NOAO Long-Range Plan
The NOAO Long-Range Plan (LRP) for 2009–2013 is now available on the NOAO Web site (www.noao.edu/dir/lrplan/2009-noao-lrp.pdf). This is the first LRP revision since the NSF Senior Review. It incorporates themes and strategic objectives that have emerged from the recent period of vigorous community review and discussion about the mission and future direction of NOAO. The Senior Review recommendations form the basic framework, and then detailed planning has been influenced by the deliberations of several committees:

- Renewing Small Telescopes for Astronomical Research (ReSTAR),
- Access to Large Telescopes for Astronomical Instruction and Research (ALTAIR), and
- Future of NOAO;

as well as our regular oversight committees:

- AURA Observatory Council,
- NSF Program Review Panel, and
- NOAO Users’ Committee.

The LRP defines high-level NOAO deliverables and how NOAO will be organized to make those deliverables possible. In the latter area, I draw your attention to the newly created NOAO System Science Center (NSSC) and NOAO System Technology Center (NSTC). The NSSC builds on the existing NOAO Gemini Science Center, Science Data Management, and various community engagement activities to create a group responsible for interfacing the US community to all the open-access science capabilities in the US Optical/Infrared (O/IR) System. The NSTC integrates a broad set of existing NOAO technology development activities, including our Large Synoptic Survey Telescope (LSST) team, to more efficiently use our engineering and technical resources to serve both internal and external needs. This reorganization embraces a key strategic directive from NSF—to further develop and support the emerging US O/IR System for the benefit of all.

The LRP summarizes what activities NOAO plans to support using our NSF base funding (e.g., operation of NOAO facilities on Kitt Peak and Cerro Tololo, user support for the US community engaged with Gemini and other major facilities within the US O/IR System, design and development of the telescope and site facilities for LSST). What activities we will support from supplementary awards if such awards are granted (e.g., annual REU program, new instruments for the Mayall and Blanco telescopes via the ReSTAR implementation program) are also summarized in the LRP. Planned funding in both areas is loosely based on out-year planning guidelines from the Executive Branch (the so-called President's Request), supplemented by regular discussions between NSF, AURA, and NOAO.

Circumstances and strategic objectives evolve with time, as does actual funding as opposed to planned funding. To that end, NOAO plans to update the LRP during the first quarter of each calendar year.

Fundamentally, the core mission of NOAO is to provide public access for qualified professional researchers, via peer review, to forefront scientific capabilities on telescopes operated by NOAO and other telescopes within the System. In support of this mission, NOAO is engaged in programs to develop the next generation of telescopes, instruments, and software tools necessary to enable exploration and investigation throughout the observable Universe, from planets orbiting other stars to the most distant galaxies in the Universe. Our LRP is a living document describing how we plan to do that. Feedback is welcome.

Budget Update
Every year about May, NSF instructs NOAO to plan for a budget target published by the Executive Branch of the Federal government. That budget target (the so-called President's Request) is reviewed, approved, or modified by Congress. Usually, NOAO has to commit to the target plan before those Congressional modifications are known. If Congress appropriates less money than the requested amount, the NOAO target plan is too expensive and NOAO has a problem. Unfortunately, we have that problem most years.

What happened in FY 2009? The official budget request for NOAO was $27.7 M. Alas, Congress decided not to pass an official FY 2009 budget until after the Federal election and NSF could only fund us at 90 percent of the FY 2008 level ($25.6M). In fact, this was the right thing to do, even though NOAO was fortunate to be awarded additional, one-time “stimulus” funding through the American Recovery and Reinvestment Act 2009 (see related ARRA article in this section).

After various twists and turns, the NSF was finally able to tell us our official FY 2009 base budget in the third quarter of FY 2009—$25.6M. That's much better than the worst-case scenario ($22.1M), but $3.1M (11 percent) less than our original target. In other words, reducing our base program activities in late 2008 was the right thing to do, even though NOAO was fortunate to be awarded additional, one-time “stimulus” funding through the American Recovery and Reinvestment Act 2009 (see related ARRA article in this section).

So, as we approach the end of FY 2009, NOAO has escaped the worst, but we still have budget challenges ahead. In particular, we will enter FY 2010 with very little buffer from previous years. I will discuss the FY 2010 budget further in the next Newsletter issue. As always, I will update you as new information develops. Everyone at NOAO appreciates your patience and support during these uncertain times.

David Silva
NSF has approved an initial award of $3M for the NOAO Renewing Small Telescopes for Astronomical Research (ReSTAR) program. The funds will be used in part to gain access for the US community on the 200-inch Hale Telescope and develop a new optical spectrograph for the NOAO 4-meter telescopes. ReSTAR (www.noao.edu/system/restar) is a community-and science-based initiative with the goal of addressing important science programs on 2- to 5-meter aperture class telescopes in the US Ground-based Optical/Infrared System. The process was prompted by the NSF Senior Review, which called for a revitalization of facilities in this class.

One of the main priorities spelled out in the ReSTAR final report was to gain more access to 4-meter-class facilities in the US System. To that end, NOAO has secured 23 nights per year for three years on Palomar’s 200-inch Hale Telescope through an agreement with Caltech Optical Observatories. Approximately $0.9M of the $3M NSF ReSTAR award will be used to gain 200-inch access. This time specifically addresses the need for optical and near-infrared spectroscopic capability, which will be gained through the Double Spectrograph and TripleSpec, respectively. Another high priority was to develop modern spectroscopic capabilities on the NOAO 4-meter telescopes of CTIO and KPNO where most of the System time resides. NOAO will allocate approximately $1.5M toward a new optical spectrograph, which will be a clone of the Ohio State Multi-Object Spectrograph. About 55 percent of the allocation will go directly to Ohio State University. The remainder of the NSF award will be used to begin upgrading the existing detector and controller systems at CTIO and KPNO with an eye to enhancing reliability and significantly reducing exposure times. Gains in sensitivity are expected as well. The highest priority systems for upgrade are the Mosaic 1 at KPNO and Hydra at CTIO.

More information on the ReSTAR award and implementation is available on our Web site and through earlier editions of Currents, the NOAO electronic newsletter.

Infrastructure Renewal at NOAO and the American Recovery and Reinvestment Act

Robert Blum

The 2006 NSF Senior Review (SR) committee determined that the aging facilities provided by NOAO are not obsolete, but rather should be considered key components of the optical/infrared (O/IR) system of capabilities in the US and should be maintained in a manner that would allow these facilities to fully meet this responsibility. This was noted as being particularly true for telescopes in the 2- to 4-meter aperture range operated by NOAO at Cerro Tololo Inter-American Observatory (CTIO) and Kitt Peak National Observatory (KPNO). The SR recommended NOAO put renewed emphasis on supporting these facilities. The NSF was advised that NOAO should continue to develop new capabilities to be deployed on these existing telescopes. In response, NOAO established a science-based process to determine the priorities for development in this aperture range. The process, called Renewing Small Telescopes for Astronomical Research (ReSTAR), resulted in a series of recommendations, the highest of which was to attend to deferred maintenance and infrastructure needs required to assure safe, reliable, and efficient operations of NOAO (and other) telescopes.

Toward that end, NOAO submitted a proposal to the NSF seeking funds through the American Reinvestment and Recovery Act 2009 (ARRA) to address a much larger range of critical infrastructure renewal needs at KPNO and CTIO than those described in the ReSTAR report (see www.noao.edu/system/restar/). These needs go beyond the direct operation of telescopes (i.e., inside the dome), touch on all aspects of the operation at NOAO, and ultimately affect NOAO’s ability to provide forefront research capabilities to the entire US community.

NOAO compiled a list of critical infrastructure upgrades/improvements and deferred maintenance items for its four major operations centers. The list covered mountain-top infrastructure items at CTIO and KPNO and base facility items at the CTIO operations and business centers in La Serena and at the KPNO operations base and NOAO headquarters in Tucson. Significant portions of the plan for CTIO will also benefit users of Gemini, SOAR, and eventually LSST. While the initial list of potential projects totaled $25M, NOAO’s final proposal totals $5.6M in high-priority projects and purchases from that list.

continued
Infrastructure Renewal at NOAO continued

The proposal describes a program of renewal that will improve efficiency, safety, and reliability in operations and provide a solid starting point for viable operations of the National Observatory into the next decade and beyond. ARRA will, in the words from a US Department of the Interior news release, “…put a down payment on addressing long-neglected challenges so our country can thrive in the 21st century” (www.doi.gov/news/09_News_Releases/051209_01). Figure 1 shows the size of NOAO’s challenge schematically.

An environmental engineering firm will be hired to review the current system and design necessary changes to the processing, filtration, disinfection, storage, and water quality testing components. The firm will provide a prioritized list of components that need to be replaced and develop plans and specifications for contracted implementation. Where appropriate, the water storage and distribution systems will also be updated to ensure safe and efficient storage of the water and proper delivery to the end users.

KPNO Infrastructure Renewal

Among the high priority projects proposed for Kitt Peak is the renovation of the water processing and distribution system that has been in use since the initial development of the National Observatory in 1960. This system provides all treatment, processing, and distribution of potable water to all buildings and facilities on the mountain, which include those directly operated by KPNO and the facilities of over 20 tenant observatories. With no changes since the original 1959 design, many components need to be modified or replaced to enable continued compliance with EPA drinking water regulations.

A modest, but important project planned for Kitt Peak is the replacement of the handicapped access lift for the Kitt Peak Visitor Center (KPVC) public telescope. The KPVC operates a very popular public observing program and the dedicated access lift accommodates handicapped individuals or those requiring a wheelchair. The lift, in use for over 10 years, has broken down several times in the past few years, temporarily stranding occupants. A modern lift with updated operating mechanisms will be installed to restore safe access for handicapped individuals.

NOAO proposes to construct a maintenance facility on Kitt Peak that would minimize potential instrument damage from repeated transport between Kitt Peak and Tucson and provide a safe location for repair and maintenance activities of our current or planned instruments. These include the NOAO Extremely Wide-Field Infrared Imager (NEWFIRM) and the One Degree Imager (ODI) being built for the WIYN 3.5-meter telescope. Both of these instruments require a large, clean space for proper and safe maintenance. ODI has large filters and a focal plane array much larger than anything NOAO has supported in the past. Having a facility near the telescope in which to service an instrument like ODI is critical to reducing the risk of damage in transport.

Figure 1: Fifteen-year comparison of NOAO base funds (bottom line) from NSF to US consumer price index (CPI, top line).

Clearly, base funding for NOAO has not kept pace with inflation. As a result, routine maintenance on many of NOAO’s facilities, systems, and buildings (both on mountain tops and at base facilities) has been deferred. In the long run, this is an unsustainable situation that will lead to serious problems in supporting NOAO’s primary mission of developing, deploying, and operating state-of-the-art capabilities to provide the highest quality of merit-based, open-access telescope time to the US astronomical community.

If the renewal plan is funded, NOAO expects to make significant expenditures on a very short timescale and finish all work within a period of three years (ARRA allows a maximum term of five years for spending). Figure 2 shows the proposed high-level spend plan of the $5.6M.

Figure 2: Program spend plan over three-year proposal period.

Figure 3: Kitt Peak water system rain catchment basin (without any water in it). (Photo credit: NOAO/AURA/NSF)
Infrastructure Renewal at NOAO continued

The facility, approximately 3,000 square feet, would incorporate clean rooms (we anticipate two, but options exist for one large room pending final design review) and instrument testing areas. The facility would have cranes for instrument movement and space for specialized tools and instrument support systems, including the ability to cool and fully operate the instruments to test all functions. This facility’s cost is less than 10 percent of the ODI total cost.

Tucson Base Facility Renewal
The proposal for infrastructure renewal in Tucson is about 30 percent of the amount proposed for Kitt Peak and includes key system replacement/upgrade of the main building electrical system components, energy management systems, and computer room. Demands on the computer room are growing significantly and include hardware to support operations in Chile for the Dark Energy Camera (DECam) community pipeline.

CTIO Infrastructure Renewal
As at Kitt Peak, a major project at Cerro Tololo will be to renew the mountain-top water system. Built in 1976, this system is the source for all water for the observatory installations on both Cerro Tololo and Cerro Pachón. It consists of a deep well pump, 4.6 kilometers of steel pipe, three pump stations for pumping up a 1,200-meter water column, six water storage tanks, a water treatment plant and chlorinator, control system, and a pressurized tank for water distribution on the mountain. The proposed work involves replacement of the pumps and major maintenance and renovation of the storage tanks and pipes. Refurbishing this key infrastructure component would benefit all users of Tololo and Pachón, including Gemini, SOAR, and eventually LSST.

Another long overdue project is the renovation of the three dormitory buildings on Cerro Tololo: two for CTIO staff who work a “turno” (seven days on and seven days off) and one for visiting astronomers. One of the staff dormitories has storm damage that needs repair. The other staff dormitory and the astronomer dormitory need roof and other structural repairs. All three dormitories need interior renovation: the furniture, carpet, and paint have not been replaced in many years; much of the furniture dates back to the early 1970s. The proposed renovations will provide modern, comfortable living space and energy efficiencies that are important for the quality of the workplace environment for staff and visitors. The staff who spend significant time living on the mountain greatly deserve these long-delayed refurbishments.

Five houses on Cerro Tololo are used for longer-term project visitors, instrument teams, construction crews, and occasional visitor overflow from the dormitories. Three of these houses are out of operation due to storm damage and aging structures; the other two are in very poor condition. The proposed work includes repair and renovation of the interiors, including paint, furniture, and appliances. These facilities will be in demand during the commissioning and operations of the Dark Energy Survey, as well as other larger surveys. The renovated space will be available for Gemini and LSST instrument and commissioning teams as well.

Operations on Cerro Pachón are growing significantly with the advent of SOAR and Gemini and soon LSST. One project proposed to support this new operations base is a kitchen and dining facility to replace the temporary building used to serve meals near the summit of Cerro Pachón. This building already is used extensively by Gemini, SOAR, and NOAO staff and visitors, who typically eat in shifts due to the small amount of available space. With the expectation that the Pachón dining facilities will soon be used by LSST staff as well, a larger space is needed.

An instrument handling capability analogous to the one at KPNO is proposed for the Blanco 4-meter telescope Coudé room. Two new, large instruments will be coming to CTIO in the next two to three years: DECam and NEWFIRM, and two more instruments (TripleSpec and an Ohio State Multi-Object Spectrograph) may arrive soon thereafter as part of the projects proposed for ReSTAR. The improvements will include: a system of compressors and distribution lines to provide high-pressure compressed helium as a working gas to cryocooler cold heads, off-telescope facilities in which the instruments can be operated and tested without interfering with telescope operations, cranes for handling heavy precision instruments both inside and outside of the clean room, and ventilation and filtering for the Coudé room air to enable its use as a plenum for the clean room air-processing system. A clean room with excellent electrostatic characteristics for testing and maintenance of the instruments has been separately funded, apart from the ARRA proposal, and is under construction in preparation for the arrival of DECam.

A series of upgrades to the observing and maintenance infrastructure at the Blanco are also proposed. These include an expansion of the computing and console room to handle new systems for DECam and NEWFIRM, a repair of the Blanco cooling facility, and an upgrade to the Blanco cooling system.

La Serena Base Facility Renewal
A host of modernization, upgrade, and renovation projects are proposed for the facilities in La Serena. As at NOAO North, these represent a smaller total investment than on Cerro Tololo, about 20 percent of the amount proposed for Chile. A modest but important expansion to the CTIO shop facilities is proposed to add space and capacity that is needed to support activities at Cerro Tololo, Gemini, SOAR, and LSST. This includes a new medium-sized milling machine.

Other proposed projects include renovation of the AURA “recinto” water system that supplies potable water to all the residents and staff working at CTIO, Gemini, and SOAR; lab equipment modernization and replacement; vehicle replacements for the 1990s era support vehicles; and security fencing.

The projects represented in the NOAO proposal to NSF for ARRA funds are an important and timely “down payment” on addressing the deferred maintenance that has accumulated over the last 15 or more years at the National Observatory. NOAO is committed to making the NSF facilities under its stewardship the best they can be, providing a safe and efficient environment for staff and visitors alike. While NOAO is hopeful that the ARRA proposal will be funded, at the time of this writing, NSF has not yet notified NOAO of a decision. Taking the optimistic view, NOAO is already working with NSF to ensure that plans are in place for continued attention to the infrastructure needs of the National Observatory so that it continues to be scientifically productive into the next decade. 🌂