



Assessing the European Severe Convective Storm Risk from ERA-Interim Reanalysis Data and Historic Severe Weather Reports

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Information about localized severe weather events like large hail, severe wind gusts, tornadoes and excessive precipitation is collected on a pan-European level and in a uniform format in the European Severe Weather Database (ESWD). It provides the first dataset which is usable for a comprehensive assessment of the European severe storm climatology. Typical environments for severe weather phenomena were identified, and their climatological probabilities were computed by a comparison of the occurrence (or non-occurrence) of historic severe weather events with underlying atmospheric conditions as resolved by ERA-Interim reanalysis data in the 1979 to 2011 period. A logistic regression based on characteristic grid-scale quantities (like CAPE and 0-6 km vertical wind shear) under the constraint of a Brier Score optimization was used for this purpose.

However, the reporting rate of severe weather events varies in space and time, leading to a more or less pronounced underreporting especially in earlier times and in Southern and Eastern European countries. Hence, the logistic regression was computed separately for each country and each year, and a clustering analysis of the individually optimized regression parameters was conducted in order to segregate a subset of data with a sufficiently high reporting rate. It comprises ten Central European countries since 2006.

The regression derived from this subset was then used to get an estimate for the number of unreported cases throughout Europe. By this means, the “expected” number of severe weather events could be computed for the entire 1979 to 2011 period, which allows a Europe-wide comparison of the risk of large hail, severe wind gusts or tornadoes. After an outline of the methodology, maps of the such derived severe weather risk in Europe and its trend over the past three decades will be the centerpiece of this presentation.