NATIONAL SOLAR OBSERVATORY



Quarterly Report (2) FY 2009

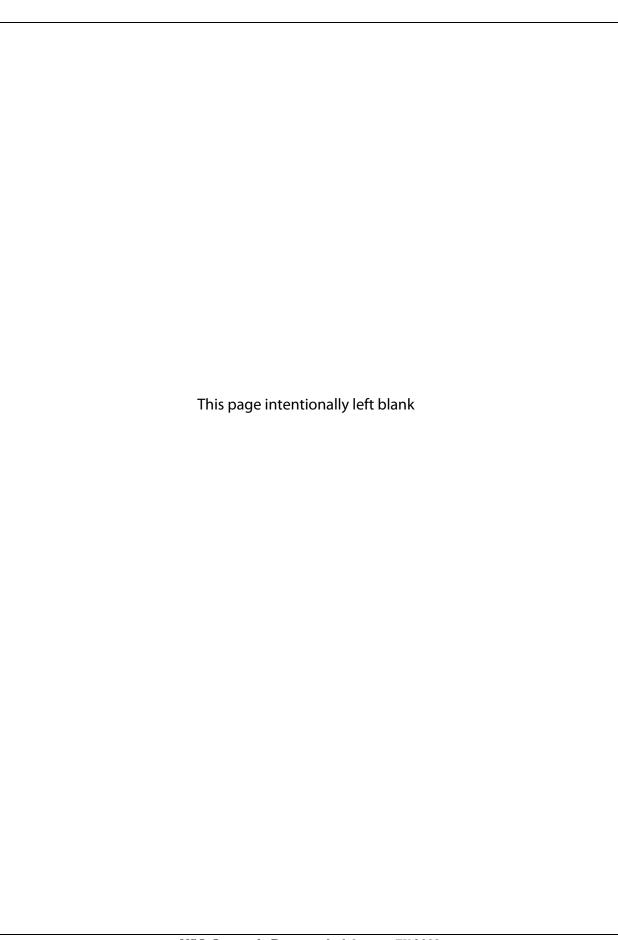
01 January - 31 March 2009

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

Quarterly Report (2) FY 2009 01 January – 31 March 2009

Submitted to the National Science Foundation under Cooperative Agreement No. 0132798 Scientific Program Order No. 2

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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 March 2009. 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 observing programs at NSO facilities this quarter.

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

Table of Contents

I.	Observing Programs	1
II.	Telescope Usage and Performance Data	2
III.	User Statistics – Archives and Data Bases	3
IV.	Public and Educational Outreach Activities	4
٧	7. Risk Management & Safety Report	6
ΑF	PPENDIX – Observing Programs	7

I. Observing Programs*

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

NSO Observing Programs by Type (US and Foreign)		
3 Months Ending March 2009	Nbr	% Total
Programs (US)	18	75%
Programs (non-US)	2	8%
Thesis (US, involving 2 grad students)	2	8%
Thesis (non-US, involving 5 grad students)	2	8%
Total Number of Unique Science Projects*	24	100%

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

Users of NS	O Fa	cilities k	y Cat	egory	
					NSO/NOAO Staff
	US	Non-US	Total	% Total	
PhDs	14	6	20	74%	8
Graduate Students	1	6	7	26%	0
Undergraduate Students	0	0	0	0%	0
Other	0	0	0	0%	14
Total Users	15	12	27	100%	22

Institutions Represented	by Vi	isiting U	sers*	*
	US	Non-US	Total	% Total
Academic	6	5	11	73%
Non-Academic	3	1	4	27%
Total Academic & Non-Academic	9	6	15	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).

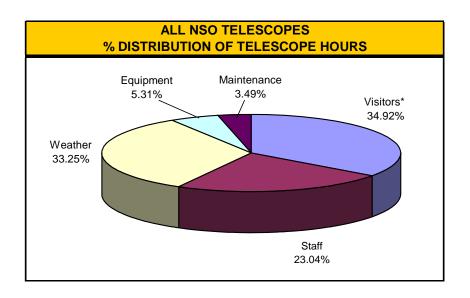
Number of Users by Nationality				
England, UK	2	Italy	1	
Germany	5	Japan	1	
Ireland, UK	3	United States	37	

INSTITUTIONS REPRESENTED BY USERS
Foreign Institutions (6)
University of Sheffield
Kiepenheuer Inst fuer Sonnenphysik
University of Köln
Queen's University
University of Tokyo
INAF - Arcetri Astrophysical Observatory
US Institutions (9)
California State University, Northridge
University of Colorado, CASA
University of Florida
University of Hawaii, Institute for Astronomy
University of Maryland
University of Wisconsin, Madison
Lockheed Martin Solar & Astrophysics Laboratory
NASA/Ames Research Center
NASA/Goddard Space Flight Center (NASA/GSFC)
NASA/Langley Research Center
US Air Force/Philips Lab (USAF/PL/GSS)

II. Telescope Usage and Performance Data

In the quarter that ended 31 March 2009, 34.9% 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; 23.0% was devoted to the programs of NSO and NOAO scientists. Scheduled maintenance, including instrument tests, engineering, and equipment changes accounted for 3.5% of total allotted telescope hours.

Total "downtime" (hours lost to weather and equipment problems) for NSO telescopes was 38.6%. 33.3% of these lost observing hours were due to bad weather, with 5.3% lost to equipment problems.



NSO TELESCOPES Percent Distribution of Telescope Hours (Scheduled vs. Downtime) 01 January 2009 - 31 March 2009							
% Hours Used By: % Hours Lost To: % Hrs. Lost To:						% Hrs. Lost To:	
Telescope	Hours Scheduled	Visitors ^a	Staff	Weather	Equipment	Scheduled Maintenance	
Dunn Solar Telescope/SP	766.0	20.5%	22.5%	40.2%	4.3%	12.5%	
McMath-Pierce*	982.0	23.9%	45.6%	29.5%	0.9%	0.0%	
KP SOLIS Tower ^{a,b}	712.0	61.7%	2.0%	31.0%	5.3%	0.0%	
FTS Lab*	48.0	0.0%	0.0%	0.0%	0.0%	0.0%	
Evans Solar Facility	244.0	33.6%	0.0%	39.3%	27.0%	0.0%	
Hilltop Dome	0.0	0.0%	0.0%	0.0%	0.0%	0.0%	
All Telescopes	All Telescopes 2,752.0 34.9% 23.0% 33.2% 5.3% 3.5%						

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

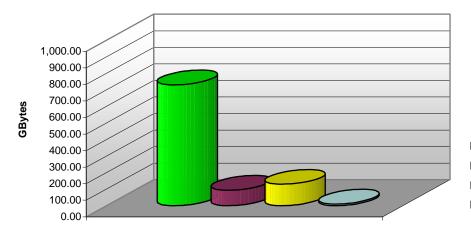
Formerly the Kitt Peak Vacuum Telescope (KPVT).

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 January - 31 March 2009



Domain	Gbytes
U.S. Science (.gov, .edu, .mil)	729.73
Other U.S. (.com, .net, misc.)	93.03
Foreign	129.29
Unresolved	10.02
TOTAL	962.07

■U.S. Science (.gov, .edu, .mil)

■ Other U.S. (.com, .net, misc.)

□ Foreign

Unresolved

PRODUCT DISTRIBUTION BY DOWNLOADED GBYTES

01 January - 31 March 2009

Site	Product Type	Gbytes	%
Т	GONG Helioseismology	634.46	72.7%
SP	Realtime Images and Movies (OSPAN, Other)	64.01	7.3%
T	GONG (Magnetograms, spectra, time series, frequencies)	56.24	6.4%
SP	SMEI Experiment & Data Pages	32.56	3.7%
Т	SOLIS/VSM	29.34	3.4%
SP & T	Other	17.21	2.0%
Т	KPVT (magnetograms, synoptic maps, helium images)	13.19	1.5%
SP	General Information	8.35	1.0%
SP	Press Releases	4.67	0.5%
SP	Staff Pages	3.56	0.4%
SP	Adaptive Optics Pages	1.97	0.2%
SP	Telescope Home Pages	1.84	0.2%
SP	OSPAN Project Pages	1.47	0.2%
SP	Corona Maps & Other Images	1.23	0.1%
Т	FTS (Spectral atlases, general archive)	1.21	0.1%
SP	Icon & Background Images	1.11	0.1%
SP	Public Relations	0.86	0.1%
T	Evans/SP Spectroheliograms (Hα, Calcium K images)	0.00	0.0%
TOTAL		873.28	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), Research Experiences for Teachers (RET), and Other NSO Summer Research Assistantship (SRA) Programs

During this quarter, NSO received 67 applications for the 2009 NSO REU Program, six applications for the RET Program, and eight applications for the Summer Research Assistantship Program. In all, a diverse group of eleven students and teachers will participate in summer research opportunities at locations in Tucson and Sunspot for 2009. Six students were selected for the REU program, two teachers for the RET program, and three students for the graduate SRA program. One of the graduate students is an Air Force Research Laboratory Space Scholar from New Mexico State University, and another graduate student is in the Fisk University Bridge Masters-to-PhD program and will be at NSO as part of NSO's participation in the Partnerships in Astronomy & Astrophysics Research and Education (PAARE) program with Fisk and Vanderbilt Universities.

Among the three applications accepted for the 2009 NSO/GONG International Research Experience for Students (IRES) Program, two U.S. graduate students were selected to participate in the program in Bangalore, India this summer.

2. Other Educational Outreach

During this quarter, John Leibacher served as a *rapporteur* for the *second doctorat* (*Habilitation de Diriger les Recherches*) for Frederic Baudin at the Université de Paris-Sud, France. Leibacher was also an "examiner" for the PhD of Juan Carlos Martinez Oliveros at Monash University, Australia.

Alexei Pevtsov taught (and continues to teach) two introductory astronomy classes (on "The Planets") at New Mexico State University in Alamogordo. This is an on-line class with a combined total of 47 undergraduate students. In March, Mark Giampapa spoke to the "Research Topics for Undergraduates" (Astro 296) class as a guest lecturer at the University of Arizona Department of Astronomy/Steward Observatory.

In early January, Mark Giampapa gave presentations to approximately 100 kindergarten through 4th-grade students and teachers at Fruchthendler Elemenatary School in Tucson on how to do a science fair project. In February, Giampapa and NSO postdoctoral research associate Bill Sherry spent a day judging science fair posters for the 4th grade at Fruchthendler Elementary School and for the 6th grade at St. Michael's Parish Day School in Tucson.

On 26 February, Dave Dooling exhibited at the Holloman Air Force Base Intermediate School "Science Night," and on 04 March, Mark Giampapa, with assistance from Bill Sherry and Robert Sparks (NOAO/PAEO), hosted a star-gazing session at Fruchthendler Elementary School, involving approximately 50 students and parents. NSO's and PAEO's Celestron telescopes were used for this event.

B. Public Outreach

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

On 23 January, Dave Dooling gave invited lectures on the Advanced Technology Solar Telescope (ATST) and the Sunspot Solar System Model to the Texas Astronomical Society in Dallas. During this quarter, Dooling also completed the ATST Maui video, now a 12-minute video expanded from a 7-minute video produced in late 2007 at the request of Maui Community College.

Sunspot Astronomy & Visitor Center	
and McMath-Pierce Solar Telescope Facilit	y
Summary of Visitors and Tours	
(3 Months Ending 03/31/09)	
<u> </u>	

Group/Program	No. of Visitors
General Public Tours	
(Visits to Center and Self-	
Guided Tours)	1,766
Guided Public Tours:	
- School Groups K-12	14
- Special Tours	15
Sub-Total Sunspot Visitors & Tours	1,795
McMath-Pierce Solar Telescope Facility:	
Guided Public Tours:	205
Total Sunspot & McMath-Pierce Visitors & Tours	2,000

On 03 March, Mark Giampapa gave a public

lecture at the Pima Community College (PCC) East Campus on 'Our Star: The Sun' as part of the College's "Lectures Under the Stars" series, and on 10 March, Frank Hill presented a colloquium on "Solar Science with the Global Oscillation Network Group (GONG)" at the University of Arizona Lunar and Planetary Laboratory.

A bookmark has been designed for the NSF to distribute at the "Taste of Arlington" event in May. Get to Know Your Local Star provides basic information on NSO and Web links. A Spanish version also has been produced. Both bookmarks will be widely distributed by NSO.

C. Broadening Participation Activities

During the first (Oct-Dec) quarter of this fiscal year, as part of the AURA/NSO/NOAO renewal of the current Cooperative Agreement with NSF, NSO embarked on efforts to develop a multi-pronged approach to increase the diversity within its staff and more generally within solar physics. The goal of this plan is to provide a better focus and to establish connections with other underrepresented minority programs combined with an advisory structure that will help NSO meet its and NSF's goals for increased diversity. In March, Steve Keil established an NSO Educational and Public Outreach (EPO) Advisory Group to assist with NSO's efforts to reform its EPO program. The individuals who accepted the invitation to serve on this group are Lisa Hunter (Associate Director, Education & Workforce Development, UC-Santa Cruz), Marilyn Lewis (Education Projects Coordinator, WILL Technology, Inc., NASA Marshall Space Flight Center), Edward Prather (Center for Astronomy Education, University of Arizona, Steward Observatory), Sandra Preston (Assistant Director for Education & Outreach, McDonald Observatory), Rhonda Spidell (Albuquerque Academy Science Faculty, NSF Einstein Fellow 2005-2006).

On 23 January, Mark Giampapa, as NSO's Diversity Advocate, gave a lunch talk at the University of Arizona Native American Student Affairs (NASA) chapter to encourage Native American students interest in NSO's REU program. An announcement about the NSO summer 2009 REU program was also distributed via the NASA listserver. In late March, materials about NSO EPO programs were prepared for an exhibit at the 03-04 April Region III Conference of the American Indian Science and Engineering Society (AISES) in Flagstaff, where Giampapa presented a talk on "The Universe and You."

On 09 February, Dave Dooling met with Dr. Marilyn Lewis at NASA Marshall Space Flight Center to discuss NSO EPO activities and strategies for outreach with African American, Hispanic, and Native American groups. Dooling attended and exhibited at the National Society of Black Physicists and National Society of Hispanic Physicists joint conference in Nashville, Tennessee on 11-15 February. He also attended a one-day workshop on Hispanics in Education at New Mexico State University (17 March) and the NSF-sponsored Latinos in Informal Science Education conference in Albuquerque (26-29 March).

V. Risk Management and Safety Report

Risk Management services at NSO/Kitt Peak and Tucson are shared with NOAO. Therefore, see the "NOAO Site Safety Report" Section 2.3.1 of the NOAO January–March 2009 Quarterly Report for details on risk management activities at NSO/Kitt Peak and Tucson. At Sacramentao Peak, the OSHA 300A log was completed and signed by the NSO director, and posted the at Sac Peak facilities.

APPENDIX

National Solar Observatory 01 January - 31 March 2009

January - March 2009: During this period, 24 observing programs, 4 of which were thesis programs involving 7 thesis graduate students, were carried out at NSO. Graduate and undergraduate students are indicated by (T) for thesis students, (G) for non-thesis graduate 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 Experiences for Teachers program participants.

		Nights	Days	Hours
1222		0.0	4.0	48.0
Curtis Rinsland	NASA Langley Research Center	0.0	4.0	40.0
Monitoring of Long-Teri	m Trends in the Concentrations of Atmospheric Gas	ses from McMath FTS	Solar Spectra	
McPE FTS/Mc-P				
1858		0.0	15.0	252.0
William Livingston	National Solar Observatory			
Cycle Variability of the S	Solar Spectrum			
McMath-Pierce Solar Tel	escope Main Spectrograph			
2058		0.0	5.0	33.0
Andrew Potter	National Solar Observatory			
Killen	University of Maryland			
Mouawad	University of Maryland, Dept. of Physics			
Studies of Exospheric En	mission Lines in the Inner Solar System			
McMath-Pierce Solar Tel	escope Stellar spectrograph			
2097		0.0	14.4	40.0
Simon Worden	NASA Ames Research Center			
Keil	National Solar Observatory			
Ca K Solar Rotation				
Evans Facility Sac Pea	ak			
2127		0.0	14.4	42.0

Three-Line Coronal Photometer

Evans Solar Facility (ESF) Sac Peak

		Nights	Days	Hours
2489h		0.0	12.0	96.0
Douglas Gilliam	National Solar Observatory			
Smaga	National Solar Observatory			
Elrod	National Solar Observatory			
Bradford	National Solar Observatory			
Schimming	National Solar Observatory			
Dunn Solar Telescope Maint	enance			
Dunn Solar Telescope (DST)	Sac Peak			
2523		0.0	9.0	48.0
Matthew Penn	National Solar Observatory			
NSO Array Camera Developr	nent			
McMath-Pierce Solar Telesco	pe Main Spectrograph/NSO Array Camera (NAC)			
2531		0.0	13.0	98.0
Haosheng Lin	University of Hawaii, IFA			
Jaeggli (T)	University of Hawaii, Institute for Astronomy			
Facility Infrared Spectro-Pol	arimeter (FIRS) Engineering and Science			
Dunn Solar Telescope (DST)	Sac Peak			
2568 a		0.0	5.0	28.0
Debi Prasad Choudhary	California State University, Northridge			
Penn	National Solar Observatory			
Three-Dimensional Structure	of Solar Magnetic Field			
McMath-Pierce Solar Telesco	pe Main Spectrograph/NSO Array Camera (NAC)			
2569b		0.0	5.0	44.0
Thomas Ayres	University of Colorado, CASA			
Development of CO 5 Micron	Capabilities in Advance of RAISE Rocket Flight			
McMath-Pierce Solar Telesco	pe Main Spectrograph/NSO Array Camera (NAC)			
2570		0.0	77.0	389.0
SOLIS TEAM				
Schramm	National Solar Observatory			
Branston	National Solar Observatory			
SOLIS Synoptic Observations	S			
Kitt Peak SOLIS Tower (KPS				
The real Solid Tower (III)	2) SSEID (COLOT Special magnetograph (1914)			

		Nights	Days	Hours
2576n		10.0	0.0	85.0
Andrew Potter	National Solar Observatory			
Killen	University of Maryland			
Detection of a Lunar Dust Cl	oud			
McMath-Pierce Solar Telescop	e Main Spectrograph			
2576		0.0	10.0	30.0
Andrew Potter	National Solar Observatory			
Killen	University of Maryland			
Detection of a Lunar Dust Cl	oud			
McMath-Pierce Solar Telescop	e Main Spectrograph			
2580		0.0	1.5	14.0
Eric Galayda	National Solar Observatory			
Kitt Peak Solar Telescope En	gineering			
Kitt Peak SOLIS Tower (KPS				
2583a		0.0	6.0	7.5
Kevin Reardon	INAF - Arcetri Astrophysical Observatory			
Berger	Lockheed-Martin Solar & Astrophysics Lab			
Γsuneta	National Astronomical Observatory of Japan			
Γritschler	National Solar Observatory			
Woeger	National Solar Observatory			
Interferometric BIdimension	al Spectrometer (IBIS) Service Mode Observing in C	oordination with l	HINODE	
Dunn Solar Telescope (DST)	Sac Peak			
2583a		0.0	6.0	7.5
Kevin Reardon	INAF - Arcetri Astrophysical Observatory			
Rimmele	National Solar Observatory			
Uitenbroek	National Solar Observatory			
Interferometric BIdimension	al Spectrometer (IBIS) Service Mode Observing in C	oordination with l	HINODE	
Dunn Solar Telescope (DST)	Sac Peak			
2584b		0.0	1.5	15.0
Γhomas Rimmele	National Solar Observatory			
Marino	University of Florida			
Schmidt (T)	Kipenheuer Institut fuer Sonnenphysik			
Richards	National Solar Observatory			
Woeger	National Solar Observatory			
Multi-Conjugate Adaptive Op	tics (MCAO) Development			
Ounn Solar Telescope (DST)	Sac Peak			

		Nights	Days	Hours
2590b		0.0	0.5	0.0
Kevin Reardon	INAF - Arcetri Astrophysical Observatory			
Komsa	National Solar Observatory			
Interferometric BIdimensiona	l Spectrometer (IBIS) Engineering & Testing			
Dunn Solar Telescope (DST)	Sac Peak			
2600		9.0	0.0	77.0
Ronald Oliversen	NASA/Goddard Space Flight Center			
Mierkiewicz	University of Wisconsin-Madison			
Lupie	NASA Goddard Space Flight Center			
Roesler	University of Wisconsin			
Lunar Exospheric Sodium En	nission			
McMP Main Spectrograph				
2601		0.0	9.0	88.0
Guido Sonnabend	University of Cologne, Physikalisches Institut			
Sornig	University of Cologne, Physikalisches Institut			
Kroetz (T)	University of Cologne, Physikalisches Institut			
Kroetz (T) Stupar (T)	University of Cologne, Physikalisches Institut University of Cologne, Physikalisches Institut			
Stupar (T) Investigation of the Day/Night	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from In	frared-Heterodyn	e Spectroscopy	of CO2
Stupar (T)	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from In- action	frared-Heterodyn	e Spectroscopy	of CO2
Stupar (T) Investigation of the Day/Night during Venus Inferior Conjun McMath-Pierce Solar Telescop	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from In- action	frared-Heterodyn 0.0	e Spectroscopy 8.0	of CO2
Stupar (T) Investigation of the Day/Night Inviring Venus Inferior Conjun McMath-Pierce Solar Telescop	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from In- action			
Stupar (T) Investigation of the Day/Night Iduring Venus Inferior Conjun McMath-Pierce Solar Telescop 2605 Alexandra Tritschler	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from In- nection Main Spectrograph			
Stupar (T) Investigation of the Day/Night Investigation of th	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from In- netion Main Spectrograph National Solar Observatory			
Stupar (T) Investigation of the Day/Night during Venus Inferior Conjunt McMath-Pierce Solar Telescop 2605 Alexandra Tritschler Uitenbroek Elmore	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from In- netion Main Spectrograph National Solar Observatory National Solar Observatory	0.0		
Stupar (T) Investigation of the Day/Night during Venus Inferior Conjun McMath-Pierce Solar Telescop 2605 Alexandra Tritschler Jitenbroek Elmore Wavelength Testing for the Ad	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from Ingection Main Spectrograph National Solar Observatory National Solar Observatory National Solar Observatory	0.0		
Investigation of the Day/Night during Venus Inferior Conjunt McMath-Pierce Solar Telescop 2605 Alexandra Tritschler Jitenbroek Elmore Wavelength Testing for the Add	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from Ingection Main Spectrograph National Solar Observatory National Solar Observatory National Solar Observatory National Solar Observatory National Solar Observatory Manced Technology Solar Telescope (ATST) Broadb	0.0		
Stupar (T) Investigation of the Day/Night during Venus Inferior Conjunt McMath-Pierce Solar Telescop 2605 Alexandra Tritschler Uitenbroek Elmore	University of Cologne, Physikalisches Institut tside Symmetry of Venus Upper Atmosphere from Ingection Main Spectrograph National Solar Observatory National Solar Observatory National Solar Observatory National Solar Observatory National Solar Observatory Manced Technology Solar Telescope (ATST) Broadb	0.0 pand Imager	8.0	49.0

Dunn Solar Telescope (DST)

Sac Peak

		Nights	Days	Hours
2607		0.0	12.0	33.0
Mihalis Mathioudakis	Queen's University, Belfast			
Jess (T)	Queen's University, Belfast			
Crockett (T)	Queen's University, Belfast			
Erdélyi	University of Sheffield, Solar Physics & Space Plan	sma Research Cen	tre	
Morton (T)	University of Sheffield, Solar Physics & Space Plan	sma Research Cen	tre	
Observational Signatures of A	Alfven Waves in the Lower Solar Atmosphere			
Dunn Solar Telescope (DST)	Sac Peak			
2608		0.0	10.0	27.0
Alexandra Tritschler	National Solar Observatory			
Reardon	INAF - Arcetri Astrophysical Observatory			
Magnetic & Dynamic Structu	re of the Chromosphere above Sunspots & Pores			
Dunn Solar Telescope (DST)	Sac Peak			
2609		0.0	9.0	72.0
David Elmore	National Solar Observatory			
Gullixson	National Solar Observatory			
Berst	National Solar Observatory			
Fletcher	National Solar Observatory			
Komsa	National Solar Observatory			

SPINOR Level 2 Initial Phase Engineering

Dunn Solar Telescope (DST) Sac Peak