



**In situ SST Quality Monitor (iQuam)**  
[www.star.nesdis.noaa.gov/sod/sst/iquam/](http://www.star.nesdis.noaa.gov/sod/sst/iquam/)

**SST Quality Monitor (SQUAM)**  
[www.star.nesdis.noaa.gov/sod/sst/squam/](http://www.star.nesdis.noaa.gov/sod/sst/squam/)

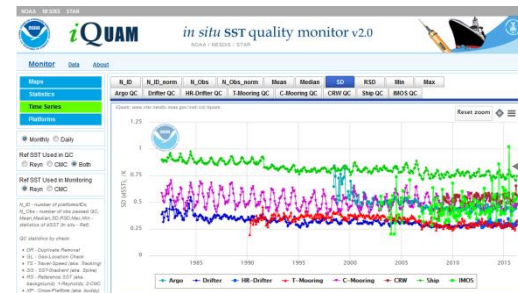
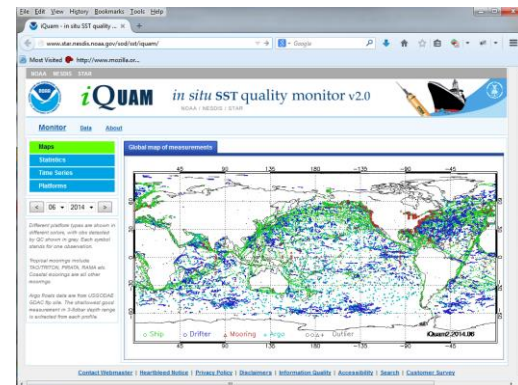
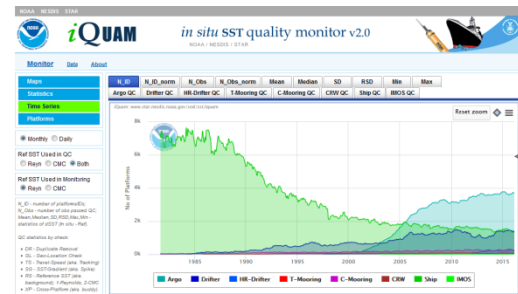
Sasha Ignatov

Xinjia Zhou, Prasanjit Dash\*,  
Kai He, Maxim Kramar, Feng Xu\*\*

NOAA STAR; CSU CIRA; GST Inc; \*EUMETSAT; \*\*Fudan University, China

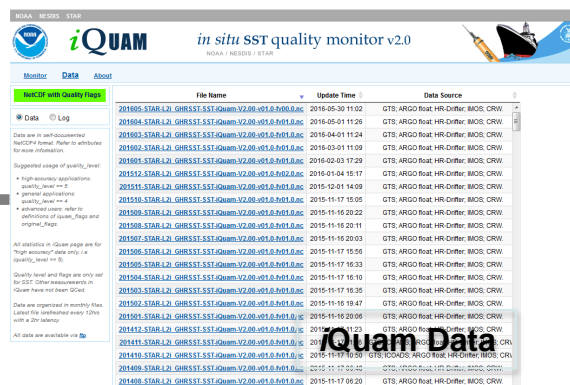
*Supported by JPSS & GOES-R, and NOAA ORS & PSDI Programs  
Thanks to NOAA and GHR SST Colleagues and Users*

# Satellite SSTs – iQuam – Match-ups – Monitoring in SQUAM



**Monitoring in iQuam**

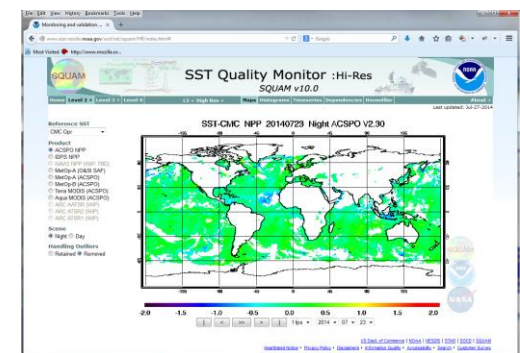
NOAA L2  
NOAA L3  
NOAA L4



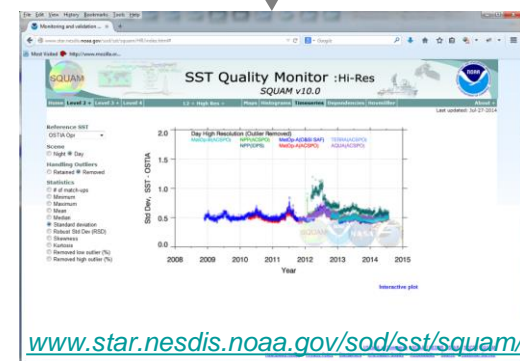
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201604-STAR-L2_GHRSST-SST-iQuam-V2.00-v01.0-B01.0.nc	2016-05-01 11:26	GTS, ARGO float, HR-Drifter, MOS, CRW
201603-STAR-L2_GHRSST-SST-iQuam-V2.00-v01.0-B02.0.nc	2016-04-01 11:24	GTS, ARGO float, HR-Drifter, MOS, CRW
201602-STAR-L2_GHRSST-SST-iQuam-V2.00-v01.0-B03.0.nc	2016-03-01 11:09	GTS, ARGO float, HR-Drifter, MOS, CRW
201601-STAR-L2_GHRSST-SST-iQuam-V2.00-v01.0-B04.0.nc	2016-02-03 17:29	GTS, ARGO float, HR-Drifter, MOS, CRW
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[www.star.nesdis.noaa.gov/sod/sst/iquam/](http://www.star.nesdis.noaa.gov/sod/sst/iquam/)

GHRSSST L2  
GHRSSST L3  
GHRSSST L4



**Satellite-iQuam-L4 Match-Ups**



**Monitoring in SQUAM**



# Major Functionalities of *i*Quam

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- ❑ **Collect in situ data (1981-pr)** from multiple sources
- ❑ **Perform uniform and accurate QC**
- ❑ **Monitor online** statistical summaries of *in situ* minus reference L4 SST
  - by platform type (drifters, ships, tropical/coastal moorings, ARGO floats, etc)
  - by individual platforms/IDs
- ❑ **Serve QC'ed data (updated twice daily) to users**
  - NOAA JPSS, GOES-R, Himawari, AVHRR SQUAM (US)
  - JPL MUR (US) – M. Chin
  - U. Miami MODIS, VIIRS (US) – K. Kilpatrick, L. Williams
  - Felyx (France/UK) – J.-F. Piolle
  - CMS (France) – A. Marsouin
  - JAXA (Japan) – Y. Kurihara, M. Kachi
  - Ocean University (China) – L. Guan
  - CMA (China) – S. Wang
  - SOA (China) – Q. Tu
  - NOAA geo-polar blended team (US) – P. Koner, J. Mittaz, A. Harris, E. Maturi
  - NOAA NCEI (K. Saha)
  - EUMETSAT (Germany) – P. Dash, A. O'Carroll

# ***i*Quam2 (2015) additions to *i*Quam1 (2009)**

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- **Extended *i*Quam period to 1981 (*i*Quam1: 1991) using ICOADS data**
- **Improved QC**
  - Added 2<sup>nd</sup> reference SST – CMC (*i*Quam1 only used Reynolds SST)
  - Added CMS black list, and individual QFs from data producers
  - Added “performance history” check (*i*Quam version of CMS/UKMO “black lists
- **Added 4 new *in situ* data types (in addition to the 4 available in *i*Quam1: ships, drifters, tropical moorings, and coastal moorings)**
  - ARGO Floats (in 2 modes: NRT and post-processing)
  - High-Resolution GHR SST Drifters
  - IMOS Ships (ABoM/Helen Beggs)
  - Coral Reef Watch buoys
- **Improved Web interface**
  - Added daily statistics (to available monthly)
  - Enhanced web graphics (interactive display; print/save capability)
  - Redesigned and optimized the code
- **Changed output format to NetCDF4 “GDS2i”**

# Data

NOAA NESDIS STAR



iQUAM

in situ SST quality monitor v2.0

NOAA / NESDIS / STAR



[Monitor](#) [Data](#) [About](#)

NetCDF with Quality Flags

☒ Data ☐ Log

Data are in self-documented NetCDF4 format. Refer to attributes for more information.

Suggested usage of quality\_level:

- high-accuracy applications: quality\_level == 5
- general applications: quality\_level == 4
- advanced users: refer to definitions of iquam\_flags and original\_flags.

All statistics in iQuam page are for "high accuracy" data only, i.e. (quality\_level == 5).

Quality level and flags are only set for SST. Other measurements in iQuam have not been QCed.

Data are organized in monthly files. Latest file is refreshed every 12hrs with a 2hr latency.

All data are available via [ftp](#).

File Name	Update Time	Data Source
<a href="#">201605-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv00.0.nc</a>	2016-05-30 11:02	GTS; ARGO float; HR-Drifter; IMOS; CRW.
<a href="#">201604-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2016-05-01 11:26	GTS; ARGO float; HR-Drifter; IMOS; CRW.
<a href="#">201603-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2016-04-01 11:24	GTS; ARGO float; HR-Drifter; IMOS; CRW.
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<a href="#">201601-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2016-02-03 17:29	GTS; ARGO float; HR-Drifter; IMOS; CRW.
<a href="#">201512-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv02.0.nc</a>	2016-01-04 15:17	GTS; ARGO float; HR-Drifter; IMOS; CRW.
<a href="#">201511-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2015-12-01 14:09	GTS; ARGO float; HR-Drifter; IMOS; CRW.
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<a href="#">201508-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2015-11-16 20:11	GTS; ARGO float; HR-Drifter; IMOS; CRW.
<a href="#">201507-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2015-11-16 20:03	GTS; ARGO float; HR-Drifter; IMOS; CRW.
<a href="#">201506-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2015-11-17 15:56	GTS; ARGO float; HR-Drifter; IMOS; CRW.
<a href="#">201505-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2015-11-17 16:33	GTS; ARGO float; HR-Drifter; IMOS; CRW.
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<a href="#">201501-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2015-11-16 20:06	GTS; ARGO float; HR-Drifter; IMOS; CRW.
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<a href="#">201408-STAR-L2i GHR SST-SST-iQuam-V2.00-v01.0-fv01.0.nc</a>	2015-11-17 06:20	GTS; ARGO float; HR-Drifter; IMOS; CRW.

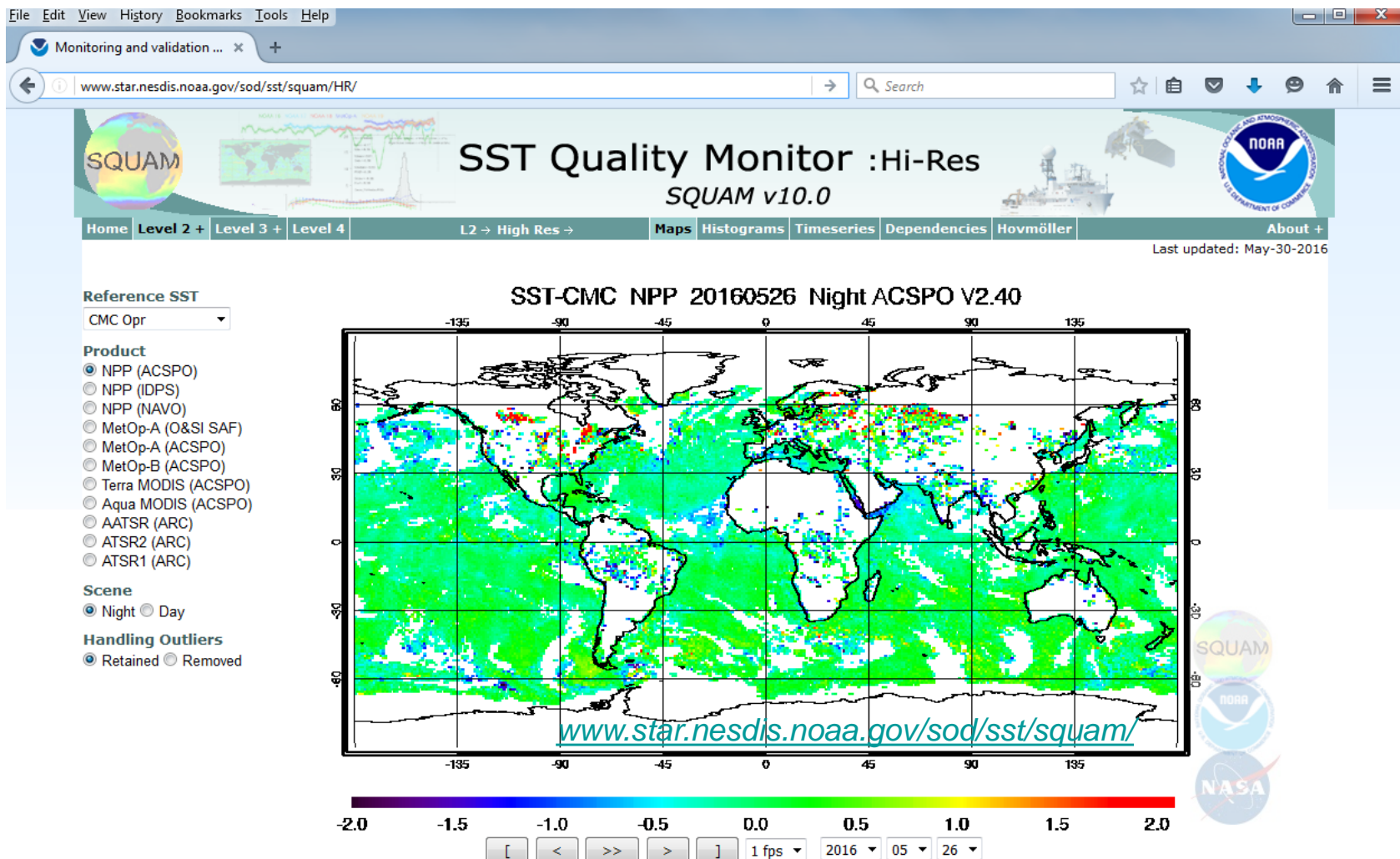
# Ongoing *iQuam2* work

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- **Completing transition to *iQuam2* (current default: *iQuam1*)**
  - Will send a 2-4 week warning via GHRSSST
- **We recommend switching to *iQuam2* NetCDFs data feed, soonest**
  - *iQuam1* hdf data continue being produced but are not supported any longer
  - No fixes will be possible in case the *iQuam1* processing fails – use at your own risk!
  - *iQuam2*: More *in situ* data (e.g., ARGO floats), longer record (1981-pr), better QC
  - Data (structure, location) have been finalized and won't change
- **Have a question? Check online FAQs**
  - If still have questions – let us know, we will help
- **Working to document *iQuam2* in peer-reviewed paper**
- **Let us know what we can improve?**
- **Tell us if you use *iQuam* data (to be informed about patches etc)**



# SQUAM



*Dash, et al: The SST Quality Monitor (SQUAM), JTECH, 2010.*

# Major SQUAM Additions Since G16

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## ● **Himawari SST**

- ACSPO H8 SST (14 Apr 2015 – on)
- NOAA heritage H7 (MTSAT2) SST (14 Apr 2015 - 4 Dec 2015)
- JAXA H8 SST (7 Jul 2015 – on)

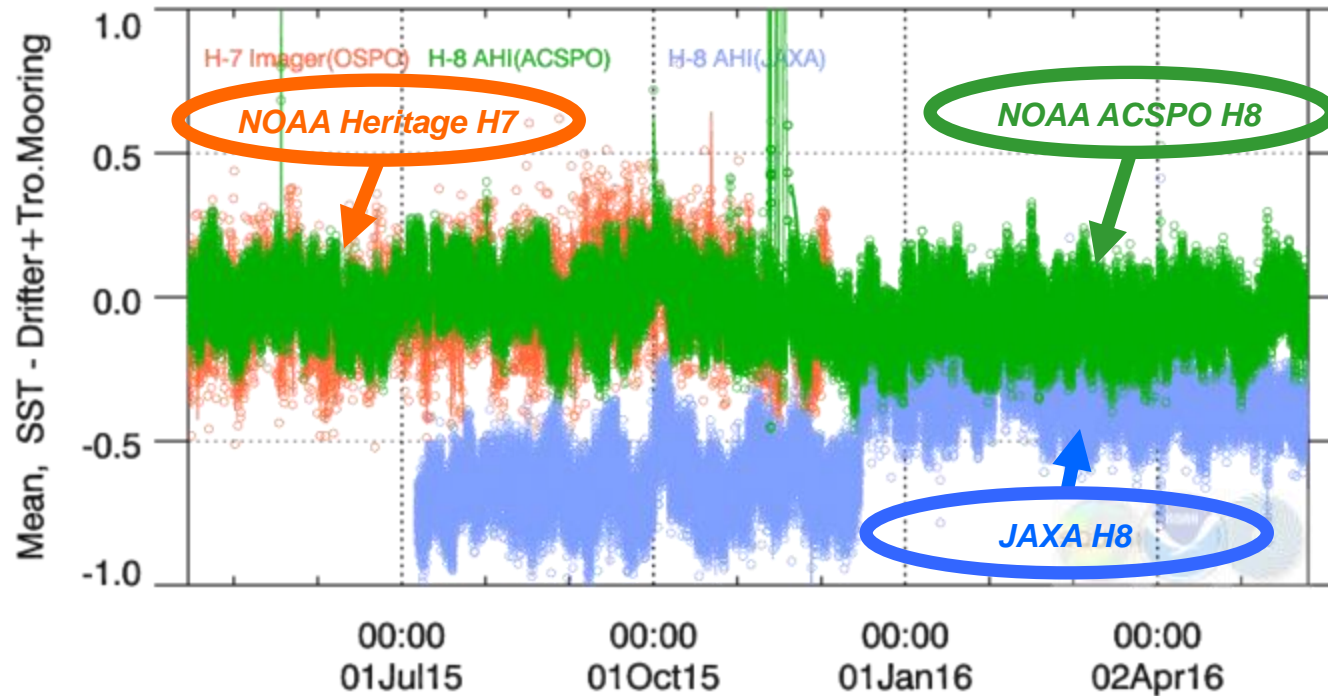
## ● **AVHRR Reprocessing**

- ACSPO GAC RAN1 (2002 – 2015)
- PFV5.2 (1981 – 2012)
- AVHRR CCI (1991 – 2010)



# Mean Bias wrt. iQuam2 (Drifters + Tropical Moorings)

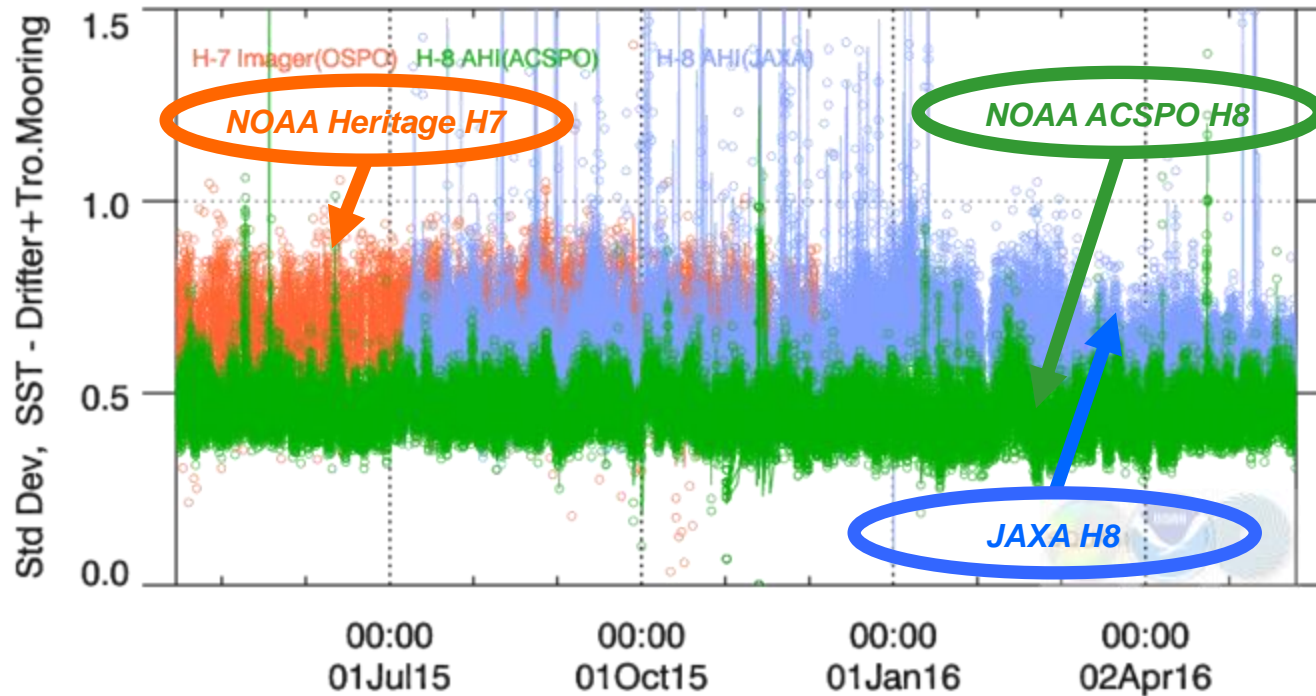
[www.star.nesdis.noaa.gov/sod/sst/squam/GEO/](http://www.star.nesdis.noaa.gov/sod/sst/squam/GEO/)



- NOAA heritage H7 SST used before Dec'2015, ACSP0 H8 SST after Dec'2015
- JAXA skin SST (expected  $\sim -0.17\text{K}$ ) produced since Jul'2015
- The JAXA processing apparently has changed in Dec 2015

# Std. Dev. wrt. iQuam2 (Drifters + Tropical Moorings)

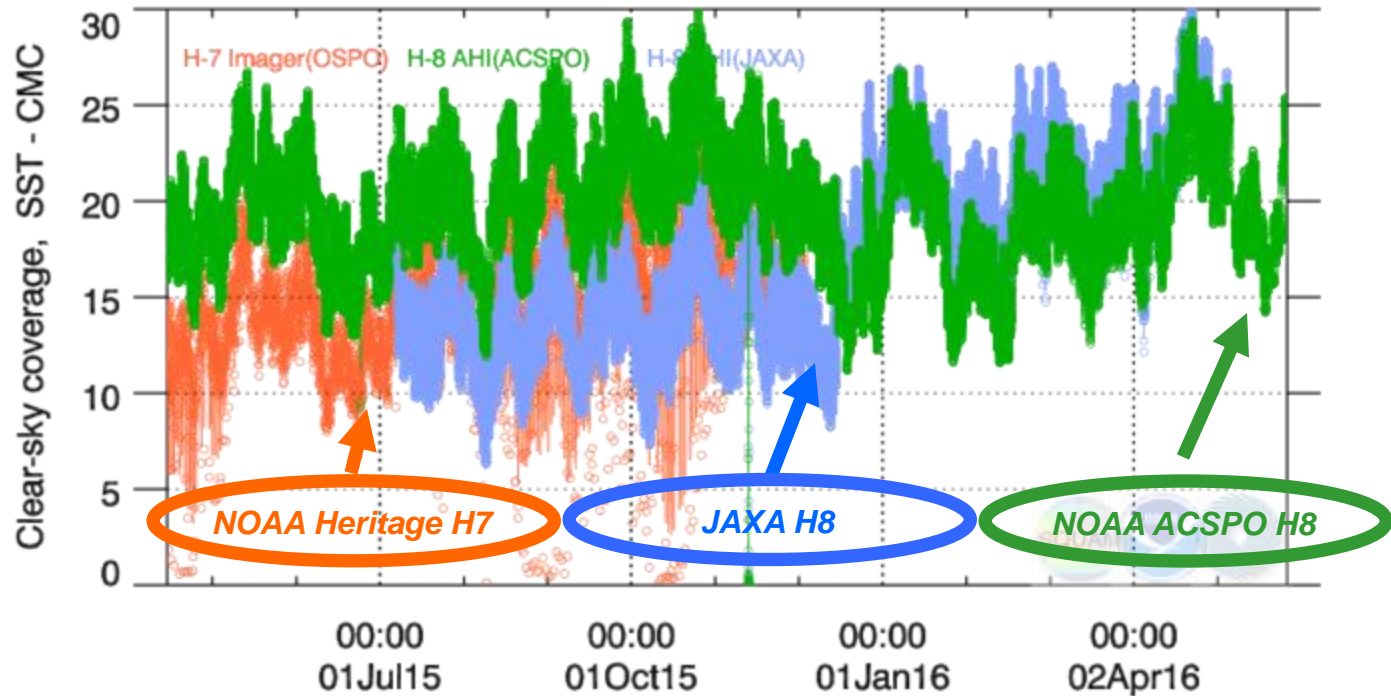
[www.star.nesdis.noaa.gov/sod/sst/squam/GEO/](http://www.star.nesdis.noaa.gov/sod/sst/squam/GEO/)



- SD for ACSP0 H8 SST tends to be on a lower envelope of the 3 products
- SD for JAXA SST is typically between ACSP0 H8 and NOAA heritage H7
- After Dec 2015, SD and outliers in JAXA SST have reduced

# % Fraction of clear-sky ocean pixels with valid SST

[www.star.nesdis.noaa.gov/sod/sst/squam/GEO/](http://www.star.nesdis.noaa.gov/sod/sst/squam/GEO/)



- ACSPO H8 SST tends to be on an upper envelope of clear-sky SST domain
- H7 SST domain was smaller and less stable
- JAXA H8 SST domain increased in Dec'2015, now comparable with ACSPO

# Ongoing SQUAM Work

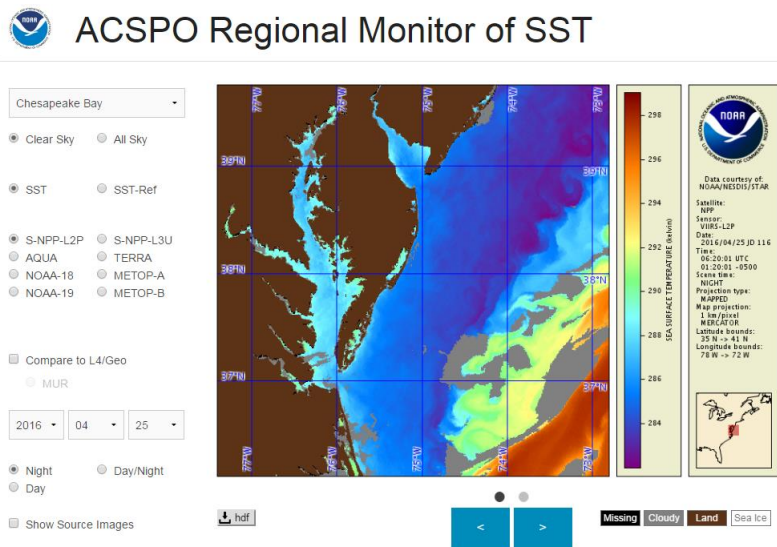
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- **Reorganizing SQUAM (underway)**
  - Regroup products, link geo, etc
  - Exclude products with no interest/feedback (from data producers / users)
  - Intuitive interface, complete functionality, fast response, dynamic graphics
  - We will try to contribute to CDR assessment
- **Tell us what we can do better**

# More SST Monitoring Resources at G-XVI

- ✓ Feng Xu – Error Characterization in iQuam SSTs using triple-collocations with satellite data – Poster #52
- ✓ Yanni Ding – ACSPO Regional Monitor for SST (ARMS) – Poster #8
- ✓ Kai He – Sensor Stability for SST (3S) – Poster #14

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**Thank You!**