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High-resolution (Dynamical) Reanalysis for the Euro-CORDEX Region

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Within the recently founded Hans-Ertel-Centre for Weather Research (HErZ), the climate monitoring branch concentrates efforts on the assessment and analysis of regional climate in Germany and Central Europe. In joint cooperation with the German Meteorological Service (DWD), 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. However, global reanalysis data sets only provide a high spatial resolution down to 50-70km and 3-hourly temporal output. Therefore, global reanalyses 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. An approach to account for these deficiencies is the implementation of regional reanalyses which use a limited area model along with a data assimilation scheme to generate reanalysis data sets with higher spatio-temporal resolution.

The work presented here focuses on a regional reanalysis system based on the DWD limited area model COSMO. This approach comprises the assimilation of observational data using the existing nudging scheme of COSMO-EU and is complemented by a special soil moisture analysis (SMA) and boundary conditions given by ERA-interim data. The domain matches the Euro-CORDEX domain (EUR-11), albeit at a higher spatial resolution, i.e. 0.055° instead of 0.11°. Besides the production of the reanalysis, we have strong focus on the evaluation. In addition to the verification of standard parameters with in-situ observations, forward operators have been applied in order to verify with independent remote sensing observations.

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