

The NOAO Data Lab at the AAS Meeting

Pat Norris



Figure 1: Data Lab team member Ken Mighell discusses the project with students visiting the booth. (Image credit: Pat Norris/NOAO/AURA/NSF.)



Figure 2: Jim Ulvestad, NSF Division Director for Astronomical Sciences, is shown Data Lab tools by Project Scientist Knut Olsen. (Image credit: Pat Norris/NOAO/AURA/NSF.)

The Data Lab team successfully met the milestone of demonstrating proof-of-concept tools at the 228th meeting of the AAS in San Diego, CA. The team showed off their hard work with a display that highlighted the Big Data mission at NOAO.

The booth had Data Lab demos displayed on an iMac and on a larger display. A movie of the build-up of NOAO's optical image holdings over time was displayed when demos were not being presented. The movie showed the primary motivation for building the Data Lab: whereas a decade ago, NOAO's archived images amounted to a sprinkling of data over a small fraction of the sky, today they cover nearly the entire sky. The Data Lab aims to provide infrastructure to allow the community to efficiently explore these enormous data holdings.

Members of the team were available to answer questions and discuss the flexibility of the Data Lab approach (Figure 1). The team members demonstrated the new Data Discovery tool, an image access service, interactive data tools, and an array of examples written as iPython notebooks.

Links to these tools are available on the Data Lab web page (<http://datalab.noao.edu>).

The booth attracted a diverse group. Attendees were interested in the new technologies and concepts behind the Data Lab. Some of the more experienced folks brought questions about how their legacy tools could be accommodated. The Data Lab team was pleased to have the opportunity to present to teams from other institutions and to several NSF staff, including Jim Ulvestad, Pat Knezek, and Ed Ajhar (Figure 2). All questions were duly noted for consideration in future Data Lab development, as the entire meeting represented an important opportunity for feedback from community members.

With the planned public release in summer 2017 now less than a year away, the Data Lab team was pleased to have successfully exhibited proof-of-concept versions of multiple tools. Overall, the Data Lab generated a great deal of interest, leaving team members looking forward to a busy schedule to meet expectations with the planned public release.

The 2016 TMT Science Forum in Kyoto

Mark Dickinson

This year's Thirty Meter Telescope (TMT) Science Forum took place May 24–26 in Kyoto, Japan, the first time this annual event has been hosted outside the United States. The Asian venue was highly relevant to this year's meeting theme: International Partnership for Global Astronomy. Astronomical research programs and observatories are now often international efforts, as the worldwide scientific community combines its intellectual and financial resources to accomplish increasingly complex and costly projects. The TMT International Observatory (TIO) unites astronomers in Canada, China, India, Japan, and the United States to build and operate a telescope whose sensitivity and angular resolution will enable ground-breaking discoveries in nearly every aspect of astronomy and astrophysics. This year's meeting stressed

the ways in which TMT's partners are working together to plan TMT's future science programs, its instrumentation and AO capabilities, and the observatory operations.

Future-generation instrumentation was a special focus at the Kyoto meeting. TMT plans three early-light instruments: a diffraction-limited Infrared Imaging Spectrometer (IRIS), a seeing-limited Wide Field Optical Spectrometer (WFOS), and an AO-assisted Infrared Multi-object Spectrometer (IRMS). The Forum featured plenary talks covering a wide range of possible future instruments, including near-infrared and optical high-resolution spectrographs, thermal-infrared instrumentation, extreme high-contrast imagers and spectrometers, and wide-field, AO-

continued



The 2016 TMT Science Forum in Kyoto continued



Participants at the TMT Science Forum, 2016 May 24–26, Kyoto, Japan. (Image credit: Fumihide Iwamuro/Kyoto University.)

assisted, near-infrared spectrographs using multiple deployable integral field units. A full day was devoted to parallel sessions: morning breakout sessions organized by science theme, where participants discussed ambitious science programs and the instrumentation they would need to accomplish them, followed by afternoon breakout sessions organized by classes of instrument capabilities. A final session gathered everyone together to summarize these discussions. These Forum sessions serve as input to the TMT Science Advisory Committee, which will continue to discuss and synthesize the TMT community's priorities before a call for competitive instrument design studies, anticipated in 2017.

The Kyoto Forum featured talks by astronomers from all of the TIO international partners, who examined TMT's capabilities to advance research on the solar system, exoplanets, star and planet formation, stellar and interstellar medium chemical evolution, close binary stars, gravitational wave sources, supernovae, supermassive black holes, and the formation and evolution of galaxies. There were discussions of cross-partnership coordination for TMT key project science and for observatory operations. Gordon Squires (TMT) and Lisa Hunter (director, Akamai Work-

force Initiative) presented TMT's ongoing development of international programs for education, public outreach, and workforce training. Subaru Telescope director Nobuo Arimoto discussed international collaboration for astronomy in Asia and the future evolution of Subaru's instrumentation and operations plans as Japan moves into the era of TMT.

Although TMT's first light is still a decade away, the high level of enthusiasm among the Kyoto Forum participants demonstrated the many ways in which the members of TMT's international consortium are working together toward an era of new science with giant telescopes. As part of its cooperative agreement to develop a model for possible US national participation in TMT, the National Science Foundation (NSF) supported travel to Kyoto for 29 US scientists from the US-at-large community, many of whom gave invited or contributed talks or participated in the science and instrumentation discussions as members of TMT's International Science Development Teams. AURA is an Associate Member of TMT International Observatory on behalf of the US national astronomical community, and NOAO and the US TMT Science Working Group represent the US community's interests in TMT to both the project and to the NSF.



For more information:

2016 TMT Science Forum online presentations and videos:
<https://conference.ipac.caltech.edu/tmfs2016/>

NOAO's TMT Liaison office:
<http://ast.nao.edu/system/us-tmt-liaison>



TMT Site Update

TMT construction remains on hold pending a new contested case hearing and vote by the Board of Land and Natural Resources in Hawai'i. A hearing officer has been selected for the contested case and the process is moving forward. The governing board of the TMT International Observatory has stated that Maunakea remains the preferred site for TMT. At the same time, the TMT project is evaluating alternate sites in both hemispheres where TMT could be built if there is no clear path to restarting construction in Hawai'i by 2018. Sites in Chile, China, India, Mexico, and Spain are under consideration. Concurrent with the site activities, work continues on all aspects of the TMT observatory in the partner countries.