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Towards a radar-based high-resolution precipitation climatology for Germany – methodology and potential areas of application

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Germany's National Meteorological Service, the Deutscher Wetterdienst (DWD), operates 17 Doppler C-band radar systems, 16 of which have recently been equipped with modern dual-polarization technique. In real-time, DWD offers precipitation data with a horizontal resolution of 1 km x 1 km and a temporal resolution of five (qualitative) to 60 (adjusted to about 1250 automatic gauges) minutes to the general public and professional clients. The complete network, virtually covering the whole area of Germany, has been operating since the year 2000.

Within the framework of a joint research project of the Strategic Agencies' Alliance 'Adaptation to Climate Change' the 15-year set of radar-based reflectivity data has been reprocessed in order to generate a homogeneous high-resolution precipitation analysis for Germany. Improvements in data quality have been achieved by developing and applying specific climatological correction methods as well as implementing additional ground-based gauge data into the adjustment procedure.

As the big advantage of using radar data compared to gauge data is the areal detection of precipitation, the focus is set to extreme precipitation events that for the first time can be detected not only regarding intensity but also spatial extent. This investigation therefore comprises raster-based high-resolution analyses as well as event-based case studies and statistics.

Potential fields of application are, e.g.:

• the climatological analysis of precipitation events' extremities
• the concretization of the damage potential of extreme precipitation events to the public and the infrastructure for the implementation of adaptation measures,
• supporting preventive measures in civil protection and flood prevention,
• the improvement of erosion monitoring in agriculture and forestry, and
• policy advice.

In this talk, we present the methodology of the reprocessing algorithm, give results of the statistical analyses, and show examples of potential applications.