



GHR SST Project Office

Annual Report 2019





GHRSSST

To provide operational users and the science community with accurate SST's derived from the satellite constellation

The Group for High Resolution Sea Surface Temperature (GHRSSST) provides a framework for SST knowledge and data sharing, best practices for data processing, assessing uncertainties in the satellite SSTs, and a forum for scientific dialog including how best to provide SSTs for climate studies, bringing SST to the operational users and scientific researchers.

GHRSSST is:

- Composed of a Science Team of researchers and operational practitioners.
- Coordinates research and operational developments in satellite-derived SST.
- Links with the CEOS Virtual Constellation for SST
- Organised into Technical Advisory Groups (TAG) and Task Teams (TT) focused on particular problems or activities

GHRSSST services offer:

- Data processing through Regional and Global Data Assembly Centers, combining satellite and NWP fields in common data formats for ease of access and analysis.
- A variety of tailored methods for downloading and access full products or subsets.
- Online visualisation of data quality through diagnostic comparisons

International collaboration

GHRSSST comprises researchers and operational practitioners of SST from a number of worldwide institutes and agencies. These bodies are represented by the set of logos shown below. Participation in GHRSSST is always increasing as new groups join the project.

CEOS SST Virtual Constellation

A key development in recent years is the formation of the CEOS SST Virtual Constellation (SST-VC). The CEOS Virtual Constellations coordinate space-based, ground-based, and/or data delivery systems to meet a common set of requirements within a specific domain. They leverage inter-Agency collaboration and partnerships to address observational gaps, sustain the routine collection of critical observations, and minimize duplication/overlaps, while maintaining the independence of individual CEOS Agency contributions. GHRSSST acts as the science team for the CEOS SST-VC.



GHRSSST Project Office

The GHRSSST Project Office (GPO) provides the secretariat for the GHRSSST Project. The GPO is funded by the European Union as part of the Copernicus Programme. The office is comprised of the GHRSSST Project Coordinator (GPC), Karen Veal and the GHRSSST Project Administrator (GPA), Silvia Bragaglia-Pike, both from the University of Leicester. Contact details are provided later on page 7.

The aim of the GHRSSST Project Office is to:

- Coordinate, at the international level, the Group for High Resolution Sea Surface Temperature and its scientific teams to foster effective scientific and operational progress in the subject area of sea surface temperature.

The Objectives of the project office are:

- Together with the GHRSSST Science Team Chairperson, 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 GHRSSST.
- Provide direct logistical co-ordination and technical support to the, GHRSSST Advisory Council.
- Together with the GHRSSST Science Team Chairperson, provide direct logistical co-ordination and technical support to coordinate, enable and facilitate the GHRSSST Science Team and all subsidiary TAG and TT and the GHRSSST Advisory Council.
- Manage GHRSSST activities in cooperation with international, national and regional institutions, committees, and offices as well as related global programs.
- Ensure good information flow among GHRSSST participants and work effectively with the GHRSSST Science Team Chair.
- Act as an interface to, and integrate the GHRSSST with, other global systems and projects as appropriate.
- Manage GHRSSST documentation.
- Promote the activities of GHRSSST on the International stage.

In support of these objectives, the GHRSSST Project Office will:

- Maintain the GHRSSST website (<http://www.ghrsst.org>)
- Maintain the GHRSSST Twitter feed
- Maintain the primary GHRSSST documentation, comprising:
 - GHRSSST Strategy and Implementation Plan (GDIP)
 - User Requirements Document (URD)
 - GHRSSST Data Specification (GDS)
 - Climate Data Assessment Framework (CDAF)
 - Validation Protocol Document (VPD)
- Organise the annual Science Team meeting
- Provide secretarial support to the GHRSSST Science Team Chair and the GHRSSST Science Team
- Provide an interface to the CEOS SST-VC
- Publish GHRSSST newsletters
- Maintain the GHRSSST brochure
- Promote GHRSSST at international conferences and meetings.

Highlights 2019

White paper on the Observational Needs of Sea Surface Temperature



REVIEW
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Observational Needs of Sea Surface Temperature

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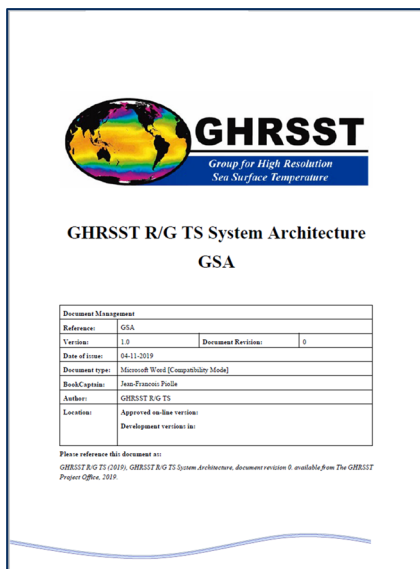
Sea surface temperature (SST) is a fundamental physical variable for understanding, quantifying and predicting complex interactions between the ocean and the atmosphere. Such processes determine how heat from the sun is redistributed across

A team of authors, led by GHRSSST Science Team chair, Anne O'Carroll, published a white paper on the Observational Needs of Sea Surface Temperature in which they highlighted the remaining and new research and development challenges for the next 10 years such as the need for sustained continuity of passive microwave SST. The paper is published in the open access journal Frontiers in Marine Science under the research topic Oceanobs'19: An Ocean of Opportunity.

O'Carroll, A. G., et al. (2019), Observational needs of sea surface temperature, Frontiers in Marine Science, 6, doi: <https://doi.org/10.3389/fmars.2019.00420>.

Highlights 2019

Publication of Report on GHRSSST Regional/Global Task Sharing System Architecture.



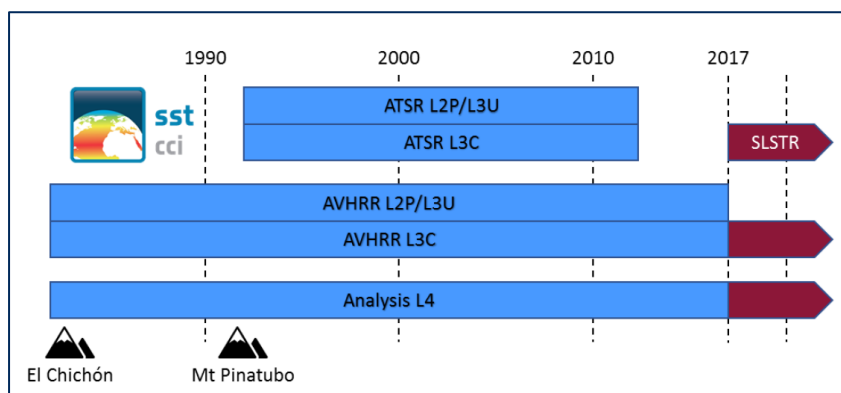
The document reports the agreed new framework for GHRSSST Regional/Global Task Sharing: it describes the data management and distribution services and specifies the services required to implement it.

Work was led by Jean-François Piollé (Ifremer) for the GHRSSST Project Office.

The latest online version of the report is available from the GHRSSST website:

<https://www.ghrsst.org/resources/ghrsst-project-documents/>

A 35 Year Sea Surface Temperature Climate Data Record from The ESA Climate Change Initiative (CCI) and Copernicus Climate Change Services (C3S)

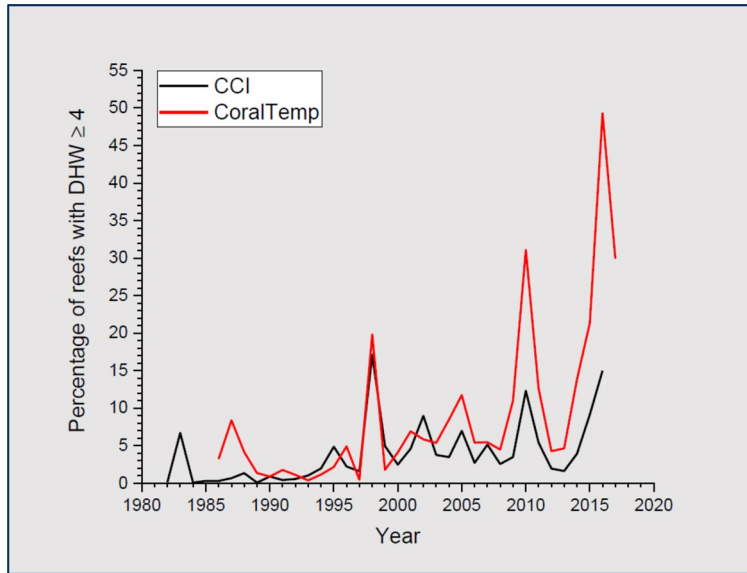


The ESA SST CCI CDR (blue) and C3S ICDR (dark red) datasets: temporal coverage and availability. C3S ICDR provides an ongoing extension of the SST daily products (L3C and L4) from 2017 onwards. Image courtesy of Owen Embury.

Merchant, C. J., et al. (2019), Satellite-based time-series of sea-surface temperature since 1981 for climate applications, *Scientific Data*, 6(1), 223, doi:10.1038/s41597-019-0236-x.

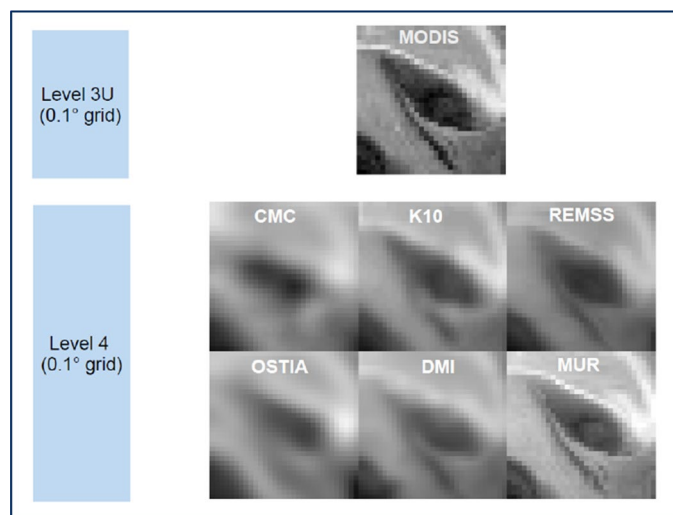
Highlights 2019

Use of SST for Monitoring Coral Stress



Extent of global coral reef bleaching-level heat stress through time using two different SST datasets: CoralTemp and ESA CCI. Image courtesy of William Skirving.

A Comparative Study of Ocean Thermal Gradients from GHRSSST Level 4 SST Products



Feature resolution in the spatial domain for six GHRSSST level 4 datasets and MODIS L3U. Image courtesy of Marouan Bouali.

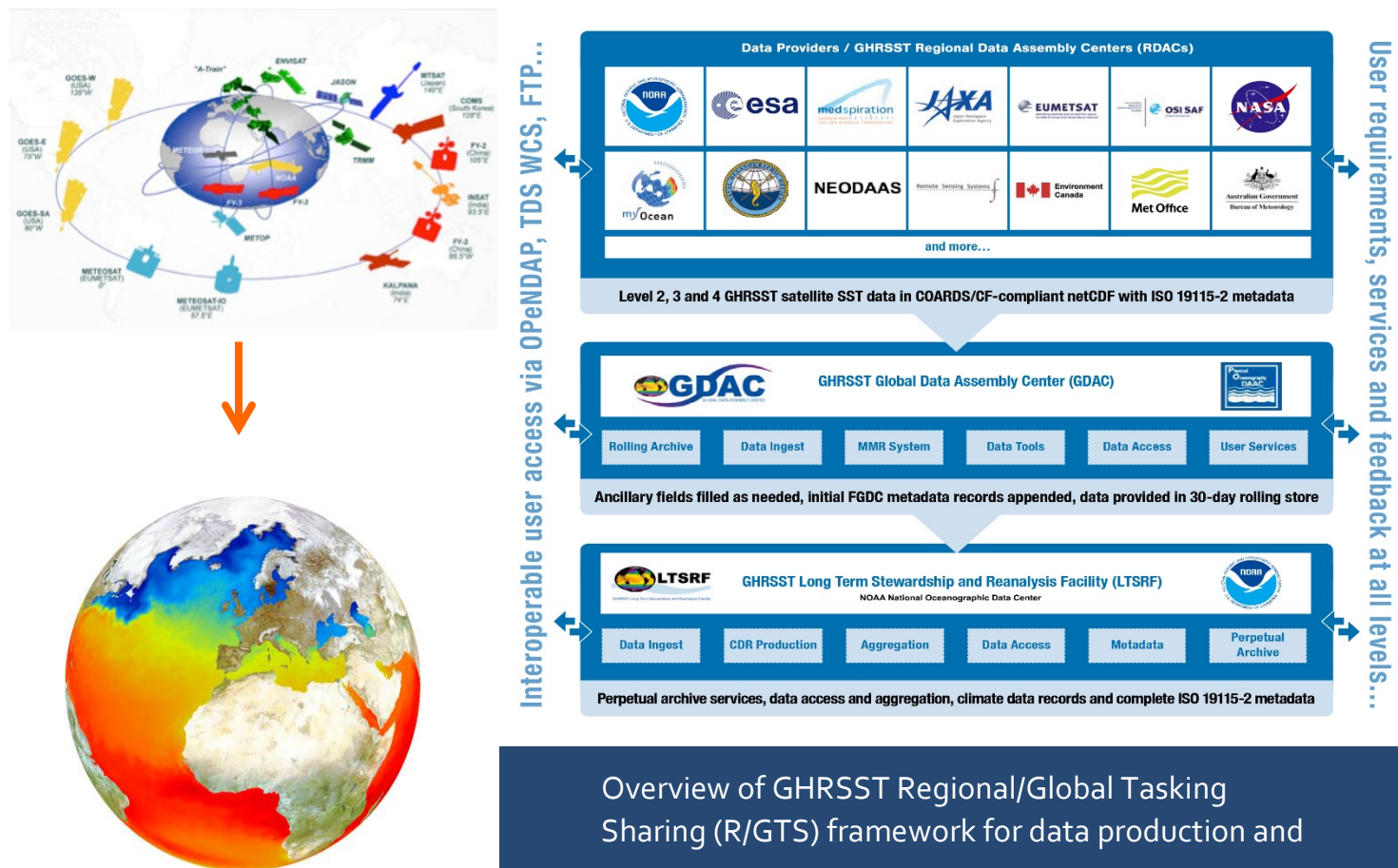
GHRSSST data provision

GHRSSST pioneered a Regional/Global Task sharing Framework (R/GTS), shown schematically below, which acquired existing SST data products and enhanced them by adding additional information and a common format so that they could be combined to produce the new generation of products using a strategy that was scientifically sound and technically feasible.

The project focused on the exploitation of unique contributions made by each satellite sensor type and institutional partner. Success was achieved not just by solving scientific, operational and technical problems, but also by co-operation at an international level to agree on data product definitions and standards acceptable to users, producers and data managers. GHRSSST established international consensus definitions for SST that are now part of the network Common Data Form (NetCDF) Climate Forecast (CF) convention. It conducts detailed research on the impact and mitigation of diurnal SST variability in SST measurements and analyses, developed satellite pixel and grid-point time varying uncertainty estimates, coordinated international data management systems, established procedures and protocols, tested and implemented archives to manage the extensive GHRSSST data sets (currently ~25Gb per day), provided near real-time

data access portals and user services and implemented near real-time quality control monitoring services. The GHRSSST has been extremely successful in revolutionizing the way satellite SST data sets are developed, shared and applied in modern oceanography, meteorology and climate centres.

Today the GHRSSST is a truly international project with over US \$30+ Million invested across all of the project activities. It orchestrates a wide variety of GHRSSST data streams input and output data that must be shared, indexed, processed, quality controlled, analysed and documented within an international framework called the Regional/Global Task Sharing (R/GTS) framework. Large volumes of data and data services must be harnessed together to deliver the new generation of global coverage high resolution SST data sets that meet the GHRSSST User Requirements.



Contact details for the GHRSSST Project Office and the major GHRSSST components and services are given below.



GHRSSST Project Office

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GDAC

You can download real-time data from the respective data producers (RDACs), or as collected by the GHRSSST Global Data Archiving Centre (GDAC), which is provided and hosted by NASA at their Physical Oceanography Distributed Active Archive Center (PO.DAAC). For further details of the GDAC and instructions on how to download data please go to the GDAC website at <http://podaac.jpl.nasa.gov/>.



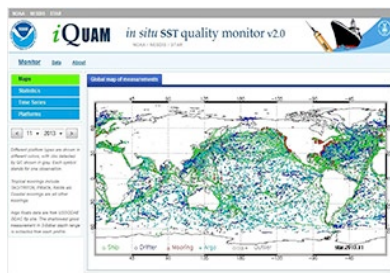
LTSRF

Historical SST products (older than 30 days) are available from the GHRSSST Long-Term Stewardship and Reanalysis Facility, which is provided and hosted by NOAA at the National Oceanographic Data Centre (NODC). For further details of the LTSRF and instructions on how to download data please go to the LTSRF website at <http://data.nodc.noaa.gov/ghrsst/>.



Felyx

The aim of the Felyx project is to provide an open-source, flexible and reusable software system that can be used to research and monitor the quality and performance of Earth observation (EO) data streams. Felyx is being developed by IFREMER, PML and Pelamis and funded by the European Space Agency. For further details please see <http://hrdds.ifremer.fr>.



iQUAM and SQUAM

The in situ data quality monitor, iQUAM, and SST summary quality monitor, SQUAM, systems are provided and hosted by NOAA. For further details please see <http://www.star.nesdis.noaa.gov/sod/sst/iquam/> and <http://www.star.nesdis.noaa.gov/sod/sst/squam/>, respectively.



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