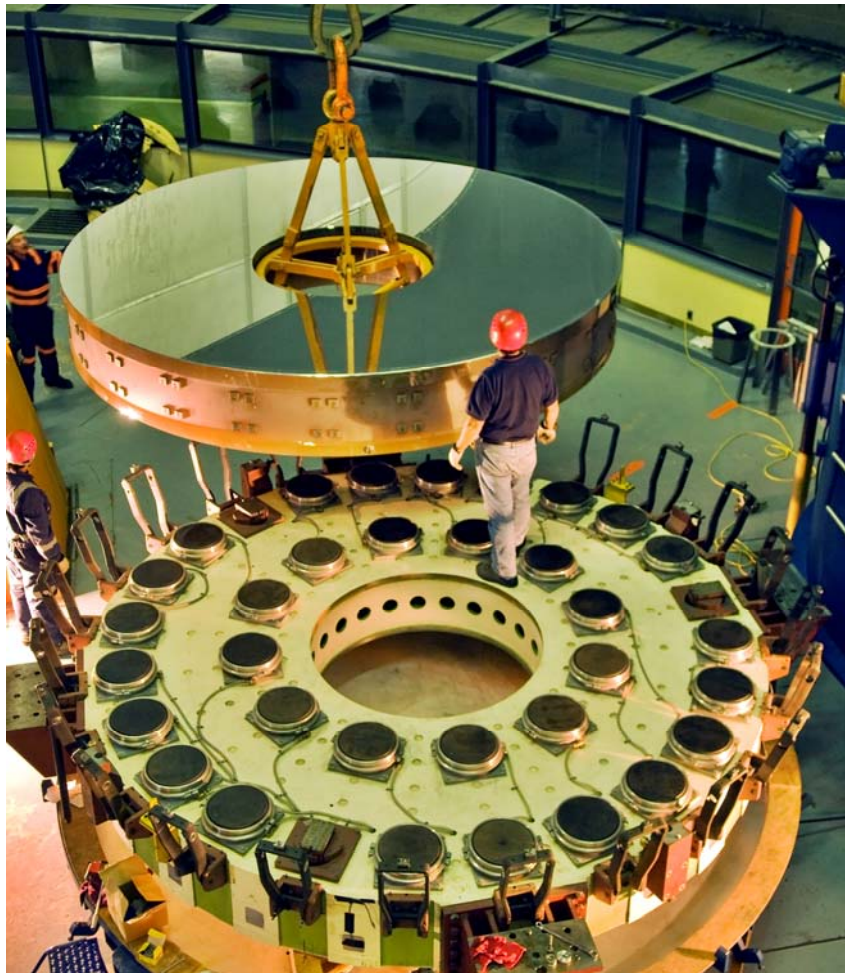




NATIONAL
OPTICAL
ASTRONOMY
OBSERVATORY

QUARTERLY REPORT (3) FY 2009

April 1–June 30, 2009



The primary mirror of the CTIO Blanco 4-meter being removed from the telescope 20 April 2009

Image Credit: T. Abbot NOAO/AURA/NSF

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**National Optical Astronomy Observatory
 Quarterly Report (3) FY 2009
 (April 1, 2008 – June 30, 2009)**



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1 NOAO DIVISIONS

1.1 CERRO TOLOLO INTER-AMERICAN OBSERVATORY

Program Highlights

In the April–May 2009 period, the CTIO Blanco 4-m telescope underwent the longest scheduled shutdown since commissioning was completed. This seven-week shutdown was the culmination of over a year of planning and preparation to refurbish and realign the 24 radial supports of the Blanco primary mirror. Previously, these supports had been failing at the rate of about one a year with undesirable consequences for image quality and operations. The newly designed attachment points have a three times higher safety factor, and this is the first time in the known history of the telescope where all 24 supports have been simultaneously attached. The immediate consequence is that the telescope maintains its alignment much more consistently. Optical tests are ongoing to obtain quantitative measures of image quality improvement.



After a successful first integration & testing round, the SOAR Adaptive Module (SAM) was disassembled to permit last modifications and improvements, products of the analysis of the instrument performance during the testing. The main module was anodized in the CTIO shops, and is now colored a distinguished gray on the outside, while the inside is painted black. In mid-April the main module returned to the laboratory where SAM will be reassembled, aligned, and tested during the coming months. SAM is on schedule to be taken to the SOAR 4.1-meter telescope for the first commissioning run in August, during which the instrument will operate in natural guide star mode. During the break in testing for modifications and anodizing, extensive laboratory tests were made on the recently received 10-Watt ultraviolet laser, which has passed all requirements successfully. This will permit the design of the laser box to proceed.

Status of FY09 Milestones

- Replace the 24 radial supports of the Blanco telescope primary mirror and re-aluminize the primary mirror.

Status: As described above, the 24 radial supports were replaced and the mirror was successfully reinstalled in the telescope. However, the mirror was **not** re-aluminized due to problems encountered with the re-aluminization chamber that led to unsatisfactory aluminization of test samples. Re-aluminization must be rescheduled for next year.

- Install the SOAR Adaptive Module (SAM) main module on the SOAR telescope and commence commissioning activities.

Status: The SAM main module components were anodized this quarter and delivered back to the laboratory for reassembly and testing.

- Complete the Blanco Telescope Instrument Maintenance Facility using NSF FY08 end-of-year funding.

Status: The Blanco Telescope Instrument Maintenance Facility, or Blanco Clean Room, underwent a critical design review this quarter. The requirements were specifically driven by the wide-field optical Dark Energy Camera (DECam) and the large-format infrared imager NEWFIRM. A three-person panel (including representatives from CTIO, DECam, and NEWFIRM instrument teams) was charged with reviewing the plans for construction of the clean room in the Blanco Coudé room in support of integration and maintenance of large instruments. The panel's report was positive, recommending that the project proceed with construction of the clean room with only minor suggestions to be reviewed by the project team.

1.2 KITT PEAK NATIONAL OBSERVATORY

Program Highlights

A special meeting within a meeting focusing on the science to be done with the One Degree Imager (ODI) at the WIYN 3.5-m telescope was held at the June 2009 AAS meeting. Scientists from across the partnership and the community met to discuss their plans for exploiting the unique properties of ODI to enable major science programs.

WHIRC (the relatively new IR imager at WIYN) was commissioned successfully with the WIYN Tip-Tilt Module. The new combined system will provide even better imagers to users than the stand-alone version of WHIRC.

Kitt Peak Visitor Center Comparison Summary of Paid Visitors		
Group/Paid Program	April 1 through June 30	
	2009	2008
General public tours	2,216	1,756
School groups K-12	586	236
Nightly Observing Program	2,129	2,625
Advanced Observing Program	58	67
Total Visitors for All Paid Programs	4,989	4,684

Status of FY09 Milestones

- Prepare the WIYN 3.5-m telescope for the arrival of the One Degree Imager (ODI) during FY10. Necessary work includes increasing/improving the facility for controlling telescope, instrument, and computing environment.

Status: The computer system that controls the telescope was improved with a new router.

- Replace the thermal chiller system at the WIYN 3.5-m telescope.

Status: A successful design review for this system was held and major hardware purchased. Work is on schedule for completion by October 2010.

- Complete the replacement of major dome subsystems at the Mayall 4-m telescope. Portions of this work have been enabled by the \$150K FY08 budget supplement to KPNO from the NSF. Work to be completed includes refurbishing the 32 dome trucks of the dome, installing new emergency brakes for the dome shutter, and completing repairs on the dome rails that were begun in FY08.

Status: Additional cracks in the dome rail have been identified. Completion of the repairs to the dome rail will not be possible during FY09 and will have to extend into FY10. Similarly, the refurbishment of the dome trucks will have to extend into FY10.

1.3 NOAO GEMINI SCIENCE CENTER**Program Highlights**

FLAMINGOS-2, a multi-object near-infrared spectrograph (and imager) passed Acceptance Testing the week of 4 May 2009 at the University of Florida in Gainesville. The contract for building and delivering FLAMINGOS-2 to Gemini South is managed by NOAO/NGSC. After being accepted as ready for shipment, FLAMINGOS-2 was shipped from Gainesville on 25 June 2009 and is expected to arrive in La Serena in early July. Both the Gemini Board and Gemini Science Committee recommended that the commissioning of FLAMINGOS-2 on the Gemini South telescope be given the highest priority. The availability of this instrument at Gemini South represents a significant new observational capability for the US community. It is expected that a successful commissioning will be followed by a call for Science Verification proposals. If such a call is issued, NOAO/NGSC will inform the US community and encourage and support proposals.

Status of FY09 Milestones

- Manage the testing and final integration of the FLAMINGOS-2 near-infrared multi-object spectrograph being built at the University of Florida for deployment at Gemini South. This management role will continue until Gemini Observatory accepts the instrument.

***Status:** Acceptance testing has been completed successfully and FLAMINGOS-2, at the time of the writing of this report, is en route to Chile and eventual delivery to Cerro Pachón and the Gemini South telescope.*

- Provide support for at least five visits per semester to each of the Gemini sites by NGSC astronomers and scientists to observe and get instrument training and familiarization. Ensure that there are at least two working visits by NGSC staff to the Gemini North base facility for stays greater than one week, in order to foster closer ties between NGSC and Gemini North staff.

***Status:** Completed. In semester 2009A, NGSC staff made six visits to the Gemini sites, which included four visits to Gemini South and two visits to Gemini North.*

- Ensure that the views and aspirations of the US user community are incorporated into the upcoming Gemini Long-Range Plan. This forthcoming five-year long-range plan for Gemini Observatory science and operations is expected to be completed in 2010 and used over the transition from the current international operating agreement, which finishes at the end of 2012, into the next agreement. NGSC will work to build communication links between NGSC/NOAO and the various committees that provide input: the NOAO Gemini Science Advisory Committee (SAC), the Users Committee, and the Telescope Allocation Committee (TAC), as well as the Gemini Observatory committees consisting of the Gemini Science Committee (GSC), the Operations Working Group, and the Gemini International TAC (ITAC).

***Status:** Progress continues to be made here. The annual meeting of the NOAO Gemini SAC was in June 2009 (as opposed to past meetings held in October) with US members of the Gemini Board and GSC. The timing of this meeting was changed to better facilitate US input to the annual October meetings of the GSC. The inclusion of both Board and GSC members has improved communication links between these various groups and has fostered open channels between the US community and the Gemini Observatory.*

1.4 SYSTEM DIVISION

1.4.1 System Development

Program Highlights

This period saw significant progress in System building activities. In May, NOAO returned to NSF to further present its case for ReSTAR funding to develop capabilities in the 2- to 5-m aperture range. NOAO awaits a final funding decision. The FY09 call for TSIP proposals was announced, and details are available on the NOAO Web site.

NOAO has been proactively communicating the results of the ALTAIR committee's final report (March 2009) to the community. ALTAIR was designed to assess the state of open access capabilities in the System at apertures of 6.5–10 m and provide input on near term priorities. Among the committee's highest priority recommendations were a call to double funding to TSIP (from

\$5M/yr to \$10M/yr) and increased access to Gemini (from 50% to 75%) provided the Gemini instrument program is more attentive to the US community needs.

NOAO continued to engage the community in this period through its regular telescope time allocation process 30 April–8 May 2009. The process, overseen by D. De Young, consisted of two-day meetings for each of seven different Telescope Allocation Committee (TAC) panels to examine 417 proposals in the areas of solar systems, galactic, and extragalactic astronomy. The merging TAC panel, chaired by De Young, recommended an excellent observing program to the NOAO director for NOAO telescopes and the telescopes offered through the TSIP process (Keck, Magellan, and MMT). De Young completed final editing of the committee members' comments on the proposals. M. Hartman handled the logistics and implementation of this complex process. In addition, NOAO planned the second of the LSST science collaborations TACs, which will be held late in FY09. This process brings in new community members and adds new science collaborations to the LSST science program based on peer review of the collaboration proposals.

In June, NOAO presented the case for developing the US Ground-based Optical/Infrared System to the Astro2010 ground-based O/IR panel. The NOAO director responded to the panel's questions and defined the NOAO vision for a growing and vibrant alliance between federal and nonfederal observatories.

Status of FY09 Milestones

- Complete the preparation of the proposal to acquire funding to begin development of the instrumentation and telescope partnerships needed to address the ReSTAR recommendations. Following successful review and funding of this proposal for the initial three-year phase, begin carrying out this work.

Status: ReSTAR proposal has been reviewed. NOAO awaits a final funding decision from NSF.

- Assist the newly formed ALTAIR committee to develop a set of community, science-driven needs for capabilities and access to telescopes in the 6.5- to 10-m aperture range. Following the completion of this study and the delivery of this report, begin to develop a plan to address its recommendations.

Status: ALTAIR report was delivered. NOAO is communicating the report's recommendations to the community.

- Continue to engage the community in an effective dialog about the evolution of the system, in the context of the NOAO program. As one mechanism, establish a series of regional town meetings to be carried out through FY09 and subsequent years.

Status: NOAO held a community Town Hall in Tucson in support of the Astro2010 process.

- Manage the Telescope System Instrumentation Program, including continuing oversight of the ongoing development projects.

Status: NOAO placed the TSIP FY09 call for proposals. Letters of intent are due in June 2009 with full proposals due in September 2009.

1.4.2 System Instrumentation

Program Highlights

System Instrumentation (SI) actively supported Gemini's efforts to return the Gemini Near-Infrared Spectrograph (GNIRS) to service. During the third quarter, staff from the SI group completed testing of two candidate science detectors from Raytheon Vision Systems, allowing Gemini to make a fully informed choice and obtain the best possible array for GNIRS. SI testing also revealed that the lower-quality array was still quite good and suitable for a spare, enabling Gemini to negotiate a very favorable price with Raytheon for the purchase of both devices. SI staff also provided optical testing, alignment, and consulting services for the GNIRS Offner relay and acquisition mirror system. In other projects, SI staff continued work on ODI fabrication and assembly, including bonding and machining of the Invar CCD mounting points in the silicon carbide focal plane substrate.

Status of FY09 Milestones

- Complete lab integration and testing of the SAM Main Module, deliver it to SOAR, and begin commissioning it in natural guide star mode.

Status: Laboratory integration and testing was completed during the third quarter of FY09, and the team began packing the module in June for delivery to SOAR. The team is well on track to deliver the module and begin commissioning with natural guide stars in the fourth quarter.

- Complete, test, and evaluate the TORRENT prototype design to achieve readiness for production.

Status: The first two TORRENT prototypes were completed during the third quarter. One was sent to La Serena, Chile, and one remains in Tucson. In both locations, SI staff began testing the prototypes. Testing is expected to be completed about the end of FY09.

- Complete a student engineering clinic project to design, prototype, and test an ultra-low-noise CCD front-end for MONSOON/TORRENT in collaboration with students and faculty at Harvey Mudd College.

Status: The students at Harvey Mudd College, under the guidance of SI staff, completed their engineering clinic project in May 2009. They wrote a detailed and thorough report laying out the results of their design study and prototype construction.

1.4.3 Giant Segmented Mirror Telescope Program Office

Program Highlights

The primary activities this quarter were in support of the on-going decadal survey, Astro2010. GSMTPO carried out an independent assessment of the status of the Thirty Meter Telescope (TMT) and Giant Magellan Telescope (GMT) projects April 27–May 2. GSMTPO staff also submitted or contributed to white papers for Astro2010.

In addition, AURA organized a workshop at the summer AAS meeting in Pasadena on adaptive optics science with large telescopes; this workshop was intended to demonstrate to the community the scientific capabilities currently available from adaptive optics facilities.

Status of FY09 Milestones

- Development of GSMT Design Reference Mission documents.

Status: This milestone has evolved in light of the Astro2010 schedule. Information gained from the June 2008 workshop in Chicago and from the GSMT Science Working Group activities has been summarized in white papers submitted to the Astro2010 panels, including one on community needs and one on mechanisms for community access to future extremely large telescopes.

- Support for community assessment of GMT and TMT by an external review panel, to be held in the spring of 2009.

Status: This review was held April 27–May 2. The reports from the review panels were submitted to the projects for comment, and the comments were received. The final reports were provided to the projects and submitted to the NSF and Astro2010.

- Submission for publication of initial site survey results.

Status: Several papers have been submitted and accepted; a current list of these can be found on the GSMTPO Web site at www.gsmt.noao.edu/.

1.4.4 Science Data Management

Program Highlights

There were several major deliveries by SDM this quarter. The SDM Program Plan for FY09–FY10 was completed, reviewed, and delivered to NSF. The SDM Hardware Plan for FY10 through FY11 was completed and reviewed in preparation for developing the SDM FY10 budget. The NEWFIRM Data Reduction Guide (www.noao.edu/ets/newfirm), the NEWFIRM Data Reduction Package (iraf.noao.edu/extern.html), and the NOAO Data Handbook (www.archive.noao.edu/help.html) were delivered and posted online for users. The SDM Web pages were redesigned and reorganized to insure ease of use by observers and general users in locating the desired documentation.

The NEWFIRM Science Pipeline v1.0 was delivered and is currently undergoing science verification by observers this semester. Science verification should be completed before the next

observing semester. Then, pipeline-reduced NEWFIRM data products will be archived and served to observers through the NOAO Archive.

The components of the end-to-end (E2E) v1.3 system were developed, tested, and delivered to Operations for deployment in early July. This release contains better error message management, metadata improvements, support for the NEWFIRM pipeline-reduced data products, and improved user notification tools.

A new Data Transport System for Dark Energy Camera (DECam) data was developed and some testing has been done. The engineering test for transport of DECam data from CTIO to NCSA and Tucson, originally scheduled in June 2009, has been rescheduled for August 2009. This will test transfer of full DECam artificial data sets from La Serena to NCSA and Tucson to demonstrate the network utilization of the system and determine tuning parameters for each of the supported transport protocols.

Members of SDM participated in several meetings for DECam including the Director's Data Management Review, the DES Collaboration Meeting, and many Survey Image System Process Integration (SISPI) and DECam Community Pipeline working group meetings.

Status of FY09 Milestones

- Operations of a functionally complete version of the end-to-end (E2E) data management system, including data capture, transport, archiving, pipeline processing, and access.

***Status:** Work continues to improve the E2E system with the delivery of E2E v1.3. All development is in place to ingest the NEWFIRM pipeline-reduced data once science verification is completed.*

2 NOAO-WIDE PROGRAMS

2.1 LARGE-APERTURE SYNOPTIC SURVEY TELESCOPE

Program Highlights

NOAO has begun hosting a series of workshop-like meetings to provide a forum for the LSST Science Collaborations to meet, both among themselves, and with key project personnel. The first such meeting with the Galaxies collaboration was a clear success; many technical issues emerged, several of which are of interest also to other collaborations. NOAO plans to continue hosting these meetings with the other collaborations.

NOAO has constituted an LSST Science Working Group to accelerate the work on issues that are of wide common interest. Such issues include future development of the Operations Simulator (which the Science Operations Plan identifies as a key tool, not just for planning, but through the data collecting life of the project), photometric calibration, and galaxy photometry methods best suited for derivation of photometric red-shifts.

Technical and programmatic progress this period has been on going. Detailed design development of the LSST mirror support systems by NOAO engineers continued with completion of the hardware design and test plans. LSST calibration experiments continued on the Calypso telescope along with the replacement of the calibration screen.

Status of FY09 Milestones

- Site and Facility: Develop the Request for Proposal for the Summit Facility Architectural and Engineering (A&E) Services contract.

***Status:** Plans are continuing for the Architectural and Engineering Services procurement. The notification for the Federal Business Opportunities was drafted to announce the request for Architectural and Engineering qualifications. This notice will go out in July.*

- Dome: Complete the analysis of the Calibration Screen position within the Dome.

***Status:** Analysis for two types of calibration screens was completed this period, and lab testing of a prototype was initiated through collaboration with Harvard University.*

- Reflective Optics: Collaborate with LSST's secondary mirror substrate vendor to develop the final grinding and support metrology requirements.

***Status:** Final designs for the support system at Corning were completed this period. The review work identified an additional processing opportunity to improve the state of the near net shape substrate. NOAO engineers recommended that LSSTC pursue this option and a new task was developed.*

- Reflective Optics: Complete the development of the primary mirror actuator prototype.

Status: Detailed designs of the baseline hardware were completed this period, and procurement of the prototype hardware was initiated.

- WFS Alignment and Calibration: operate LSST Observatory assets to conduct calibration validation experiments.

Status: On sky observing of White dwarfs has continued this period. NOAO engineers also completed plans for a new instrument to be installed on Calypso with an LSST prototype sensor. Calibration of this CCD will begin upon completion in September.

- Science Mission and Requirements: Participate in the development of the LSST Science Book.

Status: A first version of the LSST Science Book was submitted to the Astro2010 decadal survey. This living document contains community-wide contributions. Eight co-authors from NOAO have contributed to sections on System Design, Solar System, Stellar Populations, Milky Way, Galaxies, Transients & Variable Stars, and Large Scale Structure.

2.2 EDUCATION AND PUBLIC OUTREACH

Program Highlights

The EPO program emphasized activities related to the International Year of Astronomy 2009 this quarter. With S. Pompea as project director and NSF Co-PI and assisted by R. Sparks who is responsible for educator professional development, NOAO took the lead this year in three major areas: overall project management of the NSF grant-funded program, the Galileoscope student telescope kit, and the Dark Skies Education program. During this quarter, the “From Earth to the Universe” image exhibition opened in numerous US locations including the Tucson airport, and the “100 Hours of Astronomy” project kicked off at the Franklin Institute in Philadelphia as a worldwide observing event that also featured broadcasts from most major observatories worldwide. Pompea, as head of the US Telescope Kits and Optics Challenges Working Group, supervised the optical and stray light design/analysis and testing of the low-cost, high-quality Galileoscope telescope. Over 85,000 telescope kits have been produced this quarter with additional ones on order. R. Sparks led the educational materials development for the Galileoscope.

The EPO group continued its leadership role in the Spitzer Space Telescope Teacher and Student Research Program. Over 32 teachers have received training and participated in research projects with over 1400 students participating. At AAS meetings, including Pasadena, teachers have presented 31 posters with the majority of them on the science results from their observations.

EPO efforts include a special emphasis on broadening diversity, including the large Hispanic and Native American populations of the southern Arizona region. K. Garmany and J. Glaspey led these efforts. Kitt Peak was invited to have a booth at the Schuk Toak district day (the district in which Kitt Peak is located). Three NOAO staff members handed out literature, showed the KPNO Mayall 4-m through a telescope, and demonstrated the lack of sunspots. The booth had a steady stream of visitors, and EPO was approached subsequently by San Xavier district about a booth at their district day. The EPO program also built on the long-time success of its Research Experiences

for Undergraduates (REU) program in both hemispheres by adding minority students and university faculty from the NSF Partnerships in Astronomy & Astrophysics Research and Education program to the mix of its mentorship activities; examples include South Carolina State University.

The University of Arizona/NOAO Collaboration to Advance Teaching Technology and Science (CATTS) (S. Pompea Co-PI) finished with its final cohort NSF GK-12 Graduate Student Fellows in June, bringing the number of Fellows to 64 for this track, and 133 Fellows in the total CATTS program. These Fellows were all trained to work in science classes in public schools and provided 15 hours per week of educational service during their year-long fellowship.

C. Dugan expanded the Project ASTRO teacher-astronomer educational partnership program from Tucson to spinoff sites in Phoenix and Prescott and presented at the annual Project ASTRO site leaders meeting at Reno, Nevada, in May. C. Walker and R. Sparks supervised a team of six undergraduate students doing outreach at Tucson Boys & Girls Clubs using the NSF-funded Hands-On Optics program materials. R. Sparks, with Science Foundation Arizona program PI S. Pompea, supported and expanded programs at the 10 optics education sites at Boys & Girls Clubs across Arizona established by NOAO in the Hands-On Optics-Arizona program, now moving into its third year. Science Foundation Arizona PI K. Garmany continued her support for teachers in the Building

Information Technology Skills through Astronomy program for Arizona middle school teachers with planning for a fall workshop. R. Sparks, K. Garmany, and Co-PI S. Pompea continued their work in museum educator training in astronomy in the NSF-funded Astronomy from the Ground Up (AFGU) program, which has trained 433 small science and nature center educators in six face-to-face and six on-line national workshops, with the “Capture the Colorful Cosmos” workshop held May 11–22 to allow AFGU participants an opportunity to further explore this area of astronomy.

Public Affairs and Educational Outreach Information Requests & Inquiries (3 months ending 6/30/09)	
<i>Type/Origin of Request</i>	<i>Number</i>
Information requests/inquiries about astronomy/science (phone calls, e-mails, and walk-ins/requests for posters, bookmarks, brochures, etc.	250
Requests and inquiries for use of NOAO images	130
TOTAL	380

Status of FY09 Milestones

- Continue to grow outreach activity with the Tohono O’odham, including a monthly radio program, wider geographic coverage, and more formal internships with NOAO projects and staff.

Status: EPO provided substantial support for the “Reach for the Stars” attendance initiative program in the public schools. This included rewards, such as books and games, for perfect attendance. Kitt Peak’s involvement was recognized by the presentation of a plaque, which was noted in the local Tohono O’odham newspaper, The Runner. Although the school superintendent is leaving this year, he will recommend this continuing partnership to the new superintendent. Significant publicity went into recruiting Tohono O’odham students for a week long astronomy camp at Kitt Peak for ages 12–18, which is directed by Dr. Don McCarthy (University of Arizona). Following several school visits, ads, and articles in The Runner, three O’odham students applied

for scholarships and were accepted in the camp. A very successful astronomy booth (complete with telescope viewing and sunspot demonstrations) at the Schuk Toak district day near Kitt Peak prompted an invitation from the San Xavier district (south of Tucson) for a similar booth at their district day.

- Redesign the NOAO Web site to create a more attractive and more useful portal for the astronomy community and the public.

***Status:** Mainly completed. Feedback on the redesigned NOAO Web site has been generally positive with many commenting that it is not only attractive, but things are easier to find. One highlight is a Contact Us page as well as a full directory of staff members at both the North and South facilities. The design continues to evolve to meet the needs of the public and the astronomy community.*

2.3 ADMINISTRATION AND INFRASTRUCTURE

2.3.1 NOAO Site Safety Report

NOAO Risk Manager C. Gessner assisted John Weisend, NSF facilities advisor, with formalizing the safety agenda for both the AST Safety Workshop and the Large Facilities Workshop held by the NSF and hosted by NOAO April 14–17 in Tucson. In addition, Gessner invited Richard Hislop (construction safety expert), Johnny Jones (laser safety expert), and Rob Hubbard (NSO systems engineer) to present seminars in their areas of expertise. Gessner presented the NOAO Risk Management program as part of the AST Safety Workshop, which he also attended. Both workshops were well attended and a success.

V. Krabbendam and Gessner completed a draft of the LSST Safety Program, which establishes and defines safety, health, and environmental policies, procedures, and requirements. The program also defines expectations for collaborating organizations and contractors.



CFO staff met several times to plan for the safe removal from the Tucson facility of the leaking primary transformer and the safe installation of a new transformer. Related tasks were coordinated with the CIS group. S. Grandi and his staff worked in the evening of May 15 and the early morning hours to prepare the Tucson computer room for a full shutdown of all data systems. On Saturday, May 16, CFO and CIS staff prepared for shutdown and then Tucson Electric Power performed the replacement (image at left). The project was completed as planned without injury or incident. Thanks to Mike Fleming for the photo.

A fire was spotted burning south of Kitt Peak at the base of the Baboquivari Mountain on June 11 (image at right). Guy Acuna, Fire Management Officer from the Tohono O'odham Department of Public Safety, made contact to verify that communications were in place if the staff of Kitt Peak needed to take action. As time progressed, the threat of the Elk Horn fire to Kitt Peak diminished. Thanks to John Glaspey for the photo.



2.3.2 NOAO Director's Office

Program Highlights

The final version of the NOAO Long-Range Plan (LRP) 2009–2013 was submitted to NSF.

The deputy director organized the 2009 meeting of the NOAO Users' Committee. Both the director and deputy director made presentations. The director participated in various other committee meetings including the AURA Board, AURA Representatives, LSST Board, US Gemini Caucus, and the Dark Energy Survey Directors' Council.

As a result of the American Recovery and Reinvestment Act (ARRA), NOAO became eligible through NSF for funding to catch up on deferred facility and infrastructure maintenance. The deputy director led the team to describe eligible projects and submit the necessary paperwork to request ARRA funding for those projects.

Diversity Co-advocates Dara Norman and Katy Garmany helped organize and then attended the AURA Diversity Workshop in April. This meeting was organized to discuss activities related to broadening participation at all AURA centers and how each center is working to promote diversity in their workforce and in the astronomical community. Norman and Garmany were also involved in the creation and implementation of a cross-AURA workplace climate survey.

Status of FY09 Milestones

- Engage the Decadal Survey, in coordination with AURA, to present the role of NOAO in developing an open access system with a balanced set of science capabilities across the 2- to 30-m aperture range. In this context, explain the current and potential NOAO roles in LSST and GSMT design, development, construction, and operations. Participate in the deliberations of the AURA committee on the Evolution of the Ground-based O/IR System.

Status: Along with various other senior NOAO managers, the director and deputy director attended the open sessions of the Astro2010 O/IR Program Prioritization Panel meeting in Pasadena. The director made a presentation about NOAO and the US O/IR System. The director also participated in preparation of the ACCORD presentation to the same panel.

- Initiate the Renewing Small Telescopes for Astronomical Research (ReSTAR) implementation plan, as funding permits. The highest priorities are new, medium-resolution optical and near-IR spectrographs for the Mayall and Blanco 4-m telescopes.

Status: The ReSTAR Phase 1 implementation proposal remains under review by NSF. The NOAO director, deputy director, and head of program for System Instrumentation made presentations to an NSF Return Site Visit panel convened to review that proposal.

- Support the completion of the Access to Large Telescopes for Astronomical Instruction and Research (ALTAIR) committee report. As appropriate, work with AURA and NSF to develop an initial implementation plan that fulfills the recommendations of the ALTAIR committee.

Status: The director and deputy director participated in a US Gemini caucus called at the request of NSF to discuss issues raised by ALTAIR as they pertained to Gemini. The intent of that discussion was to provide input in Gemini-level deliberations.

- Prepare for and engage with the Observatory Visiting Committee (OVC) appointed by AURA. As appropriate, work with AURA on implementing OVC recommendations.

Status: Completed. NOAO received the OVC report and then wrote and delivered a response to AURA.

- Review the current NOAO program and management structure in the context of current and future commitments as well as actual and possible funding patterns.

Status: The formation of the NOAO System Science Center (NSSC) and NOAO System Technology Center (NSTC) as described in the NOAO LRP was begun.

- Work with the NOAO Executive Committee and AURA to develop and execute a constrained program, as necessary, due to cash flow restrictions related to the Federal budget cycle.

Status: During this quarter, NOAO continued to operate within a cash flow restriction of circa 90% of the FY08 quarterly cash flow.

- Continue, in coordination with AURA, work on broadening participation in the NSF science enterprise by engaging individuals, institutions, and geographical areas "...that do not participate in NSF research programs at rates comparable to others." (Quote from the Executive Summary of *Broadening Participation at the National Science Foundation: A Framework for Action*, August 2008).

Status: Director and deputy director participated in the AURA Diversity Workshop, organized in part by the NOAO co-diversity advocates.

2.3.3 Central Administration Services

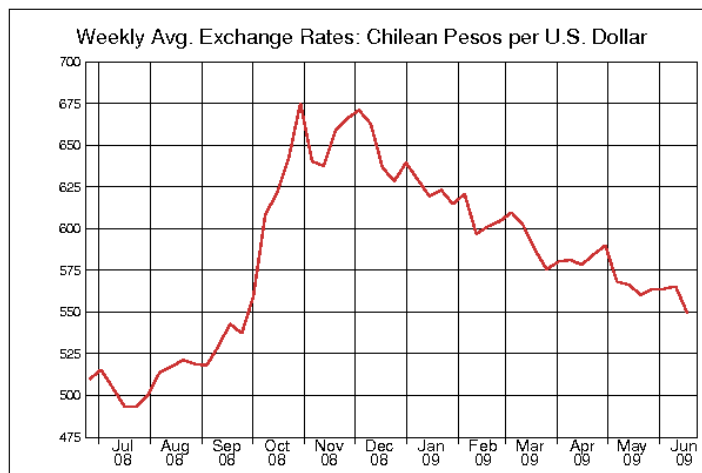
Program Highlights

The NOAO senior management and human resource staff participated in the AURA Diversity Workshop that took place April 21–22, in Tucson, AZ, prior to the AURA annual membership meeting. The meeting included a review of AURA’s Action Plan for Broadening Participation, presentations on minority and female participation in physics and astronomy, understanding the goals and objectives of a funding agency including NASA and NSF, a view from professional societies such as the AAS, and the current perspective of the AURA Diversity Committee. The group also focused on the broadening participation programs of each AURA center and ways to develop the programs further.

Implementation of and training on new software applications was a large focus for CAS, particularly the NOAO Accounting, Payroll and Human Resources (HR) departments. The implementation of the AURA-wide UltiPro human resources software should go live 1 July 2009 and will allow for all of AURA to combine payroll taxes and other services. The Web-based budget program WEBUD made its first run implementation in June. While there are still programming challenges, it should be fully operational this year.

The Sponsored Projects Office (SPO) focused on finalizing the update to the new grants and agreements database and submitted various proposals including our request for infrastructure support funding through the American Recovery and Reinvestment Act (ARRA). The SPO staff is working with the Advanced Technology Solar Telescope staff on their first ARRA Request for Proposal (RFP), which will be available in July.

The Chilean inflation rate did not materially change this quarter, and the currency exchange rate for the US dollar, while above our budget of 500 Chilean pesos to one US dollar, still continues to remain volatile as shown in the chart below, which covers 23 June 2008 to 22 June 2009.



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Status of FY09 Milestones

- Central Administration Services will further develop and implement a broader participation plan throughout its operations.

***Status:** A new Equal Employment Opportunity (EEO) diversity process for recruitment was implemented and a climate survey was continued and reviewed at the AURA diversity meeting. Further updates can be found at: database.aura-astronomy.org/diversityworkshop/.*

- Assist AURA and NSF with renegotiation of our next five-year cooperative agreement.

***Status:** Although the NSF has been focusing on the ARRA funding, NOAO is working with the program officer on the budget revision, which should be submitted shortly. NSO submitted their portion of their cooperative agreement proposal.*

- General Administration will finalize customization of the Web-based budget development and reporting system to meet the challenges of a multi-operational organization.

***Status:** This project was moved in-house and written by the new business programmer. After consulting with various managers, the first production version of the software was released in mid-June. This new software will be used for the FY10 budgeting process.*

- Human Resources will do a major review of the NOAO medical plan and issue a new Request for Proposal through NOAO's insurance broker for implementation under the new cooperative agreement in FY10.

***Status:** The HR department conducted a benefits survey to gain employee feedback on the current benefits offered at NOAO. CAS staff is working with the insurance broker to put together an RFP for release in August.*

- Human Resources will implement an online application form and tracking system in preparation for an AURA-wide implementation of a new Web-based HR software (UltiPro) that will come online January 2010.

***Status:** The migration of NOAO's payroll system from Abra software to UltiPro consumed a great deal of time and effort for the accounting department in the third quarter. Technical representatives from UltiPro were on site three times to assist in configuring the new software. In addition, NOAO's payroll and HR staff participated in a three-day training session held on site. NOAO's payroll department performed parallel testing of the new system in June and plans to switch to UltiPro July 1. A new Affirmative Action Invitation Web form was developed to collect EEO information from applicants. Implementation of this e-recruiter module is anticipated for early FY10.*

- Due to upcoming retirements, training and succession development is underway in the following areas: export and licensing and purchasing. These procurement areas will undergo a reorganization to meet the upcoming organizational needs.

Status: The reorganization of the procurement and shipping areas is progressing. A new shipping and receiving clerk was hired in mid-June who will allow current employees to focus on licensing and purchasing knowledge transfer. Adjustments to job title and responsibilities were reviewed for the existing shipping and receiving clerk and shipping and receiving supervisor. This is all in anticipation of the retirement of the current procurement manager and import/export officer.

2.3.4 Central Facilities Operations

Program Highlights

The third quarter was very eventful for CFO. Over the Memorial holiday weekend, the basement area of the NOAO Headquarters Tucson Facility was flooded. Due to pipe deterioration, a 2-inch line broke off from the 4-inch main building water supply line.

The high water flow then proceeded to flood the raised planter area next to the building and leak into the building through exterior access panels located in the planter. The after-hours security staff discovered the flooding and notified facilities staff.



Approximately 1 to 1 1/2 inches of water flooded into the main building basement (image at left) before staff could get the water shut off. Over the long holiday weekend, staff and remediation contractors worked to remove the water, protect equipment, and dry out the area. As a result, the building was ready for staff to return to work on Tuesday morning. New piping was installed, and water service was restored to the affected areas by the end of the week. Efforts are ongoing to recover from the incident and renovate the areas affected.

Also this quarter, CFO has been preparing for the possible stimulus funding opportunities for building maintenance and modernization upgrades and awaits the status of the outcome of the ARRA stimulus proposal. Fortunately, due to a call for requests for vehicle needs by the General Services Administration, NOAO was already able to qualify for and receive four vehicles in June under the ARRA funding. Two of the vehicles will replace two shuttle fleet vehicles, a half-ton pickup will replace the maintenance truck, and a Jeep Patriot, the only non-E85 fuel vehicle, will be used on Kitt Peak.

Other ongoing projects progressed, including the review and award of a landscaping sub-award to a local women minority-owned business. This is a three-year renewable sub-award with annual review.

Status of FY09 Milestones

- Remodeling and building modifications at NOAO North:

- expand the La Quinta Conference room to accommodate larger groups,...and
- begin the computer room cooling upgrades.

Status: The La Quinta project planning is done for phase 2 to improve the handicap access, restroom, and preparation area; approval to begin work is still needed. Bids were received for the computer room cooling upgrade project and the project is being released for construction.

- Design a scientific interaction area upgrade for NOAO South, if funding permits.

Status: This has been put on hold until funding sources and the stimulus ARRA support can be determined.

- Provide organizational support for the NSF Large Facilities Workshop and AST Safety Conference to be held 7–10 April 2009.

Status: Administration and Facilities staff, including volunteers from SPO, CFO, Accounting, Procurement, and HR, successfully planned for and hosted the 2009 NSF Large Facilities and AST Safety Workshops 14–17 April 2009. CFO staff provided support for planning, Web information, staffing, and logistics. Conference attendance at the Tucson Marriott University Park Hotel was 118, almost twice that originally anticipated. The 48 speakers and presenters did an excellent job, and their presentations can be viewed online at www.noao.edu/nsf, under AGENDA.

- Pursue NSF approval and demolition of the unused apartment building to allow for more parking and storage.

Status: The associate director for Administration and Facilities submitted documentation to the NSF for approval to demolish the unused structure. The NSF is reviewing the information and approval is expected in the next few months.

- Update the CFO Web site.

Status: Basic updating of contents was completed. Due to the change in staff, continued efforts were put on hold. Staff workloads did not allow time for this in the third quarter.

2.3.5 Computer Infrastructure Support

Program Highlights

CIS-South

Two problems related to the Internet occurred this quarter. First, there was a major Internet outage due to a cut fiber in Brazil that lasted for 2–3 hours. Second, some machines in Gemini, Las Campanas, and TMT became infected and caused a DOS storm which saturated our commercial Internet bandwidth for some hours. Those machines were sanitized.

In La Serena, the new email server was installed and all users migrated to it. A Barracuda filter and mail scanner is running now on the server. Equipment was purchased to provide a public wireless local area network in the Main Conference Room for visitors.

The WHAM telescope arrived on Cerro Tololo and CIS-South (CIS-S) staff connected data and phone over fiber. Also on Cerro Tololo, single-mode fiber cable was installed from the Blanco 4-m telescope to the administration building. Cable was installed to the Technician dormitories (these are being renovated for occupancy, and all rooms are being cabled for data and phones). Planning is underway to change and modernize the computer room and console room for the 4-m telescope.

New access servers were installed in the La Serena and Santiago offices to facilitate remote troubleshooting. As the Santiago office will be under the wing of CIS-S shortly, work was done to improve and tidy the environment.

Negotiations are ongoing to review the Internet connections for when the current contract with FIU expires at the end of year.

CIS-North

CIS-North (CIS-N) coped with a half-day power outage at the NOAO Tucson main building caused by the replacement of a Tucson Electric Power transformer.

Status of FY09 Milestones

- CIS-S: Assist with the integration of the Yale Survey camera on La Silla into the AURA data infrastructure

***Status:** David Rabinowitz and crew from Yale arrived to install the link from La Silla and Cerro Tololo. Installation went smoothly and they have been transmitting data from their instrument for a couple of months now.*

- CIS-N: Continue the effort to redevelop cooling and power systems in the computer lab to improve the environment for observatory computer systems and to improve overall energy and space efficiency in the observatory.

***Status:** Bids for the computer lab cooling system were solicited and a bid was selected. Construction should begin early in the fourth quarter and be complete before the end of this fiscal year.*

- CIS-N: Continue to upgrade the Tucson network infrastructure with the goal of providing multiple 1-Gbit connections into each room backed up by multiple-Gbit backhaul to the network core.

***Status:** The wireless infrastructure in the NOAO Tucson complex was upgraded from the porous WEP-based security to WPA2-based security. Some of the Hewlett Packard wireless access points were replaced with Apple units to meet special needs.*

- Continue the effort to develop Cyber Security policies, plans, and procedures backed up by user education in security “best practices.”

***Status:** At CIS-N, further efforts were undertaken to restrict ssh-logins directly to “interior” machines. The Domain Name System setup for CIS-N was modified to present different views to internal and to external users.*

3 SCIENTIFIC PROGRAM ORDERS AND AMENDMENTS

3.1 SPO #5 AST-0335461 TELESCOPE SYSTEM INSTRUMENTATION PROGRAM (TSIP)

NOAO continued oversight activities for the active TSIP programs in this period. These included the One Degree Imager for WIYN; MOSFIRE, a cryogenic multi-object spectrograph (MOS), for Keck; MODS2, an optical MOS for the Large Binocular Telescope, and an adaptive secondary for Magellan.

MOSFIRE received its cryogenic cold-configurable slit mask from CSEM in Europe, a major milestone. MODS produced a blue channel spectrum in the lab, also a major milestone. The Magellan secondary passed its critical design review in this period, and ODI continues to work toward first light. A full working orthogonal transfer array (OTA) device was produced by ITL showing that everything is in place to produce the 64 OTAs (CCD imaging detectors) for the science focal plane.

The TSIP FY09 call for proposals was issued in May 2009. Letters of intent were due to NOAO in June 2009. Six letters were received for six system improvement (one letter proposed two instruments) proposals and one system access proposal. Full proposals are to follow by 18 September 2009.

3.2 SPO #6 AST-0336888 ADAPTIVE OPTICS DEVELOPMENT PROGRAM

- Sub-Award #C33002T “Development of the Next Generation Optical Detectors for Wavefront Sensing.” There has been a very long wait to produce the polar detector on a “wafer-of-opportunity.” This quarter a collaboration effort was developed with the Starfire Optical Range to share costs for a dedicated wafer run at MIT/LL. This is expected to occur in October 2009.
- Sub-Award #C33003T “Pulsed Fiber Laser for Guide Stars.” The work was moved to a new lab, and a new fiber was received and tested. This fiber has an improvement factor of two over the previous fiber. The coating is no longer getting hot. Work is continuing on improvements to the performance of the system.
- Sub-Award #C33005T “Compact Modular Scalable Versatile LGS Architecture for 8–100-m Telescopes.” During this quarter, the Phase II system was disassembled from the two 4 ft. by 6 ft. optical tables. A new layout was developed using SolidWorks and Zemax to reassemble the system onto one 4 ft. by 6 ft. table. Three rack mount units now hold the two chillers and the diode power supplies along with the pulse generator and amplifier. The 1064 side was rebuilt. It had a goal to achieve 75 W with good beam quality and actually achieved 124 W. The 1319 side is under reconstruction now, and work is in progress to build up the amplifiers. This should be completed by the end of July 2009.

3.3 SPO #7 AST-0432601 SUPPORT FOR CONFERENCES, SYMPOSIA, WORKSHOPS AND OTHER MEETINGS

No activity to report for this quarter.

3.4 SPO #9 AST-0551161 LARGE SYNOPTIC SURVEY TELESCOPE PROJECT

A supplement was submitted and awarded for continued work on the design and development of the Large Synoptic Survey Telescope. A total of \$10,923,851 has been awarded to NOAO to date, under SPO 9, (AST-0551161), including the current amendment of \$1,787,836. An amendment to the LSST Corporate sub-award will be awarded shortly.

Furthermore, SPO 9 was extended to 31 March 2010, and funds in the amount of \$1,032,164 were provided to NOAO under SPO 1 for NOAO support to the LSST project.

3.5 SPO #10 AST-0443999 GIANT SEGMENTED MIRROR TELESCOPE PROJECT

Giant Magellan Telescope (GMT) Support

AURA's funding to Carnegie under the sub-award is directed mainly toward reduction of risk in the most critical area of development, fabricating and testing the off-axis primary mirror segments. Carnegie is applying the funds received from AURA primarily to payments on a contract with the University of Arizona's Steward Observatory Mirror Laboratory (SOML) to develop four different testing methods for the off-axis segments and to procure the equipment necessary for testing. In addition, Carnegie is using funds under amended sub-award to carry out several other long-lead-time risk reduction tasks: detailed measurement of the turbulence profile above the chosen site at Campanas Peak accompanied by wind-flow modeling using the current design for the enclosure and site modifications; modeling the dynamic response of the telescope structure to rapidly changing seismic and wind loads; simulating the performance of the adaptive optics system; design of the seven-segment adaptive secondary mirror; and development of conceptual designs for candidate science instruments.

During the third quarter of FY09, the GMT project launched the studies of telescope dynamic response to seismic and wind loads. These studies will be conducted by consulting engineers working closely with newly-hired project staff engineers. At SOML, further progress was made on the metrology methods for testing the off-axis primary mirror segments; by quarter's end, installation of equipment for the interferometric "principal test" was nearly complete, and assembly of components had begun for the "pentaprism" test for verifying the measurements of low-order shape deviations. Finally, in June 2009, the GMT project released the Request for Proposals (RFP) for conceptual designs of nine candidate first-generation instruments. The RFP makes clear that the project does not expect to build all nine instruments, but the intent is to explore the cost and technical feasibility of the complete set before making the final selection of first-generation science capabilities.

Thirty Meter Telescope (TMT) Support

The Project Management Office advanced the comprehensive revision of the project construction schedule and cost estimate in support of the partnership business plan, treating both Cerro Armazones and Mauna Kea variants leading to the site selection decision. A complete bottom-up revision of the schedule, including a funding-paced design phase through September 2011 and a technically-paced construction phase after October 2011, was completed. Corresponding “then year” cost estimate revisions were implemented. The TMT Board schedule and cost targets were addressed during this period. The schedule achieves the target project finish dates. The project completed preparations for the NSF-sponsored GSMT Community Assessment Review (GCAR). The project submitted responses to the Astro2010 Program Prioritization Panel Requests for Information.

In this period, the outstanding achievement of TMT Systems Engineering was the preparation for the successful GCAR. A major ongoing effort was flowing down the top-level requirements into subsystem Design Requirements Documents and developing Interface Control Documents. A significant number of those documents have reached advanced draft or released status. Efforts on detailed performance modeling of the telescope and enclosure continue.

Business Operations continued the management and continuous improvement of the following processes: human resources, timekeeping, payroll, contracts, supplier management and procurement, risk management, payables, travel management and audit, financial accounting and reporting, asset management, budgeting, policies and procedures, internal controls, facilities management, document management and control, communications, tax, program management control systems, estimating, and scheduling.

The Site Studies department managed contracts related to enclosure and facilities design, managed or supported the efforts related to the Declaration of Environment Impact for the Cerro Armazones site and the Environmental Impact Statement and Conservation District Use Permit for the Mauna Kea site. Efforts also included support for the site testing systems.

The TMT Telescope department includes the Controls, Optics, and Structures groups. The activities of the department for this quarter included:

- Meetings with vendors regarding TMT optical systems, metrology and drive systems, including supervision of contracts for prototype development and subsystem design and development
- Visits to review efforts to produce mirror segments for the European Extremely Large Telescope project
- Preparation for the GCAR
- Development, testing, and evaluation of prototypes for primary mirror subsystems
- Performance modeling and control algorithm development
- Staff recruitment

The TMT Adaptive Optics (AO) group continued to develop: (1) requirements and interface documents, (2) performance estimates, and (3) cost and schedule estimates for the TMT AO systems. These include the Narrow Field Infrared Adaptive Optics System (NFIRAOS) and the Laser Guide Star Facility (LGSF). AO also continued to monitor the TMT partners and suppliers who are

developing the individual AO subsystems and components. Finally, the AO group continued to prepare documentation and presentations for the GCAR and contributed material to a variety of white papers for the Astro2010 decadal survey.

Other Activities

Funding was provided to supplement funding provided by the European Southern Observatory (ESO) to develop lasers for use in producing laser guide stars for adaptive optics. The NSF funding is provided on behalf of a consortium that includes TMT, GMT, the W. M. Keck Observatory (WMKO) and NOAO. The collaboration of this consortium with ESO is led by WMKO, which has also provided some funding directly. The ESO funding supports two development contracts, and the NSF/WMKO funding is used for additional risk-reduction activities at the same two vendors. The development effort is expected to be complete by the end of calendar year 2009. Consortium representatives receive periodic reports from the vendors and attend progress reviews.

The GCAR was held successfully April 27–May 2. This activity was partially supported under SPO 10; see section 1.4.3 for further discussion of GCAR.

3.6 SPO #11 AST-0647604 CTIO RESEARCH EXPERIENCES FOR UNDERGRADUATES (REU)

No activity to report for this quarter.

3.7 SPO #13 AST-0754223 KPNO RESEARCH EXPERIENCES FOR UNDERGRADUATES (REU)

All six of the 2009 KPNO REU students are hard at work on their projects with their mentors. They took a break to visit Kitt Peak on June 15 and were given excellent tours of the telescope facilities by the mountain staff and visiting scientists. Additionally, the students are attending the 2009 REU lecture series, which began in June with the following lectures:

- “Welcome to the National Optical Astronomy Observatory,” by Dr. Bob Blum (NOAO Deputy Director)
- “Introduction to Helioseismology,” by Dr. Rachel Howe (NSO)
- “Lighting and Astronomy,” by Dr. Connie Walker (NOAO)
- “Getting Ready to Build the Advanced Technology Solar Telescope,” by Ms LeEllen Phelps (NSO)
- “Collision in the Cosmos,” by Dr. Jennifer Lotz
- “Space Weather,” by Dr. Frank Hill

4 TELESCOPE PROPOSAL AND ARCHIVED DATA STATISTICS

4.1 TELESCOPE PROPOSAL STATISTICS FOR 2009B

KPNO Telescope	Proposals	Total Nights	Dark Nights	% Dark	Avg. Nights/Run	Nights Granted	Over-subscription Factor
KP 4-m	44	192.0	53.5	28	3.8	137.0	1.45
WIYN	22	94.2	23.0	24	3.2	50.5	1.88
KP 2.1-m	29	231.0	61.0	26	5.8	144.5	1.60
KP 0.9-m	4	15.0	6.0	40	3.8	12.0	1.25
CTIO Telescope							
CT 4-m	35	178.0	95.5	54	4.2	130.00	1.34
SOAR	30	114.6	38.0	33	3.5	35.00	3.23
CT 1.5-m	4	19.0	0	0	3.8	17.10	0.92
CT 1.3-m	8	35.3	0	0	4.4	15.45	1.66
CT 1.0-m	6	71.0	43.0	61	8.9	81.00	0.73
CT 0.9-m	10	59.0	29.9	51	3.7	44.35	1.60
Gemini Telescope							
Gemini-N	118	151.4	48.4	32	1	59.55	2.54
Gemini-S	73	104.2	48.7	47	1.1	54.95	1.94
Public Access Telescope							
Keck-I	31	52.5	18.5	35	1.6	8.0	6.50
Keck-II	30	42.1	9.5	23	1.3	7.0	6.01
Magellan-I	9	20.0	16.0	80	2.2	6.0	3.33
Magellan-II	6	13.0	4.0	31	2.2	4.0	3.25
MMT	7	13.9	9.0	65	1.7	13.5	1.03

Of the 419 proposals received, 93 were thesis projects and 16 requested long-term status.

4.2 USAGE OF ARCHIVED DATA

The first set of tables below illustrates access to and usage of reduced data in the NOAO Science Archive (R2) from NOAO Survey programs. The table on the left shows the data download volume in gigabytes, the number of files retrieved and the number of unique visitors (for that month) who downloaded archive data through the ftp site. The table on the right shows the Web activity logged from the NOAO Science Archive Web site. It includes users (visitors) collecting additional information before or after downloading data, as well as visualization of the data online.

Archive Data Retrieval Activity (ftp site)			
Date	Retrieved (GB)	Files Retrieved	Unique Visitors
Apr-09	16.07	893	19
May-09	98.99	885	25
Jun-09	18.50	203	19
Total:	133.56	1,981	63

NOAO Science Archive Web Site Activity			
Date	Bandwidth (GB)	Pages Viewed	Unique Visitors
Apr-09	117.75	54,247	665
May-09	206.20	10,871	672
Jun-09	364.21	18,559	731
Total:	688.16	83,677	2,068

The second set of tables below illustrate access to and usage of non-proprietary raw data from the NOAO Science Archive (R3) and proprietary raw data from the Science Data Management (SDM) End-to-End (E2E) system. With the new release of E2E v1.2, users have another means for downloading data that goes through the VO server in Tucson. SDM is working on a logging mechanism to capture statistics on these downloads. Hence, the numbers in the right-hand table below are lower than the actual activity.

NOAO Portal Data Retrieval Activity (ftp site)			
Date	Retrieved (GB)	Files Retrieved	Unique Visitors
Apr-09	36.20	327	11
May-09	49.58	141	4
Jun-09	3.31	550	7
Total:	89.09	1,018	22

NOAO Portal Web Site Activity			
Date	Bandwidth (MB)	Pages Viewed	Unique Visitors
Apr-09	589.32	40,904	337
May-09	242.40	13,706	370
Jun-09	3,553.00	15,600	478
Total:	4,384.72	70,210	1,185

TELESCOPE PROPOSAL AND ARCHIVED DATA STATISTICS

The NOAO SkyNode provides access to catalogs and is complementary to the NOAO Science Archive, which provides access to images. SkyNode receives a simple SQL query and passes it to a backend database engine. The result is then passed back through the Web server. The most important number in the table below is “Unique Visitors.”

Tucson NOAO SkyNode			
Date	Bandwidth (MB)	Pages Viewed	Unique Visitors
Apr-09	28.45	5,898	444
May-09	47.11	7,886	634
Jun-09	35.72	6,867	346
Total:	111.28	20,651	1424