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New adjustments to the 3D convective cells identification applied to severe weather study cases.

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The nowcasting tools using radar data result essential in the research of severe weather phenomena. The identification of thunderstorms and their properties is probably the main step to follow for making a good short-time forecast. Probably, this point is even more important than the tracking and prediction modules. The importance of this type of tools is reflexed in the fact that most of these analyses are used to feed early warning systems in many countries, helping to reduce the severe weather impacts.

In the last decades, the research on this meteorological field has increased noticeable, defining different nowcasting methodologies which have result very efficient in many events. Nevertheless, sometimes these methodologies are fitted to the severe weather climatology of the region of interest of the country/region where the technique is developed. For instance, a methodology created in the USA for identify thunderstorms, could not be as efficient in Catalonia (NE of Spain). Most of these methodologies are based in a previous 3D identification of the thunderstorms, from intensity and extension thresholds, the obtaining of their characteristics and the following tracking of the centroid (Dixon and Weiner, 1993; Johnson et al., 1998). In some cases, the thresholds are restrictive or are not well fitted to the thunderstorm itself which can derive in an incorrect definition of the convective cores and their subsequent tracking. This is the case, for instance, of some precipitating systems which present more than a convective core, close one to each other and in different evolving phases. Other situations that need an improvement are those cases with isolated thunderstorms that present any kind of anomalous intern process, specially splitting or merging.

This work presents a variant of the 3D identification of convective cells proposed by Rigo and Llasat (2005) that consists on a centroid tracking based nowcasting methodology. In the new version, it has been adjusted the reflectivity and extension thresholds to redefine the convective cells. It has been modified the way the 3D cells are constructed, helping to identify possible changing processes within the same thunderstorm, such splittings or mergings. Three different cases of study are presented, showing the most common severe and adverse weather phenomena in the region of study (Catalonia, NE of Spain). This work has been developed in the framework of the HYMEX project and sponsored by the Spanish project HOPE (CGL2014-52571-R).