## JWST Update

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Eric P. Smith JWST Program Office 30-June-2021

### **RECENT EVENTS**



- Observatory
  - All observatory post-environmental testing deployments are complete
  - Final stow and preparations underway prior to shipping
- Science and Operations
  - Ground segment testing and operations rehearsals continuing
    - Completed Launch Readiness Exercises #3 and #4 and commissioning rehearsals
    - LRE #4 last week saw more mission operations center (MOC) room staffing
  - Cycle 1 program defined
- Programmatic
  - On track to complete observatory for August ship date and a 10/31/21 LRD
  - Working with ESA & Arianespace to be the 3<sup>rd</sup> Ariane 5 launch this year after they return to flight in late July.
  - NASA Senior management is fully aware of concerns raised by members of our community regarding the mission's name (and the petition about the topic) and is working with historians on the matter.



## SIMPLIFIED SCHEDULE





## **REMAINING I&T STEPS**





**DBS Final** 



4

## **REMAINING I&T STEPS**



#### **Observatory Deployments**



## **KOUROU ACTIVITIES**







## COMMISSIONING AT A GLANCE

Commissioning begins at launch and is ~ 180 days long marked by the following key events:

- 1. Launch and Ascent power positive, safe attitude, and communications established
- 2. Mid Course Correction MCC1 (a and b) corrects launcher dispersions for proper L2 trajectory
- 3. Deployments
- 4. Cool-Down/Cryo-Cooler Activation
- 5. Mirror segment deploy and wave-front control
- 6. Science Instrument calibrations and checkout





## SPACECRAFT COMMISSIONING

#### Spacecraft Systems

Any spacecraft related commissioning activities not captured under another phase fall under the spacecraft systems phase

50 total activities, spanning the course of the 180-day commissioning

Most activities are within the first 30 days of commissioning

Launch & Ascent (L&A)

Autonomously commanded phase from launch through solar array deployment, sun capture, and comm establishment

Mid-Course Correction (MCC)

Activities related to achieving final mission orbit

Deployments

All deployment activities up to mirror segment deployment



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## COOLDOWN



Objective of Cooldown:

To get to operational temperatures safely while preventing and/or mitigating contamination of sensitive surfaces on the JWST Observatory

Begins after LV fairing is jettisoned

Cooling rate increases for most of the hardware once Sunshield has been successfully deployed

• Ends when all the following have been achieved

Telescope optics and Science Instruments (SIs) have stabilized at cryogenic operational temps

MIRI opens Contamination Control Cover and ready for on-sky observations (~L+98 days)



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## **SCOMMISSIONING**

- GOAL: Bring the science instrument modes to readiness for "turning them loose on the universe"
- Characterize the performance and operational aspects of each mode well enough to know how to take "science-quality data" with it
- Important earlier functional checkouts and internal calibrations are interleaved with telescope commissioning; the heart of SI commissioning corresponds to the final two months of commissioning
- This is the time period for "on-sky" commissioning activities with an aligned/phased telescope (*i.e.*, after telescope commissioning)



## CYCLE 1 GO/AR RESULTS

**Sides courtesy STScl** 



## JVST CYCLE 1 OVERVIEW

- More than 10,000 hours of observing time allocated for science during Cyde 1
- Includes

Guaranteed Time Observations (GTO, ~3,500 hours) Director's Discretionary Early Release Science (DD-ERS, ~500 hours) General Observer Programs (GO, ~6,000 hours)

- Almost 400 individual programs
- More than 2,500 worldwide investigators
- A new call for proposals anticipated every year during the science mission
- Nearly every area of astrophysics and planetary astronomy is already represented during the first year of observations



## **EXECUTIVE SUMMARY**

#### Submission statistics

1172 proposals, 1084 GO for ~25,278 hours 1169 proposals compliant with dual anonymous protocols 374 with ESA Pls, 44 with Canadian Pls

Review process

Small & Medium proposals are reviewed by topical panels Large and Treasury proposals are reviewed by the Executive Committee

- Panel chairs, At-Large members, TAC chairs
- Acceptance Rate

  - GO 1 in 4 for proposals (286) and Hours (5981)
    Small (<25 hrs): 52% of total time allocated 1 in 4.1 by proposals</li>
    - Medium (25-75 hrs): 32% of time allocated 1 in 3.8 by proposals
    - Large (>75 hrs): 16% of time allocated 1 in 4.75 by proposals
  - Archival Research 20/75 = 1 in 3.75 acceptance by proposals Regular 15 recommended Theory 5 recommended
- Instruments: MIRI 28.1%, NIRCam 24.4%, NIRISS 6.7%, NIRSPEC 40.8%

## **EXECUTIVE SUMMARY**



#### CSA Acceptance

Pls4% for proposals and hours of total observing program CSASubmitted vs Accepted is

23% for proposals 10 accepted from 44 submitted

31% for hours 249 allocated from 813 requested

Colsare 2% of the total Cols

#### • ESA Acceptance

Psfor proposals 33.5% and 30% for hours of total observingprogram ESASubmitted vs Accepted is 24% for proposals 89 out of 374 22% for hours 1786 out of 8222 Colsare 36% of the total Cols

#### Student-led proposals

25 accepted proposals from 122 submitted

 Calibration & mission support 4 calibration proposals 4 mission support proposals

## >2000 HOURS WITH NO EXCLUSIVE ACCESS PERIOD

Programs without exclusive access periods:

- All Director's Discretionary and Early Release Science Programs,
- All Large General Observer programs
- Many Solar System Guaranteed Time Observing programs and some parallels
- Some Small and Medium General Observer programs



# SCIENCE CATEGORY



## **INSTRUMENT MODES**







## TECHNICAL & SCHEDULING REVIEWS



All proposals are subject to technical and scheduling reviews by STScI staff. Key scheduling issues:

High data volume – may preclude parallel observations in some instances Uninterrupted observations – only allowable when scientifically required Some programs may require adjustments that lead to longer charged times We will be flexible in allowing some such adjustments in Cycle 1

## JVST SCIENCE TIMELINE



estimates



#### Fiscal Year 2021 JWST HQ Milestones

Month		Milestone	Comment			
Oct-20	1	Complete Observatory Envronmental Testing	Completed 10/2/20			
Nov-20						
Dec-20	2	Complete Post Environmental Testing Spacecraft Bus Deployments	Completed 11/12/20			
Jan-21	3	Complete Post Environmental Testing Sunshield Deployments	Completed 12/16/20			
Feb-21	4	Complete Comprehensive System Test #5	Completed 2/13/21			
Mar-21	5	Complete Cycle 1 Geneal Observer Proposal Reviews	Completed 3/30/21			
	6	Sunshield Fold Complete	Completed 4/6/21			
	7	Launch Readiness Exercise #2	Completed 3/8/21			
Apr-21						
May-21	8	Final Deployable Tower deployment	Completed 6/8/21			
Jun-21						
Jul-21	9	Final Observatory Stow Complete				
	10	Observatory Pre-Ship Review				
	11	Launch Readiness Exercise #4	Completed 6/22/21			
Aug-21	12	2 Operational Readiness Review				
	13	Ship Observatory to Launch Site				
Sep-21						
Blue font(underline) denotes milestones accomplished ahead of schedule, orange font denotes milestones accomplished late.						



## BACKUP



#### MILESTONE PERFORMANCE

Since the September 2011 replan JWST reports high-level milestones monthly to numerous stakeholders

	Total Milestones	Total Milestones Completed	Number Completed Early	Number Completed Late	Deferred to Next Year	Deferred more than one quarter
FY2011	21	21	6	3	0	0
FY2012	37	34	16	2	3	3
FY2013	41	38	20	5	3	2
FY2014�	36	23	10	8	11	10
FY2015	48	44	22	12	4	3
FY2016	45	39	25	7	6	2
FY2017	38	32	12	13	8	5
FY2018	31	18	7	2	13	13
FY2019	25	22	10	10	3	2
FY2020	17*	12	5	0	0	0
FY2021	13	9	3	2	0	0

<sup>\*</sup> Milestone accounting in FY2014 was complicated by the government shutdown and multicomponent milestones. \*Milestone reporting stopped during COVID-19 impacted months

## DUAL ANONYMOUS REVIEW



- Proposal reviews are conducted with the identities of the proposal teams removed from the proposals.
- Each panel has a Leveler who helps to keep the panel discussion focused on the selection criteria.
- Once the proposals are ranked, then the panel may examine the Team Expertise.





**PI Seniority** Submitted JWST cycle 1 HST Cycle 28 HST cycle 28 - median PhD 2008 100.00% JWST Cycle 1 - median PhD 2010 90.00% 80.00% Cumulative fraction HST cycle 28 - 9% student PIs, 97 total 70.00% JWST Cycle 1 - 10.4% student PIs, 122 total 60.00% 50.00% 40.00% 30.00% 20.00% 10.00% 0.00% 965 966 967 968 969 970 971 972 973 975 975 978 979 980 981 982 988 066 983 989 .26 38 66 66 66 8 8 8 Year of PhD Approved HST Cycle 28 - median PhD 2009 JWST cycle 1 - median PhD 2010 120.00% 100.00% HST cycle 28 - 4.2% student PIs, 8 total JWST cycle 1 - 8.7%, 25 total 80.00% 60.00% 40.00% 20.00% 0.00% 1965 11966 11967 11968 11978 11970 11973 11974 11974 11975 11976 11977 11978 1 992 993 995 995 997 997 985 986 988 989 990 984 987 991