



## *Read-me for Data Users*

**MEMORANDUM FOR:** The JPSS Program Record  
**SUBMITTED BY:** JPSS Volcanic Ash Team Lead, Mike Pavolonis  
**CONCURRED BY:** JPSS Algorithm Management Project Lead Lihang Zhou  
JPSS STAR Program Manager Ingrid Guch  
**APPROVED BY:** JPSS Program Scientist Satya Kalluri

**SUBJECT:** NOAA-21 Volcanic Ash Product Beta/Provisional maturity status and public release  
**DATE:** 08/24/2023

### **Beta/Provisional maturity status declaration for Volcanic Ash Products**

**Maturity Review Date:** 08/24/2023  
**Effective Date:** 08/24/2023  
**Operational System:** NDE, Version 3.2

The JPSS Algorithm Maturity Readiness Review Board approved the release of the NOAA-21 Volcanic Ash Products to the public with a Beta/Provisional maturity level quality as of 08/24/2023 (effective date), based on JPSS Validation Maturity Review held on 08/24/2023 (link to review artifacts).

1. Maturity stage definition (reference to the AMM webpage for maturity definition: <http://www.star.nesdis.noaa.gov/jpss/AlgorithmMaturity.php>)
2. Algorithm Description:  
The NOAA-21 Spacecraft with the Visible Infrared Imaging Radiometer Suite (VIIRS) was successfully launched on November 10, 2022. With 22 spectral bands covering wavelengths from 0.41 to 12.5  $\mu\text{m}$ , VIIRS provides operational information on the land surface, atmosphere, and ocean for weather, climate and other environmental applications. The VIIRS volcanic products, which are generated at the M-band spatial resolution, consist of ash cloud height, ash mass loading, and quality flags, including a flags indicating ash detection confidence. The required volcanic ash height product has units of km and the required volcanic ash mass loading product has units of tons/km<sup>2</sup> (numerically equivalent to g/m<sup>2</sup>). The ash height retrievals are for the highest ash cloud layer, although multiple layers may be present. The mass loading is a column-integrated quantity. The Volcanic Ash EDR output file format is NetCDF4.

The VIIRS volcanic ash products are generated as follows. Pixels that potentially contain volcanic ash are identified using a series of spectral and spatial tests. The detection algorithm utilizes the M14, M15, and M16 channels on VIIRS. In lieu of brightness temperature differences, effective absorption optical depth ratios are mainly used in the spectral tests. Effective absorption optical depth ratios allow for improved sensitivity to cloud microphysics, especially for optically thin clouds. An optimal estimation technique is then applied to all pixels that potentially contain ash in order to estimate the height and mass loading of ash clouds. This retrieval technique utilizes the M15 and M16 channels on VIIRS.



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3. Changes since last maturity stage

n/a

4. Review board recommendations

5. Path Forward/Future Plan

Evaluation of the product will continue. The primary focus of evaluation in the next few months will be to analyze new eruptions that are observed by NOAA-21.

6. Additional Items to note

Additional information is available in the JPSS Volcanic Ash Product algorithm theoretical basis document (ATBD) and validation maturity review briefing, which can be accessed at:

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

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