VIIRS Vegetation Index Environmental Data Record (VIIRS VI-EDR) Release
Validated Stage 1 Data Quality
February 2015
Read-me for Data Users

The JPSS Algorithm Engineering Review Board (AERB) released the Suomi NPP VIIRS Vegetation Index Environmental Data Record (VIIRS VI-EDR) to the public with a Stage 1 Validation level maturity with an effective date of August 13, 2014 corresponding to the Transition to Operations of IDPS Mx8.5, which includes improvements in Aerosol retrievals and SDR calibration. This assessment is based on both qualitative and quantitative analysis of the VIIRS VI-EDR. Quantitative evaluation is predominantly based on the comparison with MODIS Vegetation Indices, and on the VIIRS VI-EDR meeting the JPSS Accuracy, Precision and Uncertainty (APU) product specifications as required by the JPSS Level 1 Requirements Document (L1RD).

Validated Stage 1 quality is defined as:

- Using a **limited** set of samples, the algorithm output is shown to meet the <u>threshold</u> performance attributes identified in the **JPSS Level 1 Requirements Supplement with the exception of the S-NPP Performance Exclusions**

The Board recommends that users be informed of the following product information and characteristics when evaluating the VIIRS VI-EDR:

1. **Product Requirements:** Product requirements are now documented in the Joint Polar Satellite System (JPSS) Level 1 Requirements Supplement (L1RDS) and apply only to future satellites, starting with JPSS 1. Appendix D of the L1RDS describes performance exclusions for the Suomi NPP products.

2. **Algorithm Description**. The Suomi NPP VIIRS VI-EDR is based on AVHRR and MODIS heritage code, adapted for use with the VIIRS data, and includes two VIs, the top-of-the-atmosphere Normalized Difference Vegetation Index (TOA NDVI) and the top-of-canopy Enhanced Vegetation Index (TOC EVI), and per-pixel quality flags (QFs).

3. **Product Evaluation.** Quantitative evaluation to date is predominantly based on correlative analysis with MODIS VI data in global scale, AERONET data in global scale, and tower-based radiation flux measurement data at selected sites over the conterminous US. The first two analyses showed VI-EDR meeting the APU performance thresholds in the JPSS Level 1 Requirements Supplement. Results from the last analysis indicated high accuracy and precision of VIIRS VI time series to capture land surface phenology.

4. **Quality Flags.** Users are strongly encouraged to consult QFs included in the VI-EDR product. Users are warned that the Cloud Shadows and Cloud Adjacency quality flags currently overestimate the amount of pixels affected by these conditions. The VIIRS Cloud Mask (VCM) Team is developing a solution to these problems. The table below summarizes the current recommended uses of QFs:

Recommended QFs for Data Screening	TOA NDVI	TOC EVI
Cloud Confidence ("Confidently Cloudy", "Probably Cloudy", "Probably Clear", or "Confidently Clear")	Screen "Confidently Cloudy" and "Probably Cloudy."	Screen "Confidently Cloudy" and "Probably Cloudy."
Snow/Ice (Yes or No)	Use this flag to identify pixels over snow/ice-covered surface.	Use this flag to screen pixels with suspicious EVI values over snow/ice-covered surface.
Cloud Adjacency (Pixel Adjacent to Cloud) (Yes or No)	Use this flag with caution; the flag can overestimate affected areas as the flag was set at the M band resolution (750 m at nadir).	Use this flag to screen pixels with suspicious EVI values located at cloud edges. Use this flag, however, with caution; the flag can overestimate affected areas as the flag was set at the M band resolution (750 m at nadir).
Aerosol Quantity ("Climatology", "Low", "Average", or "High")	Use this flag to identify the source of aerosol information and the degree of aerosol contamination in individual pixels.	Use this flag to identify the source of aerosol information and the degree of aerosol contamination in individual pixels. The current recommendation is to screen "High."
Cloud Shadows (Yes or No)	Use this flag with caution; this flag is currently known to overestimate shadow-affected areas.	Use this flag with caution; this flag is currently known to overestimate shadow-affected areas.

5. **Known Errors**. TOC EVI data can contain unrealistically high/low values over snow/ice covered areas at high latitudes, over clouds, along cloud edges, and possibly over cloud shadows.

6. **Future Work**. The next step in the VIIRS VI-EDR validation process, for Stage 2 validation maturity, is to continue the analyses performed for validation stage 1 using a moderate number of samples.

More information about VIIRS and the VIIRS VI-EDR product can be found at the following website, where users can find the Algorithm Theoretical Basis Document (ATBD), Operational Algorithm Description (OAD) document, and Common Data Format Control Book (CDFCB):

http://npp.gsfc.nasa.gov/documents.html

Additionally, the VIIRS Sensor Data Record (SDR) provisional quality Read-me document is available at: http://www.nsof.class.noaa.gov/saa/products/welcome

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