

Side Meeting on Next Generation Geostationary Sensors

Chair: Misako Kachi (JAXA)

Rapporteur: Helen Beggs (ABoM)

Summary

- Purpose of the meeting is:
 - to exchange information among data providers and users about Himawari-8 and future next generation Geostationary satellites; and
 - to get feedback from users about sensitivity analyses in their applications.
 - assimilate H8 SST vs not-assimilate;
 - assimilate different H8 SSTs
 - SSES bias correct vs. not SSES bias correct
- About 40 participants got together from 18:20 to 20:40 (with pizza!)
- Four talks about Himawari-8 SST
 - Report on Himawari-8 from JMA: T. Sakurai (JMA, Japan)
 - Himawari-8 SST by JAXA: Y. Kurihara (JAXA, Japan)
 - NOAA ACSPO Himawari-8 SST product: A. Ignatov (NOAA, US)
 - GHRSSST HW8 SST at ABoM: C. Griffin (ABoM, Australia)
- General Discussions about applications, validation and calibration.



Report on Himawari-8 from JMA

Japan Meteorological Agency

Toshiyuki SAKURAI*, Mika KIMURA, Akiko SHOJI (Marine Prediction Office),
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(Meteorological Satellite Center)

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Summary

□ Introduction

- ✓ Himawari-8 started operation in July 2015
- ✓ AHI: more spectral bands (16 bands), double the spatial resolution (4 ⇒ 2km for IR), more frequent observation

□ Calibration and Validation for IR Bands

- ✓ Brightness temperature biases: very stable – less than 0.2K for standard scenes, no significant diurnal variation

□ Image Navigation and Registration (INR)

- ✓ Ground processing system updates of 9 March 2016
 - significant improvement in image quality

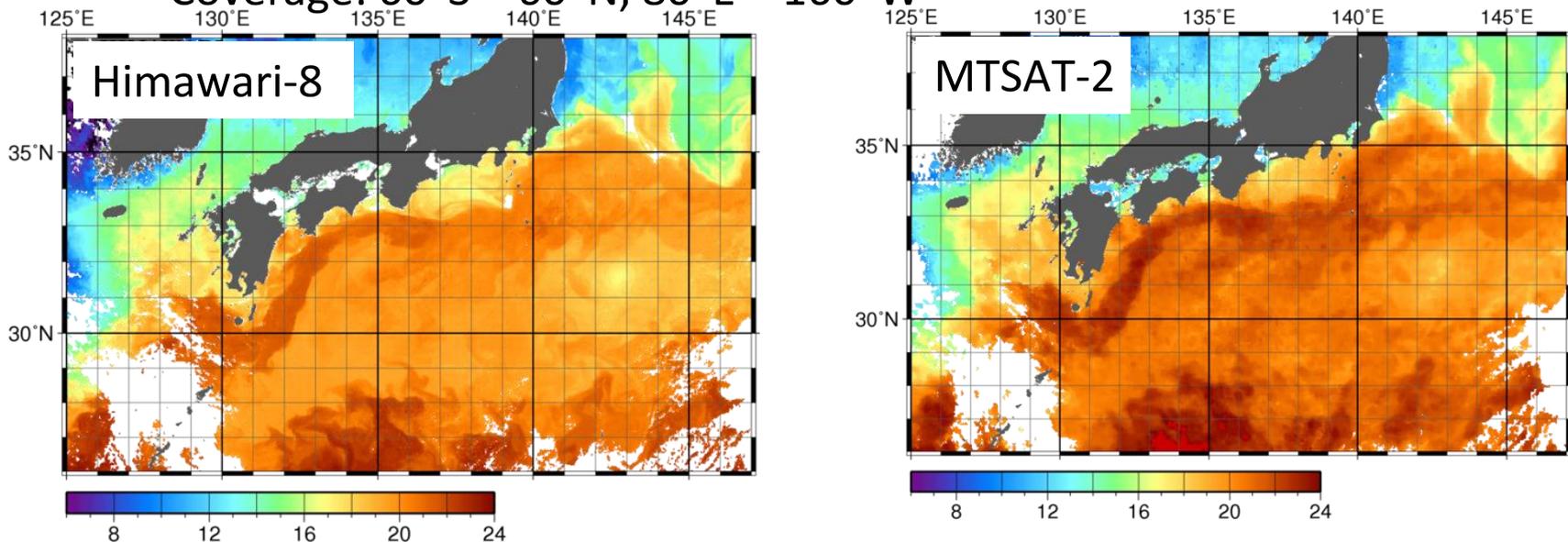
□ L3 SST and Cloud Mask

- ✓ Same SST retrieval algorithm as used by JAXA; different cloud mask method (using JMA's Fundamental Cloud Product)
- ✓ Hourly, 0.02° horizontal resolution
- ✓ Himawari-8 SST vs. buoys: Bias: -0.3 – -0.4°C; RMSE: 0.7 – 0.8°C



Himawari-8 L3 SST

- JMA's Meteorological Satellite Center produces Himawari-8 L3 SST data
- Same SST retrieval algorithm as used by JAXA based on a quasi-physical algorithm (Kurihara et al. 2016)
- Band 11 (8.6 μm), Band 13 (10.4 μm) and Band 14 (11.2 μm)
- Cloud mask based on JMA's Fundamental Cloud Product for Himawari-8
- Hourly, 0.02 $^\circ$ horizontal resolution (0.04 $^\circ$ for MTSAT-2)
- Coverage: 60 $^\circ\text{S}$ – 60 $^\circ\text{N}$, 80 $^\circ\text{E}$ – 160 $^\circ\text{W}$



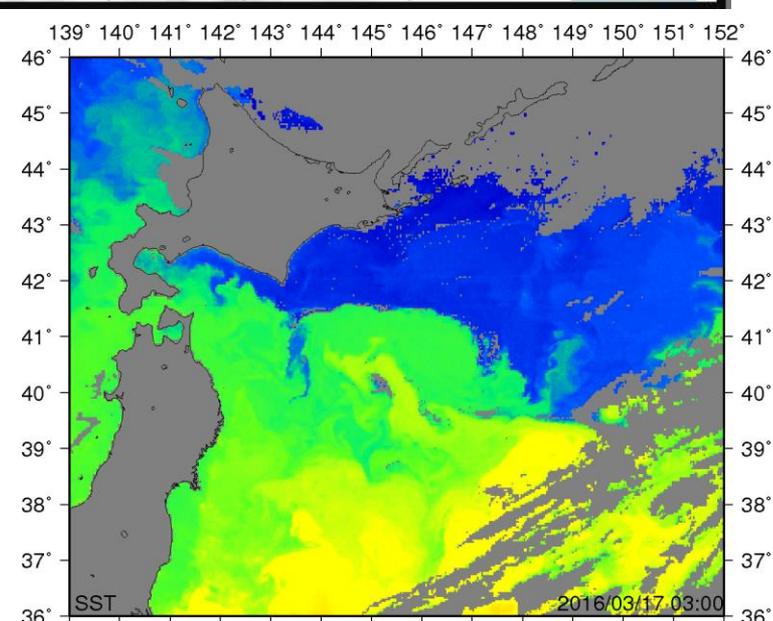
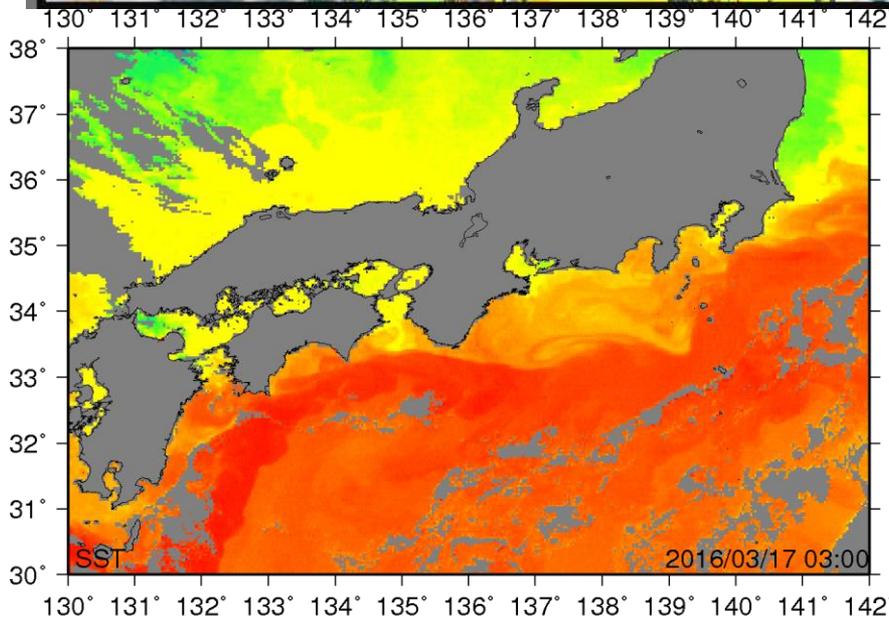
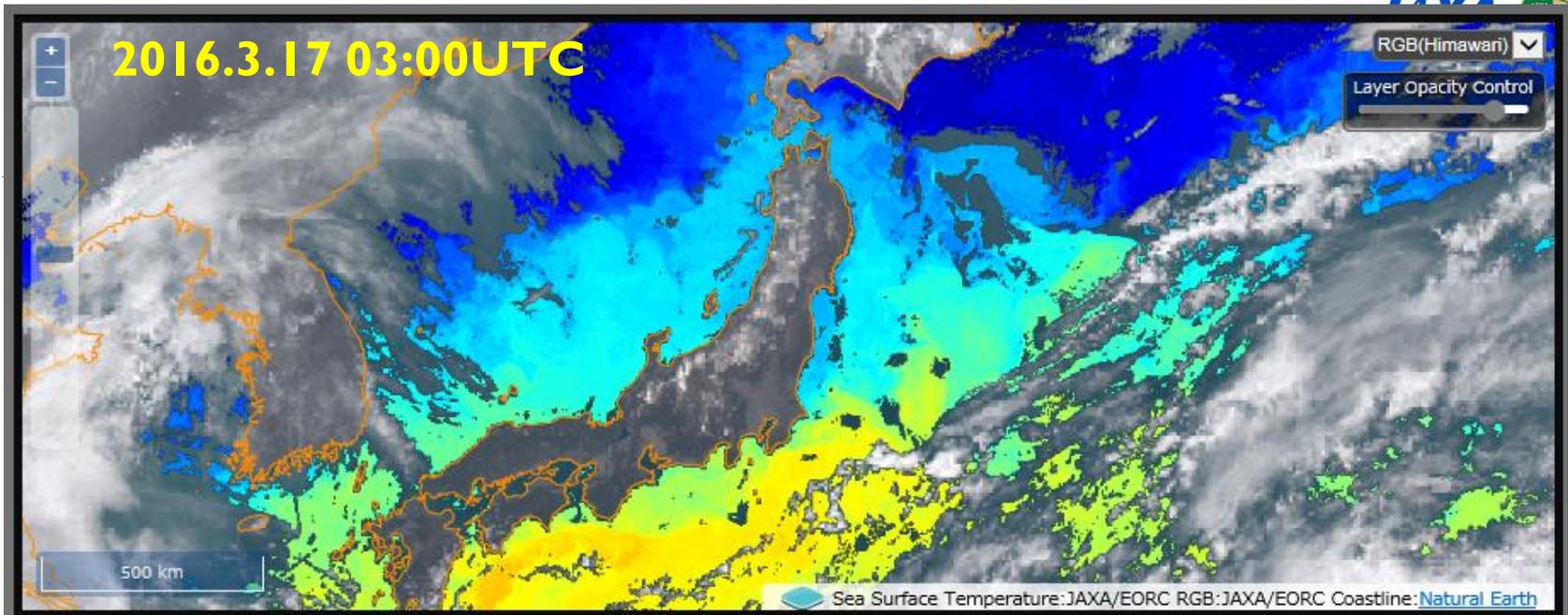
SST composite images for daytime on 17 Mar. 2016

Himawari-8 SST by JAXA

*Yukio Kurihara⁽¹⁾, Misako Kachi⁽¹⁾, Hiroshi Murakami⁽¹⁾, Tsutomu Hihara⁽²⁾
(1) JAXA, Earth Observation Research Center (EORC), (2) JAMSTEC

Summary

- ▶ JAXA opened Himawari Monitor last August and released the Himawari-8 SST product on the web-site.
- ▶ Quasi-physical algorithm and the cloud algorithm based on Bayesian is used for the Himawari-8 SST product.
- ▶ Comparison shows a good agreement between buoy data and Himawari-8 SST.
- ▶ Seasonal biases are found in the north Pacific.
- ▶ Over cloud detection will be improved in the next update.
- ▶ The update of the LI processing likely made a positive impact on the SST product.
- ▶ Dynamic ocean model of JAMSTEC has been improved by the assimilation of Himawari-8 SST.





NOAA ACSPO Himawari-8 SST Product

Sasha Ignatov

Maxim Kramar, Boris Petrenko, Prasanjit Dash*,
Yury Kihai, Irina Gladkova, Xingming Liang, Yanni Ding

*NOAA; GST Inc; CCNY; CIRA (*now with EUMETSAT)*

Support by US GOES-R and NOAA PSDI



Summary

NOAA ACSPO H8 SST Product

- ✓ Successfully replaced the H7 SST as input in geo-polar blended
- ✓ Risk reduction exercise for GOES-R

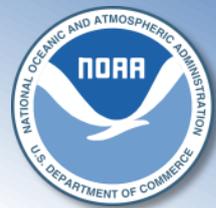
Product performance

- ✓ Meets formal NOAA requirements for accuracy ($\pm 0.2\text{K}$) and precision (0.6K)
- ✓ Realistically resolves SST diurnal cycle
- ✓ Improves upon NOAA heritage H7 SST (improved sensor, algorithms)
- ✓ Compares favorably with JAXA H8 product

Work ahead

- ✓ Derive L2C/L3C of reduced size & archive
- ✓ Revisit SST algorithm, ensure sensitivity to true SST = 1
- ✓ Implement pattern recognition algorithms, derive thermal fronts

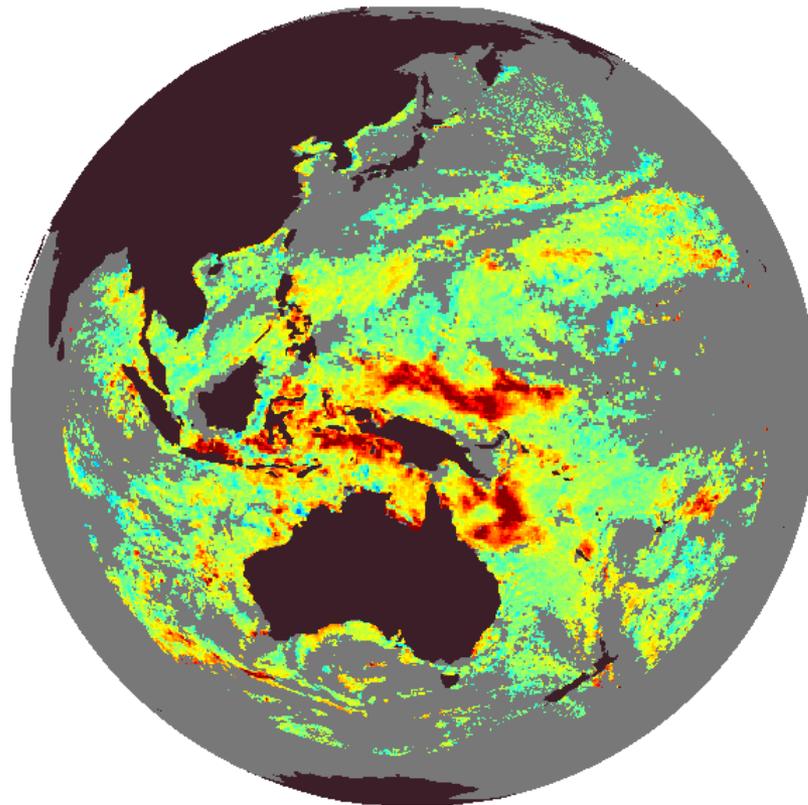
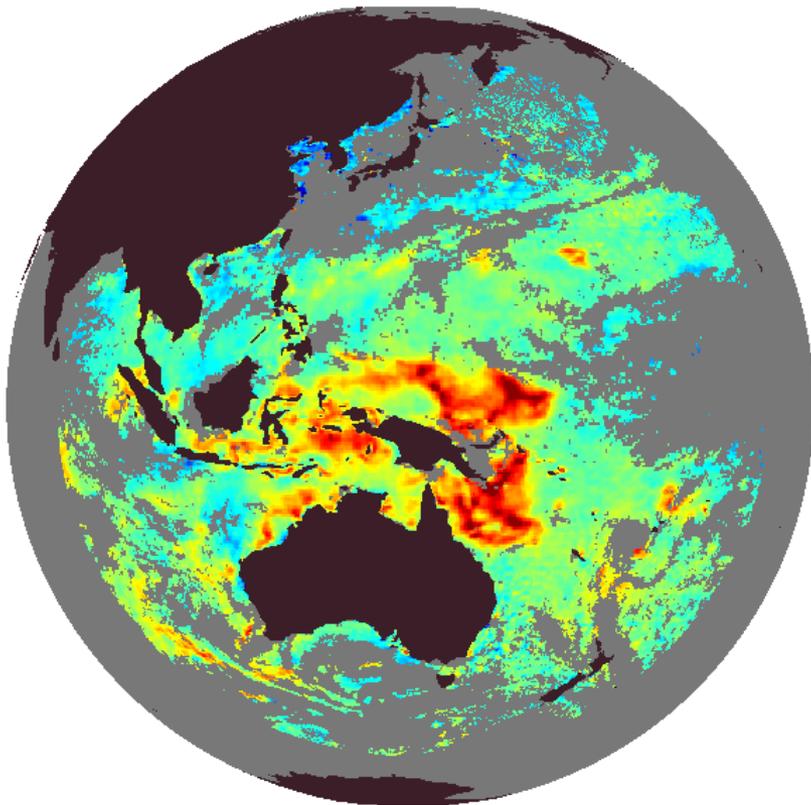
Support launch of GOES-R in October 2016



OSTIA Diurnal and ACSPO wrt CMC, Himawari-8 AHI, 8 January 2016, 5:00 UTC (Day)

OSTIA_SKIN – CMC: Bias=0.10 K, SD=0.48 K

ACSPO_SUBSKIN – CMC: Bias=0.34 K, SD=0.48 K



OSTIA_SKIN and ACSPO_SUBSKIN show different yet similar global biases with respect to CMC
OSTIA_SKIN is -0.24K colder (-0.17K comes from "skin"). Two products show close global SDs

6 June 2016

NOAA ACSPO H8 SST

Thanks to UKMO James While, 11
Matt Martin, Chongyuan Mao



Australian Government

Bureau of Meteorology



GHRSSST HW8 SST at ABOM

Christopher Griffin¹, Leon Majewski¹

¹Observations and Infrastructure Division, Bureau of Meteorology, Melbourne

GHRSSST XVII, Washington DC, 6th-10th June 2016

Summary (by rapporteur)

- Can we use polar-orbiting satellites to calibrate the geostationary satellites?
- ABoM provide full disk L2P skin SST (2km, 10min) in GDS 2.0 with quality_level, sses_bias, sses_standard_deviation
- Method:
 - Use Suomi-NPP VIIRS SST L2P (ACSPO) (apply a cool skin correction) as a “standard” for Himawari-8 BTs
 - Tried regression: single equation for day and night and tried dual day/night algorithm
 - Use SEVIRI GEOCAT cloud mask: Needs to be improved
- Results
 - Bias is slightly colder than -0.17 K cf drifting buoys
 - SD is ~ 0.5 K cf drifting buoys
- Proposed Products:
 - Hourly median SST with diurnal components, with indications of cloud cover
 - Daily (especially night): 15 to 5 degrees before local sunrise
 - Interpolated, gap-filled, to preserve measurements (similar method to ABoM interpolated rain product)

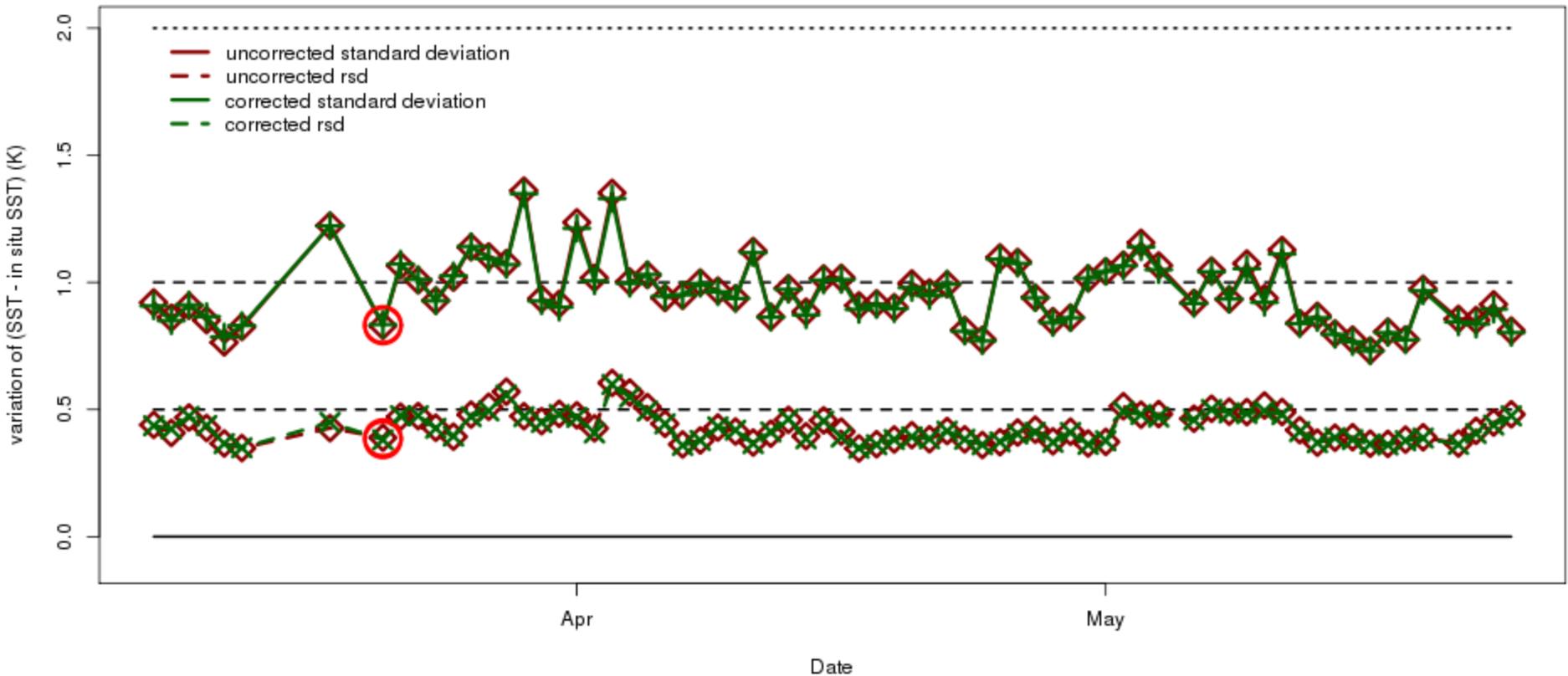


Australian Government

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Validation - Single regression

GHRSSST L2P LRG2.12 HW8 SST Single (Day and Night) Algorithm, daily (day time)
Deviations Himawari-8 , last 78 days, 2016-03-08 to 2016-05-24



General Discussion (1/3)

- L4 applications of H8 SST
 - L2 developers need feedbacks from users, such as L4 producers. Improvements when L2P SSTs are assimilated into L4 analyses with and without `sses_bias` correction?
 - L2 and L4 developers need to work together on H8 SST products (e.g. L4 SSTfnd and L4 SSTskin), so that we don't replicate effort.
 - Replication of H8 SST products is a way to compare methods and algorithms. The different L3 & L4 products can be compared in SQUAM.
 - Sharing results from each group during GHRSSST meeting will be effective.
 - Need actual pixel lat/lon information for SST input into L4. Using the gridded L3U/L3C products causes issues for geolocation in an L4 product.
 - Provide lat/lon offsets of data that go into the H8 L3 cell.
 - JAXA Himawari-8 SST quality is very poor at satellite zenith angles larger than 70 degrees.

General Discussion (2/3)

- Validation
 - The near-shore SST is becoming more important to validate.
 - IMOS ship SST is available from iQuam v2 for validation. They use calibrated SST sensors and data is Quality Controlled.
 - ABoM plans to validate H8 SST using ship SSTskin, possibly in 2017. Various agencies aim to provide ship SSTskin data for use by others. There will be a joint data portal for shipborne radiometer SST based at the British Atmospheric Data Centre.

General Discussion (3/3)

- Calibration
 - GSICS proposed to GHRSSST to evaluate their TB corrections applying them to H8 or other GEO SSTs. JAXA tried it experimentally and got some positive impact, but not applied to operational one.
 - There are other problems that are not solved by GSICS, such as the midnight effect.
 - We still have a residual midnight effect of around 0.1 K in ACSPO H8 SST.