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Convective storms over Germany during Pentecost 2014: Numerical sensitivity studies with the COSMO model

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During Pentecost 2014, central Europe was affected by an unusually high number of convective systems leading to severe damages due to strong winds, heavy precipitation, hail, and lightning. In Germany, wind gusts of 144 km/h were observed at Duesseldorf airport and maximum temperatures reached nearly 38 degrees C in southwestern Germany. An almost stationary low pressure system over the northern Atlantic and a ridge stretching from Africa to northern Europe led to very high low-level temperatures due to advection of warm air in combination with solar insolation. We present convection-permitting numerical simulations for two days of this event (8 and 9 June 2014) using the COnsortium for Small-scale MOdeling (COSMO) model. Whereas a reference run with more or less operational settings was successful in reproducing the convective events of the first day, it failed to adequately reproduce the events of the second day. Several sensitivity studies with an enlarged model domain, increased horizontal grid spacing, and using a more sophisticated 2-moment microphysical scheme are conducted to investigate the reasons for model deficiencies and convection initiation in general.