



Terms of Reference

GHRST Science Team,
Edited by GHRST Project Office
Version 2.1

1 Introduction

Accurate knowledge of sea surface temperature (SST) distribution and how it changes in time has become a subject of critical importance to many endeavours worldwide including those of interest to, and supported by, many agencies. It is essential for a diversity of tasks such as climate variability monitoring, seasonal forecasting, decadal predictions, operational weather and ocean forecasting, military and defence operations, ecosystem assessment, tourism and fisheries research. SST is an ocean variable that is readily measured by satellites and in situ sensors. It is increasingly needed as a key input to prediction systems in which it constrains the modelled upper-ocean circulation and thermal structure, and regulates the exchange of energy and gases between the ocean and atmosphere in coupled ocean-atmosphere models. Furthermore, SST is one of the most established climate variables and an endorsed GCOS Essential Climate Variable (GCOS-92).

In 2002, the Global Ocean Data Assimilation Experiment (GODAE), recognizing that none of the many sources of SST measurements then available could meet the stringent accuracy and timeliness criteria required for operational ocean prediction (0.4K, within 6 hours of time of measurement), initiated a GODAE Pilot Project to address their needs. This became the GODAE High-Resolution SST Pilot Project (GHRSSST-PP), which sought an international consensus based on collaboration between SST data producers and major operational users. The GHRSSST-PP has succeeded in transforming the way satellite SST data sets are developed, shared and applied in modern oceanography, meteorology and climatology by establishing internationally agreed methods, formats and procedures in a framework that coordinates satellite SST data sets produced in near-real time.

At the 9th International GHRSSST-PP Science Team meeting (hereafter G-IX), held 9th – 13th June 2008, in Perros-Guirrec, Brittany, France, it was agreed that the GHRSSST-PP had reached a maturity that enables it to be transitioned from a Pilot Project of GODAE to a self-standing group that should continue to coordinate the application and development of satellite and in situ SST data sets. It did so to the benefit of operational, scientific and climate user communities, working closely with Space Agencies and international agencies tasked with the provision of satellite SST data sets. Furthermore, as the GODAE project officially ended in 2008, there was a need to reconstitute formally the GHRSSST-PP to continue these important activities. The Science Team at G-IX proposed that the new entity be called the Group for High Resolution SST (GHRSSST). This approach was fully endorsed by the GHRSSST-PP Stakeholders during the GHRSSST-PP Project Office Advisory Board meeting 12th June 2008.

The purpose of this document is to set out clearly the aims, terms of reference and fundamental structure of the new GHRSSST. It includes recommendations made in plenary at G-IX, and reflects the evolution of GHRSSST in the period since. This latest document includes updates from a review of the GHRSSST structure made in plenary at G-XVII.

2 The aim of the Group for High Resolution Sea Surface Temperature

It was agreed at G-IX that the main aim of the international GHR SST is:

To develop and nurture cooperation and progress at the world scale in the subject area of satellite Sea Surface Temperature

Although there is a network of SST observations from ships and buoys, the only way to achieve this demanding specification is to use an integrated approach built on four principles:

- (1) Respond to user SST requirements through a consensus approach,
- (2) Organise activities according to principles of subsidiarity¹ and shared responsibility,
- (3) Develop complementarity between independent measurements from earth observation satellites and in situ sensors and,
- (4) Maximise synergy benefits of an integrated SST measurement system and end-to-end user service.

¹ Subsidiarity is an organizing principle that calls for matters to be handled by the smallest, lowest or least centralized competent group.

3 Terms of Reference

Terms of Reference for GHRSSST are:

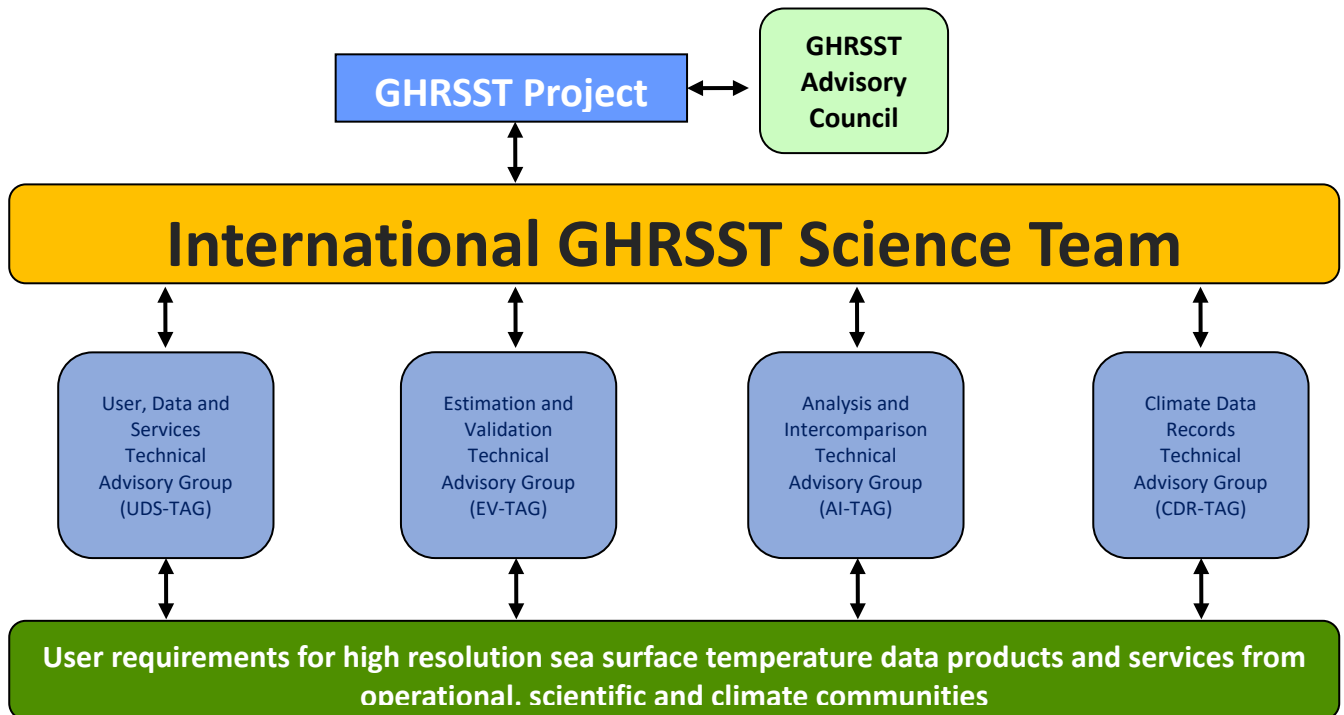
1. **To develop consensus within the international SST community** about key issues of satellite-SST science and technology, and to communicate the collective view to those who set the specifications of new instruments, those who operate satellite SST sensors and those who develop, distribute and archive SST data products. Activities to achieve this include:
 - a. Construct and maintain a partnership, at the international level, between the space agencies and the users of satellite-SST data to develop and coordinate data utilization. The priorities and activities of the partnership are embodied in the evolving GHRSSST Development and Implementation Plan (GDIP).
 - b. Manage, develop and monitor the GHRSSST Regional/Global Task Sharing (R/GTS) framework in cooperation with other bodies and systems according to the principles of subsidiarity²
 - c. Maintain an international Science Team of experts in all aspects of SST;
 - d. Maintain the GHRSSST Data Specification (GDS) documentation which is the foundation for the R/GTS. This implies a requirement to:
 - i. Encourage agencies to agree on common formats for data exchange, common data products and algorithms.
 - ii. Facilitate provision of common tools to access data in different formats.
 - iii. Provide assessments of data quality and work to identify and reduce errors and uncertainties of measurements.
 - e. Create and maintain task teams, as required, to support the GDS and R/GTS framework and to promote international best practice on all aspects of SST including data merging and integrated use for the applications, scientific and operational user communities.
 - f. Promote workshops to address issues relevant to data merging and integrated use.
 - g. Build capacity and awareness of the GHRSSST, its activities, data products and services including the coordination and facilitation of scientific and user workshops and symposia as appropriate for the GHRSSST Development and Implementation Plan (GDIP).
2. **To enhance the flow of relevant knowledge, information, recommendations and decisions throughout the international community of SST data providers, users and scientists.** Ways in which GHRSSST can accomplish this include the following.
 - a. To distribute and promote all GHRSSST related research, information, and recommendations to international, national, and regional sponsors and funding bodies.
 - b. To serve as a communication and coordination channel between data providers and the global, user community of satellite-SST data, and so to maximize the benefits that accumulate from international investments in science, operations, and technology related to SST.
 - c. To work closely with the appropriate international bodies, international scientific programs, satellite-SST-mission offices and other agencies to harmonize the international effort and advance SST science, operations and applications by maintaining a GHRSSST international user requirement document for SST, noting the need to work effectively with other agencies in this activity.
 - d. To act as an interface and thus integrate the GHRSSST within other global systems and projects as appropriate (e.g., GODAE, GOOS, CLIVAR, GEWEX etc.).
 - e. To coordinate, enable and facilitate, on behalf of the GHRSSST Science Team, the open exchange of relevant satellite and in situ data streams for use within the GHRSSST. The GHRSSST Science Team should prepare and submit specific data access proposals, negotiate with data providers (e.g., in situ observations from the commercial sector), and oversee the correct application of any associated data policy requirements and agreements.
 - f. To develop appropriate information systems making use of appropriate internet resources and data access networks to show the importance of SST data to the global community.

² The subsidiarity principle is based on the idea that decisions must be taken as closely as possible to the most appropriate expertise and existing infrastructure: GHRSSST should not undertake action (except on matters for which it alone is responsible) unless GHRSSST action is more effective than action taken at national, regional or local level (i.e. GHRSSST should not duplicate or re-invent existing capability and structures).

3. **To promote the long-term provision for continuity of satellite SST data sets and the development of new generations of SST sensors that support the growth of operational SST data services**, with an emphasis on encouraging the integration/merging of data from complementary SST data sets for use in applications ranging from short term weather and ocean forecasting to climate prediction and monitoring (GCOS Essential Climate Variable).
4. **To facilitate access to SST data and related ancillary data** (wind, atmospheric aerosol, etc.) and encourage the provision of in situ data by relevant agencies where such data are required for validation and interpretation of SST products and the derivation of secondary products. This will include activities such as:
 - a. Encourage the combined use of same source satellite and in situ data within the international data system in common data-exchange formats.
 - b. Recommend data-collecting strategies to fill existing gaps in time and space, of key variables.
 - c. Support the coordination of satellite instrument validation activities focussed on the development of a user community service for the reporting and exchange of validation results and information relating to the operational use of satellites and data delivery in near real time.
5. **To encourage and assist the transfer of SST science** into operational systems and to maintain appropriate documentation and frameworks to nurture better collaboration between SST science and operational communities.
 - a. Organize workshops and conferences targeted at potential users of the data (e.g. climate, weather and ocean forecasting, seasonal and decadal prediction, climate science, fisheries, coastal resource agencies).
 - b. Promote demonstration projects that involve both providers and users of other satellite-derived ocean variables, such as ocean-colour, surface salinity and surface winds and currents.
6. **To foster expertise in using SST data worldwide and broaden the user community for SST**, particularly in developing and emerging countries, by activities such as:
 - a. Training courses, user outreach and application support material and workshops.
 - b. Facilitate development of data systems in these areas to support and sustain the user communities.
 - c. Promote international cooperation in research and application development through international symposia, provision of data and software for user communities, scientific research and scientific exchange programs.
 - d. Develop training materials that provide the user community with the tools and the capability to utilize real data, both during instruction and after the completion of the course material.
7. **To encourage the formation of an international calibration and validation network for SST** (distinct from 2c which refers to instrument and sensor validation) This is needed to,
 - a. Ensure that validating measurements conform to accepted international protocols, and that sensor calibrations be traceable to SI calibration standards.
 - b. Encourage the development of an international protocol for satellite sensor characterization, quality assurance of data, and exchange of validation data.
 - c. Facilitate the formation of a distributed calibration and validation archive and database network.

4 GHRSSST Structure

The structure for the GHRSSST at the time of writing this document is presented below:



Science Team

The GHRSSST Science Team is responsible for the overall execution of GHRSSST according to the aim of GHRSSST and the GHRSSST Terms of Reference. The Science Team is responsible for the international co-ordination of the logistical, political, scientific, and administrative aspects of the GHRSSST Development and Implementation Plan (GDIP), the Regional Global Task Sharing (R/GTS) framework, and the GHRSSST Data Processing Specification (GDS).

4.1.1 Structure and Composition

- The GHRSSST Science Team shall consist of a Chairperson and an appropriate number of members
- Members of GHRSSST shall be experts, drawn from (or nominated by) the international SST communities, selected on their merits and to reflect a balance of both provider and user representation, and geographical distribution.
- Membership of the Science Team will be for a period of three years, and can be renewed provided the member is active in the field. Acceptance into the Science Team, and membership renewal will be by secret ballot of the Science Team administered by the GHRSSST Project Office.
- The GHRSSST Science Team may establish, as mutually agreed, Technical Advisory Groups (TAGs). These groups address long term issues of cooperation and coordination.
- The GHRSSST Science Team member or TAG may also form an *ad hoc* Task Teams (TTs) to investigate specific areas of interest. Task Teams are free to organize as needed, and are typically expected to persist only if needed.

4.1.2 Science Team Chairperson

- The Science Team Chair shall be elected at an annual Science Team meeting by a majority vote of the Science Team where a quorum of at least 66% membership is present.
- The Chair shall be responsible for representing GHRSSST, and for designating alternate representation when direct representation is not possible.
- The term of service shall normally be five years.

4.1.3 Procedures

- GHRSSST Science Team will meet in plenary at appropriate intervals as necessary, typically once per year.
- The meeting venues should reflect the globally-distributed composition of the Science Team, varying in location each year. To allow forward planning, discussions and decisions on the venues of several Science Team Meetings can be discussed at each of the Science Team Meetings, or through email communications between Science Team Meetings.
- The GHRSSST Science Team will strive to reach conclusions and recommendations by consensus.
- Within the context of their agency's/organization's policies and procedures, each GHRSSST Science Team Member will endeavour to ensure appropriate coordination with, and to obtain necessary approvals for, GHRSSST plans and activities.
- The proposals and recommendations of GHRSSST will be provided through the Chairperson to relevant bodies.
- A GHRSSST Science Team member is expected to:
 - Be frequently involved in the activities of GHRSSST;
 - Provide leadership in GHRSSST activities;
 - Attend GHRSSST Science Team Meetings.
- Nominations of new ST members shall be made prior to or at a GHRSSST Science Team meeting by two existing ST members. Candidates shall send a CV no later than two weeks before the GHRSSST Science Team meeting to the GHRSSST Project Office.
- The membership term for newly elected members will be for 3 years and re-election to the GHRSSST Science Team is permitted as many times as desired.
- Nominations of existing ST members for re-election shall be made prior to or at an annual ST meeting by either (1) one existing ST member or (2) self-nomination by the candidate. Candidates shall send a CV within two weeks of the ST meeting to the GHRSSST Project Office.
- An email ballot, conducted by the GHRSSST Project Office, will be taken within one month of the ST Meeting. A simple majority positive vote from existing ST members is required for acceptance or re-election into the ST. Members who wish to step down shall inform the GHRSSST Project Office at their first opportunity. The Science Team Chair should not vote on the election of new Science Team Members, except in the case of a tie-breaker.
- The GHRSSST Technical Advisory Groups (TAGs) are led by a Chairperson, confirmed by majority vote of the Science Team. The Chair then selects a Vice-chair and invites other members. The Chair and Vice-chair must be drawn from the GHRSSST Science Team, but TAG members can be drawn from the larger community. The Chair and Vice-chair serve 3-year terms, and can be re-elected by the membership of their TAG. Each TAG will have its own Terms of Reference, which will be approved by the GHRSSST Science Team.
- GHRSSST Task Teams are free to organize as needed, and are typically expected to persist only if needed. Each Task Team will have its own Terms of Reference, which will be approved by the GHRSSST Science Team. Task Teams will define a work plan, approved by the GHRSSST Science Team, progress against which will be monitored by the GHRSSST Project Office. Task Teams will report progress to the GHRSSST Science Team each year at GHRSSST Science Team meetings.

4.2 Advisory Council

The purpose of the Advisory Council is to provide strategic advice regarding the development and implementation of GHRSSST. The Terms of Reference for the GHRSSST Advisory Council are published in a separate document.

4.3 CEOS SST-VC

The Committee for Earth Observation Satellites SST Virtual Constellation (CEOS SST-VC) serves as the formal link between GHRSSST and the broader CEOS community. At the highest level, it provides a means for CEOS to present to GHRSSST its needs and requirements, and for GHRSSST to present its needs directly to the global community of space agencies. There are several thematic connections between GHRSSST and CEOS that take place at the Technical Advisory Group level.

4.4 GHRSSST Project Office (GHRSSST-PO)

A standing project office will be located at a location agreed upon by the GHRSSST Advisory Council. The minimum staffing requirement will be: (i) a professional with strong technical writing skills and background knowledge of ocean remote sensing (Project Office Director); and (ii) a skilled secretary/administrative assistant. This combination of expertise is necessary to accomplish the GHRSSST goals.

The project office will report to the GHRSSST Advisory Council and be responsible for coordination of the activities of GHRSSST.

The project office will be supported through contributions from agencies and organizations represented in GHRSSST.

GHRSSST-PO Terms of Reference

The GHRSSST-PO is responsible for support and logistical co-ordination of the GHRSSST Science Team. In practice, the GHRSSST-PO will manage the GHRSSST in cooperation with international, national and regional institutions, committees, and offices as well as related programmes. It will act as a central point of contact for the implementation of the GHRSSST. It will interact with related international scientific and intergovernmental bodies. It will monitor and oversee the management of GHRSSST data sets, and it will ensure good information flow among GHRSSST participants.

The following Terms of Reference have been established for the GHRSSST-PO:

1. To provide non-financial support to the GHRSSST Science Team, TAGs and TTs.
2. In partnership with the ST-Chair, identify priorities for the Project Office activities.
3. In partnership with the ST-Chair, coordinate the GHRSSST Science Team including the organisation of the GHRSSST Science Team Meetings (including Meeting preparation, editing and publication of proceedings).
4. To liaise with the GHRSSST applications and user communities including the active solicitation of feedback, requests and comments that can be presented to the GHRSSST Science Team, other GHRSSST working groups and panels for consideration and action.
5. To work with Chairs of TAGs and TTs to facilitate workshops to be held in the periods between Science Team Meetings, as appropriate.
6. To actively solicit and negotiate, on behalf of the GHRSSST Science Team, with funding bodies, sponsors and donors whose support is relevant to the successful implementation of GHRSSST.
7. To maintain, edit, and publish GHRSSST documentation (prepared by the Science Team, TAG and TT) via an electronic web portal, and other appropriate GHRSSST documentation.
8. To report to the GHRSSST Advisory Council and other stakeholders as required on the status and developments of the GHRSSST.