

Goddard Project Update

Jane Rigby (Senior Project Scientist)

Mike Davis + Brandon Bethune (Project Manager + Deputy)

Julie Van Campen + Eric Poole (Missions Systems Engineer + Deputy)

Michael McElwain (Observatory Project Scientist)

Knicole Colón and Susan Neff (Operations Project Scientist + Deputy),

Amber Straughn (Communications Project Scientist), and

Stefanie Milam (Project Scientist for Policy & User Community)



Senior Project Scientist's Perspective

Jane Rigby



How I'd like us to show up together for these two days

Sea otters in Alaska, taken by Flickr user
Mike's Birds.
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Senior Project Scientist's Perspective

- My job is to "maximize the science impact of JWST" -- for whatever budget is appropriated.
- JWST continues to deliver phenomenal performance & science.
- **The landscape of US federal science funding is challenging.**
- **Fiscal year boundaries (Oct 1) are an extra uncertain time.**
- **Research awards:** Your 5/2025 report emphasized that research awards are essential to turn data into discoveries. NASA intends to fund Cycle 4 research awards at \$60M. Notification letters coming.
- JWST's 5-year prime mission ends 7/2027. NASA has different expectations for extended missions compared to prime missions. There is a strong expectation that extended missions are more efficient, streamlined, and lower cost.

Farewell to Mic Bagley (PS for Data/Pipeline/Calibration/Archive)

- We miss them!
- Dr. Bagley came to Goddard in Nov 2024, and left in July 2025. **A huge impact in a short time.**
- Mic performed a thorough assessment of JWST's status in achieving Level 1 science requirements, doing deep dives into the JWST archive of galaxy spectra
- Their comprehensive work demonstrated the project has already met threshold science requirements, and is on track to accomplish baseline science requirements in the prime mission. See 3/2025 presentation.
- Mic also worked closely with the JWST science mission office and pipeline and calibration teams at STScI to enhance strategic planning of these critical efforts as a benefit to the community.





Welcome to Julie Van Campen and Eric Poole!

Mission Systems Engineer (MSE): **Julie Van Campen**

Julie has held a Lead Systems Engineering position as a NASA civil servant since 2012. Her involvement with the Webb project extends back to 2003 when she joined the Webb team as an I&T systems engineer. Former roles on the project included NASA Integrated Science Instrument Module (ISIM)

Systems Engineer and the Deputy Commissioning Manager for JWST.



Deputy MSE: **Eric Poole**

Eric began his NASA career in Huntsville, AL ensuring performance of the Space Shuttle solid rocket motors. He then went to Florida where he prepared such missions as Juno, Curiosity and Orion for launch from the Kennedy Space Center.

He is currently the Deputy Mission Systems Engineer for JWST and the Mission System Engineer for development of a Lunar Navigation system.





GSFC Project Management and MSE Update

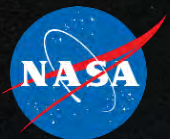
02 December 2025

Mike Davis

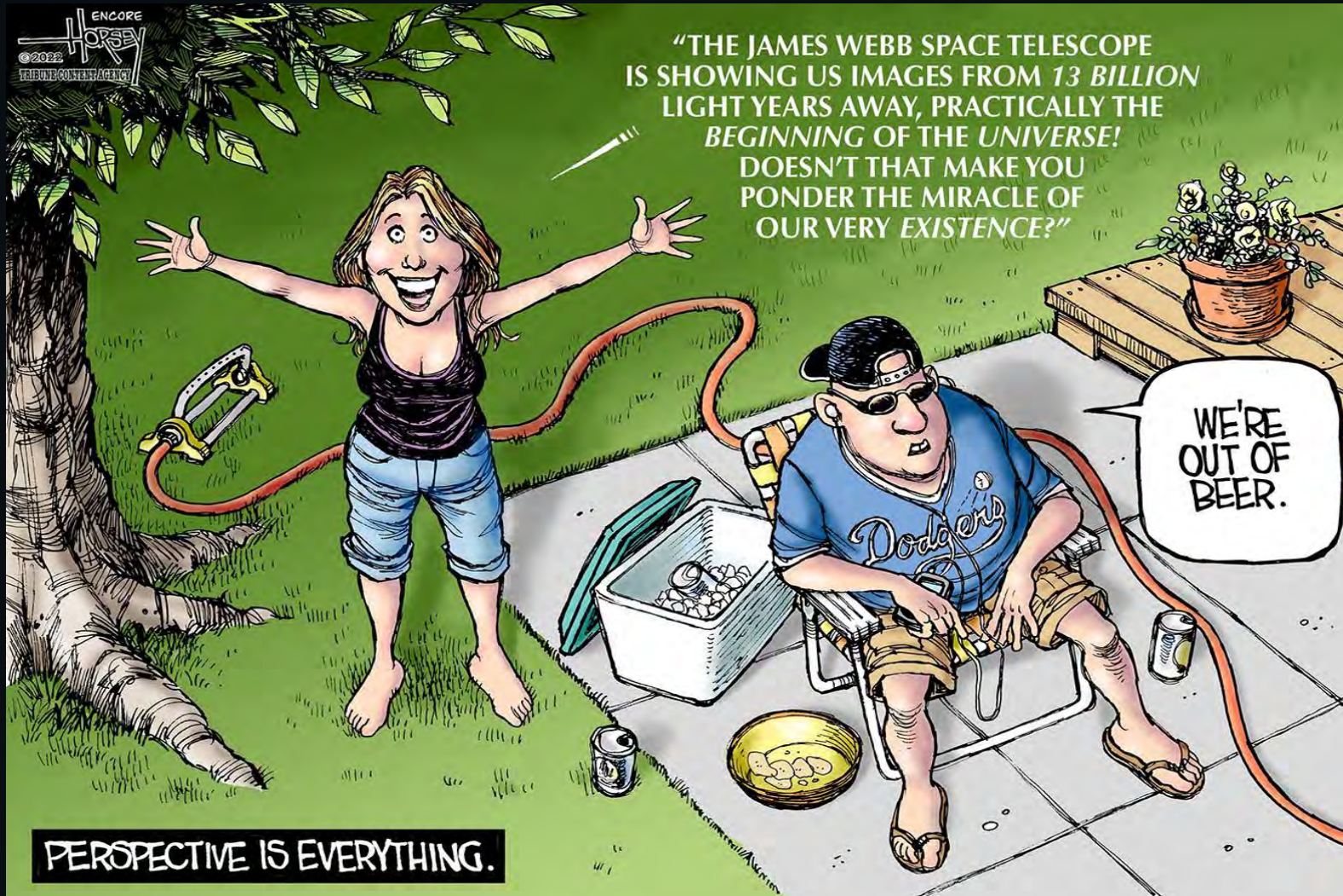
JWST Operations Project Manager

Julie Van Campen

JWST Mission Systems Engineer



Project Management Introduction

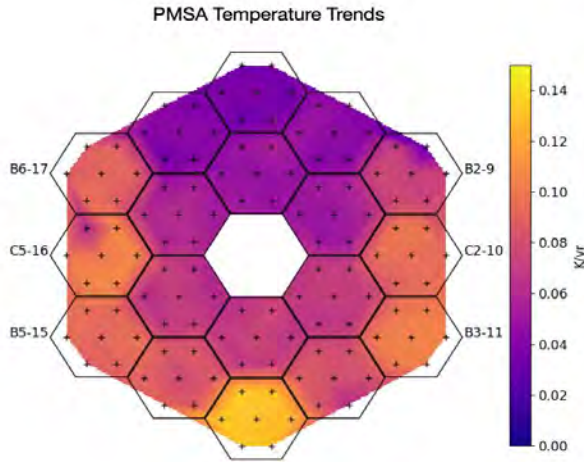


- **Good News:**
Webb is providing exemplary performance on orbit
- **Bad News:**
Budgetary pressures continue to pose impacts to Webb going forward

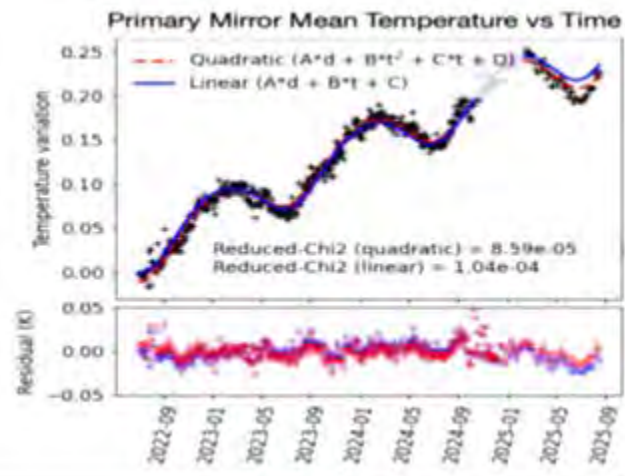
Observatory Performance Metrics (thru 31 October '25)

Observatory Performance Metrics	
FGS Performance Past Month	--
Total Visits	261
Success	98.0%
Skipped	2.0%
Micrometeoroid Impacts to Date (delta from previous month)	99 (+3)
OBS Wavefront Error Range [nm] Requirement: < 150 nm	67 to 70
Propellant End of Life [Calendar Year] Requirement: 2034	2042-2063
Power (mean load past 2 months) [W]	1362
Max Power Capability [W]	2734
# of DSN Issues Past 2 Months (delta over previous month)	20 (+11)
Solid State Recorder Hard Error Count to Date (delta from previous 2 months)	15 (+1)
NIRCam Photometric Stability	<1%
MIRI Imager Throughput Reduction [@10 um] (relative to beginning of life)	1.5%
NIRISS Flux Ratio (1.0-2.5 um)	1
NIRSpec Count Constancy	1%
Prime Science Efficiency Current Month	88.19%

Mirror Delta T due to Linear Slope Since Commissioning



The linear trend is due to some effect for which line-of-sight to the back of the wings is relevant, such as aging of the sunshield



REDUNDANCY STATUS	
Attitude Control Subsystem (ACS)	
Wheel Drive Electronics (WDE)	1 2 3 4 5 6
Valve Drive Electronics (VDE)	A B
Star Tracker Assy (STA)	1 2 3
Inertial Reference Unit (IRU)	1A 1B 2A 2B
Fine Sun Sensor (FSS)	A B
Command and Data Handling (CDH)	
Configuration Control Unit (CCU)	1
Command & Telem Processor (CTP)	1 2
Solid State Recorder (SSR)	A B
1553 Bus	A B
Communication (COMM)	
x-Band Transponder	1 2
KA-Modulator	1 2
Receivers	1 2
Traveling Wave Tube Assy (TWTA)	1 2
Deployment Control Subsystem (DCS)	
Deployment Electronics Unit (DEU)	A B
Bi-Axial Gimbal Assy (BAGA)	A B
Propulsion Subsystem (PROP)	
Monopropellant Rocket Engine (MRE)	1 2 3 4 5 6 7 8
Secondary Combustion Augmented Thruster (SCAT)	1 2 3 4
Electrical Power Subsystem (EPS)	
Power Control Unit (PCU)	A B
Telemetry Acquisition Unit (TAU)	A B
Solar Array Regulator Array Regulator Module (SAR ARM)	1,1 1,2 1,3 1,4 2,1 2,2 2,3 2,4
Integrated SI Module (ISIM)	
ISIM Command & Data Handling	A B
ISIM Remote Services Unit (IRSU)	A B
Optical Telescope Element (OTE)	
Actuator Drive Unit (ADU)	A B
Cold Junction Box (CJB)	A B
Cryo Multiplexer Unit (CMU)	A1 A2 A3 A4 A5 A6 B1 B2 B3 B4 B5 B6 C1 C2 C3 C4 C5 C6 SMA -C2 WIG -C2 WIG
Differential Impedance Transducer Control Electronics (DITCE)	A B

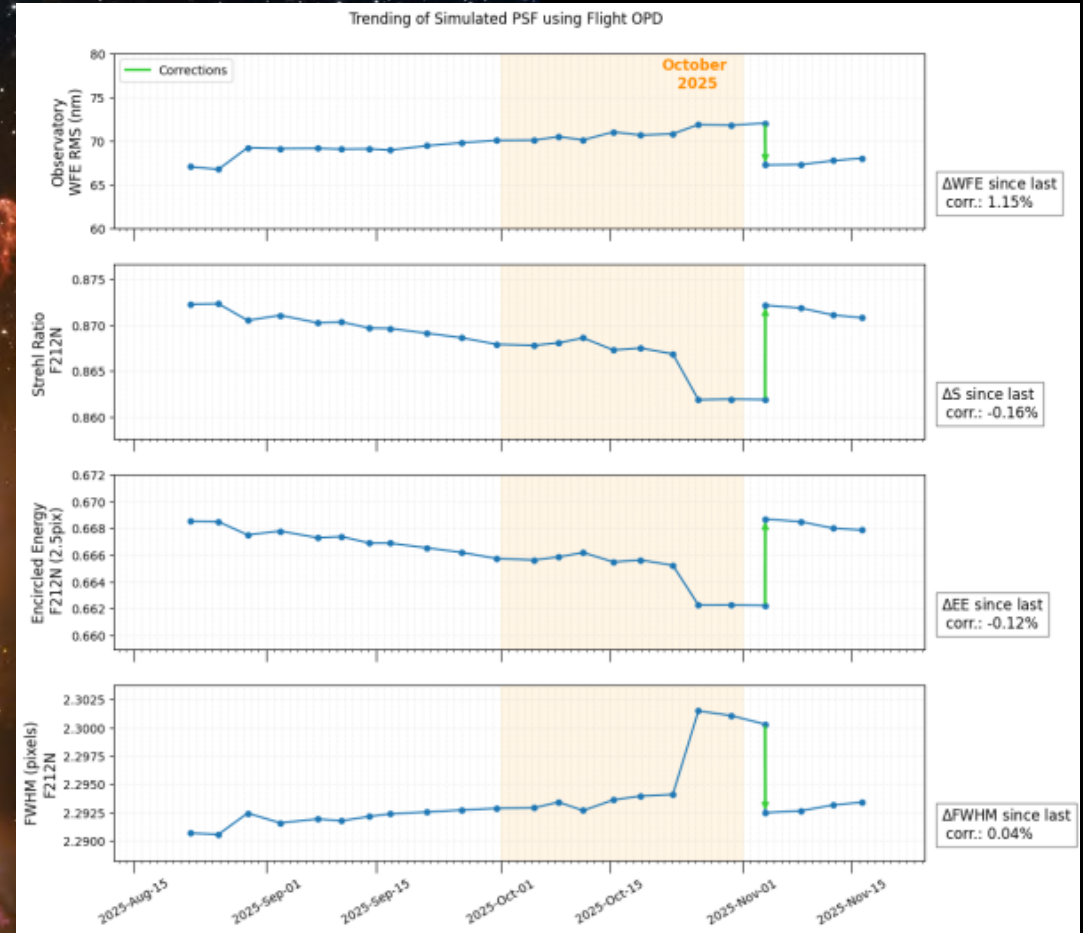
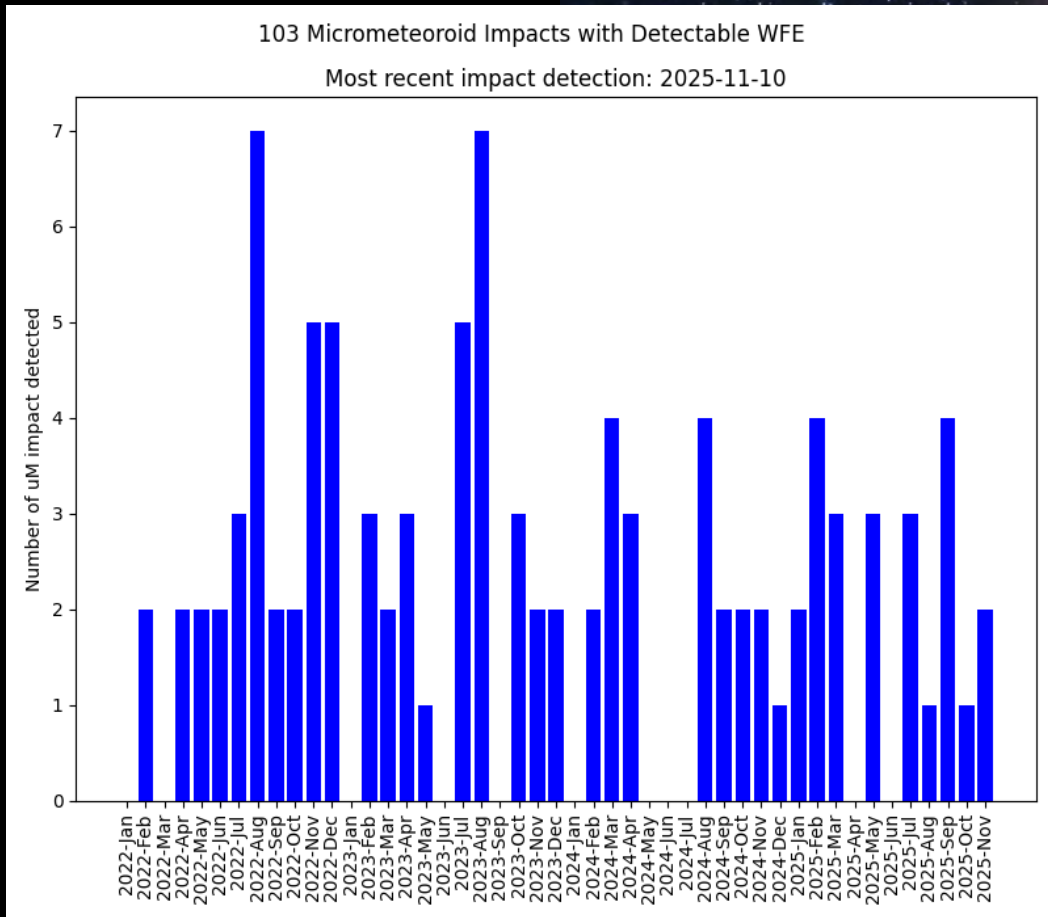
As of 10/31/25

Observatory Performance (continued)



Optical Performance: remains excellent

Micrometeoroid impact frequency (impacts per month) remain at expected levels. Effect on wavefront error is also as expected.



Station keeping maneuvers are performing as expected.

Current estimates for propellant life remain greater than 20 years.

Budget Challenges Facing JWST

- In 2011, NASA set a flat Webb Phase E budget with no adjustments due to inflation, to fit within the overall Webb cost cap, with the expectation that a successful launch and early mission would result in additional monies being made available.
- For the early part of prime mission, Webb exercised flexibility in phasing budget and timing of slow-to-cost grants, while emphasizing mission operations and not reducing science awards.
- Cost growth from set budget plus inflation has necessitated the Project to look at cost reductions.
- In FY25, Project implemented 8% reduction in non-STScI Webb support contracts, with expectations of further reductions across operations through balance of Prime Mission (through June 2027).
- The Project is executing the HQ guidance for operations under a CR, which includes awarding Cycle 4 science awards at a total value of \$60M, and delaying implementation of further reductions to operations until a full budget is passed.

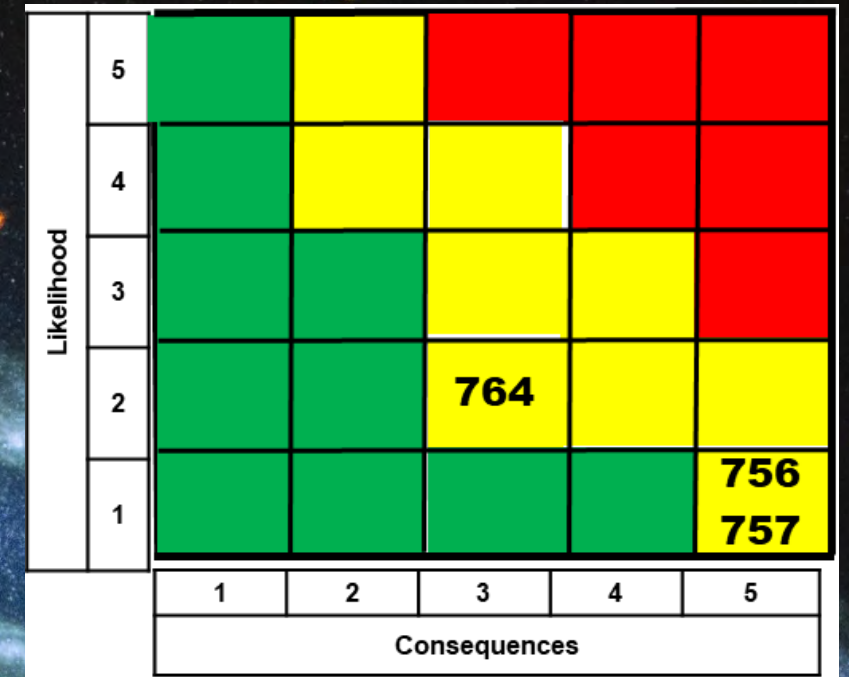


Image: NASA, ESA, CSA, STScI, Olivia Jones (UK ATC), Guido De Marchi (ESTEC), Margaret Meixner (USRA)



JWST Top Risks: 3 Moderate Risks

Risk ID	Summary	Aprch	Type of Risk	Status
756	Fine Sun Sensor #2 could possibly lock onto a "false" sun	Watch	Technical Science	"Ping" FSS-2 throughout operations to assure is locked on "Real Sun" as determined by FSS-1
757	DSN may not be able to support multiple missions simultaneous with Artemis	Watch	Technical Science	Performing DSN antenna checkouts over the next year to increase options during upcoming Artemis launches -- DSN-63 and DSN-65 checked to date -- Next round will occur in February - April 2026 following DSN antenna upgrade Contiinuing working with NSN to determine if there are commercial vendors available
764	DSN Backup Emergency Control Center loss of JWST Science Data	Mitigate	Schedule	Transfer of DSN Control Center from JPL to backup Emergency Control Center could adversely impact JWST Science -- no CCSDS File Delivery Protocol capability for data downlink at ECC -- insufficient network bandwidth to transfer data to Mission Operations Center





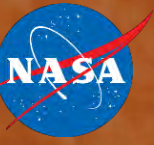
Observatory Updates

- Observatory science performance remains excellent (see project manager's charts and Tom Brown's charts for details).
- Continued monitoring the slowly increasing MIRI backgrounds as presented in the March 2025 JSTUC meeting [*Anomaly AR-9211*]. The JWST Exposure Time Calculator will be updated to adjust for the slightly increased backgrounds in Cycle 6.
- Ongoing investigation into the MIRI reduced count rate, with updates reported in the JWST Observer [*Anomaly AR-4593*]. Additional root cause testing has been carried out in the UK.



Science Operations Highlights

K. Colón
Operations PS



- JWST has not yet peaked in science interest or productivity, evident from the number of Cycle 5 proposal submissions and >800 refereed papers in 2025.
- Science operations continue to be highly efficient, with practices in place and new ideas in works to minimize idle time.
- Completion of Cycle 1-4 programs is ongoing, with Cycle 1 slated to complete in December 2025.
- A lot of work has been done or is ongoing to provide enhancements and new capabilities for Cycles 4 and 5 and beyond -- please continue to socialize these and encourage the community to make use of them!
- Data pipeline team has continued strong coordination of work efforts, leading to continuous improvements and increased community satisfaction with the data pipeline and analysis tools.
- Strategic coordination of calibration activities is also occurring with regular checkpoints and planning across instrument teams to optimize inputs to the Calibration Reference Data System.
- NASA and flight/mission operations teams are working plans to minimize science down time during the next Artemis launch (planned for February 2026), when there will be limited access to the Deep Space Network.



Mission Success Criteria

- Updates on progress towards meeting JWST Level 1 **baseline** science requirements were provided at March 2025 JSTUC meeting
- Requirements specify capabilities of JWST necessary to accomplish specific science goals
- Mission success criteria is formally based on meeting JWST Level 1 **threshold** science requirements, which are similar to the baseline science requirements but with lower requirements on e.g., number of galaxies to observe, amount of observing time to perform, etc.
- Progress towards meeting all requirements is re-assessed every year





Level 1 Baseline Science Requirements

- L1-1: Measure the space density of galaxies to a 2-micrometer flux density limit of $1.0 \times 10^{-34} \text{ W m}^{-2} \text{ Hz}^{-1}$ via imagery within the 0.6 to 27 micrometers spectral band to enable the determination of how this density varies as a function of their age and evolutionary state
- L1-2: Measure the spectra of at least 2500 galaxies with spectral resolutions of approximately 100 (over 0.6 to 5 micrometers) and 1000 (over 1 to 5 micrometers) and to a 2- micrometer emission line flux limit of $5.2 \times 10^{-22} \text{ Wm}^{-2}$ to enable determination of their redshift, metallicity, star formation rate, and ionization state of the intergalactic medium
- L1-3: Measure the physical and chemical properties of young stellar objects, circumstellar debris disks, extra-solar giant planets, and solar system objects via spectroscopy, and imagery within the 0.6 to 27 micrometers spectral band to enable further determination of how planetary systems form and evolve
- L1-4: Enable, within a 5-year mission, a total observing time of at least 1.1×10^8 seconds on targets located at any position on the celestial sphere



Level 1 Threshold Science Requirements

- ✓ L1-5: Measure the space density of galaxies to a 2-micrometer flux density limit of $1.0 \times 10^{-34} \text{ Wm}^{-2}\text{Hz}^{-1}$ via imagery within the 1.7 to 10 micrometers spectral band to enable determination of how this density varies as a function of their age and evolutionary state
- ✓ L1-6: Measure the spectra of at least 1000 galaxies with spectral resolutions of approximately 100 (over 1.7 to 5 micrometers) and 1000 (over 1.7 to 5 micrometers) and to a 2-micrometer emission line flux limit of $5.2 \times 10^{-22} \text{ Wm}^{-2}$ to enable determination of their redshift, metallicity, star formation rate, and ionization state of the intergalactic medium
- ✓ L1-7: Measure the physical and chemical properties of young stellar objects, circumstellar debris disks, extra-solar giant planets, and solar system objects via spectroscopy, and imagery within the 1.7 to 10 micrometers spectral band to enable further determination of how planetary systems form
- L1-8: Enable a total observing time of at least 5.5×10^7 seconds on targets located at any position on the celestial sphere

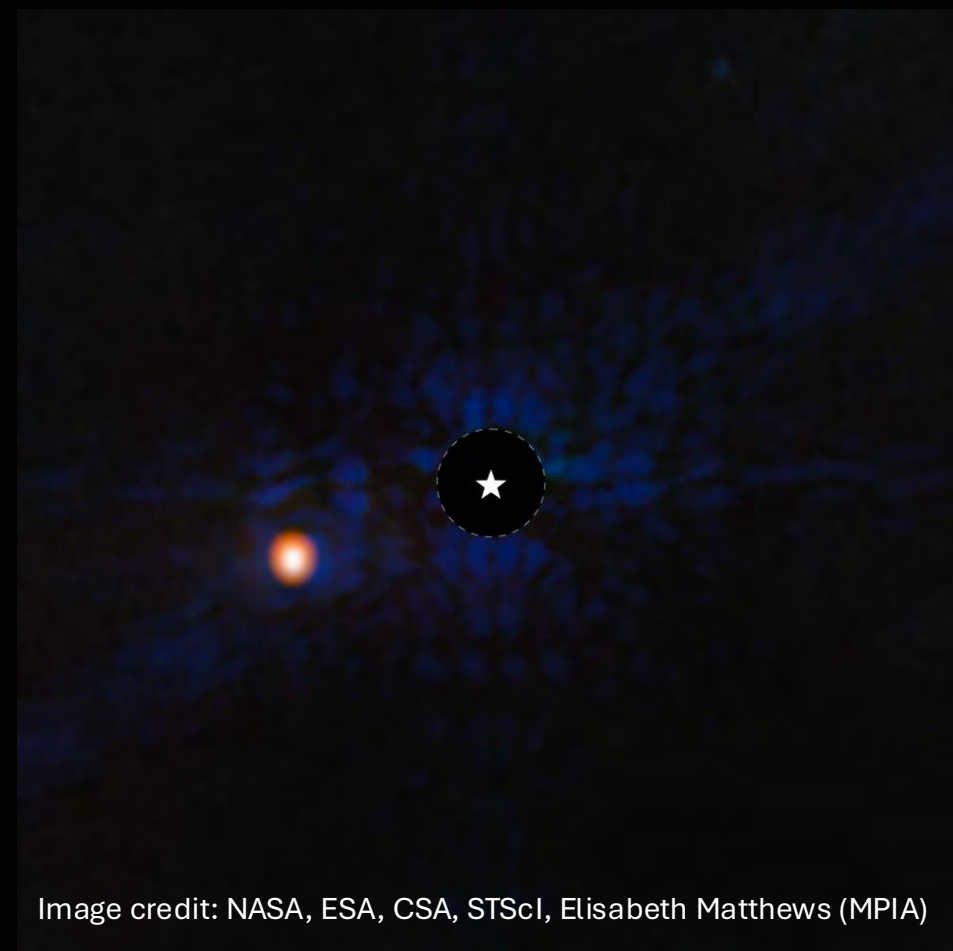
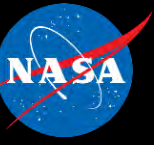


Image credit: NASA, ESA, CSA, STScI, Elisabeth Matthews (MPIA)

on track for completion by end of Cycle 4



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Image credit: NASA, ESA, CSA, STScI

JWST is well on its way to meet the Mission Success Criteria. There is only one formal remaining criterion to meet, L1-8 (Observing Time). The L1-8 criterion will be met by the end of Cycle 4 (~July 2026).



Policy and Science Community

- Grants: Formula approach provided guardrails for GO budgets. Will be assessed and revised to reflect overall GO funding level, number of grants, US-investigators, etc. each Cycle.
- Proposals: Incredible level of interest and science from the community. Concerns with growing numbers and tighter budgets. How do we avoid reviewer fatigue?
- Community response: Need to encourage more participation in surveys. These provide critical input for improvements to the observatory, operations, and leveraging funding.
- Project interaction: Limitations to travel are decreasing our presence at major conferences. In the absence of Townhall events or face-to-face interactions, how do we continue to communicate with our user community?

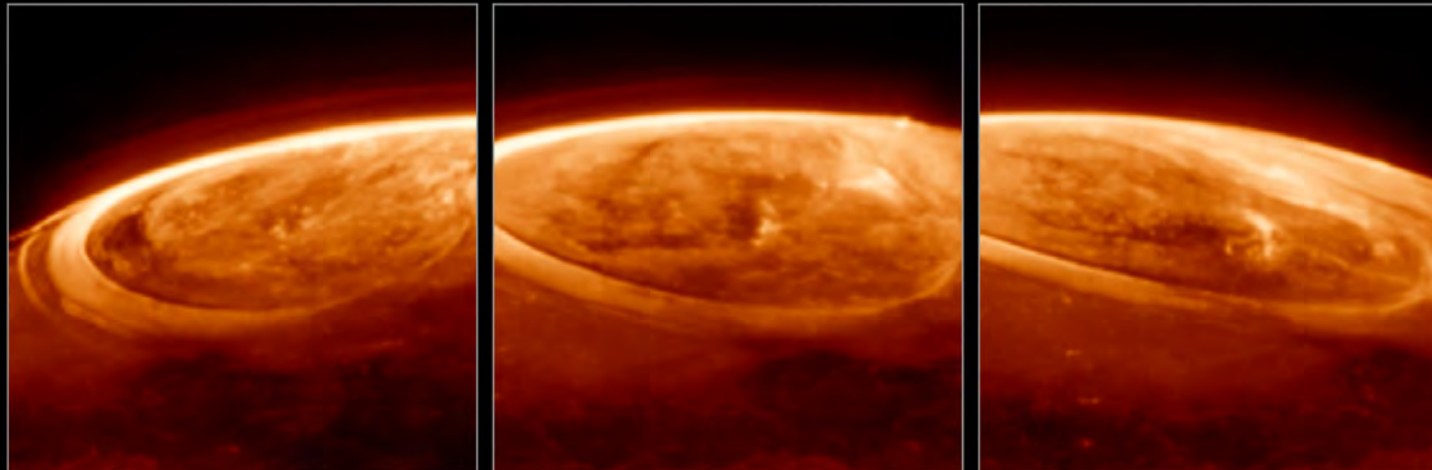


Image credit: NASA, ESA, CSA, Jonathan Nichols (University of Leicester), Mahdi Zamani (ESA/Webb)



Communications

- The GSFC-based comms team continues to work closely with the STScI team to get JWST content to the public, leveraging each teams' strengths.
- In September, the NASA and STScI teams successfully decommissioned webbtelescope.org and transitioned all content aimed at the public to science.nasa.gov/webb. This does not affect content aimed at the science user community; stsci.edu/jwst is not affected.
- *Cosmic Dawn*, NASA's documentary about JWST led by Goddard's Office of Communications, debuted earlier this year and continues to receive excellent viewership.
- JWST science stories continue to resonate with the public.
- Official NASA social media channels continue to grow (particularly Instagram, with 3.5M followers).



Senior Project Scientist's Perspective (repeated)

- My job is to "maximize the science impact of JWST" -- for whatever budget is appropriated.
- JWST continues to deliver phenomenal performance & science.
- **The landscape of US federal science funding is challenging.**
- **Fiscal year boundaries (Oct 1) are an extra uncertain time.**
- **Research awards:** Your 5/2025 report emphasized that research awards are essential to turn data into discoveries. NASA intends to fund Cycle 4 research awards at \$60M. Notification letters coming.
- JWST's 5-year prime mission ends 7/2027. NASA has different expectations for extended missions compared to prime missions. There is a strong expectation that extended missions are more efficient, streamlined, and lower cost.



Project Science's questions for the JSTUC

- What are the main barriers to turning JWST data into published results?
- How to increase survey participation?
- How to avoid reviewer fatigue? Should we reduce proposal pressure?
- Given travel restrictions, how should we communicate with users?
- How to do more with less in extended mission? What are some potential efficiencies?