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TITLE: An improved and homogeneous altimeter sea level record from the ESA Climate Change Initiative

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ABSTRACT:

Abstract. Sea level is a very sensitive index of climate change since it integrates the impacts of ocean warming and ice mass loss from glaciers and the ice sheets. Sea level has been listed as an essential climate variable (ECV) by the Global Climate Observing System (GCOS). During the past 25 years, the sea level ECV has been measured from space by different altimetry missions that have provided global and regional observations of sea level variations. As part of the Climate Change Initiative (CCI) program of the European Space Agency (ESA) (established in 2010), the Sea Level project (SL_cci) aimed to provide an accurate and homogeneous long-term satellite-based sea level record. At the end of the first phase of the project (2010?2013), an initial version (v1.1) of the sea level ECV was made available to users (Ablain et al., 2015). During the second phase of the project (2014?2017), improved altimeter standards were selected to produce new sea level products (called SL_cci v2.0) based on nine altimeter missions for the period 1993?2015 (https://doi.org/10.5270/esa-sea_level_cci-1993_2015-v_2.0-201612; Legeais and the ESA SL_cci team, 2016c). Corresponding orbit solutions, geophysical corrections and altimeter standards used in this v2.0 dataset are described in detail in Quartly et al. (2017). The present paper focuses on the description of the SL_cci v2.0 ECV and associated uncertainty and discusses how it has been validated. Various approaches have been used for the quality assessment such as internal validation, comparisons with sea level records from other groups and with in situ measurements, sea level budget closure analyses and comparisons with model outputs. Compared with the previous version of the sea level ECV, we show that use of improved geophysical corrections, careful bias reduction between missions and inclusion of new altimeter missions lead to improved sea level products with reduced uncertainties on different spatial and temporal scales. However, there is still room for improvement since the uncertainties remain larger than the GCOS requirements (GCOS, 2011). Perspectives on subsequent evolution are also discussed.

SOURCE: Earth system science data

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