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Thunderstorm nowcasting, short-range forecasting, and warning for aviation

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Following the European FLYSAFE project, further work on improved forecast products and warning methods on weather hazards for aviation is undertaken at DLR. This presentation focusses on hazards due to thunderstorms and shall give an overview on the current status of our satellite and radar based nowcasting tools Cb-TRAM (Cumulonimbus Tracking and Monitoring) and Rad-TRAM (Radar Tracking and Monitoring) and approaches to fill the gap between now- and forecast timescales by combinations of NWP model data and observations.
Cb-TRAM is a MSG SEVIRI data based algorithm to detect, track, and nowcast different stages in a storms lifecycle from convection initiation (CI) via rapid development to mature storms. Information on CI was improved recently by incorporation of additional data from surface observations and NWP products. Rad-TRAM is performing the detection, tracking and nowcasting of heavy precipitation cells using different radar composites across Europe and Germany.
To fill the gap between nowcast and forecast timescales a thunderstorm probability based on a fusion of NWP data is developed. This probability describes the potential for thunderstorms on each grid point of the NWP model with up to 6 hours lead time. A second approach is a high resolution, rapid update cycle version of the COSMO model around Munich airport called COSMO-MUC.
The multitude of generated information is incorporated in the user oriented forecasting system WxFUSION applying a fuzzy logic data fusion approach. Within WxFUSION easy understandable, unambiguous, and tailored user specific weather objects are generated. These objects are described by simple polygons. The polygons and additional information (as severity, development stage, min. cloud top temperature, max. reflectivity, availability of data, quality of products, etc.) are provided in xml format or as automatic warnings for all stakeholders. Components of WxFUSION have already been tested with success in summer campaigns at Munich airport. Further tests together with the German Meteorological Service, DWD, and a major German airline will follow.