

IVOA object visibility and observation location services at the Chandra X-Ray Center

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IVOA visibility and observation locator services

The following two new service recommendations are currently under development:

- ▶ Object Visibility Simple Access Protocol:
<http://www.ivoa.net/documents/ObjVisSAP/index.html>
... currently at version 0.5
- ▶ Observation Locator Table Access Protocol:
<http://www.ivoa.net/documents/ObsLocTAP/index.html>
... currently at version 0.4

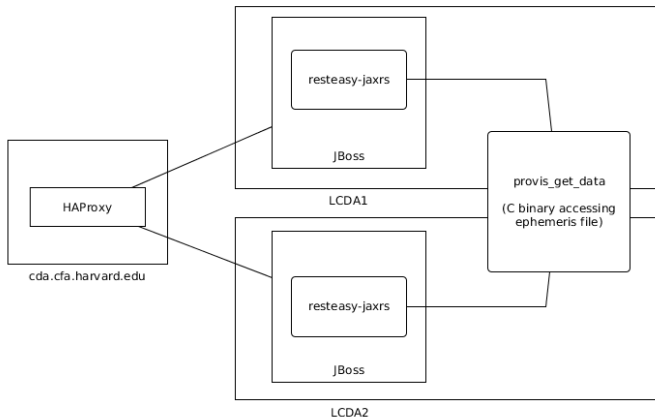
Object Visibility Simple Access Protocol

- ▶ retrieve visibility time intervals for given object coordinates
- ▶ follows the DALI-sync specification (query, availability and capabilities resources)
- ▶ output rendered as VOTable (JSON also possible)

Object Visibility Simple Access Protocol Service

Service is available at:

<https://cda.cfa.harvard.edu/cxc-objvissap/> (landing page)
<http://cda.cfa.harvard.edu/cxc-objvissap/jax-rs/vischeck/query?> (base URL)



Object Visibility SAP landing page



The screenshot shows a web browser window with the URL <https://cda.cfa.harvard.edu/cxc-objvissap/index.do>. The page header features the Chandra X-ray Center logo on the left and the Chandra Data Archive logo on the right. The main title is "CXC Object Visibility Simple Access Protocol Service".

This is a service-oriented, not presentation-oriented, application implementing the IVOA Object Visibility Simple Access Protocol (ObjVisSAP). The specification for this service is available at the [IVOA site](#). This implementation is work in progress and was written against version 0.4 of the specification.

The base URL of this ObjVisSAP service is:
<http://cda.cfa.harvard.edu/cxc-objvissap/jax-rs/vischeck/query?>

NB: if you simply click on the link above using your browser, the HTTP GET will fail as required parameters will be missing (try it and see what happens).

An example invocation might be the following:
http://cda.cfa.harvard.edu/cxc-objvissap/jax-rs/vischeck/query?s_ra=42&s_dec=42&min_vis=174000

..., which will report time windows during which one might enjoy more than 174,000 seconds of visibility to some imaginary target at RA 42 DEC 42

Refer to §3 of the specification on how to supply additional parameters and construct valid object visibility queries using the base URL.

The VOSI *availability* and *capabilities* endpoints are, respectively:

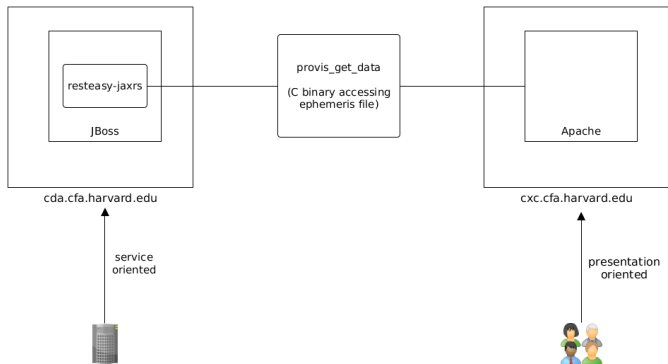
- <http://cda.cfa.harvard.edu/cxc-objvissap/jax-rs/availability>
- <http://cda.cfa.harvard.edu/cxc-objvissap/jax-rs/capabilities>

The footer contains the Smithsonian Institution logo, the text "The Chandra X-Ray Center (CXC) is operated for NASA by the Smithsonian Astrophysical Observatory 60 Garden Street, Cambridge, MA 02138 USA. Email: cxcweb@head.cfa.harvard.edu Smithsonian Institution, Copyright © 1998-2017. All rights reserved. CXC Helpdesk", and navigation links for Terms of Use, Privacy Statement, and a date stamp: Sat, 2019-04-01 13:53:13 EDT.

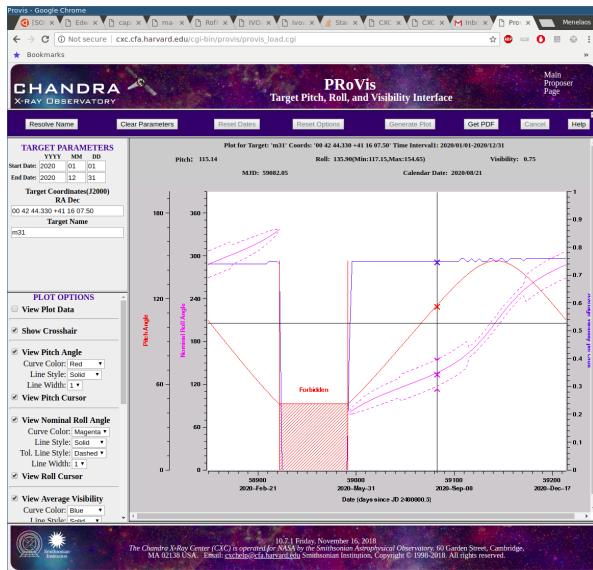
Object Visibility SAP response

```
XMLHttpRequest: [Chandra X-ray Observatory - Object Visibility Simple Access Protocol (ObjVisAP)]/DESCRIPTION
<?xml version="1.0" encoding="UTF-8" standalone="1" xsi:schemaLocation="http://www.ivoa.net/xml/ObjVisAP/ObjVisAP-1.1.xsd" version="1.1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
  xmlns="http://www.ivoa.net/xml/ObjVisAP/ObjVisAP-1.1.xsd" xmlns:sv="http://www.ivoa.net/xml/ObjVisAP-1.1.xsd"
  <RESOURCE type="results">
  <REQUESTID>Chandra X-ray Observatory - Object Visibility Simple Access Protocol (ObjVisAP)/DESCRIPTION
  <INFO name="SERVICE_PROTOCOL" value="1.0">ObjVisAP/UNFO</INFO>
  <INFO name="REQUEST" value="queryData"/>
  <INFO name="s_a" value="42"/>
  <INFO name="s_dec" value="42"/>
  <INFO name="t_start" value=""></INFO>
  <INFO name="t_max" value=""></INFO>
  <TABLE>
  <FIELD ucd="ovdb.startVisibility" name="START_VISIBILITY" utype="ovdb.visibility.startVisibility.value" datatype="char" arraysize="1"/>
  <FIELD ucd="ovdb.endVisibility" name="END_VISIBILITY" utype="ovdb.visibility.endVisibility.value" datatype="char" arraysize="1"/>
  <FIELD ucd="ovdb.duration" name="DURATION" utype="ovdb.visibility.duration.value" datatype="double"/>
  <DATA>
  <TABLEDATA>
  <TR>
  <TD>59189.72</TD>
  <TD>59112.37</TD>
  <TD>174809</TD>
  </TR>
  <TR>
  <TD>59117.65</TD>
  <TD>59120.3</TD>
  <TD>174809</TD>
  </TR>
  <TR>
  <TD>59138.81</TD>
  <TD>59141.48</TD>
  <TD>174809</TD>
  </TR>
  <TR>
  <TD>59146.74</TD>
  <TD>59149.39</TD>
  <TD>174809</TD>
  </TR>
  <TR>
  <TD>59159.96</TD>
  <TD>59162.61</TD>
  <TD>174809</TD>
  </TR>
  <TR>
  <TD>59165.25</TD>
  <TD>59167.5</TD>
  <TD>174809</TD>
  </TR>
  </TABLEDATA>
  </DATA>
  </RESOURCE>
```

Pre-existing presentation-oriented application



Pre-existing presentation-oriented application



Experience developing against the specification

- ▶ spec is in version 0.4 work so still fluid
- ▶ the semantics of certain parameters and of the output VOTable were not immediately obvious to us (in versions 0.2 and 0.4)
- ▶ no clear statement in the spec as to whether the service targets only future or also past dates
- ▶ in general, it would be nice to have some use cases discussed in detail
 - however, some (high-level) use cases are given in: J.-U. Ness et al. “Towards a better coordination of Multimessenger observations: VO and future developments” <https://arxiv.org/abs/1903.10732>

Demo of the CXC Object Visibility SAP service

next slide is video — **click** anywhere on it to start

(make sure that file `cxo-obj-visibility-SAP.mp4` is available on the same directory as this PDF file)

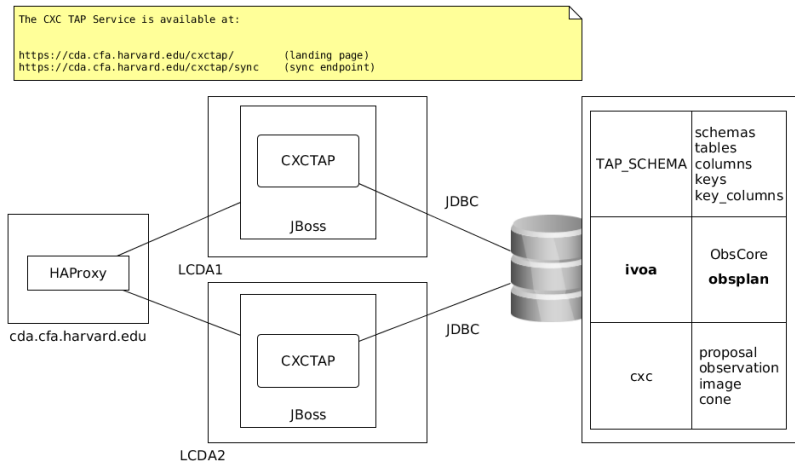
Observation Locator Table Access Protocol

- ▶ retrieve information about planned, scheduled and performed observations of a given target
- ▶ applies to ground-based and space-based observatories
- ▶ defines its own Observation Locator data model (based on the ObsCore data model)
- ▶ assumes a standard workflow of observations status progression
 - planned
 - scheduled
 - performed
 - aborted
 - archived
- ▶ TAP based; supports ADQL queries

Use cases

- ▶ Discovery of observations scheduled or planned for a certain observatory
- ▶ Identification of planned observations in a certain spectral range for a certain astronomical object
- ▶ Follow-up of Target of Opportunities (live publishing of observing plan modifications)
- ▶ communicate modification of plans due to e.g. atmospheric conditions, instrument problems, etc.

Observation Locator Table Access Protocol



Chandra X-ray Center TAP Service

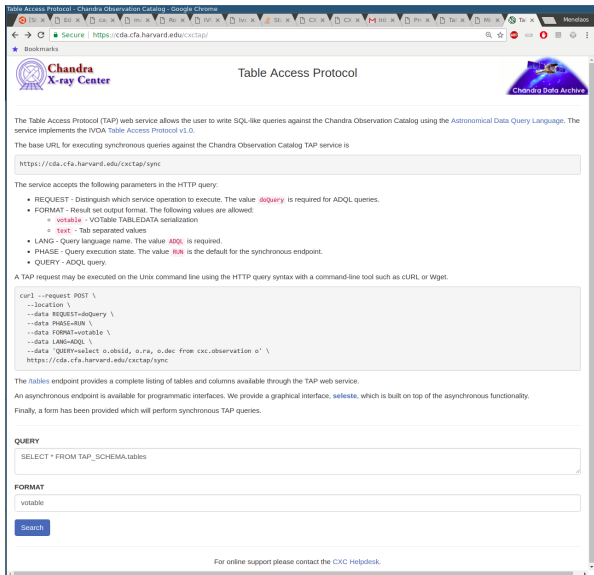


Table Access Protocol - Chandra Observation Catalog - Google Chrome

Secure | <https://cda.cfa.harvard.edu/cxctap/>

Chandra X-ray Center

Table Access Protocol

Chandra Data Archive

The Table Access Protocol (TAP) web service allows the user to write SQL-like queries against the Chandra Observation Catalog using the *Astronomical Data Query Language*. The service implements the IVOA Table Access Protocol v1.0.

The base URL for executing synchronous queries against the Chandra Observation Catalog TAP service is

```
https://cda.cfa.harvard.edu/cxctap/sync
```

The service accepts the following parameters in the HTTP query:

- **REQUEST** - Distinguish which service operation to execute. The value `doQuery` is required for ADQL queries.
- **FORMAT** - Result set output format. The following values are allowed:
 - `votable` - VOTable TABLEDATA serialization
 - `text` - Tab separated values
- **LANG** - Query language name. The value `ADQL` is required.
- **PHASE** - Query execution state. The value `RUN` is the default for the synchronous endpoint.
- **QUERY** - ADQL query.

A TAP request may be executed on the Unix command line using the HTTP query syntax with a command-line tool such as `cURL` or `Wget`.

```
curl --request POST \  
  --location \  
  --data REQUEST=doQuery \  
  --data PHASE=RUN \  
  --data FORMAT=votable \  
  --data LANG=ADQL \  
  --data 'QUERY=select o_obsid, o_ra, o_dec from cxc.observation o' \  
  https://cda.cfa.harvard.edu/cxctap/sync
```

The `/tables` endpoint provides a complete listing of tables and columns available through the TAP web service.

An asynchronous endpoint is available for programmatic interfaces. We provide a graphical interface, `seleste`, which is built on top of the asynchronous functionality.

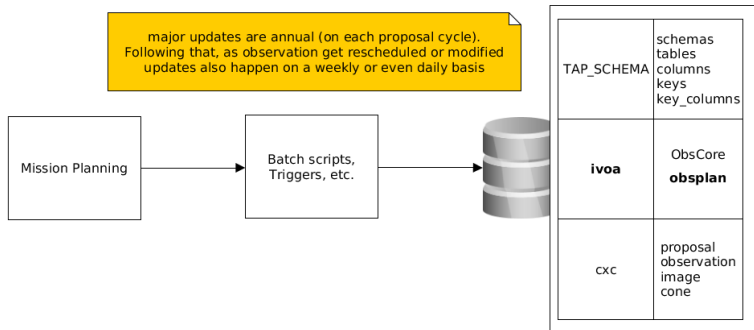
Finally, a form has been provided which will perform synchronous TAP queries.

QUERY

FORMAT

For online support please contact the CXC Helpdesk.

Populating the obsplan table



Experience developing the Object Locator TAP service

- ▶ spec is work in progress, non-trivial differences from 0.2 to 0.4
- ▶ main challenge for the implementor is to decide how tightly to integrate the updates to the **obsplan** table with their existing pipeline; we opted for a tight integration that was more time consuming
- ▶ using the **obscore** model as the baseline for **obsplan** simplified things a lot

Demo of the CXC Object Locator TAP service

next slide is video — **click** anywhere on it to start

(make sure that file `cxc-obs-locator-TAP.mp4` is available on the same directory as this PDF file)

