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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.

2. Project Status

2.1. Project Initiation

Initial activities have concentrated on requirements analysis, the capture of user feedback and critical gap analysis, with development of the User Requirements Document taking a longer time than foreseen. Preparatory activities and task work commenced in the Earth Observation Group, with algorithm development and integration tasks started.

2.2. Outcome of CCI collocation for project

The first collocation meeting was fruitful as it offered the opportunity to meet other ECV projects and define common CCI objectives. Unfortunately, the sea level ECV does not have direct linkage with other ECV projects, but potential synergy has been identified with the SST ECV as it concerns ECV product assessment and this may help to verfiy the consistency between the sea level and the SST long term variation. The guidelines proposed during the collocation have since been followed, in particular the combination of requirements arising from the CMUG and individual projects.

Discussion also included strategy for CCI system architecture. An efficient and cost effective operational system is important, particularly so as an existing sea level variable system already exists. A system engineering working group (wiki and mailing list, for the sharing of system analysis technical notes, has since been established.

2.3. User Requirements Gathering

Consulted users included the CMUG partners, national and international agencies, individual research institutes and university departments. The synthesis of this user consultation and review of the requirements from the GCOS, WCRP and GOSS programs have been consolidated and reported in the User Requirements Document, delivered to ESA on December 6th 2010.

An interesting outcome of the user feedback was the identification of different applications areas for which the usefulness of a variable is required. However, our understanding of the role of the Sea Level ECV variable for each type of application is different from that which has been stated by

the CMUG, and we plan to address this further in discussion with the CMUG. In particular, this relates to the fact that sea level is not identified for reanalysis, model development and validation applications whereas sea level is identified for model initialisation.

As concluded in the report, analysis of the contributions, and in particular those coming from the GCOS, the ocean topography community and the CMUG, clearly indicate the need to refine the GCOS requirements. In particular, there is a clear need to distinguish requirements by type of climate applications of ocean surface topography signal, such as (i) global mean sea level long term evolution, (ii) regional mean sea level and (iii) mesoscale and coastal signal.

2.4. Data Requirements Definition

33 types of data are necessary to run the algorithms and perform inter-comparison and selection tasks. These comprise of satellite and ancillary data from 6 altimeter missions (ERS-1, ERS-2, Envisat, Jason-1, Jason-2, T/P, GFO) plus in situ data. Most of these are easily retrievable, but others carry risk as they may be lost, unavailable as public data, or unavailable due to their reprocessing schedule.

2.5. Key issues on Algorithms, validation, uncertainties, confrontation with models

Interaction with the CMUG is crucial to understanding the needs of the climate modeling community and to setting a direct link with climate centres. The collocation was an opportunity to make preliminary contact that should be subsequently reinforced thanks to the CMUG meeting.

Work packages tackling algorithm matters, including orbit calculation, instrument processing, high latitude issues and tide corrections, have been run in parallel. This has included, for instance, work on identification of data needs for Point Target Response algorithm cross-comparison and new model implementation for orbit determination.

2.6. Involvement of international partners and projects

The sea level consortium was already highly involved in climate applications and services prior to the CCI, such as through contribution to the IPCC AR4 report. In particular, sea level trends estimation has been delivered on a regular basis to intergovernmental bodies such as CEOS (Committee on Earth Observation Satellites), OOPC (Ocean Observing Panel for Climate) and EEA (European Environmental Agency). Additionally, the project has a direct link with GCOS, CLIVAR, and GODAE Ocean View, via the personal involvement of key consortium personnel (A. Cazenave, D. Stammer, J. Johannessen, and G. Larnicol).

An objective is to promote the use of the Sea Level ECV within the climate modeling community, beginning with the four CMUG centres, namely ECMWF, Hadley Centre, Meteo-France, and MPI. Engagement with the community is ensured by there being sea level consortium involvement, by CLS in particular, with the MyOcean project, for which sea level is a key assimilated variable of near real time and re-analysis products.

2.7. Project Outreach (scientific and public)

The project was presented in the plenary session at the Ocean Surface Topography Science Team (OST-ST) meeting held in Lisbon (Portugal). Also, a Sea Level CCI web site (www.esa-sealevel-cci.org) has been operational since early November 2010, and includes publication of the first Sea Level CCI newsletter.

2.8. Main activities and project deliverables for next quarter (to 6 months)

In 2011 Q1, the development of improved algorithms will intensify. A meeting with all partners is foreseen on January 20th 2011, including one day dedicated to the work package comprising algorithm development, inter-comparison and selection. Splinter meetings will be organized with each partner on specific topics. Also, new partners may join the Sea Level CCI consortium on coastal and tide subjects. With regards to deliverables, the Product Specification Document is expected in 2011 Q1. Specification of data sources, storage/sizing, performance, reprocessing and other constraints necessary for the System Requirements Document will also take place.