

Modelling of the hail hazard in Germany

Marc Puskeiler, *Karlsruhe Institute of Technology, Germany*

Michael Kunz, *Karlsruhe Institute of Technology, Germany*

Manuel Schmidberger, *Karlsruhe Institute of Technology, Germany*

Every summer half-year, extreme hailstorms cause high amounts of losses due to damage to buildings, crops, cars and critical infrastructure in Germany. In the federal state of Baden-Württemberg, for example, most of the damage to buildings is caused by large hailstorms (1986-2011). According to our analyses of past events, track lengths of these systems can be in excess of several hundred kilometers. The time scale from the initiation of the hailstorm to its maximum damage potential may be less than 30 minutes. Due to the local-scale impacts of a few hundred meters to some kilometers only, hailstorms and their intensities are not captured accurately and uniquely by a single observation system. Therefore, we tried to reproduce tracks of past severe hail events from a combination of different meteorological datasets, such as 2D- and 3D-Radar data, lightning data, Reanalysis and witness observations (e.g., from ESWD), with damage data of insurance companies. Furthermore, a tracking algorithm was applied to the Radar data to analyze also whole tracks of the events.

This approach allows to estimate the number and intensity of hail events in Germany in a very high spatial resolution of 1x1 km². The results show a high spatial variability of the occurrence probability including several hotspots. We found that in particular flow direction, convection potential in terms of convective available energy and orographically-induced flow modifications are most relevant for the spatial variation.