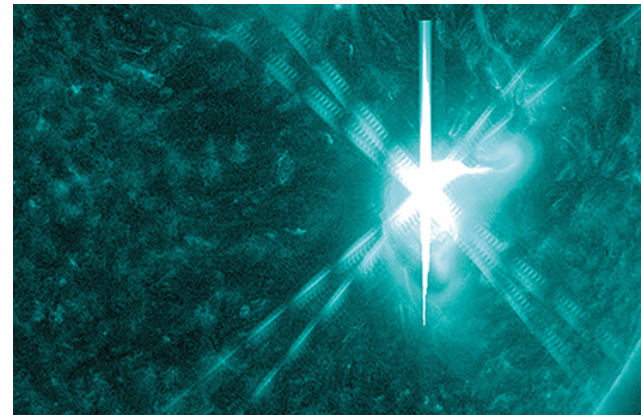
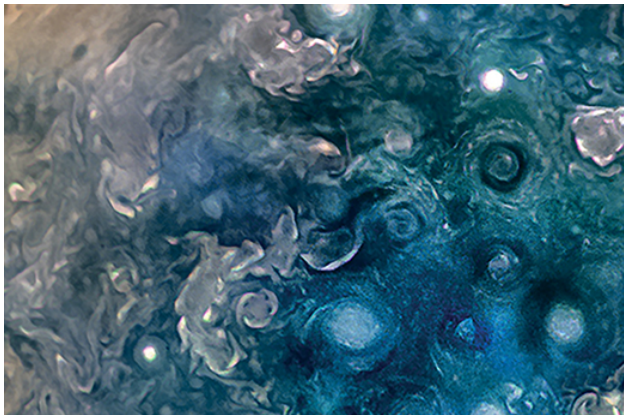
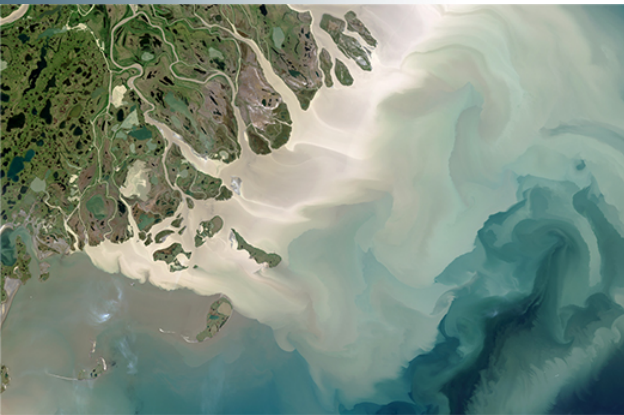


SCIENCE

National Aeronautics and
Space Administration



JWST Status

Thomas H. Zurbuchen
Associate Administrator
Science Mission Directorate

MARCH 27, 2018

Webb Mission Status - March 23, 2018

Webb Observatory Elements at Northrop Grumman (NGAS) Redondo Beach, CA

Spacecraft
Element

Sunshield

Spacecraft



Optical Telescope
Element
(with instruments)

Webb Mission Status - March 23, 2018

- Spacecraft Element (SCE) completed, stowed in launch configuration
 - Performance testing complete and ready for environmental testing
 - Sunshield
 - 7 small tears in the sunshield and sunshield covers have been repaired
 - Lessons learned from first deploy/fold & stow were significant
 - Spacecraft
 - Major impact to schedule due to propulsion valve and transducer rework
 - Dual Thruster Modules removed, valves refurbished, DTM's reinstalled, pressure check was good
- Optical Telescope Element (Telescope & Instruments)
 - Full performance and environmental testing complete and OTE delivered for Integration and Test
- Launch Readiness Date (LRD) of March - June 2019 not possible due to lessons learned during SCE Integration & Test (I&T) and propulsion system rework
- Standing Review Board (SRB) has reviewed project schedule and their analysis yields an LRD of ~May 2020 at 70% confidence
- Independent Review Board, chaired by Tom Young; final report ~May 2018
- NASA's final agency decision in June 2018

Webb 18 Month LRD Impact

From October 2018 LRD

- Multiple “critical paths” are tracked during project development
- 15 months of technical issues (**impacts do not add linearly**)
 - + - Spacecraft critical path dominated by the propulsion system – 13 months
 - + - 3 Months - Transducer problem
 - Dual Thruster Module rework slip of 9 months (much of this was worked in parallel with Sunshield issues)
 - 1 Month - Recovery from incorrect voltage applied to the catalyst bed heater
 - Sunshield Complications – 7 months
 - 4 months – Deploy/Fold/Stow (2 months to go)
 - 2 months – Tear repairs (1 month to go)
 - 1 month – Snag guard implementation (0.5 months to go)
 - Observatory I&T Replan – 3 months
 - 3 months – OTE lessons learned and applied to SCE & reduction in parallel task activities
- 3 months additional funded schedule reserve

Remaining I&T Activities

Science Payload

- OTIS Deployments at NGAS
(secondary mirror & ISIM radiator)

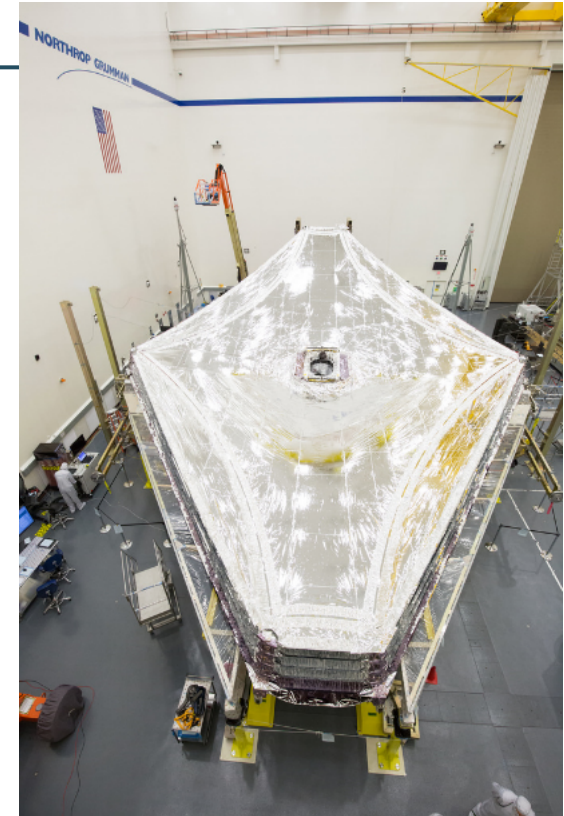


Observatory Integration

- Pre-environmental Observatory deployments
- Observatory fold & stow
- **Observatory system (electrical) test**
- Observatory vibration, acoustics tests
- **Observatory deployment**
- Observatory stow for launch
- Observatory final system test

Spacecraft Element

- **Acoustics, vibe, and thermal vacuum tests**
- Post-Environmental deployment & stow



Blue font indicates “first time” activities

Standing Review Board Schedule Review Summary



National Aeronautics and Space
Administration

Summary of SRB Schedule Risk Assessment

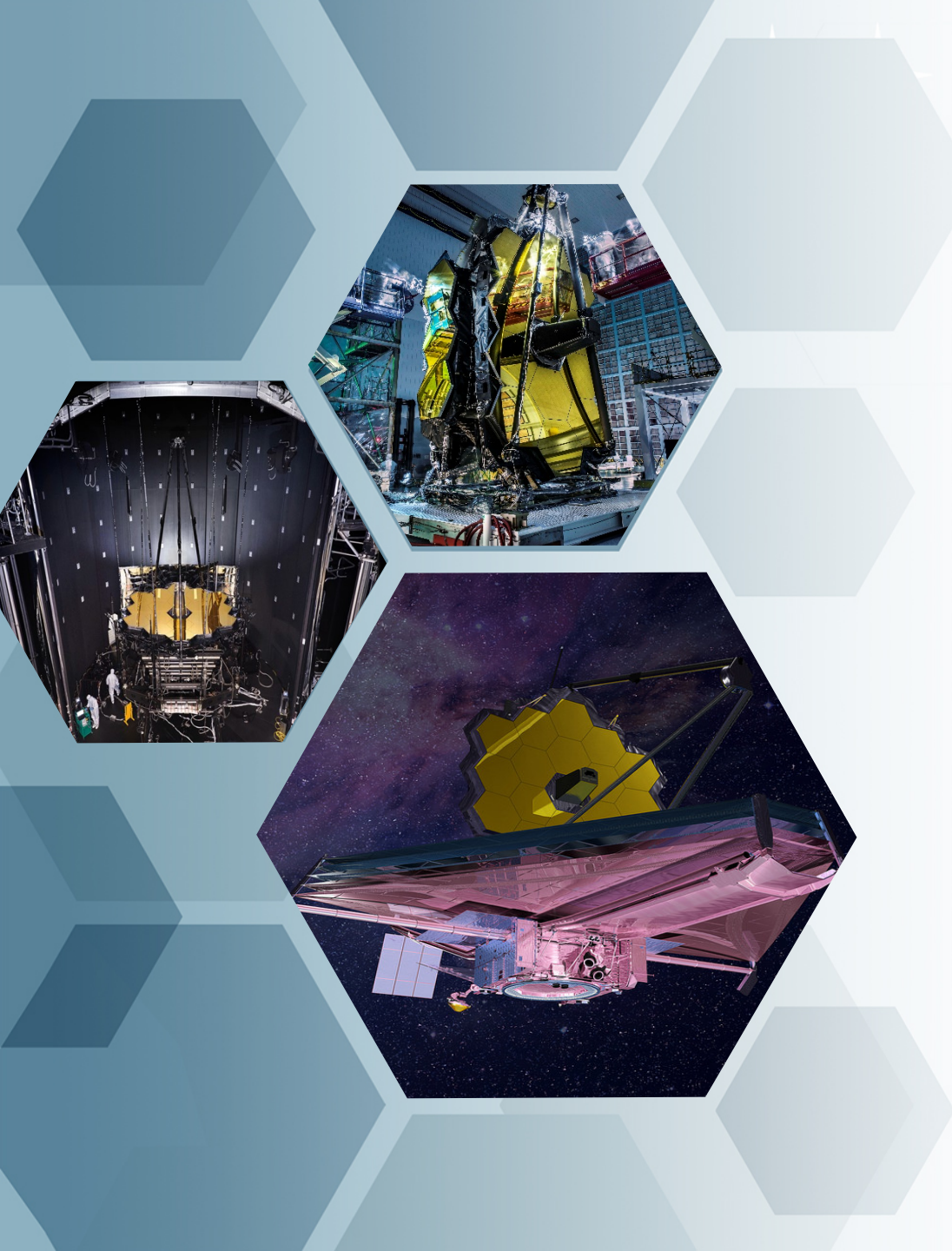
- Summary/Historical view of large, complex NASA SMD program and project schedule overruns
- Analysis of historical JWST I&T schedule margin burn rates since 2011
- SRB Delphi analysis
- SRB Assessment of project's grassroots schedule analysis and threats
- JWST Project SRA model and parametric analysis
- Comparison of similarly complex NGAS "Project X" to JWST I&T work to go
- **Based on the above analyses, the SRB assessment results in a probable JWST LRD range of 1/29/20 to 4/30/20 (increasing probability with latter date)**
- **Caveats:**
 - NGAS schedule performance improves as planned
 - No significant hardware anomalies during remaining I&T

Steps Taken to Improve Performance

- NASA HQ (Program)
 - ✓ Additional SMD Front office oversight and direct interaction with NGAS senior management (VP and above)
 - ✓ Adding Deputy Associate Administrator of Programs to JWST Program Office
 - + ✓ Tracking daily & weekly NGAS I&T reports
 - + ✓ Established IRB
- NASA Goddard (Project)
 - ✓ Senior project management resident at NGAS on permanent basis
 - ✓ Additional NASA I&T personnel at NGAS planned for specific activities
 - ✓ Bi-weekly senior NASA/NGAS (HQ, Center Director, VP level) schedule reviews
 - ✓ JWST Project Manager reporting directly to Deputy Center Director who will actively support the Project Manager
- NGAS (Prime Contractor)
 - ✓ Project Manager to VP direct communication path established
 - ✓ Reporting channels opened to Project & Program (as mentioned above)
 - I&T personnel and organizational structure changes
 - Reviewing technical processes/procedures

Independent Review Board

- Purpose
 - External team that will evaluate all factors, including
 - Those identified by the SRB
 - Integration and test (I&T) plan
 - Assuming a Ship & Launch Processing window (75 days) and the commissioning (6 months) of the telescope
 - The IRB will
 - Document the results of its review in a presentation and final report
 - The IRB may develop observations, findings, concerns, and recommendations as part of its assessment.
- Final Report to SMD AA ~May 2018
- Chair, Tom Young



Comparison of Webb and WFIRST Development Risk at KDP-B

<u>Webb @ KDP-B</u>	<u>WFIRST @ KDP-B</u>
Novel, complex segmented Be mirror development	Existing 2.4m monolithic ULE mirror
Numerous technology developments	High TRL: basis of Decadal selection, recent investments
Complex cryo-cooler	Passive Al radiator
ISIM structure materials development (30 K)	Reuse of Webb design in instrument carrier (190K)
IR detector manufacturing problem uncovered after KDP-C	IR detectors presently at TRL-6, flight growth initiated at start of Phase B; Greater maturity and understanding of Webb-derived detector technologies reduces risk of encountering problems late in the WFIRST program
Four highly configurable instruments (inherent complexity), major international roles, separate fine guidance sensor	Single primary instrument + tech demo, no separate fine guidance sensor
Many complex deployments	Standard deployments

**WFIRST risks are lower than those retired on Webb, and typical of high TRL missions.
Incorporated numerous Webb lessons learned.**