



Regional patterns of sea level change in the German North Sea in a worldwide context

Thomas Wahl, Torsten Frank, and Jürgen Jensen

University of Siegen, Research Institute for Water and Environment, Siegen, Germany (thomas.wahl@uni-siegen.de, +49 271 7402722)

Sea Level Rise (SLR) is one of the major consequences we are facing in times of a warming climate and it is obvious that a higher sea level influences the heights of occurring storm surges and thus results in a higher risk of inundation for the affected coastal areas. Therefore, regional and global sea level rise are subjects to many recent scientific publications. In contrast, the mean sea level (MSL) and its variability over the last centuries in the German North Sea area have not been analysed in detail up to now. A methodology to analyse observed sea level rise (SLR) in the German Bight, the shallow south-eastern part of the North Sea, is presented. The contribution focuses on the description of the methods used to generate and analyse high quality mean sea level (MSL) time series. Parametric fitting approaches as well as non-parametric data adaptive filters, such as Singular System Analysis (SSA) are applied. For padding non-stationary sea level time series, an advanced approach named Monte-Carlo autoregressive padding (MCAP) is introduced. This approach allows the specification of uncertainties of the behaviour of smoothed time series near the boundaries. The results for the North Sea point to a weak negative acceleration of SLR since 1844 with a strong positive acceleration at the end of the 19th century, to a period of almost no SLR around the 1970s with subsequent positive acceleration and to high recent rates. The comparison between the German North Sea and a global sea level reconstruction clearly reveals the existence of different patterns of SLR. A stronger SLR in the German North Sea area is detected for a period covering some decades starting at the end of the 19th century and for another period covering the last ten to fifteen years. These findings and the indications for the natural variability of this complex system and further research topics will be discussed.

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