

Appendix A - Agenda

NOTE – The back of the agenda that was distributed to the committee had the questions we submitted to the MECP in advance of the meeting #7 where Mr. Header presented

Appendix B - Meteorological Definition

Billy Bishop Toronto City Airport

Noise Sub Committee Meeting 6

May 29, 2019

7pm to 9pm

Billy Bishop Airport Boardroom
(Mainland Passenger Transfer Facility, above Aroma Café)

AGENDA

- 7:00 Welcome and Agenda Review
- 7:05 Update on status of Noise Assessment Scope of Work (Angela)
- 7:20 2016 Noise Exposure Contours Report for Billy Bishop Airport (Angela)
- 7:50 Review Original and Primary Meteorology Definitions List prepared by Wayne
- 8:20 Review of questions to ask the provincial Ministry of Environment, Conservation and Parks
(See *back of page*)
- 8:50 Next Steps
- 9:00 Adjourn

Draft Questions to ask MECP

Note: Questions of clarification will be focussed on NPC-300.

- 1) Could the Ministry of Environment, Conservation and Parks share an organizational chart which outlines who provides what types of approvals, sets provincial standards and who does compliance?
- 2) How does the Provincial Policy Statement, NPC-300 and the D-6 Guidelines with regards to separation distance for stationary noise sources, apply to transportation operations?
- 3) Under NPC-300, what is the definition of stationary noise source, and could the Ministry provide examples of such operations (ie. transportation facilities, airports, etc.) as this will help provide clarity to the NMSC on the concept of stationary noise sources?
- 4) In NPC-300, the stationary source definition indicates that airports are a stationary noise source that do not require MECP approval. However, the guideline refers to Aircraft Noise Control Measures determined by the outdoor NEF value (which relates to flyby noise). To what components or operations does NPC-300 apply with respect to existing airports?
- 5) Provide clarification around what components or operations NPC-300 applies to (e.g. the ferry)
- 6) A new aspect of NPC-300 is the Class 4 lands designation which refers to infill development and areas of future development. Could MECP clarify the various classes of lands and why Class 4 has been added?
- 7) With regards to standards, there is interest in understanding the intention behind the concepts of:
 - a) impulsive sounds
 - b) towers
 - c) etc....
- 8) Explain how building noise design standards were applied to existing sensitive land uses and whether this has been implemented effectively.
- 9) What is the difference between indoor and outdoor noise standards? And how does the Ministry conduct compliance/inspections on noise complaints?
- 10) Based on NPC-300 or other provincial regulatory requirements, what is required when a noise impact assessment is undertaken? If there is no regulatory requirements, what would be the best management practice or industry standard?

Environment and Climate Change Canada Meteorology Glossary (Definitions)

Note - Glossary (definitions) copied and pasted from.....

- http://climate.weather.gc.ca/glossary_e.html (Government of Canada)
- <https://ec.gc.ca/meteoaloeil-skywatchers/default.asp?lang=En&n=7884CDEA-1&def=hide1BED14A34>

Note – all definitions from 2nd bullet above prefixed with a '*'

atmospheric pressure/barometric pressure

Atmospheric Pressure, also called barometric pressure, is the force per unit area exerted by the atmosphere as a consequence of its weight. It is equal to the weight of a vertical column of air of a unit area, extending from a given elevation or level to the outer limit of the atmosphere. Measurement units for pressure are called hectopascals (hPa).

blowing dust

Dust that is raised by the wind, to moderate heights above the ground. Visibility at eye level may be reduced to 1 km.

blowing snow

Snow particles violently stirred up by wind to sufficient heights above the ground to reduce visibility to 10 km or less.

calm

An absence of wind flow or any other air motion.

celsius

A temperature scale where water at sea level has a freezing point of 0 °C (Celsius) and a boiling point of +100 °C. Commonly used in countries that observe the metric system of measurement. Created by Anders Celsius in 1742. In 1948, the Ninth General Conference on Weights and Measures replaced "degree centigrade" with "degree Celsius."

To convert from degrees Celsius to degrees Fahrenheit, $(C * 9/5) + 32$

climate

The historical record and description of average daily and in seasonal weather events that help describe a region. Statistics are generally drawn over several decades. Climatology, or the study of climate, includes climatic data, the analysis of the causes of the differences in climate, and the application of climatic data to the solution of specific design or operational problems. It differs

from weather, which is concerned with short term or instantaneous variations in the state of the atmosphere at a specific time.

climate identifier (ID)

The climate ID is a 7 digit number assigned by the Meteorological Service of Canada to a site where official weather observations are taken, and serves as a permanent, unique identifier.

The first digit assigned identifies the province where the second and third digits identify the climatological district within the province.

When observations are discontinued at a site, the number is not used for subsequent stations (which may, or may not, differ in name) unless it is judged that the records from the earlier and subsequent stations may be combined for most climatological purposes.

cloud

A visible collection of minute particle matter, such as water droplets and/or ice crystals, in the air. A cloud forms in the atmosphere as a result of condensation of water vapour. Condensation nuclei, such as smoke or dust particles, form a surface upon which water vapour can condense.

Code for Normals

Normals for some elements are derived from less than 30 years of record but can still be considered useful. The minimum number of years used are indicated by a "code" defined as:
"A": WMO "3 and 5 rule" (i.e. no more than 3 consecutive and no more than 5 total missing for either temperature or precipitation).

"B": At least 25 years of record.

"C": At least 20 years of record.

"D": At least 15 years of record.

cooling degree-days

Cooling degree-days for a given day are the number of degrees Celsius that the mean temperature is above 18 °C. If the temperature is equal to or less than 18 °C, then the number will be zero. For example, a day with a mean temperature of 20.5 °C has 2.5 cooling degree-days; a day with a mean temperature of 15.5 °C has zero cooling degree-days. Cooling degree-days are used primarily to estimate the air-conditioning requirements of buildings.

Co-operative Climate Network (CCN)

The Co-operative Climate Network (CCN) is a network of climate observing stations comprised of volunteers who, through an agreement with Environment and Climate Change Canada's Meteorological Service of Canada (MSC), report daily temperature and/or precipitation values once or twice per day on a voluntary basis, using high quality manual sensors provided and maintained by the MSC. All cooperative climate stations are representative of their area and have

trained and reliable volunteer observers who have instruments and associated equipment installed on their property. CCN observation data undergoes basic automatic quality checks.

data interval

Depending on individual climate observing programs and climate elements, weather observations at a climate station are recorded at three basic intervals:

Hourly: indicates data values for observations taken on an hourly basis.

Daily: indicates data values for observations taken once in a 24-hour period or derived from hourly data values.

Monthly: are averages for each month, derived from daily data values.

Daylight Saving Time

In Canada, time zones and Daylight Saving Time (DST) are the responsibility of provincial and territorial governments. Clocks are moved ahead one hour on the second Sunday in March, and back one hour on the first Sunday of November. At present, all of Canada except Saskatchewan, and parts of British Columbia and Quebec, follows Daylight Saving Time.

degree-days

Degree-days for a given day represent the number of Celsius degrees that the mean temperature is above or below a given base temperature. For example, heating degree-days are the number of degrees below 18 °C. If the temperature is equal to or greater than 18 °C, then the number will be zero. Values above or below the base of 18 °C are used primarily to estimate the heating and cooling requirements of buildings. Values above 5 °C are frequently called growing degree-days, and are used in agriculture as an index of crop growth.

dew point temperature (°C)

The dew point temperature in degrees Celsius (°C), a measure of the humidity of the air, is the temperature to which the air would have to be cooled to reach saturation with respect to liquid water. Saturation occurs when the air is holding the maximum water vapour possible at that temperature and atmospheric pressure.

direction of maximum gust (10's deg/tens of degrees)

The direction of the maximum gust (true or geographic, not magnetic) from which the wind blows. Expressed in tens of degrees (10's deg), 9 means 90 degrees true or an east wind, and 36 means 360 degrees true or a wind blowing from the geographic north pole. This value is only reported if the maximum gust speed for the day exceeds 29 km/h.

drizzle

Fairly uniform precipitation composed of fine drops of water (diameter < 0.5 mm). Drizzle drops are too small to cause appreciable ripples on the surface of still water. The drops appear almost to float in the air, thus making visible even slight movements of air.

dry bulb temperature

The dry bulb temperature is the value taken from a thermometer when the bulb of the thermometer is dry. It reflects the ambient temperature independent on the moisture content of the air.

elevation (m)

The elevation in metres (m) refers to the elevation of the observing location above mean sea level. The elevation of each site is given to the nearest metre and is generally the height of ground on which the instruments are exposed. Prior to April 1, 1986, the elevation at principal stations located at airports was generally the established by the elevation of the aerodrome. For principal stations not located at airports the elevation was established by the elevation of the barometer cistern.

evaporation

The physical process by which a liquid, such as water, is transformed into a gaseous state, such as water vapour. It is the opposite physical process of condensation.

Evaporation refers to the calculated lake evaporation occurring from a small natural open water-body having negligible heat storage and very little heat transfer at its bottom and sides. It represents the water loss from ponds and small reservoirs but not from lakes that have large heat storage capacities. Lake evaporation is calculated using the observed daily values of pan evaporative water loss, the mean temperatures of the water in the pan and of the nearby air, and the total wind run over the pan.

extreme maximum temperature (°C)

The highest daily maximum temperature in degrees Celsius (°C) reached at that location for that month.

extreme minimum temperature (°C)

The lowest daily minimum temperature in degrees Celsius (°C) reached at that location for that month.

fog

A visible aggregate of minute water droplets suspended in the air at or near the surface of the earth, reducing horizontal visibility to less than 1 km. It is created when the temperature and the dew point of the air have become the same, or nearly the same. It is rarely observed when the temperature and dew point differ by more than 2 °C.

freezing drizzle

Drizzle, the drops of which freeze on impact with the ground or with objects at or near the ground.

freezing rain

Rain, the drops of which freeze on impact with the ground or with objects at or near the ground.

frost

Frost is the condition that exists when the temperature of the air near the earth or earth-bound objects falls to freezing or lower (0 °C).

Alternately, frost or hoar frost describes a deposition of ice crystals on objects by direct sublimation of water vapour from the air.

frost free days

Number of frost free days is calculated based on the last occurrence of frost in spring and the first occurrence of frost in autumn. This is an especially important parameter for agriculture, because the variability in the number of frost free days is crucial for many agricultural activities such as planting and harvesting, but the impact of a strong frost can become an economic problem that affects the prices.

gusts

Gusts are sudden, rapid and brief changes in the wind speed. They are characterized by more or less continual fluctuations between the high (peak) and low (lull) speed. The extreme gust speed is the instantaneous peak wind observed from the anemometer dials, abstracted from a continuous chart recording, or from a data logger.

hail

Precipitation of small balls or pieces of ice with a diameter ranging from 5 to 50 mm or more. Hail is generally observed during heavy thunderstorms.

heating degree-days

Heating degree-days for a given day are the number of degrees Celsius that the mean temperature is below 18 °C. If the temperature is equal to or greater than 18 °C, then the number will be zero. For example, a day with a mean temperature of 15.5 °C has 2.5 heating degree-days; a day with a mean temperature of 20.5 °C has zero heating degree-days. Heating degree-days are used primarily to estimate the heating requirements of buildings.

hourly weather conditions

Normally includes observations of sky condition, visibility (kilometres), present weather conditions, obstructions to vision, atmospheric pressure (kPa) temperature (degrees C), humidity

(%), wind speed (km/h) and direction (tens of degrees), cloud cover (tenths of sky) and/or obscuring phenomena (tenths).

Humidex

Humidex is an index to indicate how hot or humid the weather feels to the average person. It is derived by combining temperature and humidity values into one number to reflect the perceived temperature. For example, a humidex of 40 means that the sensation of heat when the temperature is 30 degrees and the air is humid feels more or less the same as when the temperature is 40 degrees and the air is dry.

The standard Humidex formula used by Environment and Climate Change Canada is:

Humidex = (air temperature) + h

Where

$$h = (0.5555) * (e - 10.0);$$
$$e = \text{vapour pressure in hPa (mbar), given by:}$$
$$e = 6.11 * \exp\left[\frac{5417.7530}{(1/273.16) - (1/\text{dewpoint})}\right]$$

exp = 2.71828

Dewpoint is expressed in kelvins(K) (temperature in K = temperature in °C + 273.16) and 5417.7530 is a rounded constant based on the molecular weight of water, latent heat of evaporation, and the universal gas constant.

ice

The solid form of water. It can be found in the atmosphere in the form of ice crystals, snow, ice pellets, and hail for example.

ice crystals

Precipitation in the form of slowly falling, singular or unbranched ice needles, columns, or plates. They make up cirriform clouds, frost, and ice fog. Also, they produce optical phenomena such as halos, coronas, and sun pillars. May be called "diamond dust." Precipitation of ice crystals in the form of needles, columns or plates sometimes so tiny, they seem suspended in air. They are mainly visible when they glitter in sunshine and occur only at very low temperatures and stable air masses.

ice fog

A type of fog composed of suspended particles of ice or ice crystals 20 to 100 microns resulting from the freezing of tiny supercooled water droplets. Ice fog occurs in clear, calm, stable air when temperatures are < -30 °C.

ice pellets

Precipitation of transparent or translucent pellets of ice, which are spherical or irregular shaped, having a diameter of 5 mm or less. They are classified into two types: hard grains of ice consisting of frozen rain drops or largely melted and refrozen snowflakes; pellets of snow encased in a thin layer of ice which have formed from the freezing of droplets intercepted by pellets or water resulting from the partial melting of pellets. Ice pellets usually bounce when hitting hard ground and make a sound on impact. They can fall as continuous precipitation or in showers.

latitude

Latitude co-ordinates for climate stations are generally for the instrument site; however prior to April 1, 1986 at principal stations (airports) the locations given were normally that of the official airport locations. The accuracy of these locations depended on the quality of the reference maps available at the time. The latitude of each site is given to the nearest second or to the nearest 0.003 of a degree. All locations in Canada are north of the equator.

Local Standard Time

The Local Standard Time(LST) is used for observation purposes and is that of the standard time zone in which the station is located, whether or not "daylight saving time" is adopted for other purposes. In Canada, Local Standard Time is commonly used for archiving surface weather observations.

longitude

Longitude co-ordinates for climate stations are generally for the instrument site; however prior to April 1, 1986 at principal stations (airports) the locations given were normally that of the official airport locations. The longitude of each site is given to the nearest second or to the nearest 0.003 of a degree. The accuracy of these locations depends on the quality of the reference maps available at the time. Negative values of longitude denote degrees west of the Greenwich Meridian. All locations in Canada have negative values of longitude.

maximum relative humidity (%)

The maximum percentage (%) value of all hourly relative humidity values observed at a specified location for a specified time interval.

maximum temperature (°C)

The highest temperature in degrees Celsius (°C) observed at a location for a specified time interval.

mean maximum temperature (°C)

The average of the maximum temperature in degrees Celsius (°C) observed at the location for that month.

mean minimum temperature (°C)

The average of the minimum temperature in degrees Celsius (°C) observed at the location for that month.

mean sea level pressure

The atmospheric pressure at mean sea level usually determined from the observed station pressure. Mean sea level pressure is computed from the station pressure and reported so that the barometric pressures at stations of different elevations can be compared at a common level for analysis purposes.

mean temperature (°C)

The mean temperature in degrees Celsius (°C) is defined as the average of the maximum and minimum temperature at a location for a specified time interval.

minimum relative humidity (%)

The minimum percentage (%) value of all hourly relative humidity values observed at a specified location for a specified time interval.

minimum temperature (°C)

The lowest temperature in degrees Celsius (°C) observed at a location for a specified time interval.

number of days with specified parameters

These tables give the average number of days per month or year on which a specific meteorological event occurs.

For example:

In the case of rainfall and precipitation, 0.2 mm or more must occur before a "day with" is counted. The corresponding figure for snowfall is 0.2 cm.

A day with freezing precipitation is counted if there is an occurrence of 0.2 mm or more of rain or drizzle that turns to ice on contact with the underlying surface.

Fog for this purpose is defined as a suspension of very small water droplets reducing the horizontal visibility to less than 1 km.

A day with thunderstorms occurs if thunder is heard.

occurrence of weather and obstructions to vision

Observations of atmospheric phenomenon including the occurrence of weather and obstructions to vision have been taken at many hourly reporting stations. The current standard for these observations is in the [Manual of Surface Weather Observations](#), Chapter 3, Atmospheric Phenomena.

The phenomena that are reported are:

Tornado
Waterspout
Funnel Cloud
Thunderstorms
Heavy Thunderstorms
Rain*
Rain Showers*
Drizzle*
Freezing Rain*
Freezing Drizzle*
Snow*
Snow Grains*
Ice Crystals
Ice Pellets*
Ice Pellet Showers*
Snow Showers*
Snow Pellets*
Hail*
Fog
Ice Fog
Smoke
Haze
Blowing Snow
Blowing Sand
Blowing Dust
Dust
Freezing Fog
Virga

Precipitation types marked with an asterisk (*) are observed in three intensities: light, moderate and heavy. If the precipitation is listed in the WEATHER column without a modifier then the intensity is light. Otherwise it will appear with a modifier of moderate or heavy.

At some stations observations are made by automatic aviation weather reporting systems. The types of phenomena reported from these systems are not as numerous and are limited to:

Rain
Snow
Drizzle
Hail
Freezing Rain
Freezing Drizzle
Unknown Precipitation

Currently, the observation of Unknown Precipitation is not reported in the WEATHER column. The other precipitation types are reported.

When no weather or obstructions to visibility occur, sky conditions are provided reflecting the observation of total cloud amount. The following terms are used, based on the amount (in tenths) of cloud covering the dome of the sky:

Clear (0 tenths)

Mainly clear (1 to 4 tenths)

Mostly cloudy (5 to 9 tenths)

Cloudy (10 tenths)

These observations of cloud amounts are not available from aviation automatic weather stations.

peak gust

The highest instantaneous wind speed observed or recorded.

precipitation

Any and all forms of water, liquid or solid, that falls from clouds and reaches the ground. This includes drizzle, freezing drizzle, freezing rain, hail, ice crystals, ice pellets, rain, snow, snow pellets, and snow grains. Types of precipitation that originate aloft are classified under Liquid Precipitation, Freezing Precipitation and Frozen Precipitation. The measurement of precipitation is expressed in terms of vertical depth of water (or water equivalent in the case of solid forms) which reaches the ground during a stated period. The millimetre (mm) is the unit of measurement of liquid precipitation and the vertical depth of water or water equivalent is expressed to the nearest 0.2 mm. Less than 0.2 mm is called a "Trace". Snow depth is measured to the nearest 0.2 cm. Less than 0.2 cm is called a "Trace".

radiation

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

Radiation values are recorded hourly in Local Apparent Time and the units are expressed in megajoules per square metre, except daylight illumination is in 1000 lumen-hours per square metre.

Global solar radiation RF1

Sky radiation RF2

Reflected solar radiation RF3

Net radiation RF4

Daylight illumination RF7

Global solar radiation RF1 and sky radiation RF2

Global solar radiation RF1 and Reflected solar radiation RF3

Global solar radiation RF1 and Net radiation RF4

Global solar radiation RF1, Sky radiation RF2 and Reflected solar radiation RF3

Global solar radiation RF1, Sky radiation RF2, Reflected solar radiation RF3 and Net radiation RF4

Global solar radiation RF1, Reflected solar radiation RF3 and Net radiation RF4

Global solar radiation RF1, Sky radiation RF2, Reflected solar radiation RF3, Net radiation RF4 and

Daylight illumination RF7

Global solar radiation RF1, Sky radiation RF2 and Net radiation RF4

rain

Precipitation in the form of liquid water droplets greater than 0.5 mm. If widely scattered, the drop size may be smaller. The intensity of rain is based on rate of fall. "Very light" means that the scattered drops do not completely wet a surface. "Light" means it is greater than a trace and up to 2.5 mm an hour. "Moderate" means the rate of fall is between 2.6 mm to 7.5 mm per hour. "Heavy" means 7 mm per hour or more.

rainfall, snowfall, and precipitation

Rain, drizzle, freezing rain, freezing drizzle and hail are usually measured using the standard Canadian rain gauge, a cylindrical container 40 cm high and 11.3 cm in diameter. The precipitation is funneled into a plastic graduate that serves as the measuring device. Snowfall is the measured depth of newly fallen snow, measured using a snow ruler. Measurements are made at several points which appear representative of the immediate area, and then averaged. "Precipitation" in Canadian Climate Normals tables is the water equivalent of all types of precipitation.

At most ordinary stations the water equivalent of snowfall is computed by dividing the measured amount by ten. At principal stations it is usually determined by melting the snow that falls into Nipher gauges. These are precipitation gauges designed to minimize turbulence around the orifice, and are high enough above the ground to prevent most blowing snow from entering. The amount of snow determined by this method normally provides a more accurate estimate of precipitation than using the "ten-to-one" rule. Even at ordinary climate stations the normal precipitation values will not always be equal to rainfall plus one tenth of the snowfall. Missing observations is one cause of such discrepancies.

Precipitation measurements are usually made four times daily at principal stations. At ordinary sites they are usually made once or twice per day. Rainfall, snowfall and precipitation amounts given in the tables represent the average accumulation for a given month or year.

relative humidity (%)

Relative humidity in percent (%) is the ratio of the quantity of water vapour the air contains compared to the maximum amount it can hold at that particular temperature.

saturation point

The point when the water vapour in the atmosphere is at its maximum level for the existing temperature.

smoke or haze

A suspension in the air of small particles produced by combustion. Viewed through smoke, the sun appears very red at sunrise and sunset. When high in the sky, smoke is tinged with orange.

Smoke from nearby cities may be brown, dark gray or black. Smoke in extensive layers originating from forest fires give the sky a greenish-yellow hue. Evenly distributed smoke from distant sources is generally light gray or blue. In large quantities, smoke may be distinguished by its smell. Plumes of smoke of local origin are not reported as an atmospheric phenomenon.

snow

Frozen precipitation in the form of white or translucent ice crystals in complex branched hexagonal form. It most often falls from stratiform clouds, but can fall as snow showers from cumuliform ones. At temperatures > than -5 °C, the crystals generally cluster to form snowflakes.

snow depth

Snow depth is the depth of accumulated snow on the ground, measured in centimetres (cm) at several points that appear representative of the immediate area and then averaged.

snow grains

Frozen precipitation in the form of very small, white opaque grains of ice. The solid equivalent of drizzle. Their diameter is generally < 1 mm. When grains hit hard ground, they do not bounce or shatter. They usually fall in very small quantities, mostly from Stratus clouds or fog and never in the form of a shower.

snow on the ground (cm)

The depth of snow in centimetres (cm) on the ground. The total depth of snow on the ground at the time of the observation is determined in whole centimetres by making a series of measurements and taking the average.

snow on the ground on the last day (cm)

The depth of snow in centimetres (cm) on the ground. The monthly value displayed is for the final day of the month.

snow pellets

Frozen precipitation of particles of either spherical or conical ice; their diameter is about 2 to 5 mm. They are brittle, easily crushed, and unlike hail, when they fall on hard ground, they bounce and often break up. Snow pellets always occur in showers and are often accompanied by snow flacks or raindrops when the surface temperature is around 0 °C.

snow shower saturation point

Frozen precipitation in the form of snow, characterized by its sudden beginning and ending.

snow squall

A heavy snow shower accompanied by sudden strong winds.

snow survey

Snow surveys by designated stations are made at regular intervals during the winter months to determine the water equivalent (mm) and depth of the snow pack (cm).

- 5 points (30 m apart), measurements taken on the 1st, 8th, 15th and 23rd of each month.
- 10 points (30 m apart), measurements taken on the 1st and 15th days of each month.

soil temperature

Soil temperature measurements provide a climatology of soil thermal characteristics such as the depth of frost penetration into the soil and the duration that the soil remains frozen. It is of interest to hydrologists because it affects surface runoff, infiltration and snowmelt and to agriculturists because it affects seed germination. Measurements of soil temperature are made in accordance with the World Meteorological Organization (WMO) recommendations at the standard depths of 5, 10, 20, 50, 100, 150 and 300 cm. They are measured daily as close as possible to 08:00 LST and again at the shallowest depth at 16:00 LST.

solar radiation

Solar radiation is the measurement of radiant energy from the sun, on a horizontal surface. There are several standardized components of independent measurements. Each component is assigned a different identifying number referred to as Radiation Fields (RF). The standard metric unit of radiation measurement is the megajoule per square metre (MJ m^{-2}).

Components measured and used by MSC:

RF1: Global Solar Radiation: the total incoming direct and diffuse short-wave solar radiation received from the whole dome of the sky on a horizontal surface.

RF2: Sky Radiation (Diffuse): the portion of the total incoming short-wave solar radiation received on a horizontal surface that is shielded from the direct rays of the sun by means of a shade ring.

RF3: Reflected Solar Radiation: the portion of the total incoming short-wave radiation that has been reflected from the Earth's surface and diffused by the atmospheric layer between the ground and the point of observation onto a horizontal surface.

RF4: Net Radiation: the resultant of downward and upward total (solar, terrestrial surface, and atmospheric) radiation received on a horizontal surface.

speed of maximum gust (km/h)

The speed in kilometres per hour (km/h) of the maximum wind gust during the day. The gust is the maximum or peak instantaneous or single reading from the anemometer (the instrument used to observe wind speed) during the day. The duration of a gust typically corresponds to an elapsed time of 3 to 5 seconds.

station name

The station name is the official name of any meteorological station in the National Climate Archive as administered by the Meteorological Service of Canada (MSC).

Station Operator

The Station Operator indicates the current organization responsible for a given meteorological station. Operators include various branches of Environment and Climate Change Canada, partners, or third party data suppliers. Data from Meteorological Service of Canada's (MSC's) networks as well as data from the other sources are made available to users and archived by the National Climate Archives. Station Operator attribution will only be present on data pages from April 1st, 2018 onward.

station pressure (kPa)

The atmospheric pressure in kilopascals (kPa) at the station elevation. Atmospheric pressure is the force per unit area exerted by the atmosphere as a consequence of the mass of air in a vertical column from the elevation of the observing station to the top of the atmosphere.

station status

Indicates whether a station is currently collecting and/or transmitting weather data. An "active" or "open" station is considered operational and is expected to provide ongoing information. An "inactive" or "closed" station no longer collects or transmits data.

surface weather observation

A surface weather observation is an evaluation of meteorological elements, visually and/or by measurement at a specified location on the earth's surface, usually a weather observing station.

synoptic observations

Synoptic observations consist of sky condition, wind speed and direction; visibility, weather and obstructions to vision, atmospheric pressure, temperature, dew point, precipitation amount, special phenomena and maximum and minimum temperature. Observations are taken at specified times (usually at 0000 UTC, 0600 UTC, 1200 UTC and 1800 UTC) simultaneously around the globe and collectively give a comprehensive "synoptic" picture of weather conditions.

Transport Canada Identifier (TC ID)

The TC ID is the identifier assigned by Transport Canada to identify meteorological reports from airport observing sites transmitted in real time in aviation formats.

temperature (°C)

The temperature of the air in degrees Celsius (°C). At most principal stations the maximum and minimum temperatures are for a day beginning at 0600 Greenwich (or Universal) Mean Time, which is within a few hours of midnight local standard time in Canada.

thunder

The sound emitted by rapidly expanding gases along the channel of a lightning discharge. Most of lightning's electrical discharge is used to heat atmospheric gases around the visible channel. Temperatures can rise to over 10 000 °C in microseconds, resulting in a violent pressure wave, composed of compression and rarefaction. The rumble of thunder is created as one's ear catches other parts of the discharge, the part of the lightning flash nearest registering first, then the parts further away.

thunderstorm

A thunderstorm is a local storm produced by a cumulonimbus cloud. It is an event of relatively short duration and is always accompanied by lightning and thunder and lightning, usually with strong gusts of wind, heavy rain and sometimes hail. Officially, a thunderstorm is reported when: thunder is heard within the past 15 minutes
lightning is observed within the past 15 minutes and the local noise level is such as might prevent hearing thunder. In this case, hail may also be an indicator of a thunderstorm in progress.

total precipitation (mm)

The sum of the total rainfall and the water equivalent of the total snowfall in millimetres (mm), observed at the location during a specified time interval.

total rain (mm)

The total rainfall, or amount of all liquid precipitation in millimetres (mm) such as rain, drizzle, freezing rain, and hail, observed at the location during a specified time interval.

total snow (cm)

The total snowfall, or amount of frozen (solid) precipitation in centimetres (cm), such as snow and ice pellets, observed at the location during a specified time interval.

trace

An unmeasurable or insignificant quantity. A precipitation amount of less than 0.2 mm.

Universal Time Coordinates (UTC)

UTC is the local time on the zero meridian (0 °) which goes through the old observatory in Greenwich, London, UK. The World Meteorological Organization (WMO) has adopted the UTC as the standard time for reporting all meteorological data internationally. Times in UTC sometimes

get the suffix Z, i.e. 16Z. From the mnemonic "Zulu", as used in international marine communications standards.

upper air

Readings of pressure (kPa), altitude (m), air temperature (°C), relative humidity (%), wind speed (m/s), and wind direction (degrees) for standard pressure surfaces at 00 and 12 (UTC).

vapour pressure

The pressure exerted by the molecules of a given vapour. In meteorology, it is considered as the part of total atmospheric pressure due to the water vapour content. It is independent of other gases or vapours.

visibility (km)

Visibility in kilometres (km) is the distance at which objects of suitable size can be seen and identified. Atmospheric visibility can be reduced by precipitation, fog, haze or other obstructions to visibility such as blowing snow or dust.

weather

The state of the atmosphere at a specific time. It is the short term or instantaneous variations of the atmosphere, as opposed to the long term, or climatic, changes.

weather observing station

A weather observing station is any site from which official weather observations are made. It is normally equipped with instruments for measuring meteorological elements.

wet bulb temperature

The wet bulb temperature differs from the dry bulb temperature by an amount dependent on the moisture content of the air and is normally the same as or lower than the dry bulb temperature.

wind

Wind is defined as air in motion. It represents the horizontal flow of air at a height of 10 metres. Wind information includes direction, speed and character. Wind in the first ten's of metres above the ground tends to increase in speed and veer with height.

Winds are normally measured at level, open sites removed as much as possible from obstacles to wind flow such as trees, buildings, or hills. At most principle stations, wind is usually measured by taking a one-, two- or ten-minute mean at each observation, from an anemometer. At other wind-measuring sites, values may be obtained from autographic records of anemometers. Averaging periods may vary from one minute to an hour. The extreme gust speed is the

instantaneous peak wind observed from the anemometer dials, or abstracted from a continuous chart recording.

wind chill

Wind chill is an index to indicate how cold the weather feels to the average person. It is derived by combining temperature and wind velocity values into one number to reflect the perceived temperature.

For example, if the outside temperature is -10 °C and the wind chill is -20, it means that your face will feel more or less as cold as it would on a calm day when the temperature is -20 °C.

There are two Wind Chill formulas used by Environment and Climate Change Canada. The first equation is used when the temperature of the air is ≤ 0 °C and the reported wind speed is ≥ 5 km/h. The second equation is used when the temperature of the air is ≤ 0 °C and the reported wind speed is > 0 km/h but < 5 km/h.

The standard Wind Chill formula for Environment and Climate Change Canada is:

$$1. W = 13.12 + 0.6215 \times T_{\text{air}} - 11.37 \times V_{10\text{m}}^{0.16} + 0.3965 \times T_{\text{air}} \times V_{10\text{m}}^{0.16}$$

$$2. W = T_{\text{air}} + [(-1.59 + 0.1345 \times T_{\text{air}}) / 5] \times V_{10\text{m}}$$

Where

W is the wind chill index, based on the Celsius temperature scale
 T_{air} is the air temperature in degrees Celsius (°C), and
 $V_{10\text{m}}$ is the wind speed at 10 metres (standard anemometer height), in kilometres per hour (km/h).

wind direction (10's deg/tens of degrees)

The direction (true or geographic, not magnetic) from which the wind blows. It represents the average direction during the two minute period ending at the time of observation. Expressed in tens of degrees (10's deg), 9 means 90 degrees true or an east wind, and 36 means 360 degrees true or a wind blowing from the geographic north pole. A value of zero (0) denotes a calm wind.

wind speed (km/h)

The speed of motion of air in kilometres per hour (km/h) usually observed at 10 metres above the ground. It represents the average speed during the one-, two- or ten-minute period ending at the time of observation. In observing, it is measured in nautical miles per hour or kilometres per hour.

Conversion factors:

1 nautical mile = 1852 metres or 1.852 km

therefore

1 knot = 1.852 km/h

and

1 km/h = 0.54 knot.

World Meteorological Organization Identifier (WMO ID)

A 5-digit number permanently assigned to Canadian stations by the World Meteorological Organization to identify the station internationally. The WMO ID is an international identifier assigned by the Meteorological Service of Canada to standards of the World Meteorological Organization for stations that transmit observations in international meteorological formats in real time.

World Meteorological Organization (WMO)

Since weather systems and climatic conditions extend beyond international boundaries, it is necessary to exchange weather information freely throughout the world. This requires coordination and standardization of practices and procedures for efficient exchange of weather transmissions. To promote these services and to further the application of meteorology to aviation, shipping, agriculture and other human activities, the World Meteorological Organization was established by the United Nations in 1951. Its weather reporting codes are called International Codes.

World Meteorological Organization (WMO) standards for "Climate Normals"

"Climate averages", "climate means" or "Climate Normals" are all interchangeable terms. They refer to arithmetic calculations based on observed climate values for a given location over a specified time period and are used to describe the climatic characteristics of that location. Real-time values, such as daily temperature, are compared to the "climate normal" to determine how unusual or how great the departure from "average" they are.

There are many ways to calculate "Climate Normals"; the most useful ones adhere to accepted standards. The WMO considers thirty years long enough to eliminate year-to-year variations. Thus the WMO climatological standard period for Normals calculations are "averages of climatological data computed for consecutive periods of 30 years as follows: 1 January 1901 to 31 December 1930, 1 January 1931 to 31 December 1960, etc." and should be updated every decade. In addition, the WMO established that Normals should be arithmetic means calculated for each month of the year from daily data.

To qualify, temperature data, soil temperatures and evaporation must fit the following rule: "If more than 3 consecutive daily values are missing or more than 5 daily values in total in a given month are missing, the monthly mean should not be computed and the year-month mean should be considered missing." This is referred to as the "3/5" rule. For total precipitation, degree-days, and "days with" calculations, no missing days are allowed.

Once the months that qualify are determined, a similar "3/5" rule is also applied to the number of monthly average or total values in the thirty-year period. For instance, to meet this WMO standard, the "Normal" value of a monthly element, such as the Normal rainfall amount for May, can have no more than 3 consecutive, or 5 in total, missing rainfall values in any month of May between 1971 to 2000. For the purposes of the Canadian Climate Normals, calculated for 1971 to 2000 and 1981 to 2010, locations or climate stations, which meet to these WMO standards, are referred to as Class "A".

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<https://ec.gc.ca/meteoaloeil-skywatchers/default.asp?lang=En&n=7884CDEA-1&def=hide1BED14A34>

***Acid rain**

Acid rain is more properly called acid precipitation. It occurs when sulphur dioxide and nitrous oxide emissions convert into such pollutants as sulphuric acid and nitric acid. Both dissolve easily in air-born water droplets.

***Advisory**

Means actual or expected weather conditions may cause general inconvenience or concern, but do not pose a serious enough threat to warrant a weather warning. Examples of advisories include Air Quality Advisory, Humidex Advisory, Dust Storm Advisory, and Cold Wave Advisory. An advisory may also be used when conditions show signs of becoming favourable for severe weather when the situation is not definite enough or too far in the future to justify a warning.

***Air mass**

An air mass is a large body of air, sometimes extending thousands of kilometres, which has relatively uniform characteristics of temperature and moisture.

Air pressure

Air pressure or atmospheric pressure is the force exerted on an object or person by the weight of the air above. The internationally recognized unit for measuring air pressure is the kilopascal. (See Kilopascals)

***Anvil**

At a blacksmith's, the iron block on which the blacksmith hammers out the horseshoes is called an anvil. In weather, mature thunderstorm clouds extend so far up into the atmosphere that high-level winds cause the tops of the clouds to spread out in the shape of an anvil.

***Atmosphere**

The atmosphere is the envelope of air which surrounds the earth and is bound to it by gravity.

***Aurora Borealis**

The Aurora Borealis or Northern Lights are the shimmering, pulsating lights often seen on clear winter nights in a variety of shapes and colours and usually over countries such as Canada in the middle to higher latitudes. The Aurora Borealis results from the collision between fast-moving particles from the sun and rarefied gases in the upper atmosphere. Green, the most common colour, is caused by the electrons striking very cold oxygen. Pink is produced when nitrogen is hit.

***Backing**

Backing is the name given to a counter-clockwise change in wind direction, such as from the southwest to the south. (See Veering)

***Beaufort Wind Scale**

This scale for estimating the speed of wind while at sea was originally based on the effect which the winds have on ships and the surface of the water. The scale was later adapted so it could be used on land.

***Black ice**

Black ice is a thin layer of new ice on a road or on the water's surface. The ice appears dark because it is transparent.

***Blizzard**

A blizzard is a severe winter storm with high winds, bitter cold, and low visibility because of blowing snow. Across much of southern Canada, Environment Canada calls a severe winter storm a blizzard when the following conditions are expected to last 4 hours or more: sustained wind speeds or gusts of 40 kilometres an hour or more, widespread reduction of visibility to less than 1 kilometre due to snow and/or blowing snow, and temperatures colder than 0°C.

***Blowing snow**

Meteorologists use this term when winds lift snow from the ground to a height of 2 metres or more -- which is high enough to affect the visibility.

***Breeze**

A breeze is a light wind.

***Chinook**

A Chinook is a native Canadian word meaning snow-eater used to describe a class of gusty winds that become warm and dry as they flow down the slopes of a mountain range. In Canada,

Chinooks are strongest in southwestern Alberta where they flow through Crowsnest Pass and fan out over the southern part of the province. A Chinook can raise the temperature by as much as 22°C in a few hours, melting snow and bringing spring like weather in the darkest months of winter.

*Climate

It is the long-term average that describes the kind of weather or characteristic meteorological conditions you can expect in an area, region, province, or country. The climate is the synthesis of day-to-day weather conditions in a particular area and is represented by the collection of statistics over a period of time -- often 30 years or more.

*Cloud

A cloud is a visible cluster of tiny water droplets or ice particles above the earth's surface.

*Cold Front

When a cold air mass is coming in and pushing out a warmer air mass, the boundary between the two air masses is called a cold front.

*Condensation

Condensation is the physical process through which water vapour becomes a liquid.

*Convection

Convection is the process in which air rises because it is warmer and therefore lighter than the air around it.

*Coriolis force

The Coriolis force is named after the French scientist Gaspard Gustave de Coriolis, who, in 1835, discovered that the earth's daily rotation on its axis exerted a force on all free-moving objects such as wind. In the Northern Hemisphere, the earth's rotation deflects the winds to the right and in the Southern Hemisphere, to the left.

*Cyclone

The word cyclone comes from the Greek word kyllon which means cycle, circle or coil of a snake. In the Northern Hemisphere, the counter-clockwise movement of air around and into any low pressure system is called cyclonic circulation. A low which intensifies in the tropics is called a Tropical Cyclone; if the storm's winds reach 120 kilometres per hour or more, the storm

is called a hurricane. In the Arabian Sea, Indian Ocean and around Australia, hurricanes are called cyclones (See Hurricane, and Typhoon)

***Deep low**

The term is used to describe a low pressure system with much lower air pressure at the centre than in the surrounding air mass. Because of the steep rate at which the pressure drops as you move in towards the centre of a deep low, the winds rushing towards the centre are strong.

***Depression**

A depression is an area of low pressure.

***Developing low**

The term is used to describe a low pressure area in which the air pressure at the centre continues to drop. This causes the winds around it to increase in speed.

***Dew-point temperature**

The temperature at which the air, when cooled, becomes saturated and the water vapour in it condenses into water droplets or, if the temperature is cold enough, into ice crystals. This last process is called sublimation. (See Condensation and Sublimation).

***Dog days**

The dog days of summer are those days when the heat is the greatest, usually between mid-July and early September. They are named for Sirius, the Dog Star, which is the brightest star in the sky. Sirius is hotter and more massive even than our sun. The ancient Greeks and Romans believed that Sirius caused summer, as its hottest days coincide with the emergence or rising of this star after being lost in the sun's luminance.

***Doppler weather radar**

The Doppler weather radar is named after the Austrian physicist J.C. Doppler who hypothesized that the frequency of acoustic or sound waves from a moving source -- such as a train -- would increase as they approached a listener and decrease as they moved away. He was right.

As a train comes towards the listener, the whistle's pitch climbs as the motion of the train compresses the sound wave. When the train speeds away, the pitch drops because the sound wave is no longer being compressed by the motion. This process is called a frequency shift and is known as the Doppler effect.

Doppler weather radar uses the same principle to track the size, concentration, and relative motion of precipitation in storm systems. This helps meteorologists identify tornadoes in the early stages of development

***Downdraft**

This is a column of comparatively cooler air that sinks rapidly toward the ground. Downdrafts are often accompanied by precipitation. (See Updraft)

***Drizzle**

When precipitation droplets are less than 0.5 millimetres in diameter, they are called drizzle.

***Drought**

A drought is an extended period of dry weather which lasts longer than normal and leads to measurable losses in businesses such as farming.

***Dust devil**

A dust devil is a small and vigorous but usually short-lived whirlwind. You can see it because, as its name suggests, a dust devil picks up dust and debris as it moves across the countryside. Unlike tornadoes, dust devils do not drop from thunderclouds but are caused by intense heating of the ground. Dust devils have an average height of 200 metres and diameters which range from about three metres to 30 metres.

***El Nino**

El Nino is Spanish for little boy and it is what local South American fishermen call a warmer than usual current along the western coast of that continent at Christmas time. Most years, the strong and prevailing trade winds blow westward dragging the warmest surface waters across the Pacific to Australia and Indonesia. But every 2 to 7 years, these trade winds weaken or change direction. This allows the warm waters to change direction and head toward the coast of South America, increasing water temperatures there as much as 5°C. This causes changes in atmospheric pressure which, in turn, trigger a shift in global weather patterns. (See La Nina)

***Equinox**

This is the name given to the moment when the sun passes directly above the equator with the result that day and night are the same length all over the world. The vernal equinox occurs in the spring, usually around March 21. The autumnal equinox occurs in the fall, around September 22.

***Evaporation**

This is the change of state of a liquid, such as water, into a vapour.

***Eye of the storm**

In a severe tropical storm such as a hurricane, there is a roughly circular area right in the centre, between six and 60 kilometres in diameter, where the winds are comparatively light and the weather is fair. This is called the eye of the storm. (see Hurricane)

***Flurry**

Flurries or snow flurries are winter's equivalent of rain showers. They start and stop suddenly and change quickly in intensity from light to heavy.

***Fog**

Essentially, fog is a ground-level cloud. It consists of tiny water droplets which are suspended in the air and reduce visibility to less than one kilometre.

***Forecast**

A forecast provides a description of the most likely weather conditions one is likely to encounter in the near future. The public forecast includes information about the temperature and probability of precipitation, and may also include cloud cover, wind speed, and other weather phenomena.

***Freezing rain or drizzle**

Freezing rain or drizzle occurs when very cold rain falls and hits objects, such as tree branches or sidewalks, which have temperatures of below 0°C. When this happens, the cold rain freezes on contact with the colder sidewalk, for instance, and forms a coat of ice.

***Front**

This is the boundary or transition zone between two different air masses.

***Frost**

The term frost is used to describe water vapour which changes directly into a solid -- without becoming a liquid -- when it touches an object, such as a window pane. For this to happen, the temperature of the window pane must be lower than the surrounding air, which itself must be below 0°C. A killing frost is severe enough to end the growing season. (See Sublimation)

***Fujita Scale**

This scale describes the intensity of tornadoes based on the damage that they cause. The scale ranges from F0 where damage is light to F5 where damage is catastrophic. The scale was developed by American scientist Tetsuya (Ted) Fujita, a pioneer in tornado research. As of April 1, 2013, this scale has been replaced by the Enhanced Fujita Scale in Canada.

***Enhanced Fujita Scale**

This scale is an updated and improved version of the Fujita Scale. While the levels of intensity, ranging from EF0 to EF5, have the same relationship to damage as the original F-scale, the associated wind speeds have been made more accurate. It has been in use in Canada since April 1, 2013.

***Funnel cloud**

A funnel cloud is the preliminary stage of a tornado. At this point the funnel does not touch the ground. All tornadoes begin as funnel clouds, but not all funnel clouds become tornadoes.

***Funneling**

Funneling is the term used to describe what happens when wind is forced to funnel through a narrow opening with the result that the speed of the wind increases, in some cases dramatically. This process is well known in cities where the streets downtown are lined with skyscrapers.

***Gale**

Meteorologists call a strong wind a gale when its speed ranges from 63 to 87 kilometres an hour.

***Greenhouse Effect**

This term describes the warming of the lower atmosphere caused by atmospheric gases such as water vapour, carbon dioxide and methane containing the heat from the earth's surface. The natural greenhouse effect keeps the surface temperature of the earth warmer than it would be if all the radiation from the sun escaped immediately.

***Groundhog Day**

February 2 is the day that famous groundhogs across Canada are supposed to pop out of their burrows and forecast the number of days until spring. According to legend, if the area's groundhog sees his shadow and scurries back down into his burrow then winter will continue for six more weeks, which is not bad by Canada's standards. If he does not see his shadow and stays outside to sniff around, then winter is almost over.

*Gulf Stream

A warm and relatively swift and narrow ocean current that runs up the east coast of North America, curves south of Newfoundland, and heads out into the North Atlantic toward Europe.

*Gust

A gust is a sudden increase in wind speed which usually lasts for less than 20 seconds.

*Hail

A hail stone is a lump of ice which forms during a thunderstorm when water droplets have been tossed high into the freezing reaches of cumulonimbus or thunder clouds. In Canada, hail stones generally range from the size of peas to the size of oranges but have been as large as 114 millimetres or the size of a grapefruit.

*Halo

Halos are the coloured or white rings or arcs around the sun or moon. They are caused by light shining through ice crystals in the atmosphere or high, thin cirrus clouds.

*Haze

The term haze is used when pollutants, fine dust or salt particles in the air reduce visibility. Haze usually has a yellow or bluish tinge.

*High

In the Northern Hemisphere, this is an area of high pressure characterized by winds which move clockwise out of it. A high is sometimes called an anti-cyclone because its winds move in the opposite direction of a cyclone's winds. (See Low)

*Humidex

This is a way of expressing what hot, humid weather really feels like. The air of a given temperature and humidity is equated in terms of comfort to air with a higher temperature and low humidity. Some people are uncomfortable when the humidex is 30°C. Most people are uncomfortable when the humidex is above 40°C or 45°C.

*Humidity

The humidity is the measure of how much water vapour the air contains.

*Hurricane

In the Atlantic and eastern Pacific oceans intense tropical storms with wind speeds of 120 kilometres per hour or more are called hurricanes. They are called typhoons in the western Pacific and cyclones in the Arabian Sea, Indian Ocean and around Australia. Whatever their name, these tropical storms can extend up to thousands of square kilometres in area and last for several days.

In the North Atlantic, the hurricane season starts June 1 but most occur during August, September and October. On average, hurricanes hit the east coast of Canada less than once a year. The most famous hurricane to strike Ontario was Hurricane Hazel on October 15, 1954. In less than 18 hours, more than 178 millimetres of rain fell causing flash floods in creeks and rivers and killing 80 people. (see Eye of the storm)

***Ice fog**

Ice fog is also known as ice-crystal fog, frozen fog, and frost fog. What ever the name, this fog is composed of the suspended particles of ice that occur at very low temperatures -- usually below -30°C . This type of fog happens in clear, calm weather in high latitudes such as Northern Canada. The sun is usually visible, sometimes with a halo.

***Ice pellets**

This is the term Canadians use to describe frozen rain drops which are five millimetres or less in diameter and bounce when they hit a hard surface. Americans call this sleet.

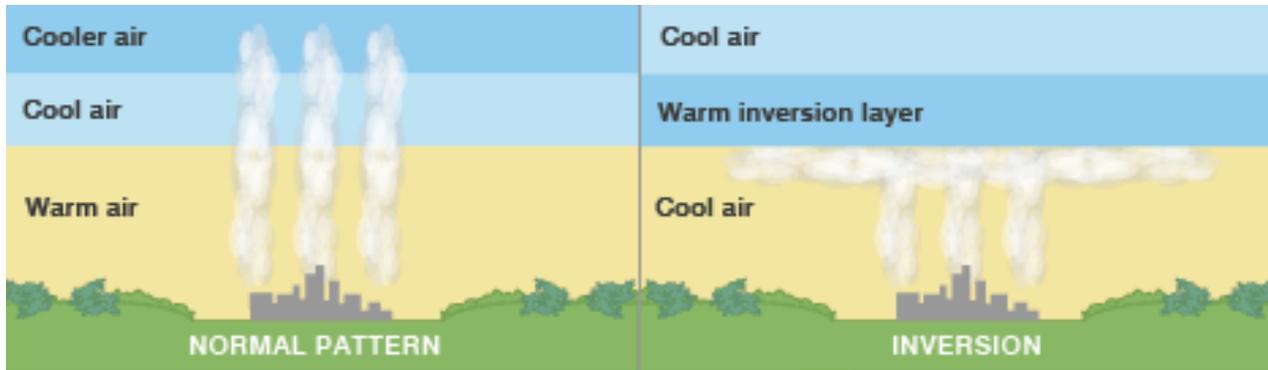
***Indian summer**

This term is more than 200 years old and probably originates from a time when native people in North America relied on these warm days to harvest their crops. Today, Indian summer refers to the sunny, dry and unusually warm days which occur in the autumn and are usually preceded by a snowfall, hard frost or spell of cool, windy and stormy weather. During an Indian summer, the winds are either light or calm and the air is often hazy blue or smoky.

***Inversion**

In the troposphere, temperatures usually decrease the higher you go. With an inversion the temperature increases with altitude.

[Provided by Noise Management Sub Committee Member – Wayne Christian]



*Isobar

Isobars are those lines on weather maps which connect points of equal pressure.

*Jet stream

This is an undulating band of strong winds at high altitudes which may extend for hundreds of kilometres. The jet stream may have wind speeds exceeding 400 kilometres per hour. In Canada, the jet stream travels mostly from west to east and at altitudes of 9,000 metres or 9 kilometres.

*Killing frost

This frost is severe enough to end the growing season, usually when the temperature falls below -2°C . (See Frost)

*Kilopascal

A kilopascal is the internationally recognized unit for measuring air pressure. The unit is named after Blaise Pascal, a seventeenth-century French scientist who proved that air pressure decreased with altitude. (See Air Pressure)

*Knot

A knot is a unit of speed equal to one nautical mile per hour or 1.9 kilometres per hour.

*La Nina

Every four to five years or so, a pool of cooler than normal water replaces the warmer than normal El Nino current off the west coast of South America. This pool of water is called La Nina or girl child and may be as much as 2°C lower than the average sea surface temperature of

28°C. In contrast to El Nino, La Nina brings colder winters to western Canada and Alaska and drier, warmer weather to the American south-east. (See El Nino)

***Lake breeze**

This is the breeze which blows from the sea or large lake to the land. A lake breeze is set off when the temperature of the land is higher than the temperature of the water. The land heats the air above, which rises and is replaced by the cooler air from over the water. (Also called sea breeze)

***Lake effect**

This is term used to describe the modifying effect large lakes, such as the Great Lakes, have on the weather along their shores and for some distance down wind.

***Land breeze**

This coastal breeze blows from the land to the sea or lake and usually occurs at night when the temperature of the water is often warmer than the nearby land. The water heats the air above which rises and is replaced by cooler air from the land.

***Low**

The term used to describe an area of low pressure, a depression or a cyclone. In the Northern Hemisphere, the winds blow counter-clockwise around and into a low pressure area. (See High and Cyclone)

***Mean temperature**

The mean temperature is the average temperature of the air during a specific period of time, usually a day, month or year. The mean temperature for any given day, for example, is an average of the highest and lowest recorded during that 24-hour period.

***Meteorology**

The study of the atmosphere and the changes which take place within it.

***Mist**

Mist looks like a thin gray veil but it is actually microscopic water droplets which are suspended in the air. Mist reduces visibility to a lesser extent than fog, usually 1 to 10 kilometres.

***Normal**

Meteorologists use the term normal to refer to the average value of a meteorological element such as temperature or precipitation for a certain area and over a fixed number of years -- usually 30 years.

***Northern Lights**

See Aurora Borealis

***Outlook**

The outlook is a term used by meteorologists to refer to the anticipated trend in the weather for the period immediately following the current forecast.

***Ozone**

Ozone is a pungent-smelling, slightly bluish gas which is a close chemical cousin to oxygen. About 90 per cent of the earth's ozone is located in a natural layer high above the surface of the globe in region of the atmosphere called the stratosphere. Here, it protects the earth and all that lies within it from the harmful effects of the sun's ultra-violet radiation by absorbing much of it.

***Parhelion**

Parhelion are more commonly called sundogs. They are the luminous spots which appear on either side of sun when its rays shine through the ice crystals floating in the air during the cold winter months.

***Polar night**

A polar night is the length of time -- longer than 24 hours -- that the sun stays below the horizon. For example, at Resolute in the Northwest Territories, the polar night lasts from November 9 to February 2.

***Precipitation**

Precipitation is any form of water -- liquid or solid -- that falls from the atmosphere and reaches the earth. Forms of precipitation include snow, ice pellets, freezing rain, freezing drizzle, rain and drizzle.

***Prevailing winds**

This is the direction from which the winds blow most frequently during a given period of time. For example, the prevailing winds in Canada come from the west.

***Probability of Precipitation or POP**

The probability of precipitation is a subjective estimate of the likelihood that a measurable amount of precipitation - that is 0.2 millimetres or more -- will fall sometime during the day at any given spot in the forecast area. For example, a 40 per cent probability of showers means there are four chances in 10 of getting wet at your school.

***Radar**

The term radar is short for RAdio Detection And Ranging. This technology was developed just prior to the Second World War as a method to detect and locate hostile aircraft and was later refined to track storm systems. Microwave energy is transmitted in bursts by the antenna -- the amount of energy received back is directly proportional to the size and concentration of the precipitation that reflected it.

***Rainbows**

Rainbows form when sunlight is refracted, then reflected by raindrops, breaking the white light into the colours of the spectrum. On occasion, the coloured light is reflected from both the front and the back of the raindrops and 2 rainbows are visible. When this happens the bands of colour in the second rainbow are displayed in the opposite order of those in the primary rainbow which displays red on the outside and violet on the inside. To see a rainbow, you must have your back to the sun and face the rain shower.

***Relative humidity**

The relative humidity is the ratio of water vapour which is actually in the air to the maximum amount of water vapour which could exist in the air at that temperature. The ratio is usually expressed as a percentage. (See Humidity)

***Ridge**

The term refers to an elongated area of high pressure (as in a ridge of high pressure) which extends from the centre of an area of high pressure. A ridge is the opposite of trough.

***Sea breeze**

(See Lake breeze)

***Snow squall**

A snow squall is a moderate to heavy snow flurry which is driven by strong gusty winds. Visibility during snow squalls is usually poor. (See Flurry)

*Snowbelt

This is the area where prevailing onshore winds are responsible for heavy snowfall, usually downwind of the open water.

*Solstice

The winter and summer solstices are the 2 times of the year when the sun at noon is farthest from the equator. In Canada, the shortest day of the year occurs at the winter solstice -- around December 21 -- when the sun is closer to the Tropic of Capricorn in the Southern Hemisphere. The longest day of the year in Canada occurs at the summer solstice around June 21 when the sun is closer to the Tropic of Cancer in the Northern Hemisphere.

*Squall

A squall is a sudden, strong wind which generally lasts only a few minutes. Squalls are usually but not always associated with severe thunderstorms.

*Squall line

A term used to describe a solid or almost solid band of thunderstorms.

*Storm surge

This is the abnormal rise in the level of water along the shoreline as a result of strong winds associated with a storm.

*Sublimation

This is the direct change of state from a gas, such as water vapour, to a solid, such as ice, and vice versa.

*Sunspot

These are the relatively dark spots on the sun's surface.

*Thunderstorm

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

*Tornado

Tornadoes or twisters are violently rotating columns of air that are usually visible hanging from the dark base of thunderstorm clouds. Tornadoes are one of the least extensive of all storms, but in violence, one of the most destructive.

***Trade winds**

The trade winds are the belts of winds on either side of the equator. In the Northern Hemisphere, the trade winds blow from the north east and in the Southern Hemisphere, they blow from the south east.

***Trough**

A trough is an elongated area of low pressure which extends from a centre of low pressure. (See Ridge)

***Turbulence**

This the name given to the vertical movement of air -- updrafts and downdrafts -- which is sometimes violent and may cause the up and down movement of an aircraft.

***Typhoon**

A typhoon is a severe tropical storm in the western Pacific Ocean. (See Hurricane and Cyclone)

***Updraft**

An updraft is a current of -- sometimes rapidly -- rising air.

***Urban heat island**

This phenomenon is caused by the emission of heat from buildings in a city, which leads to higher temperatures there than in the surrounding countryside. The greatest difference in temperature between a city and the adjacent countryside is often on calm, clear winter nights.

***Veering**

This is the term used to describe a clockwise change in wind direction, such as from the southwest to the west. (See Backing)

***Virga**

These are the wisps or streaks of precipitation which fall out of a cloud but evaporate before reaching the ground.

***Warm front**

This is the boundary or transition zone which separates a warm and cold air mass when the cold air mass is retreating and allowing the warm air mass to move in. (See Front and Cold front)

***Watch and Warnings**

Environment Canada issues a weather watch when forecasters expect severe and possibly dangerous weather to develop. Forecasters issue weather warnings when severe weather is occurring or about to occur.

***Waterspout**

A waterspout is a rotating column of vapour and water which extends from a thundercloud to the water's surface. A waterspout looks like a tornado but is much smaller and weaker. The diameter of a waterspout ranges from seven to 20 metres and its winds from 40 to 80 kilometres per hour which is strong enough to flip a boat. A waterspout may last up to 10 minutes. Waterspouts, for the most part, form over some of the major lakes of southern Canada during periods of cool, unsettled weather, usually from mid-summer to mid-fall.

***Whiteout**

Today the term whiteout is often used to describe a blizzard or snowsquall when blowing snow has reduced visibility to a few metres. But this is not a true whiteout. True whiteouts occur mostly in the Arctic and the Antarctic when unbroken snow cover and a uniformly overcast sky combine to produce a solid white glow. People in whiteouts see no shadows or horizon and lose all sense of depth and orientation.