



Performance of deterministic numerical weather forecasts during the FROST-2014 project field campaign

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Some outcomes of forecast verification activities related to the World Weather Research Programme project FROST-2014 (Forecast and Research in the Olympic Sochi Testbed) are considered. Deterministic forecasts of COSMO-Ru7, COSMO-Ru2, COSMO-Ru1, GEM-2.5km, GEM-1km, GEM-250m, INCA (very short-range forecasts), HARMONIE (1 km resolution) and NMMB (1 km resolution) systems for the period of the Sochi-2014 Winter Olympic Games were verified. Various continuous and categorical metrics were utilized for near-surface temperature, dew point temperature, relative humidity, wind speed, wind direction, wind gusts, and 3-hour accumulated precipitation.

Negative temperature bias (in particular, during daytime) was noted in forecasts of the most models, except HARMONIE up to the height of 1400 m. However, analysis of the COSMO-RU system performance during the previous test seasons revealed that the model bias could change its sign from one cold season to another depending on the prevailing weather regimes. For the COSMO model family, the effect of resolution enhancement was especially notable for wind speed and gusts, and the dependence of forecast skill on the driving model (either ECMWF-IFS or DWD-GME) was found limited. For the GEM models, the effect of resolution enhancement was overall positive for temperature, wind direction, and relative humidity and especially for high altitude mountain stations. Added value of the convection-resolving GEM 250m model was not always evident from traditional precipitation verification scores, but was noted by the Olympic forecasters. Several cases of intense precipitation were predicted well by most models.

Overall, the objective verification statistics agree well with the subjective evaluations made by the Sochi Olympics operational forecasters.