



ESA Sea level CCI

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## 1. Statement of overall progress of project

The project is on schedule: the 2011-2013 extension of the v1.1 sea level ECV (WP3 and WP4) has been released in December 2014, together with the 6<sup>th</sup> newsletter, largely distributed at the AGU meeting, where the project has been presented. The first annual review of the phase II of the project successfully took place on 29-30<sup>th</sup> January 2015. The work performed during the first year as well as the plan for the following year have been detailed and the associated deliverables have been provided. Technical developments (WP2) required for the reprocessed version (v2.0) are in progress.

## 2. Impact of the ECV dataset in the science community

In 2014, about 50 users have requested access to the products, which have led to more than 10 000 downloads of the different ECV+FCDR files. The reasons for these requests are associated with analyses of the global sea level change, ocean circulation and sea level rise globally and regionally; ocean dynamics and ocean processes studies, analyses of ocean variability, comparison with ocean models, with tide gauges; comparison with other ECVs (Ocean color, SST); contribution for the design of water limits (coastal infrastructures); contribution for writing a book on climate change and coastal cities.

In addition, the scientific cooperation has been enhanced by the climate Research Group who is comparing the SL\_cci ECV with other sea level datasets produced by international teams. A strong cross-CCI collaboration (SL, SST, Sea Ice, Ice Sheets, Glaciers and Ocean Color ECVs) has been initiated during the workshop on "Integrative study of the Sea Level budget" (International Space Science Institute, Bern, 2-6 Feb. 2015), whose goal was to analyze the possibility of closing the sea level error budget with the use of the different CCI ECVs. Thus, the use of the SL\_cci ECV is not restricted to the sea level science community.

## 3. Project outreach / promotion of the dataset

The SL\_cci ECV was promoted through the project website and numerous international conferences in 2014 (see previous QPR). The project and the ECV time series extension have been promoted at the Dec. 2014 AGU meeting where the 6<sup>th</sup> newsletter of the project has been distributed. The ISSI workshop mentioned above provided the opportunity to promote the SL\_cci ECV within the scientific community. In 2015, the project's presentation as well as results of technical developments will be presented at the EGU, the Sentinel-3 science workshop, the Paris conference "Our common future under climate change", the Eumetsat satellite conference and the OSTST / Coastal Altimetry workshop. The 7<sup>th</sup> newsletter will be distributed at the 2015 EGU. A publication presenting the SL\_cci project and phase I's results has been published (Ablain et al., 2014; see below). User's comments as well as remarks from the CMUG and CRG are being taken into account within phase II.

## 4. Operational provision of datasets

The main limitation for the operational production of the SL\_cci ECV is related to the use of some input data required for the altimeter sea level computation (atmospheric forcing of some algorithms and geophysical correction) which restricts the ECV updates to approximately one year.

## 5. Publications

A publication presenting the SL\_cci project and phase I's results is now available and has already been viewed and downloaded 2500 times for 6 months (as a discussion paper and then a finalized revised paper):



Ablain, M., Cazenave, A., Larnicol, G., Balmaseda, M., Cipollini, P., Faugère, Y., Fernandes, M. J., Henry, O., Johannessen, J. A., Knudsen, P., Andersen, O., Legeais, J., Meyssignac, B., Picot, N., Roca, M., Rudenko, S., Scharffenberg, M. G., Stammer, D., Timms, G., and Benveniste, J.: Improved sea level record over the satellite altimetry era (1993–2010) from the Climate Change Initiative project, *Ocean Sci.*, 11, 67-82, doi:10.5194/os-11-67-2015, 2015.

In addition, the following peer-reviewed papers from the SL\_cci team have been published within the last months (2014-2015):

Cazenave A., Dieng H.B., Meyssignac B., von Schuckmann K. Decharme B. and Berthier E., The rate of sea level rise. *Nature Climate Change*, vol 4, 358-361, DOI: 10.1038/NCLIMATE2159, 2014.

Couhert A.; L. Cerri; J.-F. Legeais; M. Ablain; N. Zelensky; B. Haines; F. Lemoine; W. Bertiger; S. Desai; M. Otten; Towards the 1 mm/y Stability of the Radial Orbit Error at Regional Scales, *Advances in Space Research*, 2014.

Dieng, H.B., Palanisamy H., Cazenave A., Meyssignac B. and von Schuckmann K., The sea level budget since 2003; Inference on the deep ocean heat content. *Survey in Geophysics*. DOI 10.1007/s10712-015-9314-6.

Feng, X., M. Tsimplis, G. Quartly, M. Yelland, 2014, Wave height analysis from 10 years of observations in the Norwegian Sea, *Cont. Shelf. Res.* 72, 47-56. doi: 10.1016/j.csr.2013.10.013

Feng, X., M. Tsimplis, M. Yelland, G. Quartly, 2014, Changes in significant and maximum wave heights in the Norwegian Sea, *Glob. Plan. Change.* 114, 68-76. doi: 10.1016/j.gloplacha.2013.12.010

Henry O., Ablain M., Meyssignac B., Cazenave A., Masters D., Nerem S., Leuliette E. and Garric G., Investigating and reducing differences between the satellite altimetry-based global mean sea level time series provided by different processing groups, *J. of Geodesy*, 88:351-361, doi: 10.1007/s00190-013-0687-3, 2014.

Johannessen J. A., R. P. Raj, J. E. Ø. Nilsen, T. Pripp, P. Knudsen, F. Counillon, D. Stammer, L. Bertino, O. B. Andersen, N. Serra and N. Koldunov (2014) Toward Improved Estimation of the Dynamic Topography and Ocean Circulation in the High Latitude and Arctic Ocean: The Importance of GOCE, *Survey in Geophysics*, Springer, DOI 10.1007/s10712-013-9270-y.

Palanisamy H., Cazenave A., Meyssignac B., Soudarin L., Woppelmann G. and M. Becker, Regional sea level variability, total relative sea level rise and its impacts on islands and coastal zones of Indian Ocean over the last sixty years, *Global Planetary Change*, 2013, doi: 10.1016/j.gloplacha.2014.02.0001.

Palanisamy, H. Cazenave A., Delcroix T. and Meyssignac B., Spatial trend patterns in Pacific Ocean sea level during the altimetry era : the contribution of thermocline depth change and internal climate variability, *Ocean Dynamics*, in revision, 2014.

Rudenko, S., Dettmering, D., Esselborn, S., Schöne, T., Förste, C., Lemoine, J.-M., Ablain, M., Alexandre, D., Neumayer, K.-H. (2014): Influence of time variable geopotential models on precise orbits of altimetry satellites, global and regional mean sea level trends. *Advances in Space Research*, in press, <http://dx.doi.org/10.1016/j.asr.2014.03.010>.

Passaro, M., P. Cipollini; S. Vignudelli; G.D. Quartly; and H.M. Snaith, 2014, ALES: a multi-mission adaptive sub-waveform retracker for coastal and open ocean altimetry, *Remote Sens. Env.* 145, 173-189. doi: 10.1016/j.rse.2014.02.008