



Severe weather patterns of a tornadic event associated to a squall line in the western Mediterranean region

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In this study, an attempt is made to identify severe weather patterns that may be useful for the recognition of tornados embedded in mesoscale convective systems or squall lines. Weak tornados are frequent in southern Europe and near the Mediterranean coastal regions in particular, mostly during late summer and early autumn. In particular, the analysis focuses on a storm occurred on the 18 October 2017 that affected the city of Valls (Catalonia), causing several injuries and damaging hundreds of trees, traffic signal and lamp posts. A field damage survey indicated a 6 km linear path with EF1 estimated damage. The tornado was associated to a squall line, which formed perpendicular to the coast and moved from SW to NE, crossing all Catalonia. The region of study is in the area of coverage of one of the two Lightning Mapping Array (LMA) currently operating in Europe, which provides detailed 3D mapping of the cloud lightning channels. Besides, the Lightning Location System of the Meteorological Service of Catalonia (SMC) provided IC and CG lightning data. The study also benefits from the network of C-band Doppler weather radars operated by the SMC. Regarding the case study, the “lightning jump” algorithm of the SMC provided a warning of severe weather for the squall line with a lead time of 20 min. Preliminary results on the LMA data analysis show a “lightning hole”, a lightning-free region immediately above the tornado track.