NOAO Newsletter - March 1998 - Number 53

-

NOAO Highlights!

Director's Office

SCience OPErations

Cerro Tololo Inter-American Observatory

Kitt Peak National Observatory

National Solar Observatory

Global Oscillation Network Group

US Gemini Program

Central Computer Services

Newsletter Editorial and Production Staff

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

Comments concerning this Newsletter are welcome and will be forwarded to the appropriate editors.
Newsletter Posted: 01 March 1998

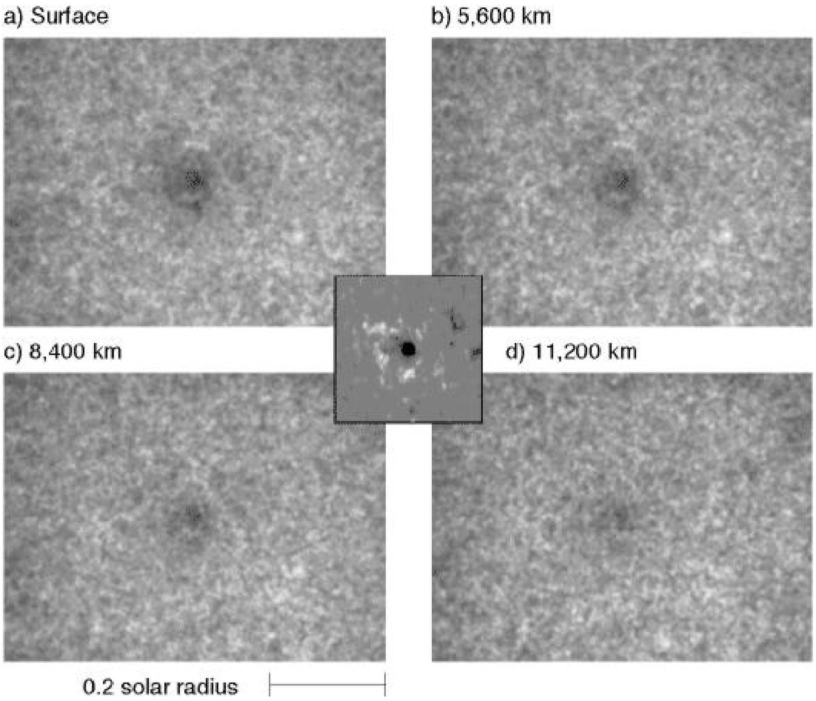
Table of Contents - -

A Sunspot and Its Quiet Neighborhood

Recent helioseismic images of a sunspot computed by Charlie Lindsey (SPRC) and Doug Braun (HAO) show a remarkable acoustic anomaly surrounding a sunspot. Lindsey and Braun applied a computational technique they call "acoustic holography" to SoHO-MDI observations of NOAA Active Region 7973, which contains a moderately large sunspot, over a 24-hour period beginning on 1996 June 25.0. The resulting acoustic images show a conspicuous halo 70,000 km in diameter surrounding the sunspot in which there appears a predominant acoustic deficit. This "acoustic moat" is terminated by a sharp outer boundary completely circumscribing the sunspot. The outer boundary of the acoustic moat coincides strongly with plages in the neighborhood of the sunspot.

Lindsey and Braun believe that the acoustic moat is the helioseismic signature of a rapid outflow surrounding the sunspot not far beneath the solar surface. The fact that sunspots absorb acoustic waves was discovered by Braun and colleagues in the 1980s. The acoustic moat appears to be the result of Doppler scattering, by the surrounding rapid outflow, of the acoustic deficit induced by the sunspot.

Depth analysis, based on focus-defocus diagnostics of the image coherently extrapolated to focal planes at various subsurface levels, show the acoustic perturbations signifying both the sunspot and the acoustic moat to be predominantly superficial, existing within a few thousand km of the solar surface. This is shown in the figure, in which the image rendered at the surface (Frame a) rapidly defocuses as the focal plane is submerged to 5,600 km, 8,400 km and 11,200 km, in Frames b, c, and d, respectively. The inset at the center of the figure shows the line-of-sight magnetic field taken by the spectromagnetograph at NSO's Kitt Peak Vacuum Telescope on 1996 June 25. A close comparison of the inset with Frame a of the figure shows that plages in the south and east quadrants of the sunspot correspond to the boundary of the acoustic moat.



Caption: *Helioseismic images of NOAA Active Region 7973 integrated over 24 hours beginning on 1997 July 25, extrapolated to focal planes at depths zero (Frame a), 5,600 km (Frame b), 8,400 km (Frame c) and 11,200 km (Frame d).*

Following theoretical work in the 1970s by F. Meyer and colleagues, Lindsey and Braun propose that that acoustic moat is the helioseismic manifestation of a single, integrated convection eddy that is driven by heat accumulation resulting from the local blockage of convective transport from the solar interior into the sunspot subphotosphere. With the advent of SoHO and GONG, helioseismic holography promises considerable insight into convective flows surrounding sunspots, an issue that is certain to be critical to the long standing problem of thermal transport in the neighborhoods of sunspots.

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Table of Contents - -

First Light for Astrographic Telescope on Tololo

The US Naval Observatory has installed a 0.2-m astrograph at Cerro Tololo and is starting a program to determine positions of stars between 7.5 and 16.5 magnitudes from -90 to +2. The detector is a Kodak 4K 4K CCD camera. This is one of the first widefield astrographic surveys to use a large format CCD, rather than photographic plates, as the detector. The current project will form a star catalog called the US Naval Observatory CCD Astrograph Catalog--South (UCAC-S).

The new Hipparcos Catalogue provides positions of about 118000 stars, accurate to about 10 mas at current epochs. The new Tycho Catalogue, combined with available ground-based data for improving proper motions, gives positions on the 20-50 mas level for one million stars to 11th magnitude. Positions of even fainter stars can be provided from Schmidt plate scans, but with an expected accuracy only at the 200 mas level. The UCAC-S project aims to extend the Hipparcos/Tycho system to include several million stars with 20 mas accuracy. A strong link to Hipparcos stars and extragalactic sources will be part of the observing program.

The instrument was relocated from Washington following completion of a pilot program to define the experimental procedures. It has been installed in one of the former 16inch domes on the Tololo summit. The astrograph, mount, and support equipment arrived at CTIO just before Christmas 1997. With excellent support from the CTIO staff, including an unanticipated architectural modification to the building, we had first light in the southern hemisphere on 10 January. As of late January, the instrument is undergoing a few weeks of calibration tests before beginning regular observing.

The survey will start at the South Celestial Pole and work its way towards the equator. With a field of view of just over 1 square degree and a center-in-corner overlap pattern, observations of about 44000 fields will be necessary to cover the Southern Hemisphere. Each field will be exposed twice, for 20s and 100s. The 100s exposure frames will reach beyond 16th magnitude. Tycho Catalogue stars will be used for the astrometric and photometric reduction of all CCD frames. The 20s exposures will saturate at about V = 7.8m and thus allow the observation of most Hipparcos stars. This gives the option for a block adjustment solution of the entire dataset based only on the Hipparcos Catalogue. Additional long exposures (about 600s) in some 200 fields of extragalactic reference frame sources are also planned, which will give 20 mas accuracy for 16th magnitude stars. Together with deep CCD frames of these sources at larger telescopes (mainly the CTIO 0.9-m), a strong link to the ICRS (International Celestial Reference System) can be utilized.

Though the US Naval Observatory's astrograph is one of the smallest telescopes at CTIO, it will provide the important astrometry link for the larger instruments. With an expected density of about 350 to 6000 stars per square degree, depending on galactic latitude, the catalog will be suitable for many applications, including:

1) general small field astrometry, particularly for current and future large telescope observations, fiber spectrographs as well as direct deep imaging,

2) astrometric calibration of small and large telescopes,

3) Near Earth Orbit (NEO) minor planet predictions,

4) improved Schmidt plate reductions,

5) ideal reference star catalog for major and minor planet astrometric observations,

6) and reductions of individual CCD chips of mosaic-CCD camera observations, such as the SDSS project input catalog for future space missions new epoch data for proper motions of faint stars.

Astrometric reductions will run in parallel to the observing program. First results are expected to be made available about one year after the start of the project. The final astrometric catalog will be about 1 GByte, so can be distributed easily.

This is not the first time the US Naval Observatory has operated a telescope in Chile. In 1849, an observatory was set up on the hill of Santa Luca, near the center of Santiago, by Lt. James M. Gilliss. This was part of an international effort to improve the solar parallax by observations of Mars and Venus. This program continued until 1852. When the Navy left, it sold the equipment to the recently created University of Chile, providing the foundation for the present Department of Astronomy.

N. Zacharias, T. J. Rafferty
US Naval Observatory, Washington DC, USA

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Table of Contents - -

NOAO Newsletter - Director's Office - March 1998 - Number 53

Long Range Plans for KPNO-CTIO-Gemini: An Update

The March 1997 Newsletter outlined the long range plan for nighttime astronomy. It is appropriate, now that it is one year later, to review how we are doing in terms of implementing that plan.

The central element of the plan was the replacement, over about a 15 year period of time, of all of the nighttime facilities offered to the community--except for the Blanco and Mayall 4-m telescopes--with new facilities that would basically double the available aperture. A comparison of the facilities available in 1990 with what will be offered in 2002 is shown in the following tables:

Capabilities - North

1990	2002
4-m Mayall	8-m Gemini (0.425)*
2.1-m	4-m Mayall
1.3-m	3.5-m WIYN (0.4)
Coud Feed	2.4-m
0.9-m	9-m HET (0.07)
0.9-m	6.5-m MMT (0.07)
Burrell-Schmidt (1/4)	
No. of Nights: 2281	No. of Nights: 1082
No. of nights $(D)^2$: 9056	No. of nights $(D)^2$: 22315

* Fraction of NOAO time.

Capabilities - South

1990	2002
4-m Blanco	8-m Gemini (0.45)
1.5-m	4-m Blanco
1.0-m (Yale)	4-m SOAR (0.3)
0.9-m	2.4-m
Curtis-Schmidt (Mich.)	
No. of Nights: 1460 (est.)	No. of Nights: 1004
No. of nights $(D)^2$: 7264	No. of nights $(D)^2$: 18925

The following summarizes the status of each of the new telescopes on the list:

Gemini

The construction of the Gemini telescopes is the responsibility of the international Gemini project team, but a visit to the Gemini Web site will show just how well the project is doing. First light on the northern telescope should occur within the next year or so, and the southern telescope is on schedule for first light in the year 2000. We have also taken steps to be ready to receive proposals for both Gemini and the independent observatories to which we will have access through the NSF instrumentation program. The new procedures and software that were in place for the application process for the spring of 1998 allowed much more efficient processing of proposals and is easily expanded with current staff to the much larger number of proposals that we expect to receive once Gemini is on line. In order to make it as easy as possible for the community to apply for observing time on this diverse suite of instruments, we have worked out arrangements so that applications for all of the telescopes accessed through NOAO can make use of a single form with a common deadline for submission.

NOAO supports the Gemini project in a number of ways, including providing management oversight for all instruments being built by US organizations and building the near-infrared spectrometer for Gemini North.

WIYN

The WIYN telescope continues to perform well in terms of delivered image quality, and the users committee has endorsed continued operation in queue mode. The advantages of queue scheduling are that it enables unique science through flexible scheduling and rapid response time, and also provides valuable experience that will be directly applicable to the Gemini telescopes when they come on line. Our survey of the community indicates a high degree of satisfaction with the quality of the data delivered by the queue observers. The WIYN partners are currently engaged in developing a long range plan, which will include a strategy for deploying new instrumentation.

SOAR

The SOAR project, which has as partners Brazil, the University of North Carolina, and Michigan State University, is now in the concept design phase. The project manager is Tom Sebring, who was previously project manager for the Hobby-Eberly Telescope. The project scientist is Gerald Cecil of the University of North Carolina, who is currently resident in Tucson.

2.4-m Telescopes

The scientific case for building wide-field O/IR imaging telescopes was strengthened by a community workshop sponsored by the USGP. The 46 participants in this workshop were divided into eight subject matter panels, asked to devise ambitious programs for Gemini and other large telescopes, and to define what resources (software, observing modes, surveys, preparatory observations) would be required to carry out those programs from end to end. All eight panels identified the need for surveys covering tens to hundreds of square degrees. The full report of the workshop is available through the NOAO home page.

The effort to obtain wide-field 2.4-m telescopes for both KPNO and CTIO is being led by Richard Green. After extensive discussions with a variety of possible university partners and also with the NSF, we have concluded that the only--and the best--way to achieve the long term goal of one full telescope for community access in each hemisphere is to proceed incrementally through partnerships. We are in the process of preparing proposals to the NSF for partial funding for the first telescope in each hemisphere, have identified partners for the first northern telescope and one partner for the southern telescope. We are actively seeking additional partners.

HET and MMT

We have concluded an MOU for community access to the HET and are negotiating the MOU for the MMT. We expect time to become available during 1999, with the exact date dependent on how rapidly commissioning proceeds.

As promised at the last Users' Committee meeting, we will continue to manage the transition from existing to new telescopes in such a way as not to disrupt ongoing observing programs or to remove fundamental capabilities. For example, the Burrell-Schmidt at Kitt Peak is now being operated by Case Western Reserve University, but wide-field imaging by the NOAO community is now supported with the Mosaic CCD imager at the 0.9-m telescope. KPNO plans to continue to operate the Coud Feed, which offers the only capability for very high resolution (200,000) spectroscopy, until we find resources to move the spectrograph to the 4-m. And if resources permit, KPNO will continue to operate the 2.1-m until the community has access to the equivalent of a full 2.4m on Kitt Peak. CTIO is similarly beginning to evolve its facilities, and the 1-m telescope has been returned to Yale, which is leading a consortium that will refurbish and continue to use the telescope.

Sidney C. Wolff

Table of Contents - -

Table of Contents - -

NOAO Educational Outreach

The NOAO Teacher Enhancement Program promoting *The Use of Astronomy in Research Based Science Education (RBSE)* is currently recruiting both teacher participants and mentors. RBSE offers a research experience to twenty-five teachers during a 180-hour summer workshop and extends the experience to the classroom during the academic year with materials, support, datasets, and mentors. This NSF- funded program will accept twenty-five middle and high school teachers for the 1998 workshop, which takes place at Kitt Peak National Observatory and the NOAO headquarters in Tucson, AZ.

We are interested in recruiting teachers who would like to add a research component to their science classes.

Astronomers interested in serving as mentors to RBSE teachers are encouraged to contact NOAO Education Officer Suzanne Jacoby (sjacoby@noao.edu) as soon as possible. Mentors are astronomers or graduate students willing to spend a few hours a month helping RBSE teachers implement the program in their local classroom; we expect mentors will not step far from their role as research scientists in this capacity. Typical duties might include providing help in downloading datasets, insight into additional research topics from the preselected datasets, interpretation of findings, and assistance in publishing results. RBSE provides a way for research astronomers to plug into effective science education reform and make a difference. Your help is needed and appreciated!

Suzanne Jacoby
NOAO Education Officer

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Table of Contents - -

NOAO Preprint Series

The following preprints were submitted during the period 1 November to 31 January 1998. Please direct all requests for copies of preprints to the NOAO author marked with an asterisk.

766 *Keller, C.U.., Harvey, J.W., Barden, S.C., Giampapa, M.S., Hill, F., Pilalchowski, C.A. "Asteroseismology from Equivalent Widths: A Test of the Sun"

767 *Lin, H., Penn, M.J., Kuhn, J.R. " He I 10830 Line Polarimetry: A New Tool to Probe the Filament Magnetic Fields"

768 *Rimmele, T., Beckers, J.M., Dunn, R.B., Radick, R.R., Roeser, M. "High Resolution Solar Observations from the Ground"

769 *Toner, C.G., Jefferies, S.M. "Searching for G-Modes at the Solar Limb"

770 *Hill, F. "Helioseismic Data Reduction"

771 *Pilachowski, C.A., Barden, S., Hill, F., Harvey, J.W., Keller, C.U., Giampapa, M.S. "The Procyon Campaign: Observations from Kitt Peak"

772 *Harvey, J., Hill, F., Komm, R., Leibacher, J., Pohl, B., and the GONG "GONG Spectra in Three Observables: What is a p-Mode Frequency?"

773 *Hill, F. "Helioseismology and the Solar Cycle"

774 *Komm, R., Gu, Y., Hill, F., Stark, P., Fodor, I. "Multiaper Spectral Analysis and Wavelet Denoising Applied to Helioseismic Data"

775 *Giampapa, M., Prosser, C.F., Fleming, T.A. "X-ray Activity in the Open Cluster IC 4665"

776 *Valenti, J.A., Piskunov, N., Johns-Krull, C.M. "Spectral Synthesis of TiO Lines"

777 *Mighell, K.J., Sarajedini, A., French, R.S. "WFPC2 Observations of the Small Magellanic Cloud Intermediate-Age Populous Cluster NGC 416"

778 *Massey, P. "Evolved Massive Stars in the Local Group: I. Identification of Red Supergiants in NGC 6822, M31, and M33"

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Other NOAO Papers

Preprints that were not included in the NOAO preprint series but are available from staff members are listed below.

*Abt, H.A. "Is the Astronomical Literature Still Expanding Exponentially?"

*Altrock, R.C. "Variation of Solar Coronal Intensity and Temperature in Cycle 22"

*Balasubramaniam, K.S., Radick, R.R., Fox, J. "A Search for Systematic Periodicities in Solar Flares"

*Balasubramaniam, K.S., Milano, L., Keil, S.L. "Synoptic Observations of Flare-Filament Eruption Complex 1997 April 6-7"

*Giampapa, M.S., "A Survey of Chromospheric Activity in the Solar-Type Stars in M67"

*Giampapa, M.S., Prosser, C.F., Fleming, T.A. "X-ray Activity in the Open Cluster IC 4665"

Goode, P.R., *Strous, L.H., Rimmele, T.R. "Local Properties of the Sun's Seismic Events"

Hammersley, P.L., Jourdain de Muizon, M., Kessler, M.F., *Bouchet, P., Joseph, R.D., Habing, H.J., Salama, A., Metcalfe, L. "A New Calibration of Mid Infrared Photometry"

*Harvey, J.W., Worden, J. "New Types and Uses of Synoptic Maps"

*Hill, F. "Helioseismology and the Solar Cycle"

*Jefferies, S.M. "High Frequency Solar Oscillations"

*Keller, C.U., NSO Staff "SOLISA Modern Facility for Synoptic Solar Observations"

*Keller, C.U., NSO "SOLIS Instrumentation Aspects"

*Keller, C.U., Harvey, J.W., Barden, S.C., Giampapa, M.S., Hill, F., Pilachowski, C.A. "Asteroseismology from Equivalent Widths: A Test of the Sun"

Marlowe, A.T., Muerer, G.R., Heckman, T.M., *Schommer, R. "The Taxonomy of Blue Amorphouse Galaxies: I, Ha and UBVI Data"

*Penn, M., Altrock, R.C., Henry, T., Guhathakurta, M. "Synoptic Coronal Temperature, Magnetic Field"

*Rhoads, J.E., Malhotra, S. "Microlensing of Globular Clusters as a Probe of Galactic Structure"

Rubin, R.H., Martin, P.G., Dufour, R.J., Ferland, G.J., *Baldwin, J.A., Hester, J.J., Walter, D.K. "Temperature Variations and N/O in the Orion Nebula from HST Observations"

*Simon, G.W. "Umbral Dots in Sunspots"

Waelkens, C.L., Waters, L.B.F.M., Snow, T.P., Lamers, H.J.G.L.M., *Bouchet, P., Geballe, T.R., Buss, R.H. Jr., Trams, N.R. "Circumstellar UV Extinction and IR Emission Features of the Carbon-Rich Stars HR4049 and HD213985"

Pat Breyfogle, John Cornett, Suzan Ecker,
Elaine Mac-Auliffe, Shirley Phipps, Cathy Van Atta

NOAO Observing Proposals Due for 1998B

Proposals for observing time for the 1998B semester (August 1998-January 1999) at Cerro Tololo Inter-American Observatory and Kitt Peak National Observatory are due 31 March 1998, Midnight MST. Proposals submitted on paper are due a week earlier on 24 March 1998 at 5pm MST.

There are three ways in which an investigator may submit an observing proposal:

- **Through a Web form** available at http://www.noao.edu/noaoprop/. The information provided on the Web form is formatted and submitted as a LaTeX file including figures that are "attached" to the Web proposal as encapsulated PostScript files. Documentation, including a short LaTeX guide, is provided online.

- **By e-mail** to *noaoprop-submit@noao.edu* using our LaTeX template and style file. The files necessary for building the proposal are available from our anonymous FTP archive at ftp.noao.edu in the noaoprop directory. A README file is part of the distribution files and contains information necessary to complete the proposal.

  We encourage all investigators to obtain current versions of the README file, the LaTeX template, and the style file, which incorporate changes in NOAO policies and format as described in the accompanying articles in this section.

- Proposals are still being accepted **on paper**, but investigators should be aware that this type of submission has an earlier deadline as noted above. A blank proposal form may be requested from the NOAO Proposal Office, SCience OPErations Division, National Optical Astronomy Observatories, P.O. Box 26732, Tucson, AZ 85726-6732 (US mail) or 950 N. Cherry, Tucson, AZ 85719 (courier). A blank proposal form is also available from our FTP archives, mentioned above, as the file blank.ps. The completed proposal form should be sent to the NOAO Proposal Office at one of the addresses given above.

Important Observing Proposal Addresses

http://www.noao.edu/noaoprop/: Web-based proposal form

ftp.noao.edu, cd noaoprop: FTP archive for LaTeX files

noaoprop-help@noao.edu: Help from a person for proposal preparation

noaoprop-letter@noao.edu: E-mail address for thesis and visitor instrument letters

noaoprop-request@noao.edu: E-mail address for automatic retrieval of LaTeX files necessary to prepare a proposal

noaoprop-submit@noao.edu: Address for submitting LaTeX proposals by e-mail

ctio@noao.edu: CTIO-specific questions related to an observing run

kpno@noao.edu: KPNO-specific questions related to an observing run

The SCOPE Proposal Team

Table of Contents - -

Table of Contents - -

Changes in the Proposal/TAC Process

The SCience OPErations (SCOPE) Division has been charged with developing a telescope allocation process that will extend to the Gemini telescopes and the independent observatories that will be supplying time to the community through NOAO. While we have been improving the existing process for some time, the present call for proposals marks the start of some important changes. Two factors motivate these changes: 1) the need to handle a substantially larger number of proposals efficiently and 2) the desire to simplify the process for astronomers to get time on all telescopes needed to carry out their scientific programs.

Increasing automation of the mechanics of proposal processing addresses the first factor. Although almost all proposals are now submitted electronically either through the Web or by e-mailing the LaTeX form, recent improvements include standardization of the forms and submission process for KPNO and CTIO and modification of the Web form to allow old proposals to be imported. On the reporting end, TAC members now write their comments on laptops, allowing us to edit and transfer them easily to the letters sent to proposers. We will continue to work to make all phases of this processing easier.

The second factor is addressed by restructuring the proposal review process to account for the complementary roles different facilities play. If a proposer has a program that requires imaging on a small telescope to support spectroscopic observations on a large telescope, it should be possible to guarantee the acquisition of that supporting data. If a sample can be split with bright and faint halves observed using two different telescopes, it should be straightforward to get the telescope time to do that. If a program requires observations of a sample extending over north and south hemispheres, a proposer should not have to argue separately to different TACs. The approach we are going to take is to generalize the current split of proposals between two panels (galactic and extragalactic) to a larger number of panels limiting the maximum number of proposals per panel to about 100. Associated with this, we will add the new telescopes into the mix, beginning with HET and MMT in March 1999, Gemini North in March 2000, and Gemini South in March 2001. Note that the pressure to accommodate these new telescopes comes initially in the north. Therefore, we are going to begin with the KPNO system and alter it to accommodate the new facilities. When it becomes appropriate to include the CTIO telescopes, we will consider the best approach.

Another significant change to note is one of perception. On the proposal form the question labeled "Why NOAO?" originally asked if proposers had access to other facilities on which they might be able to make the proposed observations, and if so, why they were not using them instead. A couple of years ago that question was changed to ask whether other facilities were being used in order to better understand the role that the NOAO facilities were playing in the overall program. We have seen that the majority of proposers have not recognized the change and are still answering the old question. Therefore, we are further modifying the question (and calling attention to the change). The "Why NOAO?" question has been eliminated and the information about other facilities has been incorporated into a new "Experimental Design" question. This new question now asks the proposer to list other facilities that are being used or applied for together with a brief description of the role of these in the overall program, followed by a couple of sentences to explain the value of the proposed observations in the context of the entire program. This information is needed by the TAC to ensure the proposed observations will make a significant contribution to the overall scientific program being judged.

Todd Boroson

Table of Contents - -

Table of Contents - -

Proposals for New Facilities Available through NOAO

During the next two years, NOAO will offer access to several new research facilities available to the community. Beginning in 1999 and continuing for six years, NOAO will allocate 27 nights per year on the Hobby-Eberly Telescope (HET) and 24 nights per year on the Multiple Mirror Telescope (MMT) through peer review. Observations on the HET will be made in queue mode as part of the HET Queue Program. Time on the MMT will be scheduled classically.

Observing time on the new Gemini telescopes will become available in 2000 for Gemini North and in 2001 for Gemini South. Half of the time on the Gemini telescopes will be scheduled in queue mode, and half will be scheduled classically.

Proposals for time on these new facilities will be accepted through the normal NOAO proposal process, with the same deadlines as for CTIO and KPNO proposals. We expect to accept proposals for time on new facilities according to the following timeline:

```
HET and MMT:      March 1999
Gemini North:     September 1999
Gemini South:     September 2000
```

Todd Boroson

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Table of Contents - -

Changes to the NOAO Proposal Forms

The LaTeX template, style, and README files for the 1998B semester have been changed to clarify what information investigators should supply as part of a telescope proposal. Investigators are encouraged to update their files before starting to write proposals. The changes include:

- The replacement of the "scientific and technical feasibility" question with a new question on experimental design.
- A clarification that information on previous allocations of time on NOAO facilities need only be supplied for the Principal Investigator.
- For CTIO proposals only, investigators should indicate why access to the southern hemisphere is important to achieving their scientific goals.

As a reminder, all proposal files are available from our network archive at ftp.noao.edu in the noaoprop directory. The same files are used for both CTIO and KPNO.

In response to our proposal survey in October, we plan to make changes to the Web-based proposal form by 1 March (http://www.noao.edu/noaoprop/) to:

- Add an option to import old LaTeX proposals into the Web form for editing and submission.
- Add a text field for personal LaTeX definitions.

We will also be looking at adding other PostScript figure options without making the form overly complicated.

Thanks to everyone who completed and returned the proposal survey. Your feedback is important to us.

Caty Pilachowski, Jeannette Barnes, Dave Bell

Table of Contents - -

Table of Contents - -

CTIO Instruments Available

The following lists common user instruments available on CTIO telescopes. The last column gives volume number of Newsletters containing relevant articles. Many optical instruments show a "generic" CCD, e.g., "Tek 2K." The most recent summary of specific CCD characteristics is in NOAO Newsletter 45; see also 51, 50, and 33. The principal change since last semester is the removal of the ARGUS fiber-fed spectrograph from service. Watch this space for the availability of Hydra II in 1999.

SPECTROSCOPY

	Detector + Spectral Range	Resolution	Slit	Reference
4-m Telescope				
OSCIR 10 m Spectrometer	128^2 Si:As BIB, 8-14 m	40-1000	23"	[51]
R-C Spectrograph	Loral 3K CCD, 3100-11000	300-5000	5.5'	[40,41,42]
Blue Air Schmidt + Echelle Spectrograph	Loral 3K CCD, 3100-11000	15000	5.2'	[40,41,42,50,51]
Long Cameras + Echelle Spectrograph	Tek 2K CCD, 3100-11000	98000	5.2'	[23,25,26,39,5,50,51]
CTIO IR Spectrometer	InSb (256^2, 0.9-5 m)	450-9800	0.3'	[37,39,41,45,49,51,53]
Rutgers Imaging Fabry-Perot	Tek 1K/2K CCDs, 4800-9600 (0.36" or 0.24"/pixel)	2400-8000	FOV 2.7'	[25,26,42]
1.5-m Telescope				
Cass spectrograph	Loral 1200800 CCD, 3100-11000	<1300	7.7'	[43,45]
Bench Mounted				

Echelle Spectrograph	Tek 2K CCD, 3100-8800	15000-60000	Fiber	[22,23,39,42,50,51]
Rutgers Imaging Fabry-Perot	Tek 1K/2K CCDs,4800-9600Ã…	2400-8000	FOV	[25,26,42]
	(f7.5 0.97" or 0.65"/pixel)		7.3'	
	(f13.5 0.54" or 0.35"/pixel)		4.1	
Curtis Schmidt				
Objective Prism Imaging	Tek 2K CCD, 3100-11000	<900	NA	[42,47,50,51]

IMAGING

	Detector	Scale ("/pixel)	Field	Reference
4-m Telescope				
OSCIR 10 m Imager	Si:AS BIB (128^2, K + 8-21 m)	0.18	23"	[51]
BTC Mosaic Imager	4K x 4K CCD Mosaic	0.43	30'	[47]
Prime Focus Camera	Tek 2K CCD	0.43	14.7'	[36,39,50,51]
Prime Focus Camera	User Photo-Plates		50'	[23,38,41]
Cass Direct Imaging	Tek 2K CCD	0.16	5.4'	[39,50,51]
Cryogenic Optical Bench	InSb (512^2, 1-3 m)	0.094	0.8'	[45,47,49,53]
CTIO IR Imager	HgCdTe (256^2 1-2.5 m)	0.4/0.22	1.7'/0.9'	[40,41,53]
1.5-m Telescope				
Cass Direct Imaging	Tek 1K/2K CCDs	0.44/0.24	14.8'/8.2'	[39,50,51]
CTIO IR Imager	HgCdTe (256^2, 1-2.5 m)	1.16/0.64	4.9'/2.8'	[40,41]
ASCAP Optical Photometer				[24,25,28,43]
0.9-m Telescope				
Cass Direct Imaging	Tek 2K CCD	0.40	13.6'	[39,50,51]
Curtis Schmidt				
Direct Imaging	Tek 2K CCD	2.0	68'	[42,47,50,51]

Ron Probst

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Table of Contents - -

KPNO Instruments Available

SPECTROSCOPY

	Detector*	Resolution	Slit	Multi-object
Mayall 4-m Telescope				
R-C CCD Spectrograph	T2KB CCD	300-5000	5.4'	single/multi
CCD Echelle Spectrograph	T2KB CCD	18,500-65,000	2.0'	
IR Cryogenic Spectrometer	InSb(256256, 0.9-5.5m)	300-1500	0.8'	
CryoCam	Loral CCD (8001200)	400-600	4.5'	single/multi
OSU-NOAO Infrared Imaging Spectrometer	InSb(5121024, 0.9-2.5m)	1400	1.5'	
High Resolution IR Spectro-meter (Phoenix) (see note 1)	InSb(2561024, 0.9-5.5m)	50,000-100,000	0.5'	
WIYN 3.5-m Telescope				
Hydra + Bench Spectrograph	T2KC CCD	700-22,000	NA	100 fibers
DensePak (see note 2)	T2KC CCD	700-22,000	IFU	~90 fibers
2.1-m Telescope				
GoldCam CCD Spectrograph	F3KA CCD	300-4500	5.2'	

IR Cryogenic Spectrometer	InSb(256256, 0.9-5.5m)	300-1500	1.3'
High Resolution IR Spectro-meter (Phoenix) (see note 1)	InSb(2561024, 0.9-5.5m)	50,000-100,000	1.0'
OSU-NOAO Infrared Imaging Spectrometer	InSb(5121024, 0.9-2.5m)	1400	3.0'
Coude-Feed Telescope (see note 3)			
Coude CCD Spectrograph	F3KB CCD	2200-250,000	3.0'

IMAGING

	Detector	Spectral Range	Scale ("/pixel)	Field
Mayall 4-m Telescope				
Prime Focus CCD camera	T2KB CCD	3300-9700	0.42	14.2'
IR Imager	HgCdTe (256x256, 1-2.5m)	JHK + NB	0.60	2.5'
CCD Mosaic (see note 4)	8Kx8K	4500-9700	0.26	35.4'
OSU-NOAO Infrared Imaging Spectrometer	InSb (5121024, 0.9-4.0m)	JHK+L(NB)	0.18/0.09	3'x1.5'/1.5'x0.75'
WIYN 3.5-m Telescope				
CCD Imager (WIYN)	S2KB CCD	3300-9700	0.197	6.7'
2.1-m Telescope				
CCD Imager	T1KA CCD	3300-9700	0.305	5.2'
IR Imager	HgCdTe (256256, 1-2.5m)	JHK + NB	1.1	4.7'
OSU-NOAO Infrared Imaging Spectrometer	InSb (5121024, 0.9-4.0m)	JHK+L(NB)	0.35; 0.18	6'x3'/3'x1.5'
0.9-m Telescope				
CCD Imager	T2KA	3300-9700	0.680	23.2'
CCD Mosaic (see note 4)	8Kx8K	4500-9700	0.425	59.0'

* Unless otherwise noted, CCDs have 3300-9700 spectral range.

1 Phoenix is likely to be shipped to CTIO in spring 1999 and not available at KPNO.

2 Available for bright time only (Integrated Field Unit: 30" 45" field, 3" fibers, 4" fiber spacing)

3 Will be continued until fiber-feed capability is available elsewhere.

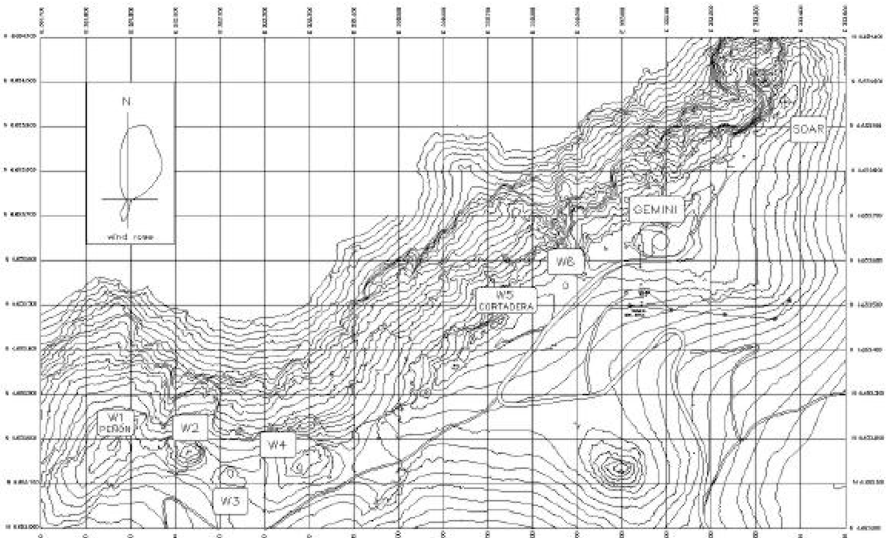
4 To minimize the number of instrument installations, the CCD Mosaic Imager will be available for block-scheduled, shared-risk observing on the 4-m and 0.9-m telescopes, with priority given to 4-m use. Check the CCD Mosaic WWW page for updates concerning new filters and progress toward replacing the current engineering-grade CCDs (the default for all of semester II 1997) with science-grade CCDs.

Table of Contents - -

Table of Contents - -

SOAR Site Leveling Underway

By the time you read this, the site of the new SOAR 4m telescope on Cerro Pachn will be leveled off and waiting for building to begin. The map shows the future location of the telescope, about 400 m NE of the Gemini South telescope on the extreme upwind end of the Cerro Pachn ridge. As can be seen from the wind rose shown on the map, this location is almost a perfect "knife-edge" cutting into the prevailing wind. The map also shows several other potential telescope sites that have been identified along the ridge. Cerro Pachn is 11 kms line of sight SE of Cerro Tololo.



Caption: *Figure 1. The Cerro Pachn ridge. An abrupt cliff runs from lower left to upper right, dropping into a deep valley filling the upper (North) part of the map. Grid lines are spaced 100-m apart.*

The photo shows the progress on leveling the site as of 24 January. By the end of February, 14,000 m^3 of rock will have been removed to produce a flat platform at an elevation of 2701m above sea level. An ex-post-facto "groundbreaking" ceremony is scheduled for 17 April. We expect the telescope to go into service in late 2001. SOAR is a joint project involving Brazil, The Michigan State University, The University of North Carolina and NOAO. For more details, follow the link to "SOAR 4m Telescope Project" on the CTIO home page (http://www.ctio.noao.edu).

Caption: *Figure 2. The SOAR site on Cerro Tololo.*

Jack Baldwin (jbaldwin@noao.edu)

Table of Contents - -

Table of Contents - -

Tip-tilt Image Stabilization on the Blanco 4-m Telescope

Tip-tilt wavefront correction, a project conceived and initiated by Richard Elston (Florida), has been successfully implemented on the Blanco telescope. This is now the standard facility installation for image stabilization and telescope guiding with the IR imagers and IR spectrometer.

In the CTIO realization, a dichroic above the Cass focus reflects IR radiation to the science instrument and transmits the optical beam to a high speed CCDTV. The digital signal is passed to a dedicated PC for centroid determination. Error correction is done at the f/14 IR secondary mirror via a commercial piezoelectric actuator system. Setup and control is the responsibility of the telescope operator. The CCDTV is mounted on a translating stage to allow access to guide stars over a 5' 5' field centered on the science target. We have successfully guided on stars as faint as V = 18, although brighter stars are preferred for optimal correction.

K band images generally show an improvement in FWHM of several tenths of arcsec with respect to the V band free air site seeing reported by the mountain seeing monitor, and similar improvement over the K band open-loop telescope performance. Available IR imagers are CIRIM (50" FOV, 0.2 "/pix) and COB (50" FOV, 0.1 "/pix). COB offers better sampling and a wide range of filter options, while CIRIM has lower system read noise and much better detector cosmetics. (CIRIM is also available at f/8, with 0.4" pixels and 100" FOV, but without tip-tilt correction.) The best images obtained to date have been with CIRIM, due to vagaries of weather and site seeing. Background-limited exposures on science targets have given 0.3"-0.4" FWHM at K. On nights of good but not superb site conditions, we have maintained < 0.5" FWHM for lengthy periods.

Spectroscopic comparisons with previous performance are made somewhat uncertain by optical changes implemented inside the spectrometer to accept the tip-tilt beam. Our best present estimate is a throughput gain of 1.5 to 2 in point source flux with the two pixel (0.64") slit in the K band (further information on all IR instruments can be found on the CTIO Web pages). In the coming months we expect to characterize and optimize system performance further. We will change the CCD sensor to a special purpose, high speed low-noise sensor to extend our guiding range to fainter stars. Fixed overheads in the PC hardware presently limit correction frequency to 100 Hz, even on very bright stars; we expect to be able to operate significantly faster. Finally, auxiliary f-ratio conversion optics for the 4-m Image Analyzer will enable us to determine primary mirror support corrections specifically for f/14 and to "tweak" the primary in real time, which may produce some further improvement in image quality (we presently use the f/8 corrections).

Together with the image quality improvements resulting from telescope and dome modifications over the past few years, tip-tilt image stabilization offers significant gains in IR spatial resolution and sensitivity; however, it is not a cure-all. Some gain is realized over a wide range of site conditions, but bad seeing "in" will produce, at best, mediocre images "out." Neither our telescope's traditional design nor our present scheduling practices permit rapid real-time instrument or program changes in response to varying conditions, so a certain "luck of the draw" element will continue to affect users' results. Historically, the best site seeing occurs in the southern summer (November-February); winter can be significantly poorer. A conservative approach is suggested for planning science programs. Programs that must have the very best conditions to achieve any useful result will have a significant element of risk.

Attendees at the SPIE Symposium on Astronomical Telescopes and Instrumentation in Kona, Hawaii, can see two poster papers about this system on Monday, 23 March: Prez and Elston, "Fast tip-tilt secondary for the CTIO Blanco 4-m telescope," and Probst et al., "Performance of a novel tip-tilt secondary on the Blanco 4-m telescope."

Ron Probst (rprobst@noao.edu),
Patrice Bouchet (pbouchet@noao.edu),
German Schumacher (gschumacher@noao.edu)

Community Time Available on YALO 1-m Telescope

We are soliciting proposals for service/queue observing with the 1-m telescope at CTIO, beginning in second semester 1998. The YALO consortium (Yale, AURA, Lisbon and Ohio State; see NOAO Newsletter No. 52) will begin operations in April-May of 1998, and by the second semester should be available for community projects. The telescope will have one permanently mounted instrument, a dual channel optical-IR imager; as of late January, it appears that only the optical CCD will be available initially.

The NOAO community has access to 9% of this telescope time. Since there will be a service/queue observer, we encourage proposals for synoptic programs where a few frames per night will yield significant scientific benefits. Proposals will be submitted and evaluated in the same way as all other proposals to CTIO. The instrument and program details are still being finalized. We ask interested proposers to check the CTIO Web pages in mid-March, for technical information and proposal advice/recommendations.

Bob Schommer (rschommer@noao.edu),
Charles Bailyn, Yale University (bailyn@astro.yale.edu)

NOAO Newsletter - Cerro Tololo Inter-American Observatory - March 1998 - Number 53

High Redshift Supernovae Discovered with BTC

Two groups have been using the CCD mosaic imager known as the Big Throughput Camera in systematic programs to determine cosmological parameters using distant supernovae. The search strategy involves finding probable supernovae by imaging fields of galaxies with massive near-real-time data reduction, and subsequent photometric and spectroscopic followup observations. This can require the meshing of observing schedules with other groundbased sites and HST, which can be a headache for the scheduler! The payoff is illustrated in the following list of supernovae discovered in two nights with BTC on the 4-m, by the Lawrence Berkeley Labs Supernova Cosmology Project headed by Saul Perlmutter:

SN	1997 UT	R.A. (2000)	Decl.	R	z	Type
1997ek	Dec. 28	4 56 11.63	- 3 41 26.0	23.8	0.86	Ia
1997el	Dec. 28	4 56 41.21	- 3 27 54.7	23.1	0.64	Ia
1997em	Dec. 28	4 56 50.44	- 3 51 37.1	23.6	0.46	Ia
1997en	Dec. 28	4 56 57.21	- 4 11 46.0	24.4	0.77	Ia?
1997eo	Dec. 28	4 57 32.35	- 3 30 06.2	24.5	0.70	Ia?
1997ep	Dec. 28	4 57 48.59	- 3 42 44.7	22.4	0.46	Ia
1997eq	Dec. 28	4 58 56.32	- 3 59 29.4	22.5	0.54	Ia
1997er	Dec. 28	5 00 38.56	- 3 59 32.2	22.3	0.47	Ia
1997es	Dec. 28	8 18 40.65	+ 3 13 36.5	24.3	0.65	Ia?
1997et	Dec. 28	8 22 53.73	+ 3 52 14.7	23.2	0.63	Ia
1997eu	Dec. 28	8 23 00.45	+ 4 08 27.3	22.4	0.59	Ia
1997ev	Dec. 28	8 24 20.28	+ 3 51 36.0	23.0	0.43	II?
1997ew	Dec. 28	8 24 25.09	+ 3 49 08.0	23.9	0.59	II/Ic?
1997ex	Dec. 28	8 24 27.87	+ 3 52 05.8	21.6	0.36	Ia
1997ey	Dec. 29	4 56 58.19	- 2 37 36.7	22.9	0.58	Ia
1997ez	Dec. 29	8 21 38.13	+ 3 25 10.5	23.4	0.78	Ia
1997fa	Dec. 29	8 22 03.72	+ 3 24 24.9	22.5	0.50	Ia

All were discovered near maximum light and confirmed spectroscopically within a few nights of discovery using the Keck telescope. Photometric follow-up is proceeding from the ground and, in some cases, with HST. These discoveries were reported in IAU Circular #6804.

The Big Throughput Camera was developed by Tony Tyson (Bell Labs) and Gary Bernstein (Michigan) and has been made available to the CTIO user community by a cooperative agreement. Prospective users may consult the BTC website at http://www.astro.lsa.umich.edu/btc/btc.html or by links from the CTIO webpages.

Malcolm Smith (msmith@noao.edu)

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

Table of Contents - -

NOAO Newsletter - Cerro Tololo Inter-American Observatory - March 1998 - Number 53

Summary and Status of CTIO Instrumentation Projects

Our instrumentation and telescope improvement agenda is full for the coming year. As reported elsewhere in this Newsletter, the f/14 tiptilt system is in routine use on the Blanco telescope, with both COB and CIRIM imagers and the IRS. The latter was successfully converted to f/14, and the improved image quality has led to significant S/N improvements for spectroscopy. Further work on the tiptilt system will be ongoing; in particular the installation of a low noiserapid readout CCD (from EEV) should improve the faint limit of the guide/acquisition camera.

The other major projects include local preparation for the Hydra multiple fiber spectrograph to replace our prime focus fiber system this calendar year (NOAO Newsletter No. 51, September 1997). We have designed and are constructing the spectrograph, fiber connectors, and calibration system, as well as the mount and control system for the ADC Cass corrector. The latter will be remotely stowable to allow other instruments at the Cass focus (IR, in particular) to function without this large piece of glass in the beam.

We continue to develop and implement the Arcon controllers for the NOAO Mosaic and Mosaic II (which is due at CTIO in about one year). We are modifying the prime focus cage and pedestal to accommodate this instrument and provide improved precision for focusing at the prime. We are also continuing to work on improvements to the Blanco servo control system, to provide improved tracking, guiding, and a modern system, based on Gemini specifications that can be maintained into the next decade. A related and important part of this effort includes ongoing upgrades to our guide TV hardware and software, based on our experience with the f/14 tiptilt system. We hope to propagate some of these improvements to the small telescope guiders in the coming year.

Our staff is also becoming involved in aspects of the SOAR telescope projects to understand and collaborate on the design and implementation of a modern 4-m telescope system.

Bob Schommer, Chair-ACTR (rschommer@noao.edu)

Table of Contents - -

Table of Contents - -

Major Accomplishments of the Mechanical Engineering Section in 1997

Improving the image quality was the major driver in almost all the projects handled last year by the Mechanical Engineering Section. We finished three major projects: the 1.5-m Dome Ventilation Doors, the 4-m Primary Mirror Cooler/Extractor system, and the f/14 Fast Guider Box.

1.5-m Dome Ventilation Doors

The first ideas on how to modify the 1.5-m dome started to take shape in mid 1995. At that time we evaluated louvers, fans, openings, sliding doors, etc. Finally we adopted a door of a guillotine type, replicated 32 times at the spring line around the dome. Each door has its own motor and limit switches. A mechanical engineer hired with MACHO funds did the design work and produced the shop drawings. Inhouse fabrication of the components started in early 1996, and installation on the dome started in October. Four mechanics worked every day, during mornings only, in order to not disturb the astronomical observations. The final electrical installation was finished in April 1997, and the doors have been in routine use since then.

4-m Primary Mirror Air Extractor

In 1994, the 4-m telescope was equipped with a system that blows cold air onto the primary mirror. Not too long after, a complementary idea was proposed to take advantage of the existing ducts to the mirror: Why not install another extractor connected to the cold air duct, with an appropriate valve, and reverse the flow of the air during the night? This would flush the face of the mirror with dome ambient air. This air from the mirror section would be dumped outside the building. In 1995, several tests were performed using a temporary installed extractor. Improvement of the image was evident, especially when the dome air temperature was above the mirror temperature. So, we decided to go ahead with a permanent system. Design work for a more robust and easytooperate system started in March 1996, and the project was completed in April 1997. The system has been in routine use since that day.

In addition to this air extractor, we installed 12 medium capacity fans inside the primary mirror central light baffle. These fans are installed at a level slightly below the optical surface of the mirror, and located in such a way to extract air from the long tube of the baffle and to force it to the main duct of the mirror extractor system. The idea is to promote a downward laminar circulation of air inside the baffle to dissipate any cell of hot air produced by heat coming from instrumentation at the Cassegrain location. Hot air bubbles in this area have a large negative effect on the image quality.

F/14 Fast Guider Box

Soon after the Tip-Tilt Secondary Mirror was completed on the Blanco 4-m telescope, construction started on the Fast Guider Box. The guider box, installed at the f/14 Cassegrain focus, takes light from the secondary mirror and splits it between a science instrument and a fast CCD camera by means of a dichroic mirror. This camera is mounted on a stiff xy carriage that allows the observer to select the appropriate guiding star. The Guider Box accommodates the Infrared Spectrometer, CIRIM, CCOB, and in future, Phoenix. Design work started in January 1996; the project was completed in August 1997.

Major Tasks for 1998

This year, the major tasks that will keep this Section busy are all related to significant instrumentation upgrades at the Blanco 4-m telescope: the Hydra installation, the Hydra ADC corrector, and modifications to the prime focus pedestal and cage in anticipation of the arrival of Mosaic.

Hydra is scheduled to arrive to CTIO in September this year. In the meantime, construction has started on the fiber bundles, the ADC corrector, comparison lamps system, and bench mounted spectrograph.

Mosaic is scheduled to arrive at CTIO sometime in early 1999. The prime focus pedestal will be modified before the end of 1998 to accept the weight of this instrument and to comply with the demanding requirements of precision and repeatability of the focus motion. Also, the prime focus cage will be modified to fit the size of the instrument and to facilitate installation.

Gabriel Perez (gperez@noao.edu),
Andres Montane (amontane@noao.edu),
Fabian Collao (fcollao@noao.edu)

Table of Contents - -

Table of Contents - -

What's New with Mountain Telescope Operations Staff

There have been several changes in the mountain staff recently, all intended to maintain the high quality operation expected by users in the face of personnel changes within CTIO as a whole.

The La Serena Computer Applications Group had two vacancies resulting from staff leaving the Observatory. While one was filled by an outside hire, the other has now been filled by the transfer of Nelson Saavedra from the mountain to La Serena. Telescope operator Manuel Hernndez has been selected to fill the resulting vacancy on the mountain, following an internal search. Manuel will be taking over Nelson's duties in support of data reduction and other computer related observer support activities. His counterpart on the other shift, Mauricio Navarrete, continues in his position.

In order to replace Manuel as a telescope operator, we have offered the position to Alberto Zuiga, who has been working as the MACHO observer. Alberto has a long prior experience as a night assistant with ESO on La Silla. During the summer he will be getting trained on the 1.5-m and 4-m telescopes. Using an opportunity offered by Rae Stiening (2MASS) we will send Patricio Ugarte to the 2MASS northern site on Mount Hopkins, Arizona, in early February to get trained as an "expert observer" for the 2MASS telescope. On his return, Patricio will assist in the training and supervision of the observers for that project.

We are in the process of selecting candidates for telescope operators to provide services under contract to on-site experiments: one for MACHO, and two each for the USNO CCD astrograph, 2MASS, and the Yale 1-m.

During this summer, we have two students from the University of La Serena, Roger Leiton and Sergio Pizarro, as "fill-ins" for vacation leaves of regular telescope operators. Roger participated in the Research Experiences for Undergraduates program in 1996. We have a computer sciences student, David Walker, who is doing his prctica (a kind of professional apprenticeship) by constructing a catalog of the Schmidt telescope plates, somewhat like the one we have for the 4-m PF plates. One goal is for David to develop tools to permit others to extend these catalogs to other telescopes and to maintain them in the future.

Oscar Sa (osaa@noao.edu)

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

NOAO Newsletter - Cerro Tololo Inter-American Observatory - March 1998 - Number 53

Some New Faces on the CTIO TAC

The membership of the CTIO Telescope Allocation Committee (TAC) has changed significantly in the past year, as various members have completed their "tours of duty" and new ones have come on board.

We thank former TAC members You-Hua Chu (Illinois), Eric Persson (OCIW), Mark Phillips (CTIO), Maria Teresa Ruiz (Chile), Verne Smith (Texas) and Charles Steidel (Caltech) for lending their expertise and judgment to the service of CTIO and the astronomical community. Recent additions to the TAC are Gary Bernstein (Michigan), Luis Campusano (Chile), Ron Probst (CTIO), and Joseph Shields (Ohio). Continuing members are David Crampton (DAO) and Nick Suntzeff (CTIO) serving as Chair. The alert reader will note that flux has not been conserved; we are seeking two additional members for the next TAC review in April-May 1998.

The TAC reviews all proposals received by CTIO, on the basis of scientific merit, and recommends time allocations to the Director. All members read and evaluate all proposals (conflicts of interest excepted), submit written comments, and participate in joint discussion of every proposal at a group meeting. This can be a scientifically stimulating, horizon-broadening experience; it is also demanding, at times grueling, and takes members away from their work and homes for several days twice a year. All of us who operate and use the NOAO facilities owe a large debt of gratitude to the TAC members for their professional service.

Nick Suntzeff (nsuntzeff@noao.edu),
Malcolm Smith (msmith@noao.edu)

NOAO Newsletter - Cerro Tololo Inter-American Observatory - March 1998 - Number 53

Recent and Forthcoming Science Meetings

Cerro Tololo and northern Chile are well known for superb observing conditions. The active and growing astronomical communities in Chile and elsewhere in South America are also giving rise to significant scientific meetings. Here is a sampler of two recent and one forthcoming specialty meeting to illustrate this vitality.

"Science With Gemini" (Florianopolis, Brazil)

In December we attended a meeting on "Science With Gemini," hosted by the University of Florianopolis. The locale was the island of Santa Catarina, off the southeastern coast of Brazil. Representatives from the Gemini project, the US, and the Brazilian, Argentine and Chilean astronomical communities contributed to three days of illuminating science and detailed discussion. A few comments on the content:

1) A section of the Brazilian community is very interested in optotomography to study the chromospheres and accretion disks in interacting binaries, stellar pulsation, astroseismology, pulsars, and X-ray binaries. These studies will require time resolution of less than 10s and accurate timing (1 ms or better) which, apparently, only Gemini will provide. A wide range of other topics, from highresolution stellar abundances to cosmological studies, was also presented.

2) Rob Kennicutt (Arizona) proposes that 8-m telescopes will be able to do spectroscopic follow-up of IR surveys to be carried out by satellites (especially WIRE and SIRTF). From about 10^4 objects estimated to be detected by WIRE on a 800 deg^2 survey at 12-25 m (launch date September 1998), about 10^3 objects could be observed by GMOS, requiring some 400 hr (~ 50 nights). For the brighter sample, one could use 4-m time at a rate of about one 8-m night per two 4-m nights. The UV satellite Gallex will also use WIRE's field as its deep field.

3) Phil Puxley (on behalf of the Gemini team) gave two talks on the expected performances of Gemini and details of queue and classical scheduling. Doug Simons summarized the instrumentation complement and continuing upgrades. Wayne van Citters summarized the situation concerning Australian participation.

The large and stimulating Brazilian astronomical community also forms one of the partners in the SOAR 4-m telescope project at CTIO. Further scientific collaborations between the communities was a topic of extensive discussion.

Meetings like this help greatly in the planning and implementation of our joint scientific programs.

"Clusters of Galaxies" (del Mar, Chile)

A workshop on "The Evolution of Clusters of Galaxies" was held in Via del Mar (on the coast, outside of Santiago) in mid-December. This was organized by Universidad Catolica (Santiago) and sponsored by CONICYT (the Chilean analog to NSF), ESO, AURA, Carnegie, UNESCO and U. Catolica. About 50 international participants gathered to hear speakers from Argentina, Brazil, Canada, Chile, France, Italy and the USA. Jim Peebles gave the opening talk and Ray Carlberg delivered the meeting summary. Evening discussion sessions were wonderfully successful, and the conference dinner, with breathtaking view of the Valparaiso harbor, was a joyous affair. El Nio did affect the weather, so summer was not yet evident, but the invited speakers did a marvelous job in keeping our dispositions sunny at least. Congratulations to the organizers; annual workshops are to be expected for the future.

"Quasars as Standard Candles"
(La Serena, May 1998)

A workshop entitled "Quasars as Standard Candles for Cosmology" will be held in La Serena on 18-22 May. Quasars' spectra depend on their luminosities, but we need to find out if these effects can be calibrated well enough to use QSOs as standard candles in cosmological tests. This workshop is intended to review recent progress on correlations between the luminosities and spectral properties of quasars, as well as to revive interest in quasars as cosmological probes. The workshop will specifically address the following interwoven questions:

- What observational correlations with luminosity exist? What is the current observational situation for luminosity correlations with the emission line spectrum? Can the correlation and scatter in the Baldwin effect be understood?
- How does the shape of the ionizing continuum change with luminosity? Does the shape of the extreme UV continuum change with the UV/X-ray spectral index? What does theory predict? What do the observations say?
- What is the chemical composition of the gas near quasars? How does the composition change with luminosity and what effects might these changes have on the emission/absorption spectrum?
- Are changes in the abundances and continuum shape enough to account for the Baldwin effect? What other agents might come into play?
- How does our current understanding of the emission line regions, the intrinsic absorption regions, and the central engine affect our ability to use quasars as standard candles? How can this be improved?

The scientific organizing committee includes Jack Baldwin, Mitch Begelman, Martin Elvis, Gary Ferland, Fred Hamann, Kirk Korista, Richard Mushotzky, Hagai Netzer, Pat Osmer, Malcolm Smith, Joe Wampler, Wei Zheng. More information on the workshop can be found at http://nimbus.pa.uky.edu/QuasarLuminosity.

Bob Schommer (rschommer@noao.edu),
Rene Mendez (rmendez@noao.edu),
Jack Baldwin (jbaldwin@noao.edu)

Table of Contents - -

Table of Contents - -

Status and Plans for KPNO

With first light for the Gemini North telescope rapidly approaching, KPNO is actively working to fulfill the vision for its new role in forefront Northern Hemisphere astronomy. That vision was articulated in the proposals to NSF for renewal of NOAO facilities and for renewal of the Cooperative Agreement with AURA. It portrays a 21st century observatory that complements and supports the capabilities of Gemini North.

The Gemini North telescope will be optimized for high image quality over a 5'-7' field, with particular emphasis on the near-infrared. Initially, it will offer imaging in the near and mid-IR, long-slit and integral field spectroscopy in the optical and near-IR, as well as multiple object optical spectroscopy . Since Gemini North will take on the role of supporting the community for spectroscopy and limiting near-IR imaging of the faintest objects, the current pattern of use of the Kitt Peak 4-m class and smaller telescopes will clearly change.

The lean, effective Kitt Peak envisioned consists of the Mayall 4-m for optical and near-IR imaging and spectroscopy; the NOAO 40% share of the WIYN telescope for moderate-field high quality imaging and wide-field multi-fiber spectroscopy; and a 2.5-m class telescope for dedicated wide-field optical and near-IR imaging and surveys. Such a suite of telescopes is (barely) consistent with the current level of funding support, and reflects the shift in aperture size by a factor of two with the advent of Gemini.

The Mayall 4-m is likely to support more programs of reconnaissance spectroscopy, while continuing to provide limiting wide-field imaging at the prime focus. The CCD Mosaic imager will be populated with science-grade devices from SITe, and is likely to be available for regular use in that mode no later than semester 1999A. Sam Barden is leading a development program for volume-phase holographic gratings that hold the promise of combining increased efficiency and broad spectral coverage at interesting resolution. With the positive outcome of his NSF-funded development program with KOSI optics company, we plan to optimize a new spectrograph based on this grating technology to replace the aging R-C spectrograph on a 3 to 4 year timescale.

NOAO is collaborating with Richard Elston (Florida) in development of his FLAMINGOS near-IR imager and multi-object spectrograph. The goal is provide cold multi-slit masks that could be changed out on a daily basis. The field of view will be about 10' at the f/7.6 Cassegrain, feeding a 1024 square HgCdTe array. Grisms will allow low-dispersion survey spectroscopy, particularly aimed at efficient redshift surveys for faint galaxies. With sufficient availability of ALADDIN InSb arrays, we will re-populate some channels of the SQIID multi-color imager for simultaneous multi-band imaging. As user demand dictates, we will also provide the ONIS imager/low-dispersion spectrograph, produced by OSU for shared use between KPNO and the MDM 2.4-m with its two-quadrant ALADDIN array and fine pixel sampling of the PSF. The future availability of the workhorses IRIM and CRSP will also be dictated by user demand.

High-dispersion spectroscopy at the 4-m is currently provided by the Cassegrain echelle spectrograph. Since the advent of Keck High-Res, we have seen a reduction in demand and in submitted proposals highly ranked by the TAC for the echelle. At the same time, the coud spectrograph at the 2.1-m fed by the 0.9-m Coud Feed telescope provides unique capability for very high dispersion spectroscopy, approaching resolutions of 300,000. To rationalize the workload of our over-committed staff, we must reduce the complexity of mountain operations. The combination of these considerations leads us to a plan to move the Coud train with the highest dispersion cameras to the large Coud room of the 4-m. The spectrograph will be fed with a fiber pair and image slicer. Placement of the fiber where it can be fed by insertion of the tertiary will allow an easy switch when the telescope is working at f/15. The completion of that project is dependent on two other efforts discussed below. Until that time, the Coud Feed remains open for your proposals. We will schedule the programs that are recommended by the TAC to the extent possible. Several of you noticed that the time is not fully subscribed, and that many nights in the semester are marked "closed." Those nights will not be available for programs that could have been reviewed through the normal TAC process. The Director will consider requests for targets of opportunity undergoing unique variable episodes or required to support larger campaigns not known about at the time of the proposal deadline.

We will continue the vigorous program of upgrading the delivered image quality at the 4-m. The dome vents have made a dramatic difference in the uniformity and volume flushing of the dome air. This summer will see the upgrading of the primary mirror support system to one of active control, following the lead of CTIO. Completion of the software interfaces to take and process wavefront data will extend into FY 1999. Further effort will be required that year to improve the refrigeration of the primary mirror bulk for tighter thermal control. The KPNO Users Subcommittee endorsed these measures of improving the overall DIQ as having the highest priority for telescope improvements.

The WIYN Telescope stands as the flagship of performance on Kitt Peak. The WIYN partners are developing a strategy for upgrading the telescope performance and instrument complement. A major step is the production of a tip/tilt imager for use at optical wavelengths. The improvements in Strehl ratio may well be modest, but the ability to compensate for windshake, tracking errors, and small residual thermal non-uniformities should bring about significant improvement in image quality over a finite field of view. The improvements in setup time that are soon to be achieved with the Hydra positioner being fabricated for the Blanco 4-m can then be translated to upgrades of the existing positioner on WIYN. The partnership is actively exploring the implementation of near-IR imaging and fiber-fed spectroscopy. Both the Users Committee and the Observatories Visiting Committee endorse continuing the queue observing experiment, so that we can be prepared as a community to make maximum use of Gemini time through improving efficiencies in the quality of data delivery from WIYN.

The third component of the new observatory is a wide-field imaging telescope. The workshop on Supporting Capabilities for Large Telescopes identified imaging surveys as a critical component for a suite of major observational problems. Spectroscopy on Gemini will go more than 5 magnitudes deeper in the K band than the flux limit of the 2MASS Survey and significantly fainter in the optical than the limits of the Sloan Digital Sky Survey. Focused surveys over limited areas will be essential for isolating samples for further study and spectroscopic follow-up. KPNO is exploring avenues for developing a 2.4-m telescope in partnership with the University of Colorado and the University of Minnesota. The potential consortium is planned to be inclusive, so that further interested partners can join to pursue additional telescopes. NOAO is committed to providing equal access to both hemispheres with such telescopes, and is working with the consortium to develop a partnership for the first telescope on CTIO as well. The Kitt Peak 2.4-m is planned to go on the site of the existing 0.9-m, which enjoys the same site seeing as the WIYN Telescope. The nominal plan calls for a wide-field corrected Cassegrain for optical imaging, and two addressable Nasmyth foci, one for a dedicated wide-field near-IR imager, and one for instruments developed by faculty and students from the university partners. The partners and NOAO are seeking funding for the project. On the most optimistic timescale, the 0.9-m telescope would be closed in semester 2000A; the telescope will be offered to the community, and the dome will be demolished to make way for the new telescope. Until then, we intend to keep the 0.9-m open for your proposals, with the CCD Mosaic Imager or T2KA.

The promise to the community in the renewal proposal was access to an entire 2.5-m class telescope or the equivalent. The plan currently being explored calls for a 50% share for KPNO. If we were limited to that level of access, users would have the Mayall 4-m, 40% of WIYN, and 50% of the 2.4-m, which is below the minimum level accepted by the NSF review and the Users Committee. We will therefore make every effort to keep the 2.1-m telescope in operation for the indefinite future as well. We will not be able to make major improvements to the system, but the telescope will offer the new GoldCam II for optical spectroscopy, and takes the same suite of IR instruments supported on the Mayall 4-m, as well as serving as a testbed for new IR instruments.

In this time of change and budget stringency, it is easy to focus on a sense of loss. KPNO is committed to renewal, to maintenance and upgrade of observing capability, and to providing an integrated suite of Northern Hemisphere facilities including access to Gemini North.

Richard Green

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Table of Contents - -

The WIYN Queue Observing Experiment Finishes Its Third Full Semester and Prepares for 1998A

The 1997B observing semester is complete except for the last four nights of January 1998. By the time this edition of the Newsletter appears, all science data obtained during the semester will have been distributed to the principal investigators. If you have not received data that you were expecting, please contact us at wiynq@noao.edu. Investigators who submitted proposals for programs that were not executed or completed should remember that new proposals must be submitted for TAC review if these programs are to be initiated or completed during future observing semesters.

Excluding the last four nights of January 1998, there were 58 nights used for queue programs (nearly the entire NOAO WIYN allocation). There was little time lost to equipment problems during this period, but as usual the weather was a major constraint on the progress of the program. The following table summarizes how the 1997B queue was affected by the weather.

Aug	Sep	Oct	Nov	Dec	Jan*
Allocated Nights					
10	13	9	9	11	6
Total Hours Avail					
81	124	95	100	126	68
Observing Hours					
14	62	58	77	47	37
Percentage of Time Used					
17%	50%	61%	77%	37%	54%

*January 1998 statistics complete only to January 27.

In addition to the scheduled queue nights, portions of seven NOAO T&E nights were used to advance several bright time science programs (T&E time at WIYN is usually scheduled around full moon). Nearly 30 additional hours were spent obtaining science data for queue programs by utilizing this extra time. The 326 hours spent collecting data (this number includes the usual observing overheads) represents about 70% of the total time allocated to the 26 TAC-approved programs for 1997B. Because of the extra T&E time, 61% percent of the bright time allocation was useful for gathering science data. The dark time programs fared considerably worse, with only 52% of the allocated time useful for observations. Below is a breakdown of the progress made during 1997B. With four long, dark nights still remaining in the semester we hope to push several dark time programs closer to completion.

1997B (Fall 1997) WIYN Queue Observing Experiment

Level of Completion

	Total	0%	25%	50%	75%	100%
Long Programs						
High Priority:						
Standard	9	1	0	1	1	6

Synoptic	3	0	2	0	1	0
Best Effort:	8	1	1	0	4	2
2HrQ Programs						
High Priority:	2	1	0	0	0	1
Best Effort:	4	0	0	1	0	3
Totals:	26	3	3	2	6	12

The observing queues for 1998A (spring 1998) have been constructed and can be reviewed on our Web site at http://www.noao.edu/wiyn/obsprog/queue/S98/S98-index.html. The NOAO WIYN Queue observing program has been allocated 57 nights (470 hours) between 1 February and 31 July 1998. The table below summarizes the 1998A semester in terms of available bright and dark time.

1998A (Spring 1998) WIYN Queue Observing Experiment

	# of programs		Hours reqd	
	Dark	Bright	Dark	Bright
Long Programs				
High Priority:	6	5	144	115
Best Effort:	10	2	172	38
2HrQ Programs				
High Priority:	2	1	4	2
Best Effort:	2		4	0
Total	20	8	324	155
Available Hours			300	170

During the 1998A semester the WIYN queue program is faced with special scheduling challenges. In May the primary mirror will be aluminized and therefore few nights will be given to NOAO during this month. In fact, the telescope schedule has the bulk of the NOAO nights in June and July, when 44% of the nights are devoted to the queue program. Only 24% of the nights are allocated to the queue in the period February-May (see the following table). This telescope schedule has serious consequences for those science programs that have all or most of their targets in the sky only during the first part of the semester. With so few nights to work with in the early part of the semester, a few programs with high TAC grades unfortunately had to be placed in the Best Effort queue. Their chances for completion are no worse than if they were kept in the High Priority queue (please see the WIYN queue Web pages for a description of the various queues), but after factoring in the typical 40% loss of time due to weather, the queue program is not likely to have enough time to complete these programs after higher ranked programs are executed. The schedule for the first half of the semester also makes it difficult to execute dark time programs simply because are few dark nights in March and April given to NOAO.

Nights Allocated to the 1998A WIYN Queue

Feb	Mar	Apr	May*	Jun	Jul
Number of Nights					
9	6	9	6	15	12
Fraction of Total Nights**					
0.36	0.21	0.33	0.33	0.56	0.43
No. of Dark Nights (moon < 50%)					
8	0	3	6	8	6
No. of Bright Nights (moon > 50%)					
1	6	6	0	7	6

* Telescope will not be in operation for 10 days in May when the primary mirror is aluminized.

**Not including T&E nights.

Another scheduling aspect that will have a more subtle effect on the WIYN queue program is that only three nights per month (typically centered around full moon) will be scheduled for T&E starting in 1998. In the past the T&E blocks have been five nights long. This will undoubtedly give the WIYN queue more "official" bright nights to work with (although this gain will not be realized during 1998A because of the mirror aluminization in May). However, to step through lunar phase in a manner that is fair for all members of the WIYN consortium, observing blocks will be increased to about eight nights from the current typical six-night length. That is, there will be fewer, but longer, queue observing runs during a semester. Investigators interested in time-critical or synoptic observations should take this into account as they plan their observing programs.

Starting with the 1998A semester, the "WIYNQ form" is no longer submitted with NOAO WIYN observing proposals. Instead, target tables are submitted allowing the proposal process to be uniform for all NOAO facilities. However, the current proposal system and format do not easily provide for any revisions to the observing program or explicit instructions on how queue observers are to execute a program. Revised WIYNQ forms could be submitted in the past at any point during a semester in order to keep the queue team informed and able to make modifications that maximize the chances of success for science programs. Because good communication between investigators and the queue team is essential for a successful program, the WIYN queue form is still available, and we recommend that investigators use it if important information was not included in the original proposal or if revisions to the target tables are required. For example, if certain radial velocity standards are required, but are not listed in the proposal, the investigator should submit a WIYNQ form listing the calibration targets required. The LaTeX template file (wiyn_qform.tex), .sty file (wiynq15.sty), and a sample WIYNQ form (wiyn_qsample.tex) can be found at http://www.noao.edu/wiyn/obsprog/proginfo/WIYNQ (or follow the links from the WIYN Queue home page at http://www.noao.edu/wiyn/obsprog/). WIYNQ forms should be submitted to *wiynq-submit@noao.edu*. We have found the WIYNQ form to be exceptionally helpful at the telescope while observing and highly recommend that investigators submit a form so that the observers are fully aware of information important to the execution of a science program.

The proposal deadline for the 1998B observing semester is rapidly approaching, and we remind proposers that DensePak is available for bright time programs only. See the or the NOAO Newsletter No. 51 for the details about the DensePak instrument. Also, there is now a version of the Hydra assignment code (whydra_sol) that can run on workstations using the Solaris operating system. The program can be transferred from ftp://ftp.noao.edu/kpno/hydra/. A Solaris version of the Hydra simulator is not yet available.

The most important measure of the effectiveness of scheduling NOAO time on the WIYN telescope in a queue format is the quality of the science published. Please send reprints and preprints of any work that includes data obtained by the WIYN queue observing program to:

```
WIYN Queue Experiment
c/o Paul Smith
National Optical Astronomy Observatories
P.O. Box 26732
Tucson, AZ 85726-6732
```

Paul Smith for the WIYN Queue Team
(Di Harmer, Abhijit Saha, Daryl Willmarth)

Table of Contents - -

Table of Contents - -

The PFCCD Ghost is Gone

There is no longer a ghost image present in PFCCD data. As PFCCD users from last fall (and readers of the Newsletter) remember, the deterioration of the Sol-gel anti-reflective coating on the new four-element corrector prompted a certain amount of consternation. A large "ghost image" of the primary was present at the 110% intensity level in both flat-field exposures and program frames; this extraneous light component was additive, and reduction purists were forced to subtract the ghost before flat-fielding their data. (The actual broad-band stellar photometry was unaffected at the sub-1% level.) Although such efforts were largely successful, the extra step had high nuisance value, and the immediate reaction of most observers at the telescope was to comment unfavorably on the aesthetic impact of the ghost image.

Accordingly, we decided to exorcise the ghost permanently and completely by offsetting the PFCCD camera 48mm (840") from the optical axis. As of this writing, we have completed our engineering tests of the camera in its new location, and are happy to report the following: 1) The image quality is excellent in the new location. The best images we've obtained are 2.0 pixels (through an "I" filter), equivalent to 0.84", and limited by undersampling. This is as we expected, since the corrector was designed to work well for the very large field of view (FOV) of the Mosaic camera, and our offset is modest compared to that FOV. 2) The telescope pointing is unaffected, despite the geometrical complications; observers and telescope operators do not have to do anything special to center on either the CCD or offset TV camera. 3) The ghost is most definitely gone, and flat-fields now look normal, with no scattered light component.

When the Mosaic CCD system is used, requiring the full field of the corrector, the ghost still will be seen at the field center. We expect to resolve the problems with the deteriorating coating over the summer, but until then, it will be necessary for Mosaic users to follow the more complex data reduction path.

We are grateful to Gary Muller and Rich Reed for the expert and quick engineering changes that brought the PFCCD camera to its new home, and to Bob Marshall and David Mills for software support.

Phil Massey, George Jacoby

NOAO Newsletter - Kitt Peak National Observatory - March 1998 - Number 53

Phoenix Grating Replaced

On 10 January 1998 the Phoenix grating surface developed a series of fine surface cracks. This event happened suddenly during an observing run. We believe that this resulted solely from thermally induced stresses in the grating. No part of the spectrograph shows evidence of physical damage or contamination, and all the mechanisms were functioning correctly. At the time the grating may have been cooling slightly, but was close to the equilibrium value of 50 K, and no sudden temperature shocks had occurred. As a result of the surface cracks in the grating, Phoenix experienced a decrease in throughput by an order of magnitude combined with a dramatic increase in scattered light.

The grating in Phoenix is a replica on a silicon substrate. It has been known since the first time the grating was cooled to cryogenic temperatures that the grating substrate and the replication epoxy had sufficiently different coefficients of expansion to be incompatible. During the design the difference of the coefficients of expansion was roughly known (although somewhat underestimated). Silicon had been selected for the substrate because of its dimensional stability and high thermal conductivity. It was incorrectly assumed that the strength of the (thin) epoxy replication layer was low so that it would comply with thermal expansion and contraction of the the silicon substrate. On the first cool down, small coils of epoxy still bonded to flecks of the silicon substrate popped off the edges of the grating. This flecking reoccurred on every cool down and indicated that the epoxy did not have negligible strength compared than the silicon substrate. Since the damage had been limited to the mainly unilluminated edges of the grating, this had little impact on the performance. However, optical modeling this past year indicated that the differential expansion of the epoxy and silicon was also warping the grating, causing astigmatic images. For this reason the grating was scheduled to be replaced. Evidently on 10 January stress in the grating replication layer reached the point where an overall failure took place.

The grating will be replaced with a replica grating on an aluminum substrate. Aluminum has a coefficient of expansion that much more closely matches the replication epoxy than did the coefficient of expansion of the silicon. Aluminum also has a proven performance history, with aluminum substrate replica gratings having been used in other cryogenic spectrographs. The new grating should be available for the 1998B semester. A positive note is that the optical performance of Phoenix should be improved. The astigmatic images with the silicon substrate grating could be focused spectrally with the collimator focus, but were spread out spatially. Better spatial focus with the new grating will increase the sensitivity as well as improve the spatial mapping capabilities.

The Users Committee strongly endorsed sending Phoenix to CTIO in early calendar 1999. Therefore, the 1998B semester will be the last for which Phoenix will be available in the Northern Hemisphere for several years.

Ken Hinkle

NOAO Newsletter - Kitt Peak National Observatory - March 1998 - Number 53

The Future of Taping at KPNO

KPNO will continue to meet the needs of its observers for taping their data in a format compatible with what astronomers have at their home institutions, while recognizing that technology changes are reflected in the decreasing availability and increasing expense of maintaining obsolete equipment and supporting legacy media formats.

KPNO currently supports the writing of Exabyte 8200 and DAT (DDS-2) format tapes at all telescopes. Exabyte 8500, DLT, and CD-R are available at certain telescopes or for certain instruments. All of these formats plus nine-track (1/2") tapes are supported downtown at NOAO HQ. All of the above, except DLT and CD-R, are supported in the KPNO Admin building.

We have recently made several decisions on the future of tape drives at KPNO:

1) **As of 1 February 1999, Exabyte 8200 format tapes will not be supported at KPNO telescopes.** This format is obsolete as it is no longer possible to buy a new tape drive that will write this format. NOAO will support writing 8200 format tapes at the KPNO Admin building and at the Tucson HQ for as long as compatible drives can be maintained and operated affordably. NOAO will support reading 8200 format tapes for as long as compatible drives can be maintained. NOAO provides facilities at HQ to our staff and visitors for copying recently supported, but obsolete format tapes to current tape formats.

2) **We commit to support the Exabyte 8500 and DAT DDS-2 formats at all KPNO telescopes for three years beginning 1 February 1998.** The computing industry changes at such a rapid pace that the devices and formats that will be popular past 1 February 2001 cannot be predicted.

- The Exabyte model Eliant 820 drives (also known as the 8705) CANNOT WRITE 8200 format. They can ONLY write the 8500 format.
- KPNO will stock 112m Exabyte tapes and 90m DAT tapes that may be purchased by observers; however, we encourage observers to supply their own data-grade media. Observers may choose to bring 160m Exabyte tapes, or 60m or 120m DAT tapes, but should be aware that the longer tapes will not work with all tape drives and that the IRAF `tapemon' program is not configured to report the correct length of the tape or the correct number of megabytes remaining for tapes other than 112m Exabyte and 90m DAT tapes.
- At any given telescope, KPNO may choose to support the Exabyte 8500 format using either an Exabyte model 8500 series or Eliant 820 (or equivalent future model) drive. It is no longer possible to buy an 8500 series drive. As the 8500 series drives break, they will be replaced with Eliant 820 drives rather than being refurbished. The Exabyte Eliant 820 is unofficially called the Exabyte 8705.
- An IRAF "mta" tapecap entry will be provided for the Exabyte 8500 or Eliant 820 drive at each telescope. The default drive will be mta which will write 8500 format tapes. 8500 compressed format tapes are written using the mta8500c alias.

3) The DLT tape format is our current choice for supporting high data volume and/or high data rate instruments such as the NOAO Mosaic. DLT-7000 drives will be installed as appropriate to support such instruments, but will not be installed mountain wide at this time. The ability to read such tapes will be maintained downtown. KPNO will stock DLTtape IV tapes that may be purchased by observers.

4) We plan to install CD-R writing equipment and software at the 4-m and 2.1-m domes within the next year to determine the demand for this medium. The DVD-R format remains a future possibility.

5) Observers remain ultimately responsible for the safety of their data.

6) KPNO will continue to work with CTIO, NSO, other NOAO branches, and the larger astronomical community to ensure the uninterrupted ability to read and write each other's media and data formats.

Rob Seaman, Steve Grandi, Bruce Bohannan

Table of Contents - -

Table of Contents - -

NOAO Newsletter - National Solar Observatory - March 1998 - Number 53

From the NSO Director's Office

I am delighted to report that the SOLIS (Synoptic Optical Long-term Investigations of the Sun) proposal has been funded by the National Science Foundation. This proposal was part of a larger proposal submitted two years ago for the renewal of facilities at NOAO, which included, in addition to SOLIS, funding for participation in a 4-meter southern hemisphere telescope (SOAR) and two 2.4-meter telescopes. SOLIS came out on top of the heap after review of the renewal proposal. After successfully leaping over some additional hurdles, it is now funded jointly by the NSF Office of Multidisciplinary Activities and the Astronomy Division. Many solar astronomers inside and outside NSO have contributed to the success of this initiative. However, I want to especially recognize the outstanding efforts of Jack Harvey, now Project Scientist for SOLIS, who, with never-ending energy, worked constructively with the NSF Astronomy Division staff and responded professionally to issues which came up in the review process. Jeremy Wagner will be the SOLIS Project Manager.

In the process of matching the funding made available at NSF for the support of SOLIS with the actual costs of the four instruments, it was necessary, unfortunately, to decrease significantly the scope of the Solar Coronal Imager. We are hopeful that we can attract funding from other sources to make up for this critical loss.

As this Newsletter is published, NSO scientists are participating in a few experiments at the 26 February 1998 Caribbean solar eclipse. The primary experiments are aimed at exploring the unknown spectrum of the infrared corona above 1.5 m. Our hopes are high for the discovery of coronal emission lines in that region strong enough to allow measurement of the coronal magnetic field with reflecting coronagraphs.

Two activities are progressing in the wings that are of utmost importance for the future of NSO and for all of ground-based solar astronomy: First, Jack Thomas is chairing the search committee for my successor; please contact him with your suggestions and views concerning this appointment. Second, the NRC Task Group on Ground-Based Solar Research (TGGSR) is in the process of finalizing its report. There is still time to express your views on the TGGSR public discussion database (http://www.nas.edu/ssb/tggsr1.html). The outcome of this "Parker Committee" study will affect all of solar physics.

Jacques Beckers

Table of Contents - -

Table of Contents - -

NSO Digital Library Status

The NSO Digital Library (NDL) is close to becoming available for general use and testing by the solar scientific community. The NDL consists of three 100-disk CD-ROM juke boxes mounted on the main NSO data server in Tucson; a Web forms user interface for searching the available data; and a data delivery system. Currently the library contains the Kitt Peak Vacuum Telescope synoptic data for the periods 1974-1987 and 1992-1995; the Sacramento Peak Ca K and H spectroheliograms for May 1996 through August 1997; the Kitt Peak Fourier Transform Spectrometer (FTS) transformed spectra from 1976 through 1996; and the Kitt Peak FTS solar spectral atlases. The CDs containing these data sets are already directly accessible via anonymous FTP through the NSO/KP Web page at http://www.nso.noao.edu/nsokp/nsokp.html.

The user interface and search tool for the KPVT synoptic data sets will be released for general use and testing within the next month. The interfaces for the NSO/SP spectroheliograms and FTS data will follow shortly thereafter. Future plans include completion of the migration of the current data sets, and addition of the FTS raw interferograms. Other candidate data sets for inclusion are the NSO/SP coronal scans, the NSO/SP K-line index, the NSO/KP high-l helioseismometer Ca K images, the Mt. Wilson white-light images, and the NRL full-disk white-light images. The SOLIS data sets will also eventually be incorporated.

This project is being carried out using funds from the NSF Space Weather program. A number of NSO staff members have materially contributed to this effort, including Detrick Branston, Wendy Erdwurm, Jack Harvey, Amanda Jaksha, Mary McGraw, Robert McGraw, Larry November, Jan Schwitters, Anna Scott, Nelsey Toner, and Jeremy Wagner.

Frank Hill

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Table of Contents - -

NOAO Newsletter - National Solar Observatory - March 1998 - Number 53

19th NSO/Sac Peak Summer Workshop: "High Resolution Solar Physics: Theory, Observations, and Techniques" --- 28 September-2 October 1998

The 19th NSO/Sac Peak Summer Workshop, scheduled for the week of 28 September-2 October 1998, will concentrate on the physics through high spatial and temporal resolution observations of the solar atmosphere. Recent observations from the ground and space have produced solar images of spectacular resolution. Advances in ground-based observations, such as frame selection and image reconstruction, as well as recent space-based observations (in particular those from SoHO), dramatically enhance our understanding of magnetic concentrations, weak fields, flux tube physics, coronal interactions, magnetic canopies, and photospheric flows and dynamics. Nevertheless, theoretical models and numerical simulations show that key physical processes occur on scales below those currently resolved. New observational techniques, further developments in image processing and data analysis, as well as advances in both ground- and space-based instrumentation, will be essential to understand the magneto-hydrodynamics of the solar convective zone and atmosphere.

This workshop will review recent progress in the areas of theoretical modeling and observations of magneto-convective physics on scales below 1000 km. There will be discussions on techniques for achieving high-resolution observations, large-aperture solar telescopes, and proposed high-resolution space missions such as Solar-B and Solar Lite. The scientific focus will be on questions such as: How do small-scale features observed in the photosphere drive physical processes in the upper atmosphere? What is the relation of weak fields to the solar cycle? Can we observe surface dynamo magnetic field generation on granular scales? What are the smallest observable magnetic elements?

Outline of Program

The meeting will consist of several invited reviews, selected oral contributions and poster summaries, and poster papers. There will be ample time for poster reviewing and discussions. Oral presentations will be held in the new Sunspot Astronomy Education Center. Posters will be displayed nearby in the Sunspot Community Center. The presentations made at this meeting are intended for publication.

Registration

Abstract and registration information should be submitted by 15 May 1998. A second announcement will be issued in the near future. The total number of participants will have to be limited to the capacity of the meeting facilities (approximately 80). There will be a registration fee of $80. Limited funds are available to help defray travel and housing costs for participants in need.

The workshop organizing committee includes: T. Rimmele (Chair), K. Balasubramaniam, T. Berger (Lockheed), T. Bogdan (HAO), P. Goode (NJIT), W. Livingston, R. Radick, and O. von der Luehe (Kiepenheuer Institute). Prospective participants are invited to direct suggestions concerning this workshop, within the framework outlined above, to:


```
T. Rimmele
National Solar Observatory
Sunspot, NM 88349
e-mail: (trimmele@sunspot.noao.edu)
Phone: (505) 434-7022
FAX: (505) 434-7029.
```


Thomas Rimmele

Table of Contents - -

Table of Contents - -

Update: Computer Control of the Main Vertical Spectrograph at the McMath-Pierce Telescope

Phase 1 of the computer control upgrade to the McMath-Pierce main spectrograph is now completed. The grating turret slew and stepper drives are now controlled by a VME-based computer running VXworks. The new hand paddle allows both manual and automatic movement of the grating. In manual mode, the user can select either slew or stepper motor control, as well as three pre-defined speeds. As the grating is moved, the ASCII display indicates the current grating angle, wavelength and grating order.

In the automatic mode, the user enters the desired wavelength, or grating angle and the grating order, and presses "go." The software will then position the grating, using the appropriate combination of slew and stepper motor motions.

The spectral line will appear at the photoelectric port. For quick optical setups, there is also a zero-order function. In both the auto and manual mode, the user may also enter an offset angle to shift the desired spectral feature to the photographic exit port.

Phase 2, due to be finished this spring, will allow users alternate methods of control as well as a grating rock function for spatial/spectral flat fielding. A standard command language will allow users to control the grating over an RS232 serial port, an ethernet port, or remotely via a Web GUI interface. The serial/ethernet access was implemented to allow users who bring their own computers and instrumentation to control the spectrograph directly. The GUI will allow users in the main observation room to run the grating without the hand paddle, as well as provide support personnel with a means to remotely troubleshoot the spectrograph operation.

Lonnie Cole, Dave Jaksha, Carole Leiker
Jan Schwitters, Ed Stover

Table of Contents - -

Table of Contents - -

NSO Observing Proposals

The current deadline for submitting observing proposals to the National Solar Observatory is 15 April 1998 for the third quarter of 1998. Forms, information and a Users' Manual for Sacramento Peak facilities (sp@sunspot.noao.edu) are available from:

```
NSO Telescope Allocation Committee
P.O. Box 62,
Sunspot, NM 88349
```

or for Kitt Peak facilities (nso@noao.edu):

```
NSO Telescope Allocation Committee
P.O. Box 26732,
Tucson, AZ 85726
```

A TeX template and instruction sheet can be e-mailed at your request; obtained by anonymous ftp from ftp.noao.edu (cd nso/nsoforms) or ftp.sunspot.noao.edu (cd pub/observing_templates); or downloaded from WWW at http://www.nso.noao.edu/.

Dick Altrock

Table of Contents - -

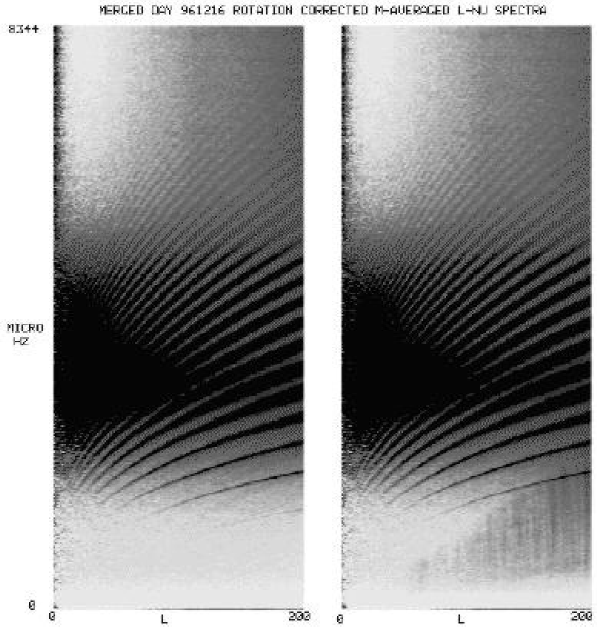
NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Table of Contents - -

Global Oscillation Network Group

The Global Oscillation Network Group (GONG) Project is a community-based activity to operate a six-site helioseismic observing network, to do the basic data reduction, provide data and software tools to the community, and to coordinate analysis of the rich data set that is resulting. GONG data is available to any qualilfied invesitgator whose proposal has been accepted, however, active membership in a GONG Scientific Team ecourages early access to the data and the collaborative scientific analysis that the teams are undertaking. Information on the status of the project, the scientific investigations, as well as access to the data, is available on our WWW server whose URL is www.gong.noao.edu.



Caption: *Comparison of rotation-corrected, m-averaged, lv spectra from a single GONG network day, demonstrating the reduction of calibration noise (the diagonal band expanding to the right in the right panel) (the broad region at low n and high l in the right panel) by temporally averaging the calibration images with a 61-day Gaussian filter. New image left, old on right.*

Operations

During the fourth quarter of 1997, the GONG network continued to perform in an outstanding manner. As expected, there was some network down time mostly due to weather as the northern-hemisphere instruments moved into winter. Preventive maintenance (PM) trips occurred on schedule and without fanfare, with visits to Tenerife (October), Udaipur (November), and Cerro Tololo (December).

During October, Cerro Tololo suffered an earthquake of magnitude 6.8, and although the GONG shelter moved 12 mm, no apparent damage occurred to the instrument. The PM team was able to reposition the shelter back to its original location during their December visit. In addition, the team replaced the turret, which required a complete realignment of the optics and additionally ensured that any possible problems introduced by the tremor were rectified. The team also installed new earthquake protection gear, which will hold the electronics rack and UPS in place in the event of another quake.

Mirror fogging, which occurs occasionally at the Big Bear and Tenerife sites, appears to be a function of the drying agent in the air dryer and may be solved by replacing it more frequently. Data-read problems were fixed at Learmonth by swapping drives and the main circuit breaker was replaced at Udaipur. The on-site staff continues to head off most of the Exabyte failures with timely intervention providing normal, continued operation. All in all, we are very pleased with the network duty cycle.

Jay LeBlanc joined the Operations group as an Electronics Technician supporting the GONG facilities. Jay will share the tasks of Duty Responder and Site Checker as well as participate in PM trips. The Project has said good-bye to Dan Bass, the GONG Operations Engineer. Dan joined the Project in 1993 and has been an integral part of the development, deployment, and operations teams. Dan leaves us to join Wyko, a Tucson-based optics firm--we wish him the best.

Data Management and Analysis

During the past quarter, month-long (36-day) velocity, time series and power spectra were produced for GONG months 22 and 23 (ending 970811) with respective fill factors of 0.84 and 0.86, and for GONG year 2 (960817 through 970811) with a fill factor of 0.86. The p-mode reprocessing campaign added GONG months 12 and 13. The project is also producing time series and power spectra from the intensity images. These products were generated for GONG month 17.

The Field Tape Reader (the subsystem that receives the raw data cartridges from the observing sites) processed 84 cartridges containing 559 site-days from the seven instruments. 368 site-days were calibrated.

During the past quarter, the Data Storage and Distribution System (DSDS) serviced 10 data distribution requests for 262 files totaling 0.3 Gigabytes of data. Each request was filled within two working days of receiving the request. The DSDS performed 1,545 data cartridge transactions (library check-ins and check-outs) in response to requests from the data reduction pipeline and other internal operations.

The Data Management and Analysis Center staff has found a simple solution for removing much of the noise that is mapped into the velocity images during the calibration process (Figure). The noise originates from dirt and flaws on the optical surfaces of the light-feed assembly. Because these cosmetic blemishes change only slightly from day to day and are typically removed each week when cleaned, the noise can be greatly reduced by averaging. Tests using a 60-day Gaussian weighting function effectively suppress the noise. The artifacts from the interferometer are nearly constant and are preserved during the averaging. It appears that this will be an effective solution for removing the diagonal artifact that is sometimes visible on l-v spectra which originate at the origin and reach the first p-mode ridge at l = 200.

Data Algorithm Developments

There has been substantial activity in peak finding algorithm development. Rachel Howe joined the project on 1 November. She has implemented a multi-dimensional fitting procedure for low-l modes that treats the leakage matrix explicitly, particularly in the m direction. Her results show a marked improvement in the estimates of low-l rotational splitting from GONG data, along with a more reasonable picture of deep rotation in the solar core.

Stuart Jefferies has been working with several collaborators to develop a physically meaningful model of the asymmetric line shape of the oscillations. They are finding that the solar background mechanism plays an important role in determining the line shape. In particular, the phase relationship between the background and the oscillation signal can flip the sense of the asymmetry, reinforcing the suggestion that a simultaneous fitting of the spectrum observed in velocity and intensity will be required to estimate the mode frequencies accurately.

Stuart is also working with Ed Anderson to install a "simplified" asymmetric line profile model in the GONG fitting. This should be available soon. Finally, along with Cliff Toner and Nadege Meunier (Stanford), Stuart is rewriting a multi-dimensional fitting code for intermediate degree m-averaged spectra. This new code is being written in Fortran90, which will make it portable to a parallel processing super computer.

Ed Anderson has fit the GONG year 2 spectrum up to l = 45 using the standard peak fitter, and is currently fitting two 3-month long time series (months 12-14 and 21-23) up to l = 150 for use by the Inversions Team. The asymmetric profile model will also be used to fit these data.

Rudi Komm continues to develop the multi-taper method. He has now implemented code originally developed by Imola Fodor and Philip Stark (Berkeley) to compute renormalized sine tapers for gapped data. The multi-taper routine will be applied to one of the three-month long GONG time series mentioned above and then rerun through the peak-fitting algorithms.

Frank Hill has been examining the effect of slight variations on the initial guesses used in the peak bagging. It turns out that a few simple revisions to the post-processing examination of the fitting results go a long way towards removing modes that have problems. A combination of H. Antia's (TIFR) strict numerical convergence criterion for the BFGS minimization, the current GONG "bad mode" flag, a reduction of the allowable fitted width to twice the guess width, and a test for locking on to the input guess, does a good job in weeding out modes that are sensitive to the first guess. There is, however, a small remaining set of modes that eludes this armada of tests. These renegade modes are in the spectral region (high frequency, high degree) where spatial leaks are unresolved and have blended into ridges. The fitting model assumes resolved leaks and is inappropriate for this situation, leading to multiple minima in the likelihood function and typically two or three distinct solutions widely separated in frequency. Work is underway to detect this situation and flag the suspicious modes.

Frank has also been working on the full leakage matrix calculation. He has found a method that is well suited to the problem of numerically integrating spherical harmonics. Instead of using an evenly-spaced grid, which requires many tens of thousands of points to converge for high degree (l = 200) near-zonal modes, a stretched grid can be used that has only slightly more points than the highest value of l being computed. The method used to determine the grid is very new (only about 200 years old): the well-known Gauss-Legendre quadrature formalism! This discovery provides further evidence that "two years of research can save you a whole week in the library!" Armed with this advanced numerical technology, the leakage matrix calculation shall resume shortly.

New Camera Development

The GONG Instrument Group has been studying retrofitting a higher-resolution (1024 1024), square-pixel camera to the existing observing stations. Increasing the detector scale will provide significantly improved helioseismic resolution in the near-surface regions of the Sun that are the home of the intense magnetic fields that seem to cause much of the more dramatic aspects of solar activity, extend all aspects of "local helioseismology" dramatically, as well as enabling many non-helioseismic, diachronic solar measurements. The Project is continuing this new-camera upgrade effort with the development of a proof-of-concept breadboard instrument during FY 1998.

After reviewing cameras from many manufacturers, it was determined that the Silicon Mountain Design camera (SMD 1M60_20) best satisfied the requirements for our application with regard to quantum efficiency, frame rate, spectral response, linearity, susceptibility to interference fringing, etc. The prototype camera is expected to arrive in mid-February, the high-speed electronics are under development, and we look forward to images this spring.

John Leibacher

Table of Contents - -

Table of Contents - -

US Gemini Program

Near Infrared Imager (NIRI)

NIRI is well into the fabrication phase, with most of the optical elements complete and machining in progress on the vacuum vessel. Work continues for cleaning up some mechanism design, but the main effort is in preparing final fabrication drawings and in making parts. Klaus Hodapp (Hawaii), the instrument PI, plans to perform a vacuum test of the main vessel in the spring of 1998 and to begin installing mechanisms and wiring for further tests in the summer. NIRI is planned to be the commissioning instrument for the Gemini North telescope, which is on schedule for first light in late 1998.

Near Infrared Spectrograph (GNIRS)

The GNIRS team successfully passed its Critical Design Review in November and is proceeding with fabrication, beginning with filter wheel assemblies. The review committee was confronted with several hundred pages of viewgraphs and about half of the expected 700 mechanical drawings that will comprise the final documentation package. A few design items not covered at the CDR will be closed out at an interim review scheduled for spring 1998. The Gemini project is considering adding an Integral Field Unit (image slicer) to GNIRS, and has undertaken a study of the feasibility of adding such a capability to the instrument soon after commissioning. PI Jay Elias and Project Engineer Dan Vukobratovich plan to ship GNIRS to Hilo on schedule in December 1999.

Near Infrared Arrays and Controllers

Building on the NOAO/US Navy ALADDIN program to produce 1024 1024 InSb 1-5 um array detectors, Gemini has commissioned NOAO tomanage a foundry run of devices in the hopes of obtaining two or three good detectors for use in its near IR instruments. Results to date are encouraging, with one four-quadrant device in good working order and the supplier, SBRC, making improvements in its process with each run. NOAO is in final system integration with the first near IR controller for the 1024 1024 devices, scheduling for delivery to the NIRI program in a few weeks.

Mid-Infrared Imager (MIRI)

NOAO has completed negotiations with the supplier of the 8-26 um imager. The contract is in the approval and signature cycle and is expected to be in place in early 1998.

GMOS/HROS Science CCDs and Controllers

An order was placed with EEV in the UK for the Gemini science CCDs, and regular communications with the EEV project engineer indicate delivery in mid-1998. NOAO has received an SDSU-2 controller to permit software development and integration with an engineering device to proceed.

Mark Trueblood

Table of Contents - -

Table of Contents - -

ADASS '98

Plans are underway for the 8th Annual Conference on Astronomical Data Analysis Software and Systems (ADASS) to be held 1-4 November 1998 in Urbana, Illinois, USA, at the Illini Union on the University of Illinois campus. The conference is hosted by the National Center for Supercomputing Applications and the University of Illinois Astronomy Department. The ADASS Conference provides a forum for scientists and programmers concerned with algorithms, software and software systems employed in the processing of satronomical data.

The ADASS '98 Program Organizing Committee consists of the following members: Rudi Albrecht (ST-ECF/ESO), Dick Crutcher (Illinois), Brian Glendenning (NRAO), F. Rich Harnden - Chair (SAO), Sally Heap (GSFC), George Jacoby (NOAO), Jonathan McDowell (SAO), Glenn Miller (STScI), Jan Noordam (NFRA), Richard Simon (NRAO), Doug Tody (NOAO), and Patrick Wllace (Rutherford Appleton Laboratory). The Local Organizing Committee members include Doug Roberts, Dick Crutcher, Ray Plante, Harold Ravlin, and Melanie Loots.

The Conference program is still in the planning stages, but will include invited talks focused on timely topics chosen for ADASS '98, contributed oral presentations, poster papers, and computer demos. Several Birds-of-a-Feather (BOFs) sessions are also planned these short, one hour or so long, sessions are organized by ADASS participants. If you are interested in organizing a BOF please send e-mail to the Conference POC Chair, Rick Harnden (frh@whitman.harvard.edu). The Proceedings of the Conference will be published as part of the Astronomical Society of the Pacific Conference Series, as were those of previous Conferences.

Details pertaining to registration, hotel reservations, abstracts, travel support, and the ADASS meeting in general are available at the ADASS '98 Web site: http://www.ncsa.uiuc.edu/ADASS98/.

Rick Harnden, Chair
Program Organizing Committee

Table of Contents - -

Table of Contents - -

Open Discussion of IRAF at the San Diego AAS Meeting

Members of the IRAF User's Committee and the IRAF software development groups from NOAO and elsewhere will hold an informal lunch-time discussion (1-2 pm) on Wednesday, 10 June, for users of the IRAF data analysis system as part of the June 1998, meeting of the American Astronomical Society in San Diego. A short presentation will outline recent upgrades, present status, and long-term plans for major changes in the IRAF system. Users are invited to comment on these plans and suggest priorities for future work, as well as to meet with IRAF programmers for one-on-one discussions.

Planning is underway to migrate the IRAF software to a more modern, state-of-the-art, software architecture. With limited resources and the ongoing support requirements of the current system this process will take some years, but the work will be done in stages and parts of the new system will be released as they become available. User input will be especially helpful in guiding the priorities for these developments.

Watch the AAS announcements for more about this meeting.

George Jacoby (IRAF Project Scientist)

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

---

Table of Contents - -

NOAO Newsletter - Central Computer Services - March 1998 - Number 53

IRAF Update

The major focus of the IRAF group for this past quarter has been on V2.11 platform upgrades, i.e., making the new IRAF V2.11 release available on all the various IRAF platforms. This always takes some months after a major release commences, as for each platform we must upgrade the host operating system (and sometimes the hardware as well), re-port the new IRAF version to the platform, run a full suite of tests, and update the release documentation. Half a dozen people are involved in this process and it typically takes at least a month (calendar time) for each platform, but we all save time later on installation and support by doing this work up-front. Platform upgrades are our top priority after a major release, as people are unable to run the new software until we release an upgrade for whatever platform they are using.

The initial releases of V2.11 in June and August 1997 were for our primary development platforms, SunOS and Solaris 2.5. An IRAF patch was released in mid-November to support Solaris 2.4 and Solaris 2.6, which was newly released at that time. In late December the first patch, V2.11.1, was released for SunOS and Solaris (including integrated Solaris 2.6 support), and new platform upgrades were released for the Dec Alpha running Digital Unix V4.0 and for the Hewlett-Packard running HP-UX 10.20.

The most notable change in V2.11.1 for users, other than the expanded platform support, is that IMFORT can now write new images in both old and new IRAF image formats by setting the host environment variable "oifversion" to either 1 (old) or 2 (new, the default). In the initial V2.11 release IMFORT would write new images only in the new image format (reading or updating existing images was no problem). In most cases you should still let IRAF make the default new format image files, but if the files will be read by older IRAF tasks it might be necessary to use the old format (by doing so you give up long file pathnames and machine independence however).

All the new IRAF distributions can be found in the IRAF network archive on iraf.noao.edu in the iraf/v211 directory.

In mid-January the first version of PC-IRAF was released, supporting Slackware Linux V3.3, Red Hat Linux V5.0, and FreeBSD V2.2.5. This release of PC-IRAF was built using IRAF V2.11.1, the same version of IRAF as released for other platforms in late December. The various PC architectures are supported as separate binary architectures within a single IRAF installation. Support for additional platforms is planned in the next PC-IRAF release, e.g., Solaris x86 and MkLinux (for the Macintosh).

V2.11.1 should be available shortly for the SGI and AIX. Platform support for OpenVMS on the Dec Alpha and the VAX, and DEC Ultrix will follow later this winter. As updates for these platforms become available they will be announced on the IRAF mail exploder (newsgroup/mailing-list adass.iraf.announce) and on the IRAF web pages. Please contact the IRAF group if you are uncertain about the availability of IRAF V2.11 for a particular platform.

We had hoped to have a new IRAF Newsletter, with detailed articles on the features of IRAF V2.11, out by this time. We apologize for the delay but the platform upgrades have been our top priority. Look for the Newsletter in the next few weeks.

The IRAF Web pages have been available for some time now through a new mirror site in Japan at http://sinobu.mtk.nao.ac.jp/iraf/web. We are pleased to report that the IRAF FTP archives are also available now through a mirror site in Japan at http://sinobu.mtk.nao. ac.jp/iraf/ftp or ftp://sinobu.mtk.nao.ac.jp/NOAO. We would like to thank Shin-ichi Ichikawa at the National Astronomical Observatory of Japan for making these files more accessible for our Japanese and East Asian IRAF users. This is in addition to the existing mirror sites already in place in Europe.

The Open IRAF project got off to a slower start in 1997 than hoped, due to some hard deadlines for the V2.11 release, STIS/NICMOS data reduction support, and the NOAO Mosaic project. Despite these distractions major work was done during 1997 on the Message Bus, which will be the basis for the architecture of the future system. Several months were spent on research into message bus and distributed shared object technology, and a prototype message bus (based on PVM) was implemented and used in the Mosaic project. In addition, some elements of the multi-language support planned for Open IRAF were included in V2.11. The Open IRAF project is now starting to ramp up, and this should be our largest effort shortly when the major V2.11 platform upgrades are out of the way. The Open IRAF effort is funded in part by a grant from the NASA ADP program.

Frank Valdes has continued to make major enhancements to the data reduction software for the NOAO CCD Mosaic. A nearly complete version of the basic phase 1 software is now available with a user's guide (contact Frank (fvaldes@noao.edu) for more information). Work will continue on this version to finish documentation and minor loose ends before going on to the phase 2 software. As part of phase 2, Frank is working on designing how pixel masks and uncertainty information can be integrated into the Mosaic data reductions and all of NOAO IRAF. This work is being coordinated with a similar effort at STScI to support the HST Advanced Camera within STSDAS.

Lindsey Davis has added two new function drivers TNX (tangent plane plus polynomial correction terms) and ZPX (zenithal radial polynomials plus polynomial correction terms) to the IRAF V2.11.1 world coordinate system interface MWCS. The new function drivers are capable of accurately describing optical systems with significant radial distortion, e.g., the NOAO Mosaic, as well as accounting for the effects of errors in the tangent point, tilt, etc. Support for writing the new TNX and ZPX coordinate systems to image headers has been added to the IMAGES.IMCOORDS package tasks CCMAP and CCSETWCS. Existing IRAF tasks which evaluate world coordinates, e.g., LISTPIXELS, IMEXAMINE, etc., will automatically understand the new systems. Lindsey has also recently added support for 2D sinc interpolation to the image interpolation package IMINTERP. Most recently support for the dithering algorithm has been added as well. This work is part of the IRAF astrometry effort, and is also part of our efforts to help determine what is needed in FITS WCS to support ground based astrometry (FITS WCS is an existing proposal by Greisen and Calabretta for a world coordinate system representation for FITS images).

Rob Seaman, in addition to supporting KPNO observing and Save-the-Bits (STB), is working on an upcoming update of STB that will add support for writable CD-Rs and add several other features such as support for multi-extension FITS input files. The next update of STB will be available for Solaris as well as SunOS. This new version of STB will be used to archive data from WIYN and the NOAO Mosaic as well as the current general archives for both KPNO and CTIO. STB is available for use by observatories outside of NOAO and is currently running at both the Keck and Lick Observatories.

For further information about the IRAF project please see the IRAF Web pages at http://iraf.noao.edu/ or send email to iraf@noao.edu. The adass.iraf newsgroups on USENET (also available via mailing list subscription by filling out a form on the IRAF web page) provide timely information on IRAF developments and are available for the discussion of IRAF related issues.

Doug Tody, Jeannette Barnes

NOAO Newsletter - Central Computer Services - March 1998 - Number 53

NOAO FTP Archives

The NOAO FTP archives are found at the following FTP addresses. Please log in as "anonymous" and use your email address as the password. Alternate addresses are given in parentheses.

```
ftp ftp.sunspot.noao.edu (146.5.2.181), cd pub
   SP software and data products--coronal maps, active region lists, sunspot
   numbers, SP Workshop paper templates, meeting information, SP observing
   schedules, NSO observing proposal templates, Radiative Inputs of the Sun
   to the Earth (RISE) Newsletters and SP newsletters (The Sunspotter).
   The NSO/SP archive can also be reached at http://www.sunspot.noao.edu/ftp/.

ftp ftp.gemini.edu (140.252.15.71), cd pub
   Archives for the Gemini 8-m Telescopes Project.

ftp ftp.noao.edu (140.252.1.54), cd to:

   catalogs---Jacoby et al. catalog, "A Library of Stellar Spectra"; "Catalogue
   of Principal Galaxies"; "Hipparcos Input Catalogue"; "Lick Northern Proper
   Motion Program: NPM1"; "Coud\'e Feed Spectral Library"; "General Catalog of
   Variable Stars, Volumes I-V 4th ed." and "Name-Lists of Variable Stars Nos.
   67-76."

   ctio (ctios1.ctio.noao.edu)---CTIO archives--- Argus and 1.5m BME
   information, 4-m PF plate catalog, filter library, instrument manuals,
   standard star fluxes.  (This archive is a nightly mirror of those files
   on ctios1.)

   fts (argo.tuc.noao.edu, cd pub/atlas)---Solar FTS high-resolution spectral
   atlases.

   gemini_NOAO (orion.tuc.noao.edu, cd pub)---Documents from the US Gemini
   Project Office.

   gong (helios.tuc.noao.edu, cd pub/gong)--- GONG helioseismology software and
   data products---velocity, modulation and intensity maps, power spectra.

   iraf (iraf.noao.edu)---IRAF network archive containing the IRAF
   distributions, documentation, layered software, and other IRAF related
   files. It is best to login to iraf.noao.edu directly to download large
   amounts of data, such as an IRAF distribution.

   kpno (orion.tuc.noao.edu)---KPNO archive of filter lists and transmission
   data, CCD and IR detector characteristics, hydra (WIYN) information,
   KPNO support schedules, 4m PF platelogs, reference documents, and sqiid
   data reduction scripts.

   kpvt (argo.tuc.noao.edu)---KP VTT solar data productsmagnetic field,
   He I 1083 nm equivalent width, Ca II Kline intensity.

   noao (gemini.tuc.noao.edu)---Lists of US areacodes and zipcodes, various
   LaTeX tidbits, report from Gemini WG on the high resolution optical
   spectrograph, etc.

   noaoprop---NOAO nighttime observing proposal LaTeX forms.

   nso (orion.tuc.noao.edu)---NSO observing forms.

   sn1987a---An Optical Spectrophotometric Atlas of Supernova 1987A in the LMC.

   tex---LaTeX utilities for the AAS and ASP.

   utils---PostScript tools.

   wiyn (orion.tuc.noao.edu)---WIYN directory tree containing information
   relating to the WIYN Telescope including information relating to the NOAO
   science operations on WIYN.
```

The following additional IP numbers are available for the machines mentioned above:

```
argo.tuc.noao.edu    = 140.252.1.21
ctios1.ctio.noao.edu = 139.229.2.1
gemini.tuc.noao.edu  = 140.252.1.11
```

```
helios.tuc.noao.edu  = 140.252.26.105
iraf.noao.edu        = 140.252.1.1
orion.tuc.noao.edu   = 140.252.1.22
```

Questions may be directed to: Steve Heathcote (sheathcote@noao.edu) for the CTIO archives, Frank Hill (fhill@noao.edu) for all solar archives, Steve Grandi or Jeannette Barnes (grandi@noao.edu or jbarnes@noao.edu) for all others.

For further information about NOAO, visit the Web at: http://www.noao.edu/.

Jeannette Barnes

Table of Contents - -

NOAO is operated by the (AURA), Inc. under cooperative agreement with the National Science Foundation

NOAO Newsletter Staff

Tod Lauer, Editor-in Chief

Division Editors

Jeannette Barnes, CCS
Todd Boroson, USGP
Robert Howard, NSO
Richard Joyce, KPNO
Tod Lauer, SCOPE
John Leibacher, GONG
Elaine Mac-Auliffe, CTIO
Priscilla Piano, NSO
Ron Probst, CTIO
Lorraine Reams, AURA
Kristen Thomson, SCOPE

Production Staff

Diane Brouillette
Joyce Duhamel
Mark Hanna
Shirley Phipps
James Rees
La Rae Rothe

The NOAO Newsletter is published quarterly by the National Optical Astronomy Observatories, P. O. Box 26732, Tucson, AZ 85726-6732