

Space Telescope Users Committee (STUC) Report: November 13-14, 2018

STUC members attending: Rupali Chandar, Dawn Erb, Francesco Ferraro, Cynthia Froning, Ana Ines Gomez de Castro, Mercedes López-Morales, Keren Sharon (Chair), Patrick Slane, Anne Verbiscer, Benjamin Williams; STUC members: Sanchayeeta Borthakur, Stephane Charlot

Meeting Summary:

The STUC reviewed presentations on the following topics: STScI outlook (Sambach), HST Project Update (Wiseman, Crouse), HST Mission Office Report (Brown), Instrument Status Reports (Debes, Oliveira, Sabbi, Grogin), HST TAC: Anonymous proposing, Cycle 25-26 review and results, plans for Cycle 27 (Leitherer, Natarajan, Reid, Johnson), NASA HQ Perspective (Still), DD statistical summary (Fox), Mid-cycle summary (Reid), HST Senior Review Preparation (Osten), ESA update (Nota), LIGO WG report (Margutti), and report from the working group on UV legacy DD program (Oey).

This report summarizes the key issues that were discussed, and recommendations of the STUC. [For a full account, the community is encouraged to review the STUC meeting presentations, accessible through <http://www.stsci.edu/institute/stuc>.](http://www.stsci.edu/institute/stuc)

Mission status

The performance of HST continues to be excellent.

During the six months since the previous STUC meeting, two of the gyros were replaced. Gyro 1 failed in April, and Gyro 2, which was experiencing degraded behavior and closely monitored, failed in October.

As of Nov 2018, the science instruments are all performing as expected, spacecraft operations are returning to fully nominal performance following the incorporation of Gyro 3 in response to Gyro 2 failure, and observation scheduling is proceeding with high efficiency.

The Operations teams deserve particular recognition for the manner in which complications from the Gyro 2 failure (with Gyro 3 displaying unexpected behavior) were handled. The return to science observing was completed in a timely manner, and the community was kept well informed of the entire process. The performance of Gyro 3 is still being monitored, and despite all indications that it will perform nominally for an extended period, the team already has a well-crafted plan for operations under any future gyro failures. Any such future change will require some software changes, and a restructuring of the Long Range Plan (LRP) of observations, but the basic plans to accommodate this are in place.

The incorporation of Cycle 26 targets into the LRP has not yet begun, and the "tail" of observations from previous cycles that extend beyond the nominal cycle end in October has continued to grow. Roughly 2300 orbits remain to be covered from Cycles 24 and 25, including hundreds of orbits that were moved due to time lost to the safe mode period during which the gyro swap was completed. Many of these remaining programs are somewhat inflexible in terms of placement in the LRP - particularly over 300 orbits of exoplanet observations with tight phase constraints.

The STUC inquired about whether or not the newly-implemented requirement for proposers to justify observing constraints in their Phase 1 proposals appeared to be successful. Many proposers did provide such justification, but there was some level of concern that others did not. Evaluation from the Phase 2 step is necessary to better assess this issue.

The STUC would like to remain informed on the success of this initiative, particularly given the recognition that scheduling constraints are becoming more difficult to satisfy while creating an efficient observing schedule.

Instruments Status:

The STUC is glad to see that the instruments are functioning at or above expectations, and that they appear to be exhibit all signs that they will continue to function for at least several additional cycles. The continuing calibration and quality control efforts in terms of flat fielding, bad pixel identification, dark and CTE corrections, and distortion characterization are impressive and appreciated. We encourage these efforts to be continued, including updated point spread function (PSF) modeling capabilities. These new PSFs should be presented to the community along with documentation for how to implement them in their data analysis.

We thank the teams for monitoring closely the behaviors of the instruments after each gyro replacement. We recommend that the instrument teams alert PIs of specific programs in which behavior outside of normal was identified, (e.g., STIS high dark current), even if those anomalies can be easily calibrated, as they could cost the observer time and effort to diagnose them as related to the gyro replacement.

GO funding:

It was reported that the observation scheduling tail is becoming longer, with some programs spilling into consecutive cycle or cycles. At the same time, the users, and in particular budget PIs, are reminded that the allowed period of performance would be limited to up to 3 years, with strict limit of no more than one year of no-cost extension.

The STUC is very concerned that if there is ZERO flexibility in this policy, some fraction of programs would be negatively affected by this policy. For example, consider a program where one orbit is executed early in the cycle, while the bulk of the observations are pushed to late in the same cycle or to the next cycle. The allocation of funds and the beginning of the period of

performance are triggered by the first observation by default, regardless of whether the beginning or bulk of the actual work can commence. It is highly unlikely that the project would be executed as planned in the budget narrative and management plan.

Since at this time the STUC does not have information, [the STUC requests to see in a future meeting some statistics summarizing the distribution of time elapsed between observations and GO-based publications.](#)

Furthermore, the STUC discussed this issue and proposed some adjustments to the policy for STScI to consider:

- [1. Allow some case-by-case relaxation of the policy.](#)
- [2. Enact the one-year no cost extension limit starting after at least 90%* of the observations have been executed. \(*the exact fraction can be decided on\).](#)
- [3. Allow PIs to decide whether they want to start receiving funding immediately at the time of the first observation, or delay the beginning of the period of performance to a later time \(e.g., when they anticipate hiring, student funding, etc.\) and the period of performance would start then.](#)

HST TAC: Anonymous proposing in Cycle 26

Cycle 26 was the first time that proposal selection process was fully anonymous. The STUC is pleased to learn that the community adjusted well to the changes, as evidenced by the fact that only a handful of proposals (out of 489) were flagged as non-compliant with the new rules. The STUC was glad to learn that the identity of the proposers remained concealed during all the stages of the process, including the Director's review of the selected programs, until the final stage.

The STUC heard a summary from the TAC Chair and internal panel observers, as well as the external observers, Dr. Johnson and Jessica Kirk. The summary indicates that overall the process went smoothly, and panel chairs reported that the discussions were thoughtful and focused on the scientific merit of the proposals. The high-quality of the discussion was attributed to a combination of the anonymous process and the request to upload comments in advance of the meeting.

Although the reports were overwhelmingly positive, the STUC cautions against drawing overly optimistic conclusions on the double-anonymous process from this cycle alone. As will be elaborated on below, Cycle 26 was extremely unusual in many aspects: the overload on the panelists, the number of orbits available to allocate, the typical size of the proposals (i.e., no regular GO programs which are usually the bulk of the proposals submitted in a typical cycle), and the number of panelists. It is important to continue to review the implications and results of this initiative in future cycles.

The STUC supports the Institute's commitment to continuing the fully anonymous selection process for HST and JWST. For the next few cycles, the STUC recommends that Dr. Stephanie

Johnson and/or her team continue to work with STScI. The STUC also endorses the following recommendations from the Cycle 26 TAC Chair:

- (1) STScI should produce a training video on how to write an effective proposal that does not refer directly to the proposers.
- (2) The process should continue to include levelers, for at least 2 more cycles.
- (3) Continue to require the "Team Management and Expertise" document.

In addition, the STUC recommends to

- (4) Implement acknowledgement of receipt of the Team Management and Expertise Document.

Finally, we reaffirm our endorsement of the Director's decision and commitment to go forward with anonymous process, to apply it to all proposal categories (including Mid Cycle and DD) and to extend it to JWST.

HST TAC: Cycle 25 and ΔCycle 26 strategy, aftermath

Following preliminary reports on Cycle 26 review, the STUC requested that STScI presents their reflection on the overall C25-C26 time allocation strategy (beyond the dual-anonymous proposing), including a discussion of what worked, what didn't work, how the outcomes of this process met expectations (e.g., burden on community and institute, scheduling, oversubscription, effect on scientific output) and what lessons were learned.

As background, in order to mitigate the workload expected for the community as well as STScI during the beginning of the JWST era, Cycles 25 and 26 were combined, and the orbits were divided between them as follows.

- All small and regular AR proposals for Cycle 25 and Cycle 26 were solicited for and selected in the Cycle 25 review. The Cycle 25 TAC allocated the usual fraction of medium and large/treasury programs.
- Cycle 26 review was executed as Delta TAC, only selecting the Medium, Large/Treasury and joint programs of any size for Cycle 26. The expectation was to receive ~200 proposals (c.f. Presentation to the STUC on 11/06/2017).
- The structure of the Delta TAC was designed to be significantly reduced compared to normal cycles with only 4 panels, each covering broad scientific topics. (More information on the TAC structure is available to the community and linked to from the call for proposals).
- Mid-Cycle calls would accommodate pressing needs for small GO proposals.

The delay in the launch and proposal schedule of JWST, that was eventually announced in late March 2018 (well after HST Cycle 25 was reviewed), was not anticipated.

The STUC was presented with the Cycle 26 Delta TAC review aftermath. The number of proposals submitted (489) was >2x higher than expected, and the orbit request was higher than ever, >25000 (vs >23000 in the previous cycle); combined with the reduced number of orbits remaining to be allocated by the Delta TAC 26, this led to a success rate of only ~8%.

The Director is confident that the selected portfolio of programs for Cycle 26 is of the highest scientific value possible.

The STUC conveyed to STScI the dissatisfaction expressed by many members of the community regarding the delta TAC in Cycle 26. The resentment is mostly related to the small success rate, and the unparalleled workload on the panelists. Also of concern is the high fraction of approved programs near the low-orbit cutoff, suggesting that larger more ambitious proposals may have been at a disadvantage.

Proposers have reported a broad range in quality of written feedback that was received, ranging from poor and useless, to useful and constructive (regardless of the proposal's success). This was attributed by the community to the extreme workload on the panelists.

The STScI leadership acknowledged that they did not anticipate the large number of proposals (489 total proposals in C26, vs. 1208 total in C25). The system, that was put in place long before the proposals for Cycle 26 were received, was simply not prepared for this number of proposals. This caused severe problems -- in particular, the resulting extremely high workload for panelists would prohibit a responsible evaluation. STScI responded with last minute requests to recruit more reviewers, and increasing the fraction of proposals to be triaged.

First, the STUC would like to **thank the panelists, panel Chairs, and TAC members**, for their extremely hard work in reviewing this heavily oversubscribed cycle. We appreciate their commitment and thank them for their invaluable service.

The STUC endorses STScI's lessons learned, in particular, [the STUC strongly recommends that Delta TACs be entirely avoided in the future](#). As also indicated by the STScI, the breadth of science in each panel can introduce complications in an appropriate selection of the best proposals and the absence of mirror panels does not allow a proper treatment of the conflicts.

Preparation for Cycle 27

The STUC was presented with the timeline and preparations for the review of Cycle 27, which are already fairly advanced. The proposal deadline for Cycle 27 will be April 5, 2019, the review will take place in June, and it will return to the same general structure as Cycle 25*. The review will support mirror panels in all science areas with the exception of the Solar System panel, as in previous cycles. (*An early plan to drastically modify Cycle 27 selection, that was presented to the STUC in 2017 April, has been aborted). All panel and TAC chairs have been recruited. There will be one new category, joint HST-TESS proposals that support 'short cadence' targets for TESS. The STUC was pleased with the state of Cycle 27 preparations, and encourages STScI to continue focusing on building diverse panels.

[The STUC requested to amend the proposed timeline to increase the time between the notification of results and Phase-2 / Budget deadline](#) (currently the plan lists 3 weeks, shorter than previous cycles).

Under the new anonymous proposal system, conflicts of interest are handled somewhat differently than in previous cycles. While the majority of the panels have mirror panels to

eliminate conflicts within each panel almost completely, the current TAC structure (composed of panel chairs and “at large” members, and reviews all the Large proposals) is not mirrored. When recruited, TAC members are requested to not submit large proposals as the PIs, and limit the number of Large programs of which they are Co-Is, in order to reduce the number of conflicts at the TAC level. However, the STUC notes that under the dual anonymous process there is no substantial difference between a TAC member being a PI or a Co-I on a large proposal.

Following discussion with the team at STScI, [the STUC recommends considering implementing mirror panels at the large proposal level](#). There is a sufficiently-large number of Large proposals (as reported to us, it is consistently about 70 large/treasury proposals submitted each cycle) to justify dividing them between two mirror TAC panels; the further elimination of conflicts that it could bring is worth considering. In such a scenario, we recommend to consider the possibility of increasing the number of at-large reviewers, to ensure that there is sufficient expertise in each mirror TAC panel.

Finally, we reiterate the need to [make sure that all feedback sent to proposers should be useful and thoughtful, and consider mechanisms through which improvements in the feedback process could be made](#). We recognize this is a challenging request given the high load on reviewers even in a regular cycle.

Mid-Cycle proposals

Mid-cycle proposals provide a way for the community to react to new discoveries on a shorter timescale than the main proposal cycles. The STUC was pleased to learn that proposals come in across many science fields and many have been approved, and that the gender ratio of successful proposals has become more balanced. As noted above, the STUC endorses the move to make future mid-cycle proposals anonymous, to be consistent with the procedure for the main cycles.

DD proposals

The STUC was presented with statistics of the rolling DD proposals from the last 4.5 years. The analysis is available as a newsletter item [2018 Volume 35 Issue 03]. The success rate is higher than regular calls for proposals, and was attributed to the high quality and timeliness of the science that is typically proposed as DD, although it could be impacted by the selection process itself. The STUC was presented with statistics of success rate broken by categories, including gender of the PI and science category. The STUC noted that it would be informative to [repeat the analysis for the subset of proposals that were sent for review, with ones that were rejected due to compliance issues excluded from the sample](#). This may provide insight on the scientific merit review process, deconvolved from compliance with the DD program criteria.

NASA HQ perspective

NASA HST Deputy Program Scientist, Science Mission Directorate, Martin Still, presented a summary of NASA’s strategic planning and recent accomplishments. NASA’s ambitious long-term plans include exploration of the moon and beyond, enabled by GATEWAY,

envisioned for the next decade. The Decadal Survey planning is proceeding with a goal of an ambitious science program in the 2020s.

Current forecast for NASA astrophysics funding based on the White House budget contains a 14% reduction for astrophysics, and JWST has now been reintroduced into the astrophysics budget. WFIRST faced potential termination; however, both House and Senate budgets would preserve the WFIRST development, and it may still be fully funded. Budgets show a 28% increase in R&A over the next five years.

The status of some current and upcoming missions was highlighted: TESS science mission has begun; JWST's delay and cost growth will likely impact other currently-unspecified NASA astrophysics science missions; WFIRST began phase B in May 2018 with funds appropriated by congress in FY18, and is awaiting FY19 appropriation; NASA is proceeding toward Athena and LISA, however, the progress is budget-limited. The STUC asked how a healthy HST budget is being pursued under this scenario. Given its Congressional budget protection, there are no current concerns about continued support for the HST program

[The STUC encourages the community to review the NASA HQ presentation, which is available online, and remain informed on NASA missions and endeavors beyond HST.](#)

Senior Review

Preparations continue for HST's full senior review in 2019, and the "Prioritized Mission Objectives" have been divided and organized as recommended in the previous STUC report. The committee thanks STScI for their attention to this recommendation. The STUC will assist in the review by 1) providing feedback through the Chair as needed throughout the process; 2) STUC member Cynthia Froning will serve on the "Red Team" review panel. The STUC further emphasizes that continued funding for HST is necessary to enable the continuation of cutting-edge science.

ESA update

The STUC congratulates ESA for a successful senior review. The ESA Hubble budget was confirmed to December 2022.

LIGO WG report

The LIGO working group presented their recommendations for increasing the impact of HST follow-up observations of gravitational wave sources and other transients. The report highlights that HST can contribute to transformative science in this field, contingent on its ability to respond quickly (within 1-2 days). The STUC appreciates this effort, and found the LIGO working group report to be informative and well organized. The recommendations in the report to increase the impact of HST in LIGO follow-up as well as throughout the time-domain community are thoughtful and ambitious. We look forward to hearing more about this synergy as it develops.

Report from the UV DD Legacy Program Working Group:

Sally Oey, chairperson of the group, reported to the STUC on the status of the working group. Its charge is to make a recommendation to STScl on a Director's Discretionary time program for Cycle 27. After input from the STUC and the broader community, the Director has specified that the DD program will focus on the UV legacy of HST and on the science of star formation, broadly conceived. The committee was subsequently selected to provide a breadth of expertise in this chosen field. They have circulated a survey and a request for white paper input from the community and will make a recommendation to the Director in January 2019. The committee requested that the STUC consider options to encourage community participation in the survey. The STUC thanks Prof. Oey and the other members of the committee for their hard work in helping shape the direction of the upcoming DD program. The STUC would like to encourage the community to share insights with the WG through the survey that was circulated this year.

Final remarks

Twenty-eight years after its launch, and twenty-five years since it was first serviced, the Hubble Space Telescope continues to enable cutting-edge science. Its scientific output continues to rise, a trend that is expected to persist into the 2020s. In the coming years, HST will be an invaluable resource, complementing future facilities such as the JWST and extremely large ground-based telescopes. While the teams are diligently working on stretching the lifetime of the telescope and instruments through innovative software, engineering, policy, and programmatic solutions, it is recognized that the lifetime of the observatory is not infinite.

However, we stress that some of HST's unique capabilities will remain unmatched for many years, and it will be an incredible loss if and when its operation is discontinued. As the scientific community prepares for discussing the next decade of Astronomy, the extension of the HST operations through a future servicing mission should not be off the table. We encourage the HST leadership to give this possibility some thought, and be prepared in case such an opportunity be considered by NASA at any time in the future.