Project Manager's Report

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Chandra marked over thirteen years of successful mission operations with continued excellent operational and scientific performance. Telescope time remained in high demand, with significant oversubscription in the Cycle 14 peer review, held in June. The Cycle 14 review approved 185 proposals, out of 672 submitted by researchers worldwide who requested 123 Ms of observing time, 5.3 times greater than the time available. Among the approved proposals are four X-ray Visionary Projects (XVPs), which were allocated a total of 6.2 Ms. XVPs are longer observing programs intended to address major questions in astrophysics and to produce data sets of lasting value.

In the Fall, the observing program transitioned from Cycle 13 to Cycle 14. Due to the gradual evolution of *Chandra*'s orbit, which has reduced the nonproductive time spent in Earth's radiation belts, *Chandra*'s overall observing efficiency has risen to the highest level of the mission. As a result, observing Cycles 13-15 have benefited from a significant increase in available observing time. We released the Call for Proposals for Cycle 15 in December, and look forward to the Cycle 15 peer review in June 2013.

In response to NASA's request for proposals for the 2012 Senior Review of operating missions, the *Chandra* X-ray Center (CXC) submitted its proposal in January, prepared by CXC and Marshall Space Flight Center program staff, and made a presentation to the Senior Review committee in February. The committee's report rated the *Chandra* X-ray Observatory highly and described *Chandra* as one of the "two most important missions in this Senior Review." The committee recommended continuing *Chandra* operations through 2016 and augmenting the budget to make up for cuts that had been planned in the General Observer grants program.

In July, NASA extended the activities of the *Chandra* X-ray Center through September 2016 by exercising the first of two contract options. (The second option, which comes into play in 2015, would extend activities through September 2019.)

In July the CXC conducted the workshop "X-ray Binaries, 50 Years Since the Discovery of Sco X-1," and in October hosted the annual symposium for the Einstein Fellowship program. As part of the CXC's regular reviews and consultations with outside organizations, NASA reviewed the CXC's operations in April and September, and the *Chandra* Users' Committee met at the CXC in October.

After several years of very low solar radiation, the sun has become more active, requiring the team to interrupt *Chandra* observing 10 times during 2012 to protect the instruments from solar particles. In addition, two requests to observe targets of opportunity required the mission planning and flight teams to interrupt and revise on-board command loads. *Chandra* passed through the 2012 spring and fall eclipse seasons with nominal power and thermal performance.

In May, *Chandra* experienced a benign safemode, one of very few throughout the mission, that was caused by a small change in the performance of the active Fine Sun Sensor (FSS) near the edge of its field of view. Recovery from the safemode was smooth and rapid, aided significantly by a new command load capability that was implemented in December, 2011. We have mitigated future occurrences of the FSS effect by assuming a slightly reduced field of view, and have begun studying data from the backup FSS to assess its performance.

Chandra's focal plane instruments, the Advanced CCD Imaging Spectrometer and the High Resolution Camera, have continued to operate well and have had no significant problems. ACIS, along with the overall spacecraft, has continued to warm gradually. All systems at the *Chandra* Operations Control Center continued to perform well in supporting flight operations. *Chandra* data processing proceeded smoothly and data distribution continued to be rapid, with the time from observation to receipt by the observer averaging ~30 hours.

In addition to producing software to support *Chandra* users with Cycle 14 observation proposal submissions, the Cycle 14 Peer Review, and the Cycle 15 Call for Proposals, the CXC's Data System team has been engaged in two major efforts: migrating the *Chandra* Data System's data processing software from Solaris to 64-bit Linux, and developing algorithms and software that will substantially increase the number of sources in the *Chandra* Source Catalog. The new catalog will incorporate fainter objects by combining multiple observations and by using new algorithms to detect on-axis sources as faint as ~5 counts, thus increasing the number of cataloged sources by a factor of ~2.5, and will for the first time include moderately extended sources. Production of the new catalog is expected to begin in late 2013.

The CXC Education and Public Outreach (EPO) group created 15 science press releases, 2 non-science press releases and 19 image releases, and produced 28 60-second High Definition podcasts on astrophysics and *Chandra* results. Two of the group's animated videos earned gold Pixie awards from the

American Pixel Academy. Members of the EPO group contributed articles featuring *Chandra* science to the Spring, 2012, edition of "The Earth Scientist", a magazine for middle school teachers of Earth science and astronomy.

The EPO team presented 24 workshops at conferences and clinics sponsored by the National Science Teacher Association, the National Science Olympiad, and the American Association of Physics Teachers. EPO and CXC staff took part in the USA Science & Engineering Festival; Astronomy Night on the National Mall; a science festival in Manchester, New Hampshire, for children of National Guard troops; and events in New York City, Los Angeles and Kennedy Space Center marking the retirement of the Space Shuttle. The EPO group launched "Here, There and Everywhere", a science exhibit designed for small libraries and museums; the exhibit "From Earth to the Solar System" in conjunction with NASA's planetary division; and "STOP for Science", an informal science education program for elementary schools. In addition, the group produced training videos for users of "STOP for Science", and to support Science Olympiad Coaches' clinics.

We look forward to a new year of continued smooth operations and exciting science results.