

Gemini Science Committee (GSC) Report

April 2010

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Membership and Conflicts of Interest

Timothy C. Beers, Michigan State University (None – in person)
Albert Bruch, LNA (substituting for Laerte Sodre) (None – in person)
Scott Croom, University of Sydney (None – by phone)
Rene Doyon, University of Montreal (GPI – in person)
John Lacy, University of Texas (None – in person)
Paulina Lira, University of Chile (None – by phone)
Ross J. Mclure, University of Edinburgh (None – not able to attend)
Christopher C. Packham, University of Florida (Flamingos 2, T-ReCS – in person)
Caty Pilachowski, Indiana University (None – in person, 2nd day)
Henry G. Roe, Lowell Observatory (None – in person)
Suzie Ramsey, ESO (None – not able to attend)
Alan Stockton, University of Hawaii (GLAO, NICI, NIRI – in person)
Chris Willott, Hertzberg Institute (GLAO, GMOS, Flamingos 2, Altair, GPI – by phone)

1.1 Attending from OpsWG

Ilona Soechting, Oxford University (by phone)

1.2 Attending from Gemini

Dennis Crabtree (by phone)

Inger Jorgensen (by phone)

Scot Kleinman (by phone)

Nancy Levenson (in person)

Bernadette Rodgers (by phone)

Doug Simons (in person)

Eric Tollestrup (in person)

2 Matters Arising

Director Simons reported briefly on the present state of affairs at the Gemini Observatory, and the primary topics to be discussed during this meeting.

The three main areas are:

1. What instruments to build is a high priority.
2. Advice on large program issues.
3. Further development and refinement of the Long Range Plan (LRP)

These topics have been considered in detail in the report below. Current copies of the relevant documents are included in appendices.

3 Instrument Status Updates

Eric Tollestrup provided a one slide summary of the current status of Gemini Instrumentation, followed by detailed supplemental information (included in appendix).

A thumbnail summary of this report follows:

GMOS-N CCDs

NRC-HIA is close to beginning tests of the new Hamamatsu CCDs and controller
Integration is planned into GMOS-N by mid 2010

GMOS-S CCDs

ANU (Brian Schmidt) submitted a GMOS-S CCD upgrade proposal to
Astronomy Australian Limited in December 2009

Proposal was 1 of the 8 winning efforts from Australian stimulus funds

Funds to be transferred to Gemini in July 2011

Upgrade expected following completion of GMOS-N upgrades, likely late 2010

Expected new CCDs and controller to be integrated into GMOS-S early 2011

GPI

Assembly of major components presently underway, with integration and testing planned for June 2010

Expected delivery to telescope no sooner than early 2011

GeMS (MCAO) & GSAOI

The 50 W laser has been delivered to Gemini South

GSAOI is now being retrieved from storage and being restarted

GEMS commissioning with GSAOI expected in semester 2011A

Flamingos 2

Gemini assumed responsibility for (but has not formally accepted) Flamingos 2 in January 2010

Flamingos 2 returned to La Serena in March 2010 in order to fix a list of known problems, and those apparently created during the shipping process

Planned return to Cerro Pachon in January 2011 for commissioning

GNIRS

Substantial progress has been made on the repair operation

Cool-downs #1 and #2 have been completed; Cool-down #3 planned for May 2010

The science grade detector has been installed, and optics have been tested

The lens coating repair is being carried out under a separate project

Proposals have been accepted for semester 2011B

NIRI

NIRI suffered from a mechanical problem recently; determined that the problem was related to the bushings, which were repaired

Other problems (not yet clear if due to electronics or mechanical issues) have continued to occur

Considerable discussion followed on the future status of NIRI. Among the items mentioned was the notion that if an electronics upgrade goes forward, as has been previously discussed, then it would make sense to consider a hardware rebuild at the same time. Tollestrup indicated that stripping and cleaning procedures were not too expensive, but of course would require resources that might go elsewhere. Inger Jorgensen questioned the value of further significant NIRI upgrades, given the age of the instrument and more recent advances in imaging technology. In an ideal world NIRI would be replaced with a significantly more capable IR imager that could be run wide-field without AO or narrower-field high-resolution with AO, perhaps sharing significant heritage with GSAOI.

Near-infrared imaging with AO at Gemini North is highly valued by the community. The timescale for a decision on what to do about NIRI appears to be in time for the October GSC meeting, so that a definite recommendation can be provided to the Gemini Board during their November meeting.

4 Next Gemini Instruments

Director Simons provided the GSC with a “lessons learned” presentation on the history of HROS (full presentation included in appendix). Bottom line is that the effort to develop a fully capable high-resolution optical spectrograph mounted at the Cassegrain focus was likely too risky, requiring the development of brand new technologies and techniques. Even after the bench mounted version of HROS (bHROS) was constructed as an alternative, it suffered from extremely poor throughput, limited spectral range, and targeted a resolving power ($R \sim 120,000$) that was too high for many programs. It saw little user demand, was de-commissioned, and its components have now been transferred to Argentina for use in another spectrometer they are designing.

Simons then discussed the possibility of executing time trades in exchange for use of the currently operational ESPaDOnS (Echelle SpectroPolarimetric Device for the Observation of Stars) at the CFHT. ESPaDOnS is a cross dispersed echelle capable of capturing 40 orders in a single exposure, with an overall throughput of about 15%, which has been operational at CFHT for the past six years. The plan would involve running a fiber from GEMINI-N to the CFHT in order to use ESPaDOnS.

Advantages

- Reduced cost compared to new instrument
- Possibly parallel startups of two new instruments
- Faster to complete than a new spectrograph
- Reduced performance risk
- No loss of Gemini-N ports

Disadvantages

- Throughput losses compared to Cass mounted instrument on Gemini-N
- Single object only
- Unclear how much time would be available
- Non-standard data sets (headers, etc) if rely on CFHT system for data delivery

The GSC suggests that this route should definitely continue to be explored, since it would add a capability to Gemini-N that would otherwise not be present (assuming a newly built, fully-fledged high-resolution spectrograph would reside on Gemini-S), and would be up and running sooner than any newly acquired instrument could possibly be deployed. The desirability of this option will turn on the amount of trade nights required, as well as the throughput hit that would be taken by the fiber run to the CFHT.

Scott Croom then gave a brief presentation on the present status of the OH suppression hardware approach that has been explored at the University of Sydney (full presentation in appendix). This technology has now advanced to the point that it will be incorporated into a near-IR (H-band) OH suppression unit for use on the AAT, beginning as a facility instrument in January 2011. A logical plan is to consider a similar unit for Gemini-S, coupled to an IR spectrograph such as GNIRS, and/or possibly an X-shooter like instrument (in which case it would be coupled to one of the multiple arms).

The GSC then had an extended discussion that focused on two new instruments seen as those likely to be the most interesting for science to the Gemini community, and well placed to take advantage of the coming era of time-domain surveys in the Southern Hemisphere – a high-throughput optical high-resolution spectrograph, and a moderate resolution X-shooter-like

instrument. The GSC noted the need for detailed science cases and potential rough strawman performance specifications to be put together for these instruments, beginning with one for the optical high-res spectrograph. Beers indicated that he would be willing to draft a first-pass science case, with input from the rest of the GSC, in time for review and approval at the October GSC meeting, then passed along to the Board. Similarly, a science case for the X-shooter-like instrument should be prepared, and vetted by the GSC at its October meeting. No one has yet been identified to make the first draft of the science case for this instrument. Beers will solicit a volunteer from the GSC.

Among the issues discussed concerning these instruments:

- The high-res optical spectrograph will need to have “reasonable” throughput as blue as 4000 Å, but would be unlikely to target going any bluer, due to photon-loss in the blue, in particular if a fiber-fed design is adopted.
- Resolving power targets for the high-res spectrograph would be from $R \sim 20,000$ to $R \sim 60,000$, which represents the “sweet spot” for most anticipated science.
- A bench spectrograph is more appealing than a Cass-mounted instrument, due to restrictions on instrument size and stability on Gemini. However, the GSC remains open to new designs that may permit a Cass-mounted instrument, if forthcoming.
- The GSC expressed the thought that an X-shooter-like instrument, with a coupling of at least one arm to an OH suppression unit, would be a powerful combination.
- It is unlikely that a Gemini X-shooter would include a UV arm, but rather, an optical and one or more near-IR arms.

5 GPI Campaign and Other Campaigns in the Future

Nancy Levenson reviewed the current status of plans for the GPI campaign, and aired a number of issues with the GSC concerning the report she is presently drafting for the Gemini Board. Going forward, one question that needs to be resolved is the total commitment of Gemini observing time that will be devoted to campaigns, the maximum number of simultaneous campaigns, and how (or even IF) campaign time should be allocated across the Gemini partners. This report is in the process of being assembled, and will presumably be vetted by the full GSC prior to the May Board meeting. The package of GPI documents will be circulated separately.

6 Enabling Large Programs with Gemini

Chris Willott discussed the current status of the Large Program Working Group report. This report began with the document developed by Dennis Crabtree detailing a plan in response to Gemini Board resolution 2009.A.4, calling for plans that foster large (or key) science programs with the Gemini Observatory, as modified by the GSC. The final plan is not yet ready, but it is anticipated to be ready in the near future, hopefully for vetting by the full GSC in time for the May Board meeting, or later.

7 Alternative Models for Future Instrument Acquisition

A few weeks before this meeting, the GSC established a working group, dubbed the Instrument Acquisition Working Group (IAWG), co-chaired by Chris Packham and Rene Doyon, to consider changes in the manner in which Gemini acquires new instrumentation. Chris Packham delivered an overview of the IAWG progress to date, and prepared a draft report (highlights in appendix). One of the key considerations of the IAWG is to move to a more flexible, nimble, and continuous process of instrumentation acquisition and upgrades in which new instrument ideas might be initiated every 1-2 years rather than in groups once every 5-7 years as in the past. He indicated that the IAWG is still in the process of drawing up a concrete proposal, with the intention that it be ready in the July timeframe. Thus, recommendations will not be in place for the May Board meeting, but will be in time for the next Board meeting in November.

Once the IAWG report is finalized, the GSC will vet the recommendations by telecom. However, preliminary conclusions of the IAWG were shown and discussed by the GSC, and were met with broad agreement. The presentation and preliminary conclusions are appended to this report.

8 GSC Role in Revised Gemini Governance

Director Simons presented an outline of proposed changes in Gemini governance, and the likely effects such changes would have on the GSC (suggested revised org chart in appendix). The primary effect on the GSC is that it would be relieved of its dual role as an advisory committee and users committee, and a separate users committee would be created. It was noted that having at least some overlap (1-3 members) between a new Users Committee and the GSC would be useful to maintain communication between the two groups. The GSC, in the new structure, would report directly to the Gemini Board, rather than exclusively to the Director.

The GSC noted that another of the proposed changes, removal of the AOCG, may have impact on the tenure process for some employees of the Gemini Observatory. Careful consideration will have to be given as to how tenure will be handled in the proposed new structure. Another possibility that was discussed is expansion of the responsibilities of the GSC to include additional responsibilities, such as proposal review, technical and scientific responsibilities, etc., similar in scope to the STC at ESO.

It is understood that all proposed changes in governance are still preliminary, and no decisions have been finalized at present.

9 Long Range Instrument Deployment Plans

The GSC received a presentation from Chris Packham on the question of the long-term future of mid-IR instrumentation at Gemini, and possible paths going forward (presentation in appendix).

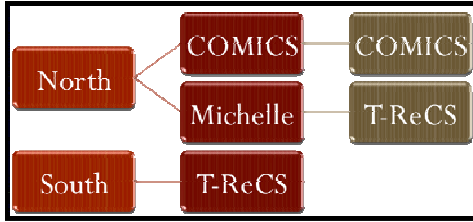
A previously published report on Michelle (and comments on MIR and instrument decommissioning in general) was prepared to examine low demand and/or science output from an instrument, in this case Michelle. The Observatory, due to the budget cut associated with the UK pull-out, feels that it may be appropriate to limit the number of instruments to five on each telescope, at least for the medium term future. However, this cost saving measure is a preliminary estimate, and remains to be examined in detail by the Observatory and Board. The likely future instrument deployment for Gemini was provided by Dennis and Inger, and is shown below:

Gemini North						
	2010	2011	2012	2013	2014	2015
Instrument 1	Altair/AO	Altair/AO	Altair/AO	Altair/AO	Altair/AO	Altair/AO
Instrument 2	GMOS	GMOS	GMOS	GMOS	GMOS	GMOS
Instrument 3	GNIRS	GNIRS	GNIRS	GNIRS	GNIRS	GNIRS
Instrument 4	NIFS	NIFS	NIFS	NIFS	NIFS	NIFS
Instrument 5	NIRI	NIRI	NIRI	NIRI	NIRI	NIRI
Instrument 6	Michelle					
Gemini South						
	2010	2011	2012	2013	2014	2015
Instrument 1	GMOS	GMOS	GMOS	GMOS	GMOS	GMOS
Instrument 2	Phoenix	GeMS	GeMS	GeMS	GeMS	GeMS
Instrument 3	T-ReCS	GSAOI	GSAOI	GSAOI	GSAOI	GSAOI
Instrument 4	NICI	F-2	F-2	F-2	F-2	F-2
Instrument 5		NICI	GPI	GPI	GPI	GPI
Instrument 6		T-ReCS				

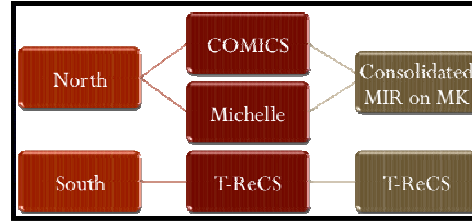
It is thus clear that T-ReCS represents the ‘sixth’ instrument on Gemini South, and hence the question of MIR consolidation was addressed to Packham.

The key point made was that MIR consolidation between Subaru and Gemini in the north, and leaving T-ReCS on Gemini south produces advantages such as:

1. Time trades allow MIR science to continue on both observatories
2. Time trades could permit access to HSC, HDS, MOIRCS, etc
3. Invigorating the time trade using T-ReCS, as it has highly demand from Subaru, and is in the strategic plan of Gemini
 - a. T-ReCS is the only MIR southern option for Subaru, and helps to prepare for ALMA, and offers many young stars and the Magellanic Clouds
4. Furthers the building of collaborations between the Gemini and Subaru observatories



Inferior, MIR only in the North



Optimal, time trades and MIR both North & South

Another cost saving measure proposed was to take advantage of the MIR seasons, where we offer only 1-2 months MIR on sky:

- South between ~July-December
- North between ~December – June

In later discussions, Packham asked the Observatory to estimate the cost for ~1 month deployment of the MIR instruments each year, and comment on what science would be displaced through this expenditure. This will permit a true trade-study of the science space, crucial to the GSC’s charter.

Other routes that should be explored are a conference call with WISE investigators to understand the possible rise in applications to follow-up their observations, and a MIR conference, presumably based in the US, to discuss the MIR situation in the US.

The GSC also discussed another option, that of consolidating the MIR on Mauna Kea with one instrument out of the three of Michelle, T-ReCS or COMICS on MK and no MIR instrument on Gemini-South. This option would produce the largest savings to the Observatory because of fewer instruments overall to support.

It was agreed that if Gemini were to discontinue MIR observations from the South, then the community should be informed well ahead of the removal of this capability, so that the decision does not come as a shock and it allows astronomers to re-plan their scientific programs accordingly. Given the likelihood of new instruments (F-2, GeMS, GPI) being available from late 2011 onwards at Gemini-South, now is the time to make the decision on the future of MIR observations at Gemini-South.

The GSC advises the Observatory to begin planning for the decommissioning of T-ReCS at Gemini-South. To allow the completion of on-going programs the instrument should be available for at least three more semesters, i.e. until the end of 11B. In the event that sufficient new capabilities listed above are not available by the start of 2012, then the lifetime of the instrument at Gemini-South may be extended.

The GSC also suggests the Observatory consider which of the three instruments out of Michelle, T-ReCS and COMICS provides the most cost-effective way of producing the best MIR science from MK during the pre-JWST era, and begin discussion with colleagues at Subaru.

10 Long Range Plan

The GSC discussed the goals for the Long Range Plan, and agreed that a document of length on the order of 10 pages was best. Director Simons indicated that it would be most useful for the Gemini Observatory if said document could be prepared in time for the NSF funding proposal due at the end of July. Beers suggested that the GSC seek to have a draft outlined by the end of June, with a final LRP report no later than mid-July.

Among the topics that might be included in the LRP, and at least briefly discussed by the GSC, are:

- What are the current strengths of Gemini, and do we want to expand or modify these ?
- Queue based observing is seen as one of Gemini's strengths, and is likely to grow in importance in the coming decade. The GSC needs to identify the important aspects/capabilities of the queue to preserve going forward in the face of anticipated budget cuts.
- How does Gemini enlarge its system role in the 8m telescope "club?" How to move the present dialogue forward.
- The changing landscape of observational drivers in the coming decade, in particular the time-domain surveys (SkyMapper, LSST, Pan-STARRS) and other large surveys (Gaia, ALMA follow-up. etc), will substantially alter the kinds of observing the Gemini community is likely to participate in. For example, the need for rapid response times between targets, additional multi-object spectroscopic modes, and faint object spectroscopy.
- Quite likely that the observational and collaborative modes will be altered as well.

11 Next Meeting

The next GSC meeting is scheduled for October 4-5, 2010, in Santiago, Chile; specific venue TBD. (Note that the Gemini Planning Committee meeting will follow in the same location, October 7-8.)

12 APPENDICES

- A. Instrument Status Report (Tollestrup): gsc2010apr_Instrument Status Report.pdf
- B. High Resolution Optical Spectroscopy at Gemini (Simons): GSC – 2010_high-res.pdf
- C. OH Suppression at Gemini (Croom) : OHsup_gsc.pdf
- D. Draft IAWG Report highlights (Packham): iawg_20100418.pdf
- E. Proposed Governance changes (Simons) : GSC – Governance.pdf
- F. Mid-IR Future at Gemini (Packham): mir_consolidation_20100418.pdf