

ESA Baltic SEAL project: setting course to advance satellite-derived sea-level products for jagged coastlines.

For Poster Presentation

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Abstract

Global sea level products such as those being produced by the European Space Agency-funded Climate Change Initiative (ESA-CCI) are proving to be instrumental in tracking the effects of Climate Change, and informing coastal communities in need of adaptation. However, measuring sea level using satellite altimeter instruments is particularly problematic in regions featuring complex coastlines. This hampers the exploitation of altimetry for Ireland's Western-facing seaboard. Here, coastal communities face the combined issues of sea level rise, winter storm surges and the storm-driven waves they bring with them. To plan and adapt to existing and future conditions, coastal communities need regionalised information on sea-level. This makes the availability of regional sea-level products, which provide better estimates closer to coasts, increasingly important.

The Baltic Sea, a semi-enclosed peripheral sea of the Atlantic Ocean with depths up to 200 meters, features complex jagged coastlines, and the presence of seasonal sea ice coverage. These are the two main areas in which the use of satellite altimetry has been severely limited since the start of the "altimetry era", with the added benefit of a low tide signal which can complicate understanding the processes affecting the measured signal. New technological improvements (e.g. the advent of Delay-Doppler, or SAR, altimetry), improved processing of the signal (re-tracking) 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 positioned to exploit these advances. The project is framed as a laboratory in which advanced solutions in pre-processing and post-processing of satellite altimetry can be tested before being transferred to global initiatives, such as the future phases of the Sea Level ESA-CCI programme. The project aims to exploiting the latest advances in altimetry era, and generating 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.

The potential impact of this project is multifaceted. It updates the current standards of sea level analysis for the specific exploitation in the study region. It also establishes a state-of-the-art altimetry processing chain that could be easily exported to other key areas. Furthermore, the project will advance our capabilities to gather sea level measurements closer to more complex, jagged coastlines, such as those along the western Irish seaboard. As such it is prudent for Irish stakeholders to engage with the advances offered by the Baltic+ SEAL initiative, and equip themselves to take advantage of opportunities presented by future global product enhancements.

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