Scenario-based risk analysis of winter snowstorms in the German lowlands

Anja von Wulffen

Federal Office of Civil Protection and Disaster Assistance (BBK), Bonn, Germany (anja.vonwulffen@bbk.bund.de)

The northern German lowlands are not especially known for a high frequency of snowfall events. Nevertheless under certain synoptic conditions Lake-Effect-like phenomena caused by the proximity especially of the Baltic Sea can lead to significantly reinforced snowfall intensities that are often accompanied by rather high wind speeds. This makes for infrequent but potentially disastrous snowstorms in a region less accustomed to snow impacts.

One possible consequence of an infrastructure failure cascade resulting from severe and longer-lasting snowstorms is a regional disruption of the food supply chain. In the context of "just-in-time"-logistics and the accompanying decrease of storage capabilities, this poses a significant threat to the population's food security. Within the project NeuENV ("New strategies to ensure sufficient food supply in case of crisis in Germany") a snowstorm in the German lowlands involving widespread disruptions of the transportation infrastructure as well as power failures is therefore used as one model for future food supply chain disruptions. In order to obtain a reliable evaluation of the supply chain and crisis management resilience, a detailed snowstorm scenario is being developed.

For this purpose, a database of impact reports of past snowstorm events is assembled and analysed to obtain a comprehensive overview of potential infrastructure impairments and failures. Examples of events analysed in this context include the winter 1978/79 with its disastrous snow drifts that commonly attained heights of 3m to 5m leading to a transportation infrastructure collapse across a wide area, the wet snow event in November 2005 in the Münsterland region that caused power failures for up to 250.000 homes, and more recent snowstorms such as Daisy in January 2010. A catalogue of thresholds for relevant parameters indicating when significant failures can be expected is then compiled through a comparison of impact reports with the detailed meteorological conditions. Based on these findings, an exemplary synoptic evolution of a snowstorm leading to representative infrastructure failure cascades is constructed.

In a next step, an extrapolation of this obtained scenario to future climate and societal conditions as well as plausible more extreme but not yet observed meteorological conditions is planned in order to obtain a thorough analysis of possible threats to the German food distribution system and a strong foundation for future disaster mitigation planning efforts.