

Space Telescope Users Committee (STUC) Report: April 19-20, 2018

STUC members: Sanchayeeta Borthakur, Stéphane Charlot, Rupali Chandar, Dawn Erb, Francesco Ferraro, Cynthia Froning, Ana Ines Gomez de Castro, Mercedes López–Morales, Keren Sharon (Chair), Amy Simon, Patrick Slane, Benjamin Williams

Meeting Summary:

The STUC continues to be impressed with the proactive approach of STScI in managing all aspects of the Great Observatory. The well-being of the satellite is monitored carefully, and the instrument teams are doing diligent work. We learned more about the efforts of the scheduling team to keep the telescope at high efficiency despite significant changes in the nature of science-driven pressure on the schedule. Finally, we applaud the leadership's continuing effort towards a more equitable distribution of telescope resources to enable the best science. We are, as always, excited to see that the scientific output of HST continues to rise.

The STUC saw presentations on the following topics: STScI outlook (Sambach), HST Project Update (Wiseman, Crouse), ESA update (Nota), HST Mission Office Report (Jenkner), Instrument Status Reports (Debes, Oliveira, Sabbi, Grogin), NASA HQ Perspective (Garcia), HST Senior Review Preparation (Osten), HST TAC - plan for Cycles 26, 27 (Leitherer), Scheduling Efficiency (Mackenty), and Anonymizing the HST review process (Strolger)

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)

HST Project Update

Hubble is leading in scientific research as well as public engagement and science communication. The transformative science that was enabled by Hubble in recent year is putting HST in the forefront of science and helping realize NASA's science mission.

The scientific productivity of the observatory has shown consistent growth as indicated by the publication record. Both GO and archival programs are equally successful in that regard. And therefore, the funding support for these programs is well justified and should be strongly emphasized in the budget.

Budget outlook

The STUC would like to echo and emphasize the statement that a *strong grants program is what keeps HST at the forefront of science*. We appreciate maintaining the budget and stress that **healthy GO funding is important and vital for the scientific output of HST**. We appreciate that the Institute and Goddard are doing whatever they can to protect the funding, especially in times of increased uncertainty.

Observatory and Instruments Status

Gyros: The performance of all gyros is being closely monitored and software solutions implemented, to increase the lifetime of the observatory in the 3-gyro phase. After several months of decline, Gyro 2 performance is now steady at a degraded but acceptable level. Although there is no strict cut off, the team will consider retiring the gyro if jitter levels increase above 10-15 milliarcsec, or the data loss due to acquisition failures increases above 10%. Effects of gyro bias on long observing campaigns, such as solar system programs were discussed. It was noted that operating with fewer gyros will also affect visibility (access to the sky).

Absent any sudden failure*, the current gyro configuration can be sustained until Gyro 2 degrades to an unacceptable level. The efforts to extending gyro lifetimes will be beneficial for keeping HST in the 3 gyro-mode for longer and will be crucial to the overall success of the observatory in years to come. **The STUC recommends making sure the community is fully aware of current planning limitations such as the need for gyro bias updates on a 6-10 orbit cadence, longest contiguous orbit constraints, etc.**

[*note: since the STUC meeting, Gyro-1 suffered an unrecoverable failure, and Gyro-6 has been powered on. Gyro-2 will remain on and continued to be monitored closely]

STIS: The status of the instrument is largely unchanged; it continues to be monitored for jitter effects. There has been significant increase in programs and User Support. The STUC appreciates the continued effort to update and improve current software environment. Future plans include commissioning spatial scans (more transiting exoplanet modes).

COS: The move to LP4 went well, and the sensitivity is being monitored, and new observing modes were implemented. The STUC thanks the team for their work and proactive approach to keep the instrument working well.

WFC3: User support transitioned to a new help desk, and new version of data handbook released. The team is working on replacing IRAF with Python and Jupyter notebooks being tested. The STUC appreciates the team's ongoing work to maintain the time-dependent calibration procedures up to date.

ACS: The instrument continues to perform well. Read noise and dark current continue to be monitored. The team updated and released CALACS pipeline. Stable warm/hot pixels are retained in the DQ array. The GO Gap Filler program has been implemented, and first observations taken.

STScI Website: The STUC learned that the Institute is in the process of updating and moving their webpages (stsci.edu) to a new system. While we find the site very aesthetically pleasing and engaging for the public, it lacks in usefulness for the Users Community.

One of the key ways that STScI interfaces with the scientific community is through these webpages, since astronomers use them to retrieve data, to search for available observations of specific objects, to find calibration information on instruments, and much more. [The STUC would like to offer more feedback to STScI](#) on the current state of the site from the users' perspective. We will create an informal survey to get feedback from the users on how they prefer information to be organized and the types of interfaces they find easiest to navigate, and will report back to the director at the fall 2018 meeting.

HST Senior Review Preparation

HST is due for a senior review in 2019. 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." The STUC has reviewed and discussed the "Potential New Prioritized Mission Objectives" presented at the meeting, and offers the following feedback.

[We suggest that the objectives be divided into "programmatic" and "scientific" categories, and that the scientific objectives be reordered as follows:](#)

Programmatic:

- Keep Hubble's instruments and subsystems healthy and safe so that great science can continue out to 2020 and beyond (*2025?*)
- Mitigate known instrument or system degradation in a manner consistent with maximizing science
- Identify and if practical, implement operational efficiencies that reduce costs without compromising science, or enable new science within the current cost profile.

Scientific:

- Support high-profile community-driven science as established through peer scientific review
- Enhance scientific discoveries through improved archive interfaces and experiences
- Optimize the unique UV scientific capabilities of Hubble
- Enable pathfinding science for JWST by utilizing Hubble's unique resources

HST Proposal Selection and TAC

Mid-cycle: The STUC is pleased to see that the midcycle proposals have been successful, that the Europa initiative generated diverse programs, and that balance to the science subjects covered in the mid-cycles appears to be returning in the proposals currently under review.

Cycle 26: The STUC was presented with the plan for Cycle 26 Delta TAC review procedure. Specific feedback regarding anonymizing the review is given below.

Cycle 27: Nominally, Phase I deadline will be in spring 2019, and the TAC will meet in late May / Early June. All categories will be offered, as was prior to cycle 25. JWST Cycle 1 GO proposal schedule will be adjusted to fit the HST schedule. The STUC was presented with a *preliminary* plan for significantly reducing the size of the on-site panels, in order to relieve some of the difficulties related to supporting both HST and JWST peer reviews. The proposed process will rely on external evaluations with small panels (3 people) convening at STScI. The idea of moving to much smaller panels, with more emphasis on the results of the grades from external reviewers was presented as necessary. [The STUC requests the precise role of the on-site panels to be made publicly available. In addition, the STUC express concern since small panels are more susceptible to be biased.](#)

DDT: We continue to support the DDT program modeled after the success of the Frontier Fields, that aims to enable transformative science, with emphasis on observations in modes unique to HST (e.g., UV/blue). [STUC member Ana Ines Gomez de Castro agreed to participate in the working group.](#)

Scheduling Efficiency and Over-Constrained Programs

The STUC had a lengthy discussion during this meeting, in order to offer input about future steps beyond Cycle 26 to maintain high scheduling efficiency and science output in light of increased demanding constraints and special requirements.

Background: The process of creating workable and efficient HST observing schedules has become increasingly complex due to the number of observations with constraints. Some orbits are over-constrained, with different programs requiring overlapping time slots. Other orbits, while not formally over-constrained, are increasingly difficult to schedule due to the large number of constraints. While the planning and scheduling team has continued to produce efficient HST schedules, this has increasingly been possible only through exceptional and growing efforts by the team. Even with such effort, the number of constrained observations has begun to cause difficulty in maintaining the HST LRP. More than 25% of HST prime science observations contain constraints that limit scheduling windows to only days or less in a given week, and in the process of meeting such constraints, other programs are necessarily delayed, leading to disappointed observers and potential missed opportunities (e.g., when observers arrange ground-based time based on the initial placement of a target in the LRP). This also results in a long tail of observations from a previous Cycle extending into the current Cycle.

Following the STUC recommendation (Fall 2017), in Cycle 26 proposers will be required to itemize and justify special constraints on their observing programs in their Phase 1 proposals. At present, there will be no limit to the number of constrained observations that can be approved by the TAC, but by requiring proposers to think more critically about the requirements and justification for constraints, the total number may become more manageable. Overall, this will be a first step in educating the community about the difficulty imposed by constrained observations, and in considering whether special orientations, un-interrupted observations, or other specific time ordering requests are truly crucial to the primary proposed science, thereby removing unnecessary constraints. It is conceivable that, at some point in the future, such a process will not provide sufficient relief to allow for efficient scheduling of the observatory, particularly as we enter a timeframe in which time-domain science is increasing demands for time-constrained observations. This may ultimately lead to a trade - whether to introduce limitations on the number of constrained observations, or whether to sacrifice observing efficiency of the observatory at the expense of such constraints.

STUC feedback: The STUC wishes to commend the HST schedulers for their outstanding and often heroic efforts to meet the observers' requests. However, we

recognize the burden this can put on the team and on HST observing efficiency, especially in an era of tight budget constraints, so we welcome efforts to optimize the scheduling process for the observatory. The STUC supports the decision to require observers to specify and justify all constraints at the Phase 1 stage, and to request and empower the panel/TAC to assess whether these constraints are indeed crucial for the science. We feel that these steps will both educate the community on the importance of considering the effects of constraints on producing efficient observing schedules, and result in more careful consideration of any constraint details that are actually required to achieve the primary science goals. The STUC recommends that words be added in the proposal template about the overhead of implementing constraints, and a warning that overly constrained programs may not be executable. In addition, the STUC recommends that full justification be required for any constraints that are truly needed to meet the science goals of the proposal.

To summarise, the STUC endorses the following changes to the proposal process:

- Phase I proposals must itemize and briefly justify the special requirements that will be implemented in Phase II (as was already recommended by the STUC in fall 2017).
- (New) Proposers will be required to give a *scientific* justification of the constraints.
- (New) The panel will assess the scientific justification of the constraints, and determine whether they are justified, similar to current assessment of the justification of parallel observations.
- (New) If the restrictions are not scientifically justified, the Phase II program coordinator and/or Contact Scientist may remove the restriction.

The STUC also recommends the following:

- STScI should highlight this new requirement (and consequences for not complying with it) prominently on the “what’s new” part of the call, and explicitly in the proposal template, not only in the call for proposals.
- At this time, we do not recommend applying quotas.
- We acknowledge that some science cases result in higher overheads on the overall cycle.
- We recommend that STScI educate the community so that proposers are more aware of the implications of the restrictions -- both on the schedulability of their own observations, and on the entire cycle.

Finally, we note that **the increasing science demands and operational complexity will require maintaining a robustly staffed planning team to accommodate the science drivers of the HST scheduling process.**

Annonymizing the HST Peer Review

The STUC commends the Director on taking this brave step. Even looking into this possibility (regardless of whether it is implemented) is not trivial, and strong leadership is critical for such change, considering that a fully anonymous process has never been part of the culture in our field.

We would like to thank the Working Group for their significant effort. The report they compiled is thoughtful and thorough.

The STUC read the working group (WG) report, and the list of ~60 responses to the call for feedback from the community, which helped framing the discussion. We had very in-depth discussions (both during general discussion and in closed doors).

[A large majority of STUC members are enthusiastically in support of implementing the WG recommendations.](#) Some members, although generally supportive, are still hesitant about whether the suggested procedure will indeed have a significant impact on the results. At the same time, most of the STUC believe that, if implemented, the proposed fully-anonymous procedure will result in better proposals, and eventually, better science. We are not concerned with the anticipated increased labor related to changing the grammar and language in the proposals.

While the current webpage (and we assume the call for proposals) will have much or all of the information proposers need in order to make the shift, [the STUC recommends that the Institute take great effort to make the most significant changes difficult to miss. We emphasize the need for both advertising of the changes \(with ample time before the proposal deadline\) and education of the community as to why this change is implemented.](#)

We encourage STScI to consider the following ideas:

- More proposers are likely to read the proposal template than any other single document. We strongly recommend including clear directions and notice in the template itself about these (and other) changes.
- Include a notice in a form of pop-up alert when users start APT, to alert those who failed to find the news otherwise.
- Different people consume their news in different ways. We recommend advertising these changes not only via newsletter/email, but also through the following platforms:
 - Social media (twitter, facebook, including facebook groups)

- Prominently on the STScI/HST website
- Prominently on the “what’s new” section of the call
- Video
- AAS meeting
- We believe that a strong statement from the Director (possibly in the form of a short video) would be important in educating the community and explaining the reasons behind this change, and reiterate the leadership’s position.

We recommend continued investigation and analysis by Dr. Johnson and/or her team, and consider expanding the analysis to other axes of inequity.

A concern that was raised by the community and echoed by STUC members is regarding a metric to evaluate the impact of the steps taken. We would like there to be a plan for evaluation, although we recognize that the WG has not come up with a concrete solution.

If implemented in C26, we support implementing fully anonymous selection process for JWST as well. Implementing this method for the new flagship observatory will emphasize the Institute’s belief in its importance (and conversely, not implementing it may undercut its use for HST).