

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 rather scarce at such high latitudes. As a consequence, the accuracy of the global tidal models decreases by several centimeters in the Polar Regions. Accurate tidal models are highly strategic information for ever-growing maritime and industrial activities in this region. In addition, better knowledge of the tides improves the quality of the high-latitude satellite 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.

NOVELTIS and DTU Space, with the expertise support of LEGOS, have developed a regional, high-resolution tidal atlas in the Arctic Ocean, in the framework of the CryoSat Plus for Ocean (CP4O) ESA project. This atlas benefits from improvements in hydrodynamic modelling, high resolution unstructured grid and data assimilation of the most complete satellite altimetry dataset ever used in this region, including Envisat data up to 82°N and 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. The available tide gauge data were also used for data assimilation and validation.

This paper presents the high performances of this new regional tidal model in the Arctic Ocean, compared to the existing global tidal models.