



Assessment of the Arctic Ocean sea level budget

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The ESA Climate Change Initiative (CCI) Sea Level Budget Closure (SLBC_cci) project includes a dedicated work package for the Arctic Ocean. They focus on the assessment of inter-annual to decadal sea level budget for the high latitude seas and Arctic Ocean for the periods 1993 to 2015 (altimetry era) and 2003 to 2015 (GRACE/ARGO era). Assessment of the Arctic sea-level budget has importance not only for the region's coastal sea level per se, but also for instance for knowledge of circulation systems, freshwater and heat, and the influence of uncertainties in this data sparse area on the global mean estimates.

Absolute budgets of ocean mass, steric and sea surface height are assessed. Among datasets used are ESA Sea Level CCI products, DTU dedicated Arctic sea level data, Arctic Ocean in situ data (e.g., steric height from the EN4 dataset), GRACE ocean mass variation (CSR, JPL, GSFC, ITSG, etc.). The model system TOPAZ provides both steric and sea level change, respectively, as a consistent reference system (2003–2015).

In the Arctic Ocean the time variable sea level pressure might contribute to sea level variations on decadal scales and hence affect the sea level budget with up to 0.4 mm/year. Similarly, annual and seasonal variation in sea ice coverage bias availability of altimetric observations, and the persistent polar gap in observations poses a challenge. And annual sea level variations exceeding 10 cm warrants a closer focus on, and modelling of, the seasonal cycle in sea level and its effect on the sea level budget closure.

We present short term trends and interannual time series of Arctic sea level and its components, with focus on uncertainties, discrepancies and challenges in producing consistent observation-based sea level budgets.