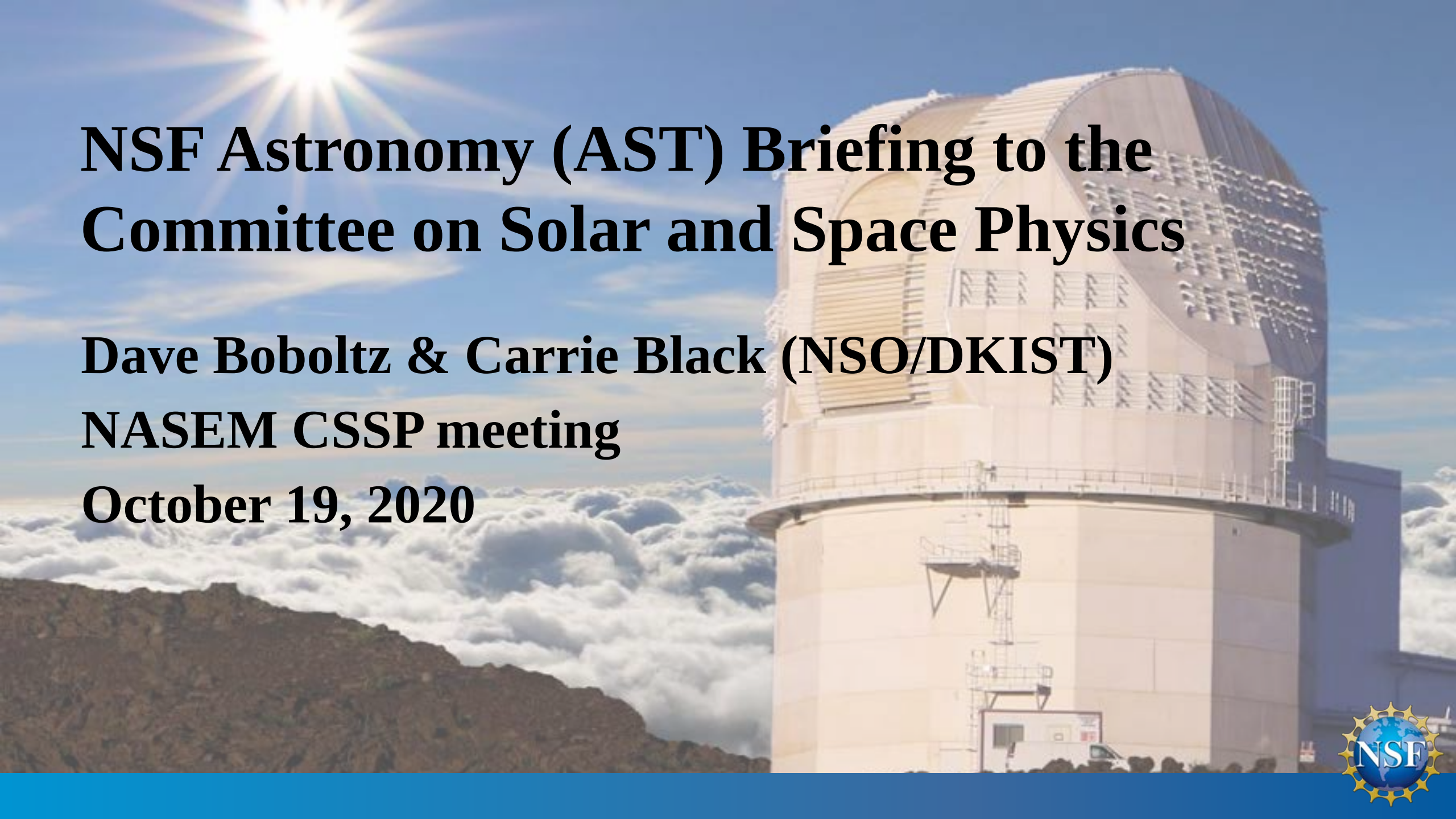


NSF Astronomy (AST) Briefing to the Committee on Solar and Space Physics

Dave Boboltz & Carrie Black (NSO/DKIST)

NASEM CSSP meeting

October 19, 2020

Changes: NSF Office of the Director

- France Córdova ended a 6-year term as NSF Director – March 31, 2020

- Kelvin Droegemeier served as Acting NSF Director – April 1–June 22, 2020
  - Dr. Droegemeier is current Director of OSTP and former member of the National Science Board

- Sethuraman Panchanathan became the 15th NSF Director – June 23, 2020
  - Dr. “Panch” also a former member of the National Science Board

Changes: MPS Directorate and AST Division

- Anne Kinney, Assistant Director (AD) for MPS, left NSF May 1, to become the GSFC Deputy Director – May 2020

- Sean Jones, named MPS AD – Sept. 15, 2020
  - Served as Deputy AD since August 2019
  - Served as acting AD since May 2020

- Tie Luo is the Acting Deputy AD since May 2020

- AST is pleased to welcome Dr. Carrie Black as new Program Director – August 18, 2020
  - Carrie working on NSO and DKIST

COVID-19 Impacts: NSF Staff

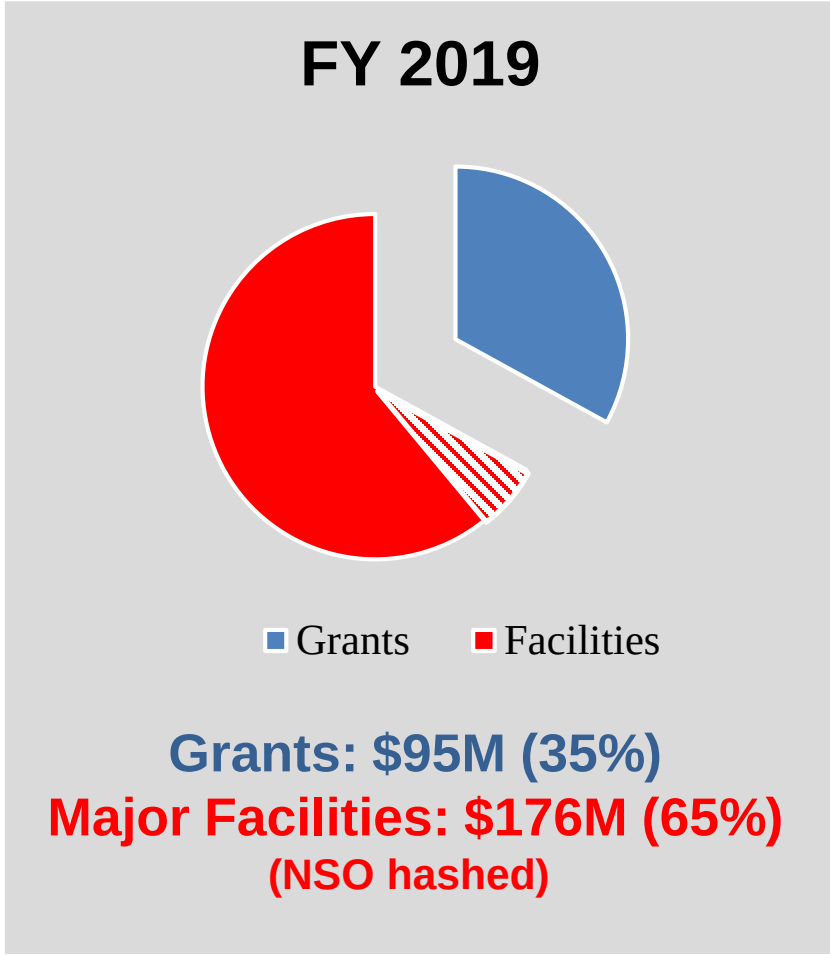
- NSF implemented (up to) 100 % telework policy – March 16, 2020
  - **Now in week 32**
  - NSF building was essentially closed to staff until July
  - Building open for staff, but most continue 100% telework
  - Flexible staff work schedules, flexible dependent care
  - No schedule for mandatory return to office
- Work-related, non-essential travel remains canceled
- All NSF meetings/panels 100% video conference
  - In March, AST was in middle of panel season
  - AST successfully ran all panels after mid-March remotely, 2 POs per panel plus Admin support
  - Remote panels will continue into FY 2021

COVID-19 Impacts: NSF Major Facilities

- **AST facilities**
  - Observing: NRAO (VLA, VLBA), GBO, GONG, Gemini (N)
  - Restarted Construction/Commissioning: DKIST
  - Not Observing, but ramping up: Arecibo, Arizona, and Chilean facilities
    - Gemini (S), CTIO, Rubin Obs., KPNO: limited science ops may begin this week
    - ALMA: ramping up from Caretaker to Extended Caretaker
  - Restart risks/costs, re-plan of MREFC programs.
- **NSF: NSF Implementation of OMB Memo M-20-26**
  - Includes (but not limited to):
    - Allowability of salaries and other project activities
  - Expired September 30, 2020
  - Working with awardees on a case-by-case basis
  - Latest info @ https://www.nsf.gov/news/special_reports/coronavirus/

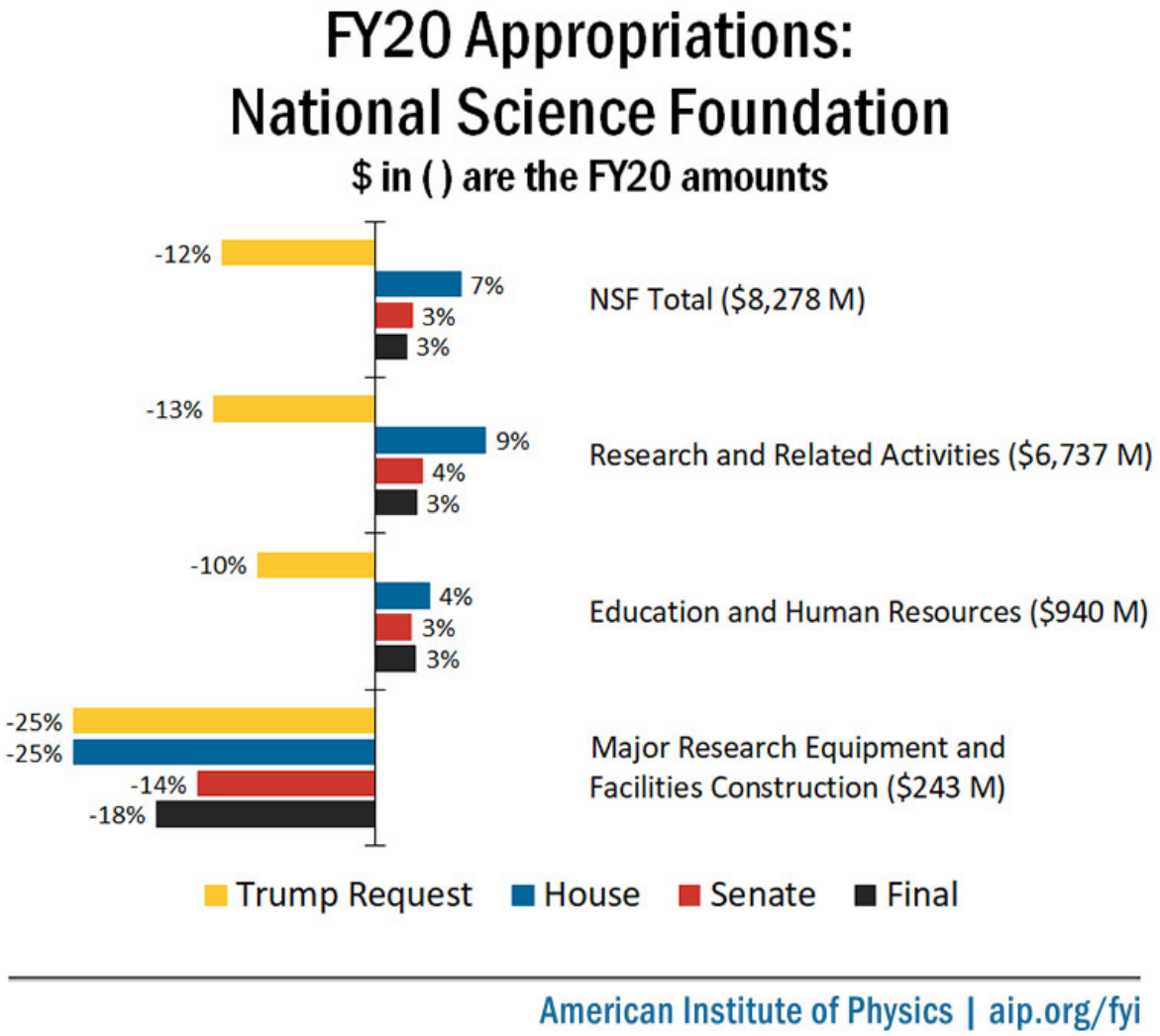
FY 2019 Appropriation and AST

- NSF top line $8.075B
  - up 8% ($580M) from FY 2018
- AST Research and Related Activities (R&RA): $287M
  - $176M for facilities operations
  - $95M for grants (AAG, ATI, MRI, etc.)
  - $16M other activities
    - e.g., Arecibo hurricane relief



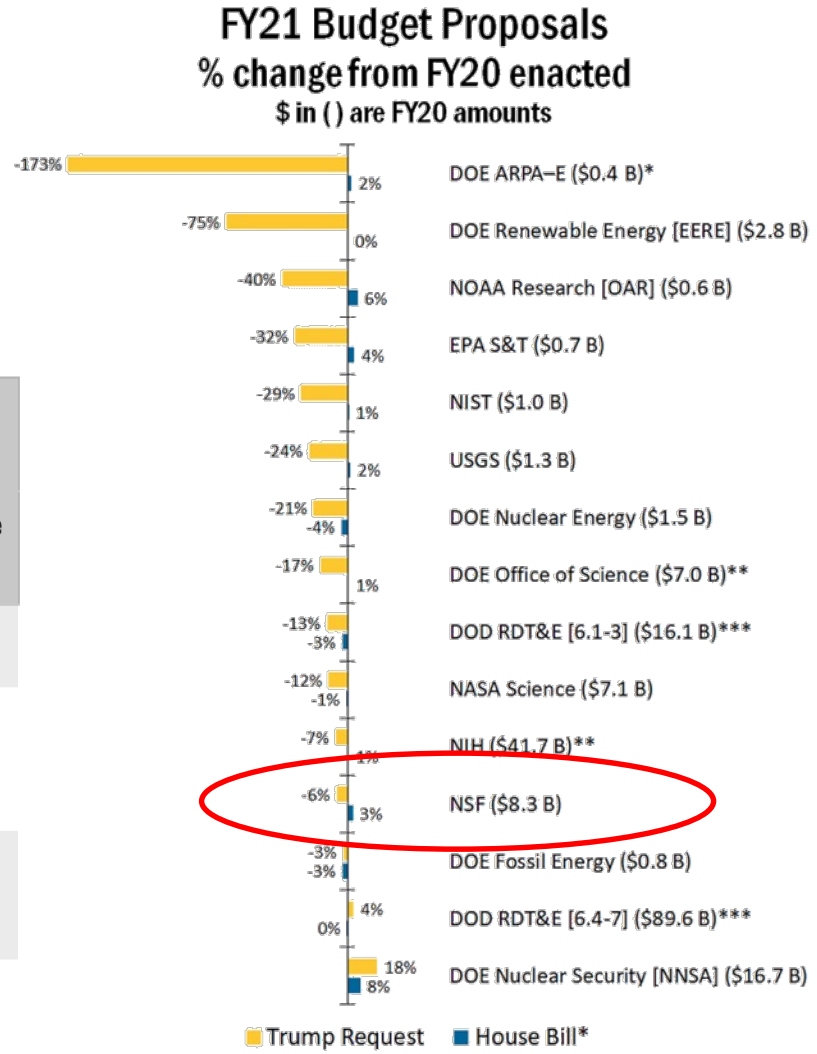
FY 2020 Appropriation

- NSF top line $8.278B
  - up ~2.5% ($203M) from FY19
  - Continued Support for NSF 10 Big Ideas
    - WoU-MMA relevant to AST
- AST
  - MREFC line fully funded Rubin Obs. at requested levels
  - AAG and MSIP numbers not yet releasable



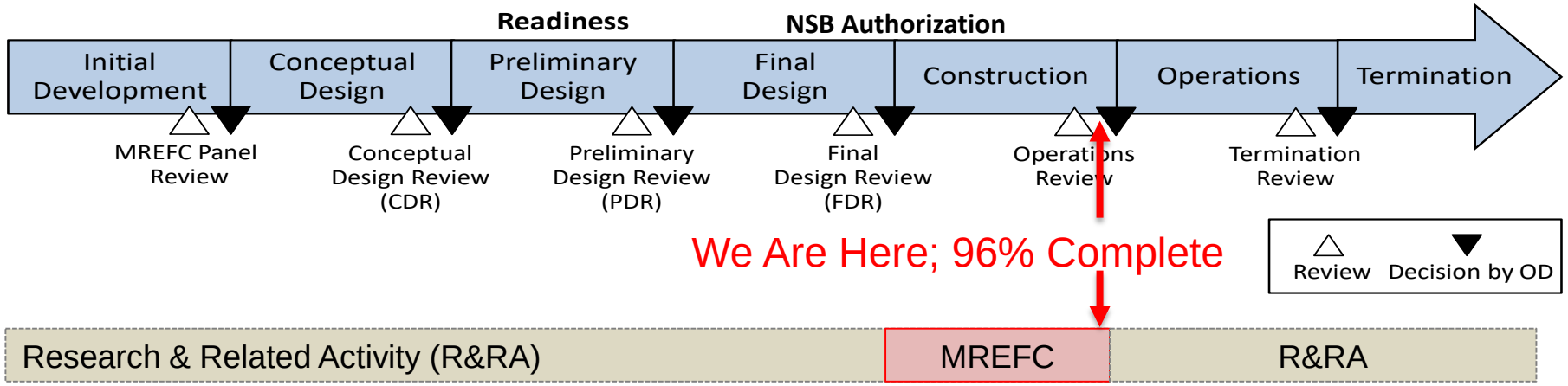
FY 2021 President's Budget Request

FY21 National Science Foundation Appropriations ($ millions, COVID-19 response and recovery funds excluded)										
Account	FY19 Actual	FY20 Enacted	FY21 Request	Change 20-21	House	Change 20-21	Senate	Change 20-21	Final	Change 20-21
NSF	**8,075**	**8,278**	**7,741**	**-6%**	**8,548**	**3%**				
Research and Related Activities[1]	**6,578**	**6,737**	**6,213**	**-8%**	**6,967**	**3%**				
Mathematical and Physical Sciences	1,491	-	1,448	-	-	-				

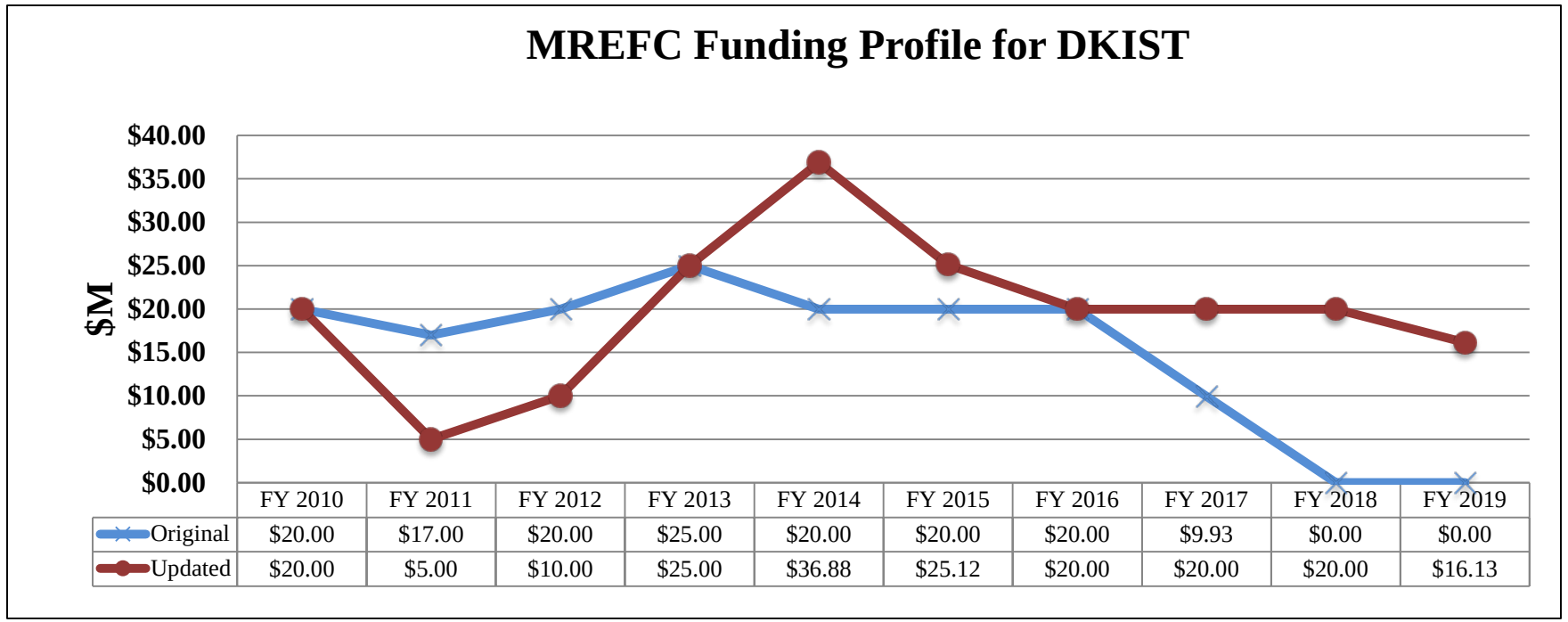


Likely we'll be under a CR for first part of FY 2021

DKIST in the NSF Facility Lifecycle



DKIST MREFC Funding Profile



	FY 2010	FY 2011	FY 2012	FY 2013	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019
Original	$20.00	$17.00	$20.00	$25.00	$20.00	$20.00	$20.00	$9.93	$0.00	$0.00
Updated	$20.00	$5.00	$10.00	$25.00	$36.88	$25.12	$20.00	$20.00	$20.00	$16.13

- DKIST Re-baselined Total Project Cost = $344.13M
- Total MREFC awarded $344.13M
  - DKIST construction fully funded (or so we thought…)

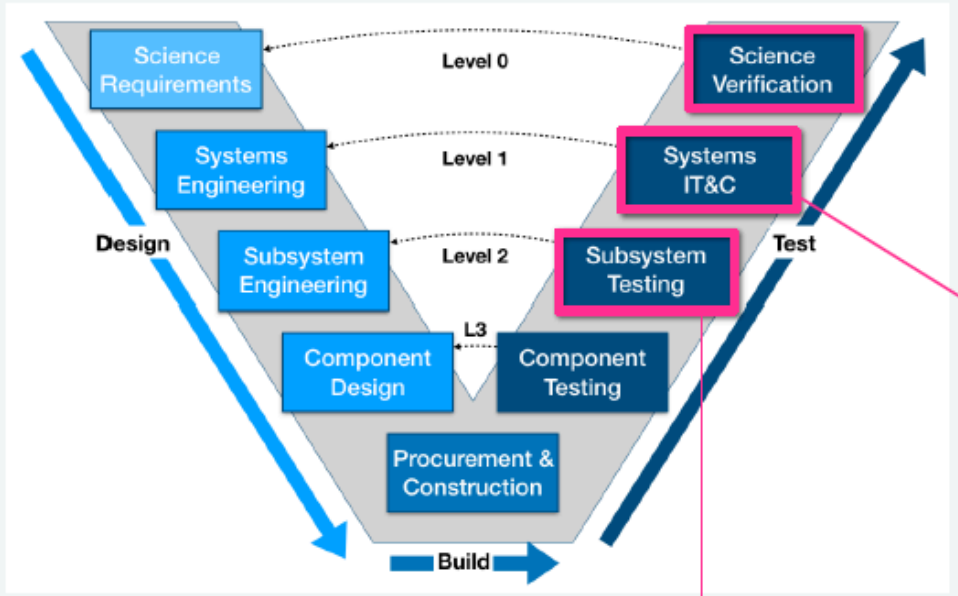
Impacts of COVID-19 on DKIST Construction

- March 17, 2020: DKIST site construction halted and access to the DSSC offices closed to all non-essential personnel.
- May 29, 2020: Restart review held. DKIST site construction approved for Phase I restart
- June 4, 2020: DKIST site construction restarted; ~30% efficient
- June 22, 2020: NSF Acting Director **authorized Management Reserve**
  - COVID-19 impacts are an **unforeseeable risk** that was realized
  - Contingency not applicable
- July 6, 2020: Project transitioned to a modified phase 1 (phase 1b) return-to-work that allows for two overlapping shifts of approximately 35 personnel per shift; ~60-70% efficient
- Governor of Hawaii's two-week quarantine for travelers to Hawaii lifted Oct. 15, 2020
  - Pre-travel COVID test required for trans-Pacific travel
  - Maui County strongly encourages an additional post-travel test

DKIST Cost and Schedule Status (as of July 31, 2020)

- Project 96% complete
- Budget
  - TPC = $344.13M
  - NSF Funding to date = $344.13M ($146M ARRA)
  - Actuals + Commitments = $335.0M
  - Earned Value = $328.2M
  - Budget Contingency = $3.15M (16.4% of remaining ETC)
- Schedule
  - CSA Expiration Date = December 31, 2020
  - Likely extended due to COVID-19

DKIST Project Scope – Principal Remaining Work



- TI Fit/Finish, FTS, Site Closeout
- M8 Assembly
- FIDO Optics (Beamsplitters)
- Wavefront Correction System
- Visible Broadband Imager
- PA&C / GOS
- Partner Instruments:
  - Cryo-NIRSP
  - DL-NIRSP
  - ViSP
  - VTF
- Visible Cameras (VTF)

Remaining Subsystems to be Delivered

- ~~SIM 1 - Telescope Pointing Map~~
- ~~SIM 2 - M1 Integration~~
- ~~SIM 3 - M1 and M2 Integration~~
- ~~SIM 4 - M1-M6 Integration~~
- ~~SIM 5 - Coude Optics + FIDO~~
- ~~SIM 6a - VBI Integration~~
- ~~SIM 6b - WFC Integration~~
- ~~SIM 7 - First Light Initiative~~
- ~~SIM 8 - GOS Integration~~
- ~~SIM 9a - Cryo-NIRSP Integration~~
- ~~SIM 9b - DL-NIRSP Integration~~
- ~~SIM 9c - ViSP Integration~~
- SIM 9d - VTF Integration
- ~~SIM 10 - Polarization Calibration~~
- SIM 11 - Commissioning & Verification

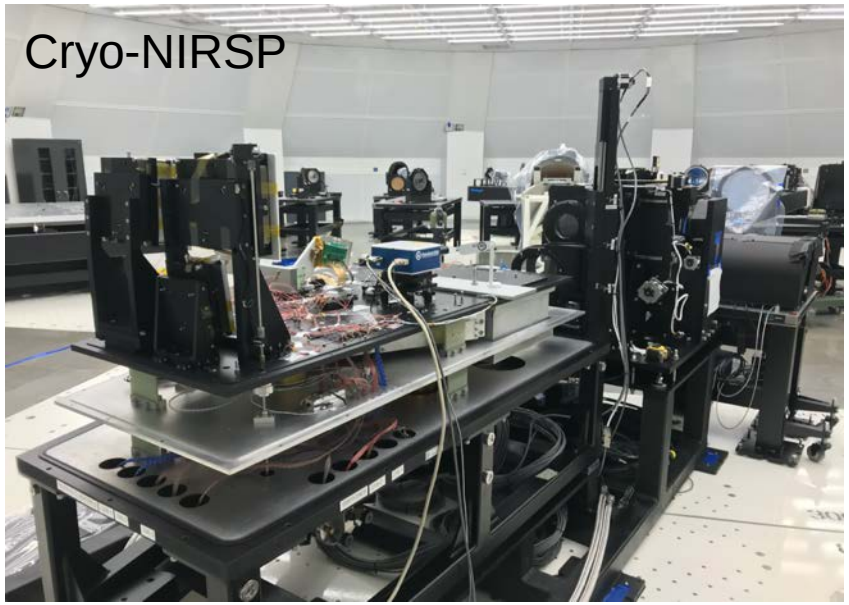
SIM Status

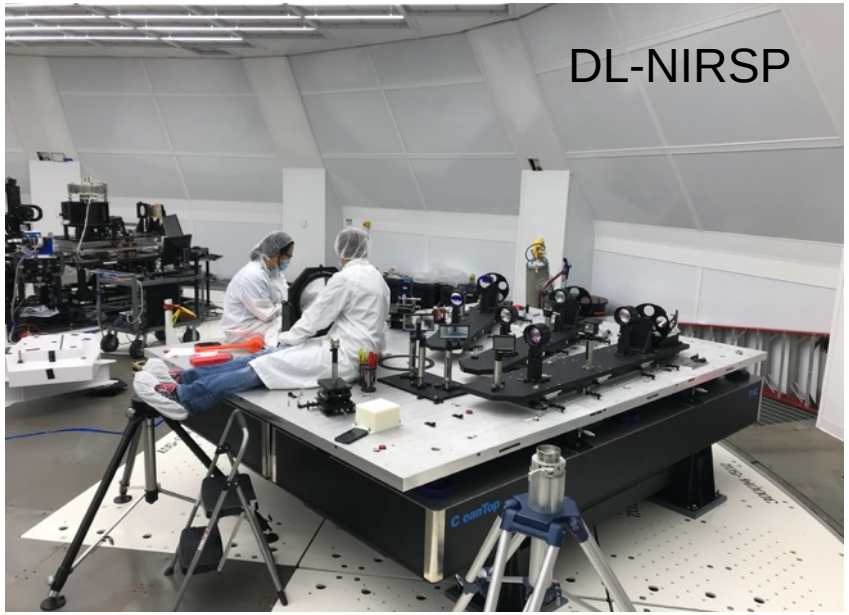
Construction Site - March 2020

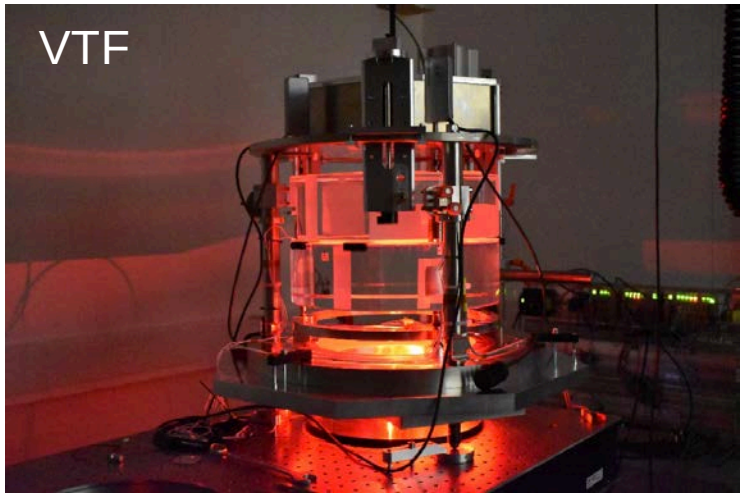
Construction Site - September 2020

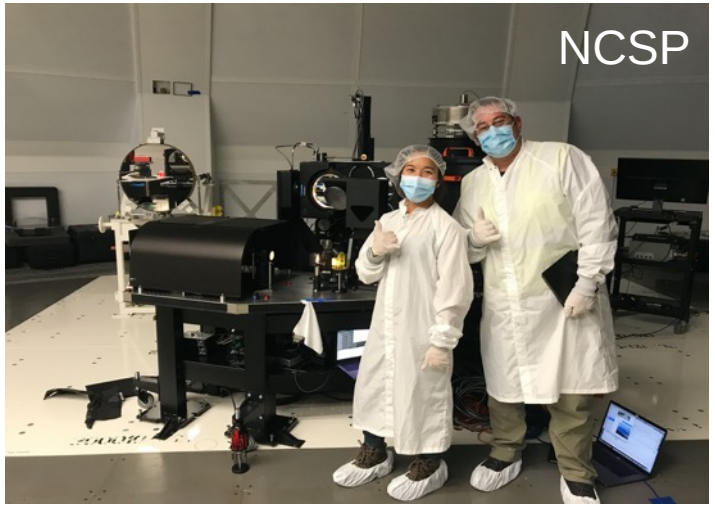
Recent Construction Pics - FTS

Recent Construction Pics - Instruments

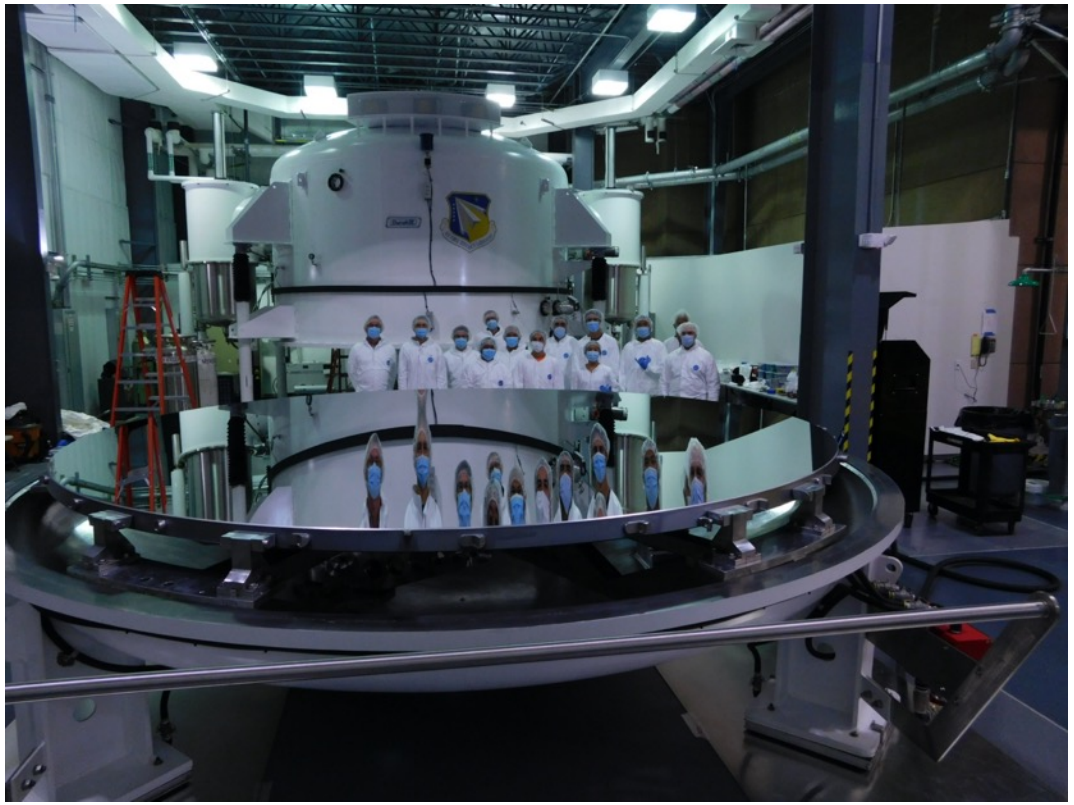








M1 and M1 Commissioning Blank

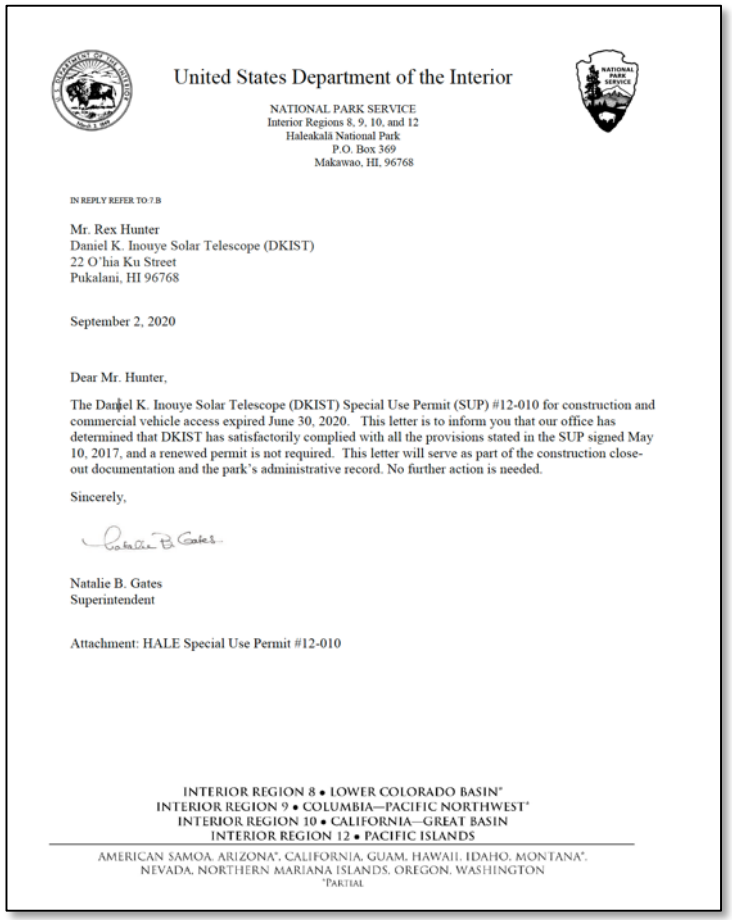


Primary (M1) Mirror after being re-coated in the U.S. Air Force's Mirror Coating Facility on the summit of Haleakala

M1 Commissioning Blank being taken down the summit for shipment to New Mexico

Environmental/Cultural/Permitting

- Special Use Permit (SUP) from the National Park Service **closed out**
- Dept. of Land and Natural Resources (DLNR) Conservation District Use Permit (CDUP) close-out process
  - Site demobilized, awaiting final DLNR inspection
  - Delayed due to COVID-19
- FAA lease renewed to June 2021
  - Some DKIST containers stored there



United States Department of the Interior

NATIONAL PARK SERVICE
Interior Regions 8, 9, 10, and 12
Haleakalā National Park
P.O. Box 369
Makawao, HI, 96768

IN REPLY REFER TO 7.B

Mr. Rex Hunter
Daniel K. Inouye Solar Telescope (DKIST)
22 O'hia Ku Street
Pukalani, HI 96768

September 2, 2020

Dear Mr. Hunter,

The Daniel K. Inouye Solar Telescope (DKIST) Special Use Permit (SUP) #12-010 for construction and commercial vehicle access expired June 30, 2020. This letter is to inform you that our office has determined that DKIST has satisfactorily complied with all the provisions stated in the SUP signed May 10, 2017, and a renewed permit is not required. This letter will serve as part of the construction close-out documentation and the park's administrative record. No further action is needed.

Sincerely,

Natalie B. Gates
Superintendent

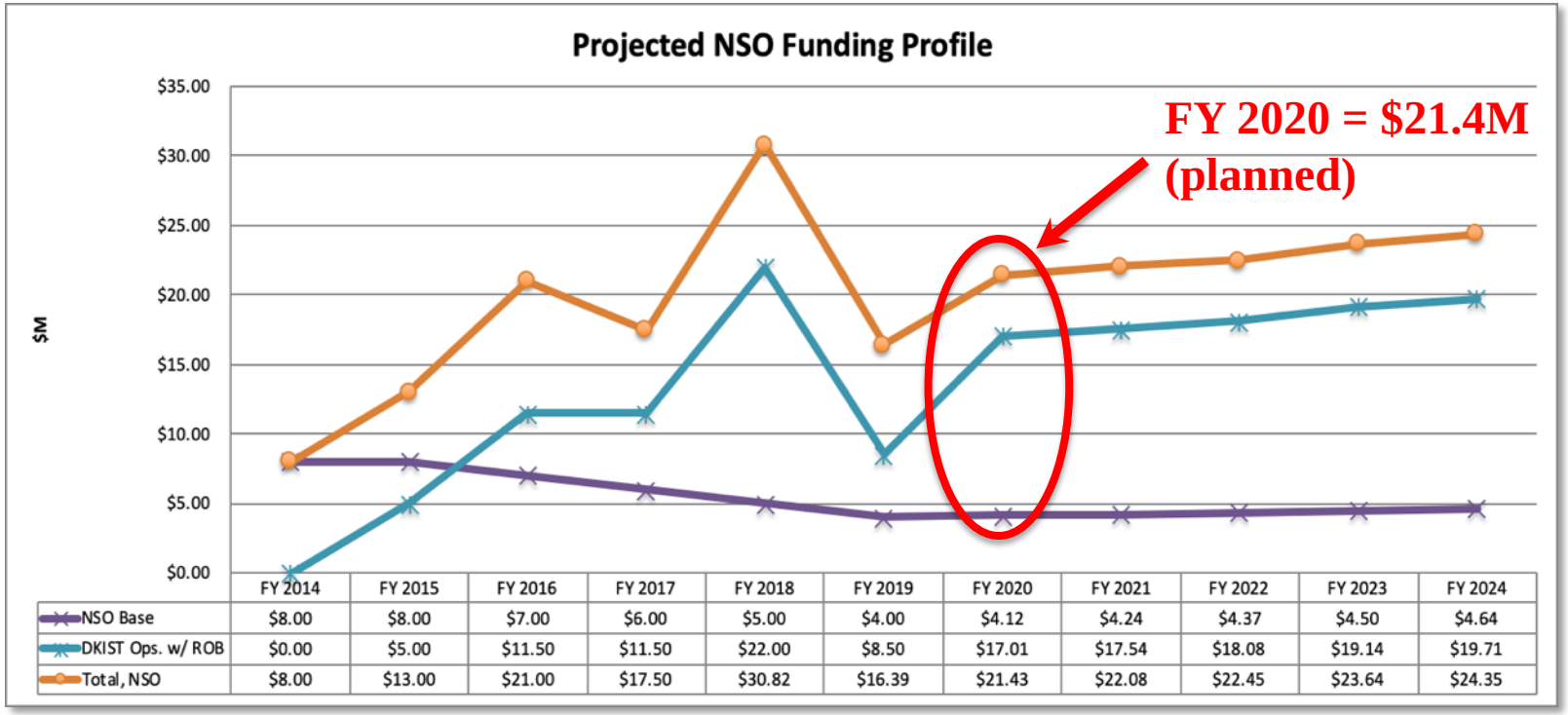
Attachment: HALE Special Use Permit #12-010

INTERIOR REGION 8 • LOWER COLORADO BASIN*
INTERIOR REGION 9 • COLUMBIA—PACIFIC NORTHWEST*
INTERIOR REGION 10 • CALIFORNIA—GREAT BASIN
INTERIOR REGION 12 • PACIFIC ISLANDS

AMERICAN SAMOA, ARIZONA*, CALIFORNIA, GUAM, HAWAII, IDAHO, MONTANA*,
NEVADA, NORTHERN MARIANA ISLANDS, OREGON, WASHINGTON
*PARTIAL

NSO Operations & Maintenance

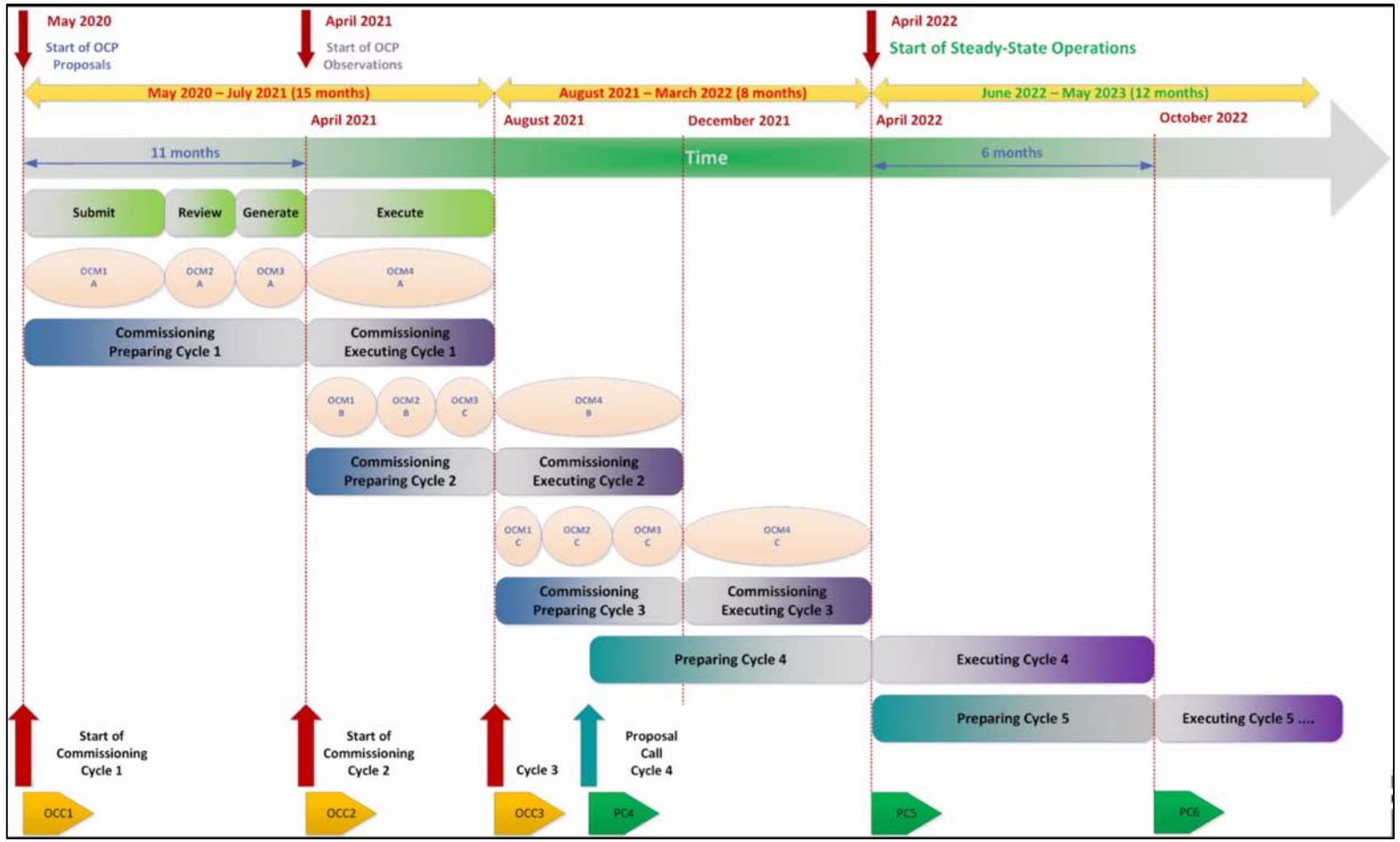
- FY 2019 O&M = $16.4M
  - DKIST Level-2 Data Products = $3.5M
  - Legacy facilities = $400K
- FY 2020 O&M = $21.4M (planned)
  - Sac Peak ops = $300K
  - Relocatable houses = $350K
  - WoU-MMA = $480K



	FY 2014	FY 2015	FY 2016	FY 2017	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
NSO Base	$8.00	$8.00	$7.00	$6.00	$5.00	$4.00	$4.12	$4.24	$4.37	$4.50	$4.64
DKIST Ops. w/ ROB	$0.00	$5.00	$11.50	$11.50	$22.00	$8.50	$17.01	$17.54	$18.08	$19.14	$19.71
Total, NSO	$8.00	$13.00	$21.00	$17.50	$30.82	$16.39	$21.43	$22.08	$22.45	$23.64	$24.35

Plan for DKIST Operations Commissioning

- 1-year Operations Commissioning Phase (OCP)
  - Cycle 1 call for proposals – May 1, 2020
  - Shared-risk observations
  - Limited instruments/modes
- **Schedule likely pushed out by ~6 months due to COVID-19**
- Anticipating start of Steady-state observations – April 2022



Relocatable Housing Units

- NSO received an inquiry from White Sands Habitat for Humanity (WSHfH) regarding the 21 relocatable housing units, which resulted in a proposals
  - WSHfH to NSO and NSO to NSF
  - Requested funding to transport the units at $16K/unit (much less than disposal $75K/unit)
- Proposal from NSO awarded – Sept. 9, 2020
  - Units will be transferred directly to WSHfH one at a time over the course of months to a year
  - Complies with NSF obligations for Sac Peak under the EIS and ROD

Space Weather (PROSWIFT) Act

- Sponsored by Reps. Perlmutter (D-CO) and Brooks (R-AL); and Sens. Gardener (R-CO) and Peters (D-MI)
- Directs NSF, NASA & NOAA to:
  - continue to support basic research in disciplines relevant to space weather
  - sponsor a National Academies "Space Weather Government-Academic-Commercial Roundtable to facilitate communication and knowledge transfer among Government participants in the space weather interagency working group"
  - establish a 15-member Space Weather Advisory Group under the Federal Advisory Committee Act (FACA)
    - 5 from academia, 5 commercial sector, 5 non-governmental end-user community
- Directs NSF specifically to
  - "maintain and improve ground-based observations of the Sun"
  - "continue to provide space weather data through ground-based facilities"
- **Good news for NISP and ngGONG**

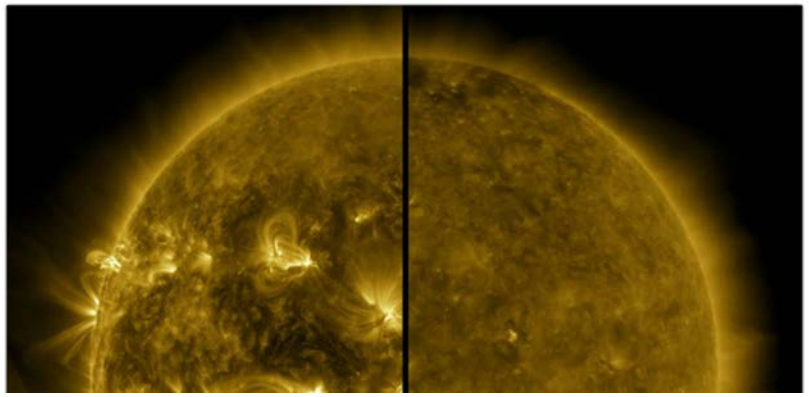
FYI
SCIENCE POLICY NEWS FROM AIP
Bulletin

Space Weather Preparedness Bill Clears Congress

SHARE THIS

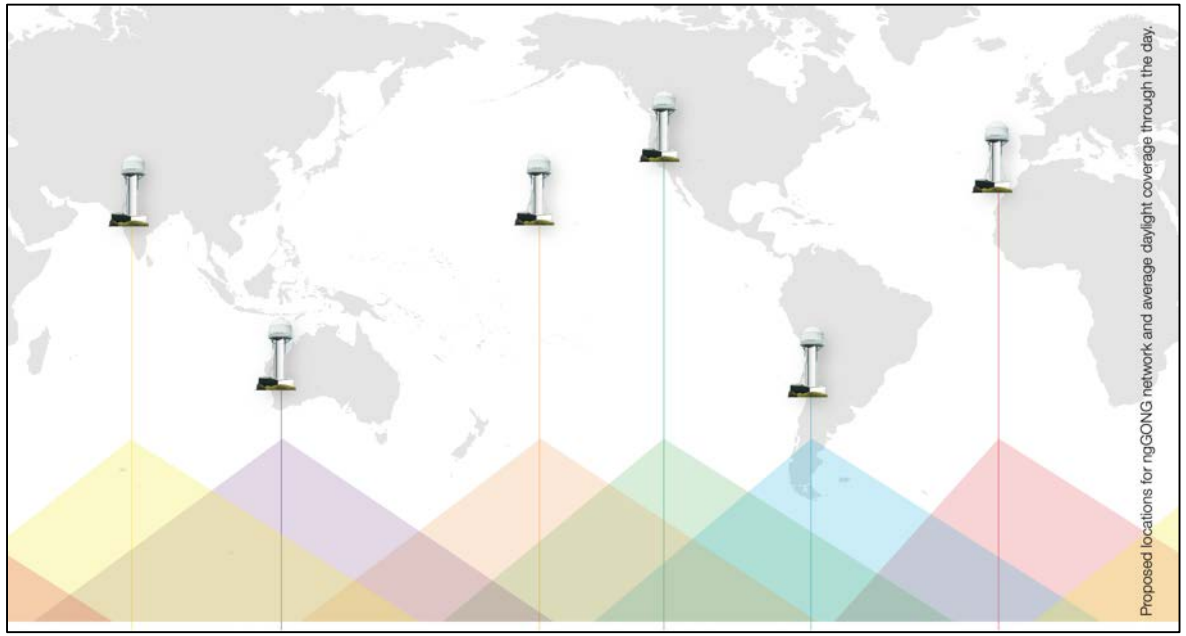
Publication date: 25 September 2020 Number: 86

Congress passed bipartisan legislation last week that delineates federal agency responsibilities for monitoring and anticipating the consequences of solar storms.

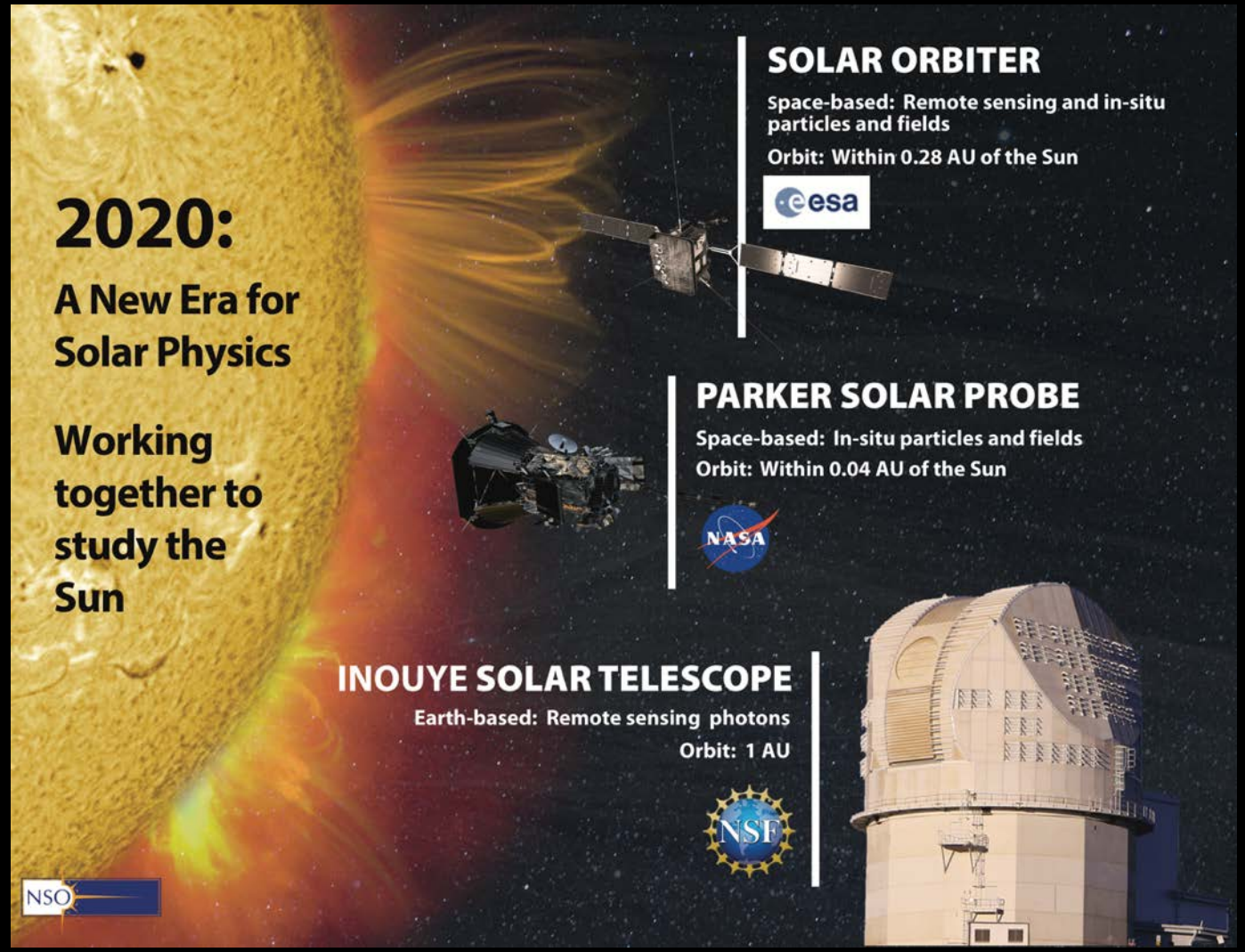


Next Generation GONG (ngGONG)

- ngGONG could replace GONG this decade
- Objective: Meet future Space Weather **operational & research** goals
  - Develop requirements with SW research (R2O) and forecasting (O2R) communities
- Advantages:
  - Cost effective; ground-based (vs. space-based)
  - Upgradeable to latest technology
  - Complementary to L5; provides L1-LOS view
- Limitations:
  - Earth's atmosphere (UV, turbulence, transparency)



Era of Multi-Messenger Solar Physics



- AST facilities encouraged to submit supplement proposals to the NSF-wide WoU-MMA opportunity
  - NSO submitted a proposal for upgrades to the DKIST distribution optics and Cryo-NIRSP to enhance spectral coverage and efficiency for joint observations with PSP and SolO
  - Highly rated; truly MMA proposal
- NSF-AST met with NASA Heliophysics to discuss joint (MMA) opportunities – Oct. 7, 2020

NSF/ AST Solicitations for Solar Physics and Observations

Astronomy and Astrophysics Research Grants (AAG)

PROGRAM SOLICITATION
NSF 18-575

REPLACES DOCUMENT(S):
NSF 16-574

National Science Foundation

Directorate for Mathematical & Physical Sciences
Division of Astronomical Sciences

Submission Window Date(s) (due by 5 p.m. submitter's local time):

October 01, 2018 - November 15, 2018

October 1 - November 15, Annually Thereafter

IMPORTANT INFORMATION AND REVISION NOTES

Proposals about the astronomy and astrophysics of our Sun, the rest of our Solar System, and/or extrasolar planets will be handled under this solicitation. The Solar and Planetary Research Grants program will now be reintegrated into the Astronomy and Astrophysics Research Grants program (this solicitation).

Collaborators & Other Affiliations Information. When completing Table 4, you may list only the first three (3) co-authors

Advanced Technologies and Instrumentation (ATI)

PROGRAM SOLICITATION
NSF 18-576

REPLACES DOCUMENT(S):
PD 08-1218

National Science Foundation

Directorate for Mathematical & Physical Sciences
Division of Astronomical Sciences

Submission Window Date(s) (due by 5 p.m. submitter's local time):

October 1, 2018 - November 15, 2018

October 1 - November 15, Annually Thereafter

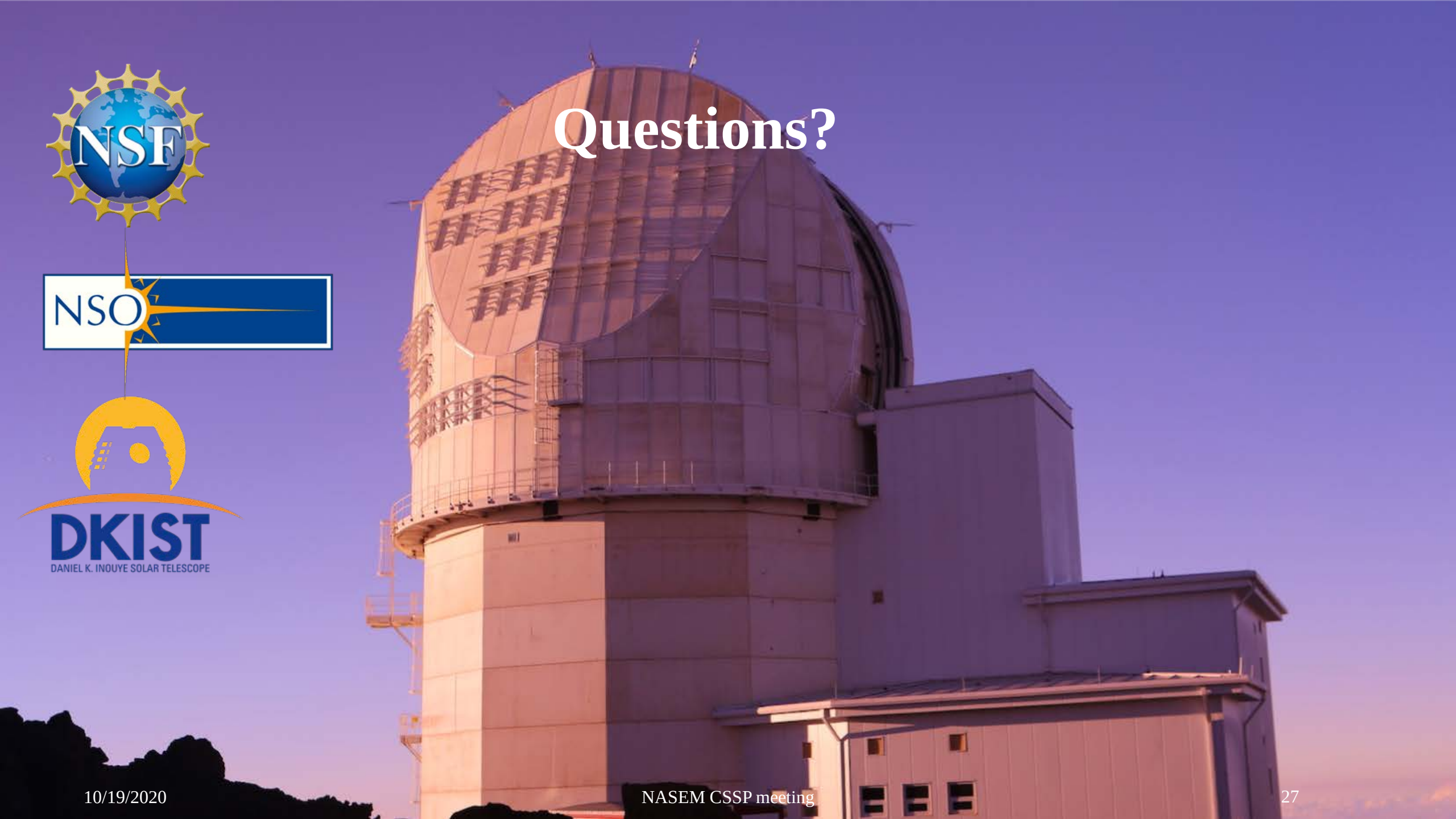
Synopsis of Program:

The Advanced Technologies and Instrumentation (ATI) program provides individual investigator and collaborative research grants for development of new technologies and instrumentation for astronomy and astrophysics. The program supports overarching science objectives of the Division of Astronomical Sciences. Development of innovative, potentially transformative technologies are encouraged, even at high technical risk. Supported categories include but are not limited to: advanced technology development or concept feasibility studies and specialized instrumentation to enable new observations that are difficult or impossible to obtain with existing means. Proposals may include hardware and/or software development and/or analysis to enable new types of astronomical observations. The program encourages making products of research available to the public. It also encourages community coordination of technology and instrumentation development efforts via an annual Principal Investigators meeting.

Cognizant Program Officer(s):

Please note that the following information is current at the time of publishing. See program website for any updates to the points of contact.

- Zoran Ninkov, telephone: (703) 292-2533, email: zninkov@nsf.gov



Questions?