

NOAO Users Committee 2015 Report

9 June 2015

This report from the Users Committee of the National Optical Astronomy Observatory (NOAO) is based upon its annual meeting at NOAO, which was held in Tucson on May 20-21, 2015. The 2015 charge for the UC requested input on the following:

1. Please comment on the overall NOAO transformation plan/vision. NOAO seeks to provide excellence in open access to telescopes, data, catalogs, and tools for the US community. Most helpful will be comments on NOAO's engagement with the community and the new mission.
2. Please comment on current operations and community engagement with DECam at CTIO. The committee should comment on current scheduling of community time including surveys to ensure the highest productivity.
3. Please comment on the current plans for development of DESI on the Mayall including the imaging surveys that are related to DESI targeting.
4. Please comment on the NNEXPLORE program as appropriate.
5. Please comment on the ongoing infrastructure and science capability modernization programs at KPNO and CTIO including the deployment and early use of KOSMOS and COSMOS and soon TripleSpec.
6. Please comment on current NOAO concepts and plans for the NOAO Data Lab and associated catalog-based research services, with particular emphasis on desired user tools (both basic and advanced) to be deployed.
7. Please comment on the current level of usage and scientific productivity of the NOAO share of SOAR. Suggestions about "quick wins" to improve scientific productivity would be particularly welcome.
8. Please comment on how US observers can best exploit the Gemini telescopes. The Committee should comment on near term capabilities needed by the US community, and specifically what priorities are seen for future Gemini instruments (for example to exploit surveys and LSST science).
9. Please comment on the Gemini Next Generation Instrument concepts as appropriate to US community needs and desires.

The current NOAO UC includes nine members: Katelyn Allers (Bucknell University), Elizabeth Buckley-Geer (Fermilab), Karen Meech (University of Hawaii), Casey Papovich (Texas A&M), Mark Brodwin (University of Missouri-Kansas City), Armin Rest (STScI), John Moustakas (Siena College), Christy Tremonti (University of Wisconsin), and Anthony Gonzalez (University of Florida, Chair). Prior to the meeting, members of the UC solicited feedback from

the community via email and direct contact. The committee also reviewed a number of relevant documents, listed in the charge, in preparation for the meeting. All of the members participated in the UC meeting (Allers, Buckley-Geer, Meech, Moustakas, Papovich, Rest, Brodwin, Gonzalez in person), with Moustakas and Tremonti participating remotely. The recommendations in this report reflect the consensus of the entire UC. We structure the remainder of the report in sections aligned with the items in the charge.

1 Overall Transformation Plan and Vision

NOAO continues to make substantive progress in executing the transformation plan mapped out over the past few years. Reflecting back over the last five years, the committee is impressed by the efficiency and effectiveness with which NOAO has navigated this transformation in a challenging environment. We commend NOAO on successfully identifying partners to enable continued scientific productivity of the Mayall, WIYN, and KPNO 2.1m, and for maintaining open access to facilities to the extent possible. Development of the NOAO Data Lab is progressing well and has the promise of becoming a valuable resource for the community.

The committee appreciates the effort that NOAO has invested in addressing the recommendations on the transformation plan and vision from the 2014 report, especially in terms of community engagement. The “Tools for Astronomical Big Data” and “DECam Community Science Workshops” organized by NOAO during the past year are exactly the type of outreach that should continue. Such workshops help develop strong community capabilities for exploiting the new generation of large survey data sets. These types of activities address one of our key recommendations from the previous year, and also directly align with Recommendation 7 from the recent NRC report *Optimizing the US Ground-Based OIR System* (hereafter the Elmegreen Report). Strong engagement of the community will be essential for maximal success of the NOAO vision moving forward. Despite efforts over the past few years to keep the community abreast of changes at NOAO via the *NOAO Currents* Newsletter and activities at AAS meetings, it is clear from user feedback that continued effort is necessary on this front.

The committee discussed possibilities for improving communication. We see significant benefit in continuous engagement of the US community via frequent, brief communication of news relevant to the community. We suggest that NOAO consider developing an opt-in means by which users can receive brief news updates on instrumentation, telescopes, workshops, and major NOAO developments with a short turn-around time. Frequent postings on a platform such as Twitter or Facebook, or the ability to sign up for opt-in emails with brief updates, could have substantial benefit. The NOAO web pages also need to be re-organized and updated to remove broken links and outdated information, update content, and make materials easier to find. For

the NOAO Newsletter emails, we suggest inclusion of short descriptive bullet points directly in the email that readers can quickly peruse to identify items of interest.

Recommendation 1: We recommend that NOAO stay the course that they have charted for transformation of the organization, continuing to place an emphasis on maintaining productive open telescope access when possible.

Recommendation 2: We recommend that NOAO continue to organize workshops, as well as summer schools, focused upon Big Data and training the next generation in utilizing the forthcoming large databases and Data Lab tools. We also recommend that summer school lectures and tutorials be made available online to increase the reach of these efforts.

Recommendation 3: We recommend that NOAO explore new avenues for effectively communicating with the full US astronomical community and undertake an update of the NOAO website.

2 DECam

The Committee is pleased to see that DECam is operating efficiently and is well on its way to tiling much of the southern sky. We commend NOAO on the successful operation of the instrument and the Community Pipeline for reduction of the data. We commend the effort to establish a remote observing capability from La Serena and Tucson, but strongly urge NOAO to establish this capability more widely.

Recommendation 1: We encourage NOAO to establish a remote observing capability for DECam at a number of geographically distributed US centers, as well as to advise and assist individual users to set up this capability at their home institutions.

Recommendation 2: We encourage NOAO to continue to work with the DESDM and DECaLS teams to keep the DECam Community Pipeline updated with the latest algorithmic improvements and bug fixes.

Recommendation 3: We recommend that NOAO explore the possibility of periodically re-reducing the entire DECam database (from all projects) using the latest pipeline to produce a uniform set of images.

3 DESI

The Committee continues to be impressed with the progress made on the DESI project and the positive communication between NOAO and the DESI team. We encourage continued

communication with DESI to ensure a successful and productive bridge period, and support the active role of NOAO in this endeavor. We note that early public release of the DESI data as well as access to fibers during bright time and community fibers during dark time would provide an extraordinary opportunity for the US community,

Recommendation 1:

NOAO should advocate for public release of DESI data on as short a timescale as is feasible.

Recommendation 2:

Because NOAO is a major partner in DESI, NOAO should continue to explore how the US community can carry out PI science with DESI. This could include access during bright time and/or the allocation of community fibers during the DESI observations, or through other means.

4 NN-EXPLORE

The Users Committee commends NOAO's effort in developing a new partnership with NASA to utilize NOAO's share of WIYN for exoplanetary science. For 2015B, the oversubscription on WIYN is somewhat higher than in recent semesters. It appears that the exoplanet community is engaged and interested in using existing WIYN instrumentation as a part of Phase I of the NN-EXPLORE program.

5 KPNO and CTIO Modernization

The Committee recognizes NOAO's continued modernization efforts, including the development and deployment of new instruments such as K/COSMOS and TripleSpec, which extend the scientific reach of the astronomical community. We support NOAO's ongoing efforts to provide community access to high-value facilities not operated by NOAO, and to expand the remote-observing capabilities at NOAO facilities.

One particular success over the past year has been the development by NOAO of the DECam Community Pipeline (CP). We encourage NOAO to use this success as a model for ensuring that users can easily and efficiently plan and analyze observations obtained at all NOAO facilities using the best-available tools.

Recommendation 1: Well-calibrated exposure time calculators (ETCs) are critical for users to effectively plan observations, and for the efficient operation of NOAO instruments. We strongly encourage NOAO to provide these tools to the user community for the K/COSMOS and TripleSpec4 spectrographs as soon as feasible, and to continue to validate the accuracy of existing ETCs using the most up-to-date data.

Recommendation 2: We encourage NOAO to use the CP as a model for developing modern, well-documented, well-validated data-reduction tools and cookbooks for additional NOAO instruments. The new generation of spectrographs should be the highest priority in this regard. NOAO should also facilitate community access to data reduction tools which have been developed by observers and instrument teams in a single, centralized location.

Recommendation 3: NOAO should strive to provide a remote-observing option for experienced observers for all facilities operated by NOAO.

Recommendation 4: We recommend that NOAO continue to pursue time trades which provide community access to high-value telescopes and instruments. High-priority options include the Magellan and Keck telescopes, and the PanSTARRS PS1 telescope, which can be operated in queue mode and yields high-fidelity reduced, photometrically calibrated data. However, these time trades should balance the high demand for community use of existing NOAO facilities, such as CTIO/DECam.

6 NOAO Data Lab

The committee liked the datalab demo and having both the command line query and a web interface will be very useful. The data lab will be successful and heavily used if NOAO continues on the path to create tools for archiving that are equivalent to the SDSS archive.

Recommendation 1: We encourage close interaction with the community to ensure that desired science is enabled. Being able to access specific high-priority databases (PanSTARRS1 in MAST, SDSS, WISE) will be highly desirable.

Recommendation 2: NOAO is encouraged to develop query builder and footprint server tools, and to, on a short timescale, enable web-based access to an image cutout tool.

Recommendation 3: Consider changing the name/acronym NSSDC for the NOAO Science Data Center, because this will be very confusing with the NASA Space Science Data Coordinated (NSSDC) archive which is the national archive for space science mission data, which was established in the 1980s.

7 SOAR

NOAO has made good progress in improving the observing efficiency at SOAR. The committee also commends its work to improve image quality, and the upgrade of the Goodman spectrograph with a new red-optimized CCD.

In the era of LSST there will be a need for medium to large facilities for rapid follow up of discoveries. It was noted in the NRC Elmegreen report that SOAR could play a vital role in this follow up. The PanSTARRS1 survey has already demonstrated the value of queue-scheduled facilities for rapid follow up of discoveries using Gemini North and the CFHT 3.6m telescope, in particular for both the planetary and extragalactic communities. It is understood that establishing full queue observing is expensive operationally and probably not within the current fiscal capabilities. However, with remote observing in place at SOAR, some of the versatility of queue observing for follow-up of new discoveries or time-domain science could be realized by allowing partial night scheduling.

Recommendation 1: In order to identify what obstacles limit scientific productivity at SOAR, NOAO should immediately survey the user community to identify these obstacles. The anonymous survey should be short and easy to fill out, in order to encourage maximum response.

Recommendation 2: It is recommended as an experiment that partial night requests be entertained. This would enable proposers to request the equivalent of a typical observing run spread over the semester.

8 Gemini Capabilities and Priorities

As the largest of the US OIR telescopes, the Gemini Observatory remains very important to the NOAO community. The UC views the continued improvement of existing instrumentation and development of future Gemini instruments as a top priority for the NOAO community to have the capability to follow-up targets from current and future surveys, including DES and LSST. The UC views favorably the support of visitor instruments, such as IGRINS.

Data support remains crucial. The UC also views favorably the efforts of NOAO to develop data reduction webpages, cookbooks, and forums. The effort to help Gemini users locate their science and calibration data on the Gemini archive is also very useful.

The UC is pleased with the Gemini science meetings, which include opportunities for the Gemini users to receive advice and assistance with their data. These are important steps in the right directions.

As a finding, the UC considers it important for Gemini to modernize the data reduction tools for Gemini instruments, moving away from IRAF-based scripts toward modern platforms (e.g., python), and towards pipeline processing to the extent possible. Providing reduced, calibratable data products would be the best means to serve the needs of the NOAO users community.

The Gemini Large and Long Program (LLP) time is in high demand given the large oversubscription (oversubscribed by a factor of 5.5). The Fast Turnaround mode also seems to have higher demand. The balance of Gemini time demand should shift between the (currently) lower-demand semester programs, fast-turn around programs, and LLP (with high oversubscription) until the oversubscription rates are better balanced. This balance will need to be watched closely and adjusted as community needs change.

Recommendation 1: NOAO should continue to work with Gemini to overhaul the documentation for Gemini instruments. Effort should be made to assist Gemini in moving away from IRAF-based data reduction tools to pipelines or data reductions tools on modern platforms (e.g., python).

Recommendation 2: NOAO should evaluate whether a rebalancing of time between the regular, Gemini LLP, and Fast-Turnaround allocations would better serve the US community given current user demand. Based on current oversubscription, allocating more of the US time for LLP may be in the community's best interest.¶¶

9 Gemini Next Generation Instrument

The committee is enthusiastic to see the concepts proposed for the Gemini Next Generation Instrument. The four concepts under consideration are consistent with the desire previously expressed by the UC for a spectrograph with simultaneous optical and infrared coverage, and are well-aligned with the recommendations of the Elmegreen Report.

10 Other Recommendations

NOAO is a national observatory that aims to support the entirety of the user community. Recent changes and user feedback to the committee highlight that consideration should be given to improving support for planetary science observations (planetary scientists represent 20% of the AAS community). For example, the archive at present has no provision for finding moving objects and that Data Lab has not integrated this into the development.

Recommendation 1: We recommend that NOAO establish a presence at the annual AAS Division for Planetary Sciences meetings to better engage the planetary community, including advertising of NOAO's new data capabilities, facilities, and workshops.

Recommendation 2: We recommend that NOAO prioritize restoration of non-sidereal guiding on the Blanco telescope, and work towards implementation of non-sidereal guiding with SAM on SOAR.

Recommendation 3: We encourage NOAO to keep issues related to moving objects in mind when developing new capabilities and in development of the archive.

11 Community Feedback

In advance of the UC meeting, individuals on the committee solicited input from members of the community in the form of an email asking specific questions about how well NOAO is serving their needs and whether they are aware of the transformation taking place at NOAO. We obtained responses from users of nearly all telescopes operated by NOAO, representing a wide range of scientific expertise. Several key themes were prevalent in the responses. Respondents generally spoke quite highly of NOAO staff and facilities. The vast majority were however unaware of recent changes at NOAO, highlighting the need for continued communication efforts. Concerns expressed by multiple individuals in the community included finding information on the NOAO and Gemini web pages, increased remote observing, and improved Gemini data reduction tools. Members of the planetary science community were particularly engaged respondents, and expressed a few subfield-specific needs. Specifically, individuals from this community advocated for additional queue observing and non-sidereal tracking on 4m class telescopes.