EMS Annual Meeting Abstracts
Vol. 15, EMS2018-326, 2018

Probabilistic forecasting of freezing rain and wet snow in Hungary

André Simon (1), Somfalvi-Tóth Katalin (2), and Szűcs Mihály (1)

(1) Hungarian Meteorological Service, Forecasting department, Budapest, Hungary (simon.a@met.hu), (2) Kaposvár University, Kaposvár, Hungary (tkokatus83@gmail.com)

The occurrence of freezing rain and wet snow in Hungary is often accompanied by extensive damage on electricity transmission wires and poles. Accretion models applied on the outputs of high resolution NWP forecasts enable to estimate the ice or wet snow loads, or other parameters indicating the severity of the event. These kinds of winter precipitation appear in case of specific temperature stratifications or rather narrow temperature intervals (e.g. between 0 and 2°C for the wet snow), thus, the results are highly sensitive on the precision of the NWP inputs. The study shows that the probabilistic approach has several advantages compared to deterministic forecasting in both short- and medium range. The Admirat (2008) method was used to calculate the accretion of precipitation. For wet snow, the collection coefficient formula of Nygaard et al. (2013) and several snow density estimation methods were applied. The choice of the accretion formula was supported by long range (1965-2016) meteorological observations and statistics. We used the AROME-EPS, ALADIN-EPS and ECMWF-EPS inputs for 2m temperature, dew point, 10m wind and precipitation. The focus of the study was mainly on the high-resolution (2.5 km in horizontal) outputs of the AROME-EPS model. In significant situations, the limited area model forecasts often outperformed the global model EPS outputs, which was not only due to their higher resolution but probably also due to finer microphysical parameterization. For some severe events (e.g. the devastating freezing rain on 30.11.-01.12.2014 in central Hungary), the NWP forecast of the precipitation type appeared to be problematic. Thus, we provided also postprocessing with empirical precipitation-type schemes developed upon long-range statistics or based on the relative topography. The results were verified upon available observations of ice- and wet snow accretion provided by electricity companies, damage records of the Civil Protection and estimates from nowcasting systems and observational data (e.g. AWS, radar data). It is concluded that further investigation of the role of the wind and temperature stratification could increase the accuracy of the ice and wet snow accretion methods. Other ensemble techniques (e.g. SPPT) or use of several different microphysical schemes could also increase the chance of detection and early prediction of severe events, which typically occur on rather small area (meso-beta, meso-gamma scale).

References:

Admirat, P., 2008: Wet Snow Accretion on Overhead lines. In: Atmospheric Icing of Power Networks, Springer Netherlands, 119-169.

Nygaard, K., Egil, B., Ágústsson, H., Somfalvi-Tóth, K., 2013: Modelling Wet Snow Accretion on Power Lines: Improvements to Previous Methods Using 50 Years of Observations. Journal of Appl. Meteorol. Climatol., 52, 2189–2203.