TROPICS-03 & TROPICS-06 Level 1 & 2a Provisional Release Notes

January 26, 2024

1) The provisional L1a (antenna temperature), provisional L1b (brightness temperature), provisional L2a (unified radiometric resolution) netCDF files are included in this release - all channels are fully functional on the TROPICS-03 and TROPICS-06 CubeSats.
2) The TROPICS-03 data release starts on June 9th, 2023 and TROPICS-06 data release starts on June 2nd, 2023. Newly available data will be delivered to GES-DISC daily at midnight UTC. See calibration observation below regarding blackout periods at high solar beta angles.
3) An antenna pattern correction has been applied to L1b in this provisional release. The empirical scan bias correction for sidelobe contamination uses an empirical correction (see next note regarding ATBD).
4) An updated L1 Algorithm Theoretical Basis Document is underway and will be provided after its approved for public release.
5) CRTM TROPICS coefficients using SRF: https://drive.google.com/drive/u/1/folders/1zcaw06DlAwausbtcXmfxJ09aD60bRyr- (Benjamin Johnson)
6) RTTOV TROPICS coefficients using SRF:
    a. https://nwp-saf.eumetsat.int/site/software/rttov/download/coefficients/coefficient-download/
    b. Provided by Emma Turner
    c. Note that Pathfinder (TROPICS-01) follows EUMETSAT convention for pathfinders and is rtcoef_tropics_0_tropics_srf.dat.
    d. SRF info: https://nwp-saf.eumetsat.int/downloads/rtcoef_rttov13/mw_srf/

L1 Calibration Observations:

1) NASA ESD definition of provisional data maturity: “Product was defined to facilitate data exploration and process studies that do not require rigorous validation. These data are partially validated and improvements are continuing; quality may not be optimal since validation and quality assurance are ongoing.”
2) High solar beta angles warm the CubeSat beyond the initial post-launch calibration temperature range, but the next calibration release will address this issue. The provisional data product release will be limited to solar beta angles between -40 to 40 degrees. To date, this will remove approximate 20% of the data, which we fully expect to restore in the next calibration update.
3) Ch. 8 (highest weighting function channel) does have higher than expected standard deviations of the departures from GEOS5-derived model fields, and we’re investigating it further.
4) Ch. 1 (W-band window) channel has a bias (Observation-Background) compared to ATMS, GMI, and ERA-5 around -6 K and scene temperature sensitivity (i.e., TROPICS

is warmer at cold scenes and colder at warm scenes). This issue will be addressed in next calibration release.

5) Early Adopters and TROPICS L2 Science Team identified an orbital (latitudinal or ascending/descending) bias in the non-surface sensitive F-band temperature sounding channels (Ch. 4 to 8). The next calibration update will attempt to address this issue.
6) During early-orbit checkout, there was some spatially-localized geolocation errors that caused some scans near the min/max latitude to have an erroneously large roll component. It only occurred during low CubeSat solar beta angles, but was remedied with the 27-Jun-2023 update.
7) All TROPICS CubeSats undergo a maneuver to point the communication antenna at ground stations to maximize contact duration. These constellation CubeSats use multiple ground stations to allow for a near-realtime (NRT) downlink, but this nominal data set at GES DISC is still the ~12-hour latency (and provided in orbit-length granules). The invalid data collected during the ground contacts are given fill values, but there are some missed scans at the ends of the ground contact that might be seen in the data that the algorithm fails to identify. An update to fix that is underway. Some users have looked at the scan angle in the netcdf variable to make an additional roll maneuver check by making sure near-nadir (position 41) scan angles should be close to zero.

Note on Near Real-Time (NRT) data:

All CubeSats are downlinking data in NRT (<1 hour), but the L1 NRT data is provided by a separate processing chain at the UW-M SSEC TROPICS Data Processing Center (i.e., not through GES DISC).

a. The L1 NRT processing is presently at the Beta data maturity, which is calibrated only for imagery purposes
b. Once the constellation L1 nominal (12-hr latency) chain has been raised to provisional, the NRT L1 processing chain will be raised to provisional at a future date.
c. Contact Patrick Duran, TROPCIS Application Lead, at patrick.t.duran@nasa.gov for more information on NRT processing.