***VIIRS NCC Imagery EDR Release, Provisional Data Quality***

***Aug 21 2013***

***Read-me for Data Users***

The JPSS Algorithm Engineering Review Board released the VIIRS Near Constant Contrast (NCC), Imagery Environmental Data Records to the public with a Provisional level maturity on 10 Jul 2013. Provisional quality is defined as:

* Product quality may not be optimal
* Incremental product improvements still occurring
* Version control is in effect
* General research community is encouraged to participate
* Users urged to consult the EDR product status
* Ready for operational evaluation

The Board recommends that users be informed of the following product information and characteristics when evaluating the VIIRS NCC Imagery EDR.

1. The VIIRS Imagery EDR comprises all 5 I-bands, 6 of the 16 M-bands, and the Day Night Band (DNB). The DNB is a special case, where the Imagery produced is referred to as Near Constant Contrast (NCC). NCC Imagery contains additional processing and therefore is considered independent of the other Imagery products. This memorandum applies only to the NCC Imagery EDRs, as the non-NCC was declared provisional back in January 2013.
2. CLASS archives only the I-band and NCC Imagery EDRs. It does not archive any Imagery created from the M-bands. The Imagery derived from the M-bands was agreed to after requirements had been established for what the program was expected to produce and deliver to CLASS. Although this additional Imagery is quite useful for identifying atmospheric and surface features, there was no need foreseen to have it archived, and that remains the case today. However it is expected the NCC Imagery EDR will continue to be archived by CLASS.
3. The NCC Imagery EDR algorithm processes VIIRS DNB SDRs and computes pseudo-albedos based on radiance values obtained from the DNB. Once computed, these pseudo-albedos are placed on a Ground Track Mercator (GTM) projection in a manner similar to the M-band Imagery EDRs. GTM uses the nearest pixel rather than an average of the surrounding pixels, unless an isolated pixel has a bad value. This holds for both NCC and non-NCC Imagery EDRs.
4. Radiometric accuracy and sufficient geolocation, covered by the VIIRS SDR team, are prerequisites for Imagery EDRs to attain Provisional data quality. The DNB SDRs were established as provisional on 18 January 2013. The only known issue for radiometric accuracy with the DNB is stray light, but this was corrected within the DNB SDR processing in Build 7.2. There are no known issues with DNB geolocation, though the program is changing this from the ellipsoid to terrain-corrected sometime in 2014.
5. The current capability of the NCC Imagery EDR is qualitatively well characterized. Quantitative assessments are not planned, given the nature and use of NCC Imagery EDR; hence a qualitative analysis is more than sufficient. No serious artifacts are present in the VIIRS non-NCC Imagery EDR, and qualitative analysis of the associated geolocation has also revealed no critical issues. There are aspects of the NCC Imagery EDR, especially at night, which a user needs to be aware of. They are:
6. Some striping will be evident either under certain enhancements or in cases where the radiance is low (low amounts of lunar illumination). The overall impact is usually minor, but it can be quite obvious in cases such as lightening and the aurora. It is rare for striping to appear in daytime scenes, but it may be found in terminator and nighttime granules.
7. The manner in which nighttime NCC Imagery is displayed, especially the enhancement used, will strongly impact the usefulness of the NCC Imagery. Updates in July 2013 corrected an issue where, under cases of low illumination (half moon or less, again night), the NCC Imagery would contain only FILL values. This made the Imagery unusable, so the algorithm was altered to allow for an expanded range of pseudo-albedos that could account for originally very small radiances. This increase of range solved the FILL issue, but does leave NCC Imagery sensitive to the enhancement used when the scene contains little (lunar) illumination.
8. The majority of issues relating to Imagery in general have to do with data availability rather than actual sensor/algorithm performance. The use of imagery is of greatest interest to real-time users, but access to imagery in short time frames (less than two hours) is currently limited. Like all other products, Imagery EDRs from CLASS are not available until 6+ hours after creation.
9. The Near Constant Contrast product is built from the VIIRS DNB calibrated SDR product. Stray light is observed in the VIIRS DNB calibrated SDR product under near new moon conditions close to both terminators.
10. After build MX7.2 on 8/20/2013, the SDR product under these conditions is corrected for the stray light contribution. The stray light contribution correction is a multi-step process. First, a stray light free background is constructed from cloud-free scenes where stray light and aurora radiation are absent. Then a set of stray light scenes are collects. Subtracting the residual of background from the stray light contaminated scenes results in the stray light contribution. These stray light contributions are collected in a Lookup table indexed by solar zenith angle, detector, scan position, HAM side, and earth hemisphere. Each VIIRS DNB observation meeting the stray light contamination criteria (near new moon conditions close to both terminators) has had the stray light contribution removed. The stray lights contributions are re-computed around new moon conditions, for each calendar month, to capture solar azimuth effects.
11. Additional Items to note:
12. Instrument and spacecraft maneuvers and tests: maneuvers and special tests are still being performed on-orbit to better characterize the VIIRS instrument performance. These include but are not limited to the monthly lunar maneuver, quarterly blackbody WarmUp CoolDown (WUCD) tests. During such events, the VIIRS Imagery EDRs will not be optimal, including NCC Imagery, and may not be useable. Data users are encouraged to contact the VIIRS SDR Team if any related issues arise.
13. The VIIRS VisNIR band degradation has no negative impact on the NCC Imagery EDRs. See VIIRS SDR Readme for details on this anomaly.
14. When displaying adjacent Imagery EDR granules, NCC or otherwise, lines of fill will be noted between the granules. This is expected and not an error, these lines of fill exist to ensure the file size of the Imagery EDR product remains constant, even though the number of Ground Track Mercator rows varies from granule to granule. It is up to the user to remove these lines if desired.
15. The next step in the NCC Imagery EDR validation process is the move to Operational stage 1 status, which depends on three factors: 1) the advancement of VIIRS DNB SDRs to validation stage 1, 2) feedback from operational users, and 3) more specific analyses targeting specific phenomena (e.g. fog, sea ice edge). The Imagery EDR Cal/Val Team believes the NCC Imagery is rapidly approaching validated stage 1 status.

Additional information on VIIRS, algorithm theoretical basis documents (ATBDs), and examples of VIIRS Imagery are available at

<http://rammb.cira.colostate.edu/projects/npp/>

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