



Ten-year lightning patterns in Catalonia using Multivariable Analysis

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The main goal of this study is the characterization of the synoptic patterns leading to thundery weather in Catalonia (NE of Iberian peninsula). To this end, a synoptic classification has been obtained using a Multivariable Analysis approach. The study relies on ten years of lightning data (2005–2014), which comes from the database of the lightning location system operated by the Meteorological Service of Catalonia. The thunderstorm events to be classified have been defined as 6-hour periods with more than 100 cloud-to-ground-strokes. The 1507 identified events have been classified using Multivariable techniques. In detail, a Principal Component Analysis (data reduction) is used together with a Cluster Analysis (classification) and Discriminant Analysis (validation). Ten synoptic patterns have been obtained and analysed. In general, the synoptic configurations are related to an atmospheric convection due to a trough in the middle levels of the troposphere. On the other hand, the regional differences are given by the predominant surface flow.