MMT Observatory
Smithsonian Institution &
The University of Arizona®

End of Trimester Summary

September - December 2010

MMT Staff from left: B. Cardwell, D. Porter, D. Clark, M. Hastie, A. Milone, T. Trebisky, G. Williams, D. Gibson, F. Vilas, T. Gerl, M. Guengerich, B. Kunk, B. Russ, T. Oldham, B. Comisso, C. Knop, J.T. Williams. (*Missing*: M. Alegria, C. Chang (student), J. Di Miceli, D. Gerber, J. McAfee, K. Powell, R. Ortiz, S. Schaller, D. Smith)

Note: Brown spot on lower right of mirror shows blemish resulting from re-aluminization on 9/1/10.

Personnel

Shawn Callahan, Principal Engineer, left the MMT in October for a position at the Keck Observatory in Hawaii. Shawn had been with the MMTO for nearly 20 years.

A position opening for a Telescope Operator was posted in November and interviews were conducted in December. After the position is filled, Mike Alegria will transition from telescope operator to the MMTO day crew.

Faith Vilas, MMTO Director, stepped down on December 31, having served as Director since December 2005. In July she had announced her retirement from the University of Arizona.

G. Grant Williams was selected to be the new MMTO Director. His selection was announced on December 14 by Dr. P. Strittmatter, Director of Steward Observatory, University of Arizona and Dr. C. Alcock, Director of the Smithsonian Astrophysical Observatory, Harvard University. (The Smithsonian Institution and the University of Arizona are joint operators of the MMT Observatory.) Dr. Williams will assume the Directorship on January 1, 2011.

Talks and Conferences

A Manager & Supervisor Safety Training Workshop sponsored by Steward Observatory was held on September 15. MMT personnel attending were D. Smith, and R. Ortiz.

At the October 5 Steward Observatory *Observer's Lunch,* G. Williams presented a talk on the summer shutdown activities.

The annual MMTO staff meeting and photo was held at the summit on November 9.

Primary Mirror Systems

Primary Mirror Support

Work continues on the rebuilding and upgrade of the actuator test stand to use EtherCAT instead of a VME crate. The two 19" chassis, one for the power supplies and the other for electronics, have been designed and manufactured by the electronics group. Work continues on the EtherCAT interface card that brings the test stand and calibration signals to the I/O modules.

The hardpoint limits were tested and the logic was found to be backward under very limited conditions. If the optical limit switches fail to sense overextension of the hardpoint and the cherry switch is tripped, the logic applied by the safety box is incorrect. The logic state should go high rather than low when the safety box override button is depressed. This function is separate from software control; the software has been tested and is working properly. A new card was designed using ExpressPCB software. The new cards are on hand and will be tested at the telescope on the spare hardpoint with the cell wiring. This will allow us to monitor the graphic user interface (GUI) while tripping limits.

Actuators

Documentation on single and dual actuator mounting, testing, and troubleshooting procedures began in September and was finished in November.

In December an actuator troubleshooting document was started. Drawings of actuator electronic cards are being completely redone and a step-by-step document will be provided with explanations on how to test the actuator cards and verify that they are in good working order. This project should be completed by February 2011.

Aluminization

After weeks of preparation, the MMT primary (M1) mirror was re-aluminized on September 1, 2010. The previous aluminization was in 2005. The planned shutdown period for re-aluminization was scheduled for seven weeks, with shutdown beginning on Tuesday, July 20th and nighttime operations scheduled to resume on Tuesday, September 7th. The actual shutdown period lasted eight weeks and one day with operations resuming on Wednesday, September 15th.

The aluminization event itself lasted approximately two and a half minutes. The aluminization welders were powered during this time only. These welders heated an array of aluminum filaments into a vacuum chamber that enclosed the primary mirror. During this two-minute period, approximately 1000 Angstroms of pure aluminum were deposited at a rate of up to 50 Angstroms/second.

Although the process appeared to proceed without issue, when the coating was inspected following removal of the vacuum bell jar it was evident that something had gone wrong that resulted in two areas of the primary mirror showing a visibly poor coating. The largest area is on the right side of the primary (when viewed from the front) centered at approximately the four o'clock position. The second area is a much smaller area positioned at around the seven o'clock. In this area some of the coating is very thin to the point of showing bare glass. The shape of the major blemished area approximates an oval of 100" by 45". This corresponds to approximately 6.9% of the collecting area. Assuming that area is completely non-reflective, the MMT would have an equivalent collecting area of a 6.27 meter primary mirror.

Although we are still investigating the cause of the blemish, it is evident that hot aluminum penetrated the mylar vacuum barrier near where the blemish occurred and that the discoloration is almost certainly due to this penetration. We are currently drafting a report to discuss the aluminization data and attempt to identify the cause of the blemish and how we plan to avoid such an incident in the future. That report will be available as an MMT Internal Tech Memo when it is completed.

The rebuilt aluminization equipment performed well during the primary mirror coating. It was quite beneficial to have built-in voltage and current displays for the glow-discharge cleaning power supply. Data were also collected with the Fluke power quality meter on the input 480VAC to the welders. The welder data normally collected (each units' output voltage and current, and vacuum jar circuit load voltage) can be combined with the AC power measurements to ensure we have adequate utility wiring to supply the welders when we install a permanent circuit breaker panel to feed them.

Secondary Mirror Systems

Adaptive Optics (AO)

The original electronic copies of the Acceptance Package from Microgate for the f/15 deformable mirror (DM) control system were found by K. Powell and copied into the electronics group archive on the MMTO server. We now have a full set of schematics for the DM controller. At this time, we have a minimal set of schematics for the AO rack electronics. K. Powell also gave the electronics group a set of bad mirror actuators, a small test box for them, and a small Digital Signal Processing (DSP) test box. We plan to re-package the DSP test box and actuator tester to facilitate off-line testing of actuators with actual DM hardware for test and repair of actuators. A solid, dependable hardware test suite should make off-line software development possible as well.

Telescope Tracking and Pointing

Servos

The MMT azimuth axis servo upgrade continued. Data collected before summer shutdown were reduced, and D. Clark produced several reports documenting the results. The reports were circulated internally among MMTO staff, and are available to others via the base URL: www.mmto.org/~dclark/Reports. The reports cover open-loop measurements of the azimuth drive system, closed-loop responses of the existing LM628-based controller, and friction/windup measurements.

During data reduction, it became clear that some measurements will need to be repeated to get cleaner results. The original data-collection effort was conducted rather quickly in order to get all the data needed for servo modeling. The next data-collection effort will take place in a more planned and unhurried manner.

To assist in understanding the mechanical aspects of the azimuth control system, and understand the underlying physical sources from measured data, Simulink offers a toolbox called Simscape for modeling physical systems in several domains (electrical, mechanical, thermodynamics) using dimensioned variables and the energy exchanged among various elements (e.g., masses, springs, dampers). It includes a mechanical simulation environment for rigid-body kinematics called SimMechanics. An add-on tool for direct export of solid models created in 3D CAD with SolidWorks allows easy translation of 3D models to SimMechanics models. To probe the rigid-body characteristics (moment of inertia, forward and reverse kinematics), a solid model of the telescope was produced in SolidWorks to drive SimMechanics' study of the pure rigid-body motion of the azimuth axis. Unfortunately, there is no automated method to translate the rigid-body model elements into SimScape to bring in the torsional elements (shaft springs) to the mechanical model. We can approximate those elements through calculation of the stiffness of the various parts in the drivetrain, and use this information to construct accurate SimScape models of the azimuth system. A good mechanical model can be used to determine the optimum servo topology, location of sensors, and other aspects of the servo design.

Adaptive Secondary Status

During the October NGS-AO run, numerous problems with the deformable secondary mirror were encountered. As a result of this, a series of tests on the DM was conducted in November and early December 2010.

The NGS-AO run in December was successful, and the adaptive secondary mirror performed well under a variety of weather conditions including large temperature changes and high humidity. Although the adaptive secondary performed well, additional work will be completed on both hardware and software to make the system more robust.

A report was written, entitled "Status of Adaptive Secondary Testing - Nov/Dec 2010", in which some of the issues seen during operation of the DM are documented. The report also reviews the various tests conducted, data collected, and preliminary conclusions. The status of the DM prior to the December AO run is then discussed along with tasks that still need to be performed in the January-February 2011 time period. It will become an MMT Internal Technical Memorandum and will be posted soon on our website under the *Publications* tab.

Computers and Software

S. Schaller made good progress on the actuator test stand software during the reporting period.

The blue/red channel spectrograph control software was modified to accept a larger range of mounting tilt offsets, and to ignore extraneous characters being sent from the spectrograph.

Numerous weather plots were updated for the Yankee, Young, Vaisala 3 and 4. Annunciator checks were added for the blower, carrier, compressors, pit Neslab, and pit HP-DAU. The Neslab GUIs were updated to use the dataserver2 service.

Initial study of Fedora 14 was begun, in order to prepare for upgrades to the MMT Linux machines in January.

Guider hardware/software upgrade

The f/9 guiding at the MMT has traditionally been done with video images captured by a Fedora-based Linux computer ("telstat") with an internal video framegrabber card. Use of this framegrabber card required recompiling (and commonly modifying) the driver software code with each Fedora operating system upgrade, which typically occurs every six months. This software complexity made operating system upgrades of this particular Linux machine problematic and time consuming.

The software group decided to replace both the Linux PC and its framegrabber card with a single AXIS (http://www.axis.com/) M7001 Ethernet video encoder. This encoder is a stand-alone embedded network device that captures images and makes them available to other (e.g., guider) software over the network. The MMT f/9 guider software was modified to use images from the new video encoder/server. All tests of the new hardware/software proved successful, and on November

5, 2010, the transition to the modified guider software and new network video server was completed.

Replacing Skycam PC/framegrabber with a Video Server (Axis)

Work began on replacing the "skycam" Linux PC (http://skycam.mmto.arizona.edu/) and its internal framegrabber card with an AXIS M7701 ethernet video encoder (similar to the one used to replace the "telstat" Linux PC and framegrabber described above). This replacement will eliminate the need to maintain the skycam Linux PC and the associated framegrabber driver software. As with the telstat computer, upgrades in the Linux operating system on the skycam computer require recompiling (and commonly modifying) the framegrabber driver source code. Use of the new video server network device will reduce both hardware and software maintenance requirements for the skycam system.

AO software

Considerable work was done on the adaptive optics (AO) software used with the f/15 secondary. The ao-server Linux machine was replaced with new hardware and the Fedora 14 operating system was installed on it. This new computer was configured with a 1TB RAID 1 hard drive array for data storage redundancy.

Versions 7.1 and 8.0 of the IDL programming language were installed on ao-server and its license was updated. AO graphic user interface (GUI) changes related to focus were implemented and the audible alerts for the GUI were restored. Programming errors in the deformable mirror (DM) telemetry plots were also fixed. Debugging started on the AO "seeing" monitor. The PC-reconstructor (PCR) code, used to calculate real-time AO corrections, was studied to see if actuator positions and currents could be obtained during open loop conditions (i.e., when the secondary is not operating in closed loop on a target).

Network Upgrades

Network upgrades began for both MMT mountain and campus operations. The upgrade at the MMT and associated buildings (i.e., support and common buildings) will include a completely new telephone system. The MMT mountain network upgrade is being led by the Smithsonian Institution (SI), including the Office of Information Technology Operations, based in Washington, D.C. The MMT campus upgrade is part of a new Steward Observatory/UITS (University Information Technology Services) network infrastructure effort. The two network upgrade efforts are occurring simultaneously and are being coordinated.

Upgrades to the MMT mountain operations will include: 1) approximately five new Cisco network switches, three of which will be in the MMT building itself, 2) network re-cabling throughout the MMT building, Support building, and Common building, 3) upgrades to the microwave link from Steward Observatory (on the University of Arizona campus) to the Mt. Hopkins summit, including larger microwave antennae, and 4) replacing the existing phones at the MMT with new VOIP (Voice over IP) phones.

As part of this upgrade, a subnet (199.104.150/24) was transferred from SI to the MMT for long term use in campus operations. Previously, the MMT had used a single subnet (128.196.100/24) that spanned both the campus and mountain operations. The 128.196.100/24 subnet will now be dedicated solely to MMT mountain operations. The new 199.104.150/24 subnet will be used for all MMT town operations. Work over the next few weeks will include transferring all MMT campus computers to the new subnet. All MMT mountain computers and network devices will remain unchanged on the existing 128.196.100/24 subnet. Various network topology changes are also planned to increase network flexibility, reliability, and security.

Summary of Service Request (SR) Activity

The MMT Service Request (SR) system is a web- and email-based informational system of operational issues that are segregated within a MySQL database by priority, subject, and category. The SR system is used by the entire staff for immediate communication and long-term documentation as operational issues are being addressed and resolved.

Figure 1 summarizes the priority levels of the 38 new SR entries that were created from September through December 2010. The different possible SR priority levels include: none/information only, low, important, near-critical, and critical.

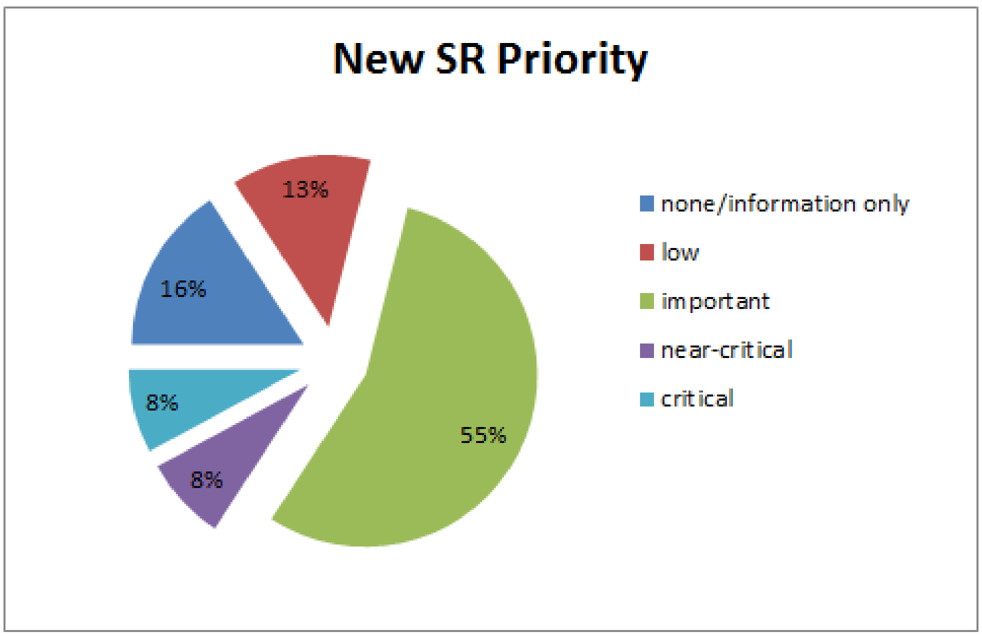

Figure 1. Breakdown of new service request (SR) entries based on priority for September-December 2010.

A total of 8% of the new SR entries during this trimester were of critical priority. Critical SRs are those that require immediate attention and have typically halted observatory operations until the SR has been addressed and resolved.

Issues related to near-critical SRs typically do not interrupt observatory operations, but have an imminent potential of doing so. During this time period, 8% of the new SRs were of near-critical priority.

The majority (55%) of the new SR entries during this trimester were of an important priority. This level indicates that the SR entry should be addressed soon since it could potentially impact observatory operations. In many cases, recognizing a potentially problematic issue early and indicating that it is of "important" priority prevents the issue from escalating into a near-critical or critical situation.

Finally, 13% of the SR entries were of low priority and 16% were of none/information only priority. Low priority entries can be addressed as time and resources allow. None/information only SR entries are used to inform the staff of changes within telescope subsystems.

Figure 2 presents the different category areas for the 38 new SR entries during this period. The majority of new SR entries were related to the telescope system itself, followed by the thermal system and the primary mirror cell.

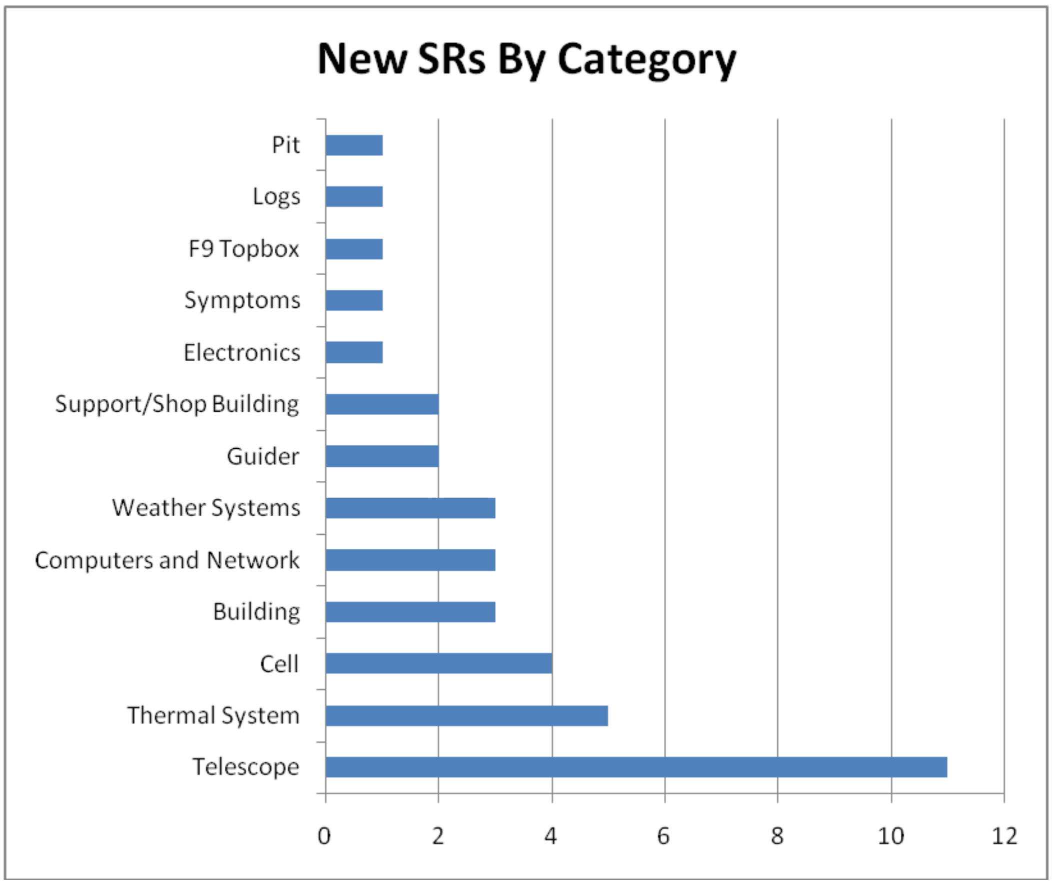

Figure 2. New service requests (SRs) created by category for September-December 2010.

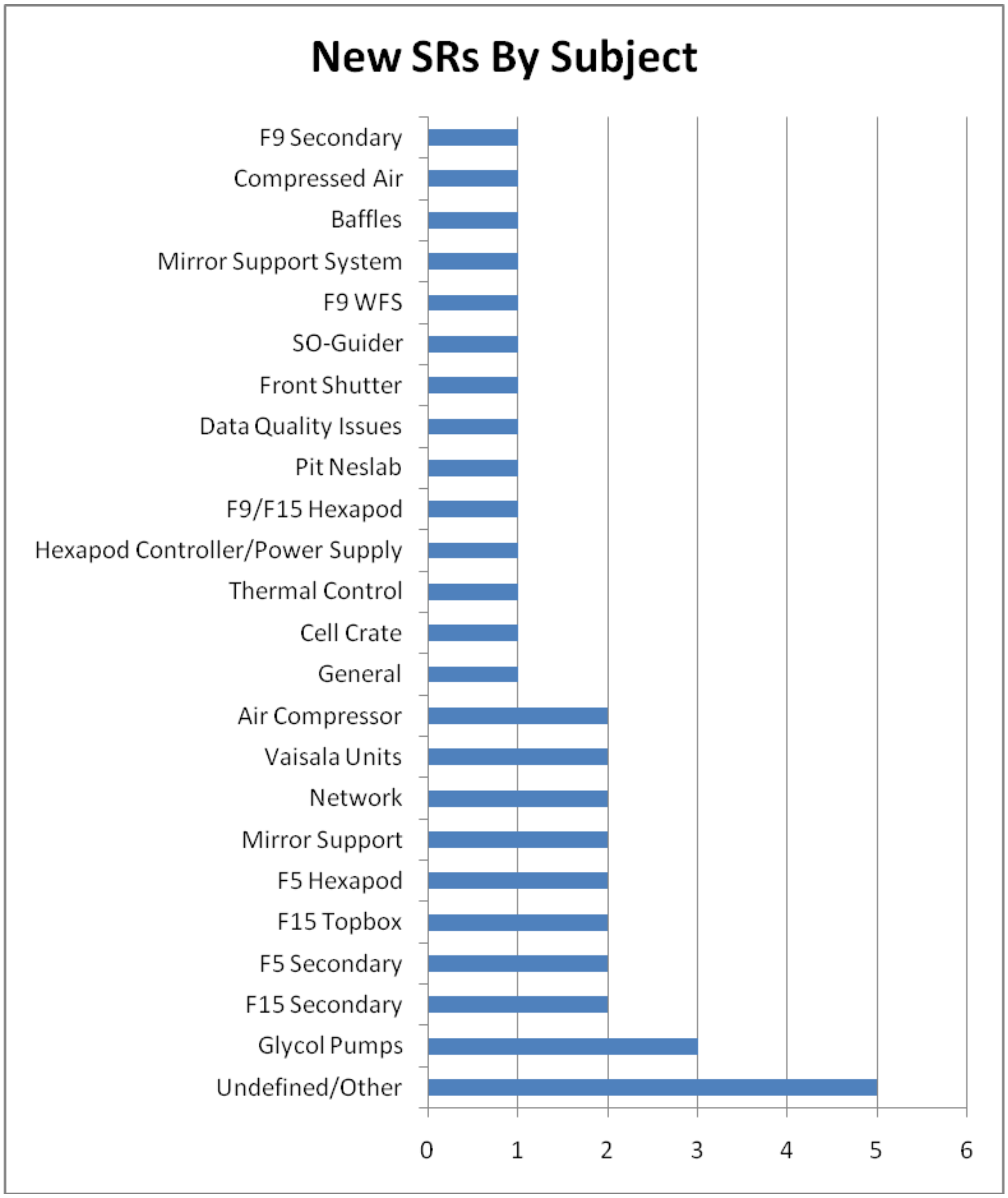

Figure 3. New SRs created by subject for September-December 2010.

Each SR is opened with an initial entry, commonly by the telescope operator. This initial entry is followed by one or more responses by staff members until the SR is closed. A total of 72 SR responses were submitted to existing or new SRs during the reporting period. Figure 4 displays the responses to new and existing SRs by categories as defined within the SR system, while Figure 5 illustrates the same responses according to their subject area.

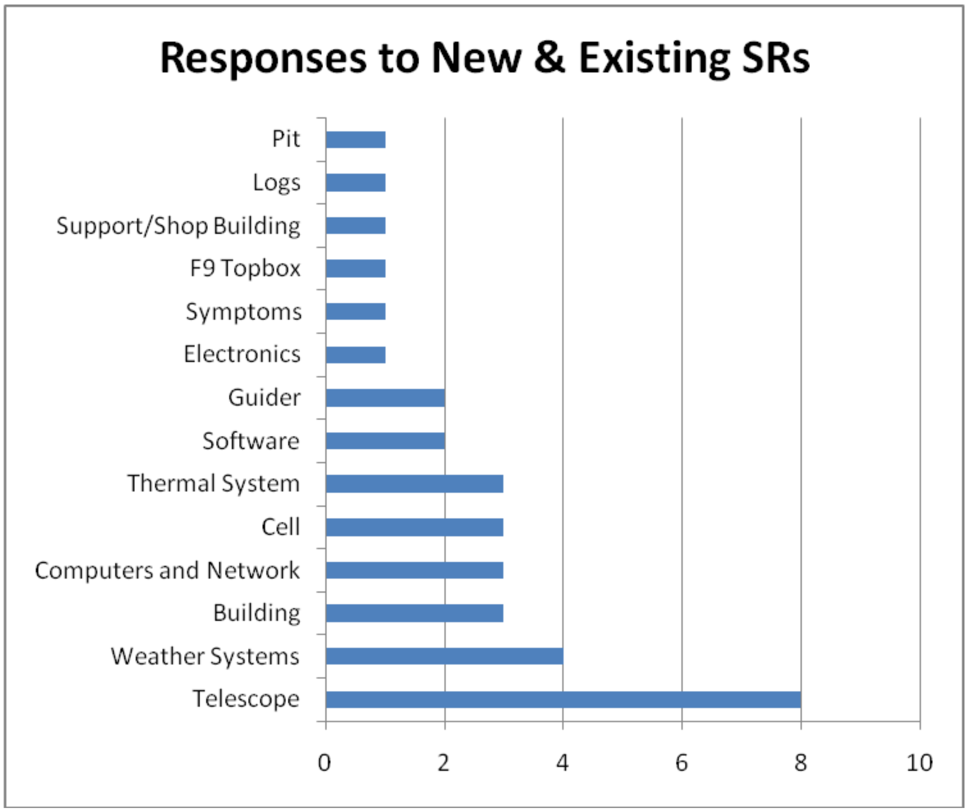

Figure 4. Responses to new and existing SRs by category for September-December 2010.

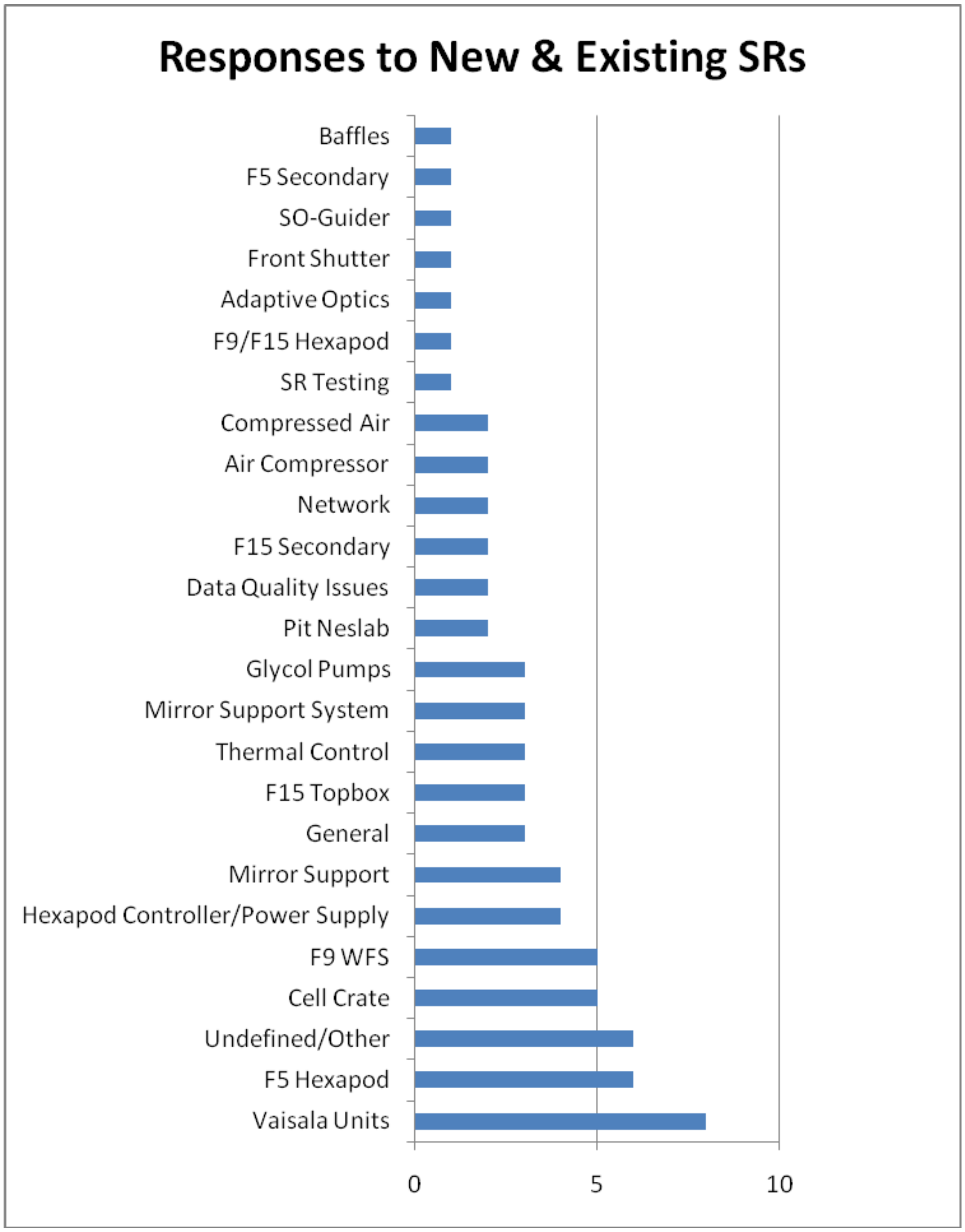

Figure 5. Responses to new and existing SRs by subject for September-December 2010.

Instruments

f/5 Instrumentation

Weather caused us to lose some time during this trimester due to clouds, wind, and humidity, plus two partial nights to very cold temperatures. Of the 36 nights that were scheduled, we were able to open for 30 of those nights, which resulted in taking sky data 40% of the scheduled hours. We obtained 479 science exposures on 136 fields.

The SAO computer rack transfer was completed in September. The computers did not boot up properly when initially repowered; messages regarding a memory problem were displayed. The problem cleared itself after the CPUs had been powered up for a while. There were a few cables/labels/connections that needed to be corrected, but the process went relatively smoothly. The graphics card on the server “clark” failed a couple of weeks later and was replaced with another NVIDIA card when performance of the spare Radeon card was found to be lacking.

A fourth server computer is undergoing modest upgrades: an improved motherboard and a new power supply have been added. Soon a new CPU within the same family and additional memory will be tested to investigate the possibility of upgrading the servers “lewis,” “clark,” and “hudson” in the future.

The spectrograph room O_2 sensor registered a lower oxygen concentration in the building during the final stages of the mirror coating when all of the cryo-pumps were operating. It also later seemed to rapidly lose its calibration, reporting numbers such as 19.8% oxygen content rather than 20.9%. The unit was re-calibrated and has since been working normally.

Hecto

When Hecto went into operation after all the reconfigurations done for the re-aluminization, no guider image could be seen. After one night of tracking with the robots it was determined that the problem was with the coax cable between the positioner and the SAO rack, in particular at the connector on the drive arc. A temporary cable was run from the positioner and through the energy chain until the right pins and tools could be obtained and the connector repaired in late September. The panel on the drive arc was modified so that the cable could be moved more easily, should that become necessary in the future.

The control of the Helium booster comparison lamp for Hectospec was moved to the Spice interface on the computer's GUI to match the other lamp controls. The RFI remote switch will no longer be needed in the yoke room. The new setup is easier for the observer/robot operator, and ensures that the lamp is off when the SAO rack is powered down. Problems developed late in the trimester with the Chelle calibration lamps and are believed to be due to the connectors. New connectors were purchased, and the cables will be fixed before observations resume.

The home values for the robot #1 angular positioning system, P1 and T1, were erratic during this trimester, drifting by tens of microns from the nominal values. The problem was corrected by adjusting the home offset using limit values as reference.

Logs of equipment temperatures for the trimester are posted on Marc Lacasse's Center for Astrophysics webpage. Logs of equipment/observational operations are posted in a private area on his webpage, and anyone wishing to review these should contact him at mlacasse@cfa.harvard.edu for access.

General Facility

Weather and Environmental Monitoring

Wind monitor Vaisala 3 was brought back online. It had been offline since construction began on the Instrument Repair Facility (IRF) in the previous year. Associated power and fiber were run to a weather proof box at the base of the east flagpole. A new enclosure was mounted inside the IRF to house the additional electronics.

MMTO Home Page

The new MMT Observatory website (http://www.mmto.org) was launched on November 3, 2010. As seen in Figure 6, this new site is designed for the professional astronomer planning to observe at the MMT, as well as providing history, news, and an image gallery for the general public.

We hope that astronomers will find everything they need at their fingertips in order to successfully apply for time, observe with any of the observatory facilities, and publish their work. We have re-structured the pages and believe they are much more intuitive to navigate.

We have also incorporated our "blog" into the new website under the "Latest News" tab. As new blogs are entered they appear on the front page so we can swiftly bring important messages to the user community.

Content has been updated and expanded. Work will be ongoing as we continue to improve and update observatory information.

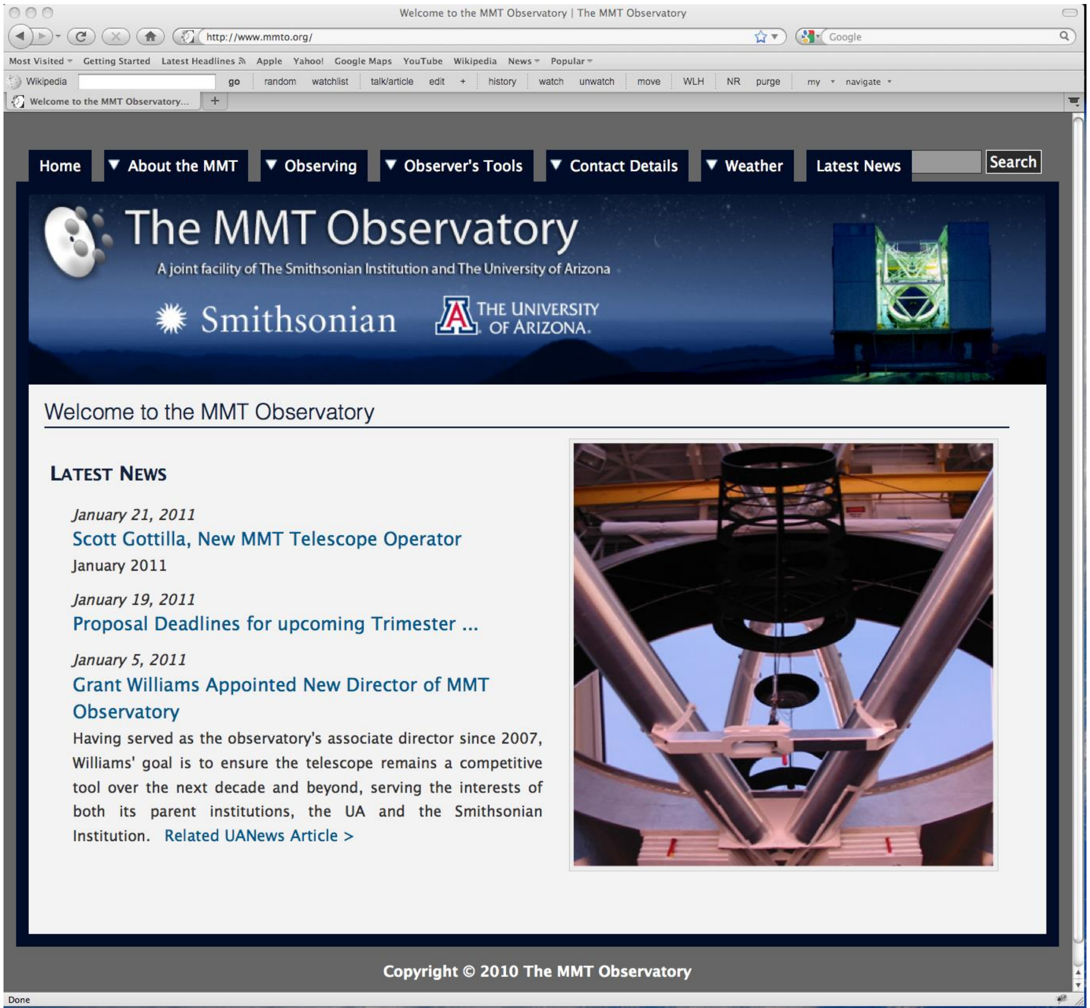

Figure 6. Sample page of the new MMTO website.

Visitors

9/21/10 – Douglas Trumbull, director of special effects in science fiction movies, toured the MMT. His movies include *2001 – A Space Odyssey, Star Trek* (the movie), *Close Encounters of the Third Kind,* and *Blade Runner*, among others.

MMTO in the Media

No activity to report.

Publications

MMTO Internal Technical Memoranda

None

MMTO Technical Memoranda

None

MMTO Technical Reports

None

Scientific Publications

10-46 A Software Framework for Telemetry and Data Logging, MMT Observatory
J.D. Gibson, T. Trebisky, S. Schaller, D. Porter
Proc. SPIE, **7740**, 77403M
http://dx.doi.org/10.1117/12.856595

10-47 Characterization of Synthetic Reconstructors for the Pyramid Wavefront Sensor Unit of LBTI
V. Bailey, et al.
Proc. SPIE, **7736**, 77365G
http://dx.doi.org/10.1117/12.857457

10-48 Progress on MMT-POL, the 1.5 μm Adaptive Optics Optimized Polarimeter for the MMT
C. Packham, et al.
Proc. SPIE, **7735**, 77356J
http://dx.doi.org/10.1117/12.856594

10-49 Results from the Laboratory Demonstration of the Non-Linear Curvature Wavefront Sensor
M. Mateen, et al.
Proc. SPIE, **7736**, 773619
http://dx.doi.org/10.1117/12.857727

10-50 Faint Collimated Herbig-Haro Jets from Visible Stars in L1641
B. Reipurth, et al.
AJ, **140**, 699
http://dx.doi.org/10.1088/0004-6256/140/3/699

10-51 GALEX and PAN-STARRS1 Discovery of SN IIP 2010aq: The First Few Days after Shock Breakout in a Red Supergiant Star
S. Gezari, et al.
ApJ Lett., **720**, L77
http://dx.doi.org/10.1088/2041-8205/720/1/L77

10-52 Constraints on Long-Period Planets from an *L'*- and *M*-Band Survey of Nearby Sun-like Stars: Observations
A.N. Heinze, et al.
ApJ, **714**, 1551
http://dx.doi.org/10.1088/0004-637X/714/2/1551

10-53 X-Ray and Infrared Emission from Young Stellar Objects near LkHα 101
S.J. Wolk, et al.
ApJ, **715**, 671
http://dx.doi.org/10.1088/0004-637X/715/1/671

10-54 The Evolution of the Star Formation Rate of Galaxies at $0.0 \leq z \leq 1.2$
W. Rujopakarn, et al.
ApJ, **718**, 1171
http://dx.doi.org/10.1088/0004-637X/718/2/1171

10-55 UGC8802: A Massive Disk Galaxy in Formation
S. Moran, et al.
ApJ, **720**, 1126
http://dx.doi.org/10.1088/0004-637X/720/2/1126

10-56 Accurate Masses for the Primary and Secondary in the Eclipsing White Dwarf Binary NLTT 11748
M. Kilic, et al.
ApJ Lett., **721**, L158
http://dx.doi.org/10.1088/2041-8205/721/2/L158

10-57 High-Contrast 3.8 μm Imaging of the Brown Dwarf/Planet-Mass Companion to GJ 758
T. Currie, et al.
ApJ Lett., **721**, L177
http://dx.doi.org/10.1088/2041-8205/721/2/L177

10-58 Time-Variable Accretion in the TW Hya Star/Disk System
J.A. Eisner, et al.
ApJ Lett., **722**, L28
http://dx.doi.org/10.1088/2041-8205/722/1/L28

10-59 The ELM Survey. I. A Complete Sample of Extremely Low-Mass White Dwarfs
W.R. Brown, et al.
ApJ, **723**, 1072
http://dx.doi.org/10.1088/0004-637X/723/2/1072

10-60 The Structure of the β Leonis Debris Disk
N.D. Stock, et al.
ApJ, **724**, 1238
http://dx.doi.org/10.1088/0004-637X/724/2/1238

10-61 Methane and Nitrogen Abundances on Pluto and Eris
S.C. Tegler, et al.
ApJ, **725**, 1296
http://dx.doi.org/10.1088/0004-637X/725/1/1296

10-62 The *400d* Galaxy Cluster Survey Weak Lensing Programme I. MMT/Megacam Analysis of CL0030+2618 at $z = 0.50$
H. Israel, et al.
A&A, **520**, A58
http://dx.doi.org/10.1051/0004-6361/200913667

10-63 The Population of Planetary Nebulae and H II Regions in M81, A Study of Radial Metallicity Gradients and Chemical Evolution
L. Stanghellini, et al.
A&A, **521**, A3
http://dx.doi.org/10.1051/0004-6361/201014911

10-64 Empirical Optical *k*-Corrections for Redshifts
E. Westra, et al.
PASP, **122**, 1258
http://dx.doi.org/10.1086/657452

10-65 Continuous Monitoring of Comet Holmes from before the 2007 Outburst
E. E. El-Houssieny, R.J. Nemiroff, T.E. Pickering
Astrophys. Space Sci., **330**, 19
http://dx.doi.org/10.1007/s10509-010-0350-x

10-66 Constraints on Extrasolar Planet Populations from VLT NACO /SDI and MMT SDI and Direct Adaptive Optics Imaging Surveys: Giant Planets are Rare at Large Separations
E.L. Nielsen, et al.
Physics and Astrophysics of Planetary Systems, EAS Publ. Series, **41**, 107
http://dx.doi.org/10.1051/eas/1041008

10-67 Host Galaxy Colour Gradients and Accretion Disc Obscuration in AEGIS $z \sim 1$ X-ray-Selected Active Galactic Nuclei
C.M. Pierce, et al.
MNRAS, **408**, 139
http://dx.doi.org/10.1111/j.1365-2966.2010.17136.x

10-68 The Optical Spectra of X-shaped Radio Galaxies
H. Landt, C. C. Cheung, S.E. Healey
MNRAS, **408**, 1103
http://dx.doi.org/10.1111/j.1365-2966.2010.17183.x

10-69 The First VLBI Image of the Young, Oxygen-rich Supernova Remnant in NGC 4449
M.F. Bietenholz, et al.
MNRAS, **409**, 1594
http://dx.doi.org/10.1111/j.1365-2966.2010.17402.x

10-70 2M1938+4603: A Rich, Multimode Pulsating sdB Star with an Eclipsing dM Companion Observed with *Kepler*
R.H. Ostensen, et al.
MNRAS Lett., **408**, L51
http://dx.doi.org/10.1111/j.1745-3933.2010.00926.x

10-71 LoCuSS: Probing Galaxy Transformation Physics with *Herschel*
G.P. Smith, et al.
A&A, **518**, L18
http://dx.doi.org/10.1051/0004-6361/201014691

10-72 LoCuSS: Shedding New Light on the Massive Lensing Cluster Abell 1689 – the View from *Herschel*
C.P. Haines, et al.
A&A, **518**, L19
http://dx.doi.org/10.1051/0004-6361/201014692

10-73 Structural and Core Parameters of the Hot B Subdwarf KPD 0629-0016 from CoRoT G-Mode Asteroseismology
V. Van Grootel, et al.
A&A, **524**, A63
http://dx.doi.org/10.1051/0004-6361/201015437

10-74 Eclipsing Binaries in the MOST Satellite Fields
T. Pribulla, et al.
Astron. Nachr., **331**, 397
http://dx.doi.org/10.1002/asna.201011351

10-75 AEGIS: A Multiwavelength Study of *Spitzer* Power-Law Galaxies
S.Q. Park, et al.
ApJ, **717**, 1181
http://dx.doi.org/10.1088/0004-637X/717/2/1181

10-76 Spectroscopic Analysis of Hot, Hydrogen-rich White Dwarfs: The Presence of Metals and the Balmer-line Problem
A. Gianninas, P. Bergeron, J. Dupuis, et al.
ApJ, **720**, 581
10.1088/0004-637X/720/1/581

10-77 PG 0907+123 and JL 194: Slowly Pulsating Hot Subdwarf Stars
C. Koen, E.M. Green
MNRAS, **406**, 2701
10.1111/j.1365-2966.2010.16868.x

10-78 SDSS J094604.90+183541.8: A Gravitationally Lensed Quasar at $z = 4.8$
I.D. McGreer, P.B. Hall, X. Fan, et al.
AJ, **140**, 370
10.1088/0004-6256/140/2/370

10-79 The Evolution of Quasar C IV and Si IV Broad Absorption Lines over Multi-year Timescales
R.R. Gibson, W.N. Brandt, S.C. Gallagher, et al.
ApJ, **713**, 220
10.1088/0004-637X/713/1/220

Non-MMT Scientific Publications by MMT Staff

None

Observing Reports

Copies of these publications are available from the MMTO office. We remind MMT observers to submit observers' reports, as well as preprints of publications based on MMT research, to the MMTO office. Such publications should have the standard MMTO credit line: "Observations reported here were obtained at the MMT Observatory, a facility operated jointly by the Smithsonian Institution and the University of Arizona."

Submit publication preprints to *mguengerich@mmto.org* or to the following address:

MMT Observatory
P.O. Box 210065
University of Arizona
Tucson, AZ 85721-0065

Observing Database

The MMTO maintains a database containing relevant information pertaining to the operation of the telescope, facility instruments, and the weather. Details are given in the June 1985 monthly summary. The data attached to the back of this report are taken from that database.

Use of MMT Scientific Observing Time

September 2010

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	*Lost to Telescope	Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PI Instr	13.00	132.00	36.00	14.70	16.80	0.00	0.00	67.50
Engr	2.00	20.00	10.10	0.00	0.00	0.00	0.00	10.10
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**15.00**	**152.00**	**46.10**	**14.70**	**16.80**	**0.00**	**0.00**	**77.60**

Time Summary Exclusive of Shutdown

Percentage of time scheduled for observing	86.8
Percentage of time scheduled for engineering	13.2
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	30.3
Percentage of time lost to instrument	9.7
Percentage of time lost to telescope	11.1
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	51.1

* Breakdown of hours lost to telescope

8.3 M2 gap contamination
2.5 M2 software and actuator
3.0 M1 thermal issues
1.0 M2 software (f/15)
0.5 f/15 WFS
0.5 M2 problems (f/15)
1.0 DM position error & loop instability

October 2010

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	* Lost to Telescope	**Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	1.00	11.30	0.50	0.00	0.50	0.00	0.00	1.00
PI Instr	27.00	291.90	132.95	1.70	22.40	0.00	0.00	157.05
Engr	3.00	33.20	4.50	0.00	3.50	0.00	0.00	8.00
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**31.00**	**336.40**	**137.95**	**1.70**	**26.40**	**0.00**	**0.00**	**166.05**

Time Summary

Percentage of time scheduled for observing	90.1
Percentage of time scheduled for engineering	9.9
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	41.0
Percentage of time lost to instrument	0.5
Percentage of time lost to telescope	7.8
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	49.4

* Breakdown of hours lost to telescope

22.6 DM (f/15)
1.0 DM won't flatten
0.5 Hexapod hardware
0.3 Hexapod hung up
1.5 DM (f/15) and WF camera
0.5 WFS casued M1 panic w/high force on act. 114

Year to Date October 2010

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	Lost to Telescope	Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	66.00	614.90	219.40	0.60	1.75	0.00	0.00	221.75
PI Instr	166.00	1643.30	534.95	32.65	101.10	0.00	0.00	668.70
Engr	15.00	148.80	48.00	0.00	3.50	0.00	0.00	51.50
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**247.00**	**2407.00**	**802.35**	**33.25**	**106.35**	**0.00**	**0.00**	**941.95**

Time Summary Exclusive of Summer Shutdown

Percentage of time scheduled for observing	93.8
Percentage of time scheduled for engineering	6.2
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	33.3
Percentage of time lost to instrument	1.4
Percentage of time lost to telescope	4.4
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	39.1

Use of MMT Scientific Observing Time

November 2010

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	*Lost to Telescope	**Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	16.00	183.60	21.90	0.00	1.00	0.00	0.00	22.90
PI Instr	12.00	141.60	64.00	0.00	0.20	0.75	0.00	64.95
Engr	2.00	23.40	0.00	0.00	0.00	0.00	0.00	0.00
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**30.00**	**348.60**	**85.90**	**0.00**	**1.20**	**0.75**	**0.00**	**87.85**

Time Summary

Percentage of time scheduled for observing	93.3
Percentage of time scheduled for engineering	6.7
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	24.6
Percentage of time lost to instrument	0.0
Percentage of time lost to telescope	0.3
Percentage of time lost to general facility	0.2
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	25.2

* Breakdown of hours lost to telescope
0.75 Hacksaw issues
0.25 Videoscope's guider
0.20 M1 panic

** Breakdown of hours lost to facility
0.75 Power failure

December 2010

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	* Lost to Telescope	**Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	20.00	239.30	50.40	0.25	0.50	0.75	0.00	51.90
PI Instr	10.00	120.00	70.50	0.00	2.00	3.50	0.00	76.00
Engr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**30.00**	**359.30**	**120.90**	**0.25**	**2.50**	**4.25**	**0.00**	**127.90**

Time Summary

Percentage of time scheduled for observing	100.0
Percentage of time scheduled for engineering	0.0
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	33.6
Percentage of time lost to instrument	0.1
Percentage of time lost to telescope	0.7
Percentage of time lost to general facility	1.2
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	35.6

* Breakdown of hours lost to telescope
2.0 DM loop not staying closed
0.5 M1 panic; WFS;

** Breakdown of hours lost to facility
3.50 NTP failure
0.75 Troubleshooting glycol system

Year to Date December 2010

Instrument	Nights Scheduled	Hours Scheduled	Lost to Weather	Lost to Instrument	Lost to Telescope	Lost to Gen'l Facility	Lost to Environment	Total Lost
MMT SG	102.00	1037.80	291.70	0.85	3.25	0.75	0.00	296.55
PI Instr	188.00	1904.90	669.45	32.65	103.30	4.25	0.00	809.65
Engr	17.00	172.20	48.00	0.00	3.50	0.00	0.00	51.50
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**307.00**	**3114.90**	**1009.15**	**33.50**	**110.05**	**5.00**	**0.00**	**1157.70**

Time Summary Exclusive of Summer Shutdown

Percentage of time scheduled for observing	94.5
Percentage of time scheduled for engineering	5.5
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	32.4
Percentage of time lost to instrument	1.1
Percentage of time lost to telescope	3.5
Percentage of time lost to general facility	0.2
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	37.2