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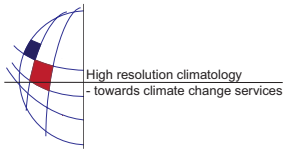

Regional impact studies performed in the COSMO Community

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Abstract

The principle objective of COSMO is the creation of a meso-scale prediction and simulation model system. It is intended to be used as a flexible tool for specific tasks of weather services as well as for various scientific applications on a broad range of spatial scales. Two application of the COSMO model system the regional model COSMO-EU and the convection-resolving model COSMO-DE together with the global model GME form the Numerical Weather Prediction (NWP) model chain at DWD. The COSMO-EU covers the Eastern Atlantic and Europe with 40 vertical layers and a grid resolution of seven km. The COSMO-DE covers Germany, Switzerland and Austria and has a grid resolution of 2.8 km and 50 vertical layers.

The data assimilation scheme for the COSMO models is based on the “nudging technique”, in which the model state is gently relaxed towards the observed values. During the assimilation sequence, the model forecast is corrected using observations at every time step, thus allowing the use of observations made at non-synoptical time scales. At present, only conventional observations are used operationally in both COMSO-EU and COSMO-DE. For COSMO-DE, the operational use of radar-derived rain rates is also included.

Due to technological progress in satellite- and ground-based remote sensing methods, the DWD is intensifying its efforts to use more remote sensing data in its local data assimilation scheme. This presentation will give a summary of recent progress in assimilation of radar-derived rain rates, VAD wind profiles, vertical integrated water vapour content of the atmosphere, derived from GPS signals, and wind profiles derived from the European wind profiler network. In addition, the results of using satellite sounding data and scatterometer wind vectors at 10m height will be shown.

One major finding is, that the use of radar-derived rain rates exert a high impact on the forecast quality of precipitation in the first three to six hours. Thereafter, the impact decreases gradually. Using data from wind profilers and VAD estimates depict a small positive impact on the forecast quality of the COSMO models, whereas the use of scatterometer winds have an overall neutral impact, but in cases of intense low pressure systems over the Atlantic a substantial positive impact on the analysis and forecast of the position and intensity of these lows is obvious.