

NATIONAL SOLAR OBSERVATORY



Quarterly Report (1) FY 2008

01 October - 31 December 2007

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>



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



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*Submitted to the National Science Foundation under
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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 31 December 2007. 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 October-December 2007 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*

25 observing programs, nine of which were thesis programs involving 12 thesis graduate students and two involving 1 non-thesis graduate student, were carried out at NSO this quarter. 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 and Foreign)		
3 Months Ending December 2007	Nbr	% Total
Programs (US, involving 1 non-thesis grad student)	12	48%
Programs (non-US, involving 1 non-thesis grad student)	2	8%
Thesis (US, involving 4 grad students)	5	20%
Thesis (non-US, involving 5 grad students)	6	24%
Total Number of Unique Science Projects*	25	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	16	12	28	65%	6
Graduate Students	5	9	14	33%	0
Undergraduate Students	0	0	0	0%	0
Other	0	1	1	2%	10
Total Users	21	22	43	100%	16

Institutions Represented by Visiting Users**					
	US	Non-US	Total	% Total	
Academic	6	8	14	70%	
Non-Academic	3	3	6	30%	
Total Academic & Non-Academic	9	11	20	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).

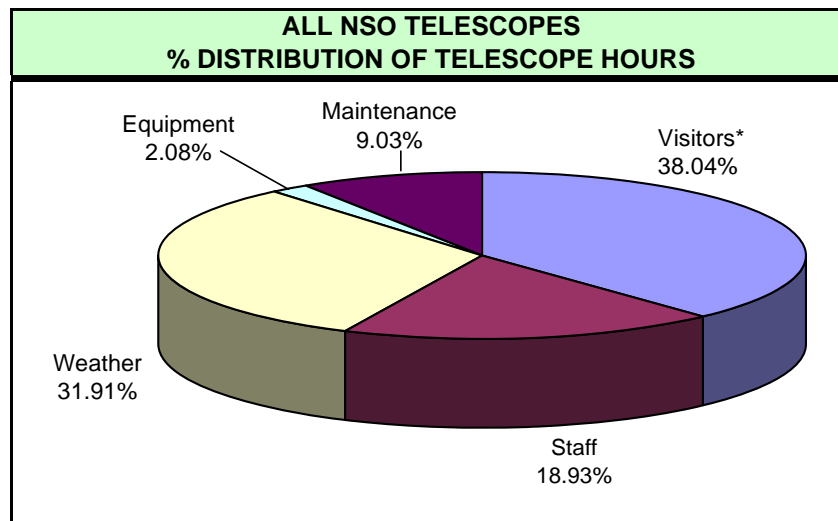
Number of Users by Nationality			
Canada	1	Netherlands	5
Germany	4	Norway	2
Italy	9	United States	37
Mexico	1		

INSTITUTIONS REPRESENTED BY USERS
Foreign Institutions (10)
Catania University, Italy
Delft University, Netherlands
INAF - Arcetri Astrophysical Observatory, Italy
INAF - Astrophysical Observatory of Rome, Italy
TNO Institute of Applied Physics, Delft, Netherlands
University of Calgary, Canada
University of Cologne, Germany
Universidad de Monterrey, Mexico
University of Oslo, Norway
University of Rome "Tor Vergata"
Utrecht University, Netherlands
US Institutions (9)
California State University, Northridge
Catholic University of America
Harvard-Smithsonian Center for Astrophysics
High Altitude Observatory, NCAR, Boulder
NASA/Ames Research Center
NASA/Goddard Space Flight Center (NASA/GSFC)
New Jersey Institute of Technology (NJIT)
NJIT/Big Bear Solar Observatory
University of Arizona
University of Hawaii, Institute for Astronomy
US Air Force/Philips Lab (USAF/PL/GSS)

II. Telescope Usage and Performance Data

In the quarter that ended 31 December 2007, 38.0% of the total available telescope hours at NSO/Sacramento Peak and NSO/Kitt Peak went to the observing programs of visiting principal investigators and synoptic programs; 18.9% were devoted to the programs of NSO and NOAO scientists. Scheduled maintenance, including instrument tests, engineering, and equipment changes, accounted for 9.0% of total allotted telescope hours.

Total "downtime" (hours lost to weather and equipment problems) for NSO telescopes was 34.0%. 31.9% of these lost observing hours were due to bad weather, with 2.1% lost to equipment problems.



NSO TELESCOPES Percent Distribution of Telescope Hours (Scheduled vs. Downtime) 01 October 2007 - 31 December 2007						
Telescope	Hours Available	% Hours Used By:		% Hours Lost To:		% Hrs. Lost To:
		Visitors ^a	Staff	Weather	Equipment	Scheduled Maintenance
Dunn Solar Telescope/SP	790.0	32.0%	12.7%	26.7%	2.3%	26.3%
McMath-Pierce*	1,161.0	35.7%	28.9%	34.6%	0.7%	0.0%
KP SOLIS Tower ^b	52.0	100.0%	0.0%	0.0%	0.0%	0.0%
FTS Lab ^c *	0.0	0.0%	0.0%	0.0%	0.0%	0.0%
Evans Facility	252.0	42.9%	0.0%	48.4%	8.7%	0.0%
Hilltop Dome	48.0	0.0%	0.0%	0.0%	0.0%	0.0%
All Telescopes	2,303.0	38.0%	18.9%	31.9%	2.1%	9.0%

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

^b Formerly the Kitt Peak Vacuum Telescope (KPVT).

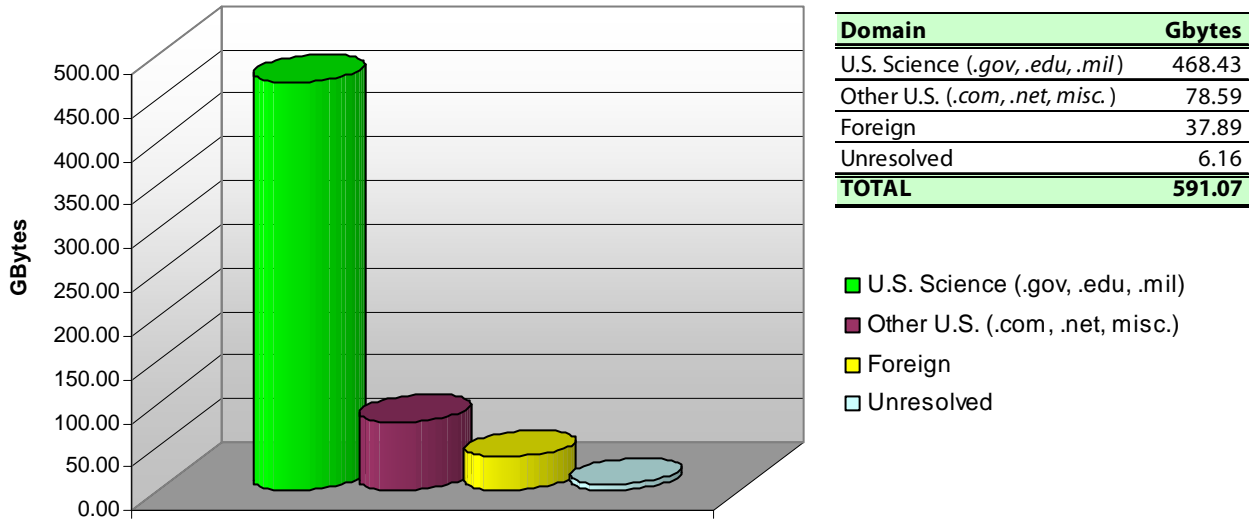
^c Shut down this quarter for repairs/upgrade.

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

III. User Statistics – Archives/Data Bases

All statistics *exclude* the use of NSO archives and data bases from within the NSO Local Area Networks in Tucson and at Sac Peak, and from NOAO as a whole.

DATA (Gbytes) DOWNLOADED FROM NSO FTP & WWW SITES
01 October – 31 December 2007



PRODUCT DISTRIBUTION BY DOWNLOADED GBYTES
01 October - 31 December 2007

Site	Data Source	Gbytes	%
SP	Adaptive Optics Pages	1.15	0.2%
SP	Corona Maps & Other Images	2.08	0.4%
T	Evans/SP Spectroheliograms (H α , Calcium K images)	0.00	0.1%
T	FTS (Spectral atlases, general archive)	2.95	0.5%
T	GONG Helioseismology	361.04	64.8%
T	GONG (Magnetograms, spectra, time series, frequencies)	61.71	11.0%
SP	Icon & Background Images	1.46	0.3%
T	KPVT (magnetograms, synoptic maps, helium images)	2.88	0.5%
SP	OSPAN Project Pages	0.62	0.1%
SP	Press Releases	10.93	2.0%
SP	Public Relations	0.62	0.1%
SP	Realtime Images and Movies (<i>OSPAN, Other</i>)	44.25	7.9%
SP	SMEI Experiment & Data Pages	24.57	4.4%
T	SOLIS/VSM	24.44	4.4%
SP	Staff Pages	5.00	0.9%
SP	Telescope Home Pages	0.94	0.2%
SP	General Information	11.04	2.0%
SP & T	Other	1.46	0.3%
TOTAL		557.15	100.0%

V. 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 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) and Other NSO Summer Research Assistantship (SRA) Programs*

In early October, recruitment and marketing plans were established for the 2008 REU and SRA programs, including the NSO/GONG 2008 International Research Experience for (Graduate) Students (IRES) program. In addition to detailed postings about the respective programs on the NSO Web site, arrangements were made for a myriad of informational postings via the internet on physics/astronomy education sites. Electronic announcements were also sent to the physics and astronomy departments of approximately 100 colleges and universities for email distribution to department graduate and undergraduate students.

Aimee Norton, in collaboration with the University of Arizona (UofA) Lunar and Planetary Laboratory (LPL), created a flyer as part of the effort to recruit students into the new graduate program in solar and heliospheric physics at the UofA LPL and to NSO's summer research programs. The flyer was posted on the NSO EPO Web site and widely distributed.

2. *Other Educational Outreach*

In October, Han Uitenbroek gave a three-hour visiting lecture, "An Introduction to Solar Radiative Transfer," to students at the University of Nice, France. Alexei Pevtsov taught two on-line courses (ASTR-105G) on "The Planets," involving 40 students at New Mexico State University during the fall 2007 semester. John Leibacher served as a member of the PhD Jury of Savita Mathur (Universite' Paris-Sud 11) for her 18 December thesis presentation on "A la recherche des modes de gravite: etude de la dynamique du coeur solaire." As one of two "reporters" on the thesis, Leibacher provided a detailed report on the thesis and whether it merits presentation to the university. Leibacher also worked with several other PhD students at the University of Paris. On 10 October, Aimee Norton was interviewed by University of Arizona undergraduate Tyler Smith, who was preparing a report on SOLIS for presentation to his Astronomy 202 class. Rob Hubbard gave a presentation on solar physics and the Advanced Technology Solar Telescope (ATST) on 17 October to two Gifted and Talented Education (GATE) science classes in the Tucson Unified School District (TUSD). Each class involved approximately 20 middle school students.

As part of an effort to enhance its partnership with NSO, the New Mexico State University (NMSU), Las Cruces, is building a solar program and recently advertised a tenure-track assistant professor position in solar astrophysics in its Department of Astronomy. NSO scientific staff are involved with the search process for this position. Location of the NSO-Sacramento Peak site in proximity of the NMSU campus will facilitate and enhance the collaborative opportunities available to a new solar physics faculty member of the NMSU community.

B. Public Outreach

1. Sunspot Visitor Center

Sunspot Astronomy & Visitor Center Summary of Visitors and Tours (3 Months Ending 12/31/07)	
<i>Group/Program</i>	<i>No. of Visitors</i>
General Public Tours (Visits to Center and Self-Guided Tours)	2,193
Guided Public Tours:	
- School Groups K-12	0
- Special Tours	15
Total Visitors	2,208

2. Other Public Outreach, Including External Coordination, Media and Public Information

Han Uitenbroek presented two colloquia on "Solar Magneto-convection," one at the at New Mexico State University in Las Cruces on 16 November, and one at the University of Florence, Italy on 06 December. At the Internet Librarian Conference in Monterrey on 31 October, Ruth Kneale gave a talk to ~250 conference participants on ATST's Content Management System. Alexei Pevtsov presented a colloquium on "The History of Space Exploration in Postage Stamps" at NASA Headquarters Science Mission Directorate in December.

Ramona Elrod and Dave Dooling attended 05 October meeting of the Southwest Consortium of Observatories in Public Education (SCOPE) hosted by Apache Point Observatory and New Mexico State University and held at the Sunspot Astronomy and Visitor Center, where Dooling presented plans for the NSO 1:250-million-scale Solar System Model. NSO, in collaboration with the New Mexico Museum of Space History and the Astronomical Society of the Pacific, hosted the Project ASTRO-New Mexico Teacher/Astronomer Workshop on 12-13 October at Sunspot. Dave Dooling also set up an NSO exhibit and made a presentation at the annual conference of the New Mexico Science Teachers Association in Las Vegas, NM, 01-02 November.

NSO, in collaboration with NOAO Public and Educational Outreach (PAEO), continues to work toward completing the McMath-Pierce "Sunnel," a project to turn the 95-foot long public hallway of the McMath-Pierce Telescope facility into an exhibit for visitors to Kitt Peak to learn more about the Sun, the NSO, and the telescopes and research associated with the NSO. Aimee Norton, Mark Giampapa, and Dave Dooling are active participants in this project, which is scheduled for completion in June 2008.

A filming crew from Interstellar Studios, which is producing a PBS documentary on *400 Years of the Telescope*, interviewed Mark Giampapa at the McMath-Pierce Telescope facility on 31 October. The interview focused on solar telescopes and contributions by solar physics to knowledge in astronomy and humans' conception of their place in the universe. Interstellar Studios also visited NSO/Sac Peak and has expressed a desire for NSO to provide Web stories on the history of NSO telescopes. Another video crew, Foolish Earthling Productions of Canada, was given a tour of Sacramento Peak and has also expressed interest in historical NSO images, which will be provided in early 2008.

On 29 December, an article about the Advanced Technology Solar Telescope by Thomas Rimmele, Steve Keil, and Dave Dooling, "Building the World's Largest Optical Solar Telescope," was the top Astronomy Newsroom story of the SPIE (online) Newsletter (<http://spie.org/x18359.xml?highlight=x2418>). In addition to producing and distributing the December 2007 issue of the ATST Quarterly Newsletter, Dave Dooling scripted, produced, and narrated a five-minute video on ATST for use on Maui by potential supporters.

V. Risk Management and Safety Report

Risk Management services at NSO/Kitt Peak and Tucson are shared with NOAO. There are no risk management and safety activities to report for NSO/Sac Peak this quarter. Therefore, see the "Tucson and Kitt Peak Site Safety Report" section of the NOAO October-December 2007 Quarterly Report for details on risk management activities at NSO/Kitt Peak and Tucson.

APPENDIX
National Solar Observatory
01 October - 31 December 2007

October - December 2007: During this period, 25 observing programs, 9 of which were thesis programs involving 12 thesis graduate students, and 2 involving 1 non-thesis graduate student, were carried out at NSO. 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. (RBSE) identifies middle and high school teachers who are Research-Based Science Education program participants, (REU) identifies Research Experiences for Undergraduates program participants, and (RET) identifies Research Experience for Teachers participants.

	Nights	Days	Hours
1858	0.0	20.0	284.0
William Livingston National Solar Observatory			
<i>Cycle Variability of the Solar Spectrum</i>			
McMath-Pierce Solar Telescope Main Spectrograph			
2127	0.0	14.8	58.0
Richard Altrock USAF Research Laboratory			
<i>Three-Line Coronal Photometer</i>			
Evans Solar Facility (ESF) Sac Peak			
2128	0.0	14.8	50.0
Simon Worden NASA Ames Research Center			
Keil National Solar Observatory			
<i>Ca K Solar Rotation</i>			
Evans Solar Facility (ESF) Sac Peak			
2454e	0.0	6.0	48.0
Steven Tomczyk High Altitude Observatory, NCAR			
<i>Coronal Multi-Channel Polarimeter (CoMp)</i>			
Hilltop Dome Sac Peak			
2489c	0.0	10.0	100.0
Steve Hegwer National Solar Observatory			
Berst National Solar Observatory			
Spence National Solar Observatory			
Radcliffe National Solar Observatory			
Jones National Solar Observatory			
<i>Dunn Solar Telescope Elevator Maintenance</i>			
Dunn Solar Telescope (DST) Sac Peak			

		Nights	Days	Hours
2498		0.0	5.0	22.0
Aimee Norton	National Solar Observatory			
Borrero	High Altitude Observatory, UCAR			
Penn	National Solar Observatory			
<i>MHD Wave Speeds as a Function of Umbral Field Strengths</i>				
McMath-Pierce Solar Telescope	Main Spectrograph/NSO Array Camera (NAC)			
2523		0.0	5.0	30.0
Matthew Penn	National Solar Observatory			
Schad (G)	University of Arizona, Lunar & Planetary Laboratory			
<i>NSO Array Camera Development</i>				
McMath-Pierce Solar Telescope	Main Spectrograph/NSO Array Camera (NAC)			
2525		0.0	3.0	0.0
Matthew Penn	National Solar Observatory			
Schad (G)	University of Arizona, Lunar & Planetary Laboratory			
<i>NSO Array Camera High-Resolution Imaging</i>				
McMath-Pierce Solar Telescope	Main Spectrograph/NSO Array Camera (NAC)			
2527		0.0	14.0	11.0
Donald Jennings	NASA/Goddard Space Flight Center			
Sada	Universidad de Monterrey			
Reuter	NASA/Goddard Space Flight Center			
Lunsford (T)	Catholic University of America, Physics Department			
<i>Near Infrared Photometry of Planets with the NSO Array Camera</i>				
McMath-Pierce Solar Telescope	Main Spectrograph/NSO Array Camera (NAC)			
2527n		14.0	0.0	113.0
Donald Jennings	NASA/Goddard Space Flight Center			
Sada	Universidad de Monterrey			
Reuter	NASA/Goddard Space Flight Center			
Lunsford (T)	Catholic University of America, Physics Department			
<i>Near Infrared Photometry of Planets with the NSO Array Camera</i>				
McMath-Pierce Solar Telescope	Main Spectrograph/NSO Array Camera (NAC)			
2531		0.0	11.0	81.0
Haosheng Lin	University of Hawaii, IFA			
Jaeggli (T)	University of Hawaii, Institute for Astronomy			
<i>Facility Infrared Spectro-Polarimeter (FIRS) Engineering & Initial Science Acquisition</i>				
Dunn Solar Telescope (DST)	Sac Peak			

		Nights	Days	Hours
2538		0.0	16.0	79.0
Guido Sonnabend	University of Cologne, Physikalisches Institut			
Sornig (T)	University of Cologne, Physikalisches Institut			
Kroetz (T)	University of Cologne, Physikalisches Institut			
Stupar (T)	University of Cologne, Physikalisches Institut			
<i>Infrared Heterodyne Spectroscopy of Planetary and Stellar Atmospheres</i>				
McMath-Pierce Solar Telescope Main Spectrograph				
2538n		16.0	0.0	90.0
Guido Sonnabend	University of Cologne, Physikalisches Institut			
Sornig (T)	University of Cologne, Physikalisches Institut			
Kroetz (T)	University of Cologne, Physikalisches Institut			
Stupar (T)	University of Cologne, Physikalisches Institut			
<i>Infrared Heterodyne Spectroscopy of Planetary and Stellar Atmospheres</i>				
McMath-Pierce Solar Telescope Main Spectrograph				
2539		0.0	7.0	41.0
Niek Doelman	TNO Institute of Applied Physics			
Keller	Universiteit Utrecht, Sterrekundig Instituut			
Fraanje	Delft University of Technology			
van Werkhoven (T)	Universiteit Utrecht, Sterrekundig Instituut			
den Breeje (T)	Delft University of Technology			
<i>Testing a Predictive Adaptive Optics Control Algorithm</i>				
McMath-Pierce Solar Telescope Main Spectrograph				
2539n		7.0	0.0	36.0
Niek Doelman	TNO Institute of Applied Physics, Delft			
Keller	Universiteit Utrecht, Sterrekundig Instituut			
Fraanje	Delft University of Technology			
van Werkhoven (T)	Universiteit Utrecht, Sterrekundig Instituut			
den Breeje (T)	Delft University of Technology			
<i>Testing a Predictive Adaptive Optics Control Algorithm</i>				
McMath-Pierce Solar Telescope Main Spectrograph				
2540		0.0	5.0	30.0
Deqing Ren	California State University, Northridge			
Plymate	National Solar Observatory			
Penn	National Solar Observatory			
Tagliamonti (T)	California State University, Northridge			
<i>Integral Field Unit for 3D Spectrographic Imaging and Polarimetry</i>				
McMath-Pierce Solar Telescope Main Spectrograph				

		Nights	Days	Hours
2541		0.0	5.0	15.0
T. Alan Clark	University of Calgary			
<i>IR Molecular Line Imaging of Active and Quiet Solar Regions</i>				
McMath-Pierce Solar Telescope Main Spectrograph				
2546		0.0	9.0	20.0
Paolo Romano	Catania Astrophysical Observatory, Catania University			
Zuccarello	Catania Astrophysical Observatory, Catania University			
Contarino (T)	Catania University, Dept. of Physics & Astronomy			
Guglielmino (T)	Catania Astrophysical Observatory, Catania University			
<i>Magnetic Helicity in Active Filament</i>				
Dunn Solar Telescope (DST) Sac Peak				
2547		0.0	10.0	32.0
Ilaria Ermolli	INAF Osservatorio Astronomico di Roma			
Del Moro	University of Rome "Tor Vergata"			
Criscuoli (T)	University of Rome "Tor Vergata"			
Berrilli	University of Rome "Tor Vergata"			
<i>Radiative Properties of Magnetic Elements at the Spectral Range of the Ni I 676.8 nm Line</i>				
Dunn Solar Telescope (DST) Sac Peak				
2548		0.0		
Chang Liu	Big Bear Solar Observatory/NJIT			
Deng	California State University, Northridge, Dept. of Physics & Astronomy			
Cao	Big Bear Solar Observatory, NJIT			
Park (T)	New Jersey Institute of Technology			
Gorceix	New Jersey Institute of Technology			
<i>Precursors and Origins of Coronal Mass Ejections</i>				
Dunn Solar Telescope (DST) Sac Peak				
2548 (cont.)		0.0	9.0	30.0
Chang Liu	Big Bear Solar Observatory/NJIT			
Shumko	Big Bear Solar Observatory, NJIT			
Choudhary	California State University, Northridge			
<i>Precursors and Origins of Coronal Mass Ejections</i>				
Dunn Solar Telescope (DST) Sac Peak				

		Nights	Days	Hours
2549		0.0	13.0	104.0
Chris Berst	National Solar Observatory			
Komsa	National Solar Observatory			
Gullixson	National Solar Observatory			
Spence	National Solar Observatory			
Fletcher	National Solar Observatory			
<i>SPINOR Integration (Phase 1) and Camera Control Upgrade</i>				
Dunn Solar Telescope (DST)	Sac Peak			
2550		0.0	7.5	75.0
Thomas Rimmele	National Solar Observatory			
Hegwer	National Solar Observatory			
Gilliam	National Solar Observatory			
<i>SPINOR Engineering and ATST Seeing Tests</i>				
Dunn Solar Telescope (DST)	Sac Peak			
2552		0.0	13.5	86.0
Kevin Reardon	INAF - Arcetri Astrophysical Observatory			
Sterling	NASA/Marshall Space Flight Center			
Carlsson	University of Oslo			
Hansteen	University of Oslo			
<i>Coordinated Spicule Observations with the Interferometric Bidimensional Spectrometer (IBIS) & the Hinode Solar Optical Telescope (SOT)</i>				
Dunn Solar Telescope (DST)	Sac Peak			
2556		0.0	8.0	29.0
Haosheng Lin	University of Hawaii, IFA			
<i>Imaging Spectropolarimetry with a Fiber Optic Image Slicer (FOIS)</i>				
Dunn Solar Telescope (DST)	Sac Peak			
2557		0.0	6.5	52.0
Edward DeLuca	Harvard-Smithsonian Center for Astrophysics			
Norton	National Solar Observatory			
Henney	National Solar Observatory			
<i>Joint Observations Related to Hinode EUV Imaging Spectrometer (EIS) Calibration</i>				
Kitt Peak SOLIS Tower (KPST)	SOLIS Vector Spectromagnetograph (VSM)			