An Introduction to GHRSST Products and Services

Gary Corlett

GHRSST Project Coordinator
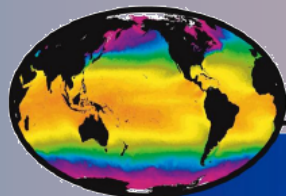
To provide operational users and the science community with the SST measured by the satellite constellation

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Group for High Resolution Sea Surface Temperature
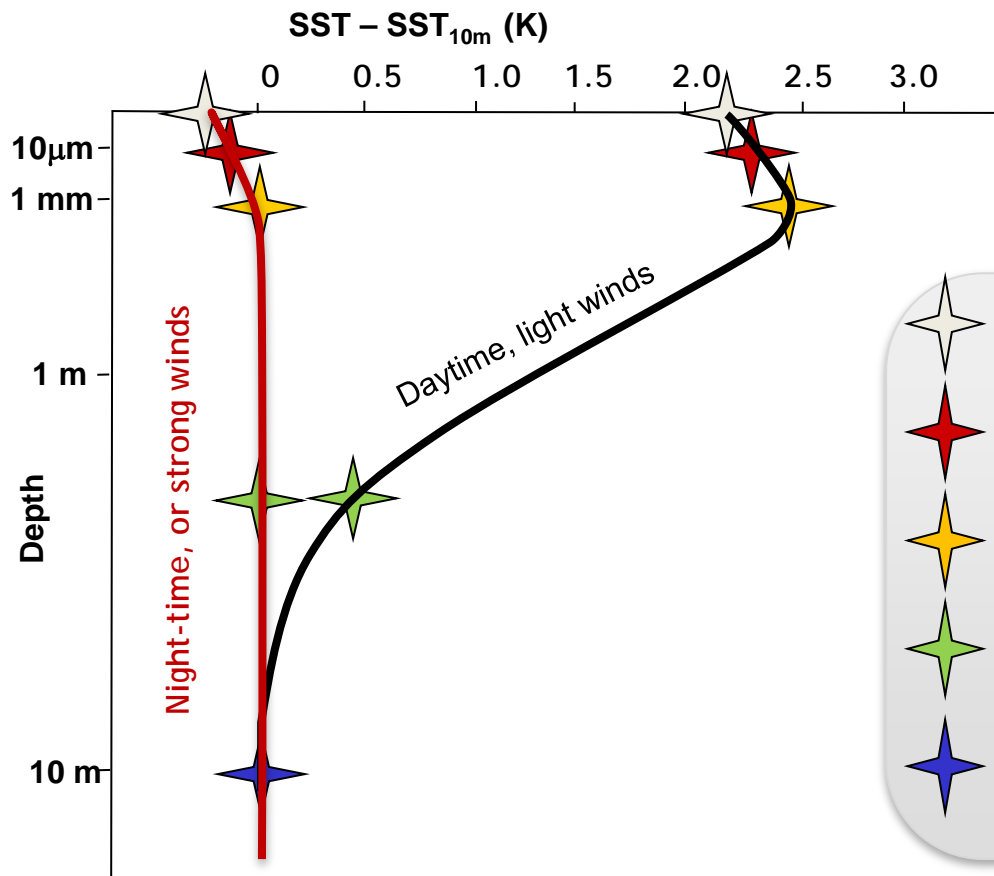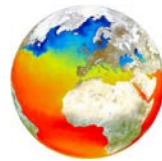
GHRSST and CEOS SST-VC
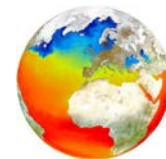
GHRSST

- The Group for High Resolution Sea Surface Temperature
    - Grew out of a Pilot Project of the Global Ocean Data Assimilation Experiment (GODAE), 1997-2008.
- Composed of an international Science Team of researchers and operational practitioners.
- Coordinates research and operational developments in satellite-derived SST.
- Data processing through Regional and Global Data Assembly Centers.

SST-VC

- The Sea Surface Temperature Virtual Constellation (SST-VC) serves as the formal link between GHRSST and the broader CEOS community.
- The SST-VC provides a means for CEOS to present its needs and requirements to GHRSST and for GHRSST to present its needs directly to CEOS.

What is SST?

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How do we measure SST from Space?
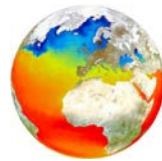
- ## We need two things:
  - A high-performance radiometer in Space
  - An effective Atmospheric Correction
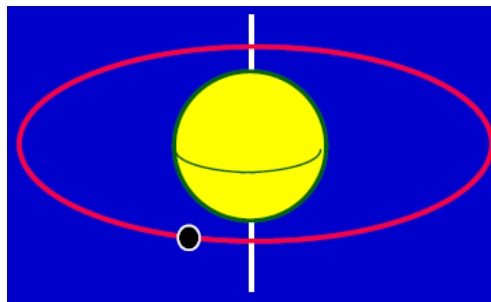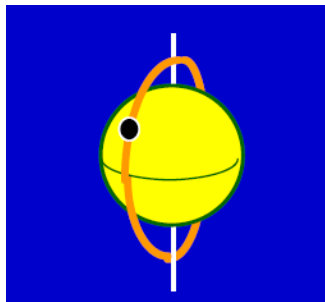
High resolution atmospheric absorption spectrum and comparative blackbody curves.

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SEVIRI spectral images

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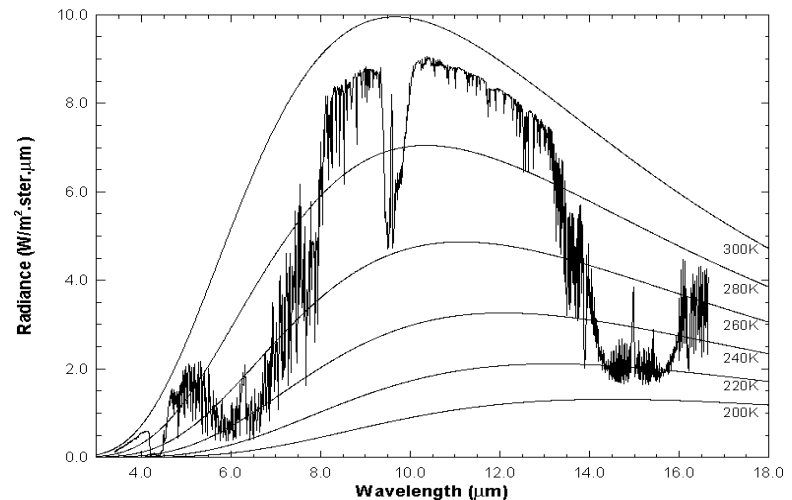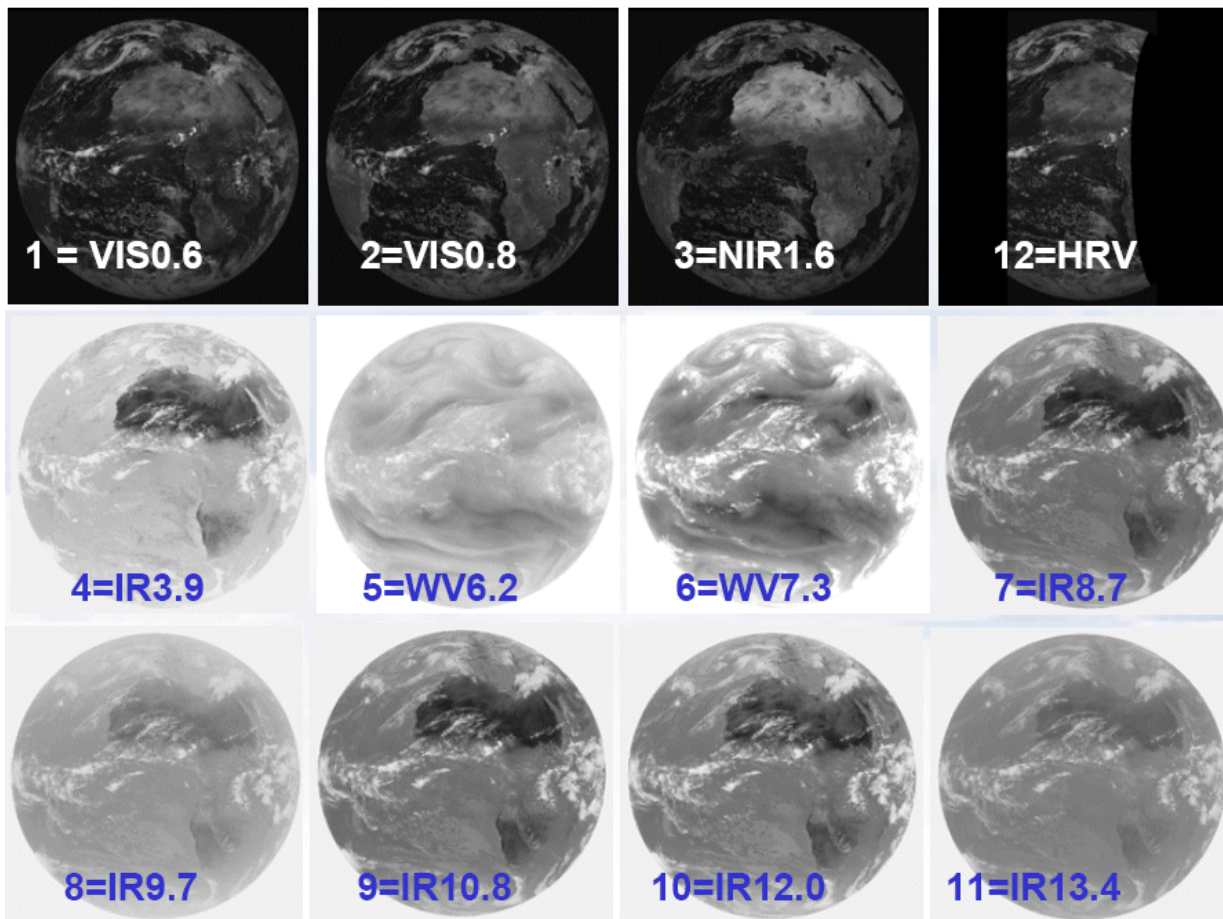
Satellite SSTs at a glance
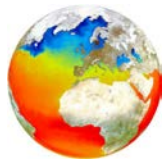
Infra-red observations

- Spatial resolution: 1 to 10 km

- Uncertainty: 0.15 to 0.5 K

- Limitations: cloud cover

- Temporal resolution per sensor (not accounting for clouds): sub-hourly (geo), ~ twice-daily (polar)

- Since 1981

Passive microwave observations

- Spatial resolution: 50 to 100 km

- Uncertianty: 0.4 to 0.75 K

- Accuracy (bias): few tenths

- Limitations: rain, margin around land and ice, radio frequency interference

- Temporal resolution per sensor (not accounting for contaminants): ~ twice daily

- Since 1997

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Optimising the SST constellation

Geostationary orbit
Infra-red radiometer

Polar-orbiting
infra-red radiometer

Polar-orbiting
microwave
radiometer

research
vessel

drifting or
moored buoy
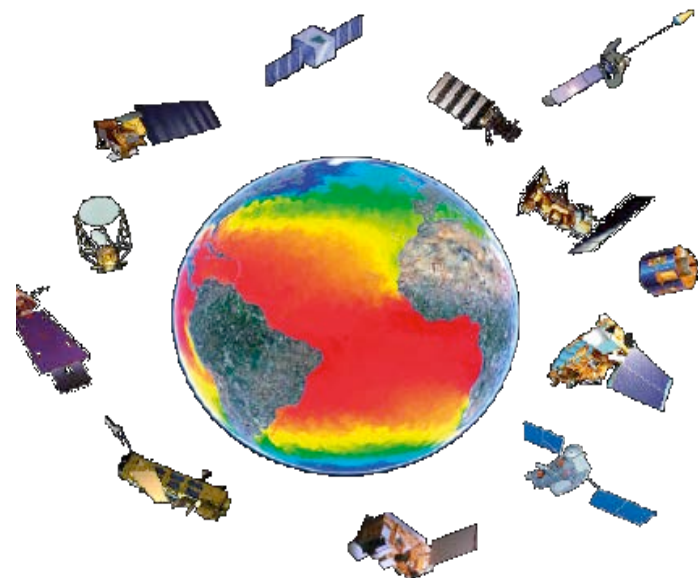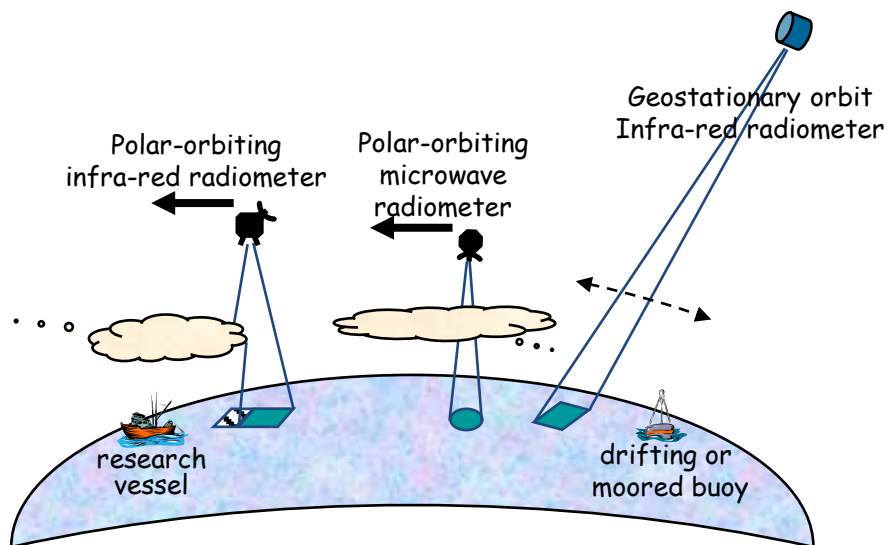
GHRSST exploits complementary data sources

- Polar Orbiting infrared has *high accuracy & spatial resolution*

- Geostationary infrared has *high temporal resolution*

- Microwave Polar orbiting has *all-weather capability*

- In situ data provide *reality in all weather conditions*

SST constellation gap analysis

- Current gaps that need attention include:
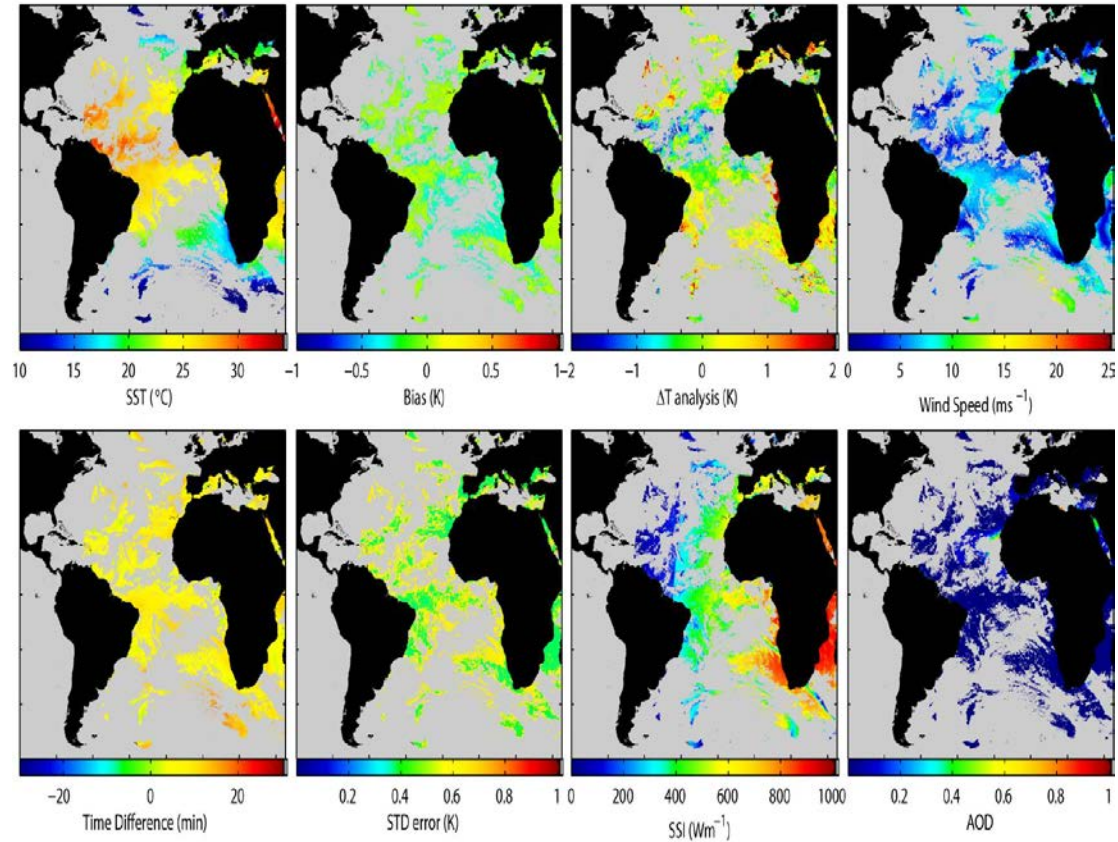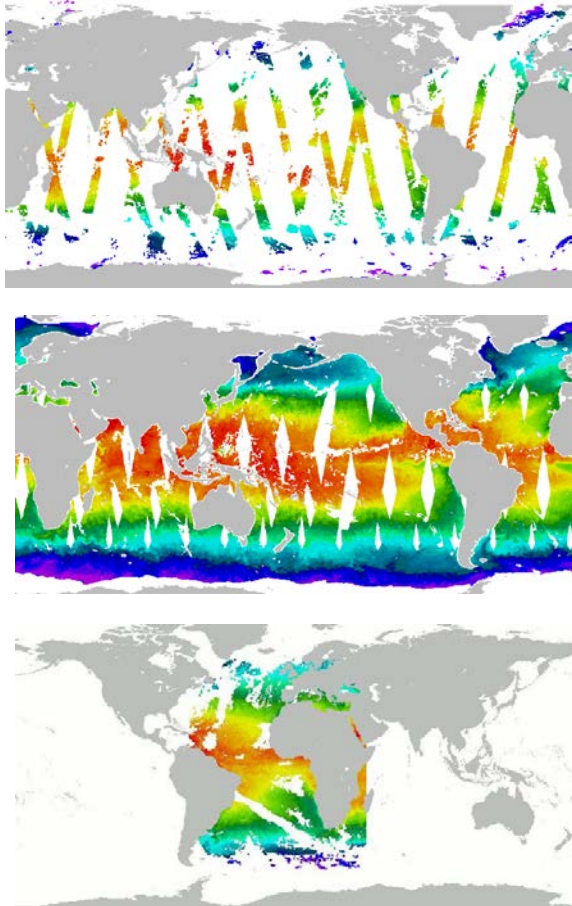
  – Redundant capability in microwave SST measurements (NSOAS)

  – Geostationary SST over Indian Ocean (ISRO; CMA)

  – Replacement 'reference' dual-view satellite radiometer (SLSTR)

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Data Processing Levels

Data Level	Description
Level 0	Reconstructed, unprocessed instrument and payload data at full resolution.
Level 1B	Level 0 data that have been processed to geolocated radiances
Level 2P	Derived SST at the same resolution and location as Level 1B source data.
Level 3	Variables mapped on uniform space-time grid scales, with some degree of spatial averaging (L3U and L3S) and temporal averaging (L3C).
Level 4	Output from analyses of lower-level data (e.g., variables derived from multiple measurements).

L2P: Common format with uncertainties
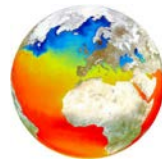
Ancillary information in L2P products: dynamic flags

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Example L3S: Multiple sensors SST_{foundation}

MyOcean L3 EUROPE-ATS 2010-11-01 Adjusted SST
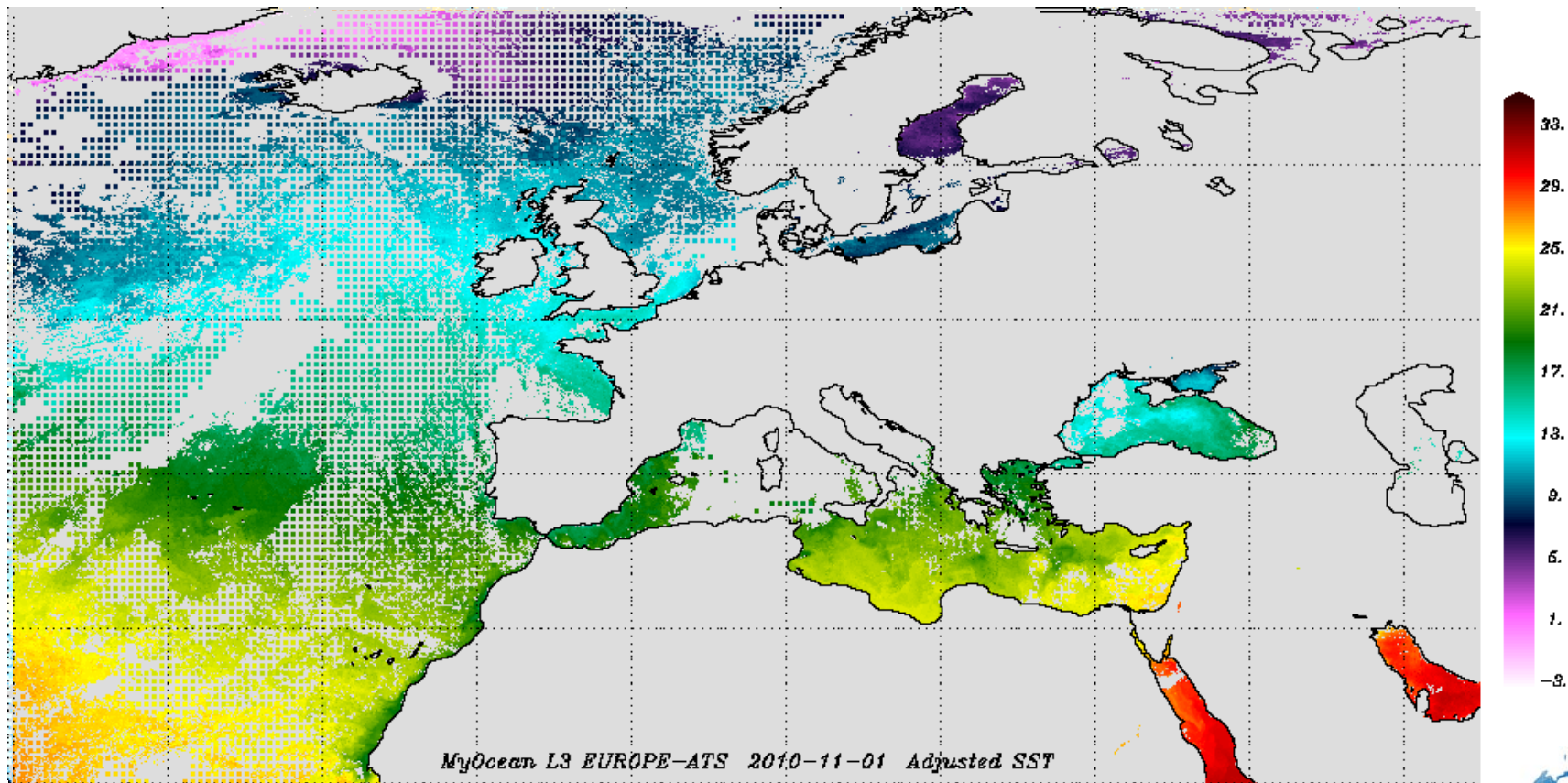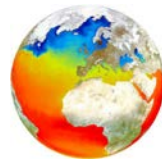
Example L4: GHRSST Multi-Product Ensemble (GMPE)

Horizontal SST gradients for GMPE on 25/01/2011
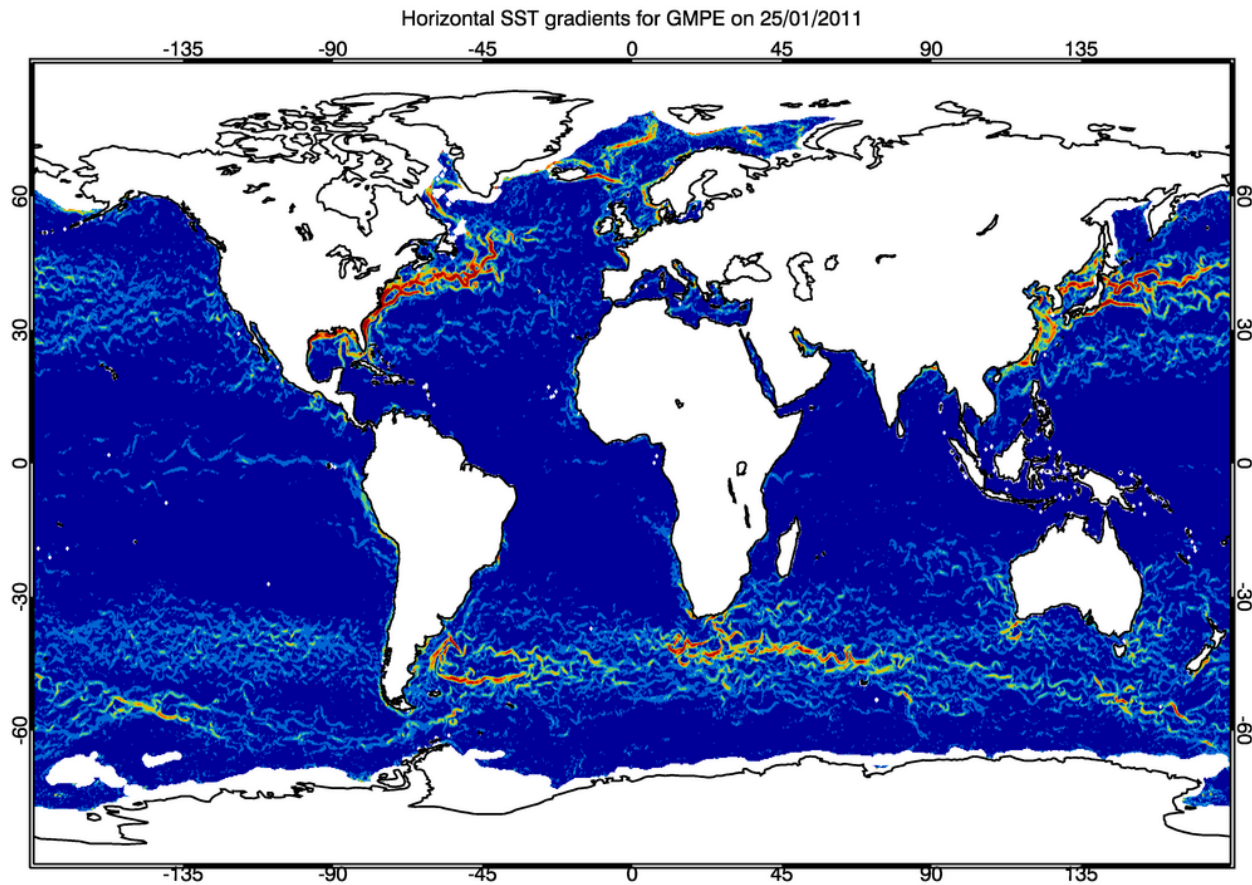
Regional/Global Task Sharing
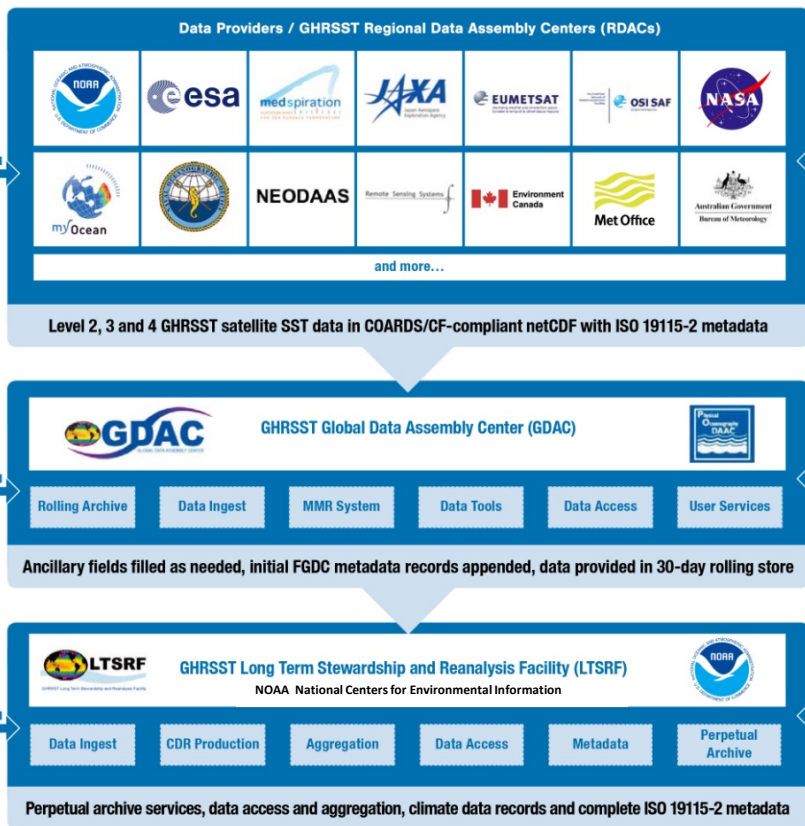
- GHRSST products geenrated by RDACs
  - Some RDACs are self-serve
- GHRSST offers to serve data on-behalf of RDACs
  - Optional step but recommended
  - Addtional metadata for discovery services

- Real time
  - Global Data Assembly Centre (GDAC)
  - Primary system hosted by NASA JPL
    - See http://podaac.jpl.nasa.gov/
  - Secondary system hosted by Ifremer
    - See http://cersat.ifremer.fr/data/collections/ghrsst (requires simple registration)
    - Not all datasets are mirrored
- Delayed mode
  - Long-term Stewardship and Reanalysis Facility (LTSRF)
  - Hosted by NOAA NODC
    - See http://data.nodc.noaa.gov/ghrsst/
- Data can be accessed using many methods
  - ftp, http, DAP, WMS, WCS, LAS, Geoportal, Granules, CWI

- Any issues
  - Please contact the GHRSST Project Office (gpc@ghrsst.org)

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Finding the SST you need
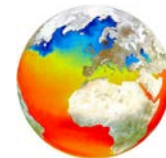
Interested in GHRSST data:
- Real-time data (collection - GHRSST): http://podaac.jpl.nasa.gov
- Long-term data: http://ghrsst.nodc.noaa.gov/
- Which data to use? Please check "Quick Start" : www.ghrsst.org/quick-start
- Tools/resources/codes: https://www.ghrsst.org/products-and-services/tools/

- Products: L2, L3, L4 SSTs
- Services: Serve data, respond to queries, guide users to choose appropriate SSTs. Hold meetings, workshops, webinars and other user interaction strategies

Products & Services

- Science Team (ST) of researchers & operational practitioners
- Technical Advisory Groups (TAGs) & Working Groups (WGs)

Group organization

GHRSST USERS

- Monitoring tools: GMPE, Felyx, SQUAM, iQUAM
- Data readers available at GHRSST web
- Publications, documents, proceedings

Tools & Resources

Applications of GHRSST data

Forecast, modeling, recreational, fishery, weather, climate

Interested in GHRSST activities:
- Visit the GHRSST website at https://www.ghrsst.org
- For your interest in a particular technical advisory group (TAG) or working group (WG), please check the description for that working group
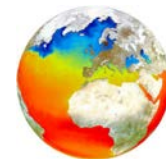
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Diagnostic Datasets (Felyx)
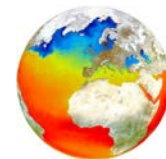
- **Felyx** (http://www.felyx.org) is funded by ESA and provides a free open source solution for scientists to analyse and inter-compare large collections of EO (here SST) data over static sites or moving targets (buoys, ships).
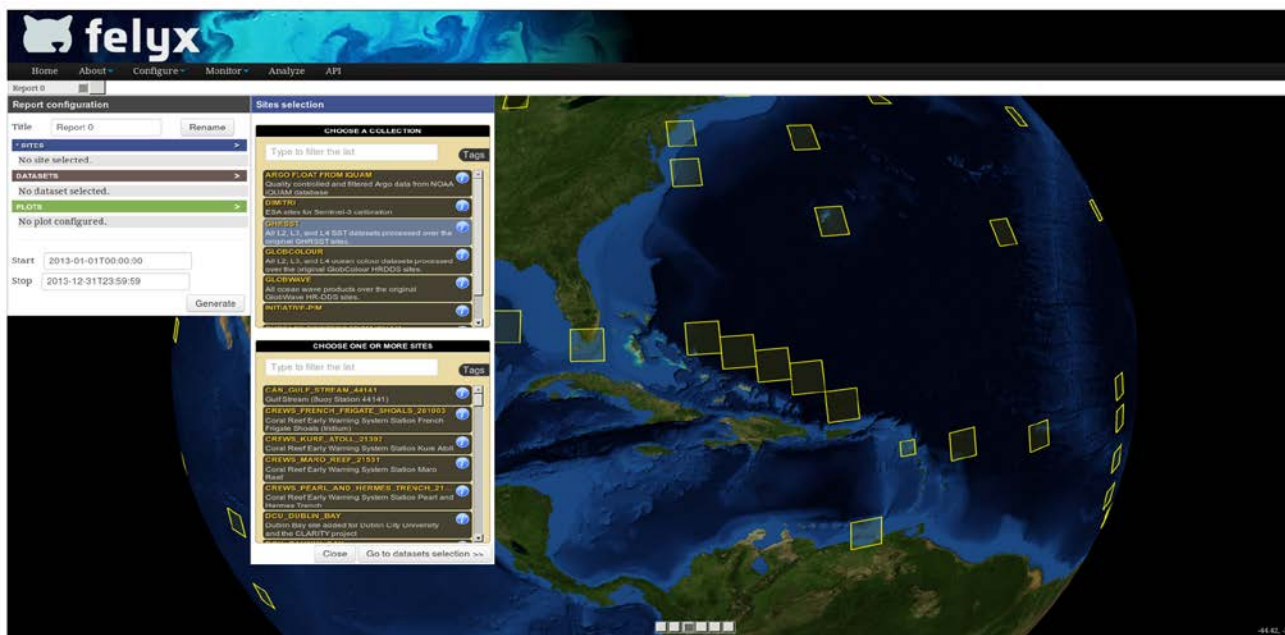
Product Validation

- GHRSST exploits online monitoring systems to access quality controlled *in situ* data for validation and use in L4 analyses
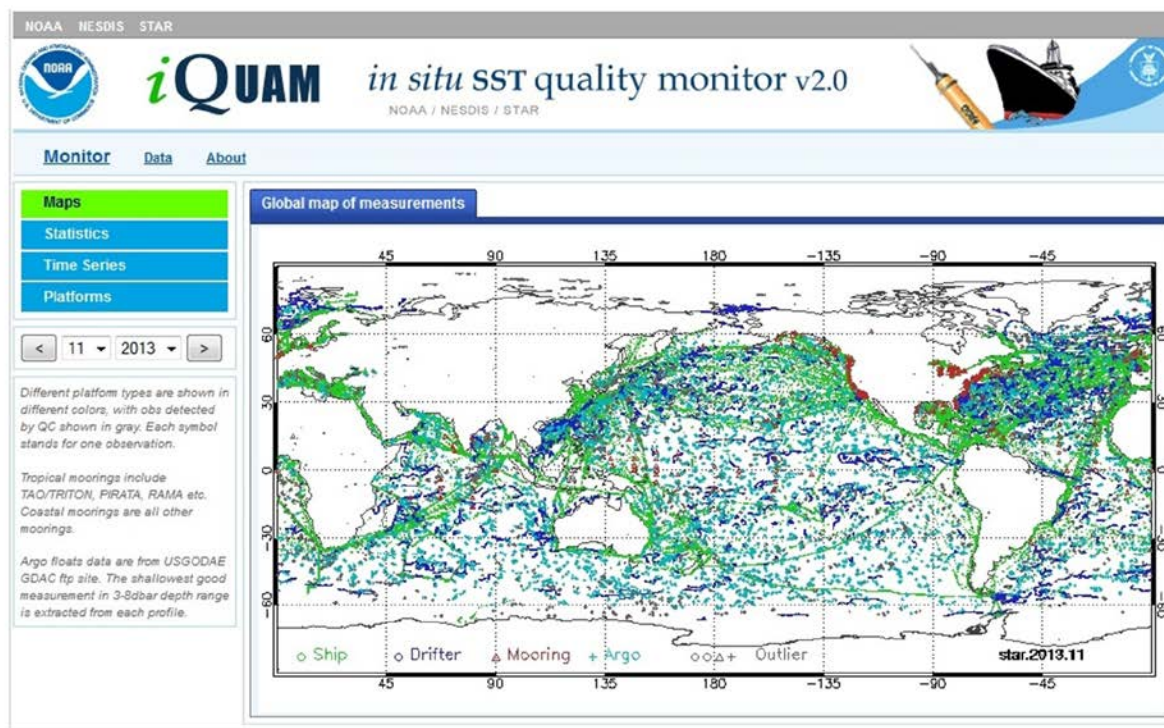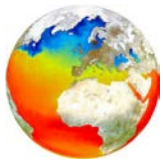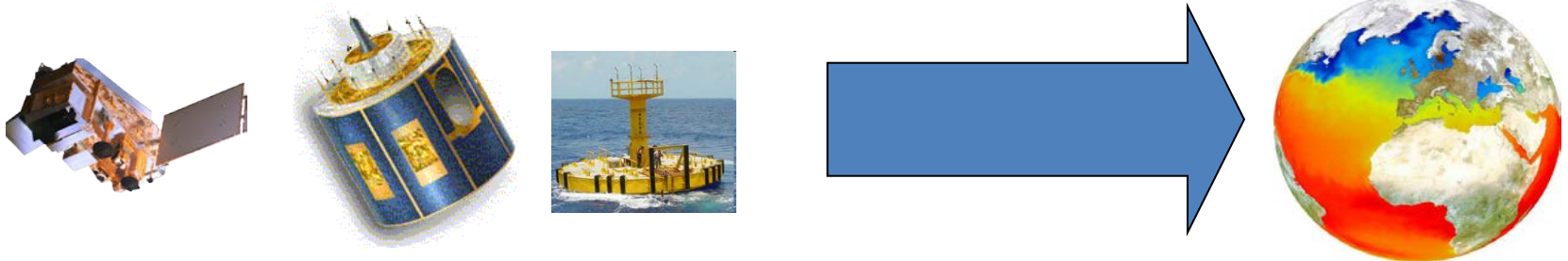
Future meeting dates

- ## GHRSST-XVII
  - Washington DC, USA, 6th – 10th June 2016

- ## GHRSST-XVIII
  - Qingdao, China, 5th – 9th June 2017

- ## GHRSST-XIX
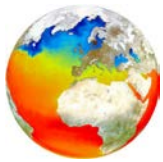 - Darmstadt, Germany, 4th – 8th June 2018

Summary

- GHRSST mission: To provide satellite-derived global SSTs with good estimates of uncertainty to operational users and the science community

- The provision of SST data by GHRSST has grown to a mature sustainable essential service

- GHRSST provides a wide range of user driven SST-related products and services

- Do they meet your needs?

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Contact details

- Thank you for your attention

- For further information please contact

  - Gary Corlett, GHRSST Project Coordinator, gpc@ghrsst.org

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