

# CTIO/CERRO TOLOLO

INTER - AMERICAN OBSERVATORY

## From the CTIO Director's Office

Malcolm G. Smith

Activity in La Serena in support of site-survey work in Northern Chile for the Giant Segmented Mirror Telescope (GSMT) and other large telescopes has now begun to involve visits to potential sites and communications with the pertinent Chilean authorities.

Construction work has begun on a stretch of basic road in support of site testing work on "El Peñón"—a possible site for the Large Synoptic Survey Telescope (LSST) a few hundred meters from the Gemini South building, in the opposite direction from the Southern Astrophysical Research Telescope (SOAR).

The Municipality of La Serena has put out a Call for Bids to change out its 13,000 street lamps for ones that comply with the "Norma Luminica" DS686—the Chilean national legislation that demands essentially "astronomy friendly" lighting in the 2nd (Paranal/VLT), 3rd (Las Campanas/Magellan), and 4th (La Silla/ESO, Pachón/

Gemini South/SOAR, Tololo/NOAO South) regions of Chile. The bids are to include maintenance of this lighting system, which ensures that better quality lamps (IP65)—that exclude dust and insects—will almost certainly be used.

This would seem to be the most visible step yet in actually controlling the spread of light pollution near international observatories in Chile. Under this legislation, compliance is required by no later than 2005. However, a significant concern is that the bid seems to allow the use of polycarbonate transparent covers instead of glass. Though initially cheaper, these covers lose transmission quite quickly over time. In the short term, the current legislation may seem good for our observatory, but it does no good if the end result is a series of complaints about poor street illumination. An information campaign has been launched to try to address this issue before the bid process is completed.

The photo here shows the current status of compliance in La Serena with sections of the Norma Luminica that require illuminated signs to be switched off after 2 A.M.

Fortunately, the sky over Cerros Pachón and Tololo is still sufficiently dark that movies have been made from Tololo of the setting zodiacal light near the major, coastal population centers low in the west.

Interest is beginning to emerge in the community for the development of even wider-field instrumentation for the Blanco 4-meter telescope. Such development will be a natural next step following the stabilization of telescope operations at SOAR (see the related articles elsewhere in this *Newsletter*). Reports will be given in future issues of the *Newsletter* as details become clearer.

The SMARTS consortium is settling into the operation of its three telescopes on Cerro Tololo and is pressing for additional partners to allow the fourth SMARTS telescope to come into operation for the consortium partners (which include NOAO's users).

The Michigan Curtis Schmidt telescope has now come back into full operation under a NASA grant to the University of Michigan to track orbital debris.

We are looking forward to the selection of the next director of CTIO, who is scheduled to take over the leadership of NOAO South on 8 November 2003. I asked to step down from the post after a satisfying decade of service to NOAO as director, and I will continue to support AURA's efforts in Chile.



The top three panels show the panoramic monitoring of 2 A.M. lighting curfew results in La Serena. The three panels across the bottom show the light pollution from legally permitted lighting for sporting events, a weakness of "Norma Luminica" DS686.



## CELT-AURA Site Testing for the Thirty-Meter Telescope

*Alistair Walker & Bob Blum*

The California Extremely Large Telescope (CELT) project and the AURA New Initiatives Office (NIO) are collaborating on a site-testing program for a 30-meter telescope. As part of this program, NIO has installed weather-stations at three sites in Northern Chile and operates a fourth with Cornell University on an additional site. These sites were selected through an evaluation process using initial topographical criteria, followed by remote sensing-based cloud and water vapor analyses, and detailed wind-flow simulations. The next step is to install a Differential Image Motion Monitor (DIMM) at each site to measure the seeing, which we are almost ready to do for the first site.

Around the end of the year, the DIMM will be replaced by a combined Multi-Aperture Scintillation Sensor (MASS) plus DIMM. The MASS produces low-resolution turbulence profiles and seeing for the free atmosphere (see [www.ctio.noao.edu/~atokovin/profiler](http://www.ctio.noao.edu/~atokovin/profiler)), and the DIMM provides the integrated seeing through the whole atmosphere. The difference between the two gives a measure of the seeing produced by the layers closest to the ground. Production MASS/DIMM units, being developed in a collaboration between NIO and the Sternberg Institute, will be installed at several sites around the world by a number of groups working on a variety of telescope projects.

The photo shows the fully robotic DIMM telescope inside its dome, mounted on a 3.5-meter tower, together with



*The DIMM telescope dome.*

solar panel arrays, satellite communications dish, and electronics box, all installed for tests on Cerro Tololo. This photo was taken just after installation in July by a team including Matthias Schoeck and Warren Skidmore (University of California at Irvine), Peter Aniol (Halfmann Teleskoptechnik GmbH), and Paul Gillett (NIO), together with Edison Bustos, Manuel Martinez, Javier Rojas, and Gale Brehmer (CTIO). After ensuring that the DIMM is operating reliably, and the results are consistent with those produced by the Tololo DIMM, the system will be moved to the first site to be tested in Northern Chile.

## SOAR Status

*Steve Heathcote & Victor Krabbendam*

As anticipated in the last *Newsletter*, figuring of the SOAR primary mirror was successfully completed at the beginning of June, and work on the integration and final testing of the entire optical system is now well advanced at the Danbury, CT, plant of contractor Goodrich Aerospace. The results obtained to date confirm that the optical system performs as expected and will meet SOAR's very exacting specifications. Progress continues on track for delivery of the completed optical system to Chile by the end of September.

At the same time, another key component of the SOAR optical system, the calibration wave front sensor, was put through its paces on the telescope. Developed by Adaptive Optics Associates of Boston, MA, this device includes a Shack-Hartman type sensor to measure the distortions in the wave front delivered by the telescope optics to the focal plane. This measurement enables calculated adjustments to the 120 primary mirror actuators, and the position and tilt of the secondary mirror, necessary to produce the sharpest possible images. In order to test this system in advance of the

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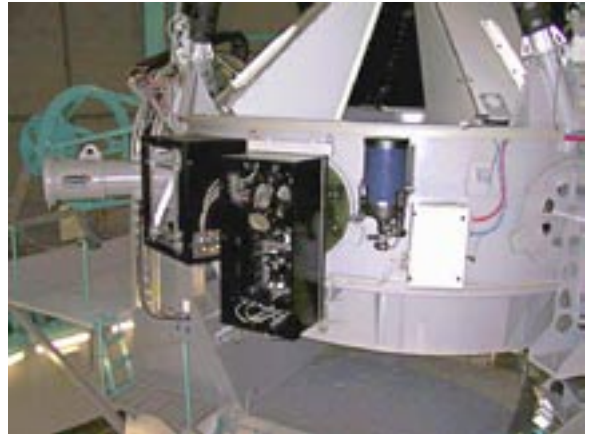


*SOAR Status continued*

arrival of the real SOAR optics, an auxiliary telescope with a six-inch diameter objective lens was used to feed starlight to the Calibration Wave-Front Sensor (CWFS). This same feed telescope will be used in the coming weeks to feed light to the first SOAR instrument, the Optical Imager, which is nearing completion at CTIO.



*In a tense but well-orchestrated maneuver, the SOAR primary mirror is carefully installed on its active support system for the first time. Here it is possible to appreciate the thinness (10 centimeters) of the 4.3-meter diameter ULE glass face sheet. The 120 electromechanical actuators attached to the blue reaction structure maintain the correct surface figure as the telescope points around the sky.*



*The Calibration Wave-Front Sensor with its associated electronics (the two black boxes) mounted at one of the bent Cassegrain foci of the SOAR telescope. The gray cylinder in the background is a mass simulator that soon will be replaced by the SOAR Optical Imager.*

These activities allow us to ensure that all the hardware and software components of the telescope, as well as the first light instrumentation package, are functioning properly, and that everything is ready for installation of the optics as soon as they arrive. As a result, we expect that the final integration steps will go smoothly and quickly, allowing us to achieve SOAR first light around the turn of the year and to be ready for the first shared-risk science use during the second part of the 2004A semester.

## Developments at “El Peñón” and Cerro Pachón

*Hugo E. Schwarz*

“El Peñón,” a potential site for the Large Synoptic Survey Telescope (LSST) near Gemini South, has been equipped with a meteorological station that sends its data to Tololo by radio modem. The station is fully independent, and runs off solar power. We have added a Doppler wind meter to test this type of instrument under realistic conditions. In recognition of the site’s probable high quality, funds have been made available for putting in a road to the top of El Peñón, allowing us to develop the site further with a seeing and turbulence monitor (MASS/DIMM) and possible other instrumentation to best determine the characteristics of the site. Work on the road started in late July, and we hope to have the El Peñón real-time weather data available on the Web soon.

Work has begun on both PASCA and CASCA, the Pachón and Las Campanas mountain equivalents of the Tololo all-Sky Camera (TASCA). PASCA will be located about 115 meters from SOAR on the Gemini side of the road. A collaboration has begun with Gemini to further develop and test the aircraft detection and beam-collision avoidance software needed for the operation of sodium lasers on Cerro Pachón. For more information, contact [hschwarz@noao.edu](mailto:hschwarz@noao.edu) or [jsebag@gemini.edu](mailto:jsebag@gemini.edu).