

# **SARA OBSERVATORY DIRECTOR'S REPORT**

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*by*

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## **I. Introduction.**

It is exciting coming to Tuscaloosa Alabama for the first time for a SARA board meeting, and planning for expansion into the southern hemisphere. We perhaps went through our worst time last July with technical problems causing several weeks of lost observing time, but in all SARA remains extremely productive. The technical issues and problems will be discussed below in detail, but suffice it to say the primary reason we were down so long was a confluence of many events. Peter was out of town in the middle-east working on a telescope, ACE was very short-handed, and we had no spare parts for the pieces that failed. But I have to relay the story showing how dedicated Peter Mack is.

Peter was on vacation in England when the dome stopped working. The encoders were old on our system and the new encoders were different, so it required some programming to make them compatible. So Peter was going to log in at his vacation cottage (which had been advertised as having internet access) and work on SARA. He found out that the cottage really had no internet connections after all. So, Peter took to the streets, and drove to a neighbor when he got a wireless signal. He logged on, while parked on the side of the street, and was working on the SARA system. About that time, the terrorist cells were uncovered in England and public awareness of strange activity was heightened. Sure enough, a resident saw Peter's car parked on the side of the road for hours with this guy on a laptop inside and called the police. The police came, took Peter and his laptop to the police station for interrogation. The details are fuzzy, but it must have been something. They impounded his laptop and it took him some time to get it back. All that time, we were down. So, we have the English police to blame for some of our downtime. However, Peter knew ACE needed to hire more people and that has now been remedied. A story for the history books.

In addition to the mechanical trials, we also had a significant wild fire that threatened the mountain and shut down observing for a few days!

## **II. Research at SARA.**

A number of papers were published using SARA data. SARA was represented by two papers at the recent AAS meeting in Honolulu Hawaii, one paper on Blazars and the other on eclipsing binaries. Two Astrophysical papers featured articles with SARA observations, one on Blazars and one on galaxies. At least two Astrophysical papers contained SARA papers, one involving white dwarf systems and the other cataclysmic

variables. Over 15 GNC submissions reporting observations of gamma-ray burst afterglow follow-up observations were published. This effort led by Dieter Hartmann and the Clemson group also included many other SARA observers from different SARA schools whose observing time the observations were made.

### **III. Telescope Usage.**

SARA operated well most of the time, with the exception of the month of July. According to records, only a few nights in July were usable, and they were for on-site observers who could manually move the dome. In total, if I read the statistics correctly, only about 70 nights out of the 150 available nights were used. Looking over the sara-report documents, the primary cause for time loss was weather. In July, the primary cause was the dome and a few nights for the fire. All in all, this was probably our worst semester of observing since we started remote observing. I have noticed an increased usage of the SARA report systems. However, I think this is a selection effect, since people tend to fill out the reports when they can't observe due to problems, while after a successful night they go to bed and forget to submit a report.

Peter has asked that we log out of the ACE system after an observing night, rather than leaving it up to prevent hackers from easily taking control of the telescope. Thus everytime you finish observing, log out, and the next observer will have to log in.

### **IV. Telescope Problems.**

We experienced a variety of problems in addition to the normal weather restrictions.

**Mirror Petals:** The mirror petals continued to break and be stuck in the closed position. The solution was to redesign the entire system, so Peter essentially wired the petals open until August shutdown at which time they were re-engineered and replaced with a more robust design. Hopefully this fixed the situation and the problems will no re-occur.

**Dome rotation:** A relay in the dome rotation circuits burned out and had to be replaced. This sounds simple enough, but Peter was overseas for an extended period when it occurred, Matt had left ACE and had not been replaced, and the company who made the relays had modified the cards. Once the replay was replaced, there was a command control problem and the software had to be modified before it would operate correctly. This would not have been a problem, had Peter been in town, but since he was in Egypt at the time, he tried to talk his assistants through it remotely. This was not a great solution, and other problems complicated the repair (see introduction). Thus, the dome fix had to await Peters homecoming which was after August shutdown. As a result, we spent all of July in "on-site only" observing mode. The dome rotation has now been repaired and we are again observing remotely as of August 31<sup>st</sup>. Peter Mack and ACE felt bad about not being able to accomplish the repair, primarily because they were short-handed after

Matt's departure, so he offered to purchase a new CCD computer in compensation for us to replace our old failed computer (see computer section), and he eventually did just that.

**Auto-guider motors:** The autoguider was not responding to requests to change stations. Peter determined that it was

## **V. Instrumentation.**

- **Cameras**

1. Apogee has sent us a new U42 CCD camera to replace the U55 camera. Although the camera is now our primary instrument, and is performing relatively well, it is not the quality of camera we really need to do our science. It appears there is an ongoing communication problem between the camera and MAXIM DL that requires rebooting computers remotely. The new ability to cycle the power remotely has been critical. It has sucked up a lot of observing time however.
2. Finger Lakes camera with SITE chip is our backup camera but it hasn't been used very much lately as our primary camera has been doing well. Peter noticed the fan blades were broken and preventing the fan from cooling the CCD. He removed it and took it down to Tucson for repair.
4. The status of the low-res spectrograph is still attached to the telescope.

- **Computing facilities**

The saraccd computer crashed in late June. Peter was out of town, but ACE used the back-up saracam computer to temporarily run the CCD camera. A new CCD computer was purchased and installed during the summer shutdown.

saratel remains the telescope computer and is functioning well.

- **Weather Station**

The weather station is up and running and appears to be accurate. We would still like to buy "fish-eye lens" camera to aid in determining whether the night is photometric or not. No one has taken action to actually purchase one.

- **Autoguider**

The auto-guider has been functioning adequately, but we really need to refurbish the back of the telescope as per Peter's suggestions.

- **ISTeC** – nothing has changed from previous board meeting.

- **REU Program -**

New interns, mentors, another great year coming up this summer.

- **ROA's** - Our current group of ROA's are exceptional. I would like to formally thank Elaine, Chuck and Roy for their excellent work. It is always a pleasure to work with them, even though the telescope is operating so efficiently only rarely does there need to be much interaction. Due to the departure of Adam Block, there was a rather severe hole in the ROA coverage. A combination of the new more lenient rules and ACE stepping up and providing ROA services has really lessened the impact of losing Adam. Thanks ACE!

## **VI. Future.**

The future is here! These are some of the challenges we face starting this week and in the near future.

1. ***New SARA North back.*** We need to refurbish the back end of the telescope with the new instrument arrangement. I believe we budgeted for it last time, but we have not arranged it yet. This is a priority as far as I am concerned.
2. ***SARA South CTIO 24-in.*** We need to immediately schedule the dome replacement ASAP. We also need to now schedule Peter to refit the telescope after the dome is replaced.
3. ***Image quality improvements.*** If we do anything here, we need to write a grant to do it.

Air conditioning the dome is a possible way to substantially improve the image quality and is reasonably inexpensive, but will be an increase in the operating costs.

No one has investigated alternative funding for secondary mirror fabrication. This is a major project and someone who is interested needs to be the driving force behind this project if we really expect developments. The board should consider hiring an optical expert to evaluate the current SARA 0.9 after the back end replacement and the air conditioning are in place,.

## **VII. Summary.**

We are at a critical stage where we need to take action. Action on the following items:

- 1) refurbishment of SARA north instrument selector

- 2) SARA south dome replacement order
- 3) SARA south automation order with Peter
- 4) SARA North and South CCD camera proposals

I propose we get commitments from board members to tackle each of these action items and set a deadline for it. The longer we wait, the longer it will take to get things done.

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