



CXC Data System CUC Report

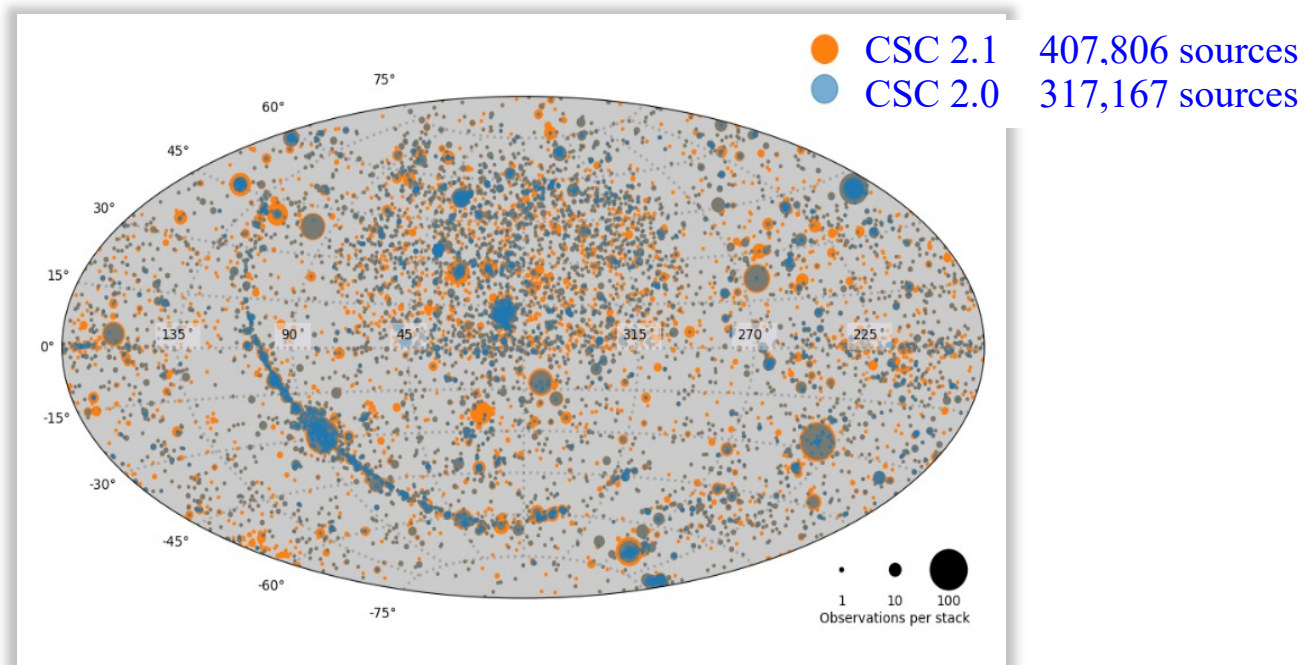
10 Nov 2025

G. Fabbiano



Chandra Source Catalog

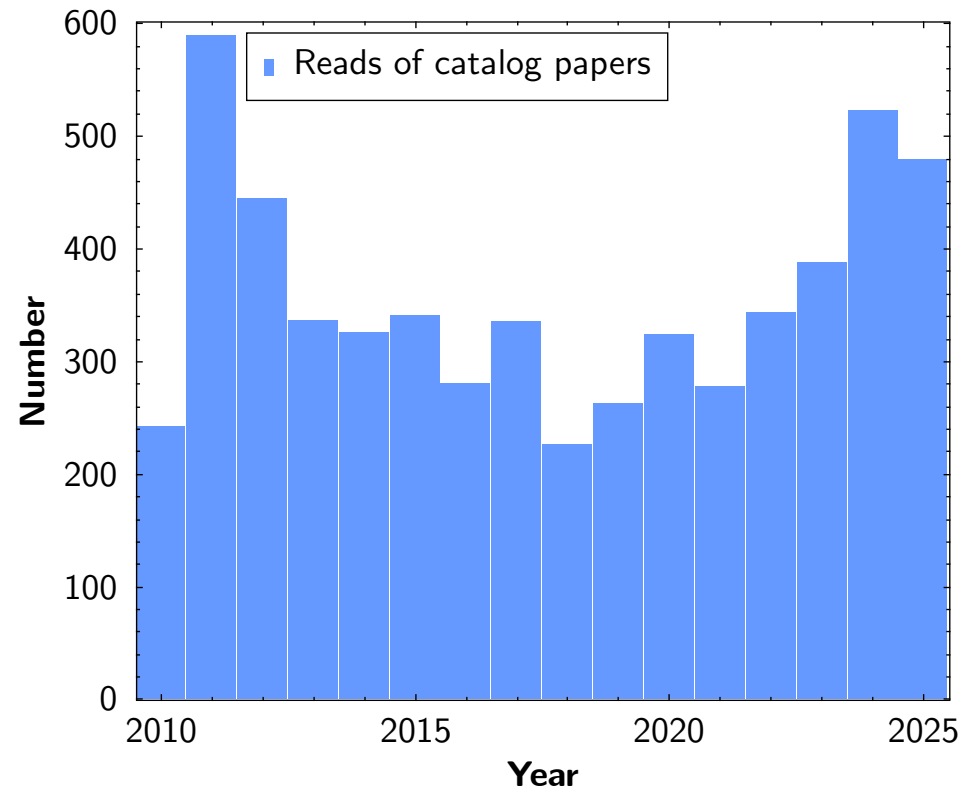
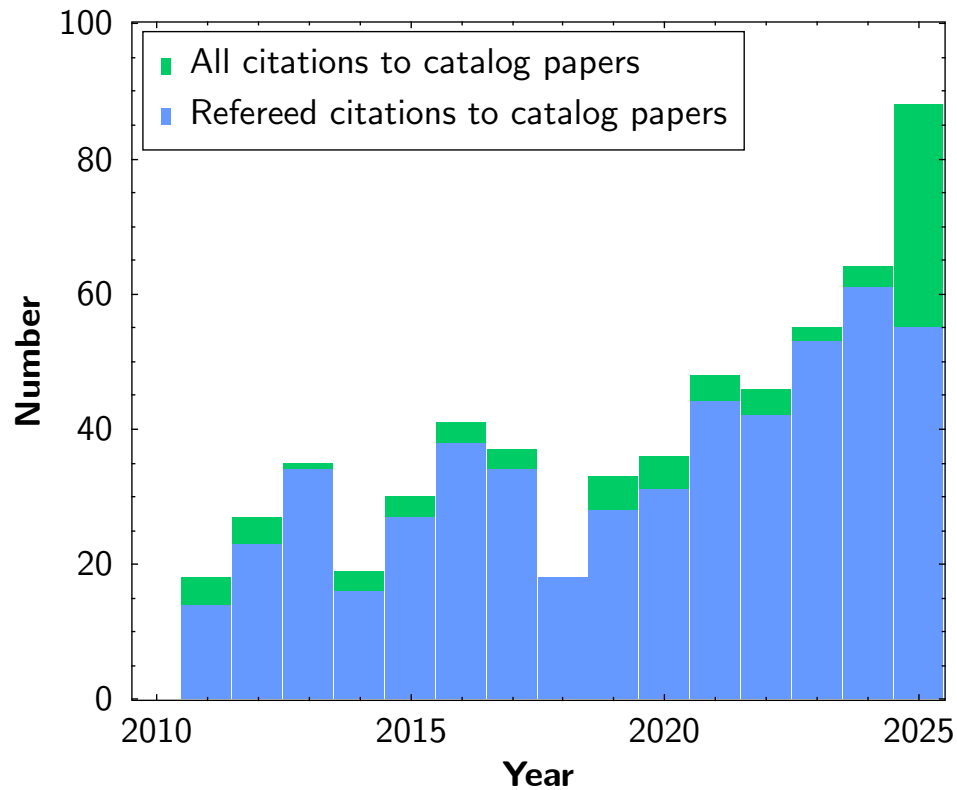
- CSC 2.1 released on April 2, 2024 — 407,806 unique X-ray sources
 - Chandra imaging observations released publicly up to the end of year 2021
 - Observations with consistent pointing are stacked (co-added)
 - Catalog astrometry tied to Gaia-CRF3
 - Minor update CSC 2.1.1 released 2024 Oct 18 addressed known issues
- Paper describing CSC 2.0/2.1 published in ApJS 2024 Sep 16
 - Evans, I. N., et al. (2024). <https://iopscience.iop.org/article/10.3847/1538-4365/ad6319>





Catalog Paper Combined Statistics

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Evans, I. N., et al. 2010 ApJS, **189**, 37 "The Chandra Source Catalog"

Evans, I. N., et al. 2024 ApJS, **274**, 22 "The Chandra Source Catalog Release 2 Series"

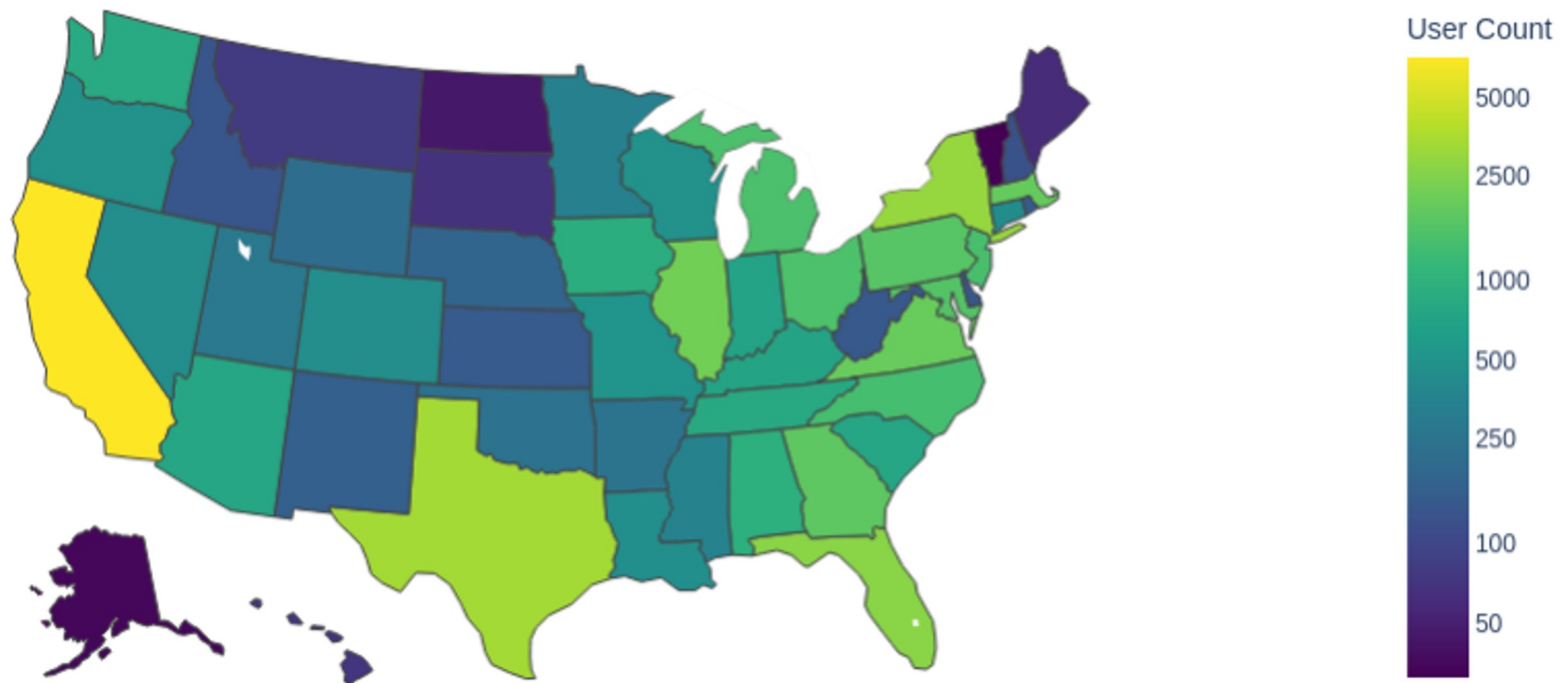


Chandra Data Users USA: 2023-07 to 2025-07^{CXC}

CDA + CSC

States + D.C.: 51

Unique Ip Addresses: 46,519



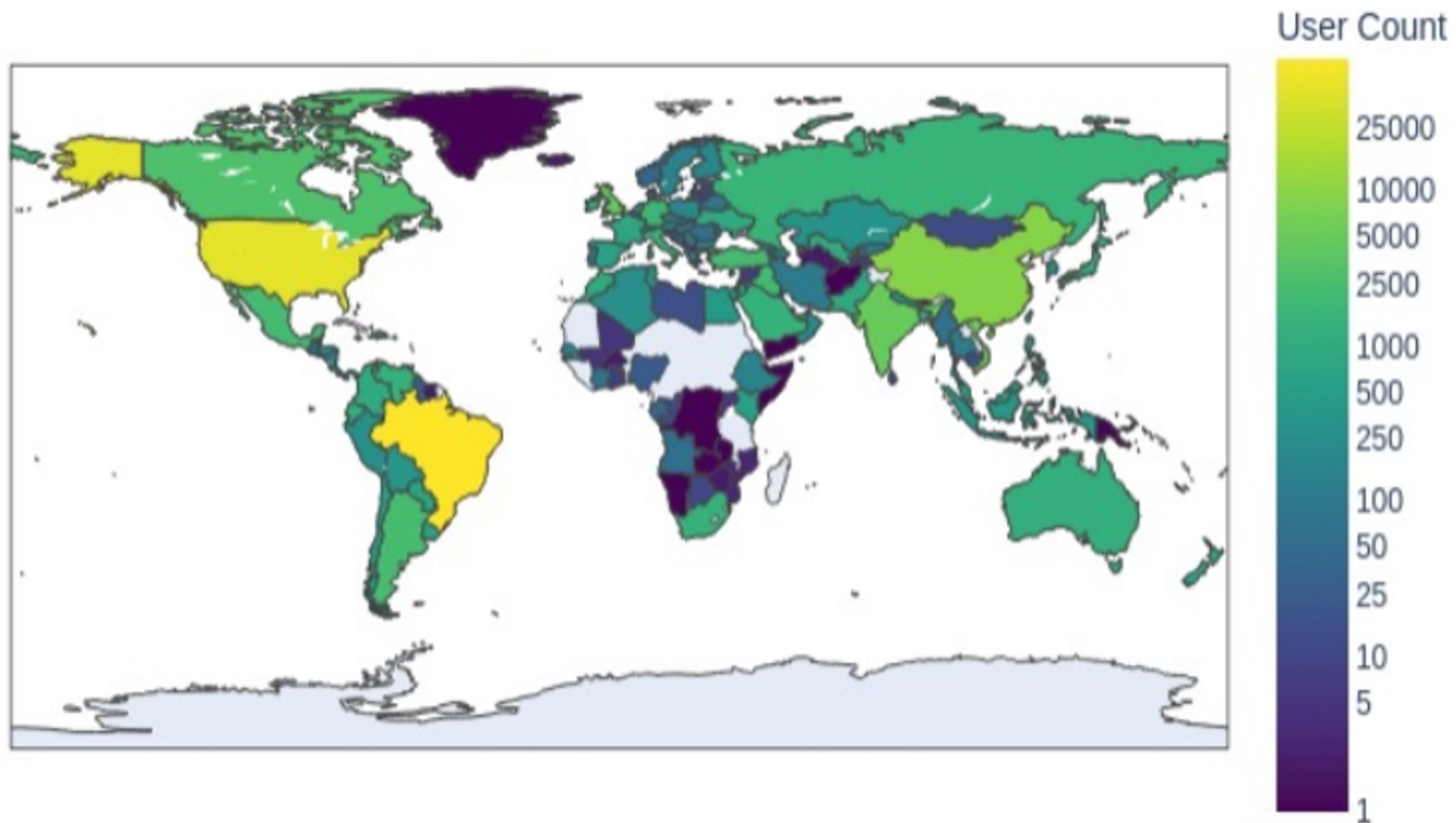


Chandra Data Users World: 2023-07 to 2025-07^{CXC}

CDA + CSC

Countries.: 151

Unique Ip Addresses: 228,057





CSC 2.1 (April 2, 2024 release)

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	CSC 2.1	CSC 2.0
Number of Master Sources	407,806	317,167
Number of Stacked-Observation Detections	493,236	376,343
Number of Stacked-Observation Detections Including Photometric Upper Limits	855,402	620,555
Number of Individual Observation Detections	1,304,376	928,280
Number of Individual Observation Detections Including Photometric Upper Limits	2,143,847	1,420,545
Sky Coverage (ACIS; deg ²)	681.068	517.373
Sky Coverage (HRC; deg ²)	67.288	56.166
Total Sky Coverage (deg ²)	730.374	558.646



Chandra Source Catalog Usage Statistics

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Release 2.0 + 2.1		Reporting Period 2024 Oct 01 – 2025 Sep 30	
Provider	Metric	Number	% Non-CfA
CXC	<i>CSCview</i> browser properties searches	6,940	88%
	<i>CSCview</i> browser data products browse	141,245	67%
	Command-line (CLI) searches	176,352	88%
	Data product (file) downloads	296,201	91%
	VO cone searches	448,272	~100%
HEASARC	<i>Browse+Xamin</i> queries ^{1,2}	29,418	
CDS	<i>VizieR</i> queries ^{1,3}	537,113	

¹ These services provide access to the CSC 2.0 and CSC 2.1 master sources tables *only*

² Includes 7 months, 2024 Oct–2025 Apr

³ Includes 9 months, 2024 Oct–2025 Jun



Readiness for an Eventual CSC2.2 Release

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S/W and product improvements to be ready
in case funding will permit a Catalog update

- Added – DONE
 - new aperture photometry draws archive product
 - missing extended source products
 - additional parallelization in tools, and other speed improvements
- Currently in work
 - Polygons instead of convex hulls to capture the extended emission automatically
 - Reduce / Eliminate many of the source detection QA's and increase efficiency in processing
 - Use spectral model (vs. mono-energy) to compute energy band EAs to correct photon flux for epoch-dependent contamination changes
 - Mostly affects soft and ultrasoft bands; critical for more recent data
 - Affects variability measurements
- Started planning CAT2.2 catalog run — 2022 Jan – 2025 Jun
 - Considering a processing plan that guards against a possible fiscal year cut while maintaining a statistically stable catalog



Other Software Activities

- [Science Operations Upgrades](#). Released DS 10.14.2 on Sep 30.
 - TOO/DDT text notifications system replacement
 - New distributed peer review
 - Better handling of exclusion windows
 - LETG limit switch handling.
- [Sherpa](#) infrastructure upgrades, code reviews, build support, and platform testing.
 - Released Sherpa 4.18 on Oct 09.
- [CIAO 4.18](#) continuous integration (CI) upgrade, system upgrades, bugfixes, and priority SDS requests.
 - Release planned for Dec 16.
- [Proposal Cycle 28](#) updates are in work in coordination with CDO & MP
 - Release planned Dec 16.



Chandra Closeout Scenarios

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- At NASA request, considered 3 month, 6 month, 1 year scenarios, based on the existing 3 year closeout plan
 - CXC Closeout turnover coordinated with HEASARC
 - Includes Final Data Processing & Catalog processing considerations
- **Archive turnover:** CDA, OCAT, CSC in HEASARC compatible format
 - Currently, HEASARC has processed data and **only** CSC master sources table.
- **CIAO and Sherpa**
 - Last CXC release distributions will be available for download
 - Version-controlled source code and associated documentation will be provided for further software development
 - HEASARC considered 5 years with a release every 2 years in their planning
- **The entire Data System Git repo** will be transferred [Proposal, MP, PL processing (Tel->L2), MTA, Archive].
 - No support for building and maintenance. Includes documentation dump.
 - Data System design document is undergoing update to provide a high-level design view of the Data System.
- **Software/Data outside CXCDs** will be coordinated with SDS & Cal teams
 - Consider DS9, SAOTrace, CSCWWW, ChaRT, Marx, TGCAT,...?



Data Processing

- Continuing mission data processing and distribution
- Reprocessing of archival data
 - Completed the reprocessing of the 'non-standard' early 1999 data
 - Started extension of 5th global reprocessing (ReproV+) to recent data (mid July 2021 to end of 2024)



We continue to maintain the Chandra CalDB

- During the past year - 5 CalDB updates ([4 public releases](#)).
- Upcoming CalDB work will include:
 - Proposal Cycle 28 updates
 - Several expected calibration updates (ACIS CONTM, T_GAIN; HRC QE/QUE; PCAD Dark Curr)



Archive Statistics

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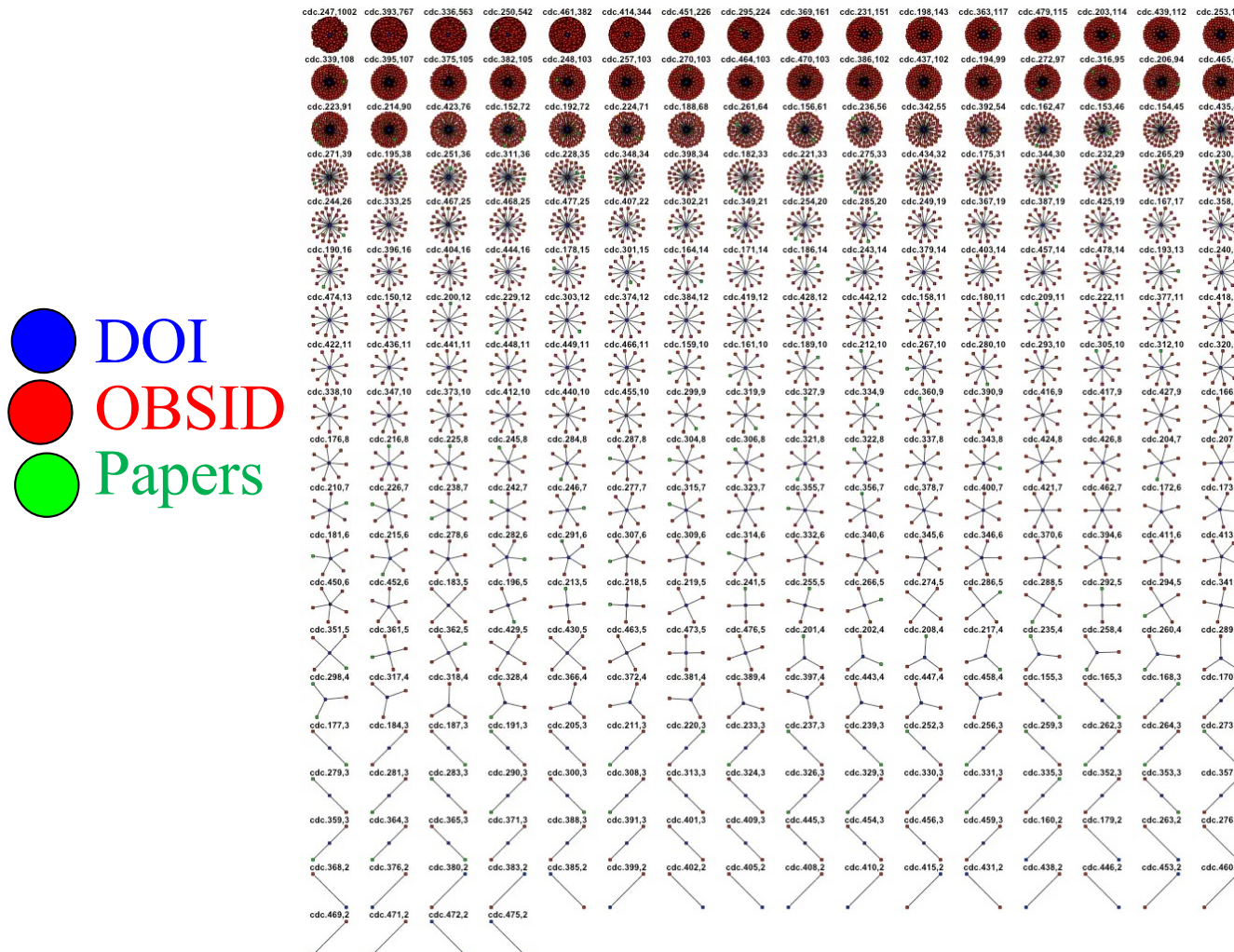
- Data Volume
 - Total over the mission: 72.7 TB
 - Years 2023–2024: 2.6 TB / year
- Downloaded Data
 - Total over the mission: 283 TB → 10.7 TB / year
 - Years 2023–2024: **39 TB / year** (CSC data products)



Data Collection DOI

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- Chandra Data Collection DOI
 - CDC DOI collect multiple Chandra/CSC data products used in the same publication for easy citeability

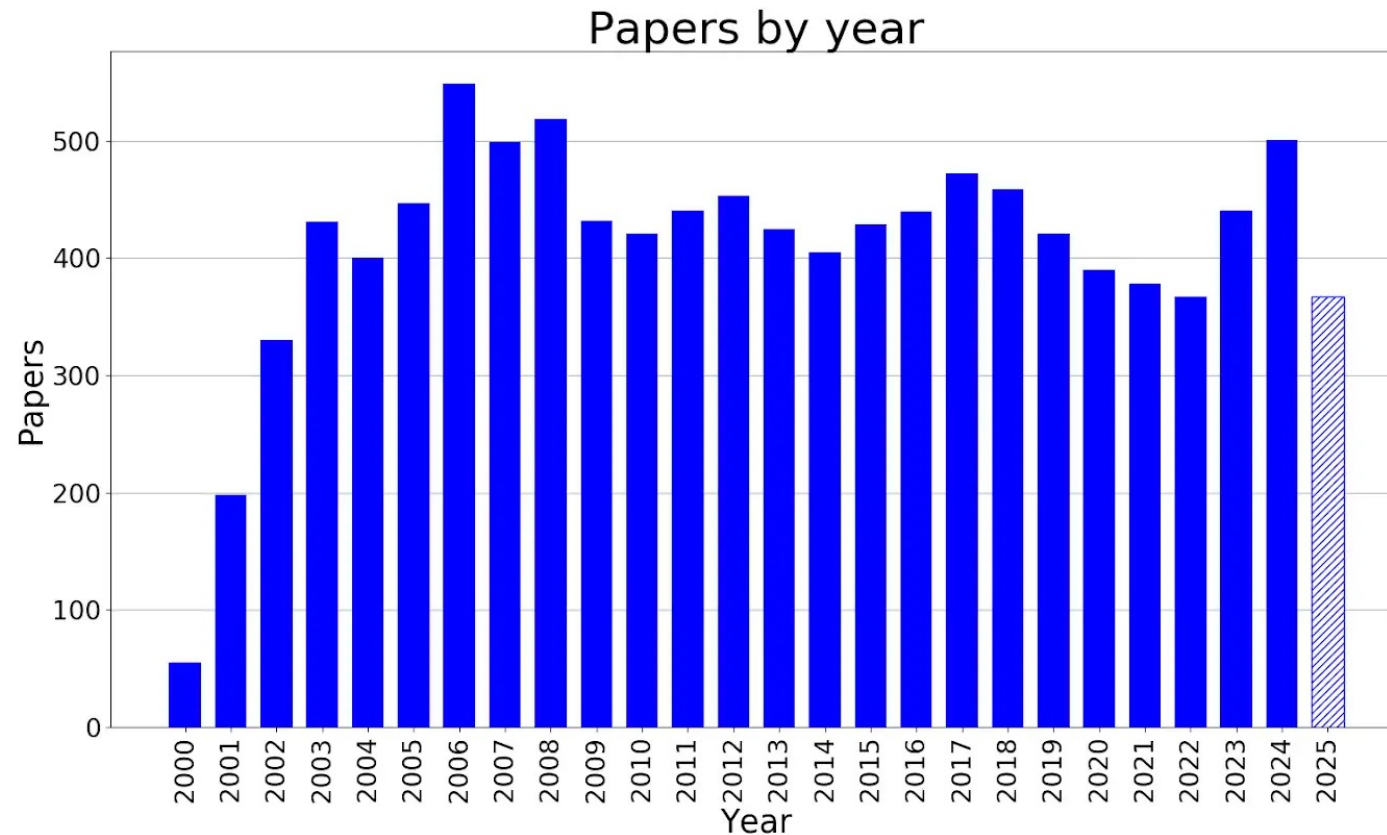


313 CDC DOI
created so far

~2.6 CDC DOIs
per week



Chandra Bibliography (up to the end of Sep 2025)^{CXC}



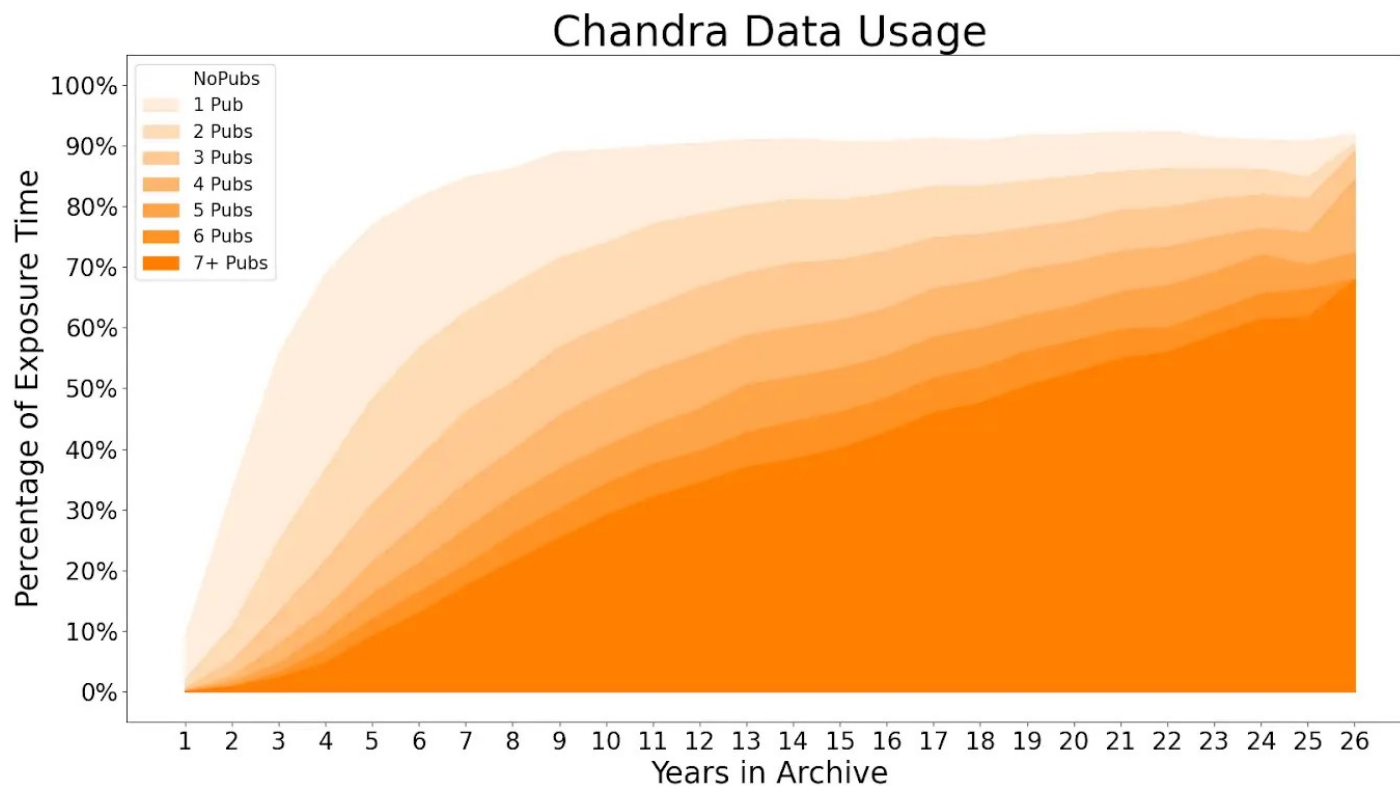
Created 2025-10-19

- Chandra Science Papers: 10,668 → 405/year
- Chandra-related Papers: 28,019
- CSC Papers (Years 2022- 2024): 234
- Mission H-index (ADS): 255 (refereed)



Chandra Science Data Usage

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Literature-Obs links: **164,358**

- *On average,*
 - each ObsId used in 7.5 papers
 - each paper linked to 16.8 ObsIds



DS – Chandra Outreach Collaboration

CSC 2.1 Sonification

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This sonification represents repeat X-ray sightings of each CSC 2.1 source over time through different notes.

During the video

- A circle appears at the position of each source with size determined by the number of detections in that location at a given time.
- A year counter appears at the top of the frame.
- A collage of images produced by Chandra fades in as a background.
- In the final frames of the video, thumbnail images representing the thousands of Chandra observations taken over the lifetime of the mission appear behind the all-sky map.

https://drive.google.com/drive/folders/14WnqlDLFwtzmdqbfyG-z8_I280Vpr8Qb

Not for Public Release