



## Decadal variability and extremes of European winter storm frequency according to the Twentieth Century Reanalysis – a process-oriented analysis

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Winter storms, represented by extensive fields of extreme wind speeds, result from intense extra-tropical cyclones. The most extreme of them cause enormous socio-economical losses over Europe.

As part of the *MiKlip* initiative this study deals with the assessment of decadal variability of synoptic-scale European winter storms in terms of their frequency and analyzes the processes influencing this decadal variability. Analysis subject is the new *Twentieth Century Reanalysis* (20CR) dataset, spanning the period 1871-2008.

The discrete winter storm events are identified by matching the results of two event tracking schemes. One scheme identifies extra-tropical cyclones, based on MSLP and its laplacian, the other is based only on surface wind speeds, thus identifies storm events diagnosed as extensive areas of extreme ( $\geq$  local climatological 98<sup>th</sup> percentile) wind speeds. Hence, the definition of a European winter storm in the context of this study is an extra-tropical cyclone producing synoptic scale fields of extreme surface winds.

Based on this approach, the period of 1871-2008 (ONDJFM) is investigated with respect to decadal variability of extreme winter storms and their frequency. Perennial periods of anomalous high/low European winter storm frequency are analyzed regarding global atmospheric and oceanic conditions – for the latter, taking additionally into account the *HadISST1.1* dataset, which was used to force 20CR – and their spatio-temporal evolution. The aim of this analysis step is to reveal some of the physical mechanisms behind decadal variability of winter storm frequency.

First results indicate a connection between the North Atlantic meridional SST gradient and decadal extremes of European winter storm frequency, as well as some remote influence from the Pacific basin and the tropics in general.