

Weather analysis for the 2010 Winter Games



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The city of Vancouver is the host of the 2010 Olympic and Paralympic Winter Games. Environment Canada's Meteorological Service – the official weather-information provider for both events – decided to expand its observational network to support weather forecasting during the Games.



Several outdoor venues of the 2010 Winter Games are located along a u-shape valley carved out by glacial action (a fjord). This is called the Sea-to-Sky corridor, and it includes the towns of Squamish and Whistler, in British Columbia. High winds, reduced visibility and mixed-phase precipitation are some of the forecasting challenges for the outdoor Games venues, all enhanced by the complex terrain conditions.

To support weather forecasting operations during the Games, Environment Canada expanded its observational network along the Sea-to-Sky corridor. The strategy included deployment of advanced meteorological sensors typically used at airports, because of their design to provide rapid updates of high-impact weather events. However, most of the Olympic network sites are not airports, but remote locations with large telecommunications challenges.

Data benefits both forecasters and researchers

The Sea-to-Sky observational network consists of a host of weather measurement instruments, such as



2010 Olympic and Paralympic Winter Games venues.



Wind profiler located at Squamish airport, in British Columbia.

different kinds of weather sensors, ceilometers and wind profilers. The observations are compiled and disseminated in real-time by several computers at Environment Canada.

The data are primarily used by the 35 official weather forecasters supporting the Winter Games. The forecasters were selected from the Meteorological Service of Canada, the US National Weather Service, and Canada's Weather Network.

The data are also being used by researchers from the SNOW-V10 program, whose focus is on forecasting wintertime events in complex terrain. The acronym stands for Science and NOWcasting of Olympic Weather for Vancouver 2010. Vaisala is a commercial partner for the program, which is primarily comprised of researchers from seven countries. It operates under the World Meteorological Organization's World Weather Research Programme.

Insight on the topographic influence on local winds

The newly extended network incorporates several Vaisala instruments, including dozens of pressure, temperature and humidity sensors. For example, monitoring of the precipitation intensity and present weather at the base of Whistler Mountain – the Alpine Ski venue – is done by a FD12P weather sensor.

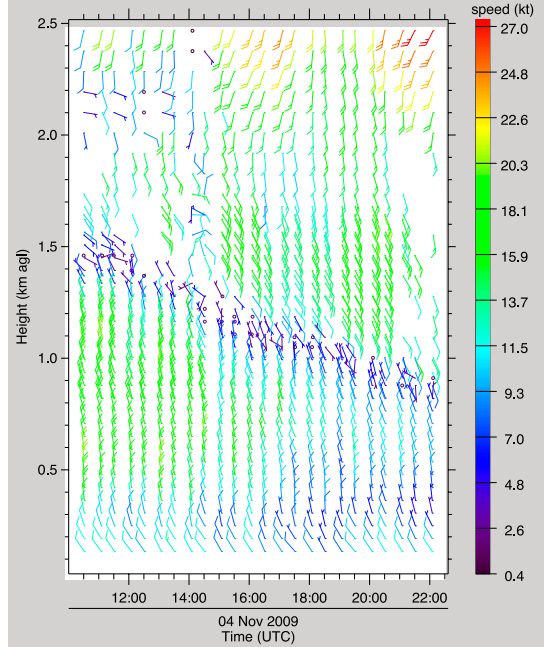
In addition, cloud-base observations are being measured by Vaisala's ceilometers both at this venue as well as near the Snowboard and Free-Style Ski competitions to be held at the Cypress Mountain. Five other Vaisala ceilometers and three other FD12P sensors are also part of the network.

A 915MHz wind profiler equipped with a Radio Acoustic Sounding System has been sited at the Squamish airport, down slope of the Whistler venues. The radar supplies hourly vertical profiles of virtual-temperature, 30-minute vertical wind profiles, and vertical profiles of precipitation signals about every five minutes.

Among the most important applications from the wind profiler is the insight gained on the topographic influence on the local winds, and the large scale inflow over the Sea-to-Sky corridor. Information on temperature transport can also be derived from the wind profiler readings by combining winds and virtual temperature profiles. Magnitudes of the vertical Doppler velocity and backscatter signals offer guidance for analysis and nowcasting of precipitation phase and intensity at some outdoor venues.

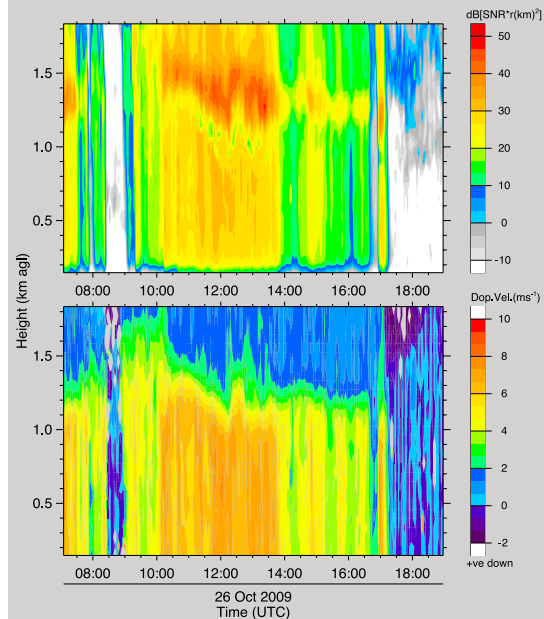
Further information:

www.weatheroffice.gc.ca/2010/



Consensus winds from UHF wind-profiler radar: Squamish Airport located at 52m asl
Environment Canada - STB/MRD/ARMP - Edwin.Campos@ec.gc.ca

Vertical profile of winds over Squamish. These observations were taken during a descending temperature inversion, with a warm front approaching the site from the west. The wind boundary descends from 1.5 km to 0.8 km (above ground level) during a 12h period. The local-scale flow (north-northwest windbarbs) is descending the Sea-to-Sky corridor, and the large-scale flow, aloft, is arriving at the site from the opposite direction (from the south east).



Vertical short (417ns) pulses from UHF wind-profiler radar: Squamish Airport XSK located at 52m asl
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Precipitation phase analyzed from pseudo-reflectivities (from Signal-to-Noise ratios) and Doppler vertical velocities. A melting level is identified when the velocities are just larger than about 2 meters per second, and when the pseudo-reflectivities are enhanced (i.e., at the bright band).