

Gemini Science Committee (GSC) Report October 2010

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1 Table of Contents

Membership and Conflicts of Interest.....	1
Attending from OpsWG.....	1
Attending from Gemini.....	1
Attending from Gemini Board	1
Matters Arising and Introductions	1
Science Highlights	1
Operations Status Report	1
Instrument Status Review	1
High-Resolution Spectrograph White Paper Review	1
Report from Operations Working Group	1
2010 Short-Term Priorities	1
Medium-Term Instrument Plan.....	1
GPI Campaign and Other Large Campaigns in the Future	1
New Terms of Reference for the GSC	1
Science Impact of the Gemini Transition Plan	1
APPENDICES	1

Membership and Conflicts of Interest

Timothy C. Beers, Michigan State University (None – in person)
Scott Croom, University of Sydney (None – by video link)
Rene Doyon, University of Montreal (GPI – by phone line)
John Lacy, University of Texas (None – in person)
Felipe Barrientos, University of Chile (None, substituting. for Paulina Lira – in person)
Diego Lambas, IATE, Cordoba, Argentina (None)
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)
Henry G. Roe, Lowell Observatory (None – in person)
Suzie Ramsey, ESO (None – not able to attend)
Laerte Sodre, University of Sao Paulo, Brazil (None – in person)
Alan Stockton, University of Hawaii (GLAO, NICI, NIRI – in person)
Chris Willott, Hertzberg Institute (GLAO, GMOS, Flamingos 2, Altair, GPI – in person)

1.1 Attending from OpsWG

Stuart Ryder, AAO (by video link)

1.2 Attending from Gemini

Andy Adamson (in person)

Julian Christou (by video link)

Steven Goodsell (in person)

Inger Jorgensen (by video link)

Scot Kleinman (in person)

Nancy Levenson (in person)

Bernadette Rodgers (in person)

Doug Simons (in person)

Eric Tollestrup (in person)

1.3 Attending from Gemini Board

Larry Ramsey, Penn State

2 Matters Arising and Introductions

Timothy Beers provided a brief welcome and thank you to those in attendance, and on the various forms of electronic linkages.

Beers suggested that the GSC take extra care to keep an eye on the total years of service of each member (presently members serve for 4 year terms), which was agreed to by all. He also noted that in later discussions at the meeting there would be a presentation of a proposal for new terms of reference for the GSC, which called for 3 year terms for members. Beers also mentioned that a letter was received from a set of observers expressing concern about the pace of Flamingos-2 commissioning, and indicated that this would be discussed as time permitted.

Director Simons reported briefly on the present state of affairs at the Gemini Observatory, and the set of issues requiring GSC input for the annual Gemini planning meeting, which was to take place immediately following the GSC meeting. primary topics to be discussed during this meeting. Simon's slides are included in the Appendices (gsc2010_StateofObservatory.pdf).

Highlights of the report:

GNIRS Repair

Commissioning on the new-repaired GNIRS is proceeding well.

Science verification anticipated in 2010B, with full community access in 2011A.

(Shortly following the GSC meeting Verne Smith announced a special call for proposals for GNIRS Science Verification from the community).

GMOS-N CCDs

Upgrade has been pursued with extremely high priority. To date, there have been problems with faulty CCD controller components, as well as detector issues.

Scott Kleinman indicated that the sources of the problems have been identified, and are being worked on at present, with an excellent prognosis.

Delivery expected to Hawaii in 2011A, and expectation is to have the upgrades installed at the focal plane in time for 2011B.

NIFS and Laser AO

Tests on laser AO feed to NIFS are being pursued, with encouraging results thus far. Reports on comparisons of efficiency of NIFS as compared to Keck/OSIRIS were highlighted as an indication of the superiority of NIFS.

ALTAIR

Tests carried out to investigate LGS operation without need for a tip/tilt star.

MICHELLE

Investigations have been carried out of the feasibility and impact of a dual beam/chopping guiding mode. Significant sky coverage capability improvement seems possible. Decision to develop will depend on the future of the MIR program at Gemini.

FLAMINGOS-2

Camera dewar opened and a number of problems were identified. None are show stoppers but this has led to delays in commissioning. On track for repairs to be completed in 2011A, so commissioning can resume.

MCAO

Electronics on MCAO bench expected to be completed next month, and bench will be sent to Cerro Pachon.

Laser has been installed at the telescope, and alignment work is on-going.

Commissioning of entire system expected in 2011A.

GMOS-S CCDs

Funds for upgrade of GMOS-S CCDs that were expected from Australian stimulus funds will instead come from the "regular" instrumentation budget.

Simons then supplied the GSC with a list of proposed activities for GSC prioritization for discussion at the Gemini planning exercise. These are discussed below.

3 Science Highlights

Nancy Levenson presented a summary of science highlights based on data obtained with the Gemini Observatory. The full presentation is provided on the slides included in the Appendices. (gsc2010oct_sci-hilights.pdf) . A brief synopsis follows:

Biller et al. (2010) have reported the detection of a substellar companion to the bright star PZ Tel, obtained as part of the **NICI** planet finding campaign.

Tokovin et al. (2010) have presented detections of “multiples within multiples”, wide binary stars observed with **NICI** that have multiple components within each of the binary members.

Davidge (2010) has used **NICI** in AO imaging mode to study stellar populations in the halo of M83, producing evidence for star formation in the outer region likely due to recent accretion.

Lucas et al. (2010) have reported the detection of a very cool, nearby brown dwarf, based on observations with **NIRI**.

Todorov et al. (2010) have used **NIRI/Altair** to detect a young, massive planetary companion to a brown dwarf in the Taurus star forming region.

Dufour et al. (2010) have used **NIRI** to obtain photometric measurements of the most metal-rich white dwarf yet known.

Carrasco et al. (2010) have reported **GMOS** imaging of the central region of the galaxy cluster Abell 3827, concluding that it may well be the most massive local galaxy yet discovered.

Sun et al. (2010) have reported on the existence of stripped HII regions associated with the galaxy ESO 1370-001 in the galaxy cluster Abell 3627, based on spectra obtained with **GMOS-S**.

Riffel et al. (2010) have uses **NIFS/Altair**, in IFU mode, to produce maps that reveal star formation signatures in the central region of the active galaxy Markarian 1066.

Davis et al. (2010) used **NIFS/Altair** to obtain observations of the star forming process in the massive young stellar object W33A, including detection of a bipolar outflow and rotating disk, similar to low-mass star formation.

Churcher et al. (2010) have use **T-ReCS** to obtain 18 um imaging of an old debris disk surrounding the 12 Myr old star HD 191089.

Rothberg & Fischer (2010) have used **GNIRS** CO measurements to study the process of galaxy mergers.

Carvana & Lazzao (2010) have used **T-ReCS** photometry to make albedo measurements of the asteroid (298) Baptistina, which indicate it is not related to the K/T mass extinction event (as had been previously thought).

4 Operations Status Report

Andy Adamson presented the current instrument status report, a copy of which is included in the Appendices (gsc2010_oct_Operations Status.pdf). This report includes information on the 2010A Instrument Offerings, 2010A Gemini-N Operations Highlights, 2010A Gemini-S Operations Highlights, Band Completion Rates, 2011A Instrument Offerings, the NICI Campaign Scheduling, Present Status of 2009 Priorities, and a Summary of Telescope Faults during 2009B and 2010A.

During the discussion of this report, Inger Jorgenson clarified that the GMOS-S blind offset project, which was among the 2009 priorities that did not receive Band 1 status, would likely shave 2-3 minutes of setup time per observation if it were implemented. This priority will be reconsidered in the near future.

A question arose about whether Phoenix should be kept available on Gemini-S until the lack of instrument ports force it off. It was commented that maintenance may present challenges.

Gemini> The planned commissioning activities do force Phoenix off in 2011A. However, if commissioning plans change significantly, Gemini will re-evaluate the situation.

5 Instrument Status Review

Eric Tollestrup presented a summary of instrument status, the full text of which is included in the Appendices (gsc2010_Instrument Status.pdf). A summary slide is shown below.

- **NIRI -- No grism mode**
- **NICI**
 - **Upgrades for November?**
- **Flamingos 2**
 - F2 returned to SBF laboratory
 - MOS dewar redesign under way
 - Camera dewar examined
 - Back to Telescope **2011A**
- **GNIRS**
 - Rebuild/testing completed
 - Returned to telescope
 - Commissioning concluded
 - SV 2010B, 1st GNIRS Science Sept 15
 - Available **2011A**
- **GMOS-N CCDs**
 - HIA activities/testing underway
 - CCD problems
 - Array controller problems
 - October 2010 installation cancelled – **Q1 2011 earliest**
- **GPI**
 - Sub-system acceptance testing underway
 - Delivery to telescope **Q4 2011**
- **GeMS (MCAO)**
 - Laser installed, on-sky testing underway
 - I&T with GSAOI starting **Q1 2011**

6 High-Resolution Spectrograph White Paper Review

A total of 21 papers were received in response to the Gemini Observatory call to the community for white papers describing science that would be enabled by development of an optical high-resolution spectrograph. The list of authors and titles are provided in the Appendices (gsc2010oct_White Paper Authors and Titles.pdf).

Each paper was reviewed by the GSC, and comments were made on the viability of the proposed science as well as the likelihood of its appeal to the entire Gemini user community. Following this discussion a set of preliminary specifications were drawn up by the GSC, meant to satisfy the majority of the science cases presented, tempered by the necessity of keeping the total development costs within reason.

Simons proposed that Gemini Observatory negotiate long-term access to the CFHT ESPaDONs spectrograph, to be fed by a fiber from the focal plane at Gemini-N. Although particulars remain to be determined, it was felt that such a setup could provide competitive throughput in the red, from 6000-9000 Å. This was seen as a reasonable path to provide quick access to high-resolution science for the Gemini community while a new high-resolution instrument is constructed, presumably to be mounted on Gemini-S. The GSC supports investigation of ESPaDONs for a northern hemisphere high-resolution option.

Concerning the new instrument, there was considerable discussion on the advantages/challenges of a single arm vs. dual arm spectrograph, with primary concerns expressed about the difficulty/expense of ensuring lack of flexure at the Cassegrain focus.

Simons suggested that a single arm spectrograph, blue optimized, with wavelength coverage from 4000-7000 Å, might be the best option. A number of GSC members felt that a dual arm configuration, extending farther to the blue, and with response extending beyond 7000 Å would be superior, if technically feasible and cost effective. So, in the end, the preliminary specs would look like:

Gemini Optical Echelle Spectrograph (GOES) Preliminary Specifications:

Targeted resolving power: $R = 40000$ (range perhaps $20000 < R < 60000$)

Single slit only

Wavelength coverage: 3700 – 10000 Å (if dual arm) / 4000 – 7000 Å (if single arm)

Cassegrain Instrument

Stability requirement: 0.3 pixel per hour, goal of 0.1 pixel per hour

The GSC recommends that the Observatory prepare technical feasibility studies for ESPaDOnS access in the north and the GOES spectrograph in the south, and at least preliminary cost estimates. The GSC recommends that, cost allowing, these options be undertaken simultaneously. If that proves infeasible, priority should be given to GOES.

Gemini> The Observatory is moving forward with these feasibility studies. If the instrument requirements cannot be met within the budget cap, we will consult with the GSC further.

7 Report from Operations Working Group

Stuart Ryder presented the report of the Operations Working Group, a copy of which is contained in the Appendices (gsc2010oct_ResolutionsActions.pdf). This report was discussed briefly by the GSC. The only action item of particular significance to the GSC was the need for designation of a “contact person” from within the UK community to whom discussions would be directed concerning management of the remaining UK time on Gemini as the 2012 transition out of the partnership approaches.

Gemini> The UK NGO should remain in place through 2012, despite the different fiscal year.

8 2010 Short-Term Priorities

Doug Simons presented the GSC with preliminary lists of suggested projects to be considered for prioritization for the planning retreat to take place immediately following the meeting. These were debated and discussed by the GSC in some detail, and after careful consideration, the following rank-ordered lists were agreed to. Note that the lists are grouped into 3 categories, which are individually ranked. The GSC approved rank-ordered list is:

Gemini-N

GMOS-N CCDs
LGS+P1 Upgrades
New IR Controllers for GNIRS/NIRI
GMOS-N + ALTAIR Commissioning
ALTAIR Upgrades
GNIRS Completion
NIRI Rebuild

Gemini-S

GPI
Flamingos-2 Completion
MCAO Completion
ISS Vibration Mitigation
GMOS-S CCDs controller

The GSC encouraged the observatory to take advantage of additional time for MCAO commissioning time, as possible, due to apparently lower than expected oversubscription rate for Gemini-S.

Observatory Wide

High-Res Optical Spectrograph
4th Generation Instrument Planning
Second Generation A&G Units
Base Facilities Ops (Telescope Upgrades)
New Sci-Ops Software
GMOS Blind Offsetting
GMOS ADC Alternative S/W
Dual beam chop/guide
Increase chop throw

Gemini> These priorities were presented at the planning retreat. The following items are currently in the 2011 plan with Band 1 status (meaning high-priority, having committed resources):

GMOS-N CCDs
LGS+P1 Upgrades
GPI
Flamingos-2 Completion
MCAO Completion
ISS Vibration Mitigation
High-Res Optical Spectrograph
4th Generation Instrument Planning
Second Generation A&G Units [starting mid-2011]
Base Facilities Ops (Telescope Upgrades) [mechanical planning]
New Sci-Ops Software [subset]

9 Medium-Term Instrument Plan

The committee received summary reports from Andy Adamson on the present state of mid-IR instrumentation at Gemini (gsc2010oct_Mid-IR Covering.pdf) and an updated version of a mid-IR futures report (gsc2010oct_Mid-IR Future.pdf), both of which appear in the Appendices.

Doug Simons presented comments on his impressions of the instrument suite and recommendations to the GSC.

A brief synopsis:

Progress from the present offerings to the so-called “4+1” model proposed in order to meet budget realities will require removal of 2-3 instruments within the next 2-3 years. However, the GSC notes that the 4+1 model presents considerable loss of scientific potential to the Gemini community, and where at all possible, a 5+1 model would deliver a disproportionately higher return than just one extra instrument. The plan should take into account the current capabilities, user demand, and resources required for maintenance of each instrument.

NIRI – Ripe for replacement

NIFS – Long life anticipated, with excellent performance

GNIRS – Just recovered; could well be most popular instrument at Gemini-N when deployed

GMOS-N/S – Currently most popular instruments on both telescopes, no plan for removal

Flamingos-2 – Once repaired and commissioned it could be extremely popular / its imaging mode may be able to replace temporary loss of NIRI

TReCS & MICHELLE – These instruments meet a worldwide need for MIR, even though they continue to be less and less in demand. The US continues to be the strongest user, and have expressed this as an important part of the “System”.

GEMS – Nothing else like it in worldwide AO

GSAOI – An essential camera for GEMS

ALTAIR – Getting old, should be refurbished or replaced

NICI – Displaced by GPI, but could take up some of the slack from NIRI/ALTAIR at Gemini-N

The proposal on the table for discussion was the notion of merging MIR onto one telescope, with some preference given to Gemini-N due to the higher quality of the site for IR, even at the cost of some southern sky coverage. If, however, an exchange with Subaru/COMICS can be brokered, this should be revisited. Although the GSC laments the loss of MIR capability and associated science on Gemini-S, the consensus was that this step appears inevitable given the

constraints of the 4+1 model and the new instruments heading to the south. We note that this step presents the loss of a capability that will greatly reduce ALMA follow-up/support capability.

The GSC was told that if NIRA and ALTAIR are to continue to be used for the foreseeable future they are both in need of major repairs and overhauls. NIRA is said to be at high risk of suffering a breakdown at any time that would leave it unusable. The possibility that the most infrared-optimized telescope at one of the best sites in the world for adaptive optics could be left without such a basic capability as infrared AO imaging for some years was discussed and is disturbing to the GSC.

Chris Willott led a discussion of the Crampton report on the desirability of a Gemini Advanced Adaptive Optics (GAAO) capability (gsc2010oct_GAAO_Sept2010.pdf), which appears in the Appendices. The GSC was suitably impressed with the scientific achievements that would be enabled by such a facility, and encouraged the observatory to continue its planning for GAAO in the future, and its consideration for construction if sufficient resources emerge.

There followed a GSC wide discussion of how to best link the worldwide community of 8m-10m class telescopes in order to avoid, where possible, redundancies of capabilities. Full cooperation appears unlikely at present, but may be unavoidable in the 30m+ era. The GSC supports the Observatory's efforts in this respect.

Gemini> We appreciate the effort of the GSC to identify a feasible reduced instrument complement in the future, under a reduced support budget. We are basing operations plans on the complement that the GSC discussed and endorsed during the meeting:

Possible Instrument Line Up (~2012)

Gemini-N	Gemini-S
GNIRS (available 2011A)	F-2 (starting 2011)
GMOS-N (upgraded 2011)	GMOS-S (upgraded 2011?)
NIFS	GSAOI (commissioned 2011)
T-ReCS or MICHELLE?	NICI (replaced by GPI in 2012)
ALTAIR (replaced by GeMS-N or GLAO?)	GeMS

Green = long term future, Blue = short term (few years) future

10 GPI Campaign and Other Large Campaigns in the Future

Nancy Levenson commented that plans for the call for proposals for GPI Campaign Science are well underway, and that a draft now exists, which is still being refined. A draft on general policies for campaign science (with emphasis on GPI) is also in the process of refinement. It is expected that these documents will be finished shortly, and then will be circulated to the GSC for final input, prior to planned release to the community on January 31, 2011, with a deadline of March 31, 2011 for proposals.

There is presently an ongoing discussion of the US Gemini SAC on how best to explore integration of campaign science across the partnership. The GSC suggested that a subcommittee

be formed to fully consider these issues. Beers will solicit membership in this subcommittee in the next few weeks.

11 New Terms of Reference for the GSC

The Gemini Board has called for a new governance structure for the Gemini Observatory, plans for which include changes in the terms of reference for the GSC. It is anticipated that changes will be implemented as part of the new international agreement, due in 2012. Summary of the plans under discussion were given by Nancy Levenson, and commented on by the GSC, including the results of a recent telecon between members of the Gemini Board, Levenson, and Beers.

Among the most important suggested changes are:

- Removal of user-committee role from the GSC

- Changes in terms of GSC members (from 4 to 3 years)

- Changes in the structures by which the GSC reports its findings to the Gemini Board, so as to improve the flow of information between them.

- Adoption of GSC-led subcommittees (drawing on additional membership from the community) with the role of following new instrument development from procurement to construction, commissioning, and deployment.

All of these issues, and more, will be discussed at the upcoming Gemini Board meeting.

Gemini> The Board is working to have the revised GSC in place at the beginning of 2012.

12 Science Impact of the Gemini Transition Plan

The GSC considered the science impact of the proposed transition plans, which include numerous cost-cutting measures in order to manage the loss of the UK from the Gemini partnership. Although it appears clear that some loss of science capabilities cannot be avoided, it was felt that better engagement of the user community in all stages of this transition could help mitigate the damage.

Several ideas were discussed:

- Operation of the telescopes by non-research astronomers is a potential problem, but experience on other large telescopes indicates that this appears to be workable, with sufficient training.

- Proposal verification by NGOs, rather than exclusively Gemini Observatory staff, is of concern to the smaller partners in particular, as they are uncertain that sufficient expertise across the full array of instrumentation would be available. This highlighted the fact that

the present NGO agreements are out of synch with the reality of the situation, an issue that is being looked into by the Operations Working Group.

It was noted that, in general, the margin for error in the implementation of the transition plan are slim, and one can easily imagine unanticipated problems emerging.

The GSC recommends that the transition plan go forward as proposed, with careful assessment of the impact on operations being monitored.

Gemini> The observatory will continue to monitor these effects. In the short term, operations has lower priority than completion of the instrumentation projects (including GeMS and GPI), and in the long term, we cannot maintain all activities at the same level with a reduced staff. Thus, complete operations “as usual” cannot be expected, although we are trying to minimize the impact on individual users. For example, we are working closely with the NGOs to identify ways to avoid duplicating work and complete tasks more efficiently. NGOs will continue to have observatory assistance with proposals to the extent they require it.

13 APPENDICES

A. State of the Observatory (Simons):	gsc2010_StateofObservatory.pdf
B. Science Highlights (Levenson):	gsc2010oct_sci-hilights.pdf
C. Operations Status Report (Adamson):	gsc2010_oct_Operations Status.pdf
D. Instrument Status Report (Tollestrup):	gsc2010_Instrument Status.pdf
E. White Papers (Tollestrup):	gsc2010oct_White Paper Authors_Titles.pdf
F. Operations Working Group Report (Ryder):	gsc2010oct_ResolutionsActions.pdf
G. Mid-IR Present (Adamson):	gsc2010oct_Mid-IR Covering.pdf
H. Mid-IR Future (Adamson):	gsc2010oct_Mid-IR Future.pdf
I. GAAO Possibilities (Willott):	gsc2010oct_GAAO_Sept2010.pdf