STScI | SPACE TELESCOPE SCIENCE INSTITUTE

EXPANDING THE FRONTIERS OF SPACE ASTRONOMY

JWST science policies and science timeline

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JSTUC: September 9, 2019

Overview

- NASA paused the JWST proposal submission process on March 27 2018
  - Formal launch date is March 30 2021 with science observations starting no earlier than 10/01/2021.
- Topics to be covered in this presentation:
  - ERS status
  - Science Timeline
  - Cycle 1 GO Call preparations

ERS Status: Science Timeline

- ERS (and GTO) teams had the opportunity to revise their proposals.
  - By 06/25/2019, 11 ERS (118 GTO) programs were resubmitted using APT 27.1.1 (PPS 14.7) (released 06/03/2019).
  - They assumed no major revisions to instrument capabilities for Cycle 1.
  - They assumed a 03/30/2021 launch date and start of science observations after 10/01/2021.
  - They were asked to communicate of any proposed changes in targets beyond the options included in the original proposal and any revisions had to be approved by the Program Scientist for the JWST Program and by the STScI Director.
  - ERS (and GTO) teams will be allowed to resubmit in 2020 using the same APT version to be used by the GOs.
    - ERS time allocation will be adjusted to accommodate APT timing model changes (because they were approved to achieve a particular science goal).

ERS Status: Communications

Topics of discussion in the quarterly ERS telecons and email communications (coordinated by Bonnie Meinke):

- Calibration pipeline:
  - Updated them on current status (Dec 2018) and pointed them to resources.
- Simulated Data:
  - Needs assessment.
  - Responsive to questions about when simulated data will be ready.
  - Connecting teams to find common simulations they could use.
- Discussion with Data Science Mission Office on development of Data Analysis Tools:
  - Needs assessment.

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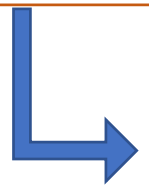
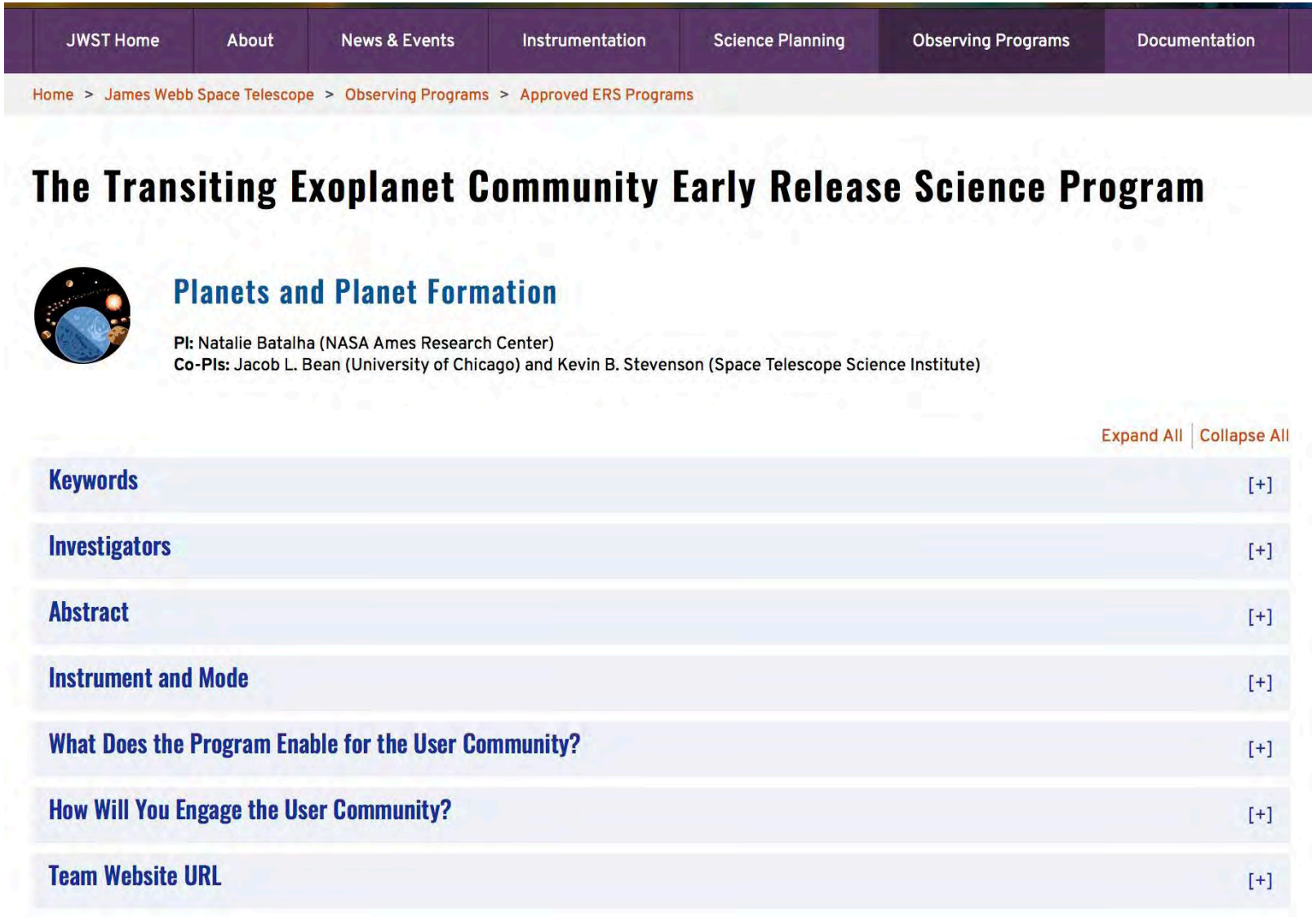


Coordinating ERS and JSTUC discussions on this topic would be very beneficial for the community.

ERS Status: Community Engagement

- ERS teams have access to wiki-style space for sharing and collaborating.
- ERS teams have pages on the JWST Observer website for sharing details of their programs and plans for engaging the broader community.



ERS Status: Funding

Sustaining support for ERS teams was identified as a priority by the Independent Review Board

- Mission Success Enhancement #15: Early Release Science Funding
- Continuing discussions with the Project to establish & maintain appropriate mechanisms

SMO/Grants schedule

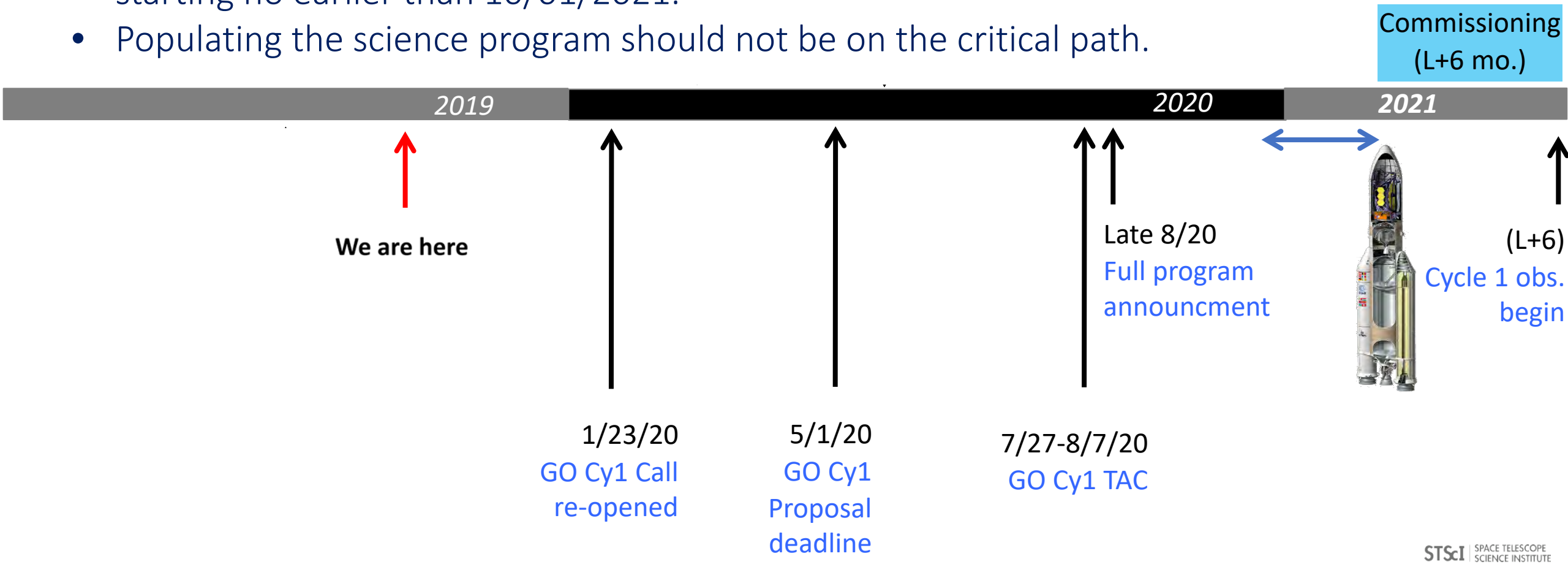
- 10/15/2018: Budgets submitted by ERS teams
- 11/4/2018: Internal review completed and results approved by the STSCI Director
- 12/2018: Budget approvals. Appropriate contract value modifications made. Letters dispersed to the ERS teams on December 13 2018
- 1/2019 all 46 ERS grants have been awarded.
- 1/31/2020: Interim reports due
- 10/1/2019: FY20 made available

ERS Status: Next Steps

- Planning visits to STScI by ERS team members.
- Helping ERS teams deliver and disseminate their user engagement materials, programs, and tools
- Give ERS teams updates on:
  - Calibration pipeline.
  - Dada Analysis Tools and the future development plans.
  - Simulated data.
  - Grants.
  - Reporting.

Science Timeline: schedule constraints

- JWST Project is working towards a November 30 2020 launch readiness date (LRD).
- Formal launch date is March 30 2021 (80% confidence level) with science observations starting no earlier than 10/01/2021.
- Populating the science program should not be on the critical path.

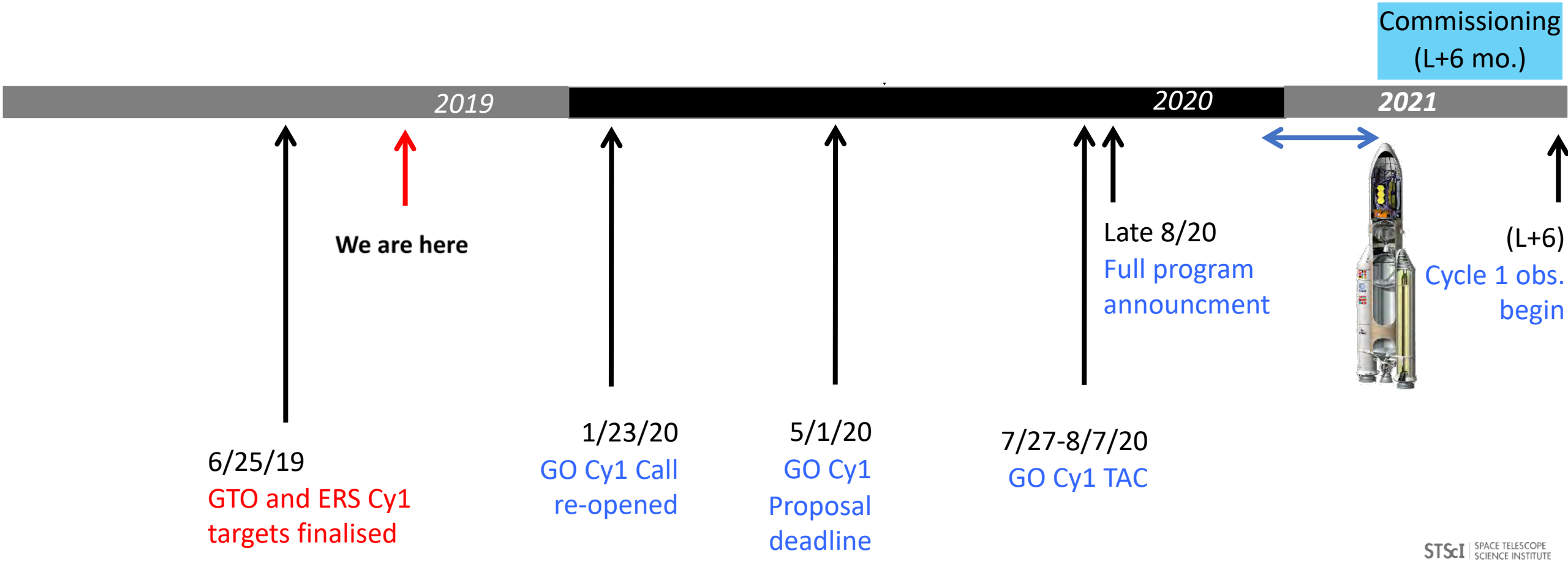


Science Timeline: schedule constraints

- NASA Policy 8: GTO targets must be finalised 7 months prior to the GO Call being re-issued.
  - To fulfil this policy, the GTO/ERS deadline to resubmit was set to 06/25/2019 and the GTO call was re-released 04/25/2019.
  - These APT submissions will serve as the reference for Cycle 1 GO proposers, so the target list is final.
- This is to allow enough time for GO proposers to design programs that avoid duplications.
  - Standard duplication rules apply regarding Cycle 1 GO programs.
  - GO Proposers can check for potential duplications using the MAST tool.
    - No spreadsheets with target lists as in 2017.
  - Scientifically unjustified duplicate observations will not be permitted.

This Science Planning Timeline was released to the community 04/25/2019

Science Timeline: schedule constraints



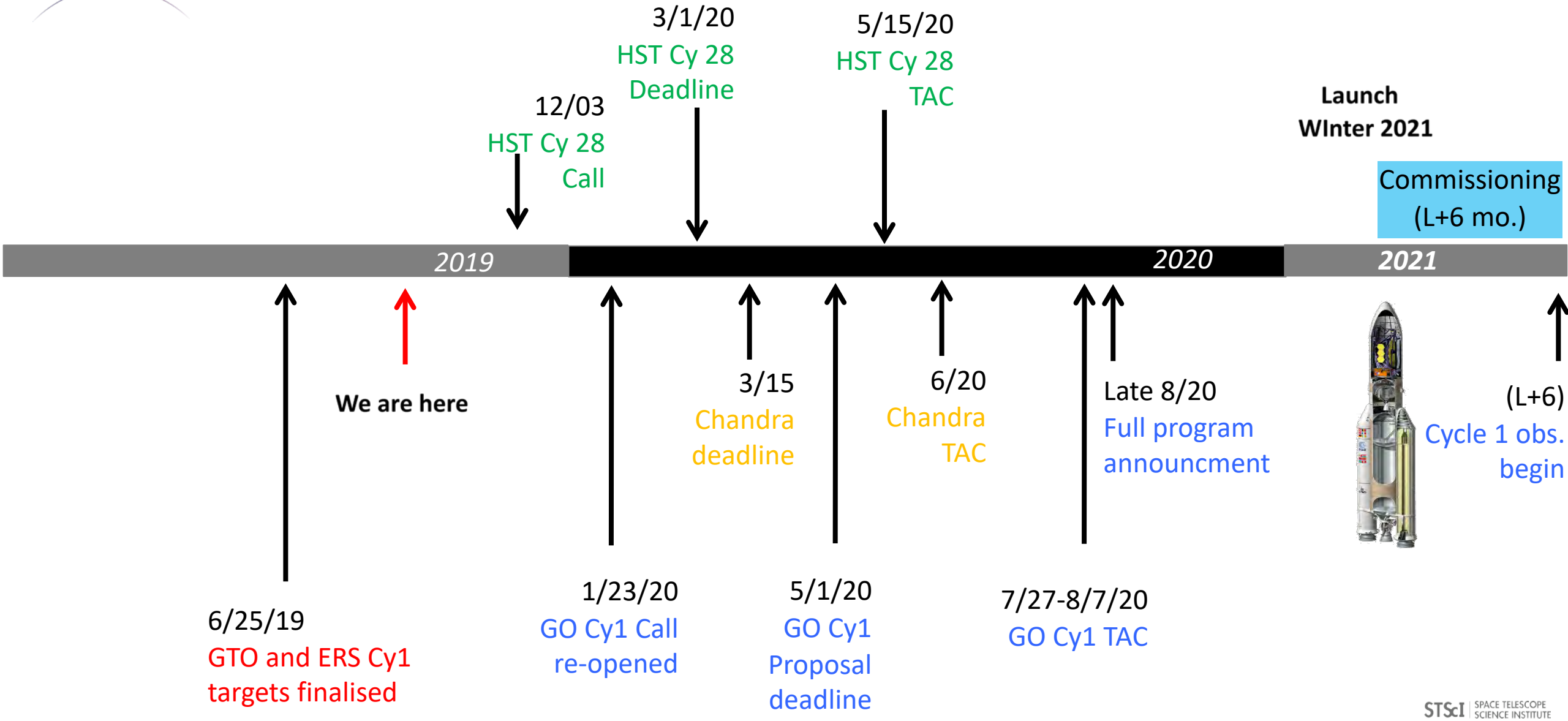
Science Timeline: upcoming ERS and GTO resubmission

- The version of APT used by ERS and GTO teams in their 06/25/2019 resubmission is not the final version to be used for Cycle 1. They will be allowed to resubmit in 03/2020 using the same APT version to be used by GOs.
- Because the APT timing model has not been finalized, strict time limits were not imposed on the 06/25/2019 ERS and GTO resubmissions.
- ERS time allocation will be adjusted to accommodate upcoming APT timing model changes (because they were approved to achieve a particular science goal).

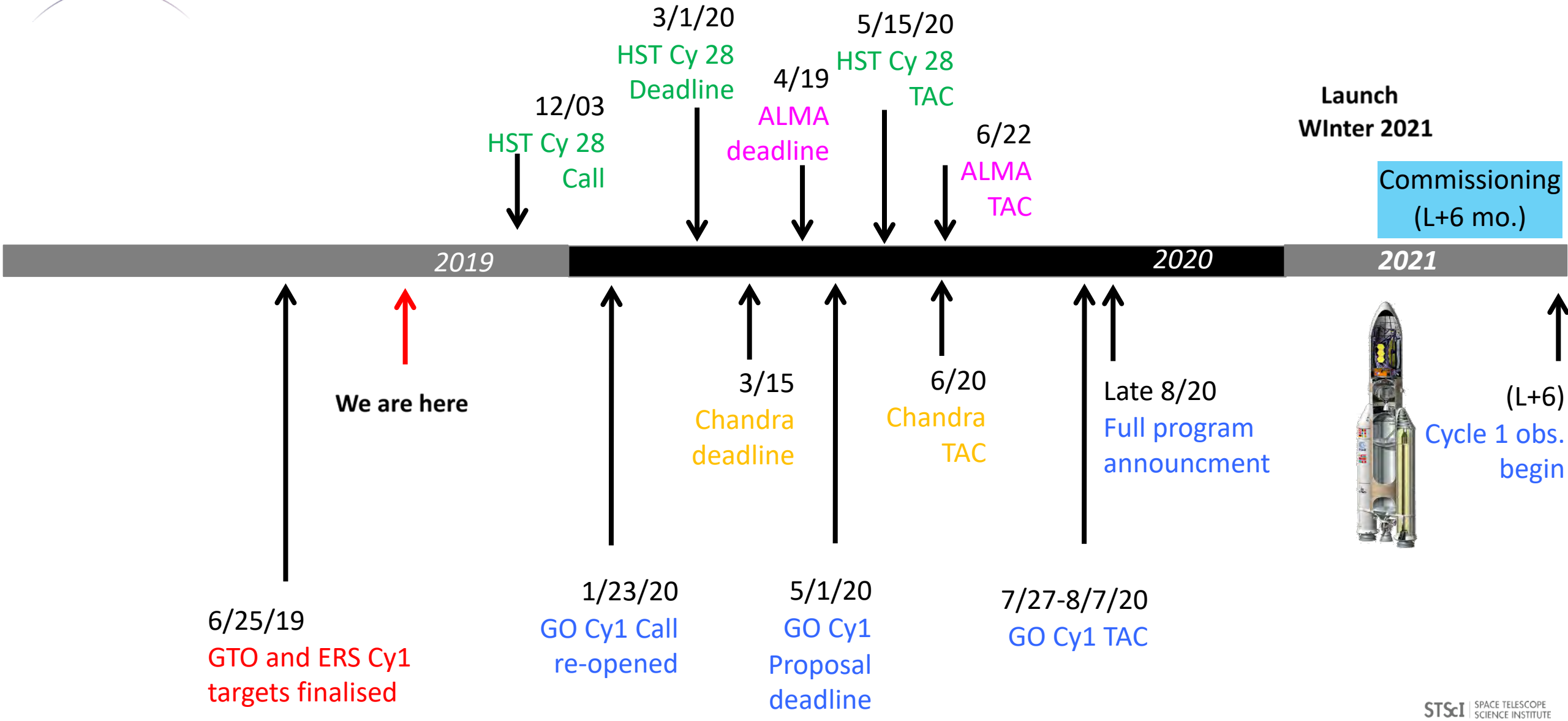
Science Timeline: upcoming ERS and GTO resubmission

- GTOs will have to adjust their programs to match their overall time allocations (specified in NASA Policy 9). From that point on, any difference between the Cycle 1 GTO time allocation and the Cycle 1 program execution time will be absorbed by the observatory.
- GTOs may not add new targets; however, they can take advantage of efficiency improvements of their approved observations.
  - Revisions must be completed by 3/31/2020 to allow sufficient time to inform GO proposers.
  - The expectation is that no substantive new instrument capabilities will be available.
- GTO/ERS/GOs may also submit change requests during Cycle 1 to take advantage of these improvements that may become available subsequent to launch.
  - Requests will be reviewed by the Telescope Time Review Board & adjudicated by STScI science policies for recommendation to the Director.

Science Timeline



Science Timeline



Cycle 1 GO Call preparations: submission process

- The launch delay allowed the opportunity to incorporate changes to the proposal process based on a “lessons learned” review of the halted 2018 submission, including
  - Training (e.g. ”train the trainers" workshops; video tutorials)
  - Tools (e.g. ETC Lite; improved APT-ETC consistency)
  - Support (encourage the community to use the Help Desk)
  - Documentation (improved JDox navigation, including Calls for Proposals).
- Many proposers would have been scrambling to meet the April 2018 deadline as most proposals are required to be “LRP-ready” on submission (full specification of observations, scheduling constraints and check for guide-star availability). We need to disseminate the message that JWST is a complex observatory with complex instrumentation **and the community needs to start working on proposals early.**
- The ERS/GTO resubmission process (due 06/25/2019) went smoothly and represented a comprehensive test of the system (PPS, JDOx, and user support aspects).
- All proposals will be processed using the same version of Astronomer’s Proposal Tool.

Cycle 1 GO Call preparations: Telescope Allocation Committee

- JWST is expected to be popular with the community.
  - Assume ALMA-like proposal submission, but not ALMA-like panel workloads.
    - Overworked panelists will make poor decisions.
  - Aim for HST-like proposal pressure per panel (70-80 proposals/panel).
- Anticipate 1400-1600 proposals ➔ 20+ panels.
- TAC will span two weeks.
  - Week 1: “Galactic”; Week 2: “Extragalactic”.
  - 10-11 panels will meet Monday-Wednesday (noon).
  - Panel chairs will meet to consider Large/Treasury proposals Wednesday afternoon through Friday.
  - TAC recruitment will start in October.

Cycle 1 GO Call preparations: joint proposals

- The Cycle 1 GO Call will include joint JWST/HST proposals.
  - Approximately 150 orbits of HST time (TBC) from the Cycle 29 allocation.
  - Aimed for programs that require a smaller number of HST orbits.
  - Large combined programs may come later.
- We are starting to develop guidelines for HST/JWST overlap in capabilities.
- Joint programs with other facilities (e.g. Chandra, ALMA/NRAO, ground-based OIR facilities) will *not* be available in Cycle 1.

Cycle 1 GO Call preparations: proposal format

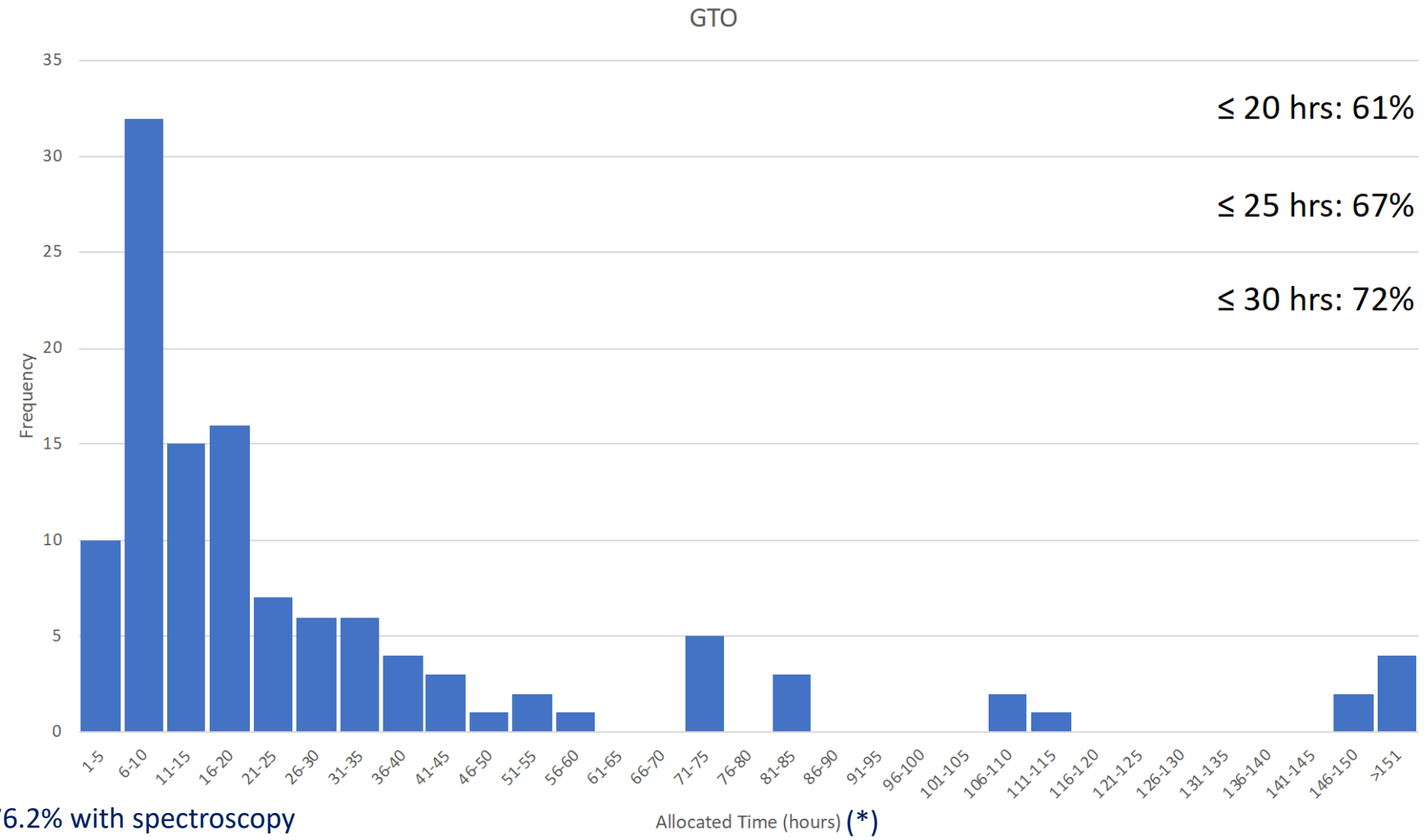
- Proposals will list total time without breaking out overheads (so the TAC panel discussions focus on the science rather than the efficiency of the observations; the latter will be improved, if need, as part of the standard review process of approved proposals).
- Proposals will follow a dual anonymous review.

Cycle 1 GO Call preparations: proposal size boundaries

- In the context of a better understanding of JWST overheads, and to ensure a balanced portfolio, we would like to revisit the boundary between small and medium proposals.
  - Small (≤25 hours), Medium (25 < t ≤ 75 hours), Large (> 75 hours) in early cycles.
  - The majority of time in Cycle 1 will likely be allocated to Small programs.
  - There will be no cap on program size.
- Given the flexibility that the GTO teams have, the submitted GTO programs are representative of what to expect regarding the proposal time distribution.

Cycle 1 GO Call preparations: proposal size boundaries

(*) Allocated hours do not yet take into account the upcoming updates to the APT timing model



Small (≤25 hours): 80 proposals; 76.2% with spectroscopy
Medium (25 < t ≤ 75 hours): 28 proposals; 82.1% with spectroscopy
Large ((> 75 hours): 12 proposals; 100% with spectroscopy

Summary

- ERS:
  - Funding is in place.
  - Teams are making plans for visits to STScI.
  - Working on coordinating tools and products.
- Science timeline:
  - The Cycle 1 GO Call will be re-issued on 1/23/2020.
  - Proposal deadline is 5/1/2020 (TBC).
  - TAC meets in late July/early August 2020.
  - Full program announced by late-August 2020.
  - ERS and GTO teams will be able to resubmit their APT files in March 2020.
- Program size:
  - Over 67% of GTO proposals are <25 hours with current version of APT (small category) (76.2% with spectroscopy).

Backup

Science Timeline: schedule constraints

- All accepted JWST proposals require technical review
- GTO and ERS proposals will be in hand well in advance of the release of the Cycle 1 GO Call
- Approximately 6,000 hours available for Cycle 1 GO proposals
  - 8766 hours available in an annual cycle
  - Over-subscribe by ~2,000 hours in Cycle 1 for scheduling efficiency
  - Up to 10% of total time as DD time: 876 hours → ~7900 hours for GO+GTO
  - GTO teams have scheduled ~3700 hours in their Cycle 1 programs
- Anticipate ~300 accepted proposals
- INS estimates a minimum of 4 months will be required for technical reviews
  - Once sufficient proposals are reviewed, the Cycle 1 Long Range Plan will be constructed
- INS staff will transition to commissioning support 2-3 weeks after launch
- Scheduling the TAC in late July/early August is consistent with supporting the Launch Readiness Date
  - 2-week timeframe for TAC proposal review
  - Proposal selection will be finalised at Director's Review, ~1 week after TAC
  - Full program announced by late-August 2020
- Anticipate reviews completed for ~80% of GO programs by mid-December 2020
- Cycle 1 LRP can be updated as reviews are completed for additional programs

Cycle 1 program types

- We anticipate a balanced distribution in program sizes over all cycles
  - Small/Medium/Large in early cycles
  - The majority of time in Cycle 1 will likely be allocated to Small programs
    - There will be no cap on program size
- Cycle 1 will include specialised categories
  - Long-term programs → Regular/Medium programs whose science requires observations in future cycles (astrometry, variability)
  - ToO programs (e.g. high redshift supernovae)
  - Time-constrained observing programs (e.g. exoplanet transits)
  - Treasury/Legacy programs → programs with broad science reach and emphasis on providing higher-level data products for the community
  - **Joint JWST-HST programs *will* be available but only via the JWST Cycle 1 Call**
  - Joint programs with other facilities (eg Chandra, ALMA/NRAO, ground-based OIR facilities) will *not* be available in Cycle 1
- JWST will also support proposals for archival & theory research programs
  - ERS programs available for AR proposals in Cycle 1
  - Some scope for related lab experiments

Science Parallel Observations

- Operating two or more instruments in parallel increases the science return
- Parallel science observations have been enabled for Cycle 1
  - Coordinated parallels
    - Single program, complementary observations
    - Both datasets carry the same exclusive access period
  - Pure parallels
    - Separate proposals, distinct programs
    - Parallel observations may not drive program parameters
    - Pure parallel observations are non-proprietary
  - The following combinations will be available for coordinated parallels
    - NIRCam Imaging + MIRI Imaging
    - NIRCam Imaging + NIRISS WFSS
    - MIRI Imaging + NIRISS WFSS
    - NIRCam Imaging + NIRISS Imaging (NIRCam must be prime)
    - NIRSPec MOS + NIRCam imaging (NIRSpec must be prime)
- Most 2-instrument combinations will be available for pure parallel observations
- Parallels may not be allowed for prime programs that require high stability (eg exoplanet transit observations, coronagraphy)

ToO Observations

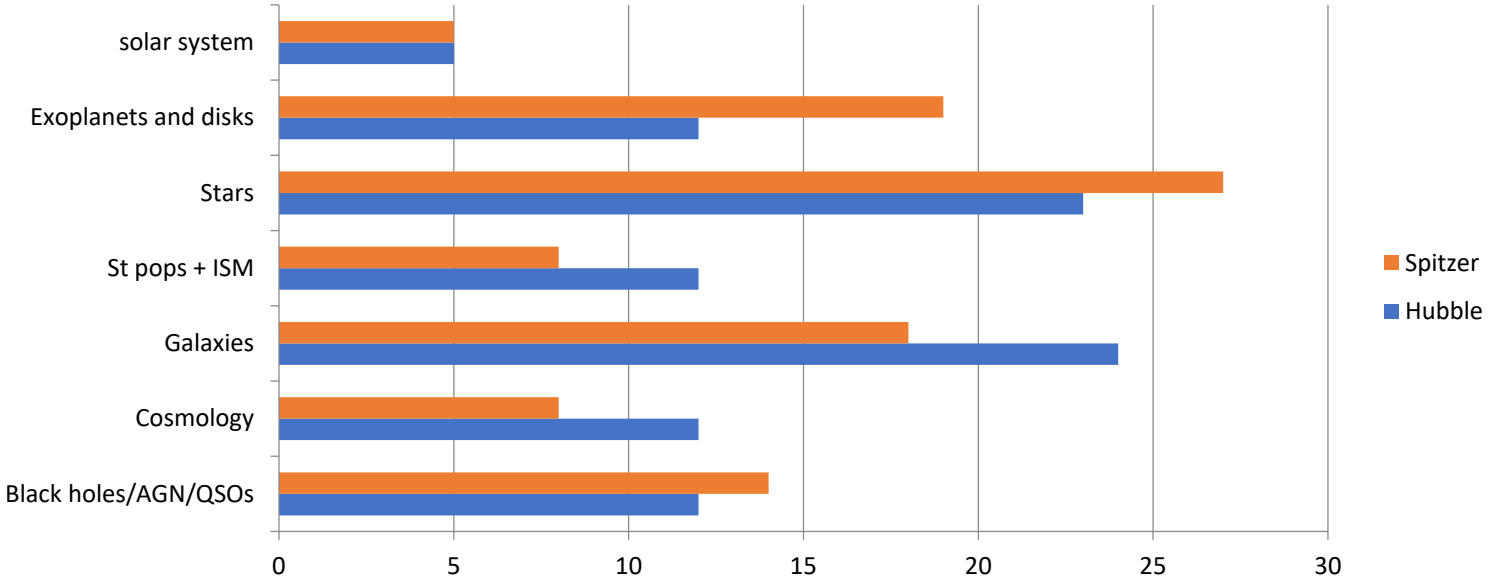
- Target of Opportunity proposals target transient phenomena that are expected, but occur at an unpredicted location and time
  - e.g. comets, novae, supernovae, GRBs
- ToOs must be inserted into the JWST observing schedule in mid-cycle
  - ToOs that require turnaround times <14 days are disruptive
    - Only 8 permitted in Cycle 1 – all available for GO proposers
  - ToOs that require turnaround times < 3 days will carry an additional overhead of 45 minutes/activation
    - Allows for the impact on observing efficiency

Time-constrained and time-critical observations

- Time constrained observations are observations that must be executed within a given absolute time period
  - e.g. observations of specific phases of variable stars, exoplanet transit observations, some solar system phenomena
- Time critical observations are time constrained observations that must start within a window of less than 60 minutes. These observations will carry an additional overhead of 60 minutes/activation to account for the scheduling impact.
  - Statistically, we generally arrive early and wait…

Cycle 1 TAC planning: topics

- **Science topics:**
  - Use Spitzer Cycle 5 & HST Cycle 24 as a guide



Cycle 1 TAC planning: panels

- **JWST is expected to be popular with the community**
  - Assume ALMA-like proposal submission, but not ALMA-like panel workloads
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  - Aim for HST-like proposal pressure per panel (70-80 proposals/panel)

Topical panel		N=2000		N=1600	
	%	proposals	panels	proposals	panels
Black holes/AGN/QSOs	12	240	3	190	3
Cosmology	10	200	3	160	2
Galaxies & IGM	20	400	5	320	4
Stellar pops/ism	10	200	3	160	2
Stellar Physics	25	500	7	400	5
Exoplanets/disks	18	360	5	290	4
Solar system	5	100	2	80	1
			29		21

Cycle 1 TAC planning: schedule

- **For planning purposes, assume N=1600 & 21 panels**
  - HST TAC currently utilizes 15 panels dispersed throughout STScI and JHU Physics & Astronomy
  - Expanding to 21 simultaneously supported panels will strain resources
- **For JWST Cycle 1 we plan on distributing the TAC process over a 2-week period**
  - Week 1 “Galactic”, Week 2 “Extragalactic”
  - 10-11 panels meet Monday-Wednesday noon
  - Panel chairs meet to consider Large/Treasury proposals Wednesday afternoon – Friday
- **JWST Cycle 1 GO TAC is planned for June 17 – 29 2018 @STScI**