August 2012 • Issue 23

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Currents

Opportunities and Challenges Ahead: Report of the NSF/AST Portfolio Review Committee Released

The report of the NSF/AST Portfolio Review Committee (PRC) was released on 2012 August 16. The committee recommendations, made to NSF/AST, chart out a funding path toward the big science recommendations of the recent decadal survey (*New Worlds, New Horizons, NWNH*) while also presenting significant challenges to the open-access OIR community in the intervening years. In making its recommendations, the committee wrestled with the issue of how to best make progress toward the science goals of *NWNH* given current budget scenarios for NSF/AST.

Here we summarize the key recommendations related to the OIR community and describe their potential impact on our community *if they are implemented as described in the report*. We also describe the next steps in the process and invite you to join a discussion on the impact of the report.

We emphasize that PRC report is the first step in a longer process and that the report is positive about many aspects of ground-based OIR astronomy. Our challenge is to ensure that the implementation of the recommendations ensures broad participation by the ground-based OIR community, now and into the future. NOAO hopes to work closely with NSF/AST to achieve that balance. We welcome your input.

The **PRC recommendations** include the following with regard to grants and facilities.

Grants:

- Preserve funding for individual investigator grants (Astronomy & Astrophysics Research Grants; Advanced Technology and Instrumentation) as much as possible.
- Create a Mid-Scale Innovations Program (MSIP) for projects with terms of 5-years or shorter and a Strategic Investments Program (SIP) for decade-scale commitments.
- Continue the REU program and Astronomy & Astrophysics Postdoctoral Fellowships, add a Theory and Computational Networks program, broaden partnerships in the Astronomy & Astrophysics Research and Education program, and increase funding for projects that improve minority recruitment and retention in astronomy.

Future Facilities:

- Construction of LSST to begin as soon as possible to maintain an operations start in 2021-2022.
- Contribute funding to CCAT and GSMT if budget allows.

Current Facilities:

- Divest before FY17 of the KPNO telescopes (4-m Mayall, WIYN, KPNO 2.1m). If stronger budgets are realized, reinvestments in facilities can be made through the small grants and mid-scale programs. Divestment may occur on a 2-3 year time frame, depending on how the report is implemented.
- Continue to operate Gemini North and South, 4-m Blanco, and SOAR.

The ***potential impacts*** of these recommendations include the following.

- ***Participation imbalance***. Open-access time on 2-m to 6-m telescopes is significantly curtailed in the recommended AST portfolio, with 700-1000 nights (more than half of the open access nights) off the table. This limits the ability of the open access community to position itself to compete for grants and observing time on ground- and space-based facilities, and to position itself to take advantage of future facilities. The imbalance hampers the broad participation that is a goal of NSF funding.
- ***Hemisphere imbalance***. The recommended divestiture of KPNO telescopes shifts the balance of open access resources to the southern hemisphere, with Gemini N the only major open access resource remaining in the north and within the US. The loss of a continental National Observatory site with a strong track record in public outreach makes it more difficult to communicate to the public the fruits of NSF expenditures on ground-based OIR astronomy.
- ***MSIP opportunity and risk***. Popular programs such as TSIP and ReSTAR and new mid-scale initiatives could be funded by MSIP through a competitive process that spans all of ground-based OIR, Radio, Millimeter, and Submillimeter (RMS) astronomy, laboratory astrophysics, and numerical computation. MSIP offers new opportunities for longer-term planning, although it appears to be inadequately funded relative to the Committee's aspirations for this program. Given these limitations, it is surprising that the PRC recommends divestment from world-class facilities such as the Mayall, which have large leverage value in attracting non-NSF funding for mid-scale projects and new instrumentation (e.g., $50-100M for BigBOSS from DOE and other sources).
- ***LSST and NOAO***. The Committee endorses NOAO's role as the manager of the federal interest in facilities such as Gemini and LSST. The current plans for LSST have NOAO participating on high-level governance committees (Board of Directors, AURA Management Committee for LSST), and NOAO is a key technical partner in the construction phase (telescope and site team). This is a positive outlook for the ability of NOAO to advocate effectively on behalf of the US community.

These issues, and the next steps in the PR process, are discussed in greater detail below.

Impact on the health of the open access community

In preserving the research grants program, PR articulated the view that "Because [research grants] are usually decoupled from the application for telescope time, robust grants funding is essential in any portfolio that seeks to support broad, merit-based access to other astronomical resources" (p. 69 of the report). Ironically, "the

broad, merit-based access to astronomical resources" would be severely affected if the report recommendations are implemented as written.

Open-access time on 2-m to 6m telescopes is significantly curtailed in the recommended AST portfolio:

- 700-1000 nights would come off the table; this is more than half of the open access time currently available.
- Open access to the northern hemisphere is particularly affected, with Gemini N becoming the only major open access resource remaining in the north.
- Use of archived data (e.g., NOAO archive) may mitigate the reduction in open access time to some extent.

As "access to facilities and resources for individual investigators [is] critically important for safeguarding the forefront research and innovation that have been hallmarks of US astronomy" (p. 64), the loss of open access to 2-m to 6m class facilities limits the ability of astronomers without institutional access to observing facilities to successfully propose for individual grants and observing time with current ground- and space-facilities (ALMA, HST, *Chandra*, *Spitzer*, JWST).

The loss of open access facilities also weakens the "bridge to the future" for a large fraction of the open access community. With the loss of open access time the community is less able to carry out forefront research today, making it more difficult to position itself to take advantage of future facilities (LSST, GSMT, CCAT).

Thus, some of the recommendations challenge the well recognized "goal of publicly funded astronomical research [which] is to give as broad and diverse a set of researchers as possible access to state-of-the-art facilities…to provide the rapid realization of new ideas" (p. 65). This conflict was recognized by the committee: "Given that nearly 50% of OIR astronomers have access to telescopes only through the open-access system…this is a critical issue for the health of our profession" (p. 67).

We caution that a significant impediment to broad participation (a "participation imbalance") is likely to be created as a result of the report, depending on how the recommendations are implemented. We will be working to limit this potential impact, and we welcome your input on this issue.

Future of Kitt Peak

The Committee recognized that "There is no doubt that these facilities would be highly productive in the coming decade and that they would impact on *NWNH* science goals. Kitt Peak National Observatory, in particular, is a mainstay of US OIR astronomers, with over 800 open access nights." The committee further recognized that supporting a major facility at KPNO enables the continued operation of tenant observatories, which provide many critical capabilities.

In recognizing the value of KPNO, the report was careful to state that divestment does not mean closure. Finding a way to keep KPNO open is important because the committee also recommended that "If stronger budgets are realized, reinvestments in facilities can be made through the small grants and mid-scale programs," with the Mayall the highest priority and most important to preserve (p. 122). Such reinvestments would be difficult or impossible if facilities are closed. Keeping KPNO open would also prevent "a cascade of closures of non-AST facilities when divesting," which the Committee aimed to avoid.

We will be working with the community to plan a future for KPNO that meets these goals and we welcome your input.

MSIP and SIP Opportunities

The PRC also recommended as a top priority, the creation of a Mid-Scale Initiatives Program (MSIP), the second-highest *NWNH* priority for large ground-based initiatives. The program would fund projects up to a total of $3-50M over no more than 5 years. Broad in scope, the program could fund new instruments, instrument upgrades, facilities (design and development, construction, operating costs), and surveys. Past examples include SDSS, URO, ACT, TSIP, and development funds for LSST. Major new instrumentation at NOAO, Gemini, NSO, Arecibo, and NRAO would be funded through this program, as well as laboratory astrophysics and numerical simulation initiatives. Proposals would be competed across all of these areas.

One component of MSIP generalizes the TSIP model in a mid-scale "Open Access Capabilities" program that would fund (1) major instrumentation upgrades on AST-funded facilities, (2) improvement of capabilities on non-AST facilities in exchange for open access observing time on those facilities; (3) public databases and data-mining tools.

The Strategic Investments Program (SIP) would fund activities aimed at providing major new capabilities. Previous examples include construction and operations agreements for WIYN and SOAR and design and development costs for ATST.

What does this mean for the NOAO community?

MSIP offers broad opportunities as well as risk for the ground-based OIR community. It continues a TSIP-like funding opportunity for OIR instrumentation for and access to 8-m class facilities and extends this opportunity to improvements on smaller aperture facilities. Open access observing time acquired through the program may offset the impact of the divestment from KPNO.

Despite these opportunities, the program appears underfunded to carry out all the aspirations invested in it by the report. In addition to funding existing programs such as TSIP ($5M/yr recommended by *NWNH*), major instrumentation for NOAO/Gemini/NRAO ($8M/yr typically), URO ($8M/yr typically), the program is also invoked to fund Arecibo and NSO instrumentation, laboratory astrophysics, numerical simulations, future surveys (as in HETDEX, SDSS), operations or dedicated surveys with the Mayall, and GSMT operations and/or instrumentation.

Although the PRC recommends "heavy" investment here, the more pessimistic of the projected portfolios leads to decreased funding in 2011 dollars (Scenario B, Figure 10.1). At an estimated funding level of $23M/yr in 2017, only a modest fraction of these investments can be realized.

Given the current fiscal environment, it is surprising that the committee did not fully endorse the leveraging of a small amount of AST resources to ensure broad community participation in future mid-scale initiatives. Mid-scale science/survey programs can be funded directly by MSIP, but this can also be accomplished *while also providing an open access opportunity to the community* by attracting outside research partners. This is the DECam model at the Blanco telescope. A major Dark Energy Survey will be enabled there through $40M of funding from DOE to build the capability, with only modest AST funding from the NOAO base budget. In exchange for the observing nights, the community will receive access to this world-leading capability.

Analogously, BigBOSS on the Mayall could potentially attract $50-100M from non-NSF partners. The AST contribution of operation funds for the Mayall would mean that a massively multiplexed optical spectrograph, a world-beating capability built for a targeted survey, could also be used by the broad community in an open access mode.

Role of NOAO as the National OIR Observatory

As in *NWNH*, NOAO is recognized as the national OIR observatory, and the report finds that there continues to be a critical role for NOAO, albeit through an evolving mission. In addition to operating facilities and allocating observing time to the community, NOAO is seen as an advocate for and facilitator of community interests and observing needs (e.g., through TSIP, ReSTAR, ALTAIR, the System Roadmap Committee). It is also seen as the manager of the federal interest in facilities such as Gemini, LSST, and GSMT, in which it represents the community's interest and priorities in these partnerships.

How will NOAO manage the federal interest in these facilities? The PRC report calls for more unity in NOAO/Gemini, however it can be managed (p. 143), noting that the governance structure, among other issues, is a significant impediment currently to the representation of the interests of the US OIR community. Resolving this difficulty remains important for the community. The US nights and a Gemini instrumentation suite responsive to the US community needs on Gemini will become critical to the health of the open access community if NSF divests from the Mayall, WIYN, and the KPNO 2.1m, and once DES takes up 100 nights/year of observing time on the Blanco. The role of Gemini in the open access system will be particularly critical to the health of the open access community in the era of LSST follow up.

Closely related is the Committee's observation that the US interest in ALMA benefits from the direct involvement of NRAO in ALMA and that separating ALMA from NRAO may lead to a loss of US representation and planning. Similar concerns would apply to the relation between NOAO and LSST. Developing an effective structure for NOAO to represent the community's interest in LSST and to support the community use of LSST once it is in operation appear to be key implementation issues stemming from the report.

In a global sense, the PRC report sets NOAO on a new course that departs from that set by the 2006 NSF Senior Review. The Senior Review recommended that NOAO focus on the revitalization of the 4-m class facilities in the US System. The new instruments (KOSMOS/Mayall, COSMOS/Blanco, TripleSpec, pODI/WIYN) and Large Science Programs (DECam on Blanco, BigBOSS on Mayall) that have been developed in response to the report will make the 4-m facilities powerful platforms for scientific exploration that will continue to rival larger telescopes in popularity and productivity.

One consequence of these developments, if implemented as written, is that although the ReSTAR-funded improvements at KPNO will not be openly available to the community that called for them, the revitalization leaves these resources in a good position to attract funding from consortia to operate them.

Next Steps

The PRC report is advisory to NSF/AST, and the next critical step is the development of the plan to implement the PRC recommendations. NOAO will provide input to NSF/AST and we are hoping to work with NSF/AST on a plan that addresses the priorities of the PRC, facilitates broad participation, and is faithful to the needs of the community. This planning and implementation phase will begin soon, but will remain necessarily uncertain for at least six months as funding and appropriations actions in Congress evolve, the national elections take place, and the community responds to the PRC report.

In the mean time, NOAO has reconvened the System Roadmap Committee to gain input and advice from the community from the System perspective (a perspective noticeably absent from the PRC report). We will meet with our User's committee to gain advice at the "PI" level, and continue open communications with our user base as we move ahead.

A fundamental, urgent issue in astronomy now is a diminution of resources from the federal government. NOAO urges all concerned astronomers to contact

their elected representatives in Congress (either directly or in concert through their legislative affairs offices) to advocate for strong federal science funding.

Let us know what you think!

As always, we welcome ***your*** input. We have created an online community forum to enable a discussion on the potential impact of the PRC report. We welcome your input on topics such as:

- How will these recommendations affect you?
- How can we maintain open access to facilities in a way that is consistent with the issues considered in the PRC report?
- Do the recommendations strike an appropriate balance between grants, facilities, and new initiatives in the NSF/AST portfolio?
- In the context of reduced resources, do the recommended investments support the best strategy for preserving US leadership in astronomy?

Comments entered at the website will be posted immediately. Comments sent to currents@noao.edu will not be posted unless requested.

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Contact Us

We welcome your input on this issue of *Currents*. Please contact us at currents@noao.edu. We look forward to hearing from you!

Currents is a spark plug for communication between NOAO and our community. It provides updates—and solicits community input—on NOAO observing opportunities and NOAO programs and policies on a more rapid timescale than is possible with the *NOAO Newsletter*.

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