

National Aeronautics and
Space Administration



EXPLORE SCIENCE

NASA Headquarters Update

ExoPAG #22 | June 18-19, 2020

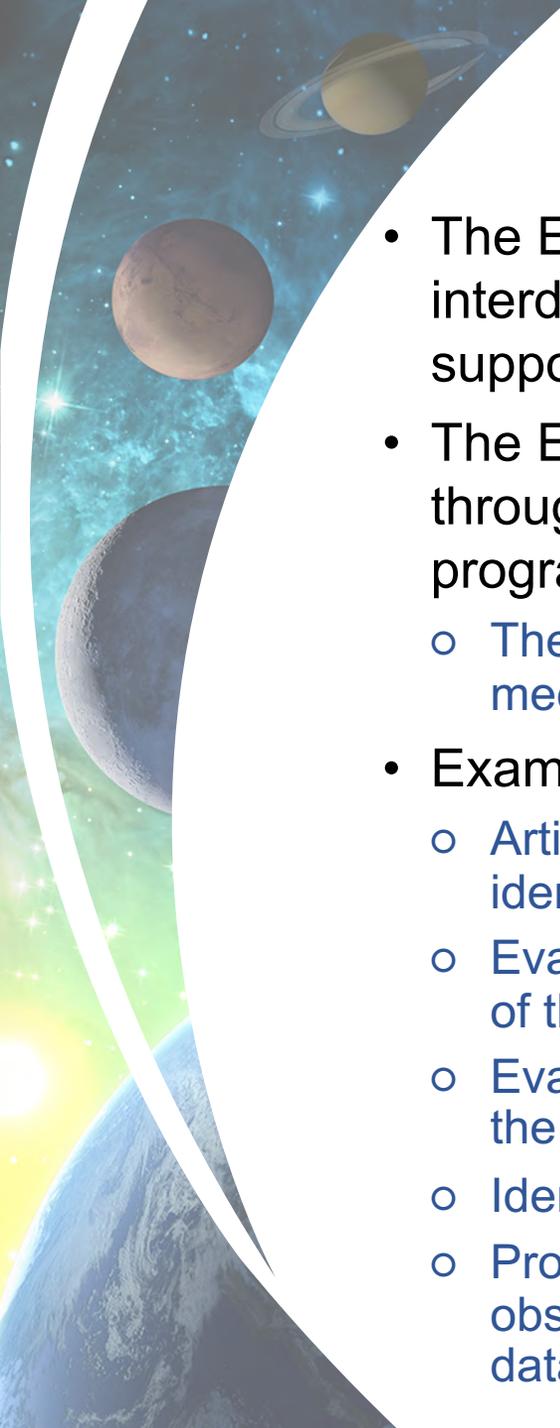
Douglas Hudgins (Douglas.M.Hudgins@nasa.gov)

ExoPAG Executive Secretary

Astrophysics Division, Science Mission Directorate

The background of the slide is a composite image of a starry night sky. The top portion features a dark blue and black space filled with numerous small, bright stars and a prominent, glowing blue nebula on the right side. The bottom portion shows a similar starry field but with a warm, golden-orange glow on the left and a greenish-yellow glow on the right, suggesting different nebulae or star clusters. The overall effect is a rich, multi-colored cosmic scene.

An Introduction to the ExoPAG



Exoplanet Program Analysis Group (ExoPAG)

<https://exoplanets.nasa.gov/exep/exopag/overview>

- The Exoplanet Exploration Program Analysis Group (ExoPAG) is a community-based, interdisciplinary forum for soliciting and coordinating community analysis and input in support of NASA's Exoplanet Exploration Program (ExEP).
- The ExoPAG enables direct regular communication between NASA and the community through public meetings that give the community opportunities to provide scientific and programmatic input.
 - The ExoPAG consists of all members of the community who participate in these open meetings.
- Example ExoPAG tasks:
 - Articulate and prioritize the key scientific drivers for Exoplanet Exploration research, and identify gaps in the current programs;
 - Evaluate the expected capabilities of potential ExEP missions for achieving the science goal of the program
 - Evaluate ExEP goals, objectives, investigations, and required measurements on the basis of the widest possible community outreach;
 - Identify and prioritize technology gaps for future exoplanet flight missions; and
 - Provide findings on related activities that support the program, such as ground-based observing, theory and modeling programs, laboratory astrophysics, suborbital investigations, data archiving, and community engagement.

Exoplanet Program Analysis Group (ExoPAG)

<https://exoplanets.nasa.gov/exep/exopag/overview>

- The ExoPAG is led by a community Chair appointed from the exoplanet community to serve a 3-year term.
- The ExoPAG Chair is supported by a 10-member Executive Committee (EC)
 - EC members are selected to reflect a cross-section of the exoplanet exploration stakeholder community;
 - EC members are solicited annually and appointed to rotating 3-year terms.
- Together, the ExoPAG Chair and EC are responsible for:
 - Capturing and organizing community input;
 - Keeping the community informed of ongoing activities and opportunities within the ExoPAG exoplanet program;
 - Overseeing ExoPAG analyses; and
 - Preparing ExoPAG findings and inputs to the Astrophysics Division.
- Much of the ExoPAG's work is conducted by Study Analysis Groups (SAGs) and Science Interest Groups (SIGs), which focus on specific exoplanet topics or goals.
 - A SAG is a group that is convened to conduct a specific, clearly-defined task or activity; SAGs are generally time limited and are dissolved after completing/reporting results of the task.
 - A SIG is a group that has a shared interest in a specific scientific area (e.g. exoplanet demographics, radial velocity measurements); group serves as an ongoing source of expert input for the program on its topic of interest.
 - Information about current and previous SAGs at: <https://exoplanets.nasa.gov/exep/exopag/sag/>

The ExoPAG Executive Committee (EC)

Name	Home Institution
Michael Meyer (Chair)	Univ. of Michigan
Tom Barclay	NASA GSFC
Natasha Batalha*	NASA ARC
Jacob Bean*	Univ. of Chicago
Jessie Christiansen	Caltech
John Debes*	STScI
Rebecca Jensen-Clem	Univ. of California, Berkeley
Tiffany Kataria	JPL
Josh Pepper	Lehigh Univ.
Dmitry Savransky	Cornell Univ.
Laura Schaefer*	Stanford Univ.
Vikki Meadows (past chair, ex officio)	Univ. of Washington

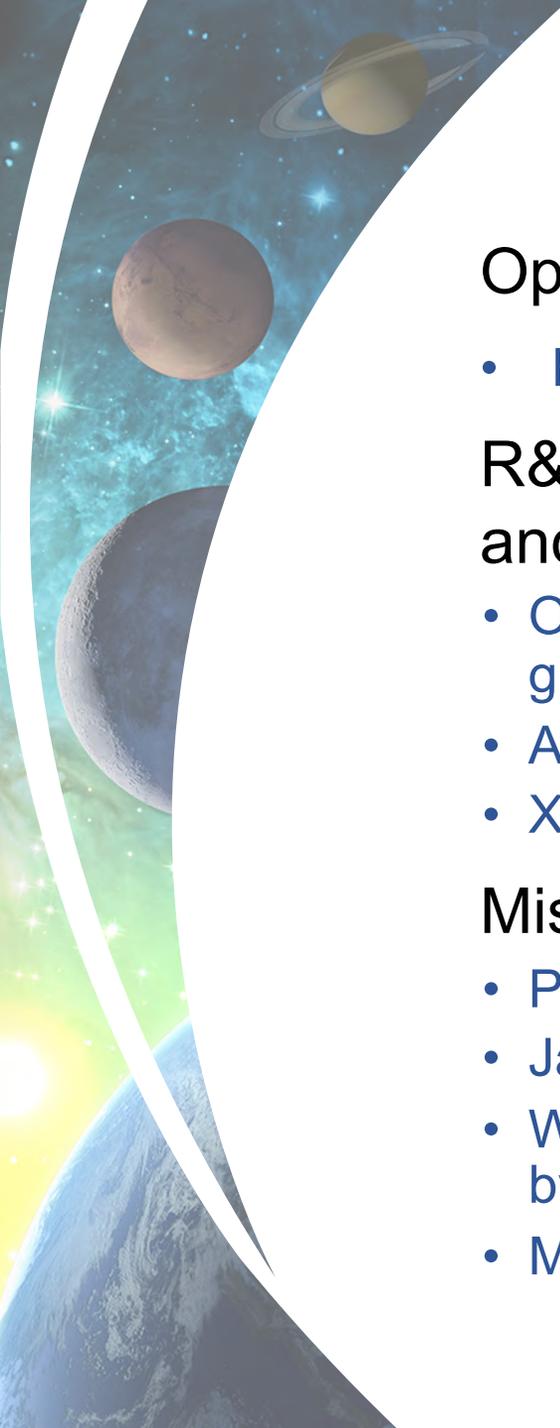
* - New member appointed Spring 2020.

Programmatic Support:

- Douglas Hudgins, NASA HQ – Executive Secretary, NASA POC
- Doris Daou, NASA HQ – Planetary Science Division Liaison
- Richard Eckman, NASA HQ – Earth Science Division Liaison
- Exoplanet Exploration Program Office, JPL - Logistics

The background of the slide is a composite of two astronomical images. The top half shows a dark blue and black space with a bright blue nebula on the right side and several bright stars with diffraction spikes. The bottom half shows a golden-yellow and green space with a large, diffuse nebula and many bright stars. A light blue horizontal band is centered across the image, containing the text.

NASA HQ Update



COVID-19: Bottom Line Up Front

Operating Missions & Data Archives: All performing nominally

- Exception: SOFIA, which is currently not flying

R&A: NASA continues to solicit, review, select, and fund ROSES and GO proposals through telework and virtual reviews

- OMB has provided Agencies with flexibilities to better support proposers and grantees, including soft money researchers and early career researchers
- ADAP-21 is cancelled, ADAP-20 is doubled
- XRP and TCAN proposal due dates are delayed

Missions in development: Each project is impacted differently

- Project teams are doing as much as they can virtually right now
- James Webb Space Telescope continues to be a priority
- Work on NASA missions is being restarted safely at NASA Centers on a case-by-case basis
- Many of NASA's contractors and partners have continued to work

NASA Science Plan Released

Science 2020-2024: A Vision for Scientific Excellence at <https://science.nasa.gov/about-us/science-strategy>

- Implement recommendations of Decadal Surveys in concert with national priorities and needs through creative partnership models that go beyond traditional ways of developing and executing missions
- Challenge assumptions about what is technically feasible and enable revolutionary scientific discovery through a deliberate focus on innovation, experimentation, and cross-disciplinary research
- Create a more collaborative culture within SMD and across science community, encouraging diversity of thought, sharing best practices, and informed risk-taking to improve operations
- Develop future leaders and inspire learners of all ages through new opportunities and hands-on experiences



2020 NASA Hubble Fellows



How does the universe work?
Einstein Fellows

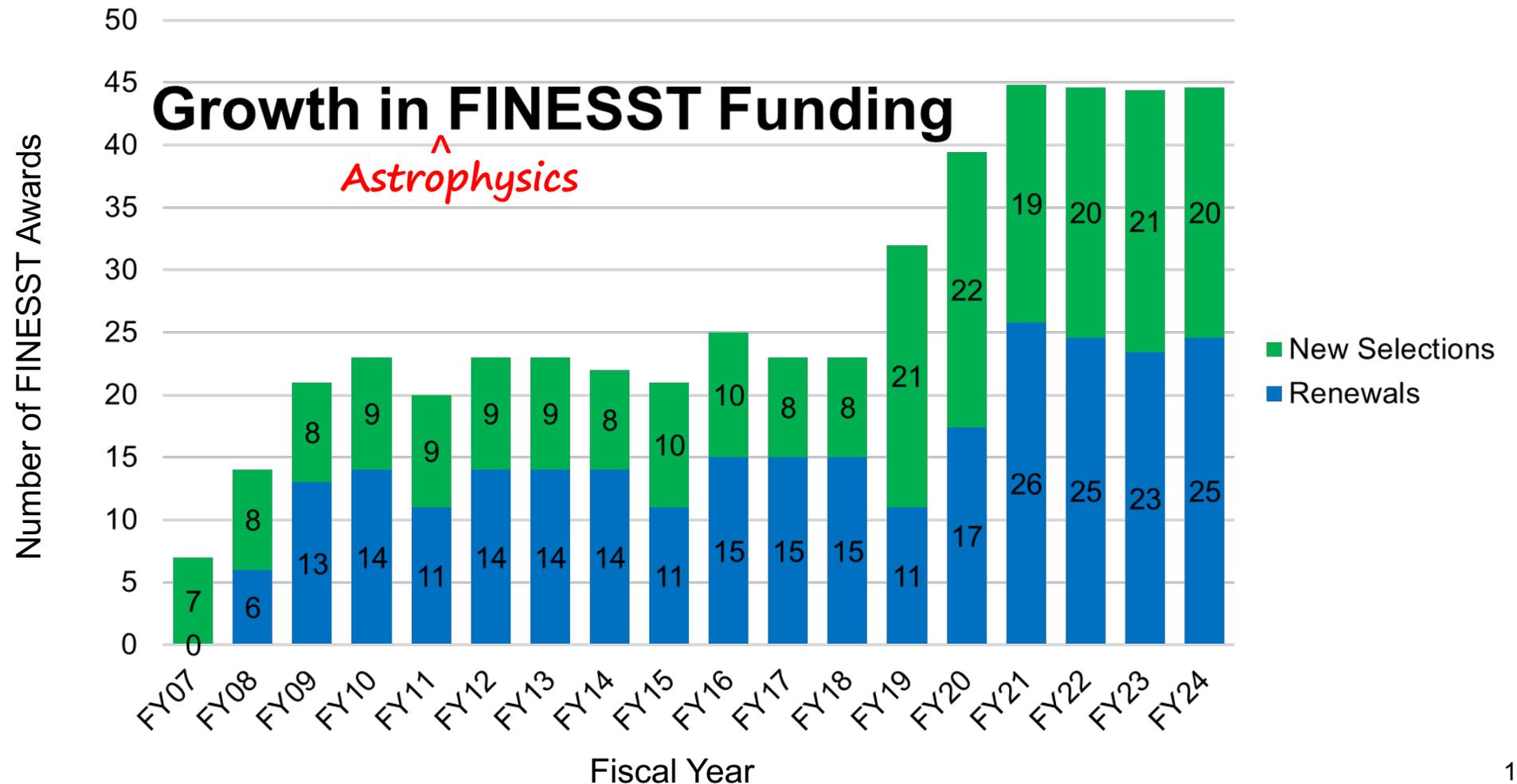
How did we get here?
Hubble Fellows

Are we alone?
Sagan Fellows

<http://www.stsci.edu/stsci-research/fellowships/nasa-hubble-fellowship-program/2020-nhfp-fellows>

Graduate Student Research Awards

NASA Earth and Space Science Fellowship (NESSF) program name changed to Future Investigators in NASA Earth and Space Science and Technology (FINESST) in 2019 to more accurately capture the nature of awards.





Join the Team at NASA Headquarters

One or more program scientists will be hired this summer

Job opening starting June 29 (planned) for 5 days at <https://usajobs.gov>

▶ *Due to hiring authority used, applications will only be accepted during a 5-day window*

AAS Job Register: <https://jobregister.aas.org/ad/8d061472>

Work as part of a diverse and agile team whose core values include excellence, integrity, transparency, teamwork and a growth mindset toward stewarding the nation's space-based astrophysics program

▶ *NASA encourages applications from candidates with non-traditional career paths, or individuals who are at earlier stages of their careers may have demonstrated experience in different ways. such individuals*

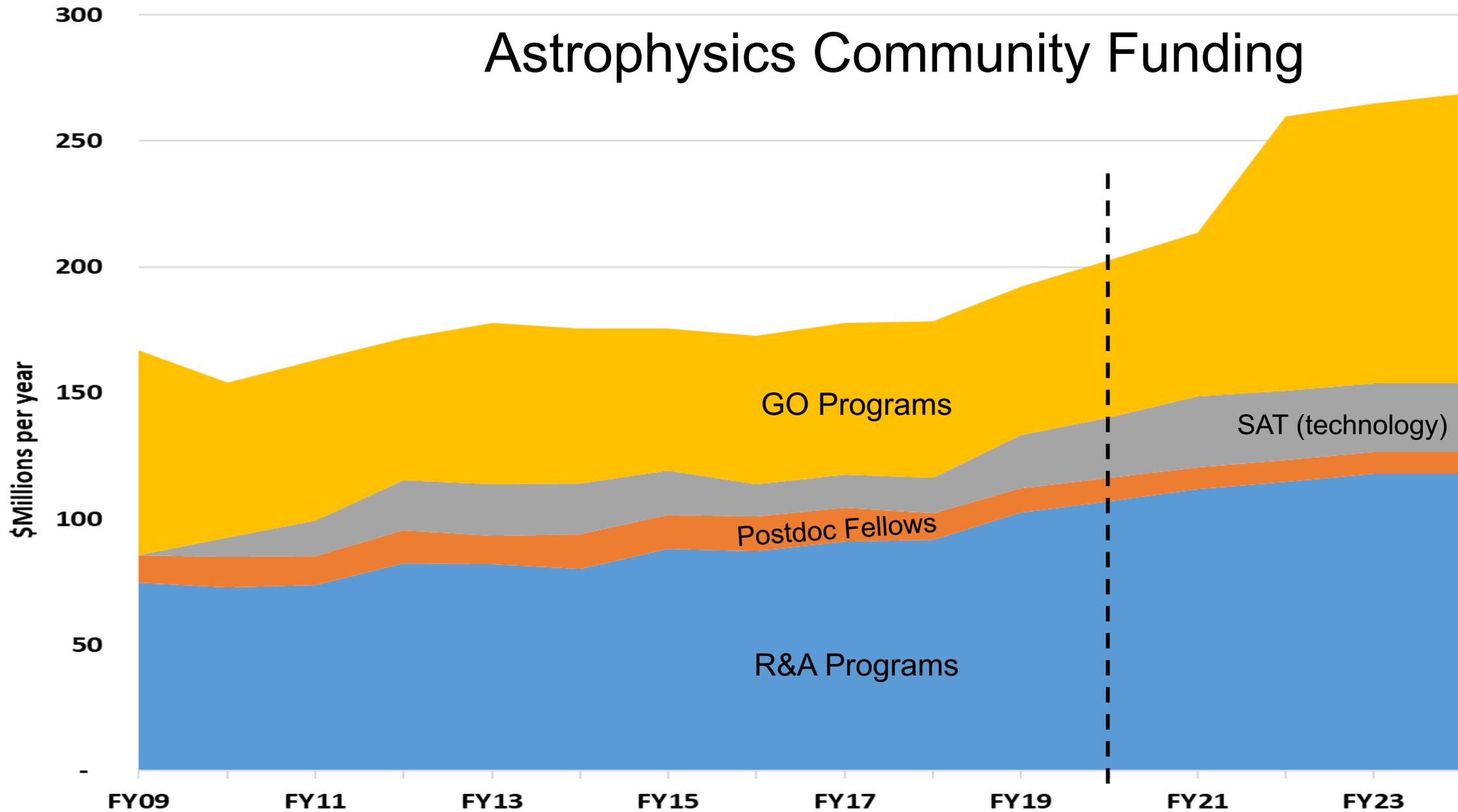
Candidates are encouraged to contact NASA so they can make a well-informed decision on submitting an application during the very short (5 day) window when the job opportunity will be open for applications

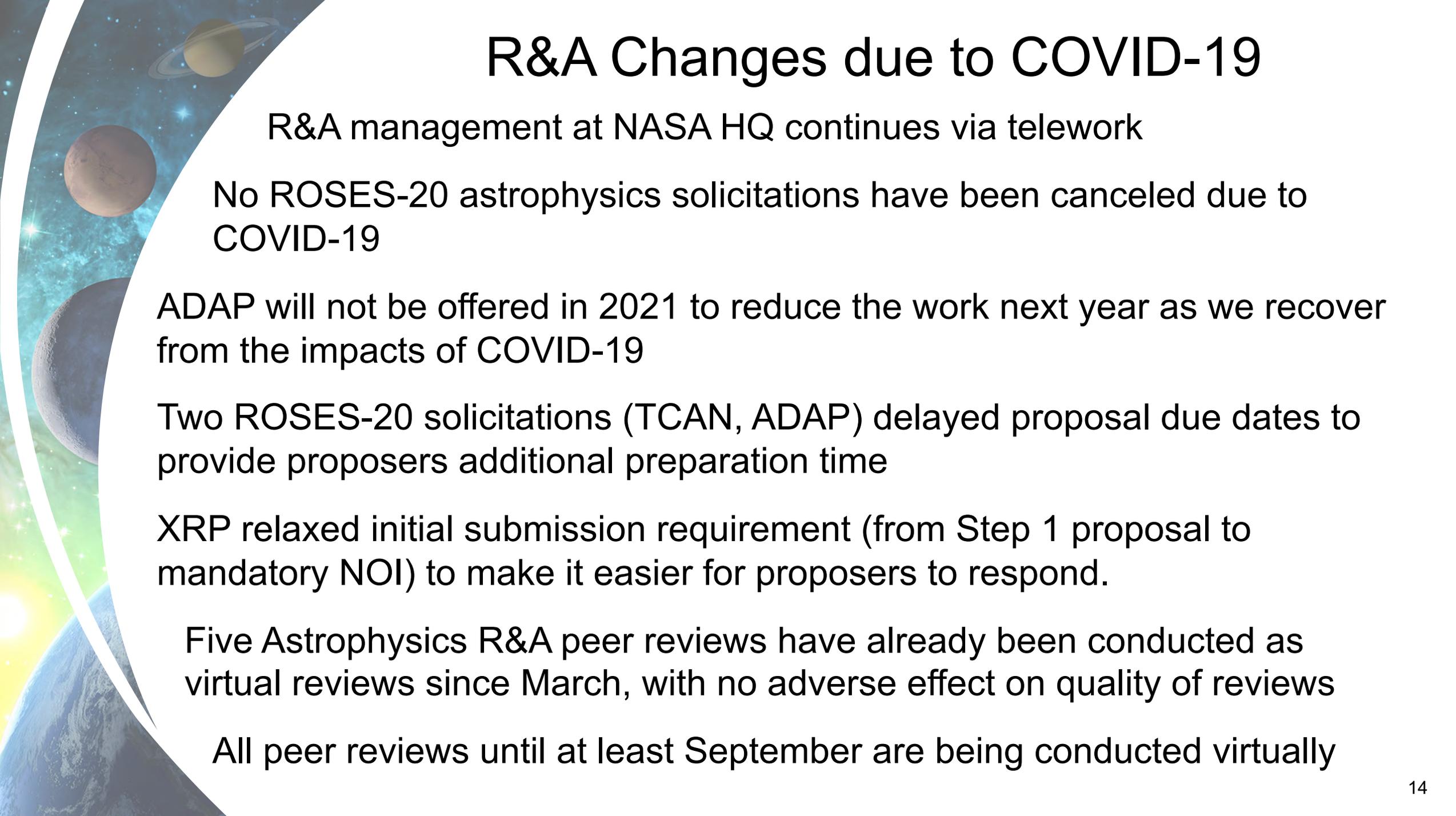
Questions about this anticipated opening for an Astrophysics Program Scientist at NASA Headquarters may be directed to Eric Smith, Chief Scientist, Astrophysics Division, eric.p.smith@nasa.gov

The background of the slide is a composite of two astronomical images. The top half features a dark blue and black space filled with numerous small stars and a prominent, bright blue nebula on the right side. The bottom half shows a similar starry field but with a warm, golden-yellow and greenish glow, suggesting a different spectral filter or a different region of space. The text 'Research Program Update' is centered in a white horizontal band across the middle.

Research Program Update

Astrophysics Community Funding





R&A Changes due to COVID-19

R&A management at NASA HQ continues via telework

No ROSES-20 astrophysics solicitations have been canceled due to COVID-19

ADAP will not be offered in 2021 to reduce the work next year as we recover from the impacts of COVID-19

Two ROSES-20 solicitations (TCAN, ADAP) delayed proposal due dates to provide proposers additional preparation time

XRP relaxed initial submission requirement (from Step 1 proposal to mandatory NOI) to make it easier for proposers to respond.

Five Astrophysics R&A peer reviews have already been conducted as virtual reviews since March, with no adverse effect on quality of reviews

All peer reviews until at least September are being conducted virtually

ROSES-2020 Program Elements

Supporting Research and Technology

- Astrophysics Research & Analysis (APRA)
- Strategic Astrophysics Technology (SAT)
- Roman Technology Fellowships (RTF)
- Astrophysics Theory Program (ATP) (biennial, not this year)
- Theoretical and Computational Astrophysics Networks (TCAN) (triennial, this year)
- Exoplanet Research Program (XRP) (cross-div)

Data Analysis

- Astrophysics Data Analysis (ADAP)
- GO/GI programs for:
 - Fermi
 - Swift
 - NuSTAR
 - TESS
 - NICER

Mission Science and Instrumentation

- Sounding rocket, balloon, cubesat, and ISS payloads solicited through APRA
- XRISM Guest Scientists
- LISA Preparatory Science
- Astrophysics Explorers U.S. Participating Investigators (triennial, this year)
- Astrophysics Pioneers

Separately Solicited

- GO/GI/Archive/Theory programs for:
 - Chandra
 - Hubble
 - SOFIA
 - Webb
- NASA Hubble Fellowship Program
- NASA Postdoctoral Program
- FINESST Graduate Student Research Awards

New in ROSES-2020:

- XRISM Guest Scientist Program (one time)
- LISA Preparatory Science (one time)
- Astrophysics Explorers U.S. Participation Investigators (APEX USPI)
- **Data Management Plan will be evaluated as part of the intrinsic merit of proposals**

ROSES-2020 Program Elements

Supporting Research and Technology

- Astrophysics Research & Analysis (APRA)
- Strategic Astrophysics Technology (SAT)
- Roman Technology Fellowships (RTF)
- Astrophysics Theory Program (ATP) (biennial, not this year)
- Theoretical and Computational Astrophysics Networks (TCAN) (triennial, this year)
- **Exoplanet Research Program (XRP) (cross-div)**

Data Analysis

- Astrophysics Research & Analysis (ADAP)
- GO/GI programs
 - Fermi
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Mission Science and Instrumentation

- Exoplanet research elements from ADAP, ATP, APRA/Lab Astro moved into XRP (w/funding);
- Exoplanet tech. dev. remains in APRA;
- Heliophysics and Earth Science Divisions are now contributing to XRP;
- Budget profile:

FY20	FY21	FY22	FY23
\$8.9M	\$10.2M	\$11.6M	\$12.7M
	+15%	+30%	+43%

New in ROSES-2020

- XRISM
- LISA Preparatory Science (one time)
- Astrophysics Explorers U.S. Participation Investigators (APEX USPI)
- Data Management Plan will be evaluated as part of the intrinsic merit of proposals
- **Exoplanet Research Program consolidation and growth**

Separately Solicited

- GO/GI/Archive/Theory programs for:
 - Chandra
 - Hubble
 - SOFIA
 - Webb
- A Hubble Fellowship program
- A Postdoctoral Program
- SST Graduate Student Research Awards

ROSES-2020 Program Elements

Supporting Research and Technology

- Astrophysics Research & Analysis (APRA), **includes Lab Astro equipment.**
- Strategic Astrophysics Technology (SAT)
- Roman Technology Fellowships (RTF)
- Astrophysics Theory Program (ATP) (biennial, not this year)
- Theoretical and Computational Astrophysics Networks (TCAN) (triennial, this year)
- Exoplanet Research Program (XRP) (cross-div)

Data Analysis

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New in ROSES-20

- XRISM
- LISA Pathfinder
- Astrophysics Research & Analysis (ADAP)
- Data Management Plan will be evaluated as part of the intrinsic merit of proposals
- Exoplanet Research Program consolidation and growth
- **Lab Astro equipment awards added to scope of APRA**

Mission Science and

- Starting in ROSES-20, a new Lab Astro Equipment Initiative will provide additional funding to support lab equipment proposals.
- Initiative is not intended to support building of new complete labs. The goal is to support maintenance and upgrade of existing equipment and purchase of new equipment.
- Proposals that request Lab Astro equipment upgrades can be submitted through APRA with proposals due on December 17;
- ROSES-20 D.3 APRA will be amended within the next few weeks.

Separately Solicited

- GO/GI/Archive/Theory programs for:
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 - SOFIA
 - Webb
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- A Postdoctoral Program
- SST Graduate Student Research Awards

(JSPI)

merit of proposals

ROSES-2020 Program Elements

Supporting Research and Technology

- Astrophysics Research & Analysis (APRA), includes Lab Astro equipment.
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- Roman Technology Fellowships (RTF)
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Data Analysis

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Mission Science and Instrumentation

- Sounding rocket, balloon, cubesat, and ISS payloads solicited through APRA
- XRISM Guest Scientists
- LISA Preparatory Science
- Astrophysics Explorers U.S. Participating Investigators (triennial, this year)
- Astrophysics Pioneers

Separately Solicited

- GO/GI/Archive/Theory programs for:
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New in ROSES-2020:

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- LISA Preparatory Science (one time)
- Astrophysics Explorers U.S. Participation Investigators (APEX USPI)
- Data Management Plan will be evaluated as part of the intrinsic merit of proposals
- Exoplanet Research Program consolidation and growth
- Lab Astro equipment awards added to scope of APRA
- **SAT-2020 canceled in anticipation of the 2020 Decadal Survey**

ROSES-2020 Program Elements

Supporting Research and Technology

- Astrophysics Research & Analysis (APRA), includes Lab Astro equipment.
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- Astrophysics Theory Program (ATP) (biennial, not this year)
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- Exoplanet Research Program (XRP) (cross-div)
- **Topical Workshops, Symposia, and Conferences (TWSC)**

Data Analysis

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Mission Science and Instrumentation

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- Lab Astro equipment awards added to scope of APRA
- SAT-2020 canceled in anticipation of the 2020 Decadal Survey
- **Astrophysics participates in cross-divisional TWSC**

ROSES-2020 Program Elements

Supporting Research

- Fills the gap between existing ROSES investigations (<\$10M for APRA) and existing Explorers MO investigations (<\$35M for SmallSats)
- Includes SmallSats, Large CubeSats (> 6U), CubeSat constellations (all as rideshare/secondary payloads), major balloon missions, and ISS attached payloads with a \$20M cost cap, not including launch
- NASA will no longer solicit
 - ISS-attached payloads within APRA
 - balloon payloads within Explorers MO
- Draft released May 14, Comments due June 15 via email to Michael.R.Garcia@nasa.gov

Data Analysis

- SAT-2020 canceled in anticipation of the 2020 Decadal Survey
- Astrophysics participates in cross-divisional TWSC
- **NEW! Astrophysics Pioneers Program**

Mission Science and Instrumentation

- Sounding rocket, balloon, cubesat, and ISS payloads solicited through APRA
- XRISM Guest Scientists
- LISA Preparatory Science
- Astrophysics Explorers U.S. Participating Investigators (triennial, this year)
- **Astrophysics Pioneers**

Program (one time)

ce (one time)

U.S. Participation Investigators (APEX USPI)

will be evaluated as part of the intrinsic merit of proposals

program consolidation and growth

wards added to scope of APRA

Separately Solicited

- GO/GI/Archive/Theory programs for:
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- NASA Hubble Fellowship Program
- NASA Postdoctoral Program
- FINESST Graduate Student Research Awards

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ROSES-2020 Program Elements

Supporting Research and Technology

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- Exoplanet Research Program (XRP) (cross-div)
- Topical Workshops, Symposia, and Conferences (TWSC)

BREAKING NEWS:

NEW ROSES 2020 SOLICITATION COMING

Extreme Precision Radial Velocity Supporting Research and Technology Development

- Expected Timeline:
 - *Solicitation issued in August;*
 - *Proposals due in Nov.-Dec. time frame;*
 - *Selections announced in Spring 2021;*
 - *2-year awards fully funded in FY21. Total ~\$1.5M available.*
- Represents an initial response to the recommendations of EPRV WG report.
- Initial solicitation will probably be focused on “tall tent pole” items; continuation/expansion of the scope of the program contingent on Astro2020.
- NEW! Astrophysics Pioneers Program

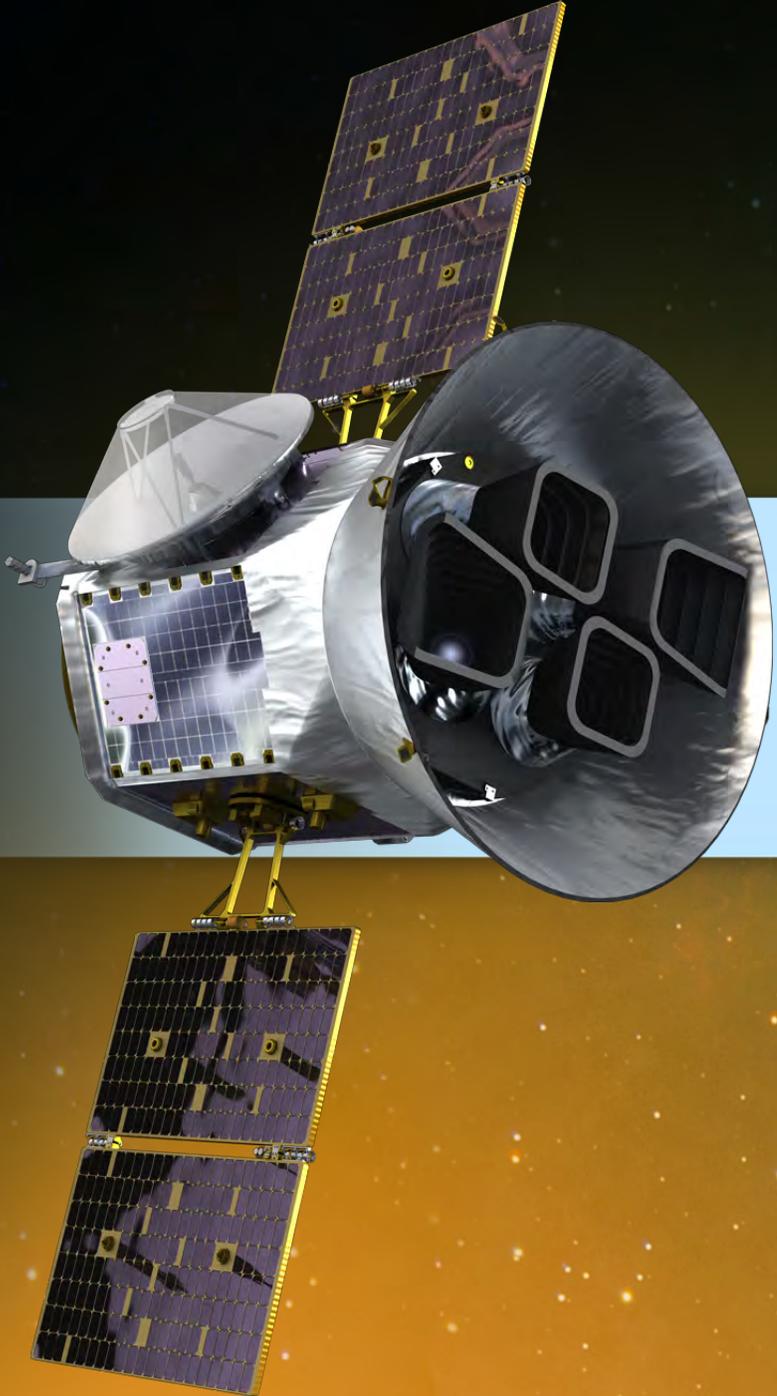
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(APEX USPI)

intrinsic merit of proposals

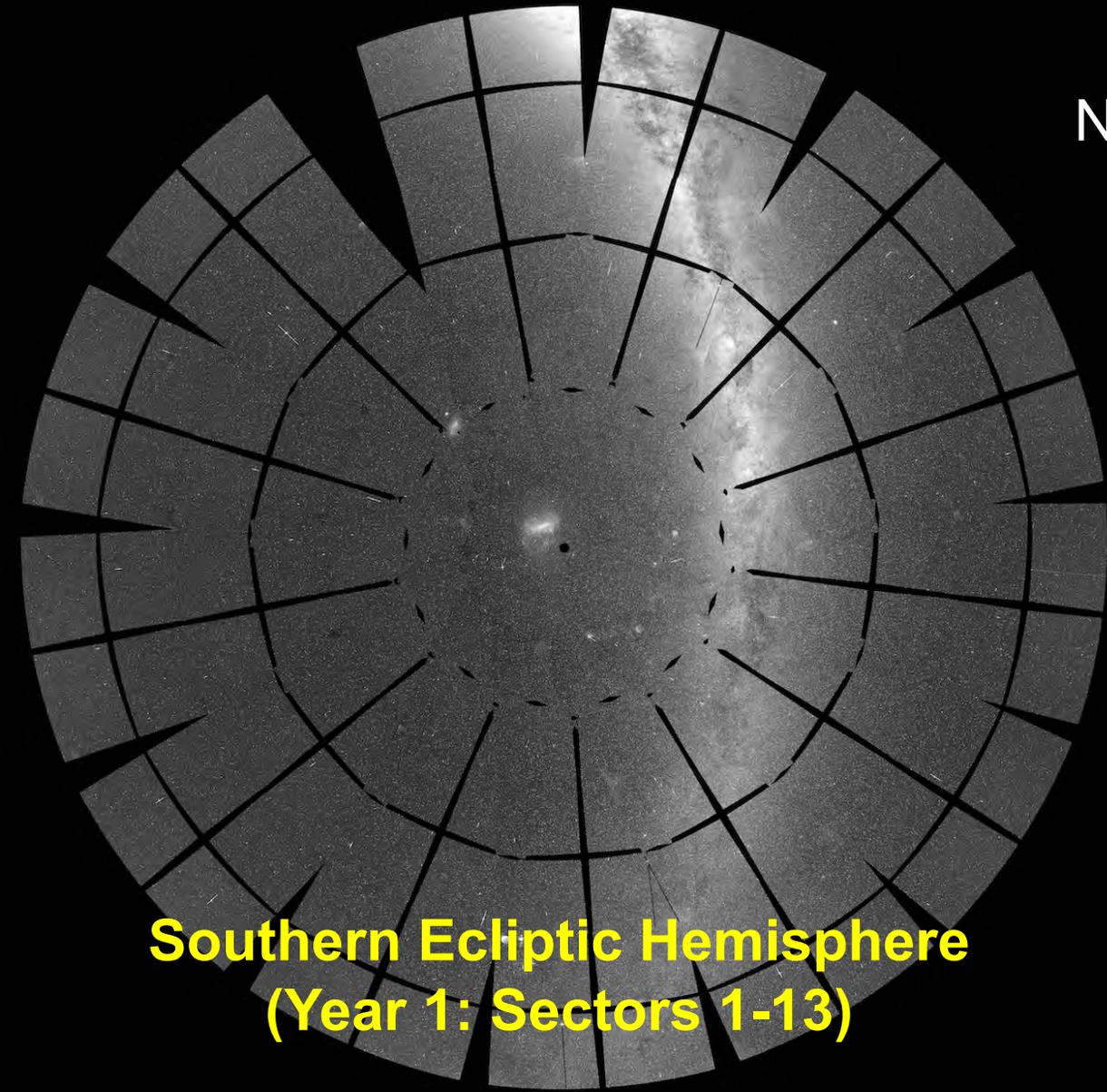
Survey



TESS Mission Update

TESS Prime Mission

Nearing completion—currently executing
Sector 26 observations



**Southern Ecliptic Hemisphere
(Year 1: Sectors 1-13)**



**Northern Ecliptic Hemisphere
(Year 2: Sectors 14-23)**

TESS

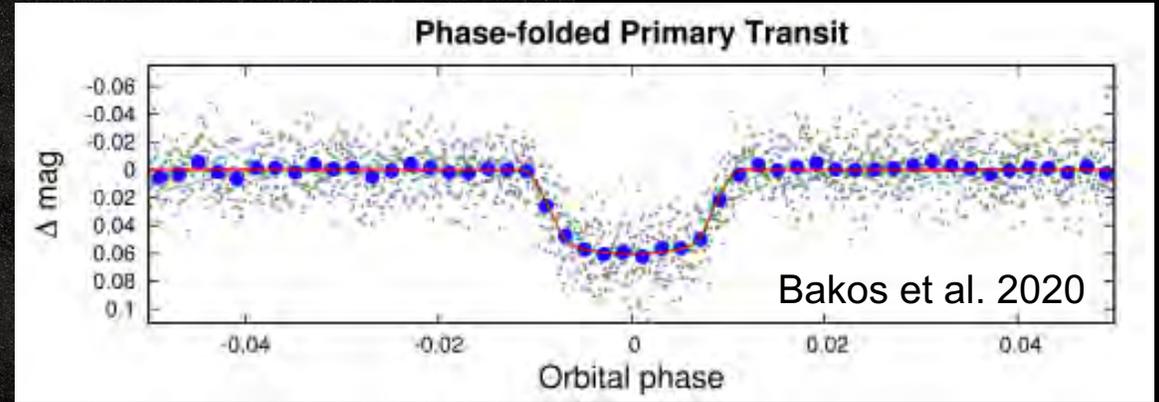
Transiting Exoplanet
Survey Satellite



51 confirmed planets
1913 planet candidates

295 publications submitted, 221 peer-reviewed
(52% exoplanets, 48% astrophysics)

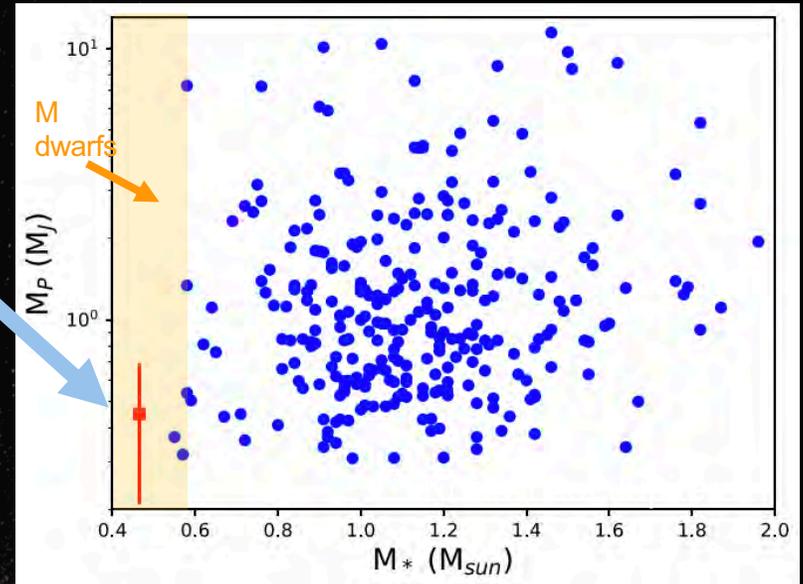
HATS-71b: A Giant Planet Transiting an M3 Dwarf Star



4.7% transit depth (largest of any confirmed transiting system!)

To date, only 4 (of 418) hot Jupiters have been found around M dwarf stars. HATS-71 is the coolest M dwarf star known to host a hot Jupiter

HATS-71b



Observation Sector 26 Orbit 59:
June 9 - June 21
Orbit 60: June 22 - July 3

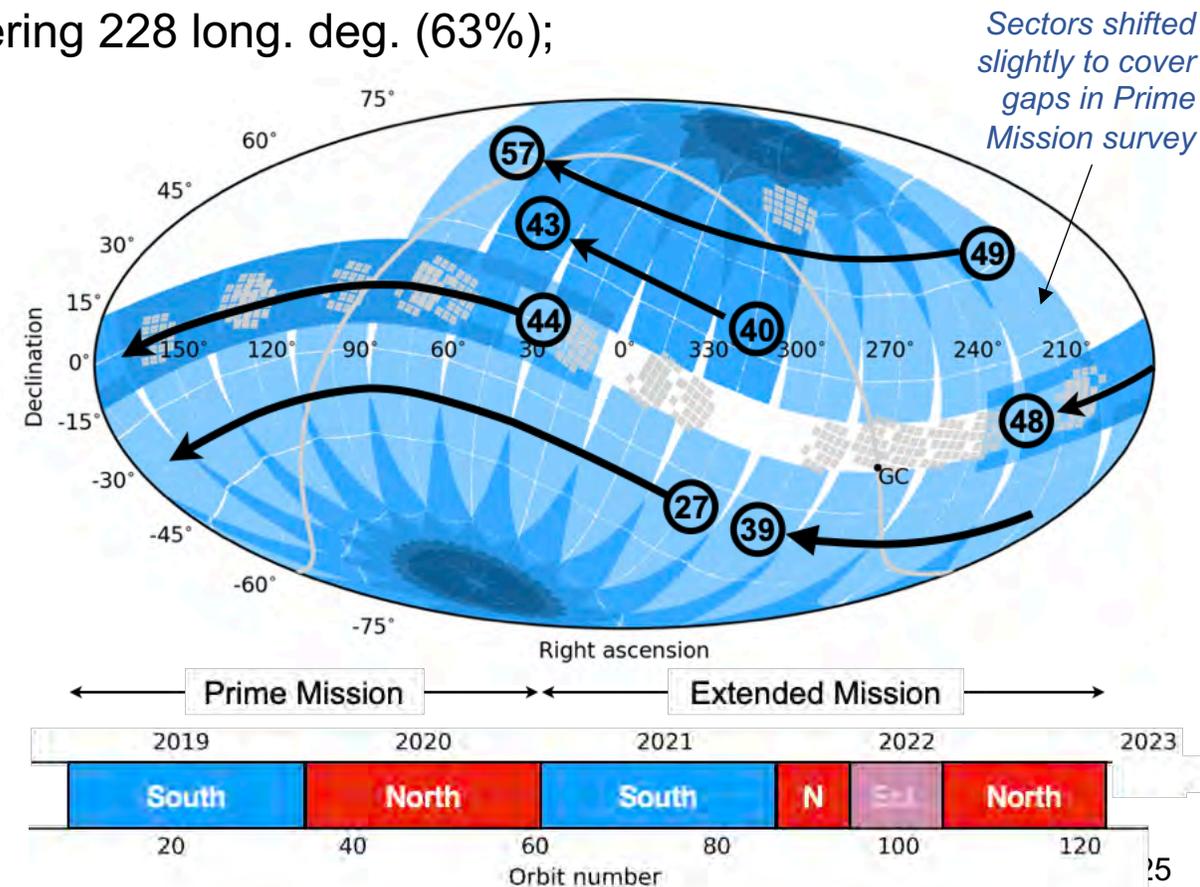
TESS Extended Mission

The Extended Mission Observing Plan covers 60 orbits of observing stretching from August 2020 to October 2022 (the end of the Astrophysics Senior Review window). It includes:

- 13 sectors (27-39) – reprise southern ecliptic hemisphere survey;
- 4 sectors (40-43) – return to northern ecliptic hemisphere, field inclusive of Kepler field;
- 5 sectors (44-48) – ecliptic plane survey covering 228 long. deg. (63%);
- 9 sectors (49-57) – return to northern ecliptic hemisphere survey; includes overlap (3rd observation) of sectors 40-43.

Observing Objectives:

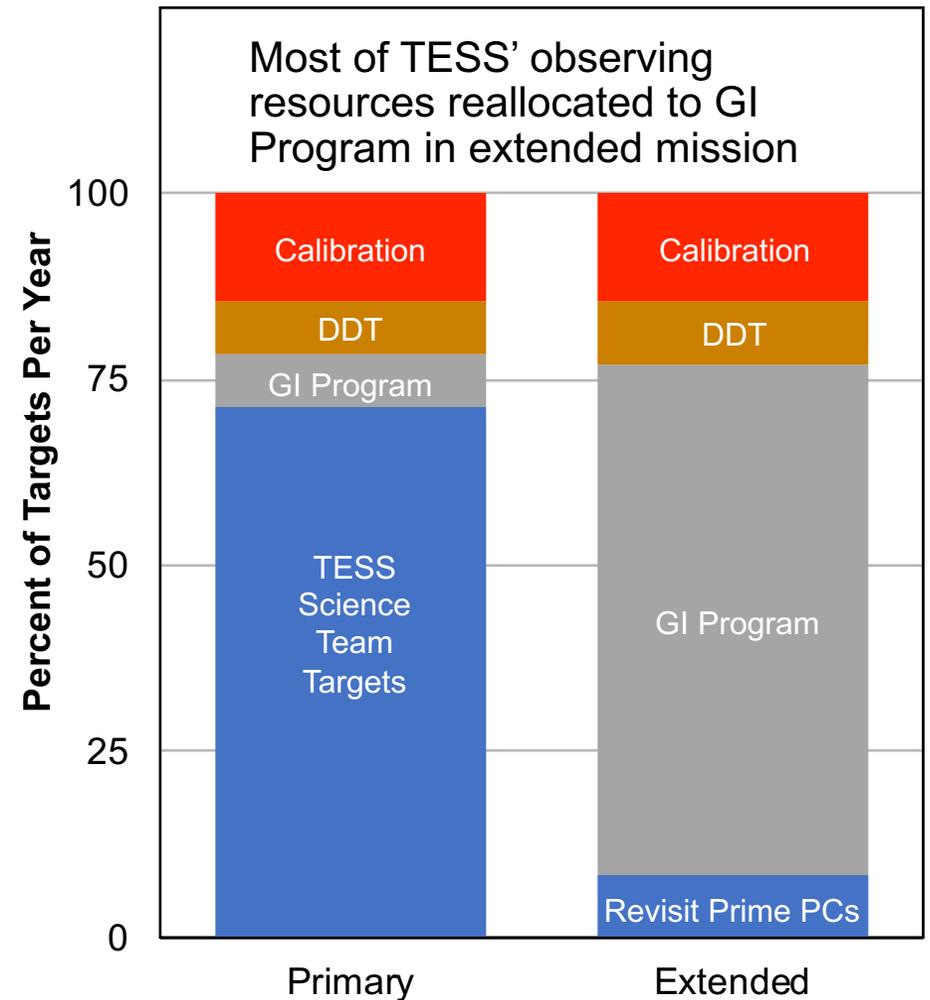
- Discover hundreds of additional transiting planets with periods of longer than 20 days.
- Double the time coverage for 80% of the prime mission fields
- Observe 70% of the sky that was not observed during the prime mission, including the ecliptic plane.

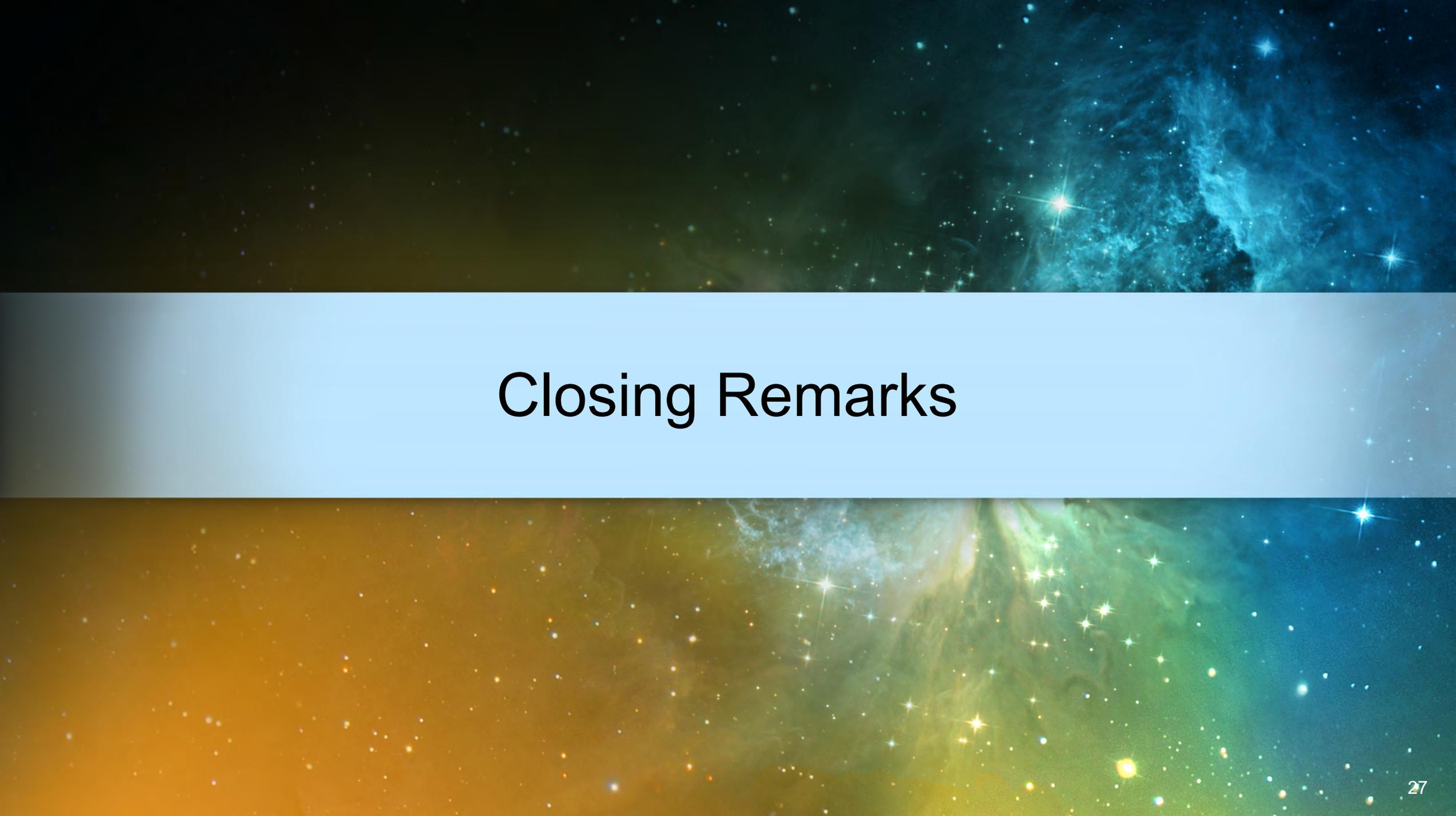


TESS Extended Mission

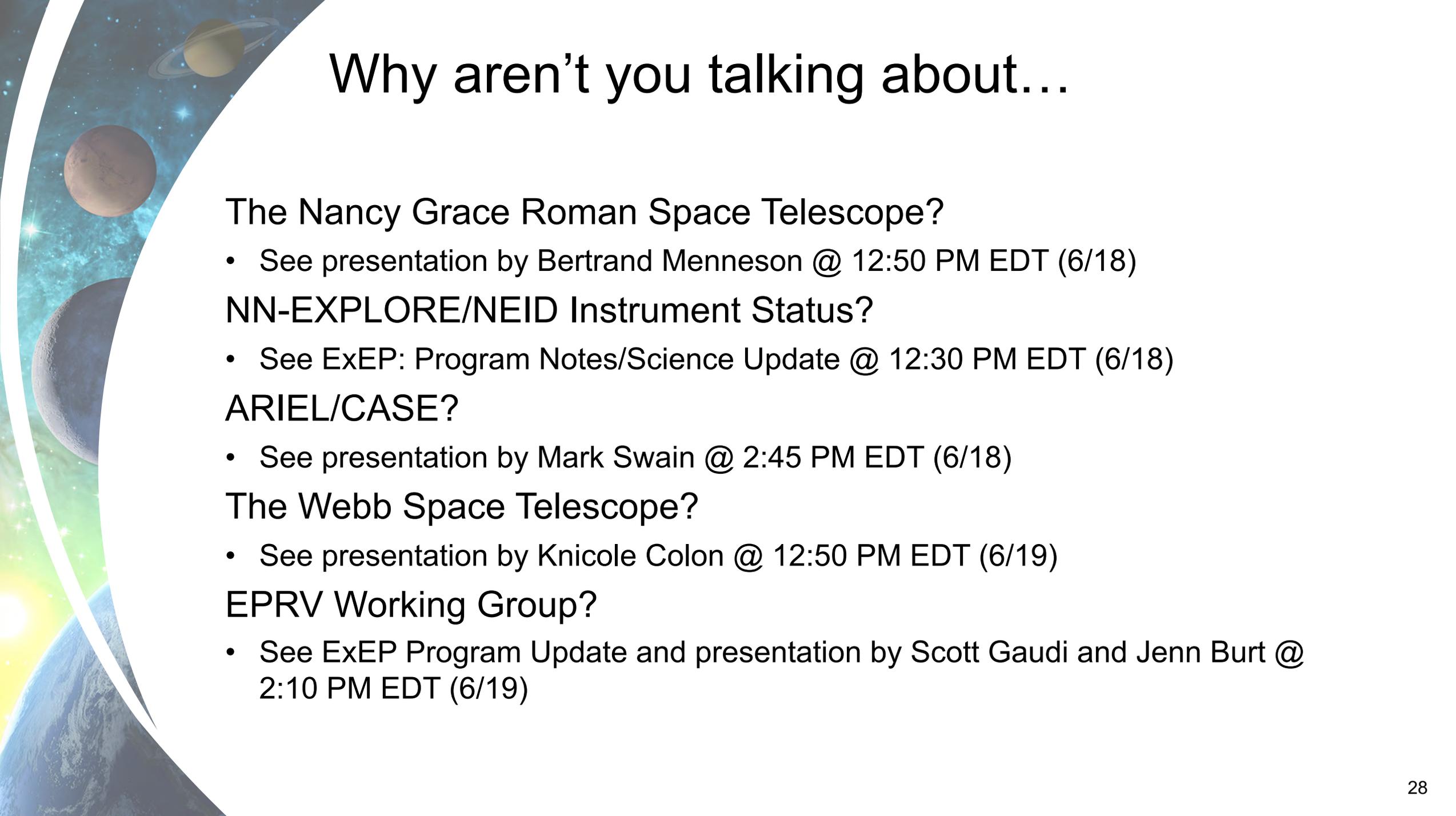
Operational Objectives:

- A much greater fraction of TESS observing resources will be allocated to competitively-selected Guest Investigator observations.
- Maintain photometric performance of 200 ppm in 1 hr at TESS mag. 10.
- Deliver calibrated full-frame images (FFIs) to the community measured with a **new 10-min cadence**.
- Deliver data for tens of thousands of targets selected by the astronomical community at both 2-min and a **new 20-sec cadence**.



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Closing Remarks



Why aren't you talking about...

The Nancy Grace Roman Space Telescope?

- See presentation by Bertrand Menneson @ 12:50 PM EDT (6/18)

NN-EXPLORE/NEID Instrument Status?

- See ExEP: Program Notes/Science Update @ 12:30 PM EDT (6/18)

ARIEL/CASE?

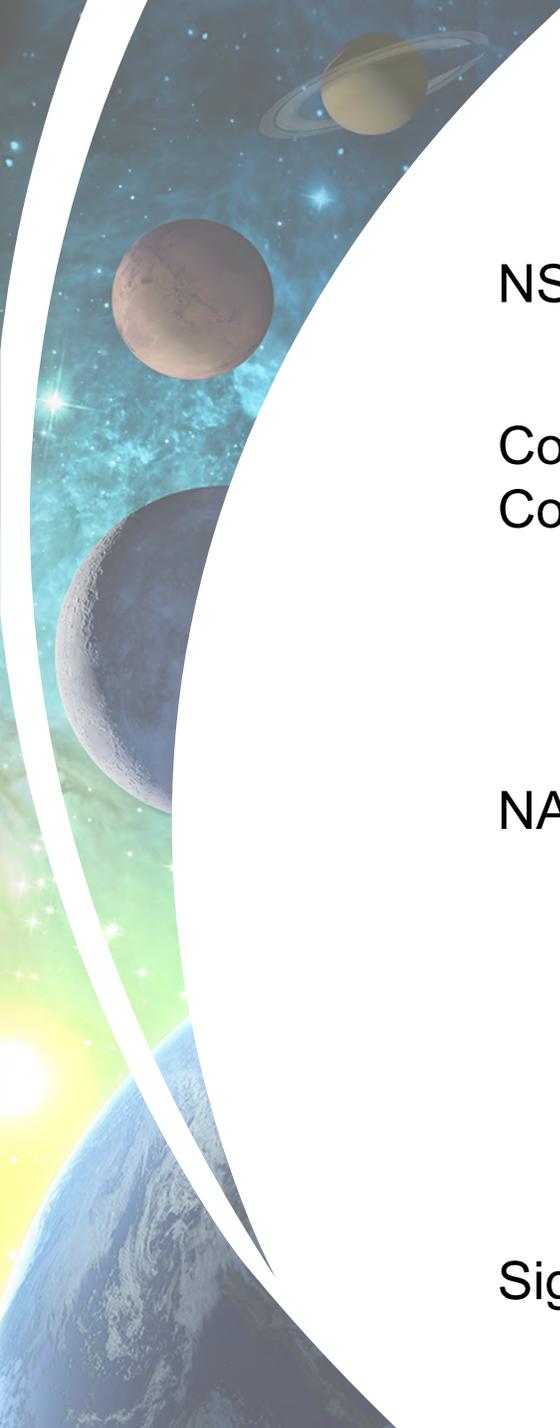
- See presentation by Mark Swain @ 2:45 PM EDT (6/18)

The Webb Space Telescope?

- See presentation by Knicole Colon @ 12:50 PM EDT (6/19)

EPRV Working Group?

- See ExEP Program Update and presentation by Scott Gaudi and Jenn Burt @ 2:10 PM EDT (6/19)



Keep Informed about NASA

NSPIRES mailing list – information about NASA solicitations

<https://nspires.nasaprs.com/>

Cosmic Origins mailing list, Exoplanet Exploration mailing list, Physics of the Cosmos mailing list – information about NASA missions and science

<https://cor.gsfc.nasa.gov/cornews-mailing-list.php>

<https://exoplanets.nasa.gov/exep/exopag/announcementList/>

<https://pcos.gsfc.nasa.gov/pcosnews-mailing-list.php>

NASA Astrophysics Federal Advisory Committees

Astrophysics Advisory Committee (APAC)

<https://science.nasa.gov/researchers/nac/science-advisory-committees/apac>

NAS Committee on Astronomy and Astrophysics (CAA)

http://sites.nationalacademies.org/bpa/bpa_048755

Astronomy and Astrophysics Advisory Committee (AAAC)

<https://www.nsf.gov/mps/ast/aaac.jsp>

Sign up to be a panel reviewer:

<https://science.nasa.gov/researchers/volunteer-review-panels>

The background of the slide is a composite of two cosmic images. The top half features a dark blue and black space filled with numerous small stars and a prominent, bright blue nebula on the right side. The bottom half features a warm orange and yellow space filled with many small stars and a greenish-yellow nebula on the right side. A light blue horizontal band runs across the middle of the slide, containing the word "Backup" in a large, black, sans-serif font.

Backup

A decorative graphic on the left side of the slide features a curved white border. Inside this border, there is a vibrant space scene with a bright sun or star at the bottom left, a blue and white planet (Earth) at the bottom, and several other planets and moons in various colors (brown, grey, blue) against a starry blue and green background.

Citizen Science

Citizen Science (CS) is a form of open collaboration in which individuals participate voluntarily in the scientific process

Current projects at <https://science.nasa.gov/citizenscience>

Proposers to any ROSES program element may incorporate citizen science and crowdsourcing methodologies into proposals, where such methodologies advance the proposed investigation

NASA Citizen Science Community Workshop series online every other Wednesday until September 30, 2020, at <https://nasacitsci2020.gmri.org/home>

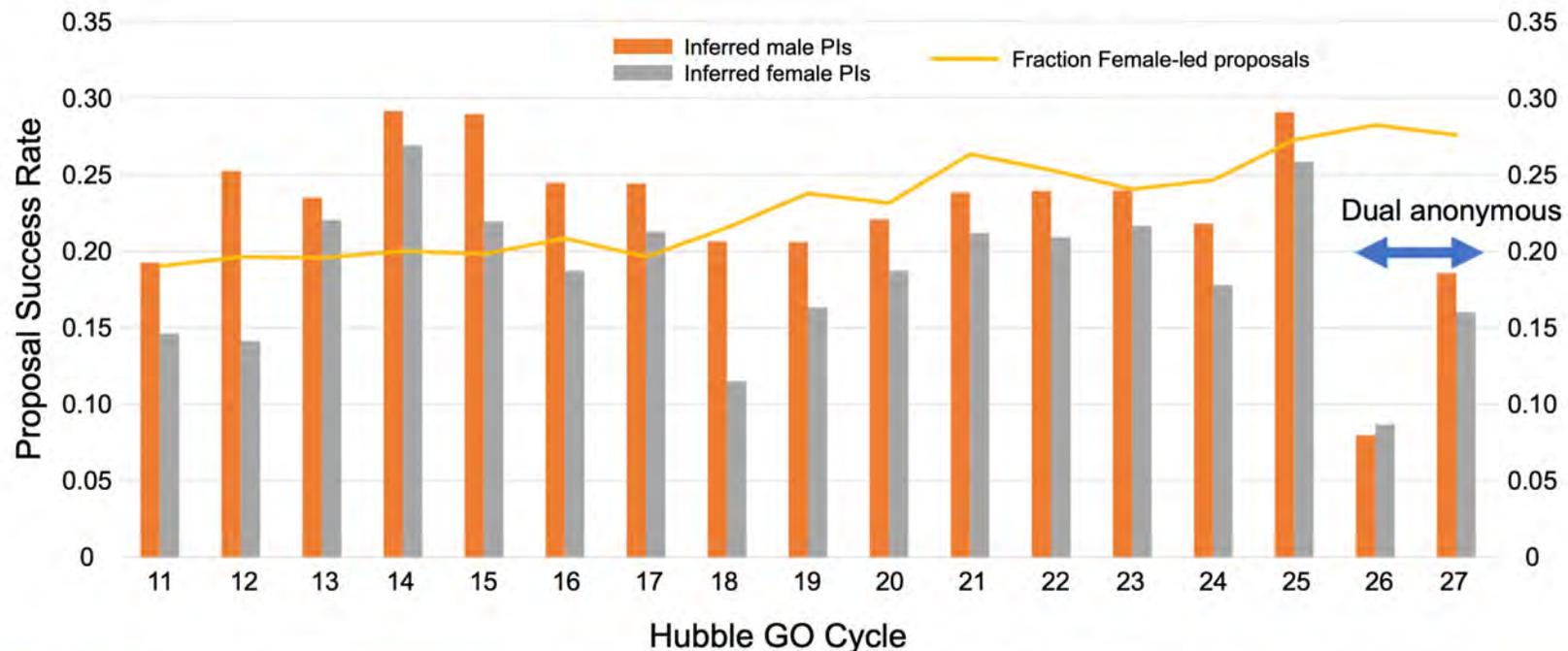
NASA's Astrophysics, Heliophysics, and Planetary Science Divisions will release a joint ROSES-20 program element for a Citizen Science Seed Funding Program to fund prototyping of citizen science projects relevant to the three Divisions

Dual-Anonymous Peer Reviews in Astrophysics

NASA is strongly committed to ensuring that the review of proposals is performed in an equitable and fair manner that reduces or eliminates unconscious bias.

To this end, motivated by a successful pilot program conducted for the Hubble Space Telescope, all future Astrophysics General Observer/General Investigator (GO/GI) proposals will be evaluated using dual-anonymous peer review.

Four SMD R&A Programs Implementing DAPR in 2020: Astrophysics Data Analysis, Earth Science US PI, Habitable Worlds (Step-2 only), Heliophysics GI (both Steps 1 & 2).

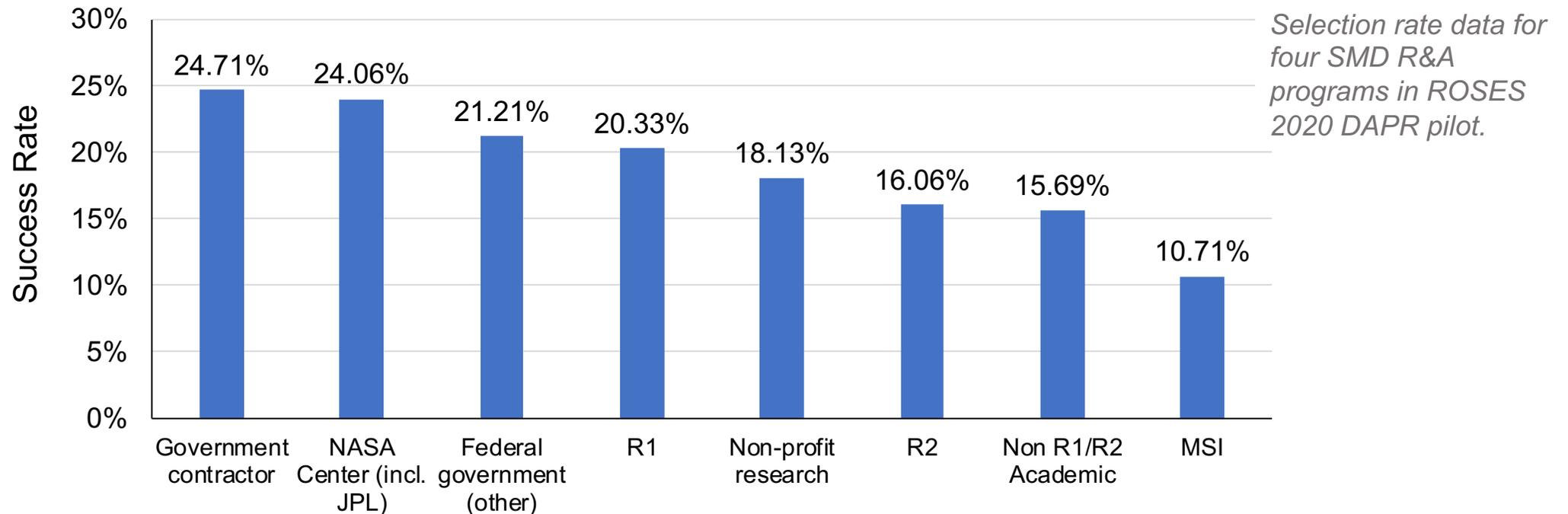


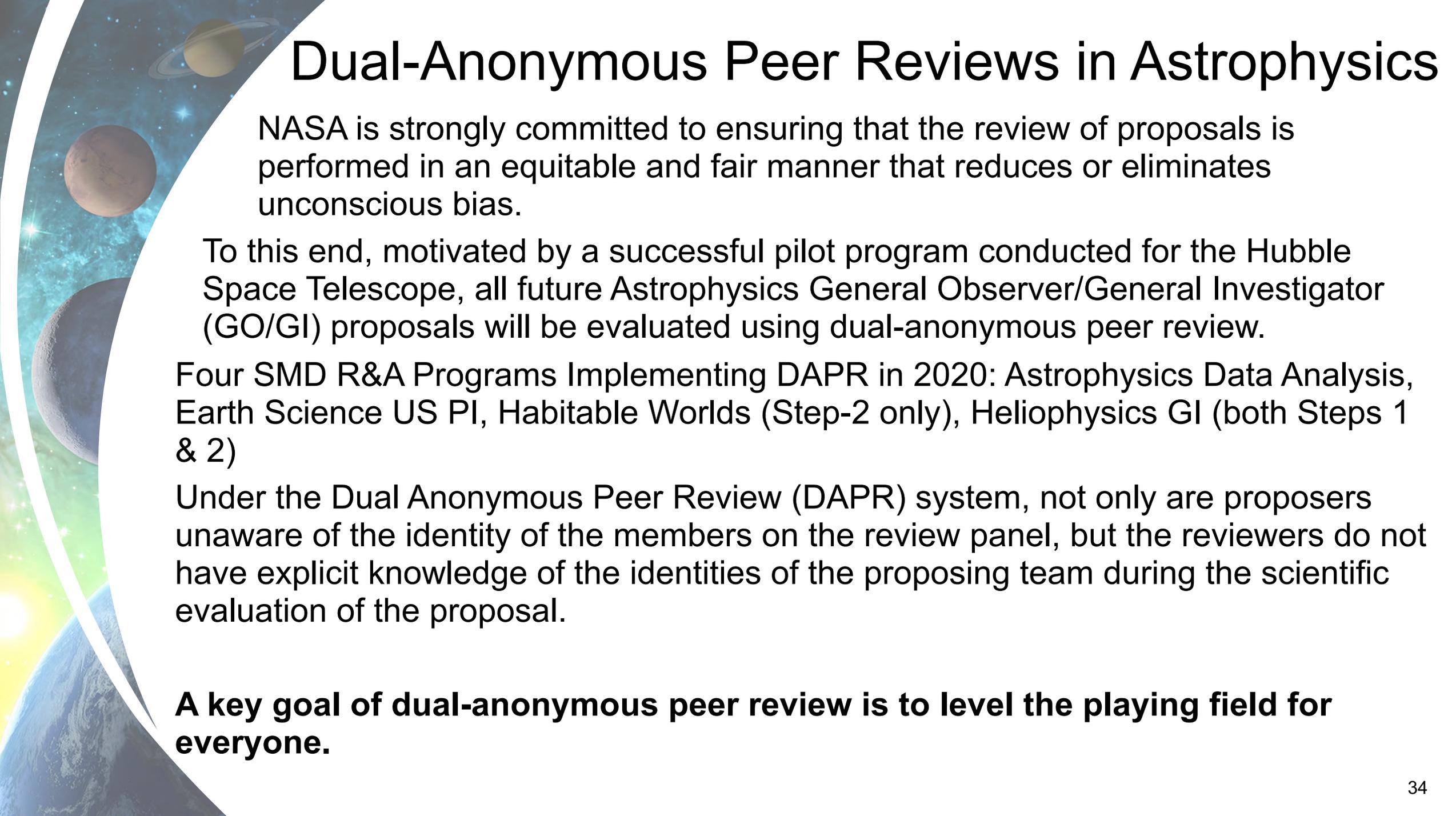
Dual-Anonymous Peer Reviews in Astrophysics

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To this end, motivated by a successful pilot program conducted for the Hubble Space Telescope, all future Astrophysics General Observer/General Investigator (GO/GI) proposals will be evaluated using dual-anonymous peer review.

Four SMD R&A Programs Implementing DAPR in 2020: Astrophysics Data Analysis, Earth Science US PI, Habitable Worlds (Step-2 only), Heliophysics GI (both Steps 1 & 2).





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Under the Dual Anonymous Peer Review (DAPR) system, not only are proposers unaware of the identity of the members on the review panel, but the reviewers do not have explicit knowledge of the identities of the proposing team during the scientific evaluation of the proposal.

A key goal of dual-anonymous peer review is to level the playing field for everyone.