NSF/AST Program Update

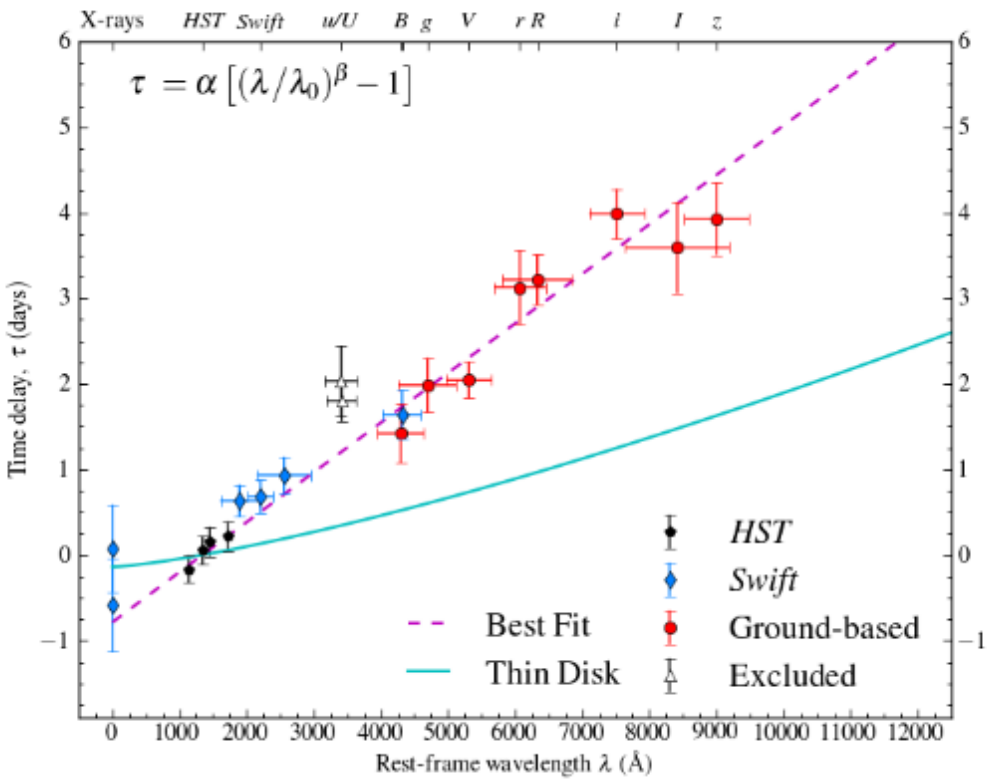
June 6, 2016

Jim Ulvestad, Division Director, MPS/AST

@UlvestadNSF

AGN-STORM Reverberation Mapping Campaign: Intensive monitoring of the Seyfert 1 Galaxy NGC 5548

- The most intensive AGN reverberation mapping campaign ever carried out, over a 6 month span in 2014
  - HST/COS UV spectroscopy
  - *Swift* monitoring
  - Nightly ground-based imaging and spectroscopy
- New result (Fausnaugh et al. 2016, ApJ, 821, 56): definitive detection of UV-optical continuum lags
  - Optical light curves lag the far-UV variations by 2-4 days
  - Implies accretion disk size 3x larger than standard thin-disk model predictions

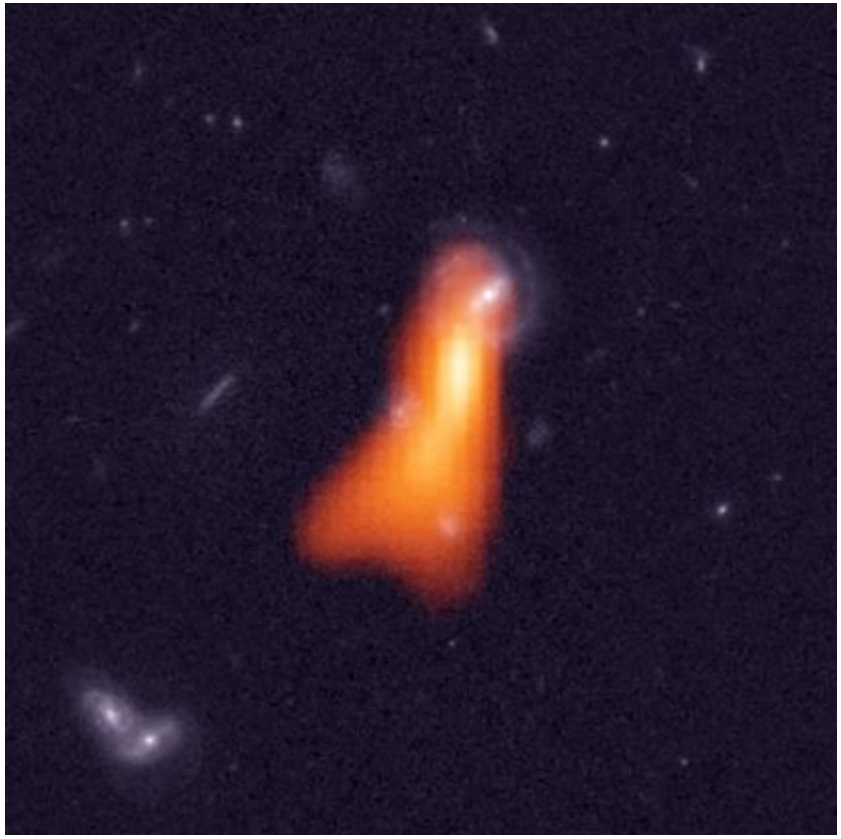


CREDIT: Fausnaugh et al.

Awards AST-1412693, AST-1412315

VLA Detection of HI in Starburst at *z*=0.38

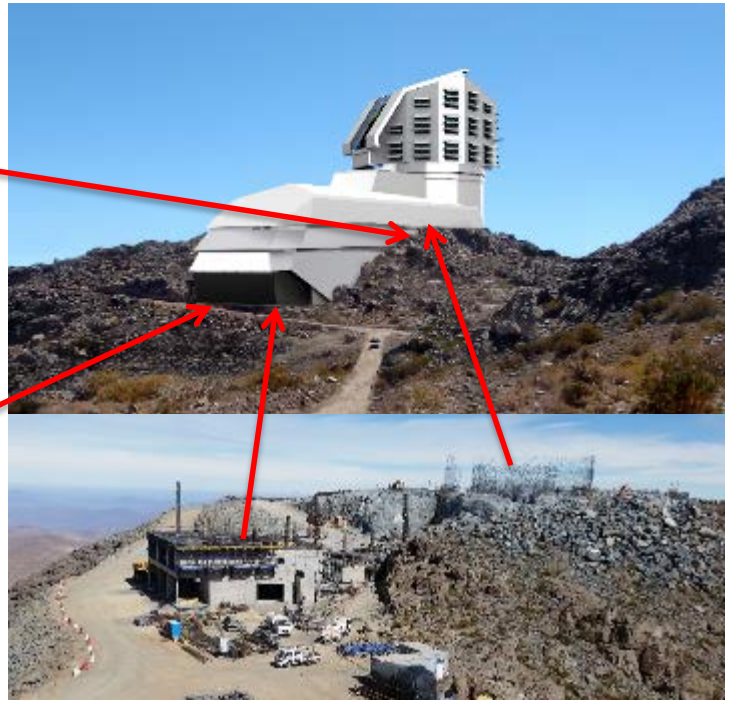
- COSMOS HI Large Extragalactic Survey (CHILES) simultaneously observing HI from z=0 to z~0.5, with 1000 hours of VLA time
- Studying the evolution of gas in and around galaxies over cosmic time
- Fernandez et al. (2016) report VLA detection of 3 x 10^{10} M_{Sun} of HI in COSMOS J100054.83+023126.2 at *z*=0.376 (double previous distance record)
- Follow-up CO detection of 2-10 x 10^{10} M_{Sun} using LMT
- Relies on the upgraded Karl G. Jansky VLA and a large collaborative individual investigator award (AST-14123102, AST-1412503, AST-1412843, AST-1413099, AST-1412578)



CREDIT: Fernandez et al., Bill Saxton, NRAO/AUI/NSF; Koekemoer et al., Massey et al., NASA.

Large Synoptic Survey Telescope

- Construction continues to progress, with no change in late 2022 start date for full 10-yr survey
- Operations plan under development



Daniel K. Inouye Solar Telescope

- Excellent construction progress, with some delays on site work because of poor weather in Hawaii
  - Scheduled for completion in late 2019
- Data rate ≈ LSST data rate, but three years earlier!

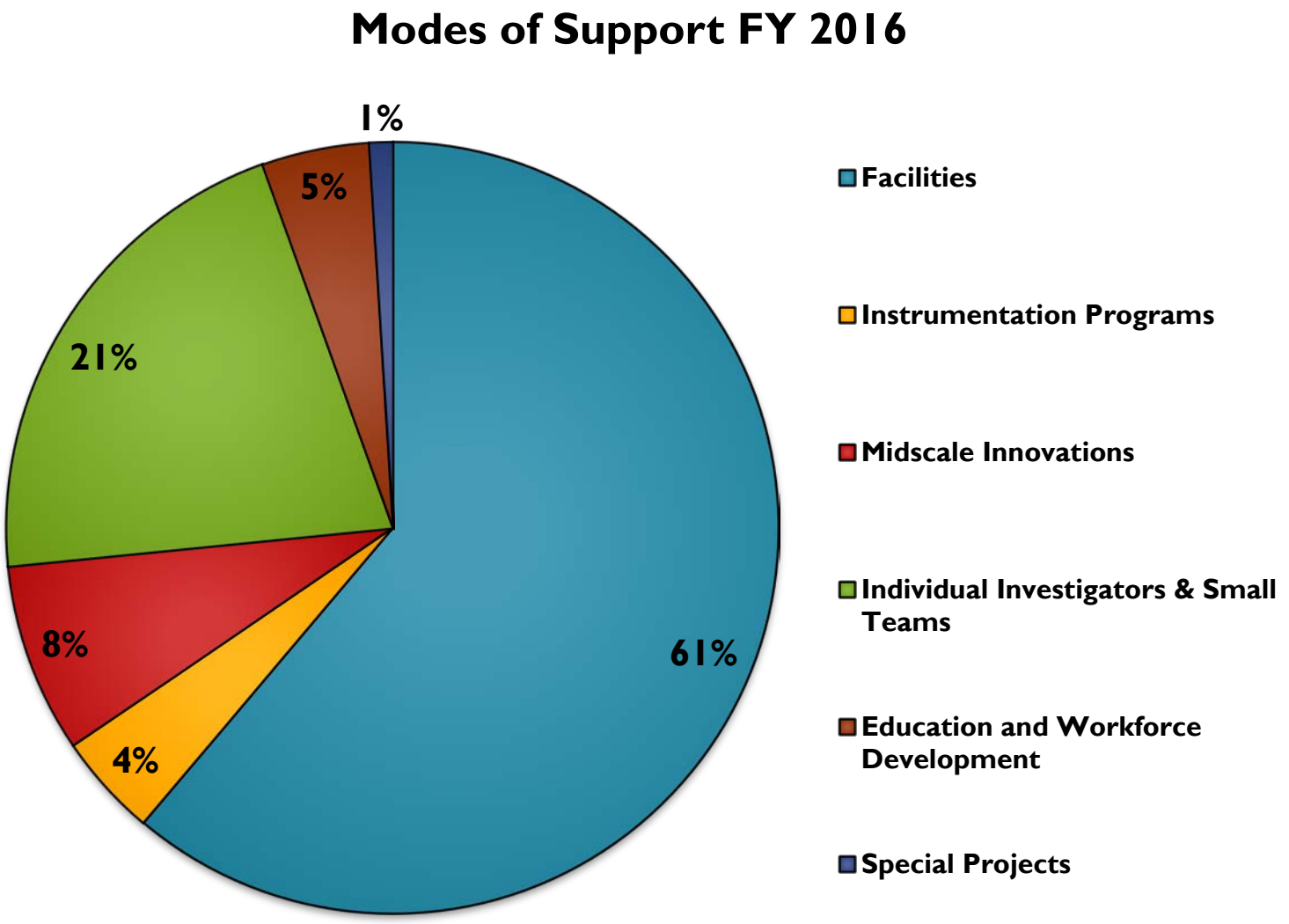
Current Budget Markups

- Senate Appropriations Committee has marked up the NSF budget with Research & Related Activities (R&RA) exactly flat from FY 2016 to FY 2017; added Major Research Equipment and Facilities Construction (MREFC) funds for third Regional Class Research Vessel (RCRV).
- House Appropriations Committee marked up NSF budget with R&RA increase of $46 million, completely cutting the RCRV from the NSF request.
- Awaiting conference and further Congressional action.
- Conclusion: NSF should probably count on an R&RA budget that is flat, or increases by 1% at best (not the full program as recommended by AAAC in its 2015-2016 report).

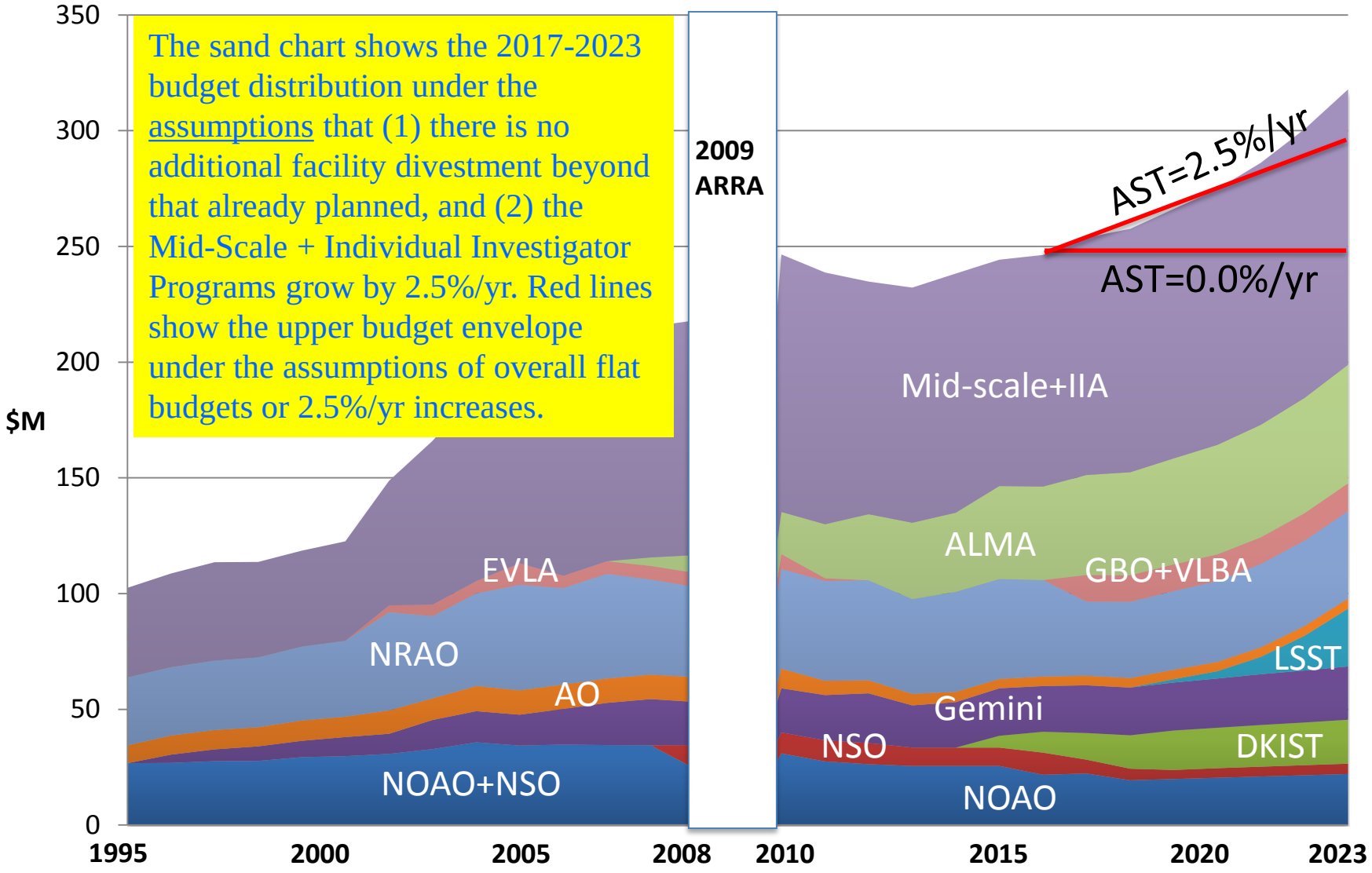
FY 2017 NSF Request by Account ($M)

	FY 2016 Estimate	FY 2017 Discretionary		FY 2017 Mandatory	House Approp.	
Research & Related Activities	$ 6034	$ 6079	0.8%	$ 346	6079	0.8%
Education & Human Resources	880	899	2.1%	54	880	0.0%
Major Res Equip & Facilities Const.	200	193	-3.6%		87	-56%
Agency Operations & Award Mgmt.	330	373	13%		340	3.0%
National Science Board	4	4			4	0.3%
Office of the Inspector General	15	15			15	0.3%
Total NSF	**$ 7463**	**$ 7564**	**1.3%**	**$ 400**	**$ 7405**	**-0.8%**

Funding Distribution in AST



Hypothetical Budget Runouts for AST



2016 AAAC Recommendations-1

- Cooperation in database design and data sharing is encouraged
  - NSF, NASA, DOE, and key project leadership continue to meet to discuss joint processing of LSST, WFIRST, and EUCLID data
- Encourage DOE, NSF, and university community to continue work on a plan for ground-based CMB Stage 4 experiment
  - NSF (AST, PHY, PLR) have had two meetings with DOE/HEP since March to compare timelines and discuss possible mechanisms that would enable agencies to move forward
- Strong efforts for facility divestment should continue, with partnerships preferred
  - Kicking off formal environmental reviews, which will include partnership options as well as cessation of operations and (no-action alternative) continuation of operations
  - See later slides

2016 AAAC Recommendations-2

- Continue to pursue international partnerships, following "Principles for Access"
  - See above comment on LSST-EUCLID-WFIRST
  - International partners remain critical for LSST operations
  - The principle of "reciprocity" from the Principles for Access is key in these conversations
- Urge that full programmatic funding be provided to agencies to execute their programs
  - Not in current Congressional markups for FY 2017
- Community-based groups should study growth in research community
  - NSF and NASA have held discussions with AAS and NRC about potential study parameters, and relation to next decadal survey

Mid-Decadal Survey

- Expect release following next week's AAS meeting

Facility Divestment Process

- Final engineering/environmental feasibility studies have been received for Arecibo, Green Bank, and Sacramento Peak. Expect to finalize VLBA and Kitt Peak (2.1m, McMath-Pierce, vacuum tower) studies by mid-June.
- Kitt Peak 4m telescope transitioning to DOE funding in 2018.
- NASA has selected Extreme Precision Doppler Spectrometer for WIYN 3.5m telescope on Kitt Peak.
- Arecibo Environmental Impact Statement (EIS) process started (see next slides).
- Aiming to start formal environmental review processes for additional facilities this year, with decision points ranging from mid-2017 to early 2018.

Arecibo "Notice of Intent" & Scoping

- NSF has issued a "Notice of Intent to Prepare an Environmental Impact Statement and Initiate Section 106 Consultation for Proposed Changes to Arecibo Observatory Operations, Arecibo, Puerto Rico and Notice of Public Scoping Meetings and Comment Period".
- Beginning scoping process to solicit public comments and identify issues to be analyzed in the EIS.
- Public comment period ends on June 23, 2016; scoping meetings in Puerto Rico will occur on June 7, 2016.
- Also initiating consultation process under Section 106 of the National Historic Preservation Act to evaluate potential effects to Arecibo Observatory, which is a historic property listed on the National Register of Historic Places.

Arecibo Environmental Review Process

- NSF welcomes input from all stakeholders to this transparent, public process (see www.nsf.gov/AST)
- Purpose of scoping process is to seek public input regarding relevant issues that will influence the scope of the environmental analysis, including viable alternatives
- E-mail comments to envcomp-AST@nsf.gov, by June 23.
- Scoping will be followed by preparation of a Draft EIS.
- A 45-day public comment period will follow the publication of the Draft EIS.
- These comments will be incorporated into a Final EIS, followed by a subsequent "cooling-off" period of at least 30 days prior to issuance of a Record of Decision.
- Expect to complete process in 2017.

Proposal Reviews: FY 2016

- MSIP full proposals have been reviewed, decisions are in process
- All 703 AAG proposals have been reviewed, 77% of decisions signed off within six months of deadline (vs. new NSF goal of 75%)
  - Number of AAG proposals decreased 9% from FY 2015 (770→703)
  - Expect a funding rate of 19%-20% in FY 2016, with budget of ~$48.5 million
- Due to personnel shortfalls, ATI proposal review was deferred until after AAG was completed. Reviews and decisions are now in process.

Future Proposal Reviews

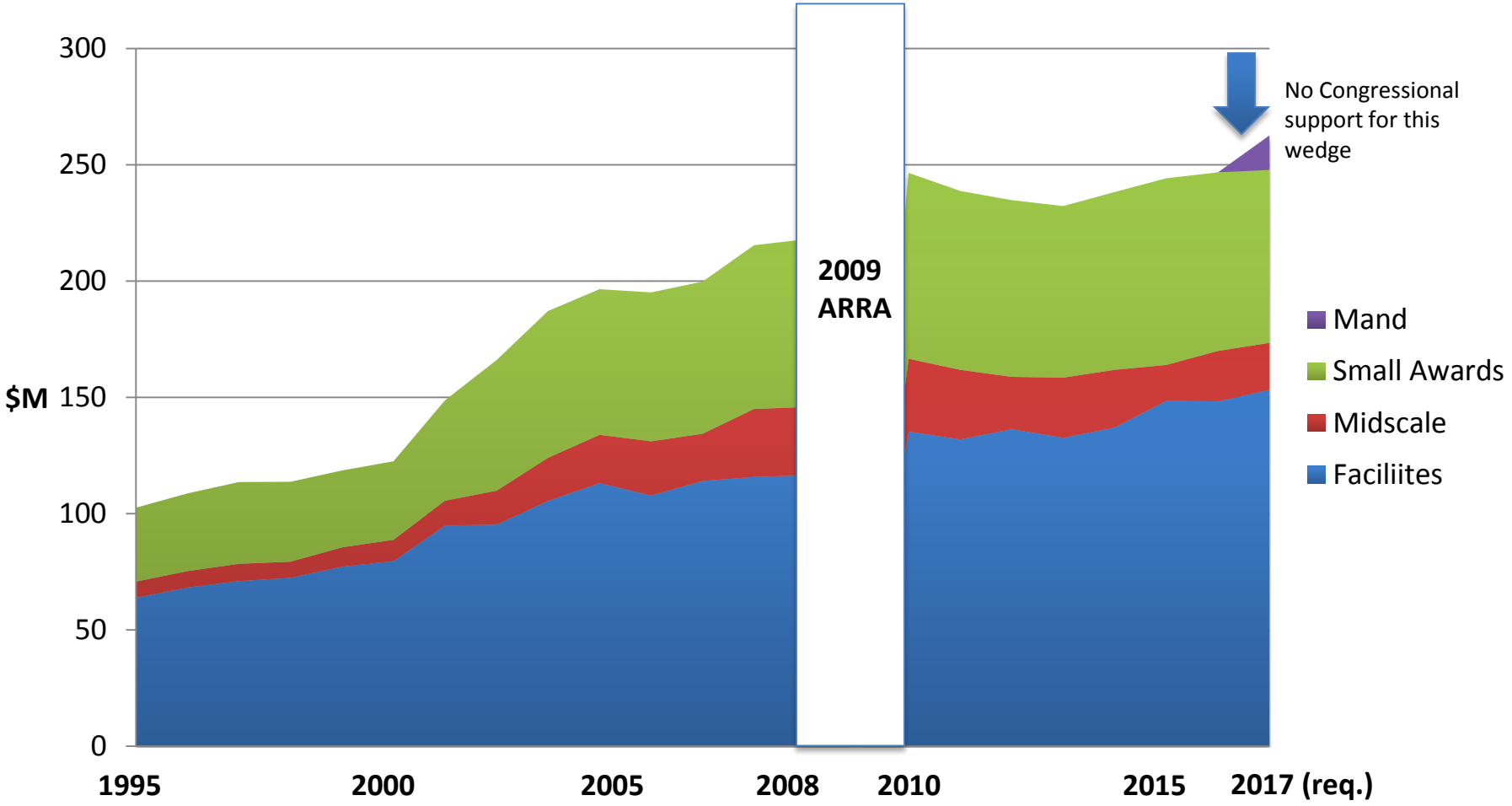
- AST will run the (Planetary + Solar) parts of the AAG program without a deadline in FY 2017, while retaining a deadline for the rest of AAG
  - New solicitations are in preparation/clearance
- This pilot program will be used to assess the complexities of operating a no-deadline program, the quality of the merit review and decision process, and any impact (plus or minus) on proposal pressure
- Expect continued difficulty in completing proposal reviews if AST cannot attract Intergovernmental Personnel Act rotators (DCL is currently open)

Backups Follow

FY 2017 MPS Request by Division ($M)

	FY 2016 Plan	FY 2017 Discretionary		FY 2017 Mandatory	FY 2017 Total	
Astronomical Sciences (AST)	$ 246.73	$ 247.73	0.4%	$ 14.88	$ 262.61	6.4%
Chemistry (CHE)	246.31	247.31	0.4%	14.85	262.16	6.5%
Materials Research (DMR)	310.03	311.03	0.3%	18.68	329.71	6.3%
Mathematical Sciences (DMS)	234.05	235.05	0.4%	14.12	249.17	6.5%
Physics (PHY)	277.03	278.53	0.5%	16.73	295.26	6.6%
Multidisciplinary Activities (OMA)	35.00	35.41	1.2%	2.13	37.54	7.3%
Total MPS	**$ 1349.15**	**$ 1355.06**	**0.4%**	**$ 81.39**	**$ 1436.45**	**6.5%**

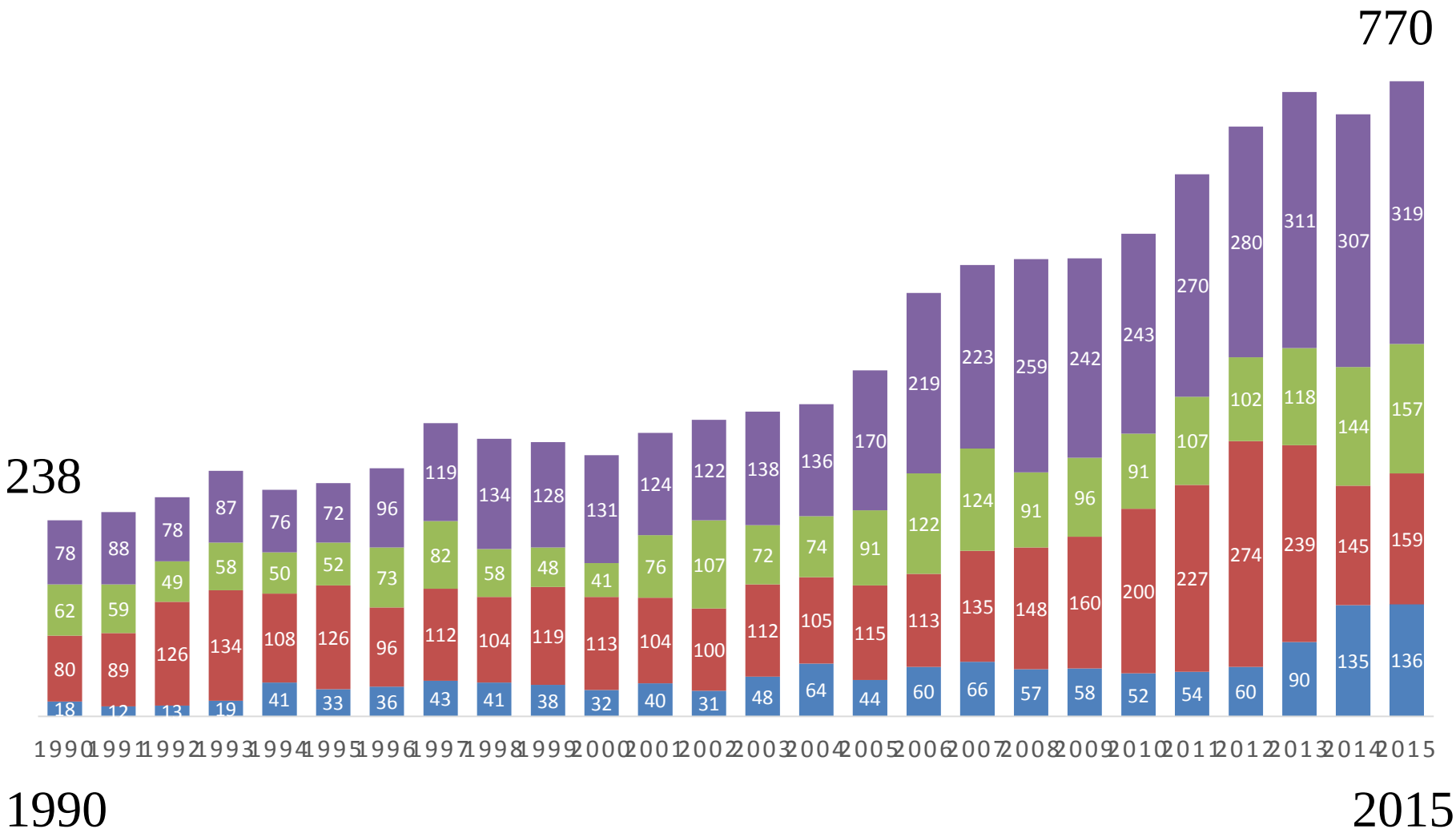
AST Budget Breakdown, 1995-2017



Arecibo-Initial Alternatives

- Continued NSF investment for science-focused operations (No-Action Alternative)
- Collaboration with interested parties for continued science-focused operations
- Collaboration with interested parties for transition to education-focused operations
- Mothballing of facilities (suspension of operations in a way that enables future resumption of operations)
- Deconstruction and site restoration
- No decisions have been made: scoping process is designed to provide public input on these and other possible alternatives

Proposals in AAG, 1990-2015



AAG Funding History, 1990-2015