



MEMORANDUM FOR: The JPSS Program Record
SUBMITTED BY: JPSS SFR Product Team Lead Huan Meng
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SUBJECT: Suomi NPP SFR Product Provisional Maturity Status
DATE: 09/21/2018

Provisional maturity status declaration for SFR Retrieval Product

Maturity Review Date: 06/20/2018
Effective Date: 06/20/2018

The Suomi NPP satellite was launched on October 28, 2011. Suomi NPP ATMS is a cross-track scanning radiometer with 22 channels at frequencies ranging from 23 to 183 GHz. The high frequencies are suitable for retrieval of snowfall rate (SFR).

The Snowfall Rate (SFR) science team has developed a Suomi NPP ATMS SFR algorithm and has been generating the product at near real-time since 2014. Extensive calibration and validation studies have been conducted to demonstrate the performance of the product. Based on the evaluation presented, the science team recommends the Suomi NPP SFR product to be considered to have Provisional maturity level quality as of 06/20/2018 (effective date).

1. Maturity stage definition:

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

2. Algorithm Description:

The Suomi NPP ATMS SFR product is water equivalent snowfall rate derived from ATMS measurements at a set of window and water vapor/temperature sounding channels. The algorithm is composed of two independent components: a statistical Snowfall Detection (SD) algorithm and a physically-based SFR algorithm. The SD algorithm optimally combines two statistical models trained using in-situ snowfall observations. The two models utilize satellite measurements and numerical weather prediction (NWP) model data, respectively. The SFR algorithm is based on a 1D variational (1D-Var) model that retrieves cloud properties from ATMS measurements. SFR is derived from the cloud properties and calculated ice particle terminal velocity. The SFR product is a two-dimensional array with the same field-of-view size as the ATMS water vapor sounding channels, i.e. 16-km at nadir.

The SFR product is included in the Microwave Integrated Retrieval System (MiRS) data file. The MiRS Collection Short Name (CSN) is: NDE_L2_MIRS. The output file is generated in netCDF4

format.

Product requirements/Exclusions (L1RDS):

The ATMS SFR 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 Suomi NPP ATMS SFR product meets all the threshold criteria of JPSS Level 1 requirements.

Applicable Conditions:

- Over global land
- Limb-corrected 53.6 GHz brightness temperature is 240 K or above

Product evaluation/validation:

The Suomi NPP ATMS SFR validation study includes two separate sets of activities: one for SD and the other for SFR. The SD algorithm is validated against both ground observations (Quality Controlled Local Climatology Data from NCEI) and radar precipitation analyses (Multi-Radar Multi-Sensor from NSSL). The SFR algorithm is validated using both the NCEP Stage IV radar and gauge precipitation analyses and the MRMS instantaneous radar precipitation analyses. The validation results show good agreement between the Suomi NPP ATMS SFR and the validation ‘truth’ with the performance statistics meeting the L1RDS requirements.

Product availability/reliability:

The Suomi NPP ATMS SFR is currently at the Integration and Testing stage prior to full production. The product is scheduled for operational production in NDE starting October 2018. Once the operational phase begins, the product will be available at NOAA CLASS as part of the MiRS Precipitation and Surface Products files:
<https://www.avl.class.noaa.gov/saa/products/welcome>

Algorithm performance dependence:

The performance of the Suomi NPP ATMS SFR product largely depends on the quality of the Suomi NPP ATMS TDR data. The TDR data have reached validated maturity.

Additional information is available in the ATMS SFR algorithm theoretical basis document (ATBD) and provisional maturity review briefing.

3. **Changes since last maturity stage:**

N/A

4. **Review board recommendations:**

TBD



5. Path Forward/Future Plan:

Perform algorithm enhancement, calibration and validation. Reach validated maturity status.

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