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Towards a novel classification of the synoptic-scale meteorological conditions associated with deep convective events

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Understanding the synoptic and mesoscale dynamical processes that lead to convection is of primary importance, also for eventually improving forecasts of convection. This study focuses on the synoptic-scale conditions that are prerequisite to the eventual mesoscale triggering of deep convection. Different meteorological situations can lead to convection (e.g. weak surface pressure gradients, passage of surface fronts, interaction with topography), but their relative importance is not known and may regionally differ. In this study, a set of parameters is determined for intense convective events in Central Europe during summer 2002. Convective events are identified from a newly produced observational data set of precipitation in Germany with 1-hour time resolution. This data set has been obtained through combined use of rain gauge and Radar data. The meteorological parameters are evaluated from ERA40 data within circular areas surrounding the convective event (with radii from 200 to 1000 km); and the list of parameters includes measures of the horizontal pressure and temperature gradients, averaged low-tropospheric stability, integrated precipitable water and the horizontal moisture flux into the area. The statistical evaluation of these physically-based characteristics will help clarify the relative role of these parameters and eventually lead to a comprehensive classification of the large-scale conditions leading to deep convection in different subregions of Central Europe.