



## **Systematic investigations of intense convective precipitation events on European scale based on radar- and lightning-cell tracking**

Lukas Tüchler and Vera Meyer

Central Institute for Meteorology and Geodynamics (ZAMG), Vienna, Austria (lukas.tuechler@zamg.ac.at)

The new radar-data and lightning-data based automatic cell identification, tracking and nowcasting tool A-TNT (Austrian Thunderstorm Nowcasting Tool), which has been developed at ZAMG, has been applied to investigate the appearance of thunderstorms at Europe scale. Based on the ec-TRAM-method [1], the algorithm identifies and monitors regions of intense precipitation and lightning activity separately by analyzing sequential two-dimensional intensity maps of radar precipitation rate or lightning densities, respectively. Each data source is processed by a stand-alone identification, tracking and nowcasting procedure. The two tracking results are combined to a “main” cell in a final step.

This approach allows that the output derived from the two data sources complement each other giving a more comprehensive picture about the current storm situation. So it is possible to distinguish between pure precipitation cells and thunderstorms, to observe regions, where one data source is not or poorly available, and to compensate for occasional data failures. Consequently, the combined cell-tracks are expected to be more consistent and the cell-tracking more robust.

Input data for radar-cell tracking on European Scale is the OPERA radar-composite, which is provided every 15 minutes on a 2 km x 2 km grid, indicating the location and intensity of precipitation over Europe. For the lightning-cell tracking, the lightning-detection data of the EUCLID network is mapped on the OPERA grid. Every five minutes, flash density maps with recorded strokes are created and analyzed.

This study will present a detailed investigation of the quality of the identification and tracking results using radar and lightning data. The improvements concerning the robustness and reliability of the cell tracking achieved by combining both data sources will be shown. Analyses about cell tracks and selected storm parameters like frequency, longevity and area will give insight into occurrence, appearance and impact of different severe precipitation events. These studies are performed to support the project HAREN (Hazard Assessment based on Rainfall European Nowcasts, funded by the EC Directorate General for Humanitarian Aid and Civil Protection), which has the objective to improve warnings for hazards induced by precipitation at local scale all over Europe.

### REFERENCES:

[1] Meyer, V. K., H. Höller, and H. D. Betz 2012: Automated thunderstorm tracking and nowcasting: utilization of three-dimensional lightning and radar data. Manuscript accepted for publication in ACPD.