Terms of Reference for the CEOS Sea Surface Temperature Virtual Constellation

Version 3.1

Last Updated: 14 June 2024

**Constellation Name:** The Sea Surface Temperature Virtual Constellation (SST-VC)

Mission Statement & Objectives

The SST-VC exists to foster the best quality sea surface temperature data and their availability for applications across all relevant spatial and temporal scales in the most effective and efficient manner through international collaboration, scientific innovation, and rigor.

The SST-VC addresses the following strategic objectives to address this aim:

* Maintain a strong and mutually supportive relationship and interface between CEOS and the activities of the Group for High Resolution SST (GHRSST);
* Foster better engagement by Nations operating or preparing satellite SST sensors;
* Work to assure the long term continuity of all necessary space-based components including passive microwave and dual-view, high quality IR reference-sensor SST data;
* Synthesize the driving requirements for SST measurements from space;
* Support outreach, education and development of new SST practitioners;
* Promote GHRSST standards for satellite SST;
* Advocate priority areas for funding of SST activities;
* Promote the sharing of data.

Characterisation of the measurements and data collections within scope

The geophysical parameter concerning the SST-VC is Sea Surface Temperature measured by infrared and passive microwave satellite sensors supported by in situ measurements required for quality control.

The SST-VC works with GHRSST to publish technical guidelines for GHRSST compliant datasets known as the GHRSST Data Specification (GDS). CEOS Agencies wishing to contribute their datasets to GHRSST and the SST-VC conform to the GDS. GHRSST and the SST-VC maintain data discovery and access to all GHRSST-formatted products, using the GHRSST Global Data Assembly Centre, the GHRSST Long Term Stewardship and Reanalysis Facility, GHRSST Regional Data Assembly Centres, and the CEOS-WGISS Integrated Catalogue as appropriate.

Characterisation of the space segment concerned

The SST-VC addresses all SST-capable space-based platforms as well as relevant in situ platforms, including but not limited to polar and geostationary orbiting platforms, infrared and microwave-based sensors, in situ radiometers, surface drifters, moored buoy arrays, and near-surface profiling instruments – implicating a large number of CEOS agency missions. The core missions that are currently the priority for coordination efforts by the SST-VC are:

* Metop series (AVHRR/IASI-A/B);
* NOAA POES series (AVHRR)
* NOAA JPSS series (VIIRS);
* Suomi NPP (VIIRS);
* Sentinel 3A/B (SLSTR);
* GCOM-W series (AMSR2)
* TRMM (VIRS/TMI)
* TERRA/AQUA (MODIS/AMSR-E)
* Coriolis (WindSat – inactive since December 2020)
* METEOSAT series (SEVIRI/MVIRI/FCI)
* GOES series (Imager)
* MTSAT series (IMAGER)
* HY series (COCTS/RAD)
* FY series (Imager)
* INSAT-3D series (Imager)
* COMS series (Imager)

With the following future missions being of particular importance:Sentinel-3 (SLSTR), GCOM-C (SGLI), JPSS (VIIRS), GOES-R (Imager), MTG (FCI), and FY-4 (MCSI). SST-VC activities include coordination of capabilities of a much broader range of CEOS agency missions and instruments.

Other SST-VC activities include the coordination of homogenous SST climate data records from past space-based sensors (dating from the early 1970s), better specification of uncertainty estimates within SST products, better use of reference sensors (e.g., ENVISAT AATSR and the Sentinel-3 SLSTR) within the Constellation, and efforts to assure the long-term continuity of passive microwave SST data.

The CEOS Missions, Instruments and Measurements database (available at <http://database.eohandbook.com/>) provides a comprehensive reference for SST missions. Not all of these missions are currently contributed to GHRSST and the SST-VC.

Activities, Outcomes, and deliverables

The SST-VC has identified the following high-level outcomes and deliverables on 3- and 5-year horizons. Annual activities leading toward these longer-term outcomes are identified and updated each year in the separate SST-VC Implementation Plan document.

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|  | 3-year horizon | 5-years or more horizon |
| Space Segment | * Documented plan for the required virtual constellation
* The 2015 constellation will have many of the core elements required to satisfy the main user requirements (with the planned launch of the first Sentinel-3 (with SLSTR) closing the current gap in dual-view IR capability).
 | * It is hoped that sustained effort will sustain C-band passive microwave SST products and develop a real aperture capability approaching 10 km.
* Dual-view IR reference sensor is expected to be reinstated with the launch of Sentinel-3 SLSTR.
* An optimistic launch schedule suggests that the IR imaging capability is well supported.
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| Ground Segment & Information Systems | * 100% of GHRSST Products Discoverable through the CEOS IDN and CWIC system
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 |
| Products & Services | * GDS2.0 specification in widespread use; Fully developed Climate Data Assessment Framework (CDAF)
* International exchange of common-specification data sets in place for many (but not all) SST satellite sensors
* Basic uncertainty information attached to some data sets
 | * SST Climate Data Assessment Framework (CDAF) implemented routinely for all GHRSST data designated as ECV products.
* International exchange of all SST satellite data sets using common specifications.
* Uncertainty estimates attached to all SST data sets
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Reports to SIT from the SST-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 SST-VC objectives requires the following implementation and coordination issues to be addressed by SIT:

1. The necessary CEOS agency participation in the generation of SST data products and coordination activities.
2. CEOS agency participation in Satellite SST metrics to assess, monitor and improve the collective SST capability for user communities.
3. Support to the SST-VC activities striving to achieve and maintain standards based traceability for on-orbit validation activities (i.e. in situ radiometer round-robin activity).
4. Endorsement of the SST-VC white paper describing and justifying the overall scope and components of the CEOS SST- Virtual constellation.

Schedule

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| Activity | Milestone | Target Date |
| 1. Develop and optimize the SST constellation | Develop a White Paper describing and justifying the SST- Virtual constellation. | Sept. 2015 |
| 2. Develop and implement metrics for SST services, products, and users | Focus discussion at 2014 GHRSST/SST-VC workshopPreparation of position paper | June 2015September 2015 |
| 3. Coordinate consensus SST reference documents | Publish updated GHRSST Data Specification 2.0 (GDS2). | Annually |
| 4. Encourage timely access to products | 53/60 GHRSST now fully integrated in IDN/CWIC (WGISS) | Complete by Sept. 2014 |
| 5. Develop and improve the satellite SST ECV | Complete and publish the SST Climate Data Assessment Framework (CDAF) | 2014/15 |
| 6. Improve SST calibration, inter-calibration, and validation | Hold an IR radiometer inter-comparison exercise building on the ISSI focus group conclusions | 2015 |

SST-VC meets normally once per year in conjunction with the annual GHRSST Science Team Meeting

More details of the SST-VC schedule of activities and milestones is maintained and updated annually in the separate SST-VC Implementation Plan document.

Membership and leadership (as of June 2024)

Current Co-Leads are:

* SANSA, Christo Peter Whittle (Cwhittle@csir.co.za)
* JAXA, Misako Kachi (kachi.misako@jaxa.jp)

And the following CEOS agencies are actively involved in SST-VC:

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Resources

The SST-VC leverages existing contributions by participants in GHRSST and on a volunteerism basis with additional resources provided by member Agencies (e.g. ESA Climate Change Initiative, Support to the GHRSST Project Office, NASA PO.DAAC, NOAA NODC data stewardship)