Intercomparison of Spatial Verification Methods for COSMO Terrain (INSPECT): Preliminary Results

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A COSMO consortium project devoted to spatial verification methods (INSPECT) has been created to follow MesoVICT activities (http://www.ral.ucar.edu/projects/icp/) and to summarize the COSMO experience of applying spatial verification methods to high and very high resolution forecast systems (deterministic and EPS). The project started in April 2015; it is planned for two years. One of the scopes of INSPECT is to propose guidelines for application of new spatial methods based on the analysis of data gained during the project.

The ICP and MesoVICT projects have already provided the setup of experiments and a set of test cases including high-resolution observations. Several INSPECT tasks involve reruns of COSMO very-high-resolution models for MesoVICT test cases with a focus on the MesoVICT core experiment and case 1. Additional periods/models will be utilized in INSPECT, e.g., the dataset of FROST-2014 project (Forecast and research in the Olympic Sochi testbed, http://frost2014.meteoinfo.ru/). The FROST models provide longer timeseries compared to MesoVICT test cases. The Sochi data focuses on winter season, which is very important for the mountainous regions. It will be useful to carry out comparison for two complex terrains: the Alps and the Caucasus with their peculiar features. The COSMO versions will be compared with other models, which is highly beneficial for improvements of models.

Until now, COSMO studies on spatial verification methods have been concentrated mainly on the deterministic precipitation field representation and the useful scales of high- or very-high-resolution models. One of the main aims of INSPECT is to investigate the additional information gained by the application of such methods to other fields such as wind speed, as well as the possibility to apply spatial verification methods to COSMO ensemble forecast systems, such as the COSMO-LEPS.

Almost all groups of methods are involved in INSPECT: in the first place, the most popular neighborhood-based approaches (summarized in Ebert, 2008); features-based approaches (Contiguous Rain Area (CRA) (Ebert and McBride, 2000), method for Object-based Diagnostic Evaluation (MODE) tool (Davis et al., 2006), SAL technique (Wernli et al., 2008)); and scale decomposition. Also, the DIST method developed at ARPA-SIMC (Marsigli, C. et al., 2008) will be studied; the DIST method is a kind of upscaling methods.

Special attention will be given to the verification strategy for analyzing extreme weather events, utilizing the intense precipitation cases that are included in MesoVICT experiments. It will be studied if spatial verification techniques can be successfully used in such cases and if such scores as the EDI, SEDI can be applied to upscaled data.

The R SpatialVx, COSMO VAST package, and IDL Beth Ebert's tool will be used to run the spatial methods.

The first results obtained concern applications at DWD, where the FSS and ETS for the upscaling method are calculated for 6-hr precipitation data over the entire German territory since 2007, providing plots of long-term trend of these indices. It is shown that a lower threshold and larger window give the highest skill. Such plots allow compact representation of the neighborhood scores (Fig. 1).

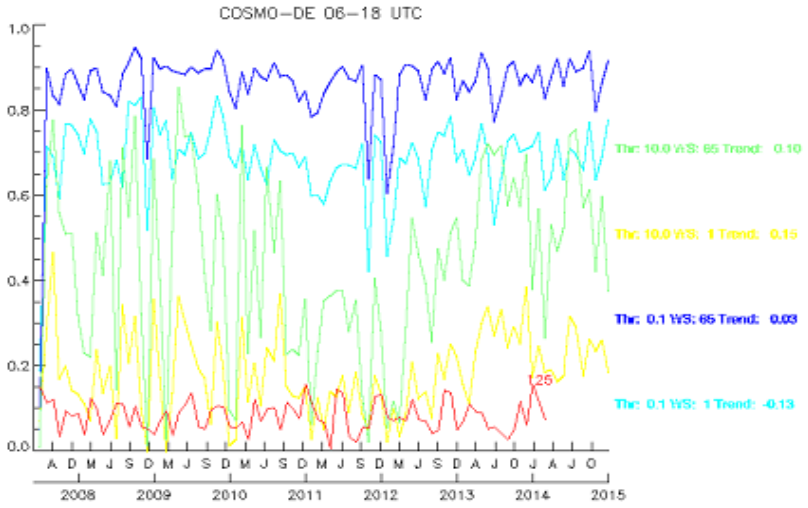

Fig. 1. Time series of the fraction skill score over the whole German territory, COSMO-DE model with 2.8 km resolution, 6h precipitation accumulations (06-18h UTC), for two precipitation thresholds (> 0.1 mm/6h and > 10.0 mm/6h) and two windows (1 and 65 boxes)

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