

ICR5 Abstract

Key area: Applications, user requirements and feedback

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Titel: Validation of COSMO-REA6/2 in respect to renewable energy applications

The ongoing energy transition causes major challenges for many stakeholders due to the spatiotemporal inhomogeneity of renewable energy sources: (1) The transition system operator is challenged to ensure the balancing between energy supply and energy demand. (2) The distribution system operator is challenged to provide the required infra structure from centralized to de-centralized electricity generators. (3) The spot market participants are challenged by dealing with volatile energy supplies. In order to overcome these problems it is crucial to know where, when and to what extent renewable energy can be generated. Atmospheric reanalyses offers interesting opportunities for a posteriori studies, since they provide all relevant meteorological quantities in a gridded and consistent way. Especially, high-resolution reanalyses with grid sizes of a few kilometers allow detailed studies on small scale variability. Therefore, we provide an evaluation of regional reanalyses with respect to renewable energy related quantities such as wind speed and solar energy.

This work focuses on two high resolution reanalyses developed within the Hans-Ertel Centre for Weather Research of the German Weather Service (DWD). The high resolution reanalyses COSMO-REA6 (6 km horizontal resolution, 40 vertical layers) and COSMO-REA2 (2 km horizontal resolution, 50 vertical layers) are based on the operational numerical weather prediction model COSMO. REA6 covers Europe and the Mediterranean region (CORDEX EUR-11 domain), REA2 is limited to Germany and its neighboring regions. The coarser reanalysis is available for two decades from 1995 to 2014 and the finer from 2007 to 2013. Both reanalyses are generated with a nudging scheme to assimilate observations.

In this quality assessment, independent observations of global radiation provided by the Baseline Surface Radiation Network (BSRN) are used. For wind speed evaluation 10 m above ground SYNOP observations serve as verifying “truth”. Vertical wind profiles are compared to measurements from two meteorological masts in Jülich and Hamburg (Germany).

The evaluation shows that while the regional reanalyses have some deficiencies, they show significant improvements for radiation and wind speed scale dependent correlations compared to global reanalyses such as ERA-Interim.