



**Workshop on
How to Publish Data in the VO
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Metadata in the VO

Sébastien Derriere

CDS

<derriere@astro.u-strasbg.fr >

Importance of metadata

- If you plan to publish data to the VO: don't forget to provide metadata !
- Metadata:
 - give description of the pixel/table/spectra contents, or service capabilities
 - are used to locate/search datasets
 - are much smaller than data!

Example: VOTable

```
<?xml version="1.0"?>  
<VOTABLE version="1.1" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"  
xsi:noNamespaceSchemaLocation="http://www.ivoa.net/xml/VOTable/VOTable/v1.1">  
  <COOSYS ID="J2000" equinox="J2000." epoch="J2000." system="eq_FK5"/>  
  <RESOURCE name="myFavouriteGalaxies">  
    <TABLE name="results">  
      <DESCRIPTION>Velocities and Distance estimations</DESCRIPTION>
```

```
<FIELD name="RA" ID="col1"  
  ucd="pos.eq.ra;meta.main" ref="J2000"  
  datatype="float" width="6"  
  precision="2" unit="deg"/>
```

METADATA

```
<FIELD name="v_river" ID="col5" ucd="stat.error;sci.velocity"  
  datatype="int" width="3" unit="km/s"/>  
<FIELD name="R" ID="col6" ucd="phys.distance" datatype="float"  
  width="4" precision="1" unit="Mpc">  
  <DESCRIPTION>Distance of Galaxy, assuming H=75km/s/Mpc</DESCRIPTION>  
</FIELD>  
<DATA>  
  <TABLEDATA>  
    <TR>  
      <TD>010.68</TD><TD>+41.27</TD><TD>N 224</TD><TD>-297</TD><TD>5</TD><TD>0.0</TD>  
    </TR>  
    <TR>  
      <TD>287.43</TD><TD>-63.85</TD><TD>N 6744</TD><TD>839</TD><TD>6</TD><TD>10.0</TD>  
    </TR>  
    <TR>  
      <TD>023.48</TD><TD>+30.66</TD><TD>N 598</TD><TD>-182</TD><TD>3</TD><TD>0.0</TD>  
    </TR>  
  </TABLEDATA>  
</DATA>  
</TABLE>  
</RESOURCE>  
</VOTABLE>
```

DATA

Describing quantities

- Heliocentric radial velocity = 1234.56km/s
- This quantity consists of
 - a UCD (spect.dopplerVeloc;pos.heliocentric)
 - a value (1234.56)
 - with datatype (float)
 - and format (%7.2f)
 - a unit (km/s)
- All this can be put into a <FIELD> or <PARAM>

Metadata in the VO

- Data models: conceptualization of domains, list of attributes
 - utypes: pointers into the DM
- Use in protocols:
 - SIA
 - SSA
- format=metadata, getCapabilities
- Standardized metadata formats for interoperability : structure and/or contents!

UCDs

- Semantic description of quantities
- Standard list of words: controlled vocabulary
- e.g., this is a right ascension:
ucd="pos.eq.ra"
- Used in:
 - VOTable (FIELD, PARAM)
 - Registry Table description
 - VOEvent PARAM, ...
 - Applications (e.g. Aladin filters)

UCDs

- Standard
 - <http://www.ivoa.net/Documents/latest/UCD.html>
 - <http://www.ivoa.net/Documents/latest/UCDlist.html>
- Tools
 - <http://vizier.u-strasbg.fr/UCD/>
- The first word carries most of the meaning
 - phot.mag;em.opt.V

Units

- Not yet a VO unit standard (being discussed)
 - DM progress
 - <http://www.ivoa.net/cgi-bin/twiki/bin/view/IVOA/UnitsDesc>
 - follow IAU recommendations
 - online service
 - <http://vizier.u-strasbg.fr/cgi-bin/Unit>
 - <http://vizier.u-strasbg.fr/cgi-bin/Unit?%3f>
 - Conversion library
 - <http://cdsweb.u-strasbg.fr/cdsdevcorner/units.gml>

Utypes

- **utypes: pointers to specific data models**
 - `utype="stc:AstroCoords.Time.TimeInstant.ISOTime"`
 - `utype="stc:AstroCoordSystem.CoordFrame.CoordRefPos.Position2D.Value2.C1"`
 - `utype="sia:Char.SpectralAxis.Accuracy.Calibration"`

Metadata structures

- Grouping of metadata elements in standardized structures
 - VOResource for registry resource description
 - SIAP protocol
 - with extensions for instrument footprints
 - STC for coordinates description
 - ...

Metadata in the registry

- Description of Resources:
 - Curation
 - Subject
 - Coverage (spatial, spectral)
 - ...
- Query tools

The screenshot shows a 'Registry Browser' window with a search bar containing 'cea'. Below the search bar are filters for 'Type', 'Content - Subject', and 'Authority'. The 'Authority' filter is expanded, showing a list of institutions including 'esdo.mssl.ucl.ac.uk', which is highlighted. Below the filters is a table of search results with columns for 'Status', 'Title', and 'Date'. The table lists several solar-related resources, all dated '2006-09-14'. At the bottom, a 'Details' panel is open, showing information for a resource titled '2XMMp Pre-release Catalogue (LEDAS)'. The details include the URL 'ivo://uk.ac.ledas/2xmmp-ledas/ceaService', the type 'CeaServiceType', and a link for further information. It also lists 'Service Capability vs:WebService' and 'Provides Tasks - ivo://uk.ac.ledas/2xmmp-ledas/ceaApplication', with a radio button selected for 'Interface type - vs:WebService' and a link for 'full - http://camelot.star.le.ac.uk:8080/dsa/2xmmp/services/CommonExecutionConnectorService'. The status bar at the bottom indicates 'Found 262 resources'.

Status	Title	Date
●	Coronal Dimming Region Recognition	2006-09-14
●	Coronal Loop Recognition	2006-09-14
●	Global Helioseismology Mode Parameters	2006-09-14
●	Local Helioseismology Inversion	2006-09-14
●	Local Helioseismology Perturbation Map Generation	2006-09-14
●	Local Helioseismology Subsurface Flow Analysis	2006-09-14
●	Solar Helicity Computation	2006-09-14
●	Solar Magnetic Extrapolation	2006-09-14

2XMMp Pre-release Catalogue (LEDAS)
ivo://uk.ac.ledas/2xmmp-ledas/ceaService
Type: CeaServiceType

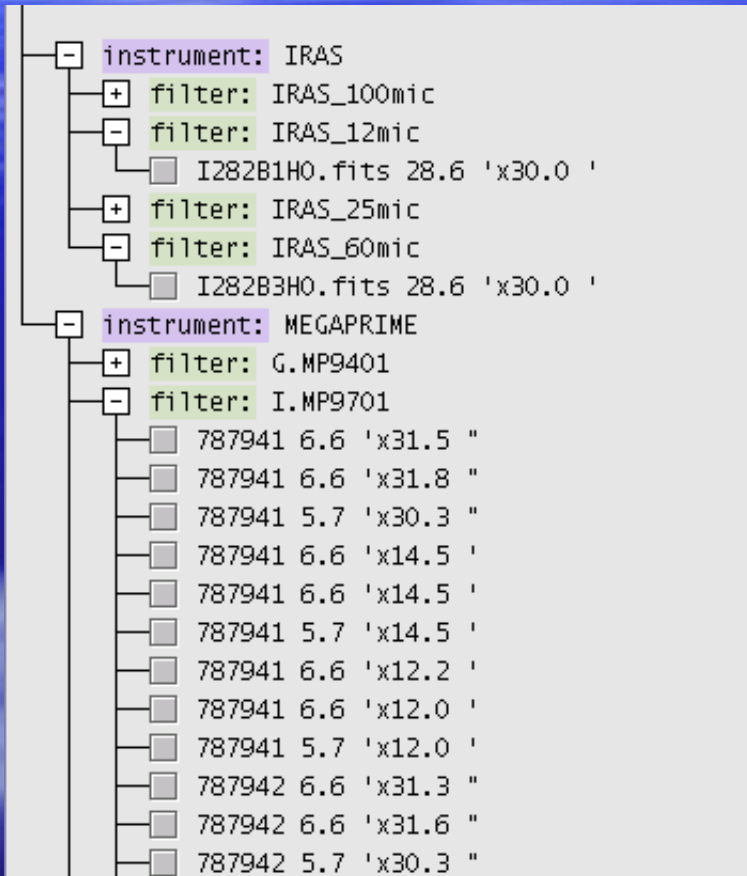
Further information - <http://camelot.star.le.ac.uk:8080/dsa/2xmmp/>
Type - Catalog

Service Capability vs:WebService
Provides Tasks - ivo://uk.ac.ledas/2xmmp-ledas/ceaApplication

- Interface type - vs:WebService
 - full - <http://camelot.star.le.ac.uk:8080/dsa/2xmmp/services/CommonExecutionConnectorService>

Found 262 resources

Metadata trees

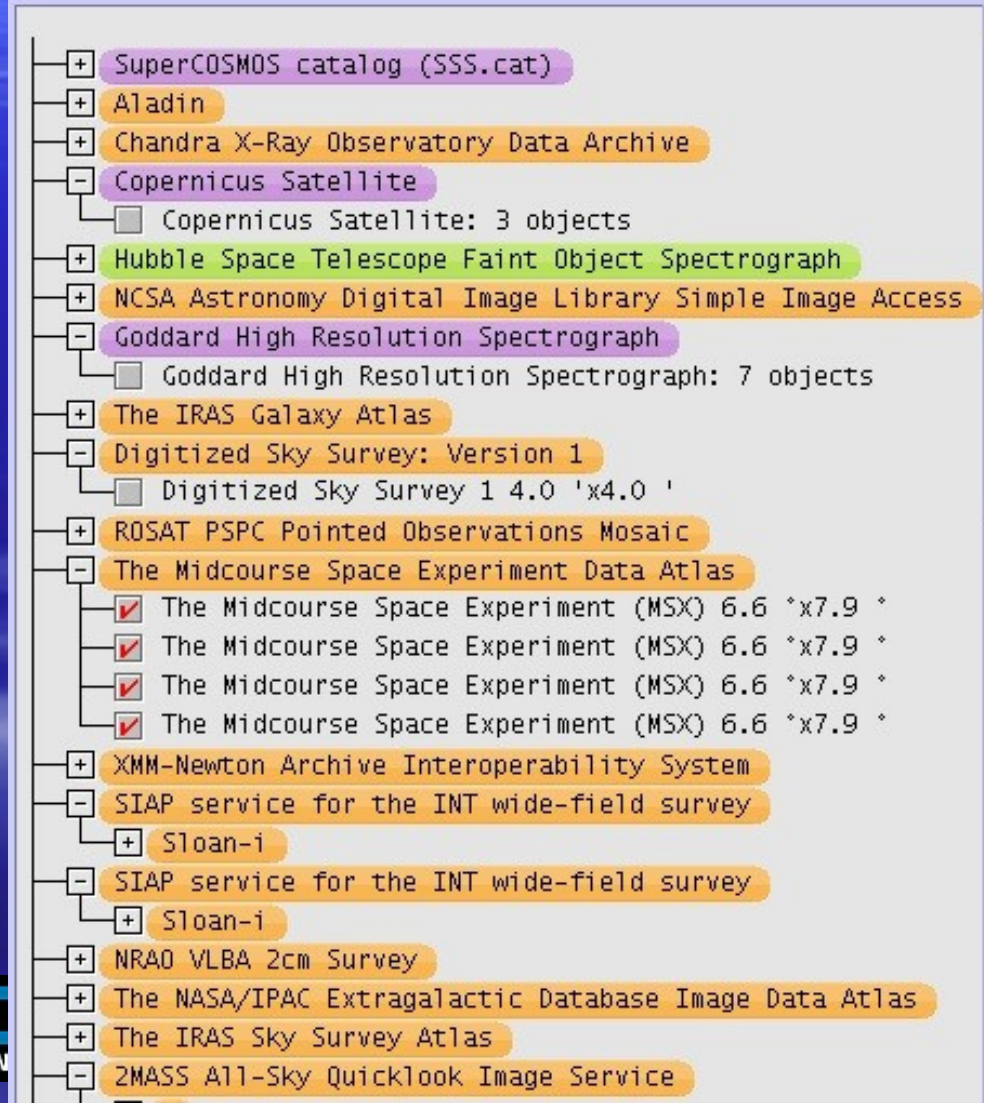


VO discovery tool ?

Target..... oph s Grab coord

Radius..... 4.0'

Servers Images Catalogs Spectra Detailed list...



SIA extension: footprints

The screenshot displays the Aladin v4.0 software interface. At the top, the title bar reads "Aladin v4.0 *** PROTOTYPE VERSION (based on v4.013) ***". Below this is a menu bar with "Load...", "Save...", "Tools...", "Plugins...", "Print...", "Help...", and "Quit". The status bar shows "Position ICRS" and coordinates "10:44:18.65 -59:42:11.4". The main window shows a grayscale astronomical image with numerous red rectangular footprints overlaid on it. A toolbar on the right side contains various icons for "select", "pan", "zoom", "dist", "draw", "tag", "text", "filter", "rgb", "assoc", "rsamp", "cont", "mliss", "pixel", "prop", and "del". A "FoV for inst." panel on the right lists "ESO POSS2L" and "eta_car.fits". A zoom control shows "Zoom 2/3x". A search bar is at the bottom right. At the bottom of the main window, text reads: "ESO POSS2UKSTU_IR 10:45:03.54 -59:41:04.4 - provided by The Digitized Sky Survey from ESO (Garching)".