VIIRS VIIRS-ST-EDR, Beta Data Quality
Last Updated: March 18th, 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 Surface Type Environmental Data Record (VIIRS-ST-EDR) to the public with a Beta level quality as of January 29th, 2013. 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-ST-EDR.

1. **Product status:** The VIIRS-ST-EDR represents continuity with NASA EOS MODIS and NOAA POES AVHRR land cover products. VIIRS-ST-EDR is an input to VIIRS LST EDR in addition to other uses. Based on the extensive MODIS/AVHRR global land cover product user base, this VIIRS product will be used by real-time resource and disaster management; ecosystem monitoring; numerical weather, climate and hydrological prediction models. The current VIIRS-ST-EDR was designed to satisfy the JPSS L1RD requirements for VIIRS Surface Type.

   The algorithm for the VIIRS-ST-EDR is to regrid VIIRS Quarterly Surface Type IP (QST IP) to VIIRS 750m swath granules with quality flags indicating snow and fire pixels using VIIRS snow/ice EDR and Active Fire ARP. The VIIRS QST IP will be generated with monthly gridded composited VIIRS NDVI, SR and Brightness Temperatures of at least one full year. Before a VIIRS data based QST IP becomes available, the MODIS C5 land cover product is used as QST IP seed.

2. **Product evaluation**:
   Validation of the EDR includes two components: First, surface type labels and quality flags in the EDR granule files are consistent with the QST IP, VIIRS snow EDR and Fire ARP; and secondly the QST IP accuracy meets the JPSS L1RD requirements for VIIRS Surface Type.

   Based on intensive comparisons of the surface type labels and quality flags of VIIRS-ST-EDR granule files in the past months (up to Feb 2013) with the QST IP seed data, VIIRS snow/ice EDR and VIIRS fire ARP, performance of the Suomi NPP VIIRS-ST-EDR is

good. Visual evaluation of VIIRS-ST-EDR was accomplished globally and in different world regions using data from both Land PEATE (NASA) and IDPS (NOAA). The results from both systems were found to be in agreement. As the quality of VIIRS-ST-EDR is a function of performance of the VIIRS QST IP seed, snow EDR and active fire ARP algorithms, the joint analysis of the three products VCM, AOD and VIIRS-ST-EDR was conducted for a number of scenes.

Quantitative validation was based on the comparisons of number of pixels of each surface type, snow/ice, or active fire between VIIRS-ST-EDR and QST IP, snow/ice EDR, or active fire ARP. Although pixel number counts do not match perfectly, the differences are less than 0.01% generally for each surface type. The differences might have been caused by gridding and regridding processes between different spatial resolutions (e.g. MODIS 1km grid to VIIRS 750m pixel, VIIRS 375m pixel to VIIRS 750 pixel at different positions of a scene). However, the differences are generally less than 0.01% for all surface type labels..

3. **Known errors:**
   a) Snow/Ice EDR may have not labeled snow/ice surface over inland water surface correctly, which may cause VIIRS-ST-EDR snow/ice flag over inland water surface to be wrong;
   b) Current coastal line pixels may have not labeled optimally;
   c) VIIRS-ST-EDR might have been designed to monitor land surface type changes such as burned areas, snow/ice covers, flooded areas, and deforested/urbanized areas. But current VIIRS-ST-EDR label or quality flag do not provide this information except the fire and snow/ice cover labels imported from the Fire ARP and Snow/Ice EDR. We recommend upgrading the VIIRS-ST-EDR algorithm by adding a surface type change detection function.
   d) VIIRS-ST-EDR was designed to provide Vegetation Cover Fraction as a data layer. But the parameters used in the VCF calculation may not be correct (namely maximum and minimum NDVI of each pixel or regions). This function of the VIIRS-ST-EDR is moved to a VIIRS Green Vegetation Fraction (GVF) product via a NOAA-NESDIS NDE project.

Additional information on VIIRS and Land Surface Reflectance algorithm theoretical basis document (ATBD) are 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.

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