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Sea level annual cycle in sea level from tide gauges, altimetry and ocean models in the Polar Seas

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Lack of adequate spatial and temporal sea level observations in the Polar Seas is one of the most challenging problems in the study of sea level variation and ocean circulation in the regions. The tide gauge data captures local sea level variability with long time span of data. Most of the stations are situated at the Norwegian and Russian border and hereby only observing the easternmost part of the Polar Seas.On the other hand, obtaining satellite data in high latitude regions is generally very problematic.
In the Polar Seas, sea level has a significant annual cycle over the coastal regions. In this work, Simple Ocean Data Assimilation (SODA, 1950-2008) and DRAKKAR (ORCA025-G70, 1958-2004) ocean reanalysis are used in conjunction with tide gauge data and altimetric data to investigate the sea level annual cycle in the Polar Seas. The preliminary results show that the amplitude and phase of sea level annual cycle from different data sources are quite difference with each other for the period 1950-1979 and 1980-2008 over the selected regions. To compare with the results from gridded altimetric sea level anomaly maps (ERS-1, ERS-2 and Envisat), more investigation is performed from 1993 to 2009. Moreover, the annual sea level variation from CryoSat-2 data is used for the cross validation.