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## Conference on European Tornadoes and Severe Storms

### **Climatology of hail in France**

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Within the framework of a doctoral thesis in geography, we endeavored to draw up the first map showing hail risk in France. The creation of this map required the combination of several statistical sources including climatological data gathered by the network of Météo-France, and data from several hail-measuring networks. This map is corroborated, moreover, by analysis of hail-damage maps. Insurance data used to measure relative hail damage are the base premium rate levels expressed as a percentage of assets insured on a single crop, in this case grapes. These levels reflect well, over the long term, the regional hierarchy of damage, without it being necessarily possible to correlate them directly in terms of frequency or intensity of hail.

The regions that suffer the most hail stretch from the southwest to the east-central area of France, passing through the Massif Central. One must also note the southern Alps as a strongly hail-prone region. The northeast of France is slightly less affected but nonetheless retains a fairly high frequency of hail. From this diagonal line of high hail risk emerge two gradients of decreasing intensity and frequency of hail. Toward the west, the risk of hail diminishes strongly, attaining a minimum level in Brittany and on the English Channel coast. Toward the southeast, hail diminishes near the Mediterranean coast.

The climatological explanations of this map are so far only hypotheses. Hail is not the exclusive feature of a single climate; it seems on the contrary to be the hallmark of regions of climatic contact. The line of maximal hail risk is situated at the frontier between the oceanic and Mediterranean influences, which are sources of instability and heat, respectively. This conflict is readily measurable in the southwest, where the Pyrenees channel the Mediterranean influences at low levels. This map is also the reflection of the probability of occurrence at high altitudes of flow from the southwest. The maps of summer hail frequency worldwide show that mountainous piedmont regions exposed to jet streams are the most affected. In the case of France, the Mediterranean regions are protected by the anticyclonic ridge in summer. This ridge weakens only with the arrival of autumn. The northern

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regions of France undergo less flow from the southwest by the fact of their geographical position with regard to the centers of atmospheric activities, and of a less active thermal convection.