



The Semantic Astronomer?

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<http://hea-www.harvard.edu/~dburke/>

Chandra X-ray Center



Harvard-Smithsonian
Center for Astrophysics



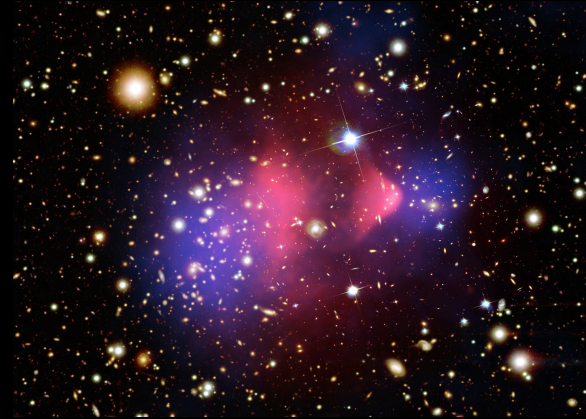
How can semantics ...



Help me in my work?

- documentation for software use and data analysis
- build better, more intelligent, software
- finding information and data

How can semantics ...

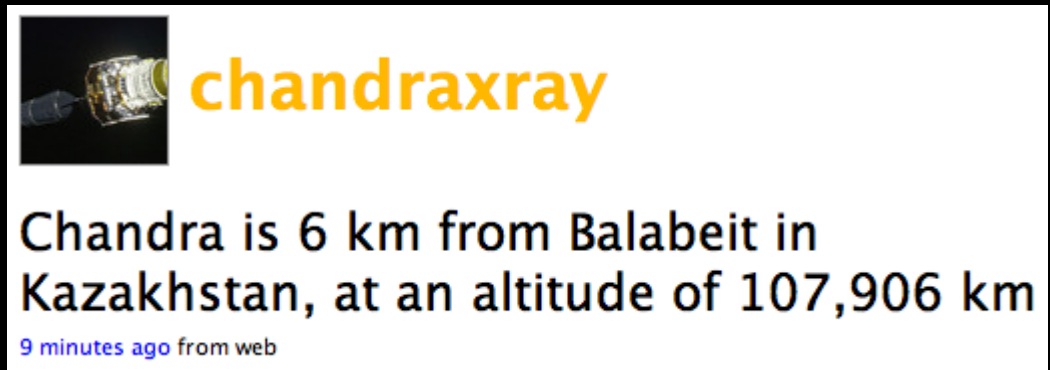


The bullet cluster, M. Markevitch et al. 2006

Help me in my research?

- find, reduce, and analyze data on clusters of galaxies
- formation and evolution of structure in the Universe

How can semantics ...



Help me with fun projects?

- Chandra twitter feed <http://twitter.com/chandraxray/>

Help the general Astronomical community?

Help the general public?

- ⇒ How different are the two groups?
- ⇒ Are Astronomy's semantic needs unique?

The Chandra X-ray Observatory

Random facts from <http://chandra.harvard.edu/>

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One of NASA's four “Great Observatories”

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If Colorado were as smooth as Chandra's mirrors, Pikes Peak
would be less than one inch tall!

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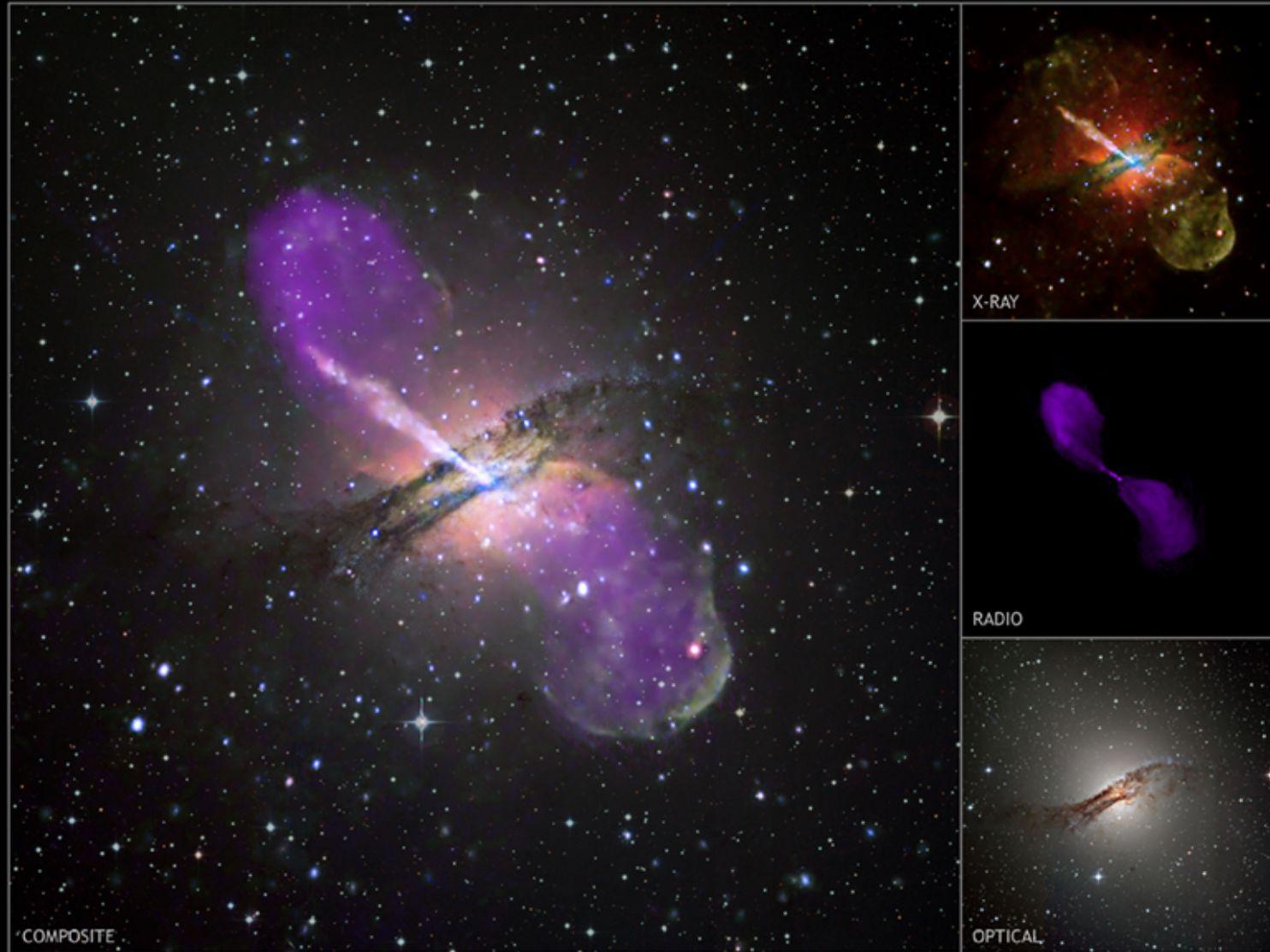
If Colorado were as smooth as Chandra's mirrors, Pikes Peak would be less than one inch tall!

The electrical power required to operate the Chandra spacecraft and instruments is 2 kilowatts, about the same power as a hair dryer.

Photograph by http://www.flickr.com/photos/sailor_coruscant/

The Chandra X-ray Observatory

<http://chandra.harvard.edu/photo/2008/cena/>



July 8 2008

The Semantic Astronomer?

SAO/NASA ADS

<http://adswww.harvard.edu/>

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(OR AND [simple logic](#))

^burke, d

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Require object for selection

(Combine with: OR AND)

Publication Date between /2000 and /

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(MM)

(YYYY)

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SAO/NASA ADS

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Title: A Common Question From The Chandra Help Desk: How Do You Combine Or Merge Observations?
Authors: [Burke, Douglas J.; X-ray Center, Chandra](#)
Affiliation: AA(SAO), AB()
Publication: American Astronomical Society, HEAD meeting #10, #34.03
Publication Date: 03/2008
Origin: [AAS](#)
Abstract Copyright: (c) 2008: American Astronomical Society
Bibliographic Code: 2008HEAD...10.3403B

Abstract

As the archive of Chandra observations grows, and the scheduling constraints on new observations becomes ever-more stringent, the number of Help Desk questions about how one should combine or merge observations has increased. In this presentation we shall describe the main scientific and technical issues behind analyzing multi-observation imaging datasets from Chandra, highlight the present support for the tasks in CIAO, and provide a forum for discussing future improvements.

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Physics &
Astronomy.

Machine-readable
access.

Links papers and
data.

Looking to use
semantic
information.

NED, SIMBAD, and APOD too

NASA/IPAC Extragalactic Database

<http://nedwww.ipac.caltech.edu/>

SIMBAD Astronomical Database

<http://simbad.u-strasbg.fr/simbad/>

Astronomy Picture of the Day

<http://apod.nasa.gov/apod/astropix.html>

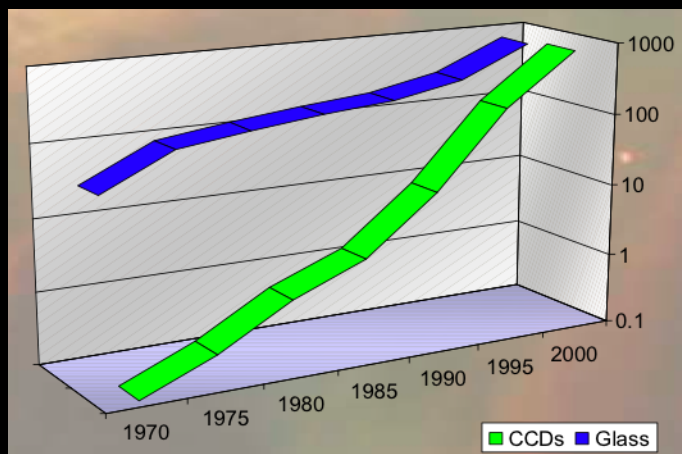
The story so far

- ⇒ FOAF and Dublin Core, but (do we?) need something more specific to Astronomy
- ⇒ Tie in to UMBEL for general audiences?
- ⇒ Tagging/smart extraction of terms (NASA ROSES application is imminent)

The Virtual Observatory



The Virtual Observatory



Digital Data in Astronomy, Hanisch et al, 2008

Astronomy's defense against the incoming flood of data from new facilities (both observational and simulated)

With enough data, the numbers speak for themselves. ... There is now a better way. Petabytes allow us to say: "Correlation is enough."

Chris Anderson, Wired, 2008

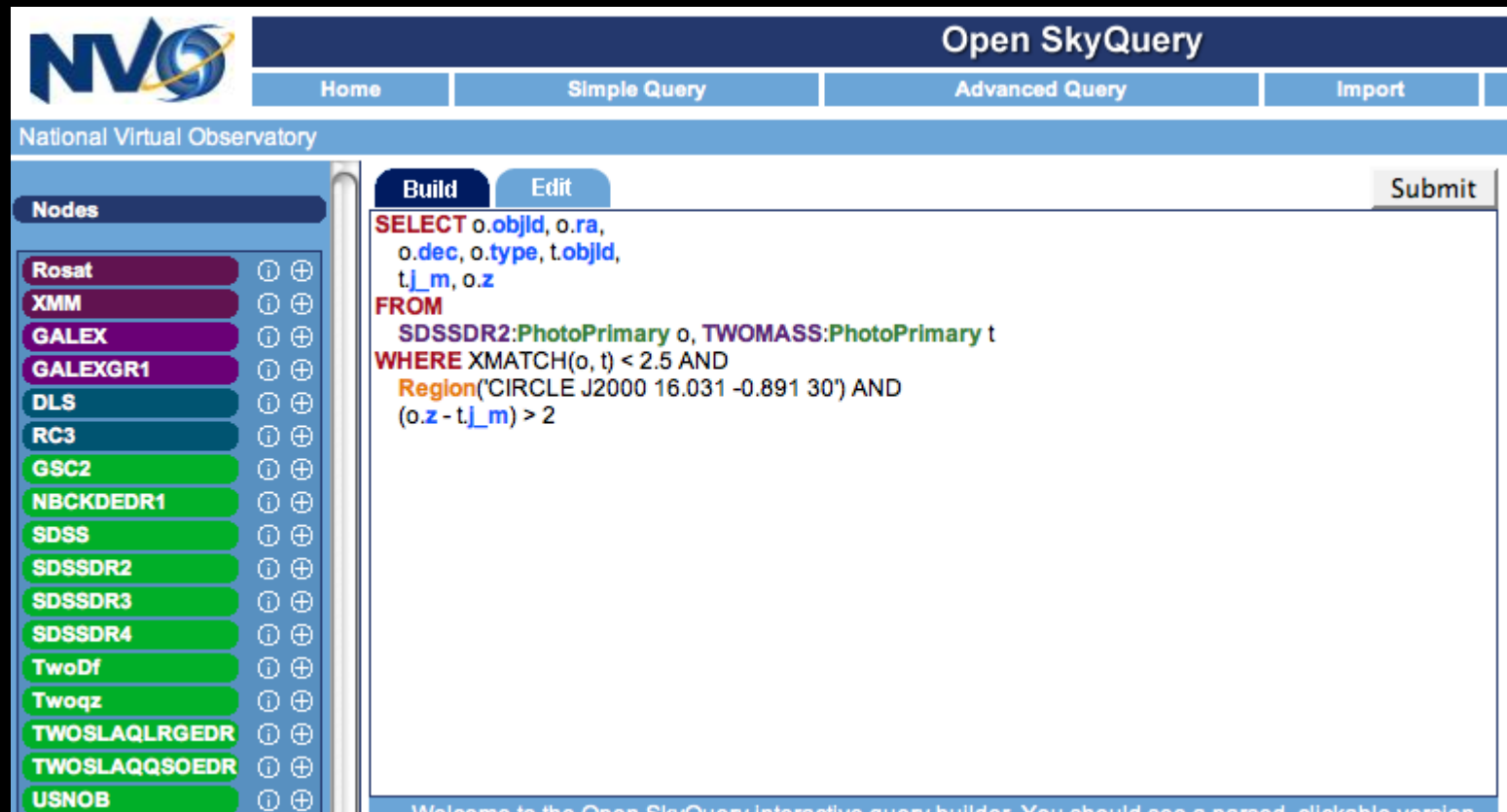


Illustration: Marian Bantjes

The Virtual Observatory

Standards: e.g. Space-Time Coordinate Metadata

Services: e.g. cross-correlate data



The screenshot displays the 'Open SkyQuery' web interface. At the top, there is a navigation bar with 'Home', 'Simple Query', 'Advanced Query', and 'Import' options. Below this, the 'National Virtual Observatory' logo is visible. The main interface is divided into a left sidebar and a central query editor. The sidebar, titled 'Nodes', lists various astronomical data sources such as Rosat, XMM, GALEX, GALEXGR1, DLS, RC3, GSC2, NBCKDEDR1, SDSS, SDSSDR2, SDSSDR3, SDSSDR4, TwoDf, Twoqz, TWOSLAQLRGEDR, TWOSLAQQSOEDR, and USNOB. The central query editor has 'Build' and 'Edit' tabs and a 'Submit' button. It contains a SQL query:

```
SELECT o.objId, o.ra,
       o.dec, o.type, t.objId,
       t.j_m, o.z
FROM
  SDSSDR2:PhotoPrimary o, TWOMASS:PhotoPrimary t
WHERE XMATCH(o, t) < 2.5 AND
      Region('CIRCLE J2000 16.031 -0.891 30') AND
      (o.z - t.j_m) > 2
```

At the bottom of the interface, a small message reads: 'Welcome to the Open SkyQuery interactive query builder. You should see a named, clickable version'.

The Virtual Observatory

Tied together by the *registry*

No single, all-encompassing entity (although we do have a RofR)

Defines URIs using the *ivo* scheme

Provides information on standards, services, institutions, observatories, data, ...

⇒ Astronomy's hub for LOD (or re-inventing the web)?

The Virtual Observatory

“Best Practices” for Astronomy vocabularies

<http://www.astro.gla.ac.uk/users/norman/ivoa/vocabularies/vocabularies-609.xhtml>

Based on SKOS, RFC soon

⇒ How to deal with change?

⇒ How to map between vocabularies?

Proposed RDF schema for registry data

<http://ivoa.net/Documents/latest/RDFVORegistry.html>

Faceted browsing of the registry with Longwell

<http://vo.cfa.harvard.edu/reports/>

The Virtual Observatory



<http://devblogzone.blogspot.com/2008/05/worldwide-virtual-telescope-from.html>