Plinius Conference Abstracts
Vol. 16, Plinius16-26, 2018
16th Plinius Conference on Mediterranean Risks

Can we predict changes in the trajectories of thunderstorms bearing severe-weather?

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The Mediterranean continental region is an area where severe weather and heavy precipitation occur frequently due to its proximity to a relatively warm sea, the steeped orography that triggers the instability at low levels and its geographical position favourable to tropical and polar air mass invasions. In particular, in Catalonia (NE of the Iberian Peninsula) both type of weather are very frequent, especially during summer and autumn causing important damages and economic loses. This type of weather is mainly produced by all thunderstorms types (isolated, multicell, supercell and inside a mesoscale convective system) which usually follow an anomalous trajectory, this is, don't follow the surrounding path or suddenly changes their track (split, merge, different direction from the neighbors, etc.).

In this sense, the authors recently proposed a new technique to optimize the 3D identification and tracking of the convective cells and to identify the key features when an anomalous motion would take place (del Moral et al, under review). In order to validate how well does the algorithm perform, it has been applied to a selected range of cases of severe (hail, strong wind gusts and or/tornados) and heavy rainfall phenomena that have produced damages in the region of study.These cases comprise different types of thunderstorm, season and orographic environments, and have been extracted from an internal database from the Meteorological Service of Catalonia (SMC) and the INUNGAMA database from the GAMA Team.

The first results show how, before a splitting or merging process, the 3D cells present key features in the reflectivity field, such as multiple cores at a same level, spreading, most of the time, from upper to lower level. Therefore, it can be obtained a "lead time" before the process occurs, which could improve noticeable the monitoring of this type of thunderstorms, and help in a decision-making process in the operative arena.