

Baltic+ SEAL: building a sea level product for climate research in a region with jagged coastline and sea-ice coverage

The Baltic Sea is a semi-enclosed peripheral sea of the Atlantic Ocean with depths up to 200 meters, which includes the two main areas in which the use of satellite altimetry has been severely limited since the start of the “altimetry era”: the presence of seasonal sea ice coverage and the proximity of the coast. New technological improvements (e.g. the advent of Delay-Doppler, or SAR, altimetry), improved processing of the signal (retracking) as well as advances in sea-ice classification methods and geophysical corrections (wet tropospheric correction, sea state bias) can nowadays push the exploitation of altimetry observations at a regional scale, despite these challenges.

The ESA project Baltic+ Sea Level (Baltic+ SEAL) is shaped as a laboratory in which advanced solutions in the preprocessing and postprocessing of satellite altimetry can be tested before being transferred to global initiatives, such as the future phases of the Sea Level CCI initiative. The project aims at the exploitation and improvement of the full altimetry era and at the generation of high spatio-temporal resolution grids of sea level anomalies in order to estimate sea level trends, an updated mean sea surface model and a map of seasonal sea level variability.

Here we present the methodology behind the first version of the dataset, as well as the future steps. Moreover, first validation results with tide gauge data and external optical images should assess the reliability of current results and algorithms. Among the processing steps we will describe, there are:

- The application of a homogenous retracking strategy for open-ocean, coastal and sea-ice conditions (ALES+)
- The development of an unsupervised classification method to detect radar echoes reflected by open-water gaps within the sea-ice layer
- The development of a gridded product based on a triangulated surface mesh, characterized by a spatial resolution better than one-fourth of a degree and by an enhanced approaching of coastal areas

The interest of this project is clearly two-sided: on one side it updates the current standards of sea level analysis for the specific exploitation in the study region, on the other side it sets a state-of-the-art altimetry processing chain that could be easily exported to other key areas.

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