The Radar-based Precipitation Nowcasting System RADVOR of Deutscher Wetterdienst for the support of meteorological and hydrological alert systems

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The RADVOR system of Deutscher Wetterdienst (DWD) operationally generates high-resolution precipitation nowcast products for meteorological and hydrological applications in the context of disaster management.

The German radar composite of the five-minute precipitation rate comprising the 17 sites of the operational weather radar network of DWD serves as input for a tracking algorithm. Precipitation elements are advected along the displacement vector field that is derived from the mapping of similar precipitation structures in successive radar images resulting in precipitation forecasts for the next two hours with an update frequency of five minutes.

For hydrological applications, every 15 minutes the predicted hourly sums of precipitation are quantified making use of the most recent gauge-adjustment procedure assuming persistence of the precipitation frequency distribution.

For winter weather applications the hourly quantitative precipitation sums are combined with the estimated areal weather information based on observations, satellite and NWP data. The resulting phase information is used to analyze and forecast snowfall with potential applications in the forecast of e.g. flight and road conditions, but also in hydrology to determine the discharge efficient precipitation amount.

Concurrent lightning observations and high radar reflectivities define the prerequisites for a qualitative hail analysis and forecast with applications in the context of extreme weather warnings as well as flood protection.

The RADVOR nowcasting products are provided to hydrological management authorities in real-time and are additionally visualized in a client specific weather information system. Within DWD, the RADVOR products are operationally available within the NinJo visualization system and serve as input for the NowcastMIX system that combines multiple data sources to derive optimized, user specific products for operational weather forecasting and warning applications.

Verification studies have been successfully conducted for single weather events. Furthermore, an online monitoring and verification system has been established to guarantee a high-quality nowcast product.