

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

The Space Telescope Users Committee (STUC) met on April 24th and 25th, 2003 at the Space Telescope Science Institute.

Attended: David Axon, Debra Elmegreen (Chair), Martin Elvis, Holland Ford, Karen Meech, Peter Nugent, Karl Stapelfeldt, Lisa Storrie-Lombardi, John Stocke

Unable to attend: Marc Davis, James Dunlop A

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

The launch date for SM4 is uncertain because of the tragic loss of the Columbia crew and shuttle and the current hold on shuttle flights. The STUC views SM4 as crucial for the continued productivity of HST. The STUC strongly supports an early flight of HST SM4, as soon as the space shuttle program is ready to support the mission. SM4 is critical to maintaining the spacecraft systems that enable all of HST's science return, and to renewing/upgrading its scientific instruments. The STUC is eager to see the new science results that the COS and WFC3 instruments will provide, and regrets the likely delay of SM4 to late 2005/early 2006.

Before the Columbia accident, issues were resolved about adequate training time for the SM4 crew. The planned training ratio of 13.4 hours per hour of EVA is a significant improvement over the previous ratio of 7. We are concerned with the possibility of the loss of EVA time during SM4 because of shuttle safety issues, and we hope that the Project can find means to mitigate the potential adverse impact of increased safety procedures. We support the default plan of replacing the old FGS3; however, we note that FGS2 is not totally stable and may need replacement instead. The ASCS is critical for maintaining the proper thermal level for both new and old instrumentation.

## 2. Project Scientist Outlook(presented by Dave Leckrone)

The STUC was relieved and encouraged that Dave Leckrone has resumed the role as HST Project Scientist. In these difficult times of shuttle and budgetary uncertainties, an experienced Project Scientist is essential, and we therefore offer our strong endorsement of this prudent choice by the NASA administration.

The STUC is concerned about the slippage of the SM4 launch as a consequence of the Columbia disaster. The HST reliability model suggests a strong probability that there will not be three functioning gyros if SM4 slips to late 2005 or early 2006. The loss of gyro #3 a few days after our meeting brings this concern into stark relief. On-orbit experience has demonstrated that gyro failure is one of the most significant risks to the mission, with devastating science impacts.

The STUC strongly recommends the development of the Two-Gyro Science (TGS) mode to help assure a scientifically functional HST during the extended period that may elapse before SM4 flies, and for use at the end of the mission. It is critical to begin this development soon, so that this capability can be available by mid-2005. STUC further recommends an exploratory study of the potential scientific impact of going to a TGS mode, including what degree of pointing accuracy could be realistically accomplished, and the scope of the science that could be achieved with these restrictions. The Call for Proposals might also include a question for GOs about how a TGS mode would affect their observations; this information would not go to the TAC, but could be useful for the exploratory study.

The STUC strongly endorses the idea of an SM5. We are encouraged that NASA has already embarked on serious discussions with the community on the future of HST, as directed in a Congressional mandate. We look forward to the imminent report of the HST Post-SM4 Scientific Review Panel chaired by David Black to address the scientific potential of an SM5, and a later report by the Blue Ribbon Committee, which we regard as vital. If new instruments are to be included on such a mission, the STUC encourages an early open AO, whose results would be included in the Blue Ribbon Committee discussions.

### **3. STScI Outlook (presented by Mike Hauser)**

The HST scientific highlights of the past year presented to the STUC span a wide range of subjects, including spectacular new results on a light echo in V838 Mon, early release observations of galaxies from the GOODS program (whose initial results will appear in a special dedicated issue of ApJ Letters), progress on detailed studies of the halo population of M31, and the prospect of refined measurements of W and L from new high-z supernovae observations. The scientific output of Hubble remains at an all-time high, accounting for a disproportionate share of high impact papers as measured against other missions within NASA and worldwide. In future brief scientific highlights, the STUC would appreciate being presented results on the spectroscopic science impact as well.

STScI successfully scheduled the heavy demands of Large and Treasury Programs in Cycle 11. A new ACS ultra-deep field (UDF) of 410 orbits in 4 filters is planned using DD time, as recommended by the Scientific Advisory Committee. Observations will begin by this fall, and the data will be immediately available to the public. The STUC is supportive of this project.

The re-organization of the Institute seems to be working well. The STUC welcomes the appointment of Dr. Antonella Nota as Head of the Science Division, to better reflect the diversity of the Institute and the science community.

At the last STUC meeting, STUC members requested updates on the state of WFC3, EPO, SM5, PYRAF/STSDAS, and astrometry, which were summarized by Dr. Hauser. Dr. Hauser then requested advice and feedback from the STUC on stimulating interest in E/PO grants, experience with APT, the shortened proposal process, PyRAF, and the parallels program, which are all addressed in this report.

There has been a tremendous growth in the data volume retrieved from the archive, driven primarily by the increase in the size of datasets generated by the new instruments. There are many issues about the architecture of the data retrieval system, which needs to have reliability, availability, and serviceability. There has been a tremendous effort by the Institute, spearheaded by Lisa Wolff, to improve the data system, and the STUC congratulates the team members on the upgrade plans that are underway. These are essential to allow the archive to be fully enhanced and developed as a legacy of HST for the NVO. The staff ingenuity and resourcefulness in planning and financing will make a significant positive impact on the user community. The provision of data one day after execution is a remarkable achievement.

### **4. HST Status (presented by Rodger Doxsey)**

It is exciting to acknowledge today's (4/24/03) 13-year anniversary of the launch of HST. The overall spacecraft performance is great. NICMOS and STIS are doing well, and there is no change with WFPC2. The ACS is performing beautifully, although the STUC is concerned with a higher-than-expected growth of hot pixels that appears to be temperature dependent. We recommend that a "Tiger Team" of experts examine the hot pixel issue in order to understand the problem and correct it if possible.

The Cycle 11 Treasury Programs are nearing completion. Cycle 10 is 90% complete, and the SNAP program is about 50% complete. STIS MAMA SNAP completion rate is lower due to more restrictions on MAMA use. The scheduling efficiency is nearly 50%. An interesting side item was that Venus was observed at western elongation for only the second time ever with HST.

As only one pure parallel program was selected for Cycle 12, the STUC thinks it would be very valuable to have a parallel working group meeting as soon as the Institute can support it. STUC members Dave Axon and/or Lisa Storrie-Lombardi will be happy to participate. We encourage the Institute to maintain the default parallel program.

Regarding archives, the STUC appreciates the convenience that the associations feature is providing to the community. Astrometry data will improve accuracy to 0.3 to 0.4 arcsec as we move from GSCI to GSCII at end of year; the STUC approves of this plan and of the intent to extend use of the GSCII to ACS and STIS images. The further improvement of astrometry to  $\sim 0.1$  arcsec by the application of USNO positions to ACS and WFPC2 associations would be invaluable to multi-wavelength studies. The STUC urges STScI to continue working toward this goal. We are pleased that outgoing secure ftp transfers from the Archive will become an option in the near future, and that selective retrievals will be enabled. The abolishment of the need for archival users to register will be an improvement, and the STUC is grateful for these upcoming changes.

## **5. WFC3 Status (presented by John MacKenty)**

The WFC3 team is making good progress towards the previously targeted November 2004 launch. The STUC is delighted to hear about the successful delivery of IR detectors for WFC3, and congratulates the WFC3 team for their perseverance in achieving stable FPAs with high quantum efficiency, stable low dark current, and nice flat fields.

The plans for dealing with the broken TEC in UVIS #1 appear reasonable. Analysis is underway to correct the problem with possible contaminants on the window at lower-than-expected CCD assembly temperatures, and the failed calibration lamp during the vibration test, and we will look forward to the next update on progress at our fall meeting.

The factor of more than 10 improvement in the GRASP of WFC3 over the current NIC3 is very encouraging. We believe it would be extremely valuable to the community to provide direct comparisons of WFC3 and NICMOS in a readily accessible format, just as it was useful to have direct comparisons between COS and STIS. We suggest putting a primer in each instrument manual describing cases that compare performance, and having an option in ETC to check exposures with both instruments, to help observers plan the most effective proposals.

## **6. Cycle 12 (presented by Duccio Macchetto)**

The TAC Review Committee met last summer and was impressed by the efficacy and integrity of the process for awarding HST time, and the role of STScI and the Director in organizing and supporting the procedures. The review committee recommended that detailed comments once again be sent automatically to all proposers, and suggested some changes in the TAC procedures (such as having TAC meet after the panels to review Large and Treasury Proposals that were also discussed in the panels, and a modified subsidy for regular proposals within the panels for Chandra and NAO allocations). These modifications have been fully implemented in the recently completed Cycle 12 selection. The mirrored panels minimized conflicts of interest while maximizing panelist input. Nearly 20,000 orbits were requested, with a typical 5:1 oversubscription. The informal goal of awarding no more than about a third of the orbits to Large/Treasury programs was achieved. There was a nearly uniform acceptance rate regardless of orbits requested. Not surprisingly, over half of the requests were for ACS, with just over 1/5 for STIS and for NICMOS. The number of archival proposals has not increased, so their oversubscription rate is still about 3:1. The system of triage still seems to

work well, since the bottom 30% are far below the cut-off for accepted proposals. If the number of proposals continues to increase, the STUC believes it may make sense to raise the bar of the triaged proposals to the bottom 40%.

The STUC is impressed with the achievement of a compressed schedule for Cycle 12, reducing the time between proposal submissions and the start of the cycle by 4 months. The goal of this dramatic reduction was to allow quicker follow-up on discoveries, and allow for "fresher" science programs. Astronomers were notified about the outcome of their proposals less than 1 week after the conclusion of the TAC (a process that used to take 3 weeks), and the STUC congratulates the Institute and the Director on this remarkable achievement.

The full implications of the experiment of the shortened Cycle 12 are not yet known, since the Phase II deadline is a few weeks away. The STUC welcomes a report on the process at our fall meeting. We specifically would like to hear about the intense period of implementation that the Institute will face to accomplish the rapid activation.

## **7. Treasury Workshop At AAS(presented by Duccio Macchetto)**

Following the recommendations of the TAC Review Committee, the Institute hosted a Treasury Proposal Workshop at STScI in November that was well attended. A similar 1-day meeting will be held at the next AAS on June 1, 2003 to involve as large a segment of the astronomical community as possible. Speakers will include PIs of current Treasury programs, which the STUC thinks is a good idea.

## **8. APT Status (presented by Steve Lubow)**

We congratulate Steve Lubow and the APT team and applaud their excellent efforts on APT, which appeared to be very successful for Cycle 12 Phase I. The suite of tools presented at the last meeting is operational now. One issue that the team will continue to work on involves dealing with inputs from proposals having a large number of targets.

The implementation of the Visual Target Tuner within APT is a very nice addition that should prove quite useful to GOs. The instructional movies were an excellent way to illustrate GUIs, since the team recognizes that astronomers commonly do not read help documentation. The direct retrieval of 2MASS images (in the style already done for DSS images) should be a priority for the next version of the VTT software. NICMOS observers now, and a potentially larger group of WFC3 observers in the future, will benefit from this feature. The 2MASS survey has finally released its all-sky image and catalog datasets, so now is the time to thread 2MASS images into HST user software.

It was very interesting to see the APT-derived statistics on what platforms astronomers use to do their HST work. The STUC notes that Linux was the most frequently used platform, and thus merits the highest priority for the development and testing of future software by STScI. Mac usage also justifies continued development for that platform. Thus, the survey shows that the Institute is properly expending effort in supporting the different platforms.

The goal of APT Phase II, recently released, is to provide users with a more graphical and interactive set of tools, in order to improve performance for orbit packing and visit scheduling. The STUC recommends that a "fuzzy box" be included in APT as a target for filling available orbit time, rather than trying to fill a firm orbit time, to avoid unnecessary iterations in planning. We also recommend that having the ability to do time/sensitivity calculations for WFC3 and NICMOS from the same ETC would be a useful addition to the APT so that the user could more easily decide between the efficacies of different modes for a particular observation.

We are looking forward to the results of Phase II evaluation.

## **9. PyRAF/STSDAS (presented by Perry Greenfield)**

The computer software development team has produced a tremendous amount of results with PyRAF with a very limited number of FTEs, and we congratulate them. Making PyRaf available on all IRAF-supported platforms ensures its widespread use. The new capabilities, including more interactive features for visualization and plotting, and ease in script-writing, will be welcomed by the community, and we enthusiastically support their efforts.

While we are very impressed by the PyRAF development, we are also concerned about multiple run time compile languages being developed in astronomy (PyRAF for IRAF, glish in AIPS++, S-Lang in CIAO). In the NVO multi-wavelength environment the ability to use tools and scripts interchangeably is highly desirable. We urge STScI to pursue interoperability with other major data centers, e.g. through forums such as the ADEC.

## **10. Office of Public Outreach (presented by Ian Griffin)**

The STUC was very impressed with the breadth, scope and excellence of the OPO office, in particular the implementation of a strategic plan for providing annual products and services to increase efforts in many facets: news, formal and informal education, and the public. The development of multimedia presentations for use in museums is a generous and appropriate effort that will bring the exciting discoveries and theory of science to the public in easily accessible ways, such as the fun "black hole through Baltimore" movie and the galaxy collisions on a planetarium dome.

The STUC views educational and public outreach activities associated with HST as extremely important and encourages OPO to find new ways to stimulate better GO involvement. The STUC feels that part of the problem is the limited funding amount per PI and per institution, and the cap even on combined proposals. Universities are constrained with what they can do for what cost because of fixed labor costs, overhead infrastructures etc. If the cost cap were softened then there might be a much higher interest and proposal rate. While we realize that the cost cap is mandated by the ROSS E/PO levels, it would be useful to explore the possibility of a higher cap. We further recommend that grant submissions be allowed by GOs from the previous 2 cycles. We also encourage the idea of having GOs coordinate innovative E/PO programs with OPO (e.g. public lectures by GOs at outreach centers (planetaria, museums, etc.), "plug-and-play" modules for GO implementation, E/PO kits for GOs, etc.).

STUC urges OPO to work more closely and directly with other NASA missions, not only in Origins but also in SEU.

## **11. Summary**

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

- the past year's success of HST, especially with ACS and NICMOS
- the continued development of PyRAF/STSDAS
- the improved data system infrastructure in progress
- the improved astrometry in progress
- the successful IR detectors for WFC3
- the completion of a compressed Cycle 12 Phase I

- the development of APT
- the successful OPO activities
- The STUC recommends and encourages:
- the development of a TGS mode
- a study of the impact of a TGS mode on the Institute and on science
- the Institute's involvement in studying the extended life of HST via an SM5
- an exploration of an increase on the cap on individual E/PO funds, the inclusion of applications from more cycles, and the possibility of packaged items for GOs to use
- the formation of a Parallels Program working group
- a "tiger team" investigation of the cause of the temperature-dependent growth of ACS hot pixels

## 12. Next Meeting

The next meeting of STUC will take place November 6-7, 2003 at the Institute. Items for the agenda include:

- Discussion/update of the Post-SM4 Review Committee report
- Examination of priorities for HST and the Institute services in support of it
- Progress report on APT status, including completion of Phase II and implementation issues at next meeting on how well the shortened schedule works, how the scheduling went, what the efficiency is, etc.

The next meeting of STUC will take place November 6-7, 2003 at the Institute. Items for the agenda include:

- what NICMOS is doing that could not be done with WFC3
- what WFPC2 is still doing, and
- how much the ACS coronagraph and ACS/SBC are used
- Progress report on instrumentation, including COS, WFC3, and ACS hot pixels, as appropriate
- The STUC would greatly appreciate STScI presenters making their presentations available on the web in PDF format prior to their talks (even the day of the meeting). This would allow the STUC members to download and review these documents, and would also save handing out and carrying home stacks of paper. Printing just a few copies would cover those who do not bring computers.

## 13. Future Work Assignments

The portfolios were reviewed and assignments were revised as follows:

- **ACS/ WFPC2:** Elmegreen, Ford, Stapelfeldt
- **COS/ STIS:** Axon, Storrie-Lombardi, Stocke
- **NICMOS/ WFC3:** Dunlop, Storrie-Lombardi
- **Proposal Handling and Scheduling:** Axon, Storrie-Lombardi
- **Software Analysis Tools:** Elvis, Davis, Ford
- **Targets of Opportunity:** Nugent, Meech
- **Solar System Issues:** Meech, Stapelfeldt
- **Archive:** Elvis, Davis, Dunlop
- **TAC:** Dunlop, Stocke
- **GO Funding:** Elmegreen, Nugent, Stocke