Judge Dismisses Tohono O'odham Lawsuit

Richard Green

On July 26, US District Judge David Bury issued a judgment that the lawsuit brought by the Tohono O'odham Nation against KPNO, NSF, and Smithsonian over the Very Energetic Radiation Imaging Telescope Array System (VERITAS) project be dismissed.

The Nation had sought a declaratory judgment that we were in violation of the law by not properly consulting with them about the placement of the VERITAS telescopes on Kitt Peak. The judge found that the NSF's decision to restart the Environmental Assessment and Historical Preservation consultation process from the beginning satisfied the Nation's claim sufficiently, and that a declaratory judgment was not warranted. He then went on to state:

> *This Court notes that this entire litigation could have likely been prevented had Plaintiff [the TO Nation] exercised a modicum of diligence from the outset. Defendants repeatedly reached out to Plaintiff's leadership as part of Defendants' original NEPA and NHPA review process.*
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> * * *
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> *Plaintiff's obstinate refusal to respond to Defendants' repeated overtures is, frankly, inexplicable. Indeed, this Court is hard-pressed to conceive of a more egregious example of a party sitting on its rights. As such, it would behoove Plaintiff to be more actively involved in Defendants' de novo NEPA and NHPA review. If Plaintiff continues to be as dilatory as it has been in the past, it may find that any future efforts to challenge the VERITAS project barred by laches.*
>
> *Accordingly, IT IS ORDERED that Defendants' Motion to Dismiss is GRANTED and Plaintiff's lawsuit is dismissed without prejudice.*

The Nation may choose to appeal, but the judge's opinion on the merits of the case is very clear. The VERITAS Project is now going through the formal consultation process, which must be successfully concluded for a restart of work on the mountain.

We are very appreciative of the skilled defense presented by the NSF's General Counsel's Office and the Department of Justice. It is also gratifying that the Court recognized our good faith efforts to engage the Nation from the beginning. We will now work for resumption of a more normal two-way dialogue in resolving issues of mutual concern between KPNO and the Tohono O'odham Nation.

SQIID to Be Retired After Semester 2006A

Buell Jannuzi

The anticipated arrival of the new wide-field infrared imager NEWFIRM next year (see companion articles in this *Newsletter*), as well as our need to limit operations costs by constraining the total number of instruments we support, has led to the decision to remove SQIID from the list of available instruments starting with observing semester 2006B. If for some reason NEWFIRM is not available for general proposals in 2006B, we will consider scheduling SQIID in 2006B.

Retiring SQIID has been our stated plan since the development of NEWFIRM began (e.g., NOAO Long-Range Plan from 2001). NEWFIRM will be able to pursue nearly all types of observations previously undertaken with SQIID, with the notable exception of simultaneous multiband observations. SQIID was initially deployed as a wide-field-of-view instrument on the KPNO 1.3-meter telescope. It has since been used extensively at the Mayall 4-meter and KPNO 2.1-meter telescopes, studying a wide range of topics from asteroids, to star-forming regions, to distant galaxies.

We thank those that built, upgraded, and supported this successful instrument over its long and valuable lifetime. In particular, we acknowledge Mike Merrill, Al Fowler, Dick Joyce, Ron Probst, Nick Buchholz, Paul Schmidt, Duane Miller, Steve Rath, Andy Peters, and Rich Lund.

Planning for NEWFIRM Scientific Verification Observations in 2006A

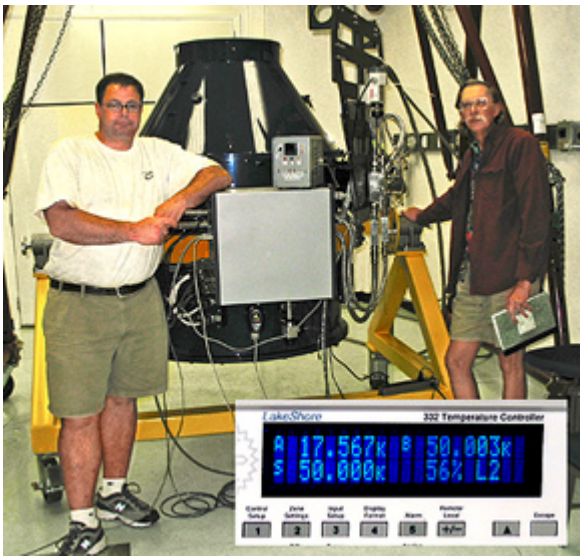
Ron Probst & Buell Jannuzi

The wide-field infrared array camera NEWFIRM is expected to arrive at the Mayall 4-meter telescope for first light early in 2006. We are now planning initial science observations to begin once engineering functionality is demonstrated. As of early August, the instrument had just gone through cold test in the lab, some of the optics were not yet delivered, and we were still producing and evaluating infrared arrays in a foundry run. Thus, it would be premature to schedule NEWFIRM for full public access in 2006A. However, we anticipate a need for science-driven usage in the latter part of this semester. This usage would be for such purposes as identifying and pursuing subtle performance issues, optimizing operating protocols, and finalizing automated data reduction pipelines. We will also need to systematically characterize performance of all the operating modes .

Our approach is to define and carry out a program of science verification (SV) observations, using approximately three to five weeks of 4-meter time in two blocks, likely to be scheduled in May and June 2006. These will be scientifically motivated investigations intended to produce new and interesting results, with perhaps some follow-on utility for data mining. The scale of the observing efforts will range from Principal Investigator-style, two or three night runs with very specific objectives, to possibly a mini-survey with multiple, perhaps exploratory, ends. These data sets will have no proprietary period. They will flow from pipeline reduction directly to a publicly accessible archive.

Ideas for science verification projects have been solicited from NEWFIRM's Science Advisory Group and from project scientific staff. Collectively, this group represents a wide range of scientific interests. Brief preliminary proposals are posted on the NEWFIRM project Web site, *www.noao.edu/ets/newfirm* (click on the link to Science Verification). These scientific ideas must now be fleshed out into real observing proposals, mapped onto operational modes to be sure all modes are exercised, and trimmed to fit the time allocation.

At this time, we are soliciting comments to improve the science value and to help craft these ideas into executable projects. Individual project initiators will carry out the observations, with the possibility of external collaboration. It is vital that the resulting data be rapidly reduced and critically examined in order to provide performance characterization input for the 2006B and 2007A proposal opportunities.



NEWFIRM during first cooldown, with Engineering Associate Ron George (left) and Project Scientist Ron Probst (right). INSET: Coldest temperatures achieved for the array mount (17 K) and the optical bench (50 K).

Parallel reductions with other pipelines or toolkits will be an important part of the validation of NEWFIRM methodologies. Serious offers of assistance with the observation, reduction, and comparative analysis of results will be entertained. While the data will have no proprietary period, hands-on participants can expect some advantage of timeliness.

We plan to have specific projects and their associated science verification teams identified by 1 December 2005. This selection may still over-fill the time allocation. There will be a final review of the science verification plan, after the first light engineering runs with NEWFIRM, in February or March 2006. We expect to carry out the bulk of SV observations in May-June 2006. The project will work with the Science Advisory Group throughout this process to insure that both scientific and technical ends are optimally met.

Comments on the proposed science and its execution, and expressions of interest in participation, may be directed to *rprobst@noao.edu* or *bjannuzi@noao.edu*. Your input may be shared with the Science Advisory Group and internal project participants as we finalize this program.

NEWFIRM: A Look into the Future

Ron Probst, Todd Boroson & Buell Jannuzi

As explained in the previous article, NEWFIRM will see first scientific use in Semester 2006A with a program of science verification observations. This program is intended to produce interesting new scientific results and publicly accessible data sets. However, this initial science verification program will be conducted outside of the normal proposal process.

Contingent on the successful commissioning of the instrument in 2006A, we anticipate that NEWFIRM will be available as a facility instrument for general proposals starting in 2006B. Instrument performance information available before the March 2006 proposal due date will be limited. More complete characterization is one purpose of the science verification program. There will also be some element of "shared risk" in using the instrument system for the 2006B semester, in terms of available filters beyond the J H K_s set and in the performance of the automated reduction pipeline.

The NEWFIRM system is being optimized for large-scale survey science. This is responsive to community needs as identified in several workshops on the US system of facilities and support needs for 6– to 10-meter telescopes. To maintain this objective through the proposal process, we expect to announce the next call for NOAO Survey proposals in 2006, with selected programs beginning observations in the 2007A semester. Under this tentative schedule, the Survey proposal deadline would be in September 2006. The call will be for all instruments and telescopes normally available for Survey proposals, not just NEWFIRM.

Finally, usage in both hemispheres has been a core component of the NEWFIRM concept. NEWFIRM will move between the Mayall 4-meter and the Blanco 4-meter telescopes in the years ahead. Move schedules and time frames are topics of ongoing programmatic discussion within NOAO, with our external advisory and oversight committees, and with the members of our user community.

Stay tuned to the *NOAO-NSO Newsletter*, the NOAO Web site, and the NEWFIRM Project Web site, *www.noao.edu/ets/newfirm*, to keep informed on further developments as this exciting new capability comes into service at NOAO.

IRMOS — Current Status and Opportunity for Shared-Risk Observing

John MacKenty (STScI), Richard Green, Buell Jannuzi & Dick Joyce

The Infrared Multi-Object Spectrometer (IRMOS) is an innovative near-infrared instrument employing an array of MEMS micromirrors for focal plane target selection. IRMOS is a joint project of the Space Telescope Science Institute, the NASA James Webb Space Telescope project and Goddard Space Flight Center, and Kitt Peak National Observatory. We are pleased to announce the availability of the instrument at the Kitt Peak Mayall 4-meter telescope for a portion of the 2006A semester (one lunation in either April or May) on a shared-risk basis.

IRMOS uses a Texas Instruments 848×600 element Digital Micromirror Device (DMD) as a focal plane mask to synthesize slits within a 3×2-arcmin field of view. It provides R~300, 1,000, and 3,000 spectroscopy in the J, H, and K bands plus R~1000 in Z, together with imaging in all bands. On the 4-meter, the image scale is 0.2-arcsec per detector pixel or micromirror element. The instrument spectral resolutions are stated for three mirror-wide (0.6-arcsec) slits (see table), but slits of arbitrary width are allowed. Generally, the image quality is limited to approximately 3 pixels FWHM by the internal optics, with the point spread function of a micromirror being about two detector pixels FWHM.

We have completed five commissioning runs that have validated the basic functions of the instrument and supported continuing software development. At present, software development for basic instrument operation is complete. Mechanisms, detector, and DMD operation via a graphical user interface is well-tested and stable. The thermal operation and monitoring of IRMOS is also mature and mainly transitioned to support by the KPNO staff. Images are provided in FITS format with fairly extensive headers documenting the state of the instrument at the time of the observation.

Future software development is now focused on three aspects: (1) improved tools for slit (micromirror) selection, (2) automation of sequences of operations (scripting), and (3) communication with the telescope control system computer (to first incorporate telescope data into the image headers and

continued

IRMOS—Current Status continued

then to allow IRMOS to command small telescope offsets). These functions should be available by spring 2006. Beyond these, development of a data reduction pipeline and related tools are planned. However, for the 2006A semester, observers will need to handle their own data reduction. Except for the additional step of sky subtraction, existing IRAF multislit reduction routines should be suitable for IRMOS data.

IRMOS will support two primary target definition modes: direct slit positioning and "point-and-click" slit positioning. In the former, the observer defines rectangular regions within the 848×600 element field using either a spreadsheet or GUI interface. Individual slits may be edited and mask patterns saved. Distortion maps for the DMD to Detector and Sky to Detector will be available in November 2005. For programs where the targets are visible in reasonably short exposures (IRMOS can see magnitude 17–18 point sources in J or H in <300 seconds), "point-and-click" mode may be preferred. In this mode, the observer can interactively select slits by clicking with the IRMOS control computer mouse on an image acquired immediately prior to obtaining the spectra. We have also been experimenting with an integral field mode using Hadamard transforms. Some limited software support to generate Hadamard masks and obtain these observations now exists, but data reduction software is still in the experimental stage. This enables full integral field spectroscopy over all (or part) of the IRMOS field of view, with a 2.5×1 arcmin field of view representing a realistic program.

Band Filters	Z(0.85–1.15)	J (1.13–1.35)	H(1.437–1.80)	K(1.947–2.50)
Sub-Band Filters		J1(1.13–1.236) J2(1.235–1.35)	H1(1.437–1.609) H2 (1.608–1.80)	K1(1.947–2.207) K2 (2.206–2.50)
Low Dispersion		188	246	327
Medium Dispersion	1063	1035	1047	1183
High Dispersion		3145 3456	2631 2992	3315 3090

IRMOS Filters and Gratings

Our analysis of IRMOS performance is ongoing. Our imaging backgrounds appear comparable to those reported by FLAMINGOS (in April 2005, IRMOS observed on the 2.1-meter: J=14.8, H=13.5, K=12.0 magnitudes per square arcsec in the CIT/CTIO system). The contrast of the DMD is proving somewhat difficult to quantify but exceeds 100, and may be several hundred. Generally, spectroscopy appears limited by the flux through the "slit" with some diffuse contribution.

Detailed values will be posted to the NOAO proposal Web site in September to aid proposers. However, the general advice is that IRMOS is not yet tested on faint targets, and is probably best used on relatively bright sources and where its multiplex capabilities are most useful. While capable of taking images, IRMOS is not intended as an imaging instrument, and the photometric precision with the DMD is presently unknown.

More details regarding the IRMOS instrument may be found in MacKenty et al., *SPIE* 5492, 1105 (2004).

Advantages to KPNO observers using IRMOS (as compared to FLAMINGOS) are opportunities to obtain spectra with R=3000, create nonrectilinear slit patterns for continuous spatial coverage of nebular features, obtain higher-density coverage of crowded fields with the eventual option of "nodding" a pattern of relatively short slits, and, to experiment with data cube reconstruction through sparse sampling with the Hadamard transform technique. In support of initial programs to gain experience with IRMOS data, the instrument will be scheduled for shared-risk observing on the 4-meter telescope for one lunation in April or May in semester 2006A. The KPNO instrument scientist is Dick Joyce; the principal investigator (John MacKenty) will be actively involved in providing technical information and supporting the inaugural observing runs.

Exabyte Decommissioning

John Glaspey & Buell Jannuzi

Advances in both data storage techniques and data transfer bandwidth have led to the decision to decommission the Exabyte tape drives at the KPNO telescopes. These are seldom used by observers and are becoming difficult and expensive to maintain and repair. Effective at the start of semester 2006A, 1 February 2006, only DAT and DLT tape drives, along with DVD and CD-ROM writers will be available for the 4-meter, WIYN, and 2.1-meter telescopes. We will try to simplify the process of writing data onto whichever media observers choose. Observers are asked to bring blank tapes or disks, but in case of need, some supplies will be available for purchase at the Admin building.