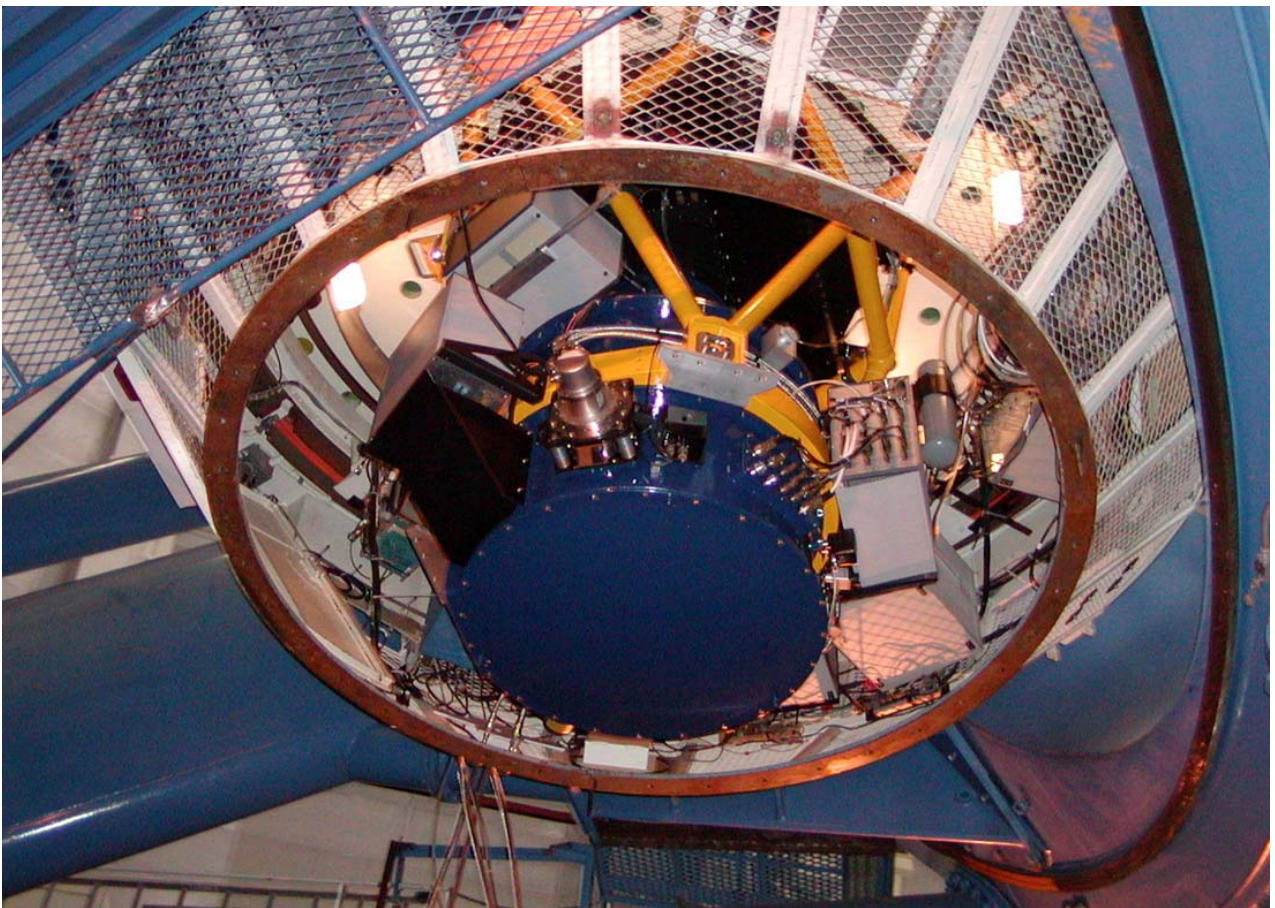




NATIONAL
OPTICAL
ASTRONOMY
OBSERVATORY

QUARTERLY REPORT (3) FY 2008

April 1–June 30, 2008



NEWFIRM, a major new instrument installed on the Mayall 4-meter telescope at Kitt Peak National Observatory, completed a successful first semester of normal science operations.

Image courtesy of Ron Probst, NOAO

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



*Submitted to the National Science Foundation
 Pursuant to Cooperative Agreement No. AST-0132798
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Contents

1	NOAO DIVISIONS.....	1
1.1	Cerro Tololo Inter-american Observatory (CTIO)	1
1.2	Kitt Peak National Observatory (KPNO).....	1
1.3	NOAO Gemini Science Center (NGSC)	2
1.4	System Division	3
1.4.1	System Development.....	3
1.4.2	System Instrumentation	6
1.4.3	Giant Segmented Mirror Telescope Program Office (GSMTPO).....	7
1.4.4	Data Products Program.....	8
2	NOAO-WIDE PROGRAMS	10
2.1	Large-Aperture Synoptic Survey Telescope (LSST).....	10
2.2	Public Affairs and Educational Outreach (PAEO)	11
2.3	Administration and Infrastructure	13
2.3.1	Tucson and Kitt Peak Site Safety Report	13
2.3.2	NOAO Director’s Office	14
2.3.3	Central Administration Services (CAS)	15
2.3.4	Central Facilities Operations (CFO).....	16
2.3.5	Computer Infrastructure Support (CIS).....	17
3	SCIENTIFIC PROGRAM ORDERS AND AMENDMENTS	19
3.1	SPO #5 AST-0335461 Telescope System Instrumentation Program (TSIP).....	19
3.2	SPO #6 AST-0336888 Adaptive Optics Development Program	19
3.3	SPO #7 AST-0432601 Support for Conferences, Symposia, Workshops and Other Meetings	19
3.4	SPO #9 AST-0551161 Large Synoptic Survey Telescope Project.....	19
3.5	SPO #10 AST-0443999 Giant Segmented Mirror Telescope Project	19

3.6 SPO #11 AST-0647604 CTIO Research Experiences for Undergraduates
(REU).....21

3.7 SPO #13 AST-0754223 KPNO Research Experiences for Undergraduates
(REU).....21

1 NOAO DIVISIONS

1.1 CERRO TOLOLO INTER-AMERICAN OBSERVATORY (CTIO)

Program Highlights

The Dark Energy Survey (DES) collaboration, which is constructing a large-format, prime-focus CCD camera (DECam) for the prime focus of the Blanco Telescope, received DOE Critical Decision 2 and 3A approval. This allowed DES to let the contract for the polishing of the five-element optical corrector and to proceed with procuring other long-lead items.

The DES biannual collaboration meeting was hosted by CTIO in La Serena during April and was attended by more than 60 scientists and engineers from all the partner institutions. In addition to the main, three-day, science-focused meeting, workshops were held on integration and installation and the focal-plane electronics systems.

A Memorandum of Understanding between AURA and the Las Cumbres Observatory Global Telescope Network was signed to allow construction of a robotic facility consisting of four 0.4-meter and three 1.0-meter telescopes on Cerro Tololo.

Status of FY08 Milestones

- Complete the enhancement of the CTIO technical and scientific staff by the hiring of two new scientists and an optical technician.

***Status:** After an extensive interview process, a single offer for a scientific staff position at assistant scientist rank was made and subsequently accepted. An optical technician was successfully hired.*

1.2 KITT PEAK NATIONAL OBSERVATORY (KPNO)

Program Highlights

Peter van Dokkum (Yale) and colleagues completed their first semester of observations for, “The NEWFIRM Medium-band Survey: Accurate Redshifts for 40,000 Galaxies.” An approved NOAO survey program using the Mayall 4-meter and NEWFIRM, this program will probe the properties of galaxies and the star formation history of the Universe between redshifts 1 and 3. A report of the team’s progress can be found in the Science Highlights section of the June edition of the *NOAO/NSO Newsletter* (www.noao.edu/noao/noaonews/june08/pdf/). Many other programs using NEWFIRM were successfully supported as this major new instrument completed its first semester of normal science operations.

This quarter saw the first shared risk observing with the WHIRC, an IR imager built by STScI and the University of Wisconsin with contributions from KPNO and NOAO System Instrumentation (SI), on WIYN. This next generation of near-IR imagers helps to keep the 4-meter-class telescopes of KPNO conducting innovative and competitive world-class science programs.

A new modern detector with a modern (MONSOON) controller was delivered by KPNO/SI/NOAO to WIYN for use with the Bench Spectrograph. This new detector is a component of the Bench Spectrograph upgrade. The detector, controller, and user interface are still under commissioning, but the new components are already delivering improved performance for the Bench Spectrograph.

Finally, Pierre Martin, currently of Canada-France-Hawaii Telescope, accepted the offer of the WIYN Board of Directors to become the second director of the WIYN Observatory, succeeding George Jacoby in this position. Dr. Martin, selected after a successful search that yielded many strong candidates for the position, will begin his term as director on 22 September.

Status of FY08 Milestones

- Complete the commissioning of NEWFIRM and begin normal operations of this wide-field Near-IR imager.

Status: Completed.

- Complete the search for a new director of the WIYN Observatory with an anticipated start date of October 2008.

Status: Completed. See above for details.

1.3 NOAO GEMINI SCIENCE CENTER (NGSC)

Program Highlights

NOAO/NGSC, along with Gemini, Subaru, Japan Society for the Promotion of Science, Science and Technology Facilities Council, and AAL, sponsored a joint workshop entitled “Cosmology Near and Far: Science with WFMOS,” 19–21 May, in Kona, Hawaii. This workshop brought the Gemini and Subaru user communities together to discuss both scientific and operational topics involving the Gemini-Subaru WFMOS collaboration. More than 80 astronomers attended, with three NOAO astronomers giving science talks. The future of WFMOS as an observational capability available to the Gemini user community depends critically on a successful collaboration between Gemini and Subaru.

The first meeting of the Access to Large Telescopes for Astronomical Instruction and Research (ALTAIR) committee was held in Tucson, 11–12 June 2008, with NGSC staff astronomers both serving on the committee (T. Matheson) and acting as NOAO liaison to the committee (V. Smith). This committee will produce a report delineating the amount of time and observational capabilities that are needed by the U.S. user community for telescopes with apertures from 6.5 to 10 meters. The role of Gemini within such a set of ground-based observational capabilities will be an important issue. A second meeting is scheduled for 8–9 September 2008, and a report from the committee is planned for early 2009.

Status of FY08 Milestones

- Improve the communication links between NGSC and the U.S. user community via improved Web pages and increased conduits through which users can provide feedback on their experiences and views on U.S. usage and participation in Gemini.

***Status:** NGSC, in collaboration with the Gemini Observatory, is working on a phone survey of all U.S. Gemini users from semester 2005B to 2008A to ascertain their satisfaction with user support, as well as developing a standard feedback mechanism for all programs beginning in semester 2008B.*

- NGSC will 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:** At the May 2008 Quarterly Review, it was decided that FLAMINGOS-2 Acceptance Testing (AT) will begin in early August and it is currently scheduled to begin the week of 4 August 2008. NGSC engineer M. Trueblood is overseeing the role of NGSC/NOAO in managing these remaining steps as FLAMINGOS-2 is fully integrated as a Gemini instrument.*

1.4 SYSTEM DIVISION**1.4.1 System Development****Program Highlights**

This quarter saw significant progress on the development of a plan for building the system of small and mid-size telescopes, as well as the beginning of the community discussions of both large telescopes (through the new ALTAIR committee) and giant telescopes (at the community workshop, *Science with Giant Telescopes: Public Participation in TMT and GMT*). In addition, the second and third editions of the new NOAO electronic newsletter, *Currents*, were distributed. They covered community use of the Gemini telescopes, advertised the GSMT workshop, and featured an interview with the incoming NOAO Director, David Silva.

The Time Allocation Process for semester 2008B was held in Tucson, 1–9 May. Seven (three galactic, three extragalactic, and one Solar System) telescope allocation committees (TAC) met, followed by a final merging meeting, including the Gemini-merging TAC. Most panelists stay on the panels for five semesters. The semester 2009A TAC will meet in October–November 2008.

Highlights of the 2008B TAC were: (1) a high proposal pressure on the Kitt Peak 4-meter telescope, due to the availability of NEWFIRM; (2) the larger number of available community-access nights with the Keck telescopes.

A Call for Letters of Intent for Survey programs was issued in the June *NOAO/NSO Newsletter*. Letters of Intent are due 31 July 2008. The Surveys TAC will be October 2008.

Status of FY08 Milestones

- Following the conclusion of the ReSTAR committee activity and the delivery of their report, develop a plan for the creation and the evolution of a robust system of U.S. ground-based O/IR facilities. Work with the NSF and with operators of private telescopes to begin to implement this plan.

Status: The NOAO Interim Director and Director Designate visited NSF to present the elements of a plan to implement the ReSTAR recommendations. Feedback from that visit will be factored into a revised white paper for community distribution and a proposal to be submitted before the end of this fiscal year.

- Organize and carry out a community-based committee effort similar to ReSTAR, but aimed at understanding community needs for large telescopes. Like ReSTAR, the goal is to solicit broad community input in order to produce a science-motivated list of prioritized capabilities.

Status: This new committee, designated ALTAIR (Access to Large Telescopes for Astronomical Instruction and Research) held its first meeting in June. The committee is preparing a community survey to solicit input and ideas about use of these large telescopes. The second meeting is planned for September.

- As part of an overall effort to engage the community in understanding and supporting NOAO’s program, initiate discussions of the development of the telescope system and, in particular, develop an understanding of the capabilities that are missing. The goal is to generate community enthusiasm for new facilities that would provide these capabilities.

Status: In April, the Interim Director attended the Mid-America Regional Astronomy Conference in Kansas City, Missouri, and presented a summary of the NOAO program and efforts to engage the community. Development of the telescope system was also a significant element of the discussion at the June meeting, “Science with Giant Telescopes,” in Chicago.

Summary of 2008B Telescope Proposal Statistics

KPNO Telescopes	Proposals	Total Nights	Dark Nights	% Dark	Avg. Nights/Run	Nights Granted	Over-subscription Factor
KP 4-m	40	203.0	60.0	30	4.3	63.5	3.21
WIYN	17	67.5	32.5	48	3.4	47.5	1.42
KP 2.1-m	23	152.0	39.0	26	5.4	136.0	1.12
KP 0.9-m	2	6.0	2.0	33	3.0	6.0	1

CTIO Telescopes	Proposals	Total Nights	Dark Nights	% Dark	Avg. Nights/Run	Nights Granted	Over-subscription Factor
CT 4-m	42	165.5	69.5	42	3.4	110.0	1.47
SOAR	13	45.6	8.0	18	3.5	29.5	1.48
CT 1.5-m	6	51.0	6.0	12	7.3	15.7	3.25
CT 1.3-m	7	26.5	0.0	0	3.8	6.9	3.85
CT 1.0-m	5	59.0	24.0	41	8.4	67.0	0.88
CT 0.9m	11	91.9	30.5	33	5.7	67.1	1.37
Gemini Telescopes	Proposals	Total Nights	Dark Nights	% Dark	Avg. Nights/Run	Nights Granted	Over-subscription Factor
Gemini-N	93	125.5	44.5	35	1.1	67.17	1.84
Gemini-S	48	75.7	24.6	32	1.3	50.08	1.55
Public Access Telescopes	Proposals	Total Nights	Dark Nights	% Dark	Avg. Nights/Run	Nights Granted	Over-subscription Factor
Keck-I	20	38.3	13.5	35	1.8	11.0	3.48
Keck-II	29	35.0	6.0	17	1.2	8.0	4.38
Magellan-I	7	15.0	7.0	47	2.1	4.0	3.75
Magellan-II	5	11.0	5.0	45	2.2	4.0	2.75
MMT	11	18.7	9.4	50	1.7	15.5	1.21

Of the 347 proposals received, 105 were thesis projects, 25 requested long-term status, and none requested survey status.

Usage of Archived Data

The first two tables below illustrate 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-08	16.39	114	17
May-08	21.89	2,531	20
Jun-08	64.64	2,213	27
Total:	102.92	4,858	64

NOAO Science Archive Web Site Activity			
Date	Bandwidth (GB)	Pages Viewed	Unique Visitors
Apr-08	24.74	4,527	1,002
May-08	127.50	13,331	1,577
Jun-08	61.92	45,203	1,969
Total:	214.16	63,061	4,548

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-08	14.97	3,170	183
May-08	19.12	3,863	263
Jun-08	20.56	3,673	248
Total:	54.65	10,706	694

1.4.2 System Instrumentation

Program Highlights

NOAO received requests from Gemini for assistance with their efforts to repair the GNIRS instrument after it suffered a catastrophic overheating in 2007. System Instrumentation (SI) helped Gemini by examining many of the optical elements and advising on whether they can be repaired and how to do so. The Division also agreed to test replacement detectors using the unique test equipment and skills available here. This testing will be carried out in the final quarter of FY 2008.

System Instrumentation has been actively pursuing several instrument concepts following the completion of the ReSTAR Committee report. Scientific, optical, and mechanical evaluation is underway to determine the feasibility of building a high-resolution optical spectrograph for the Discovery Channel Telescope under construction by Lowell Observatory. Joint work is also underway with the University of Texas for design of a high-resolution near-infrared spectrograph and for development of the silicon immersion gratings that would be needed to realize that instrument. Finally, SI is discussing with the Ohio State University instrumentation group the practicality of scaling their high-throughput, moderate-resolution, spectrograph project, currently under development for the 2.4-meter Hiltner telescope at MDM Observatory on Kitt Peak, up to the size needed for deployment on one of the NOAO 4-meter telescopes.

Status of FY08 Milestones

- Make substantial progress toward implementation of design changes for MONSOON as needed to allow use as a plug-in replacement for old systems on KPNO and CTIO.

Status: The necessary changes to the power supply have been finalized and the final design and fabrication will be released to a subcontractor very soon. The overall design of the Local Control Board has been completed, and the remaining detailed design is moving forward.

- Complete fabrication and make substantial progress on assembly and integration of the SAM Main Module, working towards a goal of readiness for delivery to SOAR early in FY09.

Status: The optical elements are all installed in the main module structure, and optical alignment is well underway. Routing of electronic cables and testing of motion-controlled stages is also underway.

- In connection with the work of the ReSTAR Committee, develop concepts and cost estimates for one or more 4-meter class instruments to support plans for the enhancement of the U.S. ground-based O/IR system.

Status: Feasibility studies are underway for high-resolution optical and near-infrared spectrographs with Lowell Observatory and the University of Texas, respectively. Discussions are also underway with Ohio State University about the feasibility of adapting their highly efficient, moderate-resolution optical spectrograph for use on one or both of the NOAO 4-meter telescopes.

1.4.3 Giant Segmented Mirror Telescope Program Office (GSMTPO)**Program Highlights**

GSMTPO continued its role monitoring the progress of the Thirty Meter Telescope (TMT) and Giant Magellan Telescope (GMT) projects on behalf of the NSF. Both projects are actively engaged in their respective design and development phases. NOAO staff attended relevant design reviews and science advisory group meetings. Both projects presented a variety of papers at the June, 2008 SPIE conference in Marseille, France, which was also attended by GSMTPO staff.

The workshop on Giant Telescopes, described below, was held 15–18 June, with close to 100 participants from throughout the U.S. astronomical community. The presentations and other products from the workshop will be used as part of the initial material for the GSMT Design Reference Mission.

Status of FY08 Milestones

- GSMT SWG starts work on GSMT Design Reference Mission (DRM). This effort requires consultation with the NSF, GMT, and TMT and will include development of mechanisms to engage the community and solicit their input and participation in the process. As part of this effort, a community-wide workshop on “Community Science with TMT and GMT” will be held in FY08.

Status: The GSMT SWG, GMT, and TMT sponsored a workshop entitled “Science with Giant Telescopes: Public Participation in TMT and GMT,” held in Chicago, 15–18 June. The presentations included four panel discussions on topics related to community needs, as well as over 20 science use case talks. The presentations are in the process of being posted, and written use cases have been requested from the use case speakers.

- TMT selects a site; TMT-related site testing is complete.

Status: TMT selected Mauna Kea (13 North location) as its designated northern site, and Cerro Armazones as its designated southern site. A choice between the two will be made at a time that allows construction to begin in 2010. Site testing has been completed on all sites except Tolonchar and Armazones. The Tolonchar equipment will be removed later this calendar year. Tests on Armazones will be directed toward validating CFD models and using multiple monitoring locations, which likely will continue through final site selection.

1.4.4 Data Products Program

Program Highlights

In June 2008, software developers and management from all three AURA centers (NOAO, STScI, and Gemini) as well as two AURA-affiliated initiatives (National Virtual Observatory and LSST) assembled in Hilo, Hawaii, for a workshop to discuss the current status and future directions for Science Support Software at AURA institutions and, more broadly, in the U.S. astronomical context. The workshop covered the status of IRAF, PyRAF, other data reduction and analysis packages and environments, and the need for a future framework that could support all of the facilities’ needs while providing a uniform system for the community to adopt. Working groups were formed to pursue detailed discussions and development of a draft report that describes a common vision for the next generation of Science Support Software being developed at the AURA centers. This report should serve as a basis for coordination and collaboration between the centers in the development of long-range software plans and to inform other astronomical institutions and the U.S. astronomical community of a broad vision for this next-generation platform/environment.

In May 2008, DPP hired a new program manager, Betty Stobie, who has many years of experience managing software development groups in astronomical settings, including a long period at STScI during the development of the HST Archive. She brings a level of software management experience to DPP that previously had not been available within NOAO.

Status of FY08 Milestones

- Deployment of the next major version of the NOAO E2E data management system, including a new, scalable, data transport system; data remediation framework (to catch and correct bad header information and other erroneous metadata); integration of pipeline processing and processed data; high-level data products (e.g., stacked NEWFIRM and Mosaic images); and an improved NOAO NVO Portal to support both these new E2E features as well as new NVO standards..

Status: *The Archive and Portal teams delivered major new releases of their subsystems, which together compose v1.1 of the E2E system. Extensive testing is underway in the distributed DPP test environment (which simulates the distributed operational environment). Small changes, which may be needed as a result of user testing, will be incorporated into E2E v1.2, which has a planned delivery by the end of FY08.*

- Full participation in NVO operations, including developing and documenting testing plans, testing deployed tools and services, and supporting and advocating scientific use of the distributed NVO facilities through leadership in either a NVO Summer School or a VO Science workshop.

Status: *DPP Staff member M. Fitzpatrick was selected to co-chair the organization of the 2008 NVO Summer School and has been leading the detailed planning of the school, which will be held in September. Two other staff members will serve as faculty at the school, and four additional staff will attend the school as students.*

- Development of the long-range plan for Science Support Software development, in collaboration or at least coordination with STScI, Gemini, and other groups with active astronomical software development programs. The plan will identify all affected areas of NOAO (observatory operations to user reduction) and other participating entities, list the steps to be taken, and estimate manpower required over the five years to reduce dependencies on IRAF and move to a modern platform.

Status: *Five DPP staff actively participated in the AURA Software workshop; one became chair of the management group and another became chair of the end-user interface working group. The goal is to have a first draft of a white paper or report ready by September 2008 that describes a common applications framework that can provide for an effective evolution forward from IRAF. NOAO's long-range scientific software planning will be informed and influenced by this report.*

2 NOAO-WIDE PROGRAMS

2.1 LARGE-APERTURE SYNOPTIC SURVEY TELESCOPE (LSST)

Program Highlights

LSST members participated in a meeting and conference this quarter. The LSST All Hands Meeting was held at NCSA in Urbana-Champaign Illinois. This very successful event brought together members from the technical and scientific teams, along with representatives from the member institutions, to focus on interactions and project-wide development. Several members of the LSST team participated in the SPIE Large Telescopes conference in Marseille in June with roughly a dozen papers and posters presented.

AURA and LSST completed negotiations with Chile, leading to a signed agreement that establishes how LSST will fulfill its Chilean telescope time obligations. The operations simulator results were made accessible to LSST project and science collaboration members this quarter. Simulations are logged, tracked, and standard reports useful for scientific and engineering studies are available through a Web interface. Interested scientists now have a productive tool to enable interaction with the group and to work with the results from the simulation runs.

Throughout the third quarter the M1M3 mirror was cooling without any issues. The mirror came through the annealing temperatures and is now a couple of weeks from being at room temperature so the oven can be opened. The secondary mirror procurement process was completed this quarter; LSST chose to buy the blank from Corning Incorporated. Both mirrors are being funded through LSST Corporation private funds.

Status of FY08 Milestones

- Science Mission and Requirements: lead a “call for proposals” for the U.S. astronomy/physics community for participation in the LSST science collaborations and support the selection process.

Status: Preparations and supporting documentation have been completed and the announcement is ready for publishing in early July 2008.

- Telescope Mount: Complete a design study of the hydrostatic bearings.

Status: The work with SKF Bearing was completed this period with a final report and a paper on the results published at the recent SPIE conference.

- Systems Engineering: Conduct Magnetron coating tests on borosilicate substrates.

Status: The test hardware was completed and an initial series of tests was completed in the Gemini North chamber to commission the test set-up and prepare for the next chamber opportunity in the next quarter.

- WFS Alignment/Calibration: Complete version 1 of WFS and reconstruction pipeline prototype.

Status: A new API for the curvature sensing code was completed along with the new MatLab library routines to de-blend objects in the image. An SPIE paper was published this quarter on the results of the version 1 pipeline completed to date.

2.2 PUBLIC AFFAIRS AND EDUCATIONAL OUTREACH (PAEO)

Education Outreach Highlights

Eight Arizona teachers, including two from the Tohono O’odham Nation, participated in this year’s first workshop for the Building Information Technology Skills through Astronomy (BITS) program funded by Science Foundation Arizona. The teachers worked on fall semester lesson plans that utilize image-processing skills and related techniques. Seventeen diverse, world-class science teachers came to Tucson for the annual two-week summer workshop for the Research Based Science Education (RBSE) program, which included several nights of observing on Kitt Peak. Instructors for this 10-year-old NOAO program noted that the group was the best-prepared yet, thanks to the continually improving distance-learning course administered by project leaders.

Public Affairs and Educational Outreach Information Requests & Inquiries (3 months ending 6/30/08)	
<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.)	268
Requests and inquiries for use of NOAO images	317
TOTAL	585

Public Outreach Highlights

Kitt Peak was featured prominently in educational film development this quarter with segments of six productions shot on site, including National Geographic’s “The Known Universe” and Discovery Channel Canada’s special on asteroids. Fifty-five donors for the Discovery Channel Telescope received a special tour of the 4-meter, McMath-Pierce, and WIYN telescopes and enjoyed lunch on the mountain. Staff and volunteers were engaged on various campuses for Earth Day and Summer Solstice celebrations, in addition to collaborating with Arizona Youth University in hosting a week-long astronomy day-camp. The Annual Laurel Clark Earth Camp returned to Kitt Peak for the third consecutive year. Teachers attending the Southwestern Astronomy Conference marveled at the 4-meter and McMath-Pierce telescopes during a special tour of Kitt Peak. The “Stars & Music” program at Kitt Peak attracted record attendance in June, with

PAEO Kitt Peak Visitor Center Summary of Visitors (3 months ending 6/30/08)	
<i>Group/Program</i>	<i># of Visitors</i>
General public tours	1,756
School groups K-12	236
Special tours	164
Nightly Obs. Program	2,625
Advanced Obs. Program	67
TOTAL VISITORS	4,848

over 70 people relaxing to the melodic sounds of the Tucson Flute Club before turning their attention skyward for a star party.



Photo Credit: James Gregg,
Arizona Daily Star

Kitt Peak National Observatory was featured as the main story on page one of the 23 April Arizona Daily Star newspaper. Although the color photo showed PAEO staff member R. Wilson using the visitor center telescope, the story covered the bright future for both science and outreach on the mountain. NOAO staff were also active participants in media support on the University of Arizona campus for the Mars Phoenix landing, including a special tour of Kitt Peak.

Status of FY08 Milestones

- Lead U.S. planning for the International Year of Astronomy 2009, particularly with international leadership on the Galileoscope telescope kit and a dark-skies awareness program (including GLOBE at Night 2008).

Status: NOAO PAEO staff played a major role in planning and executing a major “meeting within a meeting” at the June 2008 AAS meeting in St. Louis on preparing for IYA 2009. Attendance at the weekend workshops (~175 people) and the subsequent three-day session of panels, posters, and presentations (~200) was strong; and numerous messages of appreciation and intent to use the workshop materials and activities in 2009 have been received.

Perhaps the biggest hit of the IYA portion of the meeting was the first prototype of the Galileoscope, realized thanks to extensive design and development work led by S. Pompea of NOAO (U.S. project director for IYA 2009) and R. Fienberg, and some extraordinary extra effort by D. Arion of Carthage College, who obtained support from his administration to produce a rapid-prototype plastic model. An informal summative evaluation of the meeting showed that participants’ knowledge of IYA materials and programs increased from 3.5 to 6 on a seven-point scale.

- Execute the “Reach for the Stars” program requested by the Indian Oasis Baboquivari School District and continue to expand the PAEO presence in educational outreach with the Nation via visits to Kitt Peak, star parties, and Boys & Girls Club programs.

Status: “Reach for the Stars” (RFTS) completed a successful year in May. NOAO provided numerous science prizes for the youngest children (tops, Kitt Peak balls, diffraction glasses, and puzzles). Students in the older grades with close-to-perfect attendance won larger prizes via raffles. NOAO sponsored two evening bus trips to Kitt Peak for older students for the night observing program and an afternoon visit with a portable STARLAB planetarium to the intermediate school.

Although the attendance figures given to the committee showed only modest gains in attendance, both teachers and principals felt there was a marked change in student attitudes. Student achievement was highlighted in May, with gift certificates awarded jointly by NOAO/Kitt Peak and the Nation’s Chairman, Ned Norris. The program was discussed on KOHN, the tribal radio station, and reported in The Runner, the Nation’s primary bi-weekly newspaper, on two occasions.

2.3 ADMINISTRATION AND INFRASTRUCTURE

2.3.1 Tucson and Kitt Peak Site Safety Report

The NOAO Safety Web site at www.noao.edu/noaolocal/safety received more changes. The Manuals and Handbooks link was moved to the top of the site list for easier access, and the Job Hazard Analysis section was added. The documents added include “Critical Lift Plan,” “Hot Work Permit,” “Test Your Safety Knowledge,” and a white paper titled “I am Responsible.” Safety and risk management portions of the “NOAO Traveler Guidelines,” on the CAS Intranet, were also updated.

The contact lists for the updated (last quarter) NOAO/NSO Contingency Plan were completed, and most NOAO/NSO managers now have a copy of the updated version.

Kitt Peak employees noticed a wildfire on the night of 8 May in the Baboquivari Mountains south of Kitt Peak. Staff immediately executed the NOAO/NSO Contingency Plan actions. During the fire, there was no threat to Kitt Peak. The Solano Fire burned 2,545 acres on lands owned by the Tohono O’odham Nation, Arizona State Trust, and Bureau of Land Management. There were 293 personnel assigned to the fire including four Type 2 hand crews, six Type 1 Hot Shot crews, five engines and crews, one dozer, and eight water tenders. Three single-engine air tankers and one heavy, one medium, and one light helicopter were assigned. No one was injured, and no structures were damaged. The fire was nearly 100 percent contained by 12 May.



Solano Fire viewed south from Kitt Peak

C. Gessner visited the Stanford Linear Accelerator Center (SLAC) 19–21 May. He is working with SLAC safety manager Frank O’Neill to develop the LSST safety program plan. They are using the GLAST safety program plan as a model for the LSST safety program plan, as well as some of the work that has been done for ATST.

On 18 June, K. Ray and C. Gessner met with Marsh, insurance brokers, to begin the annual insurance renewal process for AURA, WIYN, SOAR Consortium, and LSST, Inc. The objective this year is to obtain optimum coverage, limits, pricing, and services in this soft insurance market. Marsh will check with several insurers to find out if they are interested in providing a quote.

AURA received from the National Council on Compensation Insurance (NCCI) a workers compensation experience rating of .73 for the period of October 2006 to October 2007 for AURA’s U.S. facilities. A rating below one is better than the national average, and AURA will enjoy about a 28 percent reduction in worker compensation premiums this year.

2.3.2 NOAO Director's Office

Program Highlights

The AURA Annual Meeting was held in Alexandria, Virginia, in April. One of the primary discussion subjects for this meeting and the associated management retreat and Board of Directors meeting was the use of Gemini by the U.S. community. The AURA President, along with the NOAO and Gemini Directors, formed a number of staff working groups to explore ways that the two organizations could benefit from increased collaboration. Reports from these groups were discussed at the management retreat. Additional discussions among the AURA institution member representatives have led to renewed interest in finding ways to better connect the community with Gemini. These discussions also connect to the beginning of the activities of the new ALTAIR committee, which is looking at community use of all telescopes with apertures of 6.5 to 10 meters.

Another area receiving increasing attention is the development of input for the upcoming decadal survey. Progress was made in organizing ideas about the overall development of the ground-based O/IR system through a meeting of the AURA Decadal Survey Steering Committee, and about the relationship of one or more new, giant telescopes to community use of existing facilities through the public workshop in Chicago.

Finally, it is critical to NOAO's success to maintain the high priority of multiple efforts to engage the community. In this context, the NOAO Interim Director attended a regional astronomy meeting that brought together astronomers from a number of (predominantly small) institutions in the Midwest. This was an important opportunity to present the NOAO program and to discuss it with a significant group that is difficult to reach through other means.

Status of FY08 Milestones

- Develop and implement new efforts to engage the community, in order to keep them more informed of the activities of the NOAO program, and to solicit their input and advocacy.

Status: In April, the Interim Director attended the Mid-America Regional Astronomy Conference in Kansas City, Missouri, and presented a summary of the NOAO program and efforts to engage the community. Discussions are under way to restructure and redesign the NOAO Web site.

- Identify potential areas of particular interest for discussion in the next decadal survey and initiate internal and external working groups to study them, establish a consensus, and write white papers to advocate their positions.

Status: The NOAO Interim Director and Director Designate met with the AURA Decadal Survey Steering Committee and presented ideas about the evolution of the system of ground-based O/IR facilities and NOAO's roles within this system. The committee recommended that AURA commission a "Future Directions of NOAO and the System" study to produce a white paper to be submitted to the appropriate survey subcommittee.

- Conduct a search for a new CTIO Director to replace Alistair Walker, whose term expires in November 2008.

Status: Two final candidates were interviewed by the search committee and made visits to Chile to meet with the staff and present their visions for CTIO. The committee is developing a final recommendation to the NOAO Director and the Observatory Council.

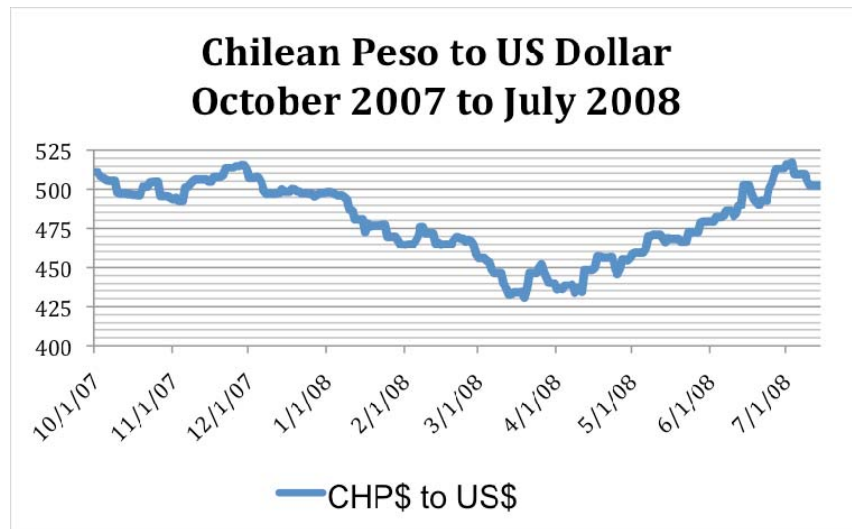
2.3.3 Central Administration Services (CAS)

Program Highlights

The NSF cost review, a Senior Review recommendation for the AST observatories, of NOAO was begun June 2008. The NSF contractor, LMI, Inc., began reviewing and visiting each observatory site. Central Administrative Services, Central Facilities Operations, and Computer Information Services presented information and participated in the reviews both at NOAO North and NOAO South. Overall the reviews were very thorough and comprehensive. The LMI and associated NSF AST and Large Facilities staff toured all the facilities and investigated the staffing levels and associated costs. A preliminary report from LMI is due to NSF within the next few months.

The volatile Chilean peso/U.S. dollar exchange rate moved favorably with respect to the U.S. dollar in the third quarter, bringing the average for the fiscal year up to CHP 479. The high was 524.80 and the low was 430.40. At the time of this report, it was holding around 502. NOAO based its FY08 Chilean peso budget on 500 pesos to the U.S. dollar. The fiscal year-to-date impact (based on 500 pesos to 1 U.S. dollar) to the NOAO program is approximately \$234K.

The graph below depicts rates from 1 October 2007 to 1 July 2008. The U.S. dollar remains weak on the global market. However, on a positive note, the dollar has strengthened during this past quarter. The NOAO South annual peso budget is approximately \$3.5M of, or roughly 14 percent of, the overall NOAO budget for FY08.



Status of FY08 Milestones

- Install and configure during the first quarter of FY08 new Web-based budgeting software, purchased in FY07, to simplify and improve the accuracy of the budgeting process.

Status: Active Planner by SAGE was purchased and installation was begun. Currently, data from the financial, human resource, and Excel budgeting applications are being migrated to this platform. The fourth quarter of FY08 is the target for completion.

- Continue support to Gemini, including the certification of the Gemini On-Site Export Control Officer, and other AURA centers to standardize systems.

Status: The NOAO Business IT manager continues to support the Gemini financial system and is currently working with their procurement manager on Reqless modifications. This interface is running smoothly and should go into routine mode beginning next fiscal year.

- Continue to automate the Conflict of Interest (COI) form for annual submission.

Status: Completed. The update was instituted this past May. The rate of response was 99.5%, with only a handful of submissions needing review. This will be a routine and virtually paperless process.

2.3.4 Central Facilities Operations (CFO)

Program Highlights

Central Facilities Operations continued to make building improvements and do maintenance despite funding reductions. The new Science Interaction Room and landscaping in the adjacent courtyard (below) are done.



Scientific Interaction Room and its newly landscaped courtyard

The NOAO Cleaning and Greening committee, whose charge is to form sub-committees to help improve the NOAO facilities, submitted its final report this quarter. The full report can be found at www.naoa.edu/naoalocal/reports/C-G-FINAL-REPORT-062308.pdf. The next step is to review the report and categorize recommendations into the following areas: (1) things that are very easy to do, which will just be done; and (2) set up a couple of groups to carry out some of the improvements

that have modest costs but big returns. The main focus in the beginning will be the hallways, the employee's lounge, rest rooms, and the patio. These committees will be given charters and budget targets for recommending the initial targets for CFO work.

Status of FY08 Milestones

- Dispose of and classify as surplus old property and machinery that no longer is of use to any of the programs as part of the "Cleaning and Greening of NOAO." Remodeling will be done to balance the space needs between office and specialty spaces.

Status: As reported above, the Cleaning and Greening committee report was received and is being reviewed. The design to add five or six new offices to support science staff by re-engineering the old Photo Lab is nearly complete. The excess property was disposed of and the warehouse was cleaned. That made room for Public Outreach inventory items that need to be moved from the old Photo Lab space. Both NOAO North and South enthusiastically embraced these activities to identify and clean space for re-engineering.

- Modify the main computer room cooling system to enhance the cooling capacity to accommodate increased computing needs. Computing systems within the main computer room are being upgraded and/or increased, which places a larger heating load on the air-conditioning systems. Engineering and design efforts are ongoing to identify and implement changes.

Status: The consultant draft report from Palmer Engineers has been reviewed and a final report that will provide costing estimates for some of the options is expected within a few weeks.

2.3.5 Computer Infrastructure Support (CIS)

Program Highlights

NOAO-Tucson: The Tucson CIS group was busy this quarter. A new rack containing LSST servers was installed in the computer lab. Members of the group helped the Mountain Programming Group with the reorganization of their rack in the computer lab. An HP ProCurve 2810-48G Ethernet switch was installed in room 137, replacing an older Intel 510T switch. Systems connected to the new switch can now make gigabit connections which are supported by a 3x1 Gbps trunk to the building backbone. HP ProCurve 2810-24G Ethernet switches also were installed in the CAS building (replacing less capable Netgear units). The new switches allow multiple subnets to be transmitted to CAS. A Cisco 1760-V router was installed in the PBX room to facilitate connections with NOAO South using the Voice over Internet Protocol (VOIP).

The DNS/email server noao.edu was replaced by a new server with built-in RAID, replacing an older box that had an external RAID array that experienced a melt-down when the computer lab got very hot one evening. The upgrade was rescinded when Web mail performance became unbearably slow under the new system. The old system was reconfigured without the external RAID. The upgrade will be revisited later.

Kitt Peak Mountain Programming Group: Third quarter activities included the following. New software that runs full-time automatically and no longer needs to be started by the operations

staff was installed for the Kitt Peak dew point sensors. At the 4-meter, testing was done on subsystem control software ported from SunOS to Linux. Sound server software was developed to run at each telescope to provide sound from the computers in the computer room to the observers. Fifteen SuperMicro servers were purchased to replace some of the older Linux systems at Kitt Peak. CentOS 5.1 was installed on the systems and hardware, and software setup is underway with system installations planned for fourth quarter FY08 and first quarter FY09.

At WIYN, the “IAS Manager” software in the TCS was replaced by a standalone GWC client to control the IAS hardware, providing an improved command model that was needed for efficient operation of the WHIRC instrument. This update required changes in much of the WIYN software. The new IAS client was completed, and integration with the rest of the WIYN software will occur early in the next quarter. The memory and disk upgrade project continued at WIYN and several upgrades were completed. Also, several bad disks were replaced and the file systems rebuilt. In the next quarter, the disk upgrade project will continue for systems at the 4-meter and 2.1-meter, replacing older IDE disks and installing backup disks. A Linux computer, “sage,” was installed at the 0.9-meter for general use by observers and staff. The development of the WIYN Active Controller Test Stand (WACTS) was completed. WACTS will be used next quarter to verify and calibrate the WIYN primary mirror support hardware. As part of the Bench Upgrade project, a new turret for the grating was purchased and a control system (hardware and software) was built. The GUI will be updated and the hardware will be integrated at WIYN in the next quarter.

NOAO South: In the third quarter, CIS South (CISS) populated the Santiago office with VOIP and installed a new firewall. A new rack was purchased and all the network cabling tidied and improved. The MCR in La Serena was refurbished with a new teleconference system, slide projector, and screen. The new lighting and window covers to improve the visibility will be done next quarter. The fire alarm system and air conditioning work was completed in the La Serena computer room. CISS installed data and phone networks at the Pachón hotel. A paper was prepared for SPIE on LSST networking. The VOIP parts for the Tololo facilities were ordered, and a VOIP switch was sent to NOAO North to improve the connection from the south. CIS is still working on this with J. Dunlop and his crew.

Status of FY08 Milestones

- Finish planning and then execute an infrastructure improvement plan for the NOAO-Tucson building. Emphasis will be placed on improvements in power and environmental conditioning for the computer lab.

Status: A preliminary report was provided by the power and cooling consultant. CIS and Facilities are awaiting the final report.

- Plan and begin execution of an improvement plan for the Ethernet electronics in “wiring closets” spread around the NOAO-Tucson building.

Status: A new Ethernet switch was installed in room 137 to support gigabit connections to offices in the vicinity. Replacement Ethernet switches were installed in the CAS building.

3 SCIENTIFIC PROGRAM ORDERS AND AMENDMENTS

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

All management activities related to the current TSIP subawards are up-to-date. TSIP is presently managing instrumentation development programs for Keck, the LBT, MMT, and Magellan.

The CCD upgrade to the IMACS instrument at Magellan was successfully completed in June 2008. The new CCDs provide a substantial improvement in throughput as well as operational efficiency and safety (a second dewar was added, alleviating the need to change the single dewar between IMACS cameras).

3.2 SPO #6 AST-0336888 ADAPTIVE OPTICS DEVELOPMENT PROGRAM

- Sub-Award #C33001T “A Noiseless Imaging Detector for AO with KiloHertz Frame Rates.”
- Sub-Award #C33002T “Development of the Next Generation Optical Detectors for Wavefront Sensing.”
- Sub-Award #C33003T “Pulsed Fiber Laser for Guide Stars.”
- Sub-Award #C33005T “Compact Modular Scalable Versatile LGS Architecture for 8–100-m Telescopes.”

For details regarding the status of the above sub-awards for the Adaptive Optics Development Program (AODP), refer to the AODP annual report for 2008, which was submitted 24 June 2008 to the NSF. The report is available at www.noao.edu/system/aodp/aodp-ar-2008.pdf.

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

There are no activities to report at this time.

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

Work on the LSST annual report progressed this quarter.

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

Giant Magellan Telescope (GMT)

In April 2008, the GMT project held a quarterly progress review for the first primary mirror segment. Steward Observatory Mirror Lab reported that loose abrasive grinding of the aspheric front surface is proceeding satisfactorily. The Lab is also nearly done with installing the Laser Tracker Plus

metrology system. Completion of this installation is now the pacing item for further progress with the mirror grinding and polishing. The Lab also held a critical design review for the Pentaprism optical metrology system, which will be used to measure low-order deviations from ideal mirror shape and as a check on the more comprehensive interferometric testing. Completion of the first segment and implementation of the metrology systems are both work items under the amended sub-award to GMT (through Carnegie). The AURA Technical Representative participated fully in both reviews.

Thirty Meter Telescope (TMT)

The following summarizes the major progress and milestones achieved by the personnel supported under this sub-award. The sub-award funds have been applied entirely to support effort as described. The TMT science and operations design, observatory software, system engineering and modeling, and telescope system management and optics design have been addressed with the sub-award funds. The supported personnel include crucial leadership in these efforts. The supported efforts have all been subject to external review, and these reviews have been attended by AURA oversight personnel and NSF officials from astronomy and large facility offices.

System Engineering: G. Angeli leads the System Engineering efforts for TMT. A major ongoing effort that he guided was updating the top level system requirements as well as their flow down to subsystem Design Requirements Documents. He also led the major efforts of modeling and design verification work, which culminated in the very successful TMT Image Quality Performance Review 15–16 April. Optical, thermal, and dynamic simulations were integrated into a consistent Monte Carlo environment to provide stochastic estimates for the overall TMT performance. The current focus is on planning the systems engineering efforts leading to the project PDR later this year. Additional personnel supporting the System Engineering effort and funded in whole or in part by the sub-award were K. Vogiatzis and M. Cho.

Telescope Science Operations: D. Silva ended his term as the Observatory Scientist and interim head of the Operations Design (DEOPS) department for the TMT Project. He will become the AURA/NOAO Director. Key activities during this quarter were: out-briefings on DEOPS and budget planning; Design Requirements Documents (DRDs) for Common Software, Executive Software, and Data Management System within the Observatory Software project; participation in the April TMT SAC and Board meetings and in meetings with a delegation from University of Hawaii, Hilo, including the chancellor, Dr. Rose Tseng; and attendance at the NSF Large Facilities Operations workshop in Boulder, CO. Silva also wrote and presented SPIE papers about TMT observatory software and operations planning for the SPIE Astronomical Telescopes and Instrumentation symposium in Marseilles, France.

Segmented Primary Mirror Design: L. Stepp leads the Telescope Department, which includes the Controls, Optics, and Structures groups. This quarter, he

- took part in numerous technical meetings and reviews for the Controls, Optics, and Structures groups, as well as meetings with contractors and potential contractors;
- met with Hawaiians advising TMT on the Mauna Kea observatory site application;

- reviewed baseline design reports from four study contracts: two for design of the secondary mirror system and two for design of the tertiary mirror system;
- wrote a statement of work for a study to evaluate the sensitivity of the relative image positions in the focal surface to changes in telescope optical parameters; the study is now being performed by the project System Engineering group;
- supported recruiting efforts for six positions in the Telescope Department;
- led development of revised Telescope Department schedules for the TMT design and construction phases; and
- continued with preparations for the Ground-Based and Airborne Telescopes conference, serving as co-chair of the conference, held 23–28 June, and as co-author of four papers.

Additional staff supporting the Telescope Group effort and supported in whole or in part by the sub-award were E. Williams (Optics Group Leader) and M. Cho.

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

There are no activities to report at this time.

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

The six 2008 KPNO Research Experiences for Undergraduates (REU) students (table below) arrived and began working on their various projects.

<u>REU Student</u>	<u>Affiliation</u>	<u>Mentors</u>
Timothy Arnold	Ohio State University	S. Howell, K. Mighell, and K. Garmany
Taylor Chonis	University of Nebraska-Lincoln	C. Claver and J. Sebag
Matthew Henderson	Clemson University	W. Sherry
Tiffany Meshkat	University of California, Los Angeles	C. Claver and K. Mighell
Ashley Stewart	University of Arkansas	J. Glaspey
Matthew Zagursky	University of Maryland	J. Lotz

The six KPNO REU and three NSO-Tucson REU students visited Kitt Peak on 15 June. They toured the 4-meter and 2.1-meter telescopes, the WIYN telescope, and the NSO facilities.

KPNO Director, B. Jannuzi, started the REU 2008 Lecture Series on 9 June with an introduction talk about NOAO, KPNO, NSO, and their roles within the U.S. astronomical community. D. Shaw (NOAO) gave the second REU lecture on 19 June on the topic “Planetary

Nebulae in the Magellanic Clouds: Clues to Stellar Evolution.” On 25 June, R. Howe (NSO) gave the third REU lecture which was an introduction to helioseismology.

When not participating in group activities, the KPNO REU students are busy working on their individual projects with consultation from their mentors.