

A satellite-derived sea surface temperature map of the North Atlantic and surrounding regions. The map uses a color scale where red and orange indicate warmer waters, and blue and green indicate cooler waters. The map is presented in a circular, yin-yang style frame.

3rd INTERNATIONAL OPERATIONAL SATELLITE OCEANOGRAPHY SYMPOSIUM

Operational exploitation of Sea-Surface Temperature data retrieved from satellites

Anne O'Carroll (EUMETSAT), Jacob Hoeyer, Ioanna Karagali, Chiara Bearzotti, Edward Armstrong, Christo Whittle

ORGANISED BY



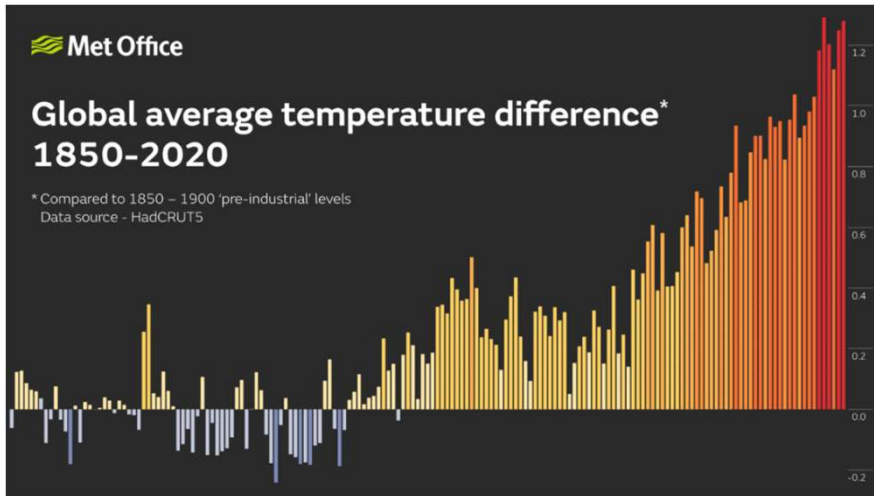
 **EUMETSAT**

HOSTED BY

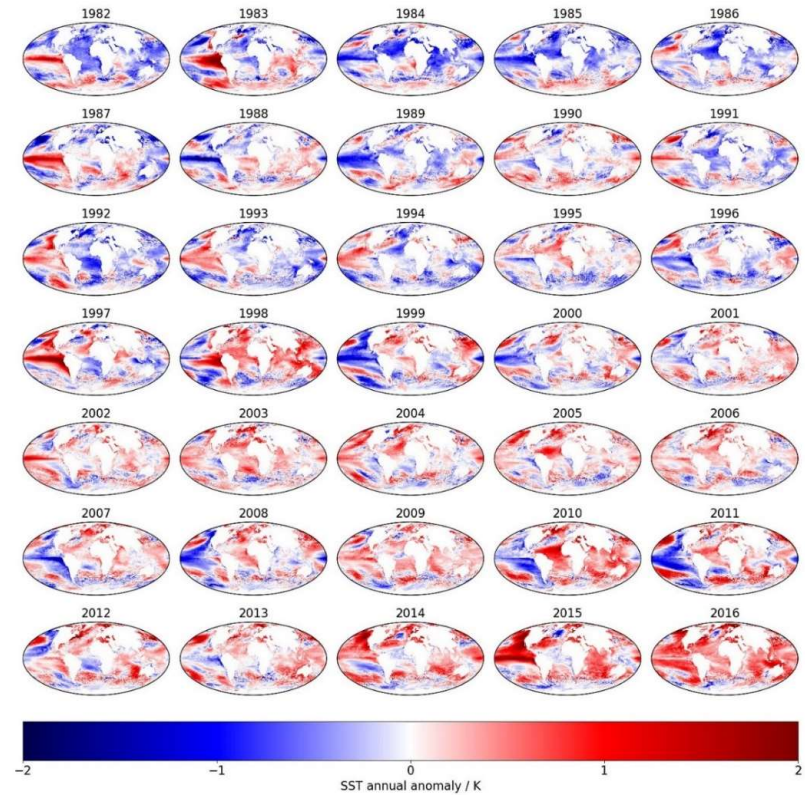


**Korea Hydrographic
and Oceanographic Agency**

SST importance and global mean temperature increase

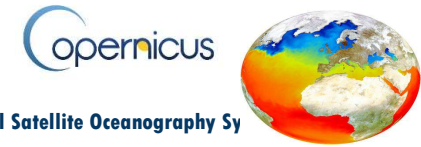


- Atmospheric circulation
- Circulation of oceans
- Ocean biogeochemistry
- Climate Change



<https://scienceblog.eumetsat.int/2019/12/sea-surface-temperature-climate-data-record-generation-with-slstr/>

The Group for High-Resolution Sea-Surface Temperature (GHRSSST)



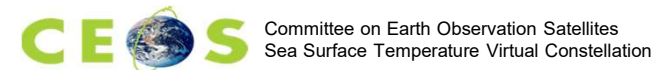
The Group for High Resolution Sea Surface Temperature grew out of a GODAE Pilot Project, 1997-2008

- **GHRSSST is an open international science group**
- **Coordinates research and operational developments in satellite-derived sea surface temperature (SST)**
- **Promotes the application of satellites for monitoring SST by enabling SST data producers, users and scientists to collaborate within an agreed framework of best practices**

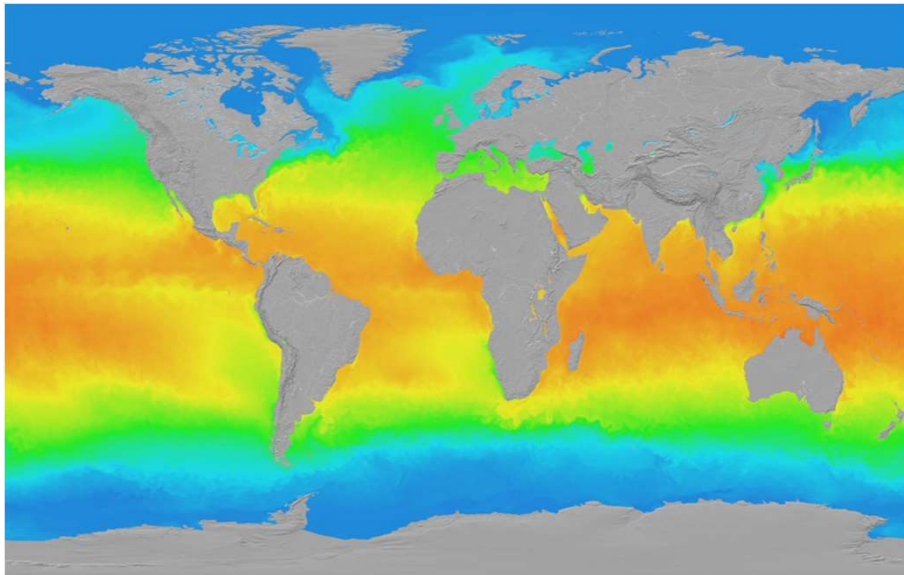
See www.ghrsst.org



<http://www.ghrsst.org>



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



- **Framework for SST knowledge and data**
- **Best practices for processing and uncertainties**
- **Bring SST to operational users and science**

Patrons and Sponsors



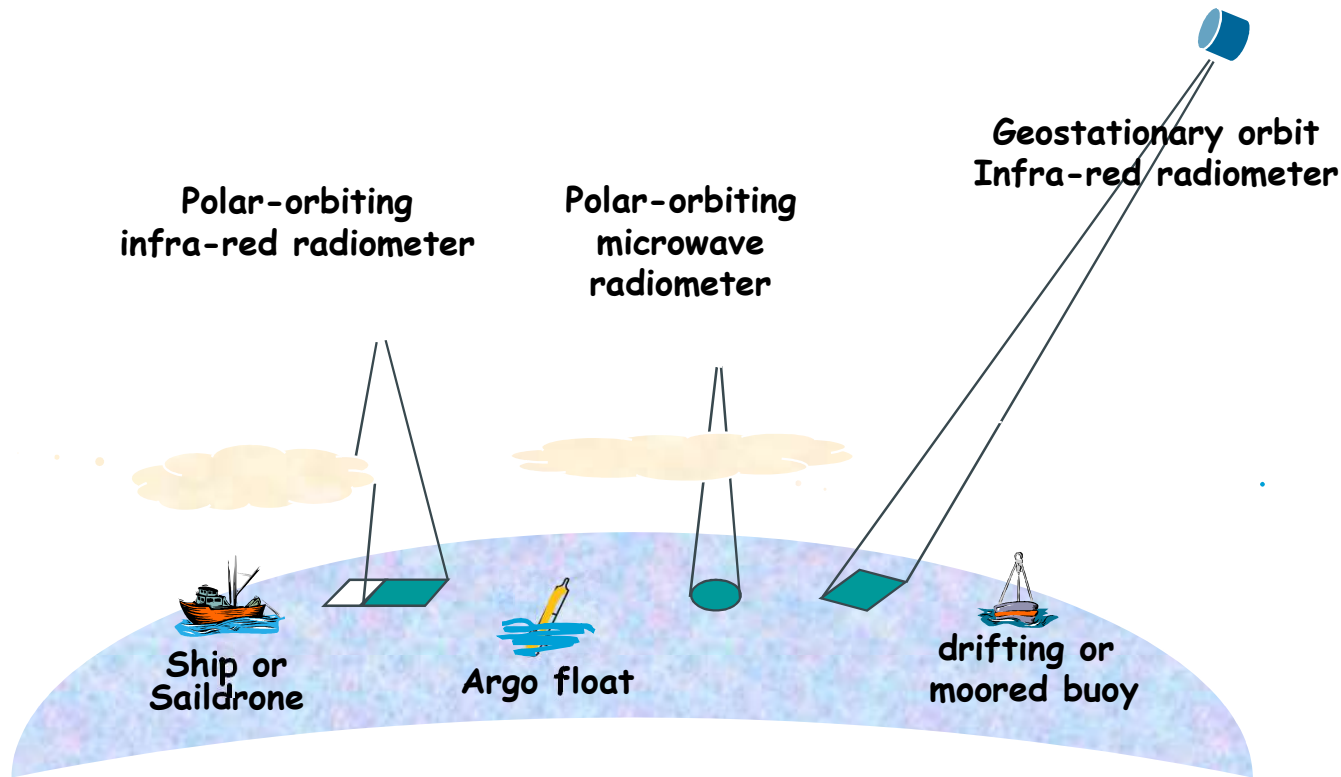
3rd International Operational Satellite Oceanography Sy



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CEOS Committee on Earth Observation Satellites
Sea Surface Temperature Virtual Constellation

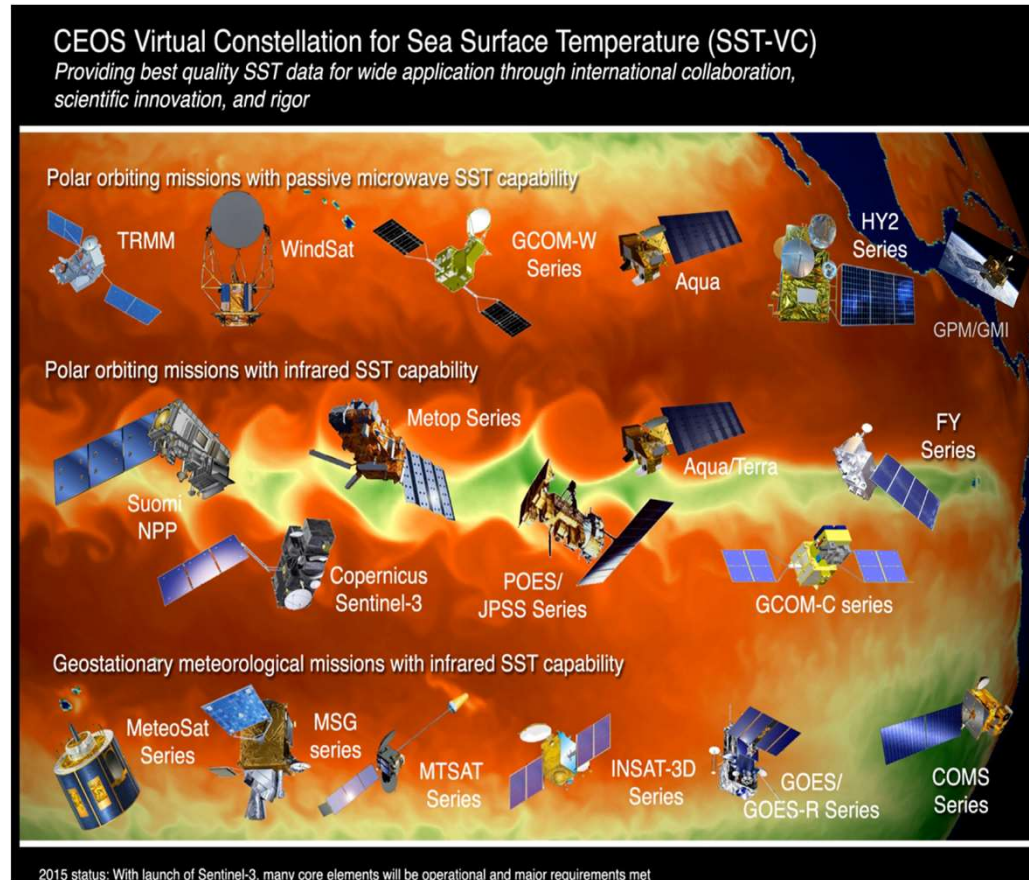
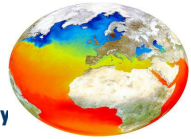
Platforms for measuring SST



Ships, drifting buoys, tropical moorings, Argo floats and Saildrones are used to validate satellite-derived SST

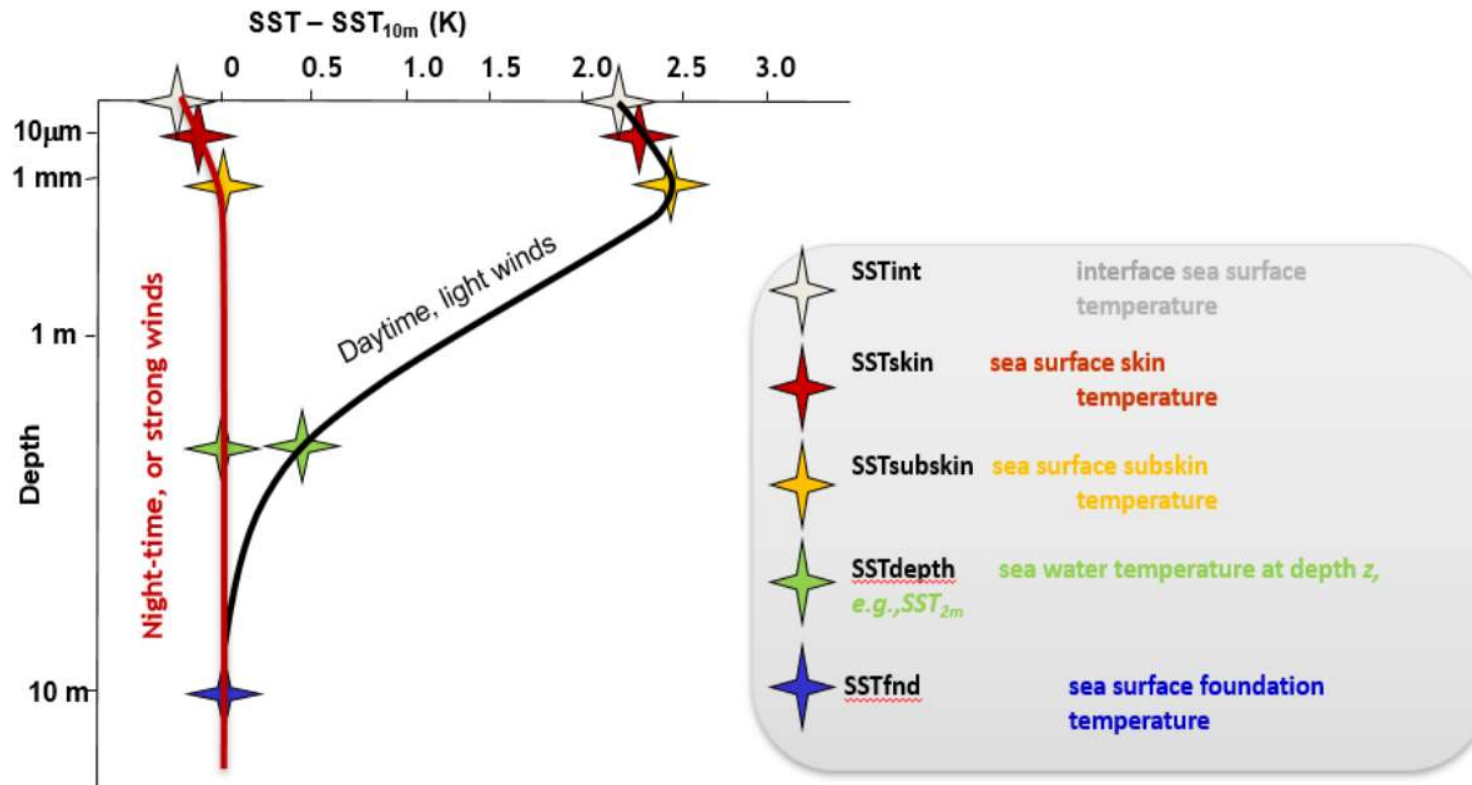
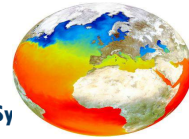
Ian Robinson

CEOS SST-VC

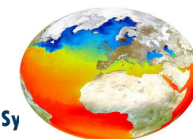


<https://ceos.org/ourwork/virtual-constellations/sst/>

What is SST?

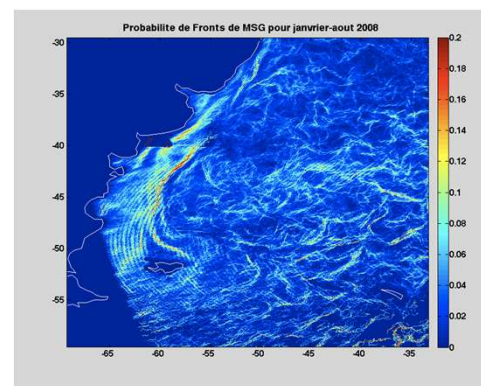
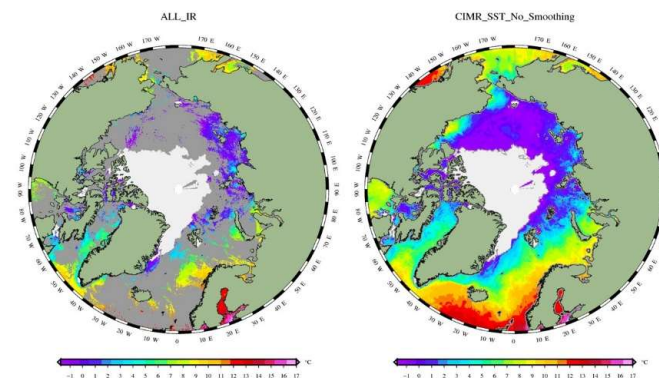


User driven priorities for SST observations in the next decade

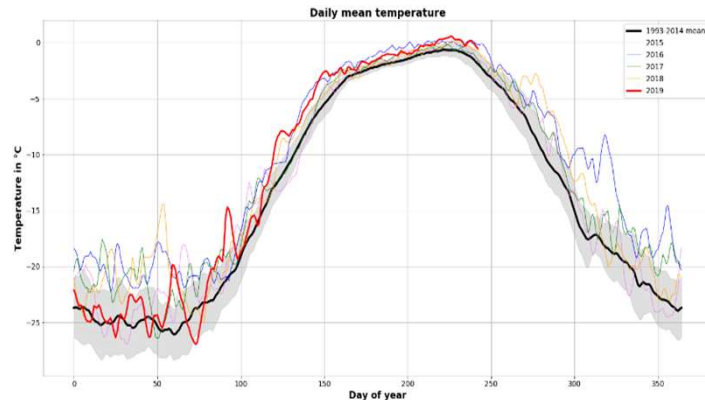
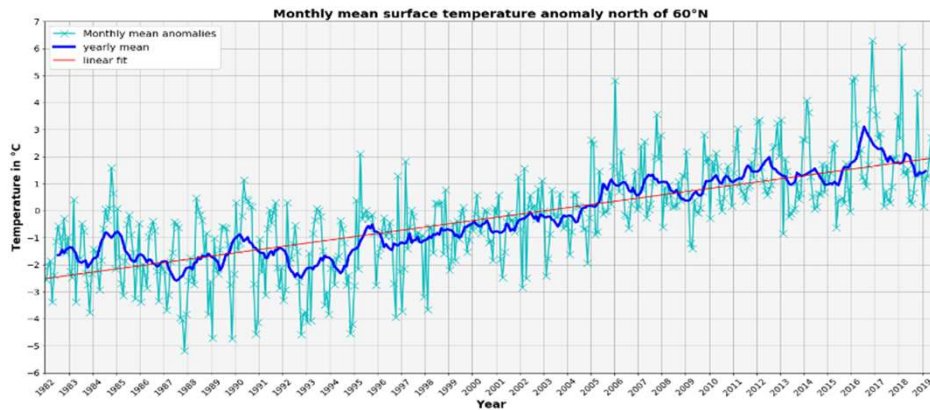
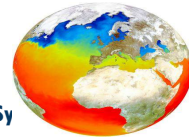


- 1) Improving data quality in the Arctic
- 2) Improving coastal SST data quality
- 3) Improving SST feature resolution

Observational needs of Sea-Surface Temperature, Front. Mar. Sci., doi:10.3389/fmars.2019.00420



Monitoring the Arctic Ocean / sea-ice



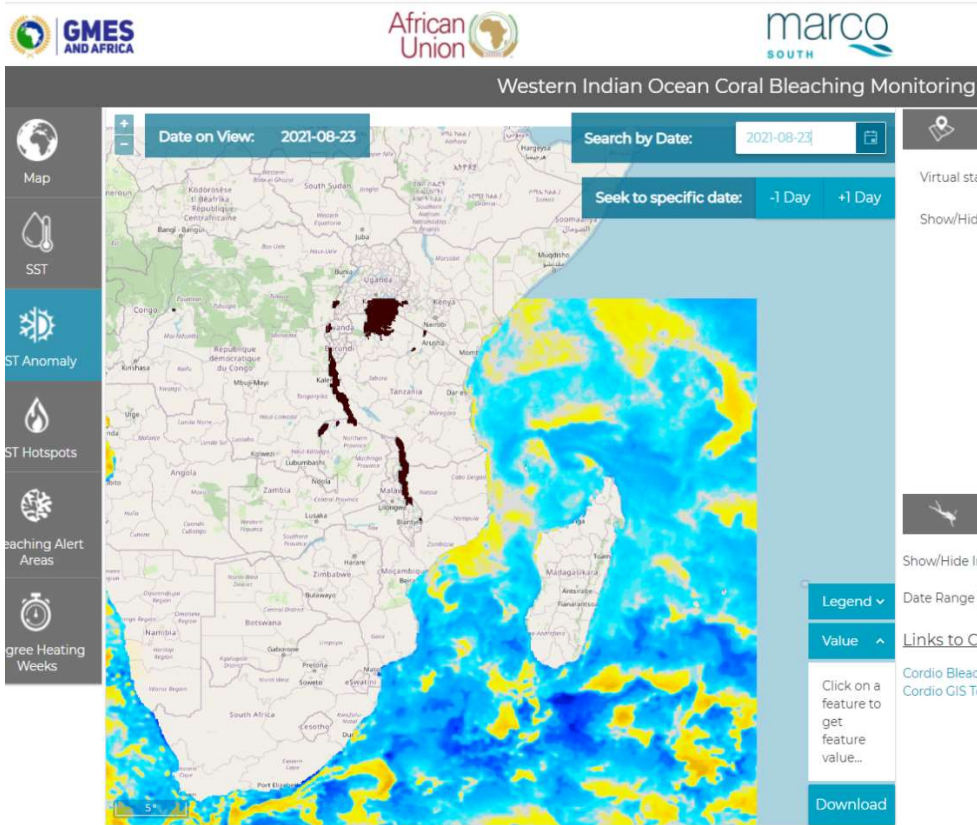
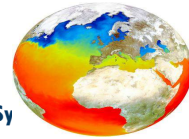
SST and Ice-Surface Temperature (IST) products enable Arctic monitoring:

- Arctic Ocean surface temperature trends
- Daily surface temperatures
- 4°C increase in Arctic Ocean (>60°N) surface temperature (SST+IST)

Høyer et al. (2021) GHRSSST Science Team meeting

<https://www.youtube.com/watch?v=KXPBgUWLFqs>

Coasts



- **Marine dissemination services**
- **Promotion of sustainable management of marine resources**
- **CEOS and GHRSSST activities towards coastal advancements**

e.g. <https://marcosouth.org/>
<https://ocims-dev.dhcp.meraka.csir.co.za/>

CEOS-COAST <https://ceos.org/>

GHRSSST Task Teams on feature fidelity and cloud-masking
<https://www.ghrsst.org/about-ghrsst/task-teams/>

SST feature resolution

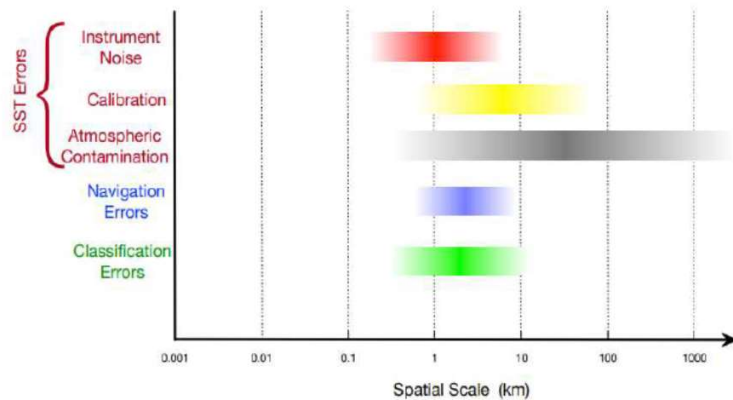
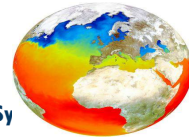
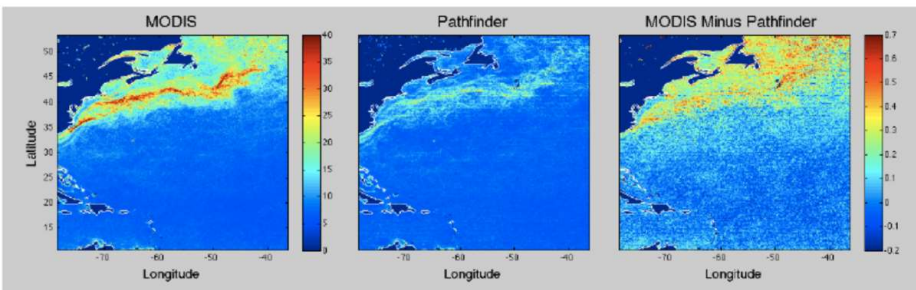


Figure 1: Spatial Scales of SST Errors Associated with Cause. Credits: Peter Cornillon.

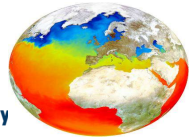
GHRSSST Task Team on feature fidelity

- Addresses issues of uncertainty of satellite derived SST fields in relation to oceanographic features at mesoscale and smaller (<100km)
- Fronts, eddies, gradient regions
- Uncertainty in SST differences (rather than absolute)
- Focus on both metrology methods and variances of SST fields

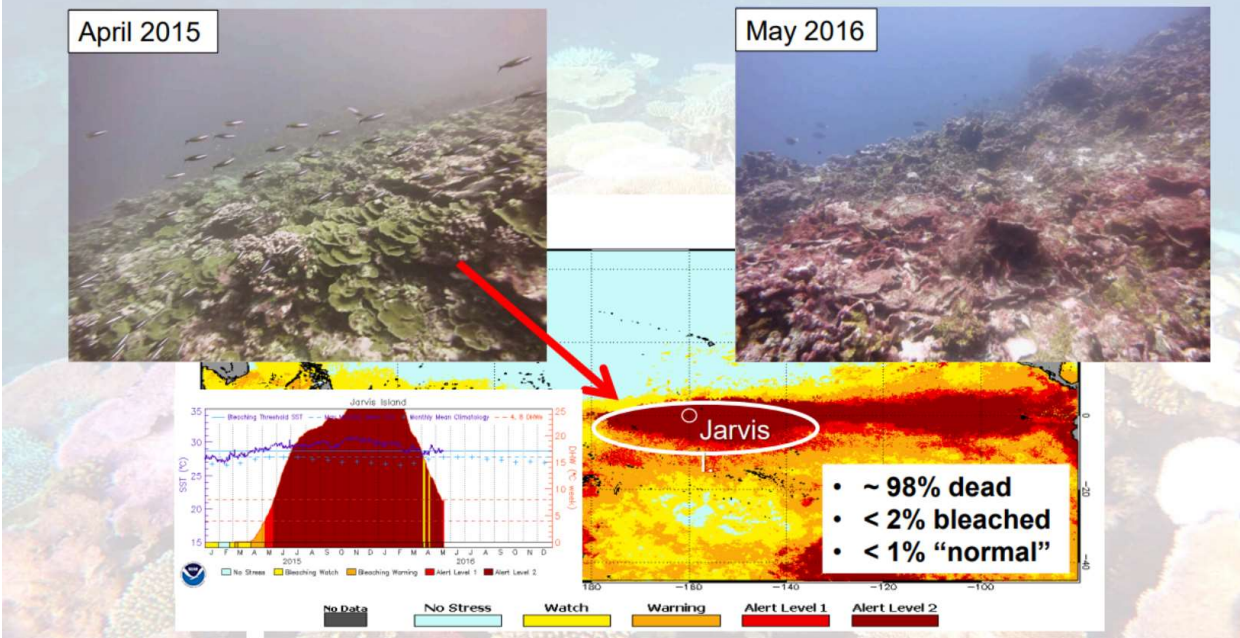
<https://zenodo.org/record/7263467> (Report from 2021)
Activities lead by P. Cornillon & C. Gonzalez Haro



Coral heat stress user SST



Heat Stress and Bleaching - Jarvis Island, Central Pacific



<https://coralreefwatch.noaa.gov/>

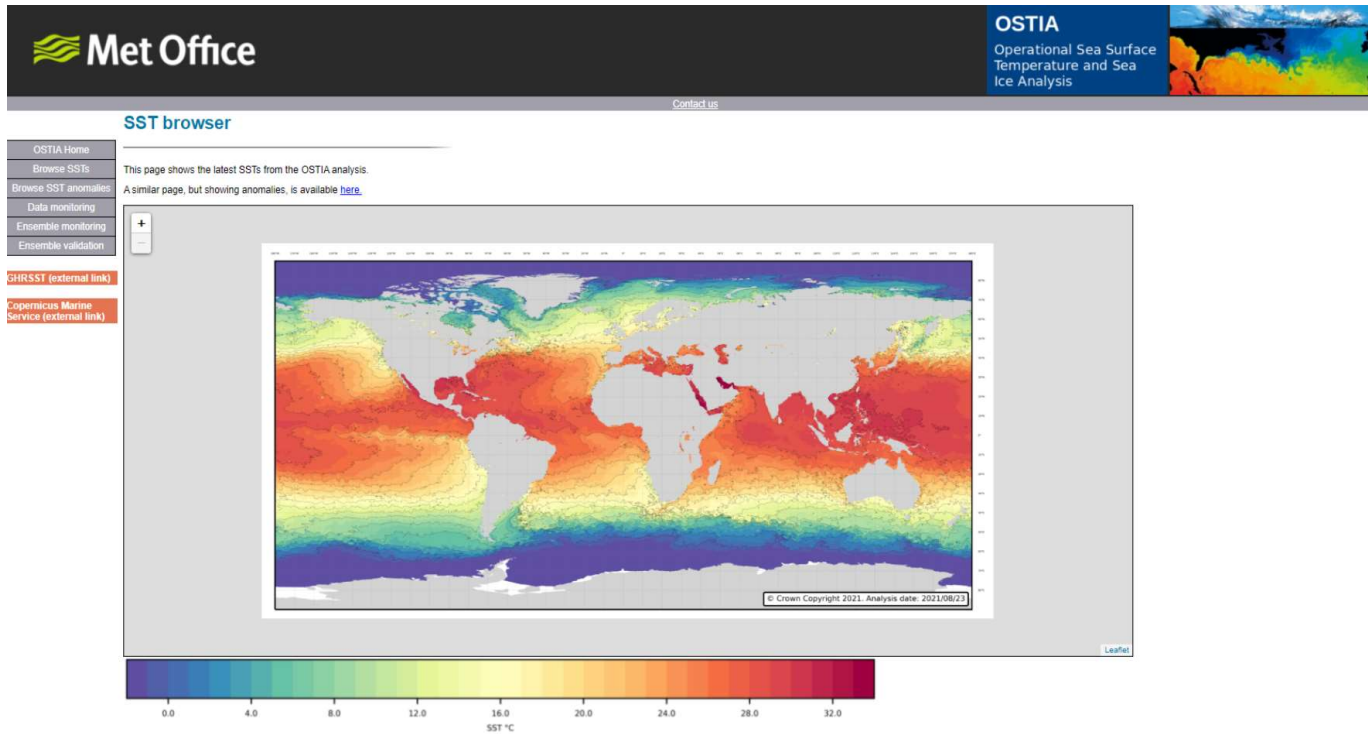
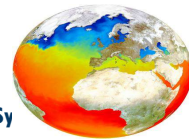
SST products need:

- **Stability / time**
- **Geolocation accuracy**
- **Gap filled**
- **Daily average**
- **Uncertainties**
- **NRT /reprocessed**
- **Regional analyses**

Skirving et al. (2020) Coral heat stress user SST requirements

<https://doi.org/10.5281/zenodo.4700411>

Modelling (ocean and climate)



<https://www.metoffice.gov.uk/hadobs/>

<https://ghrsst-pp.metoffice.gov.uk/ostia-website>

<https://marine.copernicus.eu/>

Marine heat waves

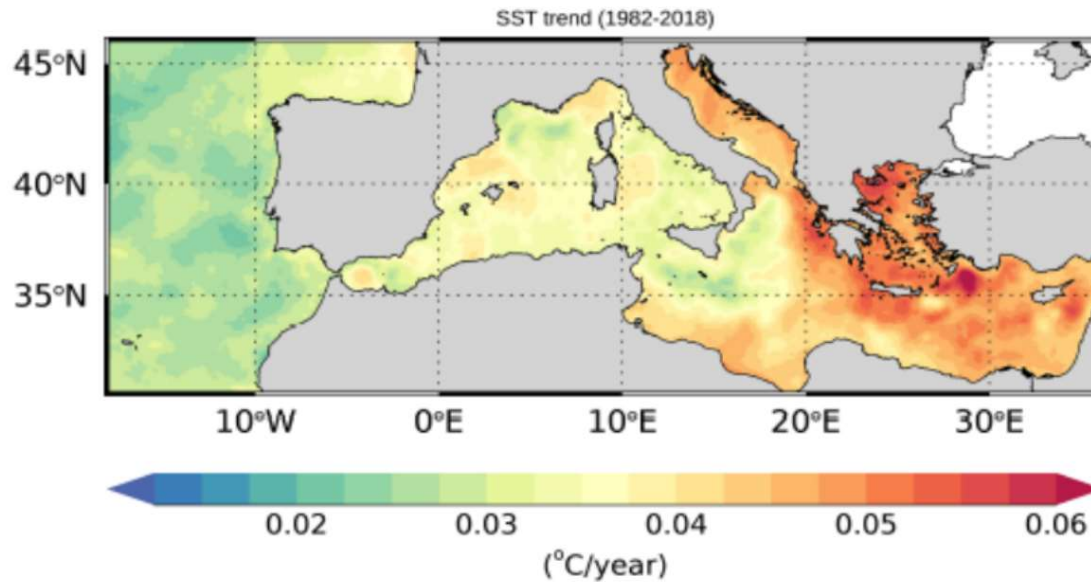
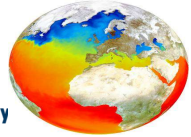


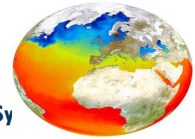
Figure 1. SST trend map (C/year) at the 95% significance level (i.e., p 0.05) covering the 1982–2018 period [Figure 6 from Pisano et al. 2020]

- **Mediterranean Sea is particularly sensitive to climate variability and global warming**
- **Shows a nearly continuous warming trend of $0.041 \pm 0.006^\circ\text{C} / \text{year}$ giving a total increase of 1.5°C from 1982 to 2008**

Leonelli et al. (2021) GHRSSST Science Team meeting

<https://youtu.be/3CvD8vRcZGU>

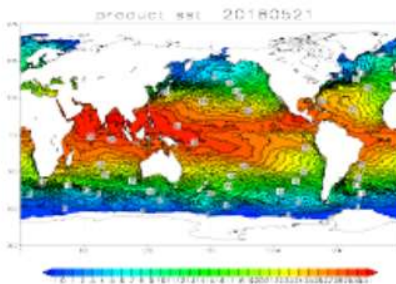
GHRSSST examples from Asia / Pacific



L4 0.25 deg. Global SST Product(MGDSST)

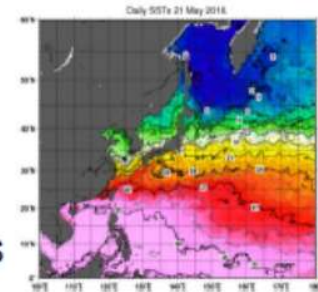
L4 0.1 deg. Regional SST Product (HIMSST)

**JMA,
GHRSSST,
2022**



Input:

- AMSR2 L2 from JAXA,
- VIIRS/sNPP from NOAA/NESDIS
- AVHRR/NOAA-19 :GAC from NESDIS, LAC from MSC/JMA
- In-situ (buoys and ships) from GTS

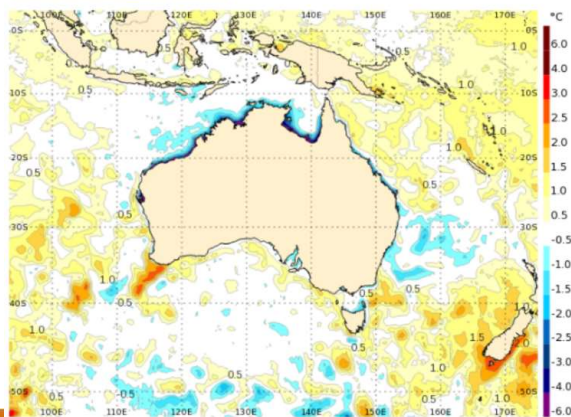


Input:

- Himawari-8 SST in addition to data used in MGDSST

Latest Sea Surface Temperature Anomaly

[About marine weather services](#) | [Safety](#) | [Definitions](#) | [Marine website feedback](#)
[About the Sea Surface Temperature Maps](#)



Sea surface temperature anomaly (deg C). Daily analysis for **Thu 1 Jun 2023**
 (c) Copyright Australian Bureau of Meteorology | **RAMSSA** | Climatology 1961-1990

**<- BoM
JAXA->
GHRSSST
2022/23**

SST Observations by MW, LEO-IR, GEO-IR



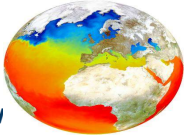
Category	Low Earth Orbit Passive MW Imager	Low Earth Orbit IR Imager	Geostationary IR Imager
Instrument	GCOM-W/AMSR2	GCOM-C/SGLI, Aqua/MODIS, JPSS/VIIRS	Himawari-8/AHI
Horizontal resolution	AMSR2: 30-60km	SGLI: 250m, MODIS: 1km, VIIRS: 750m	Himawari-8: 2km
Temporal resolution	1-2 per day (mid-latitude)	1-2 per day (mid-latitude)	2.5min (Japan) /10min (full-disc)
Coverage	Global (including Polar region)	Global (including Polar region)	1/3 of surface (except Polar region)



<http://www.ghrsst.org>

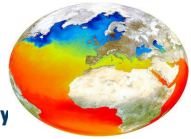
CEOS Committee on Earth Observation Satellites
 Sea Surface Temperature Virtual Constellation

Ongoing review of user-driven priorities (2021-2022)



- **High res SSTs products consistent with existing GHR SST products:**
 - **Data formats**
 - **SST retrievals and cloud masking**
 - **Quality of retrieved SST**
 - **Uncertainty components**
- **Open access to SST products**
- **High quality (Fiducial Reference Measurements) in situ observations should be used for validation.**
- **Consistency between high resolution (<100 m) and traditional (~1 km) products**
- **Consistency between SST and Land/Ice Surface Temperature products**
- **Feedback welcome and please join GHR SST 24 to learn more participate in discussions**

GHRSSST XXIV – GHRSSST24



3rd International Operational Satellite Oceanography Sy

International SST Users' Symposium & GHRSSST int. Science Team Meeting

Ahmedabad (India), in-person and online, 16-20
October 2023, hosted by ISRO

Open for abstracts, see Twitter ([@ghrsst](#)) and
[LinkedIn](#) for more information.



Registration and
Abstract submission
WWW.GHRSSST.ORG

GHRSSST24

INTERNATIONAL SST USERS' SYMPOSIUM & GHRSSST SCIENCE TEAM MEETING



Abstract submission is
now OPEN until
19th June 2023



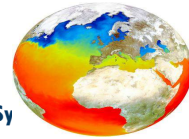
In-person in Ahmedabad (India) and online
OCT | 16-20th | 2023



<http://www.ghrsst.org>

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Sea Surface Temperature Virtual Constellation

Summary

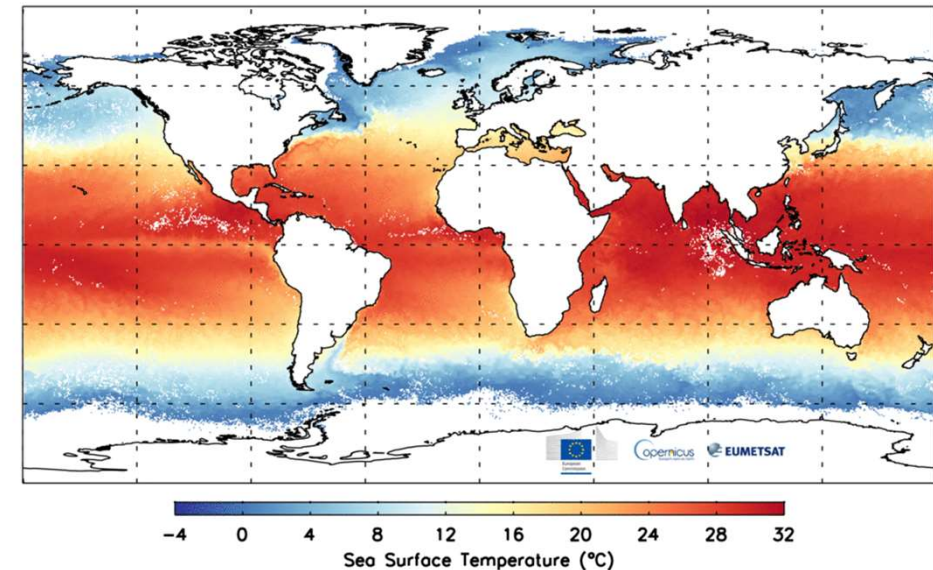


- **GHRSSST mission: To provide satellite-derived global SSTs with good estimates of uncertainty to operational users and the science community**



- **Satellite Sea-Surface Temperature essential for climate monitoring, modelling and seasonal predictions**
- **As global and regional earth temperatures continue to increase, SSTs from satellite remote sensing continue to be crucial for understanding, monitoring and modelling the climate and providing socio-economic benefits**

Copernicus Sentinel-3 SLSTR SST 20160501



User feedback is of prime importance to us!

Thank you!

Questions are welcome.

Anne.Ocarroll@eumetsat.int



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<https://www.linkedin.com/company/ghrsst>

zenodo

<https://zenodo.org/communities/ghrsst>