JPSS-1 OMPS calibration and test status

NASA OMPS J1 team
(as of now)

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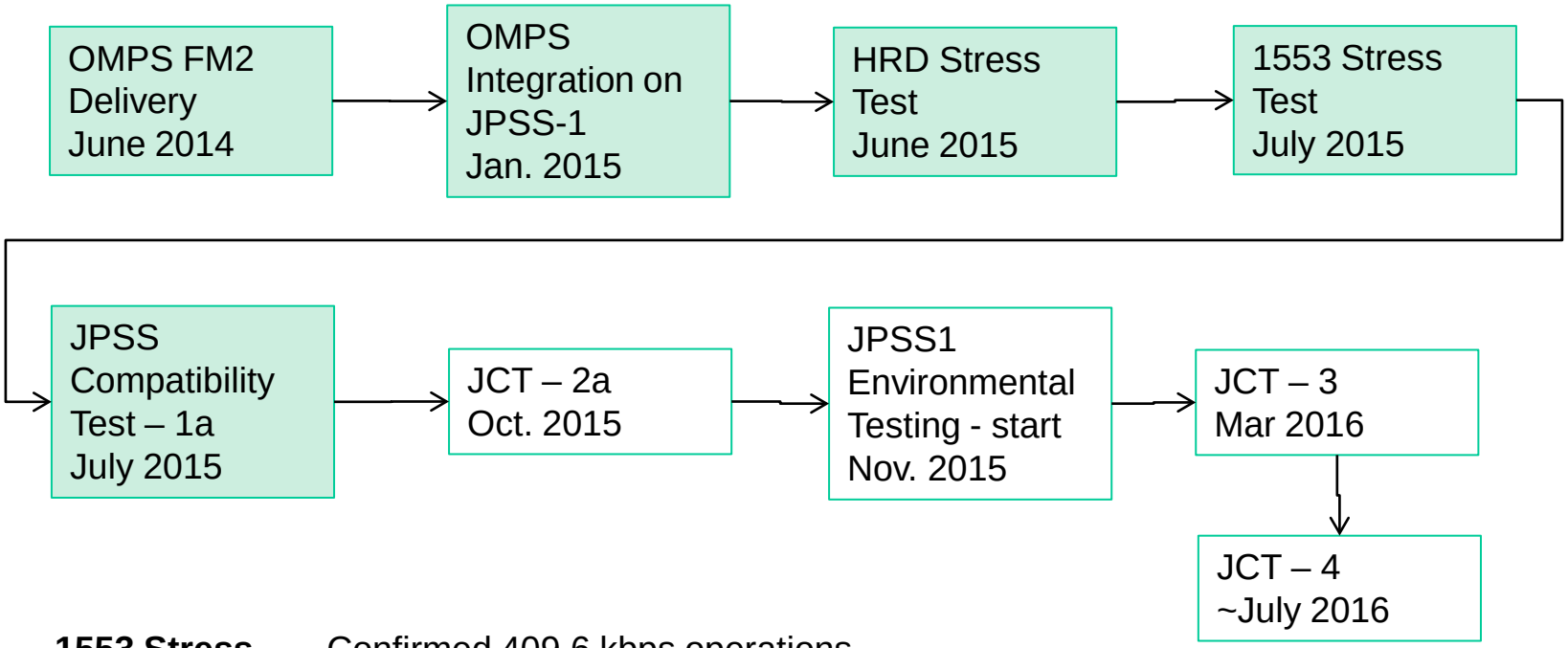
OMPS Integration
Dec. 22, 2014

Courtesy of BATC

OMPS integration is complete



1553 Stress Test	Confirmed 409.6 kbps operations
JCT1a	Verified nominal on-orbit commanding
JCT2a	Will verify nominal EV operations and data collection
JCT3	Will verify Cal. and Diag. operations
JCT4	???

a portions: Flight
b portions: Ground

Not clear when b occurs

Performance summary

Reqt ID	Requirement	Value	Performance	Margin
O_PRD-11307	Albedo Calibration (λ-independent)	≤ 2% rms	NM: 1.39%	0.61% (31%)
			NP: 1.59%	0.41% (21%)
O_PRD-11308	Relative accuracy (λ-dependent)	≤ 0.5% rms	NM: 0.44%	0.06% (12%)
			NP: 0.41%	0.09% (18%)
O_PRD-11309	Prediction of absolute calibration change in 7 year period	<3%	≤ 2.3%/7 years (0.69% per measurement)	≥ 0.7% (23%)
O_PRD-11373	Short-term Radiometric Stability	≤ 1%	NM: 0.03%	0.97% (97%)
			NP: 0.03%	0.97% (97%)
O_PRD-11429	Response Uniformity	≤ 1%	< 0.7%	≥ 0.3% (≥ 30%)
O_PRD-11349	Signal-to-Noise Ratio (NM)	≥ 1000	≥ 1519	≥ 519 (≥ 51.9%)
O_PRD-11350	Signal-to-Noise Ratio (NP)	≥ 35 (252 nm)	48	13 (37.1%)
		≥ 100 (273 nm)	229	129 (129%)
		≥ 200 (283 nm)	403	203 (102%)
		≥ 260 (288 nm)	486	226 (86.9%)
		≥ 400 (292-306 nm)	≥ 722	≥ 322 (≥ 80.5%)
O_PRD-11437	NM: Stray Light Rejection	≤ 2%	≤ 1.56%	≥ 0.44% (≥ 22%)
O_PRD-11438	NP: Stray Light Rejection	≤ 2%	≤ 1.83%	≥ 0.17% (≥ 8.5%)

Selected parameters

Courtesy of BATC

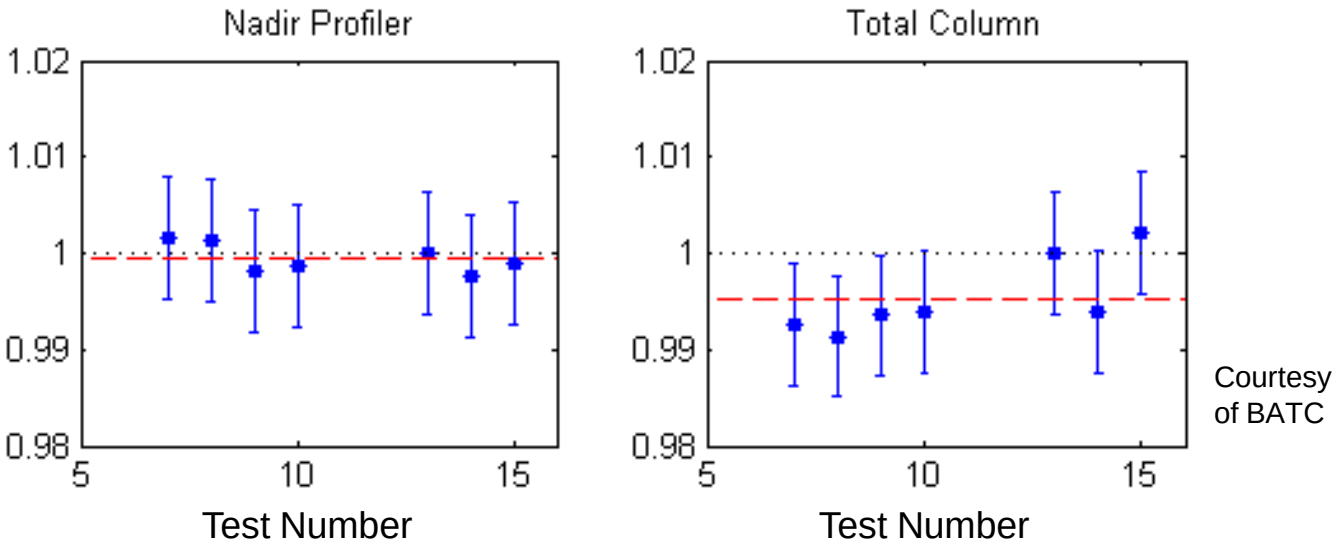
Trending Results

No significant trends observed in:

- Irradiance sensitivity (see plots)
- Readout noise
- Dark current
- Gain
- Detector full-well
- LED output

Last report was just after integration

OOTT Results



Courtesy of BATC

OMPS goals for JCT2

- Conduct nominal EV measurements
  - Construct and execute CSMs for orbital operations (a)
  - Collect and store 2400 NM Hi-res, 400 NP Med-res images per orbit (a)
  - Collect and store open-door dark currents (a)
  - Confirm that IDPS creates Hi-res, Med-res RDRs (b)
  - Confirm that SDR aggregates NM to Med-res and creates product (b)
  - Confirm creation of NP SDR (b)

- Exercise table loads
  - MOST to halt CSMs and load updates
  - SOC generation of paired sample tables and gain tables (a,b)
  - GND-PI sample table switch-over to NM Low-res output (b)
  - Load and execute NM Med-res flight tables (a)
  - Load and execute NM Low-res flight tables (a)
  - Confirm SDR output is unchanged with flight table load (b)

a portions: Flight
b portions: Ground

Not clear when b occurs

OMPS goals for JCT3

- Conduct nominal Cal measurements
  - Construct and execute CSMs for operations of all cal. orbits (a)
  - Collect and store 2400 NM Hi-res, 400 NP Med-res images per orbit (a)
  - Collect and store open, closed-door darks, 1-orb and 3-orb solar cals, LEDs (a)
  - Confirm that IDPS creates nominal and diag. Cal. RDRs (b)
  - Confirm Cal. data processing in GRAVITE (b)

- Execute extended-orbit EV
  - Load and execute new CBMs to support longer EV orbital operations (a)
  - Confirm SDR processes additional granules (b)

- Execute diagnostic activities
  - Full-frame
  - PRNU ice radiance
  - Full orbit (EV360)

Proxy data processing status

- OMPS 43 and MDR 40 data
  - Based on BBMEB and NPP OMPS data from Feb. and April, 2014
  - NM Hi-res and Low-res; NP Med-res and Low-res images
  - BBMEB data are entirely J1 OMPS, but have no signals
  - NASA DPES synthesized RDRs by combining BBMEB and NPP flight data and fusing J1 OMPS headers to NPP flight images

- OMPS SIPS processed BBMEB data
  - Successfully processed into 43 Level 1A orbits
  - 12 images failed to decompress; corrupted at BATC
  - Re-transferred data processed correctly

- OMPS SIPS still working on RDR processing
  - Creating production rules for automated processing
  - RDRs still contain corrupt images

J1 OMPS SCDBs

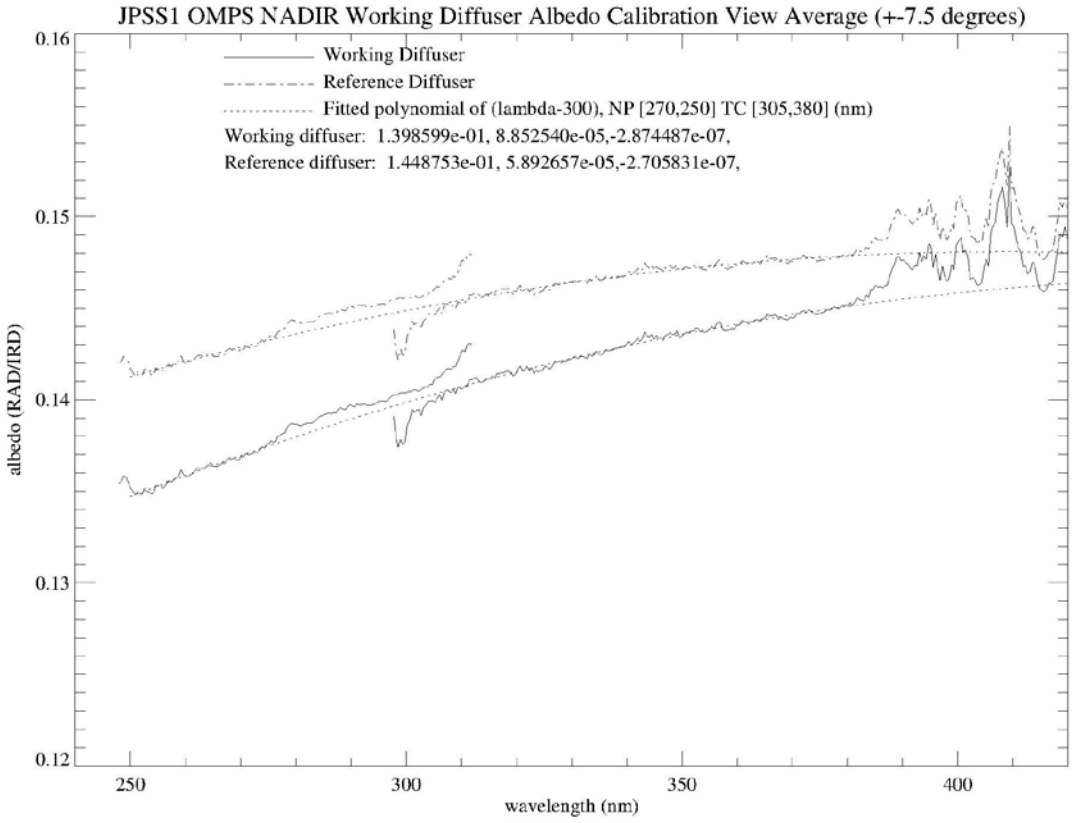
Macropixel information removed from all DBs

Short Name	Final delivery date	Changes from NPP OMPS
CBC	2/5/2014	Extended to all pixels
SRG	5/5/2014	Extended to all pixels
BPS	5/5/2014	NASA will remove 295 nm and refit; add dichroic corr.
STB	5/16/2014	NASA replacing all EV tables; Cal. tables unchanged
RAD	9/23/2014	NASA smoothing albedo cal. in dichroic region
SLT stitched	12/18/2013	DB unchanged; 417 nm added
SLT recon.	12/18/2013	DB unchanged; 417 nm added
SLT tuned	12/18/2013	DB unchanged; 417 nm added
IRD	4/30/2014	DB unchanged
GON	4/23/2014	Fine structure added; angle grid changed to 1° from 0.5°
LED	5/16/2014	DB unchanged
DCT	-	discontinued
ZIO	-	discontinued

All SCDBs and associated documentation available from the Data Management team (DMO) under the NASA JPSS Flight Project
gsfc-jpss-dmo@mail.nasa.gov

RAD database update

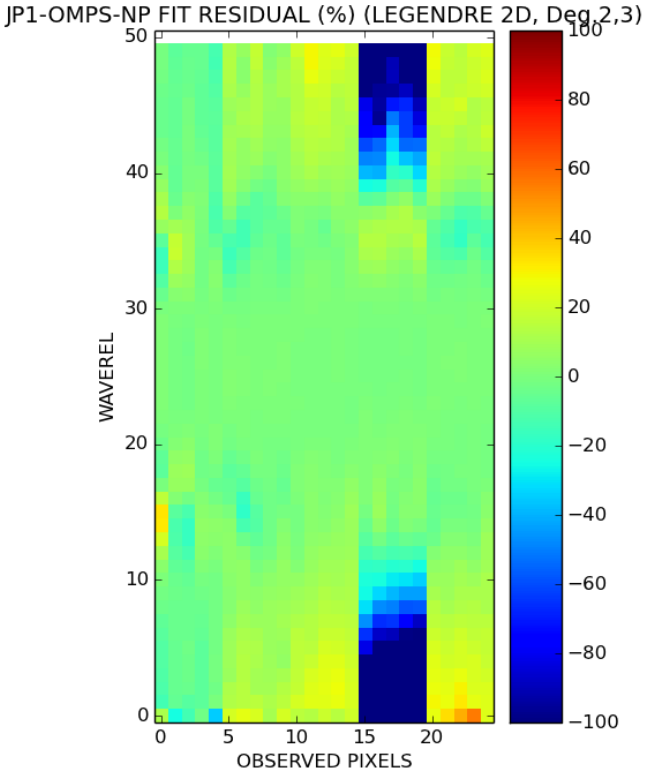
- Albedo Cal. (RAD/IRD) doesn't look like diffuser BRDF
- Anomaly may be related to H2O contamination problem during pre-launch cal.
- Similar "straightening" on NPP OMPS shows improved MLS comparisons
- Approach:
  - Divide out PRNU from RAD
  - Low-order poly fit to center 15° albedo cal.
  - Derive albedo correction and apply to full NM swath in RAD coefficients
  - Reintroduce PRNU



NPP OMPS correction required some post-launch iterations; J1 OMPS may as well

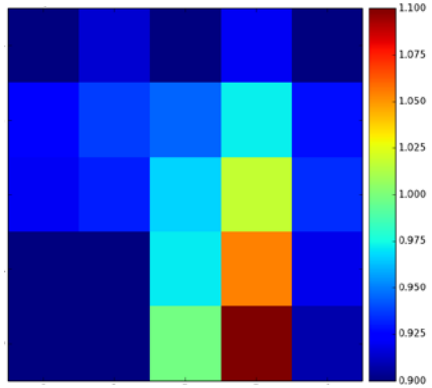
BPS database update

BATC uses Legendre polynomials to extend the 5x5 (spectral x spatial) observed bandpass functions to all pixels



Fit residuals indicate an anomaly in 295 nm observations

Observed FWHM (nm)



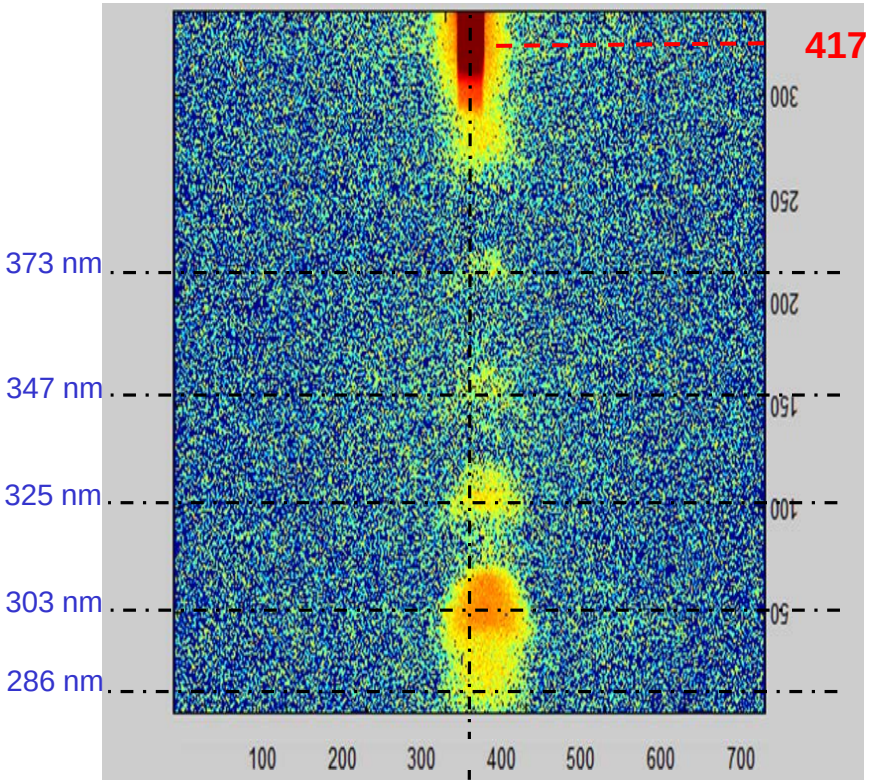
Root cause appears to be an unusually wide 295 nm bandpass (no such anomaly in NPP OMPS)

The BATC approach of stitching multiple measurements together removes the effect of spectral gradients (e.g. dichroic cutoff) on the BPS functions.

NASA is reintroducing the spectral response into the NM and NP BPS after the new NP surface fit.

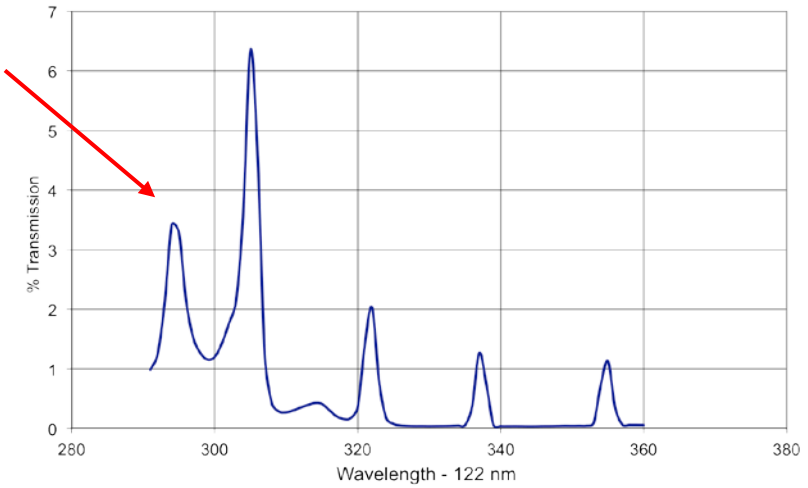
OOR ghost correction simpler with 417 nm

Broadband VIS source
(410 nm cutoff filter)



Courtesy of BATC

Witness Filter spectrum shifted 122 nm



Measurements at 417 nm provide a more direct measure of longer line signals

NPP OMPS estimates based on 370, 380 nm

Extra slides

Limited Life Items and Consumables

Program Phase	Motor Steps
Nadir ATP	1,145,000
ISS I&T + Nadir Re-calibration	1,074,000
Observatory I&T (estimate)	317,000
Total Ground Usage (actual + estimate)	2,536,000
Margin vs. Ground Allocation Budget	601,000 (19%)

Courtesy of BATC

IM2/OOTT Overview

Run	Date	ΔT	Description
1	2 August 2012	–	Pre “cleaning” test
2	6 March 2013	7 months	Post cleaning test
3	28 March 2013	3 weeks	EGSE measurement for calibration transfer
4	11 April 2013	2 weeks	Redundant MEB measurement for calibration transfer
5	15 April 2013	4 days	Primary MEB measurement for calibration transfer
6	24 April 2013	1 week	-20°C CCD temperature, OOTT #1
7	1 July 2013	10 weeks	OOTT #2 with LCC serial number 001
8	2 July 2013	–	OOTT #3 with LCC serial number 002
9	1 October 2013	3 months	Post TVAC test, OOTT #4
10	25 November 2013	8 weeks	Post EMI test, OOTT #5
11	17 December 2013	3 weeks	Abbreviated IM2, pre-G&I testing
12	18 February, 2014	4 weeks	Full IM2, post-G&I testing
13	8 April, 2014	7 weeks	Post Nadir level testing, OOTT #6
14	26 September, 2014	24 weeks	Post storage test, OOTT #7
15	31 January, 2015	18 weeks	Post installation onto spacecraft, OOTT #8

Courtesy of BATC