SARA OBSERVATORY DIRECTOR'S REPORT

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I. Introduction.

It is a pleasure to say that observing at SARA has become routine for all of us. This is the best compliment we can give our observatory and the ACE control system. I remember back to the days when we tried to believe the "first light" image really looked like the Trapezium! Photometric quality images are routinely acquired at SARA, even by the most inexperienced SARA observers. Peter Mack and ACE are continuing to give us outstanding technical support. They have been incredibly responsive to our problems and technical "emergencies" during this past year. Rarely were we down more than a day or two due to technical problems since the last board meeting. The constant evolution of the computer software and hardware has kept us up-dated, but has also caused some minor glitches. However, for the most part, these are very minor annoyances, and are scarcely worth mentioning compared to the convenience and luxury of remotely using the telescope.

A large number of observers are now observing from home over DSL or cable modem lines. We have beefed up security on our systems as a result of some hackers, and this has presented some problems for those observing from home, but we are working out the bugs rapidly.

The bottom line is that, although there are features we would still like to see implemented, we have a very productive observatory as it is.

II. Research at SARA.

Research is continuing to thrive at SARA. A partial record of the research accomplishments can be seen on the SARA web page: http://astro.fit.edu/sara/. Once again I want to encourage everyone to send recent publications to Bev Smith so she can update the SARA research page. This is important in showing our local administrators the value of SARA to our research goals. This year alone, at least three multi-year NSF proposals were funded which were based on SARA data. Looking over the observing reports, I once again noticed a broad range of research targets that were observed with the

SARA observatory. Targets ranged from asteroids to gamma-ray bursts, binaries to cool stars, and white dwarfs to quasars.

III. Telescope Usage.

The telescope is fully subscribed and ROA coverage is adequate, although not as comprehensive as we would like. Every night where there was ROA coverage was allocated for research or engineering, and most clear nights were used. A rough average of 28 nights per month were scheduled since April 2003 (except for August of course).

IV. Telescope Problems.

The majority of problems with the telescope have been minor and were almost immediately fixed by ACE. Several times the mirror cover failed, resulting in a lost night and a maintenance trip from ACE, but Peter has installed tougher bolts that hinge the shutter pedals and that seems to have fixed the problem. The tracking problems have become inconsequential since the auto-guider came on-line. This has allowed us much more flexibility in observing since we no longer have to avoid the "wild west" after transit region of the sky.

The telescope continues to have pointing problems, consistently off in RA and a small amount in DEC. Peter needs to make new observations for the pointing model, since the telescope balance has drastically changed over the August engineering time. With the re-wiring and piping of the control cables through the telescope axes, the weight distribution has apparently changed and thus the pointing model has also changed. Peter needs a few good starry nights to re-evaluate the pointing parameters and finally get the pointing to where it should be.

We still do not have ACE talking to the MAXIN-DL software, thus much of the pointing and filter information we need is not automatically put into the header. This is one of the primary concerns pointed out as a major problem by the observers. A brief discussion with Matt Bradstreet about this issue indicates it is not yet available. The problem seems to lie in passing the relevant information over the internet and getting MAXIM DL to accept it. Apparently, if MAXIM DL and ACE lives in the same box, they can do it, if they live in separate boxes, it does not work. They are close, but not yet able to give us that functionality. That would be part of the robotic package as far as I can tell.

V. Instrumentation.

- **Cameras**

    1. The small format AP7 Apogee camera remains the workhorse of the observatory. Last week it came down with a case of the "Humidities". The camera has two compartments, one containing the chip and the other containing the shutter. ACE dried out and refilled the dessicant in the shutter compartment, but moisture must have also leaked into the chip compartment. A subsequent observer noticed droplets of some type apparently on the chip itself. The camera has been sent to Apogee for cleaning and drying of the chip since ACE is not equipped to open the chip-box and safely clean the chip itself. The camera can be fixed, but the cost will be several hundred dollars even if it is just moisture on the chip and may take several weeks. If there are further problems, it could cost more. We need to contact Apogee and talk them into putting a rush on our camera.

    2. An order for a new FLI large format CCD was placed nearly 15 months ago, but the camera has yet to be delivered. Apparently FLI is having difficulty getting the camera and the SITe chip to work with the USB connector. They have offered to send us a camera with a SITe chip, but with a parallel connector. This would be a loaner until they can work out the bugs in the USB detector. After intensive E-mail discussions, we decided to wait and take delivery of a camera only if it is exactly what we ordered. A decision that seemed wise at the time, before the AP7 went down!

- **Computing facilities**

    The computing facilities are more or less stable at SARA now. Eric Johnson built a "new" saracam computer to run the old AP4 Large format CCD out of spare parts so it is now operable, but the problem remains the boards are outdated and it cannot be updated without the removal of the chip and installation into another camera. We have relatively new computers for the saratel and saraccd and they work very well. Peter is keeping the windows versions updated with new code.

    As a result of many attempts, some successful, in hacking saraccd and saratel, Peter has installed a new firewall in addition to the previously installed KPNO firewall. This has resulted in some observers having problems connecting in the short term, but in the long run is a necessary precaution.

    During the August shutdown, saratel had to be reloaded to wipe out what the hackers had done. Saraccd was updated and the disk was wiped clean. We had warned all observers that this would occur, and everyone responded by downloading their data before the critical date. We presume no data was lost during this process.

- **Weather Station**

The weather station is unfortunately not working as a result of lightening strikes frying the control board. Peter contacted the company we bought it from and they said the model we possess can not be re-furbished, as it was based on technology they no longer support. To fix it would be equivalent to purchasing of a new one. There are MUCH cheaper models now available on the internet and we need to investigate this and purchase a new one. Several SARA observers have complained that the 4- meter and WYIN weather stations give vastly different readings, reflecting the microclimate at each dome, making it difficult to reliably judge wind speeds at the SARA telescope.

- **Auto guider**

  The auto guider is on the telescope and is in regular use by observers. It works beautifully!

- **ISTeC** - The ISTeC web site is maintained by Gary Henson of ETSU. Gary hasn't had much time to solicit new members or update the web pages since the last meeting, however he plans on doing just that this fall. He has supplied a report on ISTeC to the WGAPC and hopes to make ISTeC part of the collaboration on a professional amateur database that may promise to be more useful and active. This database could possibly include the more typical ISTeC member (a small campus or low-key observatory with facilities but no programs). WGAPC just had its first conference call of the semester and he will report on that conversation at the board meeting.

- **REU Program -** It was another great year for the SARA REU program. Great job Matt! Nearly all of the interns worked hard, participated in the meetings, and showed some excellent results at the final meeting. Congratulations to all of the mentors. A discussion of who should receive SARA funds for the AAS meeting will take place at the board meeting.

- **ROA's** - Our current group of ROA's are exceptional! There have been no problems noted in the log sheets, only praise for the ROAs.

- **Summer Shutdown -** I had a long discussion with Matt Bradstreet about the summer shutdown work. There were two major improvements, the first being installation of new, much better stepper motors on both axes. The second was the re-cabling and installation of the cables through the telescope axis instead of having them trail off the back.

  The new stepper motors have more torque and more accurate divisions to improve tracking. New brackets were made for installation since these motors drive the worm gears directly, doing away with the belts we used previously. This is a huge improvement.

The re-cabling involved bunching the necessary cables and routing them through a junction box on the "DEC box". From the junction box, two high density cables lead from the junction box on the DEC axis, through the mount, and down into the control room to another junction box on the back of the ACE rack. Here, the cables are again separated and connected to the appropriate inputs (telescope or CCD). The power supplies for the CCD cameras were all removed from the optical bench on the telescope and placed on the Dec box so heating near the CCDs is reduced.

It was decided **not** to switch the control cards since Peter found the new cards had some integer addition problems that would affect our pointing and tracking.

All cables in the observatory were placed in "parduit" trays, retangular boxes designed to propagate cables safely over short distances so you have no loose cables hanging around.

VI. Future.

Here is a list of important action items I feel we need to address in order of urgency.

1. ***Finger Lakes CCD's.*** We need to help ACE ***encourage*** FLI to deliver the CCD we have purchased.

2. ***Weather Station replacement***.

3. ***Secondary mirror fabrication and image quality improvements.*** Someone needs to seriously look into these things. We need to decide whether we want to pay for this out of SARA funds or to try and write a grant for it. We need some new contributors. Any volunteers?

SUMMARY

In Summary, this has been another great summer and fall for SARA. We took full advantage of the August shutdown and made some necessary improvements to the telescope control system. We are still facing the acquisition of the large format CCD, but assuming all goes will with the AP7 refurbishment, there is apparently no great need to desperately buy another camera unless it is the one we want. The weather station replacement is a necessity. The prices are more reasonable now (apparently) than when we got the SCAS weather station, but someone needs to look into it. Peter Mack might have some ideas along that line, so who ever spearheads this task should speak with Peter before doing too much digging. We also have had no one show interest in spearheading the secondary mirror project, and this remains an upgrade that, while not critical to do our science, would be a very important improvement to our system.

The SARA REU program continues to be our "flagship" teaching program, and now our faculty have been very successful in getting NSF research support. So, lets get at it and publish tons of papers!!

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