**VIIRS Aerosol Optical Thickness (AOT) and Aerosol Particle Size Parameter (APSP)
IP/EDR Release, Provisional Data Quality**

**May 2013**

**Read-me for Data Users**

The JPSS Algorithm Engineering Review Board (AERB) released the VIIRS Aerosol Optical Thickness and Aerosol Particle Size Parameter Intermediate Product (IP) and Environmental Data Record (EDR) to the public with a Provisional level maturity as of January 23, 2013. ***This assessment is based on both qualitative and quantitative analysis of the VIIRS aerosol EDR. The VIIRS AOT EDR has been compared with MODIS aerosol products and with AERONET products and observations. Comparisons include direct collocations using various match-up criteria, and assessments of monthly statistics without the benefit of direct collocation. APSP is at Provisional level with the caveat that using APSP over land is not recommended.***

Provisional quality is defined as:

* Product quality may not be optimal
	+ Product accuracy is determined for a broader (but still limited) set of conditions.
	+ No requirement to demonstrate compliance with specifications.
* Incremental product improvements still occurring
* General research community is encouraged to participate in the QA and validation of the product, but need to be aware that product validation and QA are ongoing
* Users are urged to consult the EDR product status document prior to use of the data in publications
* Ready for operational evaluation

The Board recommends that users be informed of the following product information and characteristics when evaluating the VIIRS Aerosol Optical Thickness (AOT) and Aerosol Particle Size Parameter (APSP) IP/EDR.

1. The VIIRS aerosol IP contains AOT at 550 nm and Angstrom Exponent. This is a pixel level (~750 m) retrieval that is stored in 768 X 3200 floating point array.
2. AOT is a unitless value. The APSP is reported as Angstrom Exponent.
3. The VIIRS Aerosol EDR contains the AOT for eleven wavelengths ranging from 0.412 to 2.250 microns as well as the Angstrom Exponent. These values are stored as 96 x 400 arrays of 16-bit integers with the corresponding scale and offset stored separately in the granule.
4. The VIIRS Aerosol EDR is derived from IPs for 8 x 8 moderate resolution (750 m) pixels. Note that pixel resolution can be slightly larger at the edge of scan.
5. There is a significant difference in quality between APSP over ocean and that over land. The APSP over land data has no quantitative value; however the overall VIIRS Aerosol EDR product is still declared Provisional because:
6. AOT and APSP are contained within the same product; the quality of APSP over land should not prevent users from obtaining AOT.
7. APSP is derived from spectral AOT, and users may calculate it even if the APSP product is not provided.
8. Users have dealt with this shortcoming for MODIS as the MODIS Aerosol Team has stated that Angstrom Exponent over land from MODIS has no quantitative value, even though it is available in the same product file with AOT.
9. The following are known issues with the VIIRS Aerosol IP/EDR:
10. There is a slight positive bias over land. Only **best quality** IP/EDR data must be used.
11. There is an artificially high AOT in the snow melt region.
12. The proportion of AOT attributed to small particles is unexpectedly too high over ocean.
13. There are missing data in the bowtie deletion region.
14. Internal tests to identify the presence of snow/ice, bright pixel, ephemeral water etc. need further evaluation to determine performance.
15. The Angstrom Exponent out of range flag occurs only at extreme high latitudes, which seems unlikely.
16. Snow and ice are present in unexpected areas.
17. The “Bad SDR Data” quality flag is too omnipresent.
18. In heavy dust/smoke plume regions, AOT could be flagged as out of range.
19. The next steps in the VIIRS Aerosol IP/EDR validation process, to move the product to Stage 1 validation maturity, include the following:
20. Monitor the effect of latest changes to the VCM, and adapt aerosol Processing Coefficient Table (PCT) and code to these changes, if necessary;
21. Implement NDVI-dependent surface reflectance band ratios;
22. Investigate options for reducing standard deviation in fit of surface reflectance band ratios (may lead to decrease in number of negative AOT retrievals over land);
23. Evaluate VIIRS APSP (and MODIS AE) with Marine Aerosol Network (MAN) APSP over open ocean;
24. Test and expand valid range of land and ocean AOT retrievals from 2 to 5 at the high end and from zero to small negatives at the low end;
25. Test the elimination of the internal snow/ice flag over oceans;
26. Evaluate choice of aerosol models, land and ocean, in terms of covering adequate solution space and consequences for retrieving.

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

<http://www.star.nesdis.noaa.gov/smcd/emb/aerosols/index.php>

<http://npp.gsfc.nasa.gov/science/documents.html>

Additionally, the VIIRS Sensor Data Record (SDR) Beta quality Read-me document is available at:

<http://www.class.ncdc.noaa.gov/notification/pdfs/120615_VIIRS_SDR_Release_v2.pdf>

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