environmental temperature profile and the path of a rising air parcel, over the layer within which the latter is warmer than the former. (This area often is called positive area.) See also CIN.

### **Capillarity**

In hydrologic terms,

1. The degree to which a material or object containing minute openings or passages, when immersed in a liquid, will draw the surface of the liquid above the hydrostatic level. Unless otherwise defined, the liquid is generally assumed to be water.

2. The phenomenon by which water is held in interstices above the normal hydrostatic level, due to attraction between water molecules.

### **Capillary Zone**

The soil area just above the water table where water can rise up slightly through the cohesive force of capillary action. This layer ranges in depth from a few cms to a metre, and it depends on the pore sizes of the materials.

### **Carbonaceous biochemical oxygen demanding matter (CBOD)**

Carbonaceous matter that consumes, by biochemical oxidation, oxygen dissolved in water.

### **Catchment Area**

In hydrologic terms, an area having a common outlet for its surface runoff (also see Drainage Area or Basin, Watershed).

### **Channel**

In hydrologic terms, also known as **Watercourse**; an open conduit either naturally or artificially created which periodically, or continuously contains moving water, or forms a connecting link between two bodies of water. River, creek, run, branch, anabranch, and tributary are some of the terms used to describe natural channels. Natural channels may be single or braided. Canal and floodway are some of the terms used to describe artificial channels.

### **Chlorofluorocarbons**

(CFCs) - Manufactured substances used as coolants and computer-chip cleaners. When these products break down they destroy stratospheric ozone, creating the Antarctic Ozone Hole in the Southern Hemisphere spring (Northern Hemisphere autumn). While no longer in use, their long lifetime will lead to a very slow removal from the atmosphere.

### **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, and thus move relatively slowly.

### **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.

### **Comma Echo**

A thunderstorm radar echo which has a comma-like shape. It often appears during latter stages in the life cycle of a bow echo

### **Combined sewer**

A sewer designed to collect surface runoff and stormwater in such a manner that it mixes with wastewater

### **Confined Ground Water**

In hydrologic terms, ground water held under an aquiclude or an aquifuge, called artesian if the pressure is positive.

### **Convective Boundary Layer**

The unstable boundary layer that forms at the surface and grows upward through the day as the ground is heated by the sun and convective currents transfer heat upwards into the atmosphere.

### **Critical Rainfall Probability**

(Abbrev. CRP) - In hydrologic terms, the Probability that the actual precipitation during a rainfall event has exceeded or will exceed the flash flood guidance value.

### **Cubic metre per Second**

(Abbrev. cms) - In hydrologic terms, a unit expressing rates of discharge. One cubic metre per second is equal to the discharge through a rectangular cross section, 1 metre wide by 1 metre deep, flowing at an average velocity of 1 metre per second.

### **Cyclogenesis**

(Abbrev. CYCLGN) - The formation or intensification of a cyclone or low-pressure storm system.

### **Delta**

In hydrologic terms, an alluvial deposit, often in the shape of the Greek letter "delta", which is formed where a stream drops its debris load on entering a body of quieter water.

### **Delta T**

Change in temperature. 1) A simple representation of the mean lapse rate within a layer of the atmosphere, obtained by calculating the difference between observed temperatures at the bottom and top of the layer. Delta Ts often are computed operationally over the layer between pressure levels of 700 mb and 500 mb, in order to evaluate the amount of instability in mid-levels of the atmosphere. Generally, values greater than about 18 indicate sufficient instability for severe thunderstorm development. 2) The difference in temperature between the surface of a lake and 850mb, typically used to determine lake effect snow potential.

### **Dendritic**

In hydrologic terms, the form of the drainage pattern of a stream and its tributaries when it follows a treelike shape, with the main trunk, branches, and twigs corresponding to the main stream, tributaries, and subtributaries, respectively, of the stream.

### **Density of Snow**

In hydrologic terms, the ratio, expressed as a percentage, of the volume which a given quantity of snow would occupy if it were reduced to water, to the volume of the snow. When a snow sampler is used, it is the ratio expressed as percentage of the scale reading on the sampler to the length of the snow core or sample.

**Detention Basins**

Structures built upstream from populated areas to prevent runoff and/or debris flows from causing property damage and loss of life. They are normally dry, but are designed to attenuate storm flows or detain mud/debris during and immediately after a runoff event. They have no spillway gates or valves and do not store water on a long-term basis. Typical detention times for storm flows are on the order of 24 to 72 hours, but may be as long as 5 to 10 days. Basins designed for detention of mud and rock debris are periodically excavated to maintain their storage capacity.

**Direct Flood Damage**

In hydrologic terms, the damage done to property, structures, goods, etc., by a flood as measured by the cost of replacement and repairs.

**Direct Runoff**

In hydrologic terms, the runoff entering stream channels promptly after rainfall or snowmelt. Superposed on base runoff, it forms the bulk of the hydrograph of a flood.

**Discharge**

In hydrologic terms, the rate at which water passes a given point. Discharge is expressed in a volume per time with units of  $L^3/T$ . Discharge is often used interchangeably with streamflow.

**Discharge Curve**

In hydrologic terms, a curve that expresses the relation between the discharge of a stream or open conduit at a given location and the stage or elevation of the liquid surface at or near that location. Also called Rating Curve and Discharge Rating Curve.

**Diversion**

In hydrologic terms, the taking of water from a stream or other body of water into a canal, pipe, or other conduit.

**Divide**

The high ground that forms the boundary of a watershed. A divide is also called a ridge.

**Dividing Streamline**

In the blocked flow region upwind of a mountain barrier, the streamline that separates the blocked flow region near the ground from the streamlines above which go over the barrier.

**Domestic Consumption**

In hydrologic terms, the quantity, or quantity per capita, of water consumed in a municipality or district for domestic uses or purposes during a given period, generally one day. It is usually taken to include all uses included within the term Municipal Use of Water and quantity wasted, lost, or otherwise unaccounted for.

**Domestic Use of water**

In hydrologic terms, the use of water primarily for household purposes, the watering of livestock, the irrigation of gardens, lawns, shrubbery, etc., surrounding a house or domicile.

**Doppler Radar**

Radar that can measure radial velocity, the instantaneous component of motion parallel to the radar beam (i.e., toward or away from the radar antenna).

**Downburst**

A strong downdraft current of air from a cumulonimbus cloud, often associated with intense thunderstorms. Downdrafts may produce damaging winds at the surface.

**Downstream**

In the same direction as a stream or other flow, or toward the direction in which the flow is moving.

**Downstream Slope**

In hydrologic terms, the slope or face of the dam away from the reservoir water. This slope requires some kind of protection (e.g.; grass) from the erosive effects of rain and surface flow

**Drainage Basin**

In hydrologic terms, 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.

**Drainage Divide**

In hydrologic terms, the boundary line, along a topographic ridge or along a subsurface formation, separating two adjacent drainage basins.

**Drawdown**

In hydrologic terms, the lowering of the surface elevation of a body of water, the water surface of a well, the water table, or the piezometric surface adjacent to the well, resulting from the withdrawal of water therefrom.

**Dredging**

In hydrologic terms, the scooping, or suction of underwater material from a harbor, or waterway. Dredging is one form of channel modification. It is often too expensive to be practical because the dredged material must be disposed of somewhere and the stream will usually fill back up with sediment in a few years. Dredging is usually undertaken only on large rivers to maintain a navigation channel.

**Echo**

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

**ECMWF**

European Center for Medium-Range Weather Forecasts. Operational references in forecast discussions typically refer to the ECMWF's medium-range numerical forecast model, which runs out to 10 days.

**Effective Porosity**

In hydrologic terms, the ratio, usually expressed as a percentage, of the volume of water or other liquid which a given saturated volume of rock or soil will yield under any specified hydraulic condition, to the given volume of soil or rock.

**Effective Precipitation**

- 1) That part of the precipitation that produces runoff.
- 2) A weighted average of current and antecedent precipitation that is "effective" in correlating with runoff.
- 3) That part of the precipitation falling on an irrigated area that is effective in meeting the consumptive use requirements.

**Elevated Convection**

Convection occurring within an elevated layer, i.e., a layer in which the lowest portion is based above the earth's surface. Elevated convection often occurs when air near the ground is relatively cool and stable, e.g., during periods of isentropic lift, when an unstable layer of air is present aloft.

In cases of elevated convection, stability indices based on near-surface measurements (such as the lifted index) typically will underestimate the amount of instability present. Severe weather is possible from elevated convection, but is less likely than it is with surface-based convection.

**Embankment**

In hydrologic terms, fill material, usually earth or rock, placed with sloping sides and usually with length greater than height. All dams are types of embankments

In hydrologic terms, services provided in order to minimize the impact of a flood that is already happening. These measures are the responsibility of city, or county emergency management staff and the owners or operators of major, or critical facilities. Some examples of emergency services are flood warning and evacuation, flood response, and post flood activities.

**Emerging Flux Region (EFR)**

In solar-terrestrial terms, an area on the sun where new magnetic flux is erupting.

**ENSEMBLE**

A collection of numerical model results that show slightly different possible outcomes.

**Ensemble Forecast**

Multiple predictions from an ensemble of slightly different initial conditions and/or various versions of models. The objectives are to improve the accuracy of the forecast through averaging the various forecasts, which eliminates non-predictable components, and to provide reliable information on forecast uncertainties from the diversity amongst ensemble members. Forecasters use this tool to measure the likelihood of a forecast.

**Ensemble Hydrologic Forecasting**

In hydrologic terms, a process whereby a continuous hydrologic model is successively executed several times for the same forecast period by use of varied data input scenarios, or a perturbation of a key variable state for each model run. A common method employed to obtain a varied data input scenario is to use the historical meteorological record, with the assumption that several years of observed data covering the time period beginning on the current date and extending through the forecast period comprises a reasonable estimate of the possible range of future conditions.

**ENSO**

Abbreviation for **El Niño Southern Oscillation**, a reference to the state of the Southern Oscillation.

**Equilibrium Surface Discharge**

In hydrologic terms, the steady rate of surface discharge which results from a long-continued, steady rate of net rainfall, with discharge rate equal to net rainfall rate

**Erosion**

In hydrologic terms, wearing away of the lands by running water, glaciers, winds, and waves, can be subdivided into three processes: Corrasion, Corrosion, and Transportation. Weathering, although sometimes included here, is a distant process which does not imply removal of any material.

**Esturine Zone**

In hydrologic terms, the area near the coastline that consists of estuaries and coastal saltwater wetlands

**Evapotranspiration**

Combination of evaporation from free water surfaces and transpiration of water from plant surfaces to the atmosphere.

**Excess Rain**

In hydrologic terms, effective rainfall in excess of infiltration capacity.

**Exclusive Flood Control Storage Capacity**

In hydrologic terms, the space in a reservoir reserved for the sole purpose of regulating flood inflows to abate flood damage

**Explosive Deepening**

A decrease in the minimum sea-level pressure of a tropical cyclone of 2.5 mb/hr for at least 12 hours or 5 mb/hr for at least six hours.

**Extratropical Cyclone**

A cyclone in the middle and high latitudes often being 2000 kilometers in diameter and usually containing a cold front that extends toward the equator for hundreds of kilometres.

**Extratropical Low**

A low pressure center which refers to a migratory frontal cyclone of middle and higher latitudes. Tropical cyclones occasionally evolve into extratropical lows losing tropical characteristics and become associated with frontal discontinuity.

**Flash Flood**

A rapid and extreme flow of high water into a normally dry area, or a rapid water level rise in a stream or creek above a predetermined flood level, beginning within six hours of the causative event (e.g., intense rainfall, dam failure, ice jam). However, the actual time threshold may vary in different parts of the country. Ongoing flooding can intensify to flash flooding in cases where intense rainfall results in a rapid surge of rising flood waters.

**Flash Flood Guidance**

(FFG) Forecast guidance produced by the River Forecast Centers, often model output, specific to the potential for flash flooding (e.g., how much rainfall over a given area will be required to produce flash flooding).

#### **Flash Flood Statement**

(FFS) In hydrologic terms, a statement which provides follow-up information on flash flood watches and warnings.

#### **Flash Flood Table**

In hydrologic terms, a table of pre-computed forecast crest stage values for small streams for a variety of antecedent moisture conditions and rain amounts. Soil moisture conditions are often represented by flash flood guidance values. In lieu of crest stages, categorical representations of flooding, e.g., minor, moderate, etc. may be used on the tables.

#### **Flash Flood Warning**

Issued to inform the public, emergency management and other cooperating agencies that flash flooding is in progress, imminent, or highly likely.

#### **Flash Flood Watch**

Issued to indicate current or developing hydrologic conditions that are favorable for flash flooding in and close to the watch area, but the occurrence is neither certain or imminent.

#### **Final discharge point**

Location in a wastewater system beyond which its owner or operator no longer exercises control over the quality of the wastewater before it is deposited as effluent in water or a place.

#### **Float Recording Precipitation gage**

In hydrologic terms, a rain gage where the rise of a float within the instrument with increasing rainfall is recorded. Some of these gages must be emptied manually, while others employ a self-starting siphon to empty old rainfall amounts.

#### **Flood Categories**

Terms defined for each forecast point which describe or categorize the severity of flood impacts in the corresponding river/stream reach. Each flood category is bounded by an upper and lower stage (see Example 1). The severity of flooding at a given stage is not necessarily the same at all locations along a river reach due to varying channel/bank characteristics or presence of levees on portions of the reach. Therefore, the upper and lower stages for a given flood category are usually associated with water levels corresponding to the most significant flood impacts somewhere in the reach. The flood categories used in the NWS are: \*Minor Flooding\* - minimal or no property damage, but possibly some public threat. \*Moderate Flooding\* - some inundation of structures and roads near stream. Some evacuations of people and/or transfer of property to higher elevations. \*Major Flooding\* - extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations. \*Record Flooding\* - flooding which equals or exceeds the highest stage or discharge at a given site during the period of record keeping. Note: all three of the lower flood categories (minor, moderate, major) do not necessarily exist for a given forecast point. For example, at the level where a river reaches flood stage, it may be considered moderate flooding. However, at least one of these three flood categories must start at flood stage.

#### **Flood Control Storage**

In hydrologic terms, storage of water in reservoirs to abate flood damage

#### **Flood Crest**

Maximum height of a flood wave as it passes a certain location.

#### **Flood Frequency Curve**

In hydrologic terms,

(1) A graph showing the number of times per year on the average, plotted as abscissa, that floods of magnitude, indicated by the ordinate, are equaled or exceeded.

(2) A similar graph but with recurrence intervals of floods plotted as abscissa.

#### **Flood Loss Reduction Measures**

In hydrologic terms, the strategy for reducing flood losses. There are four basic strategies. They are prevention, property protection, emergency services, and structural projects. Each strategy incorporates different measures that are appropriate for different conditions. In many communities, a different person may be responsible for each strategy.

#### **Flood of Record**

In hydrologic terms, the highest observed river stage or discharge at a given location during the period of record keeping. (Not necessarily the highest known stage.)

#### **Flood Plain**

In hydrologic terms, the portion of a river valley that has been inundated by the river during historic floods.

#### **Flood Potential Outlook**

(ESF on AFOS) (FPO for Acronym): In hydrologic terms, An NWS outlook that is issued to alert the public of potentially heavy rainfall that could send area rivers and streams into flood or aggravate an existing flood.

#### **Flood Prevention**

In hydrologic terms, measures that are taken in order to keep flood problems from getting worse. Planning, land acquisition, river channel maintenance, wetlands protection, and other regulations all help modify development on floodplains and watersheds to reduce their susceptibility to flood damage. Preventive measures are usually administered by the building, zoning, planning and/ or code enforcement offices of the local government.

#### **Flood Problems**

In hydrologic terms, problems and damages that occur during a flood as a result of human development and actions. Flood problems are a result from:

- 1) Inappropriate development in the floodplain (e.g., building too low, too close to the channel, or blocking flood flows);
- 2) Development in the watershed that increases flood flows and creates a larger floodplain, or;
- 3) A combination of the previous two.

#### **Flood Profile**

In hydrologic terms, a graph of elevation of the water surface of a river in flood, plotted as ordinate, against distance, measured in the downstream direction, plotted as abscissa. A flood profile may be drawn to show elevation at a given time, crests during a particular flood, or to show stages of concordant flows

**Flood Routing**

In hydrologic terms, process of determining progressively the timing, shape, and amplitude of a flood wave as it moves downstream to successive points along the river

**Flood Stage**

An established gage height for a given location above which a rise in water surface level begins to create a hazard to lives, property, or commerce. The issuance of flood (or in some cases flash flood) warnings is linked to flood stage. Not necessarily the same as bankfull stage.

**Flood Warning**

(FLW) In hydrologic terms, a release by the NWS to inform the public of flooding along larger streams in which there is a serious threat to life or property. A flood warning will usually contain river stage (level) forecasts.

**Flood Watch**

Issued to inform the public and cooperating agencies that current and developing hydrometeorological conditions are such that there is a threat of flooding, but the occurrence is neither certain nor imminent.

**Flood Wave**

In hydrologic terms, a rise in streamflow to a crest and its subsequent recession caused by precipitation, snowmelt, dam failure, or reservoir releases

**Flooded Ice**

In hydrologic terms, ice which has been flooded by melt water or river water and is heavily loaded by water and wet snow.

**Floodproofing**

In hydrologic terms, the process of protecting a building from flood damage on site. Floodproofing can be divided into wet and dry floodproofing. In areas subject to slow-moving, shallow flooding, buildings can be elevated, or barriers can be constructed to block the water's approach to the building. These techniques have the advantage of being less disruptive to the neighborhood. It must be noted that during a flood, a floodproofed building may be isolated and without utilities and therefore unusable, even though it has not been damaged.

**Floodwall**

In hydrologic terms, a long, narrow concrete, or masonry embankment usually built to protect land from flooding. If built of earth the structure is usually referred to as a levee. Floodwalls and levees confine streamflow within a specified area to prevent flooding. The term "dike" is used to describe an embankment that blocks an area on a reservoir or lake rim that is lower than the top of the dam.

**Floodway**

In hydrologic terms,

(1) A part of the flood plain, otherwise leveed, reserved for emergency diversion of water during floods. A part of the flood plain which, to facilitate the passage of floodwater, is kept clear of encumbrances.

(2) The channel of a river or stream and those parts of the flood plains adjoining the channel, which are reasonably required to carry and discharge the floodwater or floodflow of any river or stream.

**Flow Duration Curve**

In hydrologic terms, a cumulative frequency curve that shows the percentage of time that specified discharges are equaled or exceeded.

**Forecast Crest**

In hydrologic terms, the highest elevation of river level, or stage, expected during a specified storm event.

**Fracturing**

In hydrologic terms, deformation process whereby ice is permanently deformed, and fracture occurs.

**Frazil Ice**

In hydrologic terms, fine spicules, plates, or discoids of ice suspended in water. In rivers and lakes, frazil is formed in supercooled, turbulent water.

**Freak Wave**

A wave of much greater height and steepness than other waves in the prevailing sea or swell system. See Rogue Wave.

**Free Atmosphere**

The part of the atmosphere that lies above the frictional influence of the earth's surface.

**Free Ground Water**

In hydrologic terms, unconfined ground water whose upper boundary is a free water table

**Freeboard**

In hydrologic terms, the vertical distance between the normal maximum level of the water surface in a channel, reservoir, tank, canal, etc., and the top of the sides of a levee, dam, etc., which is provided so that waves and other movements of the liquid will not overtop the confining structure

**Freeze**

A freeze 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 adjective situations or to occasions when wind or other conditions prevent frost. "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.

**Freeze Warning**

Issued during the growing season when surface temperatures are expected to drop below freezing over a large area for an extended period of time, regardless whether or not frost develops.

**Freezeup date**

In hydrologic terms, the date on which the water body was first observed to be completely frozen over

**Freezing Drizzle**

A drizzle that falls as a liquid but freezes into glaze or rime upon contact with the cold ground or surface structures.

**Freezing Drizzle Advisory**



Issued when freezing rain or freezing drizzle is forecast but a significant accumulation is not expected. However, even small amounts of freezing rain or freezing drizzle may cause significant travel problems.

**Freezing Level**

The altitude at which the air temperature first drops below freezing.

**Freezing Rain**

Rain that falls as a liquid but freezes into glaze upon contact with the ground.

**Freezing Rain Advisory**

Issued when freezing rain or freezing drizzle is forecast but a significant accumulation is not expected. However, even small amounts of freezing rain or freezing drizzle may cause significant travel problems.

**Freezup jam**

In hydrologic terms, ice jam formed as frazil ice accumulates and thickens

**French Drain**

In hydrologic terms, an underground passageway for water through the interstices among stones placed loosely in a trench

**Freshet**

The annual spring rise of streams in cold climates as a result of snow melt; freshet also refers to a flood caused by rain or melting snow.

**Gage Datum**

A horizontal surface used as a zero point for measurement of stage or gage height. This surface usually is located slightly below the lowest point of the stream bottom such that the gage height is usually slightly greater than the maximum depth of water. Because the gage datum is not an actual physical object, the datum is usually defined by specifying the elevations of permanent reference marks such as bridge abutments and survey monuments, and the gage is set to agree with the reference marks. Gage datum is a local datum that is maintained independently of any national geodetic datum. However, if the elevation of the gage datum relative to the national datum (North American Vertical Datum of 1988 or National Geodetic Vertical Datum of 1929) has been determined, then the gage readings can be converted to elevations above the national datum by adding the elevation of the gage datum to the gage reading.

**Gaging Station**

In hydrologic terms, a particular site on a watercourse where systematic observations of stage/ and or flow are measured.

**Greywater**

Used water, other than blackwater, from sanitary appliances or from other appliances in a kitchen or laundry.

**Ground Water**

In hydrologic terms, water within the earth that supplies wells and springs; water in the zone of saturation where all openings in rocks and soil are filled, the upper surface of which forms the water table. Also termed Phreatic water.

**Ground Water Divide**

In hydrologic terms, a line on a water table where on either side of which the water table slopes downward. It is analogous to a drainage divide between two drainage basins on a land surface

**Ground Water Flow**

In hydrologic terms, streamflow which results from precipitation that infiltrates into the soil and eventually moves through the soil to the stream channel. This is also referred to as baseflow, or dry-weather flow

**Ground Water Hydrology**

The branch of hydrology that specializes in ground water; its occurrence and movements; its replenishment and depletion; the properties of rocks that control ground water movement and storage; and the methods of investigation and utilization of ground water

**Ground Water Outflow**

In hydrologic terms, the part of the discharge from a drainage basin that occurs through the ground water. The term "underflow" is often used to describe the ground water outflow that takes place in valley alluvium (instead of the surface channel) and thus is not measure at a gaging station.

**Ground Water Runoff**

That part of the runoff which has passed into the ground, has become ground water, and has been discharged into a stream channel as spring, or seepage water.

**Grounded ice**

In hydrologic terms, ice that has run aground or is contact with the ground underneath it

**Headwaters**

In hydrologic terms, streams at the source of a river.

**Hook Echo**

A radar reflectivity pattern characterized by a hook-shaped extension of a thunderstorm echo, usually in the right-rear part of the storm (relative to its direction of motion). A hook often is associated with a mesocyclone, and indicates favorable conditions for tornado development.

**Hummocked Ice**

In hydrologic terms, ice piled haphazardly one piece over another to form an uneven surface.

**hydraulic retention time**

The average period during which wastewater is retained for treatment within the wastewater system.

**Hydrograph**

In hydrologic terms, a graph showing the water level (stage), discharge, or other property of a river volume with respect to time.

**Hydrologic Cycle**

The description of the transport of water substance between the earth, the atmosphere, and the seas.  
Or in hydrologic terms, the natural pathway water follows as it changes between liquid, solid, and gaseous states.

### **Hydrologic Equation**

In hydrologic terms, the water inventory equation (Inflow = Outflow + Change in Storage) which expresses the basic principle that during a given time interval the total inflow to an area must equal the total outflow plus the net change in storage.

### **Hydrology**

The scientific study of the waters of the earth, especially with relation to the effects of precipitation and evaporation upon the occurrence and character of water on or below the land surface.

### **Ice Boom**

In hydrologic terms, a floating structure designed to retain ice.

### **Ice Push**

In hydrologic terms, compression of an ice cover particularly at the front of a moving section of ice cover.

### **Ice Run**

In hydrologic terms, flow of ice in a river. An ice run may be light or heavy, and may consist of frazil, anchor, slush, or sheet ice

### **Ice Shove**

In hydrologic terms, on-shore ice push caused by wind, and currents, changes in temperature, etcetera.

### **Ice Storm**

An ice storm is used to describe occasions when damaging accumulations of ice are expected during freezing rain situations. Significant accumulations of ice pull down trees and utility lines resulting in loss of power and communication. These accumulations of ice make walking and driving extremely dangerous. Significant ice accumulations are usually accumulations of  $\frac{1}{4}$ " or greater.

### **Impervious**

In hydrologic terms, the ability to repel water, or not let water infiltrate

### **Industrial Consumption**

The quantity of water consumed in a municipality or district for mechanical, trade, and manufacturing purposes, in a given period, generally one day. The per capita use is generally based on the total population of the locality, municipality, or district.

### **Infiltration**

In hydrologic terms, movement of water through the soil surface into the soil

### **Infiltration Capacity**

In hydrologic terms, the maximum rate at which water can enter the soil at a particular point under a given set of conditions.

### **Infiltration Index**

In hydrologic terms, an average rate of infiltration, in inches per hour, equal to the average rate of rainfall such as that the volume of rainfall at greater rates equals the total direct runoff.

### **Infiltration Rate**

In hydrologic terms,

(1) The rate at which infiltration takes place expressed in depth of water per unit time, usually in inches per hour.

(2) The rate, usually expressed in cubic feet per second, or million gallons per day per mile of waterway, at which ground water enters an infiltration ditch or gallery, drain, sewer, or other underground conduit.

### **Initial Detention**

In hydrologic terms, the volume of water on the ground, either in depressions or in transit, at the time active runoff begins.

### **Intangible Flood Damage**

In hydrologic terms, estimates of the damage done by disruption of business, danger to health, shock, and loss of life and in general all costs not directly measurable which require a large element of judgment for estimating.

### **Interbasin Transfer**

In hydrologic terms, the physical transfer of water from one watershed to another.

### **Interception**

In hydrologic terms, the process by which precipitation is caught and held by foliage, twigs, and branches of trees, shrubs, and other vegetation, and lost by evaporation, never reaching the surface of the ground. Interception equals the precipitation on the vegetation minus streamflow and through fall.

### **Interception Storage Requirements**

In hydrologic terms, water caught by plants at the onset of a rainstorm. This must be met before rainfall reaches the ground.

### **Interflow**

In hydrologic terms, the lateral motion of water through the upper layers until it enters a stream channel. This usually takes longer to reach stream channels than runoff. This also called subsurface storm flow.

### **Irrigation**

In hydrologic terms, the controlled application of water to arable lands to supply water requirements not satisfied by rainfall

### **Irrigation Requirement**

In hydrologic terms, the quantity of water, exclusive of precipitation, that is required for crop production. It includes surface evaporation and other economically unavoidable wastes.

### **Isohyet**

A line connected points of equal precipitation amounts.

### **Juvenile Water**

In hydrologic terms, water formed chemically within the earth and brought to the surface in intrusive rock

### **La Niño**

**La Niña**, a phase of ENSO, is a periodic cooling of surface ocean waters in the eastern tropical Pacific along with a shift in convection in the western Pacific further west than the climatological average. These conditions affect weather patterns around the world.

### **Lag**

- 1) The measure of the time between the center of mass of precipitation to the center of mass of runoff (on the hydrograph); basin lag is a function of not only basin characteristics, but also of storm intensity and movement. Some hydrologic texts define lag from the center of mass of rainfall to the hydrograph peak.
- 2) The time it takes a flood wave to move downstream.

### **Lake Breeze**

A thermally produced wind blowing during the day from the surface of a large lake to the shore, caused by the difference in the rates of heating of the surfaces of the lake and of the land.

### **Lake Effect Snow**

Snow showers that are created when cold, dry air passes over a large warmer lake, such as one of the Great Lakes, and picks up moisture and heat.

### **Lake Effect Snow Advisory**

This product is issued by the National Weather Service when pure lake effect snow (this is where the snow is a direct result of lake effect snow and not because of a low pressure system) may pose a hazard or it is life threatening. The criteria for this advisory varies from area to area.

### **Lake Effect Snow Squall**

A local, intense, narrow band of moderate to heavy snow squall that can extend long distances inland. It may persist for many hours. It may also be accompanied by strong, gusty, surface winds and possibly lightning. Accumulations can be 6 inches or more in 12 hours.

### **Lake Effect Snow Warning**

This product is issued by the National Weather Service when pure lake effect snow (this is where the snow is a direct result of lake effect snow and not because of a synoptic storm or low pressure system) may pose a hazard or it is life threatening.

### **Lake Effect Storm**

A fall or winter storm that produces heavy but localized precipitation as a result of temperature differences between the air over snow-covered ground and the air over the open waters of a lake.

### **Length**

In hydrologic terms, the distance in the direction of flow between two specific points along a river, stream, or channel.

### **Lentic System**

In hydrologic terms, a nonflowing or standing body of fresh water, such as a lake or pond

### **Levee**

(Dike) In hydrologic terms, a long, narrow embankment usually built to protect land from flooding. If built of concrete or masonry the structure is usually referred to as a flood wall. Levees and floodwalls confine streamflow within a specified area to prevent flooding. The term "dike" is used to describe an embankment that blocks an area on a reservoir or lake rim that is lower than the top of the dam.

### **Liquid Water Equivalent**

Same as **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.

### **Lithometeor**

Atmospheric phenomena which affect the state of the atmosphere. They constitute dry particles that hang suspended in the atmosphere, such as dust, smoke, sand, and haze.

### **Lithosphere**

In hydrologic terms, that part of the earth which is composed predominantly of rocks (either coherent or incoherent, and including the disintegrated rock materials known as soils and subsoils), together with everything in this rocky crust.

### **Littoral Zone**

In hydrologic terms, the area on, or near the shore of a body water

### **Live Capacity**

In hydrologic terms, the total amount of storage capacity available in a reservoir for all purposes, from the dead storage level to the normal water or normal pool level surface level. Does not include surcharge, or dead storage, but does include inactive storage, active conservation storage and exclusive flood control storage.

### **Low Water Advisory**

An advisory to describe water levels which are significantly below average levels over the Great Lakes, coastal marine zones, and any tidal marine area, waterway, or river inlet within or adjacent to a marine zone that would potentially be impacted by low water conditions creating a hazard to navigation.

### **Lowland Flooding**

In hydrologic terms, inundation of low areas near the river, often rural, but may also occur in urban areas.

### **MAFOR**

(Great Lakes Marine Forecast) - A National Weather Service coded summary appended to each of the Great Lakes Open Lakes forecasts.

### **Main Synoptic Times**

The times of 0000, 0600, 1200, and 1800 UTC. Also known as the standard synoptic times.

### **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.)

### **Mean Depth**

In hydrologic terms, the average depth of water in a stream channel or conduit. It is equal to the cross-sectional area divided by the surface width.

**Microburst**

A convective downdraft with an affected outflow area of less than 5 kms wide and peak winds lasting less than 5 minutes. Microbursts may induce dangerous horizontal/vertical wind shears, which can adversely affect aircraft performance and cause property damage.

**Minor Flooding**

A general term indicating minimal or no property damage but possibly some public inconvenience.

**Mixed Precipitation**

Any of the following combinations of freezing and frozen precipitation: snow and sleet, snow and freezing rain, or sleet alone. Rain may also be present.

**Moderate Flooding**

The inundation of secondary roads; transfer to higher elevation necessary to save property -- some evacuation may be required.

**Monsoon**

A thermally driven wind arising from differential heating between a land mass and the adjacent ocean that reverses its direction seasonally.

**Movable Bed**

In hydrologic terms, a stream bed made up of materials readily transportable by the stream flow

**Mud Slide**

Fast moving soil, rocks and water that flow down mountain slopes and canyons during a heavy downpour of rain.

**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.

**Net Rainfall**

In hydrologic terms, the portion of rainfall which reaches a stream channel or the concentration point as direct surface flow.

**Normal**

The long-term average value of a meteorological parameter (i.e., temperature, humidity, etc.) for a certain area. For example, "temperatures are normal for this time of year" means that temperatures are at or near the average climatological value for the given date. Normals are usually taken from data averaged over a 30-year period (e.g., 1971-2000 average), and are concerned with the distribution of data within limits of common occurrence.

**Normal Water Surface Elevation**

In hydrologic terms, the lowest crest level of overflow on a reservoir with a fixed overflow level (spillway crest elevation). For a reservoir whose outflow is controlled wholly or partly by movable gates, siphons, or other means, it is the maximum level to which water may rise under normal operating conditions, exclusive of any provision for flood surcharge.

**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.

**Outlet**

In hydrologic terms, an opening through which water can be freely discharged from a reservoir.

**Outlet Discharge Structure**

In hydrologic terms, protects the downstream end of the outlet pipe from erosion and is often designed to slow down the velocity of released water to prevent erosion of the stream channel

**Outlook**

An outlook is used to indicate that a hazardous weather or hydrologic event may develop. It is intended to provide information to those who need considerable lead time to prepare for the event.

**Outlook**

A broad discussion of the weather pattern expected across any given area, generally confined to forecast periods beyond 48 hours.

**Perched Groundwater**

In hydrologic terms, local saturated zones above the water table which exist above an impervious layer of limited extent.

**Percolation**

In hydrologic terms, the movement of water, under hydrostatic pressure, through the interstices of a rock or soil, except the movement through large openings such as caves

**Percolation Path**

In hydrologic terms, the course followed by water moving or percolating through any other permeable material, or under a dam which rests upon a permeable foundation.

**Perennial Stream**

In hydrologic terms, a stream that flows all year round.

**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.

**Precipitable Water**

Measure of the depth of liquid water at the surface that would result after precipitating all of the water vapor in a vertical column over a given location, usually extending from the surface to 300 mb.

**Precipitation**

The process where water vapor condenses in the atmosphere to form water droplets that fall to the Earth as rain, sleet, snow, hail, etc.

### **Precipitation Attenuation**

The loss of energy that a radar beam experiences as it passes through an area of precipitation.

### **Primary Treatment**

**Reduces some solids with screening and settling processes secondary, which further reduces solids and other pollutants; and tertiary, the most stringent. In the European Union, all communities with more than 15,000 people have been required to have secondary treatment since 2000, with all urban centres slated to have tertiary treatment by 2010. In the United States, all coastal cities must have secondary treatment. Canada, by contrast, has no national sewage standards, though the environment ministers are working to develop a countrywide strategy for "municipal waste water effluent" by November 2006.**

### **RADAR**

Acronym for **RA**dio **D**etection **A**nd **R**anging; a radio device or system for locating an object by means of ultrahigh-frequency radio waves reflected from the object and received, observed, and analyzed by the receiving part of the device in such a way that characteristics (as distance and direction) of the object may be determined.

### **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 Mosaic**

A radar product that combines information from multiple radars to give a regional or national view of reflectivity or precipitation. An individual NEXRAD radar is limited to a range of about 200 miles. Typically, a mosaic product is produced for regions spanning several hundred to several thousands of kilometres. Mosaic products are produced by vendors external to the NEXRAD system.

### **Rapid Deepening**

A decrease in the minimum sea-level pressure of a tropical cyclone of 1.75 mb/hr or 42 mb for 24 hours

### **Reservoir**

In hydrologic terms, a manmade facility for the storage, regulation and controlled release of water.

### **Reservoir**

In hydrologic terms, a manmade facility for the storage, regulation and controlled release of water.

### **Residual Layer**

The elevated portion of a convective boundary layer that remains after a stable boundary layer develops at the ground (usually in late afternoon or early evening) and cuts off convection.

### **Residual Moisture**

Atmospheric moisture which lingers over an area after the main weather system has departed.

### **Riparian Zone**

In hydrologic terms, a stream and all the vegetation on its banks.

### **River Basin**

In hydrologic terms, drainage area of a river and its tributaries.

### **Rogue Wave**

Commonly used term by mariners of a wave of an unexpected wave of much greater height or steepness than other waves in the prevailing sea or swell system. Rogue waves have been part of marine folklore for centuries. They are generally considered to be unexpectedly high waves which in some instances come from a direction different from the predominant waves in the local area. A single rogue wave has certainly been known to spell disaster for the mariner. They have, over the past twenty or thirty years, come to be recognized as unique phenomena albeit with several possible causes.

(1) Constructive interference. Several different wave trains of differing speeds and directions meet at the same time. The heights of the crests are additive so that an extreme wave may result when very high waves are included in the wave trains. The effect is normally short lived since the wave trains continue to separate and move on.

(2) Focusing of wave energy. When storm forced waves are developed in a water current counter to the wave direction an interaction can take place which results in a shortening of the wave frequency. The result is the superimposing of the wave trains and the generation of extreme waves. Examples of currents where these are sometimes seen are the Gulf Stream and Agulhas current. Extreme wave developed in this regime tend to be longer lived.

(3) Normal part of the wave spectrum. The generation of waves on water results not in a single wave height but in a spectrum of waves distributed from the smallest capillary waves to large waves indeed. Within this spectrum there is a finite possibility of each of the wave heights to occur with the largest waves being the least likely. The wave height most commonly observed and forecast is the significant wave height. This is defined as the average of the one third highest waves. The probability of encountering such a wave is about 1 in 10 while 1 in 1000 waves will be nearly double the significant wave height or higher. This is thought to be the source of at least some reports of rogue waves.

### **Severe Local Storm**

A convective storm that usually covers a relatively small geographic area, or moves in a narrow path, and is sufficiently intense to threaten life and/or property. Examples include severe thunderstorms with large hail, damaging wind, or tornadoes.

Although cloud-to-ground lightning is not a criteria for severe local storms, it is acknowledged to be highly dangerous and a leading cause of deaths, injuries, and damage from thunderstorms. A thunderstorm need not be severe to generate frequent cloud-to-ground lightning. Additionally, excessive localized convective rains are not classified as severe storms but often are the product of severe local storms. Such rainfall may result in related phenomena (flash floods) that threaten life and property.

### **SOI**

The Southern Oscillation Index (SOI) has been developed to monitor the Southern Oscillation using the difference between sea level pressures at Darwin, Australia, and Tahiti, although other stations have sometimes been used. Large negative values of the SOI indicate a warm event, and large positive values indicate a cold event (also referred to as La Niña). It is important to note that there is not a one-to-one correspondence between the occurrence of Southern Oscillation events and El Niño events, using the spatially restrictive original definition of El Niño.

#### **Soil Moisture**

Water contained in the upper part of the soil mantle. This moisture evaporates from the soil and is used and transpired by vegetation.

#### **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 1920's. Walker was among the first meteorologists to use the statistical techniques to analyze and predict meteorological phenomena. 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" by some, is characterized by high pressure in the eastern equatorial Pacific, low in the west, and by anomalously cold sea surface temperature (SST) in the central and eastern Pacific. This is called El Niño Southern Oscillation or ENSO.

#### **Southern Oscillation Index**

A numerical index measuring the state of the Southern Oscillation. The SOI is based on the (atmospheric) pressure difference between Tahiti and Darwin, Australia. It is highly correlated with tropical sea surface temperature anomaly indices recorded in  $Ni\tilde{A}\pm 0.3$ .

#### **Spearhead Echo**

A radar echo associated with a downburst with a pointed appendage extending toward the direction of the echo motion. The appendage moves much faster than the parent echo, which is drawn into the appendage. During its mature stage, the appendage turns into a major echo and the parent echo loses its identity.

#### **Stage**

The level of the water surface of a river or stream above an established datum at a given location.

#### **Stair Stepping**

In hydrologic terms, the process of continually updating river forecasts for the purpose of incorporating the effects rain that has fallen since the previous forecast was prepared.

#### **Subsurface Storm Flow**

In hydrologic terms, the lateral motion of water through the upper layers until it enters a stream channel. This usually takes longer to reach stream channels than runoff. This also called interflow.

#### **Subtle Heavy Rainfall Signature**

This heavy rain signature is often difficult to detect on satellite. These warm top thunderstorms are often embedded in a synoptic-scale cyclonic circulation. Normally, they occur when the 500 mb cyclonic circulation is quasi-stationary or moves slowly to the east or northeast (about 2 degrees per 12 hours). The average surface temperature is  $68\text{Å}^{\circ}\text{F}$  with northeasterly winds. The average precipitable water (P) value is equal to or greater than 1.34 inches and the winds veer with height, but they are relatively light. The heavy rain often occurs north and east of the vorticity maximum across the lower portion of the comma head about 2 to 3 degrees north or northeast of the 850 mb low.

#### **Synoptic Weather**

Weather occurring over a wide region on time scales exceeding 12 hours.

#### **Terrain Forced Flow**

An airflow that is modified or channeled as it passes over or around mountains or through gaps in a mountain barrier.

#### **Texas Hooker**

Same as Panhandle Hook - low pressure systems that originate in the panhandle region of Texas and Oklahoma which initially move east and then "hook" or recurve more northeast toward the upper Midwest or Great Lakes region. In winter, these systems usually deposit heavy snows north of their surface track. Thunderstorms may be found south of the track.

#### **Thalweg**

In hydrologic terms, the line of maximum depth in a stream. The thalweg is the part that has the maximum velocity and causes cutbanks and channel migration.

#### **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.

#### **Undercurrent**

In hydrologic terms, a current below the upper currents or surface of a fluid body.

#### **Underflow**

The lateral motion of water through the upper layers until it enters a stream channel. This usually takes longer to reach stream channels than runoff. This also called subsurface storm flow.

#### **Universal Time (UT)**

By international agreement, the local time at the prime meridian, which passes through Greenwich, England? Prior to 1972, this time was called Greenwich Mean Time (GMT) but is now referred to as Coordinated Universal Time or Universal Time Coordinated (UTC). It is a coordinated time scale, maintained by the Bureau International des Poids et Mesures (BIPM). It is also known a "Z time" or "Zulu Time".

**Velocity Zones**

In hydrologic terms, areas within the floodplain subject to potential high damage from waves. These sometimes appear on flood insurance rate maps

**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.

**Warning**

A warning is issued when a hazardous weather or hydrologic event is occurring, is imminent, or has a very high probability of occurring. A warning is used for conditions posing a threat to life or property.

**Watch**

A watch is used when the risk of a hazardous weather or hydrologic event has increased significantly, but its occurrence, location, and/or timing is still uncertain. It is intended to provide enough lead time so that those who need to set their plans in motion can do so.

**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.

**Water Table**

The level below the earth's surface at which the ground becomes saturated with water. The water table is set where hydrostatic pressure equals atmospheric pressure.

**Water Year**

The time period from October 1 through September 30.

**Watercourse**

Any surface flow such as a river, stream, tributary.

**Watershed**

Land area from which water drains toward a common watercourse.

**Weir**

In hydrologic terms,

- (a) A low dam built across a stream to raise the upstream water level (fixed-crest weir when uncontrolled);
- (b) A structure built across a stream or channel for the purpose of measuring flow (measuring or gaging weir).

**Zero Datum**

In hydrologic terms, a reference "zero" elevation for a stream or river gage. This "zero" can be referenced (usually within ten feet of the bottom of the channel) to mean sea level, or to any other recognized datum.