

ESAC(VILSPA) proposals for extension of DAL functionality

Pedro Osuna (Pedro.Osuna@esa.int)

Jesus Salgado (Jesus.Juan.Salgado@esa.int)

Christophe Arviset (Christophe.Arviset@esa.int)

ESA/ESAC

Presentation Overview

ESAC proposal for Spectral access using modified SIAP

Use of ISO Spectra and XMM-Newton Energy Bands at AVO demo

The need of structure in SIAP

ESAC proposal for structured SIAP

Conclusions

ESAC proposal for Spectral access using modified SIAP

- IVOA Workshop 2003: we propose to include Spectral Access using the current SIAP with slight modification
- We implemented such access for ISO spectra with following few extra FIELDS:

```
FIELD_ID="AXES"      ucd=VOX:Spectrum_axes    [...]  
FIELD ID="UNITS"    ucd=VOX:Spectrum_units  [...]  
FIELD ID="FORMAT"  ucd=VOX:Spectrum_Format [...]  
FIELD ID="DIMEQ"   ucd=VOX:Spectrum_dimeq  [...]  
FIELD ID="SCALEQ"  ucd=VOX:Spectrum_scaleq [...]
```

Example of ISO Spectrum access

<http://isopma:8080/aio/jsp/siap.jsp?POS=10,41&size=1&format=html&imageType=Spectrum>

SIAP Access results - Netscape

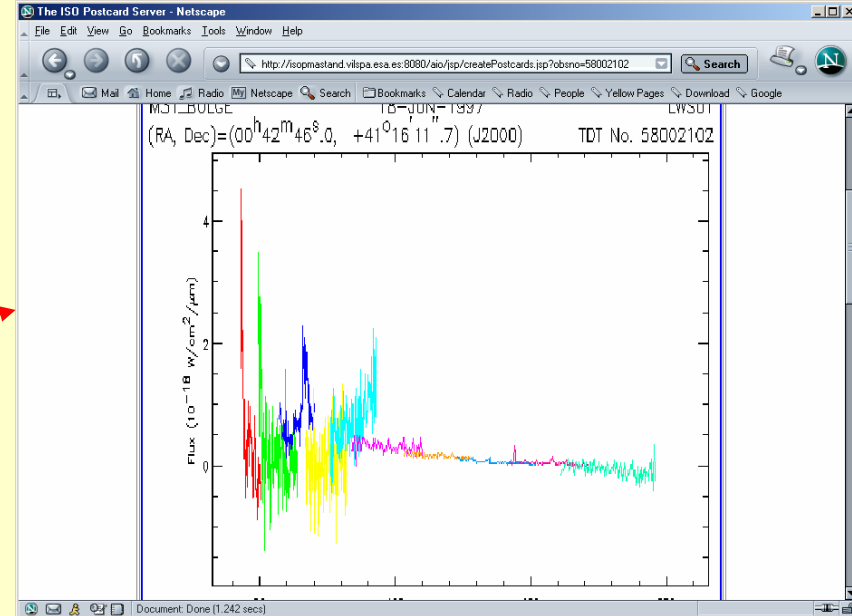
<http://isopma:8080/aio/jsp/siap.jsp?POS=10,41&size=1&format=html&imageType=Spectrum>

The ISO Data Archive SIAP Query Service

Observation id	Image	Target name	Instrument mode	Start time	End time	Ontime (s)	RA(J2000) (deg)	DEC(J2000) (deg)
40001501	Spectrum	M31_BULGE	SWS01	20-Dec-1996 21:09:09	20-Dec-1996 21:28:09	1140	10.6918099995	41.27003
57702107	Spectrum	EG_AND	SWS01	15-Jun-1997 14:34:59	15-Jun-1997 15:06:51	1912	11.15409	40.67945
5800171	Spectrum	M31_SPI	LWS02	18-Jun-1997 10:19:19	18-Jun-1997 11:10:09	3050	11.161399995	41.45478
58001703	Spectrum	M31_OI	LWS02	18-Jun-1997 11:24:57	18-Jun-1997 11:36:11	674	11.161399995	41.45478
58002001	Spectrum	M31	LWS01	18-Jun-1997 13:23:49	18-Jun-1997 14:16:29	3160	10.68498	41.26899
58002102	Spectrum	M31_BULGE	LWS01	18-Jun-1997 14:30:27	18-Jun-1997 15:15:41	2714	10.691689994999999	41.26994
58002103	Spectrum	BACKGROUND_PT	LWS01	18-Jun-1997 15:17:01	18-Jun-1997 15:31:29	868	10.433989995	41.85734
58302603	Spectrum	M31S	LWS01	21-Jun-1997 13:48:54	21-Jun-1997 14:37:26	2912	10.565409990000001	41.154
60202005	Spectrum	M31N	LWS01	10-Jul-1997 12:12:39	10-Jul-1997 13:01:11	2912	10.80456	41.3838
82301317	Spectrum	M31-D268	LWS02	15-Feb-1998 17:40:21	15-Feb-1998 17:48:29	488	10.545960000000001	41.12378
82301318	Spectrum	M31-D478	LWS02	15-Feb-1998 17:49:35	15-Feb-1998 17:57:43	488	10.776529994999999	41.40056

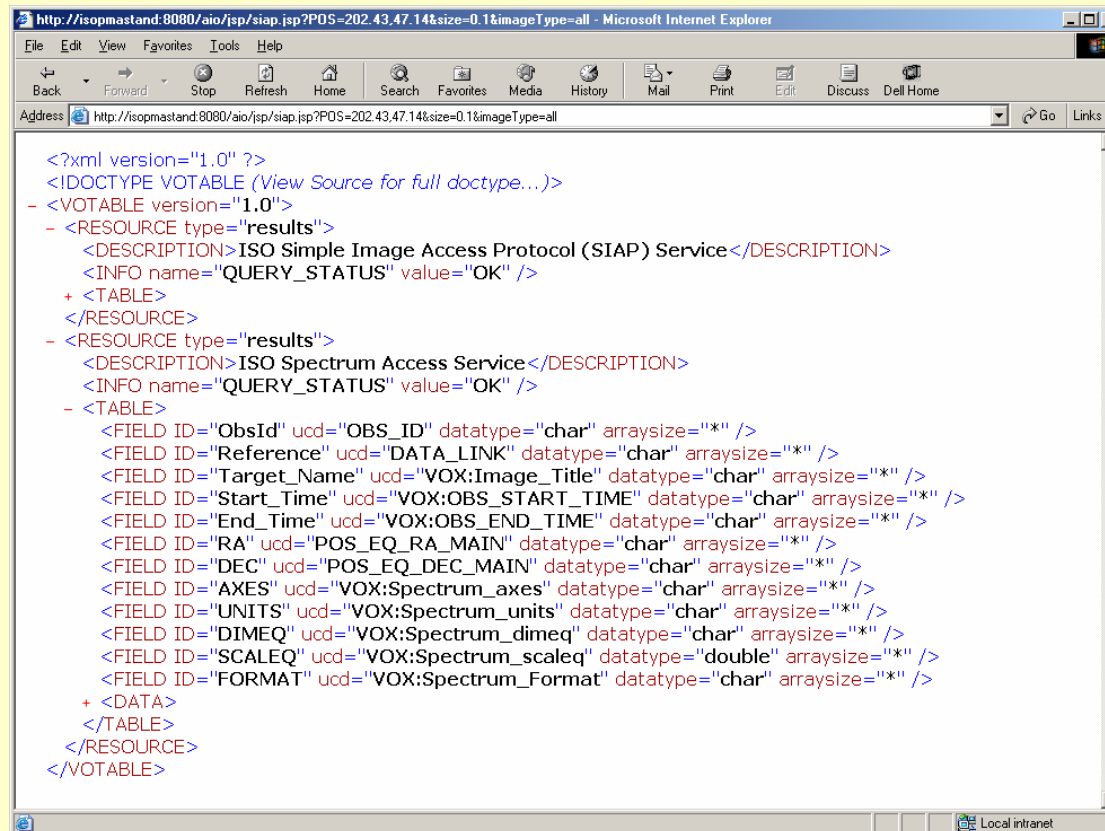
For questions, comments, please contact the [ISO Helpdesk](#)

[[What's New](#) | [Homepage](#) | [Search this site](#) | [Frequently Asked Questions](#) | [©](#)]



VOTable Result ...

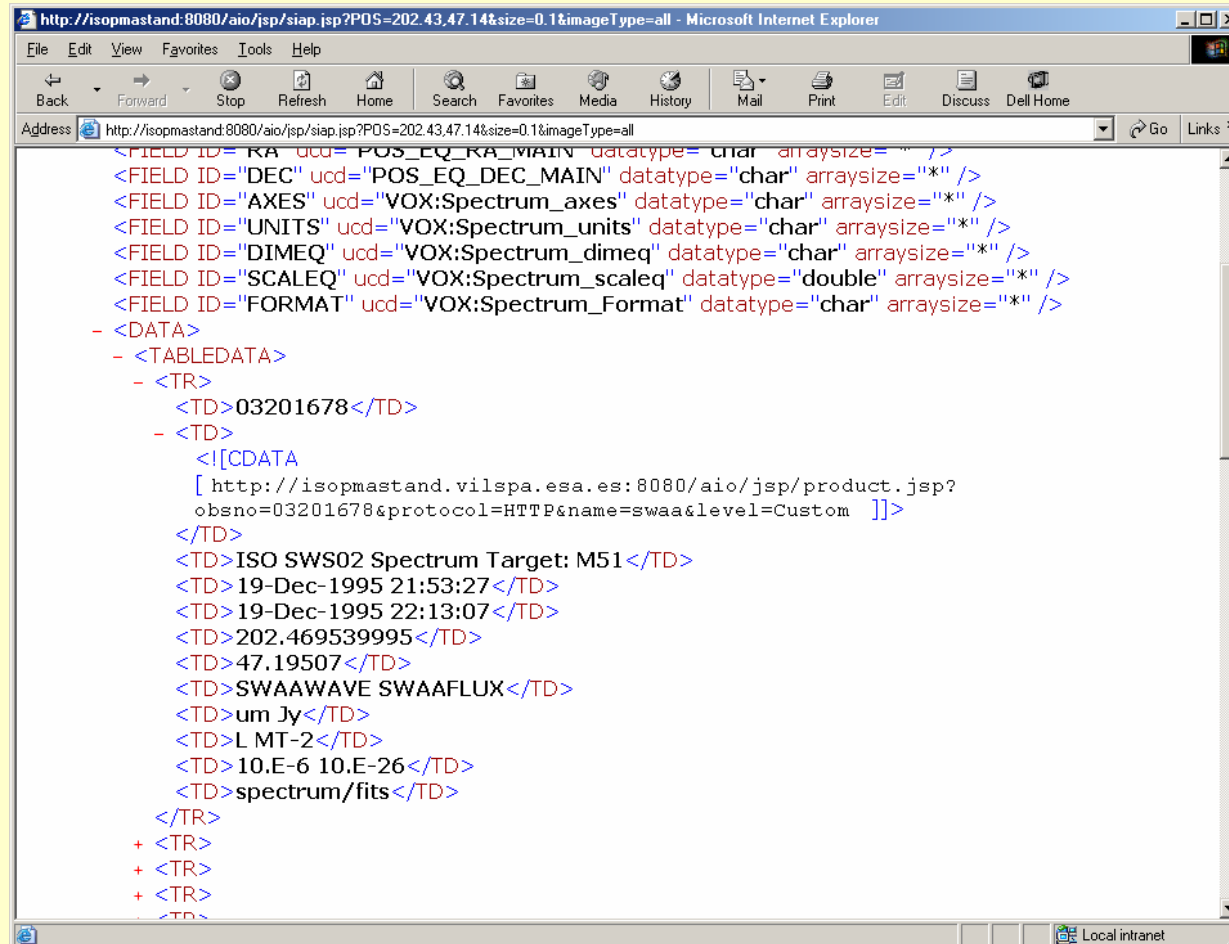
Both IMAGES and SPECTRA in same request With different RESOURCES



```

<?xml version="1.0" ?>
<IDOCTYPE VOTABLE (View Source for full doctype...)>
- <VOTABLE version="1.0">
- <RESOURCE type="results">
  <DESCRIPTION>ISO Simple Image Access Protocol (SIAP) Service</DESCRIPTION>
  <INFO name="QUERY_STATUS" value="OK" />
  + <TABLE>
</RESOURCE>
- <RESOURCE type="results">
  <DESCRIPTION>ISO Spectrum Access Service</DESCRIPTION>
  <INFO name="QUERY_STATUS" value="OK" />
  - <TABLE>
    <FIELD ID="ObsId" ucd="OBS_ID" datatype="char" arraysize="*" />
    <FIELD ID="Reference" ucd="DATA_LINK" datatype="char" arraysize="*" />
    <FIELD ID="Target_Name" ucd="VOX:Image_Title" datatype="char" arraysize="*" />
    <FIELD ID="Start_Time" ucd="VOX:OBS_START_TIME" datatype="char" arraysize="*" />
    <FIELD ID="End_Time" ucd="VOX:OBS_END_TIME" datatype="char" arraysize="*" />
    <FIELD ID="RA" ucd="POS_EQ_RA_MAIN" datatype="char" arraysize="*" />
    <FIELD ID="DEC" ucd="POS_EQ_DEC_MAIN" datatype="char" arraysize="*" />
    <FIELD ID="AXES" ucd="VOX:Spectrum_axes" datatype="char" arraysize="*" />
    <FIELD ID="UNITS" ucd="VOX:Spectrum_units" datatype="char" arraysize="*" />
    <FIELD ID="DIMEQ" ucd="VOX:Spectrum_dimeq" datatype="char" arraysize="*" />
    <FIELD ID="SCALEQ" ucd="VOX:Spectrum_scaleq" datatype="double" arraysize="*" />
    <FIELD ID="FORMAT" ucd="VOX:Spectrum_Format" datatype="char" arraysize="*" />
  + <DATA>
</TABLE>
</RESOURCE>
</VOTABLE>
  
```

VOTable Result (cont.)



```

http://isopmastand:8080/aio/jsp/siap.jsp?POS=202.43.47.14&size=0.1&imageType=all - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Forward Stop Refresh Home Search Favorites Media History Mail Print Edit Discuss Dell Home
Address http://isopmastand:8080/aio/jsp/siap.jsp?POS=202.43.47.14&size=0.1&imageType=all Go Links >>
<FIELD ID="RA" ucd="POS_EQ_RA_MAIN" datatype="char" arraysize="*" />
<FIELD ID="DEC" ucd="POS_EQ_DEC_MAIN" datatype="char" arraysize="*" />
<FIELD ID="AXES" ucd="VOX:Spectrum_axes" datatype="char" arraysize="*" />
<FIELD ID="UNITS" ucd="VOX:Spectrum_units" datatype="char" arraysize="*" />
<FIELD ID="DIMEQ" ucd="VOX:Spectrum_dimeq" datatype="char" arraysize="*" />
<FIELD ID="SCALEQ" ucd="VOX:Spectrum_scaledq" datatype="double" arraysize="*" />
<FIELD ID="FORMAT" ucd="VOX:Spectrum_Format" datatype="char" arraysize="*" />
- <DATA>
- <TABLEDATA>
- <TR>
  <TD>03201678</TD>
  - <TD>
    <![CDATA
      [ http://isopmastand.vilspa.esa.es:8080/aio/jsp/product.jsp?
        obsno=03201678&protocol=HTTP&name=swaa&level=Custom ]]>
    </TD>
    <TD>ISO SWS02 Spectrum Target: M51</TD>
    <TD>19-Dec-1995 21:53:27</TD>
    <TD>19-Dec-1995 22:13:07</TD>
    <TD>202.469539995</TD>
    <TD>47.19507</TD>
    <TD>SWAAWAVE SWAAFLUX</TD>
    <TD>um Jy</TD>
    <TD>L MT-2</TD>
    <TD>10.E-6 10.E-26</TD>
    <TD>spectrum/fits</TD>
  </TR>
  + <TR>
  + <TR>
  + <TR>
  - <TR>
  
```

SUPERIMPOSING Spectra ...

FIELD ID="UNITS" ucd=VOX:Spectrum_units [...]

FIELD ID="DIMEQ" ucd=VOX:Spectrum_dimeq [...]

FIELD ID="SCALEQ" ucd=VOX:Spectrum_scaleq [...]

```

<TD>40001501</TD> -
<TD>- <![CDATA[ http://[...]swaa]]></TD>
<TD>ISO SWS01 Spectrum Target:
M31_BULGE</TD>
<TD>20-Dec-1996 21:09:09</TD>
<TD>20-Dec-1996 21:28:09</TD>
<TD>10.691809995</TD>
<TD>41.27003</TD>
<TD>SWAAWAVE SWAAFLUX</TD>
<TD>um Jy</TD>
<TD>L MT-2</TD>
<TD>10.E-6 10.E-26</TD>
<TD>spectrum/fits</TD>
    
```

```

<TD>58001701</TD> -
<TD>- <![CDATA[ http://[...]lsan]]></TD>
<TD>ISO LWS02 Spectrum Target:
M31_BULGE</TD>
<TD>18-Jun-1997 10:19:19</TD>
<TD>18-Jun-1997 11:10:09</TD>
<TD> 10.691809995 </TD>
<TD> 41.27003 </TD>
<TD>LSANWAV LSANFLX</TD>
<TD>microns watts/cm^2/micron</TD>
<TD>L ML-1T-3</TD>
<TD>10.E-6 10.E+10</TD>
<TD>spectrum/fits</TD>
    
```

DIMEQ= MT-2

DIMEQ= ML-1T-3

... using Dimensional Equation

$$\frac{[SWS]}{[LWS]} = \frac{MT - 2}{ML - 1T - 3} = LT$$

$$LT = \lambda^n c^m = (L^n T^{-1})^m = L^{n+m} T^{-m}$$

$$\Rightarrow \left\{ \begin{array}{l} n + m = 1 \\ -m = 1 \end{array} \right\} \Rightarrow \left\{ \begin{array}{l} m = -1 \\ n = 2 \end{array} \right\}$$

\Rightarrow to go from SWS to LWS we multiply by :

$$\frac{\lambda^2}{c}$$

$$\Phi(\text{SWS units}) = \Phi(\text{LWS units}) \frac{\lambda^2}{c} \frac{\text{SWS scale}}{\text{LWS scale}}$$

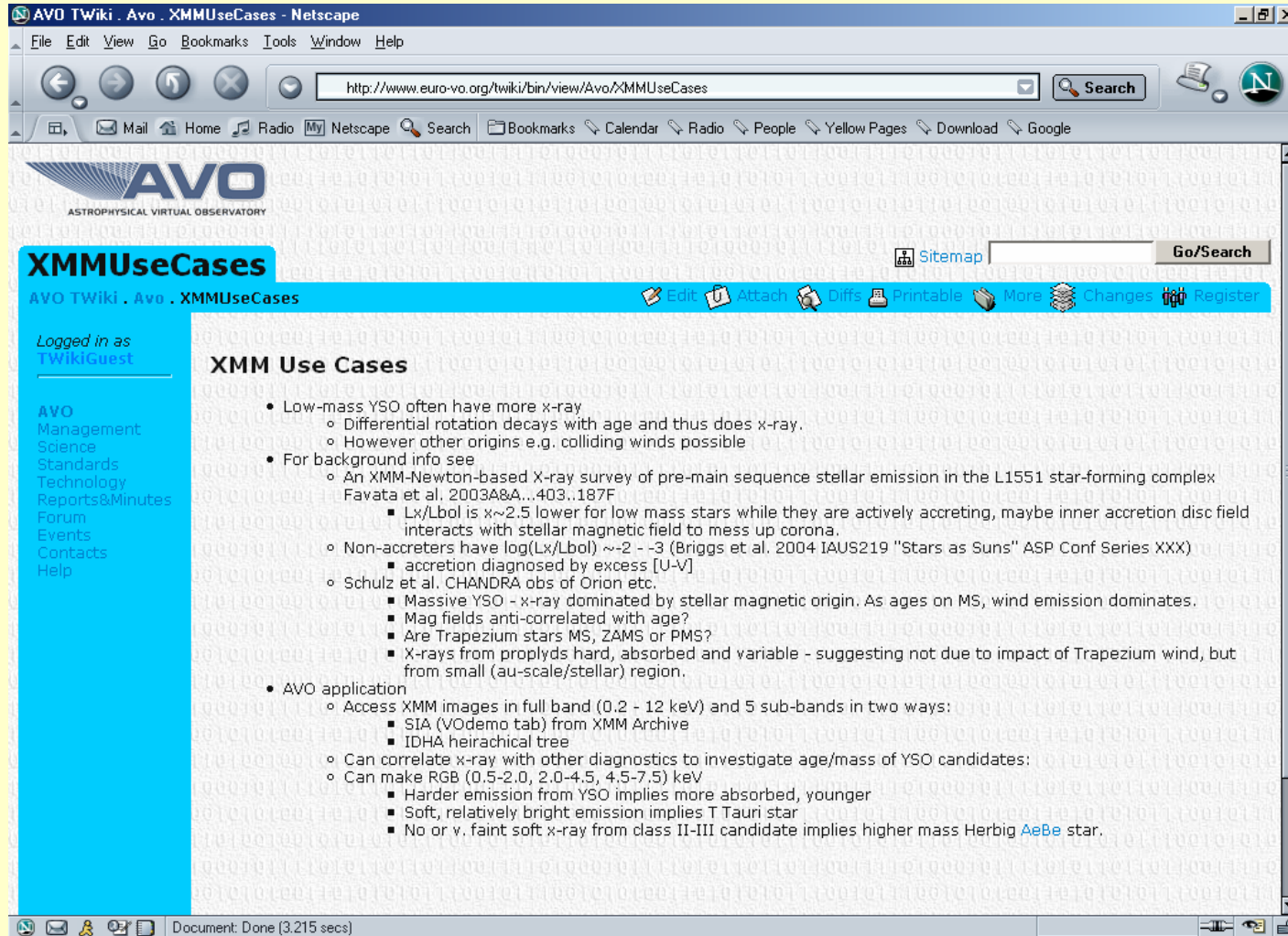
ISO Spectra were used at the AVO Demo...

The screenshot shows a Netscape browser window displaying the AVO TWiki ISOUseCases page. The page title is 'AVO TWiki . Avo . ISOUseCases' and the URL is 'http://www.euro-vo.org/twiki/bin/view/Avo/ISOUseCases'. The page content is titled 'ISO Use Cases' and lists four main categories of use cases:

- using ISOCAM images
 - IR can indicate warm dust from young YSO (taken with ISO)
 - AVO method - direct access to ISO archive using SIA
- using LWS spectra, Pezzuto et al. 2002 MNRAS 330 1034
 - 2-colour [60-100] v. [100 - 170] Pezzuto et al.'s YSO colour selection
 - Distinguishes Class 0, I, II
 - AVO Method
 - Use SSA (VOdemo tab) to discover spectra from ISO Archive
 - Selected spectra are automatically loaded into SpecView
 - Measure flux density in Jy at 60, 100, 170 um
 - Load SpecView log file, VOPlot is started automatically
 - Make colours e.g. $[60-100] = \log(F_{100}/F_{60})$
- using LWS low res Nisini et al. ApJ 2002 574 246
 - Class 0 - water (also see Ceccarelli et al. 1999 A&A 342 1033)
 - CO in excitation states detected by LWS probably comes from warm regions closer to protostar than SiO and maser transitions from high-mass YSO outflows)
 - NHC1333 IRAS4 Spectrum of Class 0 source with transitions labelled kindly supplied by ISO scientists.
 - Class I - no water (upper limit $[H_2O] < 10E-5$) but CO still seen
 - AVO method
 - Use SSA (VOdemo tab) to discover spectra from ISO Archive
 - Selected spectra are automatically loaded into SpecView
 - Inspect 160-190 um region
- ISOGAL survey
 - Galactic Plane: Felli et al. 2002 A&A 392 971 [15] < 4.5 [7] - [15] > 1.8 [7] < 6 (and $K - [7] > 4$) (3"-6")
 - See Felli et al. 2000 A&A 362 199 for high galat criteria FELLI et al.'s YSO colour selection
 - AVO method
 - ISOGAL catalogue is available in Vizier (Omont+ 2003)
 - Use VOPlot
 - [7-15] colour is expression $1.65 - (\log(F_7/F_{15}))/0.4$
 - Filter to select candidates

Overlaid on the browser window is a 'Server selector' dialog box. It contains two columns: 'Image servers' and 'Data servers'. The 'Image servers' column lists: Aladin, VOdemo (selected), SSS..., SkyView, VLA..., and Others... The 'Data servers' column lists: Vizier Catalogs, Surveys in VizierR, Missions in VizierR, Simbad, NED, Others.., and FoV. The 'VOdemo' server is highlighted with a tooltip that lists: SSA server for VLT/FORS spectra, SIA server for XMM-Newton archive, SIA server for ISO images, SSA server for ISO spectra, IDHA tree MERLIN NGC1333, IDHA tree VLA CDFS, IDHA tree HDFN, IDHA tree CGPS MF2, IDHA server for HST/WFPC2 Associations, SIA atlas server for Aladin, SIA server for SkyView, and SIA server for NOAO. At the bottom of the dialog box are buttons for SUBMIT, Data Tree, Reset, Clear, and Close.

... and so where XMM-Newton images per Energy Band



AVO TWiki . Avo . XMMUseCases - Netscape

File Edit View Go Bookmarks Tools Window Help

http://www.euro-vo.org/twiki/bin/view/Avo/XMMUseCases

Mail Home Radio My Netscape Search Bookmarks Calendar Radio People Yellow Pages Download Google

AVO
ASTROPHYSICAL VIRTUAL OBSERVATORY

XMMUseCases Sitemap Go/Search

AVO TWiki . Avo . XMMUseCases Edit Attach Diff Printable More Changes Register

Logged in as TWikiGuest

AVO
Management
Science
Standards
Technology
Reports&Minutes
Forum
Events
Contacts
Help

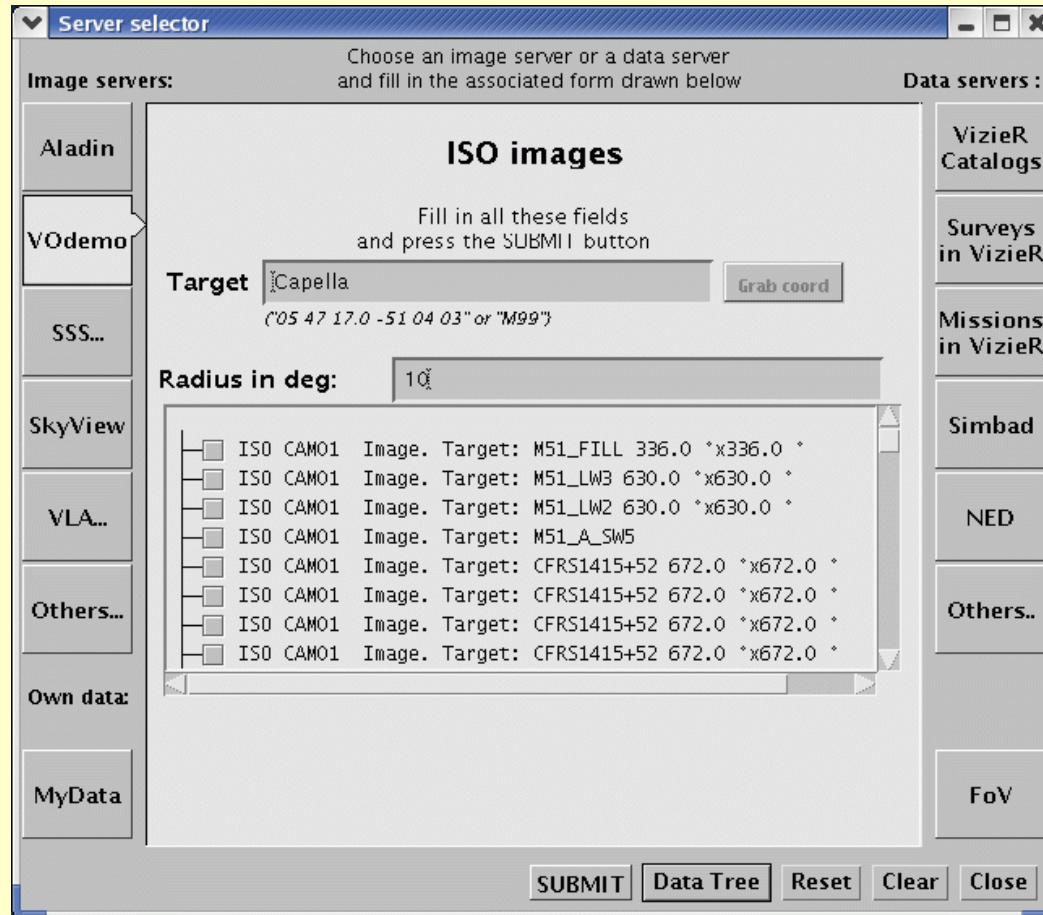
XMM Use Cases

- Low-mass YSO often have more x-ray
 - Differential rotation decays with age and thus does x-ray.
 - However other origins e.g. colliding winds possible
- For background info see
 - An XMM-Newton-based X-ray survey of pre-main sequence stellar emission in the L1551 star-forming complex
Favata et al. 2003A&A...403..187F
 - L_x/L_{bol} is $x \sim 2.5$ lower for low mass stars while they are actively accreting, maybe inner accretion disc field interacts with stellar magnetic field to mess up corona.
 - Non-accretors have $\log(L_x/L_{bol}) \sim -2 - -3$ (Briggs et al. 2004 IAUS219 "Stars as Suns" ASP Conf Series XXX)
 - accretion diagnosed by excess [U-V]
 - Schulz et al. CHANDRA obs of Orion etc.
 - Massive YSO - x-ray dominated by stellar magnetic origin. As ages on MS, wind emission dominates.
 - Mag fields anti-correlated with age?
 - Are Trapezium stars MS, ZAMS or PMS?
 - X-rays from proplyds hard, absorbed and variable - suggesting not due to impact of Trapezium wind, but from small (au-scale/stellar) region.
- AVO application
 - Access XMM images in full band (0.2 - 12 keV) and 5 sub-bands in two ways:
 - SIA (VODemo tab) from XMM Archive
 - IDHA heirarchical tree
 - Can correlate x-ray with other diagnostics to investigate age/mass of YSO candidates:
 - Can make RGB (0.5-2.0, 2.0-4.5, 4.5-7.5) keV
 - Harder emission from YSO implies more absorbed, younger
 - Soft, relatively bright emission implies T Tauri star
 - No or v. faint soft x-ray from class II-III candidate implies higher mass Herbig AeBe star.

Document: Done (3,215 secs)

The need of Structure in SIAP

Current: No Structure



The need of Structure in SIAP(II)

Future: Possible Structure

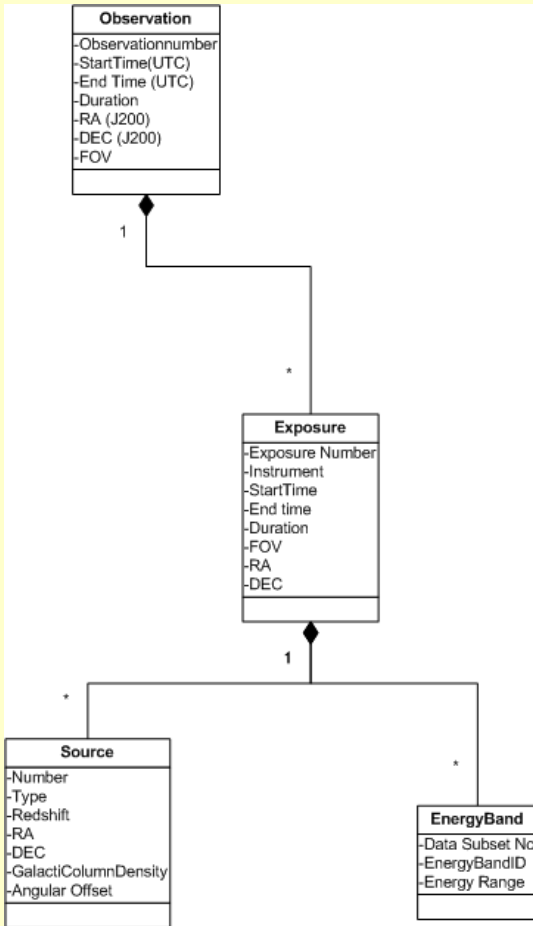
The screenshot shows a Netscape browser window displaying a web page titled "Extended Siap Proposal". The page features a hierarchical tree structure on the left side, representing the "SiapResult" data. The tree is organized as follows:

- SiapResult
 - XMM
 - Observations
 - 0121500301
 - Exposures
 - S001
 - Energy Band Table
 - Energy Band 1 (highlighted)
 - Energy Band 2
 - Energy Band 3
 - Energy Band 4
 - Energy Band 5
 - Energy Band 6
 - Energy Band 7
 - Sources
 - S002
 - S003
 - ISO
 - HST

To the right of the tree is a large astronomical image titled "P0121500301EPX0000IMAGE0000.FIT". The image shows a field of stars with a prominent bright star in the lower right quadrant. A color bar on the left of the image indicates intensity in "cta/pixel" ranging from 0.0 to 100. The axes are labeled "DEC--TAN" and "DEC--TAN".

ESAC Proposal for structured SIAP

IF agreed to use VOTable: allow tables inside tables



```

<?xml version="1.0" ?>
<!DOCTYPE VOTABLE (View Source for full doctype...)>
<VOTABLE version="1.0">
  <RESOURCE type="results">
    <DESCRIPTION>XMM-Newton Simple Image Access Protocol (SIAP) Service</DESCRIPTION>
    <INFO name="QUERY_STATUS" value="OK" />
    <TABLE>
      <FIELD ID="ObsId" ucd="OBS_ID" datatype="char" arraysize="*" />
      <FIELD ID="Target_Name" ucd="VOX:Image_Title" datatype="char" arraysize="*" />
      <FIELD ID="Start_Time" ucd="VOX:OBS_START_TIME" datatype="char" arraysize="*" />
      <FIELD ID="End_Time" ucd="VOX:OBS_END_TIME" datatype="char" arraysize="*" />
      <FIELD ID="On_Time" ucd="VOX:OBS_DURATION" datatype="int" />
      <FIELD ID="RA" ucd="POS_EQ_RA_MAIN" datatype="char" arraysize="*" />
      <FIELD ID="DEC" ucd="POS_EQ_DEC_MAIN" datatype="char" arraysize="*" />
      <FIELD ID="FOV" ucd="VOX:Field_Of_View" datatype="char" arraysize="*" />
      <FIELD ID="FORMAT" ucd="VOX:Image_Format" datatype="char" arraysize="*" />
      <FIELD ID="Reference" ucd="DATA_LINK" datatype="char" arraysize="*" />
      <FIELD ID="Exposure_Table" datatype="table" />
    </TABLE>
    <DATA>
      <TABLEDATA>
        <TR>
          <TD>0102640101</TD>
          <TD>XMM EPIC Image. Target: M33_1</TD>
          <TD>2000-08-04 05:16:00.0</TD>
          <TD>2000-08-04 10:27:12.0</TD>
          <TD>18672</TD>
          <TD>23.458305</TD>
          <TD>30.66414</TD>
          <TD>0.72x0.72</TD>
          <TD>Dec 15 2002</TD>
          <TD>image/fits</TD>
        </TR>
      </TABLEDATA>
      <CDATA[http://ssa.vilspa.esa.es:8080/ain/jsp/product.jsp?obsno=0102640101&name=OIMAGE&level=PPS&extension=FTZ&protocol=HTTP]>
    </DATA>
    <TABLE>
      <FIELD ID="ExposureNumber" ucd="EXP_ID" datatype="char" arraysize="*" />
      <FIELD ID="Image_Name" ucd="VOX:Image_Title" datatype="char" arraysize="*" />
      <FIELD ID="Instrument" ucd="INST_ID" datatype="char" arraysize="*" />
      <FIELD ID="Start_Time" ucd="VOX:OBS_START_TIME" datatype="char" arraysize="*" />
      <FIELD ID="End_Time" ucd="VOX:OBS_END_TIME" datatype="char" arraysize="*" />
      <FIELD ID="Duration" ucd="VOX:OBS_DURATION" datatype="int" />
    </TABLE>
  </RESOURCE>
</VOTABLE>
  
```

Conclusion

- **Adaptation of SIAP to include Spectra is very easy and provides a lot of functionality to the VO.**
- **We believe some structure within SIAP is needed, both for Images and Spectra.**
- **In case we want to use VOTables, map the UML Data Model diagrams of your system to VOTable, modified to allow tables inside tables.**