



Two centuries of extreme events over the Baltic Sea and North Sea regions

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In the framework of the BACC 2 (for the Baltic Sea) and NOSCCA projects (for the North Sea region), studies of past and present variability and changes in atmospheric variables within the North Sea region over the instrumental period (roughly the past 200 years) have been investigated. Findings on trends in temperature and precipitation have already been presented. Here we focus on data homogeneity issues and examine how reliable reanalyses are in this context.

Unlike most other regions in the world, there is a wealth of old observations available for the Baltic and North Sea regions, most of it in handwritten form in meteorological journals and other publications. These datasets need to be carefully digitised and homogenized. For this, a thorough quality control must be applied; otherwise the digitised datasets may prove useless or even counterproductive. We present evidence that this step cannot be conducted without human interference and thus cannot be fully automated. Furthermore, inhomogeneities due to e.g. instrumentation and station relocations need to be addressed.

A wealth of reanalysis products is available, which can help detect such inhomogeneities in observed time series, but at the same time are prone to biases and/or spurious trends themselves e.g. introduced by changes in the availability and quality of the underlying assimilated data. It therefore in general remains unclear in how far we can simulate the pre-satellite era with respect to homogeneity with reanalyses based only on parts of the observing system.

Extreme events and changes in extreme situations are more important and of greater (societal) significance than changes in mean climate. However, changes in extreme weather events are difficult to assess not only because they are, per definition, rare events, but also due to the homogeneity issues outlined above. Taking these into account, we present evidence for changes in extrema in the Baltic and North Sea regions. In particular, we will discuss different measures of storminess, compare the persistence of circulation types and investigate to what extent atmospheric circulation over the Baltic and North Sea regions is controlled influenced by distant factors, in particular Arctic sea-ice decline in recent decades.