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Local climate extremes and their linkage to large-scale atmospheric features. Part 1 - Ideas and implementations

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A classification of atmospheric features is a useful method to generate subsets of days on which to perform further analyses. They exhibit, depending on the classification procedure used, an improvement in coherence and, in broad terms, a higher degree of within-class similarity than the usage of the entire set of data. This stratification can be done by extracting large scale information from the atmosphere using empirical (e.g., Hess-Brezowsky Grosswetterlagen) or numerical-algorithmic (e.g., EOFs, clustering, et cetera) approaches. What all of these approaches share is the tendency to describe average conditions. What all of these approaches fail to achieve is an adequate description of the behaviour of local extremes.

However, regional extremes and their future development are a topic of high relevance, e.g., for climate impact studies and devising adaptation strategies. An innovative approach to quantify those linakges will be presented. It re-defines the concept of „pattern” and is based upon the the principle that a local extreme can be described by a combination of large-scale atmospheric properties. Thus a pattern is a configuration of the describing properties Pn (e.g. P1 low, P2 low, P3 high, P4 low) and the concept of similarity is applied by identifying best fits of daily "settings" of P1...P4 with respect to dominant instances of these patterns.

Studies concerning the future development of several extremes have been carried out using this methodology. Examples from applications in climate, the climatology of extremes and air quality will be given.