

# **Joint Polar Satellite System-2 (JPSS-2)/NOAA-21 VIIRS Level-1 v2.0 Product Collection: Radiometric Calibration & Geolocation Updates (December, 2023)**

The following radiometric calibration and geolocation updates are designed to support the release of the JPSS-2/NOAA-21 Visible Infrared Imaging Radiometer Suite (VIIRS) Level-1, v2.0 product collections. The JPSS-2 (J2) mission was launched on November 10, 2022 and upon achieving its successful orbit, it acquired the NOAA-21 moniker. The nadir door of the J2 VIIRS instrument was opened on December 5, 2022, while its cryo-radiator door was opened on February 8, 2023. The release date for the J2 VIIRS v2.0 collection (C2) data products starts from February 10<sup>th</sup> 2023 (Day 041).

## **Radiometric Calibration-specific changes**

The J2 VIIRS radiometric calibration Level-1B reprocessing includes a few calibration updates for the reflective solar bands (RSB), but no significant changes for the day-night band (DNB) or thermal emissive bands (TEB). The RSB updates include the following:

1. An estimated time-dependent adjustment is applied to the VIS/NIR band solar diffuser (SD) F-factors before generating the F-Predicted LUTs to correct for the expected long-term drift in the SD calibration. The estimated adjustment is the average of the S-NPP and J1 (NOAA-20) adjustments derived from comparing SD and lunar trends for S-NPP and J1. This estimated approach is used since there is not yet enough J2 lunar data to derive an adjustment directly for J2.
2. The accuracy of the F-Predicted LUTs for the SWIR bands is improved in the reprocessed time series by fitting the measured SD F-factors (which show rapid gain changes for some SWIR detectors) to smooth functions to remove the forward-prediction errors.
3. A scale factor of 6.1% is applied to the M11 reflectance and radiance values consistently over the entire mission to improve the agreement between J1 and J2 reflectances at this wavelength.

## **Geolocation-specific changes**

The J2 VIIRS geolocation underwent an on-orbit validation. Geolocation errors of about 350 m in the along-scan direction and about 165 m in the along-track direction were corrected for the image-resolution bands and moderate-resolution bands. The Day-Night band (DNB) geolocation error of about 2000 m was corrected. Further, the geolocation biases in the scan profile were also corrected. All these corrections bring the geolocation uncertainties for the J2 L1 products to within 75 m (1-sigma) in both the along-scan and along-track directions.