GHRSST — Group for High Resolution Sea Surface Temperature

CMEMS SST-TAC: Achievements During the Second Year (2019) and Evolutions Plans in 2020
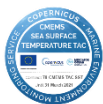
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CMEMS Sea Surface Temperature TAC · Copernicus Marine Service · CNR ISMAR · Met Office · METEO FRANCE · DMI · Ifremer · Copernicus Europe's eyes on Earth

Presented by Andrea Pisano (andrea.pisano@cnr.it) on behalf of the SST-TAC

Introduction

The Sea Surface Thematic Assembly Centre (SST-TAC) is one of the Copernicus Marine Environment Monitoring Service (CMEMS) elements that provides operational (near-real-time) and reprocessed, also referred to multi-year (MY), SST products for the Global Ocean and the European Seas. SST products are typically provided as merged multi-sensor (L3S) and spatially complete (L4) daily data.

The SST-TAC provides continuous evolutions of SST products following 3 main lines:

(1) evolutions linked to the space component; *(2)* development of new products; *(3)* Update of MYP products.

Main evolutions during 2019/2020:
(1) Integration of new sensors
(2) New products/Evolution of processing algorithms
(3) Upgrade of Multi-Year processing and implementation of Ocean Monitoring Indicators

Integration of Sentinel-3A/3B

SLSTR L2P data from both Sentinel-3A/3B have been successfully integrated in almost all the near-real-time SST products.

The impact of Sentinel SLSTR on global and regional products varies depending on processing chains

Improvement / Neutral Impact / Degradation

Region	Summer (July – September 2019)						Winter (November 2019 – January 2020)					
	Mean Difference (K)			Standard Deviation (K)			Mean Difference (K)			Standard Deviation (K)		
	OPER	S3V	S3nt	OPER	S3V	S3nt	OPER	S3V	S3nt	OPER	S3V	S3nt
Global Ocean	-0.11	-0.07	0.08	0.36	0.36	0.36	-0.09	-0.05	0.06	0.31	0.31	0.32
North Atlantic	-0.11	-0.04	0.14	0.46	0.47	0.47	-0.07	-0.05	-0.01	0.40	0.40	0.4
Tropical Atlantic	-0.17	-0.10	0.08	0.26	0.24	0.22	-0.11	-0.05	0.09	0.21	0.20	0.19
South Atlantic	-0.10	-0.08	0.01	0.43	0.43	0.42	-0.08	-0.04	0.08	0.35	0.35	0.35
North Pacific	-0.09	-0.04	0.11	0.33	0.33	0.32	-0.09	-0.06	0.02	0.27	0.27	0.28
Tropical Pacific	-0.08	-0.04	0.1	0.20	0.20	0.19	-0.08	-0.04	0.1	0.18	0.18	0.18
South Pacific	-0.10	-0.08	0.04	0.26	0.25	0.25	-0.09	-0.04	0.1	0.26	0.25	0.25
Indian Ocean	-0.16	-0.11	0.08	0.29	0.29	0.27	-0.08	-0.02	0.12	0.28	0.28	0.28
Southern Ocean	-0.11	-0.10	0.01	0.41	0.41	0.4	-0.10	-0.07	0.05	0.36	0.36	0.36
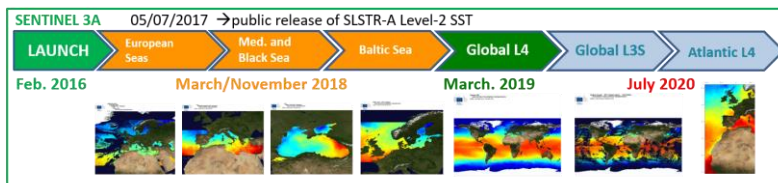
OPER: operational OSTIA (VIIRS and in situ obs. Used as reference); **S3VIIRS (S3V):** experiment that uses combined VIIRS L3P and Sentinel-3A/-3B SLSTR as reference; **S3night (S3nt):** experiment that uses (as reference) nighttime dual view
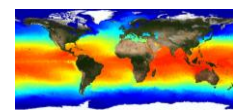
OSTIA, Baltic Sea and European Seas products: only dual view data used, comparable statistics with respect to control run (without SLSTR). Mediterranean and Black Seas products: S3A dual view data used as reference, nadir view bias-corrected → MBE and RMSD improvements

SENTINEL 3A — 05/07/2017 → public release of SLSTR-A Level-2 SST
LAUNCH — European Seas → Med. and Black Sea → Baltic Sea → Global L4 → Global L3S → Atlantic L4
Feb. 2016 · March/November 2018 · March. 2019 · July 2020

SENTINEL 3B — 12/03/2019 → public release of SLSTR-B Level-2 SST
LAUNCH — Global/Med./Black/Baltic/European Sea L3C/L3S/L4 → Global L3S → Atlantic L4
April 2018 · September/December 2019 · July 2020

SST-TAC MYPs

SST-TAC provides global and regional L4 multi-year products (MYPs). In July 2020, all the SST-TAC MYPs will be reprocessed by using the ESA CCI SST v2.0 dataset together with C3S data. *MYPs key strengths*: **consistent upstream among different products and regular updates through C3S Service**
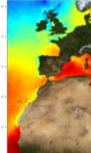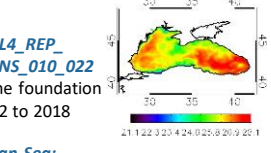
Upstream L2/L3

Global
SST_GLO_SST_L4_REP_OBSERVATIONS_010_011
(OSTIA REP, foundation SST, for users who want long-term dataset that is equivalent to the near real time product)
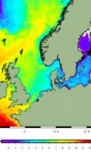
SST_GLO_SST_L4_REP_OBSERVATIONS_010_024
(daily average temperature at 20 cm produced by ESA CCI and C3S for climate research users)

Atlantic region
SST_ATL_SST_L4_REP_OBSERVATIONS_010_026
Daily nighttime foundation SST from 1982 to 2018

Baltic Sea:
SST_BAL_SST_L4_REP_OBSERVATIONS_010_016
Daily foundation SST from 1982 to 2018

Black Sea:
SST_BS_SST_L4_REP_OBSERVATIONS_010_022
Daily nighttime foundation SST from 1982 to 2018
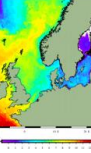
Mediterranean Sea:
SST_MED_SST_L4_REP_OBSERVATIONS_010_021
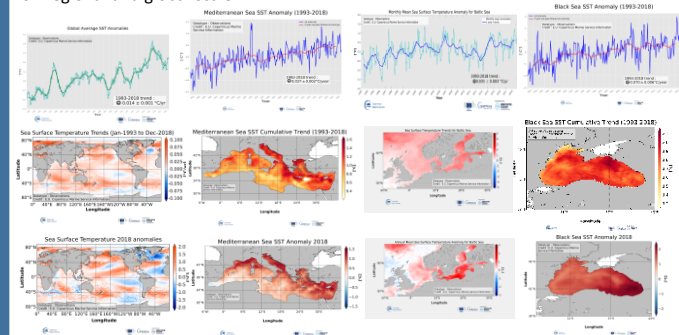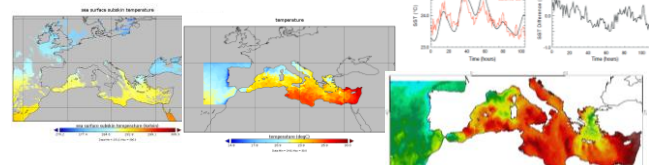Daily Nighttime foundation SST from 1982 to 2018

SST-TAC OMIs

The SST TAC has updated more than 12 SST **Ocean Monitoring Indicators (OMIs)** since 2019 and reported in the Ocean State Reports on regional and global scale

New Products

The SST-TAC has provided in 2019 a **new regional L4 product over ATL (IFREMER) and a new regional L3S over BAL (DMI).** In 2020, the SST-TAC will provide **3 new L4 diurnal MED/BS and BAL SST products.**

Diurnal OI SST product for the Mediterranean Sea and Black Ses
• Combining model and geostationary satellite data to reconstruct hourly optimally interpolated (OI) SST fields
• The approach takes advantage of geostationary satellite observations as the diurnal signal source to produce gap-free (OI) hourly SST fields using model analyses as first-guess
• The resulting SST anomaly field (satellite-model) is free, or nearly free, of any diurnal cycle, thus allowing one to interpolate SST anomalies using satellite data acquired at different times of the day

• Merchant, C.J., Embury, O., Bulgin, C.E. et al. Satellite-based time-series of sea-surface temperature since 1981 for climate applications. Sci Data 6, 223 (2019). https://doi.org/10.1038/s41597-019-0236-x
• Marullo, S., Santoleri, R., Ciani, D., Le Borgne, P., Péré, S., Pinardi, N., ... & Nardone, G. (2014). Combining model and geostationary satellite data to reconstruct hourly SST field over the Mediterranean Sea. Remote sensing of environment, 146, 11-23.
• von Schuckmann, K., Le Traon, P. Y., Smith, N., Pascual, A., Djavidnia, S., Gattuso, J. P., ... & Álvarez Fanjul, E. (2019). Copernicus Marine Service Ocean State Report, Issue 3. Journal of Operational Oceanography, 12(sup1), S1-S123.

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