NOAO Newsletter - March 1993 - Number 33

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Director's Office

AURA Corporate Office

Cerro Tololo Inter-American Observatory

Kitt Peak National Observatory

National Solar Observatory

Global Oscillation Network Group

Central Computer Services

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Comments concerning this Newsletter are welcome and will be forwarded to the appropriate editors.

Budget for FY 1993 (1Mar93)

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Budget for FY 1993 (1Mar93)
(from the Director's Office, NOAO Newsletter No. 33, 1 March 1993)

In mid-January, the NSF provided NOAO with an official budget figure for the fiscal year that started 1 October 1992. The total budget of $26.6M is lower than last year's budget of $28.5M by 6.7%. If inflation is taken into account, the decrease in purchasing power is approximately 10 percent. Costs in Chile continue to increase at a rate that is about 15 percent higher than the rate of increase in the US. This latest decrease in support, when combined with the other decreases since 1984, means that the NOAO budget for operations is about 30 percent lower than it was a decade ago.

We recognize that NOAO is not the only astronomical program facing budget cutbacks. Similar reductions have been made in the budgets for the other national centers supported by the NSF, in the astronomy grants program, and in some programs at NASA. Many universities are also facing reduced support for research, equipment purchases, and staff.

In choosing how to implement this budget cut, NOAO has tried to take into account the fact that these are difficult times for all of astronomy. Specifically, we have tried to absorb the reductions in such a way as to minimize the impact on observers. The primary enabling task of the national centers is to provide competitive observing facilities to the community, with time allocated on the basis of merit. The difficulty comes about in trying to address both types of activities that are implicit in this mission statement. If we cut back on the number of observing facilities or the capabilities offered at those facilities, then some fraction of the community will no longer be able to pursue the programs of their choice. On the other hand, if we manage most of the budget reductions in the form of cutbacks to the instrumentation program, then in three or four years the program will no longer be competitive.

A major uncertainty in planning the budget cuts is that we have no idea of the future trends of support for the national centers. Will next year bring restoration of support? or a further loss of funds? Obviously, the strategy required for the two situations is dramatically different.

In formulating the operating plan for FY 1993, NOAO has tried to keep as many options open as possible. That is, we have tried to accommodate these budget cuts without closing any facilities permanently while we wait for better information on the long-term directions for NSF-funded astronomy. About 70 percent of the NOAO budget is for salaries, and so a cutback of the magnitude imposed this year will require cutbacks in

staff costs. We will accomplish these cutbacks in two ways-- through a reduction by about 20 people in overall staffing and, in an effort to maintain a large enough staff to keep the telescopes open, through a salary freeze for remaining staff. It is clear, however, that salary freezes are not an effective long-term strategy for balancing the budget. The quality of the NOAO program depends on the quality of the staff, and we must reward the staff for their contributions with competitive salaries.

In addition to the salary freeze, we have made reductions in the non-payroll funds for major facilities maintenance and for equipment that cannot be sustained over the long-term. If the budget remains at the present level in future years, we will have to re-examine and adjust the budget accordingly. As soon as reliable numbers are available for FY 1994, we will begin the development of a longer term strategy.

The general impact of the cuts that NOAO has been forced to make this year will be to reduce the suite of capabilities available at the telescopes, to reduce the level of observer support, and to slow the rate at which new instrumentation can be brought on line. There have also been substantial reductions in the level of travel and research support provided for NOAO scientific staff. Each observatory has made its own decisions about how to reduce its budget for support of observers, and so the specific program changes are different at the three sites. A sampling of those changes follows:

CTIO will not hire a new post-doctoral fellow and will lose an open scientific staff position. There was also a reduction of 5.5 FTEs among the Chilean staff. The impacts are on optics improvements for the smaller telescopes, slowing down the instrumentation program and completion of the ARCON CCD controllers, reduced observer support on the mountain, and significantly reduced maintenance activity for the La Serena headquarters. Eligible observers are still supported for their in-country expenses, but all will now enjoy the scenic bus ride between Santiago and La Serena, rather than the more convenient air trip.

KPNO has seen manpower reductions in support for observers, development of the mountain computer network, administrative and secretarial support, and in some of the instrumentation areas. These reductions have led to limiting access or planning retirement for a number of observing capabilities that cannot be adequately supported, including photography and single- channel photometry. Other non-payroll savings have been found by reducing library subscriptions and sharply limiting computer and software purchases and maintenance.

Losses of NSF funding support to NSO translate directly to loss of observing time to the community, unless other resources are found. The tendency is to move staff to externally funded specific projects, which preserves the technical groups but limits availability of facilities both at Kitt Peak and Sac Peak. GONG funding was held constant by the NSF at last year's level. A modest increase was requested to keep the project on schedule. Since all the descopes possible have already been imposed that do not fundamentally compromise the scientific objectives of the program, an additional delay of at least three months in deployment will be inevitable without an augmentation.

Please read the relevant sections of this Newsletter carefully for the details of the decisions that were taken and the impact on your own program for Fall semester proposals. As the budget deliberations begin for fiscal year 1994, we need to fight the continuing erosion of support by devising strategies as a community to highlight the importance of our field: active astronomers are working throughout the country; we attract new talent to scientific research; and we uniquely engage the interest of the general public in scientific activity. At the same time, our forward look might well be directed toward closer cooperation in resolving the priorities of optical astronomy, so that we maximize the return of high quality data from whatever resources we get. We appreciate the feedback that you gave us on the broader budget issues as highlighted in the previous Newsletter and would value your thoughts at any time.

Richard F. Green, Sidney C. Wolff

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NOAO Management Rearrangements (1Mar93)

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NOAO Management Rearrangements (1Mar93)
(from the Director's Office, NOAO Newsletter No. 33, 1 March 1993)

As of 1 February, Sidney Wolff resumed her role as NOAO Director. She also continues to serve as Acting Gemini Project Director, with Gemini responsibilities receiving the priority claim on her time. Richard Green became Acting Deputy Director of NOAO, in order to assist Sidney Wolff and provide coverage for the full-time NOAO responsibilities. As discussed in the accompanying article, Fred Gillett took over as Acting US Gemini Project Scientist, to assure that US participation in the Project is adequately maintained and to improve communications with the astronomical community. Pat Osmer remains Deputy Director of NOAO, but is enjoying a brief period of well-earned relief from most administrative duties in order to concentrate on his research program.

David De Young has announced that he does not wish to be considered for reappointment to the position of Director of Kitt Peak. He will continue in his current role until new administrative arrangements are made. We are likely to wait for the outcome of the searches for directors for CTIO and NSO before initiating any action relative to KPNO. Dave has given years of dedicated service to KPNO and NOAO; his concern and outstanding efforts to promote the quality of research coming from the telescopes and the staff, and the quality of the scientific environment in the Tucson headquarters merit our sincere and lasting appreciation.

I would like to offer publicly my gratitude to the staff of NOAO for their help and support during my interim directorship, and to Sidney Wolff and AURA for offering me this opportunity. It is clear that NOAO is well structured and has a strong sense of cooperation within the management, so that such interim arrangements can work without major disruption, even in difficult times.

Richard F. Green, Sidney C. Wolff

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Notes from the US Project Office (1Mar93)

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Notes from the US Project Office (1Mar93)
(from the Director's Office, NOAO Newsletter No. 33, 1 March 1993)

On 1 February Fred Gillett of NOAO became the Acting US Gemini Project Scientist. Gillett chaired the Infrared Panel of the Astronomy and Astrophysics Survey (Bahcall) Committee, leads the IR Subcommittee of the US Gemini Science Advisory Committee, and serves on the international Gemini Science Committee. Gillett and his subcommittee produced the performance requirements document that serves as the basis for the imaging specification of the telescopes, as well as defining the thermal emissivity goals. Gillett interacts with the Project on an almost daily basis, working with the various group engineers and Matt Mountain to assure that the design will meet the stringent performance standards. Richard Green has relinquished the primary national project scientist duties on an interim basis to concentrate on NOAO responsibilities while Sidney Wolff serves as Acting Gemini Director.

With the advice of the national project offices, the Gemini Project has established a set of Instrument Working Groups that are now in the process of defining performance requirements and identifying potential participants in the process of designing and building the first-light instrument complement. In order to function efficiently, the working groups were purposely chosen to be small, but the US participants take seriously their roles of representing the larger US community. Their

goal is to refine the instrument performance requirements sketched out in the Gemini Science Requirements Document for presentation at the next meeting of the Gemini Science Committee on 25-26 March at the DAO. Over the following few months, the working groups will be identifying the ways for the Project to get the instruments designed and built. Now is the time! If you want to be part of the process of defining the performance of a particular instrument, or wish you and your group to be considered as suppliers of an instrument or partners in a joint development program, please contact the appropriate US working group member. They intend to develop an e-mail network of interested participants, and will consider your input carefully in their deliberations.

List of US Instrument Working Group members:

Adaptive Optics:
Don McCarthy dmccarthy@as.arizona.edu
Steve Ridgway sridgway@noao.edu
Francois Roddier roddier@uhifa.ifa.hawaii.edu

Guiding and Active Wavefront Sensing:
James Beletic beletic@gtri.gatech.edu
Bruce Woodgate woodgate@champ.span.nasa.gov

OUV Multi-Object Spectroscopy:
Pat Osmer (chair) posmer@noao.edu
John Huchra huchra@cfa.harvard.edu
Bob Schommer rschommer@ctio.noao.edu

Visible Imaging, CCDs:
Gerry Luppino (chair) ger@uhifa.ifa.hawaii.edu
James Beletic beletic@gtri.gatech.edu
Todd Boroson tboroson@noao.edu
John Geary geary@cfa.harvard.edu

High Resolution Optical Spectroscopy:
Caty Pilachowski (chair) cpilachowski@noao.edu
Don York don@oddjob.uchicago.edu

IR Imaging and Arrays:
Jay Frogel (chair) frogel@payne.mps.ohio-state.edu
James Graham jrg@ucbast.berkeley.edu
Klaus Hodapp hodapp@uhifa.ifa.hawaii.edu
Tom Soifer bts@tacos.caltech.edu

IR Spectroscopy:
Jay Elias jelias@ctio.noao.edu
Paul Harvey pmh@astro.as.utexas.edu

Fred Gillett and I are also happy to talk with you any time about the Gemini instrumentation program.

There is now a copy of the most recent Gemini Science Requirements document available via ftp. To access this document, ftp to gemini.tuc.noao.edu, login as "anonymous" (using your name as the password), and change directories to pub/gemini. There are two versions of the file, compressed and not compressed. Use the command "get" to obtain the file, and exit with "quit". The uncompressed file is called science_reqs.ps and is ~250 Kbytes long. This can be printed directly on any PostScript printer. The compressed version is called science_reqs.ps.Z and is ~87 Kbytes long. Use unix uncompress to turn it into a PostScript file and print as above. Please contact Bill Weller if you encounter any difficulties.

Richard F. Green

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Bob Williams to Leave CTIO (1Mar93)

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Bob Williams to Leave CTIO (1Mar93)
(from the Director's Office, NOAO Newsletter No. 33, 1 March 1993)

The Director of Cerro Tololo Inter-American Observatory, Robert Williams, had announced several months ago that he will not continue beyond his current term; he will leave CTIO in July 1993. Williams has won high praise for the job he has done as Director, both from the staff and the users. The Observatories' Visiting Committee met at CTIO in November and reported this: "It is clear that the CTIO Director, Dr. Bob Williams, is held in very high regard by the scientific staff, the technical and support people, and all astronomers with whom we have contact. In addition, the Chilean astronomers with whom we talked are also of the opinion that he is an excellent Director of CTIO. Their comments are important given the location of CTIO in a foreign country with a different language and culture... Clearly morale is high at CTIO and Bob Williams deserves credit for this. His example of personal scientific productivity and his strong encouragement of the scientific staff towards the same goal, while fulfilling their service obligations, is another strength of his directorship... We are very pleased with Bob Williams' performance as CTIO Director and hope that the next Director will meet the high standards he has set."

As this issue went to press, it was announced that Bob Williams has been appointed as the next Director of STScI. The NOAO staff wish him every success in this challenging new position.

Finding a suitable replacement is the challenge for the search committee, which is being ably chaired by Jim Liebert of Steward Observatory, a past chair of the CTIO Users' Committee. The members are Bruce Carney (U. of North Carolina), Jim Hesser (DAO), Ruth Peterson (Lick Obs.), Bob Schommer (CTIO), and Craig Wheeler (U. of Texas). Please contact Liebert, Sidney Wolff, or me with suggestions or nominations for the CTIO Directorship.

Richard F. Green

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Jeff Kuhn and Bob Schommer Receive Tenure (1Mar93)

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Jeff Kuhn and Bob Schommer Receive Tenure (1Mar93)
(from the Director's Office, NOAO Newsletter No. 33, 1 March 1993)

It is a pleasure to announce that at its meeting on 22-23 January 1993, the AURA Executive Committee approved the Observatory Advisory Committee's recommendations that Jeff Kuhn and Bob Schommer be granted tenure in NOAO.

Jeff Kuhn has just joined the NSO staff at Sacramento Peak Observatory; he was formerly a professor at Michigan State University, where he held a Sloan Fellowship. He was cited for the breadth of his scientific contributions and interests on the basis of his work in precision global photometry, infrared magnetometry and coronal photometry, helioseismology, and even exploration of the gravitational instability of dwarf elliptical galaxies. Kuhn was praised for the combination of abilities in instrumentation, numerical modeling and physical theory that went into the body of significant work. The NSO and NOAO staffs are fortunate that Kuhn is joining us as a colleague.

Bob Schommer moved to CTIO in 1990 from Rutgers, where he was a professor. He is widely noted for his observational work on the stellar populations of nearby galaxies, the properties of large-scale motions of galaxies and relation to the Hubble flow, and his work on internal galaxy velocity fields with the Rutgers Fabry-Perot. He was also cited for his outstanding service and support work with the Fabry Perot, the small telescopes and the Cassegrain spectrographs, as well as in representing CTIO in planning for the Gemini Project. Schommer is valued as a supportive and stimulating colleague both within CTIO and throughout NOAO; we are pleased at his decision of long-term commitment and this recognition of his contribution.

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Nicholas U. Mayall (1906-1993) (1Mar93)

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Nicholas U. Mayall (1906-1993) (1Mar93)
(from the Director's Office, NOAO Newsletter No. 33, 1 March 1993)

Nicholas U. Mayall, Director of KPNO from October 1960 to September 1971, died on 5 January after gradually becoming weakened by diabetes. We remember him as an outstanding astronomer who gave up research to become Director just after KPNO's dedication, who helped initiate the 4-m telescope later named in his honor, and who took over from the University of Chicago the establishment of a sister observatory in Chile later named Cerro Tololo Inter-American Observatory. We also remember him as a kind and considerate Director who was interested in and knew each member of the Observatory as a friend. He was cautious but reasonable in every decision that he made.

Mayall was born and raised in California and graduated with degrees from the University of California, Berkeley. He worked as an assistant at the Mt. Wilson Observatory, and that led to papers with Seth Nicholson and others about Pluto shortly after its discovery, and about other solar system objects. He taught in Berkeley and became an astronomer at the Lick Observatory. During World War II he did defense research at MIT; that was his only residence outside of California and Arizona during his lifetime.

Mayall's research at the Lick Observatory was mainly with the 36-inch Crossley Reflector, a difficult telescope to use at its prime focus. He shared with Milton Humason the responsibility for obtaining the redshifts of all the northern galaxies brighter than V = 13 mag. Humason observed the fainter ones with the Mt. Wilson 100-inch while Mayall observed the brighter ones with the Crossley. That culminated in the 1956 Humason, Mayall, and Sandage study of the expansion of the universe. He is also known for observing the rotational motions in M31, M33, and other galaxies, showing the inner solid-body rotation and the outer Keplerian motion. Gerry Kron was amazed at the sensitivity of Mayall's eyes, an important need before the days of measured blind offsets: he could see to V = 17 mag with the 36-inch. (It is ironic that in recent years his eyesight failed to the point where he could not even read.) He was also the first to determine spectroscopically the radial velocities of several dozen knots in the Crab Nebula (the supernova remnant from the explosion in 1054 AD). He determined the galactic rotation, lack of a K-term, and the local solar motion from the radial velocities of 50 globular clusters, observed in integrated light.

In 1960 he was asked to become the second Director of KPNO without having had previous administrative experience. It was still a time of decision about whether KPNO should be primarily an observatory for American astronomers having little or no access to telescopes in a good climate, or also a major observatory that would spearhead in innovative instruments and large telescopes. Also at that time the southern skies beckoned with no large telescopes in Chile. The University of Chicago felt unable to continue with the large observatory proposed by Gerard Kuiper, so that project was turned over toAURA and KPNO. During Mayall's tenure and with Jurgen Stock doing the field work, CTIO became a reality with a 1.5-m reflector funded by the Air Force through Albert Hiltner's initiative and later a copy of the Mayall 4-m at Kitt Peak.

Astronomers honored Mayall's retirement with a symposium held in 1971. Thereafter he was active in several organizations, such as the overview committee for Fermilab. He lived with his charming wife Kay for 58 years of marriage; their two children Bruce and Pamela live in Mission Viejo, California and Snowflake, Arizona, respectively.

At Mayall's retirement Frank Edmondson called him the finest gentleman

he had ever known, and that summarizes the feelings of all of us. He was always calm, reasonable, and interested in everyone and what they were doing. He loved KPNO and CTIO and was a strong but reasonable defender of their needs, working with others rather than forcing his wishes. Those observatories have been lucky to have such a friend and leader at a crucial time in their history.

Helmut A. Abt

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NOAO Preprint Series (1Mar93)

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NOAO Preprint Series (1Mar93)
(from the Director's Office, NOAO Newsletter No. 33, 1 March 1993)

The following preprints were submitted during the period 1 November 1992 to 31 January 1993. Please direct all requests for copies of preprints to the NOAO author marked with an asterisk.

Number	Author(s)	Title
479	Bogart, R., *Hill, F., Toussaint, R., Hathaway, D., Duvall, T., Jr.	"Artificial Data for Testing Helioseismology Algorithms"
480	Milford, P.N., *Hill, F., Tarbell, T.D.	"Subsurface Transverse Flows Near an Active Region"
481	*Williams, W., Hill, F., Toner, C.	"Tests of a Simple Data Merging Algorithm for the GONG Project"
482	Lazrek, M., *Hill, F.	"Temporal Window Effects and their Deconvolution from Solar Oscillation Spectra"
483	*Komm, R.W., Howard, R.F., Harvey, J.W.	"Rotation Rates of Small Magnetic Features from 2- and 1-Dimensional Crosscorrelation Analyses"
484	*Massey, P., Johnson, J.	"Massive Stars near Eta Carinae: The Stellar Content of Tr 14 and Tr 16"
485	*Hinkle, K.H., Fekel, F.C., Johnson, D.S., Scharlach, W.W.G.	"The Triple Symbiotic System CH Cygni"
486	*Pilachowski, C.A., Sneden, C., Booth, J.	"The Abundance of Lithium in Metal-Poor Subgiant Stars"
487	*Fowler, A.M.	"Large Scientific 2-D Arrays for the 1-5 Micron Region"
488	*Suntzeff, N.	"The Chemical Homogeneity of Stars in Galactic Globular Clusters"
489	Harding, P., *Morrison, H.	"The Bulge/Halo Interface Rotational Kinematics from [Fe/H] = -3.0 to Solar"
490	*Morrison, H., Harding, P., McGregor, P.	"Comparing M and K Giants in the Bulge"
491	Lockwood, G.W., Skill, B.A., Baliunas, S.L., *Radick, R.R.	"Estimating Long-term Solar Brightness Changes using Stellar Observations"
492	*De Young, D.S.	"On the Relation between FRI and FRII Radio Galaxies"
493	Vial, J.C., Koutchmy, S., *Smartt, R.N.	"Moon-Based UV Reflecting Coronagraph"

494	*Schommer, R.A.	"Kinematics of Star Clusters in M33 and Comparisons with the Magellanic Cloud and Milky Way Systems"
495	*Ridgway, S.T.	"Visible and Infrared Imaging Interferometry from Space"
496	*Pierce, M.J., McClure, R.D., Welch, D.L., Racine, R., van den Bergh, S.	"Cepheid and Long-Period Variables in Virgo Cluster Galaxies"
497	*Pierce, M.J., Crabtree, D.R.	"An Optical P - L Relation for LPVs"
498	*Altrock, R.	"Ground-Based Coronagraphic Observations of Solar Streamers"
499	Bertello, L., *Restaino, S.R.	"Some Evidence for Large-Scale Motions on the Sun"
500	*Mueller, B.E.A., Belton, M.J.S.	"An Interpretation of Pre-Perihelion (8AU) Photometry of P/Halley"
501	*Cauzzi, G., Smaldone, L.A., Balasubramaniam, K.S., Keil, S.L.	"On the Calibration of Line-of-Sight Magnetograms"
502	*Pierce, M.J.	"Luminosity-Line Width Relations and the Extragalactic Distance Scale"

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Non-NOAO Preprints (1Mar93)

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Non-NOAO Preprints (1Mar93)
(from the Director's Office, NOAO Newsletter No. 33, 1 March 1993)

Preprints that were not included in the NOAO preprint series but are available from staff members are listed below in alphabetical order by first author. Please direct all requests for copies of these preprints to the NOAO author marked with an asterisk.

Author(s)	Title
Fleming, T.A., *Giampapa, M.S., Schmitt, J.H.M.M., Bookbinder, J.A.	"Stellar Coronae at the End of the Main Sequence: A ROSAT Study of the Late M Dwarfs"
Griffiths, R., Ratnatunga, K., Doxsey, R., Ellis, R., Glazebrook, K., Gilmore, G., Elson, R., Schade, D., *Green, R., Valdes, F., Huchra, J., Illingworth, G., Koo, D., Schmidt, M., Tyson, A., Windhorst, R., Neuschaefer, L., Pascarelle, S., Schmidtke, P.	"The Hubble Space Telescope Medium Deep Survey: Status Report and First Results"
Haas, M., Christou, J.C., Zinnecker, H., *Ridgway, S.T., Leinert, C.	"Sub-diffraction-limited Infrared Speckle Observations of Z CMA - a 0.10" Variable Binary Star"
Rhodes, E.J., Cacciani, A., Dappen, W., Didkovsky, L.V., *Hill, F., Korzennik, S.G., Kosovichev, A.G., Kotov, V.A., Scherrer, P.H.	"Plans for Mt. Wilson - Crimean Observatory High-Degree Helioseismology Network"

Ann Barringer, John Cornett, Elaine MacAuliffe, Vicki Miller, Shirley Phipps, Cathy Van Atta

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Our National Centers (1Mar93)

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Our National Centers (1Mar93)
(from the AURA Corporate Office, NOAO Newsletter No. 33, 1 March 1993)

National centers are the only place where most US astronomers can observe. The quality and quantity of science and service to the community represent a bargain for US science. More than 2,000 colleagues use NOAO facilities each year. This does not include astronomers from universities that operate their own telescopes on our sites, taking advantage of the economy of scale in mountain operations. A recent study of technology transfer showed that NOAO also has a surprisingly strong effect on innovation in industry.

Our national centers are a national asset. AURA is proud to manage NOAO for NSF. We believe it is second to no other national or international observatory in the world in effectiveness and cost-effectiveness. After reductions in NOAO's budget by more than 25 percent over a decade, its program is barely sustainable at the FY 1993 funding level.

NSF and AURA share the responsibility for stewardship for NOAO. AURA is doing its best to manage NOAO within the funds NSF provides. We have urged NSF to do more on its part. We will get through this year somehow, with reductions in staff, compensation, telescope use, and therefore in service to the community. We need NSF's commitment to bring NOAO back from this valley. Incremental funds will greatly enhance innovation in science, service, education and technology at NOAO.

Goetz Oertel

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AURA Visiting Professor at NSO (1Mar93)

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AURA Visiting Professor at NSO (1Mar93)
(from the AURA Corporate Office, NOAO Newsletter No. 33, 1 March 1993)

We are pleased that Dimitri Mihalas (U. of Illinois) will spend five months, December 1992 - May 1993, as a Visiting Professor at the National Solar Observatory in Tucson. Mihalas is NOAO's second AURA Visiting Professor. While here, he will work on a community code for dynamic phenomena in stars. We look forward to the opportunity for staff and visitors to interact with Mihalas during his stay.

Goetz Oertel, Richard Green

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A Look at AURA: 1992 (1Mar93)

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A Look at AURA: 1992 (1Mar93)
(from the AURA Corporate Office, NOAO Newsletter No. 33, 1 March 1993)

A report on AURA's 1992 activities is hot off the press! The report highlights the Gemini Project, AURA relations in Chile, and the Women in Astronomy Workshop held at the Space Telescope Science Institute in September 1992. Also available is an updated brochure describing AURA. Both are free of charge. To obtain copies, contact AURA at:

1625 Massachusetts Avenue, N.W., Suite 701
Washington, DC 20036
phone: (202) 483-2101
fax: (202) 483-2106.

Lorraine Reams

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CTIO Response to FY 1993 Budget Reduction (1Mar93)

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CTIO Response to FY 1993 Budget Reduction (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

CTIO's budget for this current fiscal year is 6.7% below last year's appropriation, which represents a loss of $420,000. In responding to this cut we have attempted to preserve as much of our current program as possible and to maintain the current balance of observatory efforts. Unfortunately, it has been impossible to confine the reductions to capital items and goods and services alone, especially since costs in Chile continue to rise. We therefore have also had to reduce the number of positions at CTIO, including laying off some personnel. We are not appointing a new post-doctoral research associate for the coming year, and we are not filling a vacancy on the scientific staff. In addition, five positions have been terminated in La Serena and on Tololo in the areas of operations, instrument shop, and scientific staff support.

These reductions will impact our level of operation and our ability to respond to certain situations. Because of the reduced funds we have deferred the purchase of more disks for the mountain computers, which were needed to provide more storage space to handle the increasing data rates from the telescopes. Also, all travel support granted to visiting astronomers by CTIO will henceforth require that they use bus travel between Santiago and La Serena. We regret the inconvenience of this, but the corresponding plane fare has become very expensive ($150), and has impacted our budget for travel assistance dramatically.

In spite of the bad budget climate it is our hope that we can continue to provide forefront facilities and excellent service to visiting astronomers so they can continue to successfully carry out their research programs.

Bob Williams

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f/8 Focus of CTIO 4-m Telescope to Return December 1993 (1Mar93)

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f/8 Focus of CTIO 4-m Telescope to Return...(1Mar93)
December 1993
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

As was announced in a previous Newsletter, the f/8 secondary mirror will be removed from the 4-m telescope on 9 June 1993, in order to send it to the US to be refigured. The R-C and echelle spectrographs, the Rutgers Fabry-Perot, the ASCAP photometer, the f/8 direct imager, and visitor instruments requiring f/8 will not be available on the 4-m until the mirror is reinstalled. All f/30 and prime focus instruments will be available, of course.

We are now able to say that we fully expect to place the f/8 focus and the above instruments back into service on 1 December 1993. We will accept observing time requests to use the above instruments during the final two months of the scheduling period which starts on 1 August 1993, for which proposals are due by 31 March 1993. That is:

You can apply to use 4-m f/8 instruments during December and January of the next scheduling period for which applications are due.

The prime and f/30 foci will also be available during this period, but because of the expected strong demand, anyone who requests non-f/8 instruments should supply a compelling scientific reason why time earlier in the semester is not acceptable.

We don't expect any problems meeting this schedule, but there is always the possibility that something will go wrong and that the f/8 secondary will not be available at the planned time. So f/8 time assigned during the above-mentioned period will have to be on a provisional basis, with the caveat that we will confirm the availability of the instrument sometime around the first of November. If you are awarded time on this basis and you buy your airplane tickets before the observing time is confirmed, you may want to get refundable fares; CTIO will not reimburse you for non-refundable tickets in the event we have to cancel your time allocation.

We also will draw up a fallback observing schedule for December-January to cover the possibility that the f/8 is not available. Observers who apply for other foci may be offered contingency time, if some doubt develops about our meeting the schedule.

Note that these same uncertainties will still exist at the time proposals are due for the February-July 1994 scheduling period (the one that follows the one being discussed here), but will have been resolved by the time the TAC meets and the schedule is made.

We think that the chances are very high that the f/8 secondary will be available on schedule, so our advice to you is to go ahead and apply for time on the assumption that the mirror and the associated instruments will be there.

Jack Baldwin, Bob Williams

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Report of CTIO Users' Committee (1Mar93)

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Report of CTIO Users' Committee (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

The CTIO Users' Committee held its annual meeting in Tucson on 15 and 16 October 1992, and after discussions with CTIO Director Robert Williams, submitted the following report:

"It is of vital importance for US astronomical research that the

scientific community have continued access to a first-class observatory in the southern hemisphere. The committee strongly commends CTIO for continuing to provide such a research facility and for maintaining its traditional high priority towards observer support, especially in these times of restricted budgets. The committee wishes to emphasize that any major budget cut at this point will result in the reduction or elimination of a vital component of CTIO operations. CTIO is particularly vulnerable in that the dollar-peso exchange rate continues to be unfavorable. The committee appreciates the fact that the NSF has so far made up for the major annual shortfalls created by the dollar-peso exchange problem.

Gemini Project

The committee reiterates its strong support for the southern hemisphere component of the Gemini project. The construction of an 8-m telescope on Cerro Pachn represents the next crucial step forward if US astronomy is to maintain state-of-the-art access to the southern hemisphere skies. Discussions are now beginning that will define the role that CTIO may play vis-a-vis the operation of the Gemini 8-m. Clearly, there are major benefits in combining certain aspects of CTIO and Gemini operations. On the other hand, there are concerns that Gemini not drain CTIO resources, and, conversely, that the demands of CTIO operations in a potentially tightening financial environment not compromise operations of the 8-m. The committee recommends that the initial efforts to clarify the CTIO/Gemini interrelations be continued.

Major Instrumentation Projects

Before commenting on three main instrumentation projects ongoing at CTIO, the committee wishes to emphasize the important role played by the relatively small, but productive ETS group in La Serena. The committee strongly endorses maintaining a small but vigorous instrumentation group in La Serena. It provides CTIO with flexibility in selecting and implementing instrumentation projects (e.g., the 4-m imaging improvements) and also serves as a major stimulus to both the ETS and the scientific staffs. Furthermore, the fact that 60% of ETS time is spent on preventive and other sorts of maintenance is a major reason for the high level of user satisfaction with CTIO.

4-m Image Quality

Several projects are underway to improve the image quality at the 4-m; these projects have been described in previous issues of the NOAO Newsletter. The committee fully endorses the efforts to improve both the thermal environment (mostly completed) and the performance of the optics (via refinishing of the secondary mirror and active control of the primary mirror and the secondary mirror alignment). We note that the projects are being carried out expeditiously, and encourage the observatory to carefully document the results of these improvements.

Arcon

In last year's report it was noted that full scale testing of the Arcon controller was imminent. The current status of the project is that a full conversion to Arcon controllers will take place over the next two years. We hope that this can be carried out as quickly as possible given the time already devoted to the project and the increasing need for these new controllers, particularly for use with the large format CCDs.

IR Instrumentation

Because of the effort devoted to the 4-m seeing improvements and to the Arcon controller project over the past few years, the IR instrumentation effort has been delayed. In a 3-year instrumentation plan presented by Mark Phillips, CTIO advocates a shift in emphasis to IR instrumentation as the above two projects are completed over the next two years. The committee endorses this plan, which includes implementation of NICMOS chips, development of a new IR spectrograph, and construction of new cameras. As an interim measure, CTIO has entered into discussions with Ohio State University about making available their OSIRIS instrument on both the 4-m and the 1.5-m telescopes for most of the second semester of 1993, in exchange for some observing time. OSIRIS consists of a general purpose near-IR (0.9 to 2.5 um) imager and medium resolution long-slit spectrometer (R=550 and 1500). The detector is a 256 x 256 HgCdTe array. OSU astronomers would be on hand for the beginning of each observing run. The committee endorses this potential arrangement between CTIO and OSU in order to bridge the gap until the CTIO NICMOS-based instruments come on line.

In the longer term, CTIO proposes to implement an f/15 IR secondary at the 4-m, to keep it consistent with the KPNO 4-m. This upgrade would allow CTIO to enter joint IR instrumentation efforts with the KPNO IR group and to share major IR instruments with KPNO. The committee agrees with this approach. This is clearly an arrangement that would provide significant budgetary and human resource efficiency to the benefit of

both observatories. Consequently, funding for the IR secondary should be provided by NOAO, rather than exclusively from CTIO funds.

Finally, the committee recommends that in future meetings when large instrumentation projects are discussed, time and cost lines should be presented. While it is recognized that time and budget lines are not always easy to adhere to in complex development projects, it certainly helps the committee to better understand the flow of a particular project (especially new members on the committee) when such information is presented.

Other Instrumentation Projects

CTIO has joined in an agreement with STScI to develop new spectrograph cameras for the wide-format CCDs to be implemented on the 1.5-m and 1-m Cassegrain spectrographs. CTIO will supply the optics, and STScI will provide the mechanical components. The committee is highly supportive of this type of external collaboration as a means of realizing important, but lower-priority, projects that are of wide benefit to the user community. We note that completion of this important upgrade to spectroscopy on the smaller telescopes is dependent on the packaging and testing of the 1K x 3K Loral chips. While we recognize the enormous demands already being made on the chip thinning and packaging group in Tucson, we urge that the 1K x 3K chips be given high priority, as their implementation will greatly enhance the scientific productivity of all the CTIO spectrographs.

Aside from the above concern about timely delivery of the 1K x 3K Loral chips, the committee notes that there has been a considerable improvement in the quantity and quality of the CCDs available to users of CTIO.

Other Issues

TAC Procedures

Considerable discussion took place concerning the utility of external referee reports to the CTIO TAC. This issue was discussed both at a joint meeting of the KPNO and CTIO Users' Committees and by the CTIO Users' Committee alone. Our principal conclusion and recommendation is that the current form of the external referee process is of marginal value and should be discontinued. The main difficulty with the present system is that each reviewer typically receives only a few proposals, and hence cannot provide useful relative rankings. Since most proposals are good, the TAC tends to receive uniformly positive responses, which is of little value in their attempt to produce relative rankings of proposals. There is significant effort expended by CTIO staff in choosing referees, mailing proposals to referees, and collecting reports. After considering a modification to the external review process whereby each reviewer would receive approximately 15-20 proposals, the committee finally agreed that the external review process should be abandoned. We recommend that the CTIO TAC procedures should be restructured more along the general lines of the KPNO TAC. An important ingredient of this restructuring would be to have feedback on failed proposals coming directly from the TAC, rather than from comments by the external reviewers. Furthermore, the TAC should be enlarged to insure that its members represent all major areas of research.

NASA Satellite Link

Use of the NASA link to CTIO continues to rise, and it has become an indispensable part of CTIO operations. In particular, it allows for major cost reductions and time savings in terms of the number of observers actually travelling to Chile. Faculty members can effectively advise their graduate students without going to Chile, and collaborators on complex observing projects can provide substantial assistance over the link, thereby decreasing the number of observers required at CTIO. The committee urges that the link be maintained and upgraded.

Data Archiving

A discussion of data archiving was held at the joint meeting of the CTIO and KPNO Users' Committees, and is summarized in the KPNO Users' Committee report from last year (see NOAO Newsletter No. 29). Our committee is glad to see that efforts are being made to implement a data archiving program at KPNO. As mentioned in last year's report, CTIO should continue to monitor the progress of this important effort and adopt the archiving methods developed at KPNO.

Night Assistant on the 0.9-m

The night assistant currently shared between the 0.9-m, the 1-m, and the Curtis Schmidt is being upgraded to a mountain IRAF support person. Until now, the night assistant generally resided at the 0.9-m for most or all of the night. Under the new scheme, the IRAF support person will be available as a night assistant on the 0.9-m for the first half night of each new observer's run, and otherwise will be primarily intended

for IRAF support at all telescopes. The committee recommends that this new arrangement be monitored to insure that the 0.9-m observers are adequately supported.

Other Topics of Discussion
Other issues were discussed that did not lead to specific recommendations on the part of the committee. CTIO Director Bob Williams discussed the funding situation at CTIO, including the dollar-peso exchange problem cited above. Approximately 50% of the CTIO budget is spent in pesos, primarily in salaries. Scientific staffing has maintained a constant level for the past 10 years; the recent increase to three postdocs has been a major plus for the observatory. There is a vacancy in the instrument scientist area, but hiring is now frozen.

Williams also discussed statistics on 4-m down time. Down time is only 1/2 to 1/3 as much as at other large telescopes for which those statistics are known. He also reported that approximately 150 Ph.D. thesis projects were awarded time at CTIO telescopes during the past three years, which is comparable to KPNO.

There was a lengthy discussion about travel support. At this point it is not clear if lack of full travel support has affected observing patterns. Observers appear to manage to get support from various sources. Some emergency funds are available beyond the standard in-Chile support for PI's, and graduate students continue to be supported for thesis research. The committee recommends that an effort be made to determine whether the current level of travel support is affecting use of CTIO.

There was also considerable discussion about the Pachon site survey. Mark Phillips reviewed the excellent characteristics of the Pachon site that has been tested so far. These results have been reported previously in the NOAO Newsletters. At the joint meeting with the KPNO Users' Committee, Sidney Wolff explained that the Pachon site survey was discontinued due to lack of funds in the Gemini project. The Gemini project is convinced that (a) Pachon has been demonstrated to be at least as good as Tololo and the other AURA peaks, and (b) that it is unlikely for there to be significant variations in quality between the various sites on Pachon since they populate a main ridge that is oriented orthogonal to the prevailing wind direction. Further testing would strain the Gemini budget and perhaps delay completion of the project.

An update was given on "maintenance" projects, which include upgrading of telescope control systems, 4-m slit-viewing optics, Argus IIa, etc. Maintenance projects account for 60% of the time spent by the ETS group, with the remaining 40% going to the instrumentation projects described above. A great deal of emphasis is placed on maintenance of existing equipment.

Some concern was expressed about the lack of manuals for some of the instrumentation, e.g., Argus. The committee was told that there should be significant improvement during the next year.

Finally, Jim Rose gave a brief report on the UNC-Columbia-CTIO SOAR telescope project. An update on this project will be published in the next issue of the NOAO Newsletter.

CTIO Users' Committee:
J. Rose (Chair), M. Bolte, J. Frogel, J. Graham,
K. Meech, J. Patterson, M. Rubio, M. Shara

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CTIO Instrumentation (1Mar93)

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CTIO Instrumentation (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

Further progress was made during the last three months on CTIO's highest priority project, the new-generation array controllers. As detailed in an accompanying article, the first of the production controllers, Arcon 3.1, was successfully tested with a Thomson CCD on the 0.9-m and 4-m telescopes. Work is now proceeding on the second controller, Arcon 3.2, which will be mated to one of the Tektronix 1024 x 1024 CCDs and put into routine operation on the 0.9-m telescope in late March. The current schedule calls for Arcon 3.3, which will operate the Tektronix 2048 x 2048 chip, to be ready around May. The success of the Arcon project is very important to the future of CTIO and NOAO, and has been possible only through the dedicated and tireless effort of the team of scientists, engineers, and programmers who have worked on it over the past three years. During 1993, we will begin the process of replacing the aging VEB controllers with new Arcons. Around mid-year, work should also begin on bringing up the first infrared detector, the NICMOS III 256 x 256 HgCdTe array, with an Arcon.

During December, another major step was taken in the effort to improve the image quality of the 4-m telescope when the dome venting doors went into routine operation. Although the doors had been completed several months before, they were not put into operation until a system of safety interlocks and barriers had been fully implemented. We would remind observers that the 4-m catwalk is now permanently closed, and is off-limits to all but maintenance personnel. With the implementation of the dome doors, and the move to the ground-floor console room which occurred several months ago, the effort to improve the thermal environment of the 4-m dome has essentially been finished. In March, we plan to make new measurements inside the dome with an infrared camera in an attempt to quantify the progress that has been made.

In other areas, the first test of the 4-m Large-Format Prime Focus CCD Camera was successfully carried out in December (see the accompanying article by Alistair Walker for further details). A modification to Argus was also recently completed which appears to have significantly improved the setting accuracy of the positioners. A procedure has been developed which allows the user to bring each of the fibers into the center of the Argus field to establish an absolute reference point. This can be done in 10 minutes during the day, so that no observing time is lost. A check of the fiber positioning accuracy was made on an astrometric field provided by Arnold Klemola of Lick Observatory. This test indicates that, after carrying out the new centering procedure, nearly all of the 24 fibers can be positioned to an accuracy of 0.3 arcsec rms. As a result of this project, a few of the positioners were found to have significant hysteresis -- work will continue to locate and correct the source of this problem. Argus now has a full complement of manuals which can be copied via anonymous FTP (see NOAO Newsletter No. 32, page 17).

Mark Phillips

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IR News: Using OSIRIS (1Mar93)

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IR News: Using OSIRIS (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

An article in the previous Newsletter described both the availability of OSIRIS (Ohio State Infrared Imaging Spectrometer) during second semester and the potential availability of the CTIO HgCdTe Imager. Since then, we have gone through an exhaustive analysis of available resources (reduced by the effects of the FY 1993 budget cut), and it is now clear that the HgCdTe Imager will not be available for use during second semester. The alternatives are therefore OSIRIS or the existing CTIO instruments (IR Imager, IR Spectrometer).

As stated in the previous Newsletter, OSIRIS should be the instrument of choice for all programs except:

1) Imaging programs requiring L band imaging or other 3 m filters. It

is possible that some exotic narrow-band filters will be available only in the CTIO Imager; please contact the undersigned if you think you may need such filters. Programs of photometry of isolated stellar objects should be carried out with the CTIO Imager, since there is no particular advantage in using OSIRIS. Both instruments should have a K' filter by next semester.

2) Spectroscopic programs requiring data beyond 3 um.

3) Spectroscopic programs requiring the highest IRS resolution (3000).

It is possible that there will be other types of programs that can be done equally well with either OSIRIS or a CTIO instrument (for example, measurement of a single spectral feature). In these cases we reserve the right to assign the CTIO instrument in order to minimize the support burden on OSU personnel.

The performance of OSIRIS in direct imaging mode has been measured on the 72" telescope in Flagstaff, where it obtained S/N=30 for K=15 mag stars in a 3 second integration. The seeing was about 1 arcsec, and the background was about 13 mag arcsec-2. This is consistent with background limited performance with an estimated system efficiency of approximately 40%. The 4-m telescope should go ~0.8 mag fainter under similar conditions.

We expect OSIRIS to be background or source noise limited for essentially all imaging applications, including narrow-band filter work. Furthermore, because the read noise of the array (30 electrons in a single read; &lt 20 electrons for multiple reads) is small, we also expect spectrographic observations to be background limited for most observations.

Jay Elias

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CCD News (1Mar93)

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CCD News (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

As predicted in Newsletter No. 32, Reticon #3 CCD has replaced Reticon #2. This CCD is installed in a special dewar for use with the Air Schmidt cameras. Quantum efficiency performance surpasses expectations: we find 52% at 3200 A, 85% at 4000 A, 90% at 4700 A, then slowly falling to 83% at 6000 A, 56% at 8000 A, 33% at 9000 A and 5% at 10000 A. The QE improvement over Reticon #2 is typically a factor of two from 3500-5000 A and a factor of 1.3 in the red. At wavelengths longer than 6000 A the QE of Reticon #3 is very similar to our Tektronix CCDs, and there is now no QE advantage to be gained by specifying the Folded Schmidt camera + Tek 1024 option with the R-C Spectrograph (however the Tek + Folded Schmidt has smaller pixels, rather better image quality and less fringing). Read noise is 4 e- rms at a gain of 1 e-/adu. This CCD also has good cosmetics and charge transfer.

The Tektronix 2048 CCD sees much use for direct imaging and on the 4-m Echelle long camera. Until this CCD is installed on an ARCON controller (early 1993), we can only utilize one amplifier of the four available, thus readout times are long. Recent work by Ricardo Schmidt has been very successful in reducing readout times without impairing read noise and charge transfer. Examples are given below. Some of the improvement results from the installation of fast 16-bit Analog-to-Digital convertors (Analogic 4342) in the VEB controllers.

Gain	Read Time (min:sec)	e-/ ADU	RON (e-)	Old Read Time (min:sec)
5	1:53	8.2	10.0	3:25
10	2:35	3.9	5.6	4:07

15	3:17	2.7	4.2	4:47
20	3:59	2.0	3.5	5:30
30	5:22	1.2	2.7	6:52

As it has been 18 months (September 1991) since a general summary of the CCDs in use at CTIO has been given, I tabulate the information below. Readers should also consult recent Newsletters for details of specific applications.

CCDs in use now:
1) TI #3. This CCD sees use for direct imaging in circumstances where high UV QE is important, and occasionally with the Echelle long cameras where the small pixel size gives maximum resolution. The CCD surface is wrinkled, and TI #3 should only be used in slow beams. Cosmetics are poor by modern standards. TI #3 is UV-flooded to give high QE in the blue and UV; the figures achieved are somewhat variable for reasons which are not totally understood.

2) Tek #4. This Tek 512 CCD belongs to Rutgers University, and therefore top priority is for use with the Fabry Perot Interferometer on the 4-m and 1.5-m telescopes. It sees some use for direct imaging, but for most applications its use has been superseded by larger CCDs. It is cosmetically excellent, the only defect being a single pixel with low full well (about 200000 e-).

3) Tek 1024. We have two of these CCDs. Tek 1024 #2 has four working amplifiers and at present is being converted to operate with an ARCON controller, while #1 has a single operative amplifier. Both have perfect cosmetics, even at the very lowest light levels. QE falls precipitously below 4000 . They see most use for direct imaging, but on occasions are used for spectroscopy with the Folded Schmidt camera.

4) Tek 2048. We have one, with another on order. This CCD is scheduled to be converted to ARCON operation in early 1993. UV response is much better than the other Teks; however there are several column defects, and there are some additional columns which have poor charge transfer at very low light levels. The 2048 sees most use for direct imaging and with the Echelle long cameras.

5) EEV (ex-GEC). Now our oldest CCDs. They are front-illuminated and have been coated with laser dyes to provide some blue and UV response. One is dedicated to the 1.5-m spectrograph (#10). A second (#11) is installed in an Air Schmidt dewar. It sees niche use for programs where fringing cannot be tolerated, and since it is flat, the images are rather better than those obtained with the Reticon.

6) Thomson. We have two of these front-illuminated CCDs, each coated with Metachrome in order to provide some UV and blue response. They are cosmetically excellent with four working amplifiers and very low noise, but their use has declined since we received the big Teks which have much better QE. After-images can be a problem. One Thomson is dedicated for use at the Schmidt telescope, the other is a lab test device. Both are operated by ARCON controllers.

7) Reticon. See above.

Future plans:
These are difficult to predict in any detail since we do not know the quantity or quality of the Loral CCDs we might expect from the two wafer runs in which we participated, nor when our second Tek 2048 will be delivered. We hope to be able to improve our spectroscopic capabilities at the 4-m, 1.5-m and 1.0-m telescopes, replacing present CCDs with thinned, coated Loral 3072 x 1024 or 1200 x 800 CCDs. The Loral CCDs all have 15 um pixels which are a better match to the spectrographs than are the larger pixels of the Reticon, EEV and Tektronix CCDs. Other CCDs slated for early retirement are the TI and the Tek 512, while eventually we hope to provide a larger CCD at the Schmidt. At the same time, we will be converting all our CCDs to ARCON controllers. This is a daunting task, but the performance and reliability gains should transform directly into higher-quality data and more efficient use of telescope time.

Brief Summary of CCD Characteristics

	TI	Tek512	Tek1024	Tek2048	Reticon	Thomson	EEV
Pixels	800x800	512x512	1024x1024	2048x2048	1200x400	1024x1024	384x576
Pixel size(um)	15	27	24	24	27	19	22
QE 3000 A	50	4	2	20	40	19	20
QE 4000 A	50	35	30	60	85	18	17
QE 5000 A	60	65	62	75	89	28	22
QE 6000 A	60	80	74	76	83	40	35
QE 7000 A	50	80	76	73	75	38	45
QE 8000 A	37	67	63	63	56	32	30

QE 9000 A	20	37	34	35	33	13	14
QE 10000 A	10	10	8	8	5		3
Read noise(e-)	6-8	8-10	3-6	3-6	4-6	3-5	6-8
Preflash (e-)	25	0	0	0	0	0	0
Full well (Ke-)	40	600	&gt 300	&gt 300	&gt 250	250	150

Note: The lower read noise figures correspond to a gain of about 1 e-/adu,
the higher figures are for a gain of 3-4 e-/adu.

Alistair Walker

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Scheduling the Tek 2048 CCD (1Mar93)

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Scheduling the Tek 2048 CCD (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

Since we still have only one Tek 2048 CCD at CTIO (our second Tek 2048
is still on order), it is not possible to provide it to everyone who
requests it. This will become an even greater problem once the
Large-Format PFCCD enters service and the Tek 2048 can be used at Prime
Focus.

Our policy is to make the chip available on an aperture-priority basis;
this means that it is often unavailable on the 0.9-m telescope, and may
well be unavailable on the 1.5-m telescope. For some programs this is
an inconvenience, while for others it is disastrous. In order to help
us distinguish among these, if you must have the Tek 2048 please
indicate this clearly in item 2 on the observing time request (for
detector specify "Tek 2048 only"), and please also indicate briefly in
item 5 (technical justification) why a smaller chip is not acceptable.

If you do this, then we will make the Tek 2048 available if you are
granted time (barring unpredictable failures), but we will also not
assign you any time if the chip cannot be scheduled at the time of year
and lunar phase that you request.

You may still express a preference for the Tek 2048, in which case we
will schedule it if available, and will provide a Tek 1024 or other
substitute if not.

Prospective users of the Tek 2048 on the 0.9-m telescope should note in
any case that the coma-free field of the telescope is smaller than the
chip (see accompanying article for details).

Finally, not everyone prefers the larger format; for programs with
relatively short exposures on isolated objects the speed of the smaller
chips (Tek 1024 or even Tek 512) may be preferable. If this is the
case, please indicate this clearly in item 2 on the time request form.
Since we do try to block-schedule detectors in the interest of greater
reliability, you might still get a larger chip unless you specify the
smaller chip as essential (and justify it).

Jay Elias

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CCD Controller News (1Mar93)

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CCD Controller News (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

Two major milestones have been passed. First, ARCON 3.1 has been completed, and with the new quad dc-coupled pre-amp the video chain demonstrates state-of-the-art noise performance (3 e- rms with the Thomson 1024 CCD). Second, the conversion to operation with S-bus rather than VME-bus has been finished. On December 3 at the 0.9-m telescope, ARCON 3.1 was operated with a Sparcstation 10 and delivered high-quality images. On this engineering run the user interface (which looks like the KPNO "ICE" to the observer) was also tested, as was the hook-up to the Telescope Control System. Further engineering nights are scheduled in late January and in February. Over this period we also intend to carry out a mini-project to remove the participation of the old VEB controller in the operation of the filter wheels; during March we hope to finally retire the 0.9-m VEB.

Meanwhile, work is proceeding to implement ARCON 3.2 (Tek 1024) and ARCON 3.3 (Tek 2048). Due to pressure from other projects and the usual slow-down over the summer vacation season, this work has gone somewhat slower than anticipated, however completion is expected in early 1993. We also anticipate making rapid progress on the software front, now that the S-bus conversion is complete.

During 1992, ARCON 2.1 (Thomson 1024 CCD) was regularly used at the Schmidt telescope for service observing, in addition to its development role in La Serena. With work now being transferred to the (production) ARCON 3 series, ARCON 2.1 and its VME-based Sun computer will be stationed permanently in the Schmidt, and once again visitors will be able to carry out their own CCD programs. We should warn however, that the observing software was frozen many months ago and is much more primitive than that now used with ARCON 3. There is only a simple command-line interface and several traps for the unwary. This is not to imply that good data cannot be obtained, quite the opposite. The Thomson CCD is sensitive from 3000 A to 10000 A; readout takes about 12 seconds and de-scrambling of the (quad) data just a few seconds longer; the controller produces pictures free of any electronic interference, in addition to being impressively reliable.

Alistair Walker

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4-m Prime Focus CCD (1Mar93)

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4-m Prime Focus CCD (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

The new Large-Format PFCCD imager was completed on schedule and went for its first engineering run on December 18. It is designed to accommodate CCDs or mosaics up to 75 mm square, and has two filter wheels capable of holding five 102 mm square filters. The CCDTV camera is on a stage which permits short-scanning, while there are facilities for easy tilt and rotation of the dewar so that large CCDs can be accurately aligned with the focal plane. It works either with the triplet correctors or with the soon-to-be-installed ADC. Instrument control uses DC or DC servo motors via a STD-Bus box. Apart from the ability to use large CCDs at the 4-m, the images are expected to be significantly improved (especially with the ADC) since the present arrangement has the CCD centered well off-axis of the doublet corrector.

The above-mentioned engineering night was also the first on which an ARCON-based controller had been tried at the 4-m telescope, and it was also the first time a CCDTV camera had been used at PF for acquisition and guiding. Installation went extremely smoothly, focussing took

place soon after dark, and by 2 AM all the engineers had vanished! The equipment functioned well, but some system integration work remains to be done to make all the computers (ARCON, TCS, Motor-control) talk (and listen) to each other. With the red triplet and a CCD with 0.35 arcsec pixels, the images had 1.1-1.3 arcsec FWHM on a night when the other telescopes reported 1.5-1.7 arcsec FWHM, whereas on following nights with the old PFCCD system the FWHM was the same as the other telescopes. This rather meager statistic suggests that image quality has improved with the new system. Another engineering night is scheduled in February, and it is hoped that the instrument will be available for visitor use starting with the April prime focus run.

Alistair Walker, Tom Ingerson,
Andres Montane, Javier Rojas, Rodolfo Cardemil

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Imaging on the 0.9-m, 1-m(?), and 1.5-m Telescopes: An Update (1Mar93)

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Imaging on the 0.9-m, 1-m(?), and 1.5-m...(1Mar93)
Telescopes: An Update
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

Over the past semester, routine collimations have been performed on all these telescopes, after aluminizations.

The good news is that the 1.5-m at f/13.5 has produced sub-arcsecond images in routine use. The focus frames taken on the engineering nights (Sept 10-12) show 0.75 arcsec FWHM (optical, unfiltered). This is the best performance we have seen in the optical on any of our telescopes in recent history. This telescope might be a good choice for proposals needing high resolution imaging on objects bright enough that the 4-m telescope's aperture is not required. Note, however, that the 1.5-m is almost as heavily oversubscribed as the 4-m.

The bad news was that on a flip to the f/7.5 secondary during that night, a FWHM of 1.1 arcsec was measured. There was some time variability on this night, but other evidence, including laboratory testing when the secondary was refigured four years ago, indicates that the optics may only deliver 0.9 arcsec FWHM at this focus. While the telescope appears well collimated at both focal ratios, the f/7.5 wide field also definitely shows variations (primarily coma) over the sky. The secondary support system currently does not maintain high precision over the sky. Fortunately the tests seem to indicate the "best focus" value does not change (i.e., there is negligible piston), but at high airmasses (particularly north of +10 deg. declination) you will not be happy with the image profiles across the field.

On the 0.9-m, coma from the Cassegrain configuration is easily noticeable when the Tek 2048 is used. Typical FWHM values vary from 70-110 um (about 3-4.5 pixels, unbinned Tek 2048) over the field on a decent night (1.3-1.8 arcsec). This definitely affects PSF photometry at the 0.1 mag level, as shown by tests done by Alistair Walker. Linear and quadratically varying PSFs help, but a cubic spatial variation is seen. Peter Stetson is currently working on such PSF implementation, and has helped us analyze some of these images on his recent visit here. It is possible that such variable PSF reductions will make stellar photometry acceptable on this telescope, but we also have a preliminary design for a doublet corrector to improve the image quality over the 2048 and future mini-mosaic fields. Since the coma goes as field angle squared, these effects are negligible on our small CCDs, and just noticeable on the Tek 1024 images.

One other comment is that many filters, particularly interference filters (including several of our R band filters), produce astigmatic images.

Since the 0.9-m telescope also has spherical aberration, astigmatism, focus and pointing glitches, we are going to test the image quality on

the 1-m during some free time later this semester. This is an f/10
wide-field imaging telescope, which has been used for photometry and
spectroscopy during the past five years. It has had historical focus
uniformity and stability problems, and some wind- shake, but it should
show a flat field and is actually on one of the superior sites of the
mountain.

Bob Schommer

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It Came Upon the Midnight Clear: New Focus Readout on the 0.9m Telescope (3/1/93)

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It Came Upon the Midnight Clear: New Focus Readout...(3/1/93)
on the 0.9-m Telescope
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

On the night of Dec 23 we installed a new focus encoder on the 0.9-m
telescope. The old encoder is still operating, so either readout can be
used. The new encoder (Futaba Pulscale) is a linear scale designed for
precision machine tool applications, has a variety of display modes,
and can read to 1 um resolution. An approximate conversion between the
scales is:

                    100 old units = 59 um.

Typical focus steps on the old system were 50 units, which therefore would
be approximately 30 um.

The old encoder is known to exhibit thermal drift, and has been
noticeably aging over the past year. As shown by brief testing, and
according to specifications, the Futaba scale should be very stable.
The secondary motor system itself (motor/gears, etc.) has backlash, and
when the directions are reversed, the motor can be heard running for
several seconds before the encoders indicate any position change.

There are instructions for the use of this readout and its impressive
display available in the 0.9-m console room.

The 0.9-m telescope does have some problems with focus stability, which
are probably related to one of the mirror supports. It also exhibits
astigmatic and spherical aberrations, and is a classical Cassegrain,
with coma over the field. We can now know with precision how poorly the
telescope focuses. We would appreciate any comments from observers on
focus stability, jumps in focus, or pointing glitches.

Optical and mechanical tests are continuing. On the following night
with the Tek 2048, the collimation appeared nominal (as noted in
previous Newsletters, the coma centroid is ~2 arcmin from CCD center).
The observer also noted on several exposures a rapidly moving luminous
object, with red and green coloration, and a leading, luminous
proboscis. A hearty "Ho Ho Ho" was entered on the logsheets.

R.A. Schommer, O.Saa, J. Briones,
R. Gonzalez, M. Fernandez

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Floppy Disks for PC/ASCAP (1Mar93)

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Floppy Disks for PC/ASCAP (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

Users of the PC/ASCAP should remember that they are expected to bring their own floppy disks (1.2 Mb, 5.25-inch double density) for transporting or backing up their data. CTIO does not maintain a stock of floppies on the mountain for this purpose. Forgetful observers can purchase floppy disks in either Santiago or La Serena (although at somewhat higher prices than in the USA!). A single floppy disk can hold data for several nights of normal photometry; several floppies may be necessary for high speed photometry runs. Check with your staff contact if you have any questions, or if you are unsure about how many floppies to bring.

Doug Geisler

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New Time Allocation Procedures (1Mar93)

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New Time Allocation Procedures (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

We have made a number of changes in the way that time allocation on the CTIO telescopes will be done in the future, starting with second semester 1993 (i.e., those proposals due in March). These are outlined below:

Referees Abolished
As recommended by both the Users' Committee (see report above) and by the Observatories Visiting Committee, the system of external reviewers has been abolished. Instead, the TAC will explicitly discuss all proposals submitted. Furthermore, an individual TAC member will be assigned to lead evaluation and discussion for each proposal submitted on the two largest telescopes (4-m and 1.5-m). This general procedure is intended to be similar to that followed by KPNO.

As a result, however, written scientific evaluations can not be routinely provided for all proposals submitted to CTIO, but will be available on request. These will be based on the evaluation notes of the TAC members, and on the results of the discussion of the proposal.

Staff technical evaluations will continue to be provided.

Proposal Submission
A few people are continuing to use old versions of the time request forms. Although we have threatened repeatedly not to accept the old forms, this time we really mean it. You must use the January 1991 version. E-mail ctiosked if you don't have a copy, or obtain the form via anonymous ftp. (The file is on ctios1 in pub/ctioforms/ctioform.tex.) People who nevertheless use the 1988 or 1989 forms (or worse yet, make up their own version!) will be contacted, if possible, and asked to resubmit on the correct form.

We will also be providing an automatic reply to all e-mail sent to ctiosked during the months of March and September. If you send your proposal in via Internet and don't get a response within 24 hours, send an inquiry to ctiosked, or else a second copy. In the latter case, label it clearly as a second copy in the subject line of the e-mail header. We will continue to acknowledge receipt of proposals by ordinary mail as well. Note that the automatic reply only indicates that we received mail from you, not that we could print it out or found it problem-free.

Some other remarks: Faxed proposals remain unacceptable. Also, we still

have not gotten Postscript files to print out 100% reliably, and so are still not in a position to accept proposals sent in this form. We hope to be able to do so in the future, as there is no way at present to send figures by e-mail.

Bob Williams, Jay Elias, Nick Suntzeff

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Time Allocation Committee Membership (1Mar93)

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Time Allocation Committee Membership (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

The composition of the TAC has changed substantially since the last listing was published (September 1991). The TAC has historically consisted of eight members, but it has now been enlarged, experimentally, to nine, because of the increased responsibilities of the members (see preceding article). Each external member serves a term of three years duration. Appointments are made by the CTIO Director, who attempts to ensure that a balanced representation exists between stellar, galactic, interstellar medium, and extragalactic research. TAC members are not necessarily CTIO users, but are experts in their respective areas and, in particular, understand the interpretation of observations. An effort is also made to ensure that the TAC includes both spectroscopists and photometrists, as well as at least one expert in infrared observational techniques. The current members of the CTIO TAC are:

Nicholas B. Suntzeff (Chair: Jan 1991 -)
CTIO
May 1986 -

Jill Bechtold
University of Arizona
November 1992 - May 1995

Karl-Heinz Bohm
University of Washington
November 1990 - May 1993

Marc Davis
University of California, Berkeley
May 1993 - November 1993?

Harriet Dinerstein
University of Texas
November 1991 - May 1994

Jonathan Elias
CTIO
May 1993 -

Eileen Friel
Maria Mitchell Observatory
May 1992 - November 1994

Eric Persson
Carnegie Observatories
May 1993 - November 1995

Andrew Wilson
Space Telescope Science Institute
November 1990 - May 1993

Bob Williams

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A Few Comments by a Former TAC Member (1Mar93)

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A Few Comments by a Former TAC Member (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

Over the past two years, it has been my privilege and one of my staff responsibilities to serve as a member of the CTIO Telescope Allocation Committee. I have rotated off the TAC as of December 1992, due to reassignments of observatory duties (Jay Elias will be a new member). I want to take this opportunity to express a few personal (i.e., unpaid and unsolicited) comments on the TAC process, and to offer a few words of advice to proposal writers.

Let me initially state that the TAC process is considered a very serious responsibility by the observatory, director, and the individual TAC members. And I strongly believe it is the fairest scientific evaluation process that I have participated in, or have knowledge of. I think the TAC members perform superbly in a difficult and time consuming process (which has very little in the way of rewards, except for the semiannual trip to Tucson for a 9+ hour meeting; not everyone considers this a benefit). I find that it takes me about two solid weeks to simply read 200 proposals (4 hrs/day) and additional time to research, rank, re-read, and assign preliminary grades. This is a very heavy load (twice a year) for colleagues in university positions. I think the individuals in the user community should be thankful and grateful to the TAC members, especially since this responsibility could fall on your shoulders in some future semester.

In my opinion, the major "problem" with the Telescope Allocation process is the simple fact that we are oversubscribed by factors of 2-3+ on our largest telescopes, and the overwhelming majority of proposals are worthy of some time (in my estimation, &gt 80%). When only 1/3 can be granted time, a lot of worthy projects cannot be supported in any given semester. Most of the "problems," complaints, and concerns of investigators who wonder why they didn't get time, are simply due to these numbers. These statistics are not likely to improve, especially if the observatory staff improves the performance of our telescopes, detectors and instruments (e.g., 4-m improvements, ARCON and Loral chips, CCD spectrographs for 1.5-m and 1-m), although the data quality may increase significantly.

While some proposals are universally recommended for time, the majority present projects which raise some questions, either of feasibility or scientific context, in the TAC process. The major evaluation criteria are scientific merit and the need for southern observations. But the nature of proposals is often trying something that hasn't been done before, and therefore issues of technical feasibility are almost always present. For this reason all proposals are sent for technical review to 2-3 staff members, who look at the details of the proposed instrumentation, and the magnitudes and signal to noise requirements, etc. The TAC requests these details and relies on this technical review, but of course it can decide that projects that are considered difficult technically still are worth the "risk" of assigning time. And often the TAC has enough technical expertise for its own judgement on these matters. The TAC members also have expressed the desire to continue the use of outside referees, although as noted elsewhere in this Newsletter, this practice is being discontinued.

Enough with the philosophy and accolades. I have four specific recommendations, which I believe would improve the quality of many proposals (and therefore make the TAC's job harder!).

1) Be as clear and concise as possible in writing the scientific justification (part 4). Often we find contradictory or confusing statements in the proposal (abstract vs. scientific justification vs. specifics of program vs. need for southern observations and access or availability of other facilities). If the TAC has trouble understanding what is being requested or studied, it will have trouble recommending time.

2) Answer all the questions. Provide the technical information and some

target specifics in part 5, and comment on the southern hemisphere need in part 6. This gives you more than the single page of scientific justification to present your case. And please include details like spectral resolution, wavelength coverage desired, etc., for spectrographic proposals. You may not know the specific grating or setup (we do upgrade our systems!), but we need these specifications to evaluate the proper instrumentation and feasibility. And give at least some indication of the S/N desired. You should feel free to contact staff members about technical details when preparing a proposal for submission.

3) Include brief summaries of other recent allocations or results (no preprints, though!). The TAC does consider their job to provide access to a wide community of users, and if you have had 6 recent 4-m runs (or that many on any telescope), we expect to see publications and results. While it has not been fashionable in the last decade of economic (ex-)success, some TAC members consider "sharing the wealth among equals" to be a reasonable evaluation criterion. Productive scientists will continue to receive allocations.

4) Finally, you might consider sending in your proposal some time before midnight on the deadline date. We might actually consider enforcing the stated deadlines (e.g., five days earlier by e-mail).

Bob Schommer (free, at last, for now)

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CTIO Telephones (Again!) (1Mar93)

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CTIO Telephones (Again!) (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

This is another in what appears to be a continuing series of articles about CTIO telephone services.

Calling In
In previous articles we have provided instructions for dialing CTIO extensions directly, together with a more or less useful subset of these extensions. Various people have reported difficulties in actually calling these numbers. If this happens to you, it may be for a couple of reasons:

1) All the lines into the observatory or between La Serena and the mountain may be in use. This is most likely to occur when calling Tololo extensions, as there are only three tie-lines between La Serena and the mountain, and they are heavily used. The only solution is to wait several minutes and try again. If that still doesn't work, try calling the receptionist (011-56-51-22-5415).

2) The local telephone company has done something that is incompatible with direct dial-in. This seems to happen about once a month and gets corrected promptly once we discover it has happened, but in the meantime you have to go through the receptionist.

Calling Out
As stated in previous Newsletters, it has proven impractical for us to allow visitors to make long-distance calls charged to the observatory and subsequently billed to the visitor. Long distance calls made by visitors must therefore be collect or charged to a credit card. Either of the latter can be done through the receptionist during working hours. In addition, it is now possible to reach the relevant US operator for the three US-based long distance companies providing service from Chile by dialing an ersatz extension number:

512	AT&T
516	MCI
517	Sprint

From Tololo you need to dial 74 followed by one of the numbers given above.

These "extensions" dial the relevant access codes for the long distance
services (e.g. extension 512 dials 00-0312 for AT&T), but can be used from
extensions for which regular long- distance calls are blocked.

Jay Elias, Enrique Figueroa

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Requests for CTIO Telescope Time (1Mar93)

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Requests for CTIO Telescope Time (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

February - July 1993

Telescope		Nights Req.	Nights Sched.	# Requested/ # Scheduled	No. of Proposals	Number Scheduled	Total #/ # Scheduled	No. Staff Nights	%
4-m	Dark	177	97	1.8	55	30	1.8	26	27
	Bright	185	72	2.6	53	29	1.8	6	8
1.5-m	Dark	143	101	1.4	27	17	1.6	15	15
	Bright	223	73	3.1	41	25	1.6	13	18
1-m	Dark	56	91	0.6	8	8	1.0	10	11
	Bright	108	57	1.9	11	11	1.0	9	16
0.9-m	Dark	108	100	1.1	23	18	1.3	25	25
	Bright	150	70	2.1	18	14	1.3	14	20
Schmidt		89	89	1.0	10	4	2.5	6	7

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CTIO Telescope/Instrument Combinations (1Mar93)

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CTIO Telescope/Instrument Combinations* (1Mar93)
(from CTIO, NOAO Newsletter No. 33, 1 March 1993)

4-m Telescope:

ARGUS fiber-fed Spectrograph	+ Blue Air Schmidt Camera	+ Reticon CCD [33]
"	+ Red Air Schmidt Camera	+ GEC CCD [25,26]
R-C Spectrograph	+ Blue Air Schmidt Camera	+ Reticon CCD [33]
"	+ Red Air Schmidt Camera	+ GEC CCD [25,26]
"	+ Folded Schmidt Camera	+ Tek(a) CCD [25,26]
Echelle Spectrograph	+ Blue Air Schmidt Camera	+ Reticon CCD [33]
"	+ Red Air Schmidt Camera	+ GEC CCD [22,25,26]
"	+ Folded Schmidt	+ Tek(a) CCD [22,23,25,26]
		+ Pt:Si [27,31]
"	+ Long Cameras	+ TI or Tek(a) CCD [23,25,26]
		+ Pt:Si [27,31]
Prime Focus Camera	+ TI or Tek(a) CCD	
"	+ Photographic Plates [23]	
Cass Direct	+ TI or Tek(a) CCD	
"	+ Pt:Si IR Imager (f/30 or f/7.5) [23,27]	
Rutgers Imaging Fabry-Perot	+ TI or Tek(a) CCD [25,26]	
ASCAP Photometer [24,25,28]		

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 IR Photometer (InSb and/or bolometer)
 IR Spectrometer + SBRC array [21,22,28]
 IR SBRC Array Imager [21,28]

1.5-m Telescope:
 Cass Spectrograph                 + GEC CCD (with UV-Fluorescent Coating)
 Bench-Mounted Echelle Spectrograph + Blue Air Schmidt Camera  + Reticon
                                                                 CCD [22,23,26]
              "                    + Red Air Schmidt Camera   + GEC CCD [22,23]
              "                    + 700 mm Camera            + TI or Tek(a)
                                                                 CCD [22,23]
 Cass Direct            + TI or Tek(a) CCD
            "           + Photographic Plates [23]
            "           + Pt:Si IR Imager [23]
 Rutgers Imaging Fabry-Perot  + TI or Tek(a) CCD [25]
 ASCAP Photometer [24,25,28]
 IR Photometer (InSb and/or bolometer)
 IR Spectrometer + SBRC array [21,22,28]
 IR SBRC Array Imager [21,28]
 Filar Micrometer(b)

1-m Telescope:
 Cass Spectrograph      + 2D-Frutti
 ASCAP Photometer [24,25,28]
 Filar Micrometer(b)

0.9-m Telescope:
 Cass Direct      + Tek(a) CCD [30]
      "           + Pt:Si IR Imager [23]
 Filar Micrometer(b)

0.6-m Telescope:
 ASCAP Photometer [24,25,28]
 Filar Micrometer(b)

Curtis Schmidt:
 Photographic Plates (Direct or Prism)
 Pt:Si IR Imager [23,27]
 Thomson CCD (Direct or Prism)(c) [21,22,28,30,31]

*   Numbers in boldface following an instrument indicate the most recent
    Newsletters containing relevant articles. If there is no number, the 1990
    edition of the Facilities Manual is fully up to date. The most recent
    general summary of CCD characteristics is in 33; see also issues 26 and 28.
    Information on telescope control and guiders is in 21, 22, 24, 32.
(a) Tek CCDs available second semester 1993:
    - VEB-run (1.5-m and 4-m only): 1 512 x 512, 27 um pixels;
      1 1024 x 1024, 24 um
      pixels.
    - Arcon-run (0.9-m, 1.5-m, 4-m) 1 1024 x 1024, 24 um pixels, 1 2048 x 2048,
      24 um pixels.
    (See 33 for details on conversion to Arcon controller.)
(b) Filar micrometer limited to long-term programs.
(c) CCD on Curtis Schmidt limited to 30 nights (approximately) observing per
    semester.  See 32.
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Changes in Instrument Combinations Available at KPNO (1Mar93)

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Changes in Instrument Combinations Available at KPNO (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

The FY 1993 budget for NOAO has been reduced from the actual dollars provided in FY 1992 by a significant amount (see article in the NOAO section). In addition, detector and instrumentation technology has evolved dramatically in the last five years. These two factors, coupled with the KPNO objective of providing the best scientific capability in the face of reduced financial support, require changes in the instrumentation offered on the KPNO telescopes. These changes will

result in reduced use of some instruments, cost savings in supplies and materials, greater reliance on better detector technology, and a more effective use of mountain and downtown personnel.

4-m FTS
The Phoenix spectrograph, which will replace the 4-m FTS, has passed its critical design review, and the current expectation is that first light with this instrument will occur in about two years. We expect regular scheduled use to begin about one year after that time. In order to realize some operational economies, the following steps will be taken during the final period of FTS operation:
1. Ongoing programs will be continued without jeopardy; however, no new long term (more than two semesters) programs will be accepted;
2. Beginning in the fall semester 1993, operations will be restricted to the InSb spectral range of approximately 1 um to 5 um;
3. Effective one year from now (i.e., spring semester 1994) the FTS will terminate as a visitor instrument and will be shifted to queue scheduling only (see the accompanying article on queue scheduling);
4. The cost of new filters will have to be borne by the visiting observer except for unusual circumstances.

Photographic Plates
After the current (spring 1993) semester, KPNO will no longer stock photographic plates for visitor runs. Plate photography will be classified as a visitor instrument, and the acquisition of the required plates will become the responsibility of the visiting observer (provided the plates do not exist in the stock we currently have left; contact Bill Schoening). Such plates can be shipped directly to Kitt Peak once a run has been approved. In addition, no darkroom facilities will be available at the 4-m telescope; darkroom facilities will be maintained at the Burrell Schmidt. KPNO will continue to support ongoing programs which require photographic plates, but NO NEW photographic programs will be implemented at the 4-m telescope. Photographic programs will continue to be supported at the Burrell Schmidt.

2.1-m and Coude Feed
Beginning in the fall semester of 1993, the Fiber Optic Echelle will be available on the 2.1-m telescope but will be unavailable on the Coude Feed telescope. Also effective this semester, the 2.1-m will not be available in Coude mode.

Photoelectric Photometry
Photoelectric photometry is currently consolidated at the 1.3-m telescope. Our current equipment is out of date, difficult to maintain, and is becoming increasingly unreliable. In addition, a new telescope control system will probably be installed at this telescope in the summer of 1994, which will be incompatible with photoelectric photometry. KPNO will continue to support ongoing photoelectric photometry programs until the summer of 1994, but no new photoelectric photometry programs which would extend beyond this date will be accepted. Please note that CCD photometry will continue to be actively supported at KPNO, and that excellent photometric conditions and equipment are available at other sites such as CTIO.

Single Channel IR Photometry
The 2-20 um bolometer (BOLO) has been scheduled only once during the past six years. This instrument will no longer be available. The 1-5 m photometer (OTTO) will not be compatible with the new TCS at the 1.3-m telescope after summer of 1994. Ongoing programs using this instrument will be supported until that date, but no new single channel IR photometry programs will be accepted for the fall 1993 semester. These changes, together with the extremely effective new suite of IR instrumentation now becoming available at KPNO, reflect an Observatory focus on the near infrared. This focus is a result of the maturation of technology, coupled with a response to demand from our user community.

Black Spectrograph
This instrument has been on the reduced availability list for some years. It will no longer be available in the future.

Run Lengths
Frequent instrument changes and new observer starts place a heavy demand on the shrinking numbers of mountain personnel. Beginning in the fall semester of 1993, a much more strict adherence to the minimum run lengths on the KPNO telescopes will be imposed. As a reminder, these are 3 nights for the 4-m, 4 nights for the 2.1-m, and 5 nights for all other telescopes. Please bear this in mind when writing your proposals.

Proposals Requesting Reduced Availability Instruments
Because of the time and cost of bringing a reduced availability instrument on line, any proposal which requests such an instrument must

make a very strong case for the unique and absolutely essential use of
this instrument in order to accomplish the scientific objectives of the
proposal.

David De Young

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Instruments Available on Kitt Peak Telescopes Fall 1993(3/1/93)

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Instruments Available on Kitt Peak Telescopes...(3/1/93)
Fall 1993
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

This list summarizes the instruments that will be available on KPNO
telescopes for the August 1993 January 1994 observing season.
Proposals for this period are due by the end of March. Two classes of
instruments exist: "Primary Instruments" for regular block scheduling
and "Reduced-Availability Instruments" that are only scheduled in
instances of very high scientific merit. Visitor equipment will be
scheduled only if it a) is unique, b) is required for a project of very
high scientific merit, c) conforms to block scheduling, and d) has
small impact on KPNO operational and engineering resources.

Primary Instruments:
4-m Telescope:
  R-C Spectrograph + CCD (T2KB)
  CryoCam (with new 800 1200 Ford chip)
  Hydra fiber feed (blue or red cable) + Bench Spectrograph + CCD (T2KB)
  Echelle + (UVFast, Red Long, or Blue Long camera) + CCD (T2KB)
  PF Camera + direct CCD (T2KB)
  IR Cryogenic Spectrometer (CRSP)
  Simultaneous Quad Infrared Imaging Device (SQIID)
  IR Imager (IRIM)
  Fourier Transform Spectrometer (FTS)(3)

2.1-m Telescope:
  GoldCam (CCD Spectrometer)
  CCD Direct Imaging (T1KA)
  Fiber Optic Echelle (FOE) + CCD
  IR Imager (IRIM)
  IR Cryogenic Spectrometer (CRSP)

Coude Feed (C/F):
  Coude Spectrograph + (camera 5 or 6) + CCD (see article page 32)

1.3-m Telescope:
  Simultaneous Quad Infrared Imaging Device (SQIID)
  IR Cryogenic Spectrometer (CRSP)
  IR Imager (IRIM)

0.9-m Telescope:
  CCD Direct Imaging (T2KA)
  CCD Photometer (CCDPHOT)

Burrell Schmidt:
  Direct or objective-prism + CCD (S2KA)
  Direct or Objective-Prism + photographic plates(2)

Reduced-Availability Instruments:
  All Telescopes: Visitor Instruments
  4-m: Cassegrain CCD Imaging
  4-m: PF Camera + photographic plates(1),(2)
  2.1-m: White Spectrograph + photographic plates(2)
  1.3-m: Mark III (optical) Photometer + GaAs coldbox(3)

(1) Limited to programs that have already been started (see preceding article).
(2) Visitors must provide their own photographic plates (see preceding article).
(3) No long-term proposals (see preceding article).

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Queue Scheduling Pilot Program (1Mar93)

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Queue Scheduling Pilot Program (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

Anyone who has acquired observations with HST or ROSAT has been subjected to queue scheduling a procedure whereby approved proposals are scheduled according to various constraints. These constraints fold together environmental conditions, efficiencies of pointing the telescope and configuring the instruments, and scientific priority. While such an approach has not traditionally been used at ground based observatories, there are reasons to consider adopting it for some programs. The most valuable aspect of queue scheduling is the removal of risk due to bad weather or instrument malfunction for the highest ranked programs. Rather than being allotted a specific run of three nights, regardless of the weather, the highest ranked proposal is executed in the first nights during which conditions are suitable. In addition, queue scheduling improves the overall efficiency of telescope operations. This is done by combining programs with similar types of observations so that calibration data and setup time can be shared and by fitting in observations for programs which do not need superb conditions when the weather is less than perfect. Finally, it allows the execution of observational programs which are unsuitable for conventionally scheduled telescopes, such as monitoring projects or programs which cannot efficiently fill the night with targets. Queue scheduling should be distinguished from past programs of service observing, wherein small amounts of data were taken during a portion of an observing night. In queue scheduling, the scientific merit of the proposal figures prominently in the scheduling, and there need be no constraint on the size of the program.

It is becoming clear that new methods of observing such as queue scheduling will be employed in the future in order to improve observing efficiency, especially on new facilities such as the WIYN telescope. It is also clear that many new problems will have to be solved in order to implement an effective queue scheduling program. In order to gain some initial experience in this area, we are instituting a small pilot program during summer shutdown in 1993. Because of major control system work planned for the 4-m telescope during the summer of 1993, most of the smaller telescopes will be available for this experiment. We are planning to run this pilot program for a period of two weeks on the 0.9-m/CCD direct with the T2KA chip, the 2.1-m/GoldCam, and the Coude Feed/camera 5/grating A/T2KB. (Please see the appropriate instrument manuals for the capabilities of these instruments.) Observations will be made by the KPNO scientific or support staff according to an observing prescription designed to produce uniformly good data.

Requests for queue-scheduled observations with the above-mentioned telescope and instrument combinations should be submitted by 30 April 1993. Rather than the usual observing proposal form, we will accept proposals by e-mail only. In order to receive an electronic proposal form (good for this summer shutdown 1993 pilot program ONLY), send a request to queue-request@noao.edu.

Proposals for each telescope will be ranked by an in-house TAC on the basis of scientific merit and the degree to which they lend themselves to queue scheduling, and scheduled as other constraints permit during the period between about 20 July 1993 and 20 August 1993. Within one month of the deadline (i.e., by 31 May 1993) all proposers will be notified whether their proposal is likely to get time, might possibly get time, or is not likely to get time. To receive the general information packet, send e-mail to queue-info@noao.edu.

David De Young, Todd Boroson

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Queue Scheduling at KPNO in the Fall 1993 Semester (1Mar93)

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Queue Scheduling at KPNO in the Fall 1993 Semester (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

In order to gain experience in queue scheduling in a preliminary way, we will be conducting a queue scheduling experiment this summer during the shutdown period. The preceding article, which describes this experiment, also outlines some of the virtues of queue scheduling and our motivations for doing it. In order to discover what problems need to be solved in queue scheduling over longer periods and during a regular observing season, we will be offering this service at a modest level in the fall 1993 semester.

During this semester queue scheduling will be offered on the 2.1-m telescope with GoldCam and on the 0.9-m telescope in CCD direct imaging mode using the T2KA chip. Queue scheduling will be offered only with these telescope and instrument combinations and only for a portion of the available observing time. The fraction of time devoted to queue scheduled observations will be a function of the demand for such an observing mode and the availability of resources to provide this service. At the 2.1-m, observations will be taken by a combination of KPNO staff members working with the 2.1-m LTO, and at the 0.9-m observations will be taken by the KPNO staff. As discussed in the article on queue scheduling this summer, remember that you are more likely to get your data in a queue scheduled mode, and queue scheduling can result in more science per unit time.

If you are proposing for time on one of these telescopes with the instruments described above, and if you wish to have your program considered for queue scheduling, simply write the word "queue" on the first page of the observing form in the space following the words "None of these". If your queue proposal is accepted, you will be notified that it is part of the queue program shortly after the initial TAC letters are sent, and we will contact you about the precise parameters for the observations requested. Further information about the fall queue scheduling program can be obtained by sending a request to queue-help@noao.edu. We hope you will be interested in participating in this program and will wish to realize the economies and efficiencies made possible by queue scheduling.

David De Young

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Feedback from the TAC (1Mar93)

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Feedback from the TAC (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

It has become increasingly clear that the KPNO user community would like to obtain comments from the KPNO telescope Time Allocation Committee for all proposals that are not granted telescope time. This sentiment has arisen from many sources (see, for example, the KPNO Users' Committee Report in this Newsletter). KPNO is very willing to

comply with this request; the difficulty has been in devising a method to do so in the face of declining budgets and staffing levels. After consultation with the TAC members, with the KPNO Users' Committee, and with the KPNO scientific staff, we are pleased to announce that in the future a summary of TAC comments will be given to all PIs who are not granted telescope time. This service will begin after the TAC meeting in the spring of 1993.

In view of the large oversubscription rates on the 4-m and 2.1-m telescopes, it is important to note that some of the summaries may not appear to be particularly substantive, i.e., many good proposals simply cannot be scheduled. However, in such cases the summary comments may still be of use in preparing a proposal for resubmission that is more competitive. This new procedure adds to the burden placed on TAC members, and the detailed process may evolve with time as we gain more experience, but it is our intent to provide such comments in the future for all unsuccessful proposals.

David De Young

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CryoCam Back from the Dead (1Mar93)

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CryoCam Back from the Dead (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

We have replaced the TI 800 x 800 chip in the Cryogenic Camera with a new, thinned Ford 800 x 1200 CCD. Testing has just begun, but the instrument should be available for the spring 1993 semester and subsequently. In many ways the new chip is a great improvement over the old one. Most importantly it is flat, so the focus variations that plagued efforts to do accurate sky subtraction should be eliminated. Also, the thinning and backside treatment, applied by Dr. Michael Lesser of Steward Observatory, allow the chip to hold its UV flood for a long period of time even while it is warm. Thus, it can be flooded before the camera is sealed. We believe that one of the principal reasons for the low efficiency of the old system was the difficulty in UV flooding the CCD. The chip has 1200 15 um pixels in the spectral direction; the focus softens somewhat in the first and last 100 pixels. The chip has 9 electrons readout noise and three bright columns. No traps are apparent.

The CryoCam was used on the 4-m telescope on the nights of 19-24 January 1993. Listed below are the chip quantum efficiency and a conservative estimate of the system efficiency measured with Grism 650 under less than perfect conditions. The system is relatively inefficient below 4000 A both because of the spectrograph optics and the CCD quantum efficiency curve which was optimized for the red to reduce fringing.

Wavelength	CCD QE	System Efficiency
4000 A	25%	4.2%
4500 A	51%	10.1%
5000 A	72%	13.2%
5500 A	77%	16.4%
6000 A	83%	14.9%
6500 A	86%	11.3%
7000 A	84%	
7500 A	80%	
8000 A	72%	
8500 A	61%	
9000 A	45%	
9500 A	24%	

Todd Boroson, Rich Reed,
David Vaughnn, Bill Ditsler

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Important Changes to CRSP (1Mar93)

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Important Changes to CRSP (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

Some observers will have already noted that CRSP (our IR Cryogenic Spectrometer) has received the detector that was formerly in IRIM, significantly improving the operation of the instrument (far better cosmetics, no flux memory). However, we do not plan to stop there. Two major upgrades are planned for the summer of 1993:

1. The Digital Control Unit will be modified to operate with a SPARC host computer, similar to the FIRE program used with SQIID. This should free us from the three-headed albatross (DEC 11/73, Grinnell, and Getpix) which has become less and less reliable with time.

2. The detector will be replaced with a 256 x 256 SBRC InSb detector with 30 um pixels. Although the array intended for CRSP has only 170 operable rows, this should have no adverse effect on the instrument, since the slit will illuminate only 135 rows. We expect this to be a very significant step. The new SBRC arrays are far superior to their predecessors in many respects (good cosmetics, dark current ~ 1 e-/s, single-read noise < 30 e-) which are important to spectroscopy. In addition, the smaller pixels will permit full sampling of the slit, even under good seeing conditions, as well as enhanced spatial resolution on extended sources. The smaller well capacity may limit operation at long wavelengths and low resolution, depending on the minimum readout time we can achieve.

Since the new array will be approximately 60 percent larger in the dispersion axis, we expect increased free spectral range with the high dispersion gratings. At this point, we cannot say how much additional useful spectral coverage will result, as this depends on the effects of vignetting and aberrations at the edge of the camera optics. Until we have experience with the upgraded instrument, prospective observers should use the present performance as a guideline.

The planned upgrade will require significant time and effort. Since CRSP is scheduled to mid-July in the present semester, the physical modifications to the instrument and electronics cannot begin until then. We anticipate the instrument will be available for scheduled use by 1 November, although prospective users are warned that the performance and operating procedures may not be fully characterized by that time.

Dick Joyce

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New CRSP Manual (1Mar93)

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New CRSP Manual (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

With the replacement of the CRSP detector by the former IRIM detector (SBRC 079), a significant number of the operating parameters have

changed. Those observers scheduled for CRSP observations this semester (before the future changes noted in the previous Newsletter article) can obtain the latest version of the CRSP manual by request to either me or the Observing Support Office. A summary of the important changes may be retrieved by anonymous ftp from orion, following the recipe in Newsletter No. 32, p. 22. The file crsp.add4 in kpno/manuals is not in compressed format.

Dick Joyce

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The Present and Future Status of Hydra (1Mar93)

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The Present and Future Status of Hydra (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

Many improvements have recently been made on the user interface software for the multi-object, fiber-fed spectrograph Hydra. The primary feature is the implementation of an OpenWindows environment that allows pan, zoom, and cursor readback capability in the graphics display (which shows the locations of the fibers and target objects). We have also completed the tools for hand assigning or modifying the Hydra field configuration and for saving such modified configurations into a Hydra format configuration file. It is now possible to assign fibers to objects and random skies using the graphical display. We stress that these improvements only work in the OpenWindows environment and not in the older SunView implementation.

An updated version of the Hydra Users' Manual is soon to be released. It will be available through the previously described ftp access or through the Observing Support Office.

The original concept of the WIYN telescope included the implementation of a wide-field, fiber-fed, multi-object spectrograph permanently installed at one of the Nasmyth foci. Due to insufficient resources, that instrument will be a reincarnation of the current Hydra, instead of a second instrument. As such, Hydra will be decommissioned from the Mayall 4-m during the late spring of 1994. Commissioning of the upgraded Hydra will take place during the summer and fall of 1994. We hope to have the instrument back into the hands of visitors by the spring of 1995.

The new Hydra will contain the same positioner, stages and basic electronics. However, a completely new focal plate will be constructed to take advantage of the concentricity between the WIYN focal surface and exit pupil, and to incorporate improvements which should eliminate some of the residual fiber problems with the current instrument. The red fiber cable will be replaced with a new red cable containing fibers with 200 m cores (corresponding to 2 arcsec in the WIYN focal plane). The blue fiber cable will be preserved and moved over to the WIYN. The fibers within the blue cable will subtend 3 arcsec in the WIYN focal plane. The new focal plate will, in addition, be capable of accepting additional fiber cables, allowing for future growth. The Bench Spectrograph will move to WIYN without major modifications, except for the ongoing effort to finish the spectrograph control software and the high-throughput, all-transmission spectrograph camera.

Since the positioner itself will be virtually unchanged and since the focal plate assembly is completely new, we should be able to minimize the down time of the instrument to under 6 months.

Hydra users should start paying attention to Newsletter items regarding the WIYN telescope scheduling as it is intended that the WIYN be scheduled in a significantly different manner from the way other KPNO telescopes have been scheduled in the past.

Sam Barden, Taft Armandroff

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WhiteCam on Sabbatical (1Mar93)

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WhiteCam on Sabbatical (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

Because of the cosmetic quality of the CCD detector used in the White Spectrograph on the 0.9-m telescope, we have decided to temporarily remove that instrument from active duty. The combination of a large number of low light level traps, bad fringing in the red, and the small aperture of the telescope severely limits the scientific capabilities of the instrument. We hope to replace the CCD with a better quality Ford 3K in the near future. Watch the Newsletter for an announcement of its return.

Todd Boroson, David De Young

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Interim Detector Planned at CoudÃ© Feed (1Mar93)

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Interim Detector Planned at Coude Feed (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

For the past several semesters, the observing schedule at the Coude Feed telescope has been complicated by frequent detector changes as many different CCDs "visit" from other telescopes. Each of our other telescopes has a "resident" detector which is most often used at that telescope (T2KB at the 4-m, T2KA at the 0.9-m, T1KA at the 2.1-m, and S2KA at the Schmidt).

At the Coude Feed, the resident detector has been a TI device, most recently TI5, but many observers prefer one of our second generation detectors, which offer better performance. The TI detectors are smaller, less sensitive, and have poorer charge transfer characteristics and cosmetic defects which make them unsuitable for careful radial velocity measurements. Their only advantage has been the small (15 um) pixels needed for higher spectral resolution. While the variety of detectors in use at the Feed has been advantageous for scientific observations, it has meant a lot of extra work for the mountain and instrument support staff.

The Coude Feed dewar is scheduled to be upgraded to a Ford CCD with 3072, 15 um pixels eventually, but those detectors have been slow to appear. In the meantime, we will plan to replace TI5 with a smaller Ford device with the same size pixels (15 um), higher sensitivity, better charge transfer, and a modest increase in spectral area (1200 pixels vs. 800). The QE curve for the Ford chip should be a little better than the one given for the new CryoCam detector in this issue, with a QE near 50% at 3500 A and peaking at over 90% at 6000 A.

Programs which are awarded time on the Feed in the fall semester will be scheduled with the Ford device (F1KB) unless a compelling reason is given to schedule another chip. When the Ford 3K devices are available, the smaller Ford chip will be replaced.

Caty Pilachowski, Todd Boroson

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The WIYN Report: Progress on the New 3.5-m Telescope (1Mar93)

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The WIYN Report: Progress on the New 3.5-m Telescope (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

Slower than anticipated progress installing the exterior panels on the dome and a month of stormy weather have slowed completion of the WIYN enclosure. The remaining work includes taping of the joints in the exterior panels, installation of seals around the shutters and openings, some finish work and mechanical check-out. We are still looking for an on-schedule completion date in early March, although some flooring and mechanical work may extend beyond then. This is not expected to cause delays in the project.

The shop assembly of the telescope mount at L&F Industries is complete up through the fork and elevation axle assemblies. The azimuth and elevation axes have been squared and the fork assembly rotated under power with the azimuth drives. The center section of the Optics Support Structure containing the elevation bearings has been lifted into position on the fork, and preparations are underway for grinding the elevation drive disks, the last remaining major fabrication procedure on the mount itself. The mount will be installed in the WIYN Observatory this spring.

L&F is also completing the detailed design of the tertiary mirror support assembly and will begin fabrication shortly. This assembly will be tested separately from the mount and is not required until later in the year.

NOAO's development of the primary mirror cell is centering around improving the performance and serviceability of the active axial supports. A new design incorporating changes identified during the testing of the original supports was prototyped and tested. New supports with additional modifications resulting from the prototype test will be installed in the WIYN cell.

Polishing is underway on the 3.5-m primary mirror at the Steward Observatory Mirror Lab. The figure of the mirror has been measured by two independent interferometers: an infrared interferometer used for generating and during the initial stages of polishing and a phase-shift visible wavelength interferometer previously used for the ARC project and respaced for WIYN. The two methods of testing agree to the accuracy of the IR system. The null lens used in the visible wavelength interferometer was also checked and verified with a computer generated hologram (CGH). At the time this article goes to press (1/29), a mirror figure of 76 nm RMS, 696 nm peak-to-valley, has been achieved. Completion of polishing is expected by April.

The secondary mirror has been generated by Contraves in their Pittsburgh facility. The metrology mount and testing fixtures have been designed and are under fabrication, and preparations for polishing the mirror are underway.

The tertiary mirror is being polished by Kodak in a two-step process. Grinding and initial polishing were performed on a large planetary polishing machine. This step has been completed and the optic tested hanging vertically in a Fizeau test. It will next be tested in Kodak's large Ritchey-Common test tower supported from the back on an air bag supplied by WIYN. Once Kodak's ability to test has been demonstrated and a phase map produced, the mirror will be final figured using ion polishing.

The optical design for the wide-field corrector is being finalized, and quotes for the blanks and optical finishing are being obtained.

Work continues on controls and instrumentation for the WIYN Observatory.

The University of Wisconsin is in production on the control system and expects to begin installation this summer. At NOAO, engineering and design of the modifications necessary to move the Hydra fiber positioner and Bench Spectrograph from the 4-m telescope to WIYN are underway. The design of the CCD Imager is progressing at Indiana.

Matt Johns, Caty Pilachowski, Larry Daggert

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The New and Improved 4-m Telescope (1Mar93)

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The New and Improved 4-m Telescope (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

The first concepts of the KPNO 4-m telescope can be traced to 1961. Most of the systems, both mechanical and electrical, were designed soon thereafter, in the mid to late 1960s. Now, almost thirty years later, component age is starting to take its toll on reliability. Over the summer of 1993, we plan to make a first pass at updating the electronics, computer control systems, and a number of other efficiency related items.

The primary effort is going toward replacing the Telescope Control System (TCS), which will be comprised of modern computers and a window-based software system. Considerable hardware upgrades are required to take advantage of the new software, which is based on our experience at the 2.1-m and Coude Feed. The most noticeable improvements for the visiting astronomer will be much improved pointing and tracking, and shorter times in moving from object to object. Also, both the LTO and the observer will have control over the instrument to enhance the efficiency of setup operations by providing a second option for setting configuration parameters. This is the first real software upgrade at the telescope in twenty years, and it requires programs to control all nine supported instruments!

In addition, we continue to work toward improving the thermal environment of the telescope and dome. The oil, which is pumped to the telescope bearings, will be cooled, thereby eliminating the single greatest heat polluter in the dome (see article below on our acquisition of a thermal camera). Note that many heat sources have already been removed from the 4-m, and thus the building has only two havens from the cold: the control room, which was heavily insulated last summer, and the computer room, which is seriously air conditioned.

In 1994 we plan to improve the ventilation of the dome (following CTIO's lead) to minimize the effects of uncontrollable heat sources and to rebuild the telescope control console, which currently is dominated by outdated and unused buttons and switches.

In order to accomplish the scheduled work, the summer shutdown will be extended into late September, which unfortunately means 2-3 weeks less observing time for the fall semester.

George Jacoby, Bruce Bohannan, David De Young

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The View at 10 um (1Mar93)

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The View at 10 um (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

NOAO has recently purchased an infrared camera for thermal imaging at 10 um. The primary use of this camera is to identify heat sources contributing to the degradation of image quality due to dome seeing, although other uses of the camera can be imagined (e.g., aligning IR optics). The camera, a liquid nitrogen cooled Agema Infrared Systems model 488, provides a high quality real-time quantitative measure of the thermal environment, accurate to 0.1 C.

Thus far, we have reviewed the 4-m and 2.1-m buildings in detail, and expect to review all of our domes on a quarterly basis to guard against thermal incursions. The camera will also be visiting the CTIO 4-m in March 1993 to review the CTIO clean-up effort.

The picture below demonstrates that the oil bearings at the 4-m are an extreme heat source, dumping an estimated 3-4 KW directly under the telescope. Many smaller sources are clearly visible, such as power supplies in the Cass cage.

[figure not included]

George Jacoby, Taft Armandroff

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New and Improved Mirror Cleaning Procedures (1Mar93)

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New and Improved Mirror Cleaning Procedures (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

"It is all done with mirrors" has no greater truth than in a modern astrophysical observatory. And the cleaner the mirror the better! KPNO is now cleaning mirrors in an improved fashion with the carbon dioxide snowflake method which has been found effective at other sites.

High signal throughput and low scattering performance are affected by dust which accumulates on optical surfaces. A clean aluminum surface has a reflectivity of roughly 90% at 5000 A; when a mirror begins to look dirty, the reflectivity is 80% or so. Regular cleaning increases the lifetime of the optical coating and the surface polish, which reduces the handling risk involved in re-coating and re-figuring. In the CO2 snowflake process, liquid CO2 is forced through a nozzle and expanded onto the mirror surface. Dust is removed as the snowflakes slide over the tilted mirror surface on a cushion of CO2. This procedure works only when used frequently for it is not effective when the dust is allowed to adhere to the coating. CO2 is also not effective in removing dust which has become glued to the surface by water spotting. Estimates are that CO2 cleaning restores the mirror reflectivity to roughly 90% of that of a fresh coating.

Our plan is to clean all of the primaries and secondaries with CO2 on a monthly basis. The process is very fast and not at all messy. Most of the time goes into setup. (One has to be careful in the winter not to try to CO2 clean when the humidity is high.) Mirrors will be washed annually to remove dust which has become stuck to the mirror. We plan to monitor mirror reflectivity to determine if we should change our current scheme of re-coating every two years.

Associated with cleaning the mirrors, we are also trying to keep the domes and telescopes cleaner to stop dirt which accumulates in the domes from blowing onto the mirrors. We are also cleaning the optical path above the detector to minimize dust which can fall down on filters and CCDs. Resources limit how much we can do in this regard, but

awareness of the problem is an important first step in getting the best
performance from our telescopes and instruments.

Bruce Bohannan, Jim Hutchinson,
Jon Settlemyre, John Scott

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CoudÃ© Request Night on 11 May (1Mar93)

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Coude Request Night on 11 May (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

For many years we have had a program by which you could ask us to
obtain for you a limited amount of spectroscopic data on the Coude Feed
telescope. This semester the request night is scheduled for 11 May 1993
with the TI5 CCD. The selection of camera and gratings will depend upon
the requests received, but the usual choice is camera 5 with grating A
or B. Requests are limited to two hours per investigator per semester,
including set-up, flat fields, and standards.

Requests for observations should be submitted to David De Young. A
letter will do; please do not use the standard proposal form. Include
the names of the object(s), finding charts, coordinates, and any other
details needed to carry out the program. Requests will be reviewed
internally for feasibility and merit.

David De Young

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What's DAT? (1Mar93)

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What's DAT? (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

Several visiting astronomers have asked about the availability on Kitt
Peak of DATs (Digital Audio Tapes) for data storage to tape. DATs (DDS
format) are available now at the 4-m on `khaki' and at the 1.3-m on
`royal.' Like all of the tape drives, one can write to these devices
from other domes over the mountain network using both IRAF and Unix
networking. While additional DATs on the mountain are not in our
computer plan because of budget limitations, we do plan to support them
and would make them more available if demand increased. DATs are also
available on several of the downtown computers.

Bruce Bohannan, Steve Grandi

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Astronomer Tools (1Mar93)

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Astronomer Tools (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

So it's a cloudy night on Kitt Peak, and you have a proposal that has to go in tomorrow. Or you would like to graph the observations you took last night in order to send them off to Astronomical Telegrams. The tools to do these tasks are now available on the Sun workstations on Kitt Peak.

Among the applications we have installed are TeX, LaTeX, associated tools for displaying and printing postscript files, mongo and its descendents, itroff, and the Emacs editor. All of the applications are in a directory which is automatically in an observer's path at login. You should only have to type the name of the application. A brief description of what is available is posted in each control room.

Please let us know if there is other software that we should make available.

Bruce Bohannan, Steve Grandi, Mike Peralta

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Questions for KPNO? (1Mar93)

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Questions for KPNO? (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

A general computer mail account has been set up to answer any questions you have about visiting Kitt Peak or Tucson, and don't know who to ask. Any and all questions you have can be e-mailed to this address:

kpno@noao.edu

Some items that could be directed to this mail account are: requests to have KPNO Observing Time Requests sent to you (either in hardcopy or electronic form), questions about who to contact about Kitt Peak instruments or filters, how to reserve hotels in Tucson, requests to send instrument manuals to you, requests for the Kitt Peak Facilities Manual (although this is only sent to institutions and not individuals), or any other general questions.

The mail will be checked daily, and you will receive a confirmation of receipt of your electronic mail. If you have requested observing forms, they will be mailed to you. Any other questions will be routed to the appropriate staff person at NOAO.

Pat Patterson

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Paul Harding, Supervisor of Observing Support (1Mar93)

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Paul Harding, Supervisor of Observing Support (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

We are sad to report that Paul Harding has resigned his position of Supervisor of Observing Support on the mountain and will move across the street to the University of Arizona to complete his Ph.D. in astronomy. Beyond being a great resource to visiting astronomers on Kitt Peak, Harding, in the year and a half that he was with KPNO, brought fresh leadership to the Observing Technicians on the mountain and significantly improved the optical collimation of all the KPNO telescopes. He will be greatly missed. But we aren't saying goodbye to him as we expect to see him as a user and a colleague. We do wish him all the best.

We are moving toward filling the Supervisor of Observing Support position in a manner consistent with the current budget realities.

Bruce Bohannan

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Jim Davis - So Long - Mountain Computer Support (1Mar93)

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Jim Davis - So Long - Mountain Computer Support (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

Jim Davis, who has provided support for the mountain computers and network these past two years, left Mountain Operations at the end of January to take a position in the University of Arizona's Department of Computer Sciences. Davis brought a professional approach to the mountain computers and network, and he was instrumental in installing and configuring the Sun workstations now commonly used for data acquisition and reduction.

Because of the current budget situation, it will not be possible to hire a replacement. The first line of hardware and system support will now fall to Mountain Electronics. Steve Grandi's group downtown will be responsible for system changes and will be on call for major problems. The IRAF group will continue to support that application.

What to do if you have a problem? First call an Observing Technician. Maybe it is just a peculiarity in our system that you need to become familiar with. If it is unsolved at that level, they will direct your problem to an appropriate technical group. If it is something that does not need an immediate fix, please post it to `service' or send e-mail to iraf@noao.

And don't forget that we have data reduction support on Kitt Peak two nights a week in the person of Lisa Wells. She is on the mountain, usually Friday and Saturday nights, to help you. Do not hesitate to call her on the radio or look for her in her office in the Administration Building (telephone 306). Her schedule is posted on her office door. Wells is an observational astronomer and is becoming familiar with Kitt Peak instruments after coming here from many years at CTIO. If she does not have an immediate answer, she can usually come up with tests which can clarify the root cause and suggest a solution.

Bruce Bohannan

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KPNO Users' Committee Report (1Mar93)

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KPNO Users' Committee Report (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

The Users' Committee met in Tucson on 15 and 16 October 1992. The Committee members present were William Keel (U. of Alabama), Harold McAlister (Georgia State U.), Frazer Owen (NRAO/Socorro), Abi Saha (STScI), John Salzer (Wesleyan U.), and Rosemary Wyse (Johns Hopkins U.). Tony Tyson (ATT/Bell Labs) could not be present for the meeting but participated periodically in the meeting by conference call. Kent Wilson and Seth Tuttle, both of NSF, attended some of our sessions. David De Young was present throughout the two-day meeting except during executive sessions.

The meeting agenda was quite similar to that reported in the 1 March 1992 NOAO Newsletter (No. 29, page 23). The Committee was presented with reports on the first day from Bruce Bohannan on mountain operations, George Jacoby on the 4-m upgrade project, Todd Boroson on optical/UV detectors, Sam Barden on the Hydra fiber positioner and multi-object spectrograph, and Ian Gatley on the IR program status. During a joint meeting with the CTIO Users' Committee, both groups heard comments from Acting NSF Astronomy Division Director Kent Wilson regarding the current status of the Division and its plans for recruiting a permanent Director. Dr. Wilson also speculated on the possible near-term funding scenarios for NSF astronomy. Richard Green reported on the NOAO budget status and prospects and how the Observatories might react to restricted levels of funding. Sidney Wolff and Pat Osmer described the status of the Gemini project and introduced Dr. Matt Mountain, the newly appointed Gemini Project Scientist. The joint meeting ended with a discussion, led by Bob Williams, of possible revisions to the CTIO TAC procedures, a topic addressed separately in the CTIO Users' Committee report. The first day's meeting ended with an executive session.

The second day began with a discussion of KPNO TAC policy and continued with status reports from Doug Tody on IRAF, Steve Grandi on Central Computer Services, and Matt Johns and Caty Pilachowski on the WIYN telescope. At the request of the Committee, Sidney Wolff returned for a discussion of how Gemini might impact KPNO, a topic which was continued in a follow-on discussion with Dave De Young.

Rather than present a detailed summary of the material presented to the Users' Committee in the series of presentations we heard, the remainder of this report will focus on the concerns and recommendations expressed to the Kitt Peak Director by the Committee. This departs somewhat from the tradition of these reports, but we note that all of the topics presented to us are frequently and excellently reported to the user community on the pages of this Newsletter.

The Viability of Kitt Peak: Improvements in the imaging performance of Kitt Peak telescopes and in the mountain infrastructure are clearly demonstrating the viability of Kitt Peak as a world-class observing site. Kitt Peak will continue to be crucial to the diversity of astronomical science as conducted in the US. Image quality is basic to the optimization of instrument performance. The Committee applauds and strongly endorses the efforts of the mountain staff to implement a program of routine monitoring of collimation and the elimination of dome seeing sources in order to take advantage of the intrinsic seeing quality on Kitt Peak. Such a program is long overdue.

Mountain Operations: The operation of the Kitt Peak facilities has been quantitatively and qualitatively improved under the leadership of Bruce Bohannan as Mountain Manager. The Committee applauds the enthusiastic and energetic manner in which Bruce has approached virtually every aspect of his job, and we note a substantial improvement in the morale of mountain employees. We continue to be concerned with the "one-person depth" of mountain staffing forced by budgetary pressures over the years. The mountain technical staff certainly cannot stand any further reductions when the staffing situation is already at this critically thin level.

O/UV and IR Programs: Instrumentation and detector developments within the O/UV and IR programs show the unique and powerful expertise of NOAO to conceive, design, and produce frontline instrumentation possessing flexibility and ease of use. In addition to the superb work being

carried out within these programs, we encourage the development of better spectrograph cameras to fully utilize the large format CCDs now available. We recognize that expertise now existing within the O/UV and IR programs is a fragile commodity and that decreasing levels of funding can potentially lead to a hiatus in these activities from which a recovery would be difficult or impossible. In light of the current bleak funding picture, we wish to stress the high priority we place in the instrument and detector development programs for the long-term health of the national observatory.

Institutional Partnerships: The Committee cautiously encourages KPNO to explore potential partnerships with other institutions that might enable the enhancement of telescopes and instrumentation through resources not otherwise available to the Observatory. We emphasize that this is not an endorsement of the outright selling of telescope time (or even the indirect selling of time to instrumentation groups that are especially well funded), and that selection criteria for such arrangements must be based upon the broad impact of the proposed science and on the long-term enhancement of telescope instrumentation for the user community. Careful consideration must also be given to the possibility of displacing scientific programs already underway. Scientific interests should always have priority over financial interests in such partnerships.

The Advent of the WIYN Telescope: The WIYN Telescope is rapidly becoming a reality, and the Committee continues to see this new facility as a significant addition to Kitt Peak and its user community. We hope that the WIYN partners can meet the financial schedule which will enable the transfer of the Hydra Multi-Object Spectrograph to the WIYN Telescope.

KPNO TAC Policy: The allocation of telescope time on the basis of scientific merit is a fundamental role of a national observatory. The process requires a considerable investment by Kitt Peak management, support staff, and by community participation on the TAC. It has become apparent through feedback from the user community, and most notably through the electronic survey conducted in early 1992 by J.M. Hollis and S.B. Howell, that the allocation process would be significantly enhanced by providing comments to proposers following the meeting of the TAC. (We note that the Hollis/Howell survey generally showed satisfaction on the part of the 216 respondents with Kitt Peak services and procedures. A majority thought KPNO is doing a satisfactory job overall in handling proposals and allocating telescope time in spite of the strong desire for feedback to proposers. We also note the relative ease with which a wide segment of the community was reached and the results tabulated, indicating the usefulness that future surveys of this type might have to NOAO itself.)

The goal of the revised TAC procedure would be to provide an automatic response of uniform quality to all proposers to replace the current system of responding only to proposers upon request. The current system requires a significant amount of Dave De Young's time, and responses can only be sent 4 to 6 weeks after the request. The new system would have the further goal of establishing more trust on the part of the community in the fairness of the TAC system. It should be recognized that some proposals are not scheduled simply due to their poor quality, some good proposals are judged by the TAC to be not quite as good as others and are declined because of oversubscription. Both classes of declined proposals should know the specific shortcomings seen by the TAC in their proposal, and a variety of methods might be applied to recording and providing a summarization of the TAC comments to the proposer.

We strongly urge Dave De Young to revise the system along some lines that will satisfy the need for rapid feedback and recommend that a trial procedure be in use for the spring 1993 TAC meeting. We specifically do not recommend using outside reviewers except when a proposal is well outside the normal range of expertise found within a TAC. The CTIO experience with the use of large numbers of outside reviewers shows that this is not particularly useful in a proposal environment of heavy oversubscription such as is always the case at CTIO and KPNO. An experiment conducted with KPNO 4-m scheduling in the past also showed that outside reviews are not very useful unless the reviewers see a significant fraction of the proposals.

Queue Scheduling and Service Observing: We encourage KPNO to experiment with non-traditional scheduling strategies as a means for enhancing scientific quality and quantity. Experience to be gained with KPNO scheduling of their share of WIYN telescope time will be valuable to this end. The overriding goal of such measures should be to preserve the data flow from the mountain even if physical access to the telescopes is diminished.

Improvements of Observing Efficiency: The Committee encourages the exploration of various means of enhancing observing efficiency through such steps as frame grabbing to provide optimal focusing, determination of a truss-temperature / telescope-position defocus lookup table, automation of spectrograph rotation, increased speed of chip readout and image storage, etc. We note that the new 4-m TCS and servos will make substantial progress towards this goal of observing efficiency.

Data Archiving: We strongly endorse the immediate initiation of a basic "save the bits" data archival program on Kitt Peak. We recognize that the full initiation of an archival and retrieval/distribution program is a costly undertaking, but a basic archival process that could be eventually expanded to a full scale system can be initiated right away. We acknowledge Caty Pilachowski's efforts towards this goal.

Budgetary Prospects: All of us are aware that the budgetary future may be a bleak one for US astronomy, and the prospects continue to evolve as a result of numerous influences. While we do not know how the federal budget will eventually impact NOAO in general and KPNO in particular, we can definitely point to the underfunding that NOAO has endured for years. The Observatories and their services are fundamental to the health of US astronomy. They are also extremely fragile institutions which have been operating on fraying shoestrings. Not only are telescope closings a possibility if the budget continues to deteriorate, but NOAO may lose sufficient infrastructure to permanently damage or even destroy its capability for providing frontline telescopes and instrumentation to US astronomers. Some budget cuts are reversible while others are not, and we point out that further stifling of instrumentation capabilities at KPNO could result in the permanent loss of the capability. We encourage all astronomers to support NOAO in its operation of Kitt Peak. While there may not be uniform agreement about the optimal way of running a national observatory, it is clear to this Committee that further erosion of support for NOAO could have scientifically crippling consequences to a large fraction of US astronomers.

We strongly encourage active and potential users of Kitt Peak National Observatory to contact any or all Users' Committee members to express your suggestions and concerns. True to our name, we are anxious to represent the opinions of KPNO users to an observatory management which continues to value and follow the advice of this Committee. To make such contact easier, we close this report by providing e-mail addresses of the current Committee members:

Bill Keel, keel@bildad.astr.ua.edu
Hal McAlister, hal@chara.gsu.edu
Frazer Owen, fowen@aoc.nrao.edu
Abi Saha, saha@stsci.edu
John Salzer, slaz@parcha.astro.wesleyan.edu
Tony Tyson, tyson@physics.att.com
Rosie Wyse, wyse%wyser@jhmail.hcf.jhu.edu

Hal McAlister (Georgia State U.), Chair

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Information on Small Telescopes Listed with NASTeC (1Mar93)

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Information on Small Telescopes Listed with NASTeC (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

The Kitt Peak National Observatory has joined the North American Small Telescope Cooperative, founded by Jason Cardelli at the University of Wisconsin. The purpose of NASTeC is to inform the astronomical community of the distribution and availability of small-to-intermediate sized telescopes and associated instrumentation. NASTeC listings include locations and descriptions of telescopes, information about instruments and detectors, and a contact who can provide more information about each facility. KPNO has listed the 1.3-m, 0.9-m, Coude Feed, and Burrell Schmidt telescopes with NASTeC.

With the continuing budget cuts at NOAO, we are forced to limit even further the range of instruments available on each of our telescopes. While we would prefer to retain the broadest range of capabilities for our telescopes, we must concentrate our increasingly scarce resources on the most used and most scientifically productive instruments. As noted elsewhere in this Newsletter, photography and photoelectric photometry will soon become generally unavailable on most Kitt Peak telescopes. Astronomers who use these techniques for their research may find alternate facilities through NASTeC. We note, however, that most other telescopes listed with NASTeC are not available for large programs, but as a source for limited amounts of data. We also encourage institutions not yet listed with NASTeC to consider joining the Cooperative.

The North American Small Telescope Cooperative can be contacted through:

Jason Cardelli
Department of Astronomy
University of Wisconsin
475 N. Charter St.
Madison, Wisconsin 53706,

or on INTERNET (cardelli@madraf.astro.wisc.edu) or SPAN (madraf::cardelli).

David De Young, Caty Pilachowski

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Report from the Dark Sky Office (1Mar93)

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Report from the Dark Sky Office (1Mar93)
(from KPNO, NOAO Newsletter No. 33, 1 March 1993)

An update on the recent activities of the Dark Sky Office follows.

1. There is a revised Outdoor Lighting Code now up for consideration by the Tucson City Council and the Pima County Board of Supervisors. The existing codes have been reviewed in detail by the joint Outdoor Lighting Code Committee, and revisions to take into account changing technology and to improve the clarity and completeness of the codes have been made. We expect no difficulty in passage.

2. New and improved low pressure sodium fixtures have been put into use on city streets, and they will be extensively used for most future street lighting in the city.

3. There has been considerable media coverage of light pollution over the last six months, with articles appearing in many newspapers and magazines, including many of general or environmental interest. An Associated Press release ran in many national and international newspapers. All this publicity for the cause is a real plus.

4. The tax-exempt, non-profit organization active in these issues, the International Dark-Sky Association, continues to grow in size and impact. It now has members from 49 states and 48 other countries, with about 1100 individual members and 120 organizational members. Quite a few of the members are amateur astronomers and those interested in the nighttime environment, but many are lighting engineers and companies. In fact, there are more lighting engineers as members than there are professional astronomers. There have been 59 information sheets produced, and members receive a regular newsletter.

5. Both IDA and NOAO (Dave Crawford) field many, many requests for information. If you have questions or material to provide, please contact me at: dcrawford@noao.edu or 602-325-9346.

Dave Crawford

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New Polarization Modulator for Solar Magnetic Field Studies (3/1/93)

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New Polarization Modulator for Solar Magnetic...(3/1/93)
Field Studies
(from NSO, NOAO Newsletter No. 33, 1 March 1993)

Solar magnetographs are basically polarimeters that measure polarization produced by the Zeeman effect in the profiles of one or more spectrum lines. To measure the polarization efficiently requires a modulator that converts polarization state into a fluctuating light intensity that can be measured with a CCD or other intensity detector. Many types of polarization modulators have been used in the past. At the Vacuum Telescope on Kitt Peak, a 100 by 0.1 mm slit is used to scan the solar image and build up a magnetic field map. These dimensions rule out many modulation schemes. When the telescope and its magnetograph were designed and built in 1973, a Kerr cell was selected as a polarization modulator. The Kerr effect in nitrobenzene produces birefringence when a several kilovolt transverse electric field is applied across the liquid. This effect can be combined with polarizers and fixed retarders to make a good modulator.

In the early years of the telescope operation, three Kerr cells were purchased from a commercial manufacturer. Two of these cells required refilling every few years of use, but one was of a different design that seemed long lived. We placed the new design into service in 1981 and kept the other two as backups. The cell behaved perfectly, and we happily ignored it. After eleven years it suddenly failed. Backup number one was rushed into service, and the company was contacted about a replacement for the failed cell. The first unpleasant discovery was that the company was no longer in business. The second discovery was that the first backup failed after a few weeks. The last cell was placed into service but with a reduced voltage and limited observing schedule, to prolong its lifetime.

A crash effort to get a replacement modulator was started. Two courses were pursued. The first was to rebuild one of the existing Kerr cells. We were able to locate one of the people who built the original cells (by calling all the people with the right last name in the Santa Barbara phone book) and learned how the cells were made. This was not an attractive proposition since the process of purifying nitrobenzene is not something to be taken lightly, given the toxicity of the substance. The second approach was to find a different modulator. After all, in 20+ years something new should have turned up. The solution turned up in the Tektronix catalog where color oscilloscopes and 3-d workstation monitors are offered. Tektronix developed a proprietary liquid crystal device technology called the pi-cell. They use this technology to make modulators for several of their products. David Rust (Applied Physics Lab., Johns Hopkins U.) investigated experimental versions of these cells in the early 1980s (before they were in production) as magnetograph modulators and found them to be unsatisfactory. The cells are now manufactured in sizes from 4 by 5 inches up to 19 inches at very reasonable prices. Apparently improvements in the design have been achieved in the last ten years or so. We acquired one of the smallest ones and tested it. The cell looked promising, so we put it into service at the telescope and found it to work fine in the visible. We wanted to work in the near infrared, so we bought two of them and glued them together to get more effect. Our modulator crisis seems to be over.

The Tektronix LCD cells are strongly birefringent when no voltage is applied but lose this birefringence when a 2 kHz square wave at 20 v amplitude is applied. We chop between this voltage and a lesser one (about 2 v) to obtain a variable retardation between 0 and 1/2 wave at 868 nm at a frequency of 60 Hz. In three months of service so far, the results have been good. There are some oddities that should be noted. One is that the cell is highly optimized to work at video frequencies; lower and higher frequencies do not work very well. Another is that the glass that is used to construct the cell is not of very good optical quality. We bought several cells, tested them with a Zygo

interferometer and picked the best ones. The manufacturing consistency is phenomenal. All the cells we bought behaved identically within a few percent in terms of birefringence vs. voltage. Uniformity within a cell is good to a few percent. Finally, interference fringes within the few micron thick LCD layer require the cells to be tilted for use at high spectral resolution.

Jack Harvey

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NIM Available to Visitors (1Mar93)

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NIM Available to Visitors (1Mar93)
(from NSO, NOAO Newsletter No. 33, 1 March 1993)

The Near Infrared Magnetograph (NIM) will become available to visiting observers during the second quarter of 1993. Designed to map magnetic field strength in the active solar photosphere, NIM is a Stokes spectropolarimeter that exploits the high Zeeman sensitivity of the line Fe I 6388.64 cm-1 (15648.5 A, Lande g = 3.00, Xe = 5.36 eV) to measure the vector magnetic field. For B &gt = 850 G, the magnitude of the field is derived, without adjustable parameters, from the complete splitting of the Zeeman components. The relative strengths of the Stokes components indicate the direction of the field. The absolute strength of the polarized signal depends on the areal filling factor, inclination, continuum contrast, and line strength of the magnetic flux tubes within the angular resolution element.

NIM builds up a two-dimensional array of polarized line profiles by scanning the solar image across the slit of the 13.7-m vertical spectrograph of the McMath-Pierce Telescope on Kitt Peak. The spatial and spectral sampling frequencies are approximately 1 arcsec per pixel and 0.06 (0.025 cm-1) per pixel. The detector is a 256 x 256 indium antimonide array. At each slit position, 8 polarization pairs for each Stokes parameter (e.g., +- V) are acquired at 7 Hz, averaged, and recorded in FITS format on disk. A 4 x 4 arcmin map is acquired in about 20 minutes. The data on disk are finally recorded on Exabyte tape or DAT.

Proposals to use NIM may be made quarterly using the standard NSO form (deadlines: 15th of January, April, July, October). For more information about NIM, please contact Doug Rabin.

Dave Jaksha, Greg Kopp, Chuck Mahaffey,
Claude Plymate, Doug Rabin, Jeremy Wagner

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Visiting Doctoral Student (1Mar93)

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Visiting Doctoral Student (1Mar93)
(from NSO, NOAO Newsletter No. 33, 1 March 1993)

Vincenzo Andretta, a doctoral student with Gino Smaldone at the University of Naples, will visit NSO/Tucson from the end of January

through the middle of September 1993. Vincenzo worked with Mark Giampapa as an NSO summer student in 1990 and will be working with Mark and Harry Jones on his doctoral thesis concerning the formation of the He 10830 line in the Sun.

Harry Jones

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NSO Observing Proposals (1Mar93)

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NSO Observing Proposals (1Mar93)
(from NSO, NOAO Newsletter No. 33, 1 March 1993)

The deadline for submitting observing proposals to the National Solar Observatory for the third quarter of 1993 is 15 April 1993. Forms, information and a Users' Manual may be obtained from:

R.N. Smartt
P.O. Box 62
Sunspot, NM 88349,

for the Sacramento Peak facilities (sp@sunspot.noao.edu) and:

J.W. Brault
P.O. Box 26732
Tucson, AZ 85726,

for the Kitt Peak facilities (nso@noao.edu). At your request, a TeX or UNIX roff version can be e-mailed.

Dick Altrock (NOAO::RALTROCK)

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Vector Magnetograph Ready for Users (1Mar93)

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Vector Magnetograph Ready for Users (1Mar93)
(from NSO, NOAO Newsletter No. 33, 1 March 1993)

The JHU-APL/USAF/NSO vector magnetograph is now fully operational and is available for use by the scientific community. Specific observing requests for this facility should be made by submitting an NSO Observing Proposal.

The vector magnetograph utilizes the Zeeman-sensitive spectral line Ca I 6122.2 A, to make Stokes parameter measurements in up to five wavelengths through the line. Data reduction programs are available, in IDL, to perform initial on-site processing of the data and to look at preliminary magnetograms. Most magnetograms are made using two positions in the blue wing of the line so they can be calibrated by the derivative method, i.e., signal/(dI/dl) B. The 10-inch telescope in the Hilltop Dome offers a spatial resolution of about 1.5 arcsec, with a temporal resolution of about a minute. The field of view of the magnetograph is about 3 x 5 arcmin. Current investigations underway using this instrument are in support of the USAF-sponsored Solar

Activity Modeling Initiative and the JHU-APL/USAF/NSO Flare Genesis Project. The instrument also currently supports some of the observational programs in solar activity, specifically those looking for magnetic shear in active regions. Calibration procedures are also available to measure instrumental polarization, if one desires to do so.

For more information about the instrument, contact Dave Rust at:

(301) 953-5414
(drust@s1pvx6.jhuapl.edu).

For information about the daily operation and how to apply for time, contact Craig Gullixson at:

(505) 434-7088 (craig@sunspot.noao.edu).

K.S. Balasubramaniam, Steve Keil, Dave Rust

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New Administrative Manager at Sac Peak (1Mar93)

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New Administrative Manager at Sac Peak (1Mar93)
(from NSO, NOAO Newsletter No. 33, 1 March 1993)

NSO is pleased to announce that Guy A. Gallaway has joined the NSO/SP staff as Administrative Manager. Gallaway is a native New Mexican and previously worked at the Sacramento Peak Observatory from 1965 to 1970 as a programmer. Since 1970, Gallaway has lived in Alamogordo, New Mexico and worked for various DOD contractors.

Frank Hegwer

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NSO/SP Summer Workshop (1Mar93)

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NSO/SP Summer Workshop (1Mar93)
(from NSO, NOAO Newsletter No. 33, 1 March 1993)

The Fourteenth NSO/SP Summer Workshop will be held at Sacramento Peak, from 31 August to 3 September 1993. The workshop is on "Solar Active Region EvolutionComparing Models with Observation." The response to a preliminary announcement of this workshop was overwhelmingly positive. Based on comments received from over 60 potential participants, this workshop will place particular emphasis on physical mechanisms involved in the evolution of active regions, with two major discussion categories:

1) Physical mechanisms that determine the structure and evolution of magnetic flux.

2 Magnetic energy storage and release mechanisms in the corona and their relationship to measured physical conditions in the lower atmosphere.

Keynote speakers for the workshop will be Bob Howard and Gene Parker.

Lead members of the Scientific Organizing Committee will be Alan Title
and Nigel Weiss for the first category, and B.C. Low and Saku Tsuneta
for the second.

For more information contact:

        K.S. Balasubramaniam
        NSO/Sacramento Peak
        P.O. Box 62
        Sunspot, NM 88349
        e-mail: bala@sunspot.noao.edu
        phone: (505) 434-7000
or
        George Simon
        USAF, NSO/Sacramento Peak
        P.O. Box 62
        Sunspot, NM 88349
        e-mail: simon@sunspot.noao.edu
        phone: (505) 434-7000

K.S. Balasubramaniam

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NSO Telescope/Instrument Combinations (1Mar93)

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NSO Telescope/Instrument Combinations (1Mar93)
(from NSO, NOAO Newsletter No. 33, 1 March 1993)

Vacuum Tower Telescope (SP):
    Echelle Spectrograph
    Universal Spectrograph
    Horizontal Spectrograph
    Universal Birefringent Filter
    Fabry-Perot Interferometer Filter System
    Advanced Stokes Polarimeter
    Slit-Jaw Camera System
    Correlation Tracker
    Branch Feed Camera System
    Horizontal and Vertical Optical Benches for visitor equipment
    Optical Test Room

Evans Solar Facility (SP):
    40-cm Coronagraphs (2)
    30-cm Coelostat
    40-cm Telescope
    Littrow Spectrograph
    Universal Spectrograph
    Spectroheliograph
    Coronal Photometer
    Dual Camera System

Hilltop Dome Facility (SP):
    Ha Flare Monitor
    White-Light Telescope
    20-cm Full-Limb Coronagraph
    White-Light Flare-Patrol Telescope (Mk II)
    Sunspot Telescope
    Fabry-Perot Etalon Vector Magnetograph
    Mirror-Objective Coronagraph (5 cm)
    Mirror-Objective Coronagraph (15 cm)

McMath-Pierce Solar Facility (KP):
    160-cm Main Unobstructed Telescope
    76-cm East Auxiliary Telescope
    76-cm West Auxiliary Telescope
    Vertical Spectrograph
    Infrared Imager
    Near Infrared Magnetograph
    Image Stabilizers

    1-m Fourier Transform Spectrometer
    Stellar Spectrograph System
    3 Semi-Permanent Observing Stations for visitor equipment

Vacuum Telescope (KP):
    Spectromagnetograph
    High-l Helioseismograph

Razdow (KP):
    Ha patrol instrument

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GONG Update (1Mar93)

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GONG Update (1Mar93)
(from GONG, NOAO Newsletter No. 33, 1 March 1993)

The Global Oscillation Network Group (GONG) project is a community-based activity to develop and operate a six-site helioseismic observing network for at least three years, to do the basic data reduction and provide the data and software tools to the community, and to coordinate analysis of the rich data set that should result. The project is currently looking forward to an operational network and data management and analysis center in 1994. GONG data will be available to any qualified investigator whose proposal has been accepted, however active membership in a GONG Scientific Team will allow early access to the data and the collaborative scientific analysis that the Teams have already initiated. The GONG Newsletter provides status reports on all aspects of the project and related helioseismic science.

GONG continues to make good progress towards full scientific operations with the Data Team moving into the AURA building on Warren Avenue, the Instrument Team in the process of moving the six field stations to the integration site on the shores of Lake Rillito, the Management Team preparing for a peer review of the Production and Deployment Plan, and members of the international GONG community having concluded a very successful week-long tutorial workshop hosted by the Physical Research Laboratory at Ahmedabad, India. The Annual GONG meeting will take place in Tucson this year, 19-21 April.

The Instrument Team continued work on the production of the final field instruments, testing and debugging hardware and software at the prototype site, and observing with the prototype. The latter activities share the prototype on a six week/two week schedule respectively. This winter's heavy rains delayed a planned move of the six field instrument shelters from their present location near the NOAO shops and offices to a good-horizon site a few kilometers away on the University of Arizona Agriculture Department's farm. This move should take place in a few weeks, weather permitting. Interior fitting of the shelters (electrical and carpentry work) is finished.

On the optics front, the major current production activity is assembly of the ten Lyot filters. Several front entrance windows were delivered by the vendor, and two were tested using the prototype instrument. The results showed no detectable fringes or irregularities which were problems that affected calibration quality with earlier windows. Some of the windows have a large number of pinhole defects, and the effect of these is being tested and evaluated. The 5 A prefilters were a production challenge for the vendor. For stability reasons, an ion-assisted coating was specified, but it turned out to be hard to deposit uniformly on Schott filter glass. The design has been changed to put the coating on clear glass and to mount the Schott filter glass separately in place of what was originally a clear glass window. Production of the interferometers continues to run behind schedule. The vendor experienced trouble contacting together the two halves of the polarizing beam splitter cube with sufficient alignment precision. A fixture has been built which has solved this alignment problem, but now the contacting is not working well. The solution will probably be to use an optical epoxy to join the cube halves. The project has always

been nervous about this from the standpoint of long term stability, but the interferometer that has been in use for more than a year was joined this way and shows no sign of change. The waveplates manufactured for the interferometer have been tested by both the vendor and us with good agreement.

Good progress has been made toward final software for instrument control and data collection. Comparison of ephemeris calculations of the solar position with actual pointing coordinates has allowed alignment errors to be located and quantified, and the instrument may be pointed at the Sun with an accuracy of better than one pixel without the guider being active.

While it is not necessary to do any flat field corrections to measure velocities, it is helpful to have a good intensity flat field calibration when defining scattered light and locating the limb. A procedure has been developed that works using a small-angle scatter plate in front of the objective to define high spatial frequency components of the instrument response function, while low spatial frequency components are determined from an image of the entrance pupil. Either of these approaches alone did not work well, but together the results are very good. We also settled on a magnetograph observing scheme that gives results quite comparable with daily magnetograms from Kitt Peak (except for spatial resolution).

The Data Management Analysis Center (DMAC) Team is working on the preparation of a new version of GRASP that is to be released in February. Significant progress was made in extracting the scattering point spread function from intensity images and in understanding how this correction can be efficiently applied to the GONG data. The development of the multi-site merging capability continued with the evaluation of alternative merge strategies and the generation of a new artificial dataset.

Seven members of the DMAC team moved from the main NOAO building to the AURA building on 19 November (about ten days ahead of schedule!). The move went well with many computers up and on the network the next day. Prior to the move, the interior of the building was redecorated: ceiling insulation and ceiling tiles were replaced; walls were painted; carpets were replaced with floor tiles; FDDI and Ethernet networks were installed.

Late in the summer of 1992, the instrument team resolved many of the outstanding optical problems. Since then the volume of calibratable data produced by the instrument has increased dramatically as has the production of data products from the raw data. During the last quarter, the following prototype data days were calibrated: 31 August; 25, 30, 31 October; 1-8, 21, 24-27 November. Ten-minute averages of calibrated velocity, modulation, and intensity images were produced for 21 July; 30, 31 August; 5, 6 September; 30 October; 3-8, 21 November. l- spectra were produced from the calibrated velocity images for 30, 31 August; 25 October; 1-8 November.

A prototype implementation for most aspects of the DSDS has been assembled; many components are functional including the cartridge library and the cartridge catalog which are used routinely to support the prototype data reduction activities. The development of the file catalog, the DSDS operator interface, various report generators, and the distributable catalog and associated query software is proceeding rapidly.

The second meeting of the Data Management Analysis Committee Users Committee (DUC) was held on 2 October. The meeting was attended by Tuck Stebbins, Tim Brown, and Todd Hoeksema and by several members of the GONG project, and topics included the prioritization of DMAC development tasks, low frequency and steady flows reduction, magnetograms and rectangular pixels, m-averaged peak finding, the interface to the DSDS, and GONG/SOI interoperability. The third meeting took place on 29 January.

GONG project management recently produced an update of the detailed plan for the production and deployment of the six field stations. This plan calls for the full field network to begin operations in December 1994. The effort remaining has been broken down into small enough work packages to accurately model the problem, totaling approximately 1500 tasks. On 20 November a group of five NOAO managers, familiar with the practical realities of project management in the local environment, reviewed the planning process and tools, the resulting production strategies and tactics, the conclusions reached, and strengths and weaknesses of the draft plan itself. The project will use this feedback in its ongoing management efforts and in its presentation of the updated plan to a formal management review in early February 1993 to be chaired by Bob Noyes.

The Physical Research Laboratory, at Ahmedabad, Indiathe parent organization for GONG's Udaipur sitehosted an international tutorial workshop 4-8 January, organized by Arvind Bhatnagar, Kumar Chitre, and Juri Toomre. There were 39 participants from thirteen institutions, and the lecturers included Tim Brown, Jrgen Christensen-Dalsgaard, Douglas Gough, Frank Hill and Juri Toomre.

The annual GONG meeting will be held in Tucson this year, at the Ramada Downtown, located at 475 North Granada, 19-21 April. Hotel registration forms will be enclosed with the forthcoming GONG Newsletter. Reservations must be received by the hotel no later than 19 March 1993. The hotel telephone number is (602) 622-3000, and their facsimile number is (602) 623-8922.

John Leibacher

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1993 Software Conference Update (1Mar93)

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1993 Software Conference Update (1Mar93)
(from CCS, NOAO Newsletter No. 33, 1 March 1993)

The Third Annual Conference on Astronomical Data Analysis Software and Systems (ADASS) will be held in Victoria, British Columbia (Canada), on 13-15 October 1993. The Conference is being hosted by the Dominion Astrophysical Observatory and the University of Victoria. Additional sponsors include the National Optical Astronomy Observatories, the Smithsonian Astrophysical Observatory, and the Space Telescope Science Institute. The ADASS Conference provides a forum for scientists and programmers concerned with algorithms, software, and software systems employed in the reduction and analysis of astronomical data.

The Program Organizing Committee for ADASS '93 includes Carol Christian (Berkeley), Tim Cornwell (NRAO), Dennis Crabtree (DAO/CADC), Daniel Durand (DAO/CADC), Bob Hanisch (STScI), Rick Harnden (SAO), Doug Rabin (NOAO), Dick Shaw (STScI), Doug Tody (NOAO), and Diana Worrall (SAO).

The Proceedings for ADASS II (held in Boston in November 1992) are now being prepared for publication. The volume will be published as part of the A.S.P. Conference Series, and will automatically be mailed to all registered participants of the Boston Conference. The editors for ADASS II are Bob Hanisch (STScI), Roger Brissenden (SAO), and Jeannette Barnes (NOAO).

Preliminary conference information for ADASS '93 will be mailed shortly to the Conference mailing list. For further information about ADASS '93, or to have your name added to the Conference mailing list, please send mail to:

softconf@dao.nrc.ca.

Jeannette Barnes, Doug Rabin, Doug Tody

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IRAF Update (1Mar93)

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IRAF Update (1Mar93)
(from CCS, NOAO Newsletter No. 33, 1 March 1993)

The most recent version of IRAF, version 2.10.2 (V2.10 patch 2) was released in late November. This is a limited patch available only for Sun platforms. The V2.10.2 patch fixes a number of minor bugs and adds a few miscellaneous system enhancements, including the latest versions of the networking and magtape drivers. In particular, V2.10.2 includes support for IRAF networking between UNIX systems and the V2.10 version of VMS/IRAF.

Work is currently in progress on IRAF version 2.10.3, due out this spring. Although this will be another mini-release, this one will include an unusual amount of new software. Most importantly, V2.10.3 will include IRAF support for the X11 support package, which will be released concurrently with V2.10.3. We also hope to include the FITS image kernel (developed in collaboration with STScI), a major new version of DAOPHOT incorporating the DAOPHOT-II algorithms, and further refinements to the world coordinate support in the spectral packages. The X11 support package will include the Xgterm color graphics terminal emulator (some of you may have seen this demonstrated at the recent ADASS and AAS conferences) and a new X11 based IRAF image display server, along with several other IRAF related X11 programs.

IRAF V2.10 was released in late November for the IBM RS/6000 running AIX version 3.2. This was the first release of AIX/IRAF. The IRAF V2.10 releases for VAX/VMS and the Macintosh running A/UX 3.0 are still in testing. We are running a little behind on our projected release dates for these ports, but testing is now winding up for both platforms, and the distributions should be out shortly.

The IRAF project received an HP 730 in November, on loan from HP to the IRAF project, for porting and maintaining IRAF under HPUX. The V2.10 IRAF upgrade for this platform is being prepared for HPUX 9.01. The initial upgrade of HPUX/IRAF has since been completed, but it will take some time yet before testing is completed and the distribution is prepared.

One of the NOAO Suns has been upgraded to Solaris 2.1, in preparation for porting IRAF to this new Sun operating system. We have received many inquiries from sites about IRAF running under Solaris. The current Sun/IRAF distribution will not run under Solaris 2; this new operating system is sufficiently different from SunOS that it will require a new port and a separate distribution. The Solaris distribution should be available about the time of the IRAF V2.10.3 release or shortly thereafter.

A USENET, e-mail, and network archive based IRAF mail network is in the works; there will be more information on this in the next IRAF Newsletter, due out in the spring.

For further information about the IRAF project, please contact Jeannette Barnes, Central Computer Services.

Doug Tody, Jeannette Barnes

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