Image of our neighboring LMC galaxy in spectacular detail with highlighted very specific colors of light emitted by glowing gas. The colors highlighted on the mosaic are light emitted by hydrogen (red), oxygen (green), and sulfur (yellow), while light from individual stars has been subtracted. The mosaic shows what a busy and violent place the inside of the LMC really is. Visible in the image are many small planetary nebulae pushed out by low mass stars, large emission nebulae or ambient interstellar gas set aglow by massive stars, and huge gaseous supernova remnants cast off by massive stars exploding. The extended connected filaments are mostly connected supernova remnants. The LMC, a familiar sight to an unaided eye in the southern hemisphere, spans about 15,000 light years and lies only about 180,000 light years distant.

Credit: C. Smith, S. Points, the MCELS Team and NOAO/AURA/NSF
CONTENTS

1 SCIENTIFIC PROGRAM ORDERS
Scientific Program Order 9 .................................................................................... 1
Scientific Program Order 10 .................................................................................. 1

2 PUBLIC AFFAIRS AND EDUCATIONAL OUTREACH (PAEO)
Media and Public Information ............................................................................... 2
Public Outreach...................................................................................................... 3
Educational Outreach ............................................................................................ 3
Other Educational Outreach Activities .................................................................. 6

3 TUCSON AND KITT PEAK SITE SAFETY REPORT
OSHA Recordable Occupational Injuries and Illnesses ........................................ 7
Safety and Health ................................................................................................. 7
Fire Protection and Prevention .............................................................................. 8
Environmental ....................................................................................................... 8
Insurance ............................................................................................................... 8
Security .................................................................................................................. 8

* Quarterly updates on scientific, operational, and programmatic activities, including
telescope subscription rates, are published separately in the quarterly NOAO Newsletter
(See: http://www.noao.edu/news_rep.html)
1 SCIENTIFIC PROGRAM ORDERS

Scientific Program Order 9

The LSST Corporation provides overall management and control of the LSST Project.

(1) The LSSTC directly manages all activities related to the project and houses the Program Management Office, the Education and Public Outreach organization, the System Engineer, and the Data Management Organization. In addition, the LSSTC manages sub awards from NSF to universities funded to contribute to the design and development of LSST under this SPO 9 No.AST0551161.

(2) NOAO manages and houses the Telescope and Site subproject of the design and development of LSST.

Item 1 was funded during FY05 by SPO9 awarded to AURA and sub-awarded by AURA to LSSTC.

Item 2 was funded during FY05 by a supplement to the NOAO Cooperative Agreement.

Scientific Program Order 10

AURA is funded by NSF under SPO10 for design and development of the Giant Segmented Mirror Telescope.

(1) Funding is to be sub-awarded to the California Extremely Large Telescope Corporation (CELTCO) as partial support for design and development of the Thirty Meter Telescope through SPO 10 AST 0443999.

(2) Design of an alternate concept will be funded in part under SPO10 after down-selection of proposals for alternate concepts.
2 PUBLIC AFFAIRS AND EDUCATIONAL OUTREACH (PAEO)

Media and Public Information

• An NOAO press release on light echoes of ancient supernovae in the Large Magellanic Cloud (with two excellent graphics produced in-house), received strong media coverage by United Press International, Space.com (reposted at MSNBC.com), and numerous science news Web sites, including several in Europe. The release coincided with a paper published in the December 22 issue of Nature magazine.

• Images of Mars were seen on October 26 by Tucson news viewers, thanks to three live broadcasts by KOLD ABC-TV. The 10:00 PM KOLD broadcast reached the largest local TV news audience in the Tucson market. In interviews conducted for the 5:00 and 6:00 PM broadcasts, NOAO’s Doug Isbell and Robert Wilson spoke about the red planet and NOAO public nighttime programs.

• A combination WIYN-Hubble Space Telescope image of M82 was the cover of the December 2005 issue of Discover magazine.

• A joint NOAO-Yale press release on the merger history of red elliptical galaxies in the nearby Universe using data from the NOAO Deep Wide-Field Survey was covered by ScientificAmerican.com, NewScientist.com, and Space.com (reposted at MSNBC.com and USATODAY.com), among other outlets.

• NOAO images were featured three times as the “Astronomy Picture of the Day” and two times as the Space.com featured image. The image on the NOAO home page was replaced six times.

Press Releases Issued Last Quarter

• “Kitt Peak National Observatory Visitor Center Offers New Public Membership Program”
• “Galaxy Collisions Dominate the Local Universe”
• “Flashes from the Past: Echoes from Ancient Supernovae”

<table>
<thead>
<tr>
<th>Type/Origin of Request</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information requests/inquiries about astronomy/science (phone calls, e-mails, and walk-ins/requests for posters, bookmarks, brochures, etc.)</td>
<td>550</td>
</tr>
<tr>
<td>Requests and inquiries for use of NOAO images</td>
<td>350</td>
</tr>
<tr>
<td>Total</td>
<td>900</td>
</tr>
</tbody>
</table>
Public Outreach

The Public Outreach department coordinates activities at the Kitt Peak Visitor Center, including retail operations, daily and special tours of Kitt Peak facilities, the docent program, the popular fee-based public observing programs, educational exhibits, and media events. Following are highlights of last quarter’s activities:

- The new Kitt Peak public membership group began formally with a November 4 press release. Members receive special discounts, free telescope tours, guest passes, a newsletter, and an annual star party. The group currently has more than two dozen members and membership is increasing.

- Coronado Instruments conducted their annual Hands On the Sun (HOTS) workshop at Kitt Peak on October 7. Sixty participants attended.

- Local weatherman Chuck George (KOLD ABC-TV, Channel 9, broadcast his segments from the Kitt Peak Visitor Center on the evening on October 26, announcing Kitt Peak’s upcoming Mars program— “Meet Mars”—scheduled for November 12. The event drew 50 people.

- A film crew from The History Channel shot footage at Kitt Peak for a documentary about ancient astronomy.

Educational Outreach

Teacher Leaders in Research Based Science Education (TLRBSE)

- The TLRBSE program completed recruiting for the 2006 teacher cadre; with 18 teachers accepted from an applicant pool of 93. (Current funding pressures obliged us to admit four fewer qualified applicants than last year.) The accepted applicants represent a national teacher audience extending across the entire country. These new TLRBSE teachers have begun pre-session work on their distance-learning course, offered through the University of Arizona.

- Independent evaluation of our summer 2005 immersion workshop by M.J. Young and Associates indicated that last year’s workshop was highly successful—in the opinion of staff as well as participants. TLRBSE personnel are implementing the lessons learned in the workshop, refining the curricular materials and starting a new year of the Teacher Observing Program (TOP) under the direction of Katy Garmany. In this past quarter, three TOP observing runs took place at the Coudé Feed and the 0.9-m telescope. NOAO’s Research-Based Science Education journal, which highlights student research in astronomy, has received its first new papers of the academic year and will be published in April, 2006.
For the third consecutive year, TLRBSE team members S. Croft and C. Walker organized a special session at the December, 2005 American Geophysical Union meeting on professional development strategies to support teacher and student research in science. The three educational sessions boasted the highest submission of abstracts for education sessions to date, with 37 papers and posters.

The Spitzer-TLRBSE teacher and student research program with the Spitzer Science Center (SSC) continues to mature, with the 12 participating TLRBSE teachers helping reduce and evaluate their data. NOAO astronomers S. Howell and J. Feldmeier continued to be active as astronomy mentors and research group leaders. Final discussions were conducted this quarter with SSC on extending the program with a second group of TLRBSE teachers, to begin additional observations with the Spitzer Space Telescope in the spring of 2006. The program was approved, and a new cadre of six TLRBSE teachers was selected and will start work at the AAS meeting in Washington, DC.

**Project ASTRO**

NOAO’s three ASTRO programs took off with a (big) bang last quarter. After the Family ASTRO training workshop (“Night Sky Adventures”) on October 1, participants tested their newly learned skills with the public and enjoyed viewing the night sky from the dark site location at Pima Community College West. The featured speaker, Dr. Richard Poss (Steward Observatory), spoke on the historical and cultural facets of Southwestern Native American archeo-astronomy.

The annual two-day Project ASTRO training workshop, in which astronomers are partnered with teachers new to the program, was held the following weekend in October at the University of Arizona. The ASTRO partners were trained in a dozen hands-on activities, mostly dealing with the solar system. High points of the two-day workshop included a talk by well-known comet hunter and author, David Levy, and a nighttime trip to KPNO.

ASTRO-Chile geared up for another exciting year of projects between the two hemispheres. Videoconferences were held to plan a remote sensing project between students in La Serena, Chile, and Tucson. Students will identify features in satellite images taken of the other location and act as “rovers,” taking pictures from the ground for students in the other location. The lab activity was written by NOAO Scientist Ron Probst.

A major highlight of the ASTRO-Chile program last quarter was the visit of NOAO outreach staff to La Serena in early December. NOAO’s C. Walker and Antonietta Garcia (Gemini Observatory) presented two bilingual Family ASTRO workshops for about 20 Chilean and Argentinean teachers and planetarium staff; one workshop dealt with the Moon, the other with the night sky.

**Hands-On Optics**

The NSF-sponsored Hands-On Optics (HOO) project at NOAO continued its re-planning efforts to centralize the project at NOAO. (Project Co-PI Stephen Pompea is now project director.) Hands-On Optics is creating six optics teaching kits and training science center educators and after-school program leaders nationwide. In this quarter, major training efforts
were conducted for Math, Engineering, and Science Achievement (MESA) educators from Arizona, Maryland, and Colorado.

- In October, Pompea gave an invited talk at the International Conference on Education and Training in Optics and Photonics in Marseilles, France, and Walker organized a special education session at the Optical Society of America (OSA) in Tucson.

Highlights of the OSA meeting included two invited talks: one during the meeting’s Forum on Education by Walker on Hands-on Optics, and another by Sara Armstrong from the George Lucas Educational Foundation on technology in science education programs. The evening boasted a tabletop demonstration session for teachers where optics professionals performed optics demonstrations for use in the classroom. Over the two days following Educators’ Day, Hands-on Optics staff held training sessions for 21 Arizona teachers on two of the program’s six optics modules.

HOO kits are also being used at New York Hall of Science in Queens, Flandrau Science Center in Tucson, Orlando Science Center, and Adventure Science Center in Nashville. Rob Sparks of NOAO continues to work and support trained museum educators at the Orlando Science and worked with them in November to augment the training he delivered in late September.

Astronomy from the Ground Up

- The new NSF-sponsored "Astronomy from the Ground Up" informal science education project with the Astronomical Society of the Pacific (ASP) and the Association of Science Technology Centers is planning the kickoff workshop, to be held in Tucson at the Arizona Sonora Desert Museum and Kitt Peak April 19-21, 2006. The project will provide professional development in astronomy for science centers nationwide and will also develop teaching kits in astronomy that are suitable for an informal science institution. Planning continues for this workshop as well as for the on-line version.

Investigating Astronomy

- The NSF-sponsored "Investigating Astronomy" instructional materials development project with TERC and the ASP has stabilized this quarter in its level of effort with S. Croft doing most of the work at NOAO. He has created or found a large number of astronomical images suitable for the new national high school, standards-based astronomy curriculum. NOAO continues to play a key role in the project in the choice of astronomical imagery, image processing tools, and other software tools used in this curriculum.

CATTS GK-12

- The NSF-funded Collaborative to Advance Teaching, Technology, and Science (CATTS) GK-12 project (UA and NOAO) remains highly productive in science education throughout Tucson. In particular, NOAO CATTS Fellows Erin Doktor and Janelle Bailey (both Ph.D. candidates in the Conceptual Astronomy and Physics Education Research [CAPER] Team at Steward Observatory) are working with the teachers throughout Tucson using high-quality activities from the ASP and the Lawrence Hall of Science Great Explorations in Math and Science (GEMS) program. In December, CATTS Co-PI Pompea participated in the selection of the new
cadre of CATTS Fellows for the entire program as well as the dozen projects that will be supported by these Fellows. Pompea is also active in defining further research and evaluation efforts for the CATTS program.

**Other Educational Outreach Activities**

- The LSST education and outreach project began in earnest this quarter with Steven Croft continuing his work on the development of a middle school asteroid project than can utilize LSST-type data. Pompea and Sparks also worked with Suzanne Jacoby and other LSST education team members on data requirements for LSST outreach, including a productive site visit to the American Museum of Natural History in New York.

- Katy Garmany and Arjun Dey (PI) submitted a successful educational proposal to NASA as part of the Hubble Cycle 14 observation process. This proposal is on understanding galaxies through the use of different parts of the electromagnetic spectrum. Tucson-based TLRBSE teacher Chris Martin will assist Garmany in the development of the educational activities.

- C. Walker and S. Pompea have been working with the Global Learning and Observations to Benefit the Environment (GLOBE) project, based at University Corporation for Atmospheric Research (UCAR) in Boulder, CO, on developing protocols for “GLOBE at Night,” a new project being added to the GLOBE portfolio. Meetings on this project were held at the American Geophysical Union (AGU) meeting in December. This educational campaign, scheduled for March 2006, will collect light pollution data worldwide through GLOBE schools and other interested educational groups.

A major partner on the Chilean side of this project is CADIAS (Centro de Apoyo a la Didáctica de La Astronomía) located in Altovalsol near La Serena. CADIAS is a new astronomy-oriented science center and light pollution education/research center which has evolved from long-term CTIO outreach efforts. The CADIAS director, David Orellana, has been active in the prototype light pollution activities being conducted over the last year in Tucson and Chile. NOAO PAEO managers conducted an intense review of NOAO outreach in Chile in early December and were very impressed with its potential.
3 TUCSON AND KITT PEAK SITE SAFETY REPORT

OSHA Recordable Occupational Injuries and Illnesses

- A Tucson shipping and receiving employee suffered a cut to his left hand while loading metal pails into a pickup in October. No professional medical treatment was needed. After investigation, gloves were purchased for this type of work. This case is considered a first aid case.

- In November, a Kitt Peak employee suffered a fall while walking to a vehicle after shift. Later, the employee was diagnosed with a broken bone in the right foot. This case is considered an OSHA recordable.

- Vandals threw a rock at the window in room 166 of the Tucson NOAO building on November 7; the window was repaired.

Safety and Health

- C. Gessner met with the NSO ATST team on October 3 to discuss safety requirements for the project. A draft safety and health table of contents, contractor quality management plan, and an environmental management plan were prepared and presented to the team. Work progresses with the NSO’s ATST “Contractor Safety Plan”, “Conditions for Working at the Site”, and “Contractor Pre-Bid Qualifications Form”; drafts will be submitted to the project team by January 4, 2006.

- Fifty-three more chapters of the new NOAO and NSO Risk Management Manual have been proofread and edited.

- A safety inspection was conducted for PAEO’s newly acquired Kitt Peak “Roll off Roof Telescope”.

- A risk management presentation was made at the October 10, 2005 Kitt Peak Tenants meeting.

- Jack Kennedy held his first CPR course in Tucson on November 10 with six GONG employees. After the first of the year, Jack will be prepared to schedule additional courses, including first aid for Kitt Peak and Tucson employees.

- A draft policy has been written for handling hazardous materials for observers using the NSO’s Kitt Peak FTS lab. A meeting is planned for December 2005 or January 2006 to finalize the policy.

- Third-party elevator inspections were conducted with Roger Chartand CESI at Kitt Peak on December 13 and NOAO headquarters on December 19, 2005.

- A risk management review and comments were made for a contract between PAEO and A&E for filming at Kitt Peak.
• The NOAO phone system was re-programmed so that 911 can be dialed directly without having to access an outside line first.

• Recommended first aid and medical supply items for the various GONG facilities to be provided to GONG staff.

• Ventilation information for the machine shop anodizing area was provided to CTIO staff.

**Fire Protection and Prevention**

• Fire alarm systems were inspected at Kitt Peak in November.

**Environmental**

• Three-hundred and fifty fluorescent light bulbs were sent for recycling in November.

**Insurance**

• Through a service from Marsh, AURA obtained kelleronline.com subscriptions for all the Centers’ safety personnel. This is a useful tool for code compliance and other risk management information.

• With the help of Leonor Opazo, we provided information to Marsh related to the La Serena swimming pool and other sport facilities. As a result, an endorsement was added to Cruz del Sur policy for our facilities in Chile. The endorsement amends the policy to include the swimming pool, tennis court, and squash court with no additional charge to the premium.

• WIYN now has improved insurance for instruments. This came about when WIYN staff wanted to insure an IR CCD that needed to be sent to STScI for testing. We received quotes for the transit insurance and found that an improved policy for all WIYN instruments was about the same cost. The WIYN board approved the change.

• Preparations are being made to supply information to Marsh for LSSTC’s general liability insurance that will expire in January 2006. After January, all LSSTC’s insurance activities will be coordinated by AURA and brokered by Marsh.

**Security**

• A list of recommendations was provided to CTIO to prevent any specialized equipment thefts.

• The La Quinta conference room was added to the Keyscan system. The door was programmed to allow meeting attendees to enter the room from 7:00 am to 5:00 pm.

• The Tucson list of key cards in the hands of non-NOAO employees (e.g., visitors and vendors) was updated; about half the cards were recovered; the unreturned ones were de-activated.