JPSS CGS

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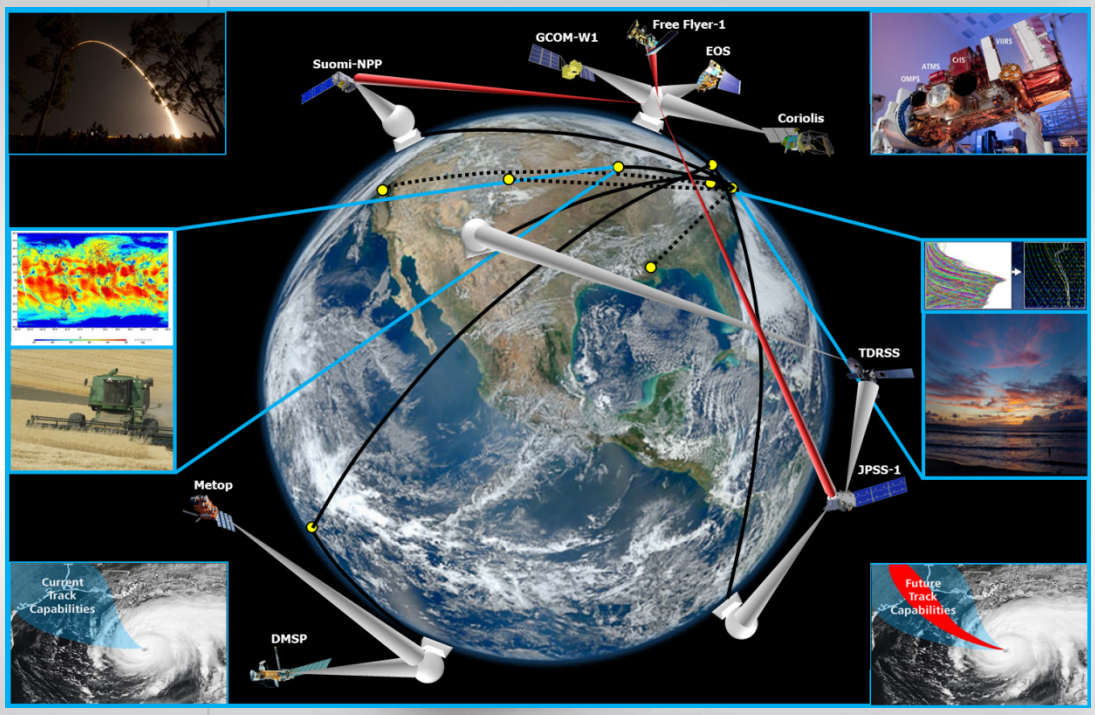

Current Joint Polar Satellite System (JPSS) Common Ground System (CGS) Technical Performance Measures (TPMs)

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Support to Multiple Missions in the JPSS CGS

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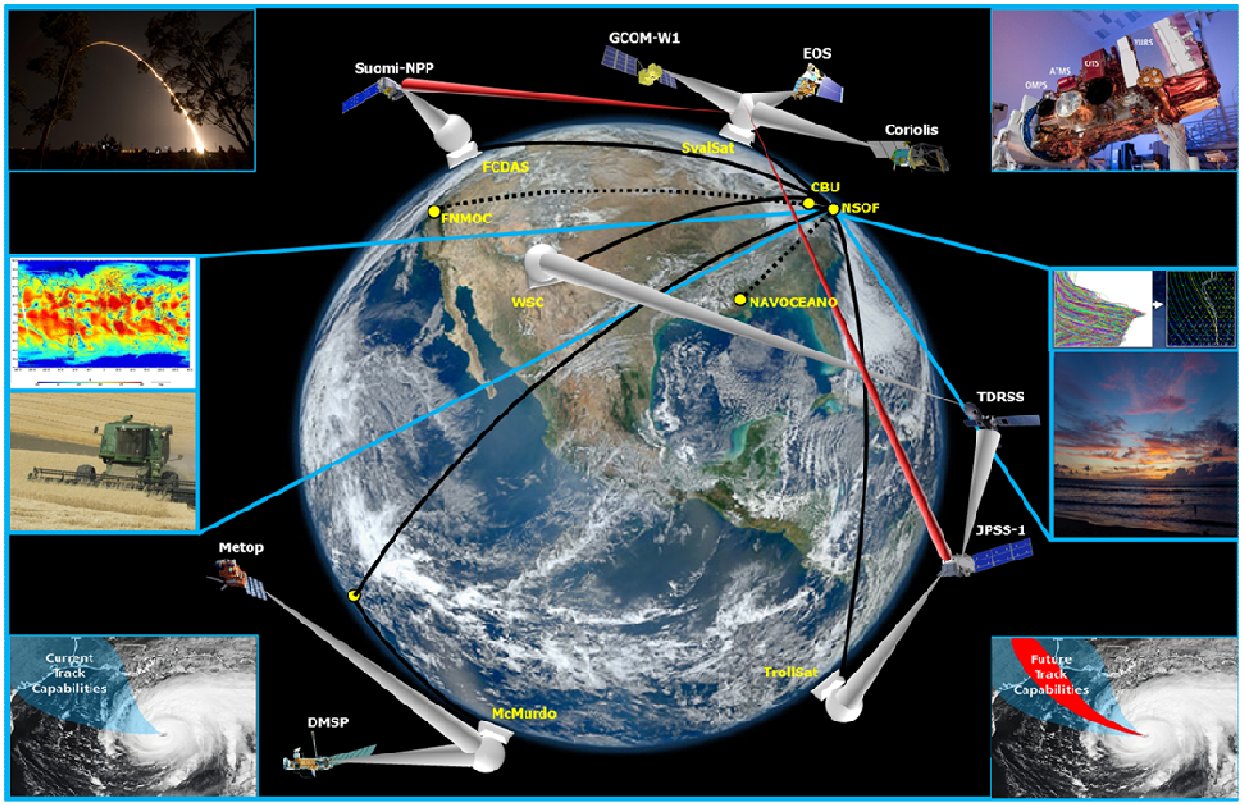
- The Joint Polar Satellite System (JPSS) will contribute the afternoon orbit component and ground processing system replacing NOAA's current Polar-orbiting Operational Environmental Satellites (POES)
  - The JPSS Common Ground System (CGS) provides command, control, data acquisition, routing and processing, and product delivery for the Suomi National Polar-orbiting Partnership (S-NPP) and future JPSS satellites
  - The CGS also provides support to a number of additional missions beyond S-NPP and JPSS



CGS Architectural Tenets for Block 2.0 (Operational in 2016)

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- Key Objectives:
  - Increasing operational robustness for S-NPP
  - Leveraging lessons learned to date in multi-mission support
  - Taking advantage of newer, more reliable and efficient technologies
  - Satisfying new requirements and budgetary constraints

- Architectural Tenets to meet the Key Objectives:
  - System-wide technology refresh for enhanced performance and security
  - New front end architecture for mission data acquisition and transport
  - Enhanced modularity and flexibility in the Interface Data Processing Segment (IDPS) for new and evolving algorithms
  - Comprehensive situational awareness
  - Full backup capability for Continuity of Operations (COOP)

CGS Block 2.0 (Operational in 2016)

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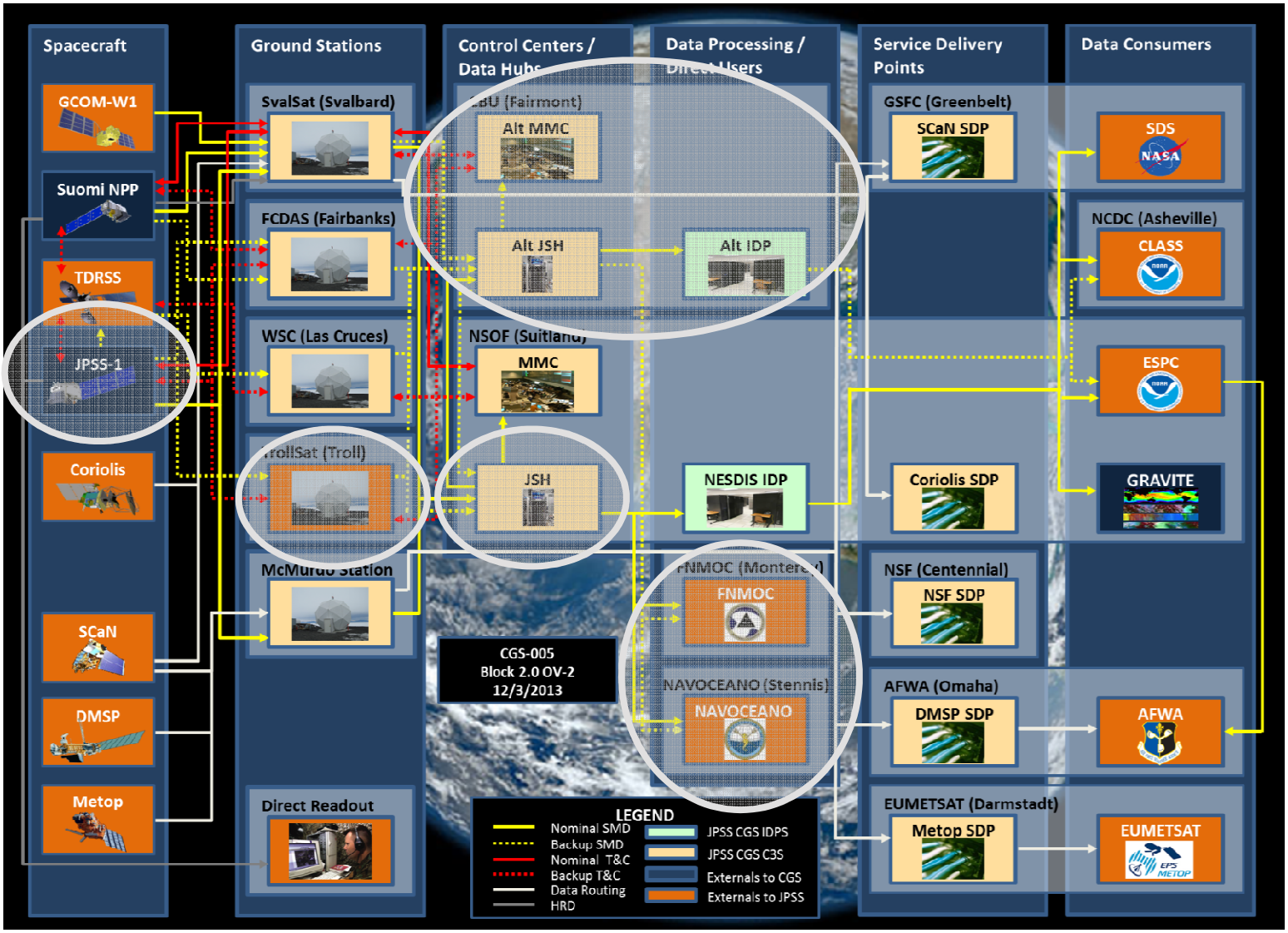

CGS Changes Highlighted

Technical Performance Measures (TPMs)

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- To ensure the CGS will meet all of its performance needs in Block 2.0, we have established ten categories of Technical Performance Measures (TPMs) which have been tracked through Block 2.0 System Acceptance Testing (SAT)

- These TPM categories are summarized on the following chart

- To track performance against TPMs, Performance Engineering has been inserted throughout the Block 2.0 Project lifecycle

- On a quarterly basis, we have generated updated reports of expected performance against each of these categories, including assessment of margin to support any associated risk management activities

JPSS CGS TPM Categories

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Category	Description	# Items	Example
Data Latency	Time from photons sensed to data products delivered	12	JPSS-1 EDR Data Latency
Data Availability	Percent of raw data captured and archived	12	JPSS Raw Data Availability to CLASS
Operational Availability	Percent of time mission critical functions are satisfied	7	Data Processing Node Operational Availability
Situational Awareness	Timeliness of system response and alerts to operators	3	Alert Display Timeliness
Efficiency	Utilization of resources	1	CGS WAN Throughput Efficiency
Recovery	Ability of system to clear backlog for recovered products	1	Recovery Processing Time
Orbit Operations	Accuracy for orbit maintenance and operations	1	Orbital Position Accuracy
Scalability	Ability of system to incorporate new missions	3	CGS Scalability for JPSS-Managed Missions
Margin	Capacity for modest growth during operations	4	CGS Storage Capacity Margin
Transition	Timeliness of transitioning to alternate resources	5	Transition Time from Primary to Alternate Facility

Performance Engineering in the Project Life Cycle

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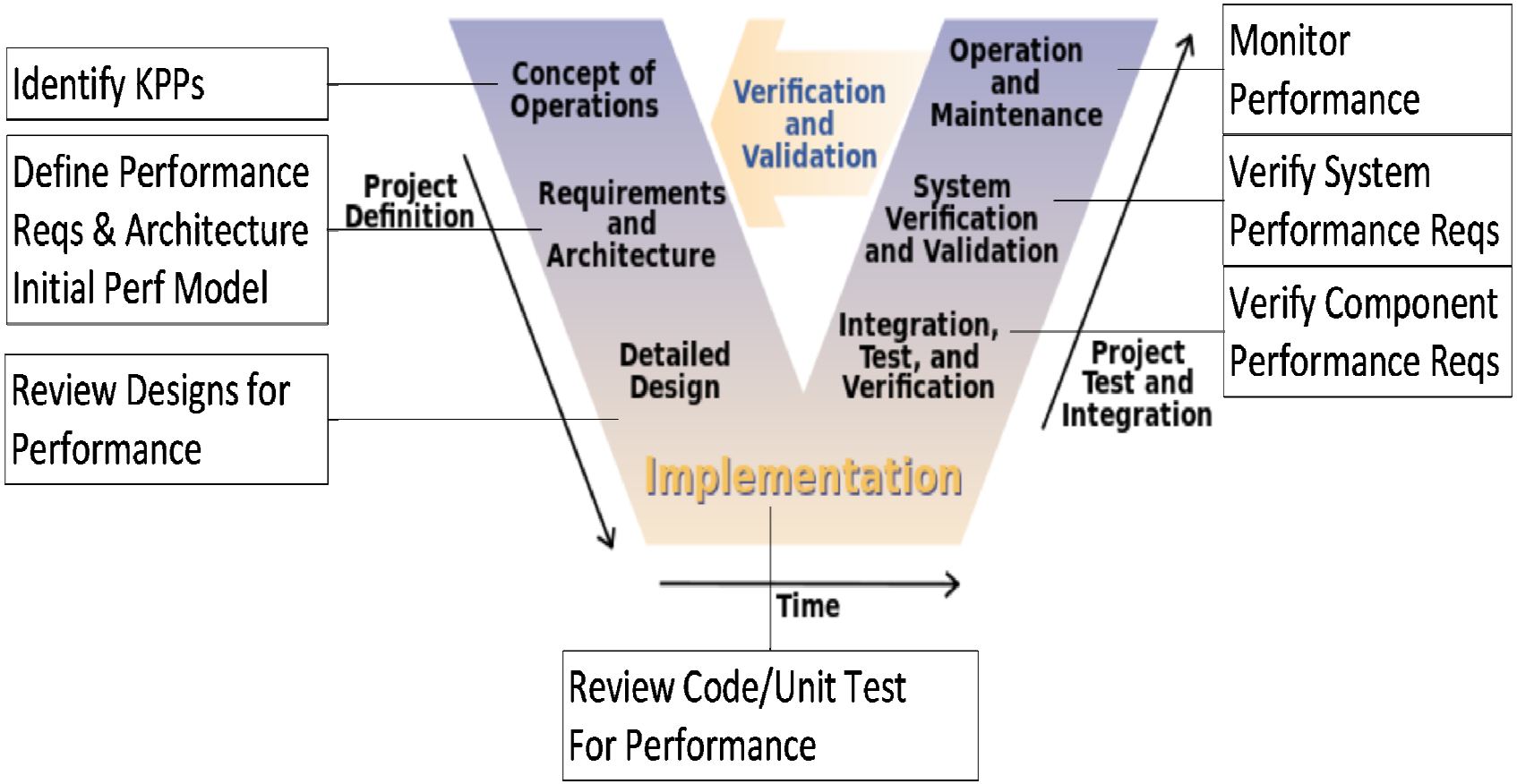

TPM	Specification (95% of Data within x Minutes)	Current Best Estimate	Current Performance Margin	Maturity*	TPM Confidence Index
JPSS-1 EDR Data Latency	80	63	22%	Medium	High

*Note Maturity will be High once acceptance testing is completed

Ensuring TPMs are Met in Block 2.0 Operations

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- To achieve the expected latency shown in the table on the previous chart, several enhancements are in the updated CGS architecture and concept of operations

- First, JPSS-1 will downlink twice per orbit, once in each polar region, which will reduce data aging on the spacecraft by over 50 minutes

- Second, the CGS provides two receiving stations in each polar region, to ensure continued low-latency performance in the event of a primary station failure

- Third, the concept of operations shown on the following chart is applied

Concept of Operations for Minimization of JPSS Data Latency

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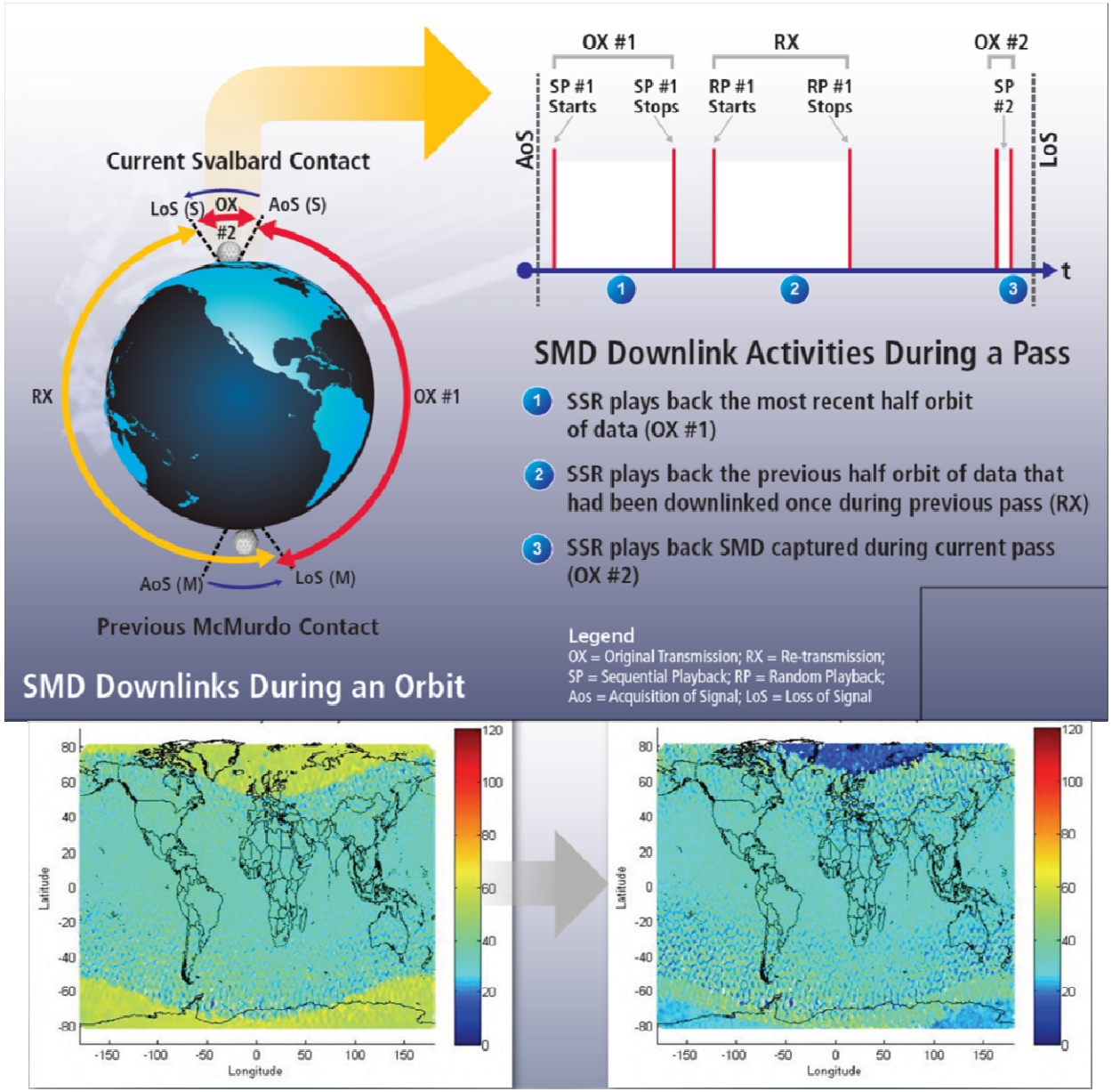

Summary and Conclusion

- First 4+ years of S-NPP Operations have been a success
  - Risk reduction for JPSS, but also generating products for operational weather forecasting today
  - Lessons learned that have flowed into our Block 2.0 architecture for the CGS
- We have developed architectural tenets to guide the multi-mission upgrades to the CGS in several key areas
  - Security, technology refresh, front end communications architecture, IDPS modularity/flexibility, situational awareness, COOP
- We are using Technical Performance Measures (TPMs) to ensure the Block 2.0 CGS will continue providing high quality multi-mission support to JPSS and its national and international partners
  - Current best estimates show we are on track to achieve this objective

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