Geophysical Research Abstracts
Vol. 15, EGU2013-5628, 2013
EGU General Assembly 2013

The OASE project: Object-based Analysis and Seamless prediction

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The research group on Object-based Analysis and SEamless prediction (OASE) is part of the Hans Ertel Centre for Weather Research (HErZ). The group consists of scientists at the Meteorological Institute, University of Bonn, the Leibniz-Institute for Tropospheric Research in Leipzig and the German Weather Service. OASE addresses seamless prediction of convective events from nowcasting to daily predictions by combining radar/satellite compositing and tracking with high-resolution model-based ensemble generation and prediction. While observation-based nowcasting provides good results for lead times between 0-1 hours, numerical weather prediction addresses lead times between 3-21 hours. Especially the discontinuity between 1-3 hours needs to be addressed. Therefore a central goal of the project is a near real-time high-resolved unprecedented data base. A radar and satellite remote sensing-driven 3D observation-microphysics composite covering Germany, currently under development, contains gridded observations and estimated microphysical quantities. Observations and microphysics are intertwined via forward operators and estimated inverse relations, which also provide uncertainties for model ensemble initialisations. The lifetime evolution of dynamics and microphysics in (severe) convective storms is analysed based on 3D scale-space tracking. An object-based analysis condenses the information contained in the dynamic 3D distributions of observables and related microphysics into descriptors, which will allow identifying governing processes leading to the formation and evolution of severe weather events. The object-based approach efficiently characterises and quantifies the process structure and life cycles of severe weather events, and facilitates nowcasting and the generation and initialisation of model prediction ensembles. Observation-based nowcasting will exploit the dual-composite based 3D feature detection and tracking to generate a set of predictions (observation-based ensemble) for severe weather events. Both the dual-composite and the observation-based ensemble will be the starting point for model-based predictions via the initialisation of high-resolution model runs for extended warnings. The poster gives an overview of the OASE project.