

Report of the Space Telescope Users' Committee (STUC) Meeting, November 1997

The Space Telescope Users Committee met in open session on 24-25 November 1997, in the Board Room of the Space Telescope Science Institute. Committee members in attendance were: W. van Breugel, J. Clarke, R. Fosbury, L. Kay, P. McCarthy, R. Schulte-Ladbeck, S. Terebey, R. Thompson, F. Walter (Chair), and B. Woodgate. Absent were J. Bally and M. Franx.

Minutes of the meeting are reported elsewhere.

This meeting featured no large crises, and hence our report has little coherence, but is rather a shopping list of concerns. Some of these are new, while others are carried over from previous meetings.

The role of the STUC is not to be critical, but rather to point out concerns which affect the users of the HST, its archival database, and its services. Although the meetings, and this report, tend to harp on what is wrong, or what could be better, we realize the sheer complexity of the HST and the efforts undertaken by the HST project and the STSCI to keep everything functioning smoothly. We applaud everyone involved in this project for all the hard work they have put in, from those in the trenches, who are overworked and underappreciated, to those at the top who must bear the brunt of the criticisms. It continues to be astonishing how well such a complex operation as the HST functions.

STScI Manpower

The total investment in HST and its instrument suite is huge. The scientific value of the hardware is directly dependent on the quality and quantity of the instrument science effort which can be devoted to understanding, calibrating and enabling the operation of the many modes of these instruments. Given the complexity of operation of NICMOS and STIS, the STUC is concerned that insufficient resources may be available to fully exploit the capabilities of these instruments. It is understood that the commissioning of all the capabilities cannot take place immediately and it is appreciated that the quality of work and the dedication of the instrument scientists and supporting personnel is very high. It is apparent, however, that the number of highly skilled people working on STIS and, particularly, NICMOS is so small that the characterisation of the instruments is slower than desirable. STUC urges the STScI to make a critical appraisal of the balance of its resources devoted to instrument science relative to other areas in order to address these concerns.

Southern Deep Field

The STUC concurs with the plans for the southern deep field, and anticipates that it will prove as scientifically exciting as did the Hubble Deep Field.

Proposal review / TAC comments

The STUC appreciates the large effort by the STScI to conduct a cycle 7-delta review of proposals for NICMOS on a very short timescale. The STUC acknowledges that the special circumstances may have required a more austere review process to decrease the workload on the STScI staff in dealing with proposal evaluation and response to users in a timely manner. The STUC is concerned, based on feedback from the user community to STUC members, that the adopted philosophy for the cycle 7-delta review process of

1. minimizing feedback to users on proposal evaluation by using user "comment tables",
2. allowing TAC panels to provide only advisory proposal rankings to the super-TAC, and
3. prohibiting TAC-panels to adjust proposal requests when deemed appropriate, is not in the best general interest of users. The STUC therefore urges the STScl for future HST proposal cycles to let users (TAC-panels) be in more control of the proposal evaluation, and provide more useful feedback in the form of written comments to users afterwards.

Advanced Camera for Surveys

The STUC recommends that the HST Project support the efforts of the ACS Science Team to obtain an additional procurement of 2k x 4k CCDs, with the goal of acquiring high quality CCDs for the Advanced Camera. Because the ACS Science Team is presently exploring alternative ways to acquire high performance CCDs, we think it is imprudent to specify in detail how they should proceed. If the ACS team presents a convincing plan that balances cost against schedule, performance, and risk, we recommend that the project support the plan.

Scheduling

The STUC understands the difficulties faced by observers with deferred cycle 7 programs. The STUC wholeheartedly supports the efforts of the STScl to reduce the backlog of uncompleted cycle 5 and cycle 6 observations. We concur with the scheduling prioritization currently implemented.

Planetary Working Group

Knox Long observed that the Planetary Working Group (PWG) was completing work on the items that had earlier been raised by the STUC, and recommended that the group now be disbanded. Indeed, progress has been made on all fronts, and many tasks have been completed while in some areas the work is planned to be completed within the next few months. We applaud the personnel at STScl and on the instrument teams for their hard work and responsiveness on these issues. The STUC agrees to disbanding the committee subject to the completion of all action items, and we hope that this can happen at the next STUC meeting in May 1998 following a presentation and discussion among the committee members. At the same time, in the past there have been recurring needs for such a group to address new issues, which might again arise at some time in the future. The specific items not yet completed are 1) distributing planetary target "finding charts" to observers on a regular basis, 2) extension of track 51 segments to times longer than 33 minutes so that consecutive observations during the same visibility period can be related to each other in absolute pointing, and 3) any issues that arise from early observations with NICMOS and STIS.

One particular area to be watched will be the success rates of STIS and NICMOS observations of moving and planetary targets, for which statistics are now being accumulated. Specific questions for STIS and NICMOS observations will be 1) reasons for any failed observations, 2) accuracy of pointing and acquisitions, and 3) accuracy of post-observation pointing and ancillary information. In particular, it remains to be seen how accurately the observer can register the pointing with STIS spectra either by target acquisition or following imaging. In the case of moving targets, the pointing with respect to the center of a planet between consecutive exposures is often not maintained, for example if the start times of linear track segments are not exactly what was planned, so that an image does not necessarily show where the aperture was pointed in a following spectrum. We hope that this issue can be addressed and put to rest at the May STUC meeting.

Archival CP

The STUC notes that the length of cycle 7 is nearly 2 years. Because the archival proposal process is tied to the observing cycle, users of the archive will not have had a recent opportunity to propose

for support for their research. As grants are usually awarded on an annual basis, this has caused financial hardships. The STUC urges that an archival proposal opportunity be offered as soon as possible.

This special archival opportunity would follow the precedent set for the NICMOS delta-CP. As the observing cycle returns to an annual cycle, a single call for proposals would cover both archival and observing opportunities.

We note with satisfaction that NASA and the STScI have agreed to a special archival proposal opportunity to address this issue.

Support for New Users

STScI does a thorough job providing documentation and support for users. However the system is very complex and time consuming to learn, and can be overwhelming for new users. New users have special needs to get them onboard quickly -- overviews, tips, and cookbook documentation. These need not be time consuming tasks for Institute Staff to be worthwhile.

These recommendations mainly concern a particular type of new user: those unaffiliated with institutions, or those at small institutions with limited institutional support. Efficient use of the phase II proposal preparation tools requires either a SUN workstation or access to a fast internet connection.

The kind of help which would prove most useful includes:

Pre-phase II travel support to the STScI to learn how to use RPS2 and to generate the Phase II proposal. A user without a SUN workstation or a quality internet connection is at a particular disadvantage, and there is generally insufficient time between announcement of the Phase I results and the Phase II deadline to obtain funding to purchase and install appropriate hardware.

Special assistance provided by STScI staff to new users. This assistance would entail a greater level of effort (per GO) than is possible for the program coordinators or contact scientists.

New users also benefit from training in how to use the data reduction software. Please continue to encourage new user visits, and provide the staff needed to support those visits.

Software Support

The STUC appreciates the difficult job that the software support personnel have in attempting to keep STSDAS current, between the new instruments, upgrades of IRAF, and the multitude of platforms observers wish to use. Some of the recent difficulties in obtaining up-to-date versions of STSDAS are due to inevitable delays in porting IRAF 2.11 from SUNs to other platforms (over which the STScI has no control). The STUC supports the decision to port the pipeline software to OpenIRAF (coded in C). The STUC admonishes the user community not to expect miracles.

STUC Membership

The STUC is comprised of 12 members, each of whom serves a 3 year term beginning with the Spring meeting. In principle, 4 new members are selected each year. The carryover of 8 members provides for a strong continuity to the committee. Due to three resignations, there were 7 new members selected in 1996. When these members rotate off in November 1998, there will be left only 5 members with experience. The STUC recommends that the two members rotating off this year be replaced with 4 members, and the 7 rotating off in 1998 be replaced with 5 members in 1999. The STUC will have 14 members for one year, and 7 returning members for 1999. The STUC recommends that, as policy, the PIs of newly installed instruments be voting members of the STUC

for a normal 3 year term beginning near the time of instrument installation. The PI of the ACS should join the STUC in May 2000. This ensures a voice for the GTOs, as well as the GOs. The STUC recommends that the PIs of all instruments selected for future flight be non-voting members of the STUC, and be encouraged to attend the full meetings.

The NICMOS Cryocooler

The committee remains less than enthusiastic about the proposed NICMOS cryocooler. As we stated in our May 1997 report, "Any decision to fly a cryogenic cooler for NICMOS should be made only after due considerations of all potential impacts on the spacecraft and the other instruments, and on the financial resources of the project. Funding for the cryogenic cooler must not be taken from UPN 459, and must not decrease the funding available for the year 2002 instrument."

The committee is also concerned that, even if the cryocooler is proven a viable concept, the scientific return from NICMOS in the era of large ground-based IR-optimized telescopes, adaptive optics technology, and improved detector technology may not be cost-effective. We recommend that this matter be investigated further.

WF3

The STUC was informed that the HST project is considering building a spare camera (WF3) from parts available from WFPC1 and utilizing spare ACS detectors. The motivation is to provide backup imaging capability for the extended HST mission through 2010. The STUC is concerned about both how the decision to do this was arrived at, and how the new instrument will be funded.

There are concerns that this decision compromises the peer-review process. If the project sees a need to construct a facility instrument, it should convene an open panel to recommend an instrument design.

The STUC is concerned about the source of funding for this instrument. We strongly recommend against use of UPN459 funds, especially if this reduces the amount of funding available to the GOs.

This report submitted by Frederick M. Walter on behalf of the Space Telescope Users Committee
February 1998

Minutes of the Space Telescope Users' Committee (STUC) Meeting, November 1997

The Space Telescope Users Committee met in open session on 24-25 November 1997, in the Board Room of the Space Telescope Science Institute. Committee members in attendance were: W. van Breugel, J. Clarke, R. Fosbury, L. Kay, P. McCarthy, R. Schulte-Ladbeck, S. Terebey, R. Thompson, F. Walter (Chair), and B. Woodgate. Absent were J. Bally and M. Franx.

Monday 24 November

B. Williams, director of the STScI, welcomed the participants and opened the meeting with the STScI perspective. The observatory continues to operate well.

R. Gilliland presented an overview of the spacecraft status. He concentrated on spacecraft operations; discussion of the science instrument (SI) status followed later. The replacement Fine Guidance Sensor, FGS1R, which was installed in SM2, is working well. It is superior to FGS3 in TRANS mode. There are no current plans to replace FGS3 with FGS1R for scientific use, but decisions on what science modes will be offered will be made prior to the cycle 8 CP. (FGS details are available here.)

Use of FGS2 is being kept to a minimum. There have been some losses of lock during small angle maneuvers, but this has not lead to any significant loss of observations.

J. Biretta discussed WFPC2 status. There is some progress on understanding the CTE problem.

D. Calzetti reported on the current status of NICMOS. Currently, science operations are expected to cease in December 1998, about a month prior to depletion of the cryogen. Camera 3 remains out of focus. Use of the coronagraph will be enabled by changes to the FSW expected in late 1997.

M. Urry discussed the NICMOS delta CP and the TAC results. 6473 orbits were requested in 449 proposals; 1041 orbits and 473 SNAP targets in 83 proposals were approved by the TAC. She outlined the responsibilities of the panels and the TAC, the conflict-of-interest rules, the criteria for ranking the proposals, and the rationale for the new comments table.

D. Machetto described the plans for the NIC3 observing campaigns and the plans for a southern deep field (HDF-S) observation. The NIC3 campaign will take place during the second half of January 1998. All other SIs will be out of focus. 127 orbits will be devoted to GTO observations of the HDF.

S. Baum discussed the current status of the STIS instrument and commanding software. Concerns include the CCD hot pixel growth rate and the lifetime of the NUV flat field lamps. With the exception of the NUV-MAMA dark count rate, STIS is operating at or above specs.

A number of commanding upgrades are planned and proposed in order to increase STIS efficiency and make more observing modes available to the community (see STIS TIR 97-21).

H. Ford discussed the current status of the Advanced Camera for Surveys (ACS), which is to be installed in servicing mission 3 (SM3) in December 1999. At present there are some developmental problems with the CCDs for the WFC (4000 X 4000). Neither meet spec for parallel charge transfer efficiency, and the QEs are about 20-40% lower than expected (but are far above the QE of WFPC2). Further work is continuing on the optical coatings. The flight filters appear to be in good shape.

P. Stanley discussed the current status of cycle 5 and 6 proposals. All cycle 4 programs are now complete. As of 11/1/97, cycle 5 is 99% complete, cycle 6 is 72% complete, and 19% of the cycle 7 observations have been completed. During the third quarter of 1997, the 51% of the available time is devoted to NICMOS, with 24% to STIS and 25% to WFPC2.

She discussed the STScI policy on over/under allocations. If too few proposals are accepted, scheduling becomes inefficient towards the end of the observing cycle. If too many proposals are accepted, scheduling efficiencies are high, but there will be a backlog of unobserved targets carried over into the next cycle. Unanticipated downtime of course affects this backlog. The STScI is making

every effort to reduce the backlog. Cycle 5 and 6 programs have higher scheduling priority than do cycle 7 STIS and WFPC2 programs.

Cycle 8 will start in June 1999. The CP will be released in June 1998, with a mid-September 1998 deadline. About 2400 GO orbits will be available. Cycle 9 is planned for one year later, with proposals due in September 1999 and the cycle beginning in June 2000.

D. Machetto presented the recommendations of the parallel observations working group. During cycle 7 only a few pure parallel observing programs were recommended by the TAC. The working group defined 3 generic parallel programs to utilize time that would otherwise have been wasted. These programs include a galactic program for $|b| < 20$, an extragalactic program for $|b| > 20$, and a special objects program. These data are non-proprietary. Further information is available at the STScI Pure Parallel Archive web page

The success of this program will be reviewed prior to the release of the cycle 8 CP.

A. Storrs and J. Clarke discussed Moving Target and Planetary Target issues. The STScI has addressed each of the issues that the Planetary Working Group has raised, with many issues now resolved and others nearing completion. While the implementation of STIS/MAMA bright object protections for moving targets is being watched carefully, UV-MAMA observations are being conducted routinely now. Due to lack of sufficiently strong community support to justify the required resources, track 48, moving target snapshots, and STIS 45 degree planetary slit capabilities are not being implemented at this time, and the STUC does not intend to push these capabilities unless strong community support were to materialize.

K. Long suggested that the Planetary Working Group had served its purpose, had addressed all outstanding issues peculiar to the planetary observers, and should be abolished. This point will be addressed in the STUC recommendations.

R. Beaser presented the STScI position on GO funding. The STScI recognizes that there is some hardship, with some observations being delayed by years due to various factors. The amount of preparatory funding routinely available has been increased from 10% to 25%. Additional funding is available for programs facing severe financial impacts due to delays in data-taking, subject to review by the Financial Review Committee and approval by the Director of the STScI.

Effective December 1997, foreign travel does not need prior approval, the definition of permanent equipment is increased to \$5000, and cost-sharing is no longer required. These changes will decrease administrative costs. Under consideration, to further reduce administrative efforts, is the possibility of electronic submission of budgets, award documents, payment requests, and financial reports.

F. Walter raised the possibility of separating the observing and archival proposal opportunities. Due to the extreme length (21 months) of cycle 7, it will be nearly 2 years between archival research proposal opportunities.

The committee then discussed the possibility of a special parallel observation data analysis research opportunity. The justification is twofold. Not only would this meet provide an interim funding opportunity, but, more importantly, it would focus the community's attention on the availability of the parallel data sets. The response to such a specialized call for proposals would serve to demonstrate the value of these data, and justify the efforts that are being made to obtain these data.

It was noted that a precedent for such a special funding opportunity was set during the HDF opportunity.

S. Tereby told the committee of her experiences as a first time user/visitor to STScI.

P. Greenfield discussed efforts to increase the portability of STSDAS. STSDAS v2.0 required IRAF v2.11, because it requires the FITS kernel in IRAF 2.11. IRAF v2.11 is currently available only for SUN platforms, which is inconvenient for users who use other platforms (e.g., DEC Alpha, HP/UX, PC-IRAF, IBM IRIX, SGI AIX). It is expected that IRAF v2.11 will be ported to these platforms shortly. STSDAS v2.0 will be released for these platforms as IRAF v2.11 becomes available.

The STScI processing pipeline is being rewritten in OpenIRAF, using C instead of SPP. The pipeline will produce multi-extension FITS files rather than GEIS-format files.

F. Walter noted that membership in the STUC is normally 12 persons, 4 appointed each year for 3 year terms. Due to a number of resignations, there will be 7 members whose terms expire after the November 1998 meeting. Since the strengths of committees like this one lie in their institutional knowledge, a committee with only 5 veteran members could be a weak advocate. He proposed that 4 new members be appointed to the STUC to replace the 2 retiring members. The STUC would be augmented to 14 members for 1998, and would decline to normal levels in 1999 with the 7 retirements.

The committee reconvened on Tuesday November 25 at 8:00 AM in executive session. The public session began at 8:30AM.

John Campbell provided the HST project perspective.

Spacecraft power is adequate. There are currently 3 failed relays in the power subsystems, causing a 10% reduction in the available power. This has no impact on operations. There have been no recent SADE upsets. The slow warming of the aft shroud continues. In all, the spacecraft continues in excellent health.

The original Fine Guidance Sensors continue to show signs of slow degradation. FGS3 will be replaced in SM3 in 1999; FGS2 will be replaced in SM4 in 2002.

No further degradation has been seen in Gyro 5; Gyro 4 will be replaced during SM3.

The new computer, to be installed during SM3, draws 22 watts, as compared to the 150 watts drawn at present. The bay may run cooler than desired.

The new solar arrays, to be installed in SM3, are made of off-the-shelf IRIDIUM arrays. They have 2/3 the surface area of the current arrays, and hence have less drag.

During SM4, in 2002, a number of proactive subsystem replacements will be made in order to ensure that HST is operations until 2010. The batteries will be replaced, as will FGS2.

NASA and ESA are negotiating an extension of their memorandum of understanding (MOU) to continue international participation in the HST project. The new MOU may include participation in the NGST project.

The HST budget continues to be healthy. Current funding is about \$200 million. This will decline to about \$50 million (in 1996 dollars) by 2002, as NGST ramps up. Overall funding for HST+NGST remains approximately constant through 2002.

David Leckrone, HST Project Scientist, reported on the long term prognosis for HST, through the year 2010.

The WFPC2 will be supported at least through Cycle 9 for scientific use, providing a full cycle of overlap between the WFPC2 and the ACS. Thereafter continued support of the WFPC2 will be based on "TAC assessment of uniqueness of proposed WFPC2 observations".

The Project and the STScI plan to continue support for scientific use of the FGSs "indefinitely".

Two independent Science Reviews (ISRs) were convened.

The Longair Committee met on May 29-30 to discuss the reduced lifetime of NICMOS. Their recommendations were essentially identical to those of the STUC, and have been implemented.

The Harwit Committee met on September 10-12 to review the proposed NICMOS cryocooler. They recommended development of the cryocooler, and a test flight in 1998. They will reconvene in late 1998 to re-evaluate technical issues and the NICMOS science return. There is some concern that NICMOS science will not be scientifically compelling in the era of the 8-meter IR-optimized telescopes with advanced IR detectors.

The Cosmic Origins Spectrograph (COS) was selected as the 2002 (SM4) instrument. PI is Jim Green (University of Colorado); Ball Aerospace is the prime contractor. This is a high throughput UV spectrograph.

NASA intends to operate HST through 2010. SM4, in 2002, will be the last servicing mission. The HST will be recovered and de-orbited in 2010. Low cost operations are planned after 2005. Strategic planning is underway for the extended mission, and will include community input, but any planning involving SM4 must be completed by early 1998. The goals of the strategic planning are to maximize the likelihood that the HST will function until 2010, will continue to produce excellent science, and that these objectives can be accomplished at low cost. Low cost can be achieved by re-using established technologies and instrument heritages.

To maximize the likelihood of HST survival, a number of options are being considered to provide for backup instruments. The COS capabilities may be extended to provide backup to the STIS in the near-UV. WFPC1 may be refurbished (see below) with spare ACS detectors as a backup imager. The Project is considering adding coronagraphic capability, based on the CODEX design, to the refurbished WFPC1. These issues will be reviewed by the 2002 instrument review panel in January 1998.

Note that there are currently no funds available for the WFPC1 refurbishment. If no other source of funding can be identified, funds may be taken from UPN459 for this.

Projections for UPN459 funding levels are stable through 2010.

K. Long reported that the FOC will be decommissioned at the end of cycle 7. Demand has been low. User support will be maintained through March 1999. The last programs are on the long term timeline in January 1999.

J. Green presented the Cosmic Origins Spectrograph (COS) to the committee. The COS is to fly in 2002. COS is a high throughput point source spectroscopy instrument operating between 115 and 300nm. It was proposed to operate in the far-UV, but the project has asked that the near-UV capability be added as a backup to STIS.

E. Cheng reported on the status of the proposed cryocooler for NICMOS. The cryocooler is expected to be able to maintain the cold well at 72K and the filter wheel at 160K, both warmer than current temperatures but scientifically acceptable. Development of the cryocooler was endorsed by the Harwit ISR in September 1997. The system will be flight-tested on the Space Shuttle in late 1998. The Harwit ISR will be reconvened to assess the cryocooler after that flight, and to recommend whether or not it be included in the SM3 activities.

E. Cheng also discussed possibilities of refurbishing WFPC1 for flight in 2002 as a spare camera. The concern is that in 2002 the ACS will be 3 years old and WFPC2 will be 9 years old. STIS has a

meager complement of filters. If HST is to be a capable telescope through 2010, a backup imaging capability may be prudent.

The project is considering a wide field camera (WF3), possibly incorporating elements from the proposed CODEX coronagraph. The instrument would occupy a radial bay, and would be built from parts from the WFPC1 where possible. A new carrier will need to be constructed, assuming that FGS2 is replaced during SM4. A decision on whether to proceed is due in early 1998.

It was noted that this camera is unbudgeted. Expected costs run \$30-\$40 million. If development continues, and costs cannot be obtained from within UPN458, then UPN459 funds, which include GO support, may have to be used.

The next meeting of the STUC is scheduled for May 18-19 1998.

The STUC thanked W. van Breugel and M. Franx for their service on the committee.

The STUC entered executive session, and adjourned at 2:30 PM.

DISCLAIMER: All technical details reported above are accurate as of 25 November 1997. Readers should refer to the STScI web site for updated information, and for details not reported here.

The recommendations of the STUC can be found here.

This report submitted by Frederick M. Walter

Chair, Space Telescope Users Committee