**MEMORANDUM FOR:** The Record

**FROM:**  Dr. Thomas Kopp, VIIRS Imagery Validation Lead

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**SUBJECT:** NPP VIIRS non-NCC Imagery EDR beta status

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The successful launch of the Suomi National Polar-orbiting Partnership (SNPP) Spacecraft on 28 October 2011 with the Visible Infrared Imaging Radiometer Suite (VIIRS) ushers in a new generation of capabilities for operational environmental remote sensing for weather, climate, ocean, and other environmental applications. VIIRS succeeds the NOAA AVHRR and NASA EOS MODIS with 22 spectral bands covering wavelengths from 0.41 to 12.5 m, providing data for the production of 22 Environmental Data Records (EDRs) with its calibrated and geolocated Sensor Data Record (SDRs). The Imagery EDR comprises use of 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. Therefore this memorandum considers the remaining, or non-NCC, Imagery EDRs.

Imagery is heavily dependent on the upstream SDRs, hence it must follow the SDR schedule closely in determining validation status. As calibration of the VIIRS SDRs improves, so does the quality of the Imagery. Radiometric accuracy and sufficient geolocation, covered by the VIIRS SDR team, are prerequisites for Imagery to attain the next stage. The VIIRS SDRs formally achieved beta status in mid-May 2012.

The Imagery team shortly after launch set up a website to post and track examples of Imagery, both from the EDRs and others built from the original SDRs. Interested parties may go to <http://rammb.cira.colostate.edu/projects/npp/> to see the numerous examples posted there. Other examples exist on CasaNOSA. Many presentations have shown Imagery examples since the visual channels started to produce scientifically valid data, starting with the first images on 21 November 2011. Imagery has been analyzed by subject matter experts at the University of Wisconsin, CIRA, NOAA/STAR, NRL-Monterey, Northrop Grumman, and Aerospace. The current capability of the Imagery EDR is, at least qualitatively, well characterized.

The Imagery products received positive feedback immediately after launch. The initial visual images received widespread praise. Within 2 months images from VIIRS even made it to the U.S. President (the so-called “blue marble” image). Even during the work on the VIIRS anomaly, the Imagery performed well and did not show any negative impacts. Early geolocation errors were repaired by April 2012. There is no blurring evident when images from different channels are placed on top of one another (i.e. true or false color images), indicating band-to-band registration is at least adequate, if not better. Minor striping has been noted either under extreme enhancement, or in some cases where channel differences are produced. However under typical use striping is not noticeable in non-NCC Imagery. More quantitative assessments are planned for future analysis, but for the sake of attaining beta the qualitative analysis has proven sufficient. No serious artifacts are present in the VIIRS non-NCC Imagery EDR.

The status of the Imagery EDR was summarized at the VIIRS Cal/Val Workshop on 18 April 2012. The majority of issues relating to Imagery had more to deal with data availability than actual sensor/algorithm performance. Items such as odd looking triangles in corners of the Imagery EDR were caused by missing data in an adjacent granule, a situation both the C3S and IDPS teams are addressing. Only under high enhancements was striping noted, and this primarily in the visual bands. There were more issues with NCC Imagery, but as stated above this was expected and hence is not covered by this memorandum.

The definition of achieving betas includes that following considerations: initial calibration has been applied, it is minimally validated but may contain significant errors, users may gain familiarity with it, and it is not yet ready for formal publications or quantitative analysis. The imagery EDR has achieved all of these, and beyond in some cases. The SDR team has reached beta with regard to calibration. Qualitative evaluation has been accomplished. Users are already familiar with the format, only the lack of access in near real-time, likely to change in July, is preventing them from testing its use in operations. The Imagery has already been used in public presentations such as the AMS Annual meeting. In collaboration with the Imagery Cal/Val team, we believe the non-NCC imagery EDR has achieved beta status.

The move to provisional status depends on three factors: 1) the advancement of VIIRS SDRs to provisional, 2) feedback from operational users, and 3) more quantitative analyses from the Imagery team. In that regard, efforts on striping and comparisons to Imagery from other satellites is planned. Further multi-spectral analysis is also planned. The definition of provisional includes that the product may “not be optimal” but it is ready for “operational assessment”. We are very close to that point already, and expect to follow closely behind the VIIRS SDRs once they attain provisional status.

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