



ESA Sea level CCI

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1. Executive Summary

1.1. Scope

The Sea Level CCI responds directly to the GCOS requirements for the Sea level ECV (Product O.2 in GCOS-107) through the generation and validation of multi-mission ECV products from the altimeters on TOPEX/Poseidon and Jason series, as well as ERS1/2, Envisat and GFO. To achieve this global objective, the specific objectives for the Sea Level CCI are:

- To involve the Climate research community to improve the understanding of their needs;
- To develop, test and select the best algorithms and standards in order to produce high quality sea level products for climate applications;
- To assess and collect information on the quality and error characteristics of the Sea Level ECV product through the involvement of independent climate research groups;
- To provide a complete specification of the operational production system that should be developed during the phase 2 of the ESA CCI programme.

1.2. Project Status

For 1 year now, the Sea Level CCI project team has been working on the development of Sea Level Climate products. The first big achievement of this year is the finalization of the User requirements document, a key output of this project. Further, extensive work has been performed on Algorithm development and selection tasks. During this quarter, several algorithms have been finalised, and the first Round Robin datapackage has been produced. There are however two big issues on this task which have been identified during the third SLCCI progress meeting and concern the Input Data recovery and phasing between CCI and ESA reprocessing projects. As a result, a slight delay is expected for certain algorithms. Additional 'Round Robin' (RR) activity will also be required as not all algorithms are expected to be in place after the first RR iteration. Finally, work has continued on the System Requirements, resulting in the delivery of the first systems engineering deliverable, the System Requirements Document, which details the description of a comprehensive and reasoned mapping from a system apt for re-use, namely DUACS, towards a SLCCI operational system. The systems engineering team are now focused on the SLCCI system specification document. During this first year, the Sea Level CCI team has set up connections with other European altimetry projects, and communicated to the international altimetric and climate community. This is a key element in fulfilling the ambitious objectives of this project.

2. Project Status

2.1. User Requirements

The URD was updated following the discussions at PM2 and it was presented at the recent CMUG meeting in Reading, UK. A number of actions were identified in order to take into account the feedback from this meeting. A new version of the URD document is now in preparation. The document will be improved by numbering the requirements and better explaining how the requirements are collected from the Climate Modelling Community. The planned delivery date for this document is the end of June. The URD might then be updated in 2nd phase of the project to catch the evolving views and requirements in the scientific user community. This would also bring special attention to the sea level requirements in the high latitude seas and the Arctic Ocean where the permanent and seasonal sea ice cover cause challenges in the altimeter based sea level processing.



2.2. Data Requirements

30 types of data are necessary to run the algorithms and to perform the inter-comparison and selection task: satellite and ancillary from 6 altimeter missions (ERS-1, ERS-2, Envisat, Jason-1, Jason-2, T/P, GFO) as well as in situ data. Among all the input datasets required, several issues were encountered which have induced a delay in the development planning. Moreover, the availability of reprocessed Envisat dataset will not be phased anymore with the SLCCI WP2 planning and therefore some corrective actions had to be taken. Strong efforts have been supplied by the SL project in terms of coordination: several meeting and teleconferences with ESA and CNES were organised in order to allow the CCI to benefit from the optimal input data from the external projects. Among the data to be ordered, 2 kinds of deliveries were requested: a one shot delivery on the overall period of availability and for data (satellite, ancillary, ...) that are processed operationally. This will allow the generation of the most complete possible sea level ECV time series.

2.3. Products specification

A first version of the PSD has been delivered in March 2011. It has been presented at the integration meeting in order to demonstrate how the product specifications meet the needs of the climate research group in the SL CCI. The requirements concerning the global and regional mean sea level applications in terms of spatial resolution and length of the time data series have been taken into account in the definition of the sea-level ECV. In comparison with sea-level products currently available, new information (crucial for climate studies) will be provided concerning the evolution of the time data series (such as the trend, the description of periodic signals...) and the errors associated.

The PSD is intended to be updated to show traceability with URD requirements. At the third SLCCI progress meeting, it was suggested that the review comments for the URD and PSD should be included in the new versions of the documents by the end of June. The revised version of the PSD is aimed to be delivered in mid July.

2.4. Scientific cooperation

The Sea Level CCI Project is closely connected to international activities related to global and regional analyses of the climate system specifically activities within the WCRP, such as CLIVAR or CLIC. Both are concerned with the Arctic system and its changes. This concerns observations (CLIVAR/GSOP and OOPC), changes in the climate system (CLIVAR/AIP) and specifically sea level (CLIC). In February a joint WCRP/IOC workshop on regional sea level variations and drifts was held in Paris. During the workshop detailed discussions of regional sea level variability was held and the role of the Arctic and its hydrological cycle was highlighted for predictions of regional and global sea level.

The ESA CCI on sea level has also cooperated with two EU projects, notably MONARCH-A (led by NERC) and MyOcean (led by Mercator-Ocean), either through direct collaborations such as envisioned with MONARCH-A or through the interface with MyOcean for which high resolution sea level products should be delivered. The role played by CLS, as leader of the SL Thematic Assembly in MyOcean, ensures a good coordination between the two projects. The work of MONARCH-A is directly related to the CCI effort both with respect to altimetry, but also Arctic tide gauges. At the same time MONARCH-A is a candidate model for bringing several ECVs together in a joint use and evaluation.



The ECV Integration meeting was also a very good opportunity to reactivate the links with the other ECV teams and the modelling community, established at the 1st CCI collocation meeting. Although the sea level ECV does not have a direct linkage with other ECV projects, a potential synergy has been identified with the SST ECV. The correlation between the two ECVs at low frequencies/long term will be useful for the ECV product assessment. It has to be noted that the ESA CCI on sea level will also cooperate with the two soon to be launched CCI projects on sea ice and ice sheet and glaciers.

One outcome from the collocation meeting and the CMUG meeting is that despite its relatively good maturity, the sea level ECV is not really used by the coupled climate models even for validation purposes. The ESA CCI program represents a very good opportunity to enhance the use of the sea level ECV.

2.5. Project Outreach (scientific and public)

The Sea Level CCI web site (www.esa-sealevel-cci.org) has been operational since early November 2010 and has been regularly updated since then. Promotion of the project to the international scientific community has been one of the main objectives of the Sea Level team in 2011. The first occasion was the EGU meeting which was held in early April 2011. The CCI project was presented during the MARCDAT workshop in May 2011 at ESRIN and will also be presented at the IUGG meeting in Melbourne and the WCRP Open Science Conference due to be held in October 2011.

2.6. Next Steps

In 2011 Q3, most of the project's effort will be dedicated to the development of the improved algorithms (WP2000) and the production of the associated Round Robin datapackage which will allow for the tuning of the validation procedure, and to take the necessary steps to prepare for the selection process. This selection process will take place at the end of Q1 2012. Intermediate results will be presented at the annual review in September 2011. The development of the SLCCI prototype will start as planned in July 2011. This processing chain will allow the production of the Phase 1 SLCCI products, which will be validated in 2012-2013 as part of the WP4 task. Finally, regarding WP 5100 the team will continue work on the design of a possible future system, via the System Specification Document (SSD).