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Development of a new seamless prediction system for very short range convective-scale forecasting at Deutscher Wetterdienst

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At Deutscher Wetterdienst (DWD) a pilot project has been set up to start the development of its future Seamless INtegrated FOrecastiNg sYstem SINFONY. The aim is to develop a system for ensemble-based storm-scale forecasting from observation time up to +6 h / +12 h forecasts, which integrates nowcasting techniques with numerical model prediction (NWP) in a more or less seamless way. The focus of the pilot project is on severe summertime convective events.

For the first 2 h the storm-scale forecasting and warning relies mostly on observation-based nowcasting products with frequent updates (typically with 5-min intervals) that are available within a few minutes. New NWP forecasts are started only every 3 h after a rather long cut-off time to wait for incoming observational data and are available to the forecaster after a longer computation time. Convection-allowing ensemble NWP is only able to reach/outperform the quality of nowcasting at later forecasting times.

Nowcasting and ensemble NWP are typically treated as two separate and independent methods, and there are few common products available for the forecasters.

The goal of SINFONY is to provide new products from observation time up to +6 h / +12 h for our forecasters combining nowcasting and NWP. To enable the development of these new combined products the currently deterministic nowcasting will be expanded to an ensemble approach and will consider life-cycle information compared to a classical pure advection approach. A further prerequisite to define the best combination of both systems is a thorough comparative verification of nowcasting ensemble and NWP ensemble.

To narrow down the differences between nowcasting and NWP concerning forecast quality and methodology, efforts are undertaken on the one hand by enhancements to both nowcasting and NWP separately and on the other hand by mutual information exchange and combination, to further enhance the quality of both. One component is the assimilation of further high-resolution observational data including 3D-radar-data, Meteosat SEVIRI satellite data and lightning densities. In this context, a Rapid Update Cycle ensemble on the km-scale with hourly updates and advanced model physics is envisaged for the ensemble NWP.