



Changes in the extreme wave heights over the Baltic Sea

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Storms over the Baltic Sea and northwestern Europe have a large impact on the population, offshore industry, and shipping. The understanding of extreme events in sea wave heights and their change due to the climate change and variability is critical for assessment of flooding risks and coastal protection. The BACCII Assessment of Climate Change for the Baltic Sea Basin showed that the extreme events analysis of wind waves is currently not very well addressed, as well as satellite observations of the wave heights. Here we discuss the analysis of all existing satellite altimetry data over the Baltic Sea Basin regarding extremes in the wave heights.

In this talk for the first time, we present an analysis of 100-yr return periods, fitted generalized Pareto and Weibull distributions, number, and frequency of extreme events in wave heights in the Baltic Sea measured by the multi-mission satellite altimetry. The data span more than 23 years and provide an excellent spatial coverage over the Baltic Sea, allowing to study in details spatial variations and changes in extreme wave heights. The analysis is based on an application of the Initial Distribution Method, Annual Maxima method and Peak-Over-Threshold approach to satellite altimetry data, all validated in comparison with in-situ wave height measurements.

Here we show that the 100-yr return periods of wave heights show significant spatial changes over the Baltic Sea indicating a decrease in the southern part of the Baltic Sea and an increase in adjacent areas, which can significantly affect coast vulnerability. Here we compare the observed shift with storm track database data and discuss a spatial correlation and possible connection between the changes in the storm tracks over the Baltic Sea and the change in the extreme wave heights.