

GOES-18 ABI Legacy Atmospheric Profiles (LAP) Release  
Provisional Data Quality  
October 12, 2022  
Read-Me for Data Users

The GOES-R Peer/Stakeholder Product Validation Review (PS-PVR) for the GOES-18 Advanced Baseline Imager (ABI) L2+ Legacy Atmospheric Profiles (LAP) was held on October 12, 2022. As a result of this review, the panel chair declared that this product meets the criteria for Provisional Maturity.

The GOES-R series ABI LAP products provide Legacy Vertical Temperature Profiles (LVT), Legacy Vertical Moisture Profiles (LVM), Total Precipitable Water (TPW), and Derived Atmospheric Stability Indices (DSI) over each 5x5 ABI pixels box with clear sky infrared band radiances.

DSI includes five atmospheric instability indices: Lifted Index (LI), Convective Available Potential Energy (CAPE), Total Totals Index (TT), K-Index (KI), and Showalter Index (SI). The GOES-R series ABI LAP products are retrieved based on the ABI infrared band radiance measurements with NWP (NOAA GFS) short range forecasts as first guess and background information in a one-dimensional variational (1Dvar) process. The LAP products are generated every 10 minutes over the ABI Full Disk (FD), every 5 minutes over the Continental United States (CONUS) region, and every 1 minute over the Mesoscale (MESO) regions. A full description and format of the LAP 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 LAP products from GOES-R series ABI observations is described in detail in the "GOES-R Advanced Baseline Imager (ABI) Algorithm Theoretical Basis Document for Legacy Atmospheric Moisture Profiles, Legacy Atmospheric Temperature Profiles, Total Precipitable Water, and Derived Atmospheric Stability Indices". ATBDs are available at [https://www.star.nesdis.noaa.gov/goesr/documentation\\_ATBDs.php](https://www.star.nesdis.noaa.gov/goesr/documentation_ATBDs.php).

GOES-18 ABI LAP for several derived products (TPW, LI, CAPE) were compared to GOES-16 and GOES-17 products in the overlap regions. The results are reasonably consistent with GOES-16 and GOES-17, with differences much smaller than product requirements. There is better agreement between GOES-16 and GOES-17 than either with GOES-18. This is most likely due to to-be-resolved co-registration issues on GOES-18. Overall, the LAP products look stable.

By definition, Provisional maturity means that:

- 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;
- Product analysis is sufficient to communicate product performance to users relative to

expectations;

- Documentation of product performance exists;
- Testing has been fully documented;
- Product is ready for operational use and for use in comprehensive calibration/validation activities and product optimization.

Persons desiring to use the GOES-18 ABI Provisional maturity LAP 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. These products are sensitive to upstream processing, specifically the quality of the calibration and navigation.

Known issues at this stage include:

1. Missing values are randomly seen in several areas.
2. LAP products are affected by the migration of the sun which might be caused by the upstream cloud mask.

More information, including comparisons to reference data, can be found on the Validation Tool web page: <https://soundingval.ssec.wisc.edu/>

Contact for further information: OSPO User Services at [SPSD.UserServices@noaa.gov](mailto:SPSD.UserServices@noaa.gov)

Contact for specific information on the ABI L2+ LAP products:

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