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Arctic sea level study. Satellite and in-situ observations for more than 25 years

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Sea level information is an important Arctic Ocean parameter for an Arctic observing system. However the presence of seasonal or even permanent sea ice limits the way this parameter can be observed.
Tide gauges are available from more than 50 year but are frequently sheltered from the open ocean in rivers severely contaminating the “sea level” observations by river flow variations and ice.
Satellite altimetry is available for more than 25 years from conventional satellites like ERS-1/ERS-2/ENVISAT and SARAL. However, sea level from these satellites are contaminated with sea ice melange and water on sea ice and only monitoring up to 82N. Recently SAR altimeters like Cryosat-2 and Sentinel 3A and B has vastly improved our ability to monitor sea level up to 88N from satellite altimetry enabling altimeters to capture sea level in leads in the sea ice.

We present a new retracked DTU/TUM Sea level observation products for the Arctic Ocean covering the period from 1995-2017 from the ESA satellites ERS2, Envisat and CryoSat-2. A comparison with a former DTU reconstructed sea level dataset from 1950-2010 indicate that sea level in the Arctic Ocean has increased significantly from 2.1 mm (1950-2010) to close to 4 mm today (1995-2017). Both datasets exhibit significant higher trend in the Beaufort Gyre region.

The components of sea level change can be divided into a change of steric height and a change of mass. Where the mass change can be derived from measurements by the GRACE-satellites (06.2002 – 06.2017), the steric component can only be modelled or calculated using T/S-profiles from floats (e.g. ARGO). The DTU/TUM sea level product is compared to these studies and show good agreement.