



Exploring thunderstorm patterns related to severe weather with Lightning Mapping Array data

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It is well-known that the use of lightning data, mixed with radar observations, is a useful indicator on the short-term forecasting of severe weather. The electrical activity is highly related to the strength of the updraft of the storms, and a detailed analysis of the behavior of lightning throughout the storm life-cycle can reveal some patterns linked to the severe weather hazard. In this study, we take advantage of the large capabilities of the Lightning Mapping Array to analyze some classical patterns related to severity (e.g. IC/CG rate, positive anomalies, lightning jump). Furthermore, we analyze also some less-known patterns (e.g., lightning holes, lightning bubbles) as well as changes in mean peak current, electric charge layer mean altitude, structures with inverted polarity, etc.; All in all, seeking to establish which patterns can be good predictors of severe weather phenomena. The data used in this study comes from the first Lightning Mapping Array system deployed in Europe, installed in the Ebro's River Delta in Catalonia (NE Iberian Peninsula). Complementary data includes lightning from LINET, as well as weather radar data from the Meteorological Service of Catalonia.