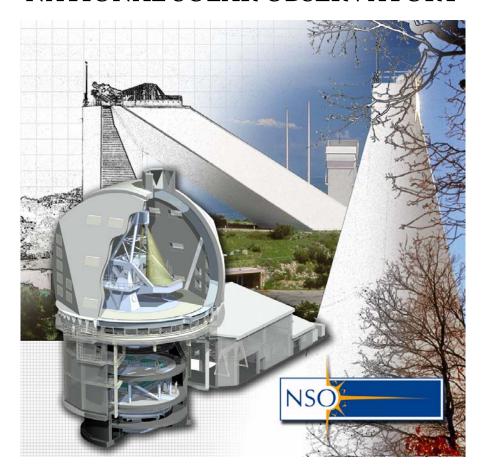
# NATIONAL SOLAR OBSERVATORY



# NSO Quarterly Report (1) FY 2005 October 1, 2004 – December 31, 2004

Submitted to the National Science Foundation Under Cooperative Agreement No. AST-0132798 Scientific Program Order No. 2

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





# National Solar Observatory

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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 December 31, 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\*

19 observing programs were carried out at NSO this quarter, one of which was a thesis program involving one graduate student. A comprehensive list of PI's, Co-Is, 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)				
3 Months Ending Dec-2004	Nbr	% Total		
Programs (US)	14	74%		
Programs (non-US)	4	21%		
Thesis (US)	1	5%		
Thesis (non-US)	0	0%		
Total Number of Unique Science Projects*	19	100%		

<sup>\*</sup>Includes observing programs conducted by NSO/NOAO staff scientists.

Users of NSO Facilities by Category					
		Vis	NSO/NOAO Staff		
	US	Non-US	Total	% Total	
PhDs	15	8	23	85%	12
Graduate Students	1	0	1	4%	-
Undergraduate Students	0	0	0	0%	-
Other	2	1	3	11%	4
Total Users	18	9	27	100%	16

Institutions Represented by Visiting Users**					
	US	Non-US	Total	% Total	
Academic	3	4	7	50%	
Non-Academic	4	3	7	50%	
Total Academic & Non-Academic	7	7	14	100%	

<sup>\*\*</sup>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).

# Foreign Institutions (5) Consultoria Astronomica de Monterrey, Mexico Kiepenheuer Institut fuer Sonnenphysik, Germany

Kiepenheuer Institut fuer Sonnenphysik, Germany Lomonosov Moscow State University, Russia Observatoire de Paris, Section de Meudon, France

### **US Institutions (6)**

Big Bear Solar Observatory/NJIT

Observatoire Pic du Midi, France

NASA/Goddard Space Flight Center

NCAR/High Altitude Observatory (HAO)

New Jersey Institute of Technology (NJIT)

Sabino High School

University of Arizona

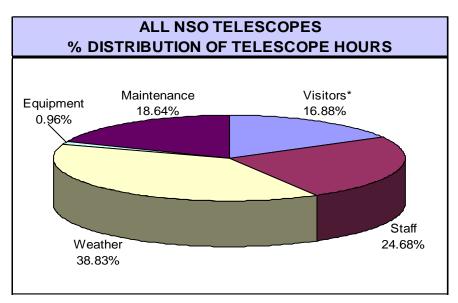
US Air Force/Philips Lab (USAF/PL/GSS)

Number of Users by Nationality					
Canada	2	Mexico	1		
France	2	Russia	1		
Germany	1	<b>United States</b>	34		
Italy	2				

# II. Telescope Usage and Performance Data

In the quarter ending December 31, 2004, 16.88% 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; 24.68% were devoted to the programs of NSO and NOAO scientists. Scheduled maintenance, including instrument tests, engineering, and equipment changes, accounted for 18.64% of total allotted telescope hours.

Total "downtime" (hours lost to weather and equipment problems) for NSO telescopes was 39.80%. Almost all of these lost observing hours were due to bad weather (38.83%), with 0.96% lost to equipment problems.



NSO TELESCOPES Percent Distribution of Telescope Hours (Scheduled vs. Downtime) October - December 2004						
		% Hours	Used By:	% Hours	s Lost To:	% Hrs. Lost To:
Telescope	Hours Available	Visitors <sup>a</sup>	Staff	Weather	Equipment	Scheduled Maintenance
Dunn Solar Telescope/SP	784.0	25.7%	27.0%	47.3%	0.0%	0.0%
McMath-Pierce*	531.0	18.3%	36.9%	36.5%	0.0%	8.3%
KP Vacuum Telescope <sup>b</sup>	0.0	0.0%	0.0%	0.0%	0.0%	0.0%
FTS Lab*	304.0	0.0%	0.0%	0.0%	0.0%	100.0%
Evans Facility	248.0	6.9%	21.4%	64.5%	7.3%	0.0%
All Telescopes	1,867.0	16.9%	24.7%	38.8%	1.0%	18.6%

<sup>&</sup>lt;sup>a</sup>Includes synoptic programs for which all data are made available immediately to the public and the scientific community at large.

<sup>&</sup>lt;sup>b</sup>The KPVT was closed on September 22, 2003 to prepare for SOLIS. The KPVT is now 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)	8.7%	10.9%			
Other U.S. (.com, .net, misc.)	69.6%	62.1%			
Foreign	19.3%	25.3%			
Unresolved	2.4%	1.6%			

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 186,407 successful user requests, serving 2,677 distinct files to 8,792 distinct hosts. A total of 35.268 Gbytes were served, averaging 392.680 Mbytes per day.

FTP User Demographics (NSO/SP)				
Demographic Group	Requests	Traffic		
U.S. Science (.gov, .edu, .mil)	9.2%	13.6%		
Other U.S. (.com, .net, misc.)	62.4%	58.9%		
Foreign	23.6%	26.3%		
Unresolved	4.9%	1.3%		

FTP Products (NSO/SP)					
Product Requests Traf					
Realtime Images	22.8%	22.7%			
Corona Maps	73.4%	66.1%			
Sunspot Numbers	1.0%	0.1%			
Staff Outgoing	2.3%	11.0%			
Other	0.5%	0.1%			

#### World Wide Web Statistics

There were 1,110,295 successful user requests, serving 22,929 distinct files to 92,983 distinct hosts. A total of 21.763 Gbytes were served, averaging 242.247 Mbytes per day.

WWW User Demographics (NSO/SP)				
Demographic Group	Requests	Traffic		
U.S. Science (.gov, .edu, .mil)	8.6%	6.5%		
Other U.S. (.com, .net, misc.)	70.8%	67.4%		
Foreign	18.6%	23.9%		
Unresolved	2.0%	2.2%		

WWW Products (NSO/SP)				
Product	Requests	Traffic		
Realtime Images and Movies	10.5%	17.4%		
Other Images	7.8%	35.3%		
General Icon and Background Images	21.6%	6.1%		
Public Relations Pages	15.1%	10.4%		
Press Releases	1.8%	4.5%		
Telescope Home Pages	7.8%	2.8%		
ISOON	2.8%	0.6%		
Adaptive Optics Pages	1.0%	2.2%		
General Information	12.1%	4.2%		
Staff Pages	2.2%	8.3%		
Other	17.3%	8.2%		

#### FTP Upload Statistics

Tracking of FTP uploads began this quarter as these uploads are using a significant amount of available bandwidth. Most of the FTP upload activity is related to the USAF Solar Mass Ejection Imager (SMEI) experiment.

There were 1,640 successful user requests uploading 136 distinct files from 14 distinct hosts. A total of 172.245 Gbytes were uploaded, averaging 2.154 Gbytes per day.

FTP User Demographics (NSO/SP)					
Demographic Group	Requests	Traffic			
U.S. Science (.edu, .mil)	99.4%	100.0%			
Other U.S. (.com, .net, misc.)	0.4%	0.0%			
Foreign	0.3%	0.0%			

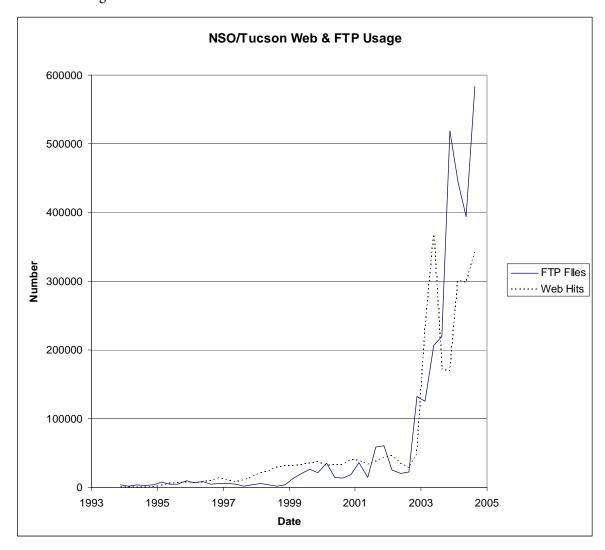
FTP Uploads (NSO/SP)			
Product	Requests	Traffic	
SMEI Data	97.7%	99.9%	
Workshop Talks	2.0%	0.1%	
Other	0.3%	0.0%	

#### B. NSO/Tucson

- Most recent complete quarter (01 October 31 December 2004)
  - 1. 525 FTP users
  - 2. 55,838 FTP logins
  - 3. 583,299 files downloaded via anonymous FTP
  - 4. 342,405 Web page hits (not counting in-line images)
  - 5. 1,576,962 Web page hits including in-line images

- Distribution of downloaded data products by number of files for the most recent quarter:
  - 1. 1% KPVT (magnetograms, synoptic maps, helium images).
  - 2. 1% SOLIS (VSM magnetograms, synoptic maps, helium images)
  - 3. 1% FTS (spectral atlases, general archive).
  - 4. <1% Sac Peak spectroheliograms (Hα, Calcium K images).
  - 5. 97% GONG (magnetograms, spectra, time series, frequencies).
- Demographics of FTP logins for most recent quarter:

Science domains: 61%
 Public domains: 6%
 Foreign domains: 33%



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) Programs

Dave Dooling represented NSO at the American Indian Science and Engineering Society (AISES) annual conference in Anchorage in November. Several contacts were made with prospective REUs and RETs. A recruiting ad for the NSO REU/RET program was purchased in *Winds of Change*, the AISES membership magazine.

Over 700 announcements about the Summer 2005 Research Experiences for Undergraduates Program at NSO were sent to astronomy, physics, engineering, mathematics, and natural science departments throughout the US and Puerto Rico. An announcement about the NSO Summer 2005 Research Experience for Teachers (RET) Program was widely distributed electronically via the National Astronomy List Serves, Arizona Physics Teachers List Serves and the Arizona Science and Math Education Center; announcements were also sent to school districts throughout New Mexico and in Tucson.

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

In November and December, Frank Hill and Claude Plymate, in collaboration with Connie Walker (NOAO), worked with teachers and students from Graves County High School in Mayfield, Kentucky and Linwood Holton Governor's School in Abingdon, Virginia on observing runs at the McMath-Pierce Solar Telescope, using the Amber infrared array to measure Zeeman splitting and magnetic fields in the Fe I 1.5-micron line. A substantial amount of data was collected and are being analyzed by the students.

In her role as a Tucson Project ASTRO partner, Roberta Toussaint attended the Family ASTRO (Moon Mission) and Family ASTRO (Cosmic Decoder) workshops, and helped with a Family Science night at the Tucson/Robison Elementary School in October. She also made three visits in November and December to a 2<sup>nd</sup> grade class at Robison Elementary, and on 19 November represented NSO/NOAO at a Career Day at Tucson High School. As a Tucson Project ASTRO partner at Richey Elementary and Middle School, Kerri Donaldson-Hanna taught "The 1000-Yard Model," an activity discussing the size of the solar system, to 5<sup>th</sup>-through 8<sup>th</sup>-grade students (18 Oct.). She also gave a presentation to 5<sup>th</sup> graders about gravity on 28 October, taught 5<sup>th</sup>- through 8<sup>th</sup>-grade students about the phases of the moon on 02 November, and participated in the school's Math and Science Night by talking with students and parents about astronomy. The NSO hosted the 2005 New Mexico Project ASTRO Workshop at the Sunspot Astronomy and Visitor Center at Sac Peak on 28-29 October which included a special briefing and tour of NSO facilities for the 23 participating teachers and amateur astronomers.

#### 4. Other Educational Outreach

Magnetic Carpet Ride, originally planned as a traveling museum exhibit on the magnetic nature of the Sun, was redesigned to be a project to develop curriculum that describes the basics of magnetism and the roles it plays in solar activity, as well as the need for the Advanced Technology Solar Telesocpe (ATST). This change was initiated by NSO Education Officer Dave Dooling in consultation with NOAO EPO Officer Stephen Pompea. Dooling also met with Michael Zeilik, astronomy professor emeritus at the University of New Mexico, to discuss educational components for the exhibit, as Zeilik has been active in astronomy education for many years. Magnetic Carpet Ride is being developed as a part of the Max 2008 education initiative related to the ATST.

Work also was initiated on *Other Suns for Other Worlds*, a separate educational activity supporting the ATST. The purpose is to take the natural interest in finding habitable worlds around other stars and inspire interest and awareness about our own star, the Sun. The project will touch on astrobiology, astronomy, and environmental science.

Dave Dooling mentored students at Cloudcroft High School who were preparing to take the astronomy test for the Science Olympiad.

#### **B.** Public Outreach

#### 1. Sunspot Visitor Center

Sunspot Astronomy & Visitor Center Summary of Visitors and Tours (12 Months Ending 12/31/04)			
Group/Program	No. of Visitors		
General Public Tours (Visits to Center and			
Self-Guided Tours)	2,385		
Guided Public Tours:			
- School Groups K-12	171		
- Special Tours	138		
Total Visitors 2,694			

Plans for a community solar system centered on the Sunspot Astronomy and Visitor Center were refined. Developing the model in stages and funding possibilities for the project are being investigated. As described in previous reports, the current plan is to have signs along the Sunspot Highway and a 1/8<sup>th</sup>-section of the Sun in a corner of the Visitor Center with mirrors to reflect the illusion of a complete solar globe.

#### 4. Other Public Outreach

Design and production of the first issue of the ATST Quarterly Newsletter were completed and released in early January 2005.

On 01 October, Ramona Elrod and Dave Dooling staffed the NSO exhibit at the New Mexico Southern Region State Fair in Las Cruces.

Several public lectures were given by NSO staff during this quarter:

- Han Uitenbroek (08 October) presented "Many Colors of the Sun: Exploring the Solar Spectrum" at the Enchanted Skies Star Party in Socorro, NM; Dr. Uitenbroek also gave a lecture (21 December) at the Lodestar Planetarium in Albuquerque on "Too Cool: Mysteries of the Sun's COmosphere."
- Alex Pevtsov (09 October) presented "Solar Storms and Space Weather" at the Enchanted Skies Star Party in Socorro; Dr. Pevtsov also gave a lecture (19 November) to the Alamogordo Astronomy Club on "Terrestrial Echo of Solar Storms."
- K. S. Balasubramanaiam presented a talk on "Solar Physics and Astronomy" at the Cloudcroft Elementary School on 05 November.
- Andrew Potter gave a one-hour talk on "Mercury" to the Tucson Amateur Astronomy Club on 03 December.

On 27 November, Bill Livingston presented the George Alcock Lecture to the Royal Meteoritical Society and the British Astronomical Association in London. An audience of approximately 150 people listened to Dr. Livingston's lecture entitled "Glorious Visions" (on light and color in nature).

#### C. Media and Public Information

#### 1. Press Releases and Image Releases

December 14, 2004: "Virtual Solar Observatory Now Available For 'One-Stop Data Shopping" (<a href="http://www.nso.edu/press/vso.html">http://www.nso.edu/press/vso.html</a>)

October 25, 2004: "Haleakala, Hawaii, Recommended for the Advanced Technology Solar Telescope" (<a href="http://www.nso.edu/press/ATST/ATST\_RecommendedSite.html">http://www.nso.edu/press/ATST/ATST\_RecommendedSite.html</a>)

October 15, 2004: " 'Think Big' is Plan at Solar Physics Conference (Large-Scale Structures Conference at Sunspot)" (<a href="http://www.nso.edu/press/thinkbig.html">http://www.nso.edu/press/thinkbig.html</a>)

On 09 November Jack Harvey was interviewed about the history of helioseismology by Dr. William Chaplin, author of a forthcoming book on helioseismology. Dr. Harvey is also providing Dr. Chaplin with old photos for possible use in his book.

On 16 November the observing staff at the McMath-Pierce Solar Telescope on Kitt Peak, Kevin Schramm, Eric Galayda, and Claude Plymate, were interviewed by reporters from local television station *KGUN News* about Kitt Peak and an author who has written a tour book about the telescope facilities on Kitt Peak.

On 07 December Bill Livingston gave an interview on Alan Stahler's science program on KVMR FM radio. Dr. Livingston discussed his book, *Color and Light*.

## V. Safety Report

#### A. OSHA Recordable Occupational Injuries, Illnesses, and Other Incidents

- There were no injuries reported this quarter.
- For the calendar year 2004, NSO/Sac Peak had three recordable injuries resulting in one lost day of work.
- For the calendar year of 2004, NOAO/NSO Kitt Peak experienced three industrial injuries including a broken rib from a fall on ice, right rotator cuff injury from an automobile accident, and knee strain due to overexertion. The 2004 Kitt Peak injury rate is 6.2 (OSHA 2003 national average for private industry is 4.7). NOAO/NSO Tucson has had four injuries including a hand sprain due to lifting, knee injury due to climbing stairs, insect bite, and a strained back. Tucson injury rate is 1.7.

#### B. Safety and Health

- During 2004, the NSO safety officer attended a two-day OSHA training workshop. Topics included recordkeeping, training requirements and updates to the regulations.
- In December of 2004, respirator training was conducted for 10 individuals at NSO/Sac Peak. Medical evaluations and physicals were also completed for all individuals required to use respirators. Also, a rewrite of the respirator program has begun and will be completed in 2005.
- Work continues with the rewrite of the NOAO/NSO safety manual/risk management manual.
  Preparations are being made to add the draft to the NOAO intranet Risk Management Documents
  section in January 2005. Additional topics include safety glasses, eye and foot protection, home safety,
  confined space entry permit and travel safety.
- "Risk Management Considerations for Projects" has been added to the NOAO intranet Risk Management Documents section. The intent of this document is help project teams address risks during the design and construction of a project. The document was developed because of a need expressed by designers and engineers, and should provide risk management assistance during the construction of future telescopes and buildings. This document discusses risk management strategies and includes lists (thought starters) with the intent to prompt the project team into addressing risks that might have consequences if not considered.
- A "Risk Management Overview" was presented to the NOAO/NSO Management Committee on 24
  November. Topics included a review of this year's injuries, risk management resources on the intranet,
  completed projects, and objectives for 2005.
- Risk Management considerations were discussed during several of the regularly scheduled NSO/ATST
  design sessions and the 27 October ATST Enclosure Workshop. Research and information was provided
  to the project team related to the environmental considerations of the use of ethylene glycol and an
  alterative chemical, propylene glycol.
- Third party elevator inspections were conducted by Roger Chartand CESI at Kitt Peak on 15 December and NOAO headquarters on 21 December. Certificates were issued for the public elevators at Kitt Peak.

Modifications were recommended and the elevator maintenance contractors were asked to provide cost estimates.

- An overview of Kitt Peak safety and emergency procedures and other risk management information was
  presented to new Kitt Peak Docents on 04 November as part of their induction. Thanks to Dave Bell,
  docents now have access to the NOAO intranet Risk Management Documents section by way of a special
  password.
- The Kitt Peak EMT's have been working on updating emergency supplies at the Kitt Peak Emergency Center including the replacement of the automatic external deliberator (AED) battery for Kitt Peak. Two additional AED's will be delivered to the Visitor Center and MDM in the near future.
- Several planning meetings were conducted with CFO to determine safe cleaning products and proper
  personal protective equipment during the cleaning and modifications to the Tucson computer room
  HVAC system.
- Overhead cranes were inspected at Kitt Peak and Tucson. Action items were reviewed and the vendor
  was requested to prepare cost estimates for repairs or modifications.

#### C. Fire Protection and Prevention

- Fire extinguishers, fire suppression, and alarm systems for Tucson and Kitt Peak were inspected this quarter, with no recommendations.
- Dr. Richard Green and Chuck Gessner coauthored a letter to Mr. Guy Acuna, Tohono O'odham Nation Fire Management Officer Division Chief thanking him for allowing us the opportunity to review the September 2004 Tohono O'odham Nation Wildland Fire Management Plan Environmental Assessment (EA). The EA detailed the plan to use only mechanical fire control methods, which is our organization's preferred method at Kitt Peak.

#### D. Environmental

- The NSO/Sac Peak safety officer consulted with State of New Mexico Ground Water Bureau and consultants/engineers regarding the status of the Sac Peak sewer plant permit. Upgrades recommended by engineers commenced, and work completed included the replacement of trickling filter media, updating of operational procedures, replacement/maintenance of safety rails and gratings, and replacement of re-circulation valves. Also, two operators received several hours of training towards Advanced Small Wastewater Operator certification. Certification will be completed in 2005. Preliminary results indicate that changes have positively impacted output and should result in re-permitting.
- NSO/Sac Peak contracted the removal of several containers of hazardous materials, which included mercury contaminated oil, rags, etc, asbestos, and miscellaneous solvents.
- The Tucson service yard chemical storage area was organized and inventoried.
- 133 pounds of hazardous waste were properly disposed in Tucson.

#### E. Insurance

- A GONG employee reported that a collaborator at the Canary Islands damaged his rental vehicle during
  a trip in October. After a thorough review of the billing, it was determined that the rental agency did not
  charge us and charged the collaborator's insurance.
- Insurance certificates for the spring picnic and NOAO vehicles were issued.

#### F. Security

- Emergency doors and lights were installed at the NSO/Sac Peak Main Lab facility. A new security plan was also implemented for the Main Lab.
- The card key system was expanded to the exterior doors of the NSO-GONG/DMAC building.
- Preparations are being made to install card key system at the Kitt Peak Visitor Center.
- An automatic gate was installed at the Tucson overnight parking area.
- The Tucson east service yard gate was repaired and improved.

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 October-December 2004 Quarterly Report for additional details on risk management activities.

#### APPENDIX

#### National Solar Observatory 01 October - 31 December 2004

October - December 2004: During this period, 19 observing programs, one of which was a thesis programs, 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. (TLRBSE) identifies middle and high school teachers who are Teacher Leaders in Research Based Science Education program participants, and (RET) identifies

Research Experience for	Teachers participants.	Nights	Days	Hours
9		0.0	38.0	304.0
Michael Dulick				
FTS Facility Engineering	g/Maintenance			
FTS Lab				
1054		0.0	4.0	20.0
1854	National Salar Observations	0.0	4.0	38.0
William Livingston	National Solar Observatory			
Line Asymmetry Changes	s in the Solar Irradiance Spectrum			
McMP FTS/Mc-P				
1858		0.0	4.0	133.0
William Livingston	National Solar Observatory			
Calhoun (RET)	Sabino High School			
Cycle Variability of the S	olar Spectrum			
McMP Main spectrograp	bh			
1985		0.0	12.0	16.0
T. Alan Clark	University of Calgary			
Bergman	University of Calgary			
Extreme Solar Limb Obs	ervations of Infrared Lines of HI, MgI and Other	Elements		
McMP Main spectrograp	oh			
2127		0.0	14.6	36.0
Richard Altrock	USAF Research Laboratory			

#### Three-Line Coronal Photometer

Evans Facility Sac Peak

		Nights	Days	Hours
2128		0.0	14.6	34.0
Simon Worden	University of Arizona			
Keil	National Solar Observatory			
Ca K Solar Rotation [N	ote 6 hrs. maintenance]			
Evans Facility Sac Peak				
2155		0.0	14.0	81.0
Donald Jennings	NASA/Goddard Space Flight Center			
Sada	Consultoria Astronomica de Monterrey			
McCabe	NASA Goddard Space Flight Center			
Wallace	NASA/Goddard Space Flight Center			
Observations of the 12.3	-µm MgI Line in the Sun			
McMP Main spectrogra	ph			
2245		0.0	10.0	56.0
Christoph Keller	National Solar Observatory	0.0	10.0	20.0
ATST Key Technology L	Developments			
McMP Main spectrogra	ph			
2367		0.0	15.0	37.0
Andrew Potter	National Solar Observatory	0.0	2010	0.10
Plymate	National Solar Observatory			
Killen	Southwest Research Institute			
Adaptive Optics for Plan	etary Observations at the McMath-Pierce Telescope			
McMP Main spectrogra	ph			
2368		0.0	13.5	98.0
Sankarasubramanian				
Gullixson	National Solar Observatory			
Rimmele	National Solar Observatory			
Diffraction-Limited Spec	ctro-Polarimeter (DLSP) Engineering			
Dunn Solar Telescope/SF	P Sac Peak			

		Nights	Days	Hours
2371		0.0	9.0	40.0
Bruce Lites	High Altitude Observatory			
Socas-Navarro	High Altitude Observatory, NCAR			
Sankarasubramanian	National Solar Observatory			
Hegwer	National Solar Observatory			
Rimmele	National Solar Observatory			
Quiet Sun Magnetic Field	ds at High Angular Resolution			
Dunn Solar Telescope/SP	Sac Peak			
2375a		0.0	4.0	35.0
Constance Walker	National Optical Astronomy Observatory			
Plymate	National Solar Observatory			
Hill	National Solar Observatory			
Croft	National Optical Astronomy Observatories			
TLRBSE Teachers				
Understanding the Morph	hology of Active Regions: Using Zeeman-Split IR Lines	to Determine Mag	netic Field Str	engths of
McMP Main spectrograp	oh			
2378		0.0	11.5	49.0
Maud Langlois	New Jersey Institute of Technology			
Moretto	National Solar Observatory			
Rimmele	National Solar Observatory			
Hegwer	National Solar Observatory			
Richards	National Solar Observatory			
Multi-Conjugate Adaptiv	e Optics			
Dunn Solar Telescope/SP	Sac Peak			
2417		0.0	10.0	52.0
Guillaume Molodij	Observatoire de Paris, Section de Meudon			
Roudier	Observatoire Pic-du-Midi			

Photosphere Dynamics around Sunspots and Filaments

National Solar Observatory

Dunn Solar Telescope/SP Sac Peak

Keil

		Nights	Days	Hours
2418		0.0	9.0	26.0
Alexandra Tritschler				
Rimmele	National Solar Observatory			
Hardi	Kiepenheuer Institut fuer Sonnenphysik			
Denker	New Jersey Institute of Technology			
Ultraviolet Blinkers - Pho	tospheric Granular Events			
Dunn Solar Telescope/SP	Sac Peak			
2419		0.0	10.0	14.0
Alexander Getling				
Pevtsov	National Solar Observatory			
Local Magnetohydrodyna	mic Effects of Solar Convection			
Dunn Solar Telescope/SP	Sac Peak			
2420		0.0	0.0	22.0
David Elmore	High Altitude Observatory	0.0	8.0	23.0
Socas-Navarro	High Altitude Observatory High Altitude Observatory, UCAR			
Spectro-Polarimeter for In  Dunn Solar Telescope/SP	nfrared and Optical Regions (SPINOR) Engineering Sac Peak			
2421		0.0	10.0	41.0
Jun Ma (T)				
Wang	New Jersery Institute of Technology			
Cao	Big Bear Solar Observatory, NJIT			
Hartkorn	New Jersey Institute of Technology			
High Resolution Infrared	Observations of Sunspots with the Infrared Imager (	IRIM)		
Dunn Solar Telescope/SP	Sac Peak			
2422		0.0	10.0	70.0
Fabio Cavallini				
Reardon	INAF - Arcetri Astrophysical Observatory			
Tomczyk	High Altitude Observatory, NCAR			
Casini	High Altitude Observatory, NCAR			
Spectro-polarimetry with	the Interferometric Bidimensional Spectrometer (IBI	S)		
Dunn Solar Telescope/SP	Sac Peak			