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Severe Storm Predictors - Capabilities of Remote Sensing in Central Europe

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Evolution of 72 isolated convective storms, which formed in Central Europe from April to September in 2016 and 2017, is studied by means of multi-sensor observations. According to the reports from the European Severe Weather Database, two categories of storms are classified: severe and non-severe. Based on radar, lightning and satellite measurements, trends of storm characteristics are analysed to ascertain their typical behaviour during whole life-cycles. In order to objectively determine crucial variables for estimating the storm severity, logistic regression models and regularized regressions (elastic net) are employed. Variables from the first 30, 60 and 90 minutes of the monitored storm lifetime are used to show their predictive skill. Results of the models indicate that the essential severe storm predictors of particular remote sensing are: 1) maximum number of strokes per 5 minutes and its sudden increase, 2) radar echo-tops and area of identified reflectivity cores and 3) minimum brightness temperatures in the 10.8 μm spectral band. Similar variables are selected by the elastic net, which can handle sparse data and correlated variables. Further training of the models and their operational adaptations have a potential to bring direct use of these results for nowcasting and improve a real-time warning process.