



## **Accurately measuring sea level change from space: an ESA Climate Change Initiative for MSL closure budget studies**

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Sea level is a very sensitive index of climate change and variability. Sea level integrates the ocean warming, mountain glaciers and ice sheet melting. Understanding the sea level variability and changes implies an accurate monitoring of the sea level variable at climate scales, in addition to understanding the ocean variability and the exchanges between ocean, land, cryosphere, and atmosphere. That is why Sea Level is one of the Essential Climate Variables (ECV) selected in the frame of the ESA Climate Change Initiative (CCI) program. It aims at providing long-term monitoring of the sea level ECV with regular updates, as required for climate studies.

The program is now in its second phase of 3 year (following phase I during 2011-2013). The objectives are firstly to involve the climate research community, to refine their needs and collect their feedbacks on product quality. And secondly to develop, test and select the best algorithms and standards to generate an updated climate time series and to produce and validate the Sea Level ECV product. This will better answer the climate user needs by improving the quality of the Sea Level products and maintain a sustain service for an up-to-date production. This has led to the production of the Sea Level ECV which has benefited from yearly extensions and now covers the period 1993-2014.

We will firstly present the main achievements of the ESA CCI Sea Level Project. On the one hand, the major steps required to produce the 22 years climate time series are briefly described: collect and refine the user requirements, development of adapted algorithms for climate applications and specification of the production system. On the other hand, the product characteristics are described as well as the results from product validation, performed by several groups of the ocean and climate modeling community. At last, new altimeter standards have been developed and the best one have been recently selected in order to produce a full reprocessing of the dataset (performed in 2016) adapted for climate studies. These new standards will be presented as well as other results regarding the improvement of the sea level estimation in the Arctic Ocean and in coastal areas for which preliminary results suggest that significant improvements can be achieved.