

WxFUSION: WEATHER FORECAST USER ORIENTED SYSTEM INCLUDING OBJECT NOWCASTING

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I. MOTIVATION

Meteorological hazards pose a serious threat all over the world. For instance, thunderstorms endanger air traffic and severe floodings resulting from torrential rainfall endanger the civil population and public facilities. It is therefore necessary to develop forecasting systems for meteorological hazards in order to enable the mitigation of the hazard's effects. This poster presents such a system, the Weather Forecast User Oriented System Including Object Nowcasting (WxFUSION).

II. WxFUSION CONCEPT AND AIMS

WxFUSION aims at combining real-time observations from different data sources with nowcasting tools and numerical model simulations (Fig. 1). This combination 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 interpretation of the future state of a weather system than only one data source or nowcasting tool could give. The system's core element will fuse available data for target weather objects (TWO, e.g. thunderstorms, icing, clear air turbulence) from the various tools accordingly in order to characterize the objects as best as possible. The fusion will use fuzzy logic in order to determine probabilities for the incidence of a hazard and identify severity levels. In addition, by using probabilistic methods WxFUSION aims to close the gap between nowcasting and forecasting.

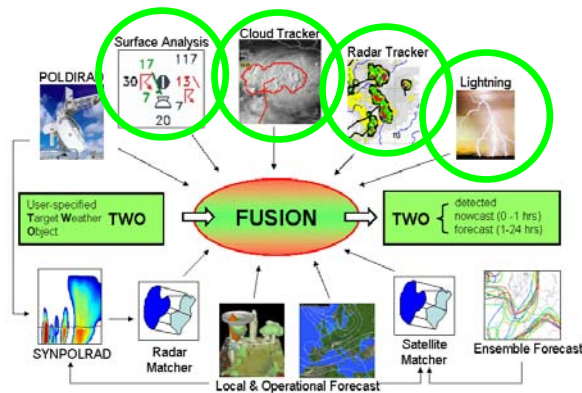


FIG. 1: Schematic diagram of the WxFUSION concept. User specified target weather objects (TWO) are characterized by appropriate information through a fusion of selected nowcasting information (upper half) and forecast products (lower half). The system is under development at present. The green circles mark the components implemented so far.

III. WxFUSION GRAPHICAL USER INTERFACE, OUTPUT AND VALIDATION

The WxFUSION graphical user interface (GUI) enables the overlay of different data sources with results of nowcasting tools and numerical forecasts (Fig. 2). The system is under development at present. So far, satellite, radar, and lightning data as well as results from the DLR cloud and radar trackers (Cb-TRAM and Rad-TRAM) are implemented. The GUI can be adjusted to local conditions and operational requirements. The user can choose his area of interest and identify the TWOs he is interested in. The parameters and attributes for each of the TWOs are dumped into XML files and can be visualized in an extra window. They aim to help the user assessing the risk and danger related to the considered TWO. The implementation and the strength of WxFUSION are exhibited in case studies of thunderstorms and related extreme precipitation events over central Europe.

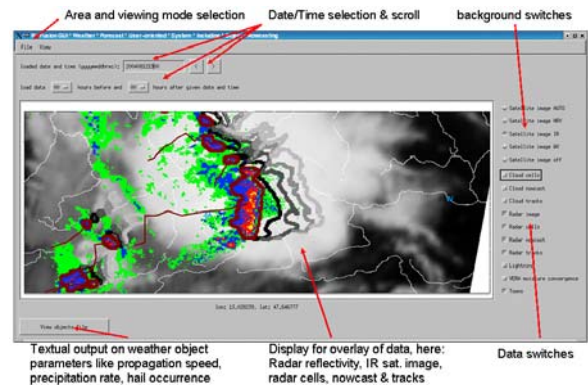


FIG. 2: WxFUSION GUI showing data from different sources (IR satellite image, radar reflectivity, radar cells, nowcast and tracks) over southern Germany and the Northern Alps on 12 August 2004. A squallline was crossing southern Germany on that day.

IV. SUMMARY AND CONCLUSIONS

WxFUSION combines real-time observations from different data sources with nowcasting tools and numerical forecasts. It extracts user-specified target weather objects (TWO) from the various tools and describes them by their parameters and attributes. This is great help for the user (e.g. pilots and air traffic controllers) to assess the risk and the danger related to the considered TWO. In addition, the possibility to overlay data in the WxFUSION GUI enables to examine the assertions of the individual tools and observations.