GOES-16 ABI L2+ Sea Surface Temperature (SST)
Full Data Quality
May 24, 2024
Read-Me for Data Users

GOES-R Advanced Baseline Imager (ABI) L2+ products will achieve Full Validation maturity by default after two years of Provisional and Operational use with no major anomalies reported (minor product improvements may still be occurring). As a result, Sea Surface Temperature (SST) is considered Full Validation Maturity as of March 9, 2020.

The GOES-R ABI SST product is generated from each 10 min Full Disk (FD) image and then 10 min 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 (8.5µm), 13 (10.35µm), 14 (11.2um), and 15 (12.3µm). 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 and internal water pixels (including cloud and ice pixels). However, only clear-sky pixels (i.e., marked with the best quality flag, DQF=0), are recommended for use. The DQF 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 (0.64µm) and 7 (3.9µm).

A full description and format of the SST product can be found in the Product Definition and User's Guide (PUG) Volume 5: Level 2+ Products, located on OSPO's GOES-R documents webpage: https://goes-r.noaa.gov/resources/docs.html.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", located on STAR's GOES-R ATBD webpage: https://www.star.nesdis.noaa.gov/goesr/documentation_ATBDs.php.

Full maturity, by definition, means that:

- Validation, quality assurance, and anomaly resolution activities are ongoing.
- Incremental product improvements may still be occurring.
- Users are engaged and user feedback is assessed
- Product performance for all products is defined and documented over a wide range of representative conditions via ongoing ground-truth and validation efforts.
- Products are operationally optimized, as necessary, considering mission parameters of cost, schedule, and technical competence as compared to user expectations.
- All known product anomalies are documented and shared with the user community.
- Product is operational.

Users of the GOES-16 ABI Full 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 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 ±3.1K is easily met for all retrieval conditions. (In fact, the baseline SST product currently meets much more stringent JPSS and Himawari-8 accuracy specifications, ±0.2K).
    - 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. Technical improvements that have been identified to facilitate the use of the SST data:
    - Include information on the algorithm version in files' global attributes
3. Other issues that may be identified by users will be investigated as needed.

Contact for further information: OSPO User Services at SPSD.UserServices@noaa.gov

Contacts for specific information on the ABI L2 SST product:
Jaime Daniels jaime.daniels@noaa.gov
Veronica Lance veronica.lance@noaa.gov