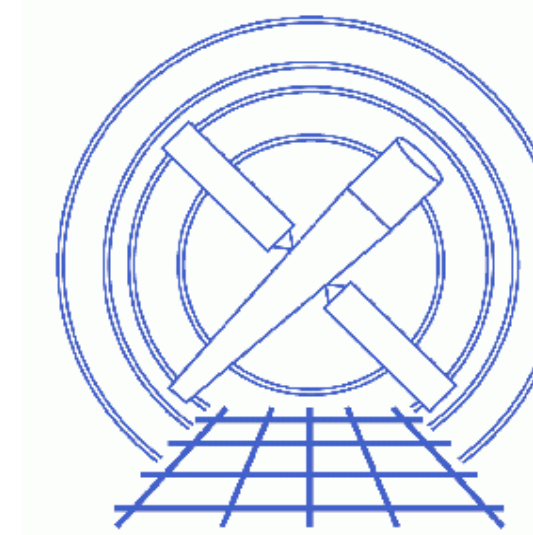




Chandra Footprint Service: Visualizing Chandra's Sky Coverage

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Introduction

The Chandra Footprint Service (CFS) provides a visual interface to data in the public Chandra Data Archive and the Chandra Source Catalog. Users of the service can directly see which areas of the sky have been observed by the Chandra X-Ray Observatory near any target of interest. The browser-based interface provides visualization of the sky coverage of Chandra instruments for any region of the sky along with tabular data for observations. The service provides an interactive client-based overlay of the instrument region data on top of a Digitized Sky Survey (DSS) background image, previews of observation images, access to data products, and access to the VOTable data used to create the interface.

The CFS provides 3 views of the Chandra Data Archive:

Footprints Tab: Provides an interactive graphical overlay of Chandra footprint data on top of a DSS background image. In the future, other surveys will be usable as a background image source.

Image Inventory Tab: Displays a table of results from a search against Chandra's IVOA-compliant SIAP service. The table interaction operates the same as the Footprints tab, but does not include the Footprint overlay. The Image Inventory is not covered in this presentation.

Preview Images/Download Data Tab: Displays JPEG preview images for each Chandra observation returned by the SIAP search. The user may select/de-select observations by clicking on the preview images, view details about the observations by following the relevant links, and build a list of observations to download from WebChaser.

URL: <http://cxc.harvard.edu/cda/footprint/cdview.html>

Left: The Footprints tab of the Chandra Footprint Service with two selected observations of the Crab Nebula in "Mixed" display mode.

Above: The overlay with the same selected observations in "Show Only Selected" mode.

Areas denoted by Red numbers (1-6) in the images are described below.

User Interaction and the Footprints Tab by Numbers

Each numbered item corresponds to a UI element in the images above.

- 1) Enter a target name or coordinates of interest. All public Chandra observations for the resolved coordinates will be returned.
- 2) The overlay displays Chandra instrument coverage. Select observations by clicking in their polygons. Polygons for selected observations turn yellow.
- 3) You can disable display of footprints for instruments by unchecking these check boxes.
- 4) The table can be filtered and sorted, and you can select/de-select observations by clicking on their rows. Selected observations are displayed with a green row in the table.

5) After selecting observations, click on the "Download Selected Observations" button to proceed to WebChaser to download data for the observations.

6) By default, all observations are displayed in the table and overlay regardless of whether they are selected or not.

Available options are to:

- Display selected observations first, then unselected ones
- Display all observations mixed together
- Only display selected observations
- Display only unselected observations

7) The footprint overlay can be toggled between showing all matching public observations or only Chandra Source Catalog observations. In the future, the ability to overlay CSC point sources will be added.

Customizing the Observation Table

The column order in the observation table is configurable by the user. By dragging and dropping the column names in the table to the right, the columns displayed in the table of observations can be changed and reordered.

Column	Unit	Description
Observation Date	chapt	The last time of this observation.
RA	deg	The RA of the center of the image. May not match the Target RA in the FITS header of some observations.
DEC	deg	The dec of the center of the image. May not match the Target DEC in the FITS header of some observations.
DEC	deg	The dec of the center of the image. May not match the Target DEC in the FITS header of some observations.
Proposal ID	int	The dataset as part of the proposal with this ID.
PI Last Name	chapt	The last name of the PI for the proposal associated with this dataset.
ObsID	int	The CXC ObsID for this dataset.
Instrument	chapt	The Chandra instrument used for this observation.
Exposure	sec	The exposure time of this observation in seconds.
Grating	chapt	The Chandra Grating used for this dataset.
Columns below are hidden. Click to change.		
JPEG Preview	chapt	The URL of the dataset preview file.
FITS	chapt	The URL of the full dataset file.
SI Mode	chapt	The Chandra SI Mode for the dataset.
Sequence Number	chapt	The Chandra Sequence Number for the dataset.
Level	int	The CXC processing level for this dataset.

Credits and Funding

This service makes use of:

- The JHU Spherical Library
- A modified version of the APT/SIA software developed at Space Telescope Science Institute
- Design and Layout from the HLA website
- The VOVview web application
- Background images are from the SkyView web service
- SIMBAD and NED are used to resolve targets

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Performance and Back-end

- After the initial search has loaded data, all interaction is performed in the client's browser
- All rendering/compositing is done in the browser
- No cookies or session tracking are required
- Stateless interaction with server reduces server load
- User's computer is the main limiting factor in responsiveness

The interface uses the HTML 5 <canvas> element to speed drawing of the overlay, and responds nearly instantaneously to user events. Javascript-based alternatives are present for instances where the browser does not support <canvas>, but the alternatives induce a performance penalty.

If desired, the user may request and/or save the raw XML data which was used to build the overlay and table of observations by clicking on the "Get VOTable" link to the left of the overlay. This allows the user to perform any data processing that they wish against the generated VOTable.

The Preview Images/Download Data View

From the Preview Images tab of the CFS, the user can select observations for download based on preview images of the observations themselves. Selections are retained when switching between views.

This view provides the user with access to high and low resolution preview images, details about the observation, and download links for each individual observation.