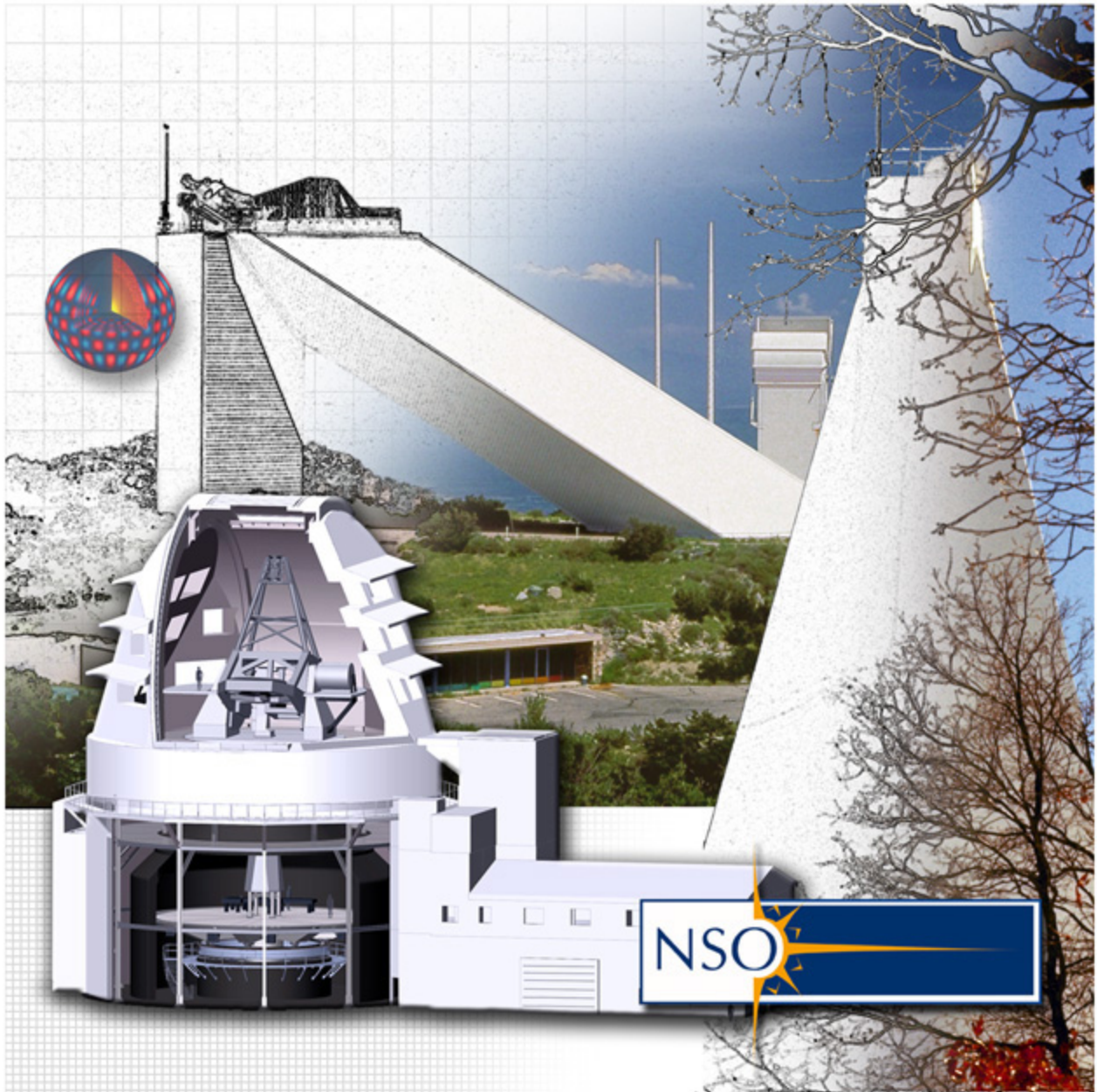


NATIONAL SOLAR OBSERVATORY



NSO Quarterly Report (3) FY 2004 April 1, 2004 – June 30, 2004

*Submitted to the National Science Foundation Under Cooperative Agreement No.
AST-0132798 (SPO No. 2)
August 24, 2004*

Also published on the NSO Web site: <http://www.nso.edu>



*NSO is operated by the Association of Universities for Research in Astronomy
under a cooperative agreement with the National Science Foundation*



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This report consists of summary statistics and other data on NSO observing programs and telescope usage, and a safety report for the fiscal quarter ended June 30, 2004. Quarterly highlights of public and educational outreach activities are also described. The appendix contains a comprehensive list of principal investigators and collaborators, program titles, telescopes used, and observing hours associated with the quarter's observing programs.

Scientific highlights and current updates on NSO initiatives, new capabilities, instrumentation, and operational activities are published separately in the quarterly *NOAO-NSO Newsletter*.

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I. Observing Programs*

31 observing programs were carried out at NSO this quarter, four of which were thesis programs involving three graduate students. A comprehensive list of PI's, Co-I's, and collaborators, as well as program titles, telescopes used, and observing hours associated with the quarter's observing programs is attached as the Appendix.

NSO Observing Programs by Type (US vs Foreign)		
12 Months Ending Jun-2004		Nbr % Total
Programs (US)	25	81%
Programs (non-US)	2	6%
Thesis (US)	4	13%
Thesis (non-US)	0	0%
Total Number of Unique Science Projects*	31	100%

*Includes observing programs conducted by NSO/NOAO staff scientists.

Users of NSO Facilities by Category					
	Visitors				NSO/NOAO Staff
	US	Non-US	Total	% Total	
PhDs	24	5	29	85%	17
Graduate Students	3	0	3	9%	-
Other (Research Tech.)	0	2	2	6%	7
Total Users	27	7	34	100%	24

Institutions Represented by Visiting Users**					
	US	Non-US	Total	% Total	
Academic	6	2	8	50%	
Non-Academic	6	2	8	50%	
Total Academic & Non-Academic	12	4	16	100%	

**Note: Total number of institutions represented by users do not include departments or divisions within an institution as separate entities (e.g., US Air Force and NASA are each counted as one institution even though several different sites/bases/centers are separately listed in the data base).

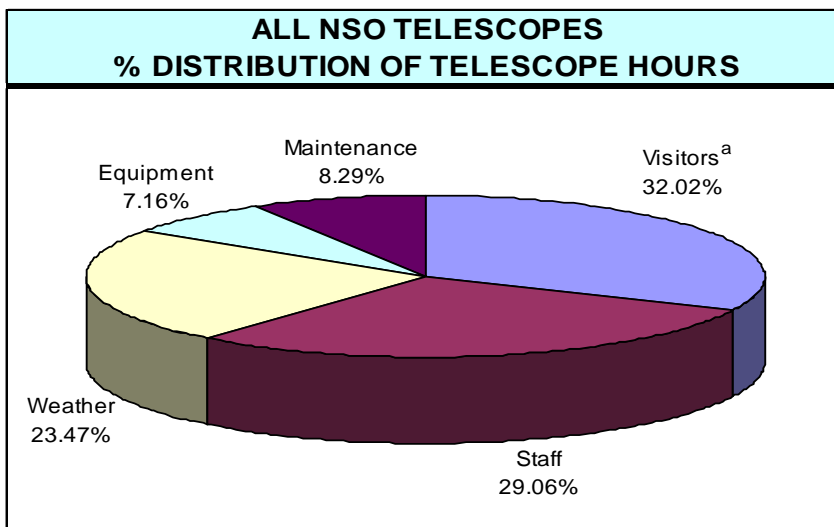
INSTITUTIONS REPRESENTED BY USERS
Foreign Institutions (4)
European Southern Observatory
INAF - Arcetri Astrophysical Observatory
Max-Planck-Institut fur Aeronomie
University of Florence
US Institutions (12)
California State University, Northridge
College of William & Mary
Colorado Research Associates
NASA Jet Propulsion Laboratory
NASA/Goddard Space Flight Center
NASA/Langley Research Center
NASA/Marshall Space Flight Center
NCAR/High Altitude Observatory
New Jersey Institute of Technology
Southwest Research Institute, San Antonio
Space Telescope Science Institute
University of Arizona
University of Washington
University of Wisconsin, Madison
US Air Force/Philips Lab (USAF/PL/GSS)

Number of Users by Nationality			
Chile	2	Italy	4
Germany	1	United States	51

II. Telescope Usage and Performance Data

In the quarter that ended June 30, 2004, 32.02% of total available telescope hours at NSO/Sacramento Peak and NSO/Kitt Peak went to the observing programs of visiting principal investigators and synoptic programs; 29.06% were devoted to the programs of NSO and NOAO scientists. Scheduled maintenance, including instrument tests, engineering, and equipment changes, accounted for 8.29% of total allotted telescope hours.

Total “downtime” (hours lost to weather and equipment problems) for NSO telescopes was 30.63%. Almost all of these lost observing hours were due to bad weather (23.47%), with 7.16% lost to equipment problems.



NSO TELESCOPES Percent Distribution of Telescope Hours (Scheduled vs. Downtime) April - June 2004						
Telescope	Hours Available	% Hours Used By:		% Hours Lost To:		% Hrs. Lost To: Scheduled Maintenance
		Visitors ^a	Staff	Weather	Equipment	
Dunn Solar Telescope/SP	1,032.0	21.0%	47.6%	21.5%	4.6%	5.3%
McMath-Pierce*	1,099.0	37.1%	37.7%	19.7%	5.6%	0.0%
KP Vacuum Telescope ^b	0.0	0.0%	0.0%	0.0%	0.0%	0.0%
FTS Lab*	380.0	5.3%	5.3%	0.0%	26.3%	63.2%
Evans Facility	275.5	6.9%	39.9%	47.4%	5.8%	0.0%
Hilltop Dome	774.0	61.5%	0.0%	34.5%	4.0%	0.0%
All Telescopes	3,560.5	32.0%	29.1%	23.5%	7.2%	8.3%

^aIncludes synoptic programs for which all data are made available immediately to the public and the scientific community at large.

^bThe KPVT was closed on September 22, 2003 to prepare for SOLIS. The KPVT will become the Kitt Peak SOLIS Tower (KPST).

*Totals include both day and night hours. (All others are day only.)

III. User Statistics – Archives/Data Bases

A. NSO/Sacramento Peak (NSO/SP)

Combined User Demographics (NSO/SP)		
Demographic Group	Requests	Traffic
U.S. Science (.gov, .edu, .mil)	9.0%	5.6%
Other U.S. (.com, .net, misc.)	67.8%	74.9%
Foreign	20.3%	17.6%
Unresolved	2.9%	1.9%

NOTE: Sac Peak statistics exclude the use of NSO archives and data bases from within the NSO/SP Local Area Network (LAN), from the NSO/Tucson LAN, and from NOAO as a whole.

FTP Archive Statistics

There were 209,619 successful user requests, serving 1,348 distinct files to 7,098 distinct hosts. A total of 21.900 Gbytes were served, averaging 246.446 Mbytes per day.

FTP User Demographics (NSO/SP)		
Demographic Group	Requests	Traffic
U.S. Science (.gov, .edu, .mil)	8.4%	4.1%
Other U.S. (.com, .net, misc.)	72.5%	81.1%
Foreign	17.6%	14.0%
Unresolved	1.6%	0.8%

FTP Products (NSO/SP)		
Demographic Group	Requests	Traffic
Realtime Images	31.1%	63.3%
Corona Maps	65.9%	24.9%
Sunspot Numbers	0.8%	0.2%
Staff Outgoing	1.6%	11.3%
Other	0.6%	0.3%

World Wide Web Statistics

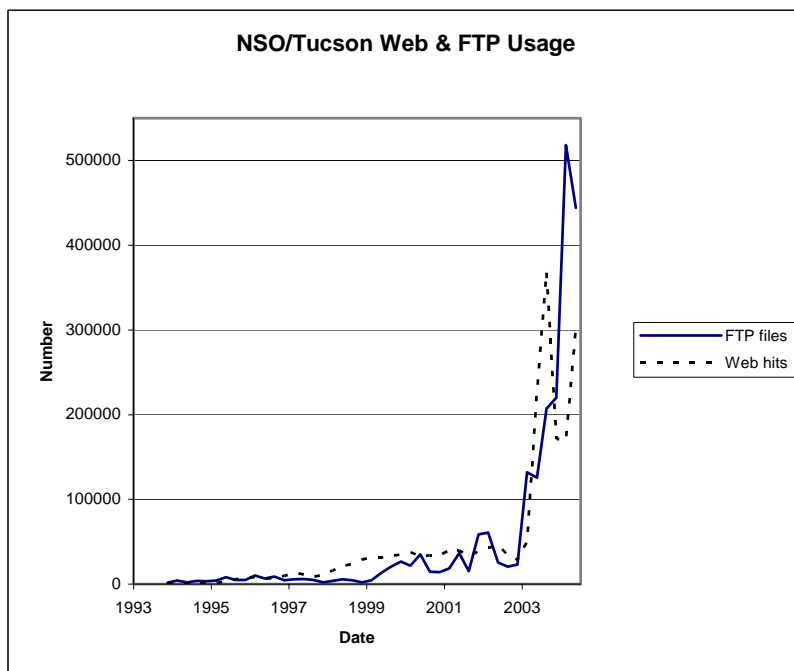
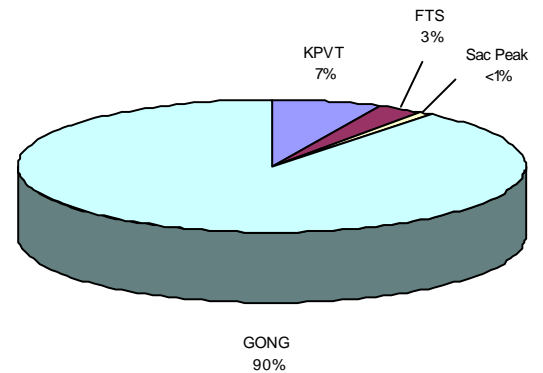
There were 966,453 successful user requests, serving 21,167 distinct files to 70,360 distinct hosts. A total of 14.307 Gbytes were served, averaging 160.995 Mbytes per day.

WWW User Demographics (NSO/SP)		
Demographic Group	Requests	Traffic
U.S. Science (.gov, .edu, .mil)	9.2%	8.0%
Other U.S. (.com, .net, misc.)	66.8%	65.5%
Foreign	20.9%	23.0%
Unresolved	3.2%	3.6%

WWW Products (NSO/SP)		
Demographic Group	Requests	Traffic
Realtime Images and Movies	10.2%	20.1%
Other Images	2.5%	15.0%
General Icon and Background Images	28.9%	9.3%
Public Relations Pages	15.0%	16.0%
Press Releases	1.5%	4.4%
Telescope Home Pages	12.4%	8.0%
ISOON	1.7%	0.8%
Adaptive Optics Pages	0.9%	3.2%
General Information	9.6%	7.8%
Staff Pages	2.5%	6.0%
Other	14.8%	9.4%

B. NSO/Tucson

- Most recent complete quarter (01 April – 30 June 2004)
 1. 472 FTP users
 2. 37,870 FTP logins
 3. 444,455 files downloaded via anonymous FTP
 4. 301,412 Web page hits (not counting in-line images)
 5. 2,633,348 Web page hits including in-line images
- Distribution of downloaded data products by number of files for the most recent complete quarter:
 1. 7% KPVT (magnetograms, synoptic maps, helium images).
 2. 3% FTS (spectral atlases, general archive).
 3. <1% Sac Peak spectroheliograms (H α , Calcium K images).
 4. 90% GONG (magnetograms, spectra, time series, frequencies).



Note: All statistics are for NSO/Tucson archive usage by non-NSO and non-NOAO personnel. The numbers do not include NSO/Sunspot.

IV. Public and Educational Outreach Activities

NSO public and educational outreach encompasses activities at the Sunspot Astronomy and Visitor Center, including the Visitor Center's retail operations, educational exhibits, and NSO/Sac Peak tours; tours of the NSO/Kitt Peak facilities; Web site outreach, including public information requests; scientific press and media relations; and staff involvement in programs to enhance science education in grades K–12, as well as higher education. Highlights for this quarter follow.

A. Educational Outreach

1. *Research Experiences for Undergraduates (REU), Research Experiences for Teachers (RET), and Summer Research Assistantship (SRA) Programs*

The NSO 2004 Summer Outreach Program supported 6 undergraduates and 4 high school teachers under the NSF-funded Research Experiences for Undergraduates (REU) and Research Experience for Teachers (RET) program, respectively; 4 undergraduate research assistants under NSO grant-funded and the US Air Force undergraduate research programs; and 4 graduate students under the NSO summer graduate program.

2. *Teacher Leaders in Research Based Science Education (TLRBSE) and Project ASTRO*

On June 23-27, Claude Plymate, Matt Penn, Frank Hill and Carl Henney, in collaboration with Connie Walker (NOAO), worked with a group of five high school teachers on an observing run at the McMath-Pierce Solar Telescope as part of a continuing solar research program for TLRBSE teachers and students on infrared spectroscopy (measurements for magnetic field strength and Evershed flow) toward active regions. Publications on the results of observations are planned for submission to the on-line journal, *The Astronomical Education Review*, as well as to popular astronomy journals, and the *RBSE Journal* produced by NOAO's outreach department. Three of NSO's summer 2004 REU students also assisted in this observing run for the observing experience and an opportunity to interact with the teacher participants.

As part of Project ASTRO this quarter, Irene Gonzalez-Hernández and Kerri Donaldson-Hanna worked with 3rd graders at Esperanza Elementary School in South Tucson, and Rudi Komm worked with teacher John Corrin at the Arizona State School for the Deaf and Blind.

4. *Other Educational Outreach*

On April 23, Mark Giampapa gave a presentation on the Sun, our solar system and stars to a kindergarten class at Fruchthendler Elementary School in Tucson.

Beginning in June, Dave Dooling spent two days a week for two months mentoring a 10th-grade student from Los Alamos, Billy Casson, who has an interest in science and was in summer training with the New Mexico Commission for the Blind in Alamogordo.

Allentown High School (New Jersey) teacher Linda Stefaniak, who was a summer 2003 participant in the NSO Research Experience for Teachers (RET) program, along with Punahou School (Hawaii) teacher Michael Gearen and longtime NSO partner-in-residence Harry Jones (NASA/GSFC), presented a joint NSO-NASA-NOAO one-hour workshop on "Data and Activities for Solar Learning (DASL)" at the National Convention of the National Science Teachers Association (NSTA) in Atlanta, April 1-4. DASL provides a classroom learning environment based on 25-years of NSO data/images of solar magnetic activity. The data can be used to learn about the Sun and astronomy at the middle school level, involves exercises emphasizing

data and error analysis at the high school level, and offers an opportunity to participate in the Researching Active Solar Longitudes (RASL) Project, a high-school level educational/research module (developed within the NSO RET and NOAO RBSE programs) that improves computer and analytical skills and contributes new scientific results to solar astronomy and physics. Teachers participating in the workshop were provided with a 60-page workbook with DASL lessons and RASL resources and recipes, and a DASL Solar Data CD-ROM. Jackie Diehl and Dave Dooling also attended the National Science Teachers Association Conference. They made extensive contacts and collected new ideas for education activities.

At the request of the Director of SuccessLink Science, a state grant that works with science for school districts in the State of Missouri, NSO provided 130 DASL CD-ROMs for distribution to grades pre-K-12 science teachers at the SuccessLink's Summer 2004 Institute on July 12 and 13. SuccessLink downloaded the workbook that accompanies the CD-ROM from the NSO DASL Web site.

B. Public Outreach

1. Sunspot Visitor Center

Sunspot Astronomy & Visitor Center	
Summary of Visitors and Tours	
(3 Months Ending 06/30/04)	
<i>Group/Program</i>	<i>No. of Visitors</i>
General Public Tours (Visits to Center and Self-Guided Tours)	5,000
Guided Public Tours:	
- School Groups K-12	721
- Special Tours*	227
Total Visitors	5,948

*Special Sac Peak facility tours were conducted for the following groups: Texas Tech University (30); an astronomy class from New Mexico State University, Alamogordo (24); Society of Physics students from the University of Texas, El Paso (8); International Heliospherical Year Planning Conference participants (60); Amarillo College MS teachers (28); Cloudcroft Church of Christ Ladies Group (10); Alamogordo Astronomy Club (12); US Department of Commerce Science & Technology Fellowship (ComSci) Program (15); the Astrophysical Research Consortium's 3.5-meter Telescope 10th Anniversary Program participants (40).

2. Other Public Outreach

A new effort during this quarter was planning for a community solar system centered on the Sunspot Astronomy and Visitor Center. Community solar systems, often erected by planetariums, museums, and astronomy clubs, are composed of scale models of the planets placed at the appropriate scale distances. Often these span many miles and thus draw significant public attention to solar system studies. The plan envisioned by NSO would have the Sun (16 feet in diameter) at Sunspot, and signs representing the planets placed along the Sunspot Scenic Byway. Pluto would be in Cloudcroft, 16 miles away and a town seeking additional

tourism attractions. Signs would be used to avoid causing traffic hazards on the narrow highway. Scale models of the planets would be at Sunspot and at partner locations. Agencies solicited as partners include the Cloudcroft Chamber of Commerce (Pluto), Space Museum in Alamogordo (Neptune), and the Las Cruces Museum of Natural History (trans-Neptunian objects).

Tony Spence represented NSO at a Career Expo at New Mexico State University on April 7. The table display was utilized to familiarize graduating students with Career opportunities at NSO.

On April 19, Claude Plymate presented a talk to a group of twelve Kitt Peak docents on “McMath-Pierce IR AO, or McMath-Pierce Active Guiding and Image Correction (MAGIC).”

Dave Dooling represented NSO at the semi-annual meeting of the Southwestern Consortium of Observatories for Public Education (SCOPE) at Mt. Hopkins, April 16. He also represented NSO at Astronomy Day, April 24, at the Las Cruces (New Mexico) Museum of Natural History. NSO provided an 8-inch telescope with filter, plus a TLRBSE solar imager and another safe solar telescope for public observing.

At the Kitt Peak sponsored open house for members of the Tohono O’odham Nation on April 24, Bill Livingston and Claude Plymate were available at the McMath-Pierce Solar Telescope Facility and Kitt Peak Vacuum Telescope to answer questions about the solar facilities and why Kitt Peak is special for solar research.

NSO hosted the planning workshop for the 2007 International Heliophysical Year (IHY) at Sunspot, New Mexico, on April 20-22. Approximately 60 researchers from several communities, including solar, interplanetary, magnetospheric, ionospheric, atmospheric, and climate, participated in the workshop.

On May 22, Jackie Diehl presented a lecture/tour of NSO facilities and an update on ATST to the Alamogordo Astronomy Club.

May 28, Jackie Diehl staffed a telescope at a star party held in honor of the 10th Anniversary of the Astrophysical Research Consortium’s Apache Point Observatory 3.5-Meter Telescope Celebration.

On May 30-June 3, 19 NSO staff and 2 NSO/REU students attended the 35th Solar Physics Division (SPD) meeting of the American Astronomical Society in Denver, Colorado. Seventeen poster papers and six talks were presented by NSO staff and resident partners; eight other posters were co-authored by NSO staff. Five of the NSO posters involved NSO REU or RET program participants:

- “Acoustic Power Maps of High Spatial Resolution Sunspot Data,” Victoria Astley (2003 REU student; first author, present at meeting).
- “IR Vector Magnetic Fields I: Instrumental Polarization Correction,” Sarah Jaeggli (2003 REU student; first author, present at meeting).
- “IR Vector Magnetic Fields II: Atomic and Molecular Line Polarization in a Sunspot,” Sarah Jaeggli (2004 REU) and Jose Ceja (2000 REU) co-authors among five authors.
- “DASL – Data and Activities for Solar Learning,” Travis Stagg (2002-2003 RET teacher) co-author among five authors.
- “Extragalactic Variable Objects in GNAT Image Archives,” Adam Kraus (2002 REU) co-author among five authors.

NSO was an exhibitor at the SPD-Denver meeting, with two booths featuring poster displays and handouts on the Observatory’s flagship facilities and major projects. At the Undergraduate Orientation on May 30, and for a special session on Education at the Denver meeting, NSO also posted a 4-foot-by-8-foot poster with

detailed information about our educational and public outreach programs entitled “Synergy of Solar Physics Research and EPO Programs – Linking Students and the Public with Exploration of the Sun.”

During the Venus Transit on June 8, GONG provided real-time imaging of the transit (via the Internet) from three of its six sites, Learmonth, Australia, Udaipur, India, and El Teide, Canary Islands, Spain. After the transit, the GONG team prepared and distributed an educational CD-ROM with raw transit images taken every minute for a total of more than 300 images. Students can learn the triangulation method, which is outlined in the CD, and how to measure Earth-Sun distance from planetary transits.

Joel Mozer gave a public lecture on space weather at the Lodestar Planetarium in Albuquerque on June 21.

C. Media and Public Information

1. Press Releases and Image Releases

Several press releases were issued in conjunction with the AAS/SPD Denver meeting. These include:

AAS Press Releases:

- May 31, 2004: Combined Optical Techniques Confirm Magnetic Shear in Sunspot Motion (Adaptive Optics (AO) story, with New Jersey Institute of Technology (NJIT))
http://www.nso.edu/press/AAS_0604/AAS04_NJIT1.html
- May 31, 2004: New Instrument Makes Highest-Resolution Magnetic Measurements inside a Sunspot (AO, Diffraction-Limited Spectro-Polarimeter (DLSP) story)
http://www.nso.edu/press/AAS_0604/AAS04_DLSP.html
- May 31, 2004: New Eyes on Old Telescope Provide Insight into Solar Storm (AO story)
http://www.nso.edu/press/AAS_0604/AAS04_AO76.html
- June 1, 2004: Infrared Camera Peeks below the Visible Surface of the Sun (AO story, with NJIT)
http://www.nso.edu/press/AAS_0604/AAS04_NJIT2.html
- June 3, 2004: Site Survey for World's Largest Optical Solar Telescope (ATST) Passes Midpoint
http://www.nso.edu/press/AAS_0604/AAS04_sitesurvey.html
- June 3, 2004: ATST Design Update http://www.nso.edu/press/AAS_0604/AAS04_ATST_update.html

Other Press Releases:

- April 15, 2004: Scientists to Plan International Heliophysical Year (IHY) (Advance note on April 20-22 IHY workshop) <http://www.nso.edu/press/ihy2004.html>
- May 28, 2004: Modern Solar Telescope Network's View of Venus Passage Will Help Students Use Web to Recall Historical Era http://www.nso.edu/press/venus_transit/venus04-eo.html

2. Special Information Products

In addition to posters and handouts produced for the AAS-SPD Denver meeting, and for the AURA Board and Member Representatives Open House on April 29 in Annapolis, a fact sheet and Web story were prepared for the June 8 transit of Venus (http://gong.nso.edu/venus2004/gong_venus.pdf).

3. Web-based Outreach

Eight Web stories posted (see C.1 Press Releases and Image Releases, above).

V. Safety Report

A. OSHA Recordable Occupational Injuries and Illnesses

- A Sac Peak employee claimed a neck strain while moving a large cabinet and drawers. This case is an OSHA recordable due to required physicians visit and follow-up.
- A Sac Peak employee claimed a twisted left knee while kneeling to cut tar paper on a roof job. This case is an OSHA recordable due to physicians visit, lost time and modified work plan.

B. Safety and Health

- The transportation and installation of the NSO SOLIS mount and vector spectromagnetograph from Tucson to Kitt Peak was safely completed in April without injury or property damage. In preparation for the move, a safety and health action plan was developed, an insurance policy for the movement of the instrument was procured, fall protection equipment training was provided, additional fall protection equipment was procured, critical lift plans were established, oversight during the lifting of the mount and other equipment by a contractor and consistent safety oversight was provided.
- Two Sac Peak employees attended the New Mexico State annual meeting of Emergency Medical Technicians in Albuquerque in July.
- Twelve Kitt Peak employees attended the American Heart First aid, CPR and AED training on April 6. This year, to date, forty-five Kitt Peak employees have been First Aid, CPR and AED use certified.
- This quarter, seventeen Tucson employees attended the American Red Cross CPR recertification.
- Kitt Peak facilities staff participated in three safety training sessions, lockout tag out, safety action plans and fire protection.
- The Arizona Industrial Commission Elevator Section informed NOAO/NSO that they will no longer perform elevator inspections at Kitt Peak and Tucson due to lack of jurisdiction and enforcement authority over federally owned facilities. Routine contracted maintenance continues. NOAO/NSO contracted with a certified elevator inspector that inspects federally owned elevators in Arizona. The inspector visited Tucson and Kitt Peak elevators and lifts on June 21, 22 and 23. The elevator inspector submitted critical recommendations for all the lifts in Tucson. The Instrument shop and Optics shop lifts would require major renovations to qualify for special purpose passenger lifts or modification to dumbwaiters. After internal discussions with CFO staff and the affected parties, we concluded that we could not justify the expense of modification. We are working together to identify alternative solutions. The service yard lift will remain a material lift and the basement lift will require modification. Kitt Peak elevators were issued certificates, however there are items that will require further analysis and correction.

C. Fire Protection and Prevention

- On June 15, the Sunspot Volunteer Fire Department was put on alert due to a fire southwest of Sacramento Peak that was in a particularly dangerous location for the Observatory due to prevailing winds. The fire was extinguished by dusk and the department was deactivated.
- Kitt Peak staff practiced the use of the foam machine in preparation for the fire season during the month of May.
- KPNO staff provided information to Applied Eco System MGT Inc., which is conducting the environmental assessment for the (BIA) Wildland/Urban Interface Fire Mitigation Plan.
- The Kitt Peak Emergency Manual was revised and re-distributed a result of staff changes and new telephone and pager numbers.
- The annual meeting with the Tohono O'odham Nation Department of Public Safety (DPS) and Kitt Peak Staff Annual Meeting was held on June 29 and was well attended by both parties. Some of the agenda topics included updating emergency contacts and procedures, fire mitigation and other emergency response issues. The Bureau of Indian Affairs (BIA) Wildland/Urban Interface Fire Mitigation Plan will be delayed but the Tohono O'odham Nation Department of Public Safety has received funds for the work, which includes Kitt Peak. At the close of the meeting, acting Director of Tohono O'odham Nation DPS, Craig Encinas, made a thoughtful closing remark and thanked us for our continued cooperation and interest in Tohono O'odham Nation Emergency Services.

D. Environmental

- Major renovation of the sewer plant at Sacramento Peak (Sac Peak) was undertaken with the assistance of a consultant with the Water Utilities Technical Assistance Program with a goal of re-permitting the plant next summer. Renovation included replacement of recirculation pumps (done), pumping all solids and most of the water out (done), cleaning primary and secondary clarifiers (done), replacing the bar screen (done), repairing walkways (done), painting (done), replacing the chlorine gas system (done), initiating testing protocol (done), re-engineering and rebuilding the trickling filter arm, replacing the trickling filter media, and writing operational procedures.
- Two facilities maintenance employees at Sac Peak attended training on wastewater plant operation.
- The NOAO Risk Management Specialist worked with GONG personnel during the renovation of room B-14 to dispose of chemicals and consulted on the proper storage of hazardous chemicals.
- Sixty pounds of hazardous waste were properly disposed of in June.

Risk Management services at NSO/Kitt Peak and Tucson are shared with NOAO. See also the "Tucson and Kitt Peak Safety Report" section of the NOAO April - June 2004 Quarterly Report for additional details on risk management activities.

APPENDIX
National Solar Observatory

01 April - 30 June 2004

April - June 2004: During this period, 31 observing programs, 4 of which were thesis programs involving 3 graduate students, were carried out at the National Solar Observatory. Graduate and undergraduate students are indicated by (T) for thesis students, (G) for non-thesis graduate students, (UT) for undergraduate thesis students; and (U) for undergraduate students. (RET) and (TLRBSE) identify middle and high school teachers who are Research Experience for Teachers and Teacher Leaders in Research Based Science Education program participants.

		Nights	Days	Hours
8		0.0	30.0	240.0
Michael Dulick	National Solar Observatory			
 <i>FTS Beamsplitter Changes; System Maintenance</i>				
McMP	FTS Lab			
1222		0.0	9.0	144.0
Curtis Rinsland	NASA Langley Research Center			
 <i>Monitoring of Long-Term Trends in the Concentrations of Atmospheric Gases from McMath FTS Solar Spectra</i>				
McPE	FTS/Mc-P			
1661		0.0	4.0	0.0
Linda Brown	Jet Propulsion Laboratory			
Miller	Jet Propulsion Laboratory			
Benner	College of William and Mary			
di Como	Jet Propulsion Laboratory			
Toth	Jet Propulsion Laboratory			
 <i>Laboratory Infrared Spectroscopy</i>				
McMP	FTS Lab			
1854		0.0	5.0	30.0
William Livingston	National Solar Observatory			
 <i>Line Asymmetry Changes in the Solar Irradiance Spectrum</i>				
McMP	FTS/Mc-P			
1858		0.0	10.0	20.0
William Livingston	National Solar Observatory			
Calhoun (RET)	Sabino High School			
 <i>Cycle Variability of the Solar Spectrum</i>				
McMP	Main spectrograph			

		Nights	Days	Hours
1886		0.0	3.0	0.0
Robert Toth	Jet Propulsion Laboratory			
<i>Laboratory Spectroscopy</i>				
McMP	FTS Lab			
2030		10.0	0.0	85.0
Ronald Oliverson	NASA/Goddard Space Flight Center			
Morgenthaler	NASA Goddard Space Flight Center			
Lupie	Space Telescope Science Institute			
Scherb	University of Wisconsin, Madison			
Neef (T)	University of Washington			
<i>Io As a Probe of the Plasma Torus</i>				
McMP	Stellar spectrograph			
2127		0.0	16.9	72.0
Richard Altrock	USAF Research Laboratory			
<i>Three-Line Coronal Photometer</i>				
Evans Facility	Sac Peak			
2128		0.0	12.5	38.0
Simon Worden	University of Arizona			
Keil	National Solar Observatory			
<i>Ca K Solar Rotation</i>				
Evans Facility	Sac Peak			
2149		0.0	91.0	476.0
Archives	National Solar Observatory			
<i>Flare Patrol: Daily/Community</i>				
Hilltop Dome	Sac Peak			
2193		0.0	3.0	19.0
Richard Altrock	USAF Research Laboratory			
Elrod	National Solar Observatory			
<i>Calibration of Coronal Photometer</i>				
Evans Facility	Sac Peak			

		Nights	Days	Hours
2292		0.0	5.0	40.0
Claude Plymate	National Solar Observatory			
<i>Infrared Spectral Imaging at the McMath-Pierce Solar Telescope</i>				
McMP	Main spectrograph			
2335		0.0	2.0	0.0
Gaspare Lo Curto	European Southern Observatory			
Gilliotte	European Southern Observatory			
<i>Calibration of Iodine Cells for High Accuracy Radial Velocity Planet Search (HARPS) Spectrograph</i>				
McMP	FTS Lab			
2360		0.0	5.0	76.0
Stephen Pompea	National Optical Astronomy Observatory			
Walker	National Optical Astronomy Observatory			
Croft	National Optical Astronomy Observatory			
McCarthy	University of Arizona, Steward Observatory			
Plymate	National Solar Observatory			
<i>Teacher Leaders in Research Based Science Education (TLRBSE) Zeeman Splitting Project</i>				
McMP	Main spectrograph			
2367n		14.0	0.0	90.0
Andrew Potter	National Solar Observatory			
Plymate	National Solar Observatory			
Killen	Southwest Research Institute			
<i>Adaptive Optics for Planetary Observations at the McMath-Pierce Telescope</i>				
McMP	Main spectrograph			
2367		0.0	14.0	108.0
Andrew Potter	National Solar Observatory			
Plymate	National Solar Observatory			
Killen	Southwest Research Institute			
<i>Adaptive Optics for Planetary Observations at the McMath-Pierce Telescope</i>				
McMP	Main spectrograph			

		Nights	Days	Hours
2368		0.0	15.0	129.0
Sankarasubramanian	National Solar Observatory			
Gullixson	National Solar Observatory			
Rimmele	National Solar Observatory			
Hegwer	National Solar Observatory			
Lites	High Altitude Observatory, UCAR			
<i>Diffraction-Limited Spectro-Polarimeter (DLSP) Phase II Engineering</i>				
Dunn Solar Telescope/SP Sac Peak				
2375		0.0	5.0	30.0
Constance Walker	National Optical Astronomy Observatory			
Plymate	National Solar Observatory			
Hill	National Solar Observatory			
Keller	National Solar Observatory			
TLRBSE Teachers				
<i>Understanding the Morphology of Active Regions: Using Zeeman-Split IR Lines to Determine Magnetic Field Strengths of</i>				
McMP Main spectrograph				
2377		0.0	11.0	80.0
Krishna Balasubramaniam	National Solar Observatory			
Uitenbroek	National Solar Observatory			
<i>High Spatial Resolution G-Band Polarimetry Using High-Order Adaptive Optics</i>				
Dunn Solar Telescope/SP Sac Peak				
2378		0.0	11.6	108.0
Maud Langlois	New Jersey Institute of Technology			
Moretto	National Solar Observatory			
Rimmele	National Solar Observatory			
Hegwer	National Solar Observatory			
Richards	National Solar Observatory			
<i>Multi-Conjugate Adaptive Optics Development</i>				
Dunn Solar Telescope/SP Sac Peak				
2380		0.0	6.5	76.0
Sankarasubramanian	National Solar Observatory			
Gullixson	National Solar Observatory			
Rimmele	National Solar Observatory			
Hegwer	National Solar Observatory			
<i>Diffraction-Limited Spectro-Polarimeter (DLSP) Science</i>				
Dunn Solar Telescope/SP Sac Peak				

		Nights	Days	Hours
2390		14.0	0.0	112.0
Ronald Oliverson	NASA/Goddard Space Flight Center			
Harris	University of Wisconsin, Madison			
Mierkiewicz	University of Wisconsin-Madison, Dept. of Atmospheric & Oceanic Science			
Roesler	University of Wisconsin			
Corliss (T)	University of Wisconsin, Madison			
<i>High Spectral Resolution Observation of Comet Neat/Q4</i>				
McMP Main spectrograph				
2391		0.0	10.0	61.0
Debi Prasad Choudhary	NASA/Marshall Space Flight Center			
Penn	National Solar Observatory			
<i>Three-Dimensional Structure of the Magnetic Field of the Solar Atmosphere</i>				
McMP Spectromagnetograph				
2392		0.0	5.0	20.0
Matthew Penn	National Solar Observatory			
Walton	California State University, Northridge			
Chapman	California State University, Northridge			
<i>High-Resolution He 1083 nm Imaging</i>				
McMP Main spectrograph				
2394		0.0	7.1	33.0
Martin Woodard	Colorado Research Associates			
Rimmele	National Solar Observatory			
Reardon	INAF - Arcetri Astrophysical Observatory			
<i>Small-Scale Acoustic Energy Generation in the Solar Photosphere</i>				
Dunn Solar Telescope/SP Sac Peak				
2397		0.0	0.4	0.0
Thomas Rimmele	National Solar Observatory			
Richards	National Solar Observatory			
Marino (T)	New Jersey Institute of Technology			
<i>Low Order Adaptive Optics (LOAO) Upgrade (PSF Estimation)</i>				
Dunn Solar Telescope/SP Sac Peak				

		Nights	Days	Hours
2398		0.0	2.0	20.0
Lloyd Wallace	National Optical Astronomy Observatory			
Hinkle	National Optical Astronomy Observatory			
<i>Air Mass Scanning</i>				
FTS Lab				
2402		0.0	14.0	79.0
Steve Hegwer	National Solar Observatory			
Spence	National Solar Observatory			
Gilliam	National Solar Observatory			
<i>DST Engineering/Camera Upgrade</i>				
Dunn Solar Telescope/SP Sac Peak				
2403		0.0	8.9	62.0
Jose Marino (T)	New Jersey Institute of Technology			
Rimmele	National Solar Observatory			
<i>PSF Estimation from Wavefront Sensor Data</i>				
Dunn Solar Telescope/SP Sac Peak				
2404		0.0	6.4	48.0
Luca Teriaca	Max-Planck-Institut fur Aeronomie			
Reardon	INAF - Arcetri Astrophysical Observatory			
Cauzzi	Osservatorio Astrofisico di Arcetri			
Falciani	Dipartimento de Astronomia, Universita di Firenze			
Falchi	Osservatorio Astrofisico di Arcetri			
<i>Chromospheric Counterparts of Transition Region Explosive Events</i>				
Dunn Solar Telescope/SP Sac Peak				
2405		0.0	10.0	93.0
David Elmore	High Altitude Observatory			
Socas-Navarro	High Altitude Observatory, UCAR			
<i>Spectro-Polarimeter for Infrared and Optical Regions (SPINOR) Visible Camera & Optics Demonstration</i>				
Dunn Solar Telescope/SP Sac Peak				