

Space Telescope Users' Committee Report: Oct 20-21, 2016

STUC Attendees: Stéphane Charlot, Hsiao-Wen Chen (Chair), Michael Cushing, Dawn Erb, Cynthia Froning, Jenny Greene, Søren Larsen, Andrea Prestwich, Keren Sharon, Amy Simon, David Sing, Benjamin Williams

Meeting Summary

The STUC continues to be impressed by the proactive approach adopted by the project office and by all instrument teams. The scientific productivity of the Observatory was noted in the 2016 NASA senior review and also recognized by the Astronomy Working Group and the Solar System Exploration Working Group as part of ESA senior review. The panel saw presentations on topics including the STScI outlook (K. Sembach), the *HST* Project (J. Wiseman and P. Crouse), the *HST* Mission Office (T. Brown), the status of COS, STIS, ACS, and WFC3 (C. Oliveira, J. Debes, N. Grogan, E. Sabbi), the ESA Senior Review (A. Nota), HST TAC process (C. Leitherer), Science Policy (I. N. Reid), COS 2025 (J. MacKenty), Outer Planets Atmosphere Legacy (OPAL; A. Simon), Office of Public Outreach update, (OPO; H. Jirdeh), and Hubble Legacy Archive & Hubble Source Catalogue (B. Whitmore). The STUC congratulates the OPAL team for receiving the Robert H. Goddard prize and is pleased to see the progress in OPO. This report summarizes the key issues and recommendations of the STUC.

The Observatory Status

Hubble continues to operate well. The project office is monitoring the functions and anomalies of the gyros, but notes that the fine guidance sensors are more likely to be the limiting factor to the observatory lifetime. It is now expected that *HST* will overlap with JWST for a few years. A main focus at the project office is to identify strategies to maximize the science return of *HST* & JWST while operating simultaneously. The Director informed the STUC that 500 hours of early science programs with JWST will be available to the public, which may be supplemented with *HST* DD time. Call for NOI will be issued in January 2017.

- **Recommendation (1)** : Multi-wavelength programs return excellent science. The STUC encourages other NASA observatories to support large joint programs.

The scheduling efficiency remains high for Hubble, further reducing available windows for SNAP programs. A new “Schedule Gap Program” is being developed to continue improving observing efficiency beyond the current SNAP program. The requirements for this program includes minimum overhead, no filter change, and isotropically distributed sources on the sky. This program currently consists of two 300-sec ACS imaging observations of NGC galaxies with

the F606W filter, and given an extremely low priority. The STUC was asked to provide input on the “Schedule Gap Program”.

- **Recommendation (2)** : The STUC supports the new Schedule Gap program, and encourages the STScI to consider additional factors without adding extra work in scheduling, including (i) additional source catalogs or additional filters in the current program; and (ii) opportunities to engage the public to provide targets for EPO purposes.

Instrument Status

Different instrument teams are working on a variety of calibration and support activities including refreshing the spectroscopic legacy and refining the astrometric calibration. ACS, WFC3, and STIS are working at a stable level. For ACS, attention is being paid to better understand the PSF in SBC and to expand polarimetry calibrations to both red and blue wavelengths. For WFC3, pixel-based CTE correction is found to be nonlinear and is being closely monitored for changes. Other ongoing activities include improving the IR dark calibration, IR sky flats, and UVIS fringing corrections. For STIS, small aperture throughputs are found to vary (~20% on average) with telescope breathing, as best focus point changes. This throughput variation is not included in the ETC. For COS, continuing progress is being made in correcting wavelength calibration errors in both the NUV and FUV channels, while the team also prepares for the move to Lifetime Position 4 (LP4), scheduled for July 2017.

- **Recommendation (3)** : The STUC encourages all instrument teams to continue their excellent work in improving and monitoring calibrations. For STIS, the committee recommends a broad user notification of the needed exposure time adjustments. The panel commends the COS team for maintaining and improving the science capabilities of COS. At the same time, the STUC urges that the improved FUV wavelength solutions for LP1 be migrated to the *HST* Spectroscopic Legacy Archive as soon as possible.

HST Time Allocation Process

A number of improvements were implemented and new lessons learned in Cycle 24 proposal reviews. For example, the review process of medium proposals went significantly more smoothly after each panel was given its own allocation to select one medium proposal. “The valley of death” that used to be in medium size proposals is now gone. However, assigning the primary and secondary reviewers ahead of triage has resulted in uneven workload among the reviewers. Cycle 24 TAC also commented on the need of more guidance on the number of orbits available for the very large programs. Anticipated changes in the Cycle 25 TAC process include: (a) reviewers may be assigned after triage; (b) Cycle 25 TAC will allocate six months of Cycle

26; (c) the default proprietary time will be shortened to six months; (d) IGM proposals will be reviewed by the galaxies panels and the cosmology panel will return to be on its own.

- **Recommendation (4)** : The STUC recommends that if Very Large Proposals are to be solicited again, the orbit allocation should be separate from the regular large proposal pool. In addition, the committee recommends moving the due date of “preliminary grades” to at least two weeks prior to the panel meeting, and urges care to be taken to ensure high-quality feedback to triaged proposals.

Science Policy

The Institute will no longer accept proposals to observe Venus as part of the standard TAC call due to concerns for the spacecraft safety and the need of extraordinary resources to support such programs. The STUC supports this decision. The *HST* and *Chandra* Observatory directors have proposed to extend the joint *HST-Chandra* program to Large Projects, which would require at least 75 orbits of *HST* and 400ks of Chandra time. This would allow the *HST* TAC to allocate up to 1000 ks of *Chandra* time and the *Chandra* TAC to allocate up to 350 orbits of *HST* time. The additional time can only be used for Large Projects.

- **Recommendation (5)** : The STUC supports expanding the Joint Program in Cycle 25 and recommend evaluating the outcome from Cycle 25 before extending to later cycles.

The Institute continues to take steps to mitigate the effect of unconscious bias, and the STUC commends the Institute for their diligence in addressing this issue. In Cycle 24, there was an extended discussion of unconscious bias and meeting etiquette at the plenary session for proposal reviewers. The reviewers were given a set of standard criteria against which proposals should be judged; this was emphasized at the plenary session. In addition, the proposal format was changed so that investigators were listed alphabetically and the PI was not identified. These changes were very well received by reviewers, who in general felt that these led to a more focused discussion, although no change in historical trends was found in Cycle 24.

- **Recommendation (6)** : The STUC recommends that the changes put in place for Cycle 24 be carried forward with only minor changes for AR proposals to ascertain whether there is a longer term effect. The committee also encourages the Institute to consult social scientists who specialize in issues of unconscious bias and stereotype threat.

Data Sciences Mission Office, Hubble Legacy Archive & Hubble Source Catalog

The Director introduced a new Data Sciences Mission office during his briefing to the STUC. The charge of Data Sciences Mission office is to coordinate data products and data holdings from all observatories into a single office. The STUC endorses this move, particularly given the

leading role STScI plays in developing archive and enhanced data products for the astronomical community. The committee also heard an update on the Hubble Legacy Archive (HLA) & Hubble Source Catalog (HSC), and saw a demonstration of the impressive capabilities offered by the Discovery Portal web interface. The HLA/HSC team is also working with the Hubble Spectroscopic Legacy Archive (HSLA) working group to include COS FUV spectra in the HSC, which will be extended to include STIS and COS NUV spectra.

- **Recommendation (7)** : The STUC recommends that STScI publicize HLA/HSC at AAS meetings and study how the actual use pattern is tied to the development efforts to optimizing STScI resources toward the most productive outcomes. The committee also notes that further development of the HLA/HSC will benefit from close coordination with the Data Sciences Mission Office. Finally, the STUC applauds the initiative to extend the HSLA to STIS and recommends the working group to include extended-source experts.

COS 2025

The COS FUV detector photocathode is depleted during normal use, resulting in limited lifetime. A working group has been put together to consider the best usage of COS and the importance of balancing current performance and long-term UV capabilities in the remaining years of Hubble. *HST* currently projects to last until 2021, possibly 2025 or later, while COS is expected to provide nominal science data products until Feb 2020. No single strategy will extend COS' lifetime to 2025 and all potential actions will require increased work on the part of the proposers, the TAC, and/or STScI to implement. STScI has requested input from the STUC to help address how to navigate the available trade space: science performance now vs. longer term capabilities (especially the potential future overlap with JWST), full wavelength coverage vs. gaps in the spectra, balancing workload on STScI vs. the user community, and balancing life-extending activities with other calibration programs for the instrument. There are also implications on trading COS vs. STIS observations, considering the diminished archival value of COS data with unusable regions, and overall trades of observing efficiency and science quality.

- **Recommendation (8)** : The STUC requests a usage chart of COS GO programs from the past few cycles, for a better understanding of the demands for different instrument setups and requirements. This will help assess the impact and implications of different mitigation options on science return. The STUC also encourages STScI to work with COS Instrument Development Team members at CU-Boulder and UC-Berkeley to quantify the risk-reward trade space for raising the FUV detector voltage to mitigate gain sag effects. Finally, the committee suggests a community workshop (possibly in the form of a virtual workshop) as an effective way to obtain broader user input on what observing modes will best support COS science goals in the future. This may also be used to develop some standard use cases for COS observations.