

# AVIATION WEATHER SERVICES GUIDE

For Aviation Users



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**NAV**  
CANADA



Revised: May 2017

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## Introduction

The *Aviation Weather Services Guide* is designed to assist aviation users about the availability and use of aviation weather products and services.

NAV CANADA is the private non-share capital corporation responsible for providing civil air navigation services, including the aviation weather program within Canadian airspace and Canadian-controlled oceanic airspace in the North Atlantic to 30°W longitude.

For more detailed information on products and services, see:

- the Meteorological (MET) section of the *Transport Canada Aeronautical Information Manual* (TC AIM);
- *Manual of Standards and Procedures for Aviation Weather Forecasts* (MANAIR), which is available through the NAV CANADA Aviation Weather Web Site;
- the *Air Command Weather Manual* (and supplement); and
- specific aerodrome information listed in the *Canada Flight Supplement* (CFS).

This guide is not an exhaustive review of aviation weather services. For more information regarding aviation weather services or to order additional copies, contact NAV CANADA Customer Service.

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## Aviation Weather Services

NAV CANADA provides aviation weather services in support of aircraft operations conducted in Canadian domestic airspace. Aviation weather information is available through either an interpretative Pilot Briefing Service (PBS) from Flight Information Centres (FIC) or via the Internet through the NAV CANADA Aviation Weather Web Site (AWWS).

### Pilot Briefing Service (PBS)

PBS is the provision of, or consultation on, meteorological and aeronautical information to assist pilots in flight planning and includes a fully interpretive weather briefing service provided by specially trained Flight Service Specialists at FIC. Interpretation of changing or complex weather situations, special user needs, consultation on specific weather problems, NOTAM and flight planning services are all available from the FIC. Refer to the FLT PLN section of the CFS Aerodrome Facility Directory for FIC contact information.

### Aviation Weather Web Site (AWWS)

Internet access to Canadian aviation weather information is available through the NAV CANADA Aviation Weather Web Site ([www.flightplanning.navcanada.ca](http://www.flightplanning.navcanada.ca)). Canadian NOTAM and flight plan filing is also available. American (U.S.) weather information, while not directly available on the AWWS, is accessible through a link to the Aviation Digital Data Service (ADDS) website.

The AWWS provides access to:

- coded and plain language surface weather observations (METAR and SPECI)
- aerodrome forecasts (TAF)
- pilot weather reports (PIREP)
- route specific alphanumeric information
- weather charts
- satellite and composite radar imagery
- plotted wind and temperature charts
- NOTAM; weather cameras
- live runway visual range (RVR)
- supplemental and reference information



The Aviation Weather Web Site consists of 5 sections, each accessible by selecting the corresponding tab in the lower portion of the NAV CANADA banner at the top of the page.

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My WX Data/Wx Mail	Personal weather information page that enable users to save up to 10 customized weather information folders; flight dispatchers can save up to 50. Saved weather information can be configured for email dissemination on a user-scheduled basis. Pilots must subscribe to use this feature.
Route Data	Enable users to retrieve weather information along a proposed flight route by specifying the departure, destinations and enroute airports.
Regional Area Data	Retrieves user-selected weather information for one of seven GFA regions.
Local Data	Retrieves user-selected weather information within a 50 nautical mile (NM) radius of a selected aerodrome.
Forecasts and Observations	The default page for the Web Site, which provides direct access to all available weather information.

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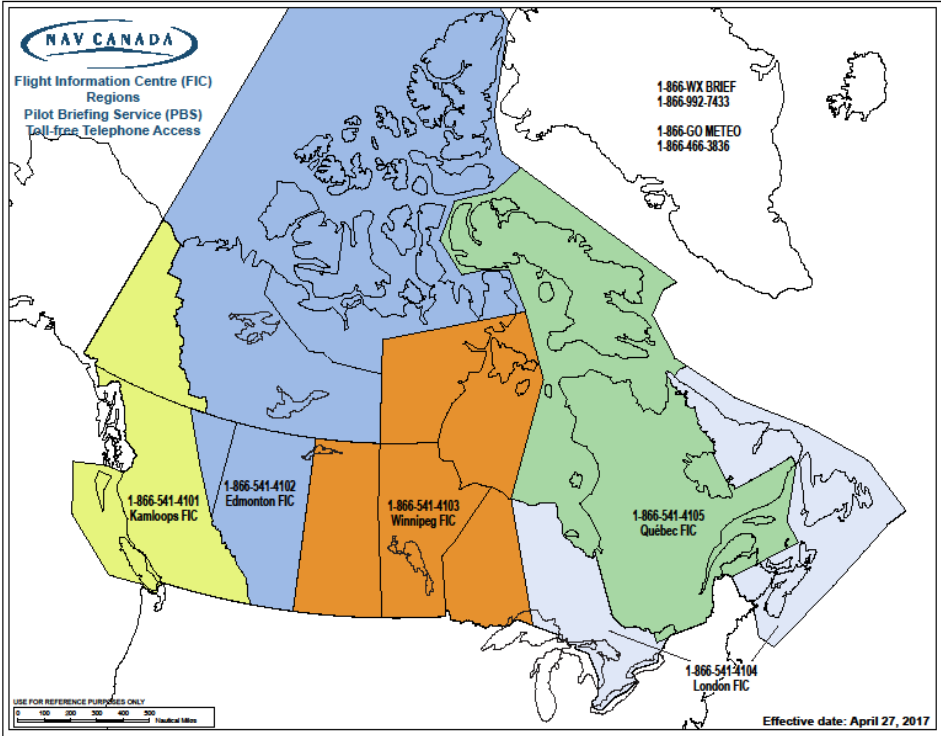
A link to the new Collaborative Flight Planning System (CFPS) for flight planning and graphical depiction of weather is available on the Aviation Weather Web Site.

Whether you choose to self-brief on the Aviation Weather Web Site, call a FIC briefer or a combination of both is up to you. However, you should keep in mind that the FIC briefer has advanced weather training and meteorological products and tools which allow them to provide a professional interpretation of weather conditions tailored for your particular flight situation. Most pilots find that contacting a briefer is particularly beneficial when facing complex or rapidly changing weather conditions.



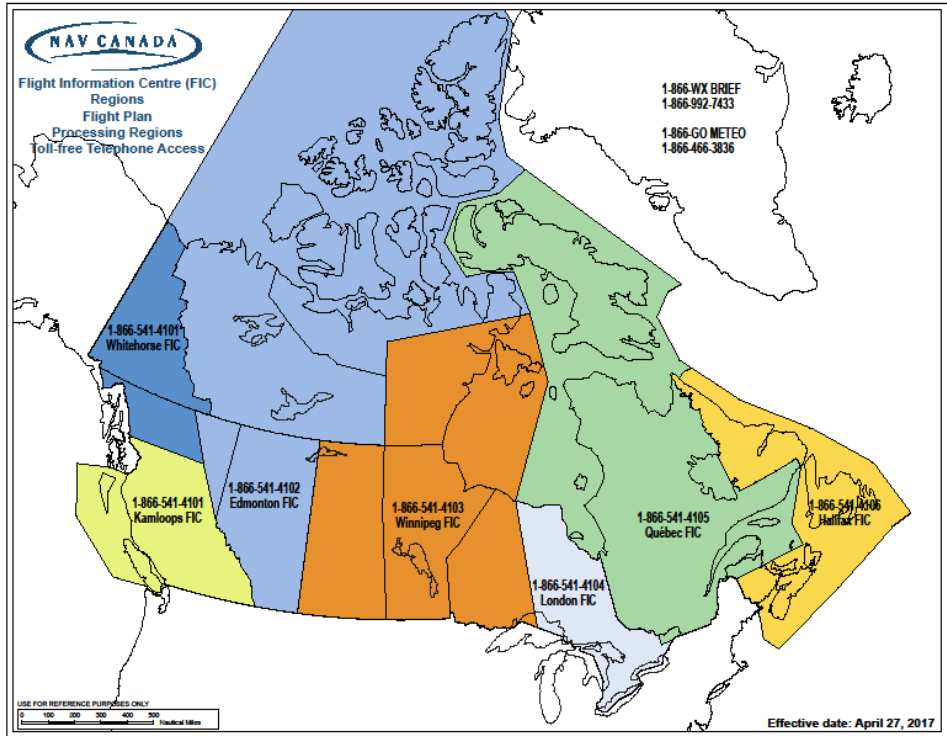
# Flight Information Centres (FIC)

## Pilot Briefing Service (PBS)





## Flight Plan Processing Regions



FICs provide pre-flight and flight information services enroute (FISE), pilot weather briefings, meteorological information, aeronautical information, aeronautical broadcasts, flight planning and VFR alerting, flight regularity message service, and other associated information services.

For access to services provided by the FIC, the following telephone numbers are available toll-free within Canada only:

1-866-WXBRIEF (1-866-992-7433)	Calls to this number are routed to the FIC serving the area from where the call originates.
1-866-GOMÉTÉO (1-866-466-3836)	All calls to this number are routed to Québec FIC, which provides of bilingual services.

Should you experience problems connecting to a FIC via 1-866-WXBRIEF/GOMÉTÉO, these numbers provide direct access to specific FIC from within Canada and the continental United States.

Kamloops	1-866-541-4101
Edmonton	1-866-541-4102
Winnipeg	1-866-541-4103
London	1-866-541-4104
Québec (bilingual service)	1-866-541-4105
Halifax	1-866-541-4106

Services that are specific to an aerodrome – such as airport advisory, vehicle control or local weather observations – will continue to be provided locally through the existing NAV CANADA Flight Service Station (FSS) network.

## Weather Briefing Tips

To obtain a good weather briefing, start with the “big weather picture”. While it may be tempting to begin with the detailed weather reports and forecasts, making sure you first have an appreciation of the synoptic-scale weather situation will enable you to better understand how current and future weather conditions may affect your flight.

A common practice amongst many pilots is to use the NAV CANADA Aviation Weather Web Site to get an appreciation of general weather conditions prior to contacting the FIC for a briefing.

When you’re ready to call the FIC, these steps can help you prepare for the call:

- Have a pen and paper handy for making notes during the briefing.
- Familiarize yourself with the general weather situation.
- Make note of any questions you would like to ask the briefer.
- Have relevant information about your flight handy.

The job of the briefer is to select pertinent information for your flight. To do this effectively, briefers need to understand as much as possible about your proposed flight. The briefer will require the following information from you:

- Is this an initial or update briefing
- If it's an update, when did you receive your previous briefing
- Type of operation (e.g., IFR, VFR, etc.)
- Type of flight (e.g., local, cross-country, photo flight)
- Aircraft registration / flight number
- Type of aircraft
- Departure point, intended route and destination (alternate if applicable)
- Proposed time of departure
- Planned altitude
- Estimated time enroute
- Other pertinent information

As weather conditions constantly change and FIC service demands vary throughout the day, briefers may have to place your call on hold while preparing your briefing information. This is normal and sometimes necessary to ensure the most accurate and up-to-date information.

If you're a relatively new or inexperienced pilot or unfamiliar with the area over which you'll be flying, let the briefer know. This will help the briefer tailor the content of the briefing to your requirements. If at any time during the briefing something is unclear to you, don't hesitate to ask for clarification. Remember, if you don't ask questions, the briefer will assume that you have understood everything.

## Pilot Briefing Format

The briefer normally follows a prescribed format and sequence when providing you pre-flight information:

- Significant meteorological and aeronautical information
- Description of major weather features
- Forecast weather summary
- Route winds and temperatures
- Detailed weather information
- Supplementary aeronautical information (e.g., NOTAM)
- Briefing review and updates
- PIREP request
- Flight Plan if required

## Flight Plan Form

It is good practice to familiarize yourself with the content and format of a flight plan before calling the briefer to file one. More information can be found in the TC AIM or the CFS.

## Trans-Border Flights

If you are planning a trans-border flight here's a few important things to know before you go:

In Canada, briefers provide any U.S. weather information available to them; however, you are encouraged to contact an American Automated Flight Service Station (AFSS) for an update briefing as soon as possible after entry into the US.

If you're calling a Canadian FIC while in the US, please keep in mind that the briefer is permitted to provide you only with weather information for the Canadian portion of your return trans-border trip.

When you file a VFR flight plan in Canada, it is automatically opened at the estimated time of departure (ETD) even if you fail to activate it. In US your filed flight plan is opened only when activated with an AFSS by the pilot directly.

## Sound Weather Judgment

Know before you go! Familiarize yourself with all significant weather conditions before you begin your flight as follow

Start monitoring the weather a day or so prior to your intended flight. This will provide you with a general weather trend of how weather conditions are evolving.

Make your Go / No-Go decision based on the inclement weather you may face. Remember only YOU can make this decision: the briefer will provide you with the information but the responsibility for proceeding with the flight rests solely with you.



## In-Flight Weather

In-flight weather information provided to pilots is primarily intended to meet the need for brief updates of destination, alternate, and enroute weather.

Air Traffic Control (ATC) – ATC may provide local weather information, time permitting.

Flight Service Station (FSS) – FSS provide services that are specific to an aerodrome. Local weather information is available to assist arriving and departing aircraft.

Flight Information Centre (FIC) – FICs provide fully interpretive weather briefing service for any area of Canada.

Automated Terminal Information Service (ATIS) – ATIS provides airport-specific information including local weather, to arriving and departing aircraft by means of a recorded continuous and repetitive broadcast. Refer to the CFS for ATIS availability at specific airports.

Automated Weather Observation Systems (AWOS) and Limited Weather Information Systems (LWIS) – AWOS and LWIS may transmit local weather information on a designated VHF frequency.



## Aviation Weather Information

Weather information is disseminated as either alphanumeric data or graphic weather products. Current weather information describes weather conditions that have already occurred, whereas forecast weather products depict the most likely weather conditions at some future time.

Weather Information	
Alphanumeric Weather Data	Graphic Weather Products
Current Weather	Current Weather
Aerodrome Routine and Special Meteorological Reports (METAR/SPECI)	Analysis Charts (Surface & Upper Air)
Pilot Weather Reports (PIREPs)	Weather Radar
Forecast Weather	Satellite Imagery
Aerodrome Forecast (TAF)	Forecast Weather
Winds and Temperature Aloft Forecast (FD/FB)	Graphic Area Forecast (GFA)
AIRMET	Significant Weather Charts
SIGMET	Turbulence Charts
	Upper Level Wind Charts
	Volcanic Ash Charts

### Weather Product Summary

The products described in the following tables are routinely available to pilots and dispatchers for flight planning and weather monitoring purposes.

Alphanumeric Weather Data			
Product	Issue Time / Validity Period	Coverage	Description
SIGMET	As required - 4 hours. Volcanic ash and tropical cyclone: valid for 6 hours	As specified in the body of the SIGMET	Information message issued by a meteorological watch office (MWO) to advise pilots of the occurrence or expected occurrence of specified weather phenomena, which may affect the safety of aircraft operations, and the development of those phenomena in time and space.
AIRMET	As required - 4 hours. Valid until updated, cancelled, or a new GFA is issued	As specified in the body of the AIRMET, up to and including 24 000 feet	Information message issued by a meteorological watch office (MWO) to advise pilots of the occurrence or expected occurrence of specified weather phenomena which may affect the safety of aircraft operations, which were not already included in a Graphic Area Forecast (GFA), and the development of those phenomena in time and space

### Alphanumeric Weather Data

PIREP	When received from a pilot	As reported by a pilot	Flight conditions, as reported by a pilot	
METAR and SPECI	Canadian on the hour, SPECI when required	As observed from the ground at the point of observation	Actual weather conditions as observed from the ground	
TAF	See CFS for issue times and validity. Normally updated every 6 hours; more frequently for larger airports	Forecast for a specific aerodrome	Forecast of expected weather conditions within 5 nautical miles of the aerodrome	
FB	Twice daily, based on 00Z or 12Z data. Valid for 24 hours	Low 3 000 ft 6 000 ft 9 000 ft 12 000 ft 18 000 ft	High FL240 FL300 FL340 FL390 FL450 FL530	Alphanumerical (text) forecast in tabular form of temperatures aloft for specific altitudes

### Graphic Weather Products

Product	Issue Time / Validity Period	Coverage	Description
Surface Analysis Chart	Four times daily: valid 00Z, 06Z, 12Z, 18Z	All of Canada, Alaska and the northern US	Surface analysis of MSL pressure values, fronts and detailed station weather plots
Upper Air Analysis Chart	Twice daily: valid 00Z and 12Z	North American coverage: 850hPa (5 000 ft) 700hPa (10 000 ft) 500hPa (18 000 ft) 250hPa(34 000 ft)	Height of constant pressure levels, wind velocity, temperature and moisture



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### Graphic Weather Products

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Graphic Area Forecast (GFA) Chart	Issued four times daily: 00Z, 06Z, 12Z, 18Z – valid for 12 hours with an additional 12-hour IFR outlook	National coverage via seven regional charts: GFACN31- Pacific GFACN32 – Prairies GFACN33 – Ont / Que GFACN34 – Atlantic GFACN35 – Yukon GFACN36 – Nunavut GFACN37 – Arctic	Forecast depiction of weather conditions up to and including 24 000 feet, consists of three Clouds and Weather charts and three Icing, Turbulence and Freezing Level charts
Local Graphic Forecast (LGF) Chart	Issued four times daily: 15Z, 18Z, 21Z, 00Z – valid for 6 hours. Last LGF includes Outlook for the next morning	Local coverage of specific geographic areas (e.g., West Coast VFR LGF)	Forecast depiction of weather conditions below 10 000 ft, tailored to meet local need. Supplements the GFA
Significant Weather Prognosis Chart	Four times daily: valid 00Z, 06Z, 12Z, 18Z	Coverage varies by product High-level, FL250–600 (400–70hPa) Mid-level, FL100–250 (700–400hPa) N. Atlantic, Sfc–FL250 (SFC–400hPa)	Forecast depiction of significant weather conditions (e.g., thunderstorms, icing, turbulence)
Volcanic Ash Forecast Chart	As required	As required	Forecast depiction of expected ash cloud dispersion (plume)
Upper Level Wind and Temperature Forecast Chart	Twice daily: valid 00Z, 06Z, 12Z, 18Z	Coverage varies by product: available for FL240, FL340, FL390, FL450	Forecast depiction of wind and temperatures aloft
Turbulence Forecast Chart	Twice daily: valid 00Z, 12Z	National and North Atlantic coverage	Forecast depiction of MDT and SEV turbulence (jet stream / convective) between FL280–FL430

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### Weather Imagery and Supplementary Products

Product	Issue Time / Validity Period	Coverage	Description
Weather Radar Imagery	Images updated every 10 minutes	Line of sight from radar within a limited horizontal range	Composite or single-site display of either precipitation intensity or height of echo tops
Satellite Imagery	Geostationary (GOES) satellite images updated every 30 minutes. Polar Orbiting (POES) satellite images updated approx. every 6 hours	Coverage varies with product chosen	GOES and POES satellites provide both Infrared (IR) and Visible (VIS) images
Weather Cameras	Images updated every 10 minutes	Fixed viewing angles	Colour picture of local weather conditions; date and time of each image superimposed. Local METAR displayed, if available



## Aviation Weather Observation Products

Canada has more than 230 surface weather observation sites. At each site, weather data is routinely collected by either a human observer or a suite of automated sensors, and are then coded into weather observations for dissemination.

### Surface Weather Observations (METAR / SPECI / LWIS)

Routine surface weather observations taken on the hour are disseminated as METARs. SPECIs are special weather observations, issued at times other than on the hour, as the result of significant weather changes. If a METAR or SPECI is taken by a suite of automated sensors, it is denoted as an "AUTO" observation in the body of the report.

Two types of automated weather stations are used for aviation purposes: the Automated Weather Observation System (AWOS) and the Limited Weather Information System (LWIS).

AWOS has a full suite of sensors that measures cloud base height, sky cover, visibility, temperature, dew point, wind velocity, altimeter setting, precipitation occurrence, type, amount and intensity, and icing. LWIS is a more basic automated weather system, measuring only wind, altimeter setting, temperature and dew point. Either system may be equipped with a voice generation module.

### Canadian surface weather observations programs, systems, and equipment

METAR	METAR and SPECI weather observations taken by qualified human observers. METAR hours are included and sites operating 24 hours a day are listed as METAR (H24)
METAR AUTO	METAR and SPECI weather observations are taken by stand-alone Automated Weather Observation System (AWOS) with noted enhancements. AWOS systems located outside the Canadian Lightning Detection Network coverage area do not receive lightning data and therefore are unable to report thunderstorm or lightning activity. AWOS hours are included. Sites operating 24 hours a day are listed as METAR AUTO (H24). Examples of METAR AUTO stations are the NAV CANADA AWOS (NC AWOS) and DND AWOS.
LWIS	Limited Weather Information System is automated weather system that produces an hourly report containing wind speed, direction, temperature, dew point and altimeter setting only. LWIS hours are included and sites operating 24 hours a day will be listed as LWIS (H24)
AUTO	This is an automated weather system that reports a variety of weather elements, but does not meet requirements to produce a METAR, SPECI or LWIS report. These systems can report a variety of observed weather elements. For further information, contact the aerodrome operator for further information.
WxCam	A NAV CANADA aviation weather camera is installed at the site. Images are transmitted to the NAV CANADA Aviation Weather Web Site at 10-minute intervals
Webcam	One or more cameras not belonging to NAV CANADA have been installed at this location. For further information, contact the aerodrome operator.

Stand-alone METAR AUTO and LWIS reports are available during published hours through normal meteorological information systems. At some sites an automated voice broadcast of the latest observation is available via VHF transmitter. In these cases, the VHF frequency is displayed in the COMM box (e.g., COMM AWOS 124.7, COMM AUTO 122.025).

The hours of coverage for METAR, METAR AUTO, and LWIS are indicated (e.g. METAR 09-21Z). At sites where coverage is 24 hours, the coverage is listed as H24 (e.g. METAR H24, METAR AUTO H24). At sites where there is a combination of weather programs, the coverage will be listed as METAR xx-xxZ O/T METAR AUTO or LWIS (e.g. METAR 12-20Z O/T LWIS).

All aviation weather observations and aviation weather camera images are available on the NAV CANADA Aviation Weather Web Site (AWWS) at [www.flightplanning.navcanada.ca](http://www.flightplanning.navcanada.ca).

## AWOS and LWIS

NAV CANADA's automated weather system network (AWOS and LWIS) includes the following features:

AWOS and LWIS		
Enhancement Description	AWOS	LWIS
Thunderstorms reported at sites within the domain of the Canadian Lightning Detection Network. Thunderstorm activity, based on the proximity of the lightning strike(s) to the site, are reported as:	Y	
TS	Thunderstorm (at site), if lightning detected at 6sm or less	
VCTS	Thunderstorm in the Vicinity, if lightning detected from >6-10SM	
LTNG DIST	(direction) if lightning detected from >10 - 30SM, Lightning Distant with octant compass cardinal direction is reported in Remarks e.g., LTNG DIST NE, S, SW	
LTNG DIST ALL QUADS	Lightning Distant All Quadrants is reported in Remarks if lightning detected in four or more octant	
Ice-resistant anemometer technology employed	Y	Y
Density altitude reported	Y	
Laser ceilometer can report cloud bases up to 25 000 feet	Y	
Improved Obstructions to Vision reporting capability	AWOS can report Haze (HZ); Mist (BR); Fog (FG); Freezing Fog (FZFG); and Blowing Snow (BLSN)	
Runway Visual Range (RVR) reported at sites equipped with RVR sensors	Y	
Specific remarks will be added whenever data is missing	Y	
CLD MISG	sky condition (cloud) data missing	
ICG MISG	icing data missing	
PCPN MISG	precipitation data missing	
PRES MISG	pressure (altimeter) data missing	
RVR MISG	RVR data missing	
T MISG	temperature data missing	
TD MISG	dew point temperature data missing	
TS/LTNG TEMPO	thunderstorm/lightning data missing	
UNAVBL		
VIS MISG	visibility missing	
WND MISG	wind missing	
WX MISG	weather data missing	

## METAR Decode and Description

**METAR CYXE 292000Z CCA 30015G25KT 3/4SM R33/4000FT/D -RA BR BKN008 OVC040 21/19 A2992 WS RWY33 RMK SF5NS3 VIS NW 3/8 SLP134 DENSITY ALTITUDE 2500FT**

METAR	Type of Report – METAR Aerodrome Routine Meteorological Report (METAR) taken on the hour SPECI indicates that the observation was taken other than on the hour because of a significant change to previously reported weather conditions
CYXE	Station Identifier – Saskatoon, Saskatchewan The station identifier is indicated using the four-letter ICAO site code.
292000Z	Date/Time of Issue – 29 <sup>th</sup> day of the month, 2000 UTC
CCA	Report Modifier – Corrected weather observation The letters CCA are used to indicate the first correction, CCB for second and so on AUTO indicates that the observation was taken by an AWOS
30015G25KT	Surface Wind – 300° true at 15 knots gusting to 25 knots The two-minute mean wind direction (to the nearest 10° True) and wind speed (to the nearest knot). Calm winds are indicated as 00000KT Peak gust speeds are preceded by the letter G; squalls by the letter Q.
3/4SM	Prevailing Visibility – 3/4 statute miles Statute Miles (SM) and fractions of SM with no maximum visibility value are reported (AWOS sites report a sensor-equivalent visibility)
R33/4000FT/D	RVR – For runway 33 is 4 000 feet with a downward tendency The 10-minute mean RVR is reported for the touchdown zone when the prevailing visibility is 1 mile or less and/or the RVR is 6 000 feet or less When the RVR varies significantly prior to the reporting period, the 1-minute mean maximum or minimum value is reported prefixed by a V. The following suffixes is used to indicate the RVR tendency /U to indicate an upward trend /D to indicate a downward trend /N to indicate no change
-RA BR	Present Weather – Light rain and mist Present weather is composed of weather phenomenon (precipitation, obscuration or others), which may be preceded by one or two qualifiers (intensify or proximity to the station and descriptor) The dominant weather phenomenon is reported first

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**METAR CYXE 292000Z CCA 30015G25KT 3/4SM R33/4000FT/D -RA BR BKN008 OVC040  
21/19 A2992 WS RWY33 RMK SF5NS3 VIS NW 3/8 SLP134 DENSITY ALTITUDE 2500FT**

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**BKN008 OVC040** Sky Condition - The cloud layer at 800 feet is broken, covering from 5/8 to 7/8 of the observed sky. The next cloud layer at 4 000 feet, combined with the lower cloud layer, is overcast covering 8/8 of the sky, as observed from the ground  
 Clouds are reported based on the summation amount of each cloud layer as observed from the surface up. The layer amounts are reported in eighths of sky coverage (oktas) as follows:  
 SKC no cloud (AWOS reports CLR if no cloud below 25 000 ft)  
 FEW >0 to 2 oktas of cloud  
 SCT 3 to 4 oktas of cloud  
 BKN 5 to 7 oktas of cloud  
 OVC 8 oktas of cloud

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Only CB and TCU clouds will be appended to a layer. An obscured sky is reported as vertical visibility (VV) in hundreds of feet

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**21/19** Temperature - 21° C, dew point - 19° C  
 Temperature and dew point are reported to the nearest whole degree Celsius. The letter M will precede negative values

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**A2992** Altimeter Setting - 29.92 inches of mercury  
 The letter A prefixing the 4-digit number group indicates inches of mercury for altimeter setting

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**WS RWY 33** Winds Shear - Wind shear reported in the takeoff or landing path of Runway 33 at 1 500 feet AGL and below  
 Wind shear information at 1 500 feet AGL and below will be provided when reported by an aircraft (usually on takeoff or landing)

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**RMK SF5NS3** Remarks - The lowest reported cloud layer type is stratus fractus with an amount of 5 oktas; the next cloud layer is nimbostratus with an amount of 3 oktas  
 Where observed, the obscuration and cloud type amount for each reported layer is included in remarks. It may exceed 8 oktas if a higher layer is observed through transparencies in a lower layer

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**VIS NW 3/8** Supplementary Remarks - Visibility to the northwest is 3/8 statute mile  
 Other supplementary remarks of operational significance may be included using standard meteorological abbreviations

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**SLP134** Mean Sea Level (MSL) Pressure - 1013.4 hPa.  
 The MSL pressure, reported to the nearest tenth of an hPa is always the last field of the METAR report, prefixed with SLP. The MSL pressure is reported in an abbreviated coded form  
 If the coded MSL pressure value starts with a 9, 8, or 7, add the number "9" to the beginning (e.g., 880 becomes 988.0)  
 If the coded MSL pressure value starts with a 0, 1, 2, or 3, add the number "10" to the beginning (e.g., 134 becomes 1013.4)

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**DENSITY ALTITUDE 2500FT** Density Altitude 2 500 ft  
 This remark is only added when the density altitude is 200 ft or higher than the aerodrome elevation.

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<b>LWIS CYLA 292000Z AUTO 31006KT M00/M02 A2926</b>	
LWIS	Limited Weather Information System (LWIS) taken on the hour.
CYLA	Station Identifier – Aupaluk, Quebec The station identifier is indicated using the four-letter ICAO site code
292000Z	Date/Time of Issue – 29 <sup>th</sup> day of the month, 2000 UTC
AUTO	AUTO indicates that the observation was taken by an AWOS
31006KT	Surface Wind – 310° true at 6 knots The two-minute mean wind direction (to the nearest 10° True) and wind speed (to the nearest knot). Calm winds are indicated as 00000KT Peak gust speeds are preceded by the letter G; squalls by the letter Q
01/M02	Temperature – 1° C, dew point – minus 2° C Temperature and dew point are reported to the nearest whole degree Celsius. The letter M will precede negative values
A2926	Altimeter Setting – 29.26 inches of mercury The letter A prefixing the 4-digit number group indicates inches of mercury for altimeter setting



## Significant Present Weather Codes

### Weather Codes

Intensity or Vicinity	Qualifier		Weather Phenomena					
	Descriptor		Precipitation		Obscuration		Other	
			DZ	Drizzle	BR	Mist (VIS 5/8-6 SM)	PO	Dust/sand Whirls (Dust Devils)
Note: Precipitation Intensity refers to all forms combined	MI	Shallow	RA	Rain	FG	Fog (Vis < 5/8 SM)	SQ	Squalls
	BC	Patches	SN	Snow	FU	Smoke (VIS ≤ 6 SM)	+FC	Tornado or Waterspout
- Light	PR	Partial	SG	Snow Grains	DU	Dust (VIS ≤ 6 SM)	FC	Funnel Cloud
Moderate (no qualifier)	DR	Drifting	IC	Ice Crystals	SA	Sand (VIS ≤ 6 SM)	SS	Sandstorm (VIS < 5/8 SM)
+ Heavy	BL	Blowing	PL	Ice Pellets	HZ	Haze (VIS ≤ 6 SM)	+SS	Heavy Sandstorm (Vis ≤ 1/4 SM)
	SH	Showers (s)	GR	Hail	VA	Volcanic Ash (With any VIS)	DS	Duststorm (VIS < 5/8 SM)
	TS	Thunderstorm	GS	Snow Pellets			+DS	Heavy Duststorm (Vis ≤ 1/4 SM)
	FZ	Freezing	UP	Unknown Precipitation (AWOS only)				

## Cloud Type Abbreviations

Abbreviations for Cloud Types found in RMK section of METAR					
Low Clouds		Middle Clouds		High Clouds	
CB	Cumulonimbus	AS	Altostratus	CI	Cirrus
TCU	Towering Cumulus	AC	Alto cumulus	CS	Cirrostratus
CU	Cumulus	ACC	Alto cumulus Castellanus	CC	Cirrocumulus
CF	Cumulus Fractus				
SC	Stratocumulus				
NS	Nimbostratus				
ST	Stratus				
SF	Status Fractus				

## Density Altitude

Density altitude is a measure of air density. It is not to be used as a height reference, but as determining criteria in the performance capability of aircraft.

Air density decreases with altitude. As air density decreases, density altitude increases. The further effects of high temperature and high humidity are cumulative, resulting in an increasing high density altitude condition.

Effects of Density Altitude: High density altitude reduces all aircraft performance parameters. To the pilot, this means that the normal horsepower output is reduced, propeller efficiency is reduced, and a higher true airspeed is required to sustain the aircraft. It means an increase in runway length requirements for takeoff and landings, and decreased climb rate. For example, an aircraft, requiring 1 000 feet for takeoff at sea level under standard atmospheric conditions requires a take-off run of approximately 2 000 feet at an operational altitude of 5 000 feet.

Note: A turbo-charged aircraft engine provides some slight advantages: it provides sea-level horsepower up to a specified altitude.

## Pilot Weather Report (PIREP)

PIREPs are reports of weather conditions by pilots in flight and are extremely useful to forecasters, weather briefers, and other pilots. Often the PIREP provides the only weather information. Even on good weather days, PIREPs are helpful for validating forecasts and assisting other pilots with flight planning decisions. PIREPs are distributed using standard meteorological abbreviations (Abbreviations are covered later in this guide). Recent PIREPs that contain weather elements that could be hazardous for other aircraft are broadcast immediately by air traffic services. PIREPs are available in both coded form and plain language on the NAV CANADA Aviation Weather Web Site.

It is highly recommended to pass PIREPs to the Flight Service Specialist whenever possible during flight using 126.7 MHz or the discrete frequency or as soon as feasible after landing. Flight service specialists accept pilot reports as provided by the pilot, however, additional information may at times be requested.

### Turbulence and Icing Reporting Tables

Turbulence Reporting		
Intensity	Aircraft Reaction	Inside Aircraft
Light	Slight erratic changes (turbulence) Slight rhythmic changed (chop)	Slight strain against seat belts, walking not difficult
Moderate	Changes to altitude/attitude but aircraft remains in control Rapid bumps or jolts (chop)	Definite strain against seat belts Objects are dislodged Walking difficult
Severe	Large, abrupt changes in altitude/attitude and airspeed Momentarily out of control	Forced violently against seat belts Walking impossible Unsecured objects thrown about

Icing Intensity Reporting	
Intensity	Ice Accumulation
Trace	Ice becomes perceptible. The rate of accumulation is slightly greater than the rate of sublimation. It is not hazardous, even though de-icing or anti-icing equipment is not used, unless encountered for an extended period of time (over 1 hour)
Light	If flight is prolonged in this environment (over 1 hour), the rate of accumulation may create a problem
Moderate	The rate of accumulation is such that even short encounters become potentially hazardous, and use of de-icing or anti-icing equipment or diversion is necessary
Severe	The rate of accumulation is such that de-icing or anti-icing equipment fails to reduce or control the hazard. Immediate diversion is necessary

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### Icing Type Reporting

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Type	Description
Rime ice	Rough, milky, opaque ice formed by the instantaneous freezing of small super cooled water droplets
Clear ice	Glossy, clear, or translucent ice formed by the relatively slow freezing of large super cooled water droplets
Mixed ice	Both rime and clear icing occurring at the same time.

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Photo by Russ Wakshinski, FSS Timmins and thanks to Bearskin Airlines



## PIREP Decode and Description

UACN10 CYXU 032133	
YZ	
UA /OV YXU 090010 /TM 2120 /FLO80 /TP PA31 /SK 020BKNO40 OVC110 /TA -12 /WV 030045 /TB MDT BLO 040 /IC LGT RIME 020-040 /RM NIL TURB CYYZ-CYHM	
UACN10	PIREP Type – Regular Priority Urgent PIREP are encoded as UACN01
CYXU	Station Identifier – Issuing Office PIREP issued by London FIC
032133	Date/Time of Issue (UTC) PIREP was issued on the 3 <sup>rd</sup> day of the month at 2133UTC
YZ	Flight Information Region (FIR) Toronto FIR. If the PIREP extends into an adjacent FIR, both FIRs are indicated
UA	PIREP Designator An urgent PIREP is indicated using the designator UUA
/OV YXU 090010	Location London VOR 090° radial, 10 NM. PIREP location is reported with reference to a NAVAID, airport or geographic coordinates (latitude / longitude)
/TM 2120	Time of PIREP PIREP was reported at 2120 UTC
/FLO80	Flight Level Altitude is 8 000 ft ASL. Altitude may also be reported as DURD (during descent), DURC (during climb) or UNKN (unknown)
/TP PA31	Aircraft Type Piper Navajo. Designator of aircraft reporting the PIREP
/SK 020BKNO40 OVC110	Sky Cover Two layers of cloud have been reported. First layer of cloud based at 2 000 ft with tops at 4 000 ft ASL. Second layer of cloud tops at 11 000 ft ASL
/TA -12	Air Temperature The air temperature at 8 000 ft ASL is reported as -12° Celsius
/WV 030045	Wind Velocity Wind direction 030° degrees true; wind speed 45 knots. Wind direction reported in degrees magnetic will be converted to degrees true
/TB MDT BLO 040	Turbulence Moderate turbulence reported below 4 000 ft ASL
/IC LGT RIME 020- 040	Icing Light rime icing (in cloud) reported between 2 000 ft ASL and 4 000 ft ASL
/RM NIL TURB CYYZ- CYHM	Remarks No turbulence encountered between Toronto and Hamilton

## AIRMET

AIRMET: Information message issued by a meteorological watch office (MWO) to advise pilots of the occurrence or expected occurrence of specified weather phenomena that may affect the safety of aircraft operations, which were not already included in a Graphic Area Forecast (GFA), and the development of those phenomena in time and space.

AIRMET is issued for the following phenomena:

- SFC WND SPD widespread mean surface wind speed above 30 KT
- Surface visibility and/or cloud less than 3SM and/or BKN or OVC below 1 000 ft AGL over a widespread area
- Thunderstorm (TS) and/or Towering cumulus (TCU) TCU if ISOLD, OCNL, FRQ; or either of the following:
  - TS if ISOLD, OCNL, with hail as necessary
  - Both TS and TCU if both are present and the spatial amount of the TCU exceeds that of the TS, with the cumulative spatial amount not exceeding 100%. Otherwise only the TS is reported
- Turbulence (TURB) only MDT
- Icing (ICG) only MDT
- Mountain waves (MTW) only MDT



## AIRMET Decode and Description

**WACN23 CWA0 162225**  
**CZWG AIRMET A1 VALID 162225/170225 CWEG**  
**CZWG WINNIPEG FIR ISOLD TS OBS WTN 20NM OF LINE /N4929 W09449/25 SW**  
**CYQK - N5104 W09348/CYRL - N5209 W09120/60NW CYPL TOP FL340 MOV E**  
**15KT NC**  
**RMK GFACN33**

WACN23	AIRMET (WA) For Canadian Airspace (CN) For Winnipeg FIR (23)
CWA0	World Meteorological Organization (WMO) Header International four-letter location indicator of the centre originating or compiling the bulletins
162225	Date/Time of Issue (UTC) AIRMET issued on the 16th day of the month at 2225Z
AIRMET A1	Bulletin Number The first AIRMET issued for this weather phenomenon within the Winnipeg FIR
VALID 162225/170225 CWEG	Validity Period AIRMET valid for four hours; from the 16th day of the month at 2225Z until the 17th day of the month at 0225Z, was issued by MWO at the Canadian Meteorological Aviation Centre - West (CMAC-W) in Edmonton. CWUL indicates CMAC-E in Montreal
ISOLD TS OBS	Description of the Phenomenon Isolated thunderstorms observed
WTN 20NM OF LINE /N4929 W09449/25SW CYQK - /N5104 W09348/CYRL - N5209 W09120/60 NW CYPL	Location of the Phenomenon Within 20 nautical miles of a line from 25 miles southwest of Kenora (N4929 W09449 CYQK) to Red Lake (N5104 W09348 CYRL) to 60 nautical miles northwest of Pickle Lake (N5209 W09120 CYPL)
TOP FL340	Flight Level and Extent Tops of the thunderstorms extends to Flight Level 340
MOV E 15KT	Movement or Expected Movement The isolated thunderstorms are moving east at 15 knots
NC	Change in Intensity No change in intensity expected
RMK GFACN33	Remarks Phenomenon is forecast within the GFACN33 domain

## SIGMET

A SIGMET is an information message issued by a meteorological watch office (MWO) to advise pilots of the occurrence or expected occurrence of specified weather phenomena, which may affect the safety of aircraft operations, and the development of those phenomena in time and space.

SIGMETs come in three types:

- WS SIGMET for thunderstorm, turbulence, icing, mountain waves, low level wind shear, dust storms, sand storms, and radioactive cloud
- WC SIGMET for tropical cyclone (TC).
- WV SIGMET for volcanic ash (VA)

SIGMET will be issued for the following phenomena (with only one phenomenon in each SIGMET):

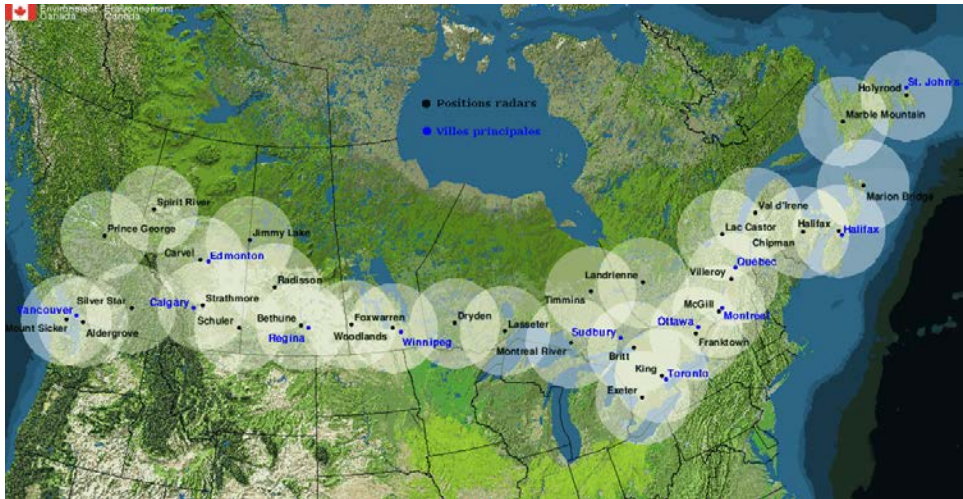
- Thunderstorm (TS): FRQ or SQLN, with hail, tornado/waterspout as necessary
- Turbulence (TURB): only SEV
- Icing (ICG): only SEV with or without FZRA
- Mountain waves (MTW): only SEV
- Low Level wind shear (LLWS)
- Dust storm (DS): only HVY
- Sand storm (SS): only HVY
- Radioactive cloud (RDOACT CLD)

## SIGMET Decode and Description

WSCN23 CWAO 162225  
 CZWG SIGMET A4 VALID 162225/170225 CWEG  
 CZWG WINNIPEG FIR WTN SQLN TS OBS WTN 20NM OF LINE /N4929 W09449/25  
 SW CYQK - N5104 W09348/CYRL - N5209 W09120/60NW CYPL TOP FL340 MOV E  
 15KT NC  
 RMK GFACN33

WSCN23	SIGMET Type (WS) For Canadian Airspace (CN) For Winnipeg FIR (23)
CWAO	World Meteorological Organization (WMO) Header International four-letter location indicator of the centre originating or compiling the bulletins
162225	Date/Time of Issue (UTC) Issued on the 16th day of the month at 2225UTC
SIGMET A4	Bulletin Number Supersedes its predecessor A3, which was issued by the same weather centre to describe the same weather phenomenon within the Winnipeg FIR
VALID 162225/170225 CWEG	Validity Period SIGMET valid for four hours; from the 16th day of the month at 2225Z until the 17th day of the month at 0225Z and was issued by Meteorological Watch Office (MWO) at the Canadian Meteorological Aviation Centre - West (CMAC-W) in Edmonton. CWUL indicates CMAC-E in Montreal
CZWG WINNIPEG FIR	Location Indicator and Name of the FIR CZWG for the Winnipeg FIR
SQLN TS OBS	Description of the Phenomenon A squall line of thunderstorm is observed
WTN 20NM OF LINE /N4929 W09449/25SW CYQK - /N5104 W09348/CYRL - N5209 W09120/60 NW CYPL	Location of the Phenomenon Within 20 nautical miles of a line from 25 miles southwest of Kenora (N4929 W09449 CYQK) to Red Lake (N5104 W09348 CYRL) to 60 nautical miles northwest of Pickle Lake (N5209 W09120 CYPL)
TOP FL340	Flight Level and Extent The top of the squall line of thunderstorms extends to Flight Level 340
MOV E 15KT	Movement or expected movement The squall line of thunderstorms is moving east at 15knots
NC	Change in Intensity No change in intensity is expected
RMK GFACN33	Remarks Phenomenon is forecast within the GFACN33 domain

## Weather Radar



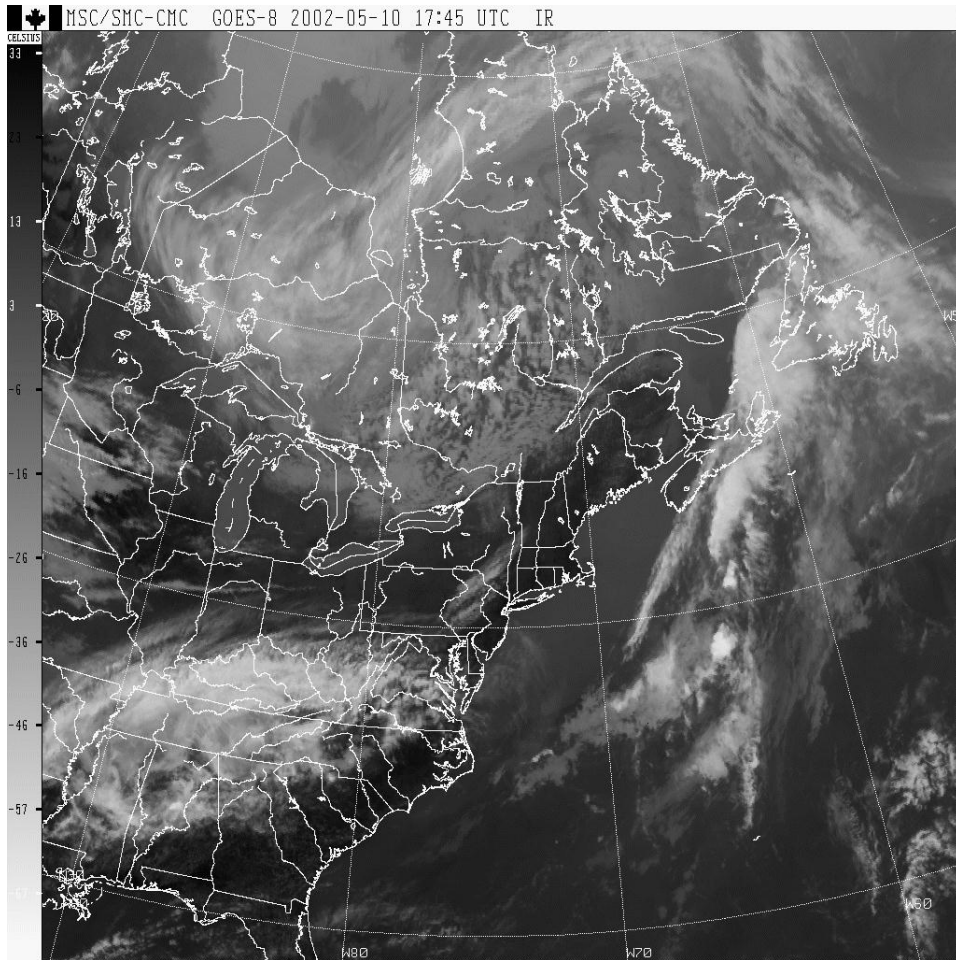
Weather radar is an important tool that assists identifying areas of precipitation. Note that weather radar does not show cloud cover. Pilots unfamiliar with interpreting weather radar products are advised to seek the assistance of a briefer.

Weather radar imagery is disseminated in two formats: a precipitation intensity product and an echo tops product. The radar product provides an indication of precipitation intensity, measured in mm or cm/hr rate of fall, at a specific altitude (e.g. 1.5 km). Two settings are used for the scale, one for rain with a scale of up to 300 mm/hr and one for snow with a rate of fall of up to 40 cm/hr. The echo tops radar product provides an indication of the vertical extent of the precipitation area. Cloud tops could extend much higher.

Each weather radar site has a detection range of approximately 150 NM. Weather radar composite products integrate a number of individual radar images into a single product. The advantage of the composite product is that radar anomalies such as signal attenuation and masking are reduced because adjacent radar sites can "see" the precipitation area from other directions.

Weather radar composite products and individual radar site images are available in colour on the NAV CANADA Aviation Weather Web Site.

## Satellite Imagery



Two of the most common types of satellite imagery—visible (VIS) or infrared (IR)—are available on the NAV CANADA Aviation Weather Web Site. Satellite images are taken from either geostationary or polar orbiting weather satellites.

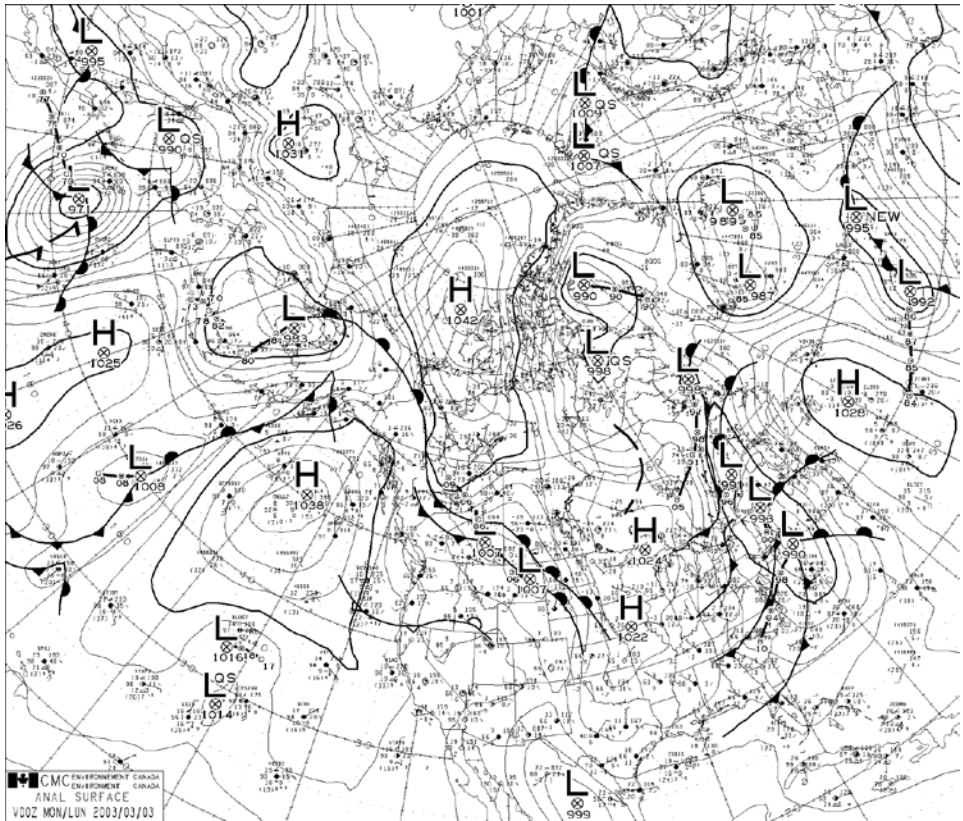
GOES satellites orbit the Earth at about 36,000 km of altitude over the equator. Their position does not change with respect to a point on the surface of the earth. POES satellites with High-Resolution Picture Transfer (HRPT) orbit the earth at an altitude of approximately 850 km. Completing one orbit every 105 minutes, the satellites circle the earth 14 times a day. Because of the orbital shift resulting from the planet's rotation, they move west by approximately 2 time zones per orbit.



Visual	A photo of the clouds during daylight hours
Infra-red	Measuring the heat (thermal) footprint of areas of cloud or the earth's surface if clouds are thin or absent, can be used both day and night

Owing to the complexity of interpreting satellite imagery, most pilots should consider consulting a briefer when considering the use of satellite products for flight planning purposes.

## Surface Analysis Chart



The Meteorological Service of Canada produces a national surface analysis chart 4 times per day, valid at 00Z, 06Z, 12Z and 18Z. few points to remember when using surface analysis weather charts:

- Isobars, curving lines joining points of equal mean sea level (MSL) pressure, are analysed at 4 hPa intervals from a 1000 hPa reference value.
- Winds tend to veer and increase with altitude. Above 3 000 ft AGL, winds tend to blow roughly parallel to the isobars. When the isobars are spaced closer together, winds are stronger.
- Fronts indicate the transition zone between two air masses and are depicted by either blue lines with barbs (cold front) or red lines with half circles (warm front).
- Fronts advance in the direction of their pointed barbs (cold front) or half circle (warm front) symbols. A front that is not advancing is said to be quasi-stationary. A TROWAL is a trough of warm air aloft.

## Upper Air Analysis Charts

Upper air weather charts, also referred to as constant pressure charts, differ from surface weather charts, such as the surface analysis chart, which displays weather information at the same geometric altitude above sea level (ASL). The altitude of the pressure level depends upon the density, and hence the temperature, of the intervening air column. Since air expands as it is heated, in regions where the air is cold and dense, the altitude of the pressure level will be lower than over a region where the air is warmer and less dense.

The depicted information on constant pressure charts is based on temperature, humidity and wind data gathered from radiosonde balloons and is supplemented with data from aircraft reports and satellite-derived wind data in the more remote regions.

On constant pressure charts the level pressure is the same everywhere on the chart, just as the name implies. What varies on these charts is the altitude of the specific pressure level. Each chart represents a constant pressure level, so it is analyzed for altitude or height in decameters above mean sea level. Lines, known as contours, are similar to isobars on surface weather charts; but these lines connect points of equal height for the particular pressure level. Contours are analyzed the same way as isobars; the closer the spacing of the contours, the stronger the wind speed.

Constant pressure charts are prepared by computers twice daily, at 00Z and 12Z for several mandatory pressure levels in the atmosphere. The approximately height of each constant pressure chart and the associated pressure level is listed below:

850 hPa chart	5 000 feet ASL
700 hPa chart	10 000 feet ASL
500 hPa chart	18 000 feet ASL
250 hPa chart	34 000 feet ASL





## Aviation Weather Forecast Products

### Aerodrome Forecast (TAF)

Aerodrome Forecasts (TAF) are produced for approximately 195 sites across Canada. See AIM MET for locations. Abbreviations and codes in the TAF are the same as those used in the METAR.

Valid Period – Canadian TAF have various validity periods and can be valid for up to 30 hours. In the Canadian TAF, a validity period that ends at midnight UTC is coded as 2400Z (2912/2924). A TAF validity period that begins at midnight UTC is coded as 0000Z (3000/3018).

Change Groups are used to indicate the time of an expected weather change. They are FM, BECMG, TEMPO, and PROB30/40. A permanent change group such as FM or BECMG is definite while a temporary change group like TEMPO is transitory. PROB indicates a probability of a weather event (not that a weather event occurs for a percentage of the time).

FM (for From) – FM230600Z

Means FROM 0600Z, and is used when a permanent change to the forecast occurs rapidly. Any forecast conditions given before FM are superseded.

BECMG (for Becoming) – BECMG 2906/2908

Means BECOMING during the period 06Z to 08Z, and is indicated when a permanent change is expected to occur over 1-4 hours. Normally this is used when only one or two weather groups are expected to change with the others remaining the same.

TEMPO (for Temporary) – TEMPO 1306/1312

Means TEMPORARY FLUCTUATION between 06Z and 12Z, and is indicated when a transitory change in some or all weather elements is expected during a specified time period. Only used when condition is forecast to last less than one hour at a time, and does not cover more than half the indicated forecast period.

PROB (for Probability) – PROB30 0806/0812

Means PROBABILITY 30% (or 40%) between 06Z and 12Z that a given weather condition may occur. In the example above, it means a 30% chance of the condition occurring between 06Z and 12Z, not that a given weather condition occurs 30% of the time.

IFR Alternate Selection Criteria – When selecting an alternate, a TAF with BECMG or TEMPO must meet alternate minima, while a TAF with PROB conditions need only meet landing minima. When using BECMG, use the most conservative time period (i.e., if conditions are deteriorating, use the start of the BECMG period, if conditions are improving; use the end of the BECMG period).

## TAF Decode and Description

TAF CYQM 291145Z 2912/3012 24010G25KT WS011/27050KT 3SM -SN BKN010 OVC040  
 TEMPO 2918/3001 11/2SM -SN BLSN BKN008 PROB30 2920/2922 1/2SM SN VV005  
 FM300130 28010KT 5SM -SN BKN020 BECMG 3006/3008 00000KT P6SM SKC  
 NXT FCST BY 281800Z

TAF	Report Type – TAF Aerodrome Forecast. If the forecast is amended, it is indicated directly following the report type, e.g., TAF AMD
CYQM	Station Identifier – Moncton, New Brunswick The station identifier is indicated using the four-letter ICAO site code
291145Z	Date/Time of Issue – 29th day of the month, 1145 UTC The first two numbers indicate the day of the month; the last four numbers the time UTC when the TAF was issued. If the TAF is based on off-site or incomplete observations, the term ADVISORY is added after the date/time group 291145Z ADVISORY
2912/3012	Validity Period – From the 29th day at 1200UTC to the 30th day at 1200UTC The TAF validity period, up to a maximum of 30 hours for selected sites, is indicated by the start day/UTC hour, and the ending day/UTC hour. Within the body of the forecast, further subdivisions describing modified weather elements are indicated by change groups
24010G25KT	Surface Wind – 240° true at 10 knots gusting to 25 knots Surface wind is forecast in the TAF using criteria similar to that of the METAR. Winds of 3 knots or less may be forecast as VRB (variable) followed by the wind speed (e.g., VRB03)
WS011/27050KT	Wind Shear – Forecast from the surface to 1 100 feet AGL. The wind at that height is forecast to be 270° true at 50 knots Forecasts of low-level non-convective wind shear are included whenever strong wind shear, which could adversely affect aircraft operation 1 500 feet AGL and below, can be adequately predicted
3SM	Prevailing Visibility – 3 statute miles Prevailing visibility is forecast per the METAR criteria. Visibility values greater than 6 statute miles are coded as P6SM
-SN	Significant Weather – Light snow A maximum of three significant weather groups, using the same weather codes as in the METAR, are allowed. Intensity and proximity qualifiers, descriptors, precipitation, obscuration and other phenomena are included as required

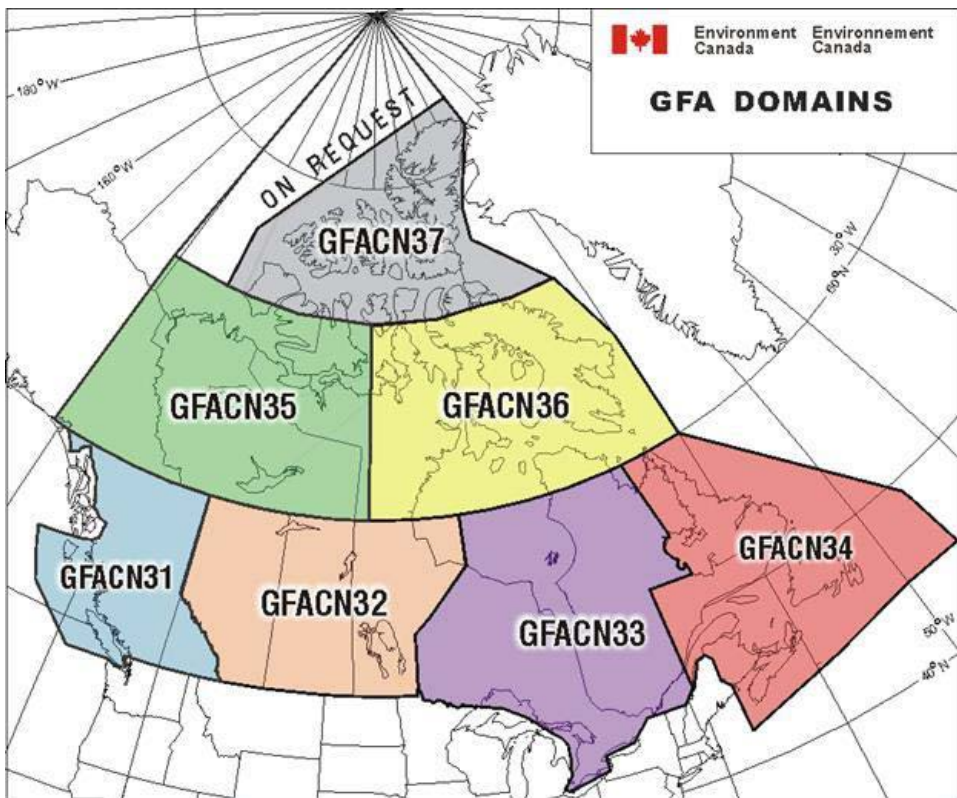
**TAF CYQM 291145Z 2912/3012 24010G25KT WS011/27050KT 3SM -SN BKN010 OVC040  
 TEMPO 2918/3001 11/2SM -SN BLSN BKN008 PROB30 2920/2922 1/2SM SN VV005  
 FM300130 28010KT 5SM -SN BKN020 BECMG 3006/3008 00000KT P6SM SKC  
 NXT FCST BY 281800Z**

BKN010 OVC040	<p>Sky Condition – Cloud layers broken at 1,000 feet AGL and overcast at 4,000 feet AGL</p> <p>Cloud layers are forecast per the METAR criteria. Only cumulonimbus (CB) cloud type is identified by appending it after the appropriate cloud layer height (BKN010CB). Cloud coverage is calculated using summation amounts as in the METAR</p>
TEMPO 2918/3001 11/2SM -SN BLSN BKN008	<p>TEMPO Change Group - These elements are forecast to temporarily change between 1800Z on the 29th day and 0100Z on the 30th day.</p> <p>Weather elements identified after a transitory change group code are expected to change. During the indicated time, visibility, significant weather, and sky condition are expected to temporarily change; wind and wind shear are forecast to remain the same</p>
PROB30 2920/2922 1/2SM SN VV005	<p>PROB Change Group – It is 30% probable that the following weather elements will occur between 2000Z and 2200Z on the 29th day</p> <p>Between 2000Z and 2200Z, it is a 30% probable that the visibility, significant weather, and sky condition will change. Because wind and wind shear are not indicated, these elements are expected to remain as previously forecast</p>
FM300130 28010KT 5SM -SN BKN020	<p>FM Change Group - At 0130Z on the 30th day a permanent change is forecast to occur to the following weather elements.</p> <p>A rapid change in the wind, visibility, significant weather, and sky condition is forecast at 0130Z on the 30th day. Since FM is a permanent change group, all weather elements forecast must be indicated following the FM group</p>
BECMG 3006/3008 00000KT P6SM SKC	<p>BECMG Change Group - Between 0600Z and 0800Z on the 30th day the following weather elements will gradually change to become as forecast</p> <p>Between 0600Z and 0800Z, a gradual change is forecast to the wind, visibility, significant weather, and sky condition. NSW (No Significant Weather) may also be used when the weather is forecast to improve to the point where significant weather is no longer expected</p>
NXT FCST BY 281800Z	<p>Remarks - Next forecast is to be issued by 1800Z on the 28th day</p> <p>The remark RMK FCST BASED ON AUTO OBS is unique to Canadian TAFs. It highlights that the on-site observational data is AWOS-based. Canada has staggered issue and update schedules for some TAFs. Refer to the CFS</p>

## Graphic Area Forecast (GFA)

The Graphic Area Forecast comprises of weather charts that provide a 12-hour graphic depiction of the most probable meteorological conditions expected to occur between the surface to at or below 24 000 feet over a given area at a specific time.

The GFA, which is designed primarily to satisfy general aviation and regional air carrier requirements for pre-flight route planning in Canada, also meets the regulatory requirements for an area forecast as stated in the Canadian Aviation Regulations (CARs). See the AIM for a more detailed description of the GFA.



Seven distinct GFA areas, or domains, cover the entire Canadian domestic airspace. A GFA is issued for each domain, and consists of six weather charts: two valid at the beginning of the forecast period; two valid six hours into the forecast period; and two valid twelve hours into the forecast period. Of the two charts valid at each time, one chart depicts clouds and weather information; the other depicts icing, turbulence, and freezing level information.

The GFA uses codes from TAF and METAR. Symbols and abbreviations are consistent with those found in the MET section of the TC AIM. All heights are ASL unless otherwise stated; cloud bases and tops are depicted; prevailing visibility is always included, and if expected to be greater than 6 statute miles, is shown as P6SM; surface wind is included only if 20 KT or more or gusts to 30 KT or more.

Each GFA chart is divided into four distinct sections:

- Title Box – Includes the domain and issue/valid time.
- Legend Box – Includes symbols commonly used and a reference measurement scale in NM.
- Comments Box – Anything the forecaster deems important, and a 12 hour IFR Outlook on the last clouds and weather chart.
- Weather Information Box – Includes the graphic depiction of forecast weather conditions.

## GFA Spatial Coverage Qualifiers

### Convective Weather

The following qualifiers for convective clouds and showers may be used in the GFA according to the spatial coverage definitions:

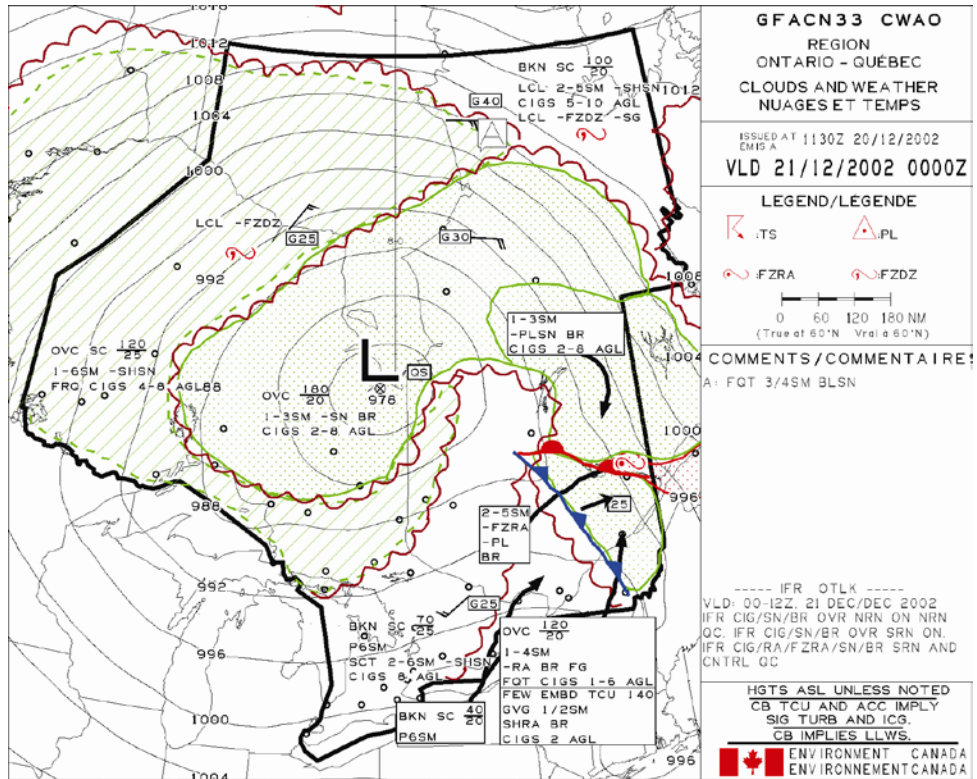
Abbreviation	Description	Spatial Coverage
ISOLD	Isolated	25% or less
OCNL	Occasional	Greater than 25% and up to 50%
FRQ	Frequent	Greater than 50%

### Non-convective Weather

The following qualifiers regarding restriction to visibility, non-convective precipitation, precipitation ceilings and low stratus ceilings, may be used in the GFA according to the spatial coverage definitions:

Abbreviation	Description	Spatial Coverage
LCL	Local	25% or less
PTCHY	Patchy	Greater than 25% and up to 50%
XTNSV	Extensive	Greater than 50%

## Clouds and Weather Chart



The Clouds and Weather GFA chart provides a forecast of cloud layers and/or surface-based phenomena, visibility, weather, and obstructions to vision. Isobars are depicted at 4mb intervals. In addition, the speed and direction of movement of relevant fronts and high / low pressure centres are depicted. When the speed of fronts or pressure systems is less than 5 knots, the letters QS are used to indicate a quasi-stationary front.

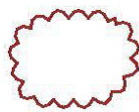


Low pressure system



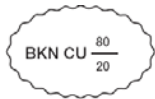
Moving to the northeast at 30 KT

Clouds are depicted with their bases and tops, including convective clouds with tops extending above 24 000 ft. Convective-type clouds (CU, TCU, ACC, and CB) are always specified if forecast. In areas where organized clouds are not forecast, and the visibility is expected to be greater than 6 SM, no scalloped area is used.



Continuous brown scalloped border

Organized areas of broken (BKN) or overcast (OVC) clouds



Area of BKN cumulus cloud with bases at 2 000 ASL and tops 8 000 feet ASL

Unlike the METAR and TAF, summation amount is not used to assign coverage descriptors for clouds in the GFA. Each organized cloud layer is considered individually.

Surface-based layers are described using standard meteorological abbreviations including the term OBSCD. LCL OBSCD CIG 3-5AGL means: local obscured ceilings between 300 and 500 ft AGL.

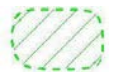
Obstructions to vision are only mentioned when the visibility is forecast to be 6 SM or less. Visibility is indicated the same as in the METAR/TAF, except that a range may be specified, e.g., 2-4 SM – SHRA.

Areas of precipitation and obscuration are often defined by borderlines.



Continuous green border line

Enclose areas of continuous precipitation



Dashed green border line

Enclose areas of intermittent or showery precipitation



Dashed orange border line

Enclose areas of obscuring phenomena other than precipitation (e.g. haze).



Continuous red border line

Enclose areas of continuous freezing precipitation.



Dashed red border line

Enclose areas of intermittent freezing precipitation.



## IFR Outlook

The GFA IFR Outlook describes IFR weather only for an additional 12 hours beyond the GFA valid period. The description for IFR, marginal (M) VFR, and VFR are included here, for these terms are often used in briefings.

Category	Ceiling		Visibility
IFR	Less than 1 000 ft AGL	or	Less than 3 SM
MVFR	1 000 to 3 000 ft AGL	or	3 to 5 SM
VFR	Greater than 3 000 ft AGL	and	Greater than 5 SM

## Icing, Turbulence, and Freezing Level Chart

The GFA Icing, Turbulence, and Freezing Level chart depicts forecast areas of icing and turbulence as well as the expected freezing level at a specific time. Included on the chart are the type, intensity, bases, and tops for each icing and turbulence area. Surface synoptic features such as fronts and pressure centres are also shown.

This chart is used in conjunction with the associated GFA Clouds and Weather chart issued for the same validity period.

Icing is depicted whenever moderate or severe icing is forecast. Bases, tops, and type of icing (RIME, MXD-mixed, and CLR-clear) are all indicated. Light icing areas are described in the Comments box. Icing is indicated as an enclosed area with dots in blue.



Continuous blue border line with light stippling

Enclose areas of moderate icing.

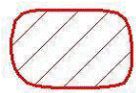





Continuous blue border line with dense stippling

Enclose areas of severe icing.



Turbulence is depicted whenever moderate or severe turbulence is expected. If the turbulence is due to mechanical turbulence, low level wind shear, lee/mountain waves, a significant low level jet or in clear air, an abbreviation indicating the cause of the turbulence is included (e.g. MECH, LLWS, LEE, WV, LLJ or CAT).

	Continuous red border line with dense light positive cross-hatching	Enclose areas of moderate low level turbulence.
	Continuous red border line with dense positive cross-hatching	Enclose areas of severe low level turbulence.
	Continuous red border line with light negative cross-hatching	Enclose areas of moderate high level turbulence.
	Continuous red border line with dense negative cross-hatching	Enclose areas of severe high level turbulence.

Freezing Level contours are indicated on the chart by red dashed lines, starting at the surface (SFC) and at 2 500 ft intervals. Any modifications are explained in the Comments Box.

## Upper Level Wind and Temperature Forecast (FB)

The header for upper winds is FB. FB bulletins are alphanumeric forecasts of wind and temperature aloft at predetermined altitudes. They are produced for approximately 175 sites across Canada. FB forecasts are not currently available on the NAV CANADA Aviation Weather Web Site.

FBs are expressed in knots (kt) to the nearest 10° true, and temperature is expressed in degrees Celsius. Temperatures are not forecast for 3 000 ft; in addition, this level is omitted if the terrain elevation is greater than 1 500 ft (see YYC at 3 000 ft). All forecast temperatures for altitudes over 24 000 ft are negative.

When the forecast speed is less than 5 kt, the code group is 9900, which reads light and variable (see YVR at 3 000 ft). Encoded wind speeds from 100 to 199 kt have 50 added to the direction code and 100 subtracted from the speed. Wind speeds that have had 50 added to the direction can be recognized when figures from 51 to 86 appear in the code (see YQL at 39 000 ft). Since no such directions exist (i.e., 510° to 860°), obviously they represent directions from 010° to 360°. Should the forecast wind speed be 200 kt or greater, the wind group is coded as 199 kt, that is, 7799 is decoded as 270° at 199 kt or greater.

FCST BASED ON 071200 DATA VALID 080000 FOR USE 21-06						
FT	3 000	6 000	9 000	12 000	18 000	
YVR	9900	2415-07	2430-11	2434-16	2542-26	
YYF	2523	2432-04	2338-08	2342-13	2448-24	
YYC		2426+03	2435-01	2430-12	2342-22	
DATA BASED ON 080000Z VALID 091200Z FOR USE 0900-1800Z						
TEMPS NEG ABV 24 000						
FT	24 000	30 000	34 000	39 000	45 000	53 000
YQL	2955-28	3068-45	3074-35	791159	3178-56	3142-55

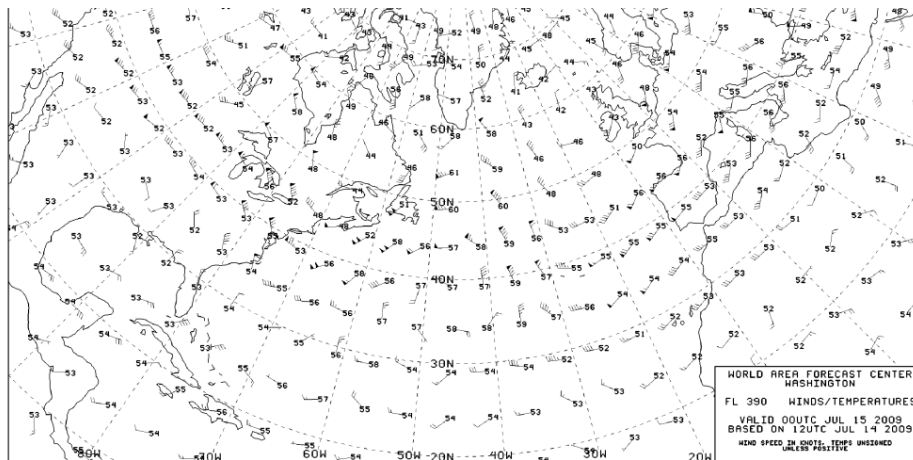
## Weather Charts – Prognosis vs Analysis

Prognosis charts and Analysis charts look the same, so ensure that you select the most appropriate chart (issue time/valid time) for the intended flight time and route.

Analysis Charts	show conditions as they actually were at a given time
Prognosis Charts	provide a forecast of the most probable weather conditions for a specific time in the future

## Upper Level Wind and Temperature Prognosis Charts

Upper level wind and temperature prognosis charts depicting the forecast winds and temperatures for FL240, FL340, FL390, and FL450 are issued twice daily and are valid at 00Z, 06Z, 12Z and 18Z. Wind direction and speed are graphically depicted. Pennants (50 KT), full feathers (10 KT), and half feathers (5 KT) at the base of the arrow shaft indicate the true wind velocity in tens of degrees. The temperature is indicated in whole degrees Celsius in a small circle at the end of the direction arrow.



## Significant Weather Prognosis Charts

Significant Weather (SIG WX) prognosis charts such as the Mid-Level FL100–250 (700–400mb), the Upper Level FL250–600 (400–70mb), and the North Atlantic SIG WX PROG (surface–FL250), provide a virtual display of forecast hazardous weather conditions. These charts use many of the meteorological symbols listed in the MET section of the TC AIM.

The Jet Stream, which is depicted on the Upper Level SIG WX prognosis, includes two numbers. The first is a forecast of the vertical depth above the depicted jet maximum and is preceded by a plus sign (+). The second number is a forecast of the vertical depth below the depicted jet maximum and is preceded by a minus sign (-).

# Meteorological Symbols

## Symbols for Significant Weather

	Tropical cyclone	,	Drizzle
	Severe squall line*	/// ///	Rain
	Moderate turbulence	*	Snow
	Severe turbulence	∇	Shower
	Mountain waves	△	Hail
	Moderate aircraft icing	†	Widespread blowing snow
	Severe aircraft icing	‡	Widespread sand or dust haze
	Widespread fog	§	Widespread sandstorm or duststorm
	Radioactive materials in the atmosphere**	∞	Widespread haze
	Volcanic eruption***	=	Widespread mist
	Mountain obscuration	≡	Widespread smoke
		~	Freezing precipitation****

## Fronts and Convergence Zones and Other Symbols Used

	Cold front at the surface		Position, speed and level of maximum wind
	Warm front at the surface		Convergence line
	Occluded front at the surface		Freezing level
	Quasi-stationary front at the surface		Intertropical convergence zone
	Tropopause high		State of the sea
	Tropopause low		Sea-surface temperature
	Tropopause level		Widespread strong surface wind*

## US Differences

Since many Canadian pilots fly to the US, it is important to know the differences between Canadian aviation weather products and those in the US. Below is a list of main differences of the American products compared to the Canadian products:

- Always use light setting 5 for RVR observations and RVR tendency not reported in METAR.
- Transcribed Weather Broadcasts (TWEB) are extensively used.
- The US produces CONVECTIVE SIGMET and Centre Weather Advisories.
- Low IFR – ceilings < 500 ft; visibility < 1 SM (LIFR) category is used in FA.
- Area Forecasts (FA) is valid for 12 hours with an additional 6-hour outlook.
- Supplementary data may be added to METARs.
- Alphanumeric radar reports are available.
- VRB (variable) is used in METARs for winds of 6 KT or less.

For more information concerning differences and standards for aviation weather products and services outside Canada, contact ICAO or the American Meteorology Society (AMS). US weather products are available on the Internet from NAV CANADA and from the National Weather Service (NWS).

## Meteorological Abbreviations

A complete list of meteorological abbreviations can be found in the Manual of Abbreviations (MANAB), which is accessible through the NAV CANADA Aviation Weather Web Site, ([publications/links for non-kiosk users/MANAB](#)) or visit the MSC Web Site at <http://www.ec.gc.ca/manab/>.



## Aviation Weather References

The NAV CANADA Aviation Weather Web Site at [www.flightplanning.navcanada.ca](http://www.flightplanning.navcanada.ca) contains most of the aviation weather information pilots need to plan a flight, as well as links to other aviation weather products and publications from the Meteorological Service of Canada and the US National Weather Service (NWS).

To obtain additional aviation weather information, visit the Meteorological Service of Canada website at [www.weatheroffice.ec.gc.ca](http://www.weatheroffice.ec.gc.ca), and the US National Weather Service at [www.nws.noaa.gov](http://www.nws.noaa.gov).

Toll-free access to weather briefing and flight planning services is available from NAV CANADA. Telephone numbers are listed in the CFS in the FLT PLN section of the airport/facility directory.

To contact NAV CANADA with questions or suggestions regarding aviation weather products or services, email [service@navcanada.ca](mailto:service@navcanada.ca) or telephone 1-800-876-4693.

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FIC Pilot Briefing Service	Local Number
	Toll-Free Number
Local Airport	Telephone Number
NAV CANADA Contact	Name and Number

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## Notes



## Notes





