



Read-me for Data Users

MEMORANDUM FOR: The JPSS Program Record
SUBMITTED BY: JPSS NUCAPS Team Lead, Antonia Gambacorta
SUBJECT: S-NPP/NOAA-20 NUCAPS Phase IV Upgrade
DATE: 04/19/2018
Operational System: NUCAPS Phase IV

NUCAPS Phase IV Algorithm Readiness Review (ARR) completed on July 6, 2017. The NUCAPS Phase IV upgrade adds ATMS block 2 and CrIS Full Spectral resolution input to the retrievals and updates the look up table coefficients. NUCAPS Phase IV was declared ready for operations on April 18, 2018 and is expected to be transitioned to operations (i.e., disseminated to the users) on April 30, 2018.

Major highlights

- Phase III vs Phase IV comparisons: Comparable results are observed for Temperature and Water Vapor global statistics in both the MW-only and MW+IR product. Users should not expect to see major differences here. See Figure 1.
- Issue with recurrent false alarm of precipitation cases removed in NUCAPS Phase IV.
- View angle dependent retrieval artifacts disappear in the MW+IR FSR NUCAPS Phase IV product, thanks to improved RTA related LUTs.
- NUCAPS Phase IV CO, CH4 and CO2 are now comparable with equivalent heritage products (NUCAPS AIRS and NUCAPS IASI). They meet specification almost entirely.

Summary on IR+MW Results v2.0.5.4 vs JPSS L1RD Requirements							
Temperature				Water Vapor			
Pressure Range (hPa)	JPSS L1RD Requirement (K)	v1.5 (K)	v2.0.5.4*(K)	Pressure Range (hPa)	JPSS L1RD Requirement (%)	v1.5 (%)	v2.0.5.4* (%)
1-30	1.5	1.6	1.5	100-300	35	28.0	22.7
30-300	1.5	1.3	1.3	300-600	35	26.9	24.9
300-Psfc	1.6	1.3	1.3	600-Psfc	20	21.3	22.7

Figure 1: Global RMS comparison between NUCAPS Phase III (v1.5) and Phase IV (v2.0.5.4)

Known errors/issues/limitations

MW+IR acceptance yield has increased to 83%. This value appears too high compared to the usual ~75%, which is the typical global acceptance yield of retrievals from infrared sounders. Further optimization is underway to optimize the stability and performance of the NUCAPS system.

Path Forward/Future Plan

Work is in progress to improve performance of thermodynamic variables (temperature and water vapor) in the boundary layer. This will focus on optimization of the current operational channel selection, land surface emissivity, and rejection thresholds, among others.

Additional information is available in the NUCAPS Phase IV 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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