NSF/AST Responses to AAAC Recommendations in 2017-2018 Annual Report

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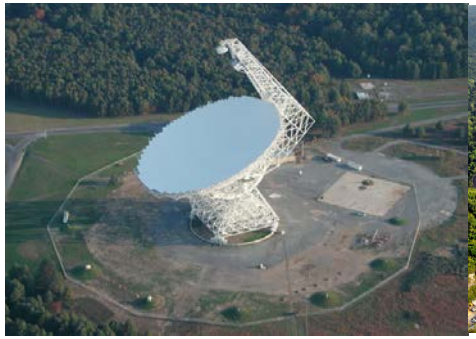
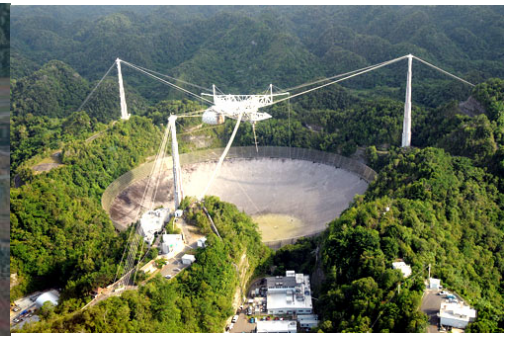


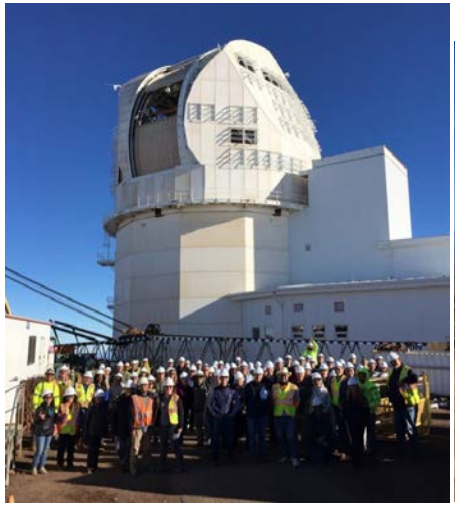
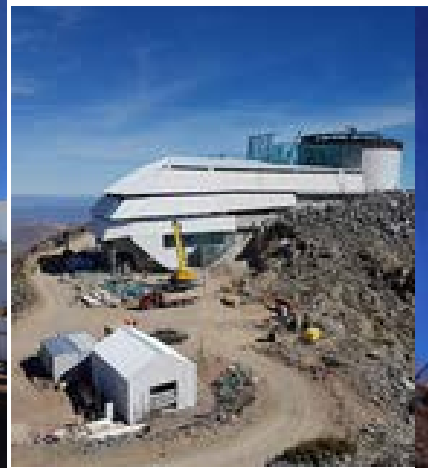
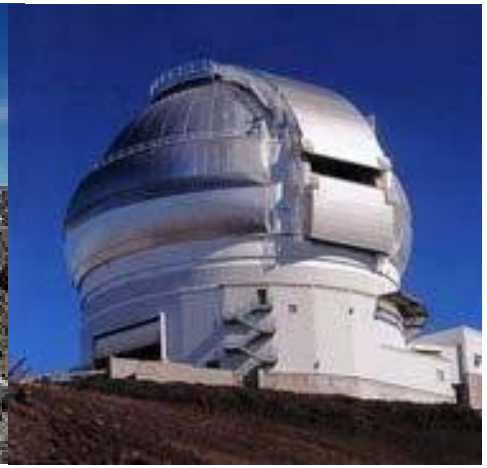

Survey Data

- **Recommendation:** All current and planned surveys should publicly release their data with suitable access tools and documentation. This is consistent with the AAAC Principles of Access recommended by the AAAC in their 2013-2014 annual report. In addition, the surveys should release the source code used to create the data products. Surveys supported in part or entirely by the federal government through its agencies should work to include funding enabling adequate public access to the data, software, and data products produced through these surveys.
- **Response:** Suitable access tools and documentation are certainly the intention of the Dark Energy Survey, the VLA All-Sky Survey, the DESI dataset, and the LSST. NSF/AST's current approach to adequate public access for LSST data is supporting the NOAO (NCOA) data science effort for Level 2 data product development and similarly to NRAO for VLASS data. Should the purpose for release of pipeline software be deeper user understanding, that level of release is feasible for current and near-future surveys. Further advice is welcome on whether the intention is for full user re-reduction of raw data into the future, and whether that capability is of more value than similar investment to enhance Level 2 data products if a trade-off were necessary.

Survey Data

- **Recommendation:** The three agencies should coordinate, and where possible standardize, the guidelines and expectations for the releases of data sets, data products, data access tools, and related software used to produce future surveys, astrophysical simulations, and missions. The goal of this coordination should be to help researchers efficiently provide access to the data they produce through tools useful for the broad scientific community with minimal duplication of effort between agencies and stakeholder groups. Release and documentation of the software used to generate and analyze the data will enhance the quality of current and future science by enabling more cost effective reproducibility and extension of the scientific results from the initial studies.
- **Response:** The utility of this request is understood. There are several proven platforms for large-scale data access, and a considerable middleware infrastructure developed for the VO that is finding application in projects like LSST. Ultimately the imposition of standards is an Agency policy decision. A possible starting point is a three-agency expert working group. The caveat is the high level of practical challenge, as exemplified by the effort addressed in the next slide.

Plan for coordination of LSST, WFIRST, and Euclid

- **Recommendation:** We recommend that the three agencies either broaden the current discussions or create parallel discussions to consider broadly the costs and benefits of coordination on the science areas of interest to both the Euclid and LSST communities. We recognize that if a decision is made to plan for coordination between LSST and Euclid during construction of LSST and to execute such a plan during LSST operations, the budgets for both the construction and operation of LSST would likely need an augmentation.
- **Response:** NASA, NSF, and DOE have formed a Tri-Agency Group to discuss the possible implementation – and cost – of joint pixel analysis for data from LSST, Euclid, and WFIRST. NSF's support for planning through carefully defined use of LSST construction funding is combined with that from the other agencies to develop a set of requirements, as well as a cost proposal, for implementing joint pixel analysis. Their report is expected next year; the discussion would indeed benefit from more active re-engagement and broader community reach. The community-based Dark Energy Science Collaboration is a strong participant in that activity. Actual implementation of the software "hooks" is not part of the construction plan, so as noted, supplementary funding would be needed for execution as part of the operations support.

Portfolio Balance and Review

- **Recommendation:** The agencies should continue to prioritize a balanced portfolio, and in particular maintain a viable research and analysis program, using existing mechanisms familiar to the community such as the portfolio reviews and pacing of the early funding and review milestones for new projects. The agencies should communicate clearly with the community as these processes evolve to match the pressures on their programs.
- **Recommendation:** The agencies should continue to communicate with each other about current and future portfolio reviews and consider how joint projects between agencies are meeting the priorities of all stakeholders.
- **Response:** NSF/AST acknowledges the need and priority for a vital individual grants program, and takes seriously this advice for appropriate balance with facilities support. Communication with the community is through AAS and DPS Town Halls, posting updates on the NSF website, and using the AAS exploder. Suggestions for other avenues are welcome. The next intended AST portfolio review will be after the release of the A&A Decadal Survey in early 2021. Particular attention to joint projects is a useful suggestion for the charge to that upcoming review.

Multi-Messenger Astrophysics

- **Recommendation:** The AAAC supports an intensification by NSF and NASA of existing collaborations that support multi-messenger astronomy, inspiring a new generation of engineers and scientists to work in this emerging area.
- **Recommendation:** The AAAC recommends that all three agencies, in recognition of the compelling science opportunities provided by the emerging field of multi-messenger astronomy, do their best to support the capabilities, facilities, missions, and programs on which progress in this area depends. For the NSF, multi-messenger astronomy is a well-recognized high priority. We recommend that DOE and NASA stay in close communication with NSF to avoid inadvertently hindering, through actions affecting their own programs or missions, this high priority of their partner agency.
- **Response:** An update on NSF's activities will be provided at this meeting. The endorsement of the agency priority is welcomed.

Spectrum Management

- **Recommendation:** NASA and NSF should enhance their collaboration with each other and with other groups, including international agencies and commercial interests, to protect the accessibility of essential astronomical wavelengths to researchers.
- **Recommendation:** Efforts, ideally coordinated with all three agencies, should be made to increase awareness of spectrum management issues among astronomers, the general public, and government agencies. Possible agents for meeting this recommendation might include the NSF-funded national facilities for operations at radio and optical wavelengths.
- **Response:** NSF's newly constituted agency-wide spectrum management group is reaching out to enable inter-agency coordination with such entities as NASA's well-established spectrum management team. Since radio spectrum management is at the international treaty level, it is appropriate for Agency involvement as well as that of NRAO and GBO, and the initial steps for ground-based astronomy to coordinate its need for protected passive observing with broader scientific needs for space-ground communication are critical. Since light pollution control is governed by more local regulation, it is fully appropriate to engage the national facility in increasing awareness, and having staff support national and international efforts through the AAS and IAU.

LSST Science

- **Recommendation:** The AAAC urges NSF and DOE to put in place a long-term operations plan and research plan that will, while maintaining a balanced overall portfolio, ensure that the US science community can capitalize on the substantial investment in LSST.
- **Response:** The establishment of an operations plan that has stable long-term and full support is a critically high priority for the LSST operations partners. That will obviously be a requirement for approval of the operations proposal by the National Science Board. Given the limitation of its grant resources compared to demand, NSF/AST has not typically pre-allocated funding by topic or relation to facility, but has allowed community demand to define the distribution. We anticipate a strong demand as LSST approaches first light and data start to flow, for which a healthy overall program is the best preparation.

Grow MSIP within constraints

- **Recommendation:** NSF/AST should continue their efforts to grow and develop the MSIP program, while maintaining a balanced portfolio of investments by NSF/AST.
- **Response:** NSF/AST established the MSIP program to create opportunities for mid-scale projects otherwise not commensurate with existing programs. The increased Congressional appropriation for FY18 allowed ~$40M to be awarded to 8 projects (with the full amount subject to availability of FY19 funds), with a success rate comparable to that in other competitions. The FY19 NSF budget request has $60M for Foundation-level mid-scale awards.

Proceed with divestment, engaging operations partners

- **Recommendation:** The AAAC concurs with NWNH-AMA recommendations that the NSF facility divestment process be moved forward and that the agencies work to ensure that individual investigators are funded, in order to capitalize on and leverage the full capabilities of the new facilities and large projects that represent such important and substantial investments by the agencies.
- **Recommendation:** The AAAC supports the NSF approach of working to divest from their funding portfolio aging NSF-developed facilities to partners or non-federal organizations that are able to extend the productive scientific lifetime of these facilities. This approach enables NSF/AST to redirect saved funding to the operations costs of new facilities and maintain a robust grant program.
- **Response:** Next slide

Divestment Status – AST Portfolio Review

Portfolio Review Received in August 2012

Partnerships Finalized

- Arecibo Observatory: New management led by U Central Florida.
- 2.1m NOAO telescope (Kitt Peak): Caltech led consortium, 2016-2021
- 4m NOAO Mayall telescope (Kitt Peak): DOE-funded dark-energy project, 2019-2023
- NSF/NOAO share 3.5m of WIYN telescope (Kitt Peak): joint NASA-NSF exoplanet project, 2019-2025
- LBO/VLBA: MOA with U.S. Navy, 50% of operations costs through 2021
- GONG (Solar monitoring telescopes): Interagency Agreement with NOAA through 2021

Partnerships in Progress

- Green Bank Observatory: Separation from NRAO in FY 2017 – current 30% operational collaboration, exploring partnership with other Agencies
- University consortium led by NMSU assuming scientific operation of the Sacramento Peak Solar Observatory (about 50%)
- Possibility of science education role for McMath-Pierce solar telescope on Kitt Peak.

Environmental Review Process

- Green Bank Observatory: Scoping meetings held, Final EIS anticipated Dec 2018
- Sacramento Peak Observatory: Scoping meetings held, Final EIS anticipated Nov 2018

Implement the *OIR System Report*

- **Recommendation:** Efforts by AURA, NOAO, Gemini, LSST, and the proposed new NCOA to implement the recommendations of the OIR System Report should be supported by NSF as long as they can be accommodated while maintaining a balanced investment across the portfolio of NSF/AST.
- **Response:** In March 2016, AST asked NOAO to either plan for or carry out the tasks in the recommendations that are relevant to NOAO. Most of the tasks require resources above the NOAO base budget, and therefore require supplemental funding. In July 2016, NOAO submitted to NSF a plan to accomplish the tasks with an estimate of the resources required. The plan noted that a total of ~$5 million over 3-4 years above the NOAO base would be needed. The plan is being funded in supplement installments as funding is available. Recent collaborative development within NOAO and Gemini has focused on alert processing and automated assignment. Gemini is proceeding with the SCORPIO spectrograph in response to the recommendation for high-efficiency time domain follow-up.

CMB-S4 Report Implementation

- **Recommendation:** The AAAC commends to DOE and NSF the report of the CMB-S4 CDT, which we find clearly communicates the results of the CDT's efforts to respond to the charge they were given. We are confident that it will meet the needs of the agencies to inform funding and programmatic decisions in the near term regarding CMB-S4.
- **Response:** The value of that report is acknowledged, and will set the context for consideration of requests for support of development projects.

Reducing Proposal Pressure

- **Recommendation:** NSF and NASA should continue to carry out and evaluate their strategies for reducing proposal pressure, reporting to the community for feedback on their evaluation strategies and the results.
- **Response:** NSF/AST just concluded a two-year trial for no-deadline submissions of proposals to the Solar and Planetary Grants program. The number of proposals in certain subtopics was reduced and those communities appreciated the well-defined identity of the program. There were several disadvantages that informed the decision not to continue after the trial period:
  - The periodic evaluation of proposals in hand led to a very broad distribution of topics for any given panel, requiring considerable engagement of ad hoc reviewers and raising the question of whether this review process provided expert input at comparable level to more concentrated subject panels.
  - Given the total breadth of subfields comprising the Astronomy and Astrophysics Grants solicitation, it is much more difficult to take proposal pressure by topic into account in advance when allocating resources when the total demand isn't known until the end of the year.
  - The no-deadline irregular cadence placed substantial additional administrative burden on the support staff, but that could be an artifact of "mixed mode" operation.