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A High-resolution Reanalysis for the European CORDEX Region

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Within the Hans-Ertel-Centre for Weather Research (HErZ), the climate monitoring branch concentrates efforts on the assessment and analysis of regional climate in Germany and Europe. In joint cooperation with DWD (German Meteorological Service), a high-resolution reanalysis system based on the COSMO model has been developed.

Reanalyses gain more and more importance as a source of meteorological information for many purposes and applications. Several global reanalyses projects (e.g., ERA, MERRA, CSFR, JMA9) produce and verify these data sets to provide time series as long as possible combined with a high data quality. Due to a spatial resolution down to 50-70km and 3-hourly temporal output, they are not suitable for small scale problems (e.g., regional climate assessment, meso-scale NWP verification, input for subsequent models such as river runoff simulations). The implementation of regional reanalyses based on a limited area model along with a data assimilation scheme is able to generate reanalysis data sets with high spatio-temporal resolution.

The work presented here focuses on the regional reanalysis for Europe with a domain matching the CORDEX-EURO-11 specifications, albeit at a higher spatial resolution, i.e. 0.055° (6km) instead of 0.11° (12km). The COSMO reanalysis system comprises the assimilation of observational data using the existing nudging scheme of COSMO and is complemented by a special soil moisture analysis and boundary conditions given by ERA-interim data. The reanalysis data set currently covers 6 years (2007-2012). The evaluation of the reanalyses is done using independent observations with special emphasis on precipitation and high-impact weather situations.

The development and evaluation of the COSMO-based reanalysis for the CORDEX-Euro domain can be seen as a preparation for joint European activities on the development of an ensemble system of regional reanalyses for Europe.