

NowCastMIX - A fuzzy logic based tool for providing automatic integrated short-term warnings from continuously monitored nowcasting systems

P. M. James, S. Trepte, D. Heizenreder, and B. K. Reichert
Deutscher Wetterdienst, Offenbach, Germany (paul.james@dwd.de)

The German Weather Service's AutoWARN system integrates various meteorological data and products in a warning decision support process, generating real-time warning proposals for assessment and possible modification by the duty forecasters. These warnings finally issued by the forecaster are then exported to a system generating textual and graphical warning products for dissemination to customers. On very short, nowcasting timescales, several systems are continuously monitored. These include the radar-based storm-cell identification and tracking methods, KONRAD and CellMOS; 3D radar volume scans yielding vertically integrated liquid water (VIL) composites; precise lightning strike locations; the precipitation prediction system, RadVOR-OP as well as synoptic reports and the latest high resolution numerical analysis and forecast data. These systems provide a huge body of valuable data on rapidly developing mesoscale weather events. However, without some form of pre-processing, the forecasters could become overwhelmed with information, especially during major, widespread summer convective outbreaks. NowCastMIX thus processes all available nowcast data together in an integrated grid-based analysis, providing a generic, optimal warning solution with a 5-minute update cycle, combining inputs using a fuzzy logic approach. The method includes optimized estimates for the storm cell motion vectors by combining raw cell tracking inputs from the KONRAD and CellMOS systems with vector fields derived from comparing consecutive radar images. Finally, the resulting gridded warning fields are spatially filtered to provide regionally-optimized warning levels for differing thunderstorm severities which can be managed adequately by the duty forecasters. NowCastMIX thus delivers an ongoing real-time synthesis of the various nowcasting and forecast model system inputs to provide consolidated sets of most-probable short-term forecasts.