

Glossary of weather terms

A

ACCRETION. The process of supercooled water droplets freezing on impact with snowflakes, ice particles or other cold objects including aircraft.

ADIABATIC PROCESS. A process where a parcel of air cools or warms due to a change in pressure and volume (expansion or compression), with no heat exchange between the parcel and the surrounding air. In adiabatic processes, adiabatic cooling accompanies expansion, and adiabatic warming accompanies compression.

ADVECTED FOG. Fog transported by local winds from one locality to another.

ADVECTION. The horizontal transport of any property in the atmosphere by the movement of air.

ADVECTION FOG. Fog which forms in the lower part of a moist air mass moving over a colder surface (land or water).

AERODROME FORECAST (TAF). A statement of meteorological conditions expected for a specific period in the airspace within 8 km of the aerodrome reference point. An aerodrome forecast issued 3 hourly is denoted by TAF3.

AERODROME WEATHER INFORMATION SERVICE (AWIS). Meteorological information from the automatic weather station (AWS) provided in real-time via a phone number and/or, at some aerodromes and critical locations, via a VHF radio broadcast.

AEROLOGICAL DIAGRAM (F160). A thermodynamic diagram with a skewed temperature scale on the horizontal axis and a logarithmic scale of pressure on the vertical axis. Used to plot a vertical profile of air temperature and dew point temperature through the atmosphere.

AIR DENSITY. Mass of air per unit volume.

AIR MASS. An extensive body of the atmosphere whose physical properties, particularly temperature and humidity, exhibit only small and continuous differences in the horizontal. It may extend over an area of several million square kilometres and over a depth of several kilometres.

AIRCRAFT ICING. Formation of ice, rime or hoar frost on an aircraft.

AIRCRAFT METEOROLOGICAL DATA RELAY (AMDAR).

A system utilising aircraft onboard sensors, computers and communications systems to collect, process, format and transmit meteorological data - including air temperature, wind, turbulence and other required information - to ground stations via satellite or radio links.

AIR-REPORT (AIREP). A report from an aircraft in flight prepared in conformity with requirements for position and operational and/or meteorological reporting.

ALTIMETER. An instrument used to determine altitude using atmospheric pressure (QNH).

ALTITUDE. Vertical distance of a level, a point or an object considered as a point, measured from mean sea level.

ALTOCUMULUS (AC). A principal cloud type, forming in the middle levels of the troposphere, and appearing as a white and/or grey layer or patch with a wavy aspect.

ALTOCUMULUS CASTELLANUS. Middle-level cloud with vertical turret type development that forms from altocumulus clouds. Indicates an unstable atmosphere, moderate to severe turbulence, and can be a precursor to thunderstorms.

ALTOSTRATUS (AS). A principal cloud type, forming in the middle levels of the troposphere, and appearing as a grey or bluish sheet.

ANABATIC WIND. An upslope wind; it usually applies only to the wind blowing up a hill or mountain as the result of strong surface heating of the slopes.

ANEMOMETER. Instrument which measures wind speed and direction.

ANOMALOUS PROPAGATION. The non-standard propagation of a beam of energy (radio or radar) under certain atmospheric conditions, which results in false echoes (i.e. non-precipitation) on a radar image. Usually caused by unusual rates of refraction in the atmosphere.

ANTI-ICING EQUIPMENT. Aircraft equipment, such as heating elements and flexible rubber strips, used to prevent or clear structural icing.

ANTICYCLONE. An extensive horizontal spiral movement of the atmosphere around and away from

a central region of high pressure. The spiral motion is anticlockwise in the southern hemisphere and clockwise in the northern hemisphere.

ANVIL. A cirriform cloud, with an anvil shape, which forms the upper part of a well developed cumulonimbus. Its glaciated top spreads out horizontally upon reaching the tropopause or by the action of the winds aloft. It indicates the mature or decaying stage of a thunderstorm.

AREA QNH. A forecast altimeter setting which is representative of the QNH of any location within a particular area.

ATMOSPHERE. Gaseous envelope which surrounds the Earth. The divisions of the atmosphere are the troposphere, the stratosphere, the mesosphere, the ionosphere, and the exosphere.

ATMOSPHERIC PRESSURE. Pressure (force per unit area) exerted by the atmosphere on any surface by virtue of its weight; it is equivalent to the weight of a vertical column of air extending above a surface of unit area to the outer limit of the atmosphere.

AUTOMATIC TERMINAL INFORMATION SERVICE (ATIS). The provision of current, routine information to arriving and departing aircraft by means of continuous and repetitive broadcasts during the hours when the unit responsible for the service is in operation.

AUTOMATIC WEATHER STATION (AWS). An automated system with a range of meteorological instruments used to collect and process real-time weather observations for a variety of meteorological elements, including wind speed, temperature, humidity, pressure, rainfall, and where fitted, visibility, present weather and cloud.

B

BACKING. Counter-clockwise change of wind direction, in either hemisphere.

BAROMETER. Instrument for measuring atmospheric pressure. 2 types of barometer are the aneroid barometer and the mercury barometer.

BLOCKING FOG. Fog formed through radiative cooling and advection, influenced by the surrounding terrain.

BLOWING DUST/SAND/SNOW. Dust/sand/snow raised by the wind to moderate heights above the ground, reducing the horizontal visibility at eye level.

BOILING POINT. Temperature of equilibrium between the liquid and vapour phases of a substance at a given pressure. The boiling point of pure water at the standard sea level pressure of 1013.25 hPa is 100°C (373°K).

BOUNDARY LAYER. The lowest layer of the earth's atmosphere, usually below 3,000 feet where frictional

influences between the earth and atmosphere are large.

BROKEN CLOUD (BKN). Used to describe an amount of cloud covering the sky of between 5 and 7 oktas (eighths).

BUOYANCY. Vertical force acting upon an air parcel as a result of a difference in density between the air parcel and its surrounding environment.

BUYS BALLOT'S LAW. Rule which relates the wind direction to the horizontal distribution of pressure as follows: If one stands with one's back to the wind, low pressures are on one's left in the northern hemisphere and on one's right in the southern hemisphere.

C

CALM. Still air.

CARBURETTOR ICING. Occurs when air (including warm air) with a high water vapour content is drawn into an aircraft's carburettor (which is chilled by the fuel evaporation process coupled with the pressure reduction in the carburettor's venturi) causing the water vapour to condense and then, if the temperature has dropped below 0°C, form ice on the surfaces of the carburettor. The ice may gradually block the venturi or cause jamming of the mechanical parts of the carburettor.

CEILOMETER. An instrument for estimating cloud amount and height.

CELSIUS TEMPERATURE SCALE (°C). A temperature scale, where water at the standard sea level pressure of 1013.25 hPa has a freezing point of 0°C and a boiling point of 100°C.

CHANGE OF STATE. The change of a substance from one physical form to another, e.g. liquid water to water vapour, ice to liquid water, ice to water vapour.

CIRROCUMULUS (CC). A principal cloud type, forming in the high levels of the troposphere, composed of ice crystals which appear from the ground as very small elements in the form of grains or small ripples.

CIRROSTRATUS (CS). A principal cloud type, forming in the high levels of the troposphere, composed of ice crystals which appear from the ground as a transparent sheet or veil, often creating a halo phenomenon around the sun or moon.

CIRRUS (CI). A principal cloud type, forming in the high levels of the troposphere, composed of ice crystals which appear from the ground as white tufts or filaments.

CLEAR AIR TURBULENCE (CAT). A form of turbulence occurring in regions of marked wind shear, particularly at the boundaries of jet streams, but may also be found in strong lee waves. It occurs in the absence of any visual clues (i.e. clouds).

CLEAR ICE. A sheet of transparent ice formed by the relatively slow freezing of large supercooled water droplets, i.e. rain. Does not seriously distort aerofoil shape but does add appreciably to aircraft weight and drag.

CLOUD (CLD). A hydrometeor consisting of minute particles of liquid water or ice, or of both, suspended in the free air and usually not touching the ground. It may also include larger particles of liquid water or ice and non-aqueous liquid or solid particles such as those present in fumes, smoke and dust.

COLD AIR ADVECTION. The horizontal movement of colder air into a location of warmer air.

COLD FRONT. The leading edge of an advancing cold air mass that is replacing warmer air.

CONDENSATION. Change of state from vapour to liquid.

CONDENSATION NUCLEI. Tiny particles upon which water vapour condenses.

CONDENSATION LEVEL. The height at which an adiabatically lifted air parcel will become saturated, whereupon condensation occurs. Corresponds to cloud base level.

CONDITIONAL INSTABILITY. Stable unsaturated air that will become unstable if saturated.

CONDUCTION. The transfer of heat in response to a temperature gradient within an object or between objects that are in physical contact with one another. Transfer is from warmer to colder regions.

CONSTANT PRESSURE CHART. A weather chart representing conditions on a constant pressure surface, e.g. 500 hPa.

CONTACT COOLING. The process whereby heat is conducted away from warmer air to a colder surface.

CONTINENTAL AIR MASS. An extensive body of air, with a more-or-less uniform temperature and moisture profile, which has originated over a large land mass.

CONTOUR. A line joining points of equal value on a surface.

CONTRAIL. Cloud which forms in the wake of an aircraft when the air at flight level is sufficiently cold and moist.

CONVECTION. In meteorology, it is the vertical transport of heat and moisture, especially by updrafts and downdrafts in an unstable atmosphere.

CONVECTIVE CLOUD. A cloud that owes its vertical development, and possibly its origination, to convection.

CONVECTIVE CONDENSATION LEVEL. The lowest height at which condensation will occur as a result of convection due to surface heating.

CONVERGENCE. The condition that exists as a result of a net horizontal inflow of air into a region. Convergent

winds at lower levels are associated with upward motion.

COORDINATED UNIVERSAL TIME (UTC). The primary time standard by which the world regulates clocks and time. In aviation forecasts and reports it is signified by the letter Z.

CORIOLIS FORCE (EFFECT). An apparent force on a moving particle that arises solely from the earth's rotation acting as a deflecting force. It acts to the left in the southern hemisphere and to the right in the northern hemisphere. It is greatest at the poles and nonexistent at the equator.

CUMULONIMBUS (CB). A principal cloud type, with bases forming in the low levels of the troposphere, characterised by a large vertical extent, and often capped by an anvil-shaped cirrus cloud. It is often accompanied by rain showers, turbulence, icing and gusty surface winds, and sometimes also by lightning, thunder, hail, microbursts and/or tornadoes.

CUMULUS (CU). A principal cloud type, forming in the low levels of the troposphere, characterised by flat bases and dome or cauliflower-shaped upper surfaces. Small, separate cumulus are associated with fair weather, but may grow into towering cumulus or cumulonimbus.

D

DENSITY. The weight of air per unit volume.

DENSITY ALTITUDE. The altitude in the International Standard Atmosphere at which a given air density is found.

DEPOSITION. A process in which a gas transforms into a solid, e.g. the process by which water vapour, in sub-freezing air, changes directly to ice without first becoming a liquid.

DEW. Water in the form of small liquid drops that form on grass and other objects near the ground when the air temperature falls below its dew point, usually overnight.

DEW POINT (TD or T_d). The temperature to which air must be cooled, at constant pressure and water vapour content, in order for saturation to occur. If the air is cooled further, some of the water vapour will condense to liquid.

DIURNAL. Pertaining to actions that are completed within 24 hours, and recur every 24 hours.

DIVERGENCE. Horizontal outflow of air from a particular region. Divergence at lower levels is associated with a downward movement of air.

DOLDRUMS. A nautical term for the equatorial trough, an area which typically has calm or light and variable winds.

DOWNBURST. Violent and damaging downdraft reaching the surface, associated with a severe thunderstorm.

DOWNDRAFT. A descent of cool air associated with convective cloud.

DOWNSLOPE WIND. A wind directed down a slope, often used to describe winds produced by processes larger in scale than the slope.

DRIFTING SNOW. Snow blown from the ground by the wind to a height of less than 2 metres.

DRIZZLE (DZ). Slow-falling and uniformly distributed precipitation in the form of tiny water droplets (diameters less than 0.5 millimetres), usually from stratus or stratocumulus clouds.

DRY ADIABAT. Curve on a thermodynamic diagram representing the temperature changes of a small mass of dry air lifted in a dry adiabatic process.

DRY ADIABATIC LAPSE RATE (DALR). The rate of change in temperature for dry air ascending or descending adiabatically. The rate is approximately 3°C per 1,000 feet.

DRY LINE. The boundary between dry and moist air masses.

DRY SEASON. Winter in the tropics (May till September in northern Australia), where little to no rain falls. The south-easterly trade winds flow from the mid-latitudes (southern Australia) bringing low humidity air to north Australia. The exception in Australia is the northern Queensland coastal strip where the south-easterly trade winds bring moisture from the Coral Sea, which is forced to rise up over the Great Dividing Range resulting in frequent showery periods.

DUST (DU). Small particles of earth or other matter suspended in the air.

DUST DEVIL (PO). A small and rapidly rotating column of wind made visible by the dust, dirt or debris picked up by the wind. It usually occurs in arid or semi-arid areas and is most likely to develop on clear, dry, hot afternoons in response to surface heating.

DUSTSTORM (DS). A phenomenon characterized by strong winds and dust-filled air over a large area, and reducing visibility to below 1,000 metres.

E

ECHO. In meteorology, it is used to refer to the appearance on a radar display of the radio signal reflected from a target (e.g. precipitation).

EDDY. A small disturbance in the wind that can produce turbulence.

ELEVATION. The distance between mean sea level and a point on the earth's surface.

EQUATOR. The geographic circle at 0° latitude on the earth's surface.

EQUILIBRIUM LEVEL. The height at which a rising parcel of air will become equal in temperature to that of the environment, at which point it is no longer buoyant and thus will cease to rise in the atmosphere without forcing.

EQUATORIAL TROUGH. Zone of relatively low pressure which lies between the subtropical anticyclones of the northern and southern hemispheres.

EVAPORATION. The physical process by which a liquid, such as water, is transformed into its gaseous state.

EVAPORATIVE COOLING. Evaporative cooling is when air cools by turning water into vapour. It occurs when water absorbs heat from its surroundings as it changes from a liquid to a gas.

EYE. An area of clear skies that develops in the centre of a tropical cyclone. It is characterised by light winds and no rainfall.

EYE WALL. A ring of intense convection (towering thunderstorms) that forms around the eye of a tropical cyclone as it reaches severe intensity. The heaviest rainfall and the maximum winds of the cyclone occur around the eye wall.

F

FAHRENHEIT. The temperature scale where water at the standard sea level pressure of 1013.25 hPa has a freezing point of +32°F and a boiling point of +212°F.

FEEDER BANDS. The lines or bands of cumulonimbus clouds that spiral into and around the centre of a tropical cyclone.

FEW (FEW). Used to describe an amount of cloud covering the sky of one or 2 oktas (eighths).

FLIGHT LEVEL (FL). A surface of constant atmospheric pressure which is related to a specific pressure datum, 1013 hPa, and is separated from other surfaces by specific pressure intervals.

FOEHN. A warm and dry downslope wind descending the lee side of a mountain range.

FOG (FG). A suspension in the air, at or near the earth's surface, of microscopic water droplets, or wet hygroscopic particles, reducing horizontal visibility to less than 1,000 metres.

FORECAST. A statement of expected meteorological conditions for a specified period, and for a specified area.

FREEZING DRIZZLE (FZDZ). Supercooled drizzle (i.e. drizzle existing at a temperature below 0°C) that freezes upon impact with surfaces to form glaze.

FREEZING FOG (FZFG). A fog formed of supercooled water droplets which freeze on contact with objects, covering them with a coating of rime.

FREEZING LEVEL (FZLVL). The lowest level above a specific location where the temperature is 0°C.

FREEZING POINT. The temperature at which a liquid solidifies under any given set of conditions. Pure water under the standard sea level pressure of 1013.25 hPa freezes at 0°C (32°F).

FREEZING PRECIPITATION. Any form of supercooled precipitation that freezes upon impact with surfaces to form glaze.

FREEZING RAIN (FZRA). Supercooled rain that falls as liquid but freezes upon impact with surfaces to form glaze.

FREQUENT (FRQ). Used for weather (TS) and cloud (CB, TCU) amount where there is little or no separation between adjacent features affecting, or forecast to affect, greater than 75% of an area.

FRICTION. The mechanical resistive force offered by one medium or body to the relative motion of another medium or body in contact with the first. In meteorology, it is the drag or resistance of the earth on the atmosphere.

FRICTION LAYER (BOUNDARY LAYER, SURFACE LAYER). The thin layer of the lower atmosphere within which wind direction and speed is subject to frictional effects caused by contact with the earth's surface. Its depth is variable, ranging from tens of metres in a stable environment, to several kilometres in convective conditions over deserts.

FRONT. The transition zone or interface between 2 air masses of different densities.

FRONTAL FOG. Fog associated with frontal zones and frontal passages. Warm front (pre-frontal) and cold front (post-frontal) fog result from rain falling into cold stable air and moistening it; frontal-passage fog results from the mixing of warm and cold air masses in the frontal zone or by the sudden cooling of air over a moist surface.

FRONTAL PASSAGE. The passage of a front over a specific point on the earth's surface. Changes in temperature, dew point, wind and atmospheric pressure occur with a frontal passage.

FROST. A covering of ice, in one of its many forms, produced by the sublimation of the water vapour on objects colder than 0°C.

FUNNEL CLOUD (FC). A violent, rotating column of air visibly extending toward the earth's surface from the base of a towering cumulus or cumulonimbus cloud. A funnel cloud reaching the ground is called a tornado if over land, and a waterspout if over water.

G

GEOSTATIONARY SATELLITE. A weather satellite, in a west to east orbit at an altitude of 35,786 kilometres, that maintains the same position over the equator.

GEOSTROPHIC WIND. A wind that blows parallel to straight isobars above the friction layer, wherein the Coriolis force exactly balances the horizontal pressure gradient force.

GLAZE. A coating of ice, generally clear and smooth, formed on surfaces by the freezing of supercooled rain, drizzle or fog.

GLOBAL NAVIGATION SATELLITE SYSTEM (GNSS). A satellite-based radio navigation system that uses signals from orbiting satellites to determine precise position and time.

GRADIENT WIND. A wind that blows parallel to curved isobars above the friction layer, wherein the wind direction is determined by the balance of 3 forces, i.e. the Coriolis force, the centrifugal force and the horizontal pressure gradient force.

GRAVITY WAVES. Waves in a fluid medium or at the interface between 2 media when the force of gravity or buoyancy tries to restore equilibrium.

GREENWICH MEAN TIME (GMT). Was used to refer to the primary time standard, but now replaced by Coordinated Universal Time (UTC).

GROUND CLUTTER. A pattern of radar echoes from fixed ground objects such as buildings, hills or other objects on or close to the ground.

GUST (G). A sudden and brief increase in wind speed.

GUST FRONT. The leading edge of cool air rushing down and out from a thunderstorm cloud. Is usually accompanied by a drop in temperature, a wind shift and a pressure jump.

H

HAIL (GS). Precipitation that originates in convective clouds, such as cumulonimbus, in the form of balls or irregular pieces of ice.

HAZE (HZ). Dust and/or smoke particles suspended in the air, and reducing the visibility to 5,000 metres or less.

HECTOPASCALS (hPa). Unit of pressure. Equivalent to 1 millibar.

HIGH ICE WATER CONTENT (HIWC). The atmospheric conditions where there are high concentrations of ice crystals. HIWC usually occurs at temperatures

below -20°C where there tends to be a reduction in supercooled liquid water and an increased ratio of ice particles.

HIGH PRESSURE SYSTEM. An area of pressure maximum with diverging and anticlockwise winds in the southern hemisphere and clockwise in the northern hemisphere.

HOAR FROST. Deposit of ice, which generally assumes the form of scales, needles, feathers or fans and which forms on objects whose surface is sufficiently cooled, usually by nocturnal radiation, to bring about the direct sublimation of the water vapour contained in the ambient air.

I

ICE PELLETS. Precipitation of transparent particles of ice which are spherical or irregular, rarely conical, and which have a diameter of 5 mm or less.

ICING (ICE). The formation of ice, rime or hoar frost on an aircraft.

INFRARED (IR). Long-wave electromagnetic radiation which is emitted by all objects.

ISOLATED (ISOL). Used for weather (e.g. thunderstorms) and/or cloud (CB, TCU) if individual features are affecting, or forecast to affect, up to 50% of an area.

INSOLATION. Solar radiation or heating received at the earth's surface. The name is derived from INcoming SOLar radiATION.

INSTABILITY. A state of the atmosphere where an air parcel lifted vertically will freely accelerate upward once the lifting mechanism ceases. The air parcel will form cumulus-type clouds if sufficient moisture is present.

INSTRUMENT FLIGHT RULES (IFR). A set of regulations governing all aspects of civil aviation aircraft operations when a flight is conducted using instruments rather than outside visual reference.

INTERNATIONAL STANDARD ATMOSPHERE (ISA). A hypothetical vertical distribution of atmospheric temperature, pressure and density that by international agreement is taken to be representative of the atmosphere for purposes of pressure altimeter calibrations, aircraft performance calculations, ballistic tables, etc.

INTERTROPICAL CONVERGENCE ZONE (ITCZ). Narrow zone where the trade winds of the 2 hemispheres meet.

INVERSION. An increase in temperature with increasing altitude, which is opposite to the usual decrease of temperature with increasing altitude.

ISOBAR. A line on a chart connecting points of equal pressure.

ISOTACH. A line on a chart connecting points of equal wind speed

ISOTHERM. A line on a chart connecting points of equal temperature.

J

JET STREAM. An area of strong winds concentrated in a relatively narrow band. Is most commonly used to refer to a stream of maximum winds embedded in the mid-latitude westerlies concentrated in the upper troposphere.

K

KATABATIC WIND. A drainage wind generated by air being cooled by conduction along a slope. The cooled air flows downhill as a katabatic wind.

KELVIN (K). A temperature scale where 0 K is defined as absolute zero (where all molecular movement stops). Water freezes at 273 K, and boils at 373 K. It is used primarily for scientific purposes.

KELVIN-HELMHOLTZ CLOUD. Cloud that forms in Kelvin-Helmholtz waves. The clouds, sometimes referred to as billows, are in the shape of breaking waves. These clouds are often good indicators of instability and the presence of turbulence.

KELVIN-HELMHOLTZ INSTABILITY. Occurs when velocity shear is present within a continuous fluid, or when there is sufficient velocity difference across the interface between 2 fluids.

KELVIN-HELMHOLTZ WAVE. A wave-form disturbance that arises from Kelvin-Helmholtz instability. Named after Lord Kelvin and Hermann von Helmholtz.

KNOT (KT). A unit of speed equivalent to 1.852 kilometres per hour.

L

LAND BREEZE. A diurnal coastal or lake breeze that blows offshore. It is caused by the temperature differences between a water surface and adjacent land.

LAPSE RATE. The rate of change of temperature with height in the atmosphere.

LATENT HEAT. The energy absorbed or released during a change of state. Evaporation, melting and sublimation (a change from solid to gas) absorb heat from the surrounding air as energy is needed to weaken the individual hydrogen bonds between the water

molecules. Condensation, freezing and deposition (gas to solid) release the latent heat, thus adding heat to the surrounding air.

LATITUDE. A geographic coordinate that specifies the north-south position of a point on the earth's surface. It is measured as the angular distance, subtended at the earth's center, along a meridian from a point on the earth to the equator. The equator is designated as zero degrees and the poles as 90 degrees.

LEE (LEESIDE/LEEWARD). The side of an obstacle that is furthest away from the wind.

LENTICULAR CLOUD. A more-or-less isolated cloud, downwind of a barrier, resembling a smooth lense with sharp outlines. They mostly occur in mountain waves, and thus indicate possible severe turbulence and icing.

LEVEL OF FREE CONVECTION (LFC). The height at which a parcel of saturated air becomes warmer than the surrounding air and thus begins to rise freely until it reaches its equilibrium level.

LIFTING CONDENSATION LEVEL (LCL). The height at which a parcel of moist air becomes saturated when it is cooled by adiabatic lifting.

LIGHTNING. A visible electrical discharge produced by a cumulonimbus cloud. It can occur between cloud and ground, between clouds, within a single cloud, or between a cloud and surrounding air.

LONGITUDE. A geographic coordinate that specifies the east-west position of a point on the earth's surface. It is measured as an angle in reference to the Prime Meridian, which is designated as zero degrees longitude.

LOW LATITUDES. The latitude belt between the equator and 30 degrees north and south of the equator.

LOW LEVEL JET. A transient strong wind concentrated in relatively narrow bands near the earth's surface.

LOW PRESSURE SYSTEM. An area of pressure minimum with converging winds rotating clockwise in the southern hemisphere and anticlockwise in the northern hemisphere.

M

MARITIME AIR MASS. An air mass that has originated over an extensive water surface.

MEAN SEA LEVEL (MSL). The height of the sea surface, measured with respect to land-based benchmarks, after averaging out variations due to tides and waves. In aviation it is used as a measurement reference for altitude at flight levels.

MEAN SEA LEVEL PRESSURE (MSLP). The atmospheric pressure at mean sea level.

MECHANICAL TURBULENCE. Disrupted airflow resulting from wind flowing over or around terrain or man-made obstructions, whereby normal horizontal wind flow is disturbed and transformed into eddies and other irregular movements.

MERIDIONAL FLOW. Atmospheric circulation in which the north and south component of motion is pronounced.

METAR. A meteorological report from an aerodrome at a routine time (half hourly) when conditions are better than specified thresholds. It is the primary format in aeronautical meteorology for reports of surface meteorological information at an aerodrome.

METEOROLOGICAL OPTICAL RANGE (MOR). The greatest distance at which a black object of suitable dimensions, situated near the ground, can be seen and recognised when observed against a bright background.

MICROBURST (MBST). Used to refer to a severe downburst of wind, usually from a thunderstorm, over an area of less than 4 km in diameter. The term downburst is used to refer to larger diameters.

MIST (BR). A suspension in the air, at or near the earth's surface, of microscopic water droplets or wet hygroscopic particles which reduce the horizontal visibility to less than 5,000 metres but not less than 1,000 metres.

MIXED ICE. A combination of clear ice and rime ice.

MIXING RATIO The ratio of the mass of a variable atmospheric constituent to the mass of dry air. In meteorology, the term normally refers to water vapour.

MOIST ADIABAT. The line on a chart that depicts the change in temperature of saturated air as it rises and undergoes cooling due to adiabatic expansion. As saturated air rises, the temperature changes at a rate of about 2°C per 1,000 feet.

MONSOON. A monsoon is a tropical and subtropical seasonal reversal in both the surface winds and associated precipitation, caused by differential heating between a continental-scale land mass and the adjacent ocean. Monsoon rains occur mainly over land in summer.

MOUNTAIN WAVE (MTW). An oscillation above and downwind of a mountain caused by a disturbance in the horizontal airflow due to the high ground. They usually occur in groups, and aircraft can expect to encounter severe turbulence and icing if flying through them.

MULTICELL THUNDERSTORM. A storm system composed of 2 or more convective cells at various stages of their life cycle.

N

NIMBOSTRATUS (NS). Low or middle-level thick dark cloud with more or less continuously falling rain, snow or sleet.

NUMERICAL WEATHER PREDICTION (NWP). Forecast of the fields of meteorological variables by numerical solution of the hydrodynamical equations, generally with the help of a computer.

O

OCCASIONAL (OCNL). Well-separated features affecting, or are forecast to affect, greater than 50% but not more than 75% of an area.

OCCLUDED FRONT. A front formed when a cold front overtakes a warm front.

OROGRAPHIC LIFTING. Occurs where the flow of air is forced up and over physical barriers such as mountains.

OVERCAST (OVC). Used to describe cloud cover equal to 8 oktas (eighths).

OVERSHOOT SHEAR. A wind shear occurrence which produces an initial effect of overshooting the desired approach path and/or increasing airspeed.

P

PARCEL. A theoretical small and self-contained volume of air responding to meteorological processes as a single entity.

POLAR AIR MASS. An air mass that forms over a high latitude region. Continental polar air is formed over cold land surfaces and is typically very stable with low moisture.

POLAR FRONT. A semi-continuous, semi-permanent boundary between polar and subtropical air masses.

POLAR-FRONT JET. A jet stream associated with the polar front, occurring at around 23,000 to 39,000 feet above the earth's surface. It is depicted on analysis and forecast charts when the wind is 80 knots or more.

POLAR-ORBITING SATELLITE. A satellite whose orbit passes over both of the earth's poles.

POST-RAIN FOG. Occurs after rain events, with almost calm winds. The air in contact with the wet surface can be readily saturated without depleting the overlying air of moisture.

POTENTIAL TEMPERATURE. The temperature that an unsaturated parcel of dry air would have if it is brought adiabatically from its initial state to a standard pressure, typically 1,000 hPa.

PRECIPITATION. In meteorology it is any product of the condensation of atmospheric water vapour that falls under gravity.

PRE-FRONTAL SQUALL LINE. A line of thunderstorms that may develop ahead of an advancing cold front, and having an orientation more or less parallel to the cold front.

PRE-FRONTAL TROUGH. An elongated area of relatively low pressure that may develop ahead of an advancing cold front.

PRESSURE ALTIMETER. An on board instrument to indicate the elevation of the aircraft above a defined datum.

PRESSURE ALTITUDE. The altitude in the International Standard Atmosphere at which a given atmospheric pressure will be observed.

PRESSURE GRADIENT. The pressure change that occurs over a fixed distance.

PREVAILING WIND. A wind that blows from one direction more frequently than any other during a given period.

PROGNOSTIC CHART. A forecast weather chart. Commonly known as a prog chart.

Q

QUASI-STATIONARY FRONT. A front which is nearly stationary or moving very slowly.

R

RADAR. Acronym for RADio Detection And Ranging. An electronic instrument used to detect distant objects and measure their range by detecting scattered or reflected radio energy.

RADIATION. The process by which energy is propagated through any medium by virtue of the wave motion in that medium. Electromagnetic radiation, which emits heat and light, is one form.

RADIATION FOG. Fog that forms when radiational cooling at the earth's surface lowers the temperature of the air near the ground to, or below, its dew point.

RADIATIVE COOLING. The cooling of the earth's surface and the adjacent air, which occurs at night when the earth's surface suffers a net loss of heat due to outgoing radiation being greater than incoming radiation.

RAIN (RA). Precipitation in the form of liquid water droplets greater than 0.5 mm diameter.

RELATIVE HUMIDITY. The ratio of the vapour pressure to the saturation vapour pressure with respect to

water. Also known as the ratio of the existing amount of water vapour to that which could be held by a parcel of air. It is usually expressed as a percentage.

RESOLUTION. In relation to radar, it is the ability to read 2 distinct targets separately. The clearer the resolution, the nearer the 2 objects can be to each other and still be distinguishable.

RIDGE. An elongated area of high pressure.

RIME ICE. Ice formed by the rapid freezing of supercooled water droplets when they contact an exposed object, such as an aircraft frame, forming a white and opaque granular deposit of ice.

ROLL CLOUD. A low-level, horizontal, tube-shaped cloud. Usually associated with a thunderstorm gust front, where the roll cloud is completely detached from the base of the cumulonimbus cloud. It will sometimes form with a cold front.

ROTOR CLOUD. A cloud formation found in the lee of a mountain or similar barrier. The air rotates around a horizontal axis parallel to the barrier, causing a hazard to aircraft.

RUNWAY VISIBILITY (RV). The distance along a runway over which a person can see and recognize a visibility marker or runway lights.

RUNWAY VISUAL RANGE (RVR). The maximum distance at which the runway, or lights or markers delineating it, can be seen from a position above a specified point on its centerline.

S

ST. ELMO'S FIRE. A luminous and sometimes audible electric discharge that occurs from objects, especially pointed ones, when the local electrical field (voltage) attains a strength of near 1,000 volts per centimetre. It often occurs during the latter phases of a violent thunderstorm. It typically appears on the extremities of aircraft, lightning rods and steeples.

SALTATION. A method of particle transport (e.g. sand or dust) driven by the wind.

SANDSTORM (SS). A strong wind carrying sand through the air and reducing visibility to less than 1,000 metres.

SATURATE. To add something to the point where no more can be absorbed, dissolved, or retained. In meteorology, it is used when discussing the amount of water vapour in a volume of air.

SATURATED ADIABAT. The line on a thermodynamic diagram that depicts the change in temperature of a saturated air parcel as it rises or falls and undergoes cooling or heating due to adiabatic expansion or compression.

SATURATED ADIABATIC LAPSE RATE (SALR). The rate of change in temperature of a saturated air parcel as it adiabatically ascends or descends through the atmosphere. The rate varies, from approximately 1.5 to 3°C per 1,000 feet, e.g., the more water vapour present in a rising parcel of air, the greater the condensation, and thus the greater is the latent heat released, reducing the rate of cooling.

SCATTERED (SCT). Used to describe an amount of cloud covering the sky of 3 or 4 oktas (eighths).

SEA BREEZE. A diurnal coastal breeze that blows onshore due to a temperature differential between the land and the water.

SEA-BREEZE FRONT. The discontinuity in temperature and humidity that marks the leading edge of the intrusion of cool and moist marine air associated with a sea breeze.

SEA FOG. A type of advection fog that forms when warm moist air advects over water with a cooler temperature, and the consequent cooling of that air to below its dew point by the underlying cooler water.

SEA LEVEL. The height or level of the sea surface after averaging out the short-term variations due to wind waves. It is used as a reference for elevations above and below.

SEVERE THUNDERSTORM. The Bureau of Meteorology defines a severe thunderstorm as one with wind gusts of 48 knots or greater, or hail of diameter 2 cm or larger, or with tornado(es), or with heavy rainfall leading to flash flooding.

SHOWER (SH). Precipitation from a convective cloud that is characterised by its sudden beginning and ending, changes in intensity, and rapid changes in the appearance of the sky. It occurs in the form of rain (SHRA), snow (SHSN), or hail (SHGR).

SLANT VISUAL RANGE (SVR). The visual range of a specified object or light along a line of sight which differs significantly from the horizontal; for example, the visual range of ground objects or lights as seen from an aircraft on the approach.

SMOKE (FU). Small particles produced by combustion that are suspended in the air. (A transition to haze may occur when the smoke particles have travelled great distance and when the larger particles have settled out; the remaining haze particles become widely scattered through the atmosphere.)

SNOW (SN). Frozen precipitation in the form of ice crystals that combine in a complex branched hexagonal form as they fall towards the earth's surface. It most often falls from stratiform clouds, but can fall as snow showers from cumuliform cloud. In aviation forecasts and reports it is coded as SN, or SHSN for snow showers.

SNOW GRAINS (SG). Precipitation of very small opaque white particles of ice which fall from a cloud and which are fairly flat or elongated with diameters generally less than 1 mm.

SNOW PELLETS. Precipitation of white and opaque ice particles, which fall from a cloud and which are generally conical or rounded, with diameters attaining as much as 5 mm.

SPACE WEATHER. The conditions on the Sun, in the solar wind and in the magnetosphere, ionosphere and thermosphere, which can influence the performance and reliability of a variety of space-borne and ground-based technological systems.

SPACE WEATHER CENTRE (SWXC). A centre designated to monitor and provide information on space weather phenomena expected to affect high-frequency radio communications, communication via satellite, GNSS-based navigation and surveillance systems and/or pose a radiation risk to aircraft operations.

SPECI. A special report of surface meteorological information at an aerodrome. They are only issued when specific criteria are met. Has the same format as a METAR, except for the name.

SQUALL (SQ). A sudden onset of strong winds with speeds increasing by at least 16 knots and sustained at 22 or more knots for at least one minute. The intensity and duration is longer than that of a gust.

SQUALL LINE (SQL). A continuous line of thunderstorms accompanied by a surface gust front at the line's leading edge.

STABLE ATMOSPHERE. A state of the atmosphere in which a lifted air parcel will sink to its equilibrium level once the lifting mechanism ceases, due to the air parcel being denser (cooler) than the surrounding air.

STANDARD ATMOSPHERE. A mathematical model of the atmosphere which is standardised so that predictable calculations can be made.

STANDARD PRESURE. The pressure of 1013.2 hPa which, if set upon the pressure sub-scale of a sensitive altimeter, will cause the latter to read zero when at mean sea level in a standard atmosphere.

STANDING WAVE. An atmospheric wave that is stationary with respect to the earth's surface.

STEAM FOG. Fog that forms when cool air, passing over warm water, reaches its saturation point due to water evaporating from the warm water into the cooler air. Fog rising in the convection currents above the water give rise to a steaming appearance.

STRATIFORM. Clouds that exhibit extensive horizontal development (in contrast to the vertical development of cumuliform clouds).

STRATOCUMULUS (SC). A principal cloud type, forming in the low levels of the troposphere and existing in a

relatively flat layer but having individual elements, from which drizzle can fall. It can form from cumulus clouds becoming more stratified when they push up into a stable atmospheric layer.

STRATOPAUSE. The boundary zone between the stratosphere and the mesosphere. In the stratosphere the temperature increases with height, with the stratopause being the point of maximum temperature, prior to a decrease in temperature in the mesosphere.

STRATOSPHERE. The layer of the atmosphere located between the troposphere and the mesosphere. It is characterized by an increase in temperature with height and an absence of convective clouds and associated turbulence.

STRATUS (ST). A principal cloud type, forming in the low levels of the troposphere and normally existing as a flat layer that does not exhibit individual elements.

SUBLIMATION. The process of ice changing directly into water vapour.

SUBSIDENCE. A descending motion of air in the atmosphere, usually with the implication that it extends over a broad area such as occurs with a high-pressure system.

SUBTROPICAL JET. A band of relatively strong winds found between 20 and 40° latitude in the middle and upper troposphere. Jet streams form near boundaries of adjacent air masses with significant differences in temperature.

SUPERCELL THUNDERSTORM. A cumulonimbus cloud characterised by a rotating and long-lived, intense updraft. They can potentially result in the most severe thunderstorms, capable of producing extremely large hail, damaging winds and violent tornadoes.

SUPERCOOLING. The reduction of the temperature of a liquid below its freezing point without it becoming a solid.

SYNOPTIC CHART. Any chart that depicts meteorological or atmospheric conditions over a large area at a given time.

T

TEMPERATURE (T). A physical quantity characterising the mean random motion of molecules in a physical body.

THERMAL. Updraft produced locally above a surface warmer than its immediate surroundings.

THERMOSPHERE. The layer of the atmosphere located between the mesosphere and outer space. It is a region of increasing temperature with height, and includes all of the exosphere and most of the ionosphere.

THUNDER. The sound emitted by rapidly expanding gases along the channel of a lightning discharge.

THUNDERSTORM (TS). A cumulonimbus cloud characterized by thunder and lightning and associated gusty surface winds, hail, rain, turbulence, icing and, under the most severe conditions, microbursts and/or tornadoes.

TORNADO. A rotating column of air extending between a cumulonimbus cloud and the ground. It is the most destructive of all storm-scale atmospheric phenomena (microbursts can be just as severe but they occur over a shorter time period).

TOWERING CUMULUS (TCU). A vertically developed cumulus cloud, often a precursor to cumulonimbus.

TRADE WINDS. Persistent winds, mainly in the lower atmosphere, which blow over vast regions from a subtropical anticyclone to the equatorial regions. Their predominant directions are NE in the northern hemisphere and SE in the southern hemisphere.

TRANSMISSOMETER. Instrument which indicates visibility by measuring the transmission or extinction of a beam of light over a fixed distance. Used to measure runway visual range.

TROPICS. The region of the earth located between the Tropic of Cancer, at 23.5 degrees north and the Tropic of Capricorn, at 23.5 degrees south.

TROPICAL AIR MASS. An air mass that forms in the tropics or subtropics. Maritime tropical air is produced over oceans and is warm and humid, while continental tropical air is formed over arid land and is very hot and dry.

TROPICAL CYCLONE (TC). A non-frontal low pressure system that develops over tropical waters with winds of 34 knots or more. In Australia, the term severe tropical cyclone is used when winds reach or exceed 64 knots.

TROPICAL DISTURBANCE. An area of organised convection, originating in the tropics or occasionally the subtropics, that maintains its identity for 24 hours or more, but has no closed wind circulation. It is often the first developmental stage of a tropical cyclone.

TROPIC OF CANCER. Located at 23.5 degrees north. The most northern point on the earth where the sun can be directly overhead at noon.

TROPIC OF CAPRICORN. Located at 23.5 degrees south. The most southern point on the earth where the sun can be directly overhead at noon.

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

TROPOSPHERE. The lowest layer of the atmosphere. It is characterised by clouds, weather and a decrease in temperature with increasing altitude.

TROUGH. An elongated area of low atmospheric pressure.

TURBULENCE (TURB). Irregular fluctuations occurring in fluid motions.

U

UPSLOPE FOG. Fog formed on windward slopes by forced ascent of air which causes adiabatic expansion and cooling.

UNSTABLE ATMOSPHERE. An atmosphere in which air parcels rise buoyantly due to the rising air parcel being less dense (warmer) than the surrounding air.

UPDRAFT. A small-scale current of air with marked vertical motion.

V

VALLEY BREEZE. An anabatic wind which forms during the day by heating of the valley floor. As the ground becomes warmer than the surrounding atmosphere, the lower levels of air heat and rise, flowing up mountain slopes.

VALLEY FOG. Fog formed through radiative cooling and advection and influenced by local katabatic winds.

VAPOUR PRESSURE. The pressure exerted by gaseous molecules. In meteorology, it is that part of total atmospheric pressure due to water vapour content.

VEERING. A clockwise shift in the wind direction.

VIRGA. Precipitation that falls from clouds but evaporates before reaching the ground.

VISIBILITY (VIS). A measure of the opacity of the atmosphere. It is the greatest distance one can see prominent objects with unaided normal eyesight.

VISIBILITY METER. Instrument for making direct measurements of visual range in the atmosphere or of the physical characteristics of the atmosphere which determine the visual range.

VISUAL FLIGHT RULES (VFR). Rules that govern civil aircraft flight under conditions that allow navigation by visual reference to the earth's surface.

VOLCANIC ASH (VA). Comprised of minerals unique to the volcanic eruption. Minerals common to most volcanic ash are silica together with smaller amounts of the oxides of aluminium, iron, calcium and sodium. The glassy silicate material is very hard and extremely abrasive. Its melting point is below jet engine burner temperature which introduces additional hazards.

W

WAKE TURBULENCE. A disruption of the airflow behind a moving aircraft that produces turbulence.

WALKER CIRCULATION. A deep east-west circulation induced by the contrast between the warm waters of the western Pacific and the cooler waters of the eastern Pacific.

WARM AIR ADVECTION The horizontal movement of warmer air into a location.

WARM FRONT The leading edge of an advancing warm air mass that is replacing a relatively colder air mass.

WARNING. A statement or meteorological report of the occurrence or expectation of a deterioration or improvement in meteorological conditions or of any meteorological phenomena which may seriously affect the safe operations of an aircraft.

WATER VAPOUR. Water in its gaseous form.

WATERSPOUT. A tornado over water.

WAVE LENGTH. The distance between 2 successive wave crests separated by a trough.

WEATHER FORECAST. A prediction of the future state of the atmosphere.

WEATHER OBSERVATION. A measurement or observation made of the current actual weather conditions, usually including temperature, humidity, wind speed and direction, cloud cover and height, pressure, rainfall, weather observed and visibility.

WEATHER RADAR. A type of radar used to locate precipitation, calculate its motion, and estimate its type. A radar uses radio methods of determining at a

single station the direction and distance of an object. The distance is determined by the time taken by signals emitted by the station to reach a distant object and return. The term radar is derived from “RADio Detection And Ranging”.

WET SEASON. Summer plus shoulder seasons in the tropics (October to April in Australia), where air, ocean temperatures and humidity are high, resulting in increased periods of convective showers and thunderstorms. Bursts of the monsoon periodically increase the wind and rain during the wet season, with the quieter period in between termed the ‘break’.

WHITEOUT. Occurs when clouds and the earth’s surface are the same colour, resulting in the horizon being unidentifiable. Commonly occur in the Antarctic, where an ice or snow ground cover and an overcast cloud cover cause the conditions. Dangerous to low-level aviation operations, as it is difficult for a pilot to visually determine where the ground is.

WIDESPREAD (WDSPR). Indicates greater than 75% coverage of an area.

WIND. Air motion relative to the earth’s surface.

WIND DIRECTION. The direction from which the wind is blowing.

WIND PROFILE. Graphical representation of wind speed and direction as a function of height or distance.

WIND SHEAR. A wind direction and/or speed change over a vertical or horizontal distance.

WIND SPEED. Ratio of the distance covered by the air to the time taken to cover it. The “instantaneous speed” or, more briefly, the “speed”, corresponds to the case of an infinitely small time interval. The “mean speed” corresponds to the case of a finite time interval.

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