

A new high resolution tidal model in the Arctic Ocean

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The Arctic Ocean is a challenging region for tidal modeling, because of its complex and not well-documented bathymetry, together combined with the intermittent presence of sea ice and the fact that the in situ tidal observations are scarce at such high latitudes. As a consequence, the accuracy of the global tidal models decreases by several centimeters in the Polar Regions. It has a large impact on the quality of the satellite altimeter sea surface heights in these regions (ERS1/2, Envisat, CryoSat-2, SARAL/AltiKa and the future Sentinel-3 mission), but also on the end-users' applications that need accurate tidal information.

Better knowledge of the tides will improve the quality of the high latitudes altimeter sea surface heights and of all derived products, such as the altimetry-derived geostrophic currents, the mean sea surface and the mean dynamic topography. In addition, accurate tidal models are highly strategic information for ever-growing maritime and industrial activities in this region.

NOVELTIS and DTU Space have recently developed a regional, high-resolution tidal atlas in the Arctic Ocean, in the framework of an extension of the CryoSat Plus for Oceans (CP4O) project funded by ESA (STSE program). In particular, this atlas benefits from the assimilation of the most complete satellite altimetry dataset ever used in this region, including Envisat data up to 82°N and the CryoSat-2 reprocessed data between 82°N and 88°N. The combination of all these satellites gives the best possible coverage of altimetry-derived tidal constituents. Tide gauge data have also been used either for assimilation or validation.

This paper presents the methodology followed to develop the model and the performances of this new regional tidal model in the Arctic Ocean.