J1 VIIRS LUT Readiness

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Overview

- Tasked by NOAA STAR to create an at-launch quality set of Look Up Tables (LUTs) for JPSS-1 (J1) VIIRS
  - *Total of 47 LUTs, some with multiple versions*
  - *Initial versions of all LUTs were delivered on July 24, 2015*
    - 21 LUTs are at-launch quality
    - 14 LUTs might be at-launch quality
    - 12 LUTs are not at-launch quality
- Effort was led by Frank De Luccia
- Contributing teams:
  - *NOAA STAR*
  - *VCST*
  - *The Aerospace Corporation*
  - *University of Wisconsin*
- LUTs and peer review presentations are available on eRooms

LUT Details (1 of 8)

LUT Name	At Launch Quality?	Comments
VIIRS_SDR_CAL_AUTOMATE_LUT	Yes	Auto and manual, Side A and B
VIIRS_SDR_RVF_LUT	No	Working on TEB & RSB comparisons
VIIRS_SDR_RELATIVE_SPECTRAL_ RESPONSE	No	Incorporating T-Sircus test
VIIRS_SDR_QA_LUT	Maybe	Lunar and SAA values taken from SNPP LUT
VIIRS_SDR_DELTA_C_LUT	No	Under review and comparison
VIIRS_SDR_F_PREDICTED	Yes	F set to 1, F_trend set to 0

LUT Details (2 of 8)

LUT Name	At Launch Quality?	Comments
VIIRS_SDR_DG_ANOMALY_DN_LIMITS_LUT	No	
VIIRS_SDR_OBSERVATIONS_TO_PIXELS_LUT	Yes	Same as NPP
VIIRS_SDR_REFLECTIVE_LUT	Maybe	
VIIRS_SDR_SOLAR_IRAD_LUT	Yes	Thullier spectrum, high resolution
VIIRS_SDR_TELE_COEFF_LUT	Yes	Electronic A & B sides separate
VIIRS_SDR_RADIOMETRIC_PARAM_V3_LUT	Yes	
VIIRS_SDR_DNB_FRAME_TO_ZONE_LUT	Yes	Two versions: Op21 and Op21/26

LUT Details (3 of 8)

LUT Name	At Launch Quality?	Comments
VIIRS_SDR_DNB_RVF_LUT	No	Edge detector issue
VIIRS_SDR_DNB_DN0_LUT	Maybe	In work
VIIRS_SDR_DNB_GAIN_RATIOS_LUT	Maybe	In work
VIIRS_SDR_DNB_LGS_GAINS_LUT	Maybe	In work
VIIRS_SDR_DNB_STRAY_LIGHT_ CORRECTION_LUT	Yes	All zeros
VIIRS_SDR_EBBT_LUT	Yes	
VIIRS_SDR_EMISSIVE_LUT	Yes	

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LUT Details (4 of 8)

LUT Name	At Launch Quality?	Comments
VIIRS_SDR_BB_TEMP_COEFFS_LUT	Yes	Unused values set to zero
VIIRS_SDR_HAM_ER_LUT	Maybe	Spectral averaging?
VIIRS_SDR_OBC_ER_LUT	Maybe	Spectral averaging?
VIIRS_SDR_OBC_RR_LUT	Maybe	Spectral averaging?
VIIRS_SDR_RTA_ER_LUT	Maybe	Spectral averaging?

LUT Details (5 of 8)

LUT Name	At Launch Quality?	Comments
VIIRS_RSBAUTOCAL_BRDF_SCREEN_TRANSMISSION_PRODUCT_RTA_VIEW_LUT	No	Data being collected
VIIRS_RSBAUTOCAL_BRDF_SCREEN_TRANSMISSION_PRODUCT_SDSM_VIEW_LUT	Yes	
VIIRS_RSBAUTOCAL_DNB_DARK_SIGNAL_AUTOMATE_LUT	Maybe	
VIIRS_RSBAUTOCAL_DNB_GAIN_RATIOS_AUTOMATE_LUT	Maybe	Same as SNPP
VIIRS_RSBAUTOCAL_DNB_LGS_GAIN_AUTOMATE_LUT	Maybe	Same as SNPP
VIIRS_RSBAUTOCAL_DNB_MOON_ILLUMINATION_LUT	Yes	

LUT Details (6 of 8)

LUT Name	At Launch Quality?	Comments
VIIRS_RSBAUTOCAL_H_AUTOMATE_LUT	Yes	SNPP with refinements
VIIRS_RSBAUTOCAL_H_LUT	No	SNPP with refinements
VIIRS_RSBAUTOCAL_ROT_MATRIX_LUT	Yes	
VIIRS_RSBAUTOCAL_RSB_F_AUTOMATE_LUT	Yes	Same as SNPP
VIIRS_RSBAUTOCAL_RVF_LUT	Maybe	Data being collected
VIIRS_RSBAUTOCAL_SDSM_SOLAR_ SCREEN_TRANS_LUT	No	Data being collected

LUT Details (7 of 8)

LUT Name	At Launch Quality?	Comments
VIIRS_RSBAUTOCAL_SDSM_TIME_LUT	No	SNPP is incorrect and will be revised. J1 version TBD.
VIIRS_RSBAUTOCAL_VOLT_LUT	Maybe	Same as SNPP, values cancel out in code
VIIRS_RSBAUTOCAL_HISTORY_AUX	Yes	
VIIRS-SDR-GAIN-LUT	Yes	All zeros
VIIRS-SDR-COEFF-A-LUT	Yes	SNPP values changed to unity
VIIRS-SDR-COEFF-B-LUT	Yes	SNPP values changed to unity

LUT Details (8 of 8)

LUT Name	At Launch Quality?	Comments
VIIRS_SDR_GEO_DNB_PARAM_LUT	No	Further basis for "earth view delay" value needed. "T_inst2SC" requires update based on SC test data. Versions for other DNB timing options needed prior to launch.
VIIRS_SDR_GEO_IMG_PARAM_LUT	No	In work
VIIRS_SDR_GEO_MOD_PARAM_LUT	No	In work
CMNGEO-PARAM-LUT	Yes	

Lessons Learned

- Define requirements early on
  - *Delivery of big endian vs. little endian vs. both*
  - *Naming convention*
- Use of a repository
  - *Manual tracking of 47 LUTs with multiple versions is labor intensive*
- Define testing protocol
  - *What are the best ways to test new LUTs?*
  - *How to test multiple versions of the same LUT?*
    - Op 21 vs. Op 21/26
    - Side A vs. Side B
    - Automated (RSBAutoCal) vs. predicted (manual F LUT deliveries)

Path Forward

- Bring all LUTs to at-launch quality
  - *Identify LUTs and justifications if not possible*
- Convert LUTs to little endian for ADL 5.x
  - *Who is responsible?*
  - *Are LUT deliveries going to be little endian in the future?*
- Test LUTs with both ADL 4.2 and ADL 5.x
  - *Test both DNB Op21 and Op21/26 options*
  - *Test automated and manual RSBAutoCal modes*
- Get a set of LUTs on the Delegated Authority List (previously known as fast track)

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