

Report of the Space Telescope Users' Committee (STUC) Meeting, November 2003

The Space Telescope Users Committee (STUC) met on November 6th and 7th, 2003 at the Space Telescope Science Institute.

Attended: David Axon, Debra Elmegreen (Chair), Martin Elvis, Holland Ford, Karen Meech, Bob O'Dell, Regina Schulte-Ladbeck, Karl Stapelfeldt, Lisa Storrie-Lombardi, John Stocke, Monica Tosi, Don York

Unable to attend: Marc Davis, Eric Emsellem, Jim Dunlop, Peter Nugent

1. Status of The Project(presented by Preston Burch)

Launch of SM4 is scheduled for May 5, 2005, but is likely to be delayed to mid-2006. This delay will have a strong impact on HST observing efficiency because of the likely loss of one or more gyros. Gyro 3 failed in April shortly after the last STUC meeting, so HST is presently operating on gyros 1, 2, and 4. With gyros 3 and 5 deceased, gyro 6 is the spare. There is a 50% probability of continuing in a 3-gyro mode till Dec. 2005. If SM4 is delayed until mid-2006 or later, the probability is high for operating in a Two-Gyro Science (TGS) mode, which is under development. A TGS mode will imply strong restrictions on the feasible science (discussed further in Section 2). The STUC applauds the efforts of the Project and the Institute to prepare for this event.

In addition to concerns about the gyros, there may be additional operational restrictions and science output impacts due to continued loss of battery charge capacity. The designed lifetime of cells in the batteries is ~2004, so the likelihood of cell failure goes up after 2004. If SM4 is delayed until 2006, battery charge capacity could require turning off NICMOS and operating one instrument at a time. STUC recognizes that an SM4 during 2005 is very important to the continued operation of the HST, although we realize that this issue is out of the control of STScI or the Project.

A mission will be necessary to de-orbit HST. The issue is whether this de-orbit might be an Expendable Launch Vehicle (ELV) with Autonomous Rendezvous and Capture, or a shuttle installed Propulsion Module (PM). Given the mission costs of perhaps more than \$0.5 billion dollars just to de-orbit HST with an ELV for no science return, the STUC strongly favors de-orbiting via a proposed SM5. An SM5 could deploy enhanced gyros, a new fine guidance sensor, a new SSA transmitter (the current one has 38,000 cycles on it, whereas it was designed for 30,000), and a new Solid State Recorder. This mission would keep HST productive for several years, providing unique science achievements until JWST gets into operation in addition to providing a means for HST de-orbit. To only de-orbit HST with no scientific return would be seen as a waste of public funds. NASA has no current plans to compete an SM5 against other missions. STUC believes that SM5 should be considered in competition with a pure de-orbit mission rather than with other NASA science missions, since a minimal SM5 on a 40 month timescale is likely to cost about the same amount as an ELV plus propulsion module. The consideration of cheaper SM5 options should be continued, but the STUC believes that a GO program is an essential part of any continued HST program to produce the strongest science result. STUC also feels strongly that an SM5 option which adds no new instruments but keeps HST running will still provide compelling science.

2. Project Scientist outlook(presented by Malcolm Niedner)

The two instruments planned for SM4, the Cosmic Origins Spectrograph (COS) and Wide-Field Camera 3 (WFC3), appear to be developing on track. The gain in point source sensitivity from 1200 Å and 2000 Å is about 25x greater in the echelle mode for COS compared to STIS at the same

resolution. Gains for WFPC3, with the flight detectors now installed, are 3-6x in point source and NUV sensitivity and 35x in FOV. A single point hardware failure has been identified for the WFC3 UVIS filter assembly (SOFA). After detailed review, the HST Project has decided, pending review by NASA HQ, to modify the electronics to remove the failure possibility. The STUC supports the Project's decision.

The STUC heard with interest details of how the Two Gyro mode would affect the HST science program. Elongated images with 15-30 mas of jitter are expected in this mode. Some science programs would cope with this degradation better than others. Wide-field surveys for extended objects, and observations at red/infrared wavelengths would be least affected; diffraction-limited imaging, particularly in the ultraviolet, would be strongly compromised. New scheduling constraints would affect all science programs. The STUC feels that this information, including its likely impact on science program selection, should be conveyed to the user community at an early opportunity through the STScI newsletter and on the website.

The HST project is beginning to develop scenarios for operation in TGS mode, involving using the fine guidance sensors (FGS), fixed head star trackers (FHST) and the Magnetometer system (MSS). While these new techniques will allow the continued acquisition of high-quality data, there are serious issues regarding scheduling while operating in the TGS mode, and regarding the transition between HST operation with 3 versus 2 gyros. The Project notes that the capture of high-jitter guide stars into FGS fine lock has yet to be established, and is developing a test setup utilizing the SM4 flight FGS to demonstrate feasibility. Development of two-gyro science operations is on a fast-track and is scheduled to be operationally ready in April, 2005. The STUC strongly encourages the Institute to develop a fast response mode for the community to drive the science during the TGS mode transition period. Don York volunteers to be on an STScI subcommittee addressing these issues. We suggest identifying proposals in Cycle 13 that fall in the upper tier and could be executed in a TGS mode, and preparing for issuing a special Call for Proposals if the third gyro fails, to solicit programs that could be scheduled if enough selected ones are not available.

3. STScI Outlook (presented by Beckwith)

The Director reported on the HST scientific highlights from the past year. The science being produced by the current mission continues to be spectacular. The GOODS Ap.J. Letters special issue, and the extensive press coverage of the Mars opposition images, demonstrate that HST remains in the forefront of astronomy to both the science community and the general public. The STUC was very pleased to see initial images from the ongoing Ultra Deep Field (UDF) program, and looks forward to the completion of this important project. STUC applauds the success of the GOODS program and the start of the UDF observations. The scientific output of Hubble remains at an all-time high, accounting for a disproportionate share of NASA scientific discoveries.

4. Discussion: HST Status (presented by Rodger Doxsey)

At the last STUC meeting, STUC asked for details about the ACS hot pixel problem. A "tiger team" meeting with detector experts was held at the SPIE meeting August, but no obvious cause or solution was determined. The team expects some improvement with installation of the Aft Shroud Cooling System in SM4, due to lower operating temperature. For ACS calibrations, a new method has been developed for low-frequency flat-field characterization by R. van der Marel, which is available on the STScI web; STUC applauds this effort.

The STUC was concerned about the fact that COSMOS Cycle 12 Treasury Program switched targets (in consultation with the Director and Institute) after the TAC review process due to scheduling conflicts. This change came about because of a scheduling collision between large programs, which was unforeseen because insufficient information is provided during the Phase I parts of the proposal. The scheduling difficulty was not just for HST, but for the coordinated ground

programs as well. The end result was that the COSMOS program switched fields however the science objectives and methodology were fully preserved. After extensive discussion about scheduling constraints, STUC was reassured that the science goals were unchanged. STUC recommends that STScI encourage proposers of Large or Treasury programs to review the detailed schedulability of their proposals using the APT tools, and to provide more detailed information in the description of the observations for large proposals in Phase I to help avoid these conflicts in the future. Enhancements have been made to APT to make working with large programs easier.

It was a pleasure to see that the increase in the cap for E/PO funding has had a positive effect, judging from the increase in submissions. The long-term benefits of these programs are difficult to identify immediately, but will clearly be many as they will bring enthusiastic, real scientists into contact with the young people who are the future generation of scientists.

Over the next 6 months, STScI must develop a process of prioritization of user support activities due to budget constraints, with input from STUC on these issues. STUC members John Stocke, Martin Elvis, and Lisa Storrie-Lombardi have volunteered to work on subcommittees at the STScI in this regard. STUC accepts that it may be necessary to scale back pure parallel observations in response to budget pressures. The large surveys currently being carried out with HST are performing coordinated parallels, which increase their science return, and have effectively reduced opportunities for pure parallel observations. Dave Axon and Lisa Storrie-Lombardi from STUC have volunteered to be on an STScI subcommittee to re-consider pure parallels.

STScI raised an important issue concerning the cost-effectiveness of supporting rarely used modes of the science instruments. Some modes are not supported, based on established low demand by potential users. There are many additional modes falling into gray zones, and it is appropriate for the STUC to be drawn into the decision process. A similar situation arises with respect to calibration of certain instrument modes. STUC supports the continued outsourcing of HST calibration for some of the less-used instrument modes by shifting these responsibilities to GOs, as long as this need is clearly stated in the Call for Proposals.

5. CYCLE 13 CP (presented by Duccio Macchetto)

The shortening of Cycle 12 to ~5 months after the proposal due date was well received by STUC. The Cycle 13 proposal process is well underway. The same science opportunities as provided in Cycle 12 will be available and the review process will continue to use the "mirror" review panels. In order to avoid potential conflicts within the single solar system panel, STUC recommends that the solar system panel be slightly increased in size. The science balance will again be decided by the panels, and there will continue to be orbit subsidies for medium-sized proposals. The algorithm for the subsidy changes from cycle to cycle and it generally functions well. A new feature added to the TAC process in Cycle 12 was to ask Cycle 11 panelists to serve in Cycle 12 to provide some process continuity. This was very successful and increased the efficiency of the TAC process, and thus will again be utilized for Cycle 13. The STUC supports this action.

For Cycle 13 the Institute will distribute the proposal review materials to the TAC and Panel members on CD-ROMs instead of mailing large packets of paper to each reviewer. Reviewers can read them as PDF files, print them out at their home institutions, or have the files reproduced at a copy center. STScI will reimburse reviewers for the photocopying costs.

The Institute plans to reduce the number of panel support scientists from 11 to 6 during Cycle 13 because of budget concerns; a data aide would continue to be provided for each panel. STUC feels that supplying support scientists during panels is a very important function, so as a compromise we strongly recommend that at least one Ph.D. astronomer from STScI be present with each panel during the process. This person could either be a data aide or a support scientist. The STUC also

feels that there should continue to be instrument support scientists for each instrument available on-call to answer technical issues for the panels.

The STUC has in the past recommended that approximately 1/3 of the orbits be allocated to proposals in the Large and Treasury category. Part of the original rationale in going to big programs was to reduce the program management and scheduling difficulties of a huge number of small proposals. The larger programs have led to other scheduling difficulties, and the target field for a Treasury program was changed after the proposal was accepted by the TAC, although as noted earlier this did not change neither the scientific objectives nor the methodology. We were informed that having fewer programs to schedule has not resulted in any workforce benefits for observation planning. STUC therefore agrees with and reiterates the 2nd Decadal report that this percentage should be 20-30%, which for Cycle 13 would include the 320 orbits previously allocated for Treasury observations by the Cycle 12 TAC. We note however that the STIC and the TAC review panel have recommended consistently that the amount of time be approximately 30%.

The STUC had a long discussion about proprietary periods and whether they should be fixed at a specific number of months for Large and Treasury proposals. The STUC was unable to come to a consensus on this issue.

The STUC recommends more details of the proposal request and allocation statistics, broken down by sub-discipline, to be put in the newsletter on a frequent basis and maintained on the STScl website. This is in response to community concerns about perceived trends in telescope allocations. The community perception appears to be caused by lack of detailed information.

6. Discussion: APT upgrades (presented by Tony Krueger, Brett Blacker)

STUC wishes to thank the APT development team for their timely response to user feedback on the performance and capabilities of both the phase I and phase II versions of APT. Virtually all the issues raised by users have been addressed and several additional innovations have been added, such as the availability to use 2Mass images in the Visual Target Tuner. We appreciate the multiple-platform support (including a Mac version). The STUC is particularly pleased with the enhanced capability to process and edit lists of targets in RPS2 format. The help videos were very useful.

STUC also noted with pleasure that the DADS has increased its capability, which should allow responding to the increased demands resulting from the higher data rates coming from the updated SI ensemble. It is regrettable that there were glitches during the transition, which produced delays, but these problems now seem to be overcome. The community looks forward to using the new retrieval options for sftp push transfers, and the restored ability to request only raw data.

7. Summary

The STUC thanks the Institute for its hospitality and congratulates the Director, the members of the STScl, and the GSFC/HST Project for:

- continued scientific achievements of HST, especially with recent ACS GOODS results and the UDF
- significant improvements to APT to be implemented in Cycle 13, especially the response to user complaints and the ability to enter text in RPS2-like mode
- imminent completion of the upgrade to the archive DADS system
- increase on the cap to individual E/PO funds and the increased competitiveness of the E/PO program

- doubling of the baseline access of the STScI website stemming from the Mars opposition images
- successful testing of COS and the assembly of WFC3

The STUC recommends and encourages:

- Launch of SM4 during 2005 if at all possible, or as early as feasible thereafter
- Development of plans in consultation with STUC for how the future budget will impact observing opportunities and user support
- Formation of a subcommittee (including STUC members John Stocke, Martin Elvis, and Lisa Storrie-Lombardi) to consider priorities
- Continued efforts to work out a TGS (two gyro science) mode as soon as possible
- Development of a fast response mode for the community to drive the science in a TGS mode change-over
- Formation of a subcommittee to consider issues (including STUC member Don York)
- Continued involvement by the STScI in studying the extended life and de-orbit of HST via an SM5
- Encouragement of outsourcing of instrument calibrations
- Formation of a working group on the parallels program (including STUC members Lisa Storrie-Lombardi and David Axon)
- Publication of proposal submission and orbit statistics in more detail in the next newsletter, giving success based on orbit size and for various science disciplines

8. Next Meeting

The next meeting of STUC will take place April 22-23, 2004 at the Institute. Items for the agenda include, in addition to responses to the above concerns:

- Update on PyRAF
- Update on reprocessing of ECF data
- Information about instructions given to the TAC
- Reports from the COS and WFC3 instrument teams
- Presentation of options resulting from budget constraints and how they impact HST users so STUC can help prioritize
- Presentation of TGS mode implementation plans
- Presentation of strategies for minimizing scheduling difficulties

The STUC appreciates the efforts of several STScI presenters in making their presentations available on the web in PDF format prior to their talks.

9. Future Work Assignments

STUC is grateful for the committee service by outgoing members Marc Davis, James Dunlop, Holland Ford, Karl Stapelfeldt, and John Stocke. The portfolios were reviewed and assignments were revised as follows:

- ACS/ WFPC2: Elmegreen, Tosi, O'Dell
- COS/ STIS: Axon, York, Schulte-Ladbeck
- NICMOS/ WFC3: Storrie-Lombardi, Emsellem

- Proposal Handling and Scheduling: Axon, Storrie-Lombardi
- Software Analysis Tools: Elvis, Emsellem, Schulte-Ladbeck
- Targets of Opportunity: Meech, Nugent
- Solar System Issues: Meech
- Archive: Elvis, Tosi
- TAC: O'Dell, York
- GO Funding: Elmegreen, Nugent