



Numerical forecast of lightning probability over Bulgaria

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Two schemes for forecasting the summer lightning activity will be presented. They are developed based on the two regional NWP models operating in the National Institute of Meteorology and Hydrology in Bulgaria – ALADIN and AROME. The hydrostatic model ALADIN is with a horizontal resolution of 5 km, 105 vertical levels and a forecast range of 72 hours. It takes lateral boundary conditions from the global model operating at Meteo France ARPEGE. The non-hydrostatic model AROME is with a horizontal resolution of 2.5 km, 60 vertical levels and a forecast range of 36 hours. AROME uses as lateral boundary conditions the ALADIN output. The two models are run operationally twice daily, at 06 and 18 UTC. A scheme for lightning probability forecast was developed to determine the forecasted atmospheric instability. It is based on statistical analysis of different instability indices (as K index, Lifted index, Severe Weather Threat index, Total Totals index) computed from ALADIN output for cases with and without detected lightning. Information for lightning activity is taken from the lightning detection network of the UK Met Office, ATDnet. The second scheme for lightning forecast is based on the relationships between cloud microphysics and cloud electrification. It was developed for a more precise in time and space forecast of lightning activity. This scheme uses the forecasted by AROME mixing ratios of different hydrometeors (as cloud water, ice crystals, snow and graupel particles) at different model levels.