NOAO Newsletter - June 1999 - Number 58

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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

NOAO Educational Outreach

Central Computer Services

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Comments concerning this Newsletter are welcome and will be forwarded to the appropriate editors.
Newsletter Posted: 28 May 1999

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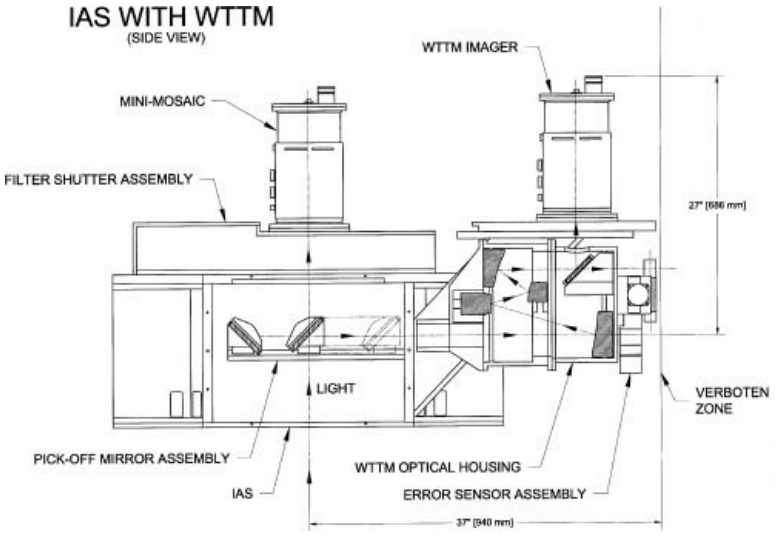
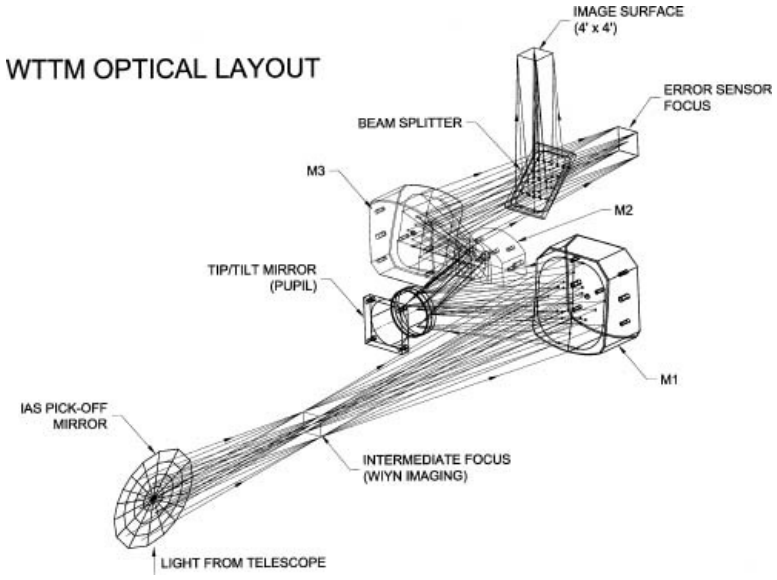
A Tip-Tilt Module for WIYN

The WIYN Consortium has initiated the construction of the WIYN Tip-Tilt Module (WTTM), which is an optical-NIR reimaging system that utilizes fast tip-tilt compensation. The WTTM will replace the Calibration Illumination Assembly (CIA) in the WIYN Instrument Adapter System (IAS) as shown in Figure 1. The CIA functions are maintained by relocating it under the WIYN azimuth skirt and bringing its calibration light to the IAS via a fiber-optic. When complete, the WTTM will provide the IAS with a second tilt-compensated imaging port to complement the standard port feeding the Mini-Mosaic CCD camera. Figure 1 shows the IAS pick-off mirror in position to feed the WTTM. Because both imagers are independent and can run simultaneously, selection between the two can be accomplished quickly by simply moving the pick-off mirror. Following the pick-off mirror, the original WIYN focus is located at the input of the WTTM (Figure 2), still inside the IAS structure. WTTM optical design re-images this focus through a series of off-axis mirrors, allowing the WTTM to be used over a very wide wavelength range. With enhanced silver coatings, the WTTM maintains high efficiency from 0.4 m through 1.7 m.



The first mirror (M1) images the telescope pupil at the tip-tilt mirror and is followed by a two mirror (M2 and M3) camera. The science beam is fed off the first surface of the beam-splitter, where the FOV is 4' 4' at a plate a scale of 0.12" per 15 m pixel. The image quality produced over this field is seeing limited to below 0.3" at 0.67 m. The quadrant error sensor is fed through the beam-splitter. Some of the astigmatism produced by passing through the beam-splitter is used to sense focus drift as seen by the WTTM. The improvement in image quality from tilt compensation alone should result in 0.1" improvement to FWHM during median seeing conditions at WIYN and 0.15" during the 10% best nights. By including focus drift compensation we expect the median and 10 percentile FWHM improvements are 0.15" and 0.25" respectively. With the WTTM users can expect to have stable images on the order of 0.7" FWHM under median conditions and 0.35" in 10 percentile case.



The Preliminary Design Review

A substantial hurdle in the WIYN tip-tilt project was passed during this past quarter. On 19-20 March 1999 the WIYN Tip-Tilt Module (WTTM) project held its Preliminary Design Review (PDR) before a distinguished committee and other interested parties. The committee comprised Rene Racine (Chair), Lonnie Cole, Don McCarthy, Bob Parks, Harvey Richardson, and Steve Ridgway. A prompt written report by the committee was distributed to the WTTM team in early April. Briefly, the committee viewed the WTTM project favorably and urged its completion with "all possible dispatch." The report in its complements and criticisms has been and will continue to be a valuable resource as the WTTM design is finalized and the project moves into fabrication and testing. The WTTM team has produced a written response to specific issues raised by the PDR Committee and is ready for distribution at press time.

At the 9 April 1999 WIYN SAC meeting, WTTM Team leaders responded to the Committee's written report and questions from SAC members. The timely arrival of the written report prior to the SAC meeting resulted in prompt approval by the SAC for the project to move forward.

WTTM Status May 1999

The WTTM is currently undergoing final design and detailing in preparation for cutting metal. To this end, a substantially more detailed finite element analysis model of the WTTM is being developed. This model is being used in our efforts to prevent flexure and resonance problems that have compromised other similar systems. The control system has undergone some minor rearranging as a result of some short comings noted at the PDR and is nearing its final design.

With the approval to proceed, the WTTM project has begun the process for procuring items with long lead time. The purchase order for the error sensor detectors, EG&G avalanche photodiode modules, has already gone out. The bid package for the WTTM optics is expected to be finished and released for competition by 15 May 1999. Recently the WTTM project took delivery of its computer system for developing the Linux-RT + LabView software system. In addition, the tip-tilt mirror subsystem is also expected to purchased in the next month or so. Other key milestones for the WTTM project are:

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Place Order for WTTM              Mirrors June 1999
Delivery of WTTM Mirrors          September 1999
Error Sensor Assembly Complete    March 2000
Optical Housing 1st Assembly      March 2000
IAS Downtown for WTTM
   integration (6-8wks)           May 2000
Testing at the Telescope          November 2000
Shared Risk Observing             April 2001
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Chuck Claver, WTTM Project Scientist

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First the Good News...

It has hardly escaped anyone's attention that the millennium is fast approaching, and this seems a particularly good time to initiate the planning for groundbased astronomy in the next century. NOAO has just completed a long range plan for both solar and nighttime astronomy that lays out a vision for the next 25 years or so, and describes what we must do in the next five years to make progress toward our ambitious long term goals. The complete plan is available through the NOAO home page (http://www.noao.edu); the key points are summarized here.

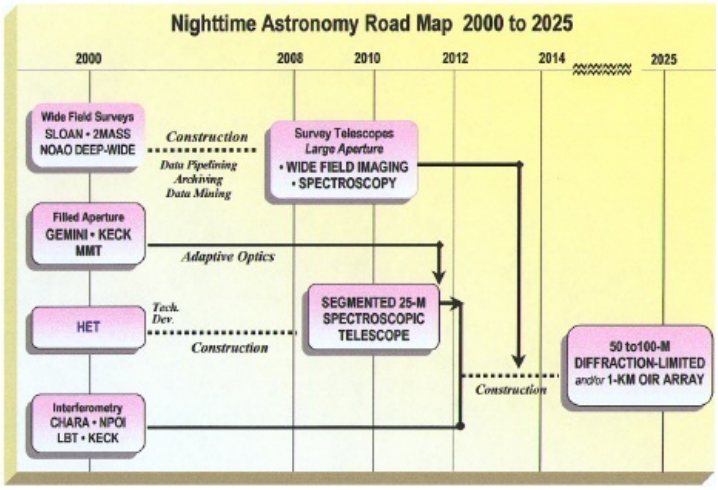
The report of the previous Astronomy and Astrophysics Survey Committee, chaired by John Bahcall, was entitled, "The Decade of Discovery," and surely the 1990s have lived up to that prediction. The rate of discovery has exceeded anything we might have imagined when the report was written. Now that we have discovered a whole host of new types of objects and phenomena--whole new worlds, so to speak--the next step is to begin systematic exploration. We can imagine asking--and answering--the most fundamental of questions. When did galaxies form and how did they evolve over the lifetime of the universe? Where is *all* the matter, both bright and dark, in a given volume of space? What is the complete inventory of earth-crossing asteroids large enough to do major damage if they were to impact the Earth? We now know more planets outside our own solar system than within it, but what are the characteristics of those solar systems--is our own typical or unique? How do changes in the magnetic fine structure on the Sun control such global characteristics as activity, irradiance levels, and atmospheric heating?

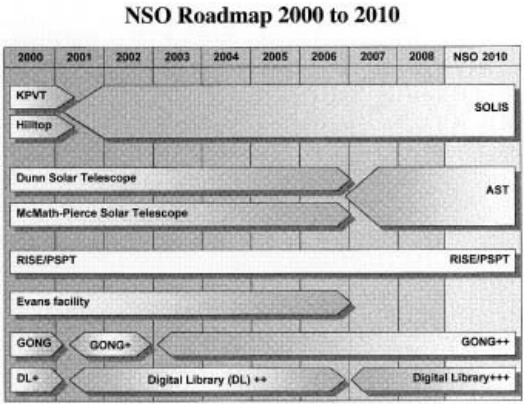
Even as our questions have become more complex, technologies have advanced to make truly ambitious programs feasible. It is possible to build a facility that would map all of the dark matter in a cone to z = 1 through weak lensing. This same facility could detect all the Earth-crossing asteroids with diameters greater than 300 meters. It is possible to build a facility that could obtain 500,000 spectra to characterize the evolution of galaxies (star formation rates, metallicities, and morphological changes) as a function of mass, redshift, and environment with sufficient statistical weight for each combination of parameters to be meaningful--and to do it in short enough time that other problems could be addressed as well. It is possible with adaptive optics to break the 0.1" barrier on the Sun and obtain polarization measurements on the scale of the photon mean-free path and pressure scale height in the solar atmosphere. Designs for a 3 field imaging telescope have been worked out by Roger Angel and his collaborators, and NOAO staff are exploring the options for efficient spectroscopic surveying over wide fields and for high angular resolution solar observations.

Discussion has also begun on the feasibility of building much larger aperture telescopes for OIR astronomy on the ground. Referred to in Europe as OWL (Overwhelmingly Large Telescope) and in the US as MAXAT (Maximum Aperture Telescope), the goal for these telescopes is 50-m to 100-m aperture with diffraction-limited imaging. The capabilities of such an instrument would be astounding. At 100-m it would be possible to observe Cepheids to a distance 100 times beyond that of Virgo, study supernovae to z = 10, and image white dwarfs in Andromeda. Building such a facility will, however, require substantial technology development and construction of some kind of intermediate aperture facility to prove the new technologies.

On the solar side, the requirement is for large aperture combined with adaptive optics. In this case, large means 3-4 m, which is required to obtain polarization measures at high angular resolution in times short relative to the characteristic time scales for variations on the surface of the Sun. The smaller the physical scale, the more rapid the variations, and so even in the case of the Sun there is a scarcity of photons!

NOAO has developed road maps for the development of new facilities for both solar and nighttime astronomy. GONG will operate over a solar cycle to correlate changes in interior structure with activity levels. SOLIS will provide data on magnetic fields, velocity flows, flares, and other forms of activity, and will also measure the Sun as a star for comparison with observations of solar-type stars. The Advanced Solar Telescope (AST) will provide high angular resolution observations of magnetic fine structure.





The key elements of the nighttime program are wide-field 6.5-m to 8.4-m telescopes for imaging and spectroscopy of large numbers of objects, coupled with the capability for data pipelining, archiving, and data mining; development of technology followed by construction of an intermediate (!) aperture telescope of perhaps as much as 25-m; the development of adaptive optics; and finally construction of MAXAT. NOAO has been working with staff at Steward Observatory, the University of Texas, Lowell Observatory, the international Gemini staff, and others to determine how we might marshal the talents and resources within the community to realize these ambitious plans. If we are to continue our voyage of discovery and exploration of the universe around us, we should aspire to nothing less.

...and Now the Bad News

As I indicated in the last Newsletter, the budget for this year was up relative to last year but by less than the funding required for the new project that we are committed to--construction of SOLIS. The net consequence was a significant decrease in the size of the staff in Arizona and New Mexico. In my view, we can no longer maintain the current level of program activities. If we also wish to move forward with plans like the ones outlined above, we must re-examine ongoing programs and operations, define what in-house support will be required to advance the initiatives included in the long range plan, and wherever possible identify alternate funding sources. It is with these goals in mind that we have undertaken an assessment of program priorities within NOAO; that exercise is in progress, and we will report to you on it when we have defined possible options. In this newsletter, we outline why this re-examination is required.

In the latest round of reductions, 14 people were laid off, transferred to temporary soft money contracts, or elected retirement. The average years of service of those laid off was 8.7 years, with the longest being 24 years 11 months. Six additional open positions were deleted, and KPNO will eliminate another six positions over the next year as they become vacant. In all, this represents slightly more than 10 percent of the positions in Arizona and New Mexico (CTIO was unaffected by this reduction in force; they made a major reduction several years ago in return for a commitment by the rest of NOAO to maintain the purchasing power of their budget until FY 2000.) The directors of NSO and KPNO have described the impacts of these layoffs, and I summarize their statements here.

NSO: The staff reductions of 3 and other budget cuts at NSO will result in reduced support for telescope maintenance and projects; reduced support for new initiatives, particularly electronics support at NSO/SP; elimination of support for placing new data in the solar digital library; delay of deployment of the high resolution GONG cameras by at least one year.

KPNO: Of the 10 positions eliminated by KPNO, 4 are from the scientific staff, including elimination of the KPNO post-doc program; electronics maintenance is no longer available on the mountain after 8 PM; the full-time presence of an operator at the 2.1-m will be phased out; and the 0.9-m is now available for use only with the Mosaic imager.

Substantial additional cuts were made in engineering staff, with the consequence that no new NOAO instruments can be started for at least a year, thereby delaying the delivery of the next major new instrument (either a wide-field IR imager or a wide-field optical spectrograph) until at least 2003. Additional cuts were made in support functions, including administrative staff, public outreach, and facilities maintenance.

These are, unfortunately, only the latest in a long series of cuts that began in 1984. In the 16 fiscal years since 1984, the nighttime staff in Arizona has been reduced in all but two years. The total staffing for all nighttime programs in Tucson has dropped from 200 in 1984, when KPNO was essentially the only component of the program, to 125 today, and we have added, within that decreased budget, support for CTIO instrumentation, the US Gemini Project Office, and operations of WIYN. Staffing for operations at NSO/KP and NSO/SP has dropped over that same period of time from 66 to 56, and the NSO scientific staff has decreased by 25 percent since 1984. The total solar staff, however, has increased to 86 in order to accommodate GONG and SOLIS.

KPNO cannot continue to operate five telescopes at the same level of reliability and user support that has traditionally been available, nor does it seem likely that NSO can continue to operate two sites indefinitely with its current staff. And we have the additional goal of trying to make progress toward an AST and large nighttime telescopes. The steps proposed by the directors to accommodate this year's reductions amount to temporary bandaids, which is the only option we have when cuts are imposed after the start of a fiscal year. We need a long term approach to budgeting and planning that provides a sustainable balance between current services and future investment, and it is for that reason that we are undertaking a re-assessment of the entire NOAO program.

Sidney C. Wolff

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Harvey Awarded Hale Prize

We are delighted that John W. Harvey has been awarded the 1999 George Ellery Hale Prize, an award which recognizes a scientist for outstanding contributions to the field of solar astronomy. The Hale Prize committee specifically cited Jack Harvey's "fundamental contributions to our understanding of the nature of solar magnetic fields and of the internal structure of the Sun through helioseismology, for his development of innovative solar instrumentation, and for his selfless and untiring service to the solar physics community."

Since his arrival at the Observatory in 1969, Jack has been a key member--and leader--of major solar initiatives while also pursuing a highly productive program of research in forefront areas of solar physics (reflected in a bibliography of over 200 publications!). His research has focussed on the unlocking of the secrets of the small-scale magnetic fields and motions on the solar surface, and on the determination of sub-surface structure and motions from global oscillation measurements. Jack was responsible for the highly successful GONG instrument, and has been a key member of a number of very productive South Pole solar observing expeditions. His dedication to the operation of the NSO Kitt Peak Vacuum Telescope since its inception in 1973 has produced an invaluable synoptic record of solar activity that is widely used by the solar and solar-terrestrial communities. The innovative successor to the Vacuum Telescope--SOLIS--was conceived by Jack who now serves as the SOLIS Project Scientist.

The seemingly endless list of advisory committees, editorial committees, and Working Groups of which Jack Harvey has been a member is testimony to the high degree of respect he has earned from his colleagues throughout the world. Among the positions Jack has held within the community are the Chair of the AAS Solar Physics Division and the Presidency of IAU Commission 12. Jack's accomplishments are even more impressive in view of the time he has devoted to such community service. We are indeed fortunate to have Jack on our scientific staff. He is truly exemplary of the AURA spirit of service to the community, excellence in science, and investment in the future.

Jack will present his Hale Prize Lecture at the Centennial American Astronomical Society Meeting in Chicago this June. We encourage readers to attend!

Mark Giampapa, Sidney Wolff

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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.

Alves, J, Lada, C.J., Lada, E.A., "Correlation Between Gas and Dust in Molecular Clouds: L977"

Blum, R.D., Damineli, A. "A 2 m Narrow-band Survey of the Inner Galaxy"

Blum, R.D., Ramrez, S.V., Sellgren, K. "The Stellar Population at Galactic Center"

Clocchiatti, A., Phillips, M.M., Suntzeff, N.B., DellaValle, M., Cappellaro, E., Turatto, M., Hamuy, M., Avils, R., Navarrete, M., Smith, C., Rubenstein, E., Covarrubias, R., Stetson, P.B., Maza, J., Riess, A.G. "The Luminous Type Ic SN 1992ar at z = 0.145"

Grant, C.E., Burrows, D.N., "Distances to the High Galactic Latitude Molecular Clouds G192-67 and MBM 23-24"

Heckman, T.M., Armus, L., Weaver, K.A., Wang, J., "An X-ray and Optical Investigation of the Starburst-Driven Superwind in the Galaxy Merger ARP 299"

Hines, D.C., Schmidt, G.D., Smith, P.S., "The Polarized Spectrum of APM 08279+5255"

Phillips, M.M., Lira, P., Suntzeff, N.B., Schommer, R.A., Hamuy, M., Maza, J. "The Reddening-Free Decline Rate Versus Luminosity Relationship for Type Ia Supernovae"

Walker, A.R. "CCD Photometry of Galactic Globular Clusters V. NGC 2808"

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

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Proposals Received

NOAO received 369 proposals for the 1999B semester, including 21 proposals for Survey Programs. 57% of our investigators took advantage of our Web proposal form to submit their proposals. This was the first semester that a proposal could request telescope time at both CTIO and KPNO, and 10% of all programs submitted did so. Among the regular (non-Survey) programs, 42% were in extragalactic subject areas, 53% in galactic subject areas, and 5% in solar system areas. The most popular areas were stars, stellar populations, active galaxies, clusters of galaxies, and resolved galaxies.

An additional 16 proposals were received from Chilean astronomers and forwarded to the Chilean national time assignment committee for time allocated as part of Chile's 10% share at Cerro Tololo. The proposals recommended by the Chilean national TAC will be forwarded to CTIO for scheduling.

Most proposals (71%) included figures; we received and processed 537 separate postscript files. The average proposal length for regular (non-survey) proposals was 6.9 pages, an increase of 1.3 pages per proposal due to the new proposal form. Survey proposals were longer, averaging 12.2 pages per proposal.

The NOAO Proposal Team

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What Do We Do with Your Proposal?

Once a proposal is received at NOAO Headquarters, it must be processed. A team of NOAO staff members prints the proposal, reviews it for any corrections, imports it into the proposal database, attaches any supporting correspondence, such as letters from thesis advisors, assigns a TAC panel member as lead reviewer, copies it, and prepares it for shipment to the members of the TAC panel to which it has been assigned. The whole process takes about two weeks. Panel members have 2-3 weeks to read and grade proposals before the panels meet. With five separate panels reviewing the regular proposals, no panelist received more than 100 proposals to review.

During processing, we found 18 proposals with figure problems that we corrected. Most of these were submitted by e-mail rather than on the Web. A dozen proposals contained LaTeX errors, which we caught and fixed. In another 14

proposals, we made small changes at the request of the principal investigator, and we changed the science category on a comparable number so that the proposal would be grouped with others proposing similar programs. Finally, we repaired the LaTeX template on a half dozen proposals in which the investigators had tinkered with instrument and telescope names or acceptable date ranges in the Observing Run Summary Table.

The NOAO Proposal Team

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Why Proposals are More Complicated

Investigators who noticed the changes to our proposal form for the 1999B semester probably wondered why the changes were necessary. The major changes included:

- the addition of a new proposal type for Survey Programs
- the addition of a subject category
- the elimination of detailed address information for co-investigators
- the expansion of the "Observing Run Summary Table" to allow up to six observing runs for a single program
- the addition of a new "Technical Description" section for each observing run.

These changes were made to accommodate new programs and directions at NOAO in our continuing effort to serve the community better. In the March, 1999 submission we offered the opportunity to apply for large-scale Survey Programs to be carried out on NOAO facilities. In the next 12 months NOAO will issue calls for proposals for access to three new facilities--the northern Gemini 8-m telescope, the 6.5m telescope at the MMT Observatory, and the Hobby-Eberly Telescope. Our goal is to allow observers to request time at all of these facilities, as well as on telescopes at CTIO and KPNO, in a single proposal. By adding the new Technical Description section to the proposal, we are able to customize each proposal to get the information needed for programs at the new facilities. Information from successful proposals will be forwarded to the appropriate sites for scheduling.

The effect of these changes was to increase the average proposal length by 1.3 pages, while allowing observers to provide more detailed technical information for each observing run. While this technical information will be required for Gemini programs, we hope that it will also allow KPNO and CTIO to provide even better visitor support for programs on their telescopes.

Todd Boroson and The NOAO Proposal Team

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Flash! Bang! Zap! Storm Strikes CTIO

On the morning of 1 April, just prior to the long Easter weekend, a rare electrical storm struck La Serena and then made its way inland to Tololo. A tree immediately outside the La Serena scientific and technical office buildings was struck by lightning. The resulting damage was considerable, with the Ethernet, many computers, and the phone plant being put out of commission. Sterling work by local staff restored most of the computer system within 48 hours, with

some workstation shuffling to provide high priority services first. The phone plant was out of service for several days waiting for spare parts to be delivered from Santiago.

Damage on Tololo was also considerable, affecting both science operations and communications between La Serena and the outside world. Despite a thoroughgoing round of disconnecting and unplugging in advance of the storm, ground strikes on the summit caused damage to telescopes and instruments, particularly the 4-m telescope control system and ancillary computers. This took some five days to completely repair. Mountain staff worked very long hours under trying circumstances dealing with multiple, sometimes subtly interrelated problems and inability to easily communicate with La Serena staff. The other telescopes, fortunately affected less, were brought back into service within a day or two.

The Entel communications tower on Tololo was also struck, so we lost telephones, the computer link to La Serena, and the cell phone net. Communications between La Serena and Tololo were reduced to two-way radios, which hampered the Tololo repair effort. Loss of grid power on Tololo followed by over-voltage on the high-tension grid supply added to the complications. We continue to share the burden of rotating two-hour daily power cuts taking place throughout Chile in response to a drought-induced shortage of hydroelectricity. The generator is thus still required for several hours a day on Tololo.

Electrical storms occur only every few years here, and this one was undoubtedly the most severe in at least 30 years. But the large amount of repair work needed and loss of telescope time has prompted us to examine ways to both improve our immunity to lightning strikes, and our backup communications.

Alistair Walker (awalker@noao.edu)

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Blanco R-C Focus ADC Corrector Now Operational

As a necessary adjunct to the CTIO Hydra project, a new corrector was constructed for the Ritchey-Chretien focus of the Blanco 4-m Telescope. It is now functioning to specifications. Without a corrector, a telescope of this type has a strongly curved field and the image quality at the edge of the field is poor.

The new corrector was designed by Charles Harmer (NOAO Tucson) and built in the NOAO Optical Shop. The mechanical mount and control system were designed and fabricated at CTIO. The Harmer corrector reduces the curvature of the field to 8.7m radius and makes the telescope pupil lie at the center of curvature, optimal for use with optical fibers. With a perfectly stable atmosphere, it should be capable of producing images smaller than 0.5" in size everywhere in the field at all wavelengths between 330nm-1.5m. Under real conditions the images will almost always be limited by seeing. So far, the smallest images seen have been 0.75" FWHM. There is no significant variation in image quality over the field.

Fabrication, testing and quality control of the corrector were excellent. The field distortion modeling parameters produced from the "as built" measurements were so accurate that Hydra was able to position its fibers to sub-arcsecond precision without any tweaking the first time it was installed.

The Harmer corrector incorporates Atmospheric Dispersion Compensation (ADC), which makes it especially useful for broad band spectroscopy. It consists of two curved elements of fused silica, which perform the basic aberration correction, and a pair of flat, rotating zero deviation prisms in between providing the ADC function. When the dispersions of the prisms are pointed in opposite directions, their net effect is zero and the system behaves as a conventional corrector. By rotating the dispersion vectors such that the two prisms add partially or entirely in the proper direction, an artificial dispersion of any magnitude and position angle can be generated to cancel the atmospheric dispersion. The corrector automatically brings the light from all wavelengths within the design range to a single focus anywhere in the sky up to a zenith angle of slightly over 70 (air mass 3). Its effect can be best seen with the Hydra gripper camera using a filter which transmits only UV and IR. At high air masses, one sees two well-separated images when the corrector is set in the neutral position. When the ADC is switched on, the images merge dramatically and gracefully into a single round spot anywhere in the sky.

Harmer's design is unique and ingenious in that the prisms are made from cemented fused silica and a light flint glass instead of two dissimilar glasses. The elements are made with non-parallel surfaces in such a way that they give zero deviation. Because four of the six elements are then made of silica, the UV throughput is good. All eight surfaces are coated with UV optimized sol-gel over MgF2, making the corrector's transmission nearly 100% at all wavelengths from 1m to 380nm, falling gradually to approximately 70% at 350nm and 50% at 340nm. There is little useful transmission below 330nm.

The Harmer corrector is now a permanently installed component of the Blanco Telescope. It can be used with any Cass Focus instrument, not just with Hydra. For example, when used with the R-C spectrograph, it will permit efficient broad band long slit spectra to be taken at arbitrary zenith angles and high air masses. The entire corrector assembly is motorized and can be flipped out of the beam in less than a minute to allow observations with other instruments or farther into the UV or IR.

Tom Ingerson (tingerson@noao.edu)

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A New CCD and Camera for Hydra

As part of the procurement for the Mosaic Cameras, SITe has delivered a superb Grade 0 2K 4K CCD for use with Hydra. The CCD will be integrated into a 400mm focal length Schmidt camera using a custom dewar with the CCD on a cold finger. The combination should become available sometime during semester 1999B. The new CCD has read noise almost three times lower than the present Loral 3K.

The new camera is expected to be somewhat more efficient, have longer focal length and significantly better image quality than the present Air Schmidt/Loral combination. With the Loral/Air Schmidt, only alternating fibers can be used because of image overlap. Using the new camera and SITe CCD, the images of the fibers will be separated and all of either the large or small fibers can be used simultaneously.

Alistair Walker (awalker@noao.edu),
Tom Ingerson (tingerson@noao.edu)

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Mosaic II Imager

The Mosaic II Imager (http://www.ctio.noao.edu/instruments/optical_instruments.html) is on schedule for commissioning in July and availability for general use in semester 1999B. In particular, the eight SITe 2K 4K CCDs have been delivered, and after testing were integrated into a single focal plane by a team led by Rich Reed at NOAO (Tucson). Installation into the dewar will take place in La Serena at the end of May, followed by full system tests. In La Serena, the Arcon controllers are undergoing testing and optimization prior to the system integration. First telescope tests are scheduled for July. August scheduling will include a second engineering run and possibly shared-risk science observing (pending outcome of TAC proposal review). The schedule for commissioning this instrument is aggressive; however, we have insurance in that Tony Tyson and Gary Bernstein have agreed to the BTC being available as backup throughout the semester.

Alistair Walker (awalker@noao.edu)

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CTIO REU Students Have a Busy Summer

CTIO was home for a group of eager students (pictured on the next page) during the Chilean summer (January-March 1999). While their northern counterparts toiled through another dreary winter of class work, our four NSF-funded Research Experiences for Undergraduates (REU) students got a taste of astronomy research. The 1999 CTIO REU students (and their projects) were:

Jeremy Buss (Wisconsin, Oshkosh) - "A Comprehensive Look at LH72 in the Context of Constellation III" (Advisor: Knut Olsen)

Jenny Greene (Yale) - "LMC X-2: The Search for the Orbital Period" (Advisor: Stefanie Wachter)

Jessica Kim-Quijano (Towson) - "The Orbital Period of the Double-lined Cataclysmic Variable Phe 1" (Advisor: Don Hoard)

Alicia Soderberg (Bates) - "The Evolution of SN1987A Debris: 12 Year Light Curves in UBVRIJHK" (Advisor: Nick Suntzeff)

All four of these REU students will attend the 194th meeting of the American Astronomical Society (Summer 1999, Chicago) to present posters based on their REU projects.

The US undergraduate students were joined by a Chilean masters student in the parallel Programa de Practicas de Investigacion en Astronomia (PIA):

Ricardo Demarco (Pontificia Universidad Catlica de Chile, Santiago) - "Supernovae Type Ia and Their Host Galaxies" (Advisor: Bob Schommer)

Two Chilean electronics engineering students doing internships at CTIO also participated in the summer student program:

Mario Caceres (Universidad Tcnica de Federico Santa Maria, Valparaiso) - "Evaluation of a CCD Imager for All-Sky Cloud and OH Monitoring" (Advisor: Roger Smith)

Cecil Acevedo (Universidad Tcnica de Federico Santa Maria, Valparaiso) - "A Graphical Unit Interface for the Voltage, Telemetry, and Temperature ARCON Card" (Advisor: Marco Bonati)

Caption: *The 1999 CTIO "REU Crew" at the Gemini South site on Cerro Pachon. From left to right: Jenny Green (REU), Jeremy Buss (REU), Alicia Soderberg (REU), Richardo Demarco (PIA), Paul Gillet (Gemini South Site Engineer and Tour Guide), Jessica Kim-Quijano (REU), Don Hoard (CTIO REU Site Director).*

In addition to their individual research projects, all of the astronomy students participated in observing runs on Cerro Tololo. These included a four-night orientation on the Curtis Schmidt Telescope with the REU Site Director (to introduce them to observing techniques, instrumentation, and the CCD control system at CTIO), as well as additional runs with their project advisors. Other activities included weekly scientific seminars presented for the students by the CTIO staff and a tour of the Gemini South site on Cerro Pachon. A highlight of the 1999 REU program was a trip to Antofagasta (in northern Chile) during early March, where the students attended the European Southern Observatory Very Large Telescope Opening Seminar. In addition to absorbing the scientific content of the four-day seminar, they

were also able to tour the VLT site, and visit the oasis town of San Pedro in the scenic Atacama Desert.

Exposure to the international astronomical community and the opportunity to work side by side with scientists and students from other countries are key components of the CTIO REU experience. Many of these young scientists will make up the next generation of astronomers in an era of international telescope projects (Gemini, SOAR, and others)--the CTIO REU program offers valuable insight into the operation of a major astronomical observatory. Although not all US students are enrolled in 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, which will run from January-March 2000. 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 and information about the program.

Donald W. Hoard (dhoard@noao.edu),
CTIO REU Site Director

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NOAO Newsletter - Cerro Tololo Inter-American Observatory - June 1999 - Number 58

In Memory: Hugo Villagran Castellon

Tololinos were saddened by the recent death of a long time AURA employee, Hugo Villagran, head of the La Serena carpenter shop and lead man of the building maintenance crew. In a valiant fight against cancer, Don Hugo outlived the doctors' predictions by a year, and was working until the week before his death.

Don Hugo represents that side of our Chilean staff which is "transparent to users" but vital all the same. He and his crew made sure that buildings used by La Serena staff and visiting astronomers were functional, and safe. As an employee representative in collective bargaining sessions, his experience and wisdom were valued by all. And as an enthusiastic organizer and participant in employee sponsored recreational activities, "El Charro" created many happy times for the rest of us.

!Que en paz descanse!

Governing Board,
Tololo Employees Association

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NOAO Newsletter - Kitt Peak National Observatory - June 1999 - Number 58

The State of Kitt Peak

The short summary of Kitt Peak status is that it is alive and pretty well, but about to undergo a period of change. We celebrated together last fall the 40th anniversary of the establishment of the observatory, based on the date that the Tohono O'odham Nation approved the agreement with the NSF. We are justifiably proud of the scientific edifice that has been built up here on Kitt Peak over the 40 years since that October agreement.

What have we accomplished over the last year? The major initiative I talked about a year ago was our plan to create a partnership to bring a new wide-field 2.4-m telescope to the mountain, to replace the aging 0.9-m. The partnership was

created with the University of Colorado and the University of Minnesota. We had agreement from NASA for a loan of the Hubble spare primary mirror. We submitted a proposal from KPNO to the National Science Foundation for our share of the cost of the project. Although it got excellent peer reviews and the highest ranking in the competition within the astronomy division, it was not viewed as competitive at the Math and Physical Sciences Division Level. We resubmitted the proposal to a different program, but funding was not possible there, either. We have therefore been forced to abandon that effort and release our claim on the Hubble spare mirror. We will concentrate on major instrumentation and telescope upgrades to maintain Kitt Peak's competitive edge.

The last year saw major progress in improving the delivered image quality of our major telescopes. The 4-Meter Active Primary Support System (4-MAPS) was installed and has been in active commissioning under the leadership of Chuck Claver, Tony Abraham, Scott Bulau, Dave Mills, and their team. The telescope has already delivered images in the 0.5-0.8" range, a performance not seen since its early days. The WIYN telescope also continues its tune-up under the guidance of Charles Corson. A major advance has been the equalization of the temperature zones on the primary mirror. A visiting instrument recorded 0.32" images (March 1999 NOAO Newsletter), which shows what this mountain and that telescope can really deliver.

We will see a number of exciting new instruments on the way in the future. SQIID is coming to life again, with a plan for four 512^2 InSb detectors from the ALADDIN program. T&E time is planned for this year. We have supported Richard Elston and his group at the University of Florida in the development of FLAMINGOS, a wide-field imager and multi-object spectrograph for the near-infrared. It will have a field of view of over 20' on a side at the 2.1-m, and will use cooled multi-slit masks for spectroscopy at the 4-m. We expect to see it here for T&E in about a year. Chuck Claver, David Vaughnn and their team have successfully passed the preliminary design review for the WIYN tip/tilt module, which will sharpen the optical light images from the telescope yet further (see related article at the beginning of this Newsletter).

For the five-year timescale, we see two major new instruments for KPNO. One is a wide field of view near-IR imager. For scale, our biggest format imager at present is ONIS, which has a 512 1024 format. The new imager is planned to have a 4096 4096 format, to cover a substantial area of the sky. We are exploring a partnership for this instrument to get the resources and technical support for an early deployment. We plan on some renovations to the 2.1-m to accommodate the new instrument and to improve its delivered image quality for the surveys to be undertaken there. The other instrument is a new, very wide-field spectrograph intended for the 4-m. It will employ the new volume-phase gratings being developed by Sam Barden and his industrial partners. The goal is to achieve twice the efficiency of the old R-C spectrograph, with multi-slits that can cover a 40' field of view.

The scientific productivity of our observatory has remained as high as ever over the last year. There were 269 articles in refereed scientific journals using KPNO data and/or having our staff as authors. I can cite three examples from our reports to the NSF that illustrate the breadth of the science from our nighttime telescopes.

1) From early X-ray surveys, it was thought that clusters of galaxies developed their halos of hot gas fairly late in cosmic history. New analysis of X-ray data, coupled with key ground-based data from KPNO has shown that there are far more X-ray detections at higher redshift than previously thought. The result is that the incidence of clusters with hot X-ray halos does not decrease as we look back in cosmic time, and that we don't yet know the epoch of formation of these halos, but it's much earlier than we previously thought.

2) Present-day elliptical galaxies obey a tight relationship among size, brightness, and internal stellar motions called the fundamental plane. The existence of such a relationship teaches us something fundamental about the formation and dynamical history of these galaxies, although the key theoretical connection has not yet been firmly made. To complicate affairs, investigators at the 0.9-m have found that the fundamental plane warps for galaxies at higher redshifts. The effect most likely arises from the difference in age of the stellar population at earlier cosmic times, changing the brightness part of the relation.

3) The formation of a star can be a very dynamic phenomenon, with gas accreting onto the star from a surrounding disk, and jets of material being shot out from the poles of the rotating system. Imaging from the 0.9-m and 4-m with Mosaic show that some of these jets extend for light years into space, much farther than previously imagined. The consequence is that the jets can propel molecules and other material far from the parent star and even create shock waves that could trigger other energetic events in the area of star formation.

We have a continuing record of excellence, yet we had to cope with a stunning budget reduction this year. My old aunt used to say, "If you're so smart, why aren't you rich?" The paraphrase for our situation: "If you're so good, why was your budget cut?" The RIFs we just experienced were the result of a required reduction of almost 10%, comparable to that in 1993.

I compare our situation to the best run long-haul passenger railroad in 1960. We have outstanding equipment and people rave about our service, but in a few years the majority of our passengers will be taking the plane. The investors are already shifting their money to the airlines. We'll have to figure out how to diversify and haul some more freight if we want to stay ahead.

Just like investors in the stock market, the astronomy community has already assimilated the changes that are about to happen when large 6 to 10-meter telescopes are routinely in operation. Gemini is just in the throes of its first commissioning activities, while the first two European VLT telescopes and Subaru have seen first light. They will join the Keck telescopes in a year or so, along with the second Gemini, the other two VLT 8-meters, the Hobby-Eberly 10-meter in Texas, the MMT upgrade, the Magellan telescopes, and the Large Binocular Telescope.

With those observational riches, the community asks why NSF should spend its money on an observatory running two 4-meter telescopes plus some smaller apertures, even if it's a national observatory. We must therefore move aggressively to demonstrate to the world that we remain a uniquely valuable resource.

We are proving our worth by playing to the strengths of our telescopes and our site. We have good seeing, a reasonable fraction of clear skies, and remain relatively dark. Our telescopes were designed to emphasize wide field of view. We will therefore emphasize wide-field imaging and spectroscopy to support and complement the larger aperture facilities. Our wide-field instruments now include Mosaic, Hydra, and ONIS, and we will soon add SQIID and FLAMINGOS. The next generation instruments planned are wide field and high efficiency--the near-IR imager and the next generation optical spectrograph. We can also use the versatility of WIYN to exploit the time dimension by monitoring variables, catching supernovae, and responding quickly to targets of opportunity.

We intend to increase the value of observing at Kitt Peak. One trend is to give more time to major survey projects. The data from such systematic surveys will be valuable for more than one astronomical research project and will be made available to the public on short timescales. In general, we will support larger programs (although fewer of them). In addition, we will investigate the promise of continuity--getting enough time to finish a program that takes more than one year--and explore the connection to support of space missions, such as surveys with the AXAF X-ray telescope and their ground-based follow-ups.

Our trend of operations is therefore longer runs, fewer instrument changes and fewer start-ups. That level of operations will be a much better match to our current staffing level, and our commitment to efficiency and reliability.

We have not abandoned a commitment to an exciting and vigorous future. Kitt Peak is a strong contender for a large-aperture (6.5-8.4 meter), wide-field telescope. Several steps will be required to win a new telescope for our mountain. First, we must present an exciting case to the committees undertaking the decadal survey of astronomy priorities. We must also demonstrate, as we did 40 years ago, that Kitt Peak remains an excellent continental site for new observing facilities. We will continue our systematic seeing measurements, undertake analysis of the SCIDAR data collected in February, begin sky brightness measurements, and re-examine the weather statistics.

In order for Kitt Peak National Observatory to be assured of a vigorous scientific future, we must show immediate willingness to support profound and rapid changes in our operating style. We have two goals for the coming year--to generate near-term excitement for our new scientific roles and to take the first steps down a sure path toward long-term development and renewal. I'm optimistic that we'll achieve both.

Richard Green

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Next Generation Optical Spectrograph Project

NOAO is currently designing a new optical spectrograph for the Mayall 4-m Telescope based upon new technologies in gratings and optics. The conceptual optical design effort and further science definition will take place for the remainder of FY1999.

Through internal discussions, the following science goals have been formulated:

1) Wide field of view (diameter of 20' to 40').

2) Multi-slit mask mode of operation.

3) 0.25" to 0.3" sampling on detector.

4) Resolving powers of up to 5000 and possibly as high as 30000.

5) Instrument to work within the window from 370 nm to 1.7 m with optical and IR detector packages.

6) Peak efficiency for telescope, spectrograph, gratings, and detector of > 40%.

Based upon suggestions from the User's Committee, we will also explore the possibility of an insertable micro-lens array for integral field spectroscopy over the full field of view.

To better refine these goals and to set priorities for the inevitable scientific tradeoffs during the final design effort, we are soliciting scientific input from the astronomical community. What requirements would you place on a wide-field, optical spectrograph for your science?

Please feel free to forward your thoughts to the undersigned. We are also going to explore the possibility of holding a mini-workshop later this year to help address this issue.

Sam Barden, Taft Armandroff

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MiniMosaic CCD Imager for WIYN

An enhancement of the capabilities for CCD imaging at the WIYN telescope is underway. The imager CCD (S2KB), a 2048 2048 SITe/STIS device, is being replaced. The new imager is a pair of thinned, backside illuminated, anti-reflection coated 2048 4096 SITe devices, arranged to mimic a 4096 4096 array. These SITe CCDs are identical to those used in the NOAO CCD Mosaic Imager and are of equally high quality. For information on CCD performance (for example, quantum efficiency curves), see the Users' Manual for the CCD Mosaic Imager (http://www.noao.edu/kpno/mosaic/manual). Each 15 m pixel corresponds to 0.141", yielding a field size of 9.6' 9.6'. The two CCDs are read out through a total of four amplifiers using a HArcon controller (a hybrid Arcon). The readout noise values of the four amplifiers are 5.5 e-, 5.3 e-, 5.4 e-, and 5.5 e-. The average gain value is 1.4 e- per data number. Observations are controlled via the same version of the Arcon software as is used with the NOAO CCD Mosaic Imager. Other properties of the WIYN imager, such as the filter wheel, available filters, the shutter, and guiding remain unchanged.

At the end of April, we had two nights of testing at WIYN during which many critical aspects of the system's on-sky performance were successfully tested. Once the commissioning process is completed, the MiniMosaic will be available for regular science observations. Astronomers who have approved WIYN imaging programs will be contacted and queried about the implications of using MiniMosaic for your observations.

Many individuals from the Optical/UV Engineering Group, the Mountain Programming Group, the CTIO Arcon team, and the IRAF Group have made important contributions to the success of the MiniMosaic project.

Taft Armandroff, Abi Saha

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ThAr Atlas Now Online

An on-line Thorium Argon spectral atlas is now available from the NOAO home page under NOAO Services. Click on Data Archives or go to http://www.noao.edu/kpno/tharatlas/. The atlas consists of one long data file from which any wavelength interval can be viewed or the whole spectrum can be obtained as a FITS file. A line list is also given with each plot or the whole list can be obtained.

This new atlas, obtained with the echelle grating on the KPNO coud spectrograph, improves upon the older (1987) ThAr atlas in increased wavelength coverage, higher resolution, and more line identifications. The spectral lines are labeled according to ion.

Future developments will include FeAr, CuAr, and HeNeAr atlases.

Daryl Willmarth, Matt Cheselka, Mike Fitzpatrick

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NOAO Newsletter - National Solar Observatory - June 1999 - Number 58

From the NSO Director's Office

Having assumed the NSO directorship on 1 April 1999, I am still in the process of getting my feet wet. As I begin working with the NSO staff to formulate our programs and long range plans, I welcome constructive inputs from the astronomical community. The NSO is developing new capabilities that will help address shortcomings in spatial, spectral, and temporal resolution that will enhance progress in understanding the origins of solar activity and variability. In the near term, we look forward to the completion of new synoptic capabilities through SOLIS, the third RISE/Precision Photometric Solar Telescope, and enhancement of the GONG network. In the longer term we look forward to working with the solar and astronomical community to define and build a large-aperture, Advanced Solar Telescope (AST). Major steps leading to the AST include the development and installation of adaptive optics at the Richard B. Dunn Solar Telescope and the McMath-Pierce Telescope, and development of infrared instruments and sensors. In addition, the NSO will continue to pursue collaborations with the community to develop the next generation, large-aperture reflecting coronagraph.

The recent NRC Report on Ground-Based Solar Research: *An Assessment and Strategy for the Future* can be found on the WWW at http://www.nas.edu/ssb/gsrmenu.htm. The staff of the National Solar Observatory is encouraged by the committee's specific recommendations directed at the NSO to carry on its national mandate for research in solar physics and development of solar instrumentation. The report represents a substantial effort to evaluate the need of solar astrophysics for ground-based assets and the need to support reduction and modeling of the data those assets generate. The recommendations, which address the NSO facilities, projects and structure, will have a positive impact on the growth and development of the observatory as a prime international institution for ground-based solar physics research. Our response to the report can be found on the WWW at (http://www.noao.edu).

Also joining the NSO family during the past few months are Leo Milano and Michael Sigwarth. Leo works for Cambridge Research and Instruments (CRI) and is stationed at NSO/SP. He and Peter Foukal (CRI) are using the Evans Coronal Facility 16" coronagraph to investigate transient coronal electric fields. He is also digitizing the NSO/SP Ca II spectroheliogram archives. Michael just received his doctoral degree from the Kiepenheuer-Institut fr Sonnenphysik. His thesis was on the *Interaction of Convective Flows and Magnetic Elements in the Solar Photosphere*. He will work closely with Thomas Rimmele and K.S. Balasubramaniam on high-resolution solar physics, exploiting the recent success with the low-order adaptive optics system and the Advanced Stokes polarimeter.

Long-term visitors at NSO include Lois Kieffaber and Alan Peterson (Whitworth College) who are conducting air glow experiments at Sunspot. Also Paul Hickson and Suzanne Watson (University of British Columbia) who are testing a new camera at the Liquid Mercury Telescope for asteroid detection and working with the Sunspot staff on methods of measuring atmospheric turbulence and seeing. The GONG project hosted visits from Markus Roth (Kiepenheuer-Institut), Sushant Tripathy (Udaipur Solar Observatory) and Pier Francesco Moretti (University of Rome) whose projects are mentioned in the GONG section herewith. K.R. Sivaraman and S.S. Gupta (Indian Institute of Astrophysics, Bangalore) are spending another summer in Tucson with Bob Howard, working on the analysis of Kodaikanal and Mt. Wilson sunspot position and area measurements from many decades of daily observations in this century.

The current NSO Users' Committee, consisting of Tom Ayres (Colorado, Chair), Tim Brown (HAO), Tom Duvall (NASA), Phil Goode (NJIT & Big Bear Solar Obs.), Ernie Hildner (NOAA/SEC), Don Jennings (NASA), K.D. Leka (Colorado Research Associates), and Dick Shine (Lockheed) have agreed to continue in their role of providing guidance to the observatory for the upcoming year. The NRC panel on ground-based solar astronomy has recommended formation of an advisory group for the NSO. The NSO plans to combine this function with the Users' Committee and hopes to enlist new members soon. Expressions of interest in serving on this committee are welcome.

NSO continues to make progress on its major projects. The adaptive optics system is now being used to make high-resolution solar observations, already revealing new results about solar fine structure. SOLIS successfully completed an external technical review and is entering the manufacturing and procurement stage. We would like to thank the review committee for their time and effort and especially for their thoughtful suggestions on important design issues. GONG+ has installed the first 1K 1K camera at the Tucson site and are performing tests. The Improved Solar Observing Optical Network (ISOON) telescope system is about to enter its construction phase. I would like to thank our partners who are contributing to these projects and to the general operations of the observatory. These include the USAF, NASA, NOAO, SPRC, and CRI.

Steve Keil

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NSO Hosts PROM Workshop in Tucson

An international team working on prominence research, known as PROM, met at NSO/Kitt Peak from 8-10 April 1999. On 9 April, the team was joined in the NOAO main conference room by several members of the NSO and Solar Physics Research Corporation (SPRC) staff for an all day review and discussion of new topics of research. Key subjects were counterstreaming in prominences, the chirality of prominences and their environment, and X-ray features associated with prominences. When seen against the disk, prominences are now commonly called "filaments."

The morning session centered around the topic of counterstreaming which is a fine-scale pattern of oppositely directed flows everywhere within filaments. In a movie of counterstreaming in a filament observed by Jack Zirker (NSO), Oddbjorn Engvold (University of Oslo), and Sara Martin (Helio Research), it was demonstrated that counterstreaming is most clearly seen near the limb in observations made during very good seeing. The movie reveals a filament to have the same shape in the red or blue wing of the hydrogen alpha line. However, in the red wing the flows are typically along the axis but toward the limb and upward in the filament barbs (away from the observer). In the blue wing, the motions are typically along the axis toward disk center and downward in the barbs (toward the observer). Many diverse ideas were discussed about the cause of this bi-directional streaming. It implies that magnetic support of filament mass is insufficient to explain the existence of prominence mass in nearly vertical filament structures called barbs.

One of the highlights of the afternoon session was the presentation by Karen Harvey (SPRC) of linear Xray features above and nearly parallel to the axis of some filaments seen in Yohkoh images. Another highlight was Yuri Litvinenko's (University of New Hampshire) presentation of theory relating canceling magnetic fields to filament formation. Jack Harvey presented processed Kitt Peak line-of-sight magnetograms, which reveal areas of horizontal magnetic field in filament channels as well as around the borders of active regions.

During the workshop, the team reviewed and studied observational material from two observing runs in 1998 from a number of observatories. High quality observations obtained in June 1998 at the Swedish Solar Observatory in La Palma revealed counterstreaming and an unexpected pattern of apparent coherent motions in adjacent prominence threads of high latitude prominence. Additional discussions centered around theory relevant to counterstreaming and observations needed to better develop realistic prominence models.

Sara Martin

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A Celebration of the Career of Bob Howard

Robert F. Howard, the first Director of the National Solar Observatory as a part of NOAO, retired last October. On 26 March of this year, over sixty of Bob's colleagues and friends gathered in Tucson for a one-day meeting to celebrate his lifelong contributions to solar astronomy. Marking the high regard in which Bob is held, Arvind Bhatnagar traveled from India, and Hiro Yoshimura from Japan, specially for the event.

Bob served and led the solar physics community in many capacities (most recently as an editor of Solar Physics), but doing science was always his passion and focus. Appropriately, science was at the core of his celebratory meeting.

After welcoming comments by Sidney Wolff (for NOAO) and Mark Giampapa (for NSO), Bill Livingston presented a biographical sketch of Bob's life with an emphasis on the Mount Wilson days during which he had a long and productive association with solar physicists from around the world, as well as with Carnegie Fellows, postdocs, and summer students. This overview was followed by a series of scientific talks related to Bob's work: Jack Harvey on magnetographs then and now, Herschel Snodgrass on magnetic rotation, Bernard Durney on differential rotation, Tom Duvall on meridional circulation, Peter Gilman on synoptic maps, Sydney D'Silva on subsurface fields, Rudi Komm on

torsional oscillations, Sara Martin on the solar cycle, and Hiro Yoshimura on the Sun and climate change. Reminiscences were presented by Dale Vrabec, Hal Zirin, Dave Rust, Dick White, and Arvind Bhatnagar.

The meeting was attended by Bob's wife Molly and their children and grandchild. As a final surprise, Bob's son closed the day with a colorful account of growing up in a much-traveled astronomical family. An evening dinner followed with congratulatory messages read from those who could not attend.

We all wish Bob and Molly the best in their future travels and adventures from a new home base in Flagstaff.

Bill Livingston, Doug Rabin, Jack Harvey

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NOAO Newsletter - National Solar Observatory - June 1999 - Number 58

NSO Observing Proposals

The current deadline for submitting observing proposals to the National Solar Observatory is 15 July 1999 for the fourth quarter of 1999. 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 the WWW at http://www.nso.noao.edu/. A Windows-based observing-request form is also available at the WWW site.

Dick Altrock

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NOAO Newsletter - US Gemini Program - June 1999 - Number 58

Preparing for Gemini Operations

The beginning of scientific operations of Gemini North is scheduled for June 2000, and preparations are under way to support the first scientific users. Each of the Gemini partner countries (US, UK, Canada, Australia, Chile, Argentina, and Brazil) has a national Gemini office that will provide that support to its astronomers. In the US, that office is the US Gemini Program (USGP) at NOAO in Tucson. While the Gemini Observatory will assist observers who come to use the telescope, the USGP will provide all assistance before and after the observing run. This includes the proposal and time allocation process, assistance for proposal writers and those planning their observations, support for users and prospective users to understand the instrumental capabilities and performance, as well as the provision of and support for data reduction software. Additionally, the USGP continues in its roles of community scientific liaison/advocate to Gemini and in managing the procurement of Gemini instruments assigned to the US.

In getting the US astronomical community ready to use Gemini effectively, there are two areas that should be highlighted early--the proposal process and the help desk.

US proposals for Gemini will be completely integrated with the NOAO proposal process. With the exception of the first call for proposals, the deadlines will be the same for telescopes at KPNO, CTIO, and Gemini. (The first call for proposals will have a deadline of 31 January 2000.) In fact, proposals will be able to request time on multiple telescopes at multiple sites. In the current TAC process, proposals are divided by subject area among panels, allowing each panel to evaluate all proposals to attack a specific problem. When Gemini South becomes available, it too will be integrated into the mix.

In order to most effectively support the users of Gemini in all the partner countries, the Gemini partnership has adopted an electronic help desk that uses a variety of searching and routing procedures to find answers to questions. That help desk can be accessed either through a Web interface (URL can be found through the USGP Web pages) or by phoning the USGP office. More information about how to get answers to questions about all aspects of Gemini from telescope and instrument performance to procedures for applying for time will be publicized in future Newsletters.

Todd Boroson

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Access to Gemini North-- The First Semester

The first semester of open use on Gemini North will run from 15 June 2000 until 31 January 2001. Thereafter, semesters will coincide with the usual NOAO semesters, i.e., 1 February-31 July and 1 August-31 January. The first call for proposals (together with all information to support applications) will be in December 1999. We will inform potential proposers through a variety of media, including the Newsletter, direct email, and our Web pages. In this first semester, the US allocation (41.6%) is expected to be between 60 and 80 nights depending on the demand for engineering time.

The application process will consist of two phases. In Phase I, applicants will submit standard NOAO proposals through the usual Web-based process. The deadline for submission of these proposals will be 31 January 2000. These proposals will be evaluated by a US TAC and a ranked list of recommended proposals will be transmitted to the International Gemini Observatory (IGO). IGO will generate a draft queue and classical schedule with approximately correct proportional allocation to each of the seven Gemini partner country communities. An international TAC will meet in early April 2000, and final approval for the queue and schedule will be issued by the Gemini Director on or before 10 April 2000. A coordinated notification of the successful applicants by IGO and USGP will initiate the start of Phase II in which all queue, and most classical programs, will be defined in detail by the proposers using IGO's Observing Tool software.

Todd Boroson

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US Gemini Instrumentation Program

The Near-IR Imager is in its final assembly and integration phase at the IfA in Honolulu in preparation for shipping to Hilo and commissioning. Klaus Hodapp is the P.I. for this instrument. A science grade InSb 1024 1024 array has been identified for this instrument and that detector is undergoing detailed characterization.

The Near-IR Spectrograph, being built at NOAO, is in a redesign phase following a hiatus that started last September. Many technical reviewers have declared their endorsement of the new design, and information about the instrument can be found on the Web at http://www.noao.edu/ets/gnirs/.

The Mid-IR Imager is reaching the end of its critical design phase, with a critical design review now scheduled for July 1999. This instrument is destined for Gemini South where it is expected to be delivered in early 2001. It is being built at the University of Florida by a team led by Charles Telesco.

A conceptual design study is beginning for a Near-IR Coronagraph/Imager for Gemini South. Funding for this design study has been awarded to a team led by Douglas Toomey (Mauna Kea Infrared). Following a nine month design effort,

the USGP will hold a second open competition to identify a group to produce a complete design and build the instrument.

Todd Boroson

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NOAO Newsletter - NOAO Educational Outreach - June 1999 - Number 58

NOAO Educational Outreach

The NOAO Educational Outreach Department is responsible for information requests, scientific media relations, and educational outreach programs. As summer approaches, our pace shifts from busy to hectic as we prepare for the arrival of teacher and undergraduate participants in our educational outreach programs.

Our NSF-funded Teacher Enhancement Program, *The Use of Astronomy in Research Based Science Education* (RBSE), has accepted another sixteen teachers into this summer's program. We are again looking for astronomers from around the country to serve as mentors to these teachers when they return to their home schools to implement the RBSE program. Teachers have been accepted from the following locations; please contact Suzanne Jacoby (sjacoby@noao.edu) if you live near these locations and would like information about becoming a mentor.

```
Traverse City, MI       Strongsville, OH
Cranston, RI            Woodbridge, NJ
Tucson, AZ              Midland, TX
Fort Benning, GA        Union, KY
Pinson, AL              Philadelphia, PA
Rio Piedras, PR         Evans, GA
Southlake, TX           San Antonio, TX
Wall, TX
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NOAO Educational Outreach has been involved with several E/PO supplements recently, developing outreach components for NOAO-affiliated NASA research proposals. We encourage our users to contact us for advice and ideas on how to effectively communicate their research to the educational community and general public. We are most interested in incorporating your science into our existing programs (ASTRO, RBSE, Kitt Peak Visitor Center display, NOAO Image Gallery, web page, desktop publishing and graphic design services, etc.) and proposals that make use of both ground based and space observations.

NOAO Outreach also offers a gateway to the Southwestern Consortium of Observatories for Public Education (SCOPE). SCOPE is a consortium of seven observatories located in the southwest: the National Solar Observatory/Sacramento Peak, Apache Point Observatory, McDonald Observatory, Very Large Array/National Radio Astronomy Observatory, Whipple Observatory, Lowell Observatory, and Kitt Peak National Observatory. Collectively, SCOPE sites host more than 500,000 visitors annually and reach more than 4,000 teachers through workshops. McDonald's StarDate/Universo reaches a radio audience of 8.7 million listeners weekly. SCOPE meets three times a year to discuss and support efforts at members' individual institutions and encourages astronomy researchers to use the expertise and infrastructure in the group to develop effective E/PO proposals. Learn more about SCOPE at http://www.as.utexas.edu/mcdonald/scope/scope.html

Eight undergraduates will participate in the Kitt Peak REU program this summer; the National Solar Observatory will host seven students as well, four in Tucson and three at Sacramento Peak. For the first time, supplements were available from the NSF to support teachers' participation in the REU program. NOAO/Tucson will have three teachers, graduates of last year's RBSE program, returning to Tucson to work with staff astronomers Nigel Sharp, Caty Pilachowski, and Travis Rector.

Our recently redesigned web pages have a new look and more information about NOAO outreach activities--check them out at http://www.noao.edu/outreach/.

Suzanne Jacoby

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IRAF Update

The IRAF V2.11 patch promised in the last Newsletter is in preparation now. This will include Y2K support, system support for GUIs, some Open IRAF enhancements, platform support upgrades, and numerous feature enhancements and bug fixes. Most science application enhancements appear between major releases in the layered packages, but the V2.11 system patch will include the sinc interpolation and drizzle resampling enhancements mentioned in the March issue of the Newsletter.

We want to remind you that you will need to update IRAF this year to avoid Y2K-related problems. At least one serious Y2K-related bug has already been found, affecting *imheader*. A number of Y2K-related "enhancements" are being made as well. The most important of these is converting all IRAF software to support the new Y2K-compliant DATE-OBS standard. These changes will mean that any images written in the year 2000 will have "2000" as the date rather than "00". More subtly, any such images read by the software will be interpreted as having a date of 2000 instead of 1900, which could adversely affect time-dependent astronomical calculations of all sorts. In addition to updating IRAF and all NOAO-supported layered packages, we are working with outside groups such as HST (STSDAS) to see that all the major IRAF packages are updated. See http://iraf.noao.edu/projects/y2k for detailed information on the IRAF Y2K upgrade and testing program.

Solaris 7, which first appeared early in the year, was installed on an IRAF server in February, and tested with the released IRAF V2.11.1 system A detailed report on this was posted to the *adass.iraf.system* mailing list 11 February (see the IRAF Web pages to subscribe to this or any other IRAF discussion group). Very briefly, the current IRAF V2.11.1 release was prepared for and supports Solaris 2.4, 2.5, and 2.6. It appears to run fine on 2.7, including supporting compilation, with the exception that IRAF networking is broken. We only did rudimentary testing and other Solaris 2.7-related bugs are possible. Full support will be provided in the upcoming IRAF patch.

The PC-IRAF upgrade is on hold awaiting the next IRAF version; it should be out not long after the general IRAF patch is released later this year. RedHat users should be aware that there is a problem running the current version of RedHat-Linux IRAF on the new RedHat 6.0 release. A patch will be available by the time this Newsletter article is published.

One major area of development for the IRAF group in early 1999 was for the science GUIs (these provide GUIs for spectral analysis, interactive image-based aperture photometry, radial velocity analysis, and HTML-based IRAF help browsing). Recent work has focused on the online help and tutorials. These are undergoing internal testing now at NOAO and should be released later this year as an add-on package. The upcoming V2.11 patch, and the latest version of X11IRAF, will be required to run the GUIs.

A second major area for IRAF development in early 1999 has been for the NOAO Mosaic and related instruments. The Mosaic DHS (and the CTIO Arcon software) has been modified to support observing at the WIYN. This system is functioning now and is currently undergoing engineering tests, with switch-over planned for sometime later this year. Finally, work has begun on the Mosaic archive pipeline first mentioned in the last Newsletter. This will provide an automated pipeline and raw data archive for all data taken with the Mosaic. Plans are being made to extend this to other instruments in the future. Eventually we expect that most IRAF-based reductions will be done using automated, GUI and database based, parallelized pipelines such as we are developing for the Mosaic.

For further information about the IRAF project please see the IRAF Web pages at http://iraf.noao.edu/ or send email to iraf@noao.edu. The adass.iraf newsgroups (available on USENET or via a moderated mailing list which you can subscribe to 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 Newsletter - Central Computer Services - June 1999 - Number 58

ADASS '99

We are pleased to announce the ninth annual conference on Astronomical Data Analysis Software and Systems (ADASS) to be held at the Hilton Waikoloa Village Hotel on the Island of Hawaii's beautiful Kohala Coast, 3-6 October 1999. The conference is hosted by the Canada-France-Hawaii Telescope Corporation (CFHT).

The ADASS Conference Series provides a discussion forum for scientists and computer specialists concerned with algorithms, software and operating systems that are employed in the acquisition, reduction and analysis of astronomical data. The program includes invited talks, contributed papers, poster sessions as well as tutorial sessions, user group meetings and special interest meetings ("BOFs"). These activities aim to encourage communication between software specialists and users, and also to stimulate further development of astronomical software and systems.

The program will include seven key topics:

```
Distributed Data Systems and Services
Developmental Methodologies
Enabling Technologies for Astronomical Research
General Analysis
Queue Scheduling
Scripting Languages
Sky Surveys
```

Sixteen invited speakers have now been confirmed to discuss diverse subjects covering these topics:

```
Jerry Fishman (MSFC)        - Gamma-ray Bursts
Jean-Pierre Veran (HIA/DAO) - Adaptive Optics
William Lupton (Keck)       - Keck Telescope Control System
Adair Lane (CfA)            - Antarctic Submillimeter Telescope and Remote Observing
Don Wells (NRAO)            - Green Bank Telescope Active Surface
Alex Szalay (JHU)           - SDSS
Luiz da Costa (ESO)         - ESO Imaging Survey
Harry Ferguson (STScI)      - Hubble Deep Field
Jeff Lubelczyk (GSFC)       - Software Engineering Lab, NASA/GSFC
Rick White (STScI)          - Object Classification
Andrew Fruchter (STScI)     - "Drizzling"
Dave Silva (ESO)            - ESO/VLT
Darrel Schiebel (NRAO)      - Glish
Bob Hanisch (STScI)         - Multi Mission Archive at Space Telescope (MAST)
Eric Smith (NGST)           - NGST
Michael McLennan (Sun)      - Tk/Tcl
```

We encourage you to participate in this exciting conference. Further information can be found at http://www.cfht.hawaii.edu/ADASS/ or by contacting the Local Organizing Committee at adass@cfht.hawaii. edu. The Web site will be regularly updated during the next few months and will include information about the program, registration, financial assistance, and Hawaiian accommodations.

Please, take note of these important dates:

```
ADASS IX Second Announcement:        May 15
Preliminary Program Announcement:    May 15
Early Registration deadline:         July 15
Hotel and car reservations deadline: August 2
Mauna Kea and Maui visits deadline:  August 2
```

We are looking forward to seeing you in Hawaii!

The Local Organizing Committee

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NOAO FTP Archives

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

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

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

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

   catalogs---Jacoby et al. catalog; "A Library of Stellar Spectra";
   update to Helen Sawyer Hogg's "Third Catalogue of Variable Stars in
   Globular Clusters"; "Hipparcos Input Catalogue"; "Lick
   Northern Proper Motion Program: NPM1"; "CoudÃ© Feed Spectral
   Library"; "General Catalog of Variable Stars, Volumes I-V 4th ed."
   and "Name-Lists of Variable Stars Nos.  67-76."

   ctio (ftp.ctio.noao.edu, cd ctio)---CTIO archives---Instrument manuals,
   4-m PF plate catalog, filter library, standard star fluxes. (Nightly
   mirror of CTIO FTP site.)

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

   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.

   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.
```

IP numbers for the machines mentioned above:

```
argo.tuc.noao.edu    = 140.252.1.21
ftp.ctio.noao.edu    = 139.229.2.67
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: Tom Ingerson (tingerson@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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