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Improving automated weather warning proposals in AutoWARN using new products based on high resolution meteorological data

Tamas Hirsch, Guido Schröder, Reinhold Hess, and Bernhard K. Reichert
Deutscher Wetterdienst, Offenbach, Germany (tamas.hirsch@dwd.de)

AutoWARN is an operational system developed by the German Weather Service (DWD) with the aim of providing an automated decision support for the weather warning service and enabling its stepwise centralisation. All available meteorological data including observations and NWP weather forecasts are processed in several steps to produce automated weather warning proposals, which can be manually modified by the forecasters. These might serve as a guidance to create their own weather warnings or even be used for fully automated warning products. The system includes several components for post-processing and combining deterministic and ensemble NWP model forecasts, smoothing and homogenizing resulting meteorological fields to create polygons of warning events and manually editing the warning status by modifying the area, level, attributes or even the type of warnings.
Automated weather warning proposals for wind gusts show high quality and have been operationally produced for 2 years. However, the skill of automated proposals for other warning events needs improvement for operational application. Several attempts are being made to increase the skill of these products including the use of new NWP models, the improvement of post-processing techniques and the combination of different forecasts. Another possibility is to use unconventional meteorological data with high temporal and spatial resolution especially for parameters with high variability in time and/or space, though with an insufficient number of conventional observations.
This applies e.g. for heavy rain and snow. In case of heavy rain, small-scale meteorological processes play an important role leading to mostly very high temporal and spatial variability of rainfall. It is difficult to provide a representative distribution of rainfall by using only conventional observations, i.e. stations measuring precipitation in a single point. A product based on the estimation of precipitation using high resolution, gauge adjusted radar measurements was developed to calculate the probability of exceedance of given rainfall thresholds. In case of snowfall, conventional measurements provide very sparse data and are subject to many kinds of errors. As a new approach, high resolution data of a hydrological model developed by DWD for simulating and forecasting snow depth was used to estimate the amount of fresh snow and to identify historical warning events of snowfall.
The presentation provides results connected to using both new products in the process of creating automated weather warning proposals with higher skill.