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Improvements of sea level anomaly maps in the Arctic Ocean

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Obtaining satellite data at high latitude regions is generally very problematic. In the Arctic Ocean (For this investigation defined as 65ºN-82ºN), the ERS and ENVISAT sun-synchronous satellite altimetry measurements are nearly always affected by the presence of sea ice. Consequently, it is difficult to get accurate altimetric data for oceanography and climatology and this affect i.e. determination of the linear sea level trend over the regions.
The objective of our study is to develop a new 3 days sea level anomaly maps in the Arctic Ocean. Multi-satellite (i.e. ERS-1, ERS-2 and ENVISAT) along track sea level anomaly data is extracted by applying adjusted editing criteria. Initially, the removal of orbit errors in sun-synchronous satellite altimetry is performed. A joint crossover with simultaneous TOPEX/Jason satellite altimetry, are used to adjust the long wavelength bias and tilt of the ERS-1, ERS-2 and ENVISAT. Subsequently, the adjusted sea level anomalies are gridded to a normal $0.5^\circ \times 0.5^\circ$grid using collocation with a second-order Markov covariance function using spatial temporal interpolation which takes into account data from nearby periods in case of missing data.
The data is then combined with tide gauge data and model outputs, the new data is used to study the sea level variability in Arctic Ocean. The contributors (for example, thermosteric, ice sheets and water mass) to the sea level change in the region are investigated. Moreover, significant decadal signal in sea level variation is found from tide gauge data and its comparison with AO index. The presentation is a contribution to the EU 7th FW supported projects MONARCH-A.