CUC Report — 2025 Nov 10

CUC Members

In-person:
- David Pooley (Chair)
- Yvette Cendes
- Vallia Antoniou
- Daniel Wang

Remote:
- Sebastian Heinz
- Marcella Brusa
- Andreas Zezas

Not attending:
- Adi Foord
- Frits Paerels
- Tea Temim

Meeting Summary

The Chandra Users Committee (CUC) meeting was held in-person at the CfA in Cambridge, MA, on 2025 November 10. Four of the committee members were in person and three were remote. Three were unable to attend. The agenda with links to presentations is given below. In the afternoon, the CUC discussed what was presented and deliberated on the recommendations.

Schedule

8:40	Introduction and Opening Remarks	Antonella Fruscione
8:45	Director's Report	Pat Slane
9:30	Chandra Status Report	Mark Weber
10:15	Morning Break	
10:45	Proposal Cycle and Future Plans	Rodolfo Montez Jr.
11:15	Mission Planning Updates	Scott Randall
11:45	Calibration: Goals, Priorities, and Plans	Akos Bogdan
12:15	Lunch	
13:15	SDS/CIAO Update	Jonathan McDowell
13:45	HRC Update	Dan Patnaude
14:15	ACIS Update	Paul Plucinsky
14:35	Chandra Source Catalog & Data Systems Initiatives	Pepi Fabbiano
15:05	Afternoon Break, Discussion, Executive Session	

Executive Summary of Discussion and Recommendations

The presentations by the Chandra X-ray Center (CXC) to the CUC gave a picture of an observatory continuing to produce excellent science and operated by a phenomenal team. The past year was another one of unexpected difficulties, continued uncertainties, and seemingly existential threats, mainly stemming from the larger political climate and executive actions and decisions affecting the entire country (e.g., the leak of the "skinny budget" in the spring and the government shutdown in the fall). The Chandra team soldiered on in this environment and continued to carry out scientific observations in a highly efficient manner and deliver excellent user products, software, and documentation (e.g., the upcoming Chandra Source Catalog v2.2, improvements to CIAO and CIAO integration into SciServer, and the various "centrals" and beginner's guide on the CIAO web pages). At the same

time, the CUC and other members of the community advocated for continued operation of Chandra and urged others to do the same. In an effort to increase transparency, the CXC acted on a previous CUC recommendation to host an online town hall to explain the budget situation and GO funding levels, and **we note that the slides and recording of that town hall are now publicly available and linked from the CUC Meetings page.**

Many of the issues that came up during the presentations fall into two main categories: (1) changes to current and near-future operations and (2) planning for mission closeout.

The TOO capabilities and DDT program have been impactful throughout the Chandra mission but represent a burden on mission planning. The maximum number of unplanned observations that can be performed is dependent on staffing levels, which are scheduled to decrease in the coming years. **The CUC recommends that the CXC continue to maintain balance between transient and non-transient science and continue to maintain a high observing efficiency.** This will likely result in a decrease in the number of approved TOO/DDT observations, making peer review of TOO proposals even more important to maximize their scientific impact. Although the CUC saw some benefits to a community-driven TOO program, **we recommend maintaining explicit trigger criteria for TOOs in GO proposals.** If staffing levels are increased to accommodate a broader TOO/DDT program without impact on observing efficiency, this topic should be revisited.

Related to this, the CUC would like to ask the CXC to explore two topics related to the upcoming Roman mission: (1) coordination on Roman's TDAMM fields and (2) what a joint program might look like and how it might benefit the Chandra user community. We hope to learn more about these at a future CUC meeting.

The CUC was informed that an average of ~1 Ms of Chandra time is returned from joint-time partners. This time has historically gone into the VLP/LP program, but the CUC feels a more considered approach is appropriate with up to half of the returned time going to the regular GO program.

Well-calibrated data have been one of many factors contributing to Chandra's success, and calibration is becoming increasingly more important. However, calibration work will decrease substantially in the minimum-cost mission. At a future CUC meeting, we would like to hear plans for prioritizing calibration observations and efforts and plans to make users aware of possible increased systematic uncertainty of calibration. The uncertainty and reliability of extrapolating based on current models and interpolating based on sparser sampling of calibration should be addressed.

A slight modification to funding procedures will help Chandra users at smaller institutions, and **the CUC recommends an exception to the current incremental funding policy for institutions that bill infrequently so that total funding is awarded at the outset.**

Although ending solicitation of archival and theory proposals was a budgetary necessity, the CUC is aware that continued efforts have been pursued to allow for Chandra-specific archival and theory proposals in NASA's Astrophysics Data Analysis Program (ADAP) and Astrophysics Theory Program (ATP). In the time since the CUC meeting, NASA released the Research Opportunities in Space and Earth Science (ROSES) guide for 2025, which does include Chandra in that ADAP program. **The CUC would like the CXC to continue to request from NASA that Chandra theory proposals be allowed in the next ATP call and also get clarity from NASA on the future of ATP before the next CUC meeting.**

Although the CXC has had a three-year closeout plan in place for decades, in recent years they have been asked to consider shorter closeout plans and evaluate their impacts. In particular NASA has asked for twelve-month, six-month, and even three-month closeout plans, and the CUC is extremely concerned about the disastrous effects

such hasty closeouts would have both on Chandra's current users and on Chandra's legacy. **It is imperative that any closeout plan includes adequate resources to produce a final Chandra Source Catalog, preserve the full capabilities of the Chandra Data Archive (CDA) including the Chandra Source Catalog (CSC), maintain CIAO software for several years, archive all Data System software (see presentation by G. Fabbiano), and produce a CIAO Legacy package (see presentation by J. McDowell).** Such a Legacy software package should include the following: full, relocatable copies of the CIAO, Sherpa, and CALDB websites; CIAO regression test scripts; Sherpa standalone code; MARX source code and documentation; DS9 source package and documentation; DS9 test files and scripts; archived CIAO and MIT HETG memos; and a copy of the Chandra Transmission Grating Data Catalog (TGCat) archive.

The CUC is very concerned about any transition of the CDA, the CSC, and the CIAO software to NASA's High Energy Astrophysics Archive (HEASARC). HEASARC is a great general-purpose repository for data from high energy missions, but the level of sophistication and functionality of the CDA, CSC, and CIAO (appropriate for a flagship mission) is beyond what HEASARC offers. **We urge the CXC to approach NASA about continuing to archive and maintain the CDA, CSC, and CIAO.** A transition of these to HEASARC seems unnecessary since the expertise is already at the CXC; the CXC knows how to serve the data products and maintain the archive, but HEASARC does not. The Chandra user community will be very negatively impacted by an imperfect and unnecessary transition.

Detailed Summaries and Reports on Presentations

Director's Report — Pat Slane

Pat Slane provided the CUC with the Director's overview. The overall status of Chandra is excellent with the exception of a current anomaly with the HRC-S, for which an unexpected shut-down occurred during the high voltage ramp-up at the start of an observation. This is under investigation. Other spacecraft systems are performing nominally, and studies have provided for continued relaxation of some thermal constraints, resulting in improved scheduling capabilities. Demand for Chandra time remains high, as demonstrated by Cycle 27 proposals and by continued requests for DDT observations.

The DDT program has continued to be vibrant and productive. As time-domain research increases due to the availability of new monitoring and survey instruments, demand for TOO and DDT observations has been high. Suggestions have been made that the CXC consider potential modifications to the TOO program to provide for larger, less restrictive, and possibly community-driven proposals. While large TOOs can be submitted as LP proposals, it was noted that requests with less restrictive (or more flexible) trigger criteria may be of interest. On a related note, STScI has announced a call for input on such a program for HST and JWST.

Given the impact this would have on the entire Chandra user community, the director asked the CUC to consider whether or not such a program is needed for Chandra. The CXC currently evaluates ~45-70 TOO/DDT triggers or requests per year, and approves ~30-50 such programs. Many of these contain multiple visits to the target, and each requires resources and displaces observations of non-transient sources. The CXC has always tried to maintain balance on this front, but it is worth considering whether a re-evaluation is in order. With staffing levels scheduled to decrease in upcoming years, significant trades will be necessary to maintain current TOO/DDT support levels. Significant trades would be required for a broader TOO/DDT program.

The Senior Review report provided an "Excellent/Very Good" rating for Chandra. The "minimal-cost mission" was the model considered in the primary evaluation, and received strong support. In the second tier of over-guide requests, restoring HRC science to the minimal-cost mission was the top recommendation. Providing funding for

the "Chandra for the Future" option, which represents continuing status quo operations, was recommended in the Tier 3 overguide requests.

Both during and after the Senior Review, significant efforts were carried out by the community to advocate for continued support for Chandra. Specific call-out in the appropriations bills for both the House and Senate was the very successful result, with the latter recommending not less than $63M for Chandra funding. These bills still require full passage and then merging when a new federal budget is developed, but they represent solid recognition of the importance of Chandra science and the high quality of the observatory.

Based on these results, NASA has provided direction for operation under a Continuing Resolution in FY26, with a budget of $63M for Chandra. This will presumably take hold following the current end of the government shutdown.

Chandra Status Report — Mark Weber

Mark Weber provided the CUC with an update on the Chandra mission. Spacecraft and instruments are stable and have been performing well. The ACIS loss of efficiency at low energies due to contamination buildup continues to be well-managed. HRC has been operating successfully under new thermal and scheduling constraints since April 2023. Very recently (24 Oct), the High Voltage Power Supply for the HRC-S experienced an anomaly— the instrument has been deliberately safed while investigations are being carried out. Both instruments are in good condition otherwise. The LETG insertion mistake lost 205 ksec. Patches and ground system updates have restored normal LETG operations, and currently rely on potentiometer readings.

The spacecraft status is very good. The effects of the slow thermal evolution on the observing program and efficiency continue to be addressed with studies, new procedures, and by cautiously raising temperature limits. As a result, the thermal state of the observatory has not incurred any new significant impacts. Likewise, no consumables will run out anytime soon.

The latest GO cycle (#27) was oversubscribed in time by a factor 4.3, which is a level of demand that has held steady and even slightly increased over the last few cycles.

The next major events for Chandra will be the outcome of Congressional and NASA budget decisions for FY 2026, and the beginning of the proposal process for mission extension after FY 2027. For the current federal shutdown, NASA positioned Chandra very well by ensuring adequate operating funds were provided in advance. As of the CXC meeting (mid-Nov 2025), CXC is currently funded to mid-April 2026 despite the shutdown, and was recently advised to keep operations at current levels as CXC plans for Cycle 27. Cycle 27 will be confirmed once CR is passed.

Proposal Cycle and Future Plans — Rodolfo Montez Jr.

Highlights of CDO recent activities include organizing and supporting booths at the Summer AAS in Alaska and the HEAD Meeting in St. Louis, and successfully completing the Cycle 27 Peer Review under the new distributed model (Distributed Peer Review, DPR).

The Cycle 27 Call for Proposals received a total of 299 proposals, a decrease in previous years, mostly due to the fact that Archive and Theory categories (usually 70-90 proposals) were not offered in this cycle. The decrease in GO and LP categories was small, while an increase in VLP has been registered. The overall oversubscription by time was 4.3, in line with the previous year.

The new DPR model was implemented, and the two-phase review process went off without any complications nor complaints from reviewers and users. Designated Reviewers were limited to no more than 16 assignments, and a majority of reviewers adjusted at least one of their scores during the second round of the review process. However, this step resulted only in a limited change in the approved proposals. The final DPR scoring (calculated on 8 out of 10 scores, withdrawing the lowest and highest grade) was used to rank proposals in the usual scientific categories. For TOO and LP/VLP proposals, the DPR scoring results were sent to the TOO/BPP panels who then made the final recommendations. As usual, 4 Ms were allocated to the BPP, with the requirement that at least 1 Ms is awarded to a VLP proposal. Almost 2 Ms of unused time reserved for our Joint Partners (particularly high this year with respect to previous years) was returned, and most of it went to the BPP (the most oversubscribed category). A total of 5.7 Ms were therefore awarded to LP and VLP.

CDO has the plan to advertise the first implementation of the DPR applied to Chandra with a Newsletter article to be distributed to the community in the next weeks/months.

Looking ahead to Cycle 28, planning includes continuing with the DPR and TOO/BPP Panels, improving reviewer instructions, continuing the allocation of approximately 4 Ms to the Big Project Panel, and considering an explicit AI Use policy statement. The timeline for Cycle 28 begins with the Call for Proposal release on December 18, 2025, and the deadline for proposals on March 18, 2026. CDO will also participate in upcoming meetings such as the Winter AAS, Summer AAS, the Chandra Science Workshop, and the NHFP Symposium.

Mission Planning Updates — Scott Randall

Scott Randall presented a detailed overview of the mission planning process, the challenges resulting from the thermal constraints for the different subsystems of the spacecraft and the actions taken to minimize their impact in the mission planning process. In more detail he presented new metrics that are developed to help in the mission planning, and software tools developed for the automated generation of the long-term schedule and its continuous monitoring. These tools greatly improve the efficiency of building and updating the long-term and weekly schedules of Chandra. In addition two new pages are created to monitor the scheduling efficiency ("Efficieny Dashboard") and the observatory lost time ("Lost Science time").

There was also an update on previous initiatives such as the Resource Cost and the cool Target list. The Resource Cost continues to be a useful metric for quantifying the difficulty in scheduling a given observation. There is also a prototype for measuring the resource cost for ToO observations. The Chandra Cool Target list (CCT) continues to be a useful resource for maximizing the science observations given the thermal constraints of the observatory.

Overall the observing efficiency is lower by a few percent in the past years, but remains high. Despite the thermal limitations the observing constraints of the observations are met successfully. In addition, the performance of TOO and DDT observations has not changed. This is mainly due to the development of tools that aid the scheduling process and the implementation of improved procedures.

In the future two components of the spacecraft (the Fine Sun Sensor, and the tank) are expected to play an increasingly important role in scheduling and for this reason they are closely monitored. An additional subject of concern is reaching the maximum number of OBSIDs, although this is not expected to happen before 20230.

The CUC welcomes all the efforts made to maintain the observing efficiency of the Observatory given the various constraints.

Calibration: Goals, Priorities, and Plans — Akos Bogdan

Akos Bogdan provided the CUC with an overview and update regarding the work of the calibration team over the previous year. Over the past year, the Chandra Calibration Team has continued calibration work on the ACIS and HRC instruments and the High Resolution Mirror Assembly (HRMA). For ACIS, three key areas were the focus: (1) development of temperature-dependent response files, (2) developing new tgain files that correct for the gain loss observed since 2022, and (3) monitoring the molecular contamination and developing a new contamination model. The team released eight CALDB files providing temperature-dependent response functions for the primary FI CCDs (I0, I1, I2, I3, S2), covering focal-plane temperatures from -120 °C to -105 °C. The resulting FWHM residuals are below 3% even at warmer temperatures. Work is ongoing to produce similar temperature-dependent response files for S3.

The gain loss observed since mid-2022 is largely driven by the solar cycle. During periods of low background, such as the current solar maximum, increased CTI leads to gain reductions. The gain loss on the S3 CCD is about half that seen on I3. Updated tgain files correcting for this effect were released in CALDB 4.12.2 and cover data from 2022 through December 2024. These corrections substantially improve gain calibration in moderately hot clusters, though residual issues remain in broadband spectral fits of the hottest clusters. Work is in progress to update high-energy tgain corrections and extend coverage of the tgain files to data taken in 2025. Dedicated calibration observations are performed using the moderately hot cluster Abell 1795, while the Perseus cluster serves as the calibration source for hot clusters.

The Calibration team continues to monitor the buildup of the ACIS molecular contaminant and develop an improved contamination model. The contaminant consists of carbon, oxygen, and fluorine. The current CALDB model accurately reproduces the carbon optical depth but underestimates the oxygen component. To this end, a new model has been developed that better matches both the oxygen and total 0.66 keV optical depths. Testing of this model is ongoing, and its release is planned for early December. Preliminary results indicate that the new model provides a significantly improved description of the contamination layer. The calibration team clarified that contamination affects the entire optical blocking filter and emphasized the risks inherent in bakeout. Risk assessment continues to indicate that the previous and current approach of monitoring and modeling continues to be the best course of action.

For HRC calibration, the detector quantum efficiency (QE) continues to decline by about 2% per year, requiring periodic increases in operating high voltage. The latest such adjustment occurred in September 2024. Corresponding HRC-I QE and HRC-S QEU files reflecting the new high voltage settings were released in January 2025. HRMA PSF monitoring with AR Lac observations shows a slow increase in the 90% encircled-energy radius of approximately 0.01" per year over the past five years. This broadening is partly attributed to declining HRC gain and lower pulse-height events. When asked about the impact of this drift, the calibration team explained that the effects are not material for ACIS observations and specifically does not meaningfully affect source photometry, and that the increase in 90% radius has recently slowed down. The calibration team clarified that the change was not necessarily correlated with temperature. The CUC recognized that Chandra continues to be the best high resolution X-ray observatory by far.

During the discussion, the calibration team was asked about the ability to provide updated blank background files. The team clarified that blank sky background files will continue to be taken; however, no stowed background files will be created. Given the changing background rates at different phases of the solar cycle, observers should find the appropriate existing background files with matching high energy background rates. It was clarified that this must be done by hand and that Ciao tools do not automatically do this.

In the future, the calibration team plans to release temperature-dependent S3 response files, update tgain corrections through 2025, release the new ACIS contamination model, and produce a new set of ACIS blank-sky observations. For HRC, continued QE and gain monitoring and file updates are planned as needed. For the optics, PSF monitoring will continue, and a new defocus calibration measurement using HRC-I AR Lac data is scheduled. When asked about the impact of possible budget reductions on the observatory, it was pointed out that calibration would be substantially affected, reducing the ability to respond to known and potential future issues as quickly and effectively as the team has been able to in the past, as demonstrated during today's presentation. While calibration would still be very good, it would make it harder to stay at the excellent level delivered through the mission lifetime to date.

CIAO Update — Jonathan McDowell

Jonathan McDowell provided the CUC with an overview and update on the activities of the Science Data Systems (SDS) team.

The SDS team reported that demand for CIAO downloads remains strong among both Linux and Mac users. Significant additions and improvements have been made to the documentation, including "Merging Central," a dedicated area of the website that provides instructions and guidance in all aspects of merging observations.

The team presented statistics on helpdesk activity, noting approximately 3,500 tickets since FY2019, with about 200 tickets in each of the past two years. The median time to close a ticket has decreased to less than half a day over the past year. A list of bugs identified through helpdesk reports was also provided.

A highly successful CIAO workshop was held at the University of Massachusetts Lowell from May 19–23, 2025. The workshop was co-funded by the Center for Astrophysics | Harvard & Smithsonian and the Heising-Simons Foundation and was attended by 30 students from around the world. In response to the large number of Windows users, the SDS team provided a high-level overview of using CIAO via SciServer containers provided by HEASARC.

CIAO versions 4.17 and 4.18 were released in mid-December 2024 and 2025, respectively. Both releases addressed numerous bugs and included multiple updates. Notably, CIAO 4.18 introduced support for 64-bit integers in data files, updates to external libraries, new scripts such as *fine_astro* for astrometric registration corrections, a .dmg installer to simplify installation for Mac users, and updates to CIAO's implementation of Sherpa. CIAO was nominated by Dave Pooley for the ADASS Prize. The award has previously been given to ADS and DS9.

The SDS team also provided a container version of the ChaRT web services, enabling users to simulate PSFs locally.

The latest standalone Python release of Sherpa was issued in October 2025. This release includes several improvements, including *cstatnegativepenalty*, which assists in identifying correct minima when model fitting converges to unphysical parameter spaces. Publication output using Sherpa remains strong.

DS9 now includes an autosave capability. The SDS team continues work to ensure the long-term sustainability of the software, including support for TCL/Tk 9 and SSL 1.3, and exploration of future funding models for DS9 and its successor. A new PDF document describing the DS9 interface is now available. DS9 is also accessible on SciServer via an X11 display running in a Jupyter lab tab in the browser.

At NASA's direction, the CXC evaluated end-of-mission closeout scenarios for 3-month, 6-month, and 1-year timelines. As part of this effort, the CXC is defining a CIAO 'legacy' package. The proposed contents include:

- A fully relocatable copy of the CIAO and CALDB websites
- CIAO regression test scripts

- Sherpa standalone code and website
- MARX code and documentation
- DS9 source package and documentation
- Archived CIAO and MIT HETG memos
- A copy of the TGCAT archive

The CUC expressed strong support for inclusion of all proposed components. While SciServer represents a promising approach, the long-term maintenance of the CIAO 'legacy' package remains uncertain. The CUC emphasized that ensuring the longevity and broad accessibility of the CIAO 'legacy' package is essential for maximizing its long-term scientific impact.

HRC Update — Dan Patnaude

Dan Patnaude provided the CUC with an overview of the HRC instrument, focusing on a recent anomaly and plans to address it. HRC operations were suspended in November, 2025. The HRC-S HVPS current limiting circuit tripped during setup for an observation on October 24, 2025. The HRC team is investigating the root cause for the current trip.

Additionally, work continues on the autonomous safing monitor for the HRC. A major milestone was passed on October 29, 2025, as the patch was reviewed and approved at the flight software working group. The next hurdle will be a code review, tentatively scheduled for late November. In parallel, work continues on the ground segment portion of the flight software patch, which includes modifications to standard HRC commanding, and command load review tools.

Work also continues on refining the HRC thermal model, with a major update expected in early 2026, pending resumption of HRC-S science. In addition, the HRC team notes strong demand for the HRC, as nearly 2 Ms of GO/GTO HRC time was approved for Cycle 27.

ACIS Update — Paul Plucinsky

Paul Plucinsky presented the CUC with an update on the performance of the ACIS instrument. The ACIS instrument on the Chandra X-ray Observatory continues to function nominally, producing high-quality data. All 10 CCDs are fully functional, and the electronics and flight software are operating without issue, with the latest software version installed on August 15, 2025. Approximately 90% of GO & GTO observations utilize ACIS.

When asked about the usage of multiple CCDs and specifically about the ability to use more than four CCDs in cases where maximal field of view is scientifically critical, it was clarified that it is at the discretion of the mission scientist liaison to work with the observer after the program is approved. It was re-emphasized that this makes scheduling harder but is possible in principle. It was clarified that about 5% of all exposures are taken with a full complement of 6CCDs on, and that the number of dropped CCDs has gone down slightly recently. It was pointed out that one front illuminated CCDs must be on at all times, regardless of any other focal plane configuration choices.

There have been no anomalies in the past year, and operations have been smooth, with minimal impact from the 2023 perigee minimum. Focal Plane (FP) temperature limits for observations are now easier to meet due to relaxed spacecraft thermal limits, and ACIS is successfully serving as Chandra's radiation monitor, requiring at least one FI CCD to be active during observations. When asked whether mitigation strategies should be planned for the next perigee minimum, the ACIS team concurred that more extensive measures will be needed starting in 2034, which would potentially require more thruster use, which was kept at a minimum during the most recent perigee

minimum. It was pointed out that, over Chandra's orbital lifetime, fuel use was conservative and that the observatory is in an excellent position regarding reserve fuel.

The peak of Solar Cycle 25 has passed, though strong storms are still possible, leading to six radiation safings (two manual, four autonomous) in the last year, which were more effective due to fortuitous timing. #It was pointed out that opportunities to react quickly to Solar activity are limited to two comms per orbit. It was pointed out that the ACIS contamination layer may be blocking some low-energy protons, helping reduce the particle background level during a discussion of background modeling and subtraction.

The latest flight software version was installed on 15 August 2025 through a realtime procedure. The patch load was relatively small in this update and it corrects a bug in the calculation of the event rates that are used for the radiation monitor called TXings that only affects rare configurations that utilize a subarray with a deadtime.

Future prospects remain excellent, with continued nominal functionality, decreasing perigee impact, easier accommodation of FP temperature limits, and successful radiation monitoring, ensuring ACIS's role as Chandra's workhorse instrument for years to come.

Chandra Source Catalog & Data Systems Initiatives — Pepi Fabbiano

Two papers describing the CSC are now available in ApJS (Evans et al. 2010, 2024). Usage of the catalog continues to grow, as shown by ADS citation and readership statistics. The CXC software team is updating the CSC pipeline in preparation for a future CSC 2.2 release. CSC2.2 release plans need to ensure a release this fiscal year, given future budget uncertainty.

In anticipation of a possible Chandra mission closeout, the CXC has begun planning with HEASARC for archive transfer under different closeout scenarios provided by NASA. A complete legacy Catalog release, including all mission data and ensuring HEASARC can serve the entire catalog (tables and data products), is scoped in the CXC 3-year closeout plan. This will involve significant work, as HEASARC currently serves only the CSC master table. If the closeout period is shorter, only a partial catalog will be available to future users. This partial catalog will not include the full set of Chandra imaging observations and may present post-mission users with potentially reduced availability of data products. Support of Chandra DOI in the post-mission phase may also be compromised, resulting in failure of literature-data links.

Plans include making the latest CIAO and Sherpa releases available for download, along with version-controlled source code and documentation for future development. HEASARC's current model assumes a 5-year horizon with releases every 2 years. The whole Data System Git repository, including documentation, will be transferred without ongoing support. Software outside CXCDS (e.g., DS9, SAOTrace, CSCWWW, ChaRT, MARX, TGCAT) will be coordinated with SDS and Calibration teams.

Routine processing and distribution continue smoothly. Reprocessing of early mission data (1999) is complete; these required special handling due to non-standard formats. Reprocessing of data from July 2021 through 2024 has begun and will finish once updated calibration files are available, creating a clean dataset for catalog processing. If you have already run chandra_repro with a recent CIAO/CALDB, your data are equivalent to—or better than—the reprocessed version.

Five updates were completed this year (four public). Upcoming work includes additional updates needed for reprocessing and Proposal Cycle 28.

Archive and Bibliography Statistics

- Total Chandra data archive size: 72.7 TB
- Annual downloads have risen sharply (39 TB/year recently, vs. a lifetime average of 10.7 TB/year), largely due to CSC usage.
- DOI creation: ~2.6/week
- Chandra science paper production: 400–500/year, totaling 10,668 to date; 28,019 Chandra-related papers overall.
- CSC papers (2022–2024): 234
- Data usage: 164,359 literature–ObsID links; each ObsID appears in ~7.5 papers, and each paper links to ~16.8 ObsIDs.