



Validation of satellite-based CI detection of convective storms via backward trajectories

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Within this study, the rapid development and evolution of several severe convective events is investigated based on geostationary satellite images, and is related to previous findings on suitable detection thresholds for convective initiation. Nine severe events have been selected that occurred over Central Europe in summer 2012, and have been classified into the categories supercell, mesoscale convective system, frontal system and orographic convection. The cases are traced backward starting from the fully developed convective systems to its very beginning initial state using ECMWF data with 0.5 degree spatial resolution and 3h temporal resolution. For every case the storm life cycle was quantified through the storm's infrared (IR) brightness temperatures obtained from Meteosat Second Generation SEVIRI with 5 min temporal resolution and 4.5 km spatial resolution. In addition, cloud products including cloud optical thickness, cloud phase and effective droplet radius have been taken into account. A semi-automatic adjustment of the tracks within a search box was necessary to improve the tracking accuracy and thus the quality of the derived life-cycles. The combination of IR brightness temperatures, IR temperature time trends and satellite-based cloud products revealed different stages of storm development such as updraft intensification and glaciation well in most cases confirming previously developed CI criteria from other studies. The vertical temperature gradient between 850 and 500 hPa, the Total-Totals-Index and the storm-relative helicity have been derived from ECMWF data and were used to characterize the storm synoptic environment. The results suggest that the storm-relative helicity also influences the life time of convective storms over Central Europe confirming previous studies. Tracking accuracy has shown to be a crucial issue in our study and a fully automated approach is required to enlarge the number of cases for significant statistics.