



A refined assessment of recent trends in hail frequency and intensity in France

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The possible increase in hail damage resulting from global warming is a main concern in several European countries. In southwestern France, a former examination of the ANELFA project hailpad data has shown that the yearly frequency of point hailfalls did not change from 1989 to 2009, but that the mean intensity increased significantly. The study was based on the data of 457 hailpad stations, all located in the southern Atlantic and Pyrenean regions, which never moved and were continuously operated during the study period. In order to process a larger data sample (there are now more than 1200 hail measurement stations set in 4 regions of France), the present study uses a grid pattern of 25 km² squares including one or more measuring stations for the computing of seasonal frequencies and intensities. The new study also examines the changes in the mean values of the hail parameters when the data are ordered in a direct or inverse chronological manner from the beginning to the end of the series. Another extension to the initial study is that, aside from an evaluation taking into account all the point hailfalls in which the largest hailstones have a diameter of at least 5 mm (the official definition of hail), a similar evaluation is made for the most serious hailfalls with hailstones larger than 9 mm, because they have the most serious economic consequences, and because a warming in a given region may induce different changes on hailfalls according to mean hailstone diameters.

The results of this new study, now relative to a longer period (1989-2014, 6620 measured hailfalls) are successively given for the Atlantic, Pyrenean, Central, and Mediterranean regions of the ANELFA project. They sometimes show different trends for frequencies and intensities in a same region, and also different trends from a region to another. In the southwestern part of France, the hail core located north to the Pyrenees seems to be spreading over a larger area. For France as a whole, the mean hailfall energy received yearly in a station has increased, but all these computed trends take into account the cyclic variations of hail which have an apparent period of approximately 6 to 7 years, so that a 26-year period (about 4 cycles) is not sufficient to make firm conclusions.