



Weather Forecast User Oriented System Including Object Nowcasting (WxFUSION): An integrated nowcasting and forecasting system using real-time observations and model data

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This study presents the Weather Forecast User Oriented System Including Object Nowcasting (WxFUSION), a new powerful integrated system for the detailed analysis, nowcasting and forecasting of extreme weather events. WxFUSION combines real-time observations from different data sources (e.g. satellite, radar, and lightning data) with nowcasting tools (e.g. cloud and radar trackers) and numerical model simulations. Generally, these tools have been used individually for a particular purpose independent from each other. Combining them within WxFUSION has the benefit that the assertions of the individual tools, e.g. with regard to the exact location of a particular weather system, its intensity and movement, can be processed and contrasted. Thus, the system provides a more reliable assertion of the future state of a weather system than only one data source or nowcasting tool. The system's core element fuses available data for target weather objects (e.g. thunderstorms) from the various tools accordingly in order to characterize the objects as best as possible. The characterization is accomplished by extracting descriptive attribute parameters and weather elements like lightning density, hail occurrence, development state (growing/decaying) and cloud top height in case of thunderstorms. The implementation and the strength of WxFUSION are exhibited in case studies of thunderstorms and related extreme precipitation events over central Europe.