



## **Assessing the diurnal cycle of integrated water vapour and precipitation with highly resolved regional reanalyses and observations over Germany**

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Both integrated water vapour (IWV) and precipitation are important parts of the hydrological cycle with a strong connection between each other. This connection can be investigated by using long-term datasets, e. g. as obtained from atmospheric reanalyses. High-resolution regional reanalysis data for Europe is provided by the Climate Monitoring Branch of the Hans-Ertel-Center for Weather Research. The reanalysis system is based on the non-hydrostatic COSMO model and uses a nudging scheme for the continuous assimilation of observational data. The COSMO reanalysis is available with two different resolutions: a horizontal gridspacing of 6km covers Europe and is available from 1995 to 2015 (REA6), and for Central Europe a 2km grid spacing is available for the years 2007 to 2013 (REA2).

The mean diurnal cycle is characterized by the time of minimum, the time of maximum and the amplitude. The dependency of these characteristics on season, region, and weather situation is assessed for both IWV and precipitation. A distinct diurnal cycle is more pronounced in spring and summer than in autumn and winter. A height dependency is found for the diurnal cycle in spring and summer with higher amplitudes and a shifted maximum for higher elevated stations. For the analysis concerning the weather situation we distinguished between westerly weather situations and non-westerly weather situations. Furthermore, the temporal connection between IWV and precipitation is assessed statistically. As part of the analyses, the COSMO reanalyses are evaluated with independent observations taken from about 180 Global Positioning System (GPS) stations provided by GFZ Potsdam and about 1000 rain gauges of the DWD network.