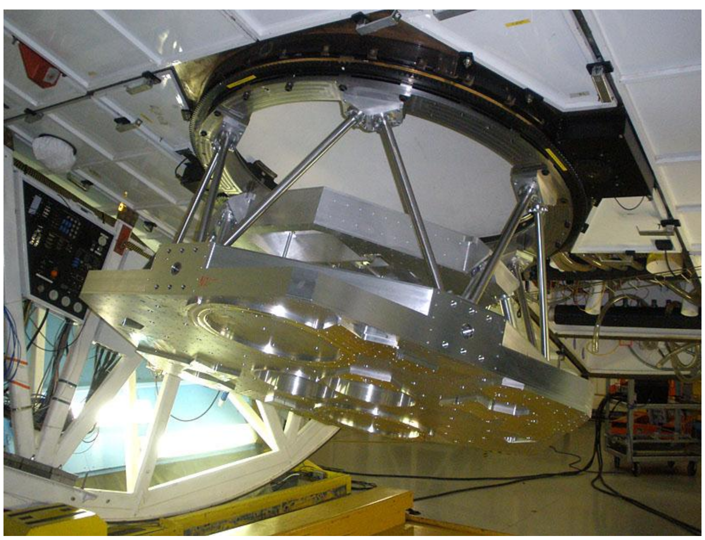
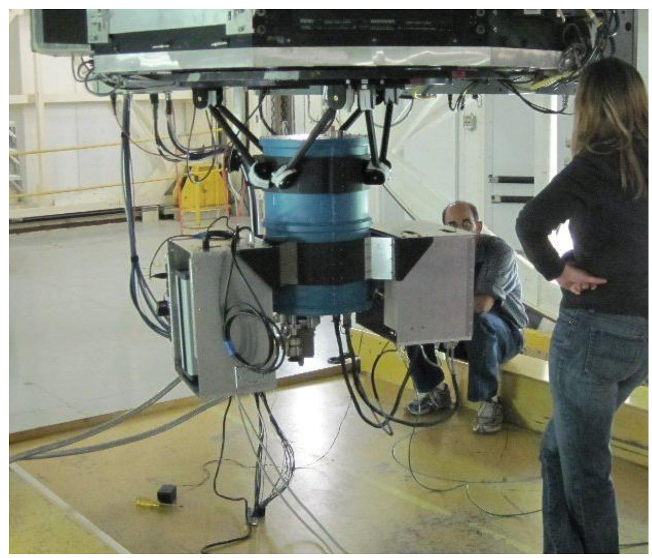
End of Trimester Summary

May – August 2011

Preliminary testing of two future instruments



The Binospec instrument support structure and cart arrived at the MMT for a test fit.



M. Hastie (MMTO) and D. Shenoy (U Minn) are shown testing the electronics on the MMTPol as part of its initial commissioning.

Personnel

Westin Smith was hired in May as a student software support assistant. Westin is a computer science undergraduate at the University of Arizona.

Xioayin Zhu was hired in May as a graduate research assistant. She is an Optical Sciences doctoral student.

Talks and Conferences

M. Hastie attended the "Exploring Strange New Worlds: From Giant Planets to Super Earths" conference in Flagstaff, Arizona, held May 1-6.

G. Williams gave a talk at the Center for Astrophysics, Smithsonian Astrophysical Observatory (SAO) in Cambridge, Massachusetts, on May 20. He also met with Dr. C. Alcock, SAO Director, and other faculty and staff during his visit.

G. Williams and M. Hastie attended the 218th American Astronomical Society (AAS) meeting in Boston, Massachusetts, held May 22-27.

G. Williams attended the "Stellar Polarimetry" conference in Madison, Wisconsin, held June 27-30, and gave a presentation entitled "The Identification and Investigation of Gamma-Ray Burst Progenitors: A Spectropolarmetric Survey of Wolf-Rayet Stars in the Milky Way and M33." (Coauthors: Paul Smith, Gary Schmidt, and Luc Dessart.)

Primary Mirror Systems

Primary Mirror Support

The two Gardner-Denver air compressors were moved from the MGE UPS room and relocated to the covered area behind the Summit Support Building. Their heat load was affecting the electronics in the MGE unit. Steve Brown (FLWO) provided crane support and Tom Welsh (FLWO) provided electrical support.

Optics

The primary mirror was washed on August 24, resulting in marked improvements in reflectance and scattering. New techniques were developed this summer that eliminated the use of an articulated lift during the mirror wash. Special thanks to the staff for their work on this demanding process.

The plots below show the reflectance and scattering measurements before and after the wash. Both reflectance and scattering measurements were taken approximately six inches north of the Cassegrain hole. For comparison, reflectance results from the 2010 coating are also shown.

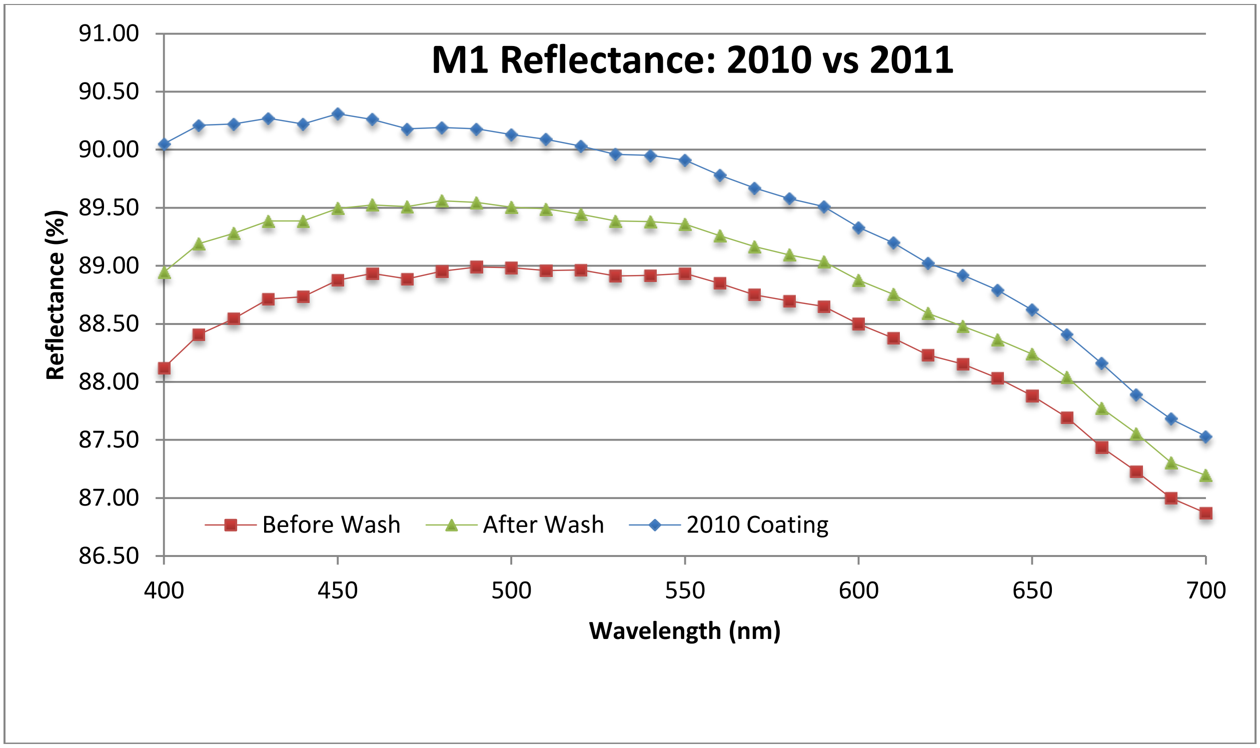


Figure 1. M1 Reflectance: August 2011, before and after wash, compared with 2010 coating.

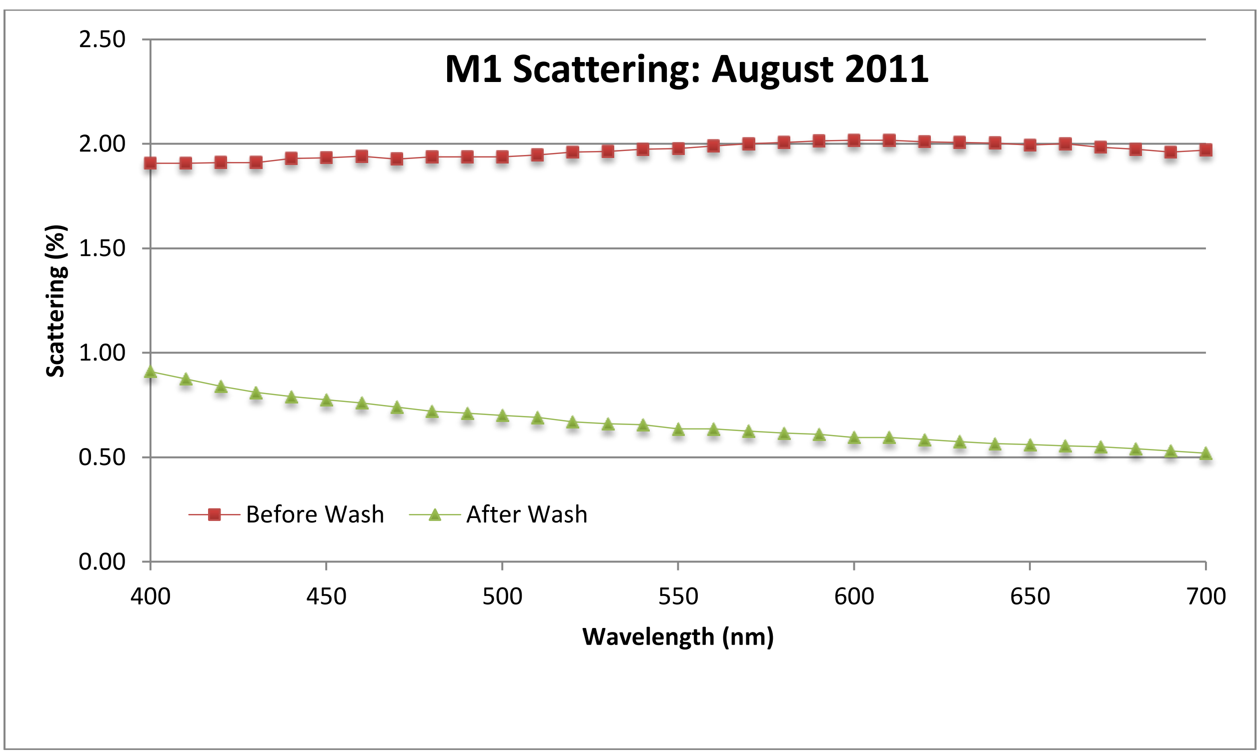


Figure 2. M1 Scattering: August 2011, before and after wash.

The f/9 secondary mirror was washed on August 25, its first wash since it was recoated in October 2006. The plots below show the improvements in reflectance and scattering following the wash. Scattering was reduced over the whole wavelength range to under 2%, and approached 1% redwards of 650nm. The best improvement in scattered light was seen in the blue, from 6.6% to 1.9%. The reflectance was also improved at all wavelengths, with at least an improvement of ~1%, and closer to 1.5% in the blue. The results show that although the 5-year-old mirror coating is faring very well, the contact wash has markedly improved its overall performance.

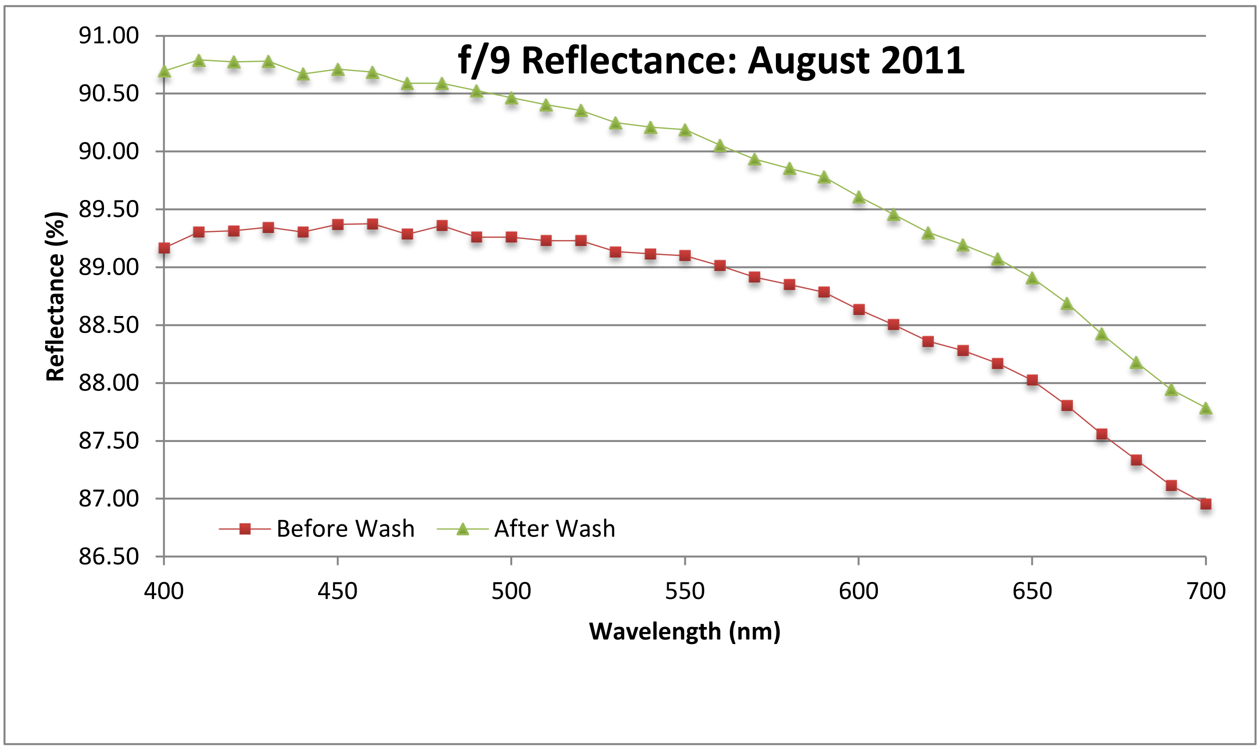


Figure 3. f/9 Reflectance: August 2011, before and after wash.

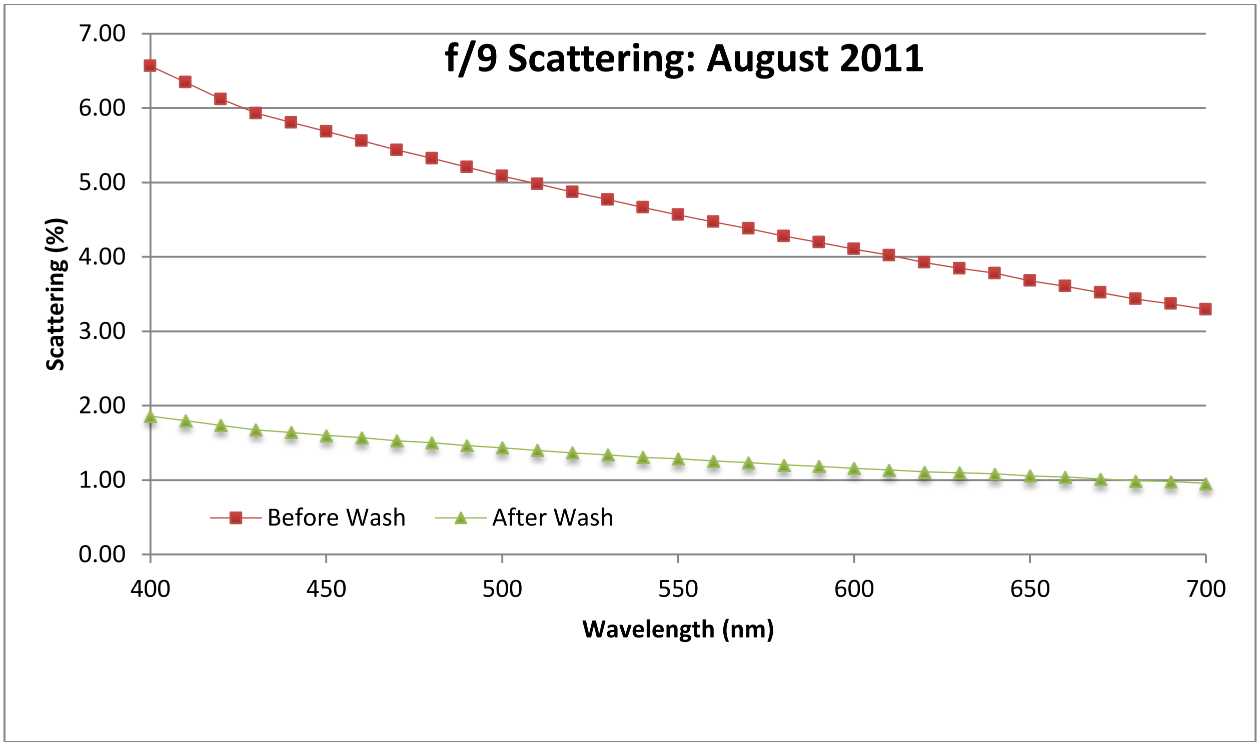


Figure 4. f/9 Scattering: August 2011, before and after wash.

Thermal System

New HEPA air filters were installed in the 60HP blower shed. While the filters were removed, new seals and support framing were also installed. The shed ceiling was cleaned, painted, and caulked. Openings that allowed dust to enter the cell ventilation system were identified and filled. This work was done by Robert Hyne (Whipple Obs.). We plan to add gravel inside on the flooring to help keep dust down.

The glycol pump controller was rewired, and proper phase-overload protection was installed and tested. The wires were sized appropriately to the load, and their colors were changed to reflect the proper color code for 480VAC. The redundant fused-overload protection was removed. A phase rotation/loss monitor was installed in series with the coils for both glycol pumps. The new configuration was documented.

Secondary Mirror Systems

f/15 Electronics

Work continued on the new f/15 electronics rack. The following is a list of the work that was completed:

-The main ON/OFF power switch on the MMT336 power supply was moved to the front of the unit. Originally the power switch was on the rear, making it difficult to perform maintenance and troubleshooting when the power supply was installed in the rack. It also created a safety hazard since there was no ready access to main power. This move also streamlines the power up/down sequence.

-The "ao_server" computer was mounted on sliding rails to aid in maintenance and troubleshooting.

-A new MMT336 test panel box was built. Fuses were placed in line with the test point to prevent damage to personnel and equipment.

-A new power panel was added to the top of the rack to allow the main power feed to come directly from the ceiling into the rack and to eliminate the trip hazard of cables being draped across the floor.

-Another U-shaped panel was added to allow the main umbilical cable and the TSS power cable to be connected to the rack. This also enables the f/15 rack doors to be fully closed.

-The +15/+12 VDC power supply that had been removed previously during troubleshooting was load tested, found to be bad, and sent out for repairs.

Computers and Software

The main server on the mountain, hacksaw, has been a potential single point of failure. A hardware failure of hacksaw would result in an extended amount of lost observing time. Along with input from others, S. Schaller developed a hacksaw recovery plan, involving network attached storage devices and the virtualization of hacksaw. The first steps of this plan are now being tested at the campus offices.

All the Linux machines were upgraded to Fedora 15. The operator and observer desktop environments were moved from "gnome" to "xfce". IDL 8.1 was installed.

An MMT departmental VPN profile was developed and tested, and the appropriate changes were made to the firewall. This will be especially useful when working on the UA wireless network at the campus offices, allowing access to all MMT resources.

S. Schaller and D. Clark worked to update the specifications for the primary mirror support actuators, and modified the test stand software accordingly.

New network cabling has been installed at the campus offices and at the mountain. UITS contracted the campus wiring and Copper State did the wiring for the mountain network upgrade. Network switches have been partially installed and configured, both on campus and at the summit. MMT campus offices are now on the University of Arizona (UA) Wifi and UA Public wireless networks. The microwave network and phone links from the campus to the summit are being upgraded. The upgrade will continue over the next few months.

Various minor changes have been made to some of the operations user interfaces: a) the balancer graphical user interface (GUI) now uses only Ajax and no longer uses Flash; b) the HTML/canvas background log plotter has been changed to allow interval plotting, zooming, and panning; and c) the hexapod server and GUI code were modified to allow restarting the hexapod server from the GUI.

D. Porter and W. Smith have been working on software for a new documentation system.

Migration of MMT staff's University email accounts to UAConnect continues.

Toward the end of summer shutdown, the Skycam shuttle PC was replaced with an AXIS M7001 video encoder and an Arduino (http://www.arduino.cc/). The old shuttle PC had a PCI video framegrabber board for acquiring the sky images, and a RS232 serial port for controlling the StellaCam2 camera. The shuttle PC ran the Skycam software scripts, which acquired and processed the images, and it also ran a webserver to host the images for MMTO and public viewers. The AXIS M7001 replaces the PCI video framegrabber functionality and makes individual images directly available on the MMTO network. The Arduino (combined with an Ethernet shield) connects to the StellaCam2 camera RS232 port and is used to issue control commands to the camera from the network. The Skycam software scripts that previously ran on the shuttle PC now run on Brak (the new Telstat computer). Hacksaw's webserver has taken over the role of hosting the images to MMTO and to the public (still at http://skycam.mmto.arizona.edu). A few modifications were made to the Skycam software scripts to get the frames from the new AXIS M7001 over the network and to issue camera controls to the Arduino as a proxy. The end result is one less PC to administer on the MMTO network.

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 addressed and resolved.

Figure 5 shows the distribution of the 46 newly created or re-opened service requests (SRs) during the reporting period, May through August 2011. Figure 6 illustrates the distribution of the 154 SR entries on which work was reported during the same reporting period. The three largest SR categories for both figures are: 1) Telescope, 2) Software, and 3) Building. Figure 7 summarizes the priority levels of the 46 newly created (or re-opened) SRs with "Important" being the most common priority.

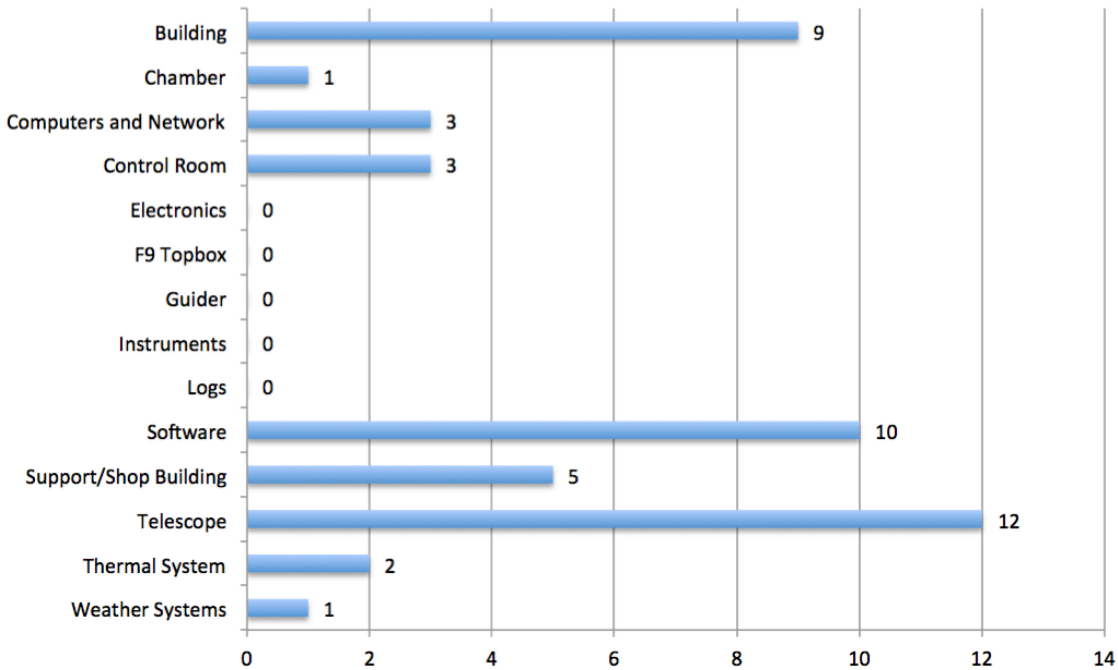


Figure 5. Categories of new or re-opened SRs from May through August 2011.

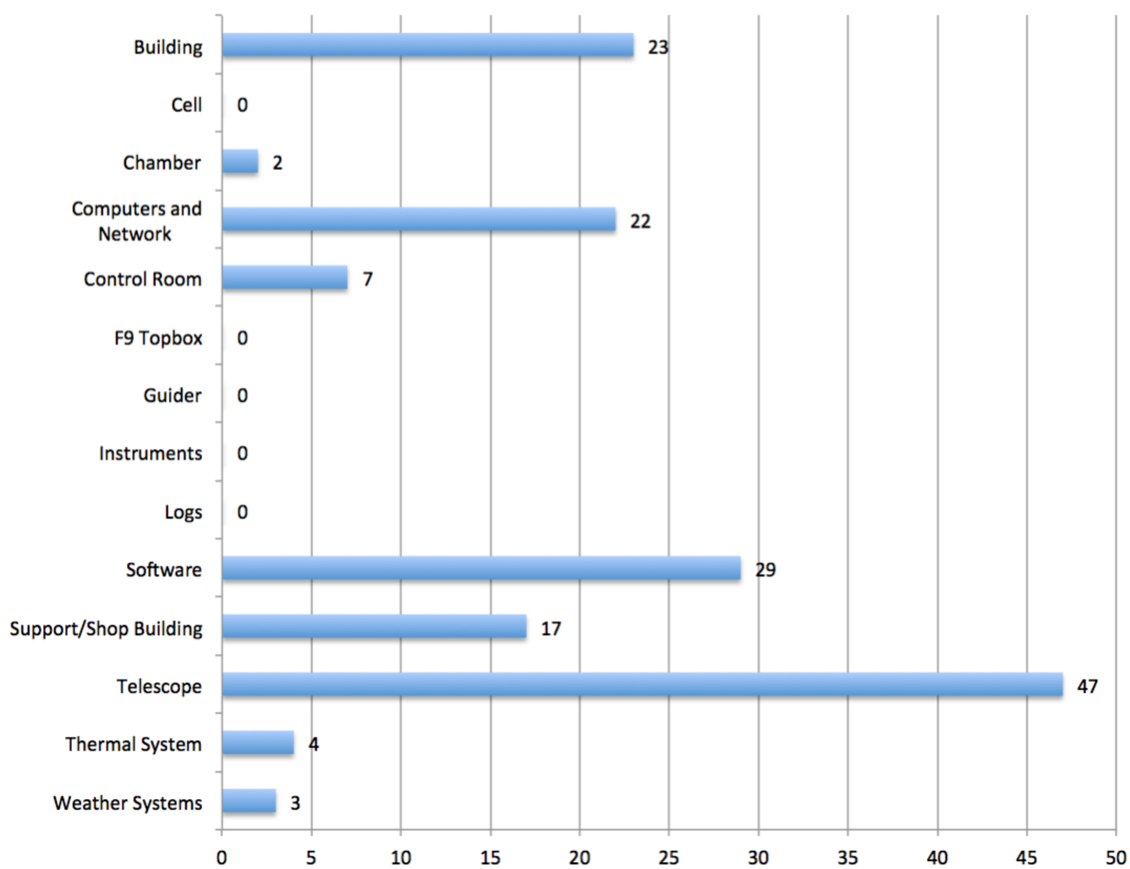


Figure 6. There were 154 responses within different categories from May through August 2011.

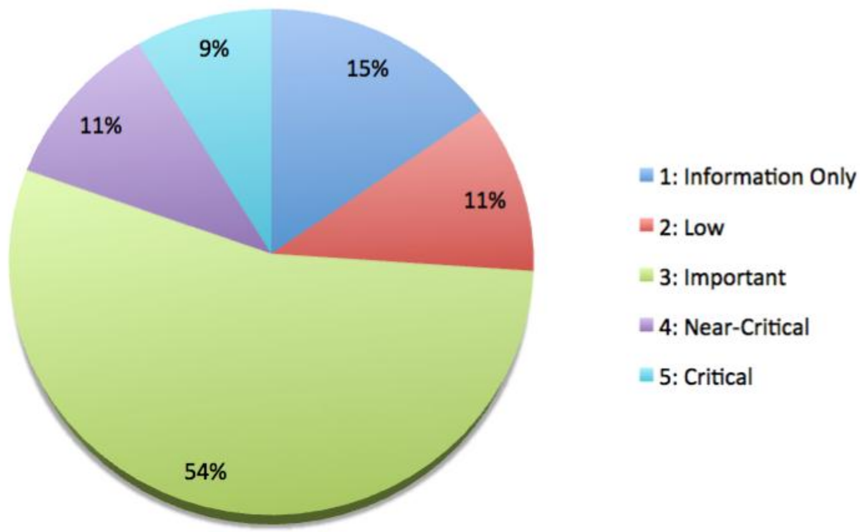


Figure 7. Percentages of the SRs in the five different priority categories from May through August 2011.

Instruments

f/15 Instrumentation

MMTPol

In late July, a team led by Terry Jones from the University of Minnesota brought a new Adaptive Optics (AO) fed instrument, MMTPol, to the MMT for initial commissioning. MMTPol is an imaging polarimeter that has been built by a collaboration between the University of Minnesota and the University of Florida. They arrived at the telescope on July 31 for four days, primarily to mechanically test fit the instrument to the telescope's rotator mount, optically align the dichroic with the telescope axis, and test communication with the AO system. There wasn't an opportunity to test the instrument on the sky since this work was completed at the beginning of summer shutdown.

The four days were invaluable for the team to understand how to mount the instrument and to determine the modifications needed to optimize the cable drape. The optical alignment possible with the chamber closed was done smoothly and successfully. The MMTPol software was installed on the summit computers, homer and alewife, and successfully controlled the instrument and communicated with the AO system. The team will return in November for their first on-sky commissioning.

f/5 Instrumentation

Hecto

The trimester had good weather, especially at the start, though nearby fires caused us to close for a night or two. We were able to operate for over 75% of the scheduled hours. About nine net nights were lost to clouds, rain, lightning, and ash. Much of the weather issues came after the quick start of the monsoon around June 28. There were 34 nights scheduled with the f/5 secondary and instruments over one long and one short run. The division was 21 nights of Hectospec and 12 nights of Hectochelle. There were 468 hecto science exposures gathered on 162 fields.

The wavefront sensor unit stopped working late in the long run because of a failed solid state hard drive. We operated for three nights with the telescope operator manually correcting for coma, collimation, and focus. D. Porter retrieved an archive of the disk contents and loaded it onto a replacement solid state hard drive so we were able to operate normally again for the next run.

Two burnt out HeNeAr calibration lamps in the Dome Calibration Boxes were replaced. Two fans in the SAO trio of servers were also replaced.

The SAO crew visited in August for the annual Hecto service mission. The positioner was separated and cleaned. The gimbal axis electronics were adjusted in the hopes of having a more stable home position. The entrance window was cleaned by J. Zajac, with several other individuals assisting.

Figure 8. The SAO crew (B. Fata, M. Lacasse, M. Mueller, and D. Fabricant) inspects the fiber positioner entrance window.

SWIRC

There were four nights of SWIRC, during which the observers gathered 2300 short exposures (including darks and calibrations).

Binospec

The Binospec instrument structure and cart were shipped to the summit from Maryland for a test run of the steps involved in reconfiguring and installing the instrument before the optics and electronics are added. Prior to its arrival, M. Lacasse performed many checks of load capacity, clearances, and lift centration. The new hoist in the Instrument Repair Facility was utilized for this, and it worked well. With the exception of the fine guides, which were a little too snug, everything fit as expected. The guides will be remachined.

Wavefront Sensor

Discussions continued between MMTO and SAO regarding replacing the science camera in the wavefront sensor (WFS). The current suggestion is to stay with the same camera system. Hardware for integration has not yet been sent from SAO.

Seeing

Summary of Wavefront Sensor Seeing Values

Figure 9 presents a histogram of WFS seeing values in bins of 0.1 arcsec, for the MMT Observatory from May through August 2011. These seeing values were obtained with the f/5 and f/9 secondary configurations. The histogram shows the combined data sets as well as the individual data set for each secondary. Seeing values are currently not available for the adaptive f/15 secondary.

As seen in Table 1, the median for the combined f/5 and f/9 WFS seeing values for this time period is 0.86 arc-seconds. A similar median-combined WFS seeing value of 0.87 arcseconds was obtained from the previous trimester. During the May-August period, the median f/5 seeing (0.83 arcsec) was slightly better than the f/9 seeing (0.92 arcsec). This contrasts with the January-April period where the median f/9 seeing (0.84 arcsec) was slightly better than the f/5 seeing (0.87 arcsec). The sample size for the second trimester was slightly smaller because of summer shutdown, with 1900 combined seeing values from May-August versus 2412 combined seeing values from January-April. In general, the seeing results are similar for these two reporting periods.

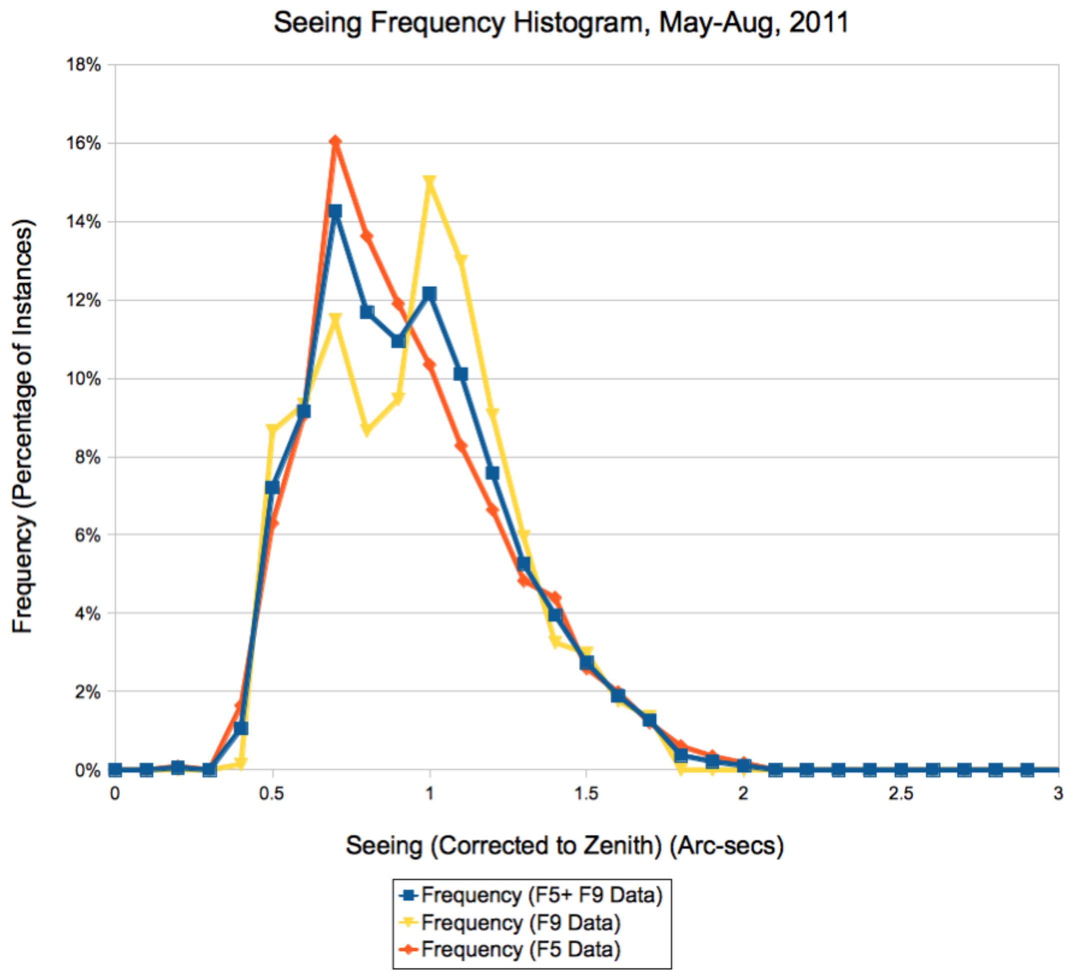


Figure 9. Histogram of WFS seeing values, May through August 2011.

Table 1. Statistics of WFS seeing values (corrected to zenith), May through August 2011.

	Combined F5/F9 Seeing (Corrected to Zenith)	F5 Seeing (Corrected to Zenith)	F9 Seeing (Corrected to Zenith)
Count	1901	1160	741
Median	0.86	0.83	0.92
Mean (Average)	0.89	0.88	0.90
Mode	0.7	0.7	1.0

Figure 10 below illustrates the seeing (corrected to zenith) versus the wind direction (in degrees azimuth), where north = 0 degrees azimuth, east = 90, south = 180, and west = 270. There is a distinct lack of seeing values from the easterly directions. Wind from the east typically generates poor seeing conditions, during which the wavefront sensor is either not used or unable to measure the seeing value. Hence, the reduced number of seeing values in this direction.

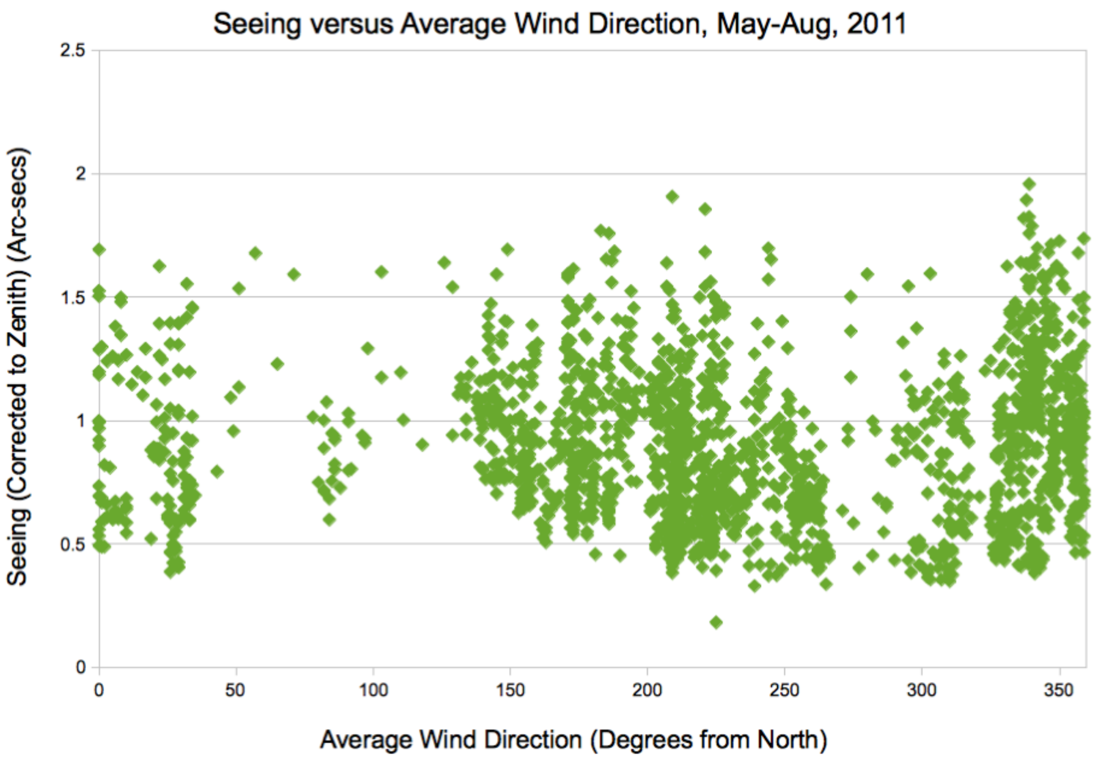


Figure 10. WFS seeing versus direction of average wind values for May through August 2011.

Figure 11 shows the seeing (corrected to zenith) versus maximum wind direction values. These maximum wind direction values correspond to the wind gusts. Similar to Figure 10, there are few observations from the easterly to northeasterly directions because of general poor seeing in these directions.

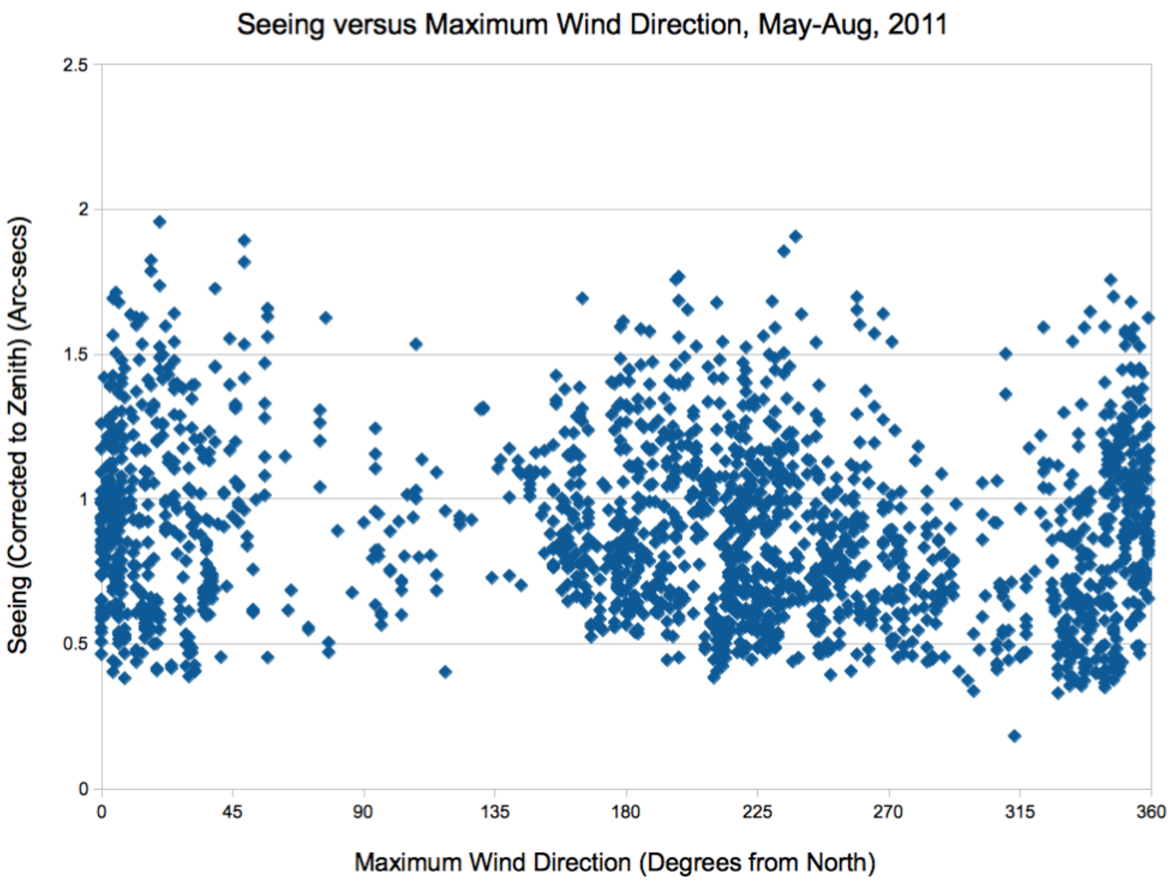


Figure 11. WFS seeing versus direction of maximum (gust) wind values for May through August 2011.

Figures 12 and 13 plot WFS seeing (corrected to zenith) versus average (Figure 12) and maximum wind speed (Figure 13), both in meters/second. Little correlation is seen between seeing and wind speed values but there is a slight trend of larger seeing values at higher wind speeds.

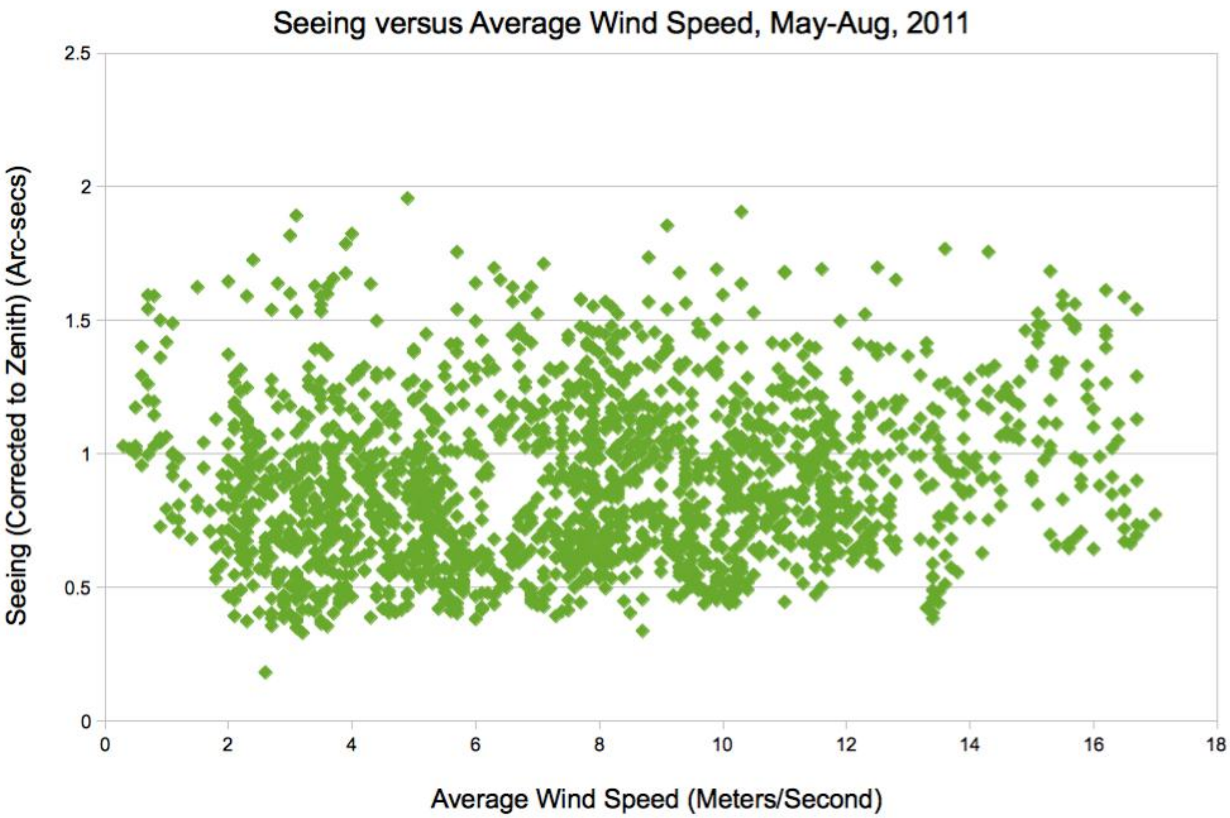


Figure 12. WFS seeing versus speed of average wind speed values for May through August 2011.

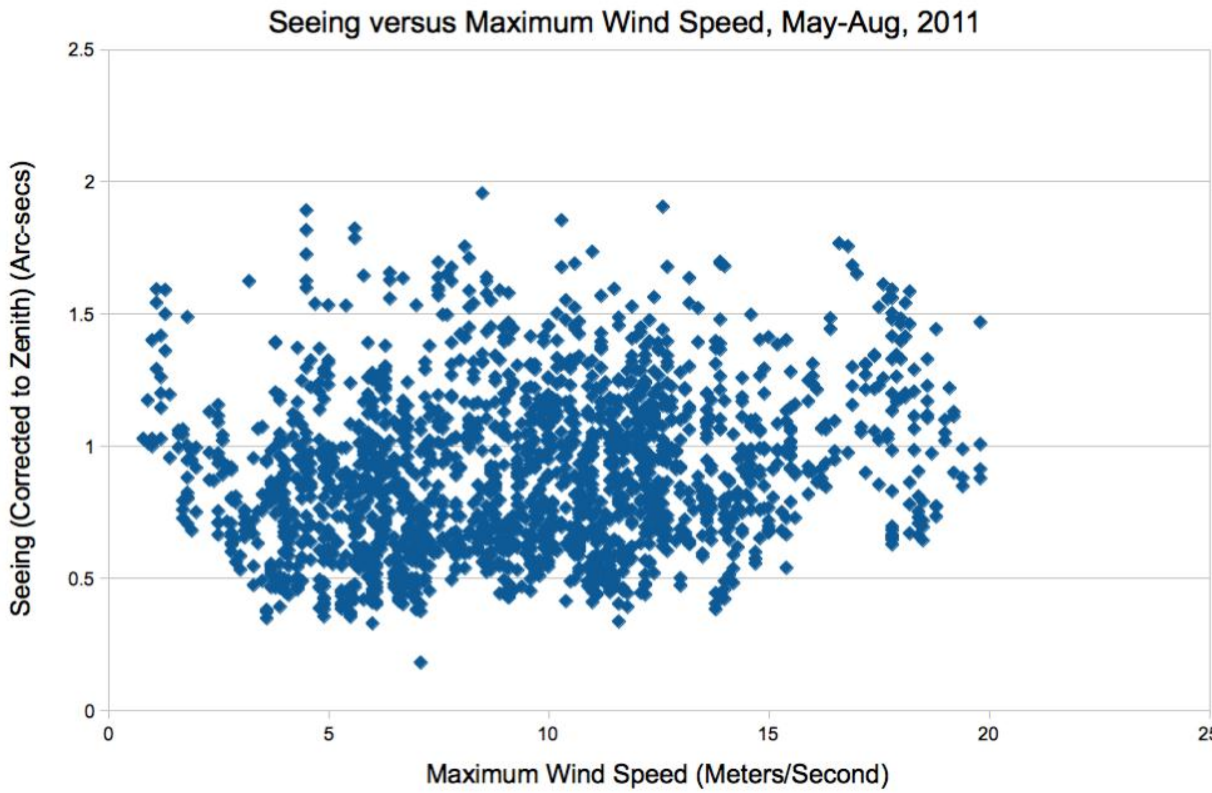


Figure 13. WFS seeing versus speed of maximum wind (gust) speed values for May through August 2011.

Figure 14 illustrates the relationship between WFS seeing and the difference between the average primary mirror glass temperature and the chamber air temperature (in degrees Celsius). This temperature difference is the contrast in temperature between air and glass at the front surface of the mirror. Since the measured seeing values include contributions from both intrinsic atmospheric seeing and local dome and mirror seeing, one would expect a correlation here. Indeed, there appears to be a trend of degraded seeing with increased thermal gradient between primary and chamber air temperatures.

The outliers that lie below the apparent lower limit for potential seeing, shown with the dashed line, will be investigated in future studies.

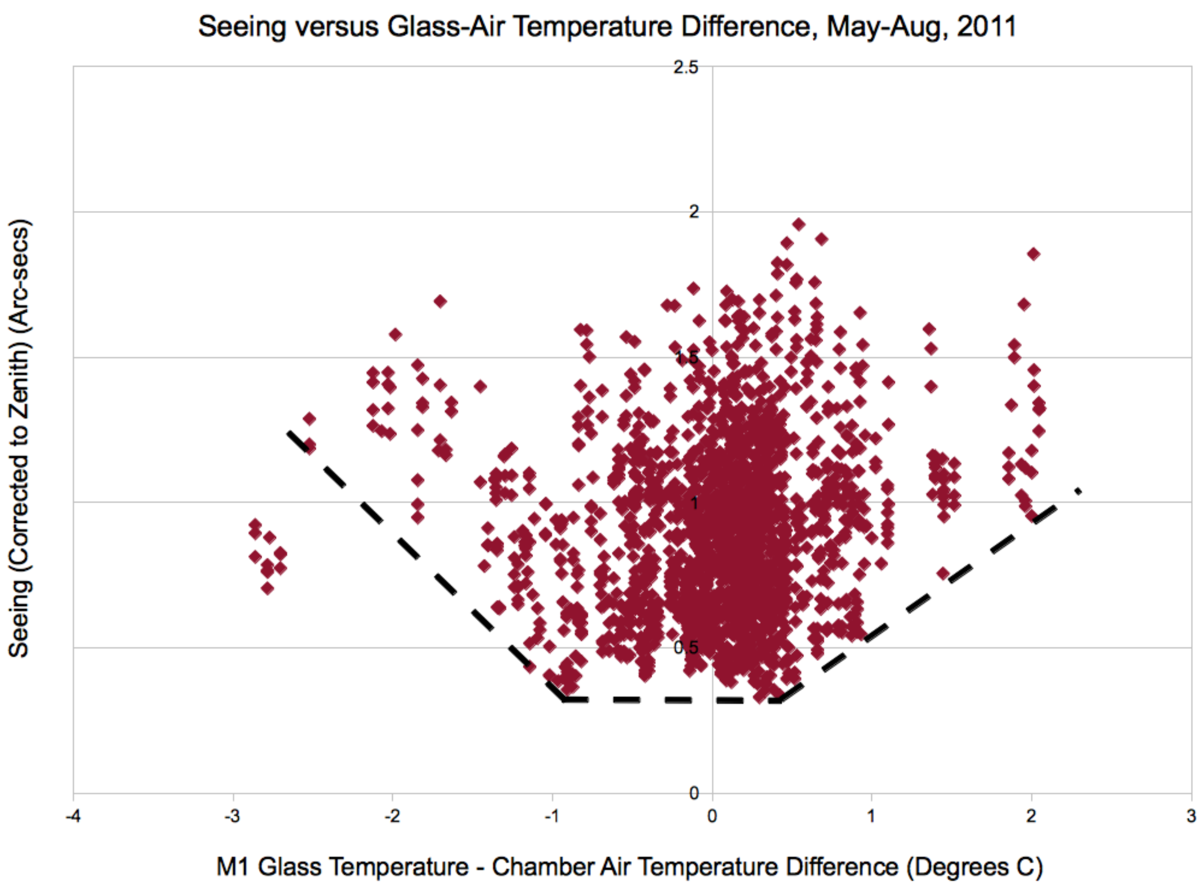


Figure 14. WFS seeing versus the temperature difference between the average M1 glass temperature and the chamber air temperature for May through August 2011.

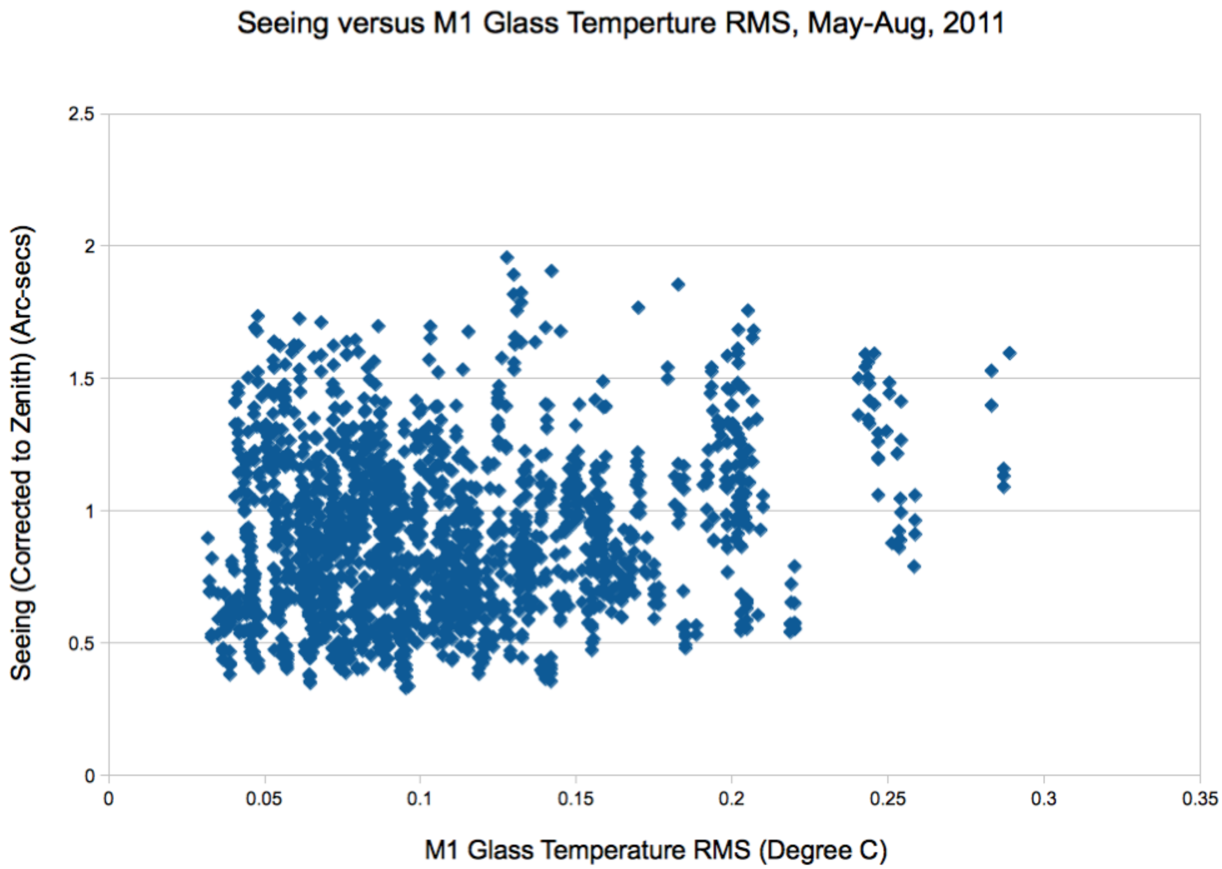


Figure 15. WFS seeing versus M1 glass temperature root-mean square (RMS) differences for May through August 2011.

Figure 15 is a plot of WFS seeing values versus the root-mean square (RMS) value of the glass temperature within the primary mirror. Little correlation is seen between seeing and these RMS values.

These measurements are provided by 47 E-series thermocouples inside the primary mirror.

Safety

Safety Manual and Safety Training Videos

As of this trimester, the Steward Observatory Safety Manual has been reviewed by 100% of the MMT staff. (MMTO falls under the umbrella of Steward Observatory safety guidelines.)

The completion rate for the viewing of safety videos by the MMT staff is currently at ~ 72%.

General Facility

Instrument Repair Facility (IRF)

A 5-ton crane was delivered and installed by MMTO staff during the last week of July. Its electrical wiring and connections were also completed and tested by MMTO staff. It was inspected by independent contractors in mid-August.

Building Drive

After troubleshooting an acrid odor from the breakout box, a broken brake coil assembly was discovered on the NW building drive motor. A new coil assembly was ordered and installed. The brake coil contacts were also cleaned to remove residue. During this time the motors and inlet filters were inspected and cleaned. All motor brushes and commutators are in good condition.

All fuses in the building drive now have spares on hand to prevent potential down time. During this endeavor all fuses were identified, labeled, and documented.

During general preventive maintenance and cleaning of the building drive amplifiers, a blown fuse was discovered and replaced.

Instrument Rotator

A rotator air interlock switch was installed in the air cabinet on the SE side of the mirror cell. This effort was in response to a service request that stated that no indication or alarm sounded when the compressed air was not present at the rotator brake. The new switch will give a visual indication (GUI) of the rotator brake air status. Although the switch is installed, additional wiring is required to bring the system online.

Roof Heaters

The roof heater wiring was completely upgraded with new conduit and #10 wiring. Several non-weatherproof conduit junction boxes were removed. It was determined that the wrong size conductor wire was initially used, and the existing conduit was too small for the number of conductors it carried. This caused the humming upon start up. The undersized wiring had also been identified by the roof contractor as a possible safety issue.

The roof heater controller was found to be defective; it always indicated snow and turned on the heaters. The satellite and master controllers are at the manufacturer for repairs and are expected to be completed within a few weeks. In the meantime, a manual controller was built and installed.

Other Facility Improvements and Repairs

A new PI panel was added to the east drive arc for the NGS topbox. The panel eliminated the need for storing long lengths of cable on the drive arc, which could potentially be damaged during movement.

The f/9 topbox power cable was repaired after discovering a split in its outer jacket. The cable was checked and is operational.

A new chamber hydraulic lift controller was built and located on the wall in the yoke room. The controller was moved to its own breaker on PN1 (breakers #38, 40, and 42). The old unit will be used as a spare. The new unit has the proper wire color code and is designed for easy separation of the pump from the control unit. This will greatly aid in troubleshooting and repairs.

The east and west cable drapes in the chamber were inspected and repositioned as needed.

The new AC units now have pigtails and plugs to facilitate moving. The 3 new AC units were discussed in the previous trimester summary (January-April '11).

A 220VAC line was run from panel AC breakers #2 and #4 for the MMTPol compressor in the pit.

Three 4-port 120VAC quiet-power drops were added to the control room. These drops will eliminate power strips being connected to each other, as well as eliminate the trip hazard created by out-stretched power cables.

New network switches were installed in preparation for the network switchover. The main building 4500 switch was installed in the drive room. This will control the first floor and pit as well as manage the interconnections of all other network switches in the building. A smaller 2960 switch was installed in the second floor west to manage the second floor and chamber. An additional 4500 switch was installed in third floor east to facilitate the third and fourth floors. This switch had a custom rack designed and built for it in the wall of third floor east, with space assigned for future network expansion.

A 20 amp power was run for two new Cisco network switches. The drive room switch is powered from QT1 breakers #2 and #4. The third floor east is powered from Q3 breakers #1 and #3. Both switches have a redundant power supply that is fed from a different phase of power. If one phase drops out, the switches will remain energized.

The heat recovery unit in the first floor mechanical room was removed and sent out for inspection and cleaning. The insulated ducts were inspected and a quote received for future cleaning during a summer shutdown while the ducts are open. The heat recovery unit was reinstalled with new filters on both current flow sides.

Visitors

5/16/11 – New York Times reporter, Marc Lacey, visited the MMTO and spoke with observer P. Groot, and also visited other facilities on Mt. Hopkins to gather material for a story on light pollution. The link to his article is listed below in the **Media** section.

5/17-20/11 - Jim Shaw, new Director of Central Engineering at SAO, visited the MMTO to learn more about the facility and its resources. He visited other facilities on Mt. Hopkins as well.

7/2/11 – Dr. Bethany Johns, the John Bahcall AAS Public Policy Fellow, was given a tour of the MMT Observatory by Dr. E. Olszewski, astronomer at Steward Observatory, who has frequently observed at the MMTO.

MMTO in the Media

5/6/11 – An article about the summer wildfires in southern Arizona and their potential effect on the MMTO by University of Arizona's Arizona Public Media (PBS/NPR affiliate):
http://www.azpm.org/news/story/2011/5/5/122-southern-arizona-wildfires-affect-astronomers/

5/12/11 – Blog by Dutch astronomer Govert Schilling, for *Sky & Telescope* magazine, about his visit to Arizona's observatories, including the MMTO:
http://www.skyandtelescope.com/community/skyblog/newsblog/121474999.html

5/19/11 – New York Times article by Marc Lacey on light pollution in Arizona and its effect on astronomy:
http://www.nytimes.com/2011/05/20/us/20whipple.html?_r=1&ref=telescopesandobservatories

8/15/11 – Interview of John McAfee about his career as an MMT Telescope Operator, broadcast on Malaysian Radio Station BFM 89.9: http://bfm.my/careers-unusual.html.

Publications

MMTO Internal Technical Memoranda

None

MMTO Technical Memoranda

None

MMTO Technical Reports

None

Scientific Publications

11-10 Direct Imaging Constraints on the Putative Exoplanet 14 Her C
T. J. Rodigas, et al.
ApJ, **732**, 10

11-11 A Massive Progenitor of the Luminous Type IIn Supernova 2010jl
N. Smith, et al.
ApJ, **732**, 63

11-12 Piercing the Glare: A Direct Imaging Search for Planets in the Sirius System
C. Thalmann, et al.
ApJ Lett, **732**, 34

11-13 Accretion Rate and the Physical Nature of Unobscured Active Galaxies
J. Trump, et al.
ApJ, **733**, 60

11-14 The Kepler Cluster Study: Stellar Rotation in NGC 6811
S. Meibom, et al.
ApJ Lett, **733**, 9

11-15 The Shortest Period Detached Binary White Dwarf System
M. Kilic, et al.
MNRAS, **413L**, 101

11-16 Dust Extinction and Metallicities of Star-forming Lyα Emitting Galaxies at Low Redshift
S. L. Finkelstein, et al.
ApJ, **733**, 117

11-17 The Wolf-Rayet Content of M33
K.F. Neugent and P. Massey
ApJ, **733**, 123

11-18 Star Clusters in M31. V. Internal Dynamical Trends: Some Troublesome, Some Reassuring
J. Strader, N. Caldwell, A.C. Seth
AJ, **142**, 8

11-19 The MMT-Pol Instrument Control System
C. Warner, et al.
ASPC, **442**, 321

11-20 A 12-Minute Orbital Period Detached White Dwarf Eclipsing Binary
W.R. Brown, et al.
ApJ, **737**, 23

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

May 2011

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	11.00	93.90	14.00	0.00	0.00	0.00	8.60	22.60
PI Instr	18.00	145.80	18.00	0.00	1.55	0.00	0.00	19.55
Engr	2.00	16.40	0.00	1.00	0.00	7.30	0.00	8.30
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**31.00**	**256.10**	**32.00**	**1.00**	**1.55**	**7.30**	**8.60**	**50.45**

Time Summary

Percentage of time scheduled for observing	93.6
Percentage of time scheduled for engineering	6.4
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	12.5
Percentage of time lost to instrument	0.4
Percentage of time lost to telescope	0.6
Percentage of time lost to general facility	2.9
Percentage of time lost to environment (non-weather)	3.4
Percentage of time lost	19.7

* Breakdown of hours lost to Instrument
1.00 Aries Spectrometer problem

** Breakdown of hours lost to telescope
1.00 DM power supply
0.25 Oscillation
0.30 Mirror panic

*** Breakdown of hours lost to facility
7.3 Building brake failure

**** Breakdown of hours lost to evnironment
8.60 Smoke

June 2011

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	8.00	61.60	9.50	0.00	0.00	0.00	0.00	9.50
PI Instr	22.00	170.90	9.40	0.00	37.45	0.00	5.00	51.85
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**	**232.50**	**18.90**	**0.00**	**37.45**	**0.00**	**5.00**	**61.35**

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	8.1
Percentage of time lost to instrument	0.0
Percentage of time lost to telescope	16.1
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	2.2
Percentage of time lost	26.4

** Breakdown of hours lost to telescope
34.30 DM power supply, electronic, wiring problems
1.55 PCR-WFS communication problems
1.60 Bad optical fiber affected AO system

**** Breakdown of hours lost to environment
5.00 Smoke and ashes

Year to Date June 2011

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	65.00	650.80	126.95	13.55	0.75	3.25	8.60	153.10
PI Instr	107.00	1020.80	211.05	4.00	40.50	2.00	5.00	262.55
Engr	9.00	89.30	3.00	1.00	0.00	7.30	0.00	11.30
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**181.00**	**1760.90**	**341.00**	**18.55**	**41.25**	**12.55**	**13.60**	**426.95**

Time Summary

Percentage of time scheduled for observing	94.9
Percentage of time scheduled for engineering	5.1
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	19.4
Percentage of time lost to instrument	1.1
Percentage of time lost to telescope	2.3
Percentage of time lost to general facility	0.7
Percentage of time lost to environment (non-weather)	0.8
Percentage of time lost	24.2

July 2011

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	128.70	78.40	0.00	0.00	0.00	0.00	78.40
PI Instr	13.00	103.30	78.50	0.00	1.50	0.00	0.00	80.00
Engr	2.00	16.10	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	**31.00**	**248.10**	**156.90**	**0.00**	**1.50**	**0.00**	**0.00**	**158.40**

Time Summary

Percentage of time scheduled for observing	93.5
Percentage of time scheduled for engineering	6.5
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	63.2
Percentage of time lost to instrument	0.0
Percentage of time lost to telescope	0.6
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	63.8

** Breakdown of hours lost to telescope
1.50 NGS Wavefront Sensor

August 2011

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	2.00	16.80	8.40	0.00	0.00	0.00	0.00	8.40
PI Instr	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Engr	1.00	9.40	6.40	0.00	0.00	0.00	0.00	6.40
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**3.00**	**26.20**	**14.80**	**0.00**	**0.00**	**0.00**	**0.00**	**14.80**

Time Summary Exclusive of Summer Shutdown

Percentage of time scheduled for observing	64.1
Percentage of time scheduled for engineering	35.9
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	56.5
Percentage of time lost to instrument	0.0
Percentage of time lost to telescope	0.0
Percentage of time lost to general facility	0.0
Percentage of time lost to environment (non-weather)	0.0
Percentage of time lost	56.5

Year to Date August 2011

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	83.00	796.30	213.75	13.55	0.75	3.25	8.60	239.90
PI Instr	120.00	1124.10	289.55	4.00	42.00	2.00	5.00	342.55
Engr	12.00	114.80	9.40	1.00	0.00	7.30	0.00	17.70
Sec Change	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total	**215.00**	**2035.20**	**512.70**	**18.55**	**42.75**	**12.55**	**13.60**	**600.15**

Time Summary Exclusive of Summer Shutdown

Percentage of time scheduled for observing	94.4
Percentage of time scheduled for engineering	5.6
Percentage of time scheduled for sec/instr change	0.0
Percentage of time lost to weather	25.2
Percentage of time lost to instrument	0.9
Percentage of time lost to telescope	2.1
Percentage of time lost to general facility	0.6
Percentage of time lost to environment (non-weather)	0.7
Percentage of time lost	29.5