This quarter was marked by transition. As I settle into the “big chair” that John Leibacher so ably filled for more than 20 years, my main impression is that the GONG program is vigorous, successful, and extremely busy. Many thanks to John for his superb leadership in building GONG to its present state, and we wish him well on his return to scientific research. Many thanks also to the entire GONG staff for their dedication and hard work in keeping the network running, reducing the data, and doing science.

By the time you read this, I will have interviewed every member of the staff to gather input on the program and help me formulate decisions on possible organizational changes. These will be outlined in the next NOAO/NSO Newsletter.

In October, GONG marked its 10th birthday dating from the completion of deployment and the start of routine operations. Many past GONGsters were able to join us for a celebration. Bill Marquette, now retired, was presented with the GONG HOG (Hero of GONG) award for his 20 years of service operating the GONG site at Big Bear Solar Observatory.

Network Operations

After the troubles experienced in the previous quarter, we were reluctant to pursue a standard preventative maintenance (PM) schedule, since it was possible that the changes and upgrades we have been employing were actually causing problems with the instrument. We therefore redirected our efforts more toward testing and certifying the modifications before deploying them to the sites. This strategy paid off promptly with the discovery that the turret to be deployed to Udaipur was “leaky” despite the modification designed to make it more resistant to moisture intrusion. We also acquired cabling designed to withstand repeated flexure to replace the camera power cable bundle at most of the sites. This replacement, along with improved strain relief between the cable and connectors, is expected to decrease the likelihood of failure of these parts. A second reason for a disrupted PM schedule was the unexpected departure of Candido Pinto, who accepted an optics position in the private sector.

Despite multiple visits to the Mauna Loa site, the symptom of the instrument control computer hanging and rebooting persisted. The camera’s cooling fan was also beginning to fail. With remote troubleshooting providing limited progress, and the need for a camera replacement looming, a third trip to Mauna Loa took place. For this visit, the team brought along monitoring instruments, but as Murphy’s Law would dictate, the instrument experienced no further unwarranted reboots. Faced with this circumstance, it was proposed that some software bug might be involved such that when cycling power to the instrument, the system is reset, and only after some period of normal operation will the problem arise again. With the allotted time drawing to a close, the team changed cameras, replaced the camera power cable bundle with the new flex cable version, and downgraded the software to an earlier version. Since the team’s departure, no further reboots have occurred. So what, if anything, fixed the problem?

In addition to Mauna Loa, the Udaipur, Learmonth and Big Bear sites have also experienced rebooting associated with unstowing the instrument, operating the calibration sequence, and collecting drift scans. The behavior at Udaipur appears to be consistent with an intermittent camera cable and excessive noise on the camera control lines generated by the camera rotator. With Udaipur shut down for the monsoon weather, remote troubleshooting is again difficult. The post-monsoon PM to Udaipur, occurring after the deadline for this Newsletter issue, should resolve the issue. Learmonth was
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consistently rebooting after the calibration sequence, so we asked site staff to power cycle the instrument to test the faulty software idea. There have been no further reboots, but the reboots actually stopped two days before the power cycle took place. Big Bear has recently been rebooting consistently after unstows and calibrations. A team visited the site to replace only the camera power cable with the new flex version and results of this remain to be determined.

Engineering and Upgrades

Two new shelters have been delivered and transformed from mere shipping containers to homes for a GONG instrument. One of these shelters will be sent to Learmonth to replace the unit that is rusting on the beach. Additional measures to retard this process have been incorporated in the replacement shelter, so we anticipate it lasting for two solar cycles this time. The swap will take place in May 2006; this time frame minimizes the impact on the overall performance of the network.

The other shelter will be filled with a new instrument and will reside at the Tucson farm as our hot spare station. This strategy provides insurance against catastrophic loss of a site, reducing the down time from two to three years to about six months. Since the production and integration of a complete instrument system is a big job, we have secured temporary help from the engineering department of NOAO to reduce the impact on the network operations staff. With this boost in resources, most of the production will be done this fiscal year.

The project to upgrade the magnetograph modulators and associated circuitry is continuing. The basic hardware operations mode is complete, and work is progressing on the software portion of the design. The new modulators, which include a heater and require a thermal controller, have been characterized in the lab. Work is beginning on incorporating the thermal controllers into the optical table layout, and a modified enclosure needed to house the new modulator controller has been fabricated. Testing of the final design will culminate with a prototype design review at the end of November. Production of the field units should be well underway by the end of the year, and deployment of the new modulators to all the sites should be accomplished before the launch of the STEREO mission in April 2006.

Data Processing and Analysis

GONG's Reduction and Analysis Software Package (GRASP), developed 15 years ago in parallel with the instrument, is a set of algorithms designed for analyzing helioseismic data. It is intrinsically linked to IRAF and is supported by GONG. A new GRASP distribution has been installed, which incorporates a new improved module that determines the angular orientation of the images using frequent noon drift scans from around the network (CoPipe II), as well as the Automated Image Rejection (AIR) modules, and improvements to the calibration procedure.

Following the recommendation of the Data Management and Analysis Center (DMAC) Users’ Committee (DUC), this will be the last monolithic GRASP release; from now on we will be releasing individual modules under CVS version control so that algorithm improvements can be incorporated into the pipeline more rapidly. GONG will support GRASP for two more years.

GONG is continuously computing farside maps of the Sun. Each map uses a 24-hour period, updated every twelve hours, of near-real-time images sent to Tucson from GONG’s six network sites. See the “Science Highlights” section of this Newsletter.

In anticipation of the modulator upgrade, work is beginning on a magnetogram processing pipeline. Richard Clark is dusting
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off his earlier zero-point correction code, so that we can process all of the data on hand. Cliff Toner and Harry Jones are working on a histogram equalization scheme to merge the magnetograms.

Two new data products have been added to the suite of “official” GONG products: merged velocity images and ring diagrams are available on the GONG ftp site. The data processing to date includes month-long (36-day) velocity time series, and power spectra for GONG Month 98 (centered at 14 December 2004), with a fill factor of 0.93; 108-day Mode Frequency Tables are now available for Month 97; and, Ring Diagrams are available through Month 98. The calibration backlog is at 699 site days. The data distribution system provided 464 Gigabytes in response to 23 data requests.

Comings and Goings
In late August, Thomas Wentzel joined the data processing group as a Scientific Programmer, and in late September, we welcomed Michael Soukup as our new Instrument Specialist.

Alex (Sasha) Serebryanskiy completed his one-year NATO fellowship and has returned to Uzbekistan. Gordon Petrie, from the High Altitude Observatory in Boulder, Colorado, joined the GONG analysis team at the end of October. Gordon is a NASA/National Research Council fellow, and will work with Jack Harvey to calibrate GONG magnetograms and support the STEREO mission science.

Sergey Ustyugov from the Keldysch Institute of Applied Mathematics in Russia visited GONG, working with Rudi Komm for two weeks on an analysis of numerical simulations of the outer convection zone.

GONG enjoyed hosting three summer students this year. Amel Zaatri, a graduate SRA from CRAAG in Algiers and the Observatoire de la Côte d’Azur (Nice), worked with Irene González Hernández and Rudi Komm on flows from ring diagrams; Douglas Mason, a Research Experiences for Undergraduates (REU) student from University of Southern California, worked with Rudi et al., on the relationship between flares, magnetic fields, and subsurface vorticity; and, Paul Anzel, an REU student from Rice University, worked with Frank Hill and K. S. Balasubramaniam at Sac Peak, applying ring diagram analysis to H-alpha intensity images from the Improved Solar Observing Optical Newtwork (ISOON) in order to develop a method of measuring filament properties from 3-D power spectra.

Notable Quotes

Cosmology in the Nude?

“As you get older, you realize that you really don’t know very much. Cosmology has progressed very slowly. Mainstream cosmological theory is like the emperor who had no clothes.”

—Geoffrey Burbidge (University of California-San Diego) quoted by Keay Davidson in a San Francisco Chronicle story regarding the surprisingly mature-looking high redshift galaxy HUDF-JD2, on 10 October 2005. Burbidge, described as a “veteran foe of orthodox cosmology” in the story, is a former director of Kitt Peak National Observatory. He and his spouse, noted astronomer Margaret Burbidge, recently received the British Royal Astronomical Society’s highest award at a ceremony in London.