2015 STAR JPSS Annual Science Team Meeting

JPSS-1/OMPS Operations Plan

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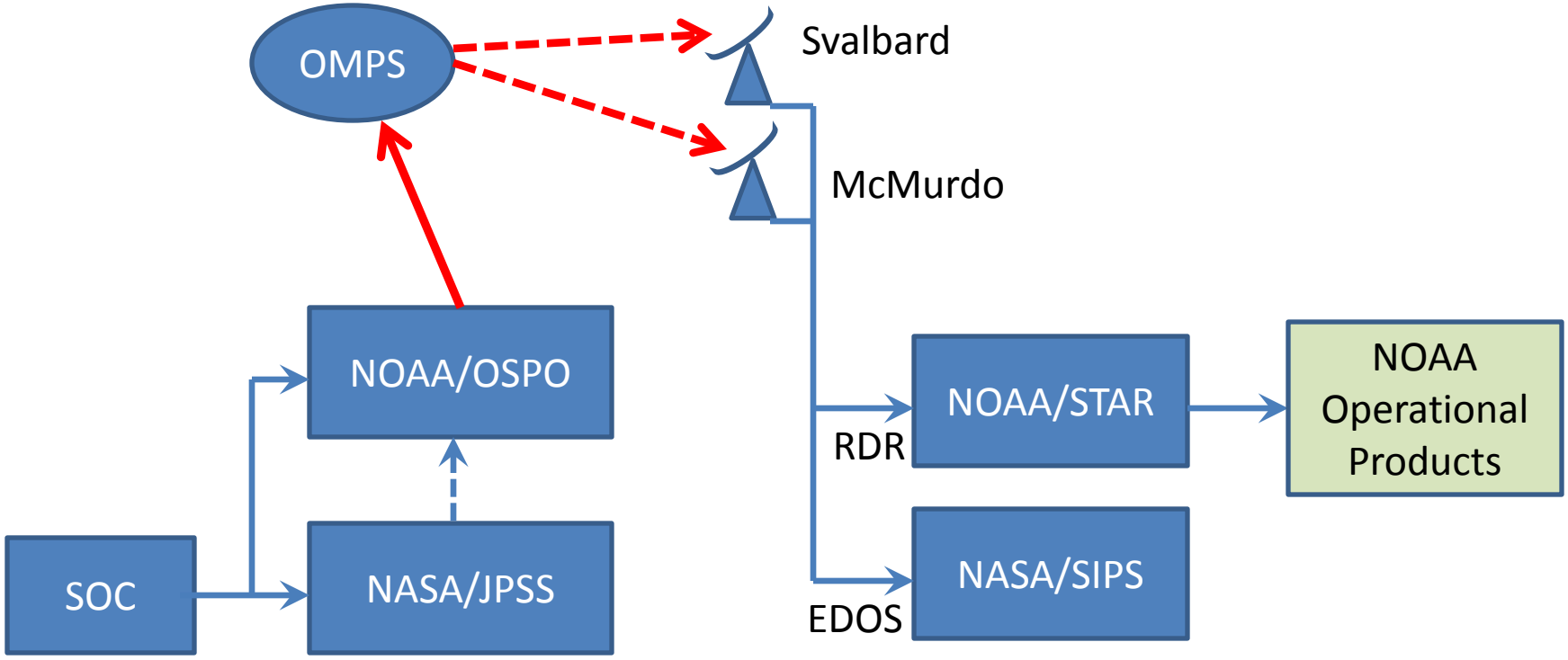
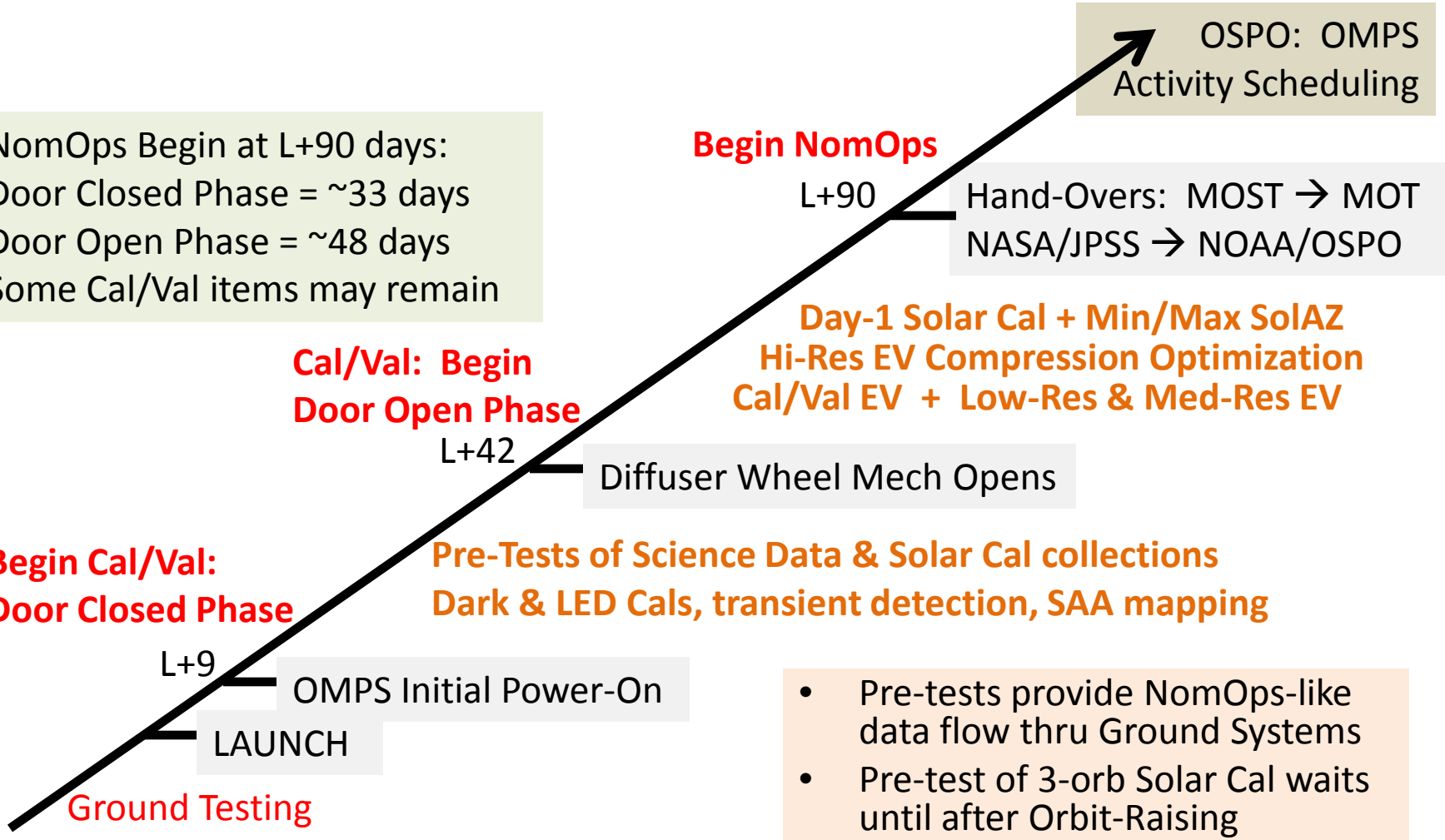
From OMPS Instrument Commands to NOAA Operational Products



- Support from NASA/JPSS to NOAA/OSPO concludes at the L+90 days Operational Hand-over

LEO&A/Commissioning Schedule



- Pre-tests provide NomOps-like data flow thru Ground Systems
- Pre-test of 3-orb Solar Cal waits until after Orbit-Raising Campaign concludes

Post-Launch Tests (PLT) for Hand-Over: Subset of Cal/Val Activities

	Activity	Objective
Door Closed Phase ↓ 34 days	Instrument Activation	Demonstrate basic instrument functionality
	Trending	Instrument health and safety; pixel statistics of Dark & LED Cals, including LED lamp warm-up behavior
	Calibration	Instrument characterization: Dark & LED Cals, pixel statistics, transient detection, SAA, LED linearity, biases
	CBM pre-tests	*Preparations for Door Open Phase*
Door Open Phase ↓ 42 days	Trending	Add monitoring of wavelength registration
	EV Data Rate Optimization	Monitor compression rates, evaluate trial NM EV ST
	Noise Characterization	SNR estimates
	Dynamic Range	Check for possible saturation in EV and Solar
	Calibration	Add wavelength registration, Day-1 Solar, PRNU
	Geolocation/Pointing Accuracy	Evaluate location of pixels' observations
OAR at L+85	*Complete data collections*	*Processing & analyses completed for OAR*

PLT responsibilities belong to BATC, NASA & NOAA

J01/OMPS NomOps Activity Highlights: Similar to SNPP/OMPS

Science Data : Default for All Orbits		
Orbits	Dayside	Dark Cals
1 -14/15	EV_HI_RES	Door Open

Future mod:
Extend all EV Xtrack-FOVs past SolZA=88°

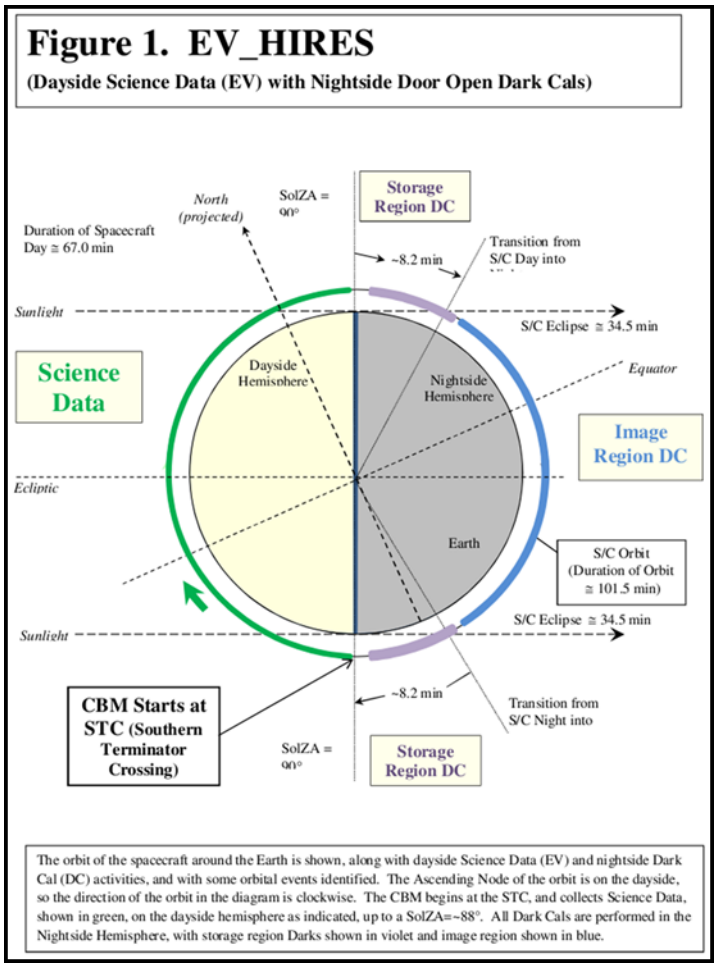
Preliminary Calibration Schedule				Solar Ref Cals
Week 1	**Week 2**	**Week 3**	**Week 4**	**Semi-Annual**
Solar-Work (QVD vs Al Diff?)		Solar-Work		Solar-Ref & Solar-Work
Door Closed Dark	Door Closed Dark	Door Closed Dark	Door Closed Dark	Door Closed Dark
	LED			

Dark Cals: Compare Door Open with Door Closed
Solar Cals: Compare J01/QVD vs SNPP Aluminum diffuser

Potential Remaining Cal/Val Measurements:

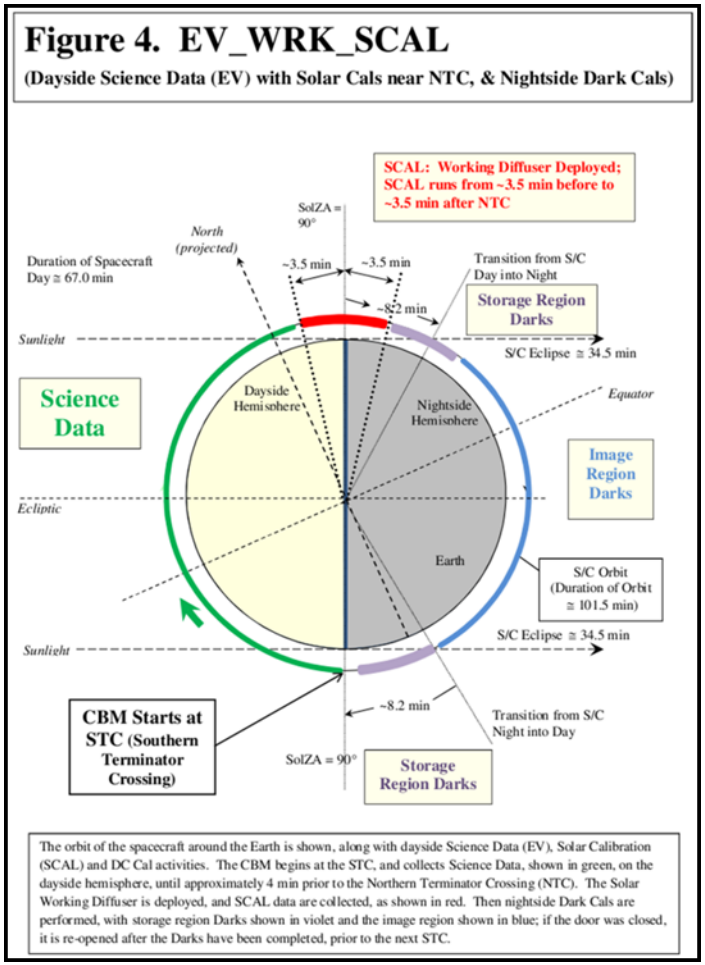
- EV Data Rate Optimization (seasonally dependent)
- PRNU (seasonally dependent: Solstice $\pm$~6 weeks)
- Full-Frame EV Measurements

J01/OMPS NomOps: Science Data w/Dark & LED Cals



- No LP on J01
- NomOps: **EV_HI_RES**
  - Default Science Data collection activity
  - Not "Extended-EV" past sub-satellite SolZA=88
    - Need to start ~75 sec prior to STC (2 EV-TPG *loops*)
    - Finish at NTC is similar
  - Open Door Dark Cals
    - Storage Region 2 sets of images in twilight
      - 5 images with IT = 30 sec
      - 5 images with IT = 10 sec
    - Image Region in S/C Night:
      - 41 images with IT = 30 sec
      - 21 images with IT = 10 sec
- Closed Door Cals:
  - **EV_CLOSED_DARK** is Closed Door version
  - **EV_CLOSED_LED** collects LED Cals
  - Same dayside EV coverage

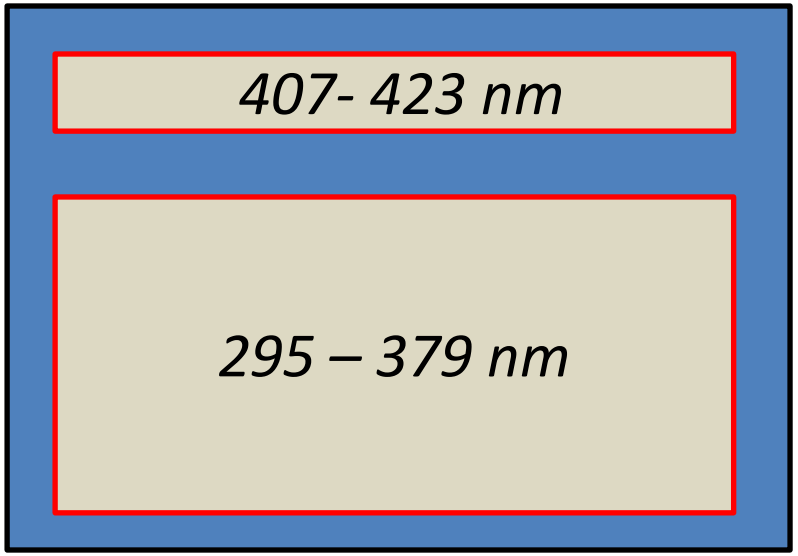
J01/OMPS NomOps: Science Data w/Solar Cals



No LP instrument on JPSS-1/OMPS NomOps:

- **3orb_EV_WRK_SCAL** or
- **EV_WRK_SCAL**
- New QVD Diffuser
  - Decreased diffuser features vs SNPP/OMPS
  - Evaluate on-orbit
- Differences are
  - EV_WRK_SCAL runs in single orbit
    - 3 Solar Measurements per 7 NM/TC Diffuser Positions
    - 9 per NP DiffPos
    - Closed Door Dark Cals
  - 3orb uses 3-orbits
    - 16 or 17 measurements per NM/TC DiffPos
    - Except 23 for TC4 and 16 for NP
    - Closed & Open Door Dark Cals
  - Similar image & Storage Dark Cals
  - Solar Cals take a bite out of EV near NTC

EV High-Res Data Collection

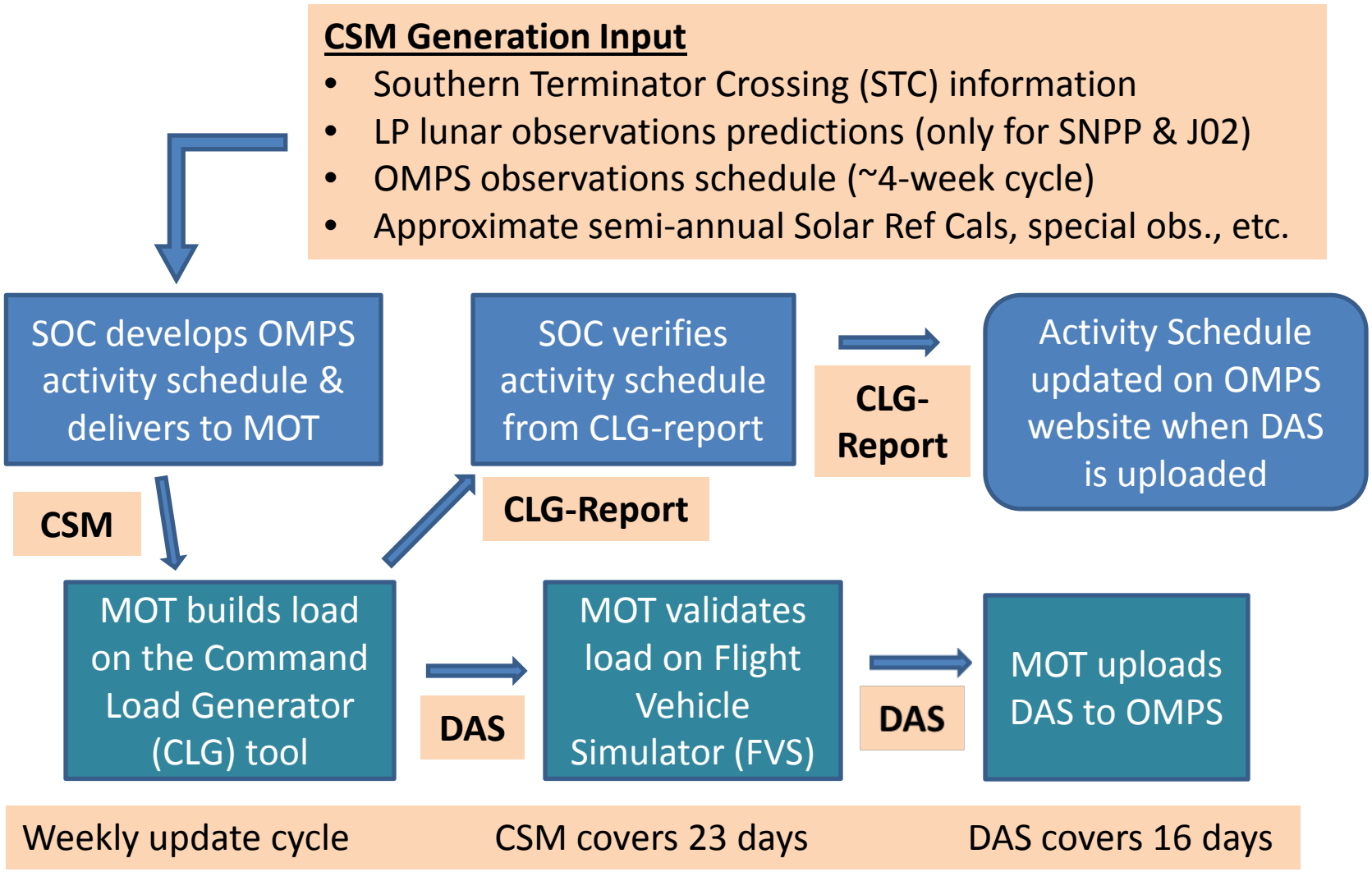


- EV Hi-Res Situation:
  - Maximize spatial resolution:
    - 147, BF=5 macro-pixels
    - 210 wavelength pixels
    - 30870 pixels (at data rate limitation)
  - Reduced Frame limits λ‘s from 295-423 nm
  - Limit insensitive λ ‘s
    - Sparse spectral: 2 λ regions

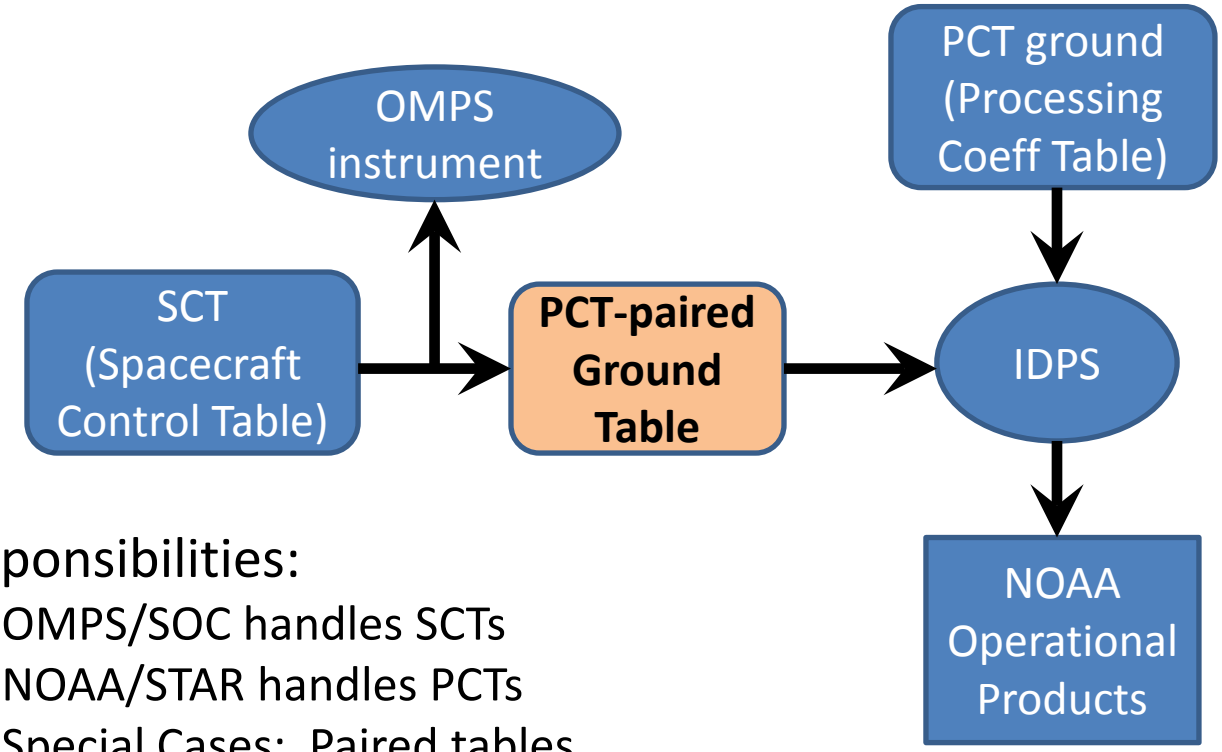
Possible enhancements:

- BATC assumes 2X compression, believe 2.2X achievable
- No BF=2 aerosol wavelengths (~4 λ’s; ~892 additional macropixels)
- No accommodation for off-nadir FOV swell

OMPS Activity-Schedule Flow



OMPS Table Flow: General Case



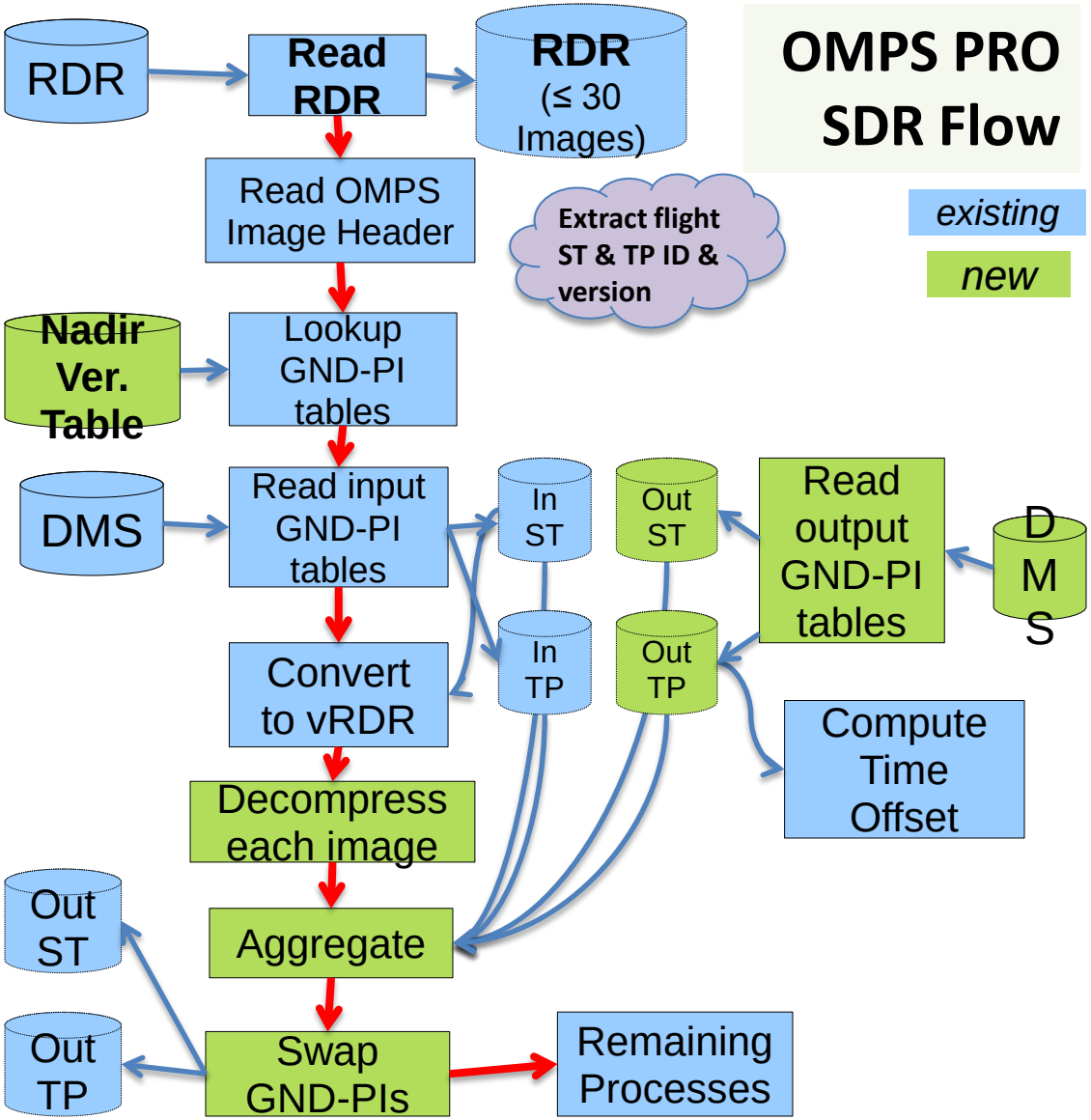
- Responsibilities:
  - OMPS/SOC handles SCTs
  - NOAA/STAR handles PCTs
  - Special Cases: Paired tables
- NOAA/STAR handles all ground tables EXCEPT PCT-paired tables

Block 1.2 to 2.0
GND_PI Table Transitions

GND_PI TABLES	BLOCK 1.2	BLOCK 2.0
Sample	SOC	SOC
Macro	"	SOC
Timing Pattern	"	SOC
CF_Earth	"	STAR
Wavelength	"	STAR
LUTS	STAR	STAR
DARKS	SOC → STAR	STAR

- Paired tables:
  - EV Sample table
  - EV Macrotable
  - EV Timing Pattern
- Block 2.0/Aggregator changed some PCT-paired tables to PCT only:
  - CF_Earth & Wavelength
- Block 2.0 changes go forward and are independent of J01 changes

EV Tables for Aggregator

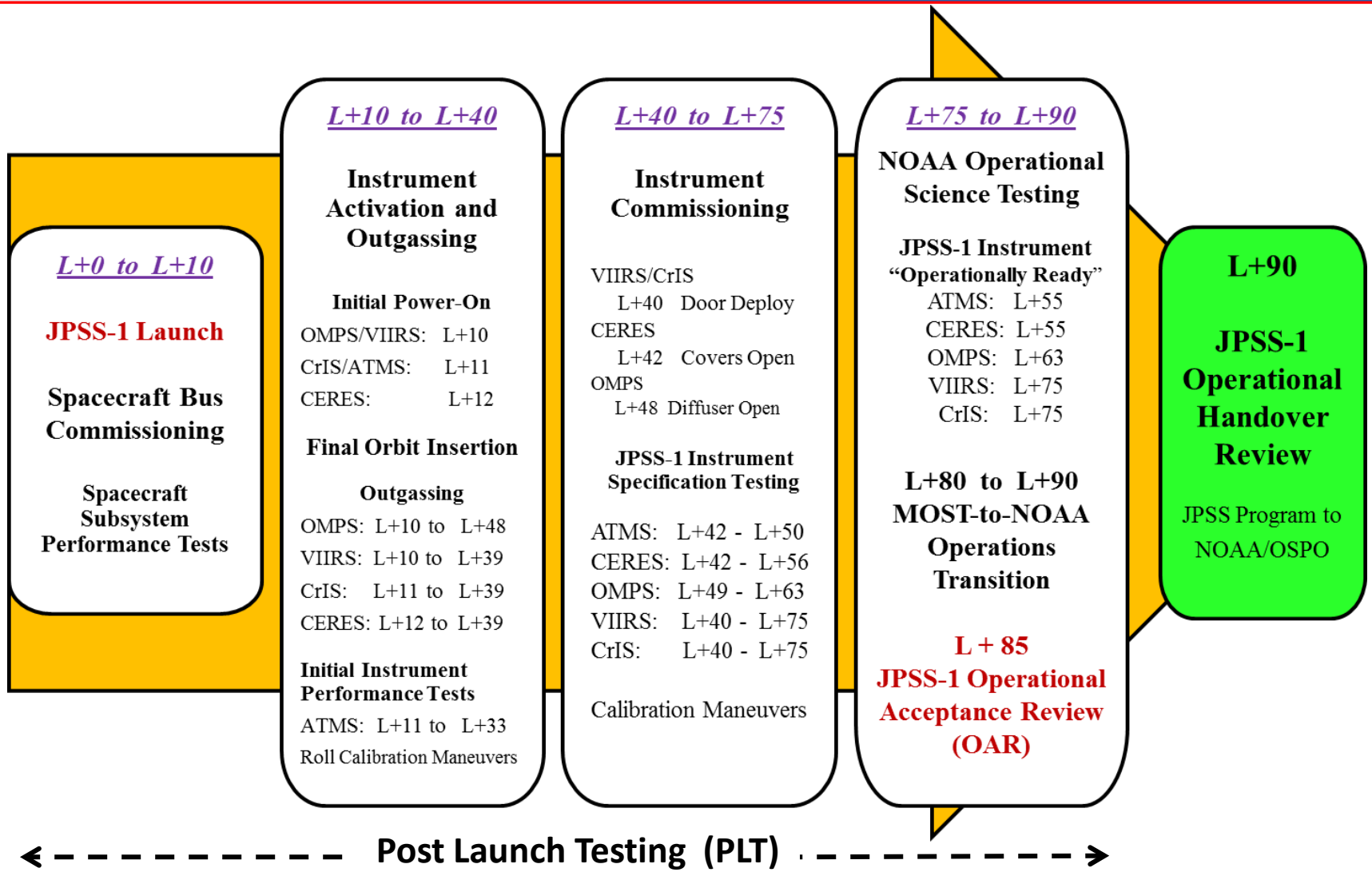


- Aggregator will exist for SNPP irrespective of any new FSW upgrades
- Paired tables include both the input and output tables:
  - Input matches data
  - Output matches SDR
- 3 paired tables:
  - EV ST
  - EV Macrotable
  - EV Timing Pattern Table
- For output-side of paired tables, per NOAA/STAR's instructions:
  - SOC can supply output side of paired tables, or
  - STAR can supply to SOC

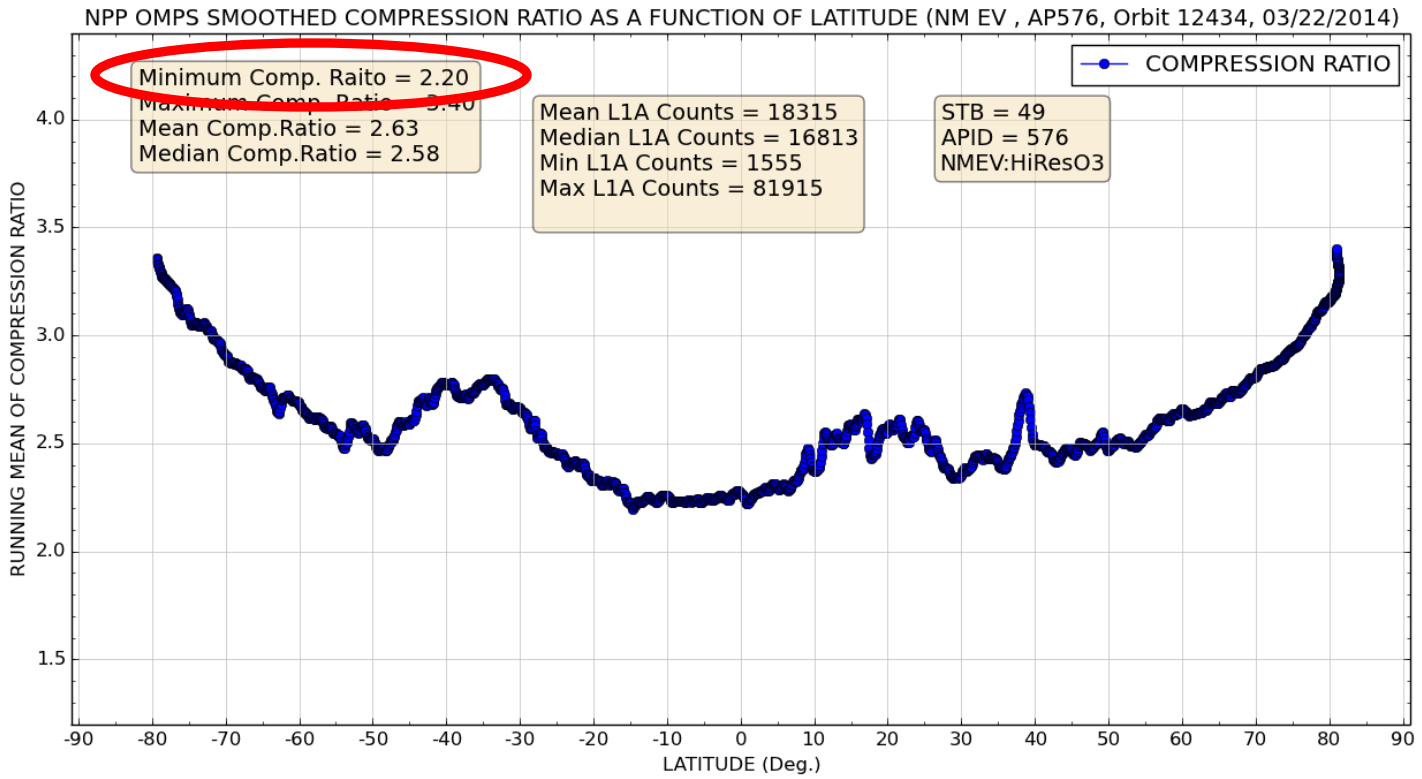
Backup Slides

- Notional On-Orbit Commissioning Timeline
- EV_HiResO3 Data Compression Sample: 1 Orbit
- EV Hi-Res ST Optimization
- Risk Mitigation

Notional On-Orbit Commissioning Timeline



EV_HiResO3 Data Compression Sample: 1 Orbit



EV Hi-Res ST Optimization

Data Rate Estimates: Compression-Rate Dependent						
BATC tests used a non-optimized value = 2					30870 EV macro-pixels	
Non-compressed estimate = 15435/coadd_IT					coadd_IT = 1.25 sec	
	Data Compression Rate					
Compression Rate	1.0	2.0	2.1	2.2	2.3	2.4
Net No. of Pixels	15435	30870	32413	33957	35500	37044

- Optimization Limitation:
  - If can't get the compressed packets thru in time, the TP halts & Science Data stops
- Create *trial* EV Hi-Res STs w/more pixels (& compression rate needs)
  - Run trial STs on-orbit as Diagnostic Science data
  - Configuration: Use available, alternate ST slots
  - Benefits:
    - Pre-load STs in advance (avoid space weather delays)
    - Monitor with MOT ground controllers

Risk Mitigation, etc.

- Risk Mitigation
  - Diffuser Wheel Mech stays closed until just prior to Door Open Phase
    - *All-Mech-Positions-Closed* MECH OPTIONS TABLE loaded (follow in APID 544)
    - Solar *peeks* not in current plan, but could be (done on SNPP)
  - Tracking of Diffuser Wheel Mech movement budget
  - Follow instrument TLM health and safety (follow in APID 544)
  - SOP: No NVM table uploads during S2 solar activity level or greater
  - SOP: OMPS is safed in case of any maneuver (RMM, ColA, DMU, etc.)
  - BATC can test new ST/GT/TP/etc. on BB in advance

- Optimizations
  - Pre-load CBM activities when possible
  - Diag EV CBM to test *trial* EV ST