



NSF/AST Mid-Scale Innovations Program (MSIP)

NRC Mid-Decade Review Committee

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Outline

- **Origin of the Mid-Scale Innovations Program (MSIP)**
- **The first round – MSIP-I**
- **Next step – MSIP-II**



History I

- Long history of funding mid-scale class projects
 - University radio facilities, ad hoc from late 1970s.
- Over the past decade +, AST mid-scale programs/projects had a variety of forms:
- ***Solicited / Competed***
 - University Radio Observatories (URO):
 - Construction and operation of medium-size radio facilities
 - 4-5 awards every 3 years, total program budget \$6-10M/yr
 - Telescope Systems Instrumentation Program (TSIP):
 - Instruments for non-federal optical telescopes > 3m
 - Trade instrument funding for nights of open access for US community
 - Annual program budget ~\$3M, program administered by NOAO
 - Renewing Small Telescopes... (ReSTAR)
 - Instruments on NOAO telescopes
 - Short term program, 2009 start; Total \$5.4M



History II

- ***Unsolicited / Uncompeted*** -- Ad Hoc Midscale Proposals
 - Individually submitted and reviewed, typically 2/yr
 - Typically \$10-15M total yearly budget for ~10 different ongoing projects
 - Examples:
 - **VERITAS**: Cherenkov gamma ray telescopes
 - **Sloan Digital Sky Survey**: optical sky survey
 - **Atacama Cosmology Telescope & Polarbear**: cosmic microwave background, millimeter radio
 - **Hobby-Eberly Telescope Dark Energy Experiment (HETDEX)**: cosmology, optical
 - **Virtual Astronomical Observatory**: data archive / mining standards
 - **Dark Energy Survey**: data management
 - **MWA & PAPER**: Epoch of Reionization cosmology, low frequency radio
 - **LSST**: design and development



ACT



ACT + Polarbear



Polarbear



VERITAS



SDSS



CARMA



PAPER



History III

- AST Mid-scale peaked in 2010 with a total of about \$34M, including URO, TSIP, ReSTAR, and Ad Hoccs
 - Other years more typically \$20-25M
- 2010 Decadal Survey, New Worlds, New Horizons
 - #2 ground-based recommendation: *“a competed program that will provide the capability to respond rapidly to scientific discovery and technical advances with new telescopes and instruments.”*
 - Advised ramp from \$20M to \$40M by end of decade
- 2012 AST Portfolio Review
 - In addition to “new telescopes and instruments” (NWNH), PR recommended telescope open access time, lab astrophysics, MREFC D&D, and long-term mid-scale facilities operations



Mid-Scale Innovations Program (MSIP-I)

- Developed following the guidelines of the Portfolio Review
- First solicitation issued June 2013
- Alternate year program; funding including two fiscal years
- Encompassed URO, TSIP, ReSTAR, Ad Hoc, plus more
- Four categories:
 - 1. **Mid-Scale Science Projects**
 - 2. **Mid-Scale Facilities**
 - 3. **Development Investments**
 - 4. **Open Access to Telescopes**
- Individual project budget upper limit: \$40M
- Two-stage process: Pre-(8 pg) and Full (30 pg) proposals



MSIP-I

- Two previous programs provided “open access”
 - **TSIP** provided fixed number of nights per dollar, typically \$3-4 million/yr in ~2010
 - **URO** provided 30-50% of observing time typically \$6-10 million/yr in 2008-2014
 - Each got 3-6 proposals per competition, funding rates of 25-50%
 - MSIP subsumed these programs; NWNH assumed URO + TSIP would continue separately
- From FY2013 Solicitation Specific Merit Review Criteria:
 - “All proposals must show the project’s value and benefit to the US astronomical community. Examples of benefit include, but are not limited to, open-access observing time on the facility, access to data products and software, and cooperation and sharing of technology with other projects.”
 - “Except for those in Category 4 [open access] with no instrumentation, proposals must include, and will be evaluated on, a substantial component of student training and involvement of a diverse and inclusive workforce in instrumentation, facility development, or data management/analysis”



MSIP-I Results

- MSIP-I was a pilot; magnitude of demand unknown
- Received 38 pre-proposals, requesting \$400M
 - Between a quarter and half classified their proposals as “Open Access” (could specify multiple categories)
 - Observing time/access offered relative to funding (aka cost/benefit) varied widely compared to either TSIP or URO standards
 - Most other proposals (and some with Open Access) involved instrumentation development
- Individual project budgets ranged from \$3M to \$40M
- Mostly 5-yr projects
- 12 full proposals invited; total request = \$177M



MSIP-I: FY 2014/2015 \$

- Awards

Awarded Proposal	PI	Total NSF Funding
Zwicky Transient Facility	Kulkarni	\$9.0M
Advanced ACTPol	Staggs	\$10.0M
H Epoch of Reionization Array	Parsons	\$2.1M
Event Horizon Telescope	Doeleman	\$6.5M
POLARBEAR	Lee	\$5.0M
NANOGrav Physics Frontier Center	Siemens	\$14.5M

Total AST FY14/15: \$27.1M; Other NSF: \$20M



Next Step – MSIP-II

- Considered comments/advice
 - Committee of Visitors (COV) – Feb 2015
 - NRC OIR System Report – Apr 2015
- Lessons learned from MSIP-I
- Solicitation ***NSF 15-580*** for FY 2016/2017 funds
 - Posted June 2015
 - Pre-proposals due September 16, 2015
 - Invited full proposals due February 22, 2016



MSIP-II Structure

Four Categories

1. **Mid-Scale Science Projects:** Self-contained, limited term projects with well-defined construction and science utilization phases.
2. **Mid-Scale Facilities:** Construction or operation of stand-alone, long-term, mid-scale facilities.
3. **Development Investments:** Design and development for future large mid-scale and large-scale facilities.
4. **Open Access Capabilities:**
 - a) New instruments for existing telescopes, both national and private, in return for US community access.
 - b) Provision of observing time for US community access on existing telescopes (e.g. providing open access nights in return for partial support of operational costs of a facility).
 - c) Data archiving and data management projects leading to public access to data resource

Individual project budget upper limit: \$30M

Two-stage process: Pre (8 pg) and Full (30 pg) proposals



Summary

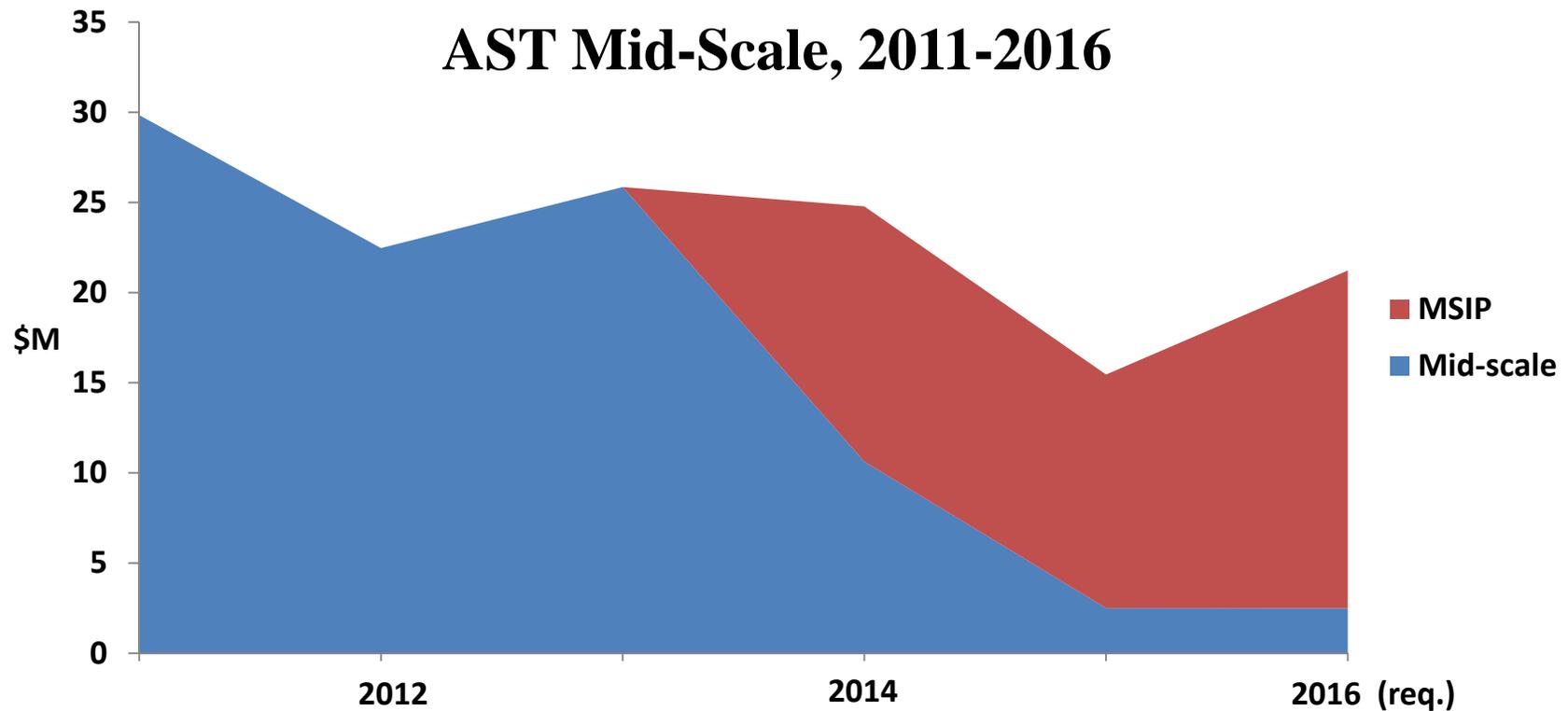


Chart shows AST funds only

“Mid-scale”= general mid-scale + TSIP + URO+ MREFC development

NWNH target = \$40 million/yr by decade end

Remaining gap for projects >\$30M to <\$135M