

2012 Senior Review Summary

2012 Senior Review of Operating Missions in the NASA Astrophysics Division

Response by NASA's Astrophysics Division, Science Mission Directorate May 18, 2012

NASA's Science Mission Directorate (SMD) periodically conducts comparative reviews of its operating missions to maximize the scientific return from these projects within finite resources. NASA uses the findings of these comparative reviews to define an overall implementation strategy, give programmatic direction to the missions and projects concerned for the next two fiscal years, and provide initial guidelines for the 3rd and 4th years after the review.

Held every two years, the Senior Review is the highest peer review in the Directorate. The 2012 Senior Review of Operating Missions in the NASA Astrophysics Division assessed the scientific merits of nine operating astrophysics missions – Chandra, Fermi, Hubble, Kepler, Spitzer, Swift, and the U.S. components of participation in Planck, Suzaku, and XMM-Newton. Performance factors included scientific productivity, future scientific potential, data dissemination, technical status, and cost.

The charge to the Senior Review Committee was to rank missions on a “science per dollar” basis, but after considerable discussion, the Committee concluded that a simple ranking of this sort was not adequate. In place of a single ranking, the committee provided its evaluation of the value of missions through commentary and metrics.

The Committee's overarching philosophy in conducting this review is best expressed by the following comments from the Committee's report (available at <http://nasascience.nasa.gov/astrophysics/2012-senior-review/>):

“The value of a mission during its extended phase depends not only on the science that it might conduct, but also its place in the overall suite of future NASA missions. An active mission offering unique capabilities that will not be replaced for many years is considerably more valuable than a mission that will be shortly superseded. Aside from the anticipated launch of JWST at the end of this decade, there are no approved missions in most other wavebands. As a result, certain types of science will rely heavily on several of the missions reviewed here. This reality, along with the challenging fiscal situation facing Federal science agencies, places greater emphasis on utilizing existing missions wisely, as well as finding strategies for reducing costs while not sacrificing the most important capabilities.”

Five of the eleven missions considered in the 2010 Senior Review were decommissioned after the review or had U.S. funding removed (GALEX, INTEGRAL, RXTE, WISE, and WMAP). The 2012 Senior Review considered the six strongest missions from the 2010 review (Planck, Chandra, Spitzer, Swift, Suzaku, and XMM-Newton) plus three new ones (Hubble, Kepler, and Fermi). The Senior Review Committee felt “these nine missions comprise an extremely strong ensemble to enter the Senior Review process”. The Committee found that all of these missions are making very significant scientific contributions.

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The Senior Review Committee evaluated each mission against six criteria: Discovery Space, Long Term Impact, Publication per Dollar, Synergy, Critical Capability, and Funding Health of Science Program. The evaluation of these criteria, except for publications per dollar, is based on the anticipated science of each mission in the next few years. Programmatic issues were not considered in their evaluation.

To avoid the problem of comparing a very small mission to a very large one, the Senior Review Committee also assessed the worth of a program by asking whether it is meritorious within its mission class as well as where it falls within that mission class.

Overall, the Committee recommended that all missions be continued, that missions significantly reduce operating cost in the extended phase, and that guest observer budgets be sufficiently augmented for adequate data analysis.

The Division's implementation plan of the Senior Review Committee's assessment is as follows, in alphabetical order of missions.

Chandra X-Ray Observatory: Chandra continues in its extended mission phase. Chandra is approved for continuation through FY14 and provisionally approved (subject to the next Senior Review) through FY16. The Division is fully funding the guideline budget of the Chandra X-Ray Observatory through this period. In response to the Committee's recommendation but in keeping with the budget realities, the Division is augmenting Chandra's guest observer budget at 50% of the request. In July 2010, the Division discussed the funds and observing time devoted to maintaining the instrument teams with the NASA Advisory Council's Astrophysics Subcommittee,

Fermi Gamma-ray Space Telescope: Fermi completes its prime mission phase and enters its extended mission phase in 2013. Fermi is approved for continuation through FY14 and provisionally approved (subject to the next Senior Review) through FY16. In response to the Committee's comments regarding a cost reduction over time, the Division has directed reductions to Fermi's operations budget in extended phase.

Hubble Space Telescope: Hubble completes its post-SM4 prime mission phase and enters an extended mission phase in 2014. Hubble is approved for continuation through the period covered by this Senior Review. The Division approves funding the guideline budget of the Hubble Space Telescope. In response to the Committee's recommendation, the requested augmentation is not approved.

Kepler Mission: Kepler completes its prime mission phase and enters its extended mission phase in 2012. Kepler is approved for continuation through FY14 and provisionally approved (subject to the next Senior Review) through FY16. The Division approves funding Kepler extended operations through FY16. In response to the Committee's recommendation but in keeping with budget realities, the Division is augmenting Kepler's budget to accommodate additional guest observer and participating science program funding at 50% of the request.

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ESA's Planck Mission: ESA has extended operations of the Low Frequency Instrument for 1 year beyond the end of the cryogenic prime mission. The Division approves funding U.S. support of Planck for the 1-year extended mission. In response to the Committee's recommendation but in keeping with budget realities, the extension includes funding to support ESA's second cosmology data release. A decision on funding to support a third cosmology data release is deferred pending ESA's decision on whether or not to support the third data release.

Spitzer Space Telescope (Warm): Warm Spitzer continues its extended mission phase. Warm Spitzer is approved for continuation through FY14 with a closeout in FY15, as the project requested. A further extension is subject to the next Senior Review.

Suzaku Mission: JAXA continues to operate Suzaku. The Division approves funding U.S. support of Suzaku through March 2015 to provide 1-year overlap with Astro-H. A further extension is subject to the next Senior Review. In keeping with budget realities, the Division has decided not to fund Suzaku guest observer program.

Swift Gamma-ray Burst Mission: Swift continues in its extended mission phase. Swift is approved for continuation through FY14 and provisionally approved (subject to the next Senior Review) through FY16. The Division is fully funding Swift's guideline extended mission and guest observer funding.

XMM-Newton: ESA continues to operate XMM-Newton. The Division approves funding U.S. support of XMM-Newton through March 2015. A further extension is subject to the next Senior Review.

The Astrophysics Division appreciates the thoughtful assessment of the Senior Review Committee, which has enabled the Division to define an overall implementation strategy, give programmatic direction to these missions for the next two fiscal years (FY13 and FY14) and initial guidelines for FY15 and FY16. All FY15-FY16 budget guidelines are for planning purposes and will be revisited in the 2014 Senior Review.