

Decadal sea-level changes in the Baltic Sea

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Sea-level change is an issue of increasing scientific and societal importance, due to its potential impacts and its links to a variety of disciplines, ranging from solid earth processes and geodesy to climate. Impacts of sea-level rise can include coastal erosion and flooding, higher waves at the coast as well as salt-water intrusion and stratification with implications for ecosystems. Several factors of different origin interact to increase the risk of flooding and submergence due to the rising sea level. In recent years, the availability of space and in situ observations has considerably contributed to the understanding of the main drivers of the global mean sea-level rise and variability. But it has also revealed more detailed information about regional variability of rates of sea-level change.

This contribution focuses on changes in the long-term trend of Baltic Sea level time-series (tide gauge data and satellite data) by statistically identifying accelerations in sea-level changes which are indicative for a climatic contribution to Baltic Sea level rise and thus help to refine the estimations of Baltic Sea level rise in the future.

Different statistical methods have been applied to identify changes in the rate of change. One method is based on the estimation of multi-decadal linear trends, followed by the estimation of temporal changes in these trends. Another method attempts to fit the sea-level records to a linear and a quadratic, instead of only linear, trend over the whole observed period. As the possible acceleration signal is small, and the overall linear trend is heavily contaminated by the influence of isostatic adjustment, great care has to be put on the estimation of uncertainty ranges.

Preliminary results indicate that the present rates of sea-level rise are not unprecedented. The maximum rates were observed at the turn of the 19th century, and therefore an anthropogenic signal does not yet emerge. However, 200-year long records are best explained if a small acceleration of the rate is allowed for, which may be due to multiple causes.