

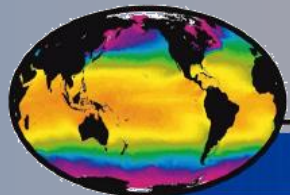
*To provide operational users and the science community  
with the SST measured by the satellite constellation*

## **GHRSSST Products and Services**

*Presented by Kenneth S. Casey,  
NOAA National Centers for Environmental Information (NCEI)*

*Co-Chair CEOS SST-VC*

*on behalf of the GHRSSST Science  
Team*



**GHRSSST**

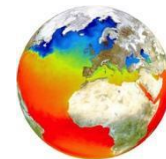
*Group for High Resolution  
Sea Surface Temperature*



**Committee on Earth Observation Satellites  
Sea Surface Temperature Virtual Constellation**

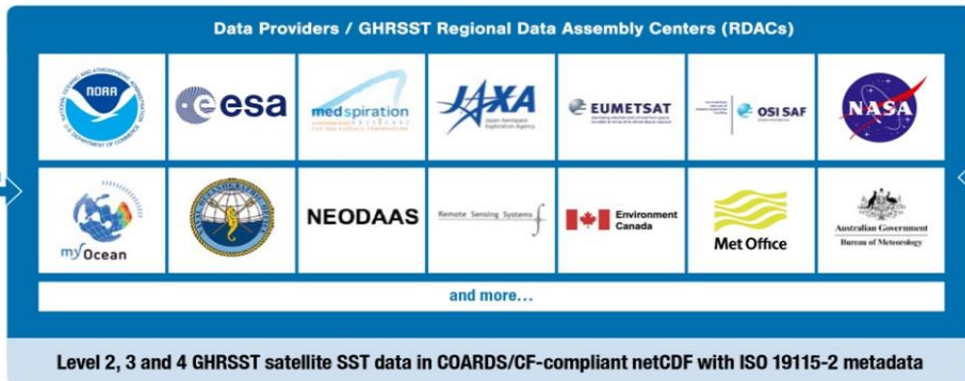
# **GHRSSST PRODUCTS AND DATA MANAGEMENT OVERVIEW**

# Regional/Global Task Sharing



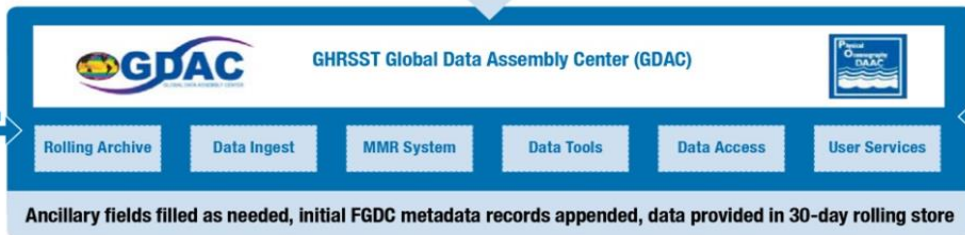
Interoperable user access via OPeNDAP, TDS WCS, FTP...

User requirements, services and feedback at all levels...



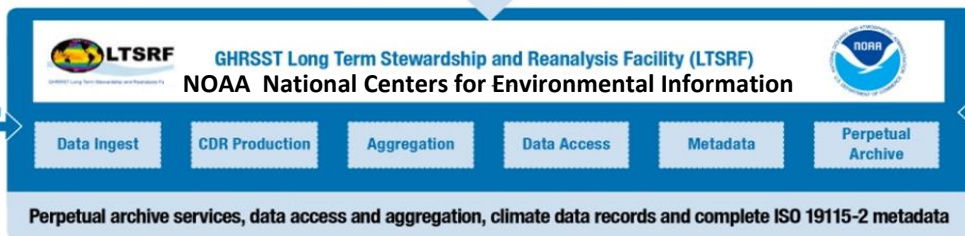
## Regional Data Assembly Centers (RDACs)

- Create GHRSSST-compliant data
- Some are “self-serve” but most provide their data to the...



## Global Data Assembly Centers (GDACs)

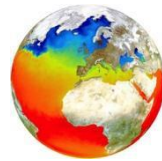
- Aggregate and serve data in near real time
- Serve data for first 30 days then provides data to..



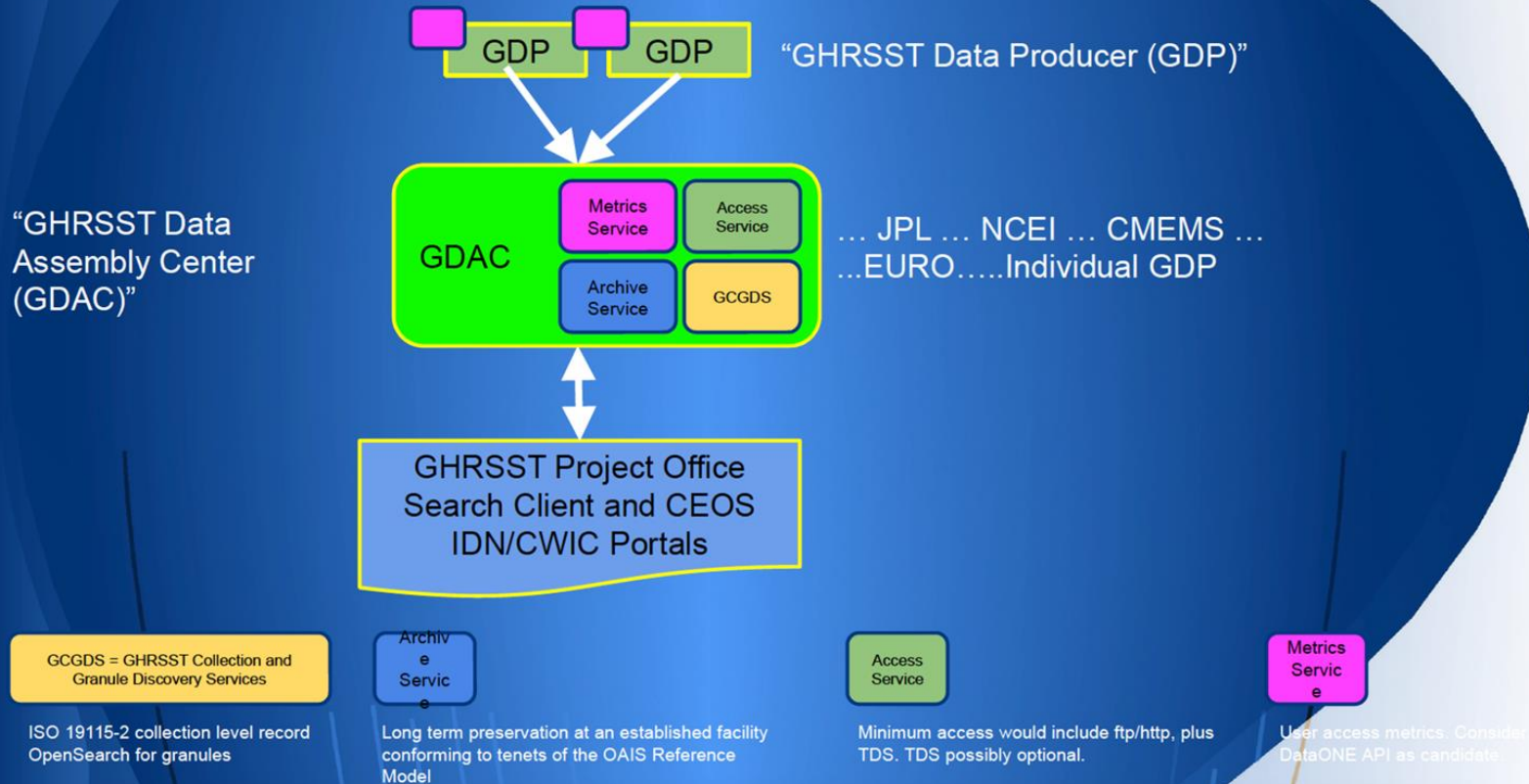
## Long Term Stewardship and Reanalysis Facility (LTSRF)

- Archives and serves data for the long-term, starting 30 days after observation for most data

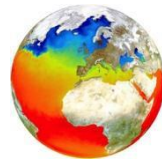
# A note about the Future: R/GTS Evolution Discussions This Week



## Proposed Future R-GTS Framework

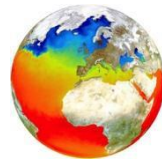


# GHRSSST Data Specification (GDS)



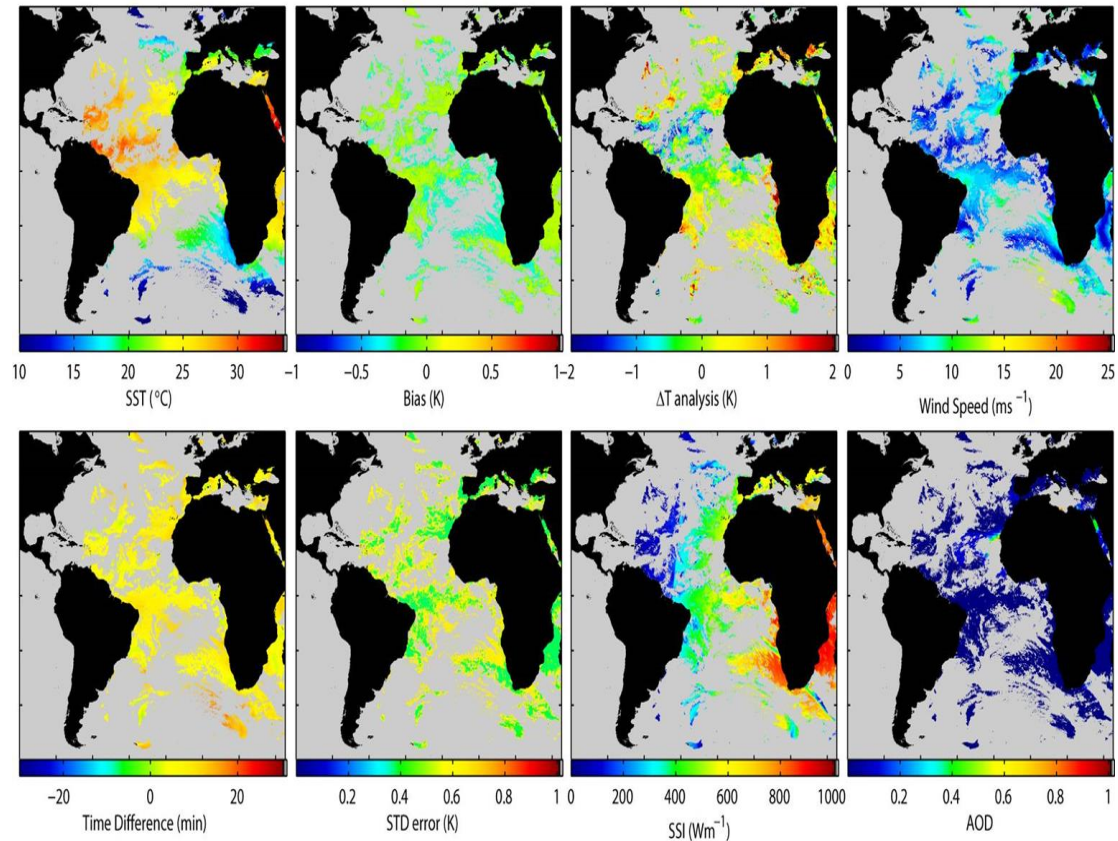
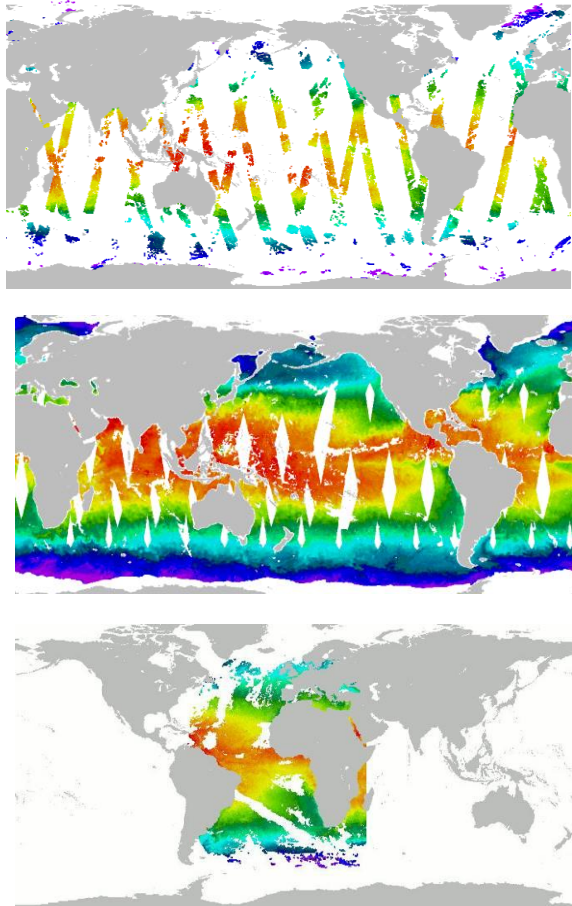
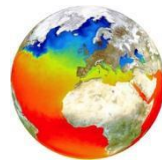
- All GHRSSST data conform to a common specification
- GHRSSST Data Processing Specification (GDS) 2.0r5
- All data files are in NetCDF4 (“classic”) file format
- All data files contain Climate Forecast (CF, v1.6) and Attribute Convention for Dataset Discovery (ACDD, v1.3) compliant file level metadata
- All GHRSSST data products have a ISO 19115-2 compliant metadata record
- All data are free and openly available to everyone
- Some RDACs require simple registration

# GHRSSST Data Processing Levels



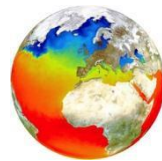
Level	GHRSSST Code	Description
Level 0	L0	Unprocessed instrument and payload data at full resolution. GHRSSST does not make recommendations regarding formats or content for data at this processing level.
Level 1A	L1A	Reconstructed unprocessed instrument data at full resolution, time referenced, and annotated with ancillary information, including radiometric and geometric calibration coefficients and geo-referencing parameters, computed and appended, but not applied, to L0 data. GHRSSST does not make recommendations regarding formats or content for data at this processing level.
Level 1B	L1B	Level 1A data that have been processed to sensor units. GHRSSST does not currently make recommendations regarding formats or content for L1B data.
Level 2 Pre-processed	L2P	Geophysical variables derived from Level 1 source data at the same resolution and location as the Level 1 data, typically in a satellite projection with geographic information. These data form the fundamental basis for higher-level GHRSSST products and require ancillary data and uncertainty estimates.
Level 3	L3U L3C L3S	<p>Level 2 variables mapped on a defined grid with reduced requirements for ancillary data. Uncertainty estimates are still mandatory. Three types of L3 products are defined:</p> <ul style="list-style-type: none"> <li>· Un-collated (L3U): L2 data granules remapped to a space grid without combining any observations from overlapping orbits</li> <li>· Collated (L3C): observations combined from a single instrument into a space-time grid</li> <li>· Super-collated (L3S): observations combined from multiple instruments into a space-time grid.</li> </ul> <p>Note that L3 GHRSSST products do not use analysis or interpolation procedures to fill gaps where no observations are available.</p>
Level 4	L4	Data sets created from the analysis of lower level data that result in gridded, gap-free products. SST data generated from multiple sources of satellite data using optimal interpolation are an example of L4 GHRSSST products. GMPE products are a type of L4 dataset.

# Level 2P: Common format with uncertainties

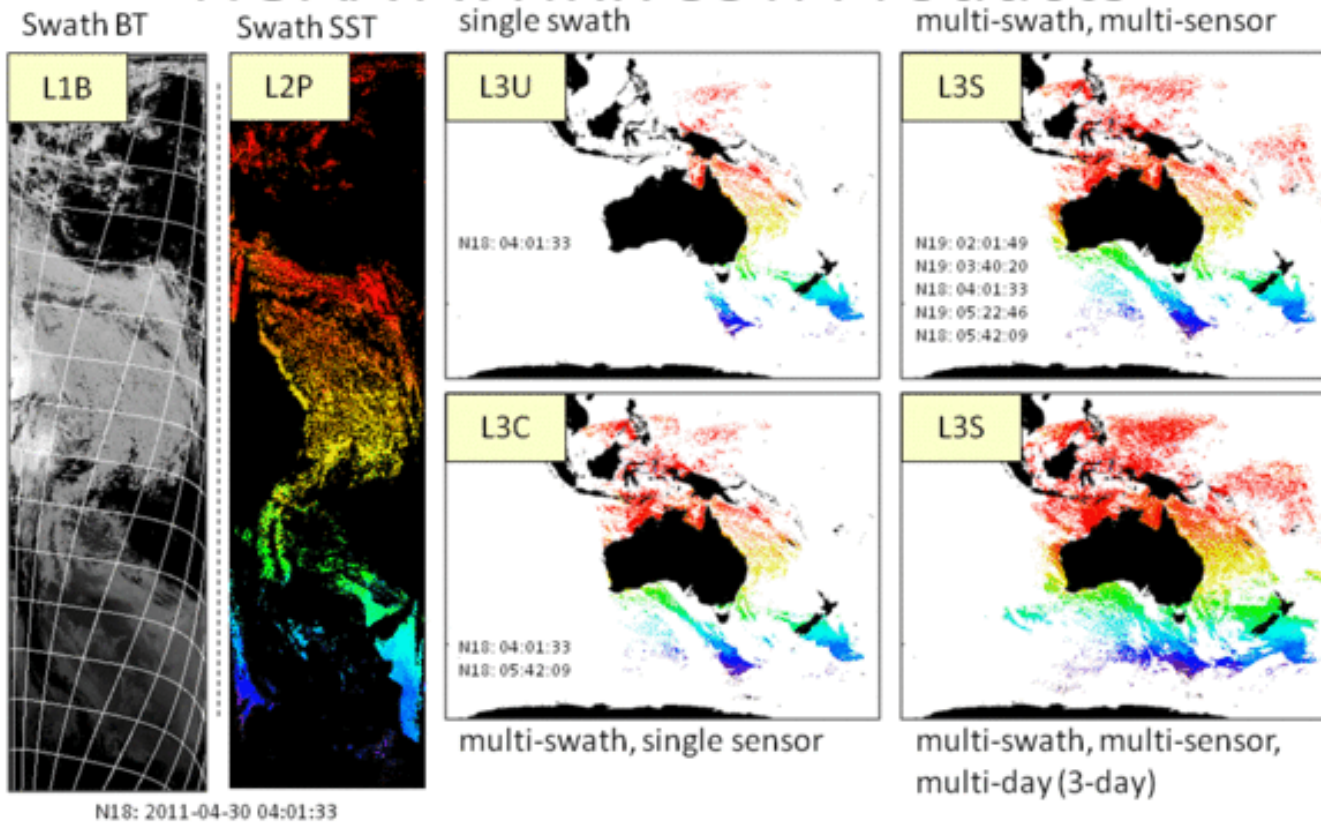


Ancillary information in L2P products: dynamic flags

# Level 3: Gridded L3U, L3C, and L3S



## NOAA AVHRR SST: Products



<http://imos.org.au/sstproducts.html>



Helen Beggs, ABoM

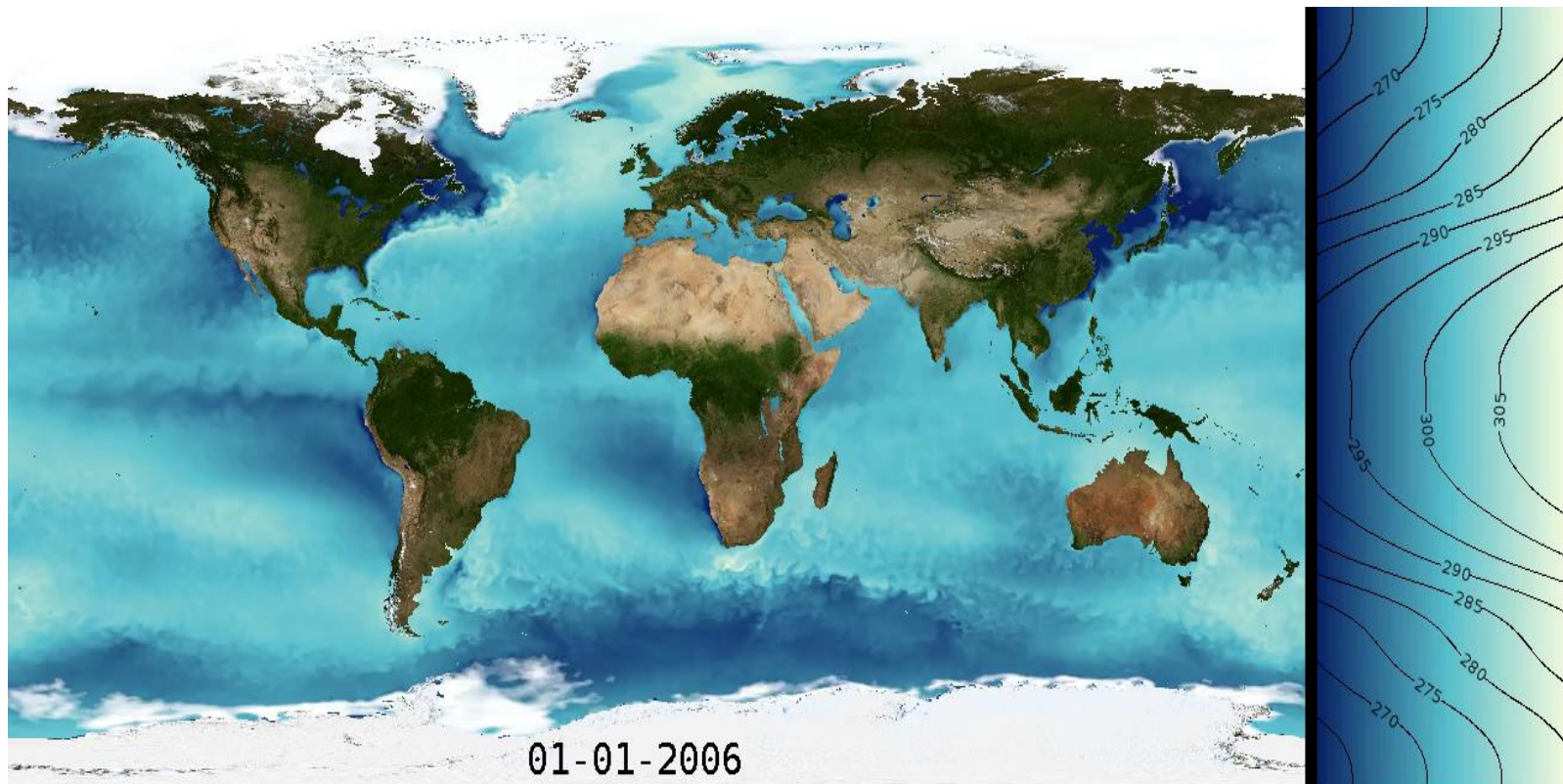
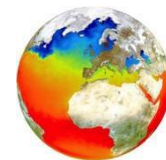


<http://www.ghrsst.org>





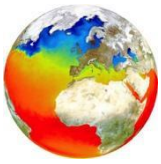
# Level 4: Gridded and Gap-free



<http://dx.doi.org/10.6084/m9.figshare.1246151>

ESA SST\_CCI L4 analysis

# **GHRSSST RDAC, GDAC, and LTSRF SERVICES**

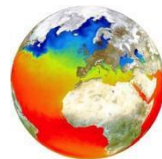


## GHR SST Data Producers - The RDACs

- Regional Data Assembly Centres
  - Provide L2P, L3U, L3C, L3S or L4 data
  - Some are “self serve”, and maintain their own data access and catalog services.
  - Many rely on the GDAC/LTSRF combination for providing wide public access to their products, and connection with CEOS CWIC



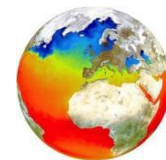
# GDACs and LTSRF



- **Global Data Assembly Centres**
  - Mainly real-time data distributors (up to 30 days)
  - Some data retained and served for longer
  - Provide a range of “value-added” services
- **Long-term Stewardship and Reanalysis Facility\***
  - Long-term archive and access services
  - Currently conduit for GHRSSST data into CEOS

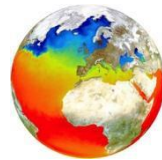
\* Important update: NCEI resources available for GHRSSST have been reduced. GHRSSST operations continue: GHRSSST products that have been archived at NCEI continue to be received, archived, and made available to users. However, due to reduced resources, dedicated customer support for GHRSSST products will no longer be available. User requests will have to go through the center-wide help desk and it may not be possible to meet specialized requests as effectively as in the past

# GDAC and LTSRF Access Services



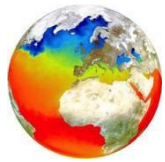
- Real time
  - For individual products, can go direct to relevant RDAC
  - For wide range of products, use the Global Data Assembly Centre (GDAC)
    - Primary system at NASA JPL: <http://podaac.jpl.nasa.gov/>
    - Secondary system at Ifremer: <http://cersat.ifremer.fr/data/collections/ghrsst>
      - Requires simple registration
      - Not all datasets are mirrored
- Delayed mode (30 days after observation)
  - LTSRF hosted by NOAA NCEI: <https://ghrsst.nodc.noaa.gov>
  - Many NOAA GHRSSST products available in near real time
- All have many ways to access GHRSSST data
  - FTP, HTTPS, DAP, WMS, WCS, Live Access Server, discovery services at collection and granule level such as Geoportal REST API, CSW, OpenSearch, HiTide, PO.DAAC Web Services, State of the Ocean
- Any issues please contact the GHRSSST Project Office ([gpc@ghrsst.org](mailto:gpc@ghrsst.org))

# GDAC Access <http://podaac.jpl.nasa.gov/>



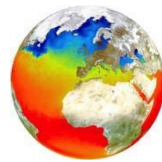
The screenshot shows the Podaac website interface. At the top, there's a navigation bar with 'EARTH DATA', 'Data Discovery', 'DAACs', 'Community', and 'Science Disciplines'. Below that is the NASA Jet Propulsion Laboratory logo and the Podaac logo. The main content area is titled 'Dataset Discovery' and shows 'Found 94 matching dataset(s)'. A sidebar on the left contains a 'Select Filter' section with categories: Processing Levels, Swath Spatial Resolution, Grid Spatial Resolution, Temporal Resolution, and Parameter. The main content area displays a list of datasets, with the first two visible. Each entry includes a thumbnail map, a title, platform/sensor, processing level, resolution, and start/end date. The first entry is 'GHRSSST Level 2P Global Skin Sea Surface Temperature from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the NASA Aqua satellite (JPL-L2P-MODIS\_A)'. The second entry is 'GHRSSST Level 2P Global Skin Sea Surface Temperature from the Moderate Resolution Imaging Spectroradiometer (MODIS) on the NASA Terra satellite (JPL-L2P-MODIS\_T)'. The third entry is partially visible: 'GHRSSST Level 4 MUR Global Foundation Sea Surface Temperature Analysis (JPL-...'.

# New and improved technologies from GDAC for GHR SST



- In operations:
  - Improved **HiTide** for Level 2 subsetting
  - Improved State of the Ocean (**SOTO**) for visualization
  - PO.DAAC Drive**: replacement for FTP
- In final formulation:
  - OceanXtremes**: Rapid time series data anomaly analysis for SST and others
  - MUDROD**: Improved search relevance and ranking for dataset discovery
  - Virtual Quality Screening Service**: On demand SST granule quality screening
  - CEOS COVERAGE**: Coincident oceanographic grids for analysis and visualization
- See 3 posters later today on these!

# GHR SST in NOAA OneStop



NOAA OneStop Demo

Search Results (showing 20 of 92)

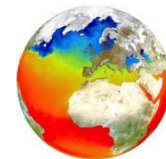
- GHR SST Level 4 G1SST Global Found...
- GHR SST Level 4 OSPO Global Found...
- GHR SST Level 4 OSTIA Global Found...
- GHR SST Level 4 OSPO Global Nightti...
- GHR SST Level 4 DMI\_OI Global Found...
- GHR SST Level 4 DMI\_OI North Sea a...
- GHR SST Level 4 EUR Mediterranean ...
- GHR SST Level 4 ODYSSEA Mediterra...
- GHR SST Level 4 AVHRR\_AMSR\_OI G...
- GHR SST Level 4 ODYSSEA Eastern C...
- GHR SST Level 4 AVHRR\_OI Global Bl...
- GHR SST Level 4 ODYSSEA North-We...
- GHR SST Level 4 MUR Global Founda...
- GHR SST Level 4 MUR North America...
- GHR SST Level 4 K10\_SST Global 1 m...

<https://www.ncdc.noaa.gov/onestop> \*

- URL will eventually change when “soft launch” period ends, fall 2017, to <https://data.noaa.gov/onestop>



# LTSRF Data Summary Table



nodc.noaa.gov

PO.DAAC

GHRSSST Long Term Stewardship and Reanalysis Facility (LTSRF) at NOAA NODC - Access Data

**NOAA** NATIONAL CENTERS FOR ENVIRONMENTAL INFORMATION  
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

formerly the National Oceanographic Data Center (NODC) ... more on NCEI

NOAA Satellite and Information Service

You are here: [NODC Home](#) > [Satellite Oceanography Team](#) > [GHRSSST LTSRF](#) > [Access Data](#)

**LTSRF**  
GHRSSST Long Term Stewardship and Reanalysis Facility

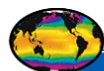
**Data Access is Here!**

- **HTTP:** <http://data.nodc.noaa.gov/ghrsst/>
- **FTP:** <ftp://ftp.nodc.noaa.gov/pub/data.nodc/ghrsst/>
- **OPeNDAP:** <http://data.nodc.noaa.gov/opendap/ghrsst/>
- **THREDDS:** <http://data.nodc.noaa.gov/thredds/catalog/ghrsst/>
- **NODC Geoportal:** <http://data.nodc.noaa.gov/geoportal/> - You may use NODC's Geoportal to search the NODC Ocean Archives for GHRSSST data using criteria such as date, collecting institution (the RDAC that created the data), and geographic domain. To limit your searches to only GHRSSST data, be sure to specify "fileIdentifier:\*GHRSSST-\*" as one of your search criteria.
- **NODC Ocean Archive System:** <http://www.nodc.noaa.gov/Archive/Search/> - You may search NODC's Ocean Archive System for GHRSSST data using criteria such as date, collecting institution (the RDAC that created the data), and geographic domain. To limit your searches to only GHRSSST data, be sure to select "Contributing projects" as one of your search criteria, and then select "GHRSSST" from the menu.
- **NODC Live Access Server:** <http://data.nodc.noaa.gov/las/> - Use the Live Access Server to search dynamically in time and space through NODC data products. To access GHRSSST data, click the 'Choose dataset' button at the top left of the browser window, click on 'GHRSSST Aggregations,' and select a GHRSSST product. Currently only GHRSSST L4 products are available through the Live Access Server.

For a simple tutorial on accessing GHRSSST data from the LTSRF or GDAC, try the GHRSSST Data Access Tutorial in [PDF \(~4 MB\)](#) or [PPT \(~6 MB\)](#) formats.

GHRSSST Products in the LTSRF												
RDAC	Product	Product Level	Start Date	End Date	GDS Version	Grid / Pixel Resolution	Metadata	Access	Disk Volume · Number of Days · Number of Files			
ABOM	GAMSSA_28km GLOB	L4	2008-08-24	2015-10-02	1.5	28 km	<a href="#">Details</a> · <a href="#">Granule Search</a> · <a href="#">Live Access Server</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	2.5GB	2589 days	2589 files	
	RAMSSA_09km AUS	L4	2008-04-01	2015-10-02	1.5	9 km	<a href="#">Details</a> · <a href="#">Granule Search</a> · <a href="#">Live Access Server</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	4.3GB	2716 days	2720 files	
CMC	CMC0.2deg GLOB	L4	2013-06-27	2015-09-20	2.0	0.2°	<a href="#">Details</a> · <a href="#">Granule Search</a> · <a href="#">Live Access Server</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	1.0GB	461 days	461 files	
DMI	DMI_OI GLOB	L4	2013-12-11	2015-09-15	2.0	0.05°	<a href="#">Details</a> · <a href="#">Granule Search</a> · <a href="#">Live Access Server</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	21.5GB	143 days	143 files	
	DMI_OI NSEABALTIC	L4	2007-06-04	2015-10-03	1.5	3 km	<a href="#">Details</a> · <a href="#">Granule Search</a> · <a href="#">Live Access Server</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	1.5GB	3009 days	3009 files	
EUR	AMSRE	L2P	2004-12-19	2007-02-26	1.5	25 km	<a href="#">Details</a> · <a href="#">Granule Search</a> · <a href="#">Live Access Server</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	3.0GB	744 days	8995 files	
	ATS_NR_2P	L2P	2004-12-30	2009-09-29	1.5	1 km	<a href="#">Details</a> · <a href="#">Granule Search</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	315.4GB	1643 days	22303 files	
	AVHRR16_G	L2P	2004-12-30	2006-08-14	1.5	8.8 km	<a href="#">Details</a> · <a href="#">Granule Search</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	0.6GB	549 days	7549 files	
	AVHRR16_L	L2P	2004-12-30	2005-10-26	1.5	2.2 km	<a href="#">Details</a> · <a href="#">Granule Search</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	0.1GB	241 days	1021 files	
	AVHRR17_G	L2P	2004-12-30	2007-02-26	1.5	8.8 km	<a href="#">Details</a> · <a href="#">Granule Search</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	0.8GB	708 days	9756 files	
	AVHRR17_L	L2P	2004-12-30	2007-02-26	1.5	2.2 km	<a href="#">Details</a> · <a href="#">Granule Search</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	0.5GB	687 days	3126 files	
	AVHRR_METOP_A	L2P	2009-10-01	2013-07-04	1.5	1.1 km	<a href="#">Details</a> · <a href="#">Granule Search</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	3221.9GB	1326 days	622720 files	
	AVHRR_METOP_A	L3P	2009-09-01	2013-07-03	1.5	0.05°	<a href="#">Details</a> · <a href="#">Granule Search</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	34.6GB	1396 days	2741 files	
	AVHRR_NOAA_19	L3P	2009-12-10	2013-07-03	1.5	2 km	<a href="#">Details</a> · <a href="#">Granule Search</a>	<a href="#">FTP</a> · <a href="#">HTTP</a> · <a href="#">OPeNDAP</a> · <a href="#">THREDDS</a>	24.0GB	1301 days	2584 files	

<https://ghrsst.nodc.noaa.gov/accessdata.html>



**GHRSSST**

Group for High Resolution Sea Surface Temperature

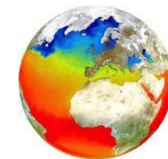


<http://www.ghrsst.org>



Committee on Earth Observation Satellites  
Sea Surface Temperature Virtual Constellation

# LTSRF Archive and Services Progression



	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017*
Products		22	26	27	40	59	60	62	77	84	84
Accessions		39,048	49,957	59,982	67,906	92,282	105,046	112,182	132,000	148,415	152,510
Files		679,000	993,580	1,352,901	1,662,004	2,459,724	3,290,806	3,971,657	4,894,891	5,888,939	6,173,833
Volumes (TB)		13	20	28	34	57	69	81	99	124	130
Services	ftp http	ftp http	ftp http DAP	ftp http DAP WMS WCS	ftp http DAP WMS WCS LAS	ftp http DAP WMS WCS LAS Geoportal	ftp http DAP WMS WCS LAS Geoportal Granules CWIC	ftp http DAP WMS WCS LAS Geoportal Granules CWIC	ftp http DAP WMS WCS LAS Geoportal Granules CWIC	ftp http DAP WMS WCS LAS Geoportal Granules CWIC	ftp http DAP WMS WCS LAS Geoportal Granules CWIC OneStop DSMM

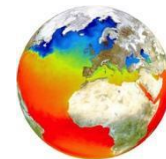
**Geoportal:** CSW, OpenSearch, Geoportal REST API

**OneStop:** Currently OneStop API and UI at <https://www.ncdc.noaa.gov/onestop>

**DSMM:** Data Stewardship Maturity Model Assessment

\* As of 24 May 2017

# Example tools: Live Access Server



Live Access Server About LAS Help  
OPeNDAP (F-TDS) / THREDDS

## NCEI LAS 7.3 (FERRET 6.82)

Choose dataset Update Plot Set plot options Animate Compare Google Earth Show Values Export to Desktop Application Save As ... Link To ... Print

GHRSSST - Aggregation / L4 / GLOB / UKMO / UKMO-L4HRfnd-GLOB-OSTIA  
+ analysed sea surface temperature

LAS 7.3/Ferret 6.82 NOAA/NCEI

TIME : 01-APR-2006 12:00 DATA SET: OSTIA Sea Surface Temperature and Sea Ice Analysis  
Subsampled 3 in X

50.63 N  
105.47 E 142.03 E  
23.91 N

**MAPS**  
 Latitude-Longitude

**HOVMOLLER PLOTS**  
 Longitude-Time  
 Latitude-Time

**LINE PLOTS**  
 Time Series  
 Longitude  
 Latitude

**SCATTER PLOTS**  
 Property-Property

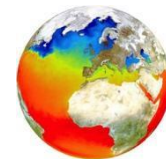
Date: Apr 01 2006

[Apply analysis](#)

US Department of Commerce NO.

<https://data.nodc.noaa.gov/las>

# Example tools: OPeNDAP and THREDDS

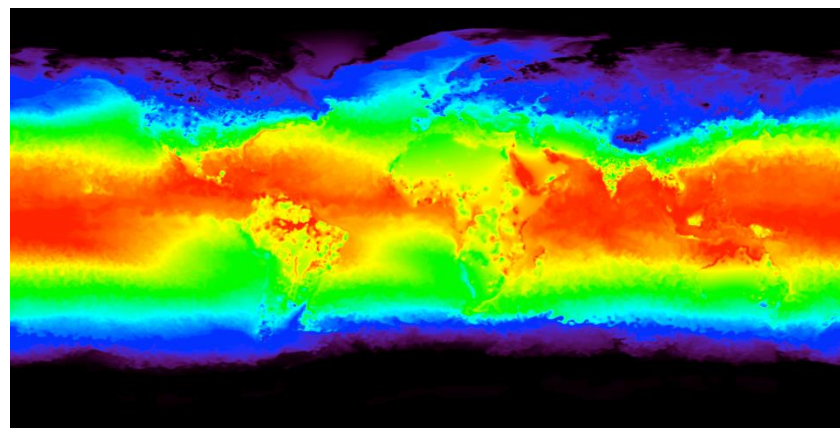


- Easy access to GDS2.0 format through OPeNDAP and THREDDS Data Servers (TDS)
- Can use IDL, MATLAB, etc., for direct access

```
url = 'https://podaac-  
opendap.jpl.nasa.gov/opendap/allData/ghrsst/data/GDS  
2/L4/GLOB/CMC/CMC0.2deg/v2/' $  
+ '2015/' $  
+ '311/' $  
+ '20151107120000-CMC-L4_GHRSSST-SSTfnd-  
CMC0.2deg-GLOB-v02.0-fv02.0.nc'
```

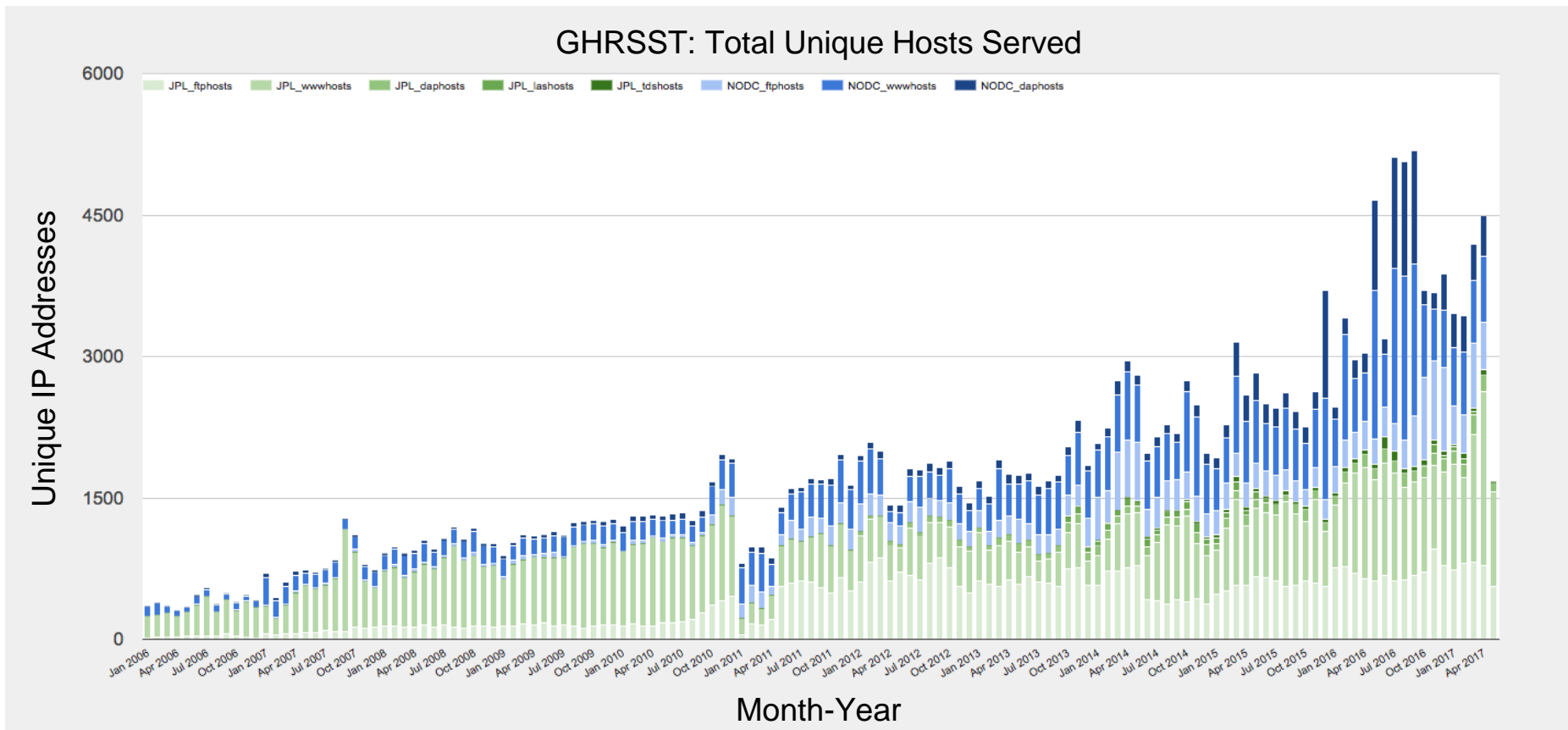
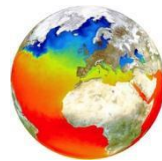
```
file_id = NCDF_OPEN(url, /nowrite)  
NCDF_VARGET, file_id, 'analysed_sst', sst  
NCDF_CLOSE, file_id  
DEVICE, decomposed=0  
LOADCT, 39, /silent  
TV, BYTSCL(sst)
```

Example IDL Code



No flags applied

# GHR SST Data Access Stats: JPL+NCEI

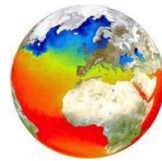


1.4 Petabytes of data in 316 million files served to over 240,000 users

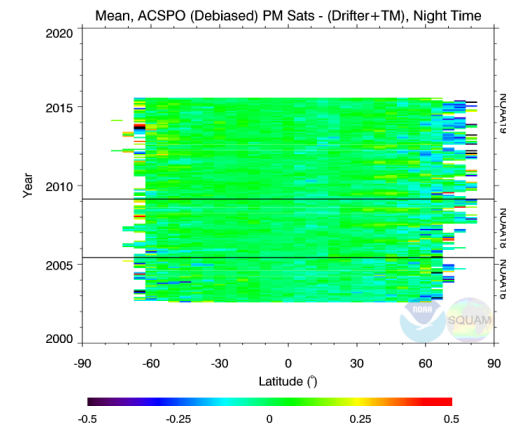
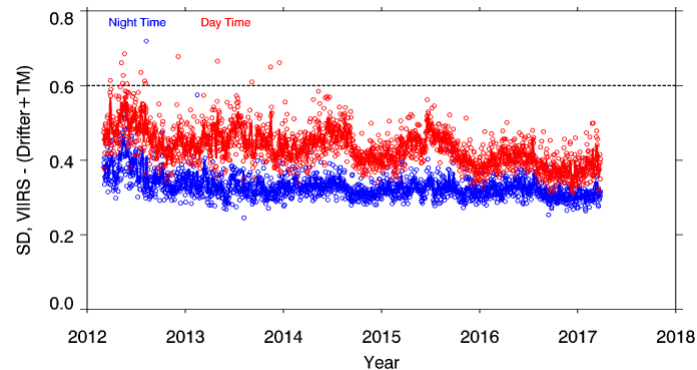
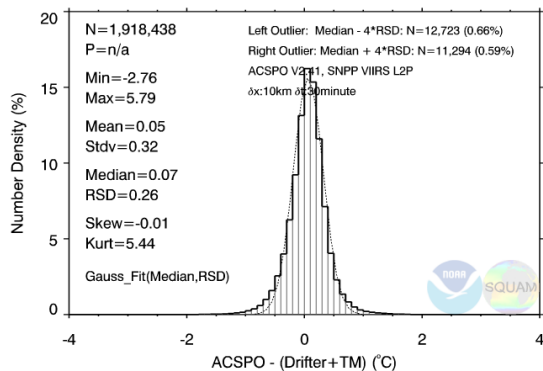
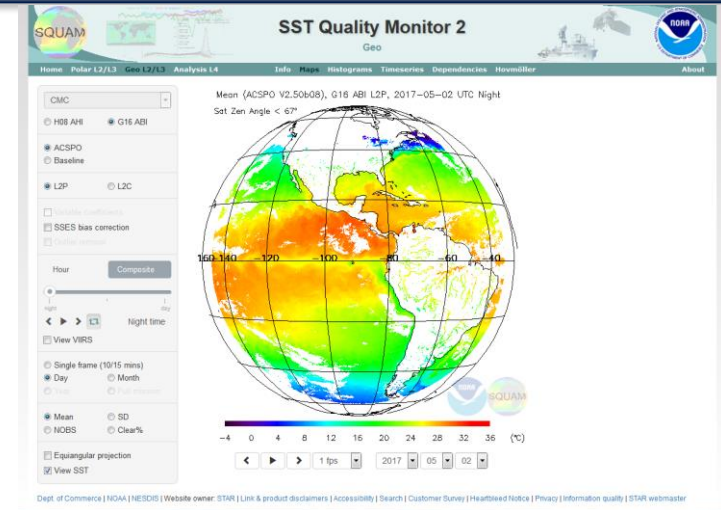
\* As of 24 May 2017

# **GHRST COMMUNITY SERVICES**

# Community Tools: SQUAM

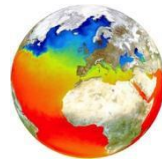


- Near-Real Time Global SST Quality Monitor (SQUAM; [www.star.nesdis.noaa.gov/sod/sst/squam/](http://www.star.nesdis.noaa.gov/sod/sst/squam/))
  - Monitors differences,  $\Delta T$ 's, between various satellite IR (L2/L3), analysis (L4), and *in situ* SSTs (from *i*Quam).
  - Monitored are Maps, Histograms, Time Series, Dependencies, and Hovmoller diagrams
  - The  $\Delta T$ s should be Gaussian, centered at  $\sim 0$  & narrow
  - Deviations from these expected patterns suggest need to improve SST algorithms, and sensor radiances

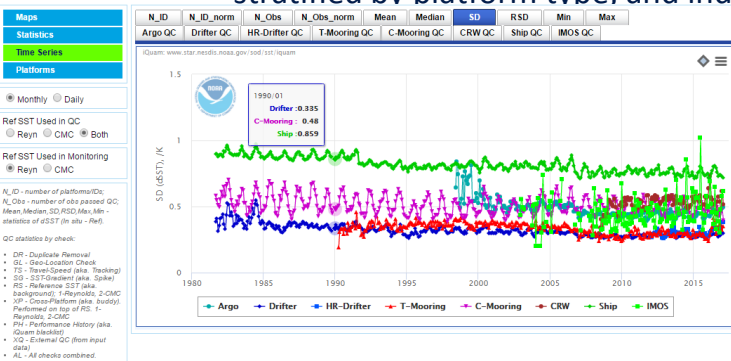
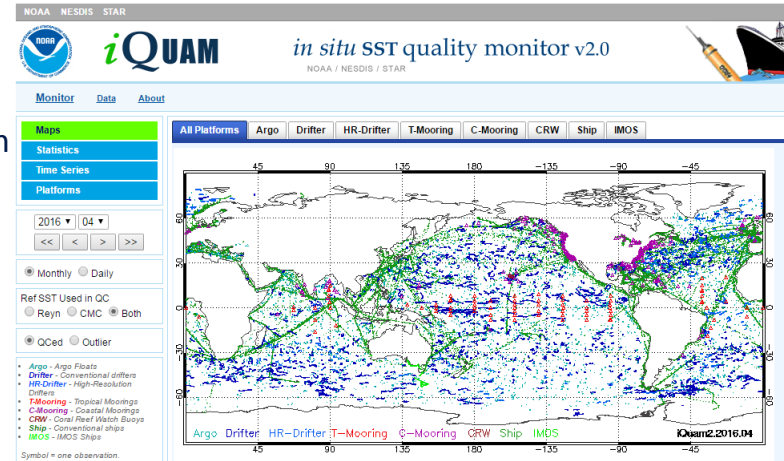


For further information see Sasha Ignatov, Xinjia Zhou or Kai He

# Community Tools: iQuam



- Near-Real Time in situ SST Quality Monitor (iQuam; [www.star.nesdis.noaa.gov/sod/sst/iquam/](http://www.star.nesdis.noaa.gov/sod/sst/iquam/))
  - Ingests various *in situ* SSTs (drifters, Argo floats, etc) from different sources (GTS, FNMOC, ICOADS, etc), from 1981-on
  - Performs uniform quality control and appends quality flags (all data are preserved with original QFs from data providers)
  - Supplies QC'ed data to GHRSSST users via web interface
  - Monitors data product online (including global statistics, stratified by platform type, and individual platforms)



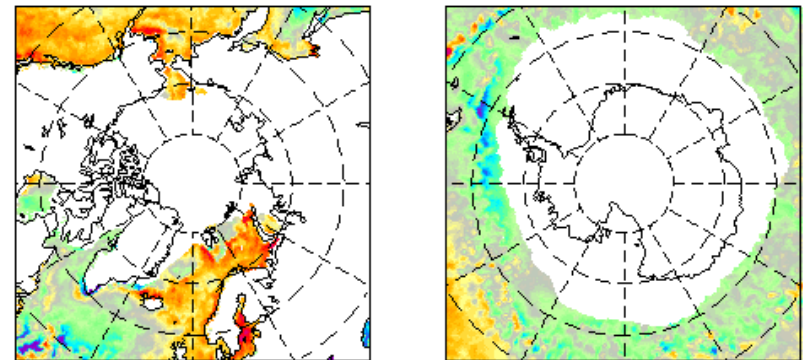
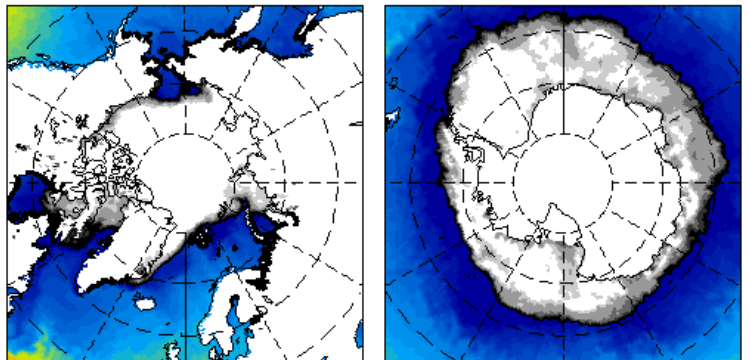
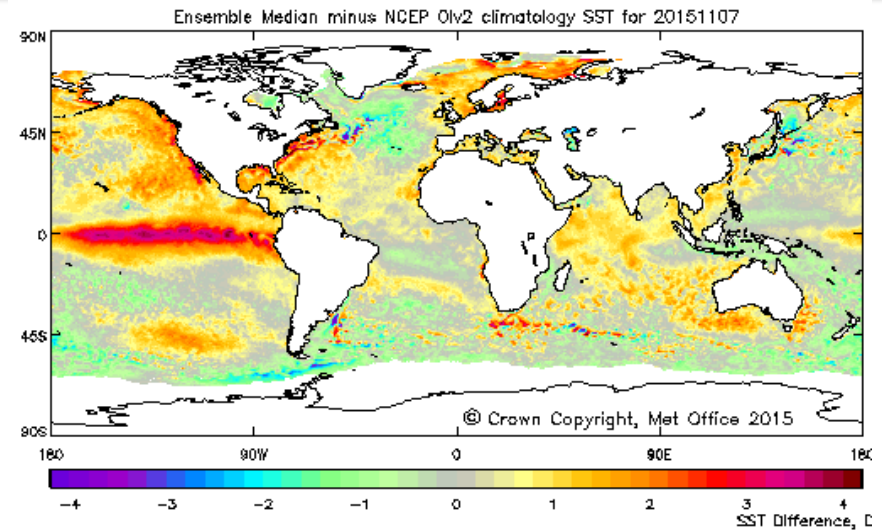
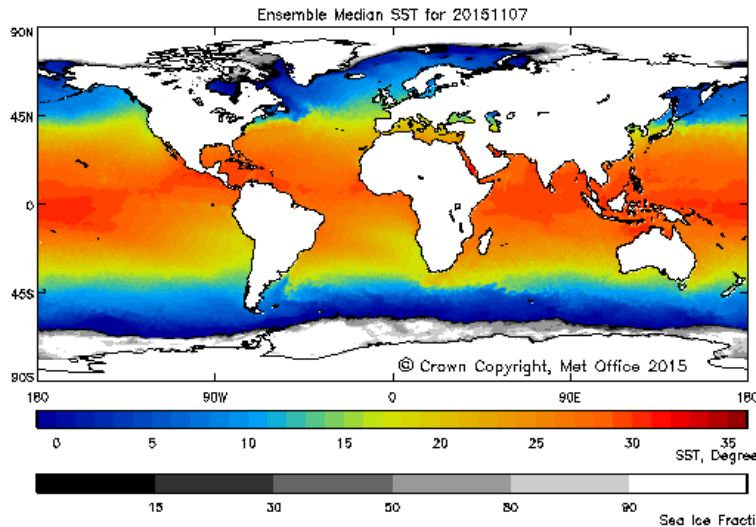
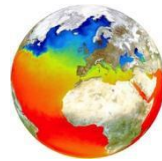
The screenshot shows a table of platform statistics and a map of ship tracks. The table has columns for platform type, ID, N\_OBS, N\_OC, Err%, N\_Mo, Mean, SD, Min, Max, AL, DR, GL, TS, SG, RS, XP, PH, XQ, LT, Lon. The map shows the track of ship "0402" from 2017-03-31 to 2017-03-30, with a legend for "Track of Ship '0402' 2017-03-31-2017-03-30".

For further information see Sasha Ignatov, Xinjia Zhou or Kai He



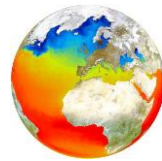
# Community Tools: GMPE

GHR SST Multi  
Product Ensemble

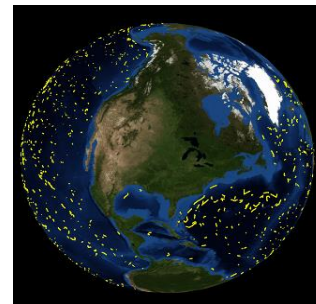
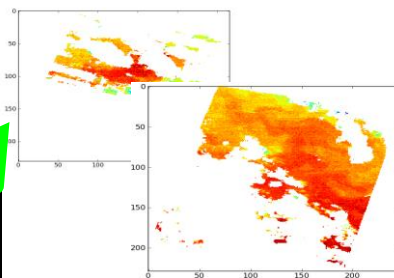
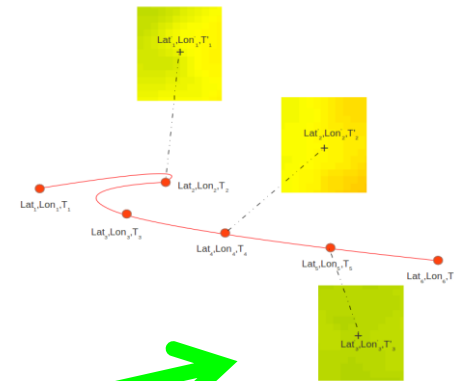


[http://ghrsst-pp.metoffice.com/pages/latest\\_analysis/sst\\_monitor/daily/ens/](http://ghrsst-pp.metoffice.com/pages/latest_analysis/sst_monitor/daily/ens/)

# Community Tools: Felyx (<http://hrdds.ifremer.fr>)



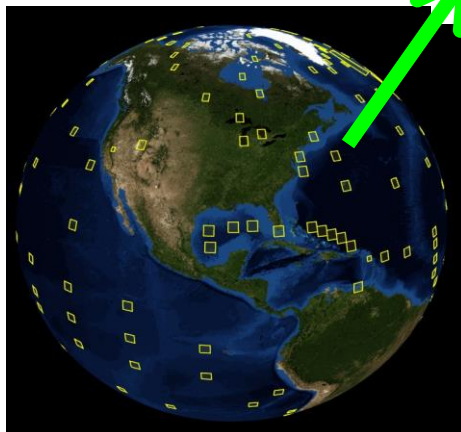
- Designed for creating match-up databases and for EO product performance monitoring
- Extract and store subsets of large datasets over predefined static or dynamic (like buoy or ship trajectories) locations
- Process and display metrics and diagnostics



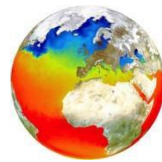
- Open source software implemented in python
- Works with all GDS format products - extensible through plugins to other datasets, new metrics,...

Ifremer

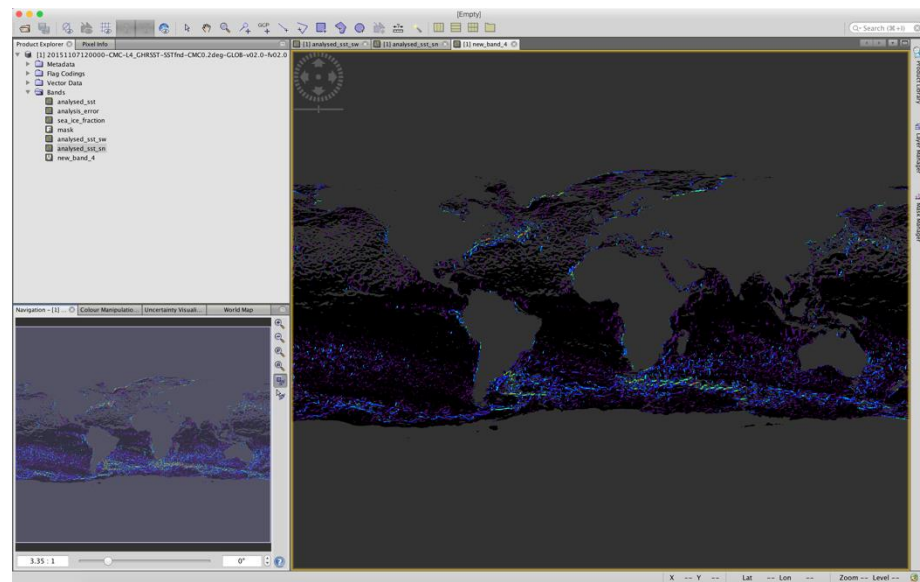
For further information see Jean Francois Piollé ([jfpiolle@ifremer.fr](mailto:jfpiolle@ifremer.fr))



# Community Tools: SNAP – Sentinel Application Platform



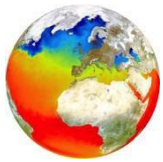
<http://step.esa.int/main/download/>



- SNAP is an open source toolbox for visualisation, analysis, and processing of the Sentinels 1, 2 and 3 EO data. Also supports many third-party missions and generic formats (e.g. GHRSSST NetCDF).

# **SUMMARY**

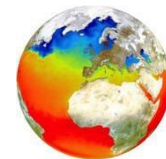
# With so many GHR SST products to choose from, start by considering....



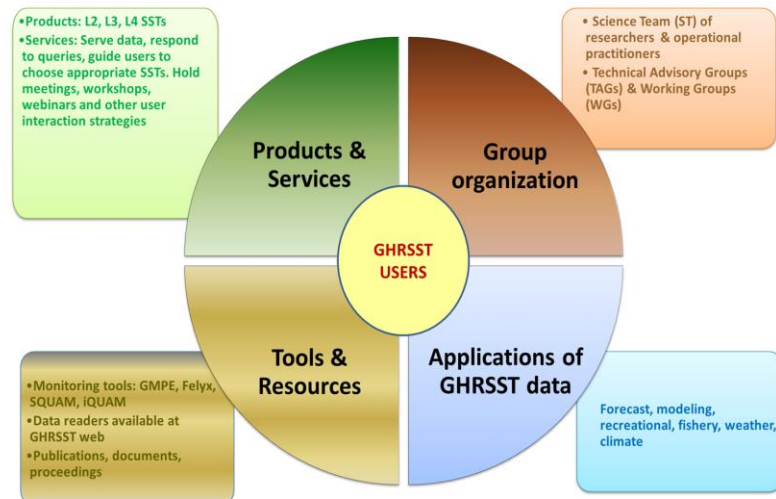
- Spatially complete?
  - Analysis or native swath data
- Duration?
  - Time series or single image
- Spatial resolution?
  - High-resolution near coast or basin scale
- Level of uncertainty?
  - Best quality only
- Depth?
  - Skin or other defined depth
- Synergy?
  - Co-located with other data
- Availability?
  - Timeliness
- Volume?
  - Local or remote processing



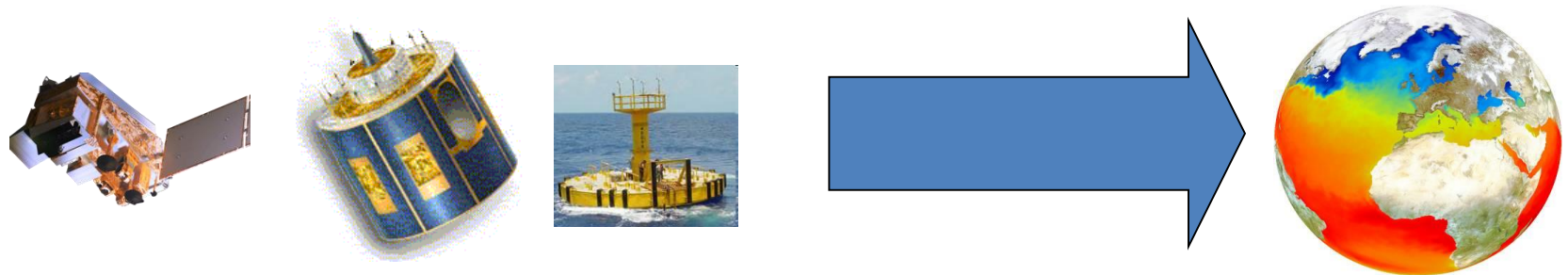
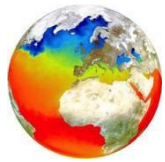
# Finding the SST you need – Key Links



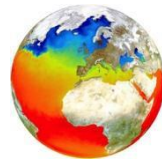
- GHRSSST Quick-Start Guide
  - <http://www.ghrsst.org/quick-start>
- GHRSSST Tools/Resources/Code
  - <http://www.ghrsst.org/products-and-services/tools>
- Real time
  - Primary system at NASA JPL:  
<http://podaac.jpl.nasa.gov/>
  - Secondary system at Ifremer:  
<http://cersat.ifremer.fr/data/collections/ghrsst>
- Delayed mode (30 days after observation)
  - <https://ghrsst.nodc.noaa.gov>
- Any issues please contact the GHRSSST Project Office: [gpc@ghrsst.org](mailto:gpc@ghrsst.org)



# Summary



- The provision of SST data through GHRSSST has grown to a mature, sustainable, essential service
- GHRSSST provides a wide range of user driven SST-related products and services
- There are many tools available to help you find and use the right GHRSSST products
- And always remember – behind these technologies are people who are ready and willing to help, so if you have questions, just ask!



# QUESTIONS?