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Adv. Geosci., 7, 215-222, 2006
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Study of 11 September 2004 hailstorm event using radar identification of 2-D systems and 3-D cells

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Abstract. The most important hail event recorded in the region of the Ebro Valley (NE Spain) in 2004 was the 11 September episode. Large hailstones (some of them with a diameter of over 30 mm) caused important damages in agriculture and properties. The hail event affected an area of 3848 ha and was caused by several multicellular systems. The aim of this paper is the analysis of the associated convective structures using the meteorological radar as well as the MM5 mesoscale model, thermodynamic data and a hailpad network. To achieve this end, the new hailstorm analysis tool RHAP (Rainfall events and Hailstorms Analysis Program) has been applied. It identifies tracks and characterises precipitation systems and convective cells, taking into account 2-D and 3-D structures. The event has also been studied with the TITAN software (Thunderstorm Identification, Tracking, Analysis and Nowcasting) in an attempt to compare both methods. Results show that the episode had a strong convective activity with CAPE values over 4000 J/kg and with hail-forming cells characterised by VIL (Vertical Integrated Liquid) exceeding 40 kg/m², VILD (VIL density) over 4 g/m³, HP (Hail Probability) of 100% and SHP (Severe Hail Probability) of over 75%. The hail cells evolved into multicellular systems that lasted between 70 and 90 min. Finally, the comparison of RHAP and TITAN has shown significant correlations between methods.

Full Article in PDF (PDF, 2470 KB)

Citation: Ceperuelo, M., Llasat, M. C., López, L., García-Ortega, E., and Sánchez, J. L.: Study of 11 September 2004 hailstorm event using radar identification of 2-D systems and 3-D cells, Adv. Geosci., 7, 215-222, 2006. [Bibtex](#) [EndNote](#) [Reference Manager](#)



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