Geophysical Research Abstracts
Vol. 21, EGU2019-10617, 2019
EGU General Assembly 2019

The Global Sea Level Budget and its Uncertainties: Results from ESA's Sea Level Budget Closure CCI Project

Martin Horwath and the Sea Level Budget Closure CCI Team
Technische Universität Dresden, Institut für Planetare Geodäsie, Dresden, Germany (martin.horwath@tu-dresden.de)

Studies of the sea-level budget are a means of assessing our ability to quantify and understand sea-level changes and their causes. Closure of the total sea level budget implies that the observed changes of global mean sea level as determined from satellite altimetry equal the sum of observed (or otherwise assessed) contributions, namely changes in ocean mass and the steric component (mainly thermal expansion). Ocean mass changes are either derived from GRACE satellite gravimetry (since 2002) or from adding up individual contributions from glaciers, ice sheets, land water storage (including snow cover) and atmospheric water content. Estimates of steric sea level are obtained from in situ ocean temperature and salinity measurements with additional inclusion of satellite derived sea surface temperature information. Misclosure of the sea-level budget indicates errors in the evaluation of some components or un-assessed elements actually contributing to the budget.

ESA's Climate Change Initiative (CCI) projects include Sea Level CCI, Greenland Ice Sheet CCI, Antarctic Ice Sheet CCI, Glaciers CCI and the Sea Surface Temperature CCI, all addressing Essential Climate Variables (ECVs) related to sea level. The cross-ECV project Sea Level Budget Closure CCI uses various products for the sea level and its components. These are based on data from the CCI projects mentioned above in conjunction with in situ data for ocean thermal expansion (e.g., Argo), GRACE-based assessments of ocean mass change, land water and land ice mass change, and model-based data for glaciers and land hydrology. The involvement of the authors of the individual data products facilitates consistency in product definition and analysis. It also enables a unified treatment of uncertainties of the individual budget elements and their propagation to the overall budget closure.

We report on the results of the global sea-level budget assessment. We focus on two periods: 1993-2016 (the altimetry period) and 2003-2016 (the GRACE / Argo period). For the long-term trend, the global sea level budget is closed within uncertainties on the order of 0.3 mm/yr (1 sigma). Moreover, the budget is also closed within uncertainties for interannual variations. The next step will be to focus on the regional scale.