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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

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Comments concerning this Newsletter are welcome and will be forwarded to the appropriate editors.
Newsletter Posted: 29 May 1998

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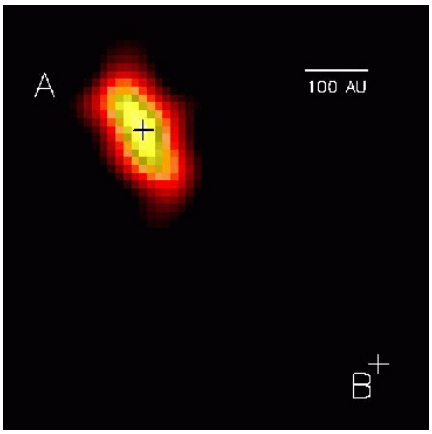
Possible Planet-Forming Disk Discovered at CTIO

A team of astronomers, using the University of Florida mid-IR camera/spectrometer OSCIR on the CTIO 4m Blanco telescope, has discovered a disk around a nearby star that may be forming -- or may have already formed -- planets. The discovery was made by a team comprised of Ray Jayawardhana, Lee Hartmann, Giovanni Fazio (Harvard-Smithsonian Center for Astrophysics) Scott Fisher, Charles Telesco, and Robert Pina (Florida). The dust disk was also discovered independently and simultaneously by a second group using the Keck II 10-m telescope.

The newly-discovered disk surrounds HR4796A in Centaurus. The disk is roughly 250 AU across and is seen nearly edge-on in 20 m images. It is much younger than the Beta Pictoris disk -- 10 million vs 200 million years old -- and is the right age for planet formation. The binary companion HR4796B is 500 AU from the primary. The composite nature of this system suggests that the presence of a companion star does not necessarily disrupt a disk before it has had enough time to form planets.



Caption: *An image of the disk around the star HR 4796A. Star A and its companion B are indicated by crosses. The disk is seen at the wavelength of 19.2 m. The emission arises from small dust particles heated by star A's visible and ultraviolet light. The elongated shape of the emission indicates that the disk is seen nearly edge-on. In addition, the disk appears to lie in the orbital plane of the binary system. A false-color image is available at: http://www.astro.ufl.edu/news/.*

From previous work by Michael Jura at UCLA and colleagues, it was known that the primary star was surrounded by a dust cloud with a central hole. The OSCIR images show that the cloud is indeed a disk. The hole may be due to gravitational clearing by inner planets. The disk truncation at 125 AU radius may represent a similar effect due to the companion. A definitive test of this possibility requires an improved determination of the binary orbit.

The disk is fainter at 10 m than at 20 m, but is undetectable at 2 m the longest working wavelength of many near-IR cameras. OSCIR's 128 128 Si:As Rockwell array represents a major advance in mid-IR detector technology which, together with the superb imaging qualities of the Blanco telescope, made this discovery possible. OSCIR was built by Telesco and colleagues at the University of Florida. It is available as a facility instrument at CTIO through a collaborative agreement, with technical support provided by the Florida group. "This discovery is a particularly exciting example of the science enabled by the NSF through the National Astronomy Centers," says Hugh Van Horn, Director of NSF's Division of Astronomical Sciences. "In this case, the cooperation between the University of Florida and CTIO is making this innovative instrument available to all U.S. astronomers." The research of both discovery teams was supported in large part by the NASA Origins Program, with additional support to the CfA/Florida team from NSF, NOAO, and the Smithsonian Institution.

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The SOAR Telescope Receives Its Cornerstone

On 17 April, under gloriously clear skies, which we trust are a harbinger of the great observing conditions to come, the cornerstone of the new SOAR 4-m telescope was laid on Cerro Pachn. The ceremony was attended by some 80 people including Chilean astronomers, local dignitaries, members of the press, and representatives from SOAR's four member institutions: Brazil, NOAO, Michigan State University, and the University of North Carolina. President Clinton, in his speech to the Chilean National Congress, also on 17 April, noted that "*On this very day.....work [starts] on a powerful new telescope in northern Chile. Their astronomers will look up to the heavens, gazing deep into outer space and, therefore, deep into the past.....*"

17 April was the not-the-groundbreaking ceremony, because the ground had already been fully broken to prepare the platform for the telescope (Figure 1). This area encompasses approximately 35m by 150m at the extreme NE end of the Cerro Pachn ridge, on a site about 400m from the Gemini-South 8-m telescope and facing into the prevailing winds so as to ensure the best possible seeing. Preliminary measurements made on the prepared site show very smooth airflow characteristics down to heights of 3-7m above the ground. This site will be occupied by the 4-m telescope in a dome approximately 16m in diameter (roughly the size of the CTIO 1.5-m's dome), and by a support building extending downwind from the dome.

Figure 1. *The SOAR site, looking northwards (into the prevailing wind) from below the Gemini-South enclosure. The terrain drops off for thousands of feet on the NE through W sides of the site, and for several hundred feet on the E side. Site leveling had been completed at this time and the dump truck was laying down a thin cap of dirt.*

The "cornerstone," a large piece of pink Cerro Pachn stone, was symbolically lowered into a seat which had been cut into the site platform. Figure 2 shows the cornerstone ready for action, with the SOAR Interim Board of Directors looking on. Acting Board Chair Sidney Wolff had the pleasure of figuring out how to actually operate the hydraulic lowering-mechanism. After a few brief speeches and glasses of champagne, we all moved over to the dining hall on Cerro Tololo for a festive meal complete with further remarks from distinguished personages. The prize for the shortest speech was set by Gene Capriotti (MSU), who had a plane to catch. Figure 3 shows the two leaders in the actual design and construction of the telescope: Project Manager Tom Sebring and Project Scientist

Gerald Cecil.

Figure 2. *The SOAR cornerstone waiting to be lowered into place, and the SOAR Board of Directors waiting to do so. Board members are (left to right): Sidney Wolff (NOAO and Acting Chair); Joao Steiner (Brazil); Gene Capriotti (Michigan State, standing in for Paul Hunt); and Bruce Carney (North Carolina).*

Figure 3. *SOAR Project Manager Tom Sebring (left) and Project Scientist Gerald Cecil (right), in a routine discussion of engineering-science tradeoffs. The rock survived the experience.*

The project is now moving forward at a fast and accelerating pace. Under contracts with SOAR, several experienced companies are producing conceptual designs for the mount, the active optics system (including providing and figuring the primary, secondary and tertiary mirrors), and the building. The differing approaches suggested by these studies will be reviewed at a conceptual design review to be held in early June, at which point specifications will be drawn up for bids for final design and construction contracts for these major subsystems. It is expected that these final contracts will be let by the start of 1999, and that the telescope will arrive in Chile and be assembled during 2001. The shares of observing time with the completed telescope will then be approximately: NOAO 30%; Brazil 30%; MSU 15%; UNC 15%; Chile 10%.

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Volume Phase Holographic Gratings

More Than Scratching the Surface

A relatively new grating technology shows exciting potential for improving the performance of the next generation of optical and near-IR astronomical spectrographs. Volume-phase holographic gratings can achieve higher diffractive efficiencies in many applications than currently available surface gratings. They may also lead to new spectrograph concepts that are currently impossible with surface gratings. NOAO has received an NSF grant to evaluate this grating technology for astronomy. Sam Barden will be collaborating on this study with Bill Colburn and Jim Arns of Kaiser Optical Systems, Inc. (KOSI) in Ann Arbor, Michigan. Eight gratings spanning a wide range of design parameters will be fabricated over the next year for evaluation. After the conclusion of the study, at least half of the gratings will be made available to the US astronomical community through the NSF.

What is a Volume-Phase Holographic Grating?

Rather than having surface structure as in classical gratings, Volume-Phase (VP) gratings diffract light by refractive index modulations within a thin layer of material sandwiched between two glass substrates. The intensity of the refractive index modulation and the depth of the grating layer are critical parameters in the performance of the grating. Light is diffracted at angles corresponding to the classical grating equation as a function of the incident angle and the frequency of the index modulation at the surface of the grating. The diffraction efficiency, however, is a strong function of the relationship between the angle of incidence and angle of diffraction with respect to the fringes formed by the refractive index modulations within the volume of the grating. If these relationships satisfy the Bragg condition, which also depends on the depth of the grating volume and on the intensity of the grating fringes, then high peak diffraction efficiencies, approaching 100%, are possible. Good efficiency over moderately broad angular and spectral bandwidths can be achieved, but peak

efficiency is usually decreased with increased bandwidth.

The first figure shows four possible grating configurations: A displays a transmission grating in which the index modulation fringes are normal to the grating surface; B shows a transmission grating in which the fringes are tilted with respect to the surface, resulting in a tilt of the Bragg condition with respect to the diffraction angles of the grating; C represents a reflective grating in which there is zero dispersion -- these are typically called notch filters; and D shows a reflection grating in which the fringes are tilted so that they intersect with the grating surface, resulting in dispersion of the diffracted light.

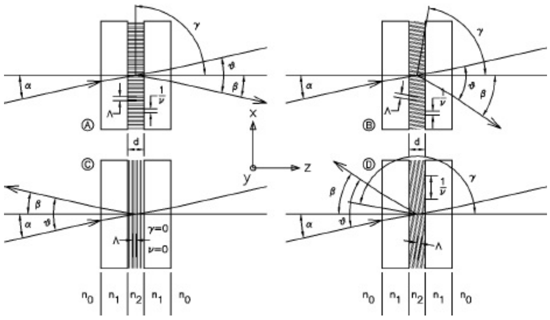
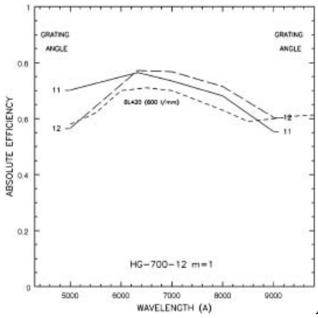


Figure 1.

Performance of a 600 l/mm VP Grating

A transmissive 600 l/mm VP grating was acquired by NOAO to explore technologies for a high efficiency spectrograph. The grating was designed for peak diffraction at 700 nm with a bandwidth of 500 to 900 nm. The grating structure is that of Figure 1 A. Figure 2 shows the measured efficiency of the test VP grating in comparison with a comparable reflective surface relief grating in use at Kitt Peak. The VP grating also displays excellent diffraction performance outside the design criterion when it is tilted to angles that satisfy the Bragg condition for other wavelengths. Figure 3 shows the diffraction efficiency of the VP grating as a function of grating angle at the wavelength of 400 nm. Not only does the grating diffract efficiently when tuned for first order diffraction, but it also shows excellent efficiency for diffraction of 400 nm when tilted for 2nd and 3rd order diffraction. This "tunable" nature provides a versatility that is unmatched with classical surface gratings.



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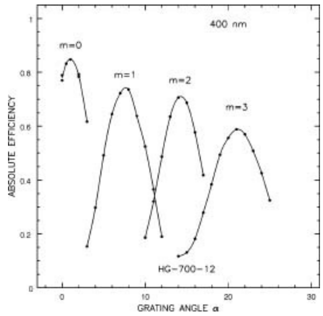

Figure 2.Â **Figure 3.**

A simple, on-sky observation was obtained with a fiber feed at the 2.1-meter telescope on Kitt Peak. A standard star was observed in both first and second order configurations of the grating at 700 nm. Figure 4 displays the resultant spectra, in which the detected efficiency was identical in both configurations (17% total system efficiency, including sky, telescope, seeing, fiber transmission, collimating lens, grating, camera lens, and detector).

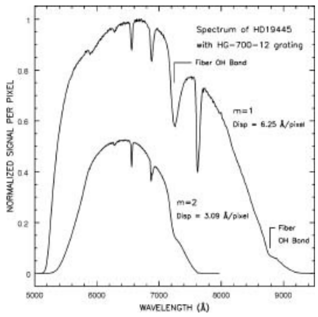

Figure 4.

The tunable behavior of this grating was somewhat of a surprise to the makers at KOSI, as they had never examined the performance of their gratings outside the design envelope. There also appears to be minimal published research regarding higher order diffraction in VP gratings. A significant part of the NSF grant effort is focused on exploring the tunability, peak efficiency, and higher diffraction order performance of a variety of VP gratings.

Ongoing Efforts

The NSF grant will allow the fabrication of eight VP gratings. Final grating characteristics may change as we explore their design in detail, but the expected set of gratings will be:

1) 300 l/mm transmission grating optimized for first order at 1 m with a 500 nm bandwidth.

2) 1200 l/mm transmission grating optimized for first order diffraction at 600 nm with a 200 nm bandwidth.

3) 2400 l/mm transmission grating optimized for first order diffraction at 600 nm with a 60 nm bandwidth.

4) 2400 l/mm transmission grating optimized for first order diffraction at 1 micron with a 50 nm bandwidth.

5) 5000 l/mm transmission grating optimized for first order diffraction at 600 nm with a 25 nm bandwidth.

6) A dual transmissive VP grating structure designed so that 656 nm is diffracted by the first grating and 486 nm is diffracted at the same angle by the second grating. This is a complex grating structure in which the wavelength affected by one grating does not meet the Bragg condition for the other grating, so is only diffracted by one of the two gratings. This is a characteristic that is impossible to achieve with surface gratings.

7) 300 l/mm transmission grating optimized for tenth order diffraction at 600 nm with a bandwidth of 60 nm. This is a first attempt at a VP Echelle. It is not currently clear if the materials can provide adequate diffraction efficiency at such a high order.

8) 1200 l/mm reflection grating for first order diffraction at 600 nm with a 200 nm bandwidth. Although KOSI makes reflection holograms in their heads-up

display combiners, they have not made a dispersive grating which works in reflection. This will be their first attempt at such a grating.

In addition to the NSF grant, Sam Barden is assisting KOSI in the implementation of a VP grism currently under fabrication for the LDSS spectrograph at the Anglo-Australian Observatory. A 400 l/mm grism with peak efficiency at 700 nm and a bandwidth of 500 to 1000 nm will serve as the dispersing element of the upgraded instrument with which the astronomers at the AAO plan to observe the Southern Hubble Deep Field with the AAT. Please refer to the January 1998, AAT Newsletter for more details.

Current Limitations and Prospects

Unfortunately, KOSI currently fabricates gratings only up to 75 mm in size. These are too small for astronomical spectrographs, which generally have beam sizes of at least 150 mm. However, there is an effort at KOSI to upgrade their holographic exposure system to make gratings at least 150 mm, and possibly 200 mm, in size. Their current expertise is in the fabrication of large holographic heads-up display combiners for the military, so the desired increase in grating size is within their range of experience in holographic fabrication. The current state of holographic technology is such that VP holographic gratings with dimensions of at least 600 mm are considered feasible. The availability of such grating sizes will be a requirement for the next generation of large telescopes and their spectrographs. For Further Information, please see the paper *"Volume-phase holographic gratings and their potential for astronomical applications"* by S. Barden, J. Arns, and B. Colburn, 1998, Proc. SPIE 3355 (NOAO Preprint No. 781) for details on the fundamentals of VP gratings.

Sam Barden

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Report of the NOAO Joint Users Committee

Introduction

The Joint NOAO Nighttime Users Committee (UC) met in Tucson on 16-17 January 1998. Committee members present were Charles Bailyn (Yale), John Bally (Colorado), Jill Bechtold (Arizona), Mark Dickinson (JHU/STScI), Richard Elston (Florida), Martha Haynes (Cornell), David Lambert (Texas), Robert Mathieu (Wisconsin), Patricio Ortiz (Chile), Evan Skillman (Minnesota), and Michael Strauss (Princeton). Ben Snavely (NSF-NOAO Program Manager) also attended the sessions. The committee split into CTIO and KPNO subcommittees for part of one day. KPNO subcommittee members were Mathieu (Chair), Bally, Dickinson, Elston, Haynes, and Skillman. CTIO subcommittee members were Bailyn (Chair), Bechtold, Lambert, Ortiz, and Strauss. The chair of the joint committee rotates between the CTIO subcommittee and KPNO subcommittee chairs; this year Mathieu was the joint committee chair.

The joint committee received written summaries of all presentations prior to the meeting, as well as published documents and summaries of important meetings that had occurred during the year. The committee heard reports from: Sidney Wolff on the status of the observatories; Richard Green on progress on the NOAO renewal plan; Todd Boroson on organizational issues with respect to user support, including time allocation, instrument information, and data analysis in the Gemini era; Paul Smith on the WIYN queue; and Green on instrumentation planning. In addition, all of the Directors led a discussion of the quality of the scientific research environment for NOAO staff.

The NOAO Renewal Plan

The centerpiece of last year's UC meeting was a forward-looking vision for the development of new facilities at CTIO and KPNO. This vision is so central to the strategic planning of NOAO that its description in last year's UC report merits repeating here:

"The NOAO Director presented a positive vision for KPNO and CTIO in which both observatories continue to play a forefront role in national groundbased optical/IR astronomy in the Gemini era. This vision encompasses an array of telescope apertures, including the 0.9-m telescopes with Mosaic imagers in the short term and ultimately 2.4-m telescopes in both hemispheres. It also includes a fundamentally new perception of the observatories as systems, whereby each observatory provides a suite of capabilities for the planning, execution, and data reduction of a scientific program. Successful completion of programs will involve classical observing, queue and service observing at multiple telescopes, and access to databases, all facilitated within the context of the observatory. This approach will provide both superior scientific performance and enhanced efficiency through streamlining operations, avoiding duplication, and unifying processes and functions across sites (including Gemini)."

The committee last year adjourned with a strong endorsement for the development and submission to the NSF of an NOAO Renewal Proposal. A primary focus of this year's meeting was assessment of progress toward this goal. Substantial progress toward the above vision has been made during the past year, although the path taken has changed. Ben Snavely reported that as a consequence of the priorities set by the NSF panel that jointly reviewed the NOAO Cooperative Agreement and Renewal proposals in 1996, it was unlikely that the NSF would fund the construction of two new 2.4-m telescopes at this time. In order to move ahead nonetheless, NOAO has begun development of a collaboration with the University of Colorado and the University of Minnesota to build a 2.4-m telescope on Kitt Peak. The details of the collaboration are still in development, but NOAO has submitted a Major Research Initiative (MRI) proposal to the NSF in partial support of such a facility. The present plan is for the facility to replace the 0.9-m telescope, with a design emphasizing wide-field imaging in both the optical and, especially, the near infrared. The UC endorsed this plan since it creates a fast track for a new facility on Kitt Peak and makes a substantive first step toward the NOAO Renewal vision.

At the same time, some members of the committee expressed disappointment that a comprehensive proposal had not been developed. There is a serious need for extensive articulation of the renewal vision to the community and to the NSF, and a vehicle for communication of that vision must be found. Furthermore, it is critical that the community be more involved with the development of this document and subsequent proposals. While a UC member was asked to review the MRI proposal, which is to the good, there was little community involvement in the development of the proposal outside of members of partner institutions. The plan for the southern 2.4-m telescope remains to be developed; NOAO needs to use this as a first inclusive effort with the community.

Ultimately, the UC remains eager for NOAO access to the equivalent of one 2.4-m telescope at both KPNO and CTIO. More broadly, the UC strongly endorses continued development of collaborations. Collaborations such as WIYN and SOAR leverage private resources for the national community, foster community linkages which lead to stability for the observatories, and enhance communication between NOAO and the community. While the UC recognizes that such collaborations lead to some inefficiency given that the staff effort results in only a partial telescope share, the reality is that these telescopes would not exist at all without the collaborations. Furthermore, in order to alleviate the additional load which these collaborations place on the staff and the technical infrastructure of the observatory, the UC strongly recommends that in the future, tenants and partners be required to contribute on-site scientific staff in addition to making appropriate financial contributions.

Instrumentation Development

Instrumentation development continues to be a vital component of the NOAO operation. The essential principle guiding the program is the provision of instruments which provide the community with a competitive edge.

Phoenix, the high-resolution infrared spectrograph, will provide resolutions as high as 100,000, a capability unmatched by any other observatory in the world. Unfortunately, commissioning of the instrument has been delayed due to optical problems associated with the grating. The UC strongly endorsed the commitment of high-priority resources to completion of Phoenix. Furthermore, the committee recommended that upon successful commissioning Phoenix be shipped to CTIO. The committee found the scientific arguments for use on the southern sky compelling, particularly in light of the tip-tilt capability of the Blanco telescope. Furthermore, the UC considered sending Phoenix to CTIO as an essential (de facto) endorsement of the recently established integrated instrument program for the nighttime observatories.

The UC was asked to prioritize a list of nine candidate instrument starts. With present resources, a major new instrument is completed every 1-1.5 years,

meaning that any given telescope sees a new instrument every five years. Hence, these prioritizations are a critical role of the UC. The UC easily reached consensus on three instruments; further prioritization of these instruments depends upon external factors as yet unknown. We recommended that priority be given to:

1) a wide-field near-infrared imager, with very high priority if the development of 2.4-m telescopes proceeds;

2) a GNIRS (Gemini Near Infrared Spectrograph) clone for the south, providing infrared spectroscopic capability to both SOAR and Gemini South; and

3) a high-throughput optical spectrograph. The last is specifically an endorsement of Sam Barden's investigations into very high efficiency gratings, which the UC felt had the potential for a major advance in optical spectroscopy.

With respect to other instrumentation issues, the UC expressed strong concern over the recent reduction of the infrared instrumentation group, at one time one of the foremost teams in the world. The UC strongly recommended immediate, targeted revitalization of this group with the goal of leadership in wide-field infrared imaging and infrared spectroscopy.

The UC also endorsed investigation of a near-infrared capability for the WIYN multi-object spectrograph, a potentially exciting opportunity which would fill the present gap in bright-time WIYN capabilities. Discussions made it clear that the scientific opportunities provided by a near infrared multi-object spectrograph remain to be well defined. The UC recommended incorporation of the community in assessing the scientific value of such a capability; if compelling then an investigation of the technical issues should proceed.

User Support In the Gemini Era

Gemini North is on schedule for first light next winter, while Gemini South is scheduled for first light in mid-2000. The community should be aware that proposal submission for Gemini observations is imminent, perhaps as early as fall 1999. At present, the plan is for Gemini observing time to be scheduled roughly half classically and half queue. Gemini will provide user support only from "sea-level to sea-level," i.e. during observations. All other support of United States astronomers will be provided by NOAO. These tasks include information on facility and instrument capabilities, the proposal and time assignment process, data reduction support, archive access, and remote observing support. This is a substantial increase in the support responsibilities of NOAO, with no associated increase in funding.

Boroson gave the UC a description of the new SCOPE (SCience OPErations) division of NOAO. (A detailed description of the division responsibilities can be found at the NOAO web page.) The integration of all user support services in SCOPE is driven both by a vision of NOAO as an integrated observatory and by anticipated efficiencies which will reduce the impact of Gemini user support on support for the smaller telescopes at KPNO and CTIO. Note that SCOPE will also handle user support with respect to community access to the Hobby-Eberly telescope and the upgraded MMT.

The UC endorsed the integration of user support and therefore resources within a single management structure of NOAO. At the same time, the UC made several strong recommendations to guide the development of this system:

1) The principle of aperture priority should be extended to the Gemini telescopes.

2) The UC saw a need for strong oversight of SCOPE by the Observatory Directors. SCOPE exists to serve the observatories, and therefore, it is essential that the observatories be involved in setting the directions of SCOPE activities. Indeed, the UC recommended consideration of a management structure where SCOPE held a position similar to the instrument program. In this context, it may be preferable formally to remove USGP from SCOPE.

3) The UC felt that SCOPE resources must be distributed among the observatories, and in particular that some SCOPE scientific staff members be resident at CTIO. Similarly, it is essential that both CTIO and KPNO scientific staff continue to be involved in the time assignment process.

4) We endorse Boroson's prioritization of responsibilities for SCOPE, given the present staffing level. In the present tight funding, the UC saw no justification for the expansion of that staffing level to take on additional desirable, but not critical, responsibilities. The UC also endorsed working collaboratively with Gemini partners for efficiency. For example, it did not seem wise for SCOPE to take on data archiving development when Canada is clearly a leader in such endeavors; in return, NOAO is well positioned to take the lead in development of Gemini data reduction and analysis tools.

The UC urged rapid development of a detailed plan for integrated user support, in close consultation with the Observatory Directors and the community through the UC.

It is clear that effective use of Gemini will require preparatory work at small telescopes, in many cases requiring only limited data (photometry and astrometry, for example). The UC recommended that in the spirit of an integrated observatory, NOAO develop a system for service observing at the smaller telescopes. The size of this program (e.g., observations beyond support of Gemini, the extent of data reduction, etc.) should be revisited at the next UC meeting.

Finally, the UC endorsed support of surveys as an integral component of the NOAO mission, particularly with respect to the new 2.4-m telescopes. At the same time the UC did not feel that the execution of surveys should be a responsibility of NOAO staff. Rather, the UC favored competitive proposals for surveys to be executed by the proposing team (on which NOAO scientists could be members as part of their research endeavors). The UC recommended the development and articulation of a policy on surveys via an (ad hoc) committee, including both UC members and a representative of the NRAO committee which recently went through the same process and produced a well thought out policy paper.

WIYN Queue

The Joint UC received a report from Smith on the performance of the WIYN queue. At this point the queue is fully commissioned and performing nominally. It is not anticipated that the queue performance will increase substantially in the future. The UC congratulated both Smith and the queue team on their development of the system.

Last year the UC recommended that once operations were nominal, a cost-benefit analysis be done in comparison to classical scheduling. Note that the cost of the queue program is roughly 2 FTE; this would not be entirely recovered given classical scheduling since the latter requires user support. For a comparison, Di Harmer mocked up classical scheduling of the non-synoptic queue proposals, permitting a comparison with queue performance given the actual weather pattern during the spring 1997 semester. The overall completion rate of programs was very similar. However, the queue completion is biased toward higher ranked proposals, as designed. Interestingly, if typical programs only need roughly 50% completion in order to derive publishable results, the performance of classical and queue scheduling are very similar even with respect to proposal ranking . Of course, only queue scheduling permits synoptic programs.

To summarize, at the cost of 2 FTE, the queue provides higher observing efficiency, enables synoptic observations, and favors higher ranked proposals. The queue has also served the invaluable role of introducing the community to queue observing in preparation for Gemini operations and providing an experiential foundation for service observing in the Gemini era. On the other hand, queue observing does not provide as broad a distribution of data within the community, fosters less community ownership of the facilities, and does not promote experimentation.

The UC concluded that the WIYN queue should be continued another year in the spirit of an ongoing experiment, and reassessed at that time.

Public Relations

The UC, with the support of Snavely from the NSF, strongly encouraged the development of an enhanced national public relations and educational outreach activity at NOAO. It is unfortunate that the scientific achievements made possible by NOAO facilities receive so much less publicity than those made with NASA missions and private facilities. We believe that this has resulted in a diminished appreciation of NOAO at NSF, within the scientific community, and among the general public. Most users do not know where to go to find help in publicizing exciting results made with NOAO facilities, in dramatic contrast with the situation at NASA. We therefore recommend that additional resources be put into public relations at NOAO, perhaps modeled on the highly successful effort at STScI, that users be frequently reminded of the public relations support that does exist, and that users be solicited for science suitable for public dissemination. We believe that application of resources in this area will repay itself many times over as NOAO moves to enhance its funding. To skimp on public relations and educational outreach is a false economy, even (or perhaps especially) in these financially strained times.

Management

The UC reaffirmed its position last year that the advocacy of an independent KPNO director is critical. Both the Joint and KPNO UCs congratulated the present KPNO Director, Richard Green, for a job very well done. Nonetheless, the UC would prefer to see a Director of KPNO dedicated to that task alone and we strongly recommend that a search for KPNO Director be initiated in the coming year.

KPNO Subcommittee Report

Facility Improvement Initiatives

The UC was presented with three initiatives for execution in FY 1999, of which KPNO resources would permit completion of one or two. These were:

1) Moving the coud spectrograph to the 4-m coud room, with a fiber feed from the 4-m. This would provide spectral resolutions as high as R = 315,000. With an image slicer, the estimated sensitivity gain was 2 mags fainter than the Coud Feed (now closed) or a fiber feed from the 2.1-m, although there remains some uncertainty over this number.

2) Installation of a tip-tilt capability at the Mayall 4-m f/15 focus, similar to the facility at the Blanco 4-m.

3) Continued DIQ improvements at the Mayall 4-m. The present median seeing is 1.1" compared to 0.8" at WIYN. The connection of seeing performance to the thermal control of the mirror is now well established and the DIQ team feels that rapid gains can be accomplished.

The UC placed continued work on the 4-m DIQ performance as the top priority. However, the UC was split in its choice of the second priority initiative (with support of the high-spectral-resolution capability being contingent on demonstration of at least a 2 mag gain in sensitivity over a fiber feed from the 2.1-m).

WIYN Improvements

Last year, the UC expressed concern that the WIYN Observatory, the forefront facility on Kitt Peak, was not being adequately developed and utilized, particularly with respect to bright-time capabilities. During the past year the WIYN consortium submitted a Major Research Initiative (MRI) proposal to the NSF to develop a tip-tilt imaging system with both optical and non-thermal infrared capabilities for WIYN. The consortium is also considering two smaller upgrades:

(1) an instrument adapter system for the folded Cass port which would permit the wide-field imager (Nasmyth) and the DensePak fiber (Cass) to both be accessible during a night, and

(2) a motor/controller upgrade for Hydra which would halve the fiber setup time. Both of these initiatives were supported by the UC. Finally, the UC discussed a non-thermal infrared capability for Hydra, as discussed in the instrument section above.

Mountain Staffing

Bruce Bohannan reported on the initiatives to reduce observing technician (OT) turnover. Many of the ideas presented at the last UC meeting have been implemented. These include an increase in the number of OTs by one to provide time for professional development, the creation of a supervisor of observing support providing better communication and guidance (filled by Paul Smith), a work schedule which includes daytime support duties, professionalization of the position by making it salaried, and development of a career path. The UC was very appreciative of these developments and anticipate that they will result in a better working environment for both OT's and visiting astronomers.

Bohannan also discussed several metrics of facility performance. The NOAO large telescopes at both KPNO and CTIO compare very well with both large private facilities and other national observatories in low failure rates, time on the sky, numbers of papers published, and average citations per paper. Furthermore, the national facilities compare well with other observatories in costs of operation, even given the typically higher level of user support at KPNO and CTIO. Of course, the lower cost-to-service ratio is a direct result of the severe financial cuts that NOAO has received, and arguably has not been good for the health of the observatory.

CTIO Subcommittee Report

New Projects at CTIO

The committee was impressed with Malcolm Smith's report on the many exciting new activities at Cerro Tololo and Cerro Pachon. In addition to ongoing work on Gemini South, new partnerships are in place with SOAR, YALO (Yale-AURA-Lisbon-Ohio: the new consortium which will operate the Yale 1-m telescope) and several infrared instrumentation groups. There are also a number of tenants on Cerro Tololo, including GONG, 2MASS, USNO and the Swarthmore robotic telescope. We endorse the vision of CTIO as a site for partnerships and tenants who require access to the southern skies, and we congratulate the director and staff of CTIO for their hard work in facilitating these projects.

Recent Activities and Current Priorities

Malcolm Smith updated the committee on recent activities and proposed priorities for the near future. In particular, the Blanco image improvement project has progressed: subarcsecond seeing is now routinely obtained at the Cass port as well as at prime focus. The UC commends the staff for their continuing efforts on this project.

Upcoming instrumentation efforts include creating a Mosaic clone and a Hydra clone for the south, and moving Phoenix to CTIO as soon as commissioning is completed in Tucson. The UC strongly endorses these efforts, and urges NOAO to provide whatever resources are required to complete these projects as soon as possible.

Smith reported future priorities developed by him and his staff as follows:

- Support for Gemini South.
- Support for new telescopes, e.g. SOAR and possible new 2-m class telescopes.
- Continued upgrades for the Blanco telescope.
- Standardization and streamlining of Blanco operations in preparation for the Gemini era.
- Support for GONG, 2MASS, YALO and other tenants.
- Support for the 1.5-m and 0.9-m telescopes.

The UC endorses these priorities, with the following recommendations:

1) As noted above, tenants and partners should be expected to contribute scientific staff as well as financial contributions. The level of scientific staff contributed by each project should be such that no additional burden falls on the CTIO scientific staff as new projects are initiated.

2) There should be no reduction in support for the 1.5-m and 0.9-m telescopes until new 2-m class telescopes are available for the community at CTIO. While we endorse the ultimate goal of replacing the smaller telescopes with new 2-m class telescopes, it is very important that community access to the 1.5-m and 0.9-m telescopes continue until a full 2-m class telescope (either a whole telescope or half shares of two telescopes) is available.

3) The UC regards the wide field imaging capability of the Curtis-Schmidt telescope as important. We urge that this telescope continue to be supported until an alternative way to provide wide field optical imaging on a telescope smaller than the Blanco is available.

Staff Concerns

We heard with great concern of the overwork and low morale of the CTIO scientific staff, and in particular of Mark Phillips' decision to leave CTIO. Mark has provided extraordinary service to CTIO for many years. We thank him for his efforts, and wish him well in the future.

In addition to the problems faced by scientific staff throughout NOAO, the CTIO scientists feel "out of the loop" regarding crucial decisions being taken in Tucson which affect the future of CTIO and NOAO in general. This perception of isolation has now become a problem in itself, extending beyond the specific irritations which gave rise to it. We urge CTIO and NOAO, as a matter of highest priority, to work together to take advantage of the great expertise and experience of the CTIO staff in both strategic and day-to-day decisionmaking at NOAO. In particular, we regard it as essential that CTIO staff be closely involved with resource allocation in instrumentation, and that some resources associated with SCOPE be located in La Serena.

We endorse the short-term plan to hire junior staff scientists this year to restore scientific staffing to nominal levels. However, we also regard the office of Deputy Director as crucial for CTIO, particularly given the Director's responsibilities to parts of AURA nominally outside of CTIO, and consequent travel

schedule. We therefore recommend that a search for a new Deputy Director be initiated as soon as possible.

We also strongly encourage the continuation and expansion of the post-doc program at CTIO. In addition to providing a constant influx of new blood into La Serena, this program has historically provided a fertile breeding ground for future CTIO staff members.

In addition to the observatory-wide measures endorsed below, we recommend an enhanced program of joint scientific activities with non-CTIO astronomers, especially those associated with Gemini, SOAR, and other partner and tenant projects, as well as those resident at other institutions in Chile. Even in these fiscally constrained times, applying resources, both human and financial, to these sorts of activities is very important.

Concluding Remarks

The caliber of the national observatories is determined by the caliber of their scientific staffs. It is these colleagues who provide the vision, the implementation, and the support which keeps NOAO at the forefront. There has been a longstanding debate about the necessity of a scientific staff within NOAO. It is the UC's observation and experience that the invention and execution of progressive ideas for NOAO facilities comes primarily from within. While the national community provides guidance and counsel in selection of initiatives, the suite of choices derives largely from NOAO staff. Similarly once the choices are made it is typically the NOAO scientific and engineering staff which makes them a reality. And finally, it is the NOAO scientific staff which provides the high-level support, e.g. who know from experience the optimal flatfielding approach for your program. For all of these reasons, the UC firmly endorses the maintenance of a superb scientific staff at the national observatories.

NOAO can only hope to attract, retain, and develop the highest quality scientific staff if their working environment permits active research programs. The present overload of NOAO staff has overly limited the time for research, and NOAO is vulnerable to a decrease of both numbers and vitality. The situation is unacceptable for the long term. We strongly encourage NOAO to pursue creative ways of enhancing the scientific environment at both KPNO and CTIO, including:

1) Creative duty scheduling, e.g. permitting mini-sabbaticals.

2) Formal commitments of staff from the partners of collaborations such as WIYN and SOAR.

3) Less observer support; the community has repeatedly expressed a willingness to "rough it" at the telescopes if necessary to maintain the vitality of NOAO.

4) Enhance programs to attract visitors with support responsibilities.

5) Continue to argue that the NSF take on the currency variations which saps CTIO resources.

However, these are only bandages that cannot cure the essential need for an increased staff size in recognition of the expansion of support responsibilities in the Gemini era. We encourage continued priority for the development of such resources.

We also strongly encourage improved communications between the staff at each observatory. In particular, we feel that it is essential that staff at each observatory regularly make extended visits elsewhere within NOAO. This could be accomplished via the mini-sabbaticals suggested above. We also would encourage an annual "all-NOAO" science meeting, rotated among the sites. Recognizing that these suggestions require allocation of resources, we feel that the investment in communication will return handsome rewards to NOAO.

We close this report with our sincere thanks to the staff of NOAO, and with encouragement to the community to express appreciation for their effort in your behalf.

The Joint NOAO Nighttime Users Committee

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NOAO Educational Outreach

Are you an astronomer interested in making an effective contribution to science education reform? Can you see yourself as a "wise and trusted counselor"? Do you live near the towns of Omaha, NE; Eastchester, NY; New Franklin, MO; Hueytown, AL; Placentia, CA; Woonsocket, RI; Los Angeles, CA; or Plymouth, Ida, or Grosse Point, Michigan?

NOAO is seeking mentors for middle and high school teachers who have been accepted into this summer's program for **The Use of Astronomy in Research Based Science Education (RBSE)**.

Mentors are astronomers or graduate students willing to spend a few hours a month helping RBSE teachers implement the program in their local classroom; we expect mentors will not step far from their role as research scientists in this capacity. Typical duties might include providing help in downloading datasets, insight into additional research topics from the preselected datasets, interpretation of findings, and assistance in publishing results.

Astronomers interested in serving as mentors in the geographic areas mentioned above are encouraged to contact NOAO Education Officer Suzanne Jacoby (sjacoby@noao.edu) as soon as possible or at the San Diego AAS Meeting.

Suzanne Jacoby, NOAO Education Officer

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NOAO Newsletter - Director's Office - June 1998 - Number 54

NOAO Preprint Series

The following preprints were submitted during the period 1 February to 30 April 1998. Please direct all requests for copies of preprints to the NOAO author marked.

779 *Barden, S.C. "Review of Fiber Optic Properties for Astronomical Spectroscopy"

780 *Barden, S.C. "Review of Fiber Instrumentation at NOAO"

781 *Barden, S.C., Arns, J.A., Colburn, W.S. "Volume-phase Holographic Gratings and Their Potential for Astronomical Applications"

782 *Barden, S.C., Sawyer, D.G., Honeycutt, R.K. "Integral Field Spectroscopy on the WIYN Telescope"

783 *Pilachowski, C.A., Brown, C. "New Database for Nighttime Programs at the National Optical Astronomy Observatories"

784 *Pilachowski, C.A., Barnes, J., Bell, D.J. "Observing Proposals on the Web at the National Optical Astronomy Observatories"

785 *Muller, G.P., Reed, R., Armandroff, T., Boroson, T., Jacoby, G. "What is Better Than an 8192 8192 CCD Mosaic Imager? Two Mosaic Wide Field Imagers, One for KPNO and One for CTIO"

786 *Keller, C.U., and NSO staff "SOLIS - A Modern Facility for Synoptic Solar Observations"

787 *Bohannan, B. "Improvements to Science Operations at Kitt Peak National Observatory"

788 *Sawyer, D.G., Code, A., Percival, J., Smith, P.S. "Flexible Observing Modes Employed at the WIYN Observatory"

789 *Jacoby, G.H., Liang, M., Vaughnn, D., Reed, R., Armandroff, T. "A New Wide-Field Corrector for the Kitt Peak Mayall 4-m Telescope"

790 *Boroson, T.A., Harmer, D.L., Saha, A., Smith, P.S., Willmarth, D.W., Silva, D.R. "The WIYN Queue: Theory Meets Reality"

791 *Wolfe, T., Reed, R., Blouke, M., Boroson, T., Armandroff, T., Jacoby, G. "CCD Detector Upgrade for NOAO's 8192 by 8192 MOSAIC"

792 *Joyce, R.R., Meyer, M.R., Skrutskie, M.F. "Infrared Astronomical Spectroscopy with a Non-Cryogenic Spectrograph"

793 *Hinkle, K.H., Cuberly, R., Gaughan, N., Heynssens, J., Joyce, R., Ridgway, S., Schmitt, P., Simmons, J.E. "Phoenix: A Cryogenic High-Resolution 1-5 micron Infrared Spectrograph"

794 *Code, A.D., Claver, C.F., Goble, L., Jacoby, G., Sawyer, D.G."WIYN Active Optics - A Platform for AO"

795 *Samarasinha, N.H., Mueller, B.E.A., Belton, M.J.S. "Coma Morphology and Constraints on the Rotation of Comet Hale-Bopp"

796 *Mueller, B.E.A., Samarasinha, N.H., Belton, M.J.S. "Imaging of the Structure and Evolution of the Coma Morphology of Comet Hale-Bopp (C/195 01)"

797 *Mills, D. "Network Services for Observation Planning and Execution"

798 *Fowler, A.M., Sharp, N., Ball, W., Schinckel, A., Ashley, M., Boccas, M., Storey, J., Depoy, D., Martini, P., Harper, A., Marks, R. "ABU/SPIREX: The South Pole Thermal IR Experiment"

799 *Wong, W-Y., Cuberly, R.W., Andrew, J.R. "Design of a Grating Mechanism for a Near Infrared Spectrograph"

800 *Massey, P., Johnson, O. "Evolved Massive Stars in the Local Group II. A New Survey for Wolf-Rayet Stars in M 33 and Its Implications for Massive Star Evolution: Evidence of the "Conti Scenario" in Action"

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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.

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

Casey, B.W., Mathieu, R.D., Vaz, L.P.R., Andersen, J., Suntzeff, N.B. "The Pre-Main-Sequence Eclipsing Binary TY Coronae Australis: Precise Stellar Dimensions and Tests of Evolutionary Models"

*Cho, M., Li, C.C., Wong, W-Y., Cuberly, R., Moon, I.K., "Design Study of the GNIRS Bracket Structure"

Eggen, O.J. "The HR 1614 Group and Hipparcos Astrometry"

Eggen O.J. "The Age Range of Hyades Stars"

Heathcote, S., Reipurth, B., Raga, A. "Structure, Excitation and Kinematics of the Luminous Herbig-Haro Objects 80/81"

Jacobson, M.R., *Kneale, R.C., Gillett, F.C., Raybould, K., Filhaber, J.M., Carnigilia, C., Laird, R., Kitchens, D., Shimshock, R., Booth, D.C. "Development of Silver Coating Options for the Gemini 8-m Telescopes Project"

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

Turner, A., Ferrarese, L., *Saha, A., Bresolin, F., Kennicutt, R.C., Stetson, P.B., Mould, J.R., Freedman, W.L., Gibson, B.K., Graham, J.A., Ford, H., Han, M., Harding, P., Hoessel, J.G., Huchra, J.P., Hughes, S.M.G., Illingworth, G.D., Kelson, D.D., Macri, L., Madore, B.F., Phelps, R., Rawson, D., Sakai, S., Silbermann, N.A. "The HST Key Project on the Extragalactic Distance Scale XI. The Cepheids in NGC 4414"

Turner, D.G., Pedreros, M.H., Walker, A.R. "Galactic Clusters with Associated Cepheid Variables. VI. Anonymous van den Bergh (C0634+031) and CV Monocerotis"

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

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The TAC Process Evolves

As the start of community access to the Gemini telescopes draws near, we have begun to modify the telescope time allocation process. The changes address both the need to accommodate a much larger number of proposals and the desire to integrate access to Gemini (and the independent large telescopes that will provide national access) with access to the smaller NOAO telescopes. The changes described here apply to the KPNO TAC, which will be expanded to include the new facilities. CTIO will be merged into this process at a later date.

As a result of our intention to provide a science context for the telescope time decisions, we consider the TACs to be discipline-based panels, charged with evaluating and ranking the proposals for all telescopes within a certain range of subject areas. This is not a qualitative change from the previous system (with its "Galactic" and "Extragalactic" TACs) but rather an extension of that system in that we will increase the number of TACs depending on the number of proposals, and develop an algorithm for dividing time up among the TACs. (Recall the Galactic/Extragalactic structure evolved from separate TACs that dealt with bright and dark time.) So, for the 1998B round of proposals, we will have three TACs: Galactic, Extragalactic, and Solar System. The creation of the Solar System TAC was driven more by the need to provide a science context for these proposals rather than a requirement to do so based on the number of proposals.

The division of time among subject areas of discipline-based TACs will be proportional to the requests to each TAC. Merging of TAC recommendations will follow numerical grades until 80% of available time is filled. A joint TAC, including representatives of each discipline-based TAC, will consider whether to continue merging to 100% of available time or to modify the sequence based on their evaluation of the individual proposals. The merged, ranked lists for each telescope then go to the site directors for approval.

The individual discipline-based TACs will each have approximately six members including one NOAO staff member. The TAC meeting will be run by a nonvoting chair (our own Dave De Young) whose task it is to keep the discussion moving in a constructive direction. Technical experts will be available to address concerns, but a comprehensive technical review will only be done for those proposals that make it to the schedule.

It will likely take several iterations before this whole process runs smoothly, but that is a motivation for starting these changes now. Further modifications will be made over the next few proposal rounds as we gain experience.

Todd Boroson

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NOAO Newsletter - SCOPE - June 1998 - Number 54

The Kitt Peak Schedule will be Late

Due to several factors, the Kitt Peak Telescope Allocation Committees will not meet until the third week of May, nearly two weeks later than usual. As a result, we wish to alert investigators who applied for telescope time for the 1998B semester (1 August 1998 - 31 January 1999) that the new telescope schedule will not be available until late June. The schedule will be posted via the NOAO Web page (http://www.noao.edu) as soon as finalized. We apologize for any inconvenience that this may cause for Kitt Peak investigators.

Todd Boroson

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NOAO Newsletter - SCOPE - June 1998 - Number 54

What Happens to My Proposal?

As the completion of the Gemini Telescopes draws near, the SCOPE office at NOAO is busy preparing for an increase in the number of telescope proposals when those new facilities begin science operations. We want to be sure that every proposal submitted for Gemini, KPNO, CTIO, or any of the other facilities available through NOAO receives a fair and thorough hearing before the Telescope Allocation Committee, and we want to process proposals with speed and efficiency. To achieve these goals the SCOPE staff has been revising and simplifying procedures and developing new tools. Here's what happens to your electronic proposal after it arrives at NOAO.

- The proposal is automatically received and logged on the NOAO proposal server, and an automated e-mail reply (to the sending e-mail address) is sent out with the assigned proposal number and instructions for submitting figures. If it is a WIYN proposal, the computer checks to be sure a target table is included. If it is a thesis program or if the PI is a graduate student, the investigator is alerted to provide a supporting letter submitted by the student's advisor.

- If it is a CTIO proposal, the LaTeX and figure files are copied to a special directory that is mirrored to La Serena, where CTIO proposals are processed separately. The procedures are similar to those described below for KPNO proposals.

- The proposal is automatically LaTex'ed and then printed by Kristen Thomson. During the printing process, proposal information is extracted and parsed, and an ASCII text file is created for import into the ALPS, an MS Access database written by Christa Brown. Proposals with LaTeX errors or figure problems are diverted to Dave Bell or Jeannette Barnes. If a proposal cannot be fixed (most can be) e-mail is sent to the investigator asking him or her to re-send the needed files.

- Once a proposal is printed successfully (no LaTeX or figure problems), the proposal information is imported into the ALPS database. Kristen reviews the information for accuracy, and address information is matched with the master address file. The requested telescopes, instruments, lunar phase, and scheduling ranges are also reviewed and confirmed.

- Caty Pilachowski reviews the printed proposal to catch any remaining figure, format, or LaTeX problems before it is copied for distribution to the TAC.

- Dave De Young oversees the assignment of proposals to each TAC (investigator choices are rarely revised) and the assignment of a lead reviewer for each proposal.

- Once the proposal information is finalized, Kristen prints TAC review lists and forms using the ALPS database and sends them, along with a big stack of proposals, to our hard-working TAC volunteers!

Kristen Thomson, Jeannette Barnes, Dave Bell,
Christa Brown, Caty Pilachowski, Dave De Young

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100% of NOAO Nighttime Proposals Are Electronic!

NOAO received 417 new proposals for the 1998B semester (1 August 1998 - 31 January 1999), up 16 from the previous semester. These include 179 proposals for CTIO and 238 for KPNO. Twenty-seven percent (or 111) of our users elected to use the Web proposal form to prepare and submit their proposals, and an additional 20 or so proposals were prepared on the Web but submitted by e-mail. All proposals were submitted electronically, either by e-mail or over the Web -- none were submitted on paper. Sixty-three proposals, or 15% of the total, were requests for thesis observations. Seventy-two percent of all proposals included figures; we received over 500 PostScript figure files.

This is also a remarkable semester for the number of proposals related to solar system programs -- a total of 16 programs. SCOPE has formed a new panel of the Telescope Allocation Committee -- the Solar System Panel -- to provide a more comprehensive review of proposals in this area.

As in previous semesters, most investigators were able to obtain the latest version of the proposal template. The most significant change to the proposal form for the 1998B semester was the new "Experimental Design" question and the elimination of the "Why NOAO" question from the previous form. The Web version offered a new option to import an old LaTeX proposal template into the new form for updating and resubmitting. We are grateful to all investigators who make the effort to obtain the new forms.

Another significant new feature was the " **NOAO Proposal Queue Status**" Web page that allowed investigators to check the status of their proposals. You can link to this page at http://www.noao.edu/scope/propinfo.html or from the Proposal Information link on the NOAO home page.

We anticipate that changes in the proposal form in September for the 1999A semester will be modest, as we devote our efforts to preparing for proposals for the Gemini 8-m telescopes. The proposal forms for submission in March 1999, for time at KPNO and CTIO will be our first test of the new template designed for Gemini programs, although proposals for the Gemini telescopes will not be accepted until September 1999, at the earliest.

Caty Pilachowski for the SCOPE Proposal Team

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Changes in the NOAO Tucson Library

On a spring-like day in March, Tucson staff gathered on the patio to honor Cathy van Atta on the occasion of her retirement from NOAO. Cathy served as librarian for over twenty years, and during this time she established and maintained the NOAO Tucson Library as one of the leading astronomical libraries in the world. As such, it stands as a major research facility in its own right and is central to the execution of high quality astronomy programs carried out by NOAO staff and visitors. Well-wishers credited Cathy for her support essential to their research and entertained us with stories of her patience with long-overdue books and perseverance in finding obscure resources.

Cathy introduced and welcomed Mary Guerrieri, our new librarian. Mary comes to us from the University of Arizona Lunar and Planetary Lab where she worked for ten years; first as Editor for Space Science Services, then as Data Manager for the Space Imaging Center. Mary received her MLS degree from the University of Arizona.

Mary's goals for the NOAO Library include providing prompt and accurate reference service and keeping the collection current and useful. Longer-term goals include electronic document delivery and bibliographic services via the Library web page. When you're at NOAO, please come by and say hello. Or contact her at maryg@noao.edu with any ideas, questions, comments, or suggestions regarding library services.

Thank you, Cathy, for your years of devoted service, and welcome, Mary!

Dave De Young

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1998B Observing Request Statistics -- Kitt Peak National Observatory

August 1998 - January 1999

Summary:

Telescope:	4-m	WIYN	W2HR	2.1-m	CF	0.9-m
No. of requests:	100	55	12	44	21	60
No. of nights requested:	330.00	130.70	2.75	194.50	210.00	262.00
No. of nights available* :	104	60	2	106	146	137
Oversubscription:	3.17	2.18	1.38	1.83	1.44	1.91
Average request:	3.30	2.38	0.23	4.42	10.00	4.37

* The number of nights available takes into account prior commitment to long-term programs and rescheduled Phoenix runs. The number of nights available is approximate until engineering time assignments have been allocated.

Requests by Telescope:

4-m Telescope

	Requests		Nights Requested		Total Nights	
Instrument	Dark	Bright	Dark	Bright	Requested	Percentage
CRSP	0	8	0.00	19.00	19.00	5.8%
CRYO	7	0	18.00	0.00	18.00	5.5%
ECH	4	12	8.00	41.00	49.00	14.8%
IRIM	0	3	0.00	7.00	7.00	2.1%
ONIS	0	3	0.00	11.00	11.00	3.3%
MOSA	21	6	71.50	22.50	94.00	28.5%
PFIM	8	0	18.00	0.00	18.00	8.5%
PHX	0	6	0.00	20.00	20.00	6.1%
RCSP	15	7	56.00	25.00	81.00	24.5%
VIS	1	0	3.00	0.00	3.00	0.9%
	56	45	184.50	145.50	330.00	100.0%

WIYN Telescope

	Requests		Nights Requested		Total Nights	
Instrument	Dark	Bright	Dark	Bright	Requested	Percentage
DSPK	0	6	0.00	17.00	17.00	13.0%
HYDR	16	8	26.60	21.10	47.70	36.5%
NFIM	20	5	50.00	16.00	66.00	50.5%
	36	19	76.60	54.10	130.70	100.0%

W2HR Telescope

	Requests		Nights Requested		Total Nights	
Instrument	Dark	Bright	Dark	Bright	Requested	Percentage
DSPK	1	1	0.00	0.25	0.25	9.1%
HYDR	1	3	0.25	0.75	1.00	36.4%
NFIM	5	1	1.50	0.00	1.50	54.5%
	7	5	1.75	1.00	2.75	100.0%

2.1m Telescope

	Requests		Nights Requested		Total Nights	
Instrument	Dark	Bright	Dark	Bright	Requested	Percentage
CFIM	7	4	37.00	19.00	56.00	28.8%
CRSP	0	4	0.00	10.50	10.50	5.4%
GCAM	4	7	15.00	26.00	41.00	21.1%
IRIM	0	5	0.00	19.00	19.00	9.8%
ONIS	0	7	0.00	43.00	43.00	22.1%
PHX	0	6	0.00	25.00	25.00	12.9%
VIS	2	0	0.00	0.00	0.00	0.0%
	13	33	52.00	142.50	194.50	100.0%

CF Telescope

	Requests		Nights Requested		Total Nights	
Instrument	Dark	Bright	Dark	Bright	Requested	Percentage
CAM5	1	16	0.00	169.00	169.00	80.5%
CAM6	0	5	0.00	41.00	41.00	19.5%
	1	21	0.00	210.00	210.00	100.0%

0.9m Telescope

	Requests		Nights Requested		Total Nights	
Instrument	Dark	Bright	Dark	Bright	Requested	Percentage
CCDP	1	0	0.00	0.00	0.00	0.0%
CFIM	14	15	60.00	63.00	123.00	47.0%
MOSA	22	9	95.00	44.00	139.00	53.0%
	37	24	155.00	107.00	262.00	100.0%

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1998B Observing Request Statistics -- Cerro Tololo Inter-American Observatory

August 1998 - January 1999

Summary:

Telescope:	4-m	1.5-m	YALO	0.9-m	Schmidt

```
No. of requests:            142         39        6        24           11
No. of Nights Requested: 459.50     165.00    10.50    116.00       115.00
No. of Nights Available*:   126        150        8       132           79
Oversubscription:          3.65       1.10     1.31      0.88         1.46
Average request:           3.24       4.23     1.75      4.83        10.45

* The number of nights available is approximate until engineering time
assignments have been allocated.
```

Requests by Telescope:

4-m Telescope

	Requests		Nights Requested		Total Nights	
Instrument	**Dark**	**Bright**	**Dark**	**Bright**	**Requested**	**Percentage**
ARGUS	0	0	0.00	0.00	0.00	0.0%
BTC	39	2	135.0	2.00	137.00	29.8%
CFIM	4	0	12.00	0.00	12.00	2.6%
CIRIM	0	12	0.00	36.00	36.00	7.8%
COB	1	2	2.00	4.00	6.00	1.3%
ECH	4	14	15.00	46.00	61.00	13.3%
IRS	0	7	0.00	19.00	19.00	4.1%
OSCIR	1	9	4.00	27.00	31.00	6.7%
PFIM	7	0	27.00	0.00	27.00	5.9%
RCSP	25	12	87.00	35.50	122.50	26.7%
RFP	1	1	2.00	3.00	5.00	1.1%
VISITOR	0	1	0.00	3.00	3.00	0.7%
	-	-	----	----	----	----
	82	60	284.0	175.50	459.50	100.0%

1.5m Telescope

	Requests		Nights Requested		Total Nights	
Instrument	**Dark**	**Bright**	**Dark**	**Bright**	**Requested**	**Percentage**
ASCAP	1	3	6.00	21.00	27.00	16.4%
BME	1	0	5.00	0.00	5.00	3.0%
CFIM14	0	1	0.00	5.00	5.00	3.0%
CFIM8	10	3	39.00	6.00	45.00	27.3%
CIRIM	1	8	7.00	33.00	40.00	24.2%
CSPEC	5	6	20.00	23.00	43.00	26.1%
RFP14	0	0	0.00	0.00	0.00	0.0%
RFP8	0	0	0.00	0.00	0.00	0.0%
VIS	0	0	0.00	0.00	0.00	0.0%
	-	-	----	----	----	----
	18	21	77.00	88.00	165.00	100.0%

YALO Telescope

	Requests		Nights Requested		Total Nights	
Instrument	**Dark**	**Bright**	**Dark**	**Bright**	**Requested**	**Percentage**
ANDICAM	0	1	0.00	5.00	5.00	47.6%
CFIM	4	1	2.50	3.00	5.50	52.4%
	-	-	----	----	----	-----
	4	2	2.50	8.00	10.50	100.0%

0.9m Telescope

	Requests		Nights Requested		Total Nights	
Instrument	**Dark**	**Bright**	**Dark**	**Bright**	**Requested**	**Percentage**
CFIM	18	6	90.00	26.00	116.00	100.0%

SCHM Telescope

	Requests		Nights Requested		Total Nights	
Instrument	**Dark**	**Bright**	**Dark**	**Bright**	**Requested**	**Percentage**
NFDIR	7	2	47.00	53.00	100.00	87.0%
NFPRM	0	2	0.00	15.00	15.00	13.0%
	-	-	----	-----	-----	-----
	7	4	47.00	68.00	115.00	100.0%

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A Busy Chilean Summer for CTIO REU Students

CTIO was humming this summer (the January through March Chilean summer, that is!) with the activities of many enthusiastic students. The NSF-funded Research Experiences for Undergraduates (REU) program at CTIO supported four US undergraduates, who joined a total of seven Chilean students to make this year's REU/Summer Student Program the largest we've ever had. This year's participants, and their projects, included:

Jomel Atienza-Rosel (California State University, Los Angeles) - "Integrated Photometry of Globular Clusters in the LMC and M33" (Advisors: Bob Schommer and Nick Suntzeff)

Amanda Jefferson (University of Maryland, College Park) - "Searching for Supernova Remnants in the Magellanic Cloud Emission-line Survey" (Advisor: Chris Smith)

Aaron Steffen (University of Wisconsin, Eau Claire) - "Multicolor Light Curve of the Type Ia Supernova 1997e" (Advisors: Nick Suntzeff and Mark Phillips)

Patrick Welti (Mankato State University) - "Developing an All-Sky Monitor Camera System" (Advisors: Roger Smith, Tom Ingerson, and Steve Heathcote)

These US undergraduates were joined by a masters student from the University of Chile and four Chilean undergraduates from the University of La Serena:

Juan Cortes (University of Chile) - "Near-IR Study of Magellanic Cloud Star-forming Regions" (Advisors: Ron Probst and Monica Rubio)

Javier Barahona, **Danilo Castillo**, **Alejandra Peralta**, and **Sergio Pizarro** (all from the University of La Serena) - "Photometry of Nearby Open Clusters" (Advisors: Ren Mendez and Chris Smith, with help from Ricardo Covarrubias and 1996 REU participant Roger Leiton)

Two Chilean engineering students, doing internships at CTIO, also participated in the summer student program. **Daniel Quevedo** (University of Santa Luca) worked on a quantum efficiency calibration unit, and **Juan Pablo Gmez** (University of Santa Luca) worked on an image-tube protection circuit for the All-Sky camera.

In addition to their individual projects, all students participated in observing runs on Cerro Tololo, including a 3-4 night "orientation" run on the Curtis Schmidt telescope to introduce them to observing techniques and the instrumentation and CCD control system at CTIO. Other activities included weekly scientific seminars for the students by CTIO staff members and a tour of the Gemini South site on Cerro Pachon (thanks to Paul Gillett). Highlights of the 1998 CTIO REU program, and more information about the students and their projects, can be found on the CTIO REU Web page (http://www.ctio.noao.edu/REU/reu.html) .

The exposure to the international astronomical community, working side by side with students from other countries, is a key component of the CTIO REU experience for all these young scientists, many of whom will make up the next generation of astronomers in an era of international telescope projects (Gemini, SOAR, and others). Although not all US students have degree programs flexible enough to accommodate an academic term REU program, for those who are interested in a special opportunity to explore research in an observational and international environment, we offer a unique REU experience. Operating the program during the Chilean summer allows us to provide a rich scientific and educational program for both Chilean and US students.

We are now starting to plan for next year's REU program, for January through March 1999. Look for announcements in future Newsletters, and check our CTIO REU Web page (http://www.ctio.noao.edu/REU/reu.html) for the most up-to-date news on the program.

Chris Smith (csmith@noao.edu)
and the CTIO Student Advisors

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CTIO Staff Comings and Goings

There have been a significant number of changes recently in both the scientific and technical staffs here in La Serena:

Chris Smith, a former CTIO postdoc presently holding the Mc Laughlin Postdoctoral Fellowship at the University of Michigan, will join us as an Assistant Astronomer beginning in August. Chris has been a frequent visitor in recent years, carrying out a major emission-line imaging survey of the Magellanic Clouds with the Curtis Schmidt telescope. He has been in residence this southern summer as the director of our NSF Research Experiences for Undergraduates program. We look forward to welcoming Chris and his wife Jacque back into the CTIO family.

We shall also be welcoming several new postdocs over the coming months. **Stefanie Wachter** and **Don Hoard** come to us from the University of Washington. Stefanie's thesis work was on observational aspects of accretion in low mass X-ray binaries. Previous to this, she received a Diploma in Physics from Ludwig-Maximilian University, Munich, for work on mass loss rates in O stars. At CTIO she plans to extend her work on binary systems to the formation processes of pre-main-sequence binaries. Don has also just completed his thesis, on the role of accretion in the observational properties of cataclysmic binaries, and will continue exploring accretion processes in astrophysics. Completing a "triple play" of new University of Washington PhDs, we will also be joined by **Knut Olsen**. His thesis uses HST WFPC2 observations of LMC clusters to study the star formation history of the LMC. This is related to the broad question of formation of dwarf galaxies. Knut will use CTIO facilities to work on the stellar populations of field dwarf galaxies.

Two of our present senior scientific staff are currently absent on sabbatical. **Bob Schommer** is visiting the Institute of Astronomy, Cambridge (UK) for six months. He is working on data related to the High-Z Supernova Survey and the determination of cosmological parameters, and on age and metallicity measurements of star clusters in the LMC and M33. Bob reports that living in a centuries-old European university city is fascinating, while his family is rising to the challenge of the brisk English weather. **Brooke Gregory** is spending a year at Adaptive Optics Associates in Cambridge, MA. This company was founded in the days of Star Wars and was one of the pioneers in the development of AO in general and of the concept of laser guide stars in particular. Brooke is studying various aspects of AO technology. He has already had hands-on experience working with a new, low cost micromachined electrostatic deformable mirror and with AOA Shack-Hartmann wavefront sensor and wavefront analyzing software. Brooke informs us that a centuries-old North American city is equally fascinating, and brisk!

Maxime (Max) Boccas arrived in April to fill the position of Optical Engineer recently vacated by John Filhaber. Max has been working in Australia at the University of New South Wales, building automatic telescopes to do IR astronomy at the south pole. Prior to that, he spent several years in Chile at ESO. His live coverage of the 1994 solar eclipse on Chilean TV, marked by his spontaneous expressions of excitement during totality, gave him nationwide fame as the "Oo-lah-lah Man." Max, wife Sofia, and two year old son Sebastian have settled into Casa 9 in the Recinto.

Marco Bonati, who had been a contract worker in the Electronics Engineering section of ETS, began a regular staff appointment in the Computer Applications Group on 1March. Marco's hire puts this group back up to strength after recent departures to Gemini and elsewhere. Marco will work primarily on Arcon-related matters in support of the Mosaic CCD imager project.

On the mountain, we have several new hires in Telescope Operations to provide telescope operators under contract to tenant projects. **Mauricio Martnez** and **Danilo Castillo** are observers for the USNO Southern Astrometric Survey. Danilo, a physics major from the University of La Serena, took part in the Summer 1998 REU program. **Claudio Aguilera** and **Joselino Vsquez** are doing the 2MASS observing. **J.J. Prez** (ex La Silla) and **Mara Teresa Acevedo** are observers for the MACHO project on the 0.9-m. Mara Teresa studied fisheries management in Iquique before joining us to plumb the starry depths.

Together with all these "comings" there have been some "goings."

Assistant Director **Mark Phillips**, a former CTIO postdoc and a scientific staff member since 1978, is leaving at the end of May to become a Staff Astronomer at the Observatories of the Carnegie Institution of Washington. He will be located at the offices of the Las Campanas Observatory in La Serena. Mark has been a leader and an inspiration to us here at CTIO. His scientific achievements in the field of AGN's and supernovae are recognized world-wide. The scientific prestige of the CTIO staff owes much to his scientific accomplishments and leadership here over the last 20 years. Mark's departure is a loss to CTIO, but the temptation to do more science with the twin 6.5-m Magellan telescopes is understandably strong. Fortunately we will continue to enjoy Mark's professional and personal presence in the astronomical and civic communities here in La Serena. We wish him well, and anticipate working together to further astronomy in the IV Region.

Research Associate **Michael Keane** is leaving in May to take a position with Raytheon Optical Systems (formerly Hughes Danbury) as a Senior Systems Engineer. Michael will be working in a group which has the technical leadership role in advanced optical systems, including a number of exciting astronomical applications. Michael, Khrystyne, and a menagerie of cats and dogs have been delightful friends and neighbors for almost three years. Their most memorable "souvenir" of Chile is undoubtedly little Lynn Francis, born in La Serena six months ago.

Long time member of the Computer Applications Group, **Dan Smith**, has left CTIO after 12 years to start a new career. Dan has relocated to Charlottesville, Virginia, where he operates a video photography service. This grew out of a hobby interest; those who were here for the Blanco telescope dedication will recall the wonderful "video photo album" Dan created as an honor and gift to the Blancos. Dan and Janet, former residents of Buffalo, NY, say they have introduced their Serenense sons Taylor and Adam to the joys of snow during the Virginia winter.

Finally, applications programmer **Pedro Gigoux** left CTIO for Gemini and Hawaii at the end of March. Pedro joins a growing number of ex-Tololinos who are working to commission the Gemini North telescope, with the intention of returning home to do the same for Gemini South. While we regret losing Pedro's skills and cheerful presence, at least for a few years, this is another mark of the growing interconnection between CTIO and US participation in Gemini under the new AURA Observatory umbrella.

Malcolm Smith (msmith@noao.edu)

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Wide-Field CCD Imaging on the Blanco Telescope

We are shortly about to enter the fourth semester that the Big Throughput Camera (BTC, http://www.ctio.noao.edu/pfccd/btc_arw.html) has been available for wide-field imaging at the prime focus of the Blanco 4m telescope. During this time the percentage of BTC time requested compared to that for the total instrument complement has steadily risen, from 15% for semester I 1997 to 30% for semester II 1998. This has partially been at the expense of the prime focus CCD imager as we increase the 6 6 inch filter complement, but also represents a decrease in the requests for the R-C spectrograph. Interestingly, BTC proposals have always done better than average in the TAC. As an example, the BTC is scheduled for 25% of the available nights in the present semester whereas it corresponds to only 20% of the total requests.

Upgrades to the BTC planned for May 1998 include replacement of the #1 CCD with a new science-grade device, and installation of a more compact VME chassis. The present #1 CCD has very poor blue response and a large thinning defect in the center of the format, so a higher quality replacement will be welcome. There is also a possibility that the #2 CCD, which apart from poor blue response is very non-linear, will be replaced at the same time.

The longer-term future of wide-field imaging on the Blanco 4-m involves the use of the NOAO Mosaic II Imager. This instrument is a clone of the Mosaic I, used at KPNO on the Mayall telescope (http://www.noao.edu/kpno/mosaic/mosaic.html) and will have an 8K 8K mosaic of thinned SITe CCDs as detector. The instrument itself is undergoing final tests in Tucson while the pacing item, the CCDs, are being delivered regularly by SITe. The first eight CCDs will be used to replace the Loral CCDs in NOAO Mosaic I during June, and the present schedule calls for the installation of the CCDs in Mosaic II later in the year, with commissioning on the Blanco telescope taking place in March 1999.

Given the high scientific demand for wide-field imaging at the Blanco, a goal is to make the transition from the BTC to Mosaic II as seamless as possible. Extensive testing of the instrument (less CCDs) has begun in Tucson, and has included tests at the Kitt Peak 0.9-m telescope. The Arcon CCD controllers are being built at CTIO with final system integration scheduled for January and February 1999. Extensive modifications to the prime focus pedestal and cage will also occur during this period. Since the instrument is a clone, with almost all hardware and software identical to that for Mosaic I, a prolonged commissioning and verification period should not be required. However schedule details depend critically on the rate of delivery of the SITe CCDs, so details of instrument availability for Semester I 1999 must be postponed to the September Newsletter. If there are delays, the BTC loan will be extended into Semester I 1999.

Finally, we are slowly building up our complement of large (146mm sq.) filters, with Washington c and m, DDO 51, Sloan ugriz, [OIII] 5007, [OIII] continuum, Ha 6563 and [SII] 6728 on order, together with an improved Johnson U presently under construction in Tucson. Suggestions for future filter purchases are welcome.

Alistair Walker (awalker@noao.edu)

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Status of Hydra CTIO

Hydra CTIO, an upgraded version of the Hydra WIYN fiber positioner, is being constructed by the Instrument Projects Group in Tucson for use on the Blanco telescope. To prepare for Hydra's arrival, CTIO is installing a new R-C field corrector with atmospheric dispersion compensation on the telescope, and completely rebuilding the old Argus bench mounted spectrograph, a level of effort comparable to the building of Hydra itself.

Hydra will have two sets of 138 independently positionable fibers, 1.3" and 2.0" (200 and 300 microns) in diameter. Both the fibers and the corrector have been designed so that the system will be efficient over the widest possible wavelength range. Losses in the corrector and fibers are expected to be small at all wavelengths longward of 4000. Fiber losses will decrease the throughput in the UV, but we expect the system will be useful to 3350, the short-wavelength cutoff of the corrector. The fibers are also believed to transmit well at wavelengths of up to 2 m, leaving the possibility open for a future upgrade of Hydra CTIO for use in the near IR.

The Hydra positioner is scheduled to arrive at CTIO on 1 October 1998, by which time the new corrector will have been installed and characterized. The system will be commissioned during October-December with the goal of having the instrument available for shared risk observing during the first semester of 1999 and routine observing thereafter.

Commissioning of Hydra CTIO, installation of the new corrector, a scheduled biennial 4-m aluminization, plus upgrades to the 4-m telescope's encoders and servo motors means that the demands for engineering time on the Blanco are unusually heavy during second semester 1998. We ask users to bear with us as we feel the result will be a much improved telescope and instrument package.

Observers contemplating shared risk use of Hydra CTIO during first semester 1999 should consult the existing Hydra WIYN and Argus documentation in preparing their proposals. Hydra CTIO's user interface will be similar to that of Hydra WIYN so the instruments will appear much the same to the observer. However, Hydra CTIO is expected to position fibers several times faster and to greater accuracy.

The new spectrograph will be optically quite different from the one used in Argus, but the same gratings will be used, so the resolutions and coverage available on Hydra will be approximately the same as those listed in the Argus documentation.

Tom Ingerson (tingerson@noao.edu)

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CCD at the Curtis Schmidt Telescope

Avid readers of these Newsletters will have followed with interest, or maybe horror, the saga of the past year of CCDs at the Schmidt telescope. For the last several months we have scheduled SITe 2K #5 at the Schmidt, which has provided high throughput and excellent image quality over a 1.7 square degrees field, albeit with 2.3" pixels producing very undersampled images. At the end of semester I 1998 this CCD moves into a dedicated dewar for use with Hydra at the Blanco telescope and is thus no longer available at the Schmidt. It will be replaced by the coated STIS 2K CCD until recently used at the Burrell Schmidt on Kitt Peak. This CCD should provide almost identical performance to the STIS CCD previously used at the Curtis Schmidt, except that it will probably only have two good amplifiers; thus readout time will be one minute. Pixel size is 2.0". See: (http://www.ctio.noao.edu/pfccd/pfccd.html#4) for a summary of the CTIO direct imaging CCD characteristics.

Alistair Walker (awalker@noao.edu)

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2MASS Goes On the Air at CTIO

The 2 Micron All Sky Survey (2MASS), a project shared between The University of Massachusetts (Mike Skruskie, Principal Investigator) and the Infrared Processing and Analysis Center (IPAC, JPL/Caltech), funded primarily by NASA and NSF, is intended to produce the following data products:

- A digital Atlas of the sky comprising more than 1 million 8 16 arcminute images having about 4" spatial resolution in each of the IR J, H, and K wavelength bands.
- A point-source catalog containing accurate (better than 0.5") positions and fluxes for ~ 300 million stars.
- An extended source catalog containing positions and total magnitudes for more than 500,000 galaxies and other nebulae.

2MASS utilizes two new, highly automated 1.3-m telescopes, one at Mt. Hopkins, AZ, and one at CTIO. Each is equipped with a three channel camera capable of observing simultaneously at J, H and K. The cameras use 256 256 arrays of HgCdTe detectors (more information about this project can be found at http://www.ipac.caltech.edu/2mass/).

The survey started in the North in April last year, and we are happy to announce that on the night of 4 March 1998 the southern observing system began acquiring its first three-channel images. The CTIO facility began nightly survey observations on 19 March 1998, and is presently operating routinely. CTIO provides observing and technical support under contract to 2MASS.

While everything is going smoothly, the delay between data taking and data processing is lengthier than in the North due to the transit time for the tapes. The data tapes pass from CTIO through NOAO Tucson to IPAC. The robustness of the packaging was improved after one tape case broke in shipment (the tape was recoverable). The largest operational problem encountered in the south is maintaining a high degree of cleanliness of the telescope against dust infiltration at its dry, barren site. Several actions have been undertaken to improve matters.

Patrice Bouchet (pbouchet@noao.edu)

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CCD Mosaic Imager Status

Testing is underway on the SITe CCDs that will replace the engineering-grade chips in the Mosaic Imager this summer. Preliminary reports are encouraging; the chips tested so far show read noise in the 3-6 e^- range and good charge transfer efficiency and cosmetic quality. The QE curves are typical of SITe CCDs (such as T2KB) with peak sensitivity around 80% at 600 nm, dropping to about 40% at 350 nm. This represents a huge gain over the chips currently in the Mosaic Imager, particularly in the blue. Barring unforeseen difficulties, the new CCDs will be installed in June and will be tested on the 4-m telescope in mid-July.

The demand for the Mosaic Imager in the most recent round of proposals (1998B) was heavy. Twenty-seven proposals requested 94 nights on the 4-m telescope and 31 proposals requested 139 nights on the 0.9-m telescope.

Our filter collection for Mosaic continues to grow. By next semester, we expect to have broad-band filters: U, B, V, R, I, as well as g, r, i, and z' from the Gunn/SDSS system. We will also have various narrow-band filters for [O III] and Ha observations. See the Mosaic filter list at http://www.noao.edu/kpno/mosaic/filters/filters.html for the most recent information.

The latest information about the CCD Mosaic Imager and the most current version of the user manual can be found at the Mosaic Web Site (http://www.noao.edu/kpno/mosaic/mosaic.html).

Todd Boroson (for the Mosaic Team)

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NOAO Newsletter - Kitt Peak National Observatory - June 1998 - Number 54

El Nio 6, WIYN Queue 0

The NOAO WIYN queue observing experiment hasn't been completely shutout during the "El Nio" winter and spring of 1998, but it hasn't made much progress either. Semester 1998A has been more affected by bad weather than the three previous semesters that the queue program has been in full operation. By late April the queue program had used 208 of its 470 hours allocation (44%) but the dome was only open 38% of the time (80 hours). Few of these hours were photometric and, as a result, useful data has only been obtained for 10 of the 27 programs in the 1998A queue. Indeed, only two programs have received more than 10 hours worth of observations. Of 21 nights devoted to NOAO science programs at WIYN, 7 nights have been completely lost to weather and the dome has been open for substantially less than half of the night on six occasions. Both dark time and bright time programs have been affected equally. It is clear even at this early stage of the semester that programs with targets westward of RA = 13h have no chance of receiving data for all of their fields. Observations requiring photometric conditions and good seeing are the most affected by the weather pattern and almost no progress has been made on them.

We would dearly like to be notified of the disposition of the data that investigators have received from the NOAO WIYN queue program in previous semesters. Please send us preprints and/or reprints of any refereed papers that include data obtained with the WIYN telescope. Relevant publications should be sent to:

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

Observing proposals for the 1998B semester (August 1998 - January 1999) have been received, and there has been a large increase in the number of extragalactic programs asking to use WIYN. 33 proposals will be reviewed by the KPNO extragalactic TAC. There were 19 galactic proposals and 1 solar system proposal submitted. In addition, 11 2HR Queue proposals were submitted. These proposals request a total of 135 nights of WIYN telescope time. The WIYN Queue program is typically allocated about 60 nights during a semester.

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

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Night Lunch on the Web

It is now possible to place your night lunch or breakfast order electronically, in advance of or during your observing run. The Night Lunch Request Form is located under the Electronic Forms section of the KPNO home page or at http://www.noao.edu/kpno/forms/nlunch/. We believe you will find this form easy to use and hopefully enjoy the convenience of this new service.

John Dunlop

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NOAO Newsletter - National Solar Observatory - June 1998 - Number 54

From the NSO Director's Office

Most of the activities in recent months have been focused on the successful launch of the SOLIS project. The implementation of SOLIS will include active participation by both NSO sites. The project absorbs much of the energy of the NSO scientific and technical staff, with details of the instrumentation design being developed and recruitment of essential personnel currently underway. A meeting of the SOLIS Science Advisory Group has been scheduled at the May SPD meeting. These are exciting times at the NSO!

The 1998 NSO Sac Peak workshop on *"High Resolution Solar Physics: Theory, Observations, and Techniques"* will be dedicated to Richard B. Dunn's lifelong contributions to solar astronomy. Dick has decided to retire, as of 31 August 1998, at which time he will become an NSO/NOAO Emeritus Astronomer. The topic of the workshop is especially appropriate for this occasion. We anticipate that the combination of an interesting workshop and the associated Dunn festivities will encourage many of you in the solar community to make the pilgrimmage to this Mecca of solar astronomy that Dick Dunn created.

The 26 February Caribbean solar eclipse was very successful. I personally enjoyed it in its full glory as a tourist, but two NSO scientists, Jeff Kuhn and Haosheng Lin, in a joint experiment with the High Altitude Observatory, obtained very interesting observations both from the air and from the ground. The implications for coronal magnetic field observations that are enabled by the discovery of the Si IX emission line at 3.9 m are particularly intriguing.

Recent NSO personnel changes include the promotions of Mark Giampapa to Full Astronomer and K.S. (Bala) Balasubramaniam to Associate Scientist, and the appointment of George Simon as NSO/NOAO Astronomer Emeritus. George has been one of NSO's "partner" staff and a lifelong Air Force employee at Sac Peak. His appointment to NSO/NOAO emeritus status is a recognition by NOAO of his contributions to NSO as a whole. I expect that George's joining the elite club of NSO Emeriti will increase the already substantial contributions to NSO by that group, which includes Keith Pierce, John Jefferies, Bill Livingston, Jack

Zirker, and now Dick Dunn.

The NSO Users' Committee met on 20 and 21 April. Its report is not yet available at this writing. You should look for it in the next NOAO Newsletter.

Stay tuned for more news on the outcome of the "Parker Committee" study, as well as the results of the NSO Director search!

Jacques Beckers

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Laser-Guide-Star at the Sac Peak Vacuum Tower Telescope

The University of Chicago Adaptive Optics System (ChAOS) group has been developing its sodium laser-guide-star system at the Sac Peak solar Vacuum Tower Telescope (VTT), since the VTT provides a good optics laboratory environment combined with a good supply of nighttime observing time. ChAOS is a high-order laser-guide-star adaptive optics (AO) system built for the large ground-based astronomical telescopes. One of the critical techniques in the system is to generate an artificial star in the upper atmosphere for the AO system's wavefront sensor. Using a laser with wavelength tuned to the sodium D2 line shining upon the mesosphere at about 90 kilometers above sea level, a bright "sodium star" can be generated.

The photo shows the laser-guide-star experiment at the NSO VTT. During the experiment, the artificial star, as bright as the 9th magnitude and as small as about the size of a natural star, was generated, and various factors that affect the quality of the artificial star were explored. The VTT was used to launch the laser beam to the mesosphere and observe the return light from the generated artificial star simultaneously. The photo was taken during the experiment on the night of 20 November 1997. In the photo, the VTT was lit up by moonlight and a 4-watt laser beam was launched from the top of the telescope. Some well-known constellations such as Orion and Taurus are also visible in the picture.

Fang Shi, Ed Kibblewhite, Jacques Beckers

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NSO Sac Peak Celebrates 50th Anniversary and Dedication of a New Visitor Center

The Sunspot Astronomy and Visitor Center located at the National Solar Observatory in Sunspot, New Mexico was formally dedicated on 13 April 1998. The list of 150 attendees ranged from Rudy Cook, the first observer at the location in 1947, to US Representative Joseph Skeen, and included most of the people responsible for the successful completion of the Visitor Center. In conjunction with the dedication of the Visitor Center, a 50th anniversary celebration of the founding of the Sacramento Peak Observatory was held. Former employees and residents came from as far away as Florida, California, and Washington to honor the celebration. Solar observations from Sacramento Peak Observatory began in the summer of 1947 by Rudy Cook for Harvard College and the US.Air Force, and have carried forward to the present. The Visitor Center is open daily to host and educate Sunspot's visitors, and provide meeting space for educational and scientific purposes.

Rex Hunter

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The NSO Digital Library Opens Its Virtual Doors

A major function at NSO is to provide its solar data to a large user community, which includes both professional scientists and the general public. To facilitate this process, and to improve data access, the initial implementation of the NSO Digital Library is now complete and directly accessible through the internet at

http://www.nso.noao.edu/diglib.

The NSO Digital Library currently consists of three 100-disk CD-ROM jukeboxes mounted on the main NSO data server in Tucson; additional magnetic disk storage at both NSO/Kitt Peak and NSO/Sac Peak; a Web forms user interface for searching the available data; an anonymous FTP data delivery system, and two high-resolution flatbed scanners to ingest photographic data. As of this writing, the library contents include all of the Kitt Peak Vacuum Telescope synoptic data from 1974 to the present; the Sacramento Peak Ca K and H spectroheliograms for May 1996 through August 1997; the Sacramento Peak coronal scans from 1993 to the present; the Kitt Peak Fourier Transform Spectrometer (FTS) transformed spectra from 1976 to the present; and the Kitt Peak FTS solar spectral atlases. Future additional contents will include the FTS raw interferograms, solar-stellar data, High-l helio-seismometer Ca K images, Near Infrared Magnetograph (NIM) data, SOLIS data, and historical data from the US Naval Observatory and Mt. Wilson. The next major revision to the library interface will incorporate quick-look graphics and queries based on quantities computed directly from the data.

The development of the Digital Library has been generously supported by the NSF Division of Atmospheric Sciences National Space Weather Program and by the NASA Upper Atmosphere Research Program. A number of NSO staff members have materially contributed to this effort, including Detrick Branston, Wendy Erdwurm, Jack Harvey, Tim Henry, Amanda Jaksha, Mary McGraw, Robert McGraw, Larry November, Doug Rabin, Jan Schwitters, Anna Scott, Nelsey Toner, and Jeremy Wagner.

Frank Hill

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Progress Report on the Main Vertical Spectrograph Computer Control at the McMath-Pierce Telescope

Phase 2 of the McMath-Pierce main spectrograph upgrade is ongoing. A portion of the software user interface is in place and functioning. The spectrograph is now able to rock the grating between two specified wavelengths -- an important feature, used during flat-fielding of the NIM InSb array. Previously, the grating had to be rocked manually for several minutes while flat integrations were taken. This was a tedious process for the user, and difficult to perform accurately. A standard command language to allow users to control the grating over a RS232 serial port, an ethernet port, or remotely via a Web GUI interface is still under develpment. The serial/ethernet access was implemented to allow users who bring their own computers and instrumentation to directly control the spectrograph. The GUI will allow users in the main observation room to run the grating without the handpaddle, as well as provide support personnel with a means to remotely trouble shoot the spectrograph operation. The goal is to have phase 2 of this upgrade completed by the end of the current calendar year.

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

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More Efficient Temperature Stabilization of the McMath-Pierce Telescope

The tunnel temperature stabilization system of the McMath-Pierce telescope will be upgraded to reduce energy costs associated with operation of the solar facilities on Kitt Peak. The above-ground portion of the telescope cooling system consists of a pump that circulates a 38% solution of glycol through the telescope skin panels, some interior panels near the top, and cooling coils embedded in the concrete deck on the telescope's top, before returning to a 16,000-gallon storage tank. The glycol in the storage tank slowly absorbs the heat from the telescope as the solution is circulated, keeping the upper telescope at a temperature approximating the prevailing outdoor air temperature. At night, the absorbed heat is re-radiated away to the night sky by the circulating liquid.

The motor currently driving the pump is 25 hp. It is estimated that a cost savings of 5-10% could be realized by replacing the existing motor with a high-efficiency motor along with a variable frequency drive (VFD) unit. Studies indicate that the flow could be reduced at night without affecting telescope performance. The VFD unit will allow this to be tested. Any reduction in the flow at night would translate to further savings on energy cost.

The 25 hp high-efficiency motor and VFD have been ordered and installation is planned for the spring quarter.

Claude Plymate, Dan Little,
Randy Feriend, Teresa Bippert-Plymate

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NSO Observing Proposals

The current deadline for submitting observing proposals to the National Solar Observatory is 15 July 1998 for the fourth quarter of 1998. Forms, information and a Users' Manual are available from the NSO Telescope Allocation Committee at P.O. Box 62, Sunspot, NM 88349 for Sacramento Peak facilities (sp@sunspot.noao.edu) or P.O. Box 26732, Tucson, AZ 85726 for Kitt Peak facilities (nso@noao.edu). A TeX or PostScript template and instruction sheet can

be emailed at your request, obtained by anonymous ftp from ftp.sunspot.noao.edu (cd pub/observing_templates) or ftp.noao.edu (cd nso/nsoforms), or downloaded from WWW at http://www.nso.noao.edu/.

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NOAO Newsletter - US Gemini Program - June 1998 - Number 54

US Gemini Program

US Gemini Instrumentation

Substantial progress has been made during the last six months on all the instruments and subsystems that are US efforts:

The Institute for Astronomy at the University of Hawaii is fabricating assemblies for the Gemini Near-IR Imager (NIRI) as well as sending out non-critical parts to commercial machine shops. Almost all optical components have been delivered, though a few did not meet the specifications and need to be reworked. A critical component, the gimbal mirror steering mechanism for the On-Instrument Wavefront Sensor, recently passed a cold test, so it appears that full integration with Gemini control systems will be possible during instrument commissioning, which is scheduled for spring 1999.

NOAO held an interim review of the Gemini Near-IR Spectrograph 30 April to close out items not covered at the November 1997 CDR. The design is essentially complete, and optical procurement drawings are being released to vendors for quotes. Durham University in the UK is designing an Integral Field Unit for integration when the instrument is assembled next year.

A contract has been signed with the University of Florida to supply the Gemini Mid-IR Imager. Charles Telesco is the PI on this 8-26 m instrument. USGP personnel met with the team to tour their facility and to kick off the project. Delivery is scheduled for March 2001.

Santa Barbara Research Center has delivered six IR arrays, with two of them appearing to be of science quality based on preliminary cold tests. Four more hybridizations are in process; the remaining two attempts will be deferred until next year to take advantage of technology improvements.

The NIRI array controller is undergoing final system tests by Mike Merrill, Instrument Scientist and Andy Peters, the electrical engineer responsible for the controllers at NOAO. Preliminary results indicate that noise specifications will be met. The unit is expected to be delivered to the University of Hawaii this summer.

NOAO expects EEV to deliver the science grade CCD arrays this summer. As an aid to checking out the SDSU-2 controllers, Gemini will purchase two engineering grade arrays from EEV. Software development is on schedule. The first GMOS camera with fully integrated detectors and controllers is expected to be delivered to Canada this fall.

Upcoming Instruments

Announcements of Opportunity are being prepared for two instrumentation efforts in the Ongoing Instrument Program for the Gemini Telescopes. The first of these is for a Near-IR (0.8-5 m) Imager/Coronagraph optimized for use with Adaptive Optics at the Gemini-South Telescope. The second AO is for development studies related to a Near-IR (1-2.5 m) multi-object spectroscopic capability. The long-term plan calls for such spectroscopic capabilities for both wide and narrow field applications. Gemini is intending to fund a substantial amount of up-front development to reduce the risk in areas of technical uncertainty, such as how to construct a cryogenic multi-object focal plane. These two AOs will be released to the national Gemini Project Offices in the next couple of months. They will be distributed by the USGP to everyone in the US who has previously indicated their interest in participating in the Gemini instrumentation effort.

Todd Boroson, Mark Trueblood

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NOAO Newsletter - Central Computer Services - June 1998 - Number 54

IRAF Users Committee

By the time you read this, the IRAF Users Committee (IUC) will have held its annual meeting on 6 May in Tucson. The primary responsibility of the IUC is to represent the interests of the IRAF user community in setting priorities for the IRAF project, reporting to the Project Scientist and to the NOAO director. Many new faces are on the committee this year; we thank both the old and new members for their valuable contributions. Users are encouraged to contact any of the committee members about any issues that they would like to see brought to the attention of NOAO management. The IUC's current membership is listed below; see also the Web page at http://iraf.noao.edu/iraf/web/admin/iuc.html . The most recent report from the IUC is posted at the same Web address.

Andrea Prestwich, Chair (CfA)
prestwich@cfa.harvard.edu

Peter Eisenhardt (JPL)
prme@kromos.jpl.nasa.gov

Gary Schmidt (Steward)
schmidt@as.arizona.edu

Mike Bolte (Santa Cruz)
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Steve Heathcote (CTIO)
sheathcote@noao.edu

Jon Morse (Colorado)
morsey@casa.colorado.edu

George Jacoby (gjacoby@noao.edu)
IRAF Project Scientist

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IRAF Update

Our top priority since the IRAF V2.11 release last fall has been platform upgrades, so that everyone can make use of the new system without having to endure long delays for their platform to be supported. It has been a lot of work, but this process is nearly complete. Two additional IRAF platform upgrades were released in mid-March; these were for SGI systems running IRIX 6, and for IBM systems running AIX 4. These releases were for patch level V2.11.1, the same patch level available for all other current V2.11 distributions. These include SunOS and Solaris, the DEC Alpha running Digital Unix V4.0, the Hewlett-Packard running HP-UX 10.20, and PC-IRAF for Slackware Linux V3.3, Red Hat Linux V5.0, and FreeBSD V2.2.5.

The V2.11 updgrade for OpenVMS is nearing completion. We hope to make this port available in the early summer for both the DEC Alpha and the VAX. Additional support for PC-IRAF is planned for Solaris x86 and for MkLinux. The initial Solaris x86 port has been done for some time, but we are awaiting the release of MkLinux DR3 before proceeding further with these ports. A release for DECstation Ultrix is planned as well if our DECstation stays healthy, although we plan to drop support for this platform after V2.11.

All the IRAF distributions can be found in the IRAF network archive on iraf.noao.edu in the iraf/v211 directory. As new updates or releases for new platforms become available they will be announced on the IRAF mail exploder (newsgroup/mailing-list adass.iraf. announce) and on the IRAF Web pages. If you do not already receive adass.iraf.announce and wish to do so, you can sign up on the IRAF Web page, or by sending a subscribe request to the mailing list processor at listproc@iraf.noao.edu.

A new issue of the IRAF Newsletter highlighting features of the IRAF V2.11 release and related software (STSDAS, SAOtng, our new CCD Mosaic package, etc.) is now available off the IRAF home page (http://iraf.noao.edu/) in HTML format as well as in PostScript and PDF. All V2.11 users are encouraged to retrieve a copy of this informative Newsletter. It contains nearly 40 articles, including information about the V2.11 release, hints about using the new V2.11 system and application packages updates, and status reports from major IRAF projects.

With the V2.11 release and platform upgrades nearing completion our focus is shifting to more future oriented projects being driven by various NASA grants and contracts. These include the Open IRAF effort, an image server and GUI project being done with SAO, and providing IRAF support for AXAF (some significant work on Open IRAF was done last year as well, e.g., the message bus and distributed shared object research and prototype message bus implementation). Although we wished we were further along with this work by now, the critically important V2.11 release and CCD Mosaic project are in good shape now, and we are looking forward to being able to work on new stuff again. Some exciting new software is in the works, and it is going to be interesting developing this over the next several years.

An upgraded version of the Client Display Library (CDL) was released in early March. CDL is a library which allows host C or Fortran programs to do image display and graphics to any Ximtool compatible image display server. The new version includes improved text capabilities providing a number of font choices (including the Greek font), subscripting and superscripting, variable line styles and widths, full ANSI-C function prototyping, an experimental SPP language binding, and numerous bug fixes. This release also contains a "virtual" display server VXIMTOOL, which can be used for debugging client programs or as a `tee' for sending images to multiple servers. CDL V1.6 is available from our /iraf/x11iraf archive directory.

Frank Valdes represented the NOAO/IRAF CCD Mosaic team at the SPIE meeting in Hawaii in late March, and presented an overview paper on the NOAO Mosaic data system entitled *"The NOAO Mosaic Data Handling System,"* by D. Tody and F.G. Valdes. The paper is available off the IRAF home page (look under "Projects") or at http://iraf.noao.edu/projects/ccdmosaic/.

Matt Cheselka has joined the IRAF group as a Scientific Programmer. Matt comes to us from Steward Observatory at the University of Arizona where he worked as a Research Specialist for the Center for Astronomical Adaptive Optics (CAAO). Matt's main responsibility was to create programs and user interfaces for high resolution image processing and data reduction. Other projects included an `image calculator' called "OpC," an automated aircraft detection system, and an image acquisition and analysis user interface for a new 1024 1024 near-infrared array being developed by Don McCarthy. In addition to his programming responsibilities, Matt will be helping with IRAF technical support so you can expect to be hearing from him shortly. Welcome aboard, Matt!

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---"A Library of Stellar Spectra"; "Catalogue
   of Principal Galaxies"; "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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NOAO Newsletter Staff

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