

## **Gemini User's Committee 2021 Report**

The User's Committee for Gemini (UCG) met remotely via Zoom on Wednesday 10/27 and Thursday 10/28.

The UCG members present included: Jonelle Walsh (Texas A&M University, chair), Lindsey Bleem (Argonne National Laboratory), Jennifer Burt (Jet Propulsion Laboratory), Scott Chapman (Dalhousie University), Jonathan Gagné (Université de Montréal), Thiago S. Gonçalves (Observatório do Valongo UFRJ), Maria Celeste Parisi (Observatorio Astronómico de Córdoba), Thomas Puzia (Pontificia Universidad Católica de Chile), Young Sun Lee (Chungnam National University), David Trilling (Northern Arizona University), Jonathan Williams (University of Hawaii, Manoa), and Letizia Stanghellini (ex-officio, US NGO).

Also present: Jennifer Lotz (Director), Henry Roe (Deputy Director), Janice Lee (Chief Scientist), Andy Adamson (Associate Director Hawaii Site), John Blakeslee (NOIRLab Head of Science Staff for Observatory Support), Joanna Thomas-Osip (Head of Science User Support), Adam Bolton (Associate Director for the Community Science and Data Center, NOIRLab), Venu Kalari (Scientist Gemini South), Kathleen Labrie (Scientist Gemini North), Bryan Miller (Scientist Gemini South), Fredrik Rantakyro (Scientist Gemini North), Julia Scharwachter (Scientist Gemini North), Andy Stephens (Scientist Gemini North), Lucia Medina (Executive Assistant), and Kathy Vivas (NOIRLab Head of Science Staff for User Support).

The UCG members would like to thank the Gemini staff, for all their work in setting up the logistics and providing presentation materials ahead of time to make the virtual meeting as efficient as possible. For future meetings, we request a brief (~10 minute) closed-door session at the start of the meeting for the committee to get organized prior to the presentations from the Gemini staff.

### ***Opportunities for Gemini Support through NOIRLab's Community Science and Data Center (CSDC):***

The UCG appreciated hearing about NOIRLab's CSDC and potential areas of collaboration with Gemini to advance data systems and user support. Below we provide feedback related to the CSDC five-year plan, the US NGO web portal, and the plan to host high-level science products.

The five-year plan for the CSDC is ambitious and the UCG is concerned that the number of FTEs in the project is not large enough to carry out all of these projects. It would be helpful to give a timeline for each item, such as integration of Gemini data into the NOIRLab archive. The presentation included items on "support and advocacy for US Gemini user community" and "engagement with the community for future facility planning and instructional programs" that

are quite different from the clearly defined data science areas in the rest of the report. The committee would like more clarification on what the role of a national CSDC is and how it relates to the international Gemini facility in particular.

The US NGO web portal is useful though it is not readily found from the main NOIRLab front page. It would be useful to have a prominent direct link from gemini.edu. The GitHub repositories linked off the US NGO web portal will be an excellent resource for researchers, and we look forward to seeing them enhanced with more complicated jupyter notebooks that illustrate the flexibility of the data reduction software.

Overall the UCG thought that offering the opportunity to host high-level science products (HLSPs) was a good idea. It is a good way to increase publication rates and broaden participation. Extending this option to smaller programs could be beneficial to the community in a number of ways. It is good to see that there has been a successful rollout for the GOGREEN Gemini Large and Long Program (LLP) before proceeding to more (and smaller) programs. This phased approach should allow Gemini to understand to what extent they have sufficient resources (i.e., people) to manage the hosting/delivery of these HLSPs. The UCG was concerned that this could be a large task with very porous boundaries, and that a limited rollout was the right approach, at least initially. Furthermore, in developing HLSPs, additional support, ideally in the form of community funding to help PIs and their teams assemble the products and necessary documentation, would go a long way to getting smaller programs (non-LLPs) to participate and would help LLPs provide high quality products beyond the minimum requirement.

### ***Gemini Program Platform (GPP) Update:***

The UCG appreciates the effort put into the development of the GPP. We unanimously agree that this will streamline the proposal submission process in tandem with the development of Phase II observation scripts. We see this work as a major improvement over previous tools, and thank the Gemini team for the initiative.

The UCG supports efforts to recruit testers from the community to determine which aspects of the GPP require improvement ahead of the official launch. Holding demos/workshops at upcoming astronomy meetings (AAS, Gemini Science Meeting 2022, etc.) and requesting that participants sign up as longer term testers may avert the need for explicit incentives as attendees are likely to be future Gemini users with a vested interest in learning how to use GPP efficiently and effectively. We assume that personalized attention, in the form of training on the GPP tools or targeted tutorials for science cases related to the tester's field of expertise could generate interest. Gemini Observatory could also fund/train experienced users at various universities to hold half-day workshops on how to use GPP; funding at the \$1-3K level per workshop organizer could attract volunteers to host such events. In the same vein, development of a library of

tutorials addressing some of the most common observing modes that users can access via the GPP website would help facilitate asynchronous learning on how to use GPP.

Two UCG members are interested in testing the GPP, and the developers should feel free to contact them once user testing begins: Jonathan Gagné (Université de Montréal) and Thiago S. Gonçalves (Observatório do Valongo UFRJ).

In addition, we list some minor suggestions below that might help further develop the platform and guarantee its intended impact on the users community. We predict that the general community will have further requests. It may be worth creating a repository for these kinds of suggestions where users can submit new requests or upvote previously submitted requests so that the GPP developers can see what features are of greatest interest to the community.

Suggested/requested features for GPP:

- Ability to read in lists of targets from a user generated .csv type file
- Ability to generate finder charts in a handful of standardized formats as specified by the instrument scientists
- Alert the user if the detector might enter the nonlinear regime or saturate anywhere based on the integration time calculator directly in the GPP
- A tool that lists telluric standards for near-infrared spectroscopy or radial velocity standards, as drawn from lists that can be queried directly with CDS, e.g. Soubiran et al. 2018 for radial velocity standards.
- Bring forward all target information from Phase I to Phase II (e.g., spectral types) so that users don't have to re-enter information when planning actual observations.
- Ability to import a previous semester's proposal as the starting point for a new proposal and then update as necessary before submitting.

### ***DRAGONS:***

We thank the DRAGONS team for their hard work thus far and applaud the milestones that have been reached, including adding reduction capabilities for all the imaging modes and a GMOS longslit quicklook, testing various operating system compatibilities, and providing a virtual machine for spectroscopic data reduction with Gemini IRAF. The completion of DRAGONS will represent a significant improvement in user experience over IRAF and will be beneficial for training graduate students.

The UCG members unanimously agree that completing DRAGONS should be a high priority for Gemini. We appreciate the challenges of developing such a comprehensive pipeline for all instruments, but the proposed timeline is worrisome. The current need for IRAF for spectroscopic data reduction makes the user experience challenging, driving away potential

observers and affecting science productivity. We are concerned that the resources assigned to DRAGONS development is not sufficient for a timely release of spectroscopic capabilities and some UCG members were particularly worried about the long timeline for the support of multi-object spectroscopy (MOS). Statistics show that GMOS is the main workhorse of both telescopes, and delivering science-quality data for longslit, MOS, and IFU modes should be an absolute priority. We urge the observatory to dedicate more FTEs to the project. Increasing the personnel would potentially allow Gemini to create sub-groups within the DRAGONS development team to speed up the process.

In addition to increasing the personnel, we recommend that the DRAGONS team obtain feedback from the user community, and not primarily rely on helpdesk tickets from users encountering problems. Gemini sends out simple Phase III surveys, and soliciting DRAGONS feedback should be built into that survey. By doing so, the DRAGONS team would learn about what is working well and if there are simple modifications that can be made that would make a big difference to the user.

According to the Gemini presentation, DRAGONS is compatible with Linux and Mac Intel, and will be compatible with Mac M1 (although it is not yet tested). The UCG wonders if it is possible to make DRAGONS compatible with Windows as well.

Finally, the committee was contacted by developers of PyPEIT, a general use and well-tested Python data reduction package (<https://pypeit.readthedocs.io/en/release/>). Given the long timeframe proposed for implementing spectroscopic data reduction in DRAGONS, we endorse Gemini engaging with the Pypelt developers to determine ways in which both platforms can be mutually beneficial to each other. We understand that Gemini is organizing a discussion with PyPEIT developers, which the UCG strongly supports, and we look forward to an update about the outcome of those discussions..

### ***GMOS Flat-fielding and Photometry:***

The UCG is pleased with the work that has been done to characterize the flat-fielding/quantum efficiency (QE) issues for GMOS. This is a challenging problem. It is important that this critical knowledge is more effectively flowed downstream to the users in terms of both experimental program design and in data reduction. Below we make several suggestions.

1. Provide prominent documentation in appropriate locations on the Gemini website detailing the extent of the problem and the best mitigation procedures through program design to reach desired levels of photometric accuracy (e.g., limitations on dithering, acquiring night flats, etc.) for common filter choices. We also recommend incorporating

this as part of the GPP EXPLORE application (and automatically filling appropriate calibrations for a chosen level of photometric accuracy if additional data is required).

2. It is critical to incorporate CCD-by-CCD reduction capabilities in DRAGONS. We also recommend providing both instructions on the GMOS data reduction webpages and tutorial Jupyter notebooks that guide users through this process. While DRAGONS is being developed it would be helpful to provide a worked example with IRAF scripts on a reference dataset illustrating the current best practices for flattening the data.
3. We recognize that DRAGONS development is resource limited and encourage Gemini to explore partnering with other imaging pipeline experts at NOIRLab to expedite this important software development.

### ***Response to Last Year's Report:***

The committee thanks Gemini for the response to the 2020 UCG report and we provide follow-up comments below.

#### *Data Reduction Pipelines -*

The committee thanks the Gemini staff for their work on developing the DRAGONS platform and the progress made. As discussed above, the UCG believes that DRAGONS should continue to remain one of the highest priority tasks for Gemini and suggests that the observatory examines how more resources can be diverted into expediting the process of the implementation of various pipeline modes on a more rapid time horizon than anticipated in the last Gemini Observatory Commentary on the UCG 2020 Report.

In addition, the ReadTheDocs (RTDs) format is a good way to serve information on data reduction packages to the users community in a modular fashion. The UCG suggests that all resources are kept up to date whenever the data reduction packages are available. One aspect that could be considered as an added-value ingredient of the DRAGONS infrastructure is to include the manuals and tutorials of visiting instruments (e.g., GRACES) in the RTDs environment.

#### *User Committees in the Era of NOIRLab -*

We thank Gemini for seeing the UCG as an important voice of the Gemini users in the new NOIRLab organization structure. The UCG was wondering whether the directorate sees a way of how to optimize a future integration of the UCG in the larger NOIRLab structure.

#### *GMOS Calibrations -*

We thank Gemini for the relentless work on this issue, and refer to the more specific comments in the corresponding section (“GMOS Flat-fielding and Photometry”) above.

*Gemini and NOIRLab publications -*

The UCG considers the new format of the Gemini and NOIRLab online publications a good mechanism to share the science and observatory news with the community and public.

*Virtual Gemini Science Meeting (GSM) -*

The UCG found that the GSM was very well organized and provided a productive format for talks and discussions. We enjoyed the Whova platform, and found it very easy to navigate the meeting with the talks, questions, and agenda all in one browser window. The meeting was better than several virtual conferences UCG members have recently attended.

*New Gemini Website -*

The UCG thinks that the new website is well developed, and it is now much easier to find the information that one wants. In particular, we appreciate that all information relevant to an instrument is grouped together. The UCG members thank Gemini for the nice transition to the new Gemini website.

*GPP -*

It is great to see the continuous development of the GPP. As the GPP section above provides specific comments, we refer to the GPP section for further information.

*Timing accuracy -*

The UCG thanks Gemini for the report on the timing accuracy issue, providing the corresponding numbers, and updating the webpage. After speaking with an expert user outside of the committee, we would like to relay that the stated accuracy of  $\sim 0.1$  seconds is unfortunately insufficient for accurate astrometry of Near-Earth Objects. For the fastest moving sources, milli-second timing accuracy is required. This challenge has been solved for Megacam on the Canada-France-Hawaii Telescope (CFHT) using simple hardware (Raspberry Pi) on the shutter mechanism and we encourage the Gemini staff to contact CFHT and see whether a similar, relatively simple fix can be implemented. Furthermore, it may be advantageous to target other experts in the user community and inquire whether additional information on the variances and time components of the timing accuracy would be needed.