

OBSERVING AND FORECASTING SNOW SURFACE TEMPERATURES FOR NORDIC SKI  
RACE COURSES AT THE 2010 WINTER OLYMPIC GAMES IN VANCOUVER, BC

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**ABSTRACT:** Fast skis play an essential role in a nordic athlete's Olympic performance. Using the right combination of ski wax depends on accurate forecasts of the snow surface conditions on the race courses with sufficient lead time to prepare race skis. Snow surface observations are being used to develop procedures for forecasting snow surface temperatures. Infrared surface temperature measurements sampled around the 2010 Olympic Nordic ski courses at the Whistler Olympic Park in the Callaghan Valley, BC are used to examine the spatial and temporal variations in snow surface temperature as a function of synoptic weather conditions. The goal for this work is to aid Environment Canada in observing and forecasting snow surface temperatures for the 2010 Olympic Games.

Snow surface thermal maps were generated during February and March of 2008. For this study the thermal maps were generated using a small instrument enclosure containing an infrared sensor, GPS and data logger recording every 5 seconds. The enclosure was attached to the side of a snowmobile and driven around the courses at  $\sim 15 \text{ km hr}^{-1}$ . Each observational period met one of three synoptic conditions: (1) clear sky conditions, (2) moderate to overcast cloud conditions and (3) overnight snow accumulation  $< 1 \text{ cm}$ . The spatial variability was greatest for a clear sky case with a maximum between  $-8 \text{ }^{\circ}\text{C}$  and  $0 \text{ }^{\circ}\text{C}$  throughout the courses and  $-4 \text{ }^{\circ}\text{C}$  and  $0 \text{ }^{\circ}\text{C}$  within the stadium area.

Environment Canada forecasters will make predictions for snow surface temperatures in the stadium area only. We are developing a forecasting template to relate snow surface temperature evolution to synoptic weather conditions. The template is derived from evaluating snow surface temperature observations in the stadium area extracted from all thermal maps.

A more complete set of thermal maps for the nordic and biathlon race courses will be generated during February and March of 2009. We will use this data to validate and modify forecasting templates. This work will include more in depth evaluation of the snow surface energy balance and snow morphology in the stadium area.

**KEYWORDS:** snow surface temperature, snow, thermal mapping, 2010 Olympics

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