

## **FROST-2014 Field Campaign**

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The WWRP RDP/FDP FROST-2014 (FROST - Forecast and Research in the Olympic Sochi Testbed) is connected to the XXII Olympic and XI Paralympic Winter Games in Sochi and targeted at advancement and demonstration of state-of-the-art nowcasting and short-range forecasting systems for winter conditions in mountainous terrain. The list of the international project participants includes the mesoscale modeling consortia COSMO and HIRLAM/ALADIN, the Central Institute for Meteorology and Geodynamics (Austria), Environment Canada, the Finnish Meteorological Institute, the National Oceanic and Atmospheric Administration of the United States and the Korea Meteorological Administration.

For purposes of weather analysis, forecasting and forecast verification about forty automatic meteorological stations were installed in the region of Olympics. For majority of the stations the sampling interval did not exceed 10 minutes. For some stations and variables it was enhanced to 1 minute. C-band dual polarization Doppler weather radar was installed on Akhun mountain in Sochi. Wind profiler, two temperature profilers and two Micro Rain Radars supplemented the network. During the Olympic winter the frequency of upper air soundings in Sochi was enhanced to 4 times/day. Additional observations were provided by the neighbourhood countries – Armenia, Turkey and Ukraine. Spatial snow measurements (intensity, depth, fresh snow density, precipitation type and size of crystals) were taken by the local avalanche protection troop.

Six nowcasting systems (model-based, radar tracking and combined nowcasting systems) and seven deterministic mesoscale NWP systems contributed to FROST-2014 (see Annex 1). Several models were implemented for region of the Olympics with grid spacing of 1 km or finer (down to 250 m in GEM system of the Environment Canada). Six ensemble prediction systems (including two convection permitting ones) participated in the project. The project operational forecasts were deeply integrated into the system of meteorological support of the Olympics. A kind of super-ensemble with rapid update cycle and adjustment to the latest observations both for nowcasting and short-range forecasting intervals was implemented and served as a first guess for the Olympic forecasters (that might be considered as one of the project social impacts along with capacity building and transfer of technologies).

With the closure of the Olympics in March 2014 the project field campaign was mostly over. Quite few systematic trials of multiple high-resolution forecasting systems in mountains are known so far due to the lack of appropriate observations and coordinated forecasting activities. In this respect FROST-2014 provides a valuable information resource for mesoscale predictability studies, development and validation of forecasting systems over complex terrain. The FROST-2014 information archive of observations and forecasts is intended to be a part of the project legacy for the international research community. Today the focus of FROST-2014 activities is switched to analysis of results of the field campaign.