



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.