

**TERMS OF REFERENCE FOR THE CEOS OCEAN
SURFACE TOPOGRAPHY VIRTUAL CONSTELLATION**

VERSION 1.0

LAST UPDATED: 19 DECEMBER 2013

CONSTELLATION NAME: The Ocean Surface Topography Virtual Constellation (OST-VC)

MISSION STATEMENT & OBJECTIVES

The OST-VC exists to coordinate a sustained, robust capability to observe the surface topography of the global oceans. These observations are central to understanding the variability and dynamics of the oceans, assessing the ocean's role in climate, and sustaining a robust ocean fore-, now- and hind-cast capability. Due to the limitations of current altimetry missions and the nature of ocean variability, a combination of data from multiple altimetry missions is essential.

The OST-VC addresses the following strategic objectives towards this aim:

- Provision of a coordination mechanism to harmonize satellite ocean surface topography payloads, data processing and calibration/validation infrastructures;
- Serving as a programmatic point of contact for the global satellite ocean surface topography measurement system as a whole, addressing issues which go beyond the individual mission programmes, such as orbit optimisation;
- Establishing and maintaining an international consensus on the structure of the minimum altimetry constellation that fulfils user needs;
- Supporting and engaging the active user community, structured through a Science Team for Ocean Surface Topography (as currently implemented by the OSTST whose yearly meetings serve as focal point for international coordination.)

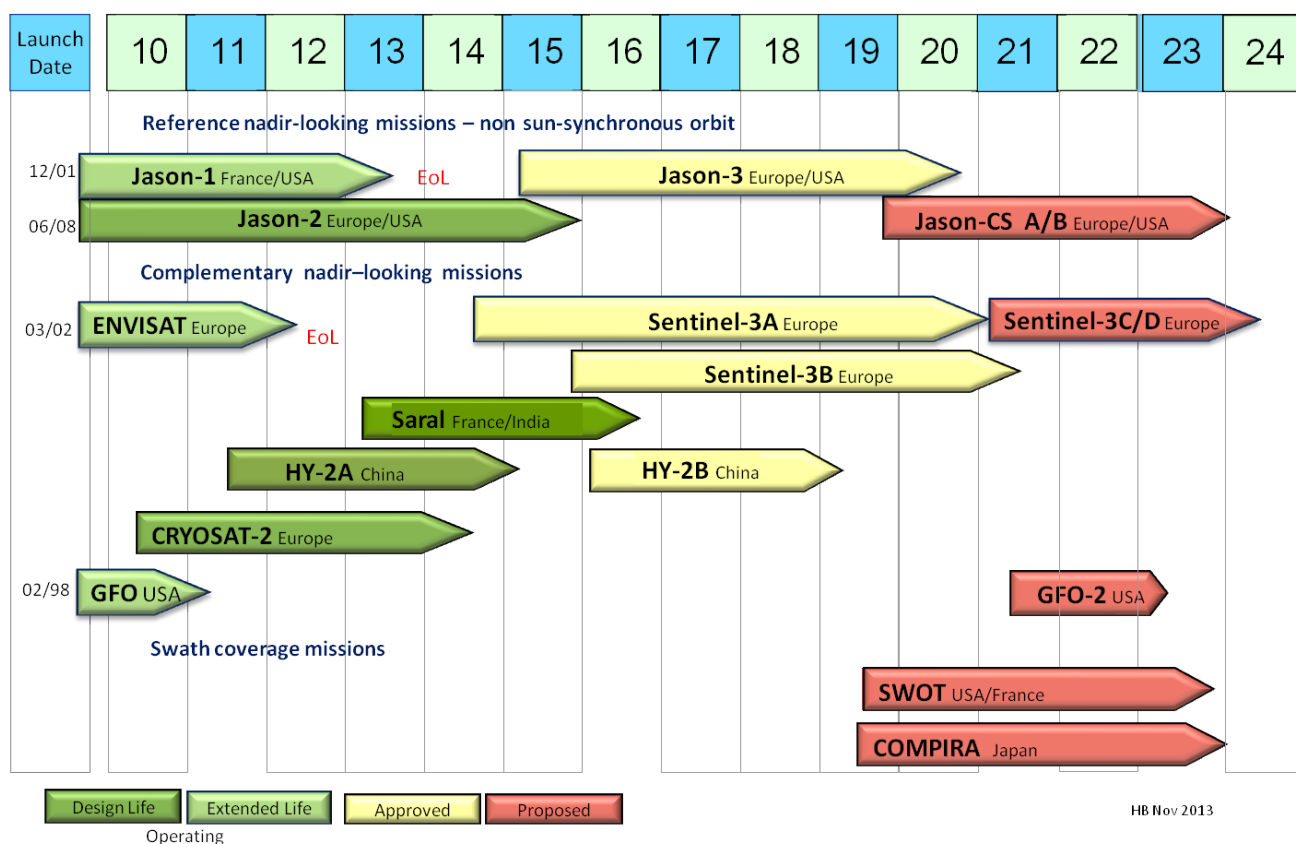
CHARACTERISATION OF THE MEASUREMENTS AND DATA COLLECTIONS WITHIN SCOPE

The geophysical parameter concerning the OST-VC is the height of the ocean surface relative to a level of no motion defined by the geoid, a surface of constant geopotential, and provides information on tides, circulation, and the distribution of heat and mass in the Earth's global ocean.

The OST-VC works with relevant missions and science teams to document compliant level 2 data sets generally known as Geophysical Data Records. The OST community currently maintains data discovery and access to level 2 products primarily through CNES/AVISO, NASA/PODAAC, EUMETSAT and NOAA dissemination and archive systems and support capabilities such as RADS.

The OST-VC will also address higher level (multi-mission) product development.

OST satellite mission product services come with different latencies. Near real time services (3 hours) are available for applications in marine meteorology. Off line product services are available with a 2-3 days or 2 months latency to support respectively mainly operational oceanography and climate applications. In addition, there are re-processing products and services. These are also within the scope of the OST-VC. Another important OST-VC activity is the promotion and development of homogeneous sea level climate data records from past and current space-based sensors, including better specification of uncertainty estimates.



CHARACTERISATION OF THE SPACE SEGMENT CONCERNED

The OST-VC is currently characterized by altimeter missions measuring sea surface height only at the nadir ground track. The core missions (current & future) that are currently the priority for coordination efforts by the OST-VC are defined around a reference mission and complementary missions to enhance the spatial/temporal coverage and resolution:

- Jason-2/3 (Poseidon);
- Cryosat-2 (SIRAL);
- SARAL (AltiKa);
- Sentinel-3-A/B (SRAL)
- HY-2A (ALT).

Future missions of interest include SWOT, Sentinel-3 C/D, HY-2B, Compira, Geo-IK-2 and GFO-2. There are also several past missions of interest, see the above figure.

The current and planned constellation undersamples the ocean surface topography from the perspective of several key user applications. Hence, any additional well-functioning OST mission will substantially enhance/secure the constellation. For the foreseeable future broad-coverage (mapping) missions are planned. Several missions are procured from multi-agency partnerships.

ACTIVITIES, OUTCOMES, AND DELIVERABLES

The OST-VC pursues the inclusion of any well functioning or well defined satellite altimeter mission. These missions may be currently be operational, they may have succeeded their end of life or may be planned near or further foreseeable future. The OST-VC promotes open data access.

In sustainment, the OST-VC wants to maintain user requirements and development guidance documentation from a constellation perspective.

Also the promotion and support of the development of homogeneous sea level climate data records from past and current space-based sensors is considered as a sustained activity of the OST-VC.

Given that the altimeter retrievals over the open and coastal ocean are closely linked to those over inland waters and over sea ice, the OST-VC will maintain a strong liaison with these science and user communities for its activities. Idem for the ocean surface wind community, e.g., the CEOS OSVW-VC.

The OST-VC has identified the following high-level outcomes and deliverables on 3- and 5-year horizons.

	3-year horizon	5-years or more horizon
Space Segment	Support the establishment of the multi-agency Jason-CS program (currently considered as the future reference mission of the virtual constellation) Update the CEOS constellation URD, considering SAR mode altimetry.	Manage the introduction of swath altimetry in the virtual constellation. Update the CEOS constellation URD, considering SAR Mode altimetry
Ground Segment & Information Systems	Develop a cal/val infrastructure catalogue to help the development of future cal/val planning and promote agency coordination. A major interest of the OST-VC is the sustainment of critical cal/val elements.	Develop new cal/val strategies for combined swath and nadir altimetry.
Products & Services	Development a reprocessing strategy for TOPEX/Jason-1 (ENVISAT?) missions. Develop together with the user community guidelines for product harmonization and product uncertainty information. Promote the use of high along-track resolution sampling into the operational ocean models. Co-organize user training. Help user training activities to work from a multi-mission perspective.	Reprocessing strategy for any altimetry mission towards high quality climate data records. Promote the preparation for getting the altimeter swath sampling into the operational ocean models.

Reports to SIT from the OST-VC will emphasise progress towards achievement of these outcomes and deliverables and the issues and obstacles for SIT attention.

IMPLEMENTATION AND COORDINATION ISSUES TO BE ADDRESSED BY SIT

Achievement of the OST-VC objectives requires the following implementation and coordination issues to be addressed by SIT:

1. Support for enlargement of the OST constellation with additional missions by other CEOS member organisations.
2. CEOS agency adoption of open data policies and promotion of free and easy data access for contribution to the ocean surface topography observing system as a whole
3. Facilitation of joint work across data providers to allow for easy inter-calibration and merging.
4. Logistic support for the OST-VC (eg hosting of the VC website).
5. Support for coordinating with other stakeholder agencies and organisations (e.g., GEO, WMO/IOC/JCOMM, GOOS, GCOS) with regard to Ocean Surface Topography.

SCHEDULE

The following table lists major key points for the 3-5 year development of the OST-VC.

Activity	Milestone	Target Date
HY-2A product availability	HY-2A products in AVISO DUACS system	Dec 2013
Sentinel-3 and Jason-CS SAR mode level 1 products	Products definition reviews	2013/2014
OST-VC management	Define OST-VC mailing list including key persons ex-officio involved in the OST-VC activities	Early 2014
Swath altimetry	SWOT MDR and phase B decision	March 2014
Towards “perfect” climate sea level data record	Jason-1 full mission reprocessing	End 2014
CEOS OST URD	Re-visit thr URD and identify necessary updates	2014
Jason-CS decision	Eumetsat program decision	June 2015
	ESA program decision	Mid 2014
	NOAA program decision	End 2015
Continuity of reference altimetry	Jason-3 launch	March 2015
Training activities	Development of training on higher resolution altimetry (SAR Mode, Swath Alt)	2015/2015
	Training jointly with OSVW-VC	2015

MEMBERSHIP AND LEADERSHIP

Current Co-Leads are:

- CNES, Juliette Lambin (Juliette.lambin@cnes.fr)
- EUMETSAT, Hans Bonekamp (hans.bonekamp@eumetsat.int)

And the following CEOS agency representatives are actively involved in OST-VC:

- Mark Drinkwater, ESA
- Eric Lindstrom, NASA
- Laury Miller, NOAA
- Wang Chen, CNSA
- Rashmi Sharma, ISRO
- Gregg Jacobs, NAVY
- Norisama Ito, JAXA

Other persons should be involved ex-officio in OST-VC coordination. A mailing list will be maintained by the co-leads.

The costs of the OST-VC should be marginal compared to costs of the individual mission programmes. Larger OST-VC activities which go beyond basic CEOS coordination should be funded by the participating members on a case by case basis.