Space Telescope Users Committee (STUC) Report

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STUC Membership

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Meeting summary

This was the first meeting to be held in person after four consecutive meetings held virtually due to the COVID-19 pandemic. The meeting was held over two days, May 19th and 20th, 2022, at the Space Telescope Science Institute. The STUC heard presentations on the current status of STScI and the observatory; of Cycle 29 mid-cycle and Cycle 30; of the HST Project and updates from ESA. The STUC also heard updates on the ULLYSES and OPAL projects, a discussion on the TAC process, proposals for changes to how Target-of-Opportunities (ToOs) and difficult to schedule programs will be treated, and finally discussion on the proposed change to a Zero Exclusive Access period. At the end of the two-day meeting the STUC presented their conclusions in a 1 hour debrief to STScI and NASA. For a full account, the community is encouraged to review the STUC meeting presentations, accessible through:

https://www.stsci.edu/hst/about/space-telescope-users-committee.

STScI status and Observatory status from HST Mission Office

The STUC heard briefings on the status of the HST observatory, instruments, and recent science highlights. The reports clearly show NASA and STScI's efforts to continue operations with HST through the end of the decade and hopefully beyond. The STUC appreciates the efforts to make the system more robust to losing synchronization signals (to avoid observatory downtime) and the current work at GSFC and STScI to restore functionality in Side B electronics after moving to Side A in summer 2021. The STUC encourages the mission to continue working on these important efforts to keep the observatory functioning in the 2020s. The STUC also appreciates the efforts of the STScI staff to operate COS in its new lifetime positions to extend the life of the COS instrument.

The STUC heard about improvements to instrument modes and data reduction pipelines, including a new spectropolarimetry mode for ACS, new Jupyter notebooks for STIS data reduction, and new machine learning algorithms for WFC/UVIS ghosts. The STUC continues to be impressed by the efforts to make improvements to this 30+ year old mission. These improvements benefit the users and the science that Hubble can do.

The STUC also heard about the reliability of the observatory components, including the instruments, DMA, and gyros. Because the gyros have lower reliability than other components, the STUC recommends that STScI continue to consider the impacts of moving to 1-gyro mode on

science operations, including what types of observations are possible (and impossible to schedule) during 1-gyro operations.

The STUC also considered questions posed by STScI director Dr. Kenneth Sembach, including the role of Hubble in the JWST era; the STUC's ideas on these issues are summarized later in the document.

Overall the STUC concluded from the presentations that the observatory was in good health, and that the Hubble team were doing an excellent job of maintaining that status.

Cycle 29 Midcycle update and Cycle 30 status

Two rounds of Cycle 29 mid-cycle reviews were conducted. In total, 57 and 47 proposals were reviewed for the first and second round, respectively, with an acceptance rate of 1:4.1 and 1:3.1. Overall, there were 200 reviewers available, with 102 used for the first round and 97 used for the second. Five reviewers were used for each proposal. The binary gender distribution of the PIs was determined by the PI name and sometimes picture. 31% of accepted proposals were by women PI. However, it should be noted that 41% of the proposals submitted by women were accepted compared to 24% of those submitted by men.

The Cycle 30 TAC followed the same hybrid approach as was used in Cycle 29, with external panelists for the smaller (<16 orbit) small GO, archival, and snapshot proposals, and virtual panels for the remaining small, medium, large, and legacy proposals. Exceptions to this include the Solar System due to the small numbers of proposals received, the CGM/LSS panel, and ToO proposals, all of which were reviewed by discussion panels. A total of 1062 proposals were received for the 3500 orbits available. These 3500 include 750 for large/treasury programs, 1000 for medium, 1700 for small, and 50 for contingency.

For the virtual panels preliminary grades are required from six panelists only. A triage list is then made available so that panelists can read the proposals that they did not grade. The chairs and vice-chairs are not assigned any reviews in order to reduce their workload. Large/treasury programs reviewed by panel chairs and vice chairs. They are sent out to five additional external reviewers and submitted reviews are provided to the TAC to support their assessment. With this system, the load per reviewer is fairly stable across different fields because the number of panelists can be adjusted to match proposal pressure. Panel orientation is now held several weeks in advance which helps the panelists and chairs understand the process prior to reviewing the proposals. This works better than having the orientation right before the meeting as had been done previously. The STUC discussed the possible issue of proposers trying to game the system and make their proposals larger or smaller, but the general feedback is that this does not really help because the proposal pool is set based on the actual number of proposals that come in.

The STUC overall was happy with how the review process for Cycle 29 mid-cycle and Cycle 30 were handled.

HST Project Status

The STUC heard a report on the HST project status from Jennifer Wiseman and Jim Jeletic at GSFC. It is still unclear to the team why either the science instrument control and data handler (SIC&DH) failures occurred. It is currently operating on Side A. A higher priority for now is

developing a plan for restored redundancy should Side A fail. The gyros are still working well, and there are no updates since the last STUC meeting.

The team submitted a report on HST to the NASA Senior Review in March 2022, presenting both an in-guide budget (i.e., the flat budget amount allocated by NASA; $98.3M for each of FY23-27) and an over-guide budget (i.e., a proposed larger budget with specific plans for the additional request). The over-guide budget requests additional funding in FY24 to maintain the current level of buying power with inflation, particularly so that the GO/AR budgets remain roughly constant in buying power. Initial comments from the NASA Senior Review committee suggested beginning thoughtful preparation for continued science productivity in the event of a major failure (e.g., one instrument) or significant degradation. Nothing is final until the Senior Review report is released, but this will be an area where input from the STUC may be useful in the near future.

The STUC was impressed by the ability of this team to address technical glitches to maintain a high level of scientific productivity after 32 years of operations should be celebrated.

ESA update

The ESA/HST program office has seen a change in the leadership team, with Dr. Chris Evans acting as the new ESA HST Project Scientist and Head of the ESA Office in replacement of Dr. Antonella Nota, with Dr. Paule Sonnentrucker now in the role as both HST and JWST Mission Manager. The office recently submitted a proposal for the ESA mission extension (at least to 2025) after a successful operations review, and they expect to receive positive news soon. It was noted that 20% of Cycle 30 proposals came from ESA members, testifying to a strong European involvement. Dr. Evans updated the STUC on the plans for the HST/JWST celebration conference in 2022, which is to be held in July. The PO's public engagement remains strong, including press/photo releases (~20 per year) and more (e.g., educational videos), and highlighting the connections with JWST, with a dedicated JWST branch (https://esawebb.org/) coming online soon. The ESA PO continues to have an active presence on social media (most recently with the popular Giphy). In particular, the ESASky website of archival images, with the relative links to press releases, has seen an increasing number of users as well as browsing times; the question arose whether this could be, in the future, also used for scientific purposes.

Overall the STUC found that the presentations on the ESA side showed that the collaboration continued to be strong and productive.

ULLYSES update

The STUC learnt the progress made by the ULLYSES team and the status of the implementation of the program. The team is planning a Special/splinter session at AAS#240 and the next Data Release will take place in June 2022. The following DRs will take place with the cadence of 5-6 months. The observations are 72% complete as of May 2022.

The team shared that for the Massive Stars half of the targets on the LMC have been completed (52 out of 94) with 23 orbits repeated, 80% targets completed on the SMC (40 orbits repeated), and for the massive stars on the low metallicity galaxies with 3 targets each, NGC 3109 have been completed with a S/N a bit lower than what they wanted, and Sextans A is under implementation with observations expected by November. Regarding the data quality, the team met the established goals, as shown with the S/N plots for the different spectrographs, even though they have to do educated guesses for the exposure times. The team is having trouble getting the exposure times

totally right for the G130M/1096 configuration which is consistently lower than what they would like in terms of S/N. The large number of HOPRs is still not completely understood for the SMC.

Regarding the T-TAURI STARS the survey component part of the program that has 58 targets has been completed to a 81% level, 36 orbits had to be repeated. It is very hard to estimate the S/N for these targets since it is mainly determined by the variable accretion rates. The team obtained a big spread in the S/N compared with the expectations. In Orion they had the additional problem of underestimating the extinction which was corrected in the next batch of observations. The monitoring component of the program is looking into 4 very bright well-known T-Tauri stars with time coverage, 2 epochs separated by a year, each epoch 4 obs per rotation period over 3 rotation periods. First epoch of all 4 stars has been completed and the second epoch will occur in 2022 for 3 of the stars. The team reported the wealth of coordinated observations for the T-Tauri stars that convey a lot of community interest. For massive stars VLT X-Shooter observations have been completed.

The ULLYSES team also reported the plan for the future data products that include re-processed previous releases and new data. Next DR is scheduled for June 28, 2022. Future plans for data dissemination platform will include, among other things, new search fully integrated in MAST, visual selection of targets via interactive plots, sharing ULLYSES codebase and data reduction for publication and recalibrating of FUSE data. In order to get more community engagement in the future the team will be presenting in Stockholm in July and are thinking of organizing a workshop or Symposium at STScI in 2023. Furthermore, they are working on the survey paper. The community will be expected to analyze the data and lead the future papers.

The STUC found the presentations on ULLYSES clearly showed the compelling and unique nature of programs like this, that can only be enabled by the use of DDT, as they are outside of the scope of GO programs.

OPAL update

The Outer Planet Atmosphere Legacy (OPAL) program, which obtains long time baseline observations of the outer gas giant planets, is a crucial program for filling in missing coverage for small time scale events that may not be approved through normal cycle or mid-cycle proposals. Headed by Amy Simon, Mike Wong, and Glenn Orton this relatively small group working with a modest number of orbits (41 per cycle) has created a legacy program to help understand the atmospheric dynamics and the evolution of the gas giant and ice giant planets over long and short timescales. This includes storm activity, wind field variability, and changes in aerosol distributions and colors. Observing all four outer planets over two full rotations in 7 to 10 filters per planet with WFC3, this program fills a gap of high resolution in the shorter wavelength regime that is missed with AO from the ground which generally operates in the NIR. As an ongoing approved DDT program, the WFC3 image data are immediately available at MAST with a zero exclusive access period, and High-Level Science Products are uploaded to a dedicated MAST page after processing by the OPAL team. The STUC was impressed to hear that the publication record from this program had made it to 49 refereed papers at the time of the meeting.

Overall, the STUC support this effort, and hope for the continued success of the program which seems to be enabling exciting solar system astronomy.

Overview of TAC processes, including hybrid review process

The previous in-person time allocation committees (TACs, cycle 27 and earlier) consisted of multiple panels (14 - 16) in 8 subject areas. Each panel consisted of 1 Chair and 8-12 panelists. All Chairs, +3 At-Large members, +1 TAC chair formed the Executive Committee. In the current hybrid model, there are two panels, 1 discussion and 1 external, for 7 of the 8 subject areas. The Solar System science panel only has a discussion panel given the smaller number of proposals received. In total, there are 15 panels. All Chairs and vice chairs, +3 At-Large members, +1 TAC chair form the Executive Committee. The discussion panels proceed like the old model. For the external panel, the process is like the mid-cycle review process. Each proposal is assigned a minimum of 5 external reviewers. Panelists read, grade, and comment in their own time. These proposals are not discussed. STScI averages the grades to create a ranked list. Each external panel is allocated a certain number of orbits based on orbit pressure. The top-ranked proposals that total <= N orbits for that panel are recommended for acceptance. The subject area discussion chair also acts as chair of the external panel and checks for duplication and science balance.

STScI will continue to use the hybrid review process for Cycle 30 and going forward. The need for a hybrid panel process was not driven by COVID related issues but by the pressure to find reviewers for both the HST and JWST proposal review processes in coming years. The previous in-person discussion model was necessarily synchronous and limited participation due to distance, travel expense, caregiver resource constraints, and time zones. This led to a globally limited pool of reviewers who would be assigned prohibitive workloads. The hybrid model which incorporates external reviewers is asynchronous, allows for broader participation and representation of the global HST community, and lowers the time commitment and workload for reviewers. The hybrid model is geographically more inclusive and allows a flexible schedule. Specifically, since the institution of the hybrid review process, participation from reviewers in South America, Europe, Africa, Asia, and Oceania has dramatically increased while the US participation has stayed the same. Participation of reviewers from Africa is low but is enabled and increasing. The total number of participant reviewers has increased from ~150 in Cycle 27 to ~300 in Cycle 30.

External reviewers also serve as mid-cycle reviewers for a period of 2 years. Mid-cycle proposals started in Cycle 23 as a way to provide the community with an opportunity to propose for in-cycle observations of recently-discovered, non-transient objects. Typically, 300 orbits are awarded per year with ~50 proposals submitted per midcycle. The justification for the urgency of proposed observations is necessary for mid-cycle proposals. To evaluate this, the abstracts are compared against previous submitted proposals to ensure no duplication. The external reviewers also judge the proposals for urgency. Submissions and acceptances by science vary considerably every year. For example, in the last two mid-cycles, stellar and solar system proposals had the highest acceptance rate (~35%) while three cycles before it was proposals on exoplanets (~39%).

In order to better highlight the difference in the evaluation process and prevent confusion, the STUC recommends splitting the current ‘small’ GO proposal category into ‘very small’ (<16 orbits) and ‘small’ proposals. The STUC also recommends future calls include specific mention that all panels, including externals, are allocated orbits based on orbit pressure based on submitted proposals.

Concern was raised around proposals that request large programs on both JWST and HST that require joint programs and the question of which TAC will make the awarding decision. This question has now been moved higher up at STScI and is currently in discussion. It will be revisited

at the next STUC meeting in Fall 2022, prior to the JWST Cycle 2 call for proposals. The STUC urges that these decisions be clearly communicated to the community with the next proposal call.

Regarding the climate on in-person and virtual panels, and harassment reporting requirements for HST grant recipients, the STUC appreciates the efforts of STScI to follow our recommendations from Fall 2021. Specifically, the STUC was informed that STScI has notified all HST cycle panelists of both the AURA and STScI codes of conduct, as well as guidelines for what constitutes unacceptable behavior at the start of the review.

Finally, the STUC also recommends including a brief questionnaire about the panel climate as part of the post-TAC survey of panelists.

Discussion of trade-offs for ToOs and difficult-to-schedule programs

Tom Brown presented a proposal to the STUC for a new rapid response mode for HST. HST cannot respond as rapidly to Target-of-Opportunity (ToO) triggers compared to ground-based and other space-based telescopes, as the observing schedule is updated weekly, thus, it may take up to 3 weeks between Phase I submission of ToO and eventual observations. HST ToOs are currently divided into three categories according to the turn-around time – in other words, the time between STScI receiving activation and observations. Non-disruptive ToOs have more than 3 weeks turn-around time, and there are no limits on the number of non-disruptive ToOs to be observed in Cycle 30. Disruptive ToOs have turn-around times less than 3 weeks, with a minimum turn-around time of 2-5 days, and up to 8 activations since C26. Ultra-disruptive ToOs have 36–48-hour turn-around times and none will be awarded in Cycle 30. Tom noted that in 2020 and 2021, 9 out of 14 disruptive activations fell on Friday or Saturday, maximizing disruption for HST operations staff, as it falls out of the work week.

Tom proposed a new category of GO Disruptive ToO observations, noting that with the ever-increasing samples of transients detected, that if there is a statistically significant sample of transients to draw activations from over a given cycle, it is better to have GO program accepted in annual call, instead of one-off DD proposals for individual transients. To fit with the calendar build process, the suggestion was made that these observations could be scheduled on one designated Thursday per month, where the schedule will be built to be constraint-free. GO ToOs scheduled in this mode would be scheduled on a 2–5-day timescale, with a phase 2 submission to be made by Tuesday 6 AM EST before the constraint-free Thursday. Phase 2 for such targets would have to follow strict rules to minimize disruption to other science, including having 100% schedulability, no timing/orient constraints, be limited to a single visit without follow-up visits, no MAMAs or BOP checks, a maximum of 5 SAA free orbits, and no iteration on Phase 2 beyond activation. To support this new class of observation would require accepting 50-100 orbits of time per semester and may have impacts on time-constrained observations, such as exoplanet transits. However, such a mode might minimize disruption for HST operations staff in terms of trying to change the schedule during non-working hours.

The STUC was generally supportive of this proposal but wanted to get a better handle on the demand there would be for such observations, as this would serve a somewhat different community (given the need for a statistical significant sample of targets from which to draw activations) compared to the typical ToO triggers found in DD proposals.

Although the idea of setting aside a single day each month to perform disruptive TOO observations, the STUC advised flexibility in which Thursday this should be, given that some

programs that require strict monitoring cadence, e.g. hard-to-schedule exoplanet transit observations, could still end up being interrupted.

Transition to default Zero Exclusive Access Period

The Science Policies Group requested feedback from the STUC on the Director's proposal to transition to a default zero exclusive access period for new Hubble data. The primary goal of this change would be to maximize the science return of all Hubble data. It would also bring Hubble into accord with recent changes to NASA's Science Information Policy, which stipulate that there shall be no period of exclusive access to Mission data (SPD-41), though it was stressed that this policy does not currently directly apply to Hubble or JWST.

The default exclusive access period was changed from 12 months to 6 months in Cycle 25 (2017). The STUC requested an assessment of the increased science return from this change, to help evaluate the impact of the proposed reduction to 0 months.

Currently, the default proprietary time for Large and Treasury programs is zero months, and for small and medium programs it is six months. The proposed policy would make all Hubble data immediately publicly available by default. Proposers would be able to request a non-zero Exclusive Access Period with justification through the peer review process and would need final approval from the STScI Director. The Science Policies Group proposed three different models for enabling non-zero EAP requests: (1) justification is included in the science justification of the proposal; (2) justification is separated from the science justification and is fully anonymized; and (3) justification is separated from the science justification and is not anonymous.

The STUC discussed this topic at some length. Concerns were raised regarding the potential undue impact of a zero EAP on early-career scientists, and those from institutions that do not benefit from a long legacy of working with HST data. It was noted that proprietary access is far more important to some subfields of astronomy than others. On the other hand, the policy could make more data available to researchers from foreign institutions, who might be less likely to propose their own observations because data analysis funding is not included. The STUC was concerned with the lack of clarity on how requests for exceptions would be treated, and the criteria that would be used to determine whether they should be awarded. These issues are of crucial importance to assessing how this policy change will affect the community.

For these reasons, the STUC does not endorse a transition to zero EAP for Cycle 31. Instead, we strongly recommend that STScI take steps to solicit broader community feedback on this potential policy change. It is important that (1) STScI strongly emphasizes and communicates to the community that a change to the EAP policy is being discussed; and (2) STScI provides a forum in which all scientists, and early-career scientists and scientists at underrepresented institutions in particular, are encouraged to freely share their thoughts regarding the way such a change may impact their ability to do the best science. This could be done at an AAS Town Hall or virtual Town Hall meeting, by a solicitation for white papers, or via an online poll. The STUC requests to see the results of this information gathering at a future meeting.

General Grant Provisions Document

The last update of the "General Grant Provisions" document (GGP) was Dec. 2018. The STUC raised several issues regarding policies laid out in this document and requested followup discussion at the October 2022 meeting..

STUC members have heard that the community is having cash flow problems due to the incremental funding availability used by the institute. We recognize that the policy is meant to control grants that do not spend as anticipated, but it also causes inconvenience for researchers actively spending, and it was noted by several of the STUC members that the community had approached them with questions surrounding the efforts required for budgeting and grant reporting being unnecessarily burdensome. The STUC requested that at the next meeting in October 2022, STScI will present information on the grant procedures such that the process and motivations could be reviewed and communicated to the community.

Multiple institutional affiliations: Some community members may be affiliated with multiple institutions of the types listed in Sec. 4. But STScI does not allow grants to multiple institutions for a single investigator. For example, someone with appointments at both UC Berkeley and SETI Institute must choose one of those two institutions to manage all their grants. Grants administered by STScI are funded by NASA, which itself allows multiple affiliations for researchers in the NSPIRES system that manages NASA proposals. This issue could be improved by updating MyST / APT to allow each HST proposal to go to a different institution linked to an investigator's profile. If a policy change cannot be made, the GGP could be updated to justify the policy and to state it. Currently the GGP does not mention this restriction at all.

The STUC raised the need for clear language and clear guidelines to be placed in the General Grants Permission relating to formal reporting requirements for PIs or co-Is related to harassment, including the process to file complaints and the course of action which can be taken by AURA or NASA. For an example of a policy in place with the NSF, we include links to their harassment policy and harassment notification form. In order to provide transparency to the process and a metric for evaluation, yearly statistics on the number of complaints filed and their resolution should be made available to the community.

The STUC were informed that there is a plan in place to implement this and that the process is underway. STScI has been working with the HST Project to determine how to include the NASA requirements in the GGP.

STUC visibility to community

The STUC noted that more effort needs to be put in from STScI and the STUC members to make the roles and responsibilities of the STUC clearer to the community. The STUC suggested the inclusion of STUC members at the STScI booth at AAS conferences, the inclusion of information at Town Hall events, and the production of a newsletter associated with the release of the STUC report. These ideas were welcomed by STScI, and plans are underway to produce a newsletter as well as increasing community engagement. It is noted that this is an ongoing process as STUC members rotate on and off the committee and that inclusion and promotion of the STUC should be a staple of the telescope operations.

Hubble Spectroscopic Legacy Archive

Tom Brown and Marc Rafelski described plans to update the Hubble Spectroscopic Legacy Archive, which was most recently updated in July 2018. Their plans include enabling automated updates for new datasets and adding STIS data to the archive. The STUC commends and encourages these efforts, as this will add significant value to an important community resource.

The Next Large Director's Discretionary Project

The STUC notes the success of the ongoing ULLYSES project, and the strength of the legacy dataset that those data will provide for years to come. The Hubble Frontier Fields and ULLYSES provide models for how large community orientated projects with Hubble should be executed, utilizing Director's Discretionary Time.

However, we are now at the point where ULLYSES observations are more than 70% completed and therefore, the STUC proposes that the first steps be taken towards defining one or more new projects to follow ULLYSES, that are beyond the scope of Large/Legacy programs enabled by the current TAC process. We envision that these projects will be focused on providing large legacy datasets, spanning multiple years of observations, with a strong focus on providing service to the community, and that take advantage of Hubble's unique and/or synergistic capabilities in the era of JWST .

Therefore, the STUC encourages the STScI Director to start the process of definition of this future program by requesting community input on ideas for "The Next Large Director's Discretionary Project" to follow ULLYSES. This project should be of sufficient scope that it can provide a strong legacy for Hubble and be a defining achievement for the final years of the mission.