



MEMORANDUM FOR: The JPSS Program Record
SUBMITTED BY: JPSS OMPS Team, Trevor Beck, Chunhui Pan, and others.
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SUBJECT: NOAA-20 OMPS SDR beta maturity status and public release
DATE: 01/22/2018

Beta maturity status declaration for OMPS SDR

Maturity Review Date: 01/26/2018
Effective Date: 01/5/2018
Operational System: IDPS with OMPS LUT from ADR 8362-8363

1. Background:

The Joint Polar Satellite System-1 (JPSS-1) was successfully launch on November 18, 2017 and renamed NOAA-20 after reaching polar orbit. Forty-eight days after launch, on January 5, 2018, the NOAA-20 Ozone Mapper Profiler Suite (OMPS) started collecting science data. With the same design as that of the Suomi NPP OMPS Nadir Suite, NOAA-20 OMPS consists of two spectrometers each with different spectral and spatial coverage. The nadir mapper has spectral coverage from 300nm to 380nm with 196 channels and 1.1nm bandpass. The nadir profiler has spectral coverage from 250nm to 310nm with 150 channels and 1.1 nm bandpass. The OMPS nadir suite provides global measurements of total ozone, ozone profile, sulfur dioxide, and an aerosol index.

The OMPS SDR team consists of experts from NOAA, University of Maryland/CICS, NASA, ERT Inc, The Aerospace Corp., and industry partner Raytheon. The team has been working intensively on post-launch instrument performance optimization and OMPS SDR pre- and post-launch calibration and validation.

2. Beta maturity stage definition:

- 1) Product is minimally validated, and may still contain significant identified and unidentified errors.
- 2) Information/data from validation efforts can be used to make initial qualitative or very limited quantitative assessments regarding product fitness-for-purpose.
- 3) Documentation of product performance and identified product performance anomalies, including recommended remediation strategies, exist.

3. Justifications for declaring OMPS SDR data products beta maturity:

After NOAA-20 OMPS activation, OMPS SDR team members immediately started analysis of OMPS science RDR, telemetry RDR, SDR and GEO data products. Based on three weeks of intensive evaluation and monitoring of OMPS data after the door opened on January 5, 2018, the following assessments of the OMPS SDR products were performed:

- 1) OMPS SDR products for the major categories (Nadir Mapper SDR, GEO and Nadir Profiler SDR, GEO) were checked;
- 2) The OMPS solar measurements were compared to prelaunch model spectra;
- 3) Dark current and LED calibration parameters were evaluated and compared to prelaunch measurements;
- 4) The on-orbit wavelength scale was estimated and compared to prelaunch measurements;
- 5) On-orbit SDR radiometric bias was estimated based on preliminary comparisons with Suomi NPP.
- 6) Errors and artifacts in the data products were documented. Solutions have been proposed and evaluated, but not necessarily implemented.
- 7) All data products can be used for making initial qualitative or limited quantitative assessments.
- 8) The NOAA STAR EDR team has successfully used the SDR data in total ozone and ozone profile retrievals and are generally positive about the measurement quality.

The detailed justifications for declaring OMPS SDR beta maturity is provided in the attached presentation.

4. NOAA-20 OMPS SDR beta maturity caveats

The following caveats are provided to the beta product users:

- 1) The nadir mapper SDRs that use high resolution and medium resolution measurement modes as inputs have problems with spatial alignment relative to the Nadir Profiler SDR and errors in along-track aggregation due to short granules.
- 2) The high resolution mode data do not have complete spectral coverage at the short and long ends of the standard spectral interval.
- 3) A striping problem has been identified. The measurement pixels at the western-most and eastern-most spatial pixels have measurement counts and radiances that are too low.
- 4) Analysis of pre-launch data indicated evidence of unexpected degradation in the OMPS-NP shortest spectral measurements. A waiver was written for OMPS-NP SDR on this issue. So far, there is no clear evidence of accelerated degradation based on solar measurements.
- 5) The wavelength scale and solar flux currently provided in the SDRs are not consistent with on-orbit analysis. The SDR team will be providing new wavelength scale and day 1 solar tables for both instruments in the coming weeks as part of the path forward to provisional maturity.
- 6) The nadir profiler and mapper geolocation are using incorrect Field Angles. New Field Angle Map tables were delivered (CCR 3760 and 3761).

5. Path Forward

The team will work diligently to continue with the following planned cal/val tasks to promote the OMPS SDR data products to provisional maturity by launch+90 days:

- 1) Evaluate Geolocation performance
- 2) Check normalized radiance with radiative transfer modelling
- 3) Continue to monitor OMPS instrument stability and performance, as well as SDR data quality
- 4) Analyze the high resolution data for evidence of diminished measurement counts due to FOD (Foreign Object Debris), so far, there appears to be no evidence of impact the FOD on Earth-view or solar measurements. The FOD is clearly seen in the LED measurements.
- 5) Check for degradation in the OMPS-NP shortest spectral region.
- 6) Problems were identified in the low-resolution measurement sample table. The current recommendation is to use the medium resolution sample table in flight and the low resolution in IDPS without along-track aggregation. Several calibration tables will be delivered to IDPS.

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

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

Pre-operational NOAA-20 OMPS near real time status and performance monitoring password protected web page is available using the following URL at:

https://www.star.nesdis.noaa.gov/icvs-beta/status_J01_OMPS_NP.php

https://www.star.nesdis.noaa.gov/icvs-beta/status_J01_OMPS_NM.php

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