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How do regional reanalyses contribute to renewable energy applications?

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Within the coming decades an accelerated transition from carbon-based energy consumption to renewable energy use is expected. The growing influence of renewable energy production leads to an increasing dependence of the electricity market on weather situations, thus the dispatch of power plants and electricity infrastructure, e.g., electricity grids, are also strongly influenced by local weather conditions.

The availability of renewable energy can be limited due to several weather related risks, for example non-resolving stratus clouds, snowfall, fog, and extreme wind. Compound events with simultaneous reduction of solar, wind and water energy production are especially threatening.

In order to analyse the temporal and spatial dependencies of potentially available renewable energy we will make use of a high resolution reanalysis developed within the Hans-Ertel Centre for Weather Research. For Europe the CORDEX EUR-11 domain is covered with a horizontal resolution of 6 km (COSMO-REA6). It is available for the twenty year time-period from 1995 to 2014. Additionally, an even finer resolution of 2 km (COSMO-REA2) is available for the eight year period 2007 to 2014 for the central European domain, which also assimilates radar measurements. Both reanalyses provide relevant quantities (e.g., wind speed, solar irradiation) at a high temporal resolution of fifteen minutes. Using this unique data set, we will evaluate risks of high-impact weather, identify critical weather constellations and assess their likelihood.