

CCI-based Sea Level ECV and GCOS requirements

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Sea level is one of the best indicators of climate change as it integrates changes of several components of the climate system in response to anthropogenic forcing and natural/internal variability. Among the 50 Essential Climate Variables (ECVs) defined by Global Climate Observing System (GCOS) to be monitored on the long time to improve our understanding of the changing climate, 26 are observable from space and among them, the “sea level” ECV. Since 2010, a consistent and continuous sea level record (at global and regional scales) is being produced under the auspices of the ESA Climate Change Initiative (CCI) programme, by combining data from several satellite altimetry missions. This project has led to the production of a homogeneous and accurate sea level record. This was achieved in several steps: 1) the user requirements have been collected and refined; 2) dedicated algorithms and optimized processing strategies were designed and tuned; 3) the geophysical corrections (orbit, atmospheric corrections, etc.) residual errors were reduced using improved algorithms; 4) instrumental drifts and bias have been scrutinized and upgraded. Such an improved product, used in synergy with other CCI ECVs (e.g., “ice sheets”) helps addressing important science questions such as “can we close the sea level budget over the altimetry era?”, “what is the deep ocean contribution to sea level rise and its role in the current Earth’s energy imbalance?”, “what are the causes of the regional and interannual sea level variability?”, “can we already detect the anthropogenic forcing signature and separate it from the internal/natural climate variability?”, etc. Owing to the CCI support, the accuracy of the altimetry-based sea level ECV has been significantly improved at both global and regional scales, which has led to revisit and extend the GCOS accuracy requirements for both space and time segments of the spectrum, especially at regional and decadal time scales. Some efforts are still needed however to improve the sea level ECV at interannual time scale. In this presentation, we will deliver an overview of the importance of the sea level ECV in climate research and report on progress realized within the CCI project.