

climate change initiative

→ SEA LEVEL NEWSLETTER

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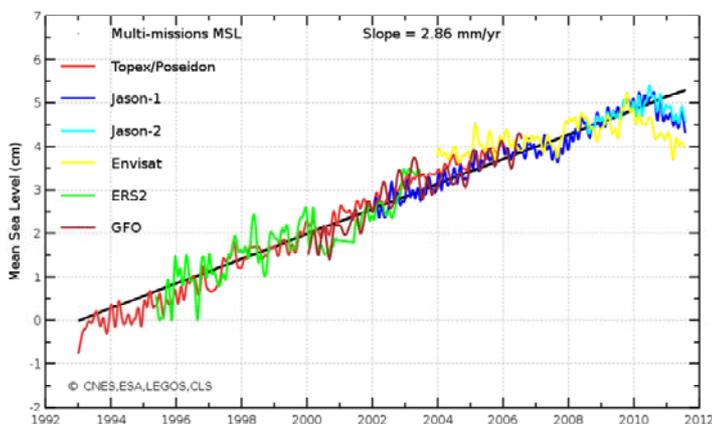


Fig 1: Multi-mission Mean Sea Level



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Happy Birthday.....

We are now nearing the completion of our first year as the Sea Level CCI project team. It has been a very busy year 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. Several algorithms have been finalised, and most of the Round Robin Data Package have been produced. The results, still under analysis, look very promising. The

algorithms tested as part as the CCI/WP2 should deeply improve the estimation of the Sea Level.

There are two 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 is 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 with the international altimetric and climate community. This is a key element in fulfilling the ambitious objectives of this project.

Sea Level CCI project objectives - the main objective of the sea level CCI project is to produce and validate a Sea Level Essential Climate Variable (ECV) product. It represents the first phase of the ESA Climate Change Initiative program that aims at setting up in a second phase an "operational processing capacity of Earth Observation data". In order to achieve this global objective, the specific objectives for this project are: to involve the climate research community, to develop, test and select the best algorithms and standards to assess and collect information on the quality error characteristics and to provide a complete specification of the operational production system. **More Info on the project website:** <http://www.esa-sealevel-cci.org>

Mean Sea Level Elevation: the latest numbers

The global mean level of the oceans is one of the most important indicators of climate change. It incorporates the reactions from several different components of the climate system. Precise monitoring of changes in the mean level of the oceans, particularly through the use of altimetry satellites, is crucial for understanding not just the climate but also the socio-economic consequences of any rise in sea level.

With the satellite altimetry missions, the global mean sea level (GMSL) has been calculated on a continual basis since January 1993. 'Verification' phases, where satellites follow each other in close succession (Topex/Poseidon and Jason-1, then Jason-1 and Jason-2), help to link these different missions by precisely determining any bias between them. Additionally, permanent monitoring of quality during the missions (Cal/Val) and studies of the necessary corrections of altimetry data regularly add to our understanding and knowledge.

The global mean sea level continues to rise at an average rate of 3.2 mm/yr since 1993. However superimposed to this linear trend, we observe interannual variability, with either positive or negative anomalies around the mean trend that coincide with El Nino and La Nina events (Fig.4). In particular, we note that the

recent La Nina event (between mid-2010 and mid-2011) coincides with a large drop of the global mean sea level.

This is better illustrated in Fig.5 which shows the detrended global mean sea level and the multivariate ENSO Index (MEI), an indicator of ENSO (El Nino-Southern Oscillation). Both curves are well correlated: during ENSO warm/cold phases (El Nino/La Nina), global mean sea level displays positive/negative anomalies.

What process is responsible for the observed correlation between ENSO and interannual variability of the global mean sea level? Recent studies (e.g., Llovel et al., 2011) showed that, at least for the 1997-1998 ENSO, the global mean ocean heat content did not increase. Rather, the positive sea level anomaly could be explained by land water storage change in tropical river basins (with land water storage

deficit during El Nino). Could the reverse be also true during La Nina events? I.e., does more water on land correspond to sea level drop (through decrease of ocean precipitation) during La Nina, in particular the most recent event of 2010-2011? This is very likely, all the more that the recent La Nina is now over and global mean sea level is increasing again (see Fig.1). Investigations are currently underway to confirm this.

Reference :

Llovel W., Becker M., Cazenave A., Jevrejeva S., Alkama R., Decharme B., Douville H., Ablain M. and Beckley B., Terrestrial waters and sea level variations on interannual time scale, *Global Planet. Change*, 75, 76-82, doi.10.1016/j.gloplacha2010.10.008, 2011.

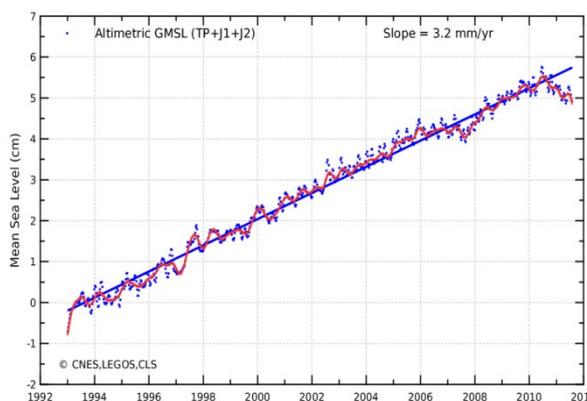


Fig 4: Global mean sea level curve from T/P, Jason-1 and Jason-2 [source AVISO]

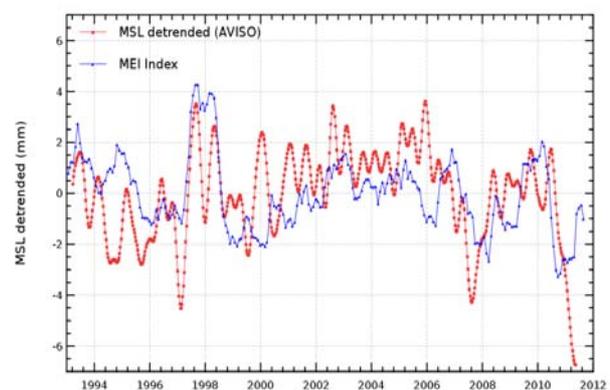


Fig 5: Detrended (altimetry-based) global mean sea level curve and the Multivariate ENSO Index

→ CLIMATE CHANGE INITIATIVE

Meet the team

The project team is comprised of 11 companies/institutes from over 8 countries and has been built to integrate expertise in the fields of Earth Observation and Climate Modelling.

The project team is composed of 11 European partners from the Earth Observations community (CLS, GFZ, IsardSat, DTU Space, LEGOS, FCUP, NOC) and partners from the Climate modelling community (UoH, ECMWF, NERSC), all which hold internationally acknowledged expertise in their respective fields. The consortium is led by CLS, which is responsible for the overall project management and the technical activities that are related to the development and testing of the algorithms as well as the sea level ECV production. Fig. 4 shows the project team gathered for 2nd progress meeting.

*Fig 4: A part of the Sea Level CCI team at the second progress Meeting on the 20th of January.
From the left to the right standing: Paulo Marreiros, Per Knudsen, Gary Timms, Thierry Phulpin, Anne Delamarche, Marie Helene Rio, Estelle Obligis,, Joanna Fernandes, Jerome Benveniste, Anny Cazenave, Sergei Rudenko, Yannice Faugere, Vincent Claverie, Johnny Johannessen, Detlev Stammer, Geoff Buswell.
Sitting: Gilles Larnicol and Michael Ablain*



Upcoming events

The end of the year 2011 will be very intense for the Sea Level CCI project team. The SL CCI project will be represented at the following colloquium and meetings:

The Eumetsat Meteorological Satellite Conference, will take place in Oslo, Norway, 5th - 09th September. The focus in 2011 will be on the assimilation of satellite data into global and regional numerical prediction models.

<http://www.eumetsat.int>

Sea Level CCI Annual Review #1, will take place in Toulouse on the 19th and 20th of September. A complete progress of the project will be presented to ESA and to all the partners of the consortium.

The Ocean Surface Topography Science Team Meeting (OSTST) will take place in San Diego, USA, 19th - 21st October 2011. The theme for this year's meeting will be "Continuity and Complementarity with Other Ocean Observing Systems"

<http://sealevel.jpl.nasa.gov/OSTST2011>

The 5th Coastal Altimetry Workshop will take place in San Diego, USA, 16th - 18th October 2011. Three days devoted to applications of coastal altimetry and synergies with other data sets and to the technical issues in coastal altimetry (retracking, corrections, etc).

<http://www.coastalaltimetry.org/>

The World Climate Research Program (WRCP) - Session Oceans and Climate. This will take place in Denver, Colorado, 24th - 28th October, 2011. This session solicits contributions that address the relationship, and especially the interaction, between the oceans and other components of the climate system (e.g., atmosphere, land, cryosphere, and biosphere) both on global and regional scales.

<http://www.wrcp-climate.org/conference2011/>

AGU Fall Meeting, will take place in San Francisco, USA, 5th - 9th December, 2011.

<http://www.wrcp-climate.org/conference2011/>

Other News ... CCI-SL iPad

ESA is making an iPad application to promote the Sea Level CCI to scientists. It will be presented at the next collocation meeting in October

