

# Gemini Science Committee (GSC) Report October 2006

## CONFIDENTIAL

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### 2 GSC Membership (Conflicts listed after name)

Conflicts are listed for the member's current institution, and include past and current Gemini contracts or submitted bids.

Prof. Simon Morris (Chair)

- WFMOS, GLAO
- GMOS (+IFU)
- GNIRS-IFU

Dr. Timothy Beers

Dr. Malcolm Bremer

Dr. Luis Campusano

- Board

Dr. Paul Francis

- GSAOI

Dr. Rachel Johnson

- WFMOS

Dr. JJ Kavelaars

- Lots of conflicts, especially on AO, not explicitly listed at the meeting

Dr. Michael Liu

- By teleconference, NICI, GLAO, PRVS

Dr. Basilio Xavier Santiago

Dr. Verne Smith

- NICI
- Flamingos 2
- WFMOS

Dr. Nicole Vogt

Prof. Howard Yee

- Board

#### **Observers at the GSC Meeting**

- Dr. Jay Frogel (AURA)
- Dr. Charles Woodward (Board )
- Dr. Colin Aspin (UH)

### **3 Meeting Overheads**

The GSC chair sat in on discussions of the AOC-G on ways to reduce the meeting overheads on Gemini staff. No clear recommendations emerged, but the current practice of merging the AOC-G and GSC meetings was strongly endorsed, and the possibility of holding the merged AOC-G/GSC meeting much closer to the Finance committee and Board meetings was discussed.

### **4 New Staff**

The GSC welcomed Dennis Crabtree to his new role as Associate Director for North/South Science Operations, and look forward to working with him in the future.

### **5 Matters arising from the GSC October 2005 Report**

Although this was not in fact an Agenda item during the meeting, the issues from that report were discussed under other topic headings in this report. In future, it is planned to have this topic as an explicit agenda item.

### **6 Gemini Board Resolutions**

The GSC noted the Gemini Board resolutions of November 2005, May 2006 and the teleconference of August 2006.

## **7 Earthquake Report**

The GSC received a briefing on the effects of the Hawaii Earthquake, including updates during the course of the meeting. The GSC appreciates the hard work being done, and was grateful for the willingness of the Gemini staff to combine dealing with this emergency and supporting the GSC meeting.

It was clear during the meeting that some of the recommendations of the GSC in this report may be hard to follow, given the obvious top priority of getting Gemini North back on-sky. However, the GSC has tried to fulfil its role as an advisory body to the Gemini Director by making recommendations based on the information available at the meeting, with the expectation that these recommendations will have to be balanced against other priorities by the Gemini Directorate.

## **8 Proposed Changes to GSC's Terms of Reference**

There was considerable constructive discussion of the draft terms of reference presented to the GSC. Much of the discussion centred on the clear conflict between having the GSC serve as an external User's committee and also serve as an advisory body appointed by the Gemini Director. While it would be possible to separate these two functions (along the lines of the ESO User's Committee and the ESO Science and Technology Committee), the majority of the GSC members agreed that any expansion in the number of Gemini Committee's was inadvisable. One suggested way of reducing community concern about any lack of independence of the GSC was to have the Gemini Director appoint members (in consultation with the GSC Chair) taken from a list solicited from the Gemini Partner Agencies.

It was also noted that in order to fulfil its role as a User's committee the GSC needs to not only collect and document User's concerns, but also to monitor the Observatories responses to these, and inform the Gemini Users' of the results. A model was proposed whereby the Operations Working Group (OpsWG) collects user feedback through the National Gemini Offices (NGOs), and also through the questionnaires circulated to Gemini Users by the Observatory, and flags items of concern. These will then be discussed by the GSC during the OpsWG report and documented in the GSC report to the Director. (This has been partially implemented already). There will then be a fixed GSC agenda item each year where the responses of the Observatory to these concerns are reported and documented. (This too has been partially operating already). It is proposed that these parts of the GSC report to the Director be edited into a public document which is published to the Gemini community, possibly via Gemini Focus, and/or via a web location.

The GSC Chair was tasked with collecting detailed comments on the draft GSC Terms of Reference and collating these into a new Draft by the time of the November 2006 Gemini Board meeting.

In the course of these discussions, the number of GSC working groups was collated. These currently are:

- The Operations Working Group: tasked with several functions, but particularly reporting to the GSC and the Gemini Director on issues of User's concerns, Operational Efficiency, the Time Allocation process, and NGO operations.
- The Adaptive Optics Working Group: tasked with advising the GSC and the Gemini Director on all AO related issues at Gemini.
- The Planet Finder Working Group: This working group is being set up to advise the GSC and the Gemini Director on issues relating to the Near-Infra-Red Coronagraphic Imager (NICI), the Gemini Planet Imager (GPI) and the Precision Radial Velocity Spectrometer (PRVS).
- The WFMOS Working Group: This working group is not currently active due to the difficulties of dealing with conflicts of interest during the current competitive phase of the WFMOS study.
- The Data Reduction Working Group: tasked with advising the GSC and the Gemini Director on Data Reduction Issues at Gemini.

These working groups generally have independent membership and indeed functions which are not restricted to reporting to the GSC. However, it is expected that a report on their work over the year will be received at each GSC meeting.

## 9 Aspen Program

Reports were received on the status of the GPI, WFMOS and GLAO studies.

The GSC was pleased to see the progress on the GPI work. We were explicitly consulted on an interesting science trade between spectral resolution, wavelength coverage, field of view and exposure time. While not having in front of us the technical details needed to advise on specific numbers for the above parameters, the GSC strongly felt that the ability of GPI to characterise planetary properties should be preserved, even at the expense of some ancillary science, such as the study of debris disks (which will be partially covered by NICI). Although it would be acceptable, for example, to increase the time needed to measure planetary surface gravities in order to gain ancillary science, (given the likely small number of such planets suitable for study), anything that risks the ability to make such measurements at all should be strongly avoided.

The GSC was pleased to see the Board's directive to restart of the WFMOS studies. Although, whether this is possible remains uncertain, depending on the outcome of on-going negotiations with the Observatory and WFMOS study teams.

Under conditions of strict Non-Disclosure, the GSC was given a report on the Precision Radial Velocity Spectrometer review.

**Some Text removed**

The GSC was also pleased to hear that any future PRVS campaign would be organised on a competitive basis, allowing the whole Gemini community to bid for involvement.

## 10 Gemini AO Program

The GSC received reports on the Altair LGS system, the MCAO System and Mauna Kea Inter-Observatory Synergies. The GSC also received a comprehensive, and extremely helpful, report from the AOSWG.

The GSC noted the successful recent Altair LGS run. The GSC endorsed the AOSWG strong recommendation that efforts be made to upgrade the Altair LGS performance to be competitive with the Keck LGS system. It was strongly felt that the whole of the Gemini AO programme would be seriously undermined if users could not be persuaded to use this system and were not able to compete. In practice, then, the highest priority should be given to increasing the LGS sky coverage through expanding the Tip-Tilt (TT) star acquisition field of view, and allowing fainter TT stars to be used. The next priority involves ensuring that competitive image qualities are delivered at the science focal planes.

The GSC also holds to its view that MCAO with GSAOI and Flamingos 2 will be world leading facilities, and was very pleased to hear about the progress of these projects.

The GSC noted the AOSWG advice about a possible upgrade of the NICI Deformable Mirror (DM). The GSC agreed that, when NICI and MCAO were both operational, it would be very unfortunate if NICI could only operate in the best seeing conditions. As a result the GSC recommends that on-sky performance data for NICI with the current DM be collected, and that scheduling of joint NICI and MCAO operations be investigated, to quantify the extent of this problem.

The GSC noted the long term vision and the outline of a strategic plan for AO at Gemini presented by the AOSWG.

The GSC noted the comments of both the AOSWG for Gemini in particular and also Bob Fugate in the context of Mauna Kea wide AO, indicating that the ambitious AO plans were seriously under-staffed. The GSC would like to draw the attention of the Gemini Board to these concerns.

The GSC gratefully noted the offer of the AOSWG of performance modelling for the combination of MCAO with the GNIRS IFU and the GMOS IFU. The GSC recognises that all such (unfunded) modelling efforts take significant amounts of work, and are difficult to fit in amongst other funded projects. The GSC also noted the AOSWG request for additional astronomy advice to allow it to prioritise such modelling efforts, amongst other things. The GSC notes that the current GSC membership and terms of reference are under review, and that significant changes in membership are possible in the near future. As a result, the GSC recommends that the AOSWG (in consultation with the GSC Chair and Gemini Director) recruits further astronomers with AO experience from outside of the current GSC, to help with prioritisation. The GSC Chair also accepts the offer of a (virtual) attendance at future AOSWG meetings, to ensure the extremely valuable AOSWG effort is used optimally.

## 11 Operational Issues

The GSC received a report from the Operations Working Group, as well as reports on Science Efficiency and Program Completion, and the Gemini Dataflow System and Products Project.

The operations working group highlighted a number of issues, and also proposed a number of solutions.

- Oversubscription is not high and falling in several partners
  - End of semester web pages with completion statistics
  - Less confusing Phase-II skeletons
  - Better advertising of Phase-II libraries within the skeleton
- Phase-II skeletons are not useful
  - Investigate short and long term possibilities for including the OT libraries as part of the Phase-II skeleton
  - Improve the guide star selection algorithm in Phase-I, which feeds into the Phase-II skeleton
- Users are finding data reduction difficult
  - Not discussed in detail. Some issues within remit of DRWG.
  - Discussion between Gemini staff (DRWG) and NGOs required.
- Web pages are out of date. Information is hard to find
  - A two stage plan to improve the web pages is in progress
  - Led by Gemini (Rachel Mason) with effort from Gemini and NGOs
  - Stage 1: remove conflicting and confusing information
  - Stage 2: migrate to new content management system for improved navigation

The GSC endorsed all of the OpsWG suggestions for solutions and would like to thank them for their proactive approach to the issue of User feedback. As noted in item 8 above, there are proposed changes to the GSC terms of reference that should formalise the process which the OpsWG already has partially in place.

The GSC noted the recommendation to change the size of the allocation bands from its current values of bands 1=20% 2=30% 3=50%, to bands 1=30% 2=30% 3=40% (acting in response to a suggestion of the November 2005 ITAC). The advantages of the change would be to allow more sensible allocation of projects to band 1 and to keep more discrimination between the lower ranked, but still accepted, proposals. The GSC supported this change, after being given some (qualified) reassurance by the Gemini North Head of Science Operations that the current completion targets would be sustainable, with rollover, for reasonable weather conditions.

The GSC noted the continuing problem with partner imbalances in integrated time allocated on the telescope, and endorsed the Observatory proposal for how to reduce these imbalances.

The GSC noted the suggestions for reductions in acquisition time, and reiterated their strong desire for a rapid implementation of efficient blind offsetting. It was suggested at

the meeting that implementation of this upgrade would have a disproportionate effect on user perception of Gemini efficiency.

The GSC noted the Gemini Board interest in the Dataflow System, and endorsed the implied high priority for this work. The GSC was pleased to see the progress made so far on this project. The vision and direction described by Pau Hirst, and included in the document seem consistent with the intent of the Board and the wishes of the GSC. The GSC was invited to send comments on the draft document presented at the meeting.

The GSC also received a report on the proposed NGO and TAC review.

## **12 Gemini Science Highlights and the Gemini 2007 Science Meeting**

The GSC received a comprehensive report on Gemini publication efficiency and also a collection of science highlights from the year. As noted in the GSC report last year, there is now no indication that Gemini is lagging behind its competitor observatories, and it is clear that the Observatory is delivering high quality science. Some of the details of the different science productivity of different instruments will be used below in the recommendations on instrumentation priorities for Gemini in item 13 below.

The GSC received a report on the preparations for the Gemini 2007 Science Conference and Users Meeting. The GSC was consulted on possible names for membership of the scientific organising committee. The GSC expressed some concern about the short time now available for filing out the agenda and ensuring sufficient people attend. It was noted that for the last meeting, Partner country funding was made available to encourage attendance, and the GSC would like to bring this issue to the attention of the Gemini Board.

## **13 Instrumentation Priorities**

The GSC received a report on the Gemini Instrumentation Program and also a request for guidance on future Instrumentation priorities.

As part of this process, the GSC revisited its recommendations from October 2005, which were endorsed by the Gemini Board in November 2005. Below we list an updated version of those recommendations, based on extensive discussions during the meeting.

Some of these recommendations were influenced by the information provided to the GSC on demand for instrumentation at Gemini (summarised in Figure 1: Distribution of Gemini Proposals by Instrument).



2007A proposal statistics



**Oversubscription:**  
**GN 2.06**  
**GS 1.97**

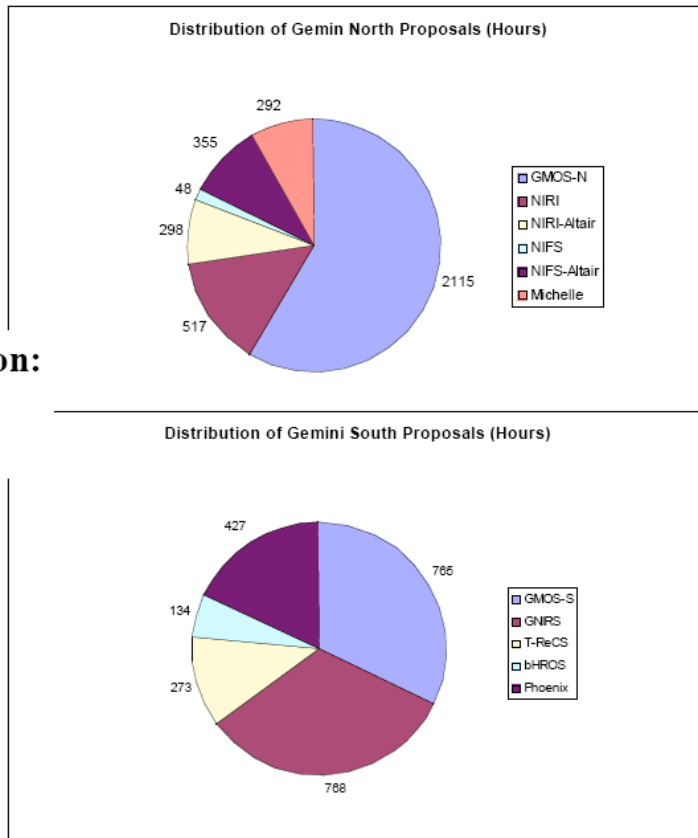


Figure 1: Distribution of Gemini Proposals by Instrument

And also by the information presented on publication statistics (summarised in Figure 2: Publication by Instrument) and citations (summarised in Figure 3: Top Cited Gemini Papers).

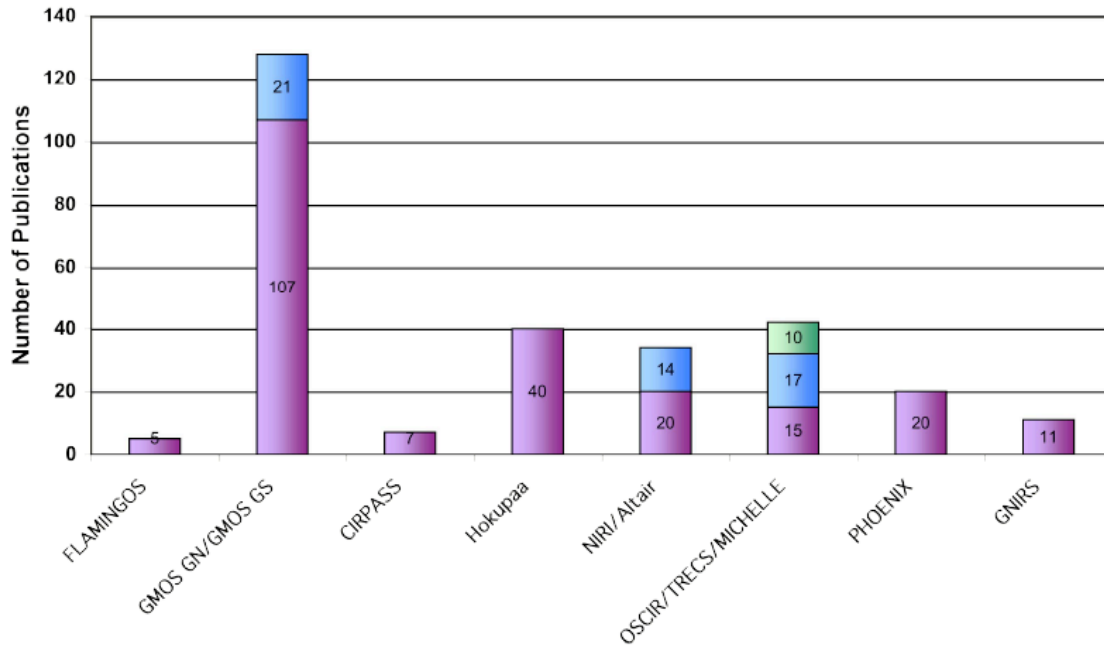


Figure 2: Publication by Instrument

<b>AUTHORS</b>	<b>YEAR</b>	<b>JOURNAL</b>	<b>#CITATIONS</b>	<b>ToMedian.AJ</b>	<b>INSTRUMENT</b>
Astier + 41 (SNLS)	2006	A&A	191	Other	GMOS-N Q
Genzel + 14	2003	ApJ	130	Other	Hokupa'a DD
Schodel + 5	2003	ApJ	113	Other	Hokupa'a DD
Glazebrook + 11 (GDDS)	2004	Nature	101	US	GMOS-N Q, DD
Close + 3	2003	ApJ	88	US	Hokupa'a C
Fox + 35 (ToO GRB)	2005	Nature	82	US	GMOS-N Q
Bloom + 27 (ToO GRB)	2006	ApJ	68	US	GMOS-N Q
Kaspi + 5	2003	ApJ	67	Ca	NIRI DD
LeFloch + 13	2003	A&A	66	Other	Hokupa'a Q
Berger + 23	2005	Nature	63	US	GMOS-N Q
Juneau + 13 (GDDS)	2005	ApJ	62	Ca	GMOS-N Q, DD
Abraham + 11 (GDDS)	2004	AJ	55	Ca	GMOS-N Q, DD

Figure 3: Top Cited Gemini Papers

As can be seen, the two GMOS instruments along with GNIRS are the current workhorse instruments in terms of demand, publication and citation. It is the view of the GSC that adding red CCD capabilities to at least one (and preferably two) of the GMOS spectrographs would preserve their value for some years to come. It is also the opinion of the GSC that this same popularity and publication success could be rapidly achieved by Flamingos 2 after commissioning on Gemini South, drawing largely on the same scientific (sub-)community.

One can also see in the above statistics the beginnings of payback for Gemini's AO investment. Amongst the various AO activities, the GSC intends in its recommendations below to follow the AOSWG advice to place as top priority making the Altair LGS system competitive with the Keck LGS.

On Gemini South, some of the commissioning decisions will be dominated by the delivery schedule of the instruments, and these have been folded to some extent into the recommendations below. That said, the relative ranking of Flamingos 2 and MCAO was discussed at length during the meeting, with the current order reflecting the view that Flamingos 2 even without MCAO is expected to be a highly useful and productive instrument. Of course, the GSC is also **extremely** excited about the prospects of using Flamingos 2 and GSAOI behind MCAO.

### **13.1 Gemini North**

- Red CCDs for GMOS N. The GSC still holds to a specification of 'competitive with FORS2'
- ALTAIR LGS
  - With NIFS (and NIRI with PSF variable) – option for no field lens larger TT sky coverage
  - Larger FOV for TT with field lens (goal to get comparable sky coverage to Keck LGS)
  - Improve the operational elevation from  $\geq 59$  deg to  $\geq 30$  deg
  - Goal of comparable IQ to Keck LGS
- Blind offset ability for GN (and GS) – GMOS high priority
- MICHELLE
  - Eliminate image elongation which is impacting science output
  - Dual beam chopping/guiding
  - Increase chop throw to 30"
  - Spectropolarimetry

#### **GN Footnotes:**

The initial TEXES results look encouraging. If we have lost the current opportunity due to earthquake, the GSC would like Gemini to investigate bringing it back after IRTF.

### **13.2 Gemini South**

- NICI
  - Commissioning
  - System Verification
  - Start of science campaign
- FLAMINGOS 2 (see above for some discussion of the GSC opinion on the relative priority of Flamingos 2 and MCAO)
  - Commissioning
  - System Verification
  - Demo science
- MCAO
  - System Verification
  - GSAOI

- Flamingos-2
- MCAO science operation readiness
- Red CCDs for GMOS S . The GSC still holds to a specification of ‘competitive with FORS2’. NB First priority for red CCDs is GMOS N.
- Blind offset ability for GS – GMOS, GNIRS high priority

**GS Footnotes**

A NICI DM upgrade path may be important to free up good seeing nights for MCAO, but may need on sky data and some analysis of possible queue building before making a decision.

**13.3 General Footnotes**

- The Subaru MOIRCS trade is also very important
- The GSC supports the Gemini directorate in its continued investigation of further exchanges of time.
- The GSC noted the Keck trade barrier around Keck 2 (Deimos), but agreed that an option for access to LRIS blue was worth further investigation.

**14 Science Time Fractions**

The GSC was asked to comment on science time fractions for the two Gemini telescopes. A proposed distribution which was discussed is shown in Figure 4: Science Time Fractions.

Telescope	2007B	2008A*	2008B*
GN	90%	95%	90%
GS	75%	80%	80%



*(\* ) Tentative % for 2008 - to be re-visited in 2007*

**Figure 4: Science Time Fractions**

It was explained that the (very impressive) 95% science time goal could only be achieved during semesters when no major optics needed coating, and no major commissioning activities were occurring, and that otherwise, one should expect 90%. The GSC accepts these statements and commends the Gemini team for their ambitious goals for Gemini North.

Gemini South has a large number of major instrument commissioning activities pending, and the GSC also accepts that 75% science time for semester 2007B is a reasonable goal. However, in the absence of a more detailed commissioning plan for the periods 2008A and 2008B on Gemini South, the GSC is currently unable to support the proposed 80% science times. While accepting that any reasonable person would expect the current commissioning to extend into these periods, the GSC would like to recommend that a

goal of 90% science time be retained for these two periods **until** such a commissioning plan is in place and reviewed.