

Two Decades of Global and Regional Sea Level Observations from the ESA Climate Change Initiative Sea Level Project

G. Larnicol¹, A. Cazenave², M. Ablain¹, J.-F. Legeais¹, Y. Faugère¹, J. Benveniste¹², B.M. Lucas¹², S. Dinardo¹², J. Johannessen³, G. Timms⁵, P. Knudsen⁶, P. Cipollini⁷, M. Roca⁸, S. Rudenko⁹, J. Fernandes¹⁰, M. Balmaseda¹¹, G. Quartly¹³, L. Fenoglio-Marc¹⁴, B. Meyssignac², M. Scharffenberg⁴, O. Andersen⁶

¹CLS, ²LEGOS, ³NERSC, ⁴University of Hamburg, ⁵CGI, ⁶DTU, ⁷NOC, ⁸IsardSAT, ⁹GFZ, ¹⁰University of Porto, ¹¹ECMWF, ¹²ESA, ¹³PML, ¹⁴TUD

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. After a first phase (2011-2013), the program has started in 2014 a second phase of 3 years. The objectives of this second phase are to involve the climate research community, to refine their needs and collect their feedbacks on product quality, 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. To this extent, the ECV time series has been extended and it now covers the period 1993-2013, with the 2014 additional year available by the end of 2015.

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 21 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, the work plan and key challenges of the second phase of the project are described, including the development of new algorithms that will be used for the 2016 reprocessing of the two decades of altimeter measurements.