



High resolution tidal modeling in the Arctic Ocean: needs and upcoming developments

Mathilde Cancet (1), Ole Baltazar Andersen (2), David Cotton (3), Florent Lyard (4), and Jerome Benveniste (5)
(1) Noveltis, France, (2) DTU Space, Denmark, (3) SatOC, UK, (4) LEGOS, France, (5) ESA/ESRIN, Italy

The Arctic Ocean is a challenging region for tidal modeling, because of its complex and not well-documented bathymetry, combined with the intermittent presence of sea ice and the fact that the in situ tidal observations are rather scarce at high latitudes. As a consequence, the accuracy of the global tidal models decreases by several centimeters in the Polar Regions. As a consequence 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) are impacted.

Better knowledge of the tides would 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 are currently working on the development of a regional, high-resolution tidal atlas in the Arctic Ocean. In particular, this atlas will benefit from the assimilation of the most complete satellite altimetry dataset ever used in this region, including Envisat and SARAL/AltiKa data up to 82°N and the CryoSat-2 reprocessed data between 82°N and 88°N. The combination of all these satellites will give the best possible coverage of altimetry-derived tidal constituents. The available tide gauge data will also be used either for assimilation or validation.

This paper presents the deficiencies and needs of the global tidal models in the Arctic Ocean as identified using the CryoSat altimetry data, and the on-going work to develop an improved regional tidal atlas in this region.