

May 15, 2007

Dr. David Leckrone
Senior Project Scientist
Hubble Project

Dr. Matthew Mountain
Director, Space Telescope Science Institute

Dear Dave and Matt,

The STUC has spent the past four weeks considering the issues related to priorities in the plans to repair STIS and ACS as part of SM4. We have consulted with both instrument teams and polled a broad spectrum of HST users. These discussions have reinforced the strong motivations for returning both instruments to functionality and have highlighted the vital importance of Hubble's final years of operation.

There is a compelling case that STIS brings unique capabilities to Hubble that address a broad range of science. The ability to perform spatially resolved spectroscopy in the UV and visible with the unrivaled resolution of Hubble enables studies of black holes, massive star forming regions and their outflows, stellar populations, and galaxy dynamics that cannot be matched from the ground. By observing above the terrestrial atmosphere STIS not only probes the vacuum UV, its unmatched photometric stability allows detections of the atmospheres of transiting exoplanets. The rather poor prospects for adaptive optics at visible wavelengths from the ground and the lack of any clear path to a large aperture optical/UV telescope in space makes the case for the repair of STIS all the more compelling and urgent. While COS will provide impressive gains over STIS in some areas, it is a fundamentally different instrument that was intended to complement, rather than replace, STIS.

The Advanced Camera for Surveys and WFPC2 have been the most productive instruments on HST, whether measured from data volume, archive access, publication rates or citation rates. The large field of view and great sensitivity of ACS enabled a series of surveys whose legacy value is unrivaled. Wide Field Camera 3 was originally

conceived as a backup for ACS, a testament to the importance attached to a state of the art imaging camera for Hubble. While WFC3 can carry out much of the science envisioned for ACS, it too was ultimately designed to work in concert with ACS. The power of ACS and WFC3 working together in coordination is uniquely powerful. Large area or deep multi-color surveys spanning more than four octaves of the spectrum can be carried out efficiently with this instrument combination. The value of these surveys for future studies with JWST and other NASA and ground-based facilities should not be overlooked. When Hubble ceases operations, the imaging surveys will likely constitute its most lasting legacy.

We have discussed these issues with our colleagues and fellow HST users. There is strong support throughout the community for repairing both instruments. Among those who responded to our e-mail polls, the vote totals were very close with a slight preference for STIS. We note that another barometer of community preference, proposal and usage statistics, favor ACS by a factor of two to one. This is true if measured by proposal submission or award rates, either by orbit or by number of programs. We also note that the anomalies with GHRS, NICMOS, STIS and ACS highlight the fragility of HST instruments. While we have oriented our thinking by assuming that WFC3 and COS will be installed before repair work on ACS or STIS can commence, we believe that we would be remiss if we did not consider the possibility that one or both of these instruments might fail before the end of the Hubble mission.

These considerations lead us to urge the project to continue to plan to return both instruments to operation. We ask you to continue to develop technical approaches and EVA plans with this goal. The large expenditure of public funds in the construction of ACS and STIS further argues for investment in their return to scientific productivity.

We realize that even with the best and most optimistic planning, on-orbit realities may limit us to the repair of one, or even neither, of the two instruments. If a choice needs to be made it is the view of the present STUC that the legacy and redundancy value in imaging slightly outweigh the benefits of a second spectrograph. We note that WFC3 was commissioned because the project felt that Hubble would be crippled if it were to lose its primary imaging camera. This logic is even more compelling now as we contemplate the final servicing mission. Although repairing both instruments is unquestionably our preferred outcome, scientific priority should be given to returning ACS to operation should such a decision be required.

The STUC found this task quite difficult and, while a modest consensus was achieved, the decision was by no means unanimous. The support for both instruments is strong, widely based and close to even with the committee and the broader community of HST users. The success of the upcoming servicing mission is foremost a question of engineering, planning and execution. The scientific case for repairing both STIS and ACS

is sufficiently strong that we accept that technical realities are likely to be the deciding factor in the outcome of the mission. We appreciate your dedication to Hubble and have complete faith in your commitment to achieving the most favorable outcome to the servicing mission.

Sincerely yours,

The HST Users Committee

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