

# Report of Gemini's Science and Technology Advisory Committee (STAC), Nov. 2023

The STAC held its twenty-fifth meeting on 13-14 Nov. 2023 in a hybrid format (meeting in La Serena, Chile, and via Zoom).

## STAC Membership

Craig Heinke, Chair	Damián Mast
Henri Plana, Deputy Chair	Rene Mendez
Ivana Damjanov	Jenny Patience
James De Buizer	Benjamin Shappee
Maria Drout	Breann Sitarski
Rebecca Larson	Gelys Trancho
Jae-Joon Lee	Jonelle Walsh

## Congratulations

**25.0** The STAC congratulates the Observatory on the offering of GHOST and the GNIRS low-res IFU to the community, the signing of an MOU for Gemini to join the GIRMOS partnership, and the recruitment of KASI as a GIRMOS partner.

**25.1** The successful delivery of IGRINS2 is exemplary, showcasing the team's exceptional job.

**25.2** The STAC congratulates the Observatory on completing the repair of GMOS-S, the successful return of Gemini-N to the sky after the M1 repair, and overcoming the cybersecurity incident. The STAC appreciates that recovering from the cybersecurity incident is an ongoing effort. This has been a very challenging year.

**25.3** The STAC appreciates the Observatory's provision of details on development risks, safety incidents, and a ToO completion analysis in its last response.

**25.4** The STAC congratulates the Observatory on its numerous successful recruitment efforts. In particular, the STAC welcomes Dr. Andreas Seifahrt as the new AD Development and thanks Dr. Rubén Díaz for his work as Acting AD Development.

**25.5** The STAC wishes to sincerely thank Jen Lotz for her leadership of Gemini Observatory through several crises and wishes her well in her new appointment as STScI Director.

## **Recommendations/Endorsements**

**25.6** The STAC notes that the Observatory is still recovering from the cybersecurity incident, with significant and continuing impacts on many projects and efficiencies. The STAC urges NOIRLab to continue to focus IT efforts and resources on restoring Gemini's internal systems as quickly as possible. The STAC emphasizes that there is a high risk of delays to both scientific instrument development and commissioning if the impacts of cyber security on restricting access to machines from teams are not resolved imminently.

**25.7** We endorse Gemini's plan for an externally led review of SCORPIO project management in early 2024. The STAC would also encourage the Observatory to include a reevaluation of the current instrument design with respect to the intended science case as part of the review process to ensure all relevant and required expertise is accounted for in the program.

**25.8** The STAC would like to express significant concern about the current loss of science capability due to the lack of a functioning AO system in the North, as Altair has been down for over a year. We strongly recommend that Gemini pursue all avenues for repairing Altair and suggest that it may be helpful to work with the NRC on this.

**25.9** The STAC acknowledges and appreciates the planning efforts undertaken by Gemini Observatory for future maintenance strategy within the context of NOIRLab. We strongly encourage the Observatory to prioritize maintenance initiatives independently, recognizing its pivotal role in significantly mitigating the risk of telescope time loss. The STAC maintains concerns about potential scientific losses during the two-year gap preceding the full implementation of the proposed maintenance plan. Therefore, we recommend continued vigilance and contingency planning to minimize any adverse impacts on scientific productivity during this transitional period.

**25.10** The STAC identifies a potential risk associated with the existing telecom network access to the Maunakea summit. It is suggested that alternative access options, such as utilizing the University of Hawaii's (UH) network, be explored as a proactive measure to mitigate the risk of network downtime and, consequently, the loss of valuable science time.

**25.11** To support predictive maintenance, the STAC suggests establishing a regular calibration monitoring process for GMOS gratings, particularly when the gratings are temporarily removed from the telescope for extended periods. The use of the calibration unit during these checks will allow for the early detection of any potential deterioration issues, enabling proactive maintenance actions to maintain instrument performance.

**25.12** The STAC suggests that Gemini create a strategic plan for extending the lifetime of the GMOS instruments and their inevitable replacement, given the importance of the GMOS instruments to the scientific community and to the renown of the Observatory. These instruments have been in operation for an extended time and have increasing maintenance issues, resulting in a loss of their competitive advantage (specifically throughput and sensitivity,

IFU field of view) compared with the advent of similar instruments at other 8m-class observatories.

**25.13** The STAC suggests that if Altair is unavailable to commission the high-resolution GNIRS IFU by March, a small amount of IQ 20% time may be used to proceed with commissioning.

**25.14** The STAC recommends that for GPI 2.0, sensitivities and contrast comparisons be made with the current detector, with a new detector that meets specifications, and with and without CAL2.0, prior to a decision not to upgrade the detector and/or not to commission with CAL2.0. In parallel to the study, the STAC endorses pursuing a science-grade detector to replace GPI2.0's current detector with a high fraction of bad pixels.

**25.15** The STAC is keenly interested in employing GeMS with F2 without laser guide stars to enhance image quality across a broader sky area. This non-LGS mode improves image quality by a factor of 2, leading to "super-seeing" capabilities that expand sky coverage and streamline nighttime operations, opening up new scientific opportunities for GeMS+F2.

**25.16** The STAC notes a potential risk to scientific readiness and delivery of reduced data products to the community given the misalignment between the allocated FTE for software projects outlined in the software projects report and the instrument priorities highlighted during the development presentation, particularly concerning the facilitation of MAROON-X.

**25.17** The STAC endorses the plan to request input from the science community in preparing its strategic plan and suggests some minor edits to the questionnaire as presented in the Director's Report;

a) for Q2, suggest another response mentioning synergies with current facilities, specifically other optical and radio ground-based facilities.

b) Please add Euclid and Habitable Worlds Observatory to the 3rd response to Q2, along with JWST/HST/Roman.

c) In the instance where multiple choices can be selected, the STAC recommends including the ability to place them in user-designated priority order.

The STAC would be interested in helping with the development of the questions.

**25.18** The STAC congratulates the Observatory for the impressive archival data-based publication statistics, as it further emphasizes the importance and lasting scientific impact of Gemini. The STAC also encourages the Observatory to distinguish the number of publications by individual instruments to highlight the scientific impact of each. Tracking the number of papers that use Gemini to complement JWST, in addition to the productivity of Gemini compared to other observatories, is a worthy exercise in collecting input for the future investments of the Observatory in instrumentation development and allocation.

**25.19** The STAC notes the engineering time estimates provided by the Observatory for 2024B.

**25.20** The STAC recommends the following priority ordering for instrumentation projects into two distinct categories:

TOP: GNAO/GIRMOS, SCORPIO, IGRINS-2, GPI2, MAROON-X, GNIRS IFU

SECONDARY: GeMS improvements, GPOL, GLAO conceptual design plan.

The STAC holds divergent viewpoints regarding incorporating these "secondary" priority items before completing the "top" priority projects, which are more scientifically impactful. The concern is that spreading staff and resources thinly across multiple projects may hinder the timely execution of the Observatory's highest-priority initiatives.

**25.21** The STAC looks forward to community involvement in the science verification of IGRINS2 in consultation with the new Gemini Chief Scientist.

**25.22** STAC members from several partners noted that it would be valuable to have scheduled meetings with the partner NGO offices a couple of months prior to the STAC meeting. For example, this would be an opportunity to discuss topics to include in the report, such as the instrument distribution of awarded time in addition to the distribution of requested time.

**25.23** It would facilitate better attendance and input from the STAC if Gemini would schedule the meeting with input from the STAC. In particular, teaching and grant schedules make the mid-November date difficult for many members.

**25.24** We highly value the insights provided by the current science metrics report released by the Gemini Observatory. While we understand that the cyber security event did not allow the creation of a metrics dashboard, in order to promote greater collaboration and facilitate information sharing, we again recommend the creation of an interactive website for science metrics reporting, similar to the successful implementation utilized by the sustainability group at NOIRLab/Gemini through Looker Studio (e.g., [https://lookerstudio.google.com/u/0/reporting/ce686bcc-9477-4f7c-bd3d-7085dd360b29/page/p\\_llq3sgn10c](https://lookerstudio.google.com/u/0/reporting/ce686bcc-9477-4f7c-bd3d-7085dd360b29/page/p_llq3sgn10c)).

By developing an interactive website, stakeholders, including National Gemini Offices (NGOs), would have the opportunity to actively engage with the data and apply filters that align with their specific requirements. This approach would enhance the targeted understanding of the Observatory's scientific contributions and foster collaboration between the Observatory and NGOs.

**25.25** The STAC looks forward to the forthcoming report detailing the results of the vibration test conducted at Gemini, as it will provide valuable insights into the performance enhancements required at Gemini before GPI2.0 can be effectively implemented.

**25.26** The STAC would like to see the report of shutdown nights broken down by planned vs. unplanned nights.

**STAC Points of Contact:**

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GMOS: Breann Sitarski, Ivana Damjanov  
GNIRS: Damián Mast, James De Buizer  
GPI-2: Breann Sitarski  
IGRINS2: Jennifer Patience, Rebecca Larson  
Instrument Upgrade Program: Damián Mast  
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SCORPIO: Maria Drout  
Visiting Instruments: Jae-Joon Lee  
Default for other issues: Chair

**Future STAC Meetings:**

The dates for the 2024A meeting have not been finalized as of this writing. Pending Board approval, this meeting will likely be held May 20-21 in a hybrid format and in Hawaii.