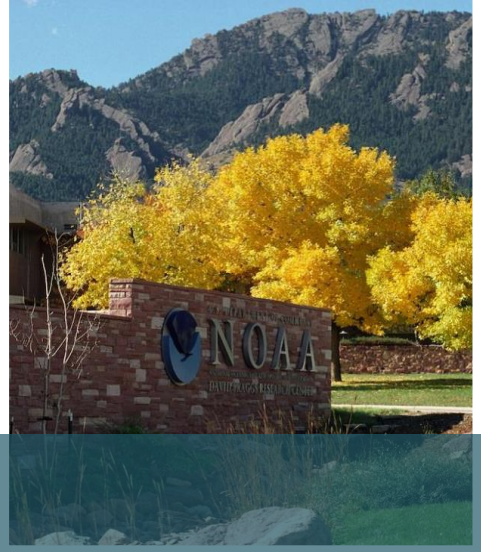
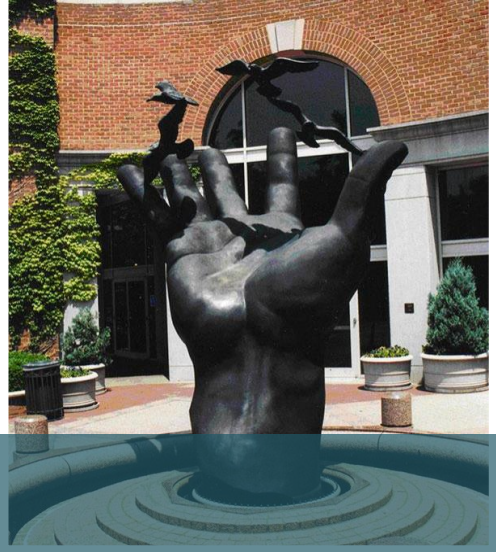






*GHRSST RDAC Update: NOAA National Centers for Environmental Information (NCEI)**

Huai-Min Zhang, Viva Banzon, Ken Casey, Eric Freeman, Boyin Huang, Chunying Liu, John Relph, Tom Ryan, Korak Saha, Zhankun Wang, Yongsheng Zhang, Xuepeng Zhao

*** Merged from NCDC, NGDC, NODC**

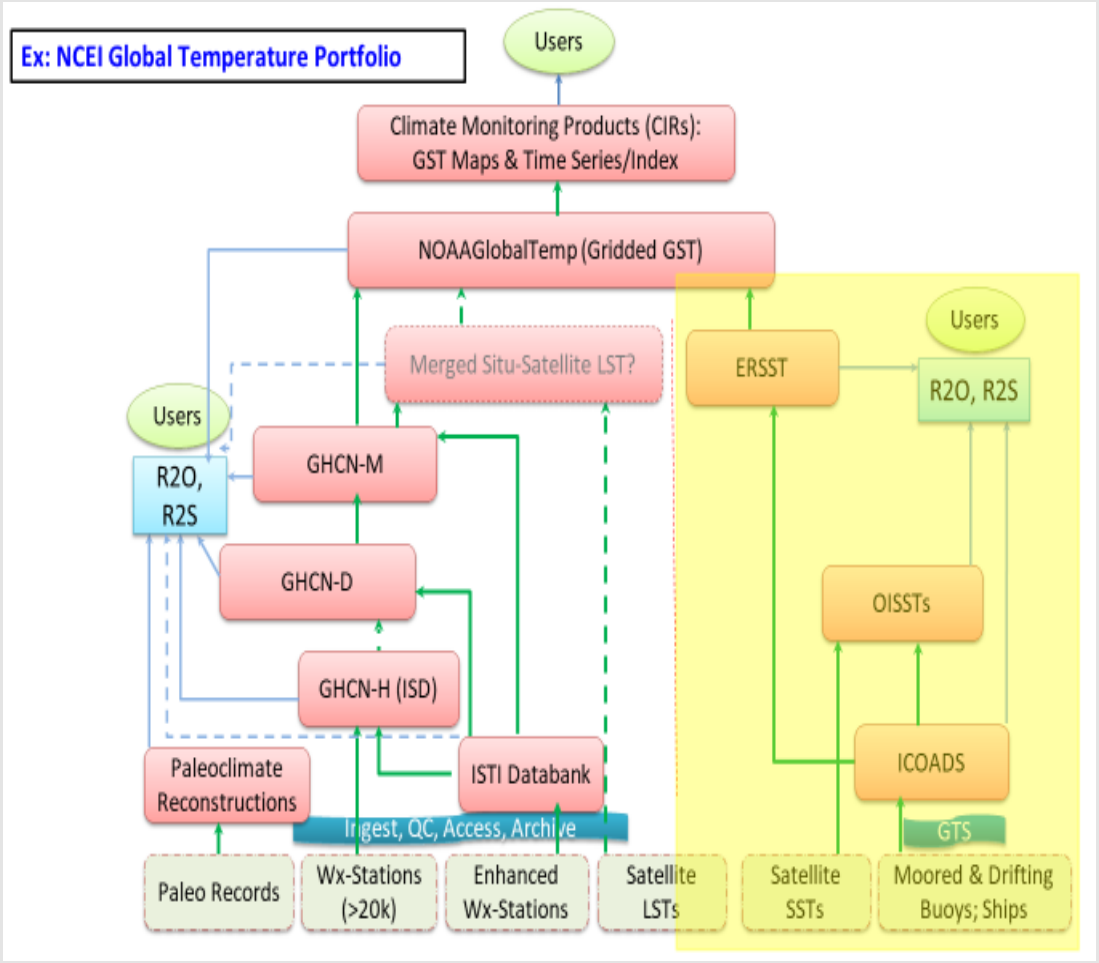
Overview

NCEI's Marine Surface Meteorology and Oceanography

- To provide an end-to-end, integrated, and collaborative approach for the data collection, quality control and processing, product generation, and societal service for the surface marine and meteorological observational data, from both in-situ and satellite platforms.

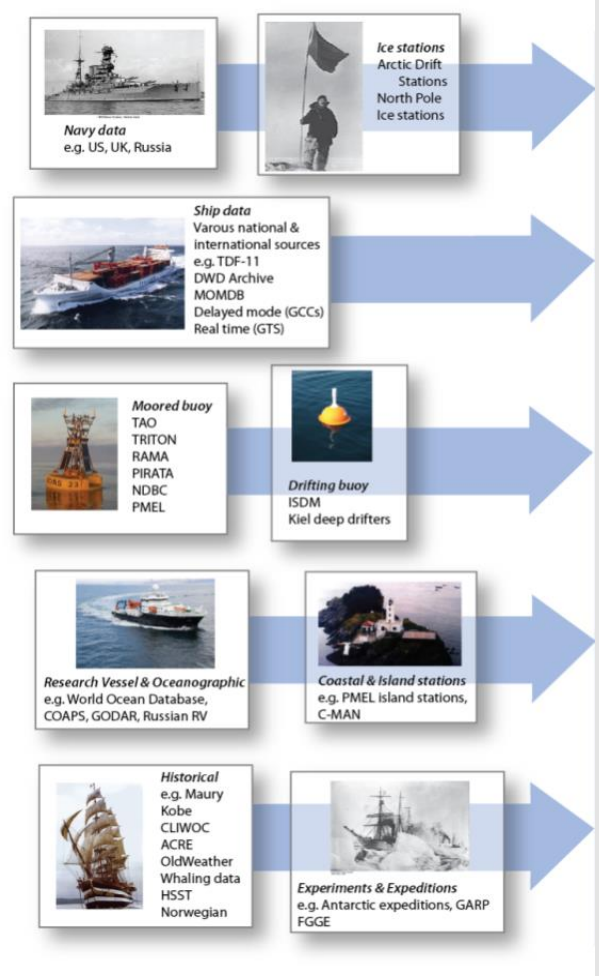
- The scope ranges from ***foundational datasets*** (e.g. ICOADS, Pathfinder SST) ***to high level authoritative*** gridded, blended & merged datasets (e.g. ERSST, OISST and Blended Seawinds) (tiered scientific data stewardship).

NOAA/NCEI's Tiered Scientific Data Stewardship and Mapping to GST Portfolios



ICOADS:

The International Comprehensive Ocean-Atmosphere Data Set



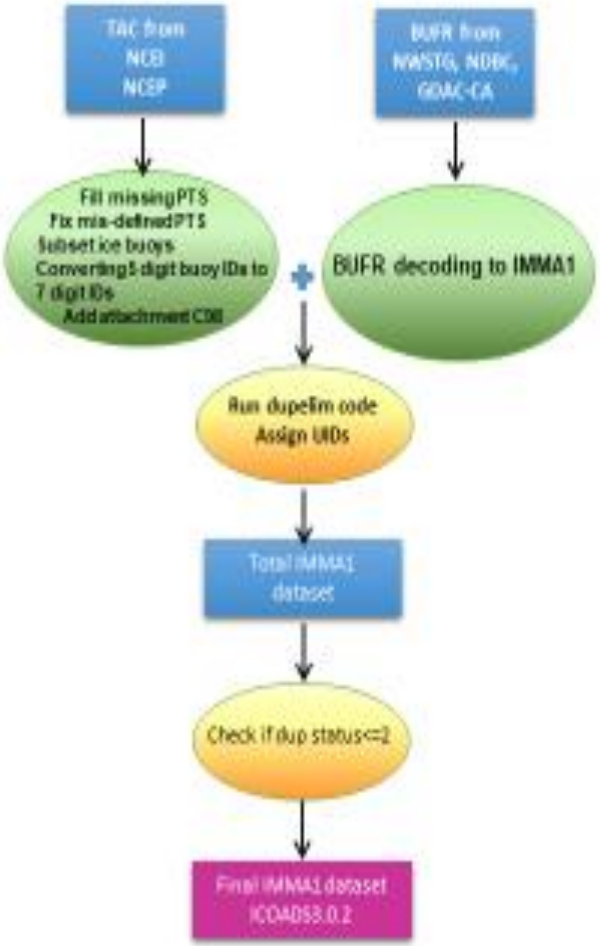
<u>Scope:</u> The world's most extensive surface marine & meteorological data collection (akin to GHCN over land); a foundational dataset for climate monitoring & studies (e.g. ERSST …)

<u>Objective:</u> Archive, stewardship, & service of ICOADS

ICOADS

Recent Progress: Blending TAC and BUFR Marine in Situ data for ICOADS Near Real Time Updates

Dupelim procedure

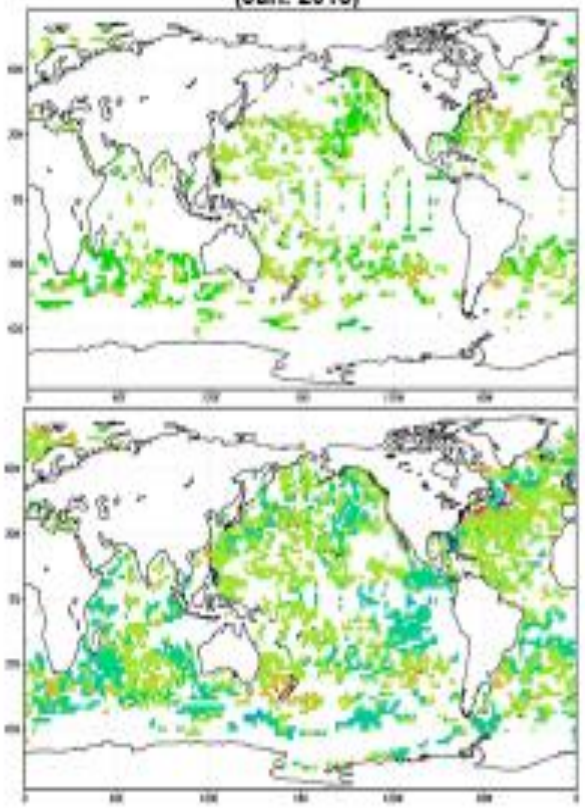


Results

Report numbers of each platform type

PT	Platform Type	ICOADS R3.0.1	ICOADS R3.0.2_beta
4	Light ship	137	272
5	ship	175122	241740
6	moored buoy	508731	563114
7	Drifting buoy	412202	1231103
8	Ice buoy	0	11289
13	C-MAN	65228	65228
14	Other coastal station	580764	580764
15	Fixed ocean platform	3452	13381
16	Tide gauge	1879451	1879451
	Unknown PT	95994	76215

Comparison of buoy SST coverage between ICOADS R3.0.1 and ICOADS R3.0.2 (Jan. 2018)



The NCEI Thermosalinograph (TSG) Database

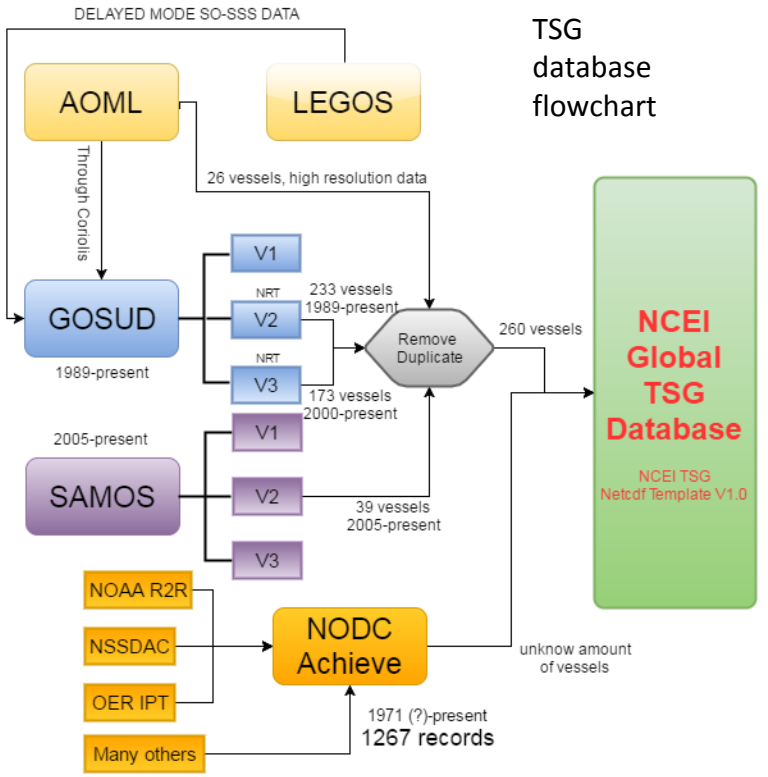
Goal of the project: Stewardship, archive, distribution and quality controlling of in situ underway TSG sea surface salinity and temperature data.

Purpose: To gather all available TSG data, quality control, and make them available to the public in a uniform format, with granule subsetting tools.

Usages: (1) validation, calibration and matchup of satellite SSS/SST; (2) Air-sea interaction and variability; (3) Climate water cycles; …

Temporal Coverage : 1989-present

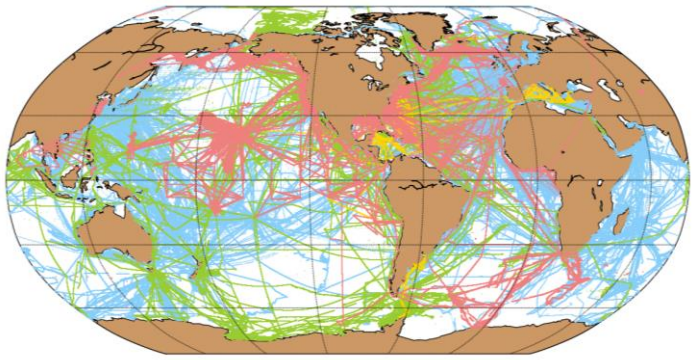
TSG database flowchart



Spatial coverage

GOSUD V3: Red

SAMOS V1 : Green



The Extended Reconstructed Sea Surface Temperature (ERSST)

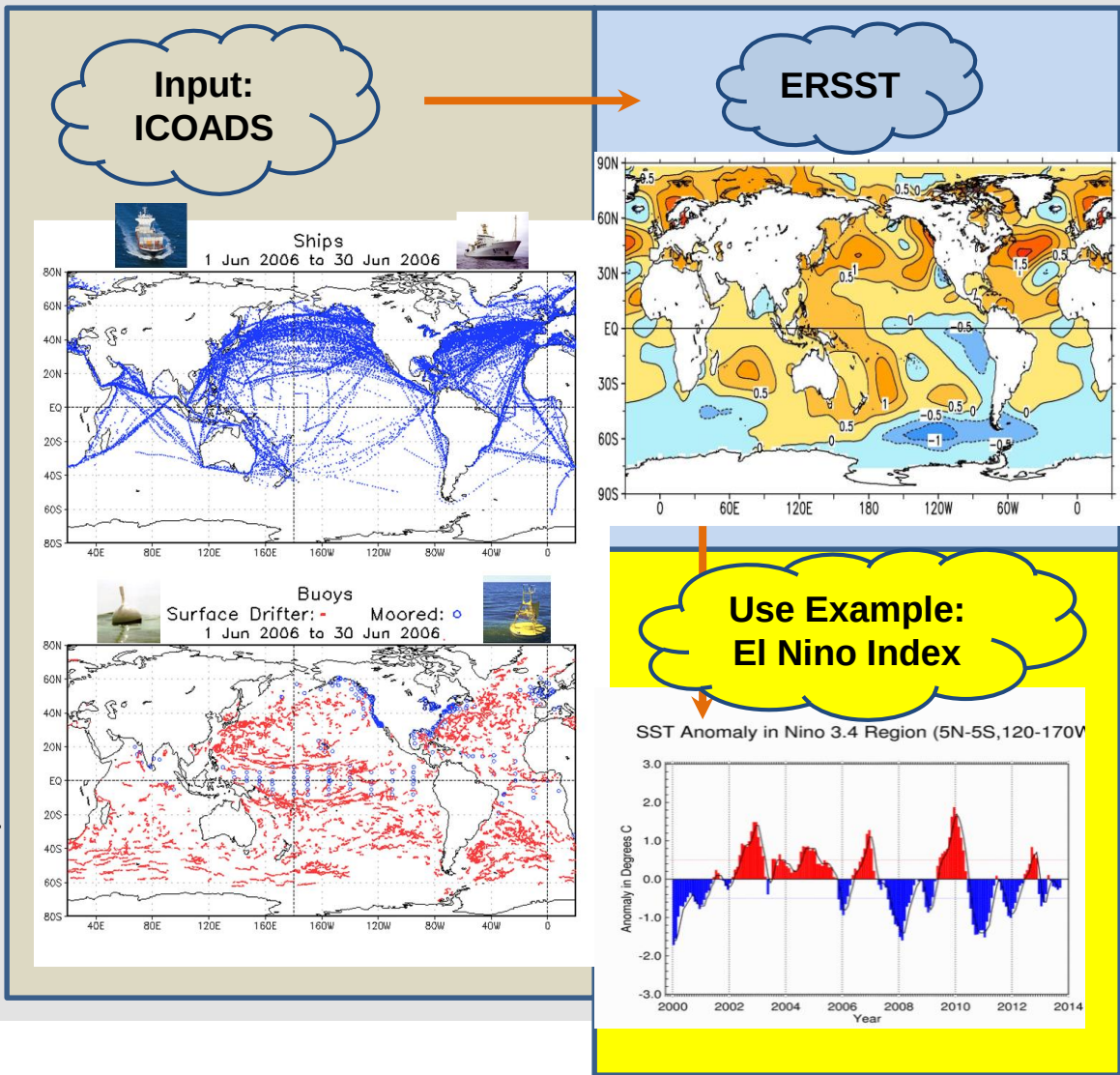
Scope: Authoritative centennial global sea surface temperature dataset for climate change research, assessment & monitoring (Monthly from Jan 1854 – present)

Objective: Monthly production & dissemination; development to remain state-of-the-science & authoritative

Version update history:

- v1 - 2003; v2 – 2004; v3 - 2008; v4 – 2015;
- v5: 2017 (J. Climate)

Use & public interests: Used for climate reports and assessments. New bias corrections starting from v4 showing no recent warming hiatus



ERSST v5 uncertainty in 1000-member ensemble due to 28 parameters

1. First-guess:	Adjusted-; Unadjusted-ERSSTv4
2. SST STD for QC:	OISST v2 (1982–2011), COADS (1950–79);
3. Min SST STD:	0.5; 1.0; 1.5°C
4. Max SST STD:	3.5; 4.5; 5.5°C
5. SST STD multiplier:	3.5; 4.5; 5.5
6. SST obs random error:	1.3°C for ships and 0.5°C for buoys
7. Ship SST error:	1.2; 1.3; 1.4°C
8-9 Buoy/Argo SST error:	0.4; 0.5; 0.6°C
10-11 Buoy/Argo SST weighting:	5.8; 6.8; 7.8
12. SSTA calculation:	Grid box basis; in situ basis
13. NMAT for SST bias:	UKMO NMAT; HadNMAT2; HadNMAT2 3-lat; 25x25 HadNMAT2
14. SST bias smoothing:	Annual; Lowess=0.05; 0.10; 0.2; linear; Linear-Lowess
15. Ship bias re-adj based on buoy:	0.062, 0.077, 0.092°C
16. Argo-buoy adjustment:	0.0, 0.03, 0.06°C
17. Min num of mon for ann average:	1; 2; 3
18. Min rate of superobservation:	0.02; 0.03; 0.04
19. Max number of observations:	5; 10; 15
20. EOT training period and scale:	1982–2005; 1988–2011; 1982–2011; even yr from 1982 to 2012; odd yr from 1983 to 2013; Lx 6000 km and Ly 4000 km; Lx 5000 km and Ly 3000 km; Lx 4000 km and Ly 2000 km
21. EOT weighting:	$W= \cos(\varphi)$; $W=N/(N+e^2)\cos(\varphi)$
22. EOT critical value:	0.05; 0.10; 0.20
23. Ice concentration factor:	0.9; 1.0; 1.1
24. Min ice for SST adj:	0.5; 0.6; 0.7
25. Max ice for SST adj:	0.8; 0.9; 1.0
26. LF filter period:	11 yr; 15 yr; 19 yr
27. Min yr for LF filter:	1; 2; 3
28. HF filter period:	0; 3 month

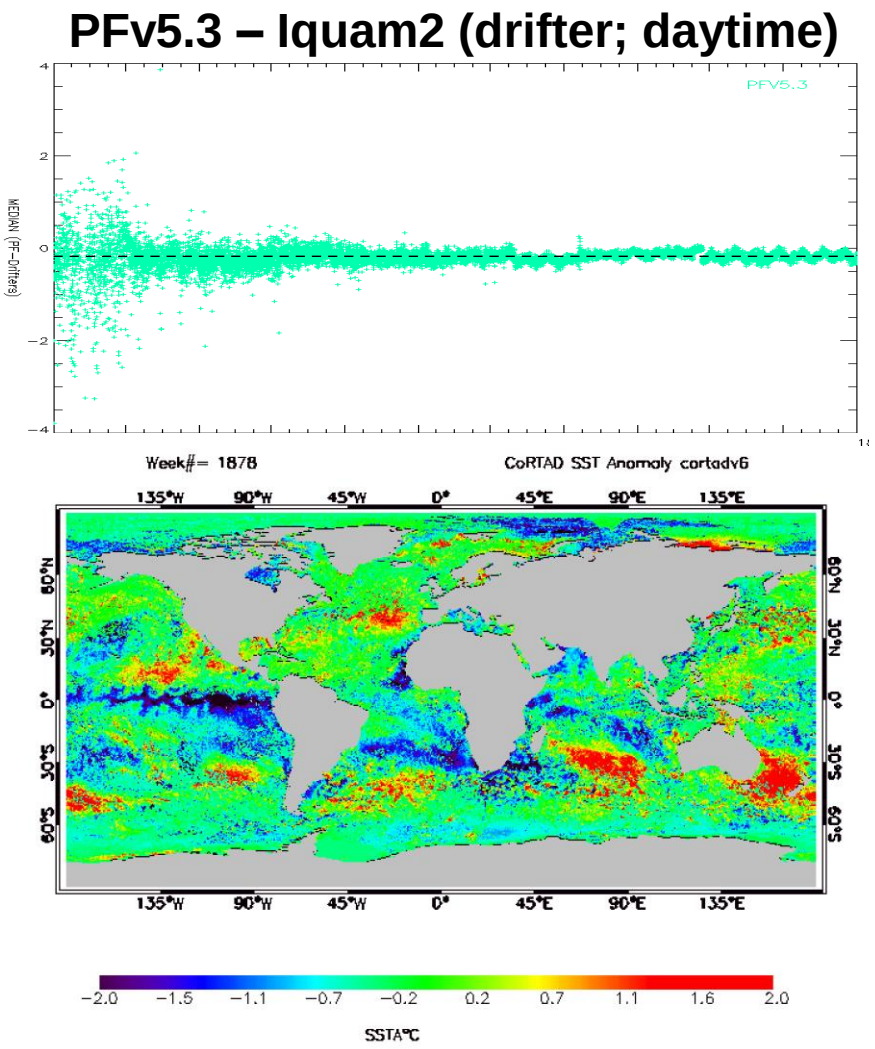
Huang et al, 2019, submitted to J. Climate

AVHRR PFSST

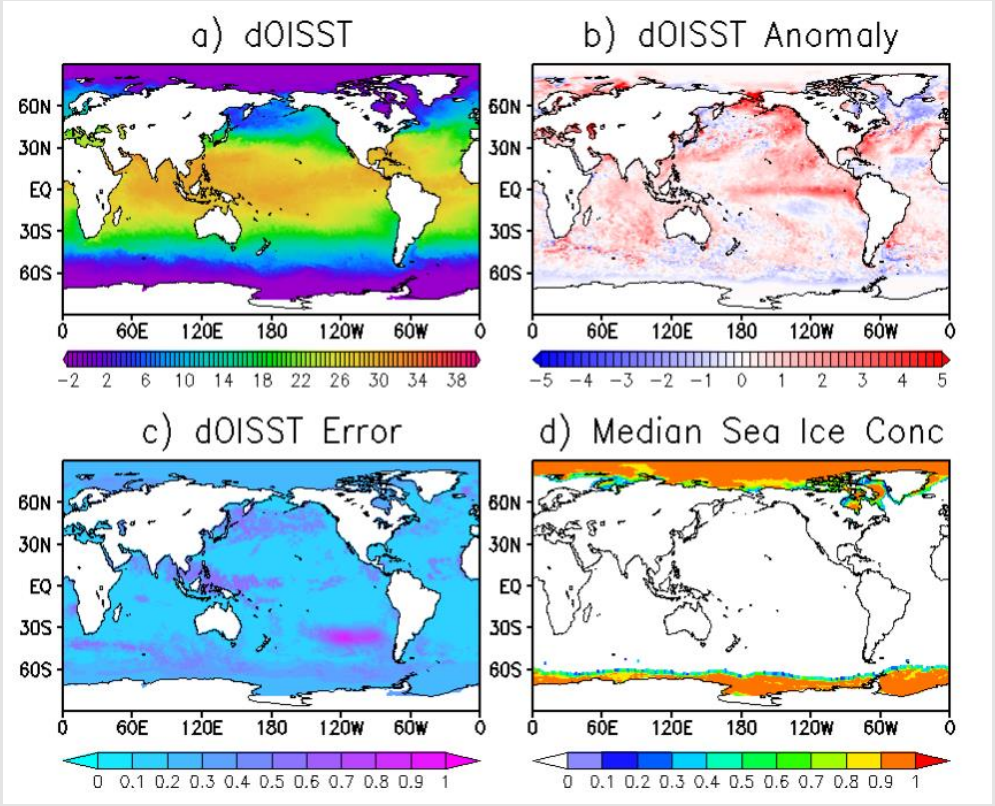
- Revived and completed R2O transition of PFv5.3 and L3C CDR product has been extended from 2014 to 2018; quarterly update since then. Compares well with other GHRSST CDRs.

- Reprocessing of PFv5.3.1 (improved binning at high latitudes) for the production of L2P, L3U, and L3C CDR is ongoing

- Thermal stress anomalies CoRTAD has been revived and upgraded to v6



Daily ¼° Optimum Interpolation SST (dOISST)



Characteristics:

- Daily and global ¼° grid, gap-free SST, ice and error fields
- Satellite SSTs bias corrected by and blended with in-situ SSTs

Types:

- AVHRR-only (1981 - presentt)
- AVHRR+AMSR-E (inactive for new AMSRs)

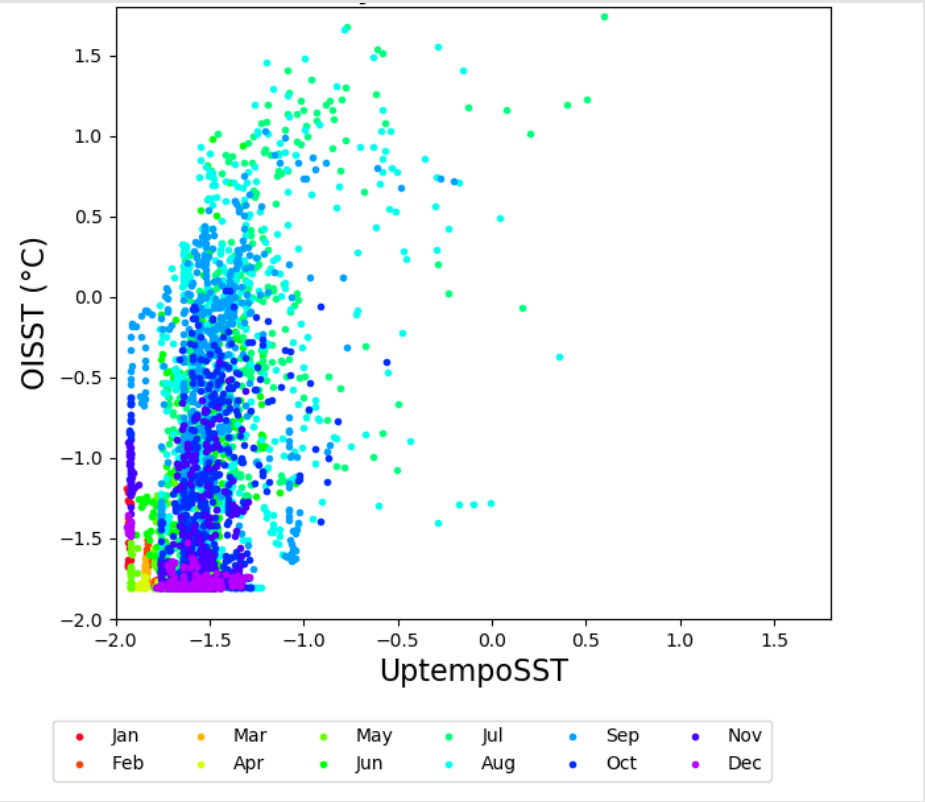
Production schedule

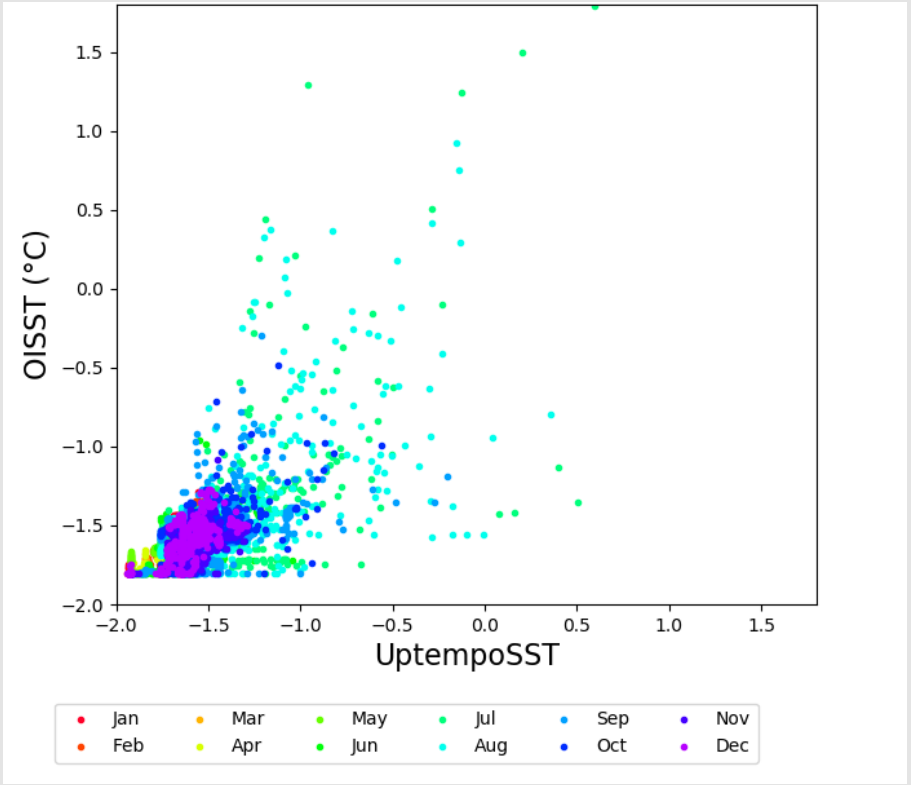
- Preliminary produced every day in near real time (1-day delay)
- Replaced by final (CDR science quality) after 2 weeks.

Supports Operations, Modelling, Research and Management

Daily ¼° Optimum Interpolation SST (dOISST)

Improvement over the Arctic region: old (left) vs new (right)





Summary

NCEI's Marine Surface Meteorology and Oceanography

- **NCEI provides end-to-end scientific stewardship for their global sea surface temperature datasets. New developments include:**
- The ICOADS near-real-time product of merged ASCII/TAC and BUFR stream
- The ERSST ensemble uncertainty estimates
- The quarterly update capacity for the PFSST CDR
- Improvements on OISST bias reduction in the Arctic Region, and
- Expanded GHRSST collection and services.