

VIIRS-VI-EDR Release, Beta Data Quality
Last Updated: 01/10/2013
Read-me for Data Users

The Joint Polar Satellite System (JPSS) Algorithm Engineering Review Board approved the release of the Visible Infrared Imager Radiometer Suite Vegetation Index Environmental Data Record (VIIRS-VI-EDR) to the public with a Beta level quality as of May 02, 2012. Beta quality is defined as:

- Early release product
- Initial calibration applied
- Minimally validated and may still contain significant errors (additional changes are expected)
- Available to allow users to gain familiarity with data formats and parameters
- Product is not appropriate as the basis for quantitative scientific publications, studies and applications

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

1. **Product status:** Vegetation Index (VIIRS-VI-EDR) is a key parameter to specify the boundary conditions in global climate models, weather forecasting models and numerous remote sensing applications for monitoring environmental state and its change. The VIIRS-VI-EDR is produced using the VIIRS spectral bands I1, I2 and M3 and provides continuity with NASA EOS MODIS and NOAA POES AVHRR; however, users need to be aware that differences between the VIs from the various sensors exist due to differences in spectral band placements. The VIIRS-VI-EDR consists of two vegetation indices: the Top of the Atmosphere Normalized Difference Vegetation Index (TOA-NDVI) and the Top of the Canopy Enhanced Vegetation Index (TOC-EVI) each provided at image channel resolution (nominally 375m) on a daily basis. TOA-NDVI: is most directly related to absorption of photosynthetically active radiation, but is often correlated with biomass or primary productivity. The retrieval uses the following equation:

$$NDVI = (\rho_{12}^{TOA} - \rho_{11}^{TOA}) / (\rho_{12}^{TOA} + \rho_{11}^{TOA})$$

TOC-EVI was developed to optimize the vegetation signal with improved sensitivity in high biomass regions and improved vegetation monitoring through a reduction in atmosphere and canopy background influences. The EVI is derived from TOC reflectance with a different gain factor from that of the MODIS equation:

$$EVI = (1 + L) \cdot \frac{\rho_{12}^{TOC} - \rho_{11}^{TOC}}{\rho_{12}^{TOC} + C_1 \cdot \rho_{11}^{TOC} - C_2 \cdot \rho_{M3}^{TOC} + L}$$

VIIRS-VI-EDR is calculated for LAND retrievals including inland water bodies and rivers. Retrievals are not performed over ocean. The VIIRS-VI-EDR product includes quality flags on land/water, cloud confidence including thin cirrus, heavy aerosol loadings, and exclusion conditions. Measurement Exclusion Conditions are: SZA > 85 deg for both NDVI and EVI (nighttime); confidently cloudy for both NDVI and EVI; and AOT > 1.0 for EVI.

2. **Product evaluation:** The VIIRS-VI-EDR Beta evaluation assumed the VIIRS SDR was calibrated. The internal performance evaluation included: assessment of data structure and integrity; quality assessment at granule level; quality assessment using regional/global mosaics; and visual assessment of quality flags. External performance evaluation consisted of comparison with Aqua MODIS and AVHRR using regional/global mosaics and assessment of time series using Aqua MODIS and AVHRR as a reference. Accuracy, precision, and uncertainty (APU) metrics of VIIRS-VI-EDR in reference to Aqua MODIS are consistent over time. VIIRS-VI-EDR temporal profiles (3 km-by-3 km window) depicting seasonal changes are comparable to those of Aqua MODIS.
3. **Known errors:**
 - a. Daily VIIRS TOC EVI data (1) can be contaminated with residual clouds and (2) can contain unrealistically high/low values over snow/ice covered areas at high latitudes as well as over residual clouds. Temporal compositing reduces residual atmosphere and cloud contaminations.
 - b. Daily VIIRS TOA NDVI data are also contaminated with residual clouds and systematically higher than AVHRR TOA-NDVI.

Additional information is available in the VIIRS Vegetation Index algorithm theoretical basis document (ATBD), which is available at:

<http://www.star.nesdis.noaa.gov/jpss/ATBD.php>

The VIIRS SDR Read-me for Beta Data Quality is also available at the CLASS Homepage.

Point of Contact:

Marco Vargas
JPSS VIIRS Vegetation Index EDR Algorithm Lead
Email: marco.vargas@noaa.gov
Phone: 301-683-3590