Chandra (CXO) 2016 Senior Review Summary

Donald A. Kniffen, Chairman

2016 Chandra SR Panel Members

Panelist Name:

Laura Ferrarese (HIA/NRC)
Sebastian Heinz (U Wisconsin)
Charles Holmes (NASA retired)
Donald Kniffen (Chair) (GSFC, NASAHQ,USRA retired)
Chryssa Kouveliotou (GWU)
Pamela Marcum (NASA/Ames)
Richard Rothchild (UCSD)
Daniel Stern (NASA/JPL)
Lou Strolger (STScI)

Program Executive: Jeffry Hayes, Astrophysics Division, NASA HQ

NASA: This was a Delta Review

Chandra has been operating since 1999, and there have been no major changes to the observatory since the time of the last Senior Review. Given the strong endorsement of Chandra by the 2014 Senior Review, and Chandra's position as a Great Observatory, NASA intends to extend the mission. Consistent with NASA's response to the 2014 Senior Review, **the 2016 SR will be an incremental or "delta" review that will focus on changes since the 2014 SR with an emphasis on the efficiency of the mission.**

Context of the Senior Review

- Chandra Launched aboard the Shuttle in 1999
- Third of the Great Observatories (Following Hubble and Compton Observatories)
- Site Review at the Chandra X-Ray Center(CXC) 22-24 March 2016
- Review presented by the Harvard Smithsonian Smithsonian Center for Astrophysics (CfA) and CXC Management and Staff
- Most Panel Members were experienced Chandra Users supplemented by experts from other disciplines

The Review

- The focus of the review was in response to the Charges provided to the Panel by NASA.
- The detailed responses appear in the written report, and I will endeavor to provide some additional Panel reaction.
- The Panel was very much impressed by the dedication and commitment of the CfA and CXC Management and Staff to the stewardship of this major NASA investment in astrophysics in light of aging and degrading instruments and spacecraft. The effort spans a much broader focus than professionalism, but also a huge dedication of personal time and energy beyond the requirements of the job to a mission in which they are personally invested.
- Of particular note was the soon-to-be-released second Chandra Source Catalog, surely to be a major legacy of the mission to astrophysicists in all disciplines for many years.
- The decision to institute the Joint Large proposal program with related NASA astrophysics missions (JLP) in Cycle 18 was a welcome advance.

Noteworthy Achievements

- The CXC has been quite adept at addressing several subsystem deficiencies that have developed over the very long mission lifetime. In particular the Panel was pleased with the CXC's effective mitigation of the multilayer thermal blanket degradation by adjusting observing plans to minimize the scientific impact.
- The Panel was impressed with the ability of the CfA and CXC to mitigate funding decreases with minimal impact on operations through cross-training of its staff. The panel is concerned about the added stress placed on the dedicated staff, which is close to critical mass. In particular, any additional funding constraints could have severe effects on the scientific return and also lead to increased risks to the observatory and instruments.
- The Panel supports efforts by the CXC to mitigate the effects of contamination in the ACIS blocking filter.
- The work-around for the loss of the EPHIN radiation monitor is laudable.

Achievements (Continued)

- The Panel was impressed with the demonstrated success rates for female and other minority investigators by the CfA. This is a testimony to the dedication of all involved in supporting these important goals.
- The continuing high oversubscription rates help maintain standards to support the high quality science.
- The CfA dedication to maintaining GO funding is exemplary.
- Adjusting the GO Review rules and procedures to maximize scientific return is excellent.

Concerns

The major concern of the Panel was addressed in a side note to the Astrophysics Division Director, since it is outside the charge by NASA

to the panel and is beyond the scope of the information provided by the CfA and CXC Staffs in response to the charge. This issue was addressed as a repeated concern by the Senior reviews of 2010, 2012 and 2014. This is the matter of guaranteed GTO Time.

- This policy was a revision of the policy stated in the original Announcement of Opportunity. The revision was adopted well in advance of the launch.
- In the original policy GTO was to be competitively awarded. In the revised policy, 15% of observing time was provided as GTO to the instrument teams for the life of the mission (expected to be 3 years), later reduced to 11.4% when there was no longer a telescope scientist.
- The crossover time between the GTO provided by the original and revised policies was 7.5 years (well in excess of the expected lifetime at launch).
- The Project Scientist made the important argument that the GTO Time vests the instrument scientists in the success of the mission, however most of the time that was awarded to the HRC scientists was used for ACIS observations, not HRC observations.
- The Panel felt reducing the GTO time might allow for some awards of a speculative nature with lower success probability but potential high reward.