GOES-16 ABI L2+ Clear Sky Mask Release,
Provisional Data Quality
February 27, 2018
Read-Me for Data Users

The GOES-R Peer/Stakeholder Product Validation Review (PS-PVR) for the Advanced Baseline Imager (ABI) L2+ Clear Sky Mask (CSM), also known as the Binary Cloud Mask (BCM), Provisional Maturity was held on February 16, 2018. As a result of this review, the PS-PVR panel recommended that the ABI BCM be declared Provisional.

The GOES-16 ABI BCM generates the cloud mask used by many of the ABI L2 Products. The BCM consists of the binary cloud mask, a 4-level mask and the results of individual tests. Only the binary cloud mask is made available to external users. In Mode 3 operations, the BCM is required to be generated every 15 minutes for ABI Full Disk (FD) of the Earth, every 5 minutes over the Continental United States (CONUS) region, and every 5 minute over the Mesoscale (MESO) regions, according the GOES-R Mission Requirements Document. However, operationally, the Mask is produced for every Mesoscale image due to downstream requirements.

A full description and format of the BCM 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 BCM from GOES-16 ABI observations is described in detail in the "GOES-R Advanced Baseline Imager (ABI) Algorithm Theoretical Basis Document for ABI Cloud Mask" (https://www.goes-r.gov/products/ATBDs/baseline/Cloud_CldMask_v2.0_no_color.pdf).

The ABI L2+ BCM 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 BCM 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 BCM product is sensitive to upstream processing that includes the quality of the calibration, navigation, terminator regions and dynamic ancillary data, such as the snow mask.

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

- Summary of the measured performance of the BCM products as measured against reference data:
    - Accuracy specifications are met when compared with MODIS C6 MYD35 EDRs, excluding MYD35 EDRs with known issues
    - Accuracy is met for GOES-16 BCM when compared to the clear sky SST, and most SURFRAD observations
    - Accuracy specifications are met when compared with CALIPSO, is above specifications

- The BCM has the current known issues and limitations, which are being addressed
    - False cloud due to fresh snow not being present in ancillary snow mask: The BCM is totally reliant on the ancillary snow mask. Errors in the snow mask will impact the BCM. Modifications to the BCM to reduce this reliance are being explored.
    - Some blocks on land around unmarked inland water due to the RFMFT
    - False Cloud (PFMFT/ETROP tests along coast lines): This issue is most prevalent in regions with a strong land/sea temperature gradient.
    - False Cloud over SST gradients: One of the BCM tests (RFMFT) is known to falsely detect cloud over strong SST gradients or features.
    - Missed Cloud (warm low stratus at night). Clouds which pose a very small thermal signal can be missed in the BCM. We are working to improve this performance.
    - Terminator Performance: Performance differences from day to night are apparent with more cloud being detected during the day than at night. This difference causes the terminator to be noticeable in the data. The BCM Team is working to remove any erroneous terminator artifacts.
    - Lingering impact of calibration of ABI Band2 still poses a risk. An ad-hoc adjustment was made to the RGCT (Reflectance Gross Contrast Test) to account for this but other tests remain unadjusted and this may also contribute to some terminator issues. If the ABI Band 2 calibration is adjusted, there will be a lag in time before the BCM can be adjusted accordingly.

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