NOAO Newsletter - September 1998 - Number 55

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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

Comments concerning this Newsletter are welcome and will be forwarded to the appropriate editors.
Newsletter Posted: 30 Aug 1998

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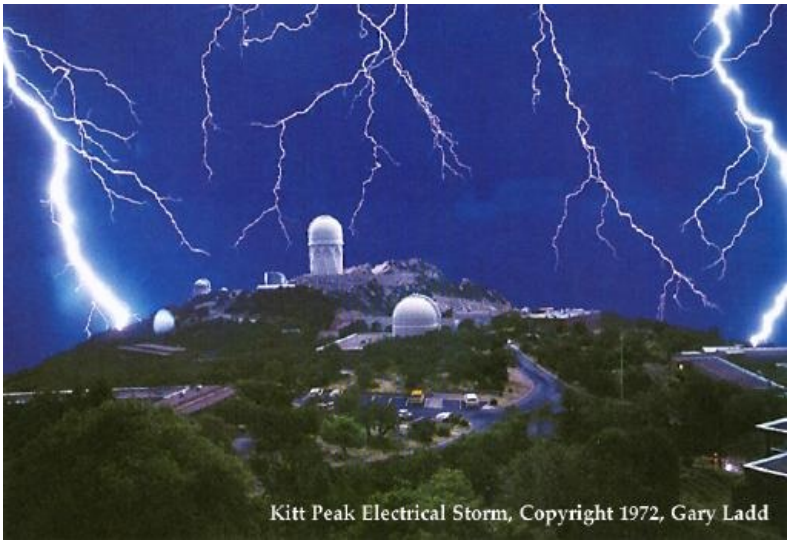
KPNO Celebrates Its 40th Anniversary

KPNO is celebrating its 40th anniversary this year. Please visit the KPNO Web Site http://www.noao.edu/kpno/40th for a striking collection of images and recollections. You will also be receiving a special supplement to *Nature* magazine in October commemorating the occasion with reflections and review articles of current topics to which Kitt Peak observers have made major contributions. It took vision and persistence to establish a national facility dedicated to cutting-edge observations based on peer reviewed scientific merit. We look forward to continuing a tradition of excellence, with the reward of enriching the intellectual ferment of astronomical discovery for years to come.



Caption: *Kitt Peak during a rare occasion of bad weather (Kitt Peak Electrical Storm, 1972, Gary Ladd)*

Richard Green

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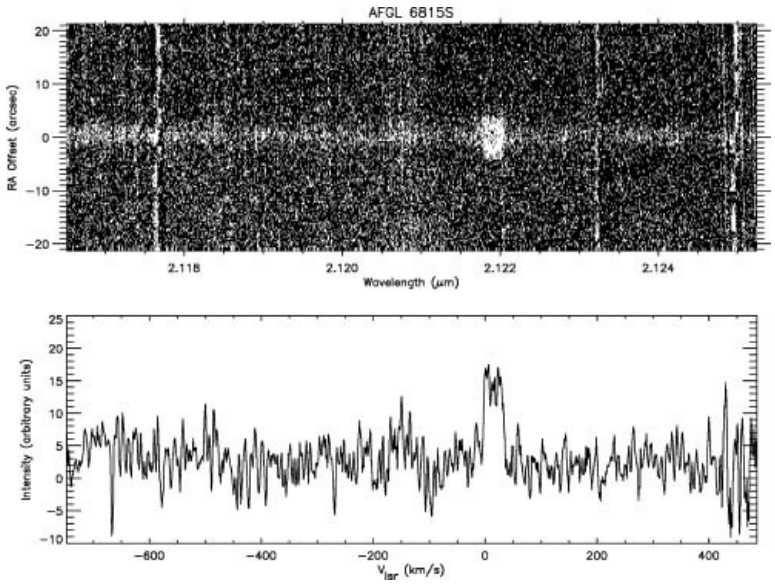
The Early Lives of Planetary Nebulae

David Weintraub and Tracy Huard (Vanderbilt), Joel Kastner (MIT), and Ian Gatley (Rochester Institute of Technology) used the new high-resolution spectrometer Phoenix on the 2.1-m telescope at KPNO to search for emission in the 2.1218 m line of molecular hydrogen in five *pre*-planetary nebulae (pPNe). H_2 emission was detected in two bipolar pPN, AFGL 6815S (Figure 1) and IRAS 17441-2411, both of which strongly resemble the well-studied bipoloar pPNe AFGL 2688 in recent high-resolution images. These new detections thus bring to four the number of bipolar pre-planetaries that have been detected in molecular hydrogen emission.



Caption: *Figure 1: Top: Spectral image of AFGL 6815S in the geocentric rest frame. Telluric OH emission lines are seen as bright vertical lines; continuum of IRAS AFGL 6815S stretches horizontally across the image at RA Offset = 0. The bright emission patch just shortward of 2.122 m is due to shocked molecular hydrogen. Bottom: Spectrum of AFGL 6815S extracted from top image, obtained by summing flux in a 7.4" strip running parallel to the dispersion direction and centered on the nebular continuum. The spectrum has been transformed to local standard of rest velocities.*

The appearance of bipolar structure in the late stages of evolution of many intermediate mass stars is commonly seen, but poorly understood. Observations of molecular emission, however, appear to provide clues to the origin of bipolarity. According to Gatley's Rule, a planetary nebula that has molecular hydrogen emission 2.1218 m will be structurally bipolar. On the basis of Gatley's Rule, one can determine the structure of a PN with a single spectral observation and without any direct spatial information, provided the spectrum shows H_2 emission. The relationship between H_2 emission and PN structure suggests that further studies may ultimately reveal more about the origin, timing, and mechanism of formation of bipolarity and the generation of H_2 emission. A growing number of objects suspected to be in transition from red giant to PNe have been revealed to be bipolar via high-resolution optical or near-infrared imaging. These observations of bipolar structure in transition objects suggest that the onset of bipolarity occurs *before* the nebular envelopes are ionized. Notably, two of the best-studied transition objects, the bipolar pPNe AFGL 618 and AFGL 2688 are H_2 sources. Phoenix observations may now allow a way to study the early morphological evolution of planetary nebulae from their spectra alone.

All four pre-planetary nebulae with molecular hydrogen have central stars with intermediate or early spectral types. Weintraub et al. contrast these objects to the bipolar, post-main sequence sources OH231.8+4.2, IRAS 07131-0147, and IRAS 09371+1212 in which they could *not* detect molecular hydrogen. Of the four bipolar sources in this sample for which H_2 emission is detected at 2.1218 m, the three with known spectral types for their central stars are G2 or earlier. All three bipolar sources for which no H_2 line emission was detected have M spectral types. Thus, the absence of H_2 emission appears to be related to post-main sequence evolutionary age. Evidently the least evolved pPNe have not reached the stage where shocks develop and produce H_2 emission. It follows that the central star of IRAS 17441-2411, which has yet to be classified, is likely to be of intermediate spectral type. The detection of H_2 emission only from the bipolar pPNe with intermediate- and early-type central stars suggests that the event that triggers the formation of bipolarity precedes the event that produces the shocked H_2 emission, and that both these developments take place before the photoionization event occurs and transforms a pPN into a PN.

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NOAO Astronomer Recognized for Development of Multi-Object Spectrograph

I am pleased to report that Samuel Barden (NOAO), has been awarded the 1998 Maria and Eric Muhlmann Award of the Astronomical Society of the Pacific (ASP). The Muhlmann Award is given for innovative advances in astronomical instrumentation, software, or observational infrastructure that enable significant astronomical discoveries. The award to Barden recognizes his pioneering use of optical fibers with astronomical spectrometers.

For Kitt Peak National Observatory, Barden led the development of the Hydra Multi-Fiber Positioner, which enables simultaneous observation of up to 100 sources, thus significantly increasing the efficiency of astronomical spectroscopic observations.

Hydra and its associated bench-mounted spectrometer were designed and built by a team of astronomers and engineers at NOAO in Tucson under Barden's leadership. Hydra was first tested on the KPNO Mayall 4-meter Telescope in 1991. For three years, it was the most used instrument on this telescope. In the summer of 1994, Hydra was removed from the Mayall 4-m and rebuilt as the prime facility instrument on the new, 3.5m WIYN Telescope on Kitt Peak. Scientific research with Hydra resumed at WIYN in 1995. Barden is now working with NOAO engineers to construct a duplicate of WIYN Hydra for use at Cerro Tololo InterAmerican Observatory beginning in 1999.

The Muhlmann Award was presented to Barden on 29 June at the Summer Meeting of the ASP in Albuquerque, New Mexico.

Sidney C. Wolff

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Welcome to New Scientific Staff

We are very pleased to welcome a number of new scientific staff to NOAO in Tucson this coming fall and winter.

Ian Dell'Antonio will be joining us as a Kitt Peak Postdoc. Ian got his PhD from Harvard, working with Margaret Geller on peculiar velocities in large-scale structures and properties of groups of galaxies. He will come to Tucson from Bell Labs, where he is working with Tony Tyson on projects involving gravitational lensing of galaxies by clusters of galaxies and by other galaxies through analysis of HST images. He also collaborated on the software development for the BTC camera, currently in use at CTIO. He plans to pursue three major topics during his fellowship: strong gravitational lensing through further HST images; weak lensing through wide-field CCD images from the BTC and KPNO Mosaic Imager; and growth of large-scale structure through determination of peculiar velocities in structures like the Great Wall.

Sangeeta Malhotra will be coming to us as a Hubble Fellow. She got her PhD from Princeton with Jill Knapp with a study of the vertical structure and kinematics of atomic and molecular gas in the Galaxy. She will come here from IPAC at Caltech, where she is working with the US ISO Key Project on the ISM and star formation in normal galaxies. Her interests also include determination of the star-formation efficiency in galaxies in Butcher-Oemler clusters through measurement of the molecular gas content, the Galactic mass distribution through gravitational microlensing of halo sources, and searching for dust signatures in quasar absorption systems.

Arjun Dey will also arrive as a Hubble Fellow. Arjun received his PhD from UC Berkeley with Hy Spinrad for investigations of high-redshift radio galaxies. Arjun was a Kitt Peak postdoc, and took the first year of his Hubble Fellowship at Johns Hopkins. He is working on the stellar content, dynamical state, recent star-formation history, and chemical abundances of high-redshift progenitors of bulge-like galaxies; determination of ages of high-redshift massive elliptical galaxies; and exploitation of the NOAO Deep-Wide Survey to identify the entire evolving luminous elliptical galaxy population to z = 2. We are very pleased that Arjun will become a member of the Kitt Peak scientific staff in December 1999.

Joan Najita is a new addition to the Kitt Peak scientific staff starting in September. Joan was awarded her PhD from UC Berkeley from work with Frank Shu on modeling of accretion processes in protostellar disks. Joan was a CfA postdoc, and comes to us from STScI. Joan will use infrared spectroscopy to study circumstellar disks, to probe the structure, kinematics, and chemical abundances at size scales smaller than that of the solar system. She will also use

Phoenix to examine gap formation from unseen planetary companions at AU distances. Joan's service responsibilities will include support and development of near-IR spectroscopic capabilities.

Steve Strom will join our staff in the ScOpe Division in January. Steve got his PhD at Harvard, and served on the faculty of SUNY Stony Brook before joining the KPNO scientific staff. He left here for a faculty position at University of Massachusetts, Amherst, and returns to us from there, where he is both Chair of the Five College Astronomy Department and Director of the Large Millimeter Telescope Project. Steve's drive is to understand the origin of the stellar initial mass function through carefully selected samples from near-infrared photometry and spectroscopy; and the origin of stellar angular momentum by subjecting the disk regulation hypothesis to rigorous tests. Steve will serve the Observatories by exploring ways for NOAO to facilitate and lead community-based surveys, by defining and implementing plans for Gemini era operations, and by providing intellectual energy to our long-term planning and role in the broader scientific community.

John Glaspey is the new Supervisor of Mountain Scientific Support. John received his PhD from the University of Arizona, working with Bart Bok and Dave Crawford on photoelectric photometry of open clusters. He was a staff member at the University of British Columbia and the University of Montreal before serving as Resident Astronomer, then Associate Executive Director of the CFHT. He comes to us from the position of Facility Manager for the Hobby-Eberly Telescope. John will have the major responsibility of the day-to-day scientific productivity of Kitt Peak. We know that his experience and expertise will serve the Observatory well in this challenging position.

Yes, John is taking over the mountain-based responsibilities from **Bruce Bohannan**. Bruce chose a change of scene as of 15 March 1998. He continues to lead the scientific oversight of the Kitt Peak improvement projects and the exploration of key issues in long-term technical planning as Kitt Peak Projects Scientist. In addition, he is spearheading an effort for enhanced reporting and dissemination of scientific discoveries from NOAO, as strongly urged by the NSF, AURA, and our external committees. Bruce provided the impulse that changed the approach to support on Kitt Peak. His principle of scientific productivity of the facility as the unquestioned top priority has maintained KPNO's reputation for excellence through difficult times. We remain enormously grateful to Bruce for this extraordinary contribution. I look forward to a management team strengthened by the presence of both Bruce and John, dedicated to the highest quality scientific performance of Kitt Peak.

Richard Green

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NOAO Preprint Series

The following preprints were submitted during the period 1 May to 31 August 1998. Please direct all requests for copies of preprints to the NOAO author marked.

801 Moretto, G., *Kuhn, J.R., "Off-Axis Systems for 4-m Class Telescopes"

802 *Rimmele, T.R., Radick, R.R., "Deconvolving Solar Images Using a Shack-Hartmann Wavefront Sensor"

803 *Rimmele, T.R., Radick, R.R., "Solar Adaptive Optics at the National Solar Observatory"

804 *Radick, R.R., Rimmele, T.R., Dunn, R.B., "The Image Improvement Program at the NSO/SP Vacuum Tower Solar Telescope"

805 *De Young, D.S., "The 'Alignment Effect' and the Evolution of Dust in High Redshift Radio Galaxies"

806 *Jacoby, G.H., De Marco, O., Sawyer, D.G., "The Size and Age of Sakurai's Planetary Nebula and the Temperature of Its Central Star"

807 *Lauer, T.R., Faber, S.M., Ajhar, E.A., Grillmair, C.J., Scowen, P.A., "M32 1"

808 *Vukobratovich, D., Don, K., Sumner, R., "Improved Cryogenic Aluminum Mirrors"

809 *Ridgway, S.T., "Ground Based Astronomy with Adaptive Optics"

809 *Armandroff, T.E., Davies, J.E., Jacoby, G.H., "A Survey for Low-Surface-Brightness Galaxies Around M31. I. The Newly Discovered Dwarf Andromeda V"

810 *Armandroff, T.E., Davies, J.E., Jacoby, G.H., "A Survey for Low-surface-Brightness Galaxies Around M31. I. The

Newly Discovered Dwarf Andromeda V"

811 *Joyce, R.R., Hinkle, K.H., Wallace, L., Dulick, M., Lambert, D.L., "Spectra of Cool Stars in the J Band (1.0-1.3 m) at Medium Resolution"

812 *Kinman, T.D., "The Delta-Scuti Star GSC 2985 01044"

813 *Mighell, K.J., Sarajedini, A., French, R.S., "WFPC2 Observations of Star Clusters in the Magellanic Clouds. II. The Oldest Star Clusters in the Small Magellanic Cloud"

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Other NOAO Papers

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

*Eggen, O.J., "The SCO OB2 Complex"

*Eggen O.J., "The Sirius Supercluster and Missing Mass Near the Sun"

*Eggen, O.J., "The Pleiades and Alpha Persei Clusters"

Hall, P.B., *Green, R.F., Cohen, M., "An Optical/Near- Infrared Study of Radio-Loud Quasar Environments I. The z = 1-2 Data"

Hall, P.B., *Green, R.F., "An Optical/Near-Infrared Study of Radio-Loud Quasar Environments II. Imaging Results"

Harrison, W., *Ball, W., Fowler, A.M., "Characterization of Gemini Near-IR Arrays"

*Jannuzi, B.T., Bahcall, J.N., Bergeron, J., Boksenberg, A., Hartig, G.F., Kirhakos, S., Sargent, W.L.W., Savage, B.D., Schneider, D.P., Turnshek, D.A., Weymann, R.J., Wolfe, A.M., "The Hubble Space Telescope Quasar Absorption Line Key Project. XIII. A Census of Absorption Line systems at Low Redshift"

Meyer, M.R., Edwards, S., *Hinkle, K.H., Strom, S.E., "Near-Infrared Classification Spectroscopy: H-band Spectra of Fundamental MK Standards"

Postman, M., *Lauer, T.R., Szapudi, I., Oegerle, W., "Clustering at High Redshift: Precise Constraints from a Deep, Wide Area Survey"

Tolstoy, E., Gallagher, J.S., Cole, A.S., Hoessel, J.G., *Saha, A., Dohm-Palmer, R.C., Skillman, E.D., Mateo,

M., Hurley-Keller, D., "WFPC2 Observations of Leo A: A Predominantly Young Galaxy Within the Local Group"

*Walker, A.R., "CCD Photometry of Galactic Globular Clusters. IV. The NGC 1851 RR Lyraes"

Weymann, R.J., *Jannuzi, B.T., Lu, L., Bahcall, J.N., Bergeron, J., Boksenberg, A., Hartig, G.F., Kirhakos, S., Sargent, W.L.W., Savage, B.D., Schneider, D.P., Turnshek, D.A., Wolfe, A.M., "The HST Quasar Absorption Line Key Project XIV. The Evolution of Lya Absorption Line in the Redshift Interval 0 to 1.5"

Pat Breyfogle, John Cornett,
Suzan Ecker, Mary Guerrierri,
Elaine Mac-Auliffe, Shirley Phipps

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NOAO Nighttime Proposals Due for 1999A

Proposals for observing time for the 1999A semester (February 1999-July 1999) at Cerro Tololo Inter-American Observatory and Kitt Peak National Observatory are due Wednesday, 30 September 1998, Midnight MST. Proposals submitted on paper are due a week earlier, on 23 September 1998 at 5pm MST.

There are three ways to 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. Also see the CHANGES file for any late-breaking news, such as instrument configuration or policy changes that may affect your proposal preparation (see accompanying article in this section).
- Proposals are still being accepted **on paper**; however, 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, PO 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.

Although we plan no major modifications to the LaTeX template and style file for the 1999A proposal form, there are changes to instructions in these files and to instructions and lists of available instruments in the README file. *Be sure to update these files if you plan to submit your proposal by e-mail.* All changes will be incorporated into the Web-based form.

100% of the proposals for the last observing proposal semester were submitted electronically. The NOAO proposal team would like to thank the astronomy community for their cooperation in helping us meet this long-awaited goal!

The NOAO Proposal Team

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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
: Address for thesis and visitor instrument letters

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

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

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

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

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Why Should I Use the Web-based Proposal Form?

Each semester, we see a steady increase in the percentage of proposals submitted over the Web. What are the advantages of the Web-based proposal form?

- **A simple form!** Entering information via the Web form is quick and easy. You can do the first draft with the Web form, and then e-mail yourself back a filled-out LaTeX template to polish the scientific justification.
- **Availability of old proposals.** Your old proposals prepared using the LaTeX template can be "imported" into the Web form. Proposals from previous semesters that have been submitted through the Web form are available to update and resubmit.
- **No FTP files to worry about.** If you use the Web form you are always guaranteed that you are using the up-to-date files and have the most recent information about telescopes, instruments, and policies without having to update things by FTP.
- **No LaTeX installation required.** By using the Web form you let NOAO worry about the LaTeX installation and any other supporting software. You can fill out your proposal from any local computer that supports a Web browser, including your laptop or home computer running Windows 95.
- **More accurate submission.** Your proposal is processed electronically and the information is stored in a database. The information in the database is tabulated in various forms, and lists are sent to the TACs. Although every effort is made to verify the information transferred from proposal form to database, sometimes typos or misconstrued information makes it past our filters. The biggest danger is not getting what you asked for. The Web form allows us to better control what gets written to the proposal form and what passes through to the database. Fewer mistakes are made, which is better for investigators. The Web form also checks the proposal to be sure all required information has been filled in and alerts the investigator to missing fields.
- **Easy figure placement.** The Web form will place your figures and even rotate them for you. No more fussing with plotfiddle! Some investigators have complex figures and use fancy placement methods, but for many, the Web form scheme will work just fine.
- **Sharing with Co-Is.** The Web form can be accessed by Co-Is so it is easy for them to read and edit what you have done, if you share the login and password with them.

In the past many users have complained about a slow network connection to NOAO. Many institutions have been added to the new NSF fast backbone (vBSN); we encourage you to try again and see if things have improved.

During the last proposal semester, 1998B, 26% of the proposals came in over the Web. Those who tried it, liked it. Give the Web form a try yourself!

The NOAO Proposal Team

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Exposure Time Calculators

The SCience OPErations Division, in collaboration with KPNO and CTIO, is planning to make exposure time calculators for the various NOAO instruments available to investigators as an aid in preparing observing proposals. Accurate exposure estimates are necessary during proposal preparation to provide reasonable time estimates both for the number of nights requested on the front page of the printed proposal and for the discussion and justification in the Experimental Design section. We would like to implement a single tool that can be used for all telescope and instrument configurations available through the NOAO proposal process. This general Web-based exposure time calculator tool is still in the planning stages, but for imaging estimates now we encourage the use of our Web-interface to the IRAF task `ccdtime` at http://www.noao.edu/scope/ccdtime/. The database driver for this task has been updated to contain information for computing exposure times for all imaging instruments, including IR, at KPNO and CTIO.

Each site also maintains additional Web tools for helping investigators to identify imaging or spectroscopic needs and exposure times. KPNO has two tools at http://www.noao.edu/kpno/imaging/imaging.html (identify a telescope/instrument configuration from input requirements) and at http://www.noao.edu/kpno/spectroscopy/spect.html (predict a telescope/spectrograph combination based on input parameters). CTIO supports exposure time calculators for many of their optical spectrographs---see http://www.ctio.noao.edu/spectrographs/spectrographs.html .

Todd Boroson, Dick Joyce, Steve Heathcote

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Check the CHANGES Log!

For the September 1998 proposal submission, we are adding an important new feature to the proposal information --- a CHANGES link from the proposal Web page and an additional CHANGES FTP file.

We freeze all files associated with the proposal process (both FTP- and Web-based) at least one month before the proposal deadline. What do we do if there is a change? How do we notify the community, for example, if there is an instrument configuration change? The new CHANGES Web link will allow users to check for any important new information related to detector, telescope, or instrument availability after the files are frozen. The same information will be available through a CHANGES file that will be available in the FTP directory *noaoprop* on *ftp.noao.edu*. Check this file for last minute changes before filling out your proposal form.

Jeannette Barnes, Dave Bell

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Checking Your Proposal Status

You have submitted your proposal by e-mail to *noaoprop-submit@noao.edu* or you have pressed the final "Submit" button on the Web-based form. Is it safe to go home to bed and have a good night's rest? No! Take another 5-10 minutes to be sure your proposal did not get lost between your place and ours, especially if you submitted your proposal close to

the deadline.

Each proposal submitted receives an automatic e-mail reply as it is processed by our proposal queue. The contents of this message will vary depending on the contents of your proposal and how we received it (by e-mail or the Web). Most importantly, the e-mail message will contain your **proposal number**, as well as instructions for submitting any figures, if it was an e-mail submission. If you do not receive this e-mail message 5-10 minutes after your submission, something may have gone wrong. If you suspect a problem, send e-mail to noaoprop-help@noao.edu and someone will get back to you as soon as possible.

Additionally, selected information from all incoming proposals is automatically logged and posted to the Web at http://www.noao.edu/cgi-bin/noaoprop/propstatus . This log is updated every ten minutes, and information is listed by proposal number. Check to be sure that all of your figures have arrived, among other things.

If everything checks out, have a good night's sleep. Checking the Web log at a later time should show that your proposal has changed "Status" to "Imported" this is a manual operation and indicates that your proposal information has been imported into our database, ready to be tabulated with other proposals for the TAC's review. The "Imported" status implies, too, that your proposal was successfully printed with all of its figures.

Remember, you must have a **proposal number** for each proposal submitted!

The NOAO Proposal Team

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Proposals to be Processed in Tucson

Beginning this September all incoming proposals will be processed and imported into the proposal database in Tucson. In the past CTIO proposals came into the Tucson office but were immediately transferred to CTIO for further processing. What this means for investigators is that they will be getting e-mail from Tucson rather than from CTIO if any problems are encountered during the LaTeXing and printing of their proposals. For the most part, however, this change will be transparent to investigators.

Proposals will still be sent to CTIO after they are imported into the database for review by CTIO scientific staff.

Todd Boroson

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Changes to the TAC Process in Preparation for Gemini

In anticipation of the call for proposals for U.S. time on the Gemini 8-m telescopes, as well as for community access time on the Hobby-Ebberly Telescope and the 6.5-m telescope of the MMT Observatory, NOAO's SCience OPErations Division is re-inventing the proposal review process to handle the increase in proposals. The traditional Extragalactic and Galactic Telescope Allocation Committees must be expanded to a larger number of panels to provide a careful and thorough review of all proposals received. As the number of panels is increased, we face a more complex problem in needing to merge recommendations of all panels fairly to produce a single telescope schedule.

A welcome increase in proposals in the area of solar system astronomy for the second semester of 1998 provided a good

opportunity to develop new TAC procedures. A new TAC was convened to review solar system proposals. We are grateful to Jeff Cuzzi, Carol Neese, William Hubbard and Michael Belton for their exemplary service on this first Solar System TAC.

Following the meetings of all three NOAO nighttime TACs, the rank-ordered lists were merged to produce a final list of ranked programs.

In subsequent semesters, we will be adding additional TACs as need and opportunity arises, so that by the time the Gemini telescopes are ready, we will have a new set of procedures in place.

Todd Boroson

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List of Scheduled Proposals Now on the Web

The NOAO Web site now lists the nighttime proposals that were granted telescope time for the 1998B semester (August 1998-January 1999). Information given includes principal investigator name (in alphabetical order) and institution, proposal number, site (CTIO or KPNO), telescope, nights granted, and title of proposal. In the future we will provide proposal abstracts as well, and this information will be linked to the schedule so that one will be able to go from an entry in the schedule to information about that entry with just one click.

For now, the list is accessible from the page that lists the available schedules (for CTIO and KPNO) and temporarily from the NOAO home page.

Todd Boroson

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Survey Working Group Meets in Tucson

The workshop that NOAO ran in September 1997 on Supporting Capabilities for Large Telescopes identified surveys done on 2-m to 4-m telescopes as a critical element that must be provided for effective use of the very large telescopes, including Gemini, that are becoming available to the community. The joint nighttime NOAO users' committee suggested that we convene a working group to make recommendations on policies and procedures for a program that would encourage such surveys. We have organized such a working group and they will meet late in July in Tucson. Their report will be published in the next (December) NOAO Newsletter.

Todd Boroson

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CTIO Instruments Available

This lists common user instruments available. 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. Note the availability of Hydra for this coming semester.

SPECTROSCOPY

	Detector + Spectral Range	Resolution	Slit	Reference
4-m Telescope				
Hydra + Fiber Spectrograph	Loral 3K CCD, 3300-11000Ã… or Tek 2K CCD, 3300-1000Ã…	300-2000	Fiber* *120+fibers, 1.3 or 2 arcsec aperture	[54,55]
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 Bench Mounted	Loral 1200800 CCD, 3100-11000	<1300	7.7'	[43,45]
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… (f7.5 0.97" or 0.65"/pixel) (f13.5 0.54" or 0.35"/pixel)	2400-8000	FOV 7.3' 4.1'	[25,26,42]
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'	[47,54,55]
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	STIS 2K CCD	2.0	68'	[42,47,50,51]
YALO Telescope				
ANDICAM Optical/IR Camera	STIS 2K CCD + HgCdTe 1K	0.3	10'	[55]

Ron Probst

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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	5.4'	single/multi
OSU-NOAO Infrared Imaging Spectrometer	InSb(5121024, 0.9-2.5m)	1400	1.5'	
WIYN 3.5-m Telescope				
Hydra + Bench Spectrograph	T2KC CCD	700-22,000	NA	100 fibers
DensePak (see note 1)	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'	
OSU-NOAO Infrared Imaging Spectrometer (see note 2)	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	8Kx8K	4500-9700	0.26	35.4'
OSU-NOAO Infrared Imaging Spectrometer	InSb (5121024, 0.9-2.5m)	JHK+L(NB)	0.18/0.09	3'x1.5'/1.5'x0.75'
WIYN 3.5-m Telescope				
CCD Imager	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, 0.9-2.5m)	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	8Kx8K	4500-9700	0.425	59.0'

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

2 Phoenix will be shipped to CTIO in mid-1999 so will not be available for scheduling at KPNO. see accompanying article in KPNO section of the Newsletter.

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

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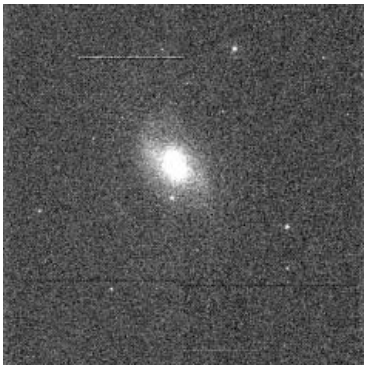
NOAO Newsletter - Cerro Tololo Inter-American Observatory - September 1998 - Number 55

YALO: A New Optical/Infra-red Service Observing Capability At CTIO

The Yale, AURA, Lisbon, Ohio State partnership (YALO) to refurbish and operate the Yale 1-m telescope at CTIO (NOAO Newsletter No. 52, page19) saw first light in early June 1998. This note is to alert the community to the availability of time on this telescope for the next observing period and to invite submission of observing proposals. The operating mode of this telescope is well suited to synoptic programs, targets of opportunity, or acquisition of small data sets. The single fixed instrument is an optical-IR camera, ANDICAM, providing imaging in standard bands from 0.4 m to 2.2 m.



Caption: *I-band frame of the Type I SNe 1998bu taken with the YALO Telescope some 45 days after maximum, when the SNe had faded by about 2.4 magnitudes to I = 13.2. This SNe is interesting, as it occurred on M96 (NGC 3368), a Leo-I Group Galaxy with a Cepheid distance from HST data. This 40s exposure with a FWHM of 1.5" shows also some of the cosmetic details of the CCD (picture courtesy of Ricardo Covarrubias and Nick Suntzeff.)*

Present Status

The telescope, the new imaging system, and a new commercial Telescope Control System have been in use for a commissioning and science verification period. This process will ensure that, when the instrument becomes available to the NOAO user community later this year, it will be stable and reliable. Most of the commissioning and science verification has been performed under Yale and Ohio State management, while work on the telescope has been performed on a labor-charge basis by CTIO mountain staff.

As of mid-July, about 25 Gbytes of data have been obtained on programs including bulge micro-lensing photometric follow-ups (Ohio State), low-mass X-ray transients, and globular cluster monitoring (Yale). All observations are being performed on a queue-scheduling basis by two observers provided by CTIO working on one-week shifts. The scheduling has proved to be flexible and efficient enough to respond to short-notice events. This has been operationally tested on several targets of opportunity: The gamma-ray burst 980703 (http://cfa-www.harvard.edu/iauc/06900/06966.html) for Yale, the micro-lensing event 98-SMC-01, detected by the MACHO collaboration, (http://cfa-www.harvard.edu/iauc/06900/06935.html) for Ohio State, and SN 1998bu in NGC 3368 for CTIO staff (http://cfa-www.harvard.edu/iauc/06800/06899.html).

The new imaging system ANDICAM was built at Ohio State by a group led by Darren DePoy; for details, see: . Because of delays in the procurement of an array for the IR channel, it has been commissioned with only the optical CCD channel operating. Some performance features are as follows:

1) The sensitivity curve of the CCD can be found on ANDICAM's home page. The count rate, and color terms from standard stars, are being determined and will be posted on the YALO web pages at CTIO in the near future.

2) There is significant fringing in the R band---therefore special calibration plans are needed to remove this effect.

3) The total overhead (readout time plus clearing the chip and starting the next integration) is about 50 seconds.

The telescope presently slews very slowly, about 1 minute per 10 degrees. Therefore, programs with widely separated targets, or which need frequent standard stars, will be very inefficient. We plan to change the gear train late this year to achieve about 0.6 deg/s.

Vendor information on the new TCS system can be found at http://www.primenet.com/~comsoft/.

Proposing for February-July 1999

It is expected that by December 1998, the IR array will be installed and ANDICAM will have both channels fully functional and characterized. Proposers for semester 1999A can assume the availability of the complete imaging system with 0.4-2.2 m coverage.

ANDICAM has a ten position filter wheel in its optical channel. Five of these positions hold 50 mm filters that allow unvignetted imaging over the entire 2048 2048 CCD (10' field-of-view). The other five positions are 25 mm filters that will vignette part of the CCD (a 1024 1024 section in the middle will remain unvignetted). The full field-of-view positions will have the set uBVRI, while the restricted field-of-view positions will hold Strmgren filters vby plus Hb. In the IR channel the standard J, H, and K broadband filters will be available; the possibility of additional narrowband filters is under discussion. Any one of the optical filters and any one of the IR filters can observe the same telescope's field of view simultaneously and independently. A dithering capability is provided for the IR channel by an internal chopping mirror. For performance estimates, we suggest that ANDICAM's IR performance be scaled from CIRIM, considering telescope aperture and pixel size. Pixel size on the sky for both the optical and the IR channels will be 0.3".

Changing either filter complement involves opening the dewar and it is not expected to be done more than once a year. NOAO users should restrict their filter choices to the above sets.

All observations will be performed on a queue-scheduling basis by two CTIO mountain staff observers. Queue management will rotate among the partners. The queue manager on duty is charged with monitoring the short-term performance of the queue, and with all communication with the observers. No direct communication between the time grantees and the observers is allowed. The long-term monitoring of the queue, as well as the balance of the distribution of time among the partners, is performed by a management committee having partner representatives.

Under AURA's operating agreement in Chile, 10% of the science time is allocated to Chilean astronomers. NOAO users also receive a 10% time share, allocable during the non-Bulge season. This restriction arises from the science interests of the Ohio State group. This amounts to about eight dark and eight bright nights for next semester depending on the exact request for engineering nights. It is vital that science proposals provide accurate estimates of total telescope time per program (including general overheads, time on standards, slewing time, readout time, etc.). Time spent on standard stars will be counted against the observing program. If two or more programs can share standards during a particular night, they will be charged proportionally. Observed time is logged from an archive that stores all the (raw) data on local disks, which are subsequently transferred to two data tapes (one remaining at CTIO). These data are then sent to the proposer via express-delivery; receipt within four weeks of data taking is the goal. Custom-made IRAF scripts and translation files are being written at CTIO by S. Heathcote for NOAO users, that they can reduce their frames using quadproc just as with any other detector at CTIO.

Since the YALO telescope provides a unique queue/service observing capability not available on other CTIO telescopes, preference will be given to (a) proposals for synoptic programs where a few frames/night will yield significant scientific results, or (b) proposals that require less than 10 hours total observing time. Consistent with this policy, target-of-opportunity as well as long-term (i.e., multi-year) programs will be considered. Successful proposals should avoid duplication with programs being pursued by other YALO partners (see http://www.ctio.noao.edu/yale/yale.html for a list of Yale and Ohio-State observing programs). Proposals for YALO time should be submitted by 30 September using the standard NOAO electronic form, and will be evaluated in the same way as all other proposals submitted to NOAO. Because of the queue/service observing mode, it is important to include a target table at the end of the standard form, as is done for proposals submitted for the WIYN telescope (see ftp://ftp.noao.edu/noaoprop/wiyn_info.txt, especially Section 2.2 of that document.)

Proposers with time granted on YALO should expect a "Phase II" communication in order to provide, on a standard template, the basic information needed by the queue-manager and the observers to complete the program. This is an important step, as no communication between the NOAO user and the observer will be allowed prior to, or during the observations; remaining details can be dealt with through the CTIO liaison astronomer Ren A. Mndez (rmendez@noao.edu). The contents and layout of the Phase II form are being worked out at this moment; it will probably be a simple ASCII form distributed via e-mail.

For general information on the YALO project, please take a look at: http://www.ctio.noao.edu/yale/yale.html. For other information, please contact the undersigned.

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Darren DePoy, Ohio-State University (depoy@rosse.mps.ohio-state.edu)
Charles Bailyn, Yale University (bailyn@astro.yale.edu)

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OSIRIS Returns to CTIO

CTIO and The Ohio State University are upgrading the Ohio State Infrared Imager and Spectrometer (OSIRIS) for a comeback tour at CTIO. We will put a new HgCdTe 1024 format array into the instrument and expect it to be available

for visitor use sometime during semester 1999A. We will offer OSIRIS for use on both the 4-m (f/14 tip-tilt) and 1.5-m (f/13 focus only).

As of mid-July the project schedule remains approximate. The detector upgrade, delivery to CTIO, and instrument characterization on the telescope should occur over the southern summer. However, to err on the conservative side, IR proposals for semester 1999A should be written for use of CIRIM or the IRS. When OSIRIS is user-ready (hopefully by March-April), we will offer it as an alternative instrument for CIRIM and IRS proposals that would benefit from its capabilities. We will place information about OSIRIS on the IR Instruments Web page as it becomes available, along with updates to the schedule.

OSIRIS provides two imaging scales, which can be changed while the instrument is on the telescope. On the 4-m, this will maximize efficiency with the f/14 tip-tilt system under differing conditions. A 0.15" per pixel scale will take advantage of Cerro Tololo's best corrected seeing, while a 0.4"/pix scale will allow productive observations even when the site seeing is not at its best. OSIRIS will not completely fill the 1024 pixel format in imaging mode because it was not designed for an f/14 beam. The fully illuminated square field of view will be approximately 70" on a side at the fine scale on the 4-m---an increase of 1.75 in area at a 25% finer pixel scale than currently available. The field of view at the coarser scale will be about 3' 3', or about 3 the area coverage of CIRIM with the same sampling at f/8. The corresponding fields on the 1.5m will be nearly 4' 4' at 0.4" per pixel and 10' at 1.1"/pix. Because the internal cold stop is fixed and optimized for the 4-m, the 1.5-m will be effectively stopped down to 1.4-m. We expect the increased field size to more than compensate this in total throughput for many programs.

OSIRIS will provide at least the following set of filters: JHK, H_2, continuum, Brg, and CO. We will likely add more narrow band filters to this list, up to a maximum of 16.

In addition to 1-2.5 m imaging, OSIRIS provides spectroscopic capability in the same dewar. There is a long slit mode covering an entire band (J, H, or K) at resolution 2900 in one grating setting. This mode uses the fine pixel scale; the slit width is approximately 3 pixels (0.45" on the 4-m). In addition, there is a cross dispersed mode that covers J, H, and K bands simultaneously at resolution 1200. The XD mode will use the coarse scale with 0.4" pixels and a 1.2" slit on the 4-m.

The throughput in imaging mode should be similar to CIRIM. In spectroscopic mode, OSIRIS will have lower sensitivity than the IRS since the original f/30 optics will now overfill the grating at f/14. However, for many programs the much greater wavelength coverage at higher spectral resolution than typical IRS configurations should provide compensating advantages.

We expect that OSIRIS will largely supplant CIRIM for imaging programs. The IRS will remain available for programs requiring longer wavelength coverage (> 3 m) or higher spectral resolution than provided by OSIRIS. We will still offer CIRIM for use on the 1.5-m when OSIRIS is scheduled on the 4-m.

The return of OSIRIS is made possible by an agreement between CTIO and OSU, which includes a small amount of guaranteed telescope time. If you have questions regarding OSIRIS and CTIO, please contact one of us.

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Ron Probst (rprobst@noao.edu)
Patrice Bouchet (pbouchet@noao.edu)

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Guidelines For HYDRA Proposals

The CTIO version of the fiber-fed multi-object spectrograph "Hydra" is on schedule for commissioning during October-January 1998. We anticipate that Hydra will be ready for limited visitor use during semester 1999A.

Because the instrument will be in its final shakedown period, observing during semester 1999A will be on a "shared risk" basis. Proposals for using Hydra will be accepted and evaluated for scientific merit by the normal review process. Final selection will be based on the anticipated behavior of the instrument at the time of scheduling, after the initial engineering runs in October 1998. All proposals must include a backup plan for observing with the R-C spectrograph if for some reason Hydra is unavailable.

Because the instrument will be new, the Hydra proposals likely to be successful during semester 1999A will be those that do not make excessive demands on its performance. Prospective users should not expect to observe extremely dim targets or in very crowded fields. Experienced observers who have previously used multi-object spectrographs such as

Argus or Hydra WIYN are encouraged to propose to use Hydra CTIO during this semester.

Details of the characteristics of Hydra CTIO will be found on the CTIO WWW site at http://www.ctio.noao.edu/spectrographs/hydra/. Documentation is continuously being written so prospective users should check this site frequently. Questions should be addressed to tingerson@noao.edu .

T. Ingerson (tingerson@noao.edu)

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Mosaic Imaging At Blanco 4-m Prime Focus

In the last NOAO Newsletter (No. 54, p32) I reported on the status and future of wide-field imaging on the Blanco 4-m telescope. At that time, replacement of one and possibly two of the Big Throughput Camera (BTC, http://www.ctio.noao.edu/pfccd/btc_arw.html) CCDs was planned. In May 1998 both CCDs 1 and 2 were replaced by Gary Bernstein. The new CCDs are a great improvement over the old ones, with higher blue sensitivity and linear response. The WWW pages have been updated with new count rates and other information.

As expected, the BTC is scheduled for a large fraction of the dark time for semester 1998B. We have negotiated extension of the loan period with Tony Tyson and Gary Bernstein to cover semester 1999A. During this period we expect to be commissioning NOAO Mosaic II at CTIO (http://www.noao.edu/kpno/mosaic/mosaic.html). Delivery of the eight SITe 2K 4K CCDs is the pacing item for the completion of Mosaic II, and although SITe is regularly delivering CCDs, it is still too early to be sure whether the nominal commissioning date (15 February 1999) will be met. For the purposes of proposal writing, assume that the BTC will be the instrument offered to visitors in 1999A. We will contact those awarded time when we are preparing the schedule (November 1998) to give an update on our plans for BTC and/or Mosaic II availability in 1999A.

Alistair Walker (awalker@noao.edu)

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Undergraduates Wanted for the 1999 CTIO REU Program!

The CTIO REU program is back! After a great program in 1998, we're looking forward to another outstanding program for 1999. Pending final NSF approval of funding, we anticipate offering four Undergraduate Research Assistant positions for a ten-week program starting in January 1999 under the direction of our new REU site director, Don Hoard.

The CTIO REU program offers students the unique opportunity to gain observational experience studying objects in the rich Southern hemisphere (the Magellanic Clouds, the Galactic center, etc.), while also providing them a chance to work alongside Chilean astronomy and engineering students who come to CTIO for summer projects. The CTIO program is the only NSF REU site that is run during the academic year (from January through March). It provides an alternative for students who can take advantage of a quarter or semester away from their home campuses, and/or who are interested in participating in an overseas program.

The application deadline will be in early October. Please check the CTIO REU web page, http://www.ctio.noao.edu/REU/reu.html for up to the minute news about our 1999 program and application materials, as well as for more information about the CTIO REU program and projects and participants from previous years.

Chris Smith (csmith@noao.edu),
Don Hoard (dhoard@noao.edu)

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Requests for CTIO Telescope Time August 1998 - January 1999

Telescope	Nights Req.	Nights Sched.	#Requested #Scheduled	#Visitor Nights	%Visitor Nights	#Staff Nights	%Staff Nights	#Eng. Maint.
4-m Dark	243	77.5	3.1	64.5	83	13	17	45.5
Bright	224	59	3.8	46.5	79	12.5	21	
1.5-m Dark	61	90	0.7	83	92	7	8	21
Bright	111	47	2.3	36	76	11	23	
0.9-m Dark	81	80	1.0	74	92	6	8	3
Bright	58	39	1.5	33	85	6	15	
Schmidt	79	111	0.7	86	77	25	23	-

Ximena Herreros
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NOAO Newsletter - Kitt Peak National Observatory - September 1998 - Number 55

Mosaic-The Next Generation!

We installed SITe science-grade CCDs in KPNO's CCD Mosaic Imager in June, replacing the frontside Loral chips that have been used since the commissioning of the instrument. To test out the new detectors, we had an engineering run in mid-July. The new CCDs represent a vast improvement over the old ones. The new chips are thinned, back-side illuminated devices and are coated with SITe's standard AR coating, much like the several T2K chips that are used as imagers and spectrographic detectors around the mountain. They have 15 m pixels, however.

We have had limited time to reduce and analyze the data we obtained from the engineering run, but we can offer the following information. The table below lists the gain, read noise, and bias values of the chips as we are currently operating them:

Chip	Gain (e-/ADU)	Read Noise (e-)	Bias (ADU)
1	3.7	4.6	346
2	3.2	5.0	391
3	3.7	6.1	254
4	3.5	5.2	434
5	2.9	4.2	175
6	3.6	4.8	253
7	3.9	4.8	404
8	3.5	5.4	393

This is with a long (8 s) dwell time needed to avoid excessive read noise but that results in a readout time of almost 4 minutes. We regret the inefficiency of this longer readout time, and we expect to shorten it in the near future. The chips have excellent charge transfer efficiency and minimal bad columns (2 or 3 per chip) and charge traps. The one deficiency is fairly significant variations in their flat fields. There is an overall "mottling" of ~ 3% and several of the chips show a series of rings with amplitudes of up to 15% peak-to-valley. These variations are somewhat wavelength-dependent. Preliminary tests indicate that, after flat fielding using dome flats, residuals from these features remain at the ~ 0.5% level. We are working further to understand what limitation they will place on the accuracy to which frames may be flattened.

The CCDs are very flat physically. The whole array shows no significant degradation of image quality even out to the corners of the 36' 36' field. We obtained 0.8" FWHM images in both B and R bands on nights of good seeing. We also obtained astrometry frames to compute geometric distortion maps in a number of bands. From these we measure that the gaps between the sides of chips are typically 0.75 mm (50 pixels) and the gaps between the ends of chips are typically 0.50 mm (37 pixels).

We have previously described the pupil ghost problem with the 4-m corrector; it is particularly severe with narrow-band filters. The Solgel coating on the surface that causes the problem has deteriorated further since we last wrote about this (see NOAO Newsletter No. 52). Consequently, we have carried out laboratory tests in collaboration with DAO and Cleveland Crystals. These tests showed that hardened spin-coated Solgel was much less vulnerable to deterioration. Therefore, we are recoating this surface with the more resilient coating at DAO this summer.

We continue to work on completing our planned complement of Mosaic filters. The U filter is our current highest priority and will be ready for usage in September. We also hope to have Gunn/SDSS g', r', and i' by some time in the fall (z' is currently available).

We are continuing to improve the acquisition and reduction software. The GUI that controls the automatic display of images as they are read out has been improved to allow more control over this process. We are in the process of adding the capability of performing flat fielding "on the fly" for the display that takes place during read out. This will greatly aid the observers' quick assessment of data quality.

Spurred by the planned installation of the science-grade CCDs, many proposers applied for time with the CCD Mosaic Imager. A total of 104 nights were awarded during the 1998B semester, 45 on the 4-m and 59 on the 0.9-m. While operation of the CCD Mosaic Imager is basically unchanged from before, a number of the important characteristics of the instrument are different from the information in the manual. We will be updating the manual this summer to reflect the current state of the instrument. Please watch the Mosaic Web site (http://www.noao.edu/kpno/mosaic/mosaic.html) for further information and for a link to the updated manual.

Todd Boroson, Taft Armandroff, George Jacoby, Rich Reed (for the Mosaic Team)

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The "Full-up" Queue Finishes its Second Year

The 1998A semester for the NOAO WIYN queue observing experiment was completed on 22 July 1998. Although the weather was often quite good from late April to the middle of July, programs that had targets available early in the semester could not generally be completed because of our weather problems with El Nio from February to mid-April. As a result, only 6 of 23 "long" observing programs could be completed outright. All of these science programs utilized MOS/Hydra. This reflects both the difficulty in finding periods of excellent seeing that most imaging programs require and the fact that nearly all of the bright time allocated to the queue program (~ 1/3 of the total) is used for spectroscopic projects. Over the last four semesters 24 MOS/Hydra programs (13 bright time programs) have been completed in terms of the number of hours spent obtaining data for a program reaching or exceeding the KPNO TACs' recommended allocation. This is 40% of the total number of MOS/Hydra long programs approved by the KPNO TACs. In contrast, only 5 of 26 imaging programs (nearly 20%) could be considered complete under this criterion during the last four semesters.

At the other extreme, approved observational programs for which the WIYN queue obtained no data also shows a dichotomy between the Imager and MOS/Hydra. In this case, 12 MOS/Hydra programs and one imaging program were not initiated. This lone imaging program involved follow-up to observations that were never obtained at the Kitt Peak 4-m telescope because of bad weather. The domination of MOS/Hydra programs in this unfortunate category underscores the greater difficulty of fitting "best effort" spectroscopic programs into the queue as backup programs to those with higher TAC ranking. A spectroscopic program in the "high priority" queue is either chosen to be the primary program for a particular night or is used as a backup program for highly ranked imaging projects. Since few MOS/Hydra

programs request the same Bench Spectrograph configuration, there is a higher probability that best effort spectroscopic observations will not be attempted so that the queue avoids the substantial overhead associated with changing the spectrograph configuration during the night. Imaging programs, on the other hand, are not encumbered by large observational overheads and typically do not require as much time to obtain a scientifically viable data set as do MOS/Hydra programs. Therefore, the probability is high that the WIYN queue can provide at least some data for almost all long imaging programs under the current practice of limiting the queue to the number of programs that fully subscribe the approximate NOAO time allocation for the WIYN telescope. Averaged over the past four semesters, the NOAO allocation has been cut by 43% because of bad weather and technical problems (technical problems account for less than 5% of the total allocated time). This percentage of lost time is higher than for other Kitt Peak telescopes largely because the WIYN facility is operated through the summer monsoon season.

The table below summarizes how observational programs accepted into the 1998A WIYN queue fared. All data obtained during the 1998A semester have been distributed. Please contact us at wiynq@noao.edu if you have not received data that you believe were obtained for your program.

1998A (Spring 1998) WIYN Queue Observing

		Level of Completion				
	Total	**0%**	**25%**	**50%**	**75%**	**100%**
Long Programs:						
High Priority	11	2	2	2	1	4
Best Effort	12	4	3	2	1	2
2Hr Programs:						
High Priority	3	0	0	0	1	2
Best Effort	2	2	0	0	0	0
Totals:	28	8	5	4	3	8

The NOAO observing queues for the 1998B (fall 1998) semester have been devised and posted on our Web site at http://www.noao.edu/wiyn/obsprog/queue/F98/F98-Index.html . The 1998B NOAO WIYN queue has been allocated 54 nights (548 hours; 142 hours during bright time). The high priority queue is comprised of 11 programs, and 10 programs are given best effort status (see the "Queue Rules" on the queue Web site for a general explanation of how these two queues are handled during the semester). Time was granted to 10 short programs by the 2 Hr Queue TAC. However, the TAC did not explicitly rank these proposals and indicated that several programs be executed only if they are reasonably compatible with the instrumental setups required for programs in the long queues. Semester 1998B marks the first time that DensePak programs are in the queue. There has also been a shift in the relative demand for MOS/Hydra and the Imager. Over the past two years MOS/Hydra programs have accounted for 70% of the long programs placed in the queue. For 1998B the Imager accounts for nearly 50% of the programs in the queue (MOS/Hydra = 40%; DensePak = 10%). The top of the high priority queue is dominated by imaging programs (6 of the 7 highest ranking programs).

Hydra News

Unfortunately, fiber 53 (blue fiber cable) broke during the past semester. Investigators wishing to use the blue fiber cable should use the new version of the "concentricities" file (v6.1) to construct their Hydra fiber assignment files. This file can be obtained at the NOAO FTP site ftp://ftp.noao.edu/kpno/hydra/.

Semester 1999A Proposals

The WIYN queue experiment will continue for the first semester of 1999. Proposers should be aware that DensePak will continue to be offered as a BRIGHT time instrument only. Also, based on the past experience executing 2 Hr queue imaging programs and the recommendations of the 1998B 2 Hr Queue TAC, the queue will no longer absorb the overheads associated with photometric calibration of 2 Hr queue imaging programs. Truly photometric nights have been rare at Kitt Peak over the past few years and the desire is to keep short queue programs within the 2 hour time limit. Photometric calibration of target fields will be obtained at the discretion of the queue observers based on the needs of long programs that have requested photometric calibration. 2 Hr queue proposers should design their experiment in a way that does not require multi-color photometry of many standard stars distributed in color and airmass, or obtain photometric calibration of their fields using other facilities. There is no change to the overheads charged to long imaging programs that request photometric calibration of their target fields. Two hours should be added to the time request for every 8 hours (including overheads) required to observe your science targets if you wish to have standard stars observed.

We remind investigators requesting time on the WIYN telescope to include the observing overheads detailed on the WIYN queue Web site in their time request for the 1999A semester (see http:/www.noao.edu/wiyn/obsprog/proginfo/OverHeads.html).

Paul Smith for the WIYN Queue Team
(D. Harmer, A. Saha, and D. Willmarth)

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Better Images at the 4-m

This is an update on our on-going efforts to improve the delivered image quality (DIQ) at the 4-m telescope. It is clear that thermal effects dominate the DIQ at the 4-m, as the various graphs shown in NOAO Newsletter No. 50 (June 1997) have shown. During the past year, we completed a major project to address these thermal issues: as all recent 4-m observers have noticed, dome vents were put into regular operation at the 4-m (see NOAO Newsletter No. 52) last November. These vents provide 1600 ft^2 of opening, in addition to the dome slit's 2300 ft^2, and provide about one-third of the area to volume ratio as at WIYN. This ventilation is intended to flush the dome roughly 100 times per hour in a 10 mile/hr wind.

Our next major improvement on the thermal front is to bring the mirror temperature under control. Several years back we installed a mirror cooling system, and our excellent summer student, Josh Pearson, is currently evaluating all of our thermal data. We know that when the primary mirror is warmer than dome air, we experience a 0.5" degradation per degree C difference. When the primary mirror is too cold, the situation is nowhere near as bad: we experience a degradation of about 0.15" per degree C difference. (This makes some physical sense, as we expect convection to set in with a warm surface!) It is apparent that we cannot keep the primary sufficiently cool with the amount of cooling we are currently providing; we are in the process of evaluating how to either fix the current system, or replace it.

This summer we are in the process of replacing the primary support system with an "active" system, in which the pressure of each of the air bags is individually controlled. Chuck Claver is leading this effort, with Scott Bulau providing the leadership in the engineering effort. Chuck's wavefront analysis suggests that such a system will improve the DIQ by 0.10" at zenith under typical seeing conditions. The system will come on-line during the 1998B semester as look-up tables for the various telescope configurations are constructed. All of us working on the 4-m DIQ issues were gratified by the strong support expressed by the KPNO subcommittee of the NOAO Users' Committee.

Phil Massey (for the DIQ Group)

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Ongoing Phoenix Work and Plans for Semester 1999A

During the summer of 1998 Phoenix is undergoing an upgrade of the mechanism controls. The motions of the slit and viewer wheels have been too slow to provide the quick slit centering capability that was envisaged for the instrument. This upgrade will make these two wheels, as well as the other mechanisms, turn faster. Furthermore, jams of the viewer wheel and incorrect computer read back of the mechanism positions will be corrected by this effort. To implement these changes, the grating drive mechanism had to be rebuilt. A desirable additional outcome of this work is that the precision for setting the grating angle has been increased as has the stability of the grating after a change in grating angle.

The 1998B semester was the last semester that Phoenix will be available as a Kitt Peak instrument for the next few years. As announced in the NOAO Newsletter No. 53, Phoenix is being redeployed to CTIO in 1999. Future use is also planned on Gemini South. There will be a period of roughly six months when Phoenix will not be available to the user community. This time will be devoted initially to understanding and improving the collimator image quality. The collimator currently has large astigmatism, which is both limiting the spectral resolution and reducing the sensitivity by spreading the image over an excessive number of pixels. Phoenix will also be tested under operating conditions for Gemini where the instrument can be operated in nearly any orientation (including upside down) from the normal Cassegrain position. The instrument will be shipped to CTIO and interfaced to the 4-m Blanco Telescope. At that point, it will again be available for user programs.

An aggressive campaign is already underway to correct the collimator imaging. This could result in changes to the details of the deployment plan during the next few months. Prospective Phoenix users who want an update on the availability in 1999 should check the Phoenix Web page (http://www.noao.edu/kpno/phoenix/) or send e-mail to the undersigned.

Ken Hinkle

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Better Coordinates in ICE

For historical reasons, the telescope coordinates have only been recorded to integer precision in both RA and DEC in our observing headers. The problem traces back to the olden days when FORTH ruled the mountain. Despite the upgrades to the telescope control systems at the 4-m and the 2.1-m during the past decade, information passed to the instrument computers (CCD, IR) have remained in integer precision. While 1" precision might have been acceptable to most in declination, 1s of time may be as much as 15", making it difficult to run astrometry code on the frames or mosaic frames together.

Recent upgrades at the 4-m and the 2.1-m now result in the RA being recorded to 0.01 time seconds, and the declination to 0.1". The accuracy of these values depends, of course, on how recently and where the telescope coordinates were reset ("zeroed"), but the relative precision within a region should be comparable to the recorded value. Note that retaining the equinox to 0.01 years is an appropriate match to this precision; i.e., knowledge of the equinox to 0.01 years is roughly equivalent to a 0.2" precision.

These upgrades should soon be available within the Wildfire environment used with IR instrumentation. However, the upgrading of the 0.9-m may have to wait until its replacement with the 2.4-m control system!

We are grateful to Buell Jannuzi for urging someone to take on this project, and to Bob Marshall and Rob Seaman for carrying out the actual upgrades.

Phil Massey, Dick Joyce

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Knowing the Angle at the 4-m

What limits the offsetting accuracy of the 4-m Mayall telescope? Tests during the past several years have shown that even guided offsets were sometimes off by 2-3" or more over 10' , and that guided offsets were often LESS accurate than unguided offsets. This has compromised spectroscopic observations of faint point sources, and it has long been apparent that the culprit was the limited precision and accuracy of the encoding of the rotator angle. Although nominally precise to 0.1 degrees, "reality checks" on the sky have shown that the actual accuracy of the encoder was 0.2-0.3 degrees. (It is easy to align the rotator to 90 degrees using the telescope and guider motion as a fiducial; the reproducibility of the zero-point has been no better than this.) This is wholly consistent with the offsetting problem.

Our engineers Scott Bulau, Tony Abraham, David Stultz, and Shelby Gott have long had a design for an upgrade to this sytem, but limited resources combined with only once-a-year access to the rotator have prevented its implementation until this summer, despite the on-going impact to science at the 4-m. We are glad to announce, though, that the upgrade has been built and bench-tested, and will be installed during the present summer shutdown. On-sky tests will

begin as we bring the telescope out of shutdown at the beginning of September. The design goal is an offset accuracy of 0.3" over 10', consistent with the demands of observing with the R-C Spectrograph or CryoCam. This requires an encoder accuracy of 0.03 degrees; the new system should exceed this by roughly an order of magnitude. We expect that our closed-loop offsetting will be limited only by the mechanical accuracy of the X-Y stage of the guide probe; our tests will reveal the actual offsetting accuracy of the new system.

Phil Massey, 4-m Telescope Scientist

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From the NSO Director's Office

Everyone is eagerly awaiting the outcome of the search for the new NSO Director and the recommendations of the "Parker Committee," both of which are important occurrences in the history of the observatory.

At its August 1998 meeting the AURA Board approved tenure for Christoph Keller and Thomas Rimmele. Warm congratulations go out to both of them for this well deserved promotion. Having Thomas and Christoph on our permanent scientific staff is a very important step towards achieving the renewal of NSO.

I regret to report the departures of Matt Penn and Jeff Kuhn from NSO. Matt will join the faculty of Cal State, Northridge as tenure-track professor, Jeff is moving to the University of Hawaii. We wish them the best of success in their future. The very positive aspect of their leaving is that they both are joining university programs in solar physics. Solar physics and NSO badly need strong programs in this discipline at universities. Jeff and Matt are without doubt going to do a great job at that.

Elsewhere in this Newsletter you will find the full NSO Users' Committee report. I have received some feedback on the report as it was published in Solar News. The section on the RISE/PSPT funding apparently came across quite negative to the people working on the PSPT front line. Let me assure all that this was not the intention of the report as I understood it. Haosheng Lin, Jeff Kuhn, Roy Coulter and others active in seeing the PSPTs through to reality deserve a lot of credit in producing first-rate instruments, within budget, under circumstances which were often very difficult. NSO appreciates the help it receives from the Rome Observatory and the High Altitude Observatory in operating the facilities in Italy and Hawaii.

Jacques Beckers

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NOAO Newsletter - National Solar Observatory - September 1998 - Number 55

Report of the NSO Users' Committee

Immediately following is the complete report of the meeting of the National Solar Observatory Users' Committee which was held in Tucson on 20-21 April this year. I am very grateful to the members of the committee, especially its chairman, for their efforts in helping me in maintaining liaisons with our user community this way.

Jacques Beckers

Introduction

The purpose of the Users' Committee of the National Solar Observatory is to advise the Director on issues concerning

operations at the two main sites, Sac Peak and Kitt Peak, from the perspective of current and potential outside users of those facilities. The committee met in Tucson on 20-21 April 1998. In attendance were committee members T. Ayres (Chair, Colorado), T. Brown (HAO), T. Duvall (NASA/GSFC, stationed at Stanford), P. Goode (NJIT), D. Jennings (NASA/GSFC), K.D. Leka (NOAA/SEC), and R. Shine (Lockheed-Martin). E. Hildner (NOAA/SEC) was not able to attend. B. Snavely (NSF) and R. Radick (AFRL; filling in for R.Sagalyn) also were present, speaking on behalf of NSF and USAF interests, respectively. H. Jones described NASA activities, primarily support of the daily magnetograms and 1083 nm images from the KPVT. During the meeting, presentations were made concerning the current status of the Observatory and its projects, and plans for the coming fiscal year.

Current Status and Future Plans

NSO continues to run the highly successful GONG program, and the team has hopes to upgrade the instruments with high-resolution CCD cameras and operate the network through the current sunspot cycle. The Observatory has begun development work for the recently approved SOLIS project: a cluster of long-term solar monitoring and spectral characterization instruments slated for operation through the first quarter of the 21st century. Work also is proceeding to develop an adaptive optics system for the Sac Peak VTT, building on the successful implementation of an "active optics" compensator over the past several years. The latter has been utilized to ferret out weak links in the current optics of the VTT, and has significantly improved the quality of the images by actively compensating for slowly varying telescope aberrations. A 20-actuator compensator is under development, scalable to the 80 element system needed for full image restoration on the 76cm aperture VTT. The successful demonstration of a true adaptive optics system is considered an essential step along the path toward a major new large-aperture (3-m class) ground-based solar facility. NSO/SP also is participating in the upgrade of the Air Force ISOON solar monitoring system, which will be deployed at four sites around the globe.

At Kitt Peak, the staff helps support a number of visitor instruments in addition to the normal complement of the facility. The Swiss ZIMPOL (imaging Stokes polarimeter) is one example. ZIMPOL I is in active use, exploring the so-called "second solar spectrum" (in polarized light), and a second generation instrument is under development. Another example is the GSFC 12 m imaging spectrometer used for studies of the magnetically-sensitive Mg I high-Rydberg transitions. In addition, the 1-m FTS supports a wide range of atomic physics investigations, partially supported by grants from NSF and NASA atmospheric chemistry groups. The McMath-Pierce nighttime program is entering its second year of self-funded operations. Digital Archive use continues to expand rapidly: the 300-disk capacity CD-ROM Jukebox currently contains primarily FTS and KPVT data sets; additional acquisitions are being evaluated.

A number of upgrades to the McMath-Pierce telescope and Main spectrograph are underway. One effort is modernization of the telescope control system, with emphasis on guiding and image stabilization. The entrance port from the telescope tunnel into the main observing room has been enlarged to allow access to the entire image when observing at one of the limbs. Two schemes have been advanced to track and stabilize the Main image. The simpler of the two would be permanently installed above the Main spectrograph and serve it exclusively; while the other---more general, but more complex---scheme would operate immediately after the heliostat so that it could serve any of the observing stations (e.g., the FTS). However, since only the Main spectrograph has image rotation compensation, the utility of high-stability guiding and tracking at the other ports is debatable.

A second effort involved modernizing the "photometry" system on the Main spectrograph. The grating mechanism now is under full computer control. A major beneficiary of the upgrade will be long-slit infrared imaging. Previously, camera flatfields based on combining spectrally smeared frames had to be done laboriously by hand (literally, "turning the crank"); now, such critical observations can be done in an automated (and more reproducible) fashion.

A third major effort at the McMath-Pierce concerns the cryogenic camera system used in the Near Infrared Magnetograph (NIM 1, a long-slit grating system; and NIM 2, currently under development, utilizing a Fabry-Perot etalon). (Note: the NIM camera system also supports long-slit unpolarized infrared spectral observations with the Main spectrograph.) A controller and dewar are slated for purchase, to run one of the high-sensitivity 1K 1K "Aladdin" InSb chips, developed at NOAO for nighttime astronomy. The implementation of new infrared spectral capabilities on the McMath-Pierce also is considered important groundwork for a future large-aperture solar facility.

Progress in the latter area---the so-called Advanced Solar Telescope---has mainly been confined to continued seeing tests at various sites using scintillometers, and further refinement of that technique. The ultimate goal of replacing the aging and outdated (although still highly productive) solar facilities at the two current NSO sites hinges on the results of the Parker Committee, whose report was not yet available at the time of the Users' Committee meeting, but is expected later in the summer (1998).

Another key issue was the selection of a new Director for NSO, to replace current Director Jacques Beckers when he steps down this fall. The search committee, chaired by Jack Thomas (Rochester), had not yet begun their deliberations at the time of the Users' Committee meeting.

Recommendations

The committee is encouraged by the vitality of NSO---in the face of its perennial funding difficulties---as evidenced by the high rating and selection of the SOLIS project, the stepped plan and visible progress of the AO work, and the modernization efforts at the McMath-Pierce which promise significantly improved observations at the worlds largest solar telescope. The committee strongly endorses NSO's efforts to develop the 20 Zernike AO system as an important adjunct to the AST work, seek a commitment from NOAO to acquire a 1K 1K Aladdin device, and pursue funding for the camera upgrade and long-term operation of the GONG network. The Committee again voiced its concerns over the futures of some of the younger staff members, on whose shoulders much of the key AO and AST development work disproportionately falls. We urge the Observatory to make allowances for the negative impact of such "service work" on the productivity of these staff members at this critical stage of their careers, when considering such staff for promotion and/or tenure. The Committee also is concerned over the impact of the several development projects on the ability of

the scientific staff---already thinly spread---not only to carry out the projects successfully, but also to support outside users of the facilities at the SP and KP sites. An example of the dilemma is the RISE/PSPT program, for which development and construction funds were provided, yet no operations money was secured for the Sac Peak component of the network. This presents a difficult choice for the Observatory: run the PSPT, and give up one of the other high-priority claims on the base budget; or relinquish NSO involvement in the operations of a key project that it helped initiate. We urge the Observatory to consider carefully the operations implications in any new projects in which it wishes to become involved; and to secure firm commitments for funding said operations before accepting the responsibility for such projects. In the case of RISE/PSPT, the committee firmly believes that it is the clear responsibility of the Atmospheric Sciences Division at NSF to support the operations and maintenance of the Sac Peak component of the network, and we encourage the NSO to pursue that avenue vigorously. The committee noted that one key area of support, namely online documentation for the available facility instruments (and visitor instruments, if applicable), could be improved significantly. Finally, the committee commends current Director Beckers for his successful leadership of the Observatory through the difficult period of the past several years. We sincerely hope that Beckers will continue to champion a state-of-the-art groundbased solar facility, and that his successor will embrace that vision as well.

Tom Ayres, Chair, NSO Users' Committee

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Another Successful Undergraduate (REU) and Graduate (SRA) Summer Program

The NSO summer student program has had another successful year. Participants included four Research Experience for Undergraduates (REU) students and two graduate students, or SRAs (Senior Research Assistants), at NSO/Sac Peak and three REUs and four SRAs at NSO/Tucson. Information about the students and the work they did is presented below. In addition to work performed at each of the NSO sites, the students exchanged visits between the sites and also visited the White Sands Missile Range in New Mexico and the Very Large Array (VLA) near Socorro, New Mexico.

Brad Benson (University of Wisconsin/Madison fall senior), worked with Thomas Rimmele to pinpoint the locations on the Sun at which the five-minute oscillations are excited. The project involves reductions of high spatial and high temporal resolution data obtained at the NSO/SP Vacuum Tower Telescope. The observations were made with a new tunable narrow-band filter that consisted of dual Fabry-Perot filters and a blocker. Brad is also evaluating the performance of this filter system.

Amy Smith (Davidson College, Davidson, North Carolina), worked with John Worden and examined the SoHO CDS images to determine the plage and network intensity contrasts of the EUV emissions for He I 58.4 nm, O IV 55.4 nm, O V 62.9 nm. These contrasts can then be used for modelling solar cycle irradiance variability changes.

Jacob Taylor (Harvard third year), worked with Mark Giampapa (NSO/NOAO) and Eric Craine (Western Research) investigating the use of CCD arrays for night-to-night differential photometry at the milli-magnitude level under a variety of conditions. The subtle issues of CCD calibration were examined in detail, as were the problems of atmospheric variability and the higher order extinction effects associated with it. He prepared IRAF scripts for on-the-fly reductions accurate to 5 milli-mags, utilizing aperture photometry combined with the calibrations and extinction corrections studied. This script might allow for an observationally intensive task such as detecting planetary transits using automated telescopes, as proposed by GNAT (the Global Network of Automated Telescopes). During his summer work, Jacob obtained and analyzed CCD data from the 2.1-m and 0.9-m telescopes on Kitt Peak, as well as data from a prototype, automated 0.5-m telescope currently operated by GNAT.

Patricia (Trish) Van Lew (University of Wyoming, Laramie sophomore), worked with Christoph Keller on various aspects of the design of SOLIS. She was responsible for the photon and energy budget of the Vector-Spectromagnetograph (VSM) and the associated web page, performed grating efficiency and polarization measurements for the VSM (described in a SOLIS Instrument Memo), recorded and analyzed data from the Integrated Sunlight Spectrometer (ISS) prototype, and developed initial flat-field procedures for the ISS.

Three REU students have worked with S.L. Keil and K.S. Balasubramaniam on a project to measure and understand the evolution of active regions in the solar atmosphere prior to solar flares, filament eruptions, and coronal mass ejections. The observations they worked with were obtained simultaneously using several different instruments. Each student worked on a different aspect of the study as described below. Their results will be combined to form a complete picture of pre-activity evolution.

Jeff Clark, (University of California, Santa Cruz fall senior), reduced and analyzed polarization data made at the NSO/SP Vacuum Tower Telescope. His goal is to derive maps of the photospheric magnetic field which show the time evolution of the field prior to a solar flare. He is also collecting coronal images from several space missions (SoHO, YOHKOH, and TRACE), to investigate the overlying coronal structure.

Adam Bayliss (University of Montana fall senior), concentrated on the large-scale surface velocities in flaring and erupting filament regions as observed in chromospheric Ha images. The data were obtained with the full-disk Ha patrol camera at NSO/SP at a 10-second cadence. The surface velocities in active regions are determined from local correlation tracking of sub-images within the active region. Adam also used the full-disk Ha images and images from space to study the relationship between the flaring region and the global structures present on the Sun.

Jeremy Jones (Lehigh University fall senior), worked with high-resolution data observed at the Vacuum Tower Telescope. Simultaneous images of the structure in the photosphere (G-Band) and in the chromosphere (Ha) were obtained every 5 seconds at high spatial resolution. Jeremy will determine if flow signatures observed simultaneously at two different heights in the active region atmosphere can provide a reason for, and an early warning of, the instability leading to the observed activity.

John Barentine (University of Arizona senior) was an NSO REU student last summer (1997) and participated this summer as a Senior Research Assistant, working with Karen Harvey on analyzing the NSO/KP full-disk magnetograms to separate out different structures based on specific properties of their magnetic field distribution. He is using a set of algorithms to accomplish this task, with the product being a series of masks that specify the locations of pixels in active regions, decaying active regions, enhanced network, the quiet sun network, sunspots, and the quiet atmosphere. The objective of this project is to understand the relation between magnetic flux and spectral intensities observed in CaII K images, for example, and to determine the contributions of different magnetic structures to solar irradiance and irradiance variability. John's project, a part of this larger set of goals, is to examine various active region properties, such as the relation of magnetic flux to area, the fraction of magnetic flux in sunspots, and what happens to the magnetic flux in sunspots when they disappear.

Michele Bianda (ETH Zurich, Switzerland graduate student), worked with Don Neidig and Craig Gullixson to evaluate the performance of large-aperture (150 mm) Fabry-Perot etalons. These etalons will be part of the instrument being built by the NSO for the Air Force to replace the current instruments at the Air Force's Solar Optical Observing Network (SOON) sites. SOON consists of five sites at various locations around the Earth. Michele was also involved in the engineering of the telescopes and camera systems. In addition, Michele is working with Balasubramaniam on chromospheric structure seen in the Ca II k-line.

Scott Dahm (San Diego State University graduate student who will continue his doctoral studies at the University of Hawaii), has been working with Harrison Jones on the analysis of He I 1083 nm imaging spectroscopy. The project involves data obtained with the NSO/NASA spectromagnetograph at the Kitt Peak Vacuum Telescope and is directed towards the study of spectral asymmetry in coronal holes. The line shows an excess of blue-wing absorption in many coronal holes as compared with quiet-sun spectra, consistent with outflows which could be associated with high-speed solar wind.

Alina Donea (Astronomical Institute of the Romanian Academy graduate student), worked in local helioseismology with Drs. Charles Lindsey and Doug Braun (SPRC). She studied the temporal character of helioseismic noise created by the quiet Sun and anomalous noise emitters surrounding emerging active regions. She obtained the first helioseismic image of a solar flare whose seismic signature was discovered in the SoHO MDI observations by A.G. Kosovichev (Stanford) and V.V. Zharkova (Glasgow)

Elena Moise (MSc, Bucarest University, and works in the solar group of the Romanian Academic of Sciences), has helped Bill Livingston develop a "generic" line bisector for plage vs the quiet Sun on the solar disk. Observations were made on the FTS of 16 plage and nearby quiet regions using the 80cm image of the McMath-Pierce, 1 meter out of focus. Line bisectors are a diagnostic of granular convection, and the aim is to see how, on average, the granulation in active areas compares with non-active granulation. It is clear that in a plage convection is inhibited, but it is not certain that this localized effect is the one that dominates the Sun as a star. We hope to present our results at the Sac Peak Summer Workshop.

NSO 1998 Summer REU and SRA Advisors

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New "Bumping" Rules in Effect for NSO/Sac Peak

After agonizing over the difficulties that are encountered when "bumping" observing programs are run at the National Solar Observatory at Sacramento Peak (see http://www.sunspot.noao.edu/INFO/INTRODUCTION/submission_proposals.html), the Telescope Allocation Committee has decided to make substantial changes in the rules for bumping. Discussion centered on (1) the considerable time and effort now required to set up most observing programs, which typically require complex instrumental configurations, multiple cameras, and a process of alignment and testing that takes one or more days, and (2) the hope that space-coordinated bumping programs can be run as regular programs if the PI plans ahead with sufficient lead time.

These new rules, which follow, are effective immediately. If you have any questions about them, please contact Raymond N. Smartt (TAC Chair, NSO/SP), smartt@sunspot.noao.edu, Phone (505)434-7033.

NSO/SP Rules for "Bumping" Observing Programs

- Bumping will only be considered by TAC as a possibility, following a request, if it can be carried out with the current observing program instrumental setup, or with only minor modifications.
- A minimum 48-hour notice to request to bump is required.
- Externally-initiated programs, for which a PI travels to NSO/SP, cannot be bumped.
- A PI cannot bump on a specific program more than once each quarter.
- Balloon/rocket/shuttle type observations that are not pre-scheduled will be handled on a best-judgement basis at that time by available members of the TAC (many times this could be satisfied by Hilltop observations and additional ESF synoptic observations).

Dick Altrock

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A Drier McMath-Pierce Telescope

Things are drier in the McMath-Pierce telescope these days. Thanks to John Dunlop and the mountain maintenance crew, we are experiencing much less seepage into the building during heavy rain storms. The ground underneath the telescope has been sculpted so that water now drains down and away from the telescope, rather than puddling and seeping into the concrete. During the heavy rains at the beginning of July, there was no seepage in the machine shop, west hallways, or FTS stairway, and much reduced seepage in the hall near the restroom. Thanks!

Teresa Bippert-Plymate

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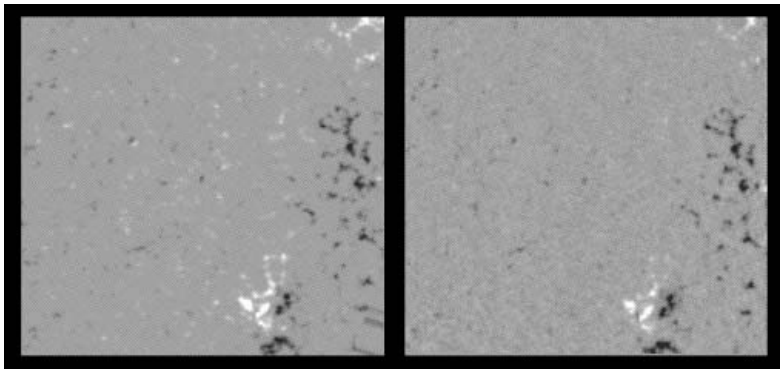
NOAO Newsletter - Global Oscillation Network Group - September 1998 - Number 55

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 and provide the data and software tools to the community, and to coordinate analysis of the rich data set that is resulting. GONG data are available to any qualified investigator whose

proposal has been accepted; however, active membership in a GONG Scientific Team encourages early access to the data and the collaborative scientific analysis that the Teams are undertaking. Information on the status of the Project and the scientific investigations, as well as access to the data, is available on our WWW server whose URL is www.gong.noao.edu.

The GONG 1998 Meeting, and the 6th SOHO Workshop, hosted by the CFA and organized by Sylvain Korzennik, were held jointly in Boston, 1-4 June. The workshop focused on the results from the continued GONG operations and the helioseismic experiments aboard SOHO (GOLF, MDI/SOI, and VIRGO). Results from other ground-based multi-site projects, TON, MWO-CRAO, BISON, and IRIS, were also included. All of the helioseismic projects have produced a wealth of data of unprecedented quality from which new insights on the structure and dynamics of the solar interior are being inferred. The Meeting provided the perfect venue for assessing the needs and expectations of future activities.



Caption: *The first magnetogram from the GONG+ camera and polarization modulator [right] and a roughly co-temporal magnetogram from the KPVT [left]. We hope to be able to provide continuous magnetograms when the existing, low-resolution, network camera systems have been replaced.Our plans are for them to be summed for 5 minutes to increase sensitivity and reduce data volume.*

Representatives from five of the sites attended, providing a rare opportunity for us all to discuss site issues together. The DMAC Users Committee and the Project's Scientific Advisory Committee also met and had extremely productive discussions. The "proof of concept" high-resolution breadboard instrument dominated the discussions, which resulted in several ideas for helping to move the effort forward.

Operations

The GONG network of telescopes continues to achieve a high level of operational success. Most of the network down-time is due to the scheduled preventative maintenance visits which, in the second quarter of 1998, occurred during eight days of May at Udaipur, and the final seven days of June at El Teide.

The Learmonth station suffered a loss of power due to a failure of the Uninterruptible Power Supply (UPS). The unit was bypassed, and the system was brought up using the unconditioned line power. Although operating again, the station was vulnerable to any power outages at the site. As fortune would have it, the site power was lost when an electrical line was accidentally cut during construction. The total downtime incurred was about 8.5 hours.

The Big Bear Station was down for about an hour due to weather related causes. The morning after a day of rain and a cold night in May, some ice formed on the turret, causing a circuit breaker to trip when the turret tried to unstow. Resetting the breaker got things operating again. Some early morning images are still being lost on occasions when condensation forms on the turret mirrors after a cold night.

Then there are the ongoing difficulties with Exabyte tape drives. Only one site did not experience tape drive failures during the time period in question. The total downtime, as measured by the number of images lost while the equipment was inoperative or being replaced or repaired, was about 77 hours. (These hours could include periods of poor weather and nighttime when other stations could be acquiring good images. This number is a worst case value indicating downtime caused by equipment failure only.) The efforts of the on-site personnel who contributed considerable time to remedying these problems deserve heartfelt recognition.

Data Management and Analysis

During the past quarter, month-long (36-day) velocity, time series, and power spectra were produced for GONG months 25, 26, 27, and 28 (ending 980207) with fill factors of 0.85, 0.75, 0.83, and 0.82.

The p-mode reprocessing campaign (data that have been reprocessed or initially processed with the improved p-mode pipeline) added GONG months 8 and 9, boosting the available data set to months 8-28 (960114-980207). The project is also producing time series and power spectra from the intensity images. These products were generated for GONG month 20.

Data Algorithm Developments

A set of mode parameters has been estimated from the average of six 108-day long time series. These parameters are now being used to create a new first guess table for producing GONG frequencies.

A test of an image merging algorithm is underway. Cliff Toner is producing a time series of four days of merged images, using a weighted average of restored, remapped images. The dates of these images have been chosen to be during the first SOI dynamics run in 1996. Irene Gonzalez will then perform a coarse ring diagram analysis and compare with her

previous results from the SOI/MDI data.

The multi-taper method is moving towards installation in the GONG production pipeline. Final tests are underway to finalize the number of tapers, and to verify the method with a random-restart test.

The leakage matrix code has been run for all degrees up to 100, with 25 leaks on either side, and for months 21-23. The code is now being upgraded to include MTFs and horizontal components, and to improve the speed of the calculation.

New Camera Development

Development is proceeding on the installation of a higher-resolution (1024 1024), square-pixel camera and data acquisition system at the Tucson observing station. A fully developed prototype is expected to be in operation by mid-fall.

A Silicon Mountain Designs 1M60_20 camera has been obtained and subjected to a number of tests to verify its suitability. Although limited by our present video data acquisition electronics, the camera has been successfully used to acquire helioseismic time series, and we are very pleased with the results.

A request-for-bid has been issued for the high-speed data acquisition electronics, and a vendor will be selected by the end of the summer.

Visitors

This summer we have had the pleasure of extended visits from Rafael Garcia, Irene Gonzalez, and J. Javaraiah.

Rafael Garcia (DAPNIA/Service d'Astrophysique, CEA/Saclay, France) is working with Stuart Jefferies continuing their effort on the High-frequency Interference Peaks (HIPs) which they detected for the first time for low-degree solar modes. They are pursuing two different strategies for their work: 1) the analysis of new techniques to increase the signal-to-noise ratio of the detected peaks, and 2) continue the study of the HIPs from a theoretical point of view.

Irene Gonzalez Hernandez (Instituto de Astrofisica de Canarias, Tenerife, Spain) is testing the new image merging method, currently being developed by Cliff Toner, using "ring diagram analysis". Currently, the spherical harmonic coefficients are merged. However, for high-resolution applications of local helioseismology, it is necessary to use the images themselves. She will compare the results of applying this method to a set of GONG data with the results obtained in previous work using MDI data.

J. Javaraiah (Indian Institute of Astrophysics, Bangalore, India) is working with Rudi Komm to determine solar surface meridional motion from small magnetic features observed on high-resolution SOI/MDI magnetograms. Latitudinal motions of small magnetic features will be determined by two-dimensional cross-correlation analysis of consecutive (96 minute interval) observations from which active regions are excluded. They have determined the short-term periodicities in solar differential rotation on time scales shorter than the 11-year solar cycle through power spectrum analysis of the differential rotation parameters derived from Mt. Wilson velocity data (1969-1994) and Greenwich sunspot group data (1879-1976). They found considerable differences in the periodicities in solar differential rotation determined from the velocity data and the spot group data. They are currently revising a paper on these results which will be published in *Solar Physics*.

John Leibacher

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NOAO Newsletter - US Gemini Program - September 1998 - Number 55

The Gemini Instrument Program Marches Forward

The Gemini Near-IR Imager (NIRI) is progressing through the fabrication phase. Nearly all of the optical elements are complete, the vacuum vessel is ready for its first vacuum test, and most mechanisms are machined. Klaus Hodapp, the instrument PI (Institute for Astronomy, University of Hawaii), plans to begin installing mechanisms into the dewar this fall, with a goal of performing final alignment around the end of 1998. NIRI will be the commissioning instrument for the Gemini North telescope, which is currently on schedule for first light in late 1998.

The NOAO team that is building the Gemini Near-IR Spectrograph (GNIRS) is producing final fabrication drawings and proceeding with fabrication, beginning with filter wheel assemblies and the cross dispersion turret. All optics are on order, except for the gratings. A test dewar is nearing completion, and will be used to test the larger mechanisms. A few design items not covered at the CDR were closed out at an interim review in April. The Gemini project has

contracted with Durham University (UK) to add an Integral Field Unit (image slicer) to GNIRS, which will be delivered in early 1999. Jay Elias (PI) and Dan Vukobratovich (Project Engineer) plan to ship GNIRS to Hilo in mid-2000.

The USGP awarded the University of Florida a contract to build the mid-IR imager, now know as the Thermal Region Camera System (T-RECS). Charles Telesco (PI), and his team are on schedule for a mid-September Preliminary Design Review. This 8-26 m imager has a single plate scale of 0.09 "/mm and will be delivered to Cerro Pachon in early 2001.

Gemini commissioned NOAO to manage a foundry run of 1024 1024 InSb ALADDIN devices to obtain detectors for NIRI and GNIRS. Two very good science grade arrays have been produced so far, so the program was placed on hold temporarily to increase the odds of obtaining even better devices in the future. NOAO conducted the acceptance test of the NIRI IR controller in July. Gemini personnel used the controller in Tucson to familiarize themselves with its operation, then the NIRI controller was shipped to Hawaii in August. Another controller for the Gemini laboratory in Hilo will be delivered soon, and the GNIRS controller will be delivered later this year.

The CCD vendor, EEV in the UK, scheduled delivery of the Gemini science CCDs throughout this fall. NOAO has received a GMOS dewar and an SDSU-2 controller to permit software development and integration with an engineering device to proceed.

Mark Trueblood

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NOAO Newsletter - US Gemini Program - September 1998 - Number 55

Upcoming Gemini Instruments - The Process

The Gemini instruments that are currently under construction are all part of the initial complement of instruments---they were assigned to the partner countries on the basis of interest, expertise, and equity among the partners. The process by which future Gemini instruments will be procured is different; several of the decisions take place in the Gemini Instrument Forum. The Gemini Instrument Forum is a committee that meets twice a year to address instrumentation issues. Its membership includes two representatives from each partner country; the two US members are Todd Boroson and Richard Green. The Instrument Forum is chaired by Fred Gillett (Gemini Project Scientist).

The long term Gemini instrument plan is put together with scientific input from the communities of the partner countries, through national and international workshops and through the activities of the Gemini Science Committee. Using cost estimates generated by the national Gemini offices, the Instrument Forum develops a plan that combines the scientific goals with the realities of the funding opportunities. As the time comes for each instrument to be started, Gemini issues an Announcement of Opportunity for a conceptual design study to the national Gemini offices. The offices (through a different process in each country) develop a proposal to bring to the Forum. Because each country advocates its own proposal, it is necessary that the USGP undertake a pre-selection process to identify the group or groups that will write the US proposal. We have chosen to do this by holding open, informal meetings where potential proposers discuss their approaches with an unbiased expert committee. This committee makes a recommendation to the USGP, and we work with the selected group or groups to produce the US proposal. We believe that the opportunity to discuss all the approaches, their strengths and their weaknesses will allow the chosen group to write a stronger proposal.

This process is repeated after the conceptual design stage, with a new opportunity to propose to produce a complete design and build the instrument. Again, the national Gemini offices will bring proposals to the Instrument Forum, and we envision a similar open, informal meeting in front of an unbaised expert committee to pre-select a proposer. Obviously a group that has done a conceptual design study, and had feedback on that study will have an advantage. For that reason, we urge any group that is not funded in the conceptual design stage to consider doing an unfunded design study to improve their chances in the next stage.

The USGP will continue to make these opportunities known to all US groups that are interested. We maintain a list (currently about 350 individuals) that we use for circulating this information. If you are not on this list, but wish to have your name added, please contact us.

Todd Boroson

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NOAO Newsletter - Central Computer Services - September 1998 - Number 55

ADASS '98

Plans are well 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 being hosted by the National Center for Supercomputing Applications and the University of Illinois Astronomy Department. Sponsors for the Conference include the National Center for Supercomputing Applications (NCSA), the University of Illinois Astronomy Department (UIUC), the Smithsonian Astrophysical Observatory (SAO), the National Radio Astronomy Observatory (NRAO), the National Optical Astronomy Observatory (NOAO), the European Southern Observatory (ESO), the Space Telescope Science Institute (STScI) and Sun Microsystems. The ADASS Conference provides a forum for scientists and programmers concerned with algorithms, software and software systems employed in the processing of astronomical data.

The ADASS '98 Program Organizing Committee consists of the following members: Rudi Albrecht (ST-ECF/ESO), Dick Crutcher (Illinois), Brian Glendenning (NRAO), F. Rick 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 Wallace (Rutherford Appleton Laboratory). The Local Organizing Committee members include Dick Crutcher (Chair), Melanie Loots, Ray Plante, Harold Ravlin, and Doug Roberts.

The Conference program includes invited talks focused on timely topics chosen for ADASS '98, These special topics for this year's meeting are Advanced Visualization Technologies, Next Generation User Support Tools, Future Trends in Astronomical Computing, Synthesized Supercomputers and Large Scale Computing, Systematization and Use of Astrophysical Atomic Data, Automated SN Detection to Measure the Cosmological Constant Algorithms, Astrostatistics, and Educational and Public Information Activities. The current list of invited speakers includes:

Paul Woodward (U. MN), *Advanced Visualization Technologies*

Richard Puetter (UCSD), *Algorithms: "Pixons"*

Ken Mighell (NOAO), *Algorithms: Stellar Photometry*

Tom Loredo (Cornell), *Astrostatistics*

Anuradha Koratkar (STScI) and Sandy Grosvenor (GSFC), *Next Generation User Support Tools*

Andrew Chien (UCSD), *Synthesized Super-computers and Large Scale Computing*

Nancy Brickhouse (SAO), *Systematization and Use of Astrophysical Atomic Data*

Larry Smarr (UIUC), *The Future of Astronomical Computing*

Peter Garnavich (SAO), *Cosmological Constant via Automated SN Detection*

Roberta Johnson (U. MI), *Education/Outreach: "Windows on the Universe"*

Contributed oral talks, poster papers, and computer demos are all an important part of any ADASS Conference. Participants should note that the deadline for submitting abstracts for these activities is 23 August 1998. Several Birds-of-a-Feather (BOFs) sessions are also plannedthese short, one-hour or so long, sessions are organized by ADASS participants. If you are interested in organizing a BOF please send email 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.

The Local Organizing Committee has arranged for several tutorials on Sunday, 1 November, prior to the ADASS meeting. There will be a four-hour workshop entitled "An Introduction to Parallel Computing" as well as two 2-hour workshops on "Creating Collaborative Applications with Java and NCSA Habanero" and "3D Visualization with the Java 3D API." See the Web site below for details and registration information. NCSA will also offer tours of their facilities on Sunday afternoon and Wednesday afternoon following the Conference. A reception is planned Sunday evening with a Conference banquet scheduled for Tuesday evening on the 20th floor of the University Inn (great views and great food!).

Details pertaining to registration (early registration deadline is 23 August 1998), hotel reservations (deadline is 1 October 1998), 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, Program Organizing Committee Chair
Dick Crutcher, Local Organizing Committee Chair

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NOAO Newsletter - Central Computer Services - September 1998 - Number 55

IRAF Users Meeting at the San Diego AAS

The NOAO IRAF group held an open user meeting at the San Diego AAS meeting in June 1998. Representatives of the STScI STSDAS and the AXAF software groups also were present to meet with users and answer their questions. The motivation for the meeting was to solicit user input and feedback on future directions for IRAF, since a large multi-year effort to develop a major new version of IRAF is just getting started.

An overview of the current status and the future directions ("Open IRAF") for the IRAF system were described by George Jacoby. Andrea Prestwich, chair of the IRAF User's Committee (IUC), presented a summary of the IUC meeting held at NOAO in May 1998.

The discussion with those present centered on the following questions:

Do scientists find sufficient value in error arrays to justify the computer time and storage space needed to carry them along with the science data arrays? [there was no consensus---some use error arrays, but others don't]

Are GUI interfaces for existing IRAF tasks more valuable than developing new software? [again, there was no clear consensus, but many felt strongly that GUIs were not a critical item while others felt strongly that they were]

What new science software do people wish they had? [some responses included an IDL-like toolbox, better Fourier transform support, true-color image support]

If you have questions or comments on the short- and long-term directions for IRAF, feel free to contact George Jacoby, Project Scientist for NOAO IRAF (gjacoby@noao.edu), or Andrea Prestwich, chair of the IUC (prestwich@cfa.harvard.edu).

George Jacoby, IRAF Project Scientist

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Display and Ximtool

A new version of Ximtool was released last fall, but many IRAF users have not upgraded yet. There are numerous improvements in the latest versions (V1.1), especially the experimental version, that are described in the Ximtool documentation, such as print, including a save to EPS or GIF file, a magnifier viewport, and on-line help. I encourage users to FTP the latest version (from *iraf.noao.edu* in the /iraf/x11iraf directory). Here I answer a few questions about using Ximtool to view large images, now that 2048 4096 CCDs are becoming common, and a few 8192 8192 Mosaic systems are on-line.

There are many ways to display an image of a particular size within IRAF. If the image is very small, it can be magnified without gaining or losing information---this is an easy case. A more complex situation arises, though, when loading a large image. You can either see the whole image while sacrificing details, or you can view a small piece of the image at full resolution. This article briefly explores some of the ways to view large imagesthose that have dimensions larger than the screen.

Consider the simple case of a square 2048 2048 image being viewed on a 1024 1024 screen. The number of screen pixels allows one to examine only one-quarter of the image at full resolution at one time. Within IRAF, one can display the entire image in several ways. Some of these have advantages over others.

Let's initially adopt this set of parameters:

set stdimage = imt2048, display.fill = no, display.xmag = 1,
display.ymag = 1

With this configuration, the display task will load the entire image into the frame buffer, one pixel per buffer pixel, requiring at least 8 Mbytes of RAM (since Ximtool, by default, starts up with two frame buffers). The only drawback is the memory requirement. Within Ximtool, you can pan and zoom to see the entire image or a piece of it. If you use Ximtool with the experimental magnifier box, you can see the entire image in the main window at reduced resolution and see individual pixels in the magnifier box at full resolution.

If you cannot afford to use the 8 Mbytes of memory, then you might be tempted to use a smaller frame buffer of imt1024. With display.fill = no, you will find that only the central 1024 1024 pixels of the image are displayed, but at full resolution. If you wish to see the entire image, you can set display.fill = yes, but then you lose the ability to see individual pixels. The display task attempts to squeeze the entire 2048 2048 image into the smaller frame buffer by interpolating the pixels to lower resolution.

When you don't need multiple frame buffers the memory requirements of Ximtool can be minimized using the "nframes 1" command-line option to start up with a single frame buffer. This allows you to double the number of pixels in the frame buffer used since two frames are normally created even if the second is never used. Using the "-memModel small" option will minimize Ximtool memory requirements even further.

Even with a full 2048 2048 frame buffer, there are secondary concerns: if the Ximtool window is smaller than the frame buffer size (say, 800 800 to allow you to have an Xgterm window visible), and you zoom out to show the entire image, resampling of the image must take place. In the Control Panel there is a button called "Antialias." If engaged, the resampling uses all the pixels to reinterpolate the image onto the Ximtool grid. Otherwise, subsampling is used, which is faster, but more likely to misrepresent the data.

Now consider the case of a very large image, say 8192 8192 from the NOAO CCD Mosaic. We could set stdimage to imt8192 to maintain as high a resolution as possible, but this uses 64 Mbytes (per frame) of RAM. If you wish to blink among the 4 available frame buffers in Ximtool, 256 Mbytes of RAM are needed. Also, this configuration takes a very long time to load the image since every pixel must be pushed into the frame buffer. We usually adopt the compromise case and set stdimage to imt4096.

There are a variety of other parameters that can affect the display/Ximtool interactions. My preference is to use the parameters listed above, but not all of my fellow scientists at NOAO find these optimal for their work. If you have questions on how to display your images to take full advantage of the IRAF tools, feel free to contact us at iraf@noao.edu.

George Jacoby, IRAF Project Scientist

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IRAF Update

With the latest releases in mid-March of IRAF V2.11.1 for SGI systems running IRIX 6 and for IBM systems running AIX 4, platform support for V2.11 is available now for the most popular IRAF systems. These include SunOS and Solaris, Dec Alpha systems running Digital Unix V4.0, Hewlett-Packard systems running HP-UX 10.20, SGI IRIX, IBM AIX, and PC-IRAF for Slackware Linux V3.3, Red Hat Linux V5.0, and FreeBSD V2.2.5.

The V2.11 upgrade for VMS running on the VAX and the DEC Alpha is in early testing now (with help from the Space Telescope Science Institute), and a general release is planned sometime in the fall. Interest in an IRAF port to Macintosh systems continues to be strong. We are concerned about future support for MkLinux by Apple since it has taken so long to finish the DR3 release (Developer's Release 3). Depending on the timing, we may be taking a look at Rhapsody as well as a possible alternative base for the IRAF port. Rhapsody, a new operating system for the Macintosh under development by Apple (originally by NEXT) is due for release this fall. Rhapsody is a server OS for the Mac based on a Mach kernel and BSD Unix. It would provide the ability to run Macintosh applications but probably would not provide a full Unix environment and suite of Unix applications as Linux does. The next release of PC-IRAF will also include the Solaris x86 port. This will complete the initially planned round of platform ports for the PC-IRAF project.

The IRAF group helped commission and test the new NOAO Mosaic CCD Camera with thinned, science-grade CCDs in June. This involved minor bug fixes and extensions of the software to deal with the CCDs being read out from the

opposite amplifier than was the case with the first Mosaic; i.e., data from each CCD was flipped relative to the earlier system. The data feed (Picfeed), data capture agent, keyword translation module, the real-time display, MSCRED data reduction software, system setup at the telescope, and Save-the-Bits were affected.

During the commissioning some enhancements to the Data Capture Agent control panels (the DCA GUI) were added and tested. These primarily involved more control over the real-time display. The display program is also being modified to apply "on-the-fly" calibration (flat fielding) since the new detectors exhibit significant flat field patterns that limit the evaluation of data as it is taken if the flat field variations are not removed.

The IRAF group, working with Tod Lauer, have been involved in the preliminary design of the planned Mosaic Archive Pipeline. This "off-line" pipeline will use the Mosaic data reduction tools to reduce all Mosaic data taken with the new camera. The reduced data will be archived for community access after a proprietary period.

Several new Web pages are now available from the IRAF homepage to help users get more out of IRAF: A "Tips & Tricks" page (http://iraf.noao.edu/tips) was added to provide a place where shortcuts, clever script tricks, and just plain good ideas about how to do something could be shared. Users should feel free to submit their own tips; the pages will be updated as new tips are collected. For those who think they already know all the tricks, an "IRAF Quiz" page (http://iraf.noao.edu/quiz) is available for you to test your prowness. The answer key should prove interesting even for those who decide not to submit answers.

Lindsey Davis was invited to present a paper on *"Stellar Photometry in IRAF"* at the Global Network of Astronomical Telescopes (GNAT) workshop on "CCD Precision Photometry" in early June in San Diego prior to the AAS meeting. Lindsey also participated in their hands-on session giving IRAF photometry demos to an enthusiastic group of participants. Lindsey's paper will be published in the workshop Proceedings.

Members of the IRAF group will be attending the ADASS '98 Conference in early November (see the accompanying article in this section). Several papers will be presented on the latest IRAF projects. The IRAF group will be available to answer questions about IRAF installations, reductions and programming tools.

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 USENET-based adass.iraf newsgroups (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

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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";
   update to Helen Sawyer Hogg's "Third Catalogue of Variable Stars in
   Globular Clusters"; "Hipparcos Input Catalogue"; "Lick
   Northern Proper Motion Program: NPM1"; "CoudÃ© 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,
4-m PF platelogs, reference documents, and sqiid data reduction scripts.

kpvt (argo.tuc.noao.edu)---KP VTT solar data products---magnetic 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

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