

GOES-16 ABI L2+ Sea Surface Temperature (SST) Release
Provisional Data Quality
March 9, 2018
Read-Me for Data Users

The GOES-R Peer/Stakeholder Product Validation Review (PS-PVR) for the Advanced Baseline Imager (ABI) L2+ Sea Surface Temperature (SST) Provisional Maturity was held on March 9, 2018. As a result of this review, the PS-PVR panel recommended that the ABI SST product be declared Provisional.

The GOES-R ABI SST product is generated from each 15min Full Disk (FD) image and then 15min images are aggregated into 1 hour composites. SSTs are derived using a regression equation, applied to brightness temperatures (BTs) in the four longwave ABI window bands 11 (8.5 μ m), 13 (10.35 μ m), 14 (11.2 μ m), and 15 (12.3 μ m). Using a single regression equation across day and night, greatly facilitates the derivation of a smooth and continuous diurnal cycle. SSTs are calculated and reported in all ocean pixels (including e.g. cloud, ice, etc.), up to 10km inland. (Note that currently, SSTs are not calculated over internal waters, such as e.g. the Great Lakes but this will be added in the very near future). However, only clear-sky pixels (i.e., marked with the best quality flag, QF=5), are recommended for use. The QF is set using the ABI Clear-Sky Mask (which is external to the SST algorithm) and the SST Quality Control (QC; performed as a part of the SST algorithm). The SST QC uses the same four SST bands, plus bands 2 (0.64 μ m) and 7 (3.9 μ m).

A full description and format of the SST product can be found in the Product Definition and User's Guide (PUG) document (<http://www.goes-r.gov/products/docs/PUG-L2+-vol5.pdf>). The algorithm used to derive the SST product from GOES-16 ABI observations is described in detail in the "GOES-R Advanced Baseline Imager (ABI) Algorithm Theoretical Basis Document for Sea Surface Temperature" (<https://www.goes-r.gov/products/ATBDs/baseline/baseline-SST-v2.0.pdf>).

Provisional maturity, by definition, means that:

- Validation activities and quality assurance activities are ongoing and the general research community is now encouraged to participate.
- Severe algorithm anomalies are identified and under analysis. Solutions to anomalies are in development and testing.
- Incremental product improvements may still be occurring.
- Product performance has been demonstrated through analysis of a small number of independent measurements from select locations, periods, and associated ground truth and field campaign efforts.
- Product analysis is sufficient to establish product performance relative to expectations.
- Documentation of product performance exists that includes recommended remediation strategies for all anomalies and weaknesses. Any algorithm changes associated with severe anomalies have been documented, implemented, and tested.
- Testing has been fully documented.
- Product is ready for operational use and for use in comprehensive cal/val activities and product optimization.

Users of the GOES-16 ABI Provisional maturity SST product for any reason, including but not limited to scientific and technical investigations, are encouraged to consult the NOAA/NESDIS/STAR Algorithm Working Group (AWG) scientists (in particular, AWG SST lead listed at the end of this readme file), for feasibility of the planned applications. The SST product is sensitive to the quality and availability of the

(1) L1b data (including calibration, navigation, and band co-registration); and (2) ABI cloud mask.

Status of the current SST product and any remaining known issues that are being resolved:

1. Summary of the performance of the SST product as measured against reference in situ data:
 - GOES-R SST accuracy specification (defined as a FD mean bias with respect to quality controlled in situ data) of $\pm 3.1\text{K}$ is easily met for all retrieval conditions. (In fact, the baseline SST product currently meets much more stringent JPSS and Himawari-8 accuracy specifications, $\pm 0.2\text{K}$).
 - GOES-R precision specification (defined as a FD standard deviation, SD, with respect to quality controlled in situ data) of 1K is easily met for all retrieval conditions. (In fact, the baseline SST product currently meets more stringent JPSS and Himawari-8 precision specifications, 0.6K).
2. A major improvement to the SST algorithm, identified by data users, is adding retrievals over internal waters (in particular, the Great Lakes).
3. Several technical improvements have been identified to facilitate the use of the SST data
 - Fix large QF/SST outages appearing as rectangular blocks of highest quality data (which in fact may be cloud or otherwise degraded SST data).
 - Fix wrong Time Stamps/Bounds in file names/attributes.
 - Fix aperiodic data flow
 - Include information on the algorithm version in files' global attributes
4. Other issues that may be identified by users will be investigated as needed.

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