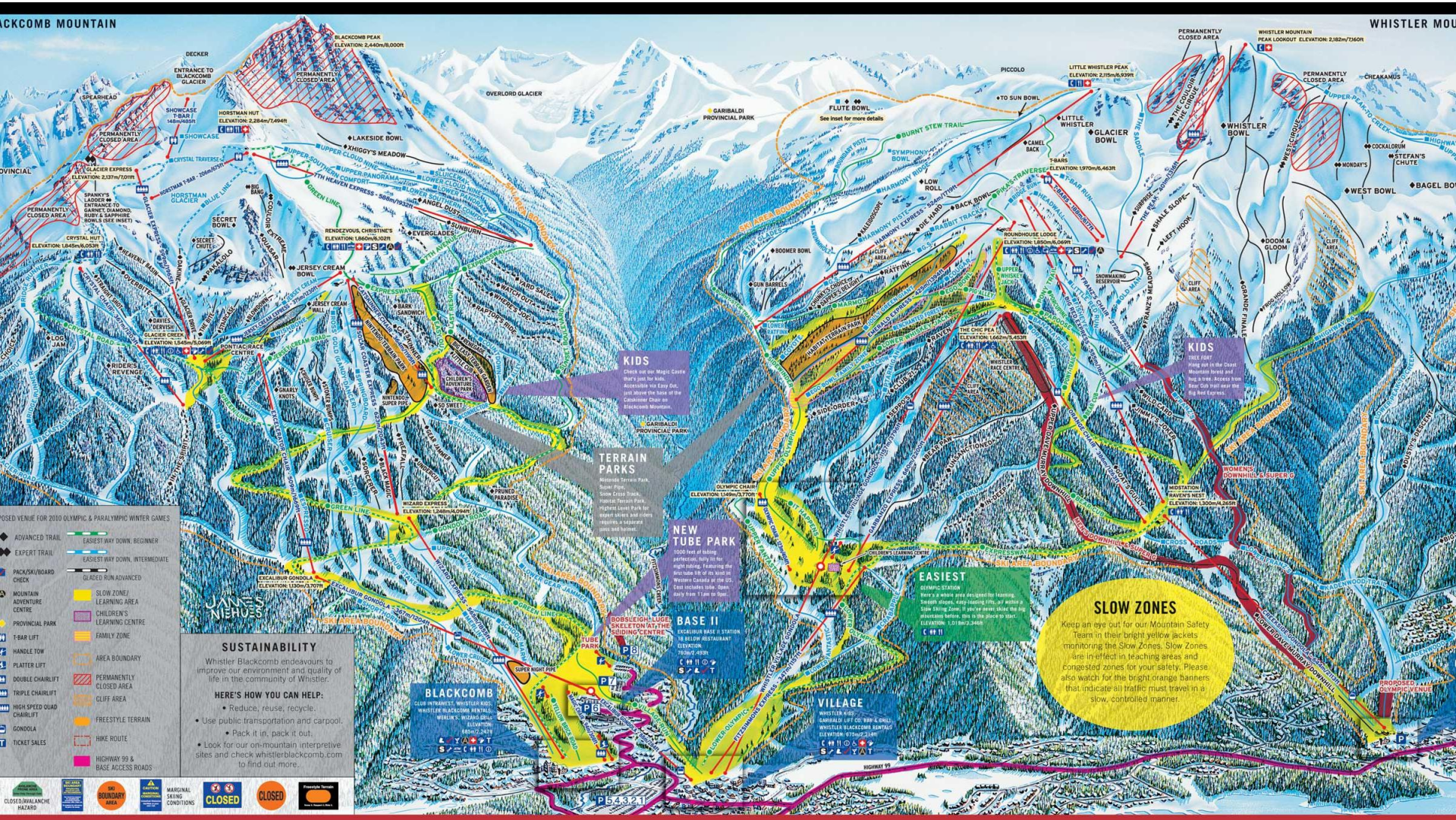
RDP Program for the Vancouver 2010 Winter Olympic Games

Based on a presentation by **Paul Joe**, with additional information from **Stéphane Bélair**

General Information about VO2010

- *Periods: 12-28 Feb and 12-21 March 2010*
- *MSC: official weather service provider, with mandate and contractual obligation to VANOC*
- *Opportunity to develop, enhance, and demonstrate new abilities in the forecasting of weather elements*
- *Main sites are in Vancouver and Whistler / Callaghan Valley*
- *Vancouver is a North American west coast city with complex terrain*
- *Typical weather conditions at Whistler: high winds at the top, fog/cloud and poor visibility at mid levels, snow / rain below that*
- *Sea-to-Sky highway (between Vancouver and Whistler) will be a crucial transportation artery*

Whistler and Blackcomb



Cypress Bowl

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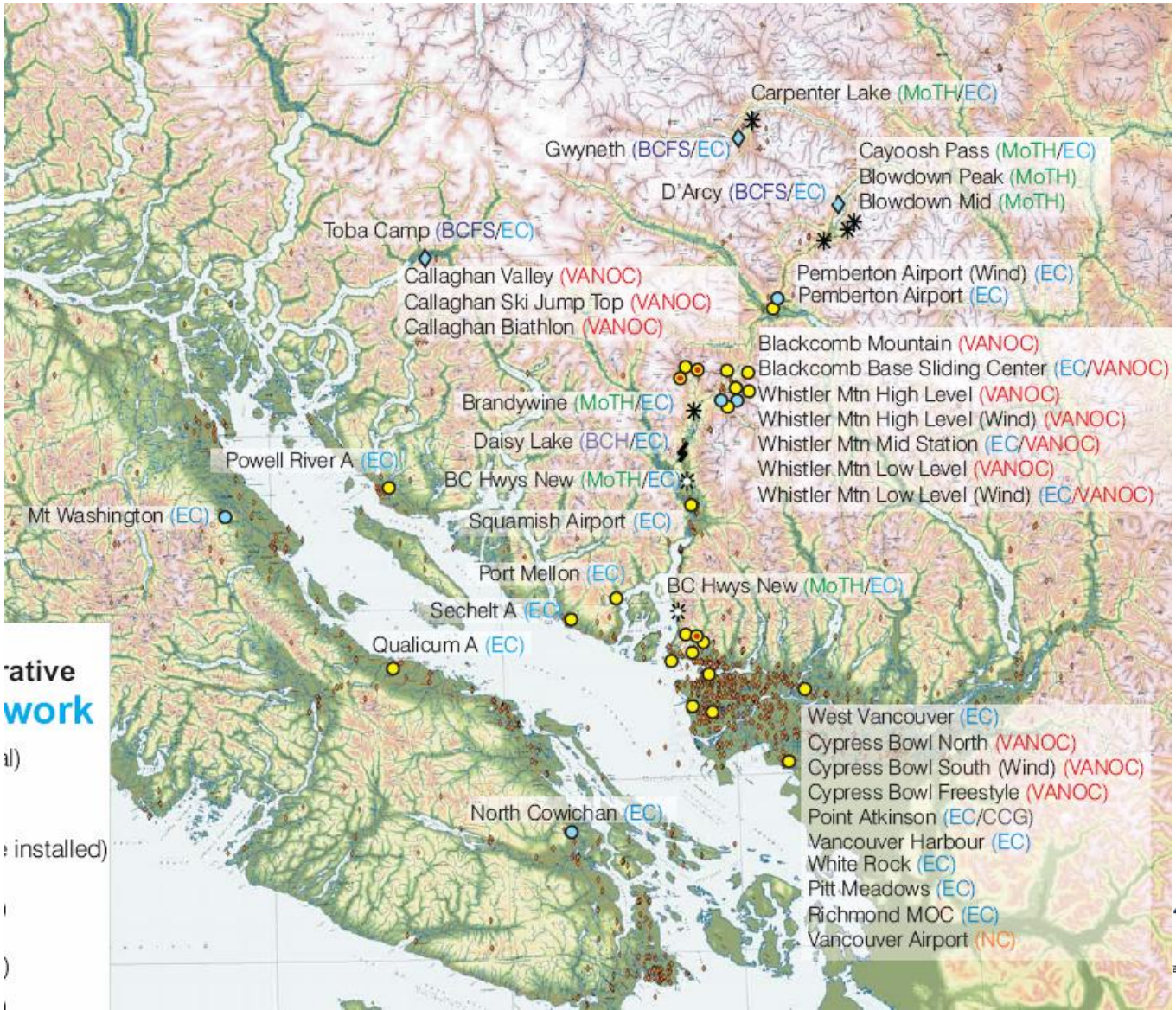
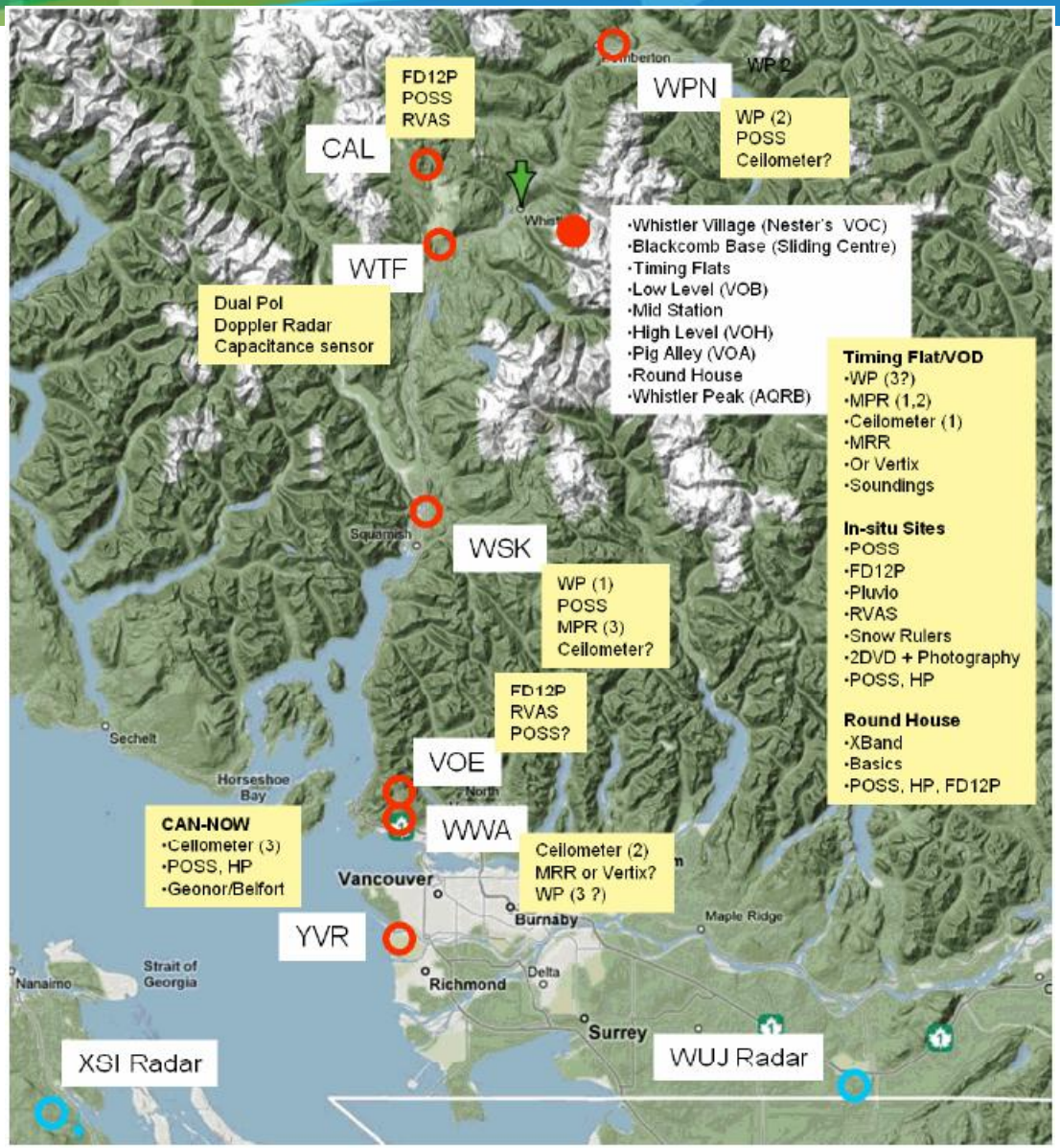
VO2010 Autostation Surface Network



Advanced Sensor Suite

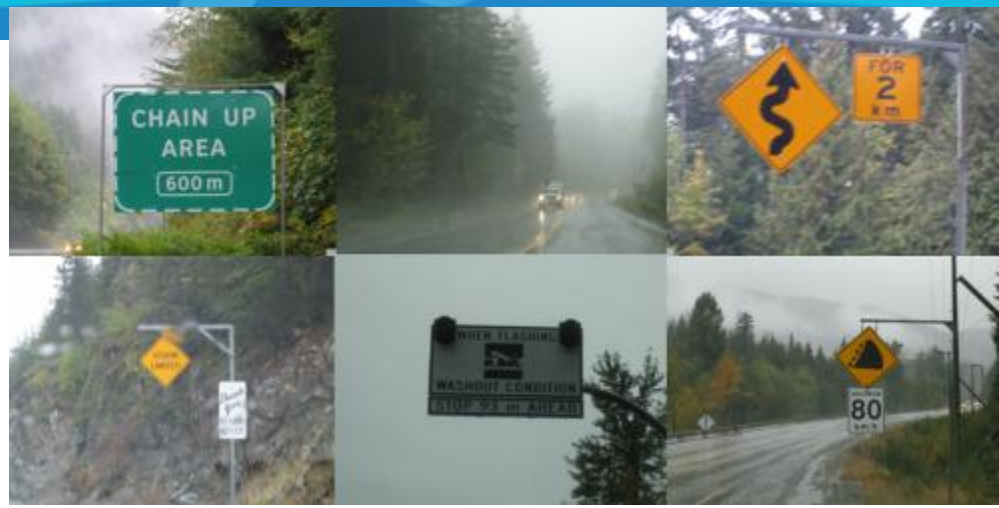


VANOC Forecasting Requirements

Occurrence	Frequency
2-3 Days before	6 hourly, update twice per day
Day before	3 hourly, updated four time per day
Day of	1 hourly, updated hourly
0-2 hours	5 minutes, update every 15 min

Forecast Requirements

- High winds
- Fog/Ceiling/Visibility
- Precipitation Type/Intensity
- Road weather
- Orographic Enhancement
- Wind directions
- Rapidly changing in space/time
- Narrow confined valley
- Coastal



Temperature: Temperature:	Jan	Feb	Mar	Apr	May	Jun	Code
Daily Average (°C)	-3	-0.6	2.3	5.9	9.8	13.2	A
Standard Deviation	2.9	2	1.5	1.1	1.4	1.4	A
Daily Maximum (°C)	0.1	3.1	7.2	11.6	16	19.4	A
Daily Minimum (°C)	-6.1	-4.3	-2.6	0.1	3.7	6.9	A
Extreme Maximum (°C)	8.9	14.3	19.6	27.8	35.6	34.9	
Date (yyyy/dd)	1977/18+	1992/28	1994/29	1977/24	1983/29	1987/29	
Extreme Minimum (°C)	-28.2	-24.1	-18.5	-7.7	-3.4	-0.7	
Date (yyyy/dd)	1979/04	1986/19	1991/05	1982/08	1978/05	1988/04	
Precipitation: Precipitation:							
Rainfall (mm)	68.9	60.3	54	59.3	65.1	58.1	A
Snowfall (cm)	96.3	66.8	45.5	16.6	1.1	0	A
Precipitation (mm)	157.2	119.5	96.1	75	66.2	58.1	A
Average Snow Depth (cm)	52	57	37	6	0	0	C
Median Snow Depth (cm)	50	57	38	5	0	0	C
Snow Depth at Month-end (cm)	59	56	14	0	0	0	C
Extreme Daily Rainfall (mm)	**79.2**	69.8	40	33.6	25.5	30.7	
Date (yyyy/dd)	**1983/07**	1991/01	1997/18	1992/29	1979/03	1994/23	
Extreme Daily Snowfall (cm)	52.6	42.8	40	47	8	0	
Date (yyyy/dd)	1993/26	1999/23	1987/02	1988/05	1985/10	1977/01+	

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Gap Analysis

- *Forecasting and nowcasting in coastal complex terrain for the safety and security of the public and operation of the Olympic venues not done before.*
- *Little experience and knowledge in the Sea to Sky Corridor.*
- *Much smaller horizontal scale and complex terrain beyond current prediction program capabilities (Monitoring, NWP, Data Assimilation or nowcasts)*

Goals of Proposed RDP

- *Improved nowcasts/forecasts for coastal, complex, cold season*
- *Rapid technology transfer*
- *Accelerated and enhanced development*
- *Institutional and infrastructure legacy of a nowcasting testbed*
- *End user decision-making linkages*

Hybrid Demonstration and Development Project

- *FDP = Forecast Demonstration Project*
  - *operational or quasi-operational systems*
- *RDP = Research Development Project*
  - *promote and develop emerging concepts*
- *Hybrid Demonstration Project*
  - *Something in-between FDP and RDP*
  - *Reduced scale*
  - *Target emerging technology*
  - *Prototype operational systems*
  - *Develop relationships/decision-making practices with end users*
  - *Verification focus*

Main Components

- *In-situ and profiles of microphysical measurements (EC and Stewart in McGill)*
- *Fog, visibility, and low clouds predictions from NWP. Bott (Ubonn), Mueller (Ubasel), and Gultepe (EC)*
- *Mesoscale Ensemble Forecasts – 15 km (Charron, EC)*
- *High resolution Analysis in Complex Terrain (Variational Doppler Radar Analysis System – VDRAS from NCAR)*
- *Dual-pol particle and phase type. Hudak (EC) and Koistinen (FMI)*
- *High Resolution (mesoscale) experimental-operational NWP, data assimilation and land surface systems. Bélair, Mailhot (EC)*
- *Winter, multi-parameter nowcasts. CAN-NOW from EC (Isaac), WSDM from NCAR.*
- *Quantitative Precipitation Estimation in complex terrain and winter (STEPS, Seed from BOM)*
- *Real-time verification. CAN-NOW (EC) with support from BOM Australia*
- *Possible links with TPARC*
- *Possible social impact component. Descurieux (EC)*

What About Mesoscale NWP?

- *Main focus of RDP on nowcasting*
- *Interest in having a component on mesoscale numerical modeling, BUT…*
- *First question: Is the observational network sufficient for verification of mesoscale models ?*
- *Another problem: no resources internally at EC to support this effort*
- *Finally, it's getting late…*

Note: There will be a workshop next week at Whistler concerning the VO2010 RDP.