



Read-me for Data Users

MEMORANDUM FOR: The JPSS Program Record
SUBMITTED BY: JPSS VIIRS Daytime Cloud Properties (DCOMP) Team:
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SUBJECT: NOAA-20 VIIRS DCOMP EDR beta maturity status
DATE: 07/19/2018

Beta maturity status declaration for VIIRS DCOMP EDR

Maturity Review Date: 07/19/2018
Effective Date: TBD
Operational System: NDE 2.0

The Joint Polar Satellite System-1 (JPSS-1) was successfully launched on November 18, 2017 and renamed NOAA-20 after reached the polar orbit. With the same design as that of the Suomi NPP Visible Infrared Imaging Radiometer Suite (VIIRS), NOAA-20 VIIRS is a cross-track scanning radiometer with 22 channels at wavelengths ranging from 0.41 to 12.5 μm , enabling global measurements of clouds, ocean and land surface temperatures, detection of aerosols and fires, as well as low light from human settlements at night.

On January 3, 2018, the NOAA-20 VIIRS started providing earth scene measurements for the mid-wave infrared and thermal bands. By January 5, the data quality enabled the generation of the VIIRS active fire product for evaluation purposes. Based on evaluation presented to the NOAA JPSS program, the NOAA-20 VIIRS NDE DCOMP (Daytime Cloud Optical and Microphysical Properties) products are now considered to have Beta maturity.

1. Maturity stage definition

The Definition of Beta maturity stage is available at the JPSS Algorithm Maturity Matrix webpage: <https://www.star.nesdis.noaa.gov/jpss/AlgorithmMaturity.php>

2. Algorithm Description:

The DCOMP properties are Cloud Optical Depth (COD), Cloud effective Particle size (CPS), Liquid and Ice water path (LWP and IWP) under daytime conditions. We define daytime pixels as all observations with a solar zenith angle of 65 degrees or lower. COD and CPS are retrieved simultaneously from observations in one visible and one near-infrared channel. The main information content for COD lies in the conservative-scattering channel at about 0.6 micrometer. The absorption channel at 2.2 micrometer provides additional information on CPS and helps indirectly to estimate COD by adjusting the differences in the phase function due to particle size. Liquid and ice water path are calculated subsequently from COD and CPS.



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Detailed information on the content of the netCDF4 data file is available in the NDE VIIRS DCOMP EDR Algorithm Theoretical Basis document <https://www.star.nesdis.noaa.gov/jpss/clouds.php>

Product requirements/Exclusions (L1RDS)

VIIRS DCOMP product requirements are documented in the Joint Polar Satellite System (JPSS) Level 1 Requirements Supplement (L1RDS). The current version of the L1RDS is available at http://www.jpss.noaa.gov/technical_documents.html. The NDE VIIRS DCOMP product meets the full set of JPSS Level 1 requirements. VIIRS DCOMP product requirements are also documented in the JPSS ESPC Requirements Document (JERD) Volume 2: Science Requirements Version 2.0.

Product evaluation/validation

- Visual comparison to CLAVR-x development retrieval
- Comparison to MODIS/AQUA collection 6 science products
- Visual comparison of LWP with AMSR2/GCOM-W microwave based products

Product availability/reliability

- NOAA-20 ECM EDR data were produced on the NDE Integration and Testing (I&T) string since 03/26/2018. Data availability was not reliable as the NDE I&T string during the beta test period as a result of scheduled maintenance throughout. As such, data availability was not reliable from 2 April to 20 April.
- Roughly 25% of the NOAA-20 DCOMP files are missing for any given day due to known product distribution at NESDIS Environmental Satellite Processing and Distribution Services (ESPDS) Product Distribution and Access (PDA) system. This issue exists on both the operational and I&T strings of NDE. A resolution has been identified and will be fixed on the I&T string in mid to late 2018 and will be transitioned to the operational string late 2018, early 2019.

Algorithm performance dependence

The performance of the VIIRS DCOMP product largely depends on the performance of the VIIRS SDR product. It was stated that M5 on SNPP is 5% too bright. This may impact the performance of COT retrieval significantly, and may lead to an error of more than 50% for thick clouds.

DCOMP also relies on the input of other cloud retrievals (cloud mask, cloud phase and height).

Particular, cloud phase (ice or liquid) will have a big impact on DCOMP's performance. Cloud optical thickness can be wrong by 50%.

Known errors/issues/limitations

The algorithm over bright surfaces such as snow or sea ice show limited quality particular for thin clouds. We will implement an update which use M10 as the main channel for COT retrieval.



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3. Changes since last maturity stage

N/A - This is the Beta maturity declaration of the NOAA-20 NDE VIIRS Enterprise DCOMP product.

4. Review board recommendations

N/A

5. Path Forward/Future Plan

- The DCOMP team will implement the snow and sea ice adjustment of the retrieval
- The use of visible reflectance retrieved from backscattered moonlight in DNB channel will when once included in NDE give the chance to extend DCOMP to nighttime scenes.

6. Additional Items to note

None.

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

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

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