Enhancing the Arctic Mean Sea Surface and Mean Dynamic Topography with CryoSat-2 Data

Lars Stenseng, Ole B. Andersen, and Per Knudsen

Technical University of Denmark, DTU Space, National Space Institute, Geodesy, Kgs. Lyngby, Denmark
(stenseng@space.dtu.dk)

A reliable mean sea surface (MSS) is essential to derive a good mean dynamic topography (MDT) and for the estimation of short and long-term changes in the sea surface. The lack of satellite radar altimetry observations above 82 degrees latitude means that existing mean sea surface models have been unreliable in the Arctic Ocean. We here present the latest DTU mean sea surface and mean dynamic topography models that includes CryoSat-2 data to improve the reliability in the Arctic Ocean.

In an attempt to extrapolate across the gap above 82 degrees latitude the previously models included ICESat data, gravimetrical geoids, ocean circulation models and various combinations hereof. Unfortunately cloud cover and the short periods of operation has a negative effect on the number of ICESat sea surface observations.

DTU13MSS and DTU13MDT are the new generation of state of the art global high-resolution models that includes CryoSat-2 data to extend the satellite radar altimetry coverage up to 88 degrees latitude. Furthermore the SAR and SARin capability of CryoSat-2 dramatically increases the amount of useable sea surface returns in sea-ice covered areas compared to conventional radar altimeters like ENVISAT and ERS-1/2. With the inclusion of CryoSat-2 data the new mean sea surface is improved by more than 20 cm above 82 degrees latitude compared with the previous generation of mean sea surfaces.