

GOES-16 ABI L2+ Cloud Top Parameters (CTP) Release,  
Provisional Data Quality  
February 28, 2018  
Read-Me for Data Users

The GOES-R Peer/Stakeholder Product Validation Review (PS-PVR) for the Advanced Baseline Imager (ABI) L2+ Cloud Top Parameters (Height [CTH], Temperature [CTT], and Pressure [CTp]) Provisional Maturity was held on February 16, 2018. As a result of this review, the PS-PVR panel recommended that the ABI CTP products be declared Provisional.

The GOES-16 ABI CTP product generates the cloud-top height, cloud-top temperature and cloud-top pressure products from the 11  $\mu\text{m}$ , 12  $\mu\text{m}$  and 13.3  $\mu\text{m}$  infrared observations. The GOES-R Series Level I Requirements (LIRD) states the Cloud Top Height shall be produced every 60 minutes for CONUS and Full Disk, and 5 minutes for Mesoscale. The Cloud Top Pressure will be produced every 60 minutes for CONUS and Full Disk. The Cloud Top Temperature will be produced every 15 minutes for Full Disk, and every 5 minutes for Mesoscale. However, in current normal Mode 3 operations, the CTP product is generated every 15 minutes for Full Disk, every 5 minutes over the CONUS region, and every 1 minute over the Mesoscale regions.

A full description and format of the CTP products 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 CTP products from GOES-16 ABI observations is described in detail in the "GOES-R Advanced Baseline Imager (ABI) Algorithm Theoretical Basis Document for ABI Cloud Height" ([https://www.goes-r.gov/products/ATBDs/baseline/Cloud\\_CldHeight\\_v2.0\\_no\\_color.pdf](https://www.goes-r.gov/products/ATBDs/baseline/Cloud_CldHeight_v2.0_no_color.pdf)).

The ABI L2+ CTP Beta, Provisional and Full Validation Readiness, Implementation and Management Plan ([RIMP](#)) defines Provisional maturity as:

- Validation 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 obtained from select locations, periods, and associated ground truth or field campaign efforts.
- Product analysis is sufficient to communicate product performance to users relative to expectations (Performance Baseline).
- 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, tested, and shared with the user community.
- Testing has been fully documented.
- Product is ready for operational use and for use in comprehensive cal/val activities and product optimization.

Persons desiring to use the GOES-16 ABI Provisional maturity CTP products 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 for feasibility of the planned applications. The CTP product is sensitive to upstream processing that includes the quality of the

calibration, navigation, cloud mask, and cloud type/phase.

Status of the current CTP products and any remaining known issues that are being resolved:

1. Summary of the measured performance of the CTP products as measured against reference data:
  - Accuracy specifications are met for all 3 products when compared with MODIS C6 MYD35 EDRs. Precision specifications are met for CTH and CTp, and nearly met for CTT.
  - For scenarios which are consistent with the retrieval assumptions (single layer, known phase) the cloud top products are within specifications for accuracy when compared to CALIPSO. The precision is just missing for CTH and CTT due to extremely tight precision specifications.
  - Accuracy is met for GOES-16 CTH when compared to the DOE ARM surface-based LIDAR measurement in Oklahoma. Precision is a bit above specifications.
  - CTp returned from the DMW algorithm shows the CTp, when compared to CALIPSO, is within specifications.
2. The Derived Motion Winds Team (DMW) is reliant on accurate CTP products in their algorithm. From the DMW Provisional discussion, there are sub optimal cloud height assignments causing precision specifications to be missed in the 350 – 500 hPa layer, negative speed biases in the upper levels, and positive speed biases in the middle levels. A library of outlier cases is being built by the DMW team which will allow the Cloud team to address the height assignment issues.
3. The CTP products still need to attain a balance between meeting CTP requirements, as well as providing accurate products for the DMW team. Future work will include diagnosing the reasons why these outlier cases are failing to deliver accurate cloud heights during the retrieval process.

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