The Maryland-NOAO Instrument Partnership (2003-2009)

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Seven years ago, with the encouragement of the NSF and AURA, NOAO requested proposals from the community to partner with the national observatory to improve instrumentation and/or telescope capabilities at KPNO and CTIO. Of the proposals that were selected, one came from the University of Maryland with the goals of helping NOAO complete the development, construction, and deployment of a new, wide-field, near-IR imager (NEWFIRM) and of working with NOAO to develop data reduction pipelines and data archiving capabilities at NOAO.

By all measures, the Maryland-NOAO instrument partnership has been a resounding success. NOAO and the astronomical community have benefited from the use of Maryland resources and staff to support the development of NEWFIRM; the One Degree Imager (ODI), an innovative, wide-field optical imager; and the NOAO Science Archive (NSA). University of Maryland funds also were used to help support NOAOs share of the costs of constructing ODI for WIYN. The University of Maryland procured key hardware components for NEWFIRM and acquired a suite of narrowband filters that were not affordable in the baseline budget. Maryland personnel Rob Swaters, Tracy Huard, and Brian Thomas became fully integrated into the NOAO pipeline and NSA development teams. Their participation made the critical difference for meeting the delivery schedule of the quick-reduce pipeline with the commissioning of NEWFIRM. They helped with, and often led, the design, implementation, and testing of several aspects of the NOAO High-Performance Pipeline System (NHPPS) and the NSA.

The NHPPS, now in routine operation, is used to process data obtained with Mosaic and NEWFIRM on the 4-meter telescopes at KPNO and CTIO. The data processing carried out by NHPPS consists of two components: a Quick-Reduce Pipeline that reduces data in near real time at the telescope and a Science Pipeline that provides in-depth data reduction at the end of an observing block. Examples of NEWFIRM data processed by NHPPS were discussed in the December 2008 NOAO/NSO Newsletter (#96, pp. 1 and 2122; Gutermuth & Dickinson).
From the point of view of Maryland, this partnership has had a direct, positive impact on the quantity and quality of the science produced by members of the Department of Astronomy. It allowed Maryland astronomers and students to (1) explore new avenues of research including high-reward projects that would perhaps have been considered too risky by a national Time Allocation Committee, (2) quickly respond to new discoveries and targets of opportunity, and (3) undertake large thesis and non-thesis surveys with a guarantee of telescope time.

Under this partnership, 11 professorial faculty, 11 research faculty (i.e., post-docs and research scientists), 16 graduate students (including 13 PhD theses), and 3 undergraduate students from Maryland used the KPNO facilities. Thirteen papers directly involving KPNO data have been published so far under this partnership (11 of these papers have Maryland graduate students as first authors); many more are in preparation. A necessarily incomplete list of scientific highlights includes the successful monitoring of comet Tempel 1 between February and July 2005 in support of the Deep Impact mission (M. AHearn, PI), an extension of the “Cores to Disks” Spitzer Legacy Program to shorter, near-infrared wavelengths (S. Chapman, PhD thesis; L. Mundy, advisor), a study of the density profiles of the dark matter halos in low-surface brightness galaxies and low-mass dwarf galaxies (R. Kuzio de Naray, PhD thesis; S. McGaugh, advisor), and a spectroscopic survey for superwinds in massive starbursts (D. Rupke, PhD thesis; S. Veilleux, advisor).

The Maryland-NOAO partnership also has had a direct positive impact on the technical capability of Maryland’s Department of Astronomy. It helped strengthen the Department’s software expertise in the areas of optical and near-infrared data reduction and archiving, complementing the already strong software group at millimeter wavelengths associated with the Combined Array for Research in Millimeter-wave Astronomy (CARMA) collaboration. The lead role assumed by the Maryland personnel in the development of NHPPS and NSA helped create an in-house resource group with the highest level of expertise capable of advising Maryland users and collaborators, as well as members of the astronomical community-at-large, on all aspects of the analysis of Mosaic and NEWFIRM data. It also helped position the Maryland software group for similar projects at national or private observatories in the future.

The Maryland-NOAO partnership increased the visibility of the Department within the College and the University. It was branded by the administration as an excellent example of successful collaboration between a University and a national laboratory. No doubt it will be regarded as a model to follow in future partnerships in which the University of Maryland becomes engaged. For KPNO, the partnership helped keep the Mayall a competitive, modern facility by helping to ensure the arrival of NEWFIRM. Maryland’s critical involvement in the
development of the first “real-time” pipelines in use for our instruments has helped continue the development of the modern science capabilities of KPNO. Finally, the returning users of our facilities from Maryland provided valuable, close ties to a segment of our user community and valuable feedback and suggestions from experienced users of our facility. If and when we enter into new partnerships, we will endeavor to repeat the success of the Maryland-NOAO partnership.
Fig. 1.— Participants and instructors of the 2007 Kitt Peak Summer School.
Fig. 2.— Maryland graduate student Rachel Kuzio de Naray (foreground) in the Mayall 4-meter control room.