The Next Five Years at Gemini: Opportunities for the US Community

Verne V. Smith

The Gemini Observatory offers the US astronomical community significant amounts of time on twin 8-meter telescopes, with full-sky coverage from the two Gemini sites at Mauna Kea, Hawaii and Cerro Pachón, Chile (near La Serena). The observatory is an international partnership comprising the US, United Kingdom, Canada, Australia, Brazil, Argentina, Chile, and Hawaii. Each partner maintains a National Gemini Office (NGO), with each NGO responsible for managing that partner’s share of observing time on the Gemini telescopes. As the US NGO, the NOAO Gemini Science Center (NGSC) supports the US user community, from the preparation of Gemini observing proposals to the implementation of their approved programs on the telescopes. NGSC also offers help and answers questions about general topics, such as observational capabilities or data reduction.

Over the next five years, the US user community can expect to have access to about 40 percent of the available science observing time on each of the Gemini telescopes. Viewed in terms of aperture-area times available nights of observing, Gemini represents the largest single component of the ground-based “system” of telescopes that the US user community can access via open peer-reviewed observing proposals. Gemini is not simply a major resource, but a unique one as well: it is the only full-sky coverage 8-meter class observatory that is capable of supporting as much as 100 percent queue observing, if so requested by observers. Astronomers with Gemini programs are thus free to request queue and classical observing as they see fit, with the only restriction being that classical programs must be for one or more integer nights.

At the moment (Semester 2008A), the two Gemini telescopes each host a versatile and diverse set of instruments that include imagers and spectrographs, as well as an operational laser guide star adaptive optics (LGS AO) system at Gemini North, nicknamed Altair. The telescopes themselves were optimized to excel in the infrared (IR), particularly in the thermal-IR at wavelengths from about 5 microns out to 26 microns, and are the most sensitive ground-based systems at these thermal-IR wavelengths. The current suite of instruments includes a multi-purpose optical imager and spectrograph (with single-slit, multi-object, and IFU modes) at both sites, along with thermal-IR imaging and spectroscopy. In addition, Gemini North offers near-IR (from a wavelength of 1 to 5 microns) imaging, spectroscopy, and IFU spectroscopy, all of which can be fed by the Altair AO system. Gemini South also offers high-resolution near-IR spectroscopy.

Beyond its already powerful set of capabilities, new (and in many cases unique) observational possibilities will be coming online at the Gemini telescopes at a rapid pace, making the next five years opportunity ones for US users. Beginning in late-2008/early-2009, Gemini South will offer a near-IR coronagraphic AO imager (NICI) that is optimized for detecting faint companions near bright stars. Also in late-2008/early-2009, the newly refurbished near-IR spectrograph GNIRS will be deployed at Gemini North and provide its unique capabilities, such as cross-dispersed H- to K-band spectroscopy working behind the Altair AO system.

Looking further ahead, it is currently planned that sometime in 2009–2010, Gemini South will offer an exceptional multi-conjugate laser AO system (MCAO; recently named Canopus). The five-beam laser system will provide an AO-corrected 2-arcminute field-of-view and will feed two near-IR instruments: the Gemini South Adaptive Optics Imager (GSAOI) and the multi-object IR spectrograph FLAMINGOS-2. The deployment of Canopus, GSAOI, and FLAMINGOS-2 on Gemini South will provide the US community with an unmatched LGS-AO-capable imaging/spectroscopic system that will enable a large set of new ground-based observational projects.

The years 2011–2013 will find a Gemini Observatory fielding additional observational opportunities provided by a next generation of instruments, now in various stages of design. Currently planned for a probable 2011 deployment to Gemini South is the Gemini Planet Imager (GPI), an extreme-AO coronagraphic imager. At the same time, the Precision Radial Velocity Spectrometer (PRVS) will work from Gemini North. Looking past the next five years toward the middle of the next decade, the Gemini partners are working on a major scientific collaboration to build and deploy a Wide-Field Multi-Object Spectrograph (WFMOS). This instrument would provide an

continued
The Next Five Years at Gemini continued

unmatched combination of large numbers of targets and a wide field of view with which Gemini users could tackle an impressive array of fundamental scientific questions.

Because astronomy is such a rapidly evolving field, forecasting opportunities five years or more into the future contains some degree of uncertainty. The US community should keep in mind that the current operating agreement for Gemini ends in 2012, so the middle of the next decade may find the observatory functioning within a somewhat different operational framework. Therefore, the view from our crystal ball may not be as sharply defined for the end of the coming five-year window as it is for the next year or two. It is also important to note that any changes in Gemini operations will be influenced by input from the community.

NGSC is happy to receive input from you via email (vsmith@noao.edu). We also invite you to visit the following Web sites, which contain detailed information about observing with Gemini, its instruments and projects and all manner of observing or publication statistics.

International Gemini Observatory (www.gemini.edu)
NOAO Gemini Science Center (www.noao.edu/usgp/)
NOAO (www.noao.edu)

Verne V. Smith & Ken Hinkle

A major focus of NGSC is the output and "scientific health" of Gemini. To track this, we monitor community time pressure, the Time Allocation Committee (TAC) process, project completion rates, and refereed publications, as well as feedback from the community. Ultimately, this enhances the scientific productivity of your Gemini observing time.

We are always seeking ways to connect the user community with the Gemini Observatory and invite you to make suggestions to us at any time for other things that we might do. We will be at the upcoming January 2008 AAS meeting in Austin (see article in this section). We invite you to visit us at the NOAO booth to discuss your concerns and suggestions for increasing your Gemini-related scientific output.

Here are some of the major highlights of NGSC’s role as the gateway for the US astronomical community to the Gemini telescopes:

Community Education/Awareness

- **NOAO/NSO Newsletter.** The NGSC section of the newsletter contains articles written by staff or solicited from others about instruments, new capabilities, science verification, science campaigns, calls for proposals, and other items of interest to users. The Newsletter is available at www.noao.edu/noao/noaonews.html.
- **NGSC Web Site.** The Web site (www.noao.edu/usgp) contains links to recent news, Gemini publications, NGSC staff contact information, meetings, etc.
- **Instrument Brochures.** NGSC produces brochures on Gemini instruments, the Gemini Science Archive, and How to Propose for US Gemini Time, which are available at various meetings and by request.
- **Email announcements.** US Gemini users are sent timely announcements of calls for proposals and other special opportunities.
- **AAS Meetings.** The NGSC has a booth at the winter AAS meetings, with staff available to meet with you and answer your questions—a major part of our mission as the gateway to Gemini for US astronomers. Featured information includes guidance on how to apply for time on the Gemini telescopes, details about currently available instrument capabilities, and tips on the Phase II process, including one-on-one tutorials.
- **Major Meetings.** The NGSC funds the travel of US delegates to major meetings such as the Gemini Science Committee, Gemini Operations Working Group, Gemini science and users meetings, Gemini National Gemini Offices meetings, and the Aspen Workshop.

Technical Help

- **HelpDesk Requests.** NGSC staff respond to HelpDesk Requests from the US community at the Tier 1 level and on certain assigned topics at the Tier 2 level.
- usgemini@noao.edu. NGSC staff respond to emails directed to the contact address on our Web site.

Proposal Process Support

- **Proposal Technical Reviews.** Before the TAC meetings, NGSC staff read all proposals submitted for US Gemini time and assess their technical feasibility based on the information provided by the Principal Investigator (PI); staff then write a summary report which is made available to the TAC panel members.
- **Pre-Submission Technical Reviews.** NGSC staff will also work with PIs before they submit a proposal to review its technical feasibility.
- **Gemini ‘Awareness’ and Education.** The NGSC Director briefs the TAC panels on relevant Gemini issues, including recent developments, current instruments, completion statistics, and the Phase I Tool (PIT).
- **Technical Issues.** NGSC staff answer questions from the TACs regarding any technical issues that may arise.

continued
NGSC Works for You! continued

Phase II Support

- **Phase II Review.** Everyone granted time on the Gemini telescopes must complete a Phase II observing plan, which is a script executed at the telescope. One of the functions of the NGSC is to check all of the US Phase II submissions. This is an iterative process and often involves working together with the PI to produce several “drafts” of the plan before it is completed. Following NGSC review, each Phase II is again reviewed by Gemini staff. This may result in further interaction with NGSC staff.
- **Instrument Expertise.** The NGSC staff who review the Phase II plans also share their knowledge of the instruments with the PIs, helping them to get the best data from their program.

Observational Completion

- **Review of Projects.** NGSC tracks the number of hours requested vs. the number of proposals submitted, US success rates by instrument, program size distributions for successful proposals, and program size distributions of submitted and forwarded proposals, among others.
- **Staff Visits to Gemini Facilities.** NGSC staff visit both the Gemini North and Gemini South telescopes in order to familiarize themselves with the instruments and the queue process, and to interact with Gemini staff. For example, in 2006 NGSC logged 41 person-days at Gemini North facilities (Hilo Base Facility and Mauna Kea).
- **NOAO South and Gemini La Serena Facilities.** The close proximity of NOAO South and Gemini South facilities allows NGSC staff to interact easily with Gemini staff and quickly obtain answers to questions from the US community.

Data Reduction and Archive

- **User Support.** NGSC staff assist with data reduction and use of the archive via HelpDesk Requests.
- **Gemini Data Reduction Working Group.** This group, which is chaired by an NGSC staff member, advises the Gemini director on issues relating to tools and methods used to process the data produced by the observatory.

NGSC Contacts

- NGSC Director Verne Smith – vsmith@noao.edu
- NGSC Instrument Scientists – see www.noao.edu/usgp/noaosupport.html
- General Questions – usgemini@noao.edu
- Gemini HelpDesk – www.gemini.edu/sciops/helpdesk/helpdeskDirectIndex.html

Visit NGSC at the January 2008 AAS Meeting

Ken Hinkle

NGSC staff member Tom Matheson works with Marcel Agüeros (Columbia University) and Nicole Silvestri (University of Washington) on their Phase II preparation during the January 2007 AAS meeting in Seattle.

The NOAO Gemini Science Center will have a strong presence at the winter AAS meeting in Austin. This year we will be part of the larger NOAO booth, so look for us there in January. High-speed Internet access will be available so we can help you with Semester 2008A Phase II preparation. The majority of our staff plans to attend and will be able to answer detailed Phase II questions about all instrument and telescope combinations.

NGSC is different from the other branches of NOAO in that we seldom meet our users. Since the AAS meetings are one of the few opportunities that we have to meet you in person, please stop by and introduce yourself. We are always ready to talk about observing opportunities at Gemini, and we will have a number of handouts, including brochures describing each available Gemini instrument. Enter the drawing at our booth! We hope to raffle off an item that we expect will be of interest to you.
The Gemini Phase One Tool – PIT

Tom Matheson & Katia Cunha

Two forms can be used to apply for US observing time on the Gemini telescopes. For standard proposals asking only for US time, either the Web-based or emailed NOAO proposal form can be used. The Gemini Phase I Tool (PIT) can also be used for such proposals, but the PIT must be used in cases where time is requested from multiple partners, for Director’s Discretionary (DD) time, or for programs designed specifically for poor weather. The PIT must also be used for Gemini demo science and science verification proposals.

There have been some recent changes to the PIT. There are now options on the “Submit” tab for the subset of proposals that go directly to the Gemini Observatory rather than to the NOAO Time Allocation Committee. This tab should be used for DD time, poor-weather programs, demo science, and science verification proposals. Note that DD requests should be submitted via the PIT rather than emailed as they have been in the past. Poor-weather programs can be submitted throughout the semester.

Starting with Semester 2007B, a tab was added to the PIT to specify how a program might be altered if it has a Band 3 ranking. Recall that observing programs that are scheduled on the telescope are scientifically ranked, and these programs are separated into three priority groups: Bands 1, 2, and 3. Band 1 (containing the most highly ranked programs) and Band 2 each contain 30 percent of the available time. Band 3 thus holds 40 percent of the available telescope time. Using the “Band 3” tab, one can indicate how observing constraints might be relaxed or how the number of targets could be reduced. A recent change has included entry boxes for the total time requested if in Band 3, and the minimum time necessary in Band 3. The minimum time will be used as the criterion of successful observation by Gemini. Programs with small minimum required times will be more likely to be observed.

For Semester 2008A, there will be a new tab for programs intended to be observed classically. Proposers will have to provide backup programs. In addition, observing conditions for the primary and backup programs must be specified. If conditions worsen beyond the constraints for the classical program, the night may revert to the queue.

In the essay sections of the PIT, LaTeX formulae cannot be used, unlike in the standard NOAO proposal form. In addition, the font used is slightly larger, occasionally leading to scientific justifications that are longer than prescribed for NOAO proposals in the printed versions. There is a “Save as PDF” option which will allow you to see how the proposal will appear in the printed version that will be evaluated by the TAC. Please look at this version of the proposal before submission to make sure that it meets all of the NOAO requirements.

You can learn more from the PIT Web pages (www.gemini.edu/sciops/P1help/p1Intro.html). In addition, advice on using the PIT for NOAO proposals is posted on the NOAO Web site (www.noao.edu/noaoprop/help/pit.html).

Gemini Science Staff Meetings

Ken Hinkle & Verne V. Smith

The Gemini Observatory, like other major observatories, has a fixed schedule of meetings to discuss various facets of observatory operations. Every Tuesday, Gemini has a joint meeting of North and South scientific staff via video conference. For the past year, many of the meetings have been open to the partner National Gemini Office (NGO) staff as well. The meeting typically takes less than an hour. Each meeting starts with a brief summary of the weekly telescope operations, typically followed by a report on a topic of general interest.

In the last few months, we have heard reports on topics such as calibrations and the long-term monitoring of calibrations, progress on the Multi-Conjugate Adaptive Optics (MCAO) system, Web page revisions, the call for proposals, and updates on the Near-Infrared Coronagraphic Imager (NICI) and Gemini Near-Infrared Spectrometer (GNIRS). The Gemini/NGO staff meeting is one of the ways that NGSC keeps up to date with new developments at the observatory. While this is a Gemini meeting, we, as well as any user through us, can suggest topics of discussion through us for future meetings. Your suggestions can be sent to vsmith@noao.edu or usgemini@noao.edu. The material discussed is frequently reported in this Newsletter.
The Updated Gemini Web Pages

Rachel Mason (Gemini Observatory)

With the bulk of Gemini observations taken in queue mode, the observatory Web site plays many roles traditionally filled by face-to-face interactions between the user community and observatory staff. Perhaps to a larger extent than with many other observatories, our Web pages really are the “face” of Gemini. A good set of Web pages is essential to help our users write technically sound proposals, optimize their Phase II setups, reduce their data with a minimum of fuss, and generally make the most of the capabilities that Gemini has to offer.

With this in mind, a small group from both Gemini sites and the UK National Gemini Office (NGO) has been overhauling the science operations Web pages (i.e., pages that live below www.gemini.edu/sciops: instruments, schedules, helpdesk, data, etc.). The single largest and most complicated section of this vast collection is the instrument pages, so we have concentrated our initial efforts on these.

In reorganizing the instrument pages, we sought to bear in mind the path taken by a Principal Investigator (PI) from initial idea to final publication, the kind of instrument information that would be needed at each stage, and where a “typical” user might look for that information. Pages are grouped according to instrument mode (e.g., NIFS coronography, T-ReCS imaging) and the steps a PI takes in preparing a proposal, defining observations, and reducing data. The pages use a menu system to keep important links from being buried in paragraphs of text. To help us maintain the pages and not confuse the user, duplication of information is avoided wherever practical. To enable proper version control, the new pages use the Drupal open-source content management system.

At the time of this writing, the entire Gemini science staff and NGOs have been asked to use the new pages as their “default” Gemini instrument pages for a period of a few weeks of intensive testing, so that we can uncover and fix as many bugs, mistakes, and generally undesirable features as possible. The new instrument pages will then be integrated with the existing site and made public. This is the first phase of a redesign that will eventually include all of the Gemini public Web pages.

We’d like to emphasize that all of the Gemini Web pages are yours every bit as much as they are ours, and your feedback helps us to improve them. If you spot inaccuracies, inconsistencies or other points that need attention, tell us (rmason@gemini.edu), and we’ll do our best to address your concerns!

Changes to Classical Mode Observations at Gemini

Verne V. Smith

Prior to Semester 2008A, any classical observing programs to be conducted on either of the Gemini telescopes were required to have a minimum length of three nights. Beginning with the 2008A Gemini Call for Proposals, however, classical programs may now request a minimum of one night. This change opens up the possibility of many more potential Gemini programs being eligible for classical observing time, if so desired by the Principal Investigator. Please note that classical proposals must request integer nights.

A second change is that classical proposers must specify both the observing conditions required to achieve the primary scientific goals of the program, and an alternative set of poor weather observations. During the classical run, if conditions are worse than those required by the main or alternate program, the time may be used for queue observations. In such an event, the classical time will not be rescheduled.
NGSC Instrumentation Program Update

Verne V. Smith & Mark Trueblood

The NGSC Instrumentation Program continues its mission to provide innovative and capable instrumentation for the Gemini telescopes in support of frontline science programs. This article gives a status update on Gemini instrumentation being developed under the oversight of the NGSC, with progress since the September 2007 NOAO/NSO Newsletter.

FLAMINGOS-2

FLAMINGOS-2 is a near-infrared multi-object spectrograph and imager for the Gemini South telescope. FLAMINGOS-2 will cover a 6.1-arcmin-diameter field at the standard Gemini f/16 focus in imaging mode, and will provide multi-object spectra over a 6.1 × 2-arcmin field. It will also provide a multi-object spectroscopic capability for Gemini South's multi-conjugate adaptive optics system. The University of Florida is building FLAMINGOS-2 under the leadership of Principal Investigator Steve Eikenberry.

The NGSC held a quarterly review of the FLAMINGOS-2 instrument with the University of Florida team on October 22 at Gainesville. Shortly before this meeting, the Instrument Team developed a revised schedule showing the Pre-ship Acceptance Test occurring in April 2008 and the instrument being shipped in May 2008.

The instrument integration and testing phase of the project continues. Although software remains a significant item on the Integration and Test agenda, figure 1 shows that significant progress has been made in this area, with all mechanisms and housekeeping under software control. Furthermore, past issues with mechanisms appear to have been resolved with the replacement of the previous motors with commercial cryovac stepper motors on all mechanisms (see figure 2).

As of October, the University of Florida team reports that 95 percent of the scheduled work to FLAMINGOS-2 final acceptance by Gemini has been completed.

Figure 1: FLAMINGOS-2 engineering GUI used to control a high-level instrument sequence.

Figure 2: FLAMINGOS-2 camera mechanism shown with two Phytron steppers mounted on top and one on the side.