



Spatial variability of hailfalls in France: an analysis of air mass retro-trajectories

Lucía Hermida (1), Andrés Merino (1), José Luis Sánchez (1), Claude Berthet (2), Jean Dessens (2), Laura López (1), Sergio Fernández-González (1), Estíbaliz Gascón (1), and Eduardo García-Ortega (1)

(1) Atmospheric Physics Group, Environmental Institute, University of León, Spain. E-mail: jl.sanchez@unileon.es , (2) ANELFA, Toulouse, France

Hail is the main meteorological risk in south-west France, with the strongest hailfalls being concentrated in just a few days. Specifically, this phenomenon occurs most often and with the greatest severity in the Midi-Pyrénées area. Previous studies have revealed the high spatial variability of hailfall in this part of France, even leading to different characteristics being recorded on hailpads that were relatively close together. For this reason, an analysis of the air mass trajectories was carried out at ground level and at altitude, which subsequently led to the formation of the hail recorded by these hailpads.

It is already known that in the study zone, the trajectories of the storms usually stretch for long distances and are oriented towards the east, leading to hailstones with diameters in excess of 3 cm, and without any change in direction above 3 km. We analysed different days with hail precipitation where there was at least one stone with a diameter of 3 cm or larger. Using the simulations from these days, an analysis of the backward trajectories of the air masses was carried out. We used the HYSPLIT (Hybrid Single Particle Lagrangian Integrated Trajectory Model) to determine the origin of the air masses, and tracked them toward each of the hailpads that were hit during the day studied. The height of the final points was the height of the impacted hailpads. Similarly, the backward trajectories for different heights were also established.

Finally, the results show how storms that affect neighbouring hailpads come from very different air masses; and provide a deeper understanding of the high variability that affects the characteristics of hailfalls.

Acknowledgements

The authors would like to thank the Regional Government of Castile-León for its financial support through the project LE220A11-2. This study was supported by the following grants: GRANIMETRO (CGL2010-15930); MICROMETEO (IPT-310000-2010-22).