Exploiting Virtual Observatory and Information Technology: Techniques for Astronomy

Lecture #5 Goal:
VO Applications
Science Usage

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Summary: Lecture #5

- Review of VO Client Side Tools
- Examples of Usage
  - Creating the H-R diagram
  - Discovery of Brown Dwarfs
  - Stars in Open Clusters
  - Discovery of Type 2 QSO's
  - P-AGB (OH masers, PN) stars

VO Client Side Applications

- Applications are now available which conform to VO standards
- Powerful tools exploiting the uniform data access methods
- Lecture #6 will cover server side applications

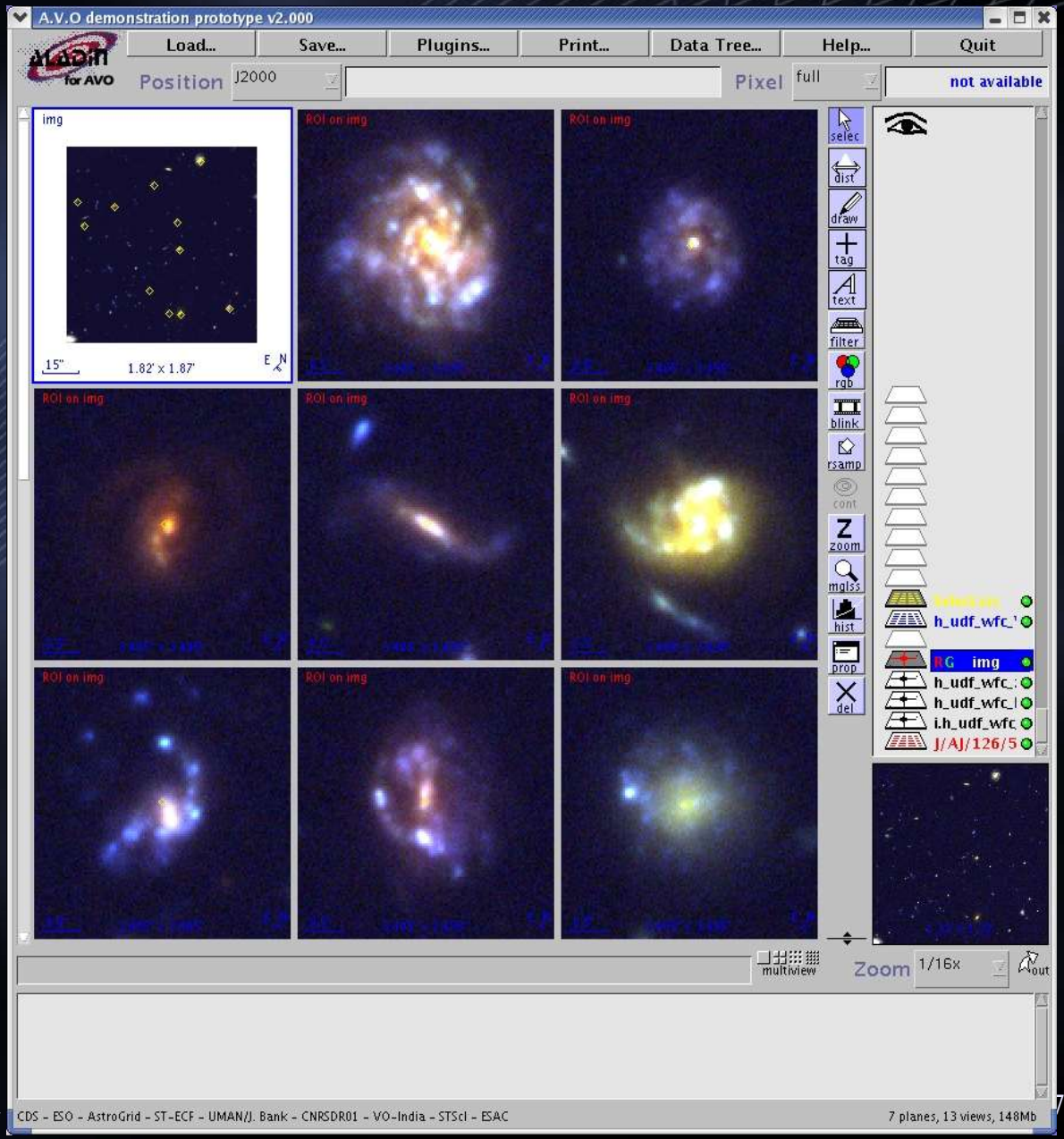
Aladin

- A sophisticated data visualiser and workbench
- Developed at CDS - Strasbourg
- Two versions available:
  - Mainstream Aladin v2.503: http://aladin.u-strasbg.fr/AladinJava?frame=downloading
  - VO enabled: AVO-Aladin v2.000: http://www.euro-vo.org/twiki/bin/view/Avo/SwgDownload
- Many new features in latest AVO-Aladin v2.0 version

Aladin: Multi-view

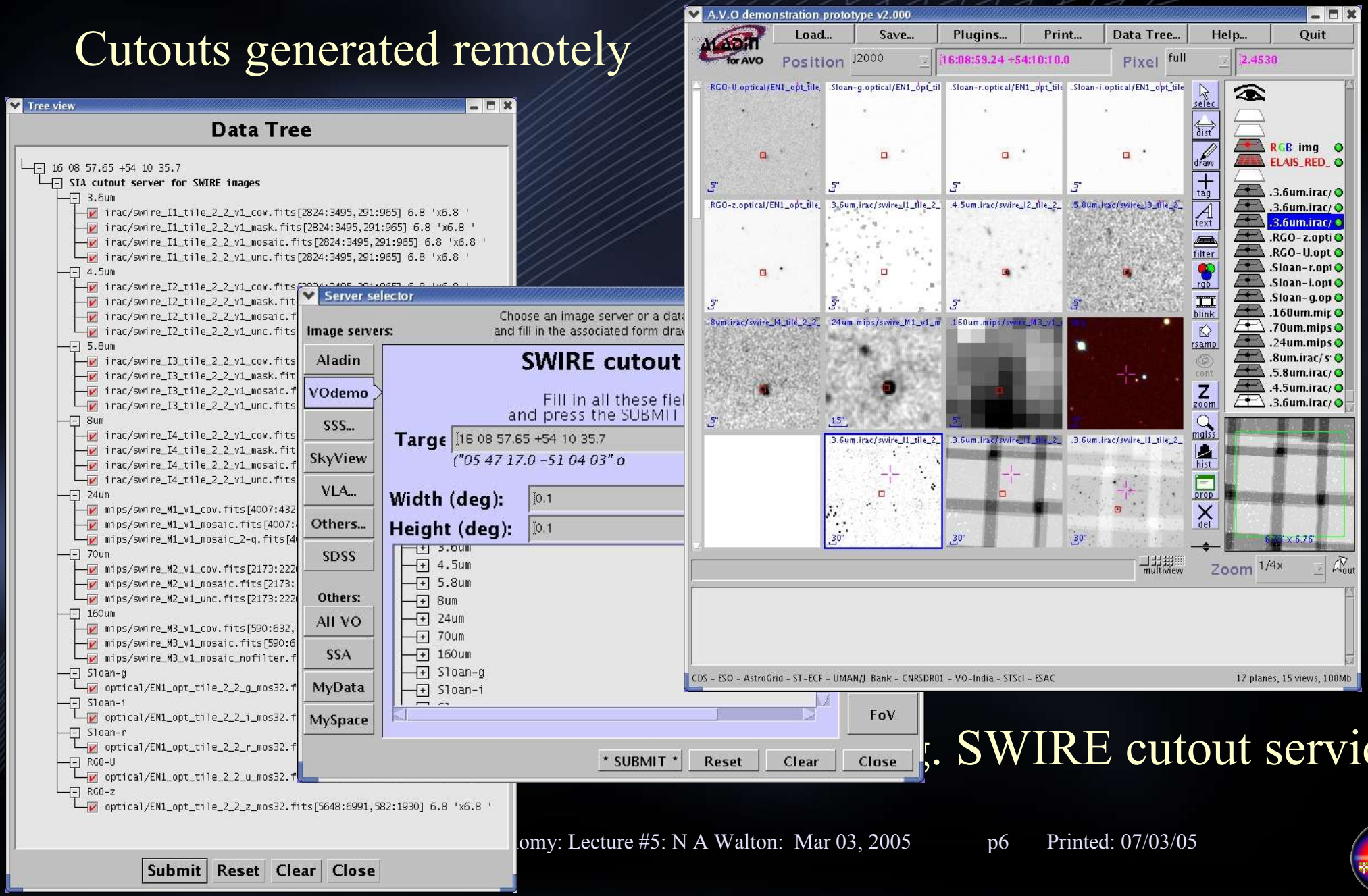
HST ACS
Ultra Deep Field

variable size cutouts generated from loaded images



Aladin: Image Cutout Services

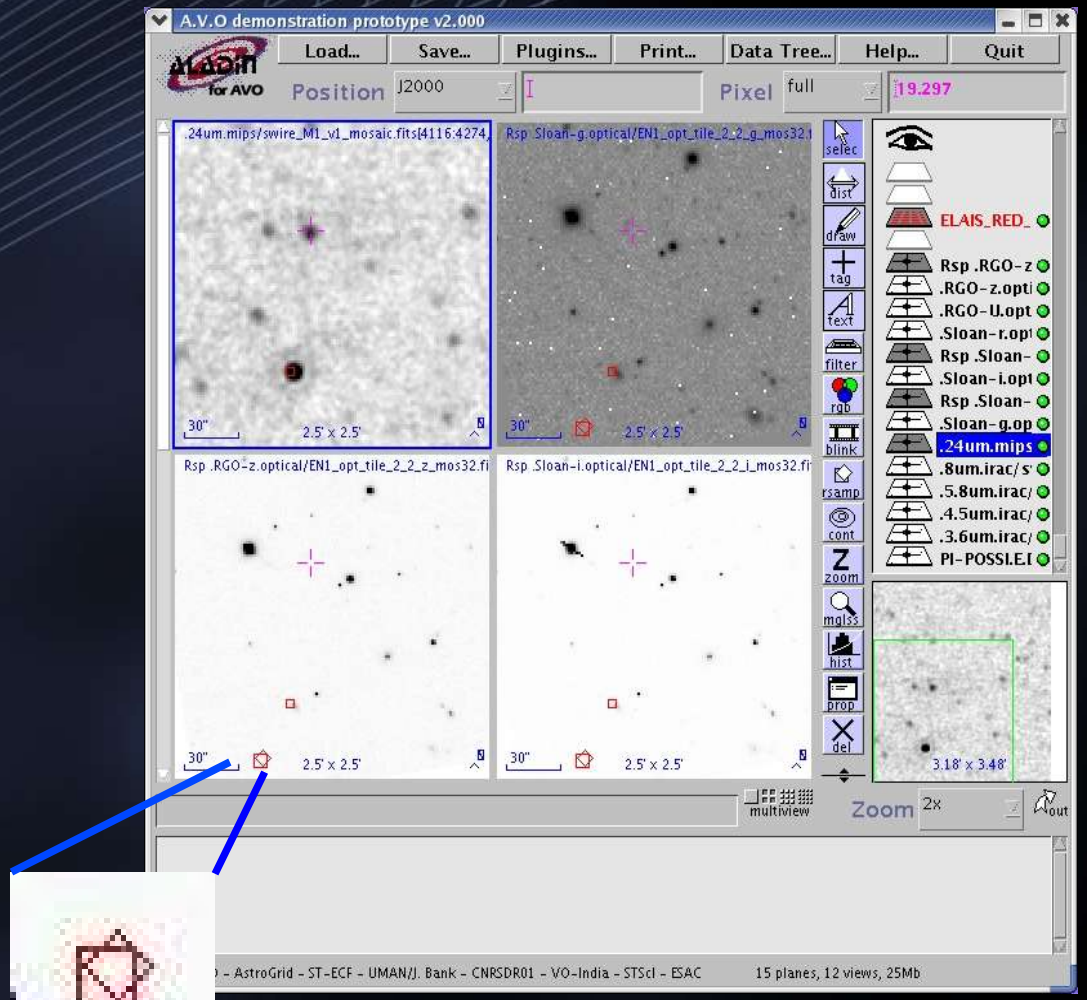
Cutouts generated remotely



. SWIRE cutout service

Aladin: image browsing for distributed data

- IDHA data model for describing FOV: Data Tree
- Re-sampling to pixel grids
- Matched zoom and pan
- Simple image registration



Pixel re-sampling

Aladin: Query by List

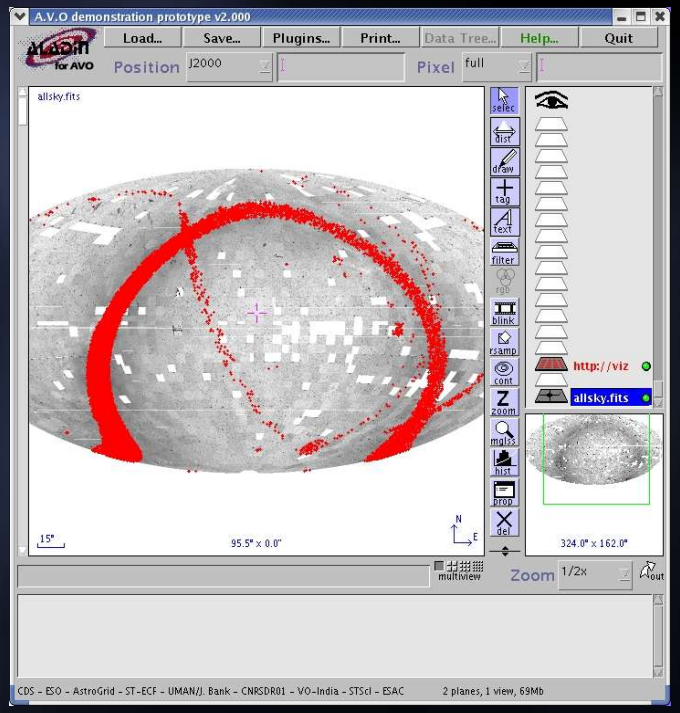
Remote Cross-Matching:

'bringing the computation to the data'

Multiple Cone Searching:

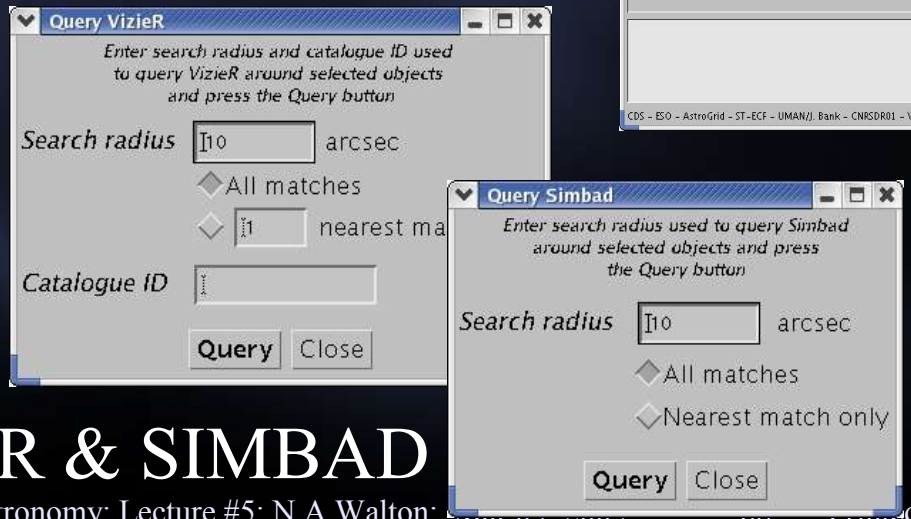
'stream-lining batch requests'

Supports X-Match for sparse or complex distributions of sources



$>10^5$ sources

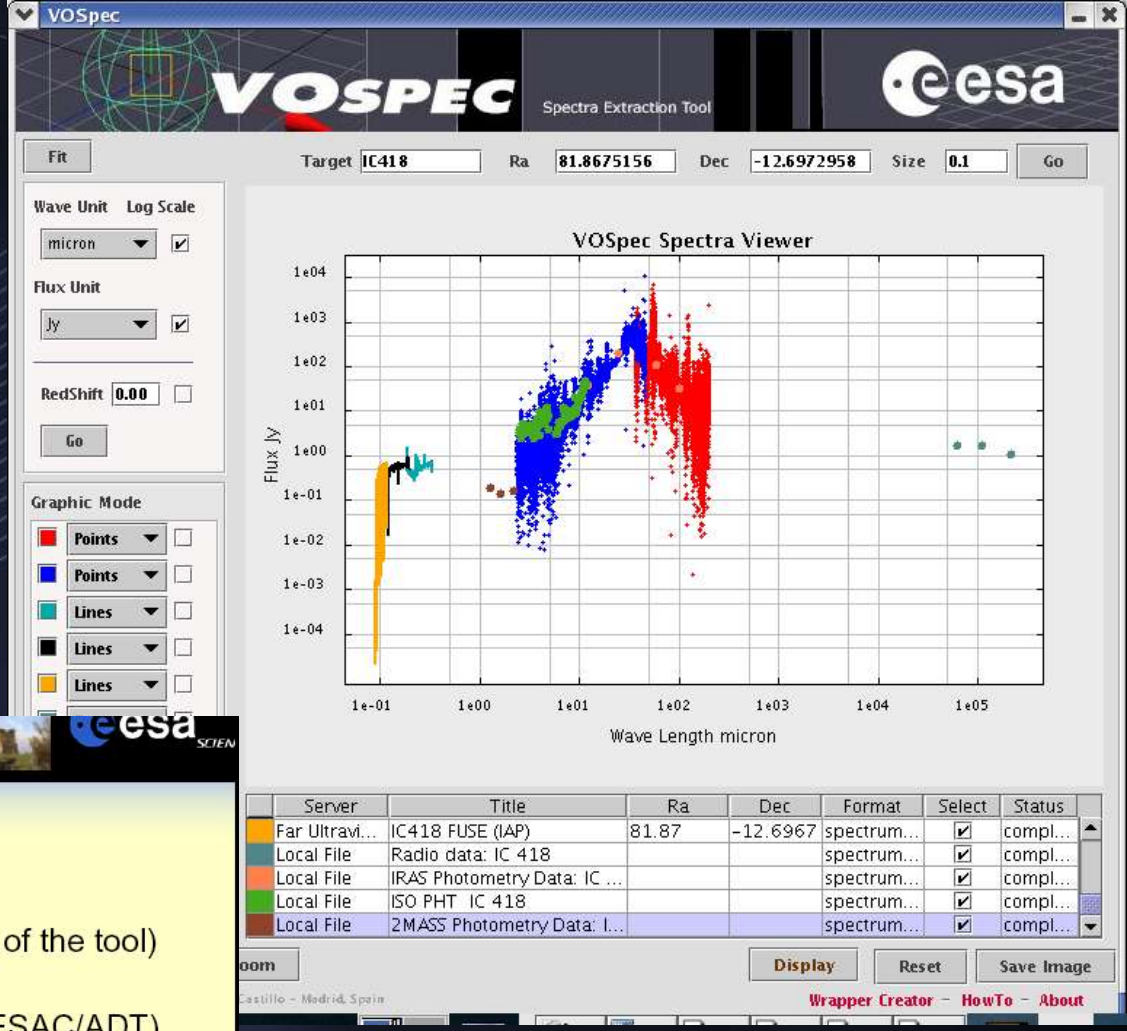
e.g. entire IRAS



VizieR & SIMBAD

VOSpec

- VO spectral access tool
- Developed at ESAC
- Startup from:
  - http://esavo.esa.int/vospec/

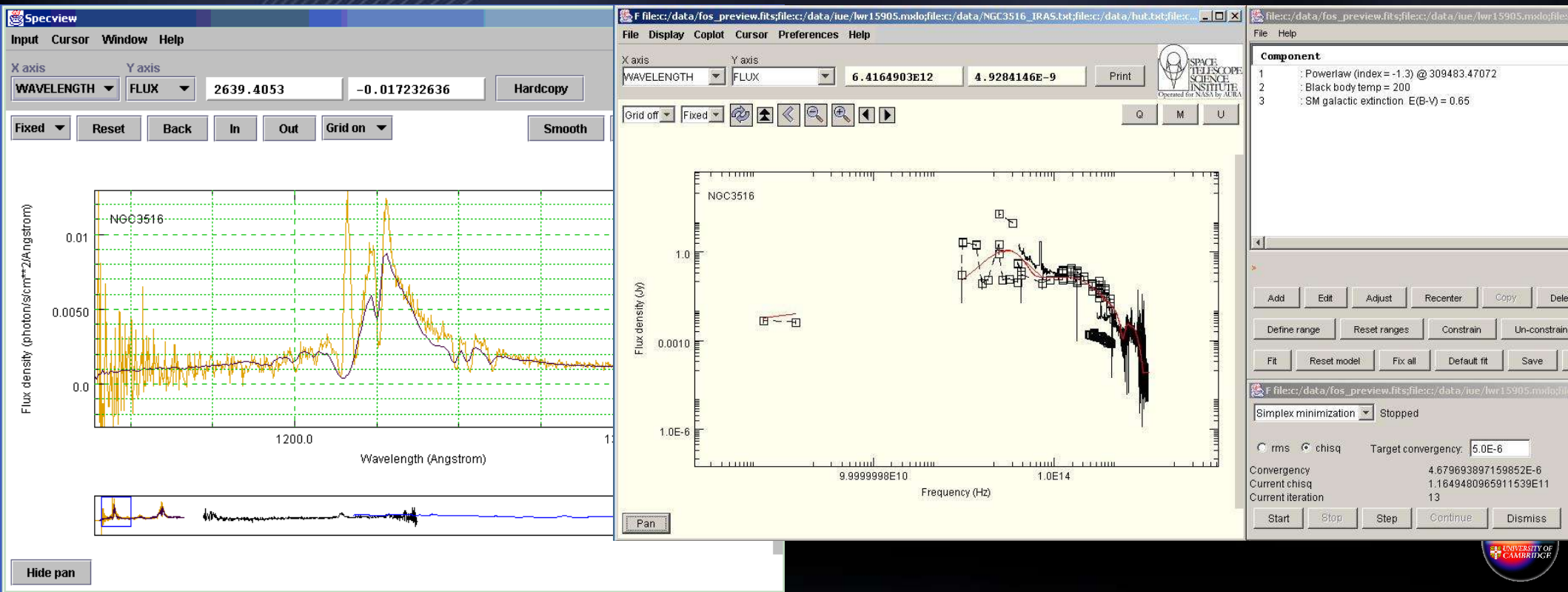


VOSpec fact sheet

- Using VO Standards:
  - Access to Registry to get SSA servers information
  - Use SIMBAD Web Service (easily integrated with rest of the tool)
  - Display VOTable information from SSA
  - Already working with available SSAP services: ISO (ESAC/ADT), IUE (INES archive), ST-ECF HST and SLOAN.
  - Handles VOTable 1.0 and 1.1
  - Handles SED Data Model (0.9.2)
- Handling spectra
  - Get spectra from SSA servers
  - Display and superimpose spectra
  - Accept spectra in FITs and VOTable formats
  - Automatic unit conversion through dimensional analysis
  - Multi-wavelength analysis
  - Polynomial/Black body/Gaussian fitting

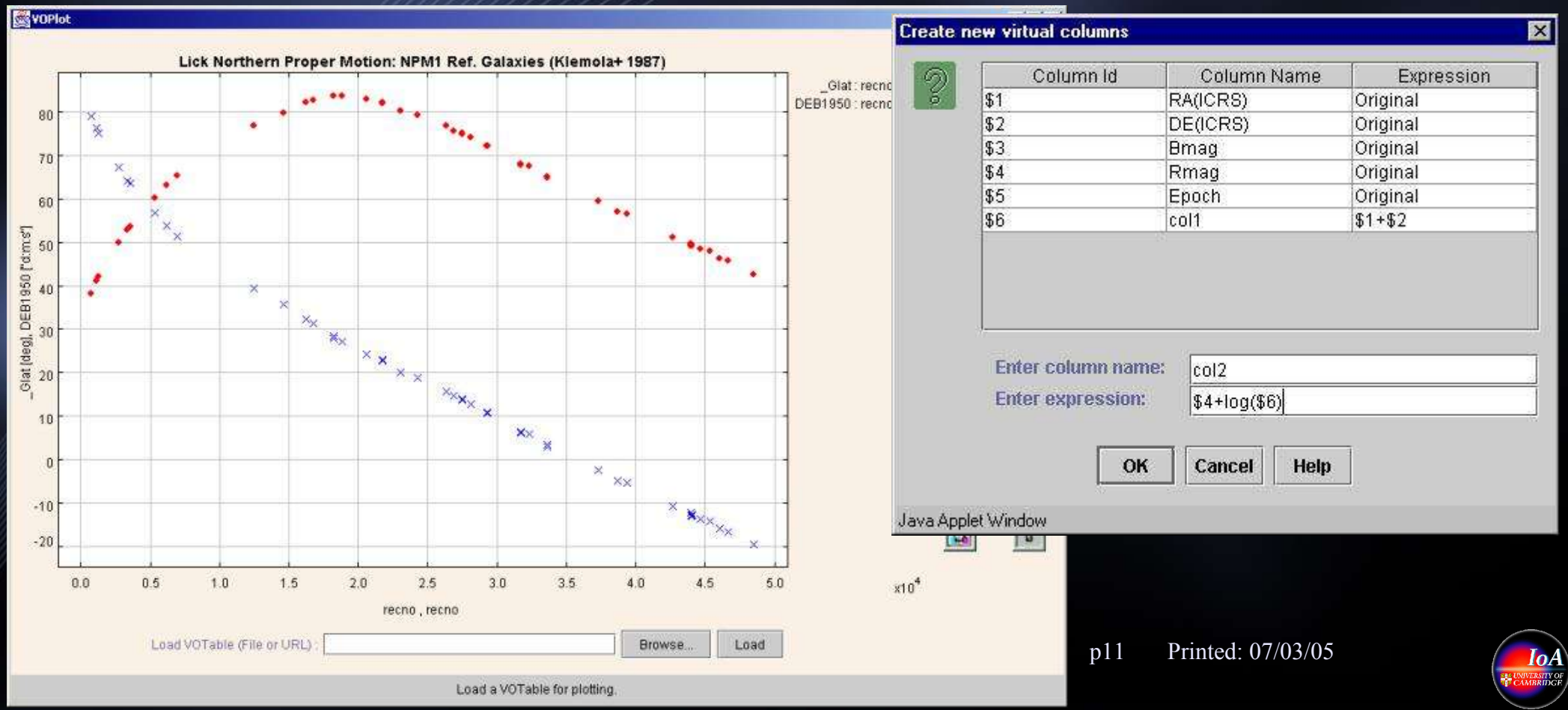
Specview

- A java application for analysis and visualisation of 1-D spectra
- Developed at STScI
- Download from
  - http://www.stsci.edu/resources/software_hardware/specview
  - Also available as a helper app to e.g. Aladin



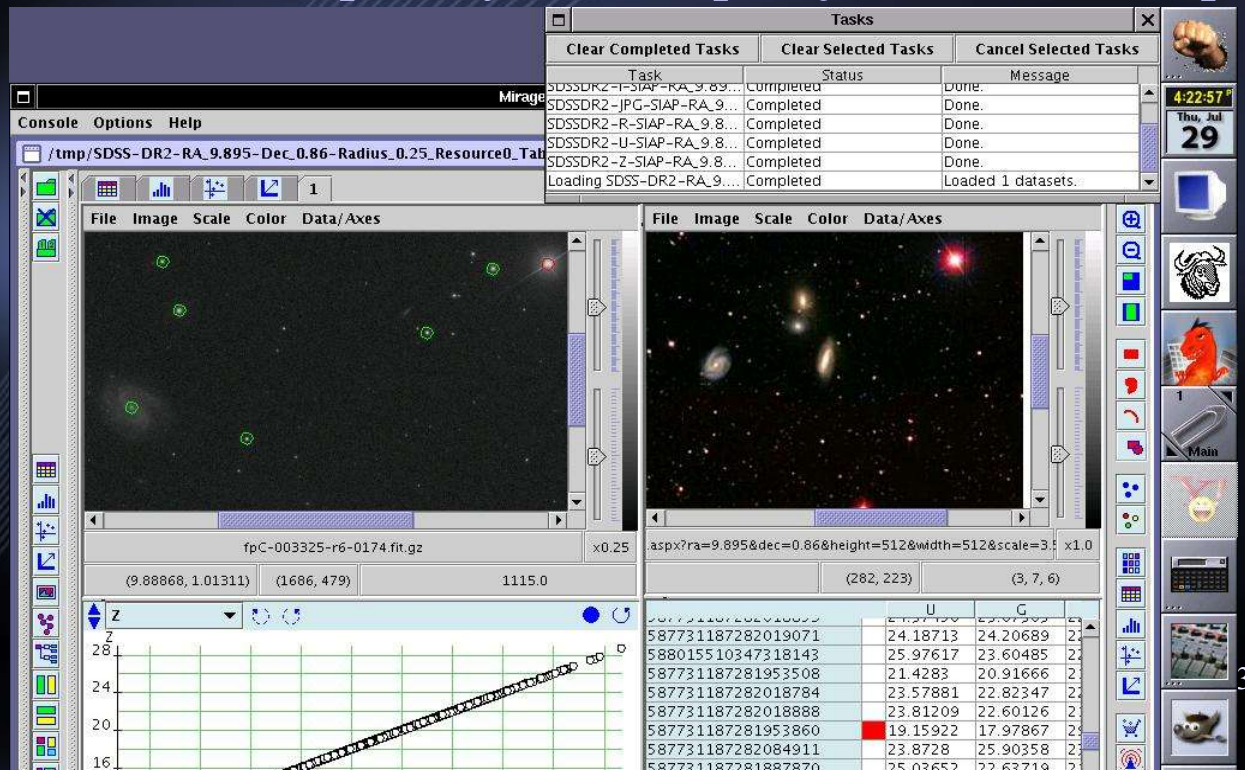
VOPlot/ VOPlot3D

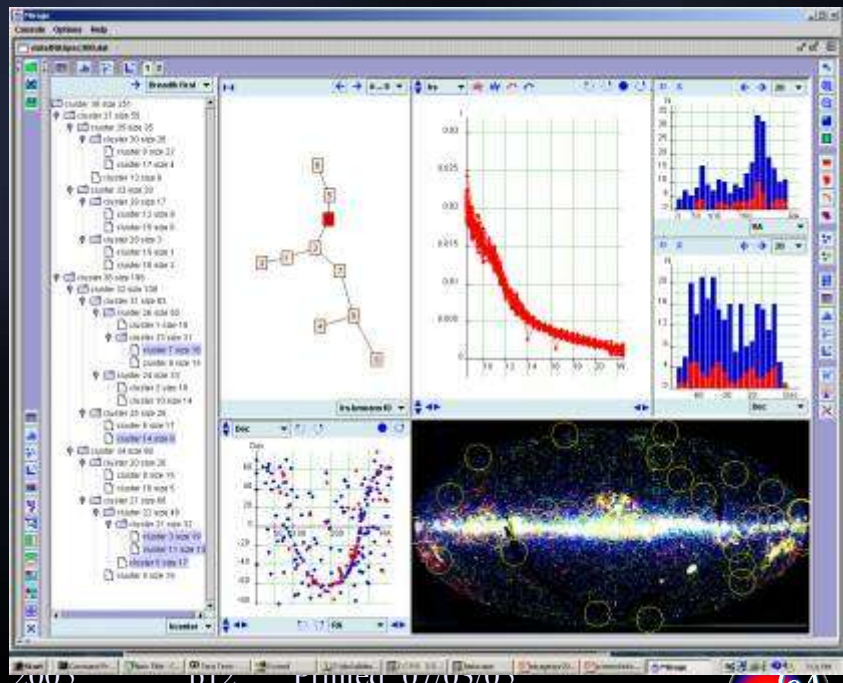
- Java tools for the visualisation of tabular data in 2-D and 3-D
- Developed for VO-India by Persistent Systems and IUCAA
- Available in standalone or plugin formats
  - http://vo.iucaa.ernet.in/~voi/voplot.htm



Mirage

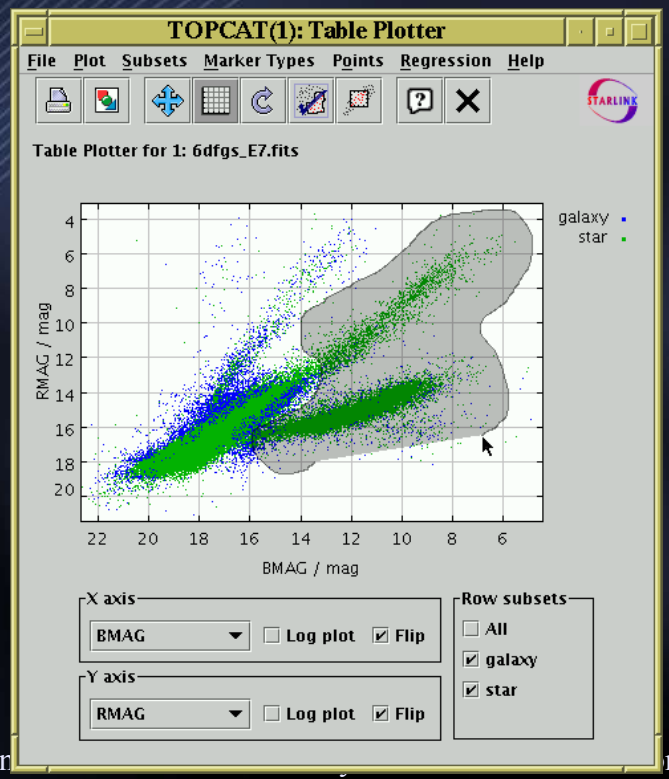
- 'Mirage is a Java-based software tool for exploratory analysis and visualization of images and multi-dimensional numerical data from an arbitrary domain of study.'
- Developed by Tin Kam Ho at Lucent Technologies
- Available at:
  - http://cm.bell-labs.com/who/tkh/mirage/index.html
  - http://skyservice.pha.jhu.edu/develop/vo/mirage/default.aspx

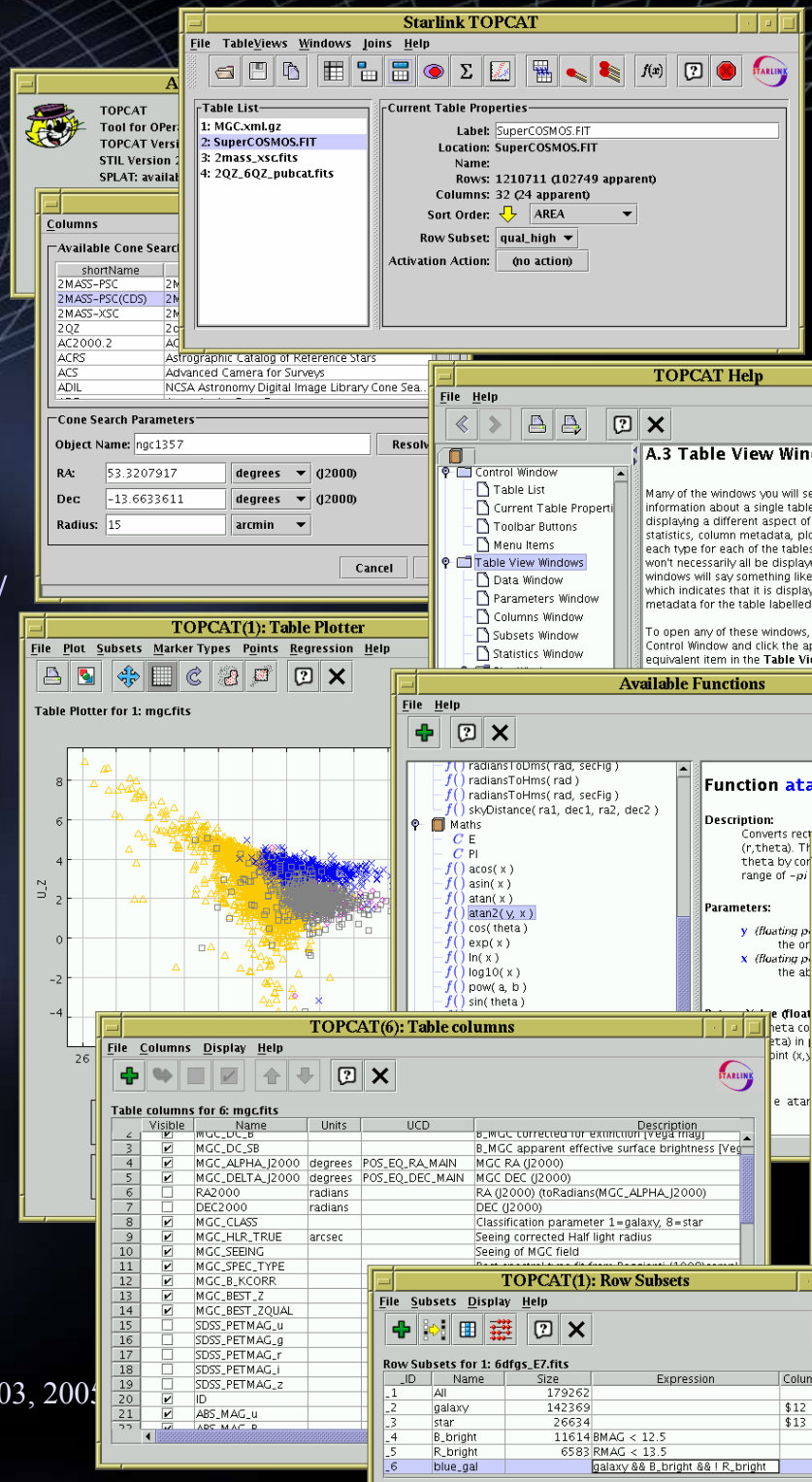




TopCat

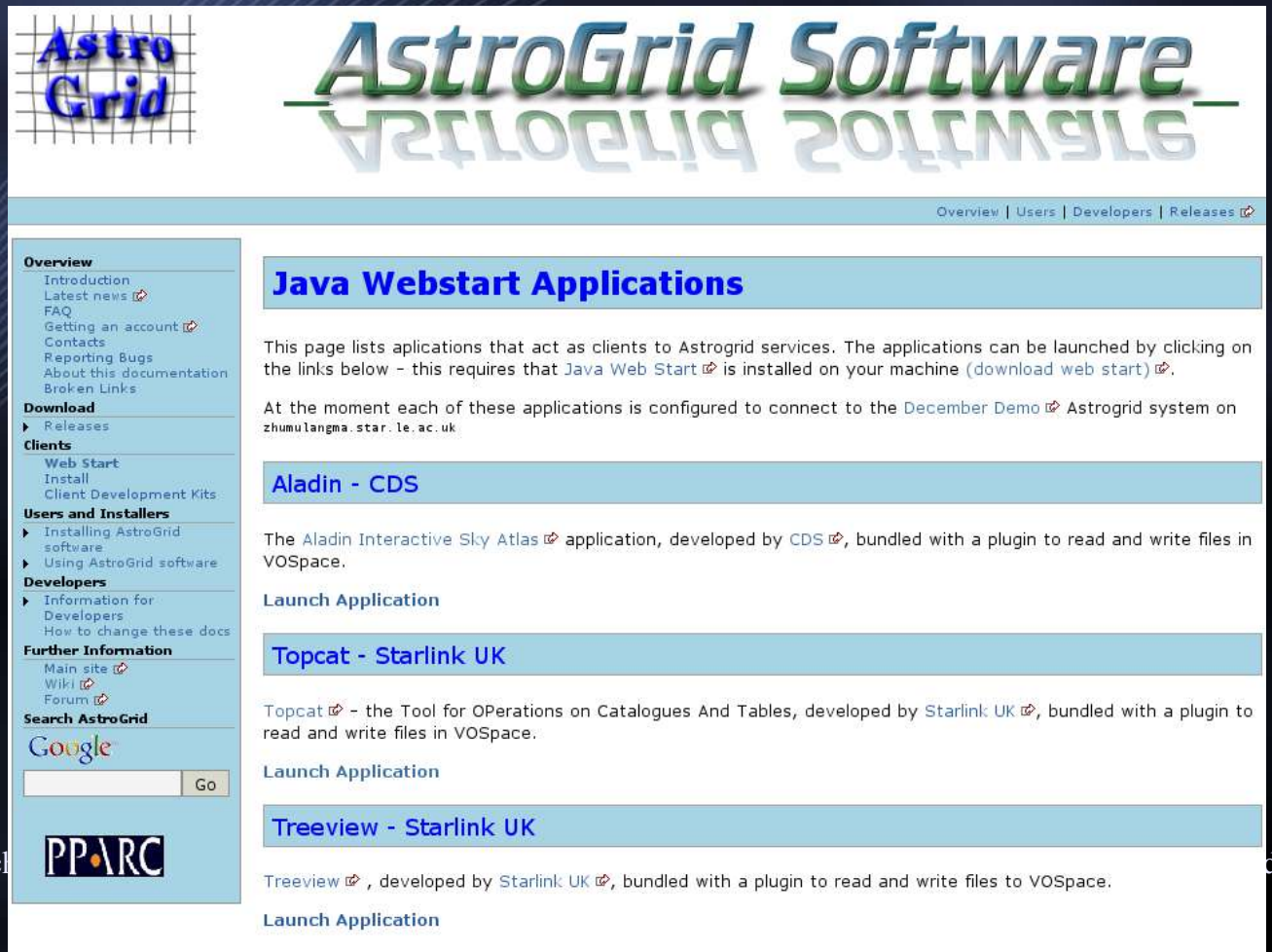
- TOPCAT is an interactive graphical viewer and editor for tabular data
- A Starlink developed Java app
- Available from:
  - http://www.star.bris.ac.uk/~mbt/topcat/





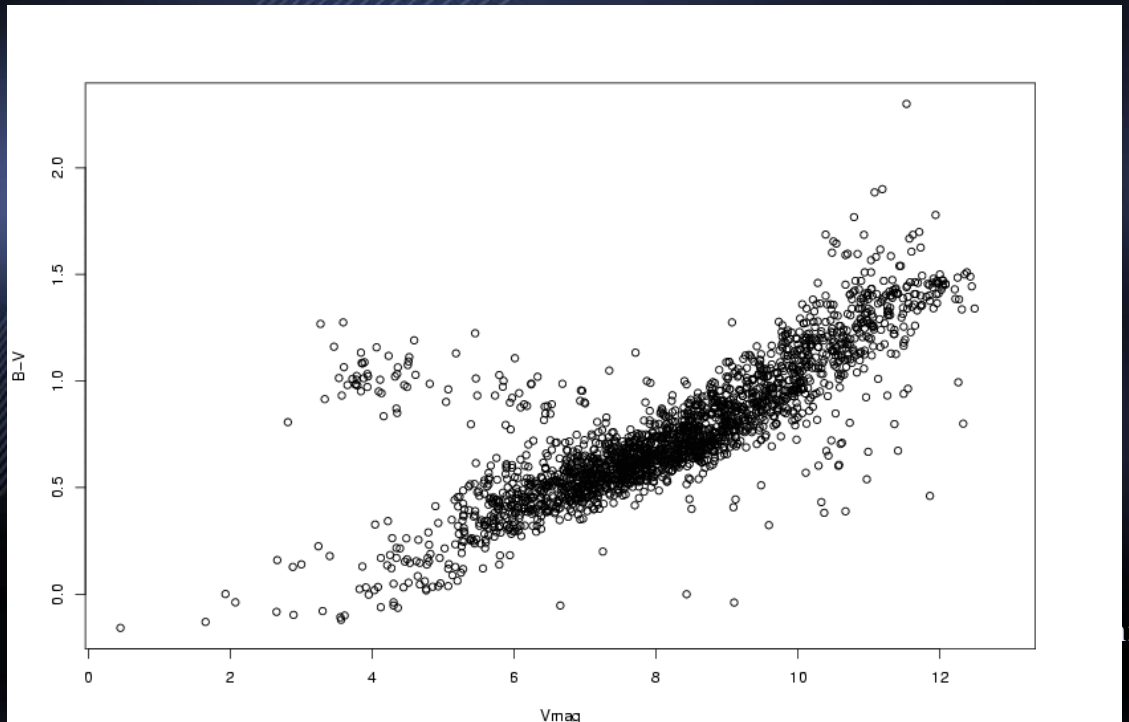
AstroGrid: Applications via Java WS

- AstroGrid is making available many of the preceeding applications via Java Web Start
  - http://java.sun.com/products/javawebstart/download.jsp
- Applications are listed at http://software.astrogrid.org/jnlp/



VOStat: Statistics via the VO

- Provides a quite of statistical tools
  - http://vostat.org
  - Includes (partial) access to the 'R' statistics package: http://www.r-project.org/
- Example usage given at:
  - http://vostat.org/demos/index.html



Science Examples

Putting the applications to use ...

The H-R Diagram

- Using VO Tools to construct a H-R diagram
- The flow of this case is as follows
  - Search registry for a stellar catalogue with absolute magnitudes or objects at a set distance (e.g. Members of a cluster)
  - Get relevant catalogue – in this case the Gliese catalogue
    - Vizier: http://vizier.u-strasbg.fr/viz-bin/VizieR
    - HEASARC: http://heasarc.gsfc.nasa.gov/cgi-bin/tam/conetest.pl?table=cns3&RA=0.0&DEC=0.0&SR=180.0&VERB=2
  - Use VOPlot of TopCat to display catalogue
  - Create an absolute magnitude table column
    - Vabs = Vmag + 5 + 5 log p (p is parallax in arcsec)
  - Vabs vs B-V to show the H-R diagramme
    - Select the objects bottom left
    - As expected – identified as White Dwarfs
- Case developed for the US-VO 2004 Summer School
  - http://www.us-vo.org/summer-school/proceedings/exercises/HRDiagram.htm

Brown Dwarfs

- Searching for Brown dwarfs based on a z-J > 3 mag
- Make use of 2MASS and SDSS IR and Optical photometry
- Search using Open Sky Query
  - http://openskyquery.net/Sky/skysite/browse/Browse.aspx

```
SELECT o.objId, o.ra,o.dec, o.type,
t.objId, t.j_m, o.z
FROM SDSS:PhotoPrimary o,
TWOMASS:PhotoPrimary t
WHERE XMATCH(o,t)<2.5
AND Region('Circle J2000 16.031 -0.891 .10')
AND( o.z- t.j_m)>1
```

- Results can be saved as VOTable for further analysis
- Example developed for the NVO 2004 Summer School
  - http://www.us-vo.org/summer-school/proceedings/exercises/BrownDwarf.htm

Science from the US-VO

US-VO Website - Mozilla

File Edit View Go Bookmarks Tools Window Help

http://www.us-vo.org/news/story.cfm?ID=9

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US-VO Website

US National Virtual Observatory

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NVO Summer School
Data Inventory Service
Discovery by VO Demo
VO Alliance Formed
NVO News Archive

About

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Who is Involved?
Science Objectives

Community

NVO Meetings
International VO Alliance

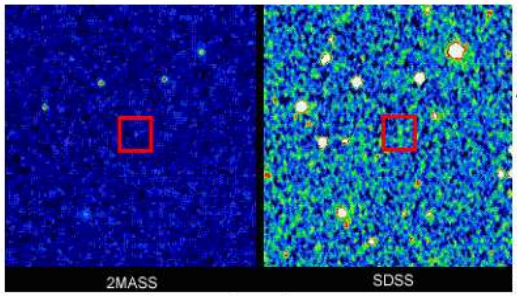
Documents

Recent NVO Documents:
Quarterly Report Q104
Management Plan
VO Resource Registry
Advisory Committee Report
All NVO Documents
IVOA Documents

Supported by the National Science Foundation

Discovery by VO Demo

Date Posted: February 28, 2003



Early demo project identifies new brown dwarf

A new approach to finding undiscovered objects buried in immense astronomical databases has produced an early and unexpected payoff: a new instance of a hard-to-find type of star known as a brown dwarf.

Scientists working to create the National Virtual Observatory (NVO), an online portal for astronomical research unifying dozens of large astronomical databases, confirmed discovery of the new brown dwarf recently. The star emerged from a computerized search of information on millions of astronomical objects in two separate astronomical databases. Thanks to an NVO prototype, that search, formerly an endeavor requiring weeks or months of human attention, took approximately two minutes.

The image above shows the 2MASS (left) and SDSS (right) of the newly found L-type brown dwarf, 2MASSI J0104075-005328.

NVO researchers emphasized that a single new brown dwarf added to a list of approximately 200 known brown dwarfs isn't as scientifically exciting as the timing of the new discovery and the tantalizing hint it offers to the potential of NVO. The discovery came at a stage when organizers were simply hoping to use NVO to confirm existing science, not make new findings.

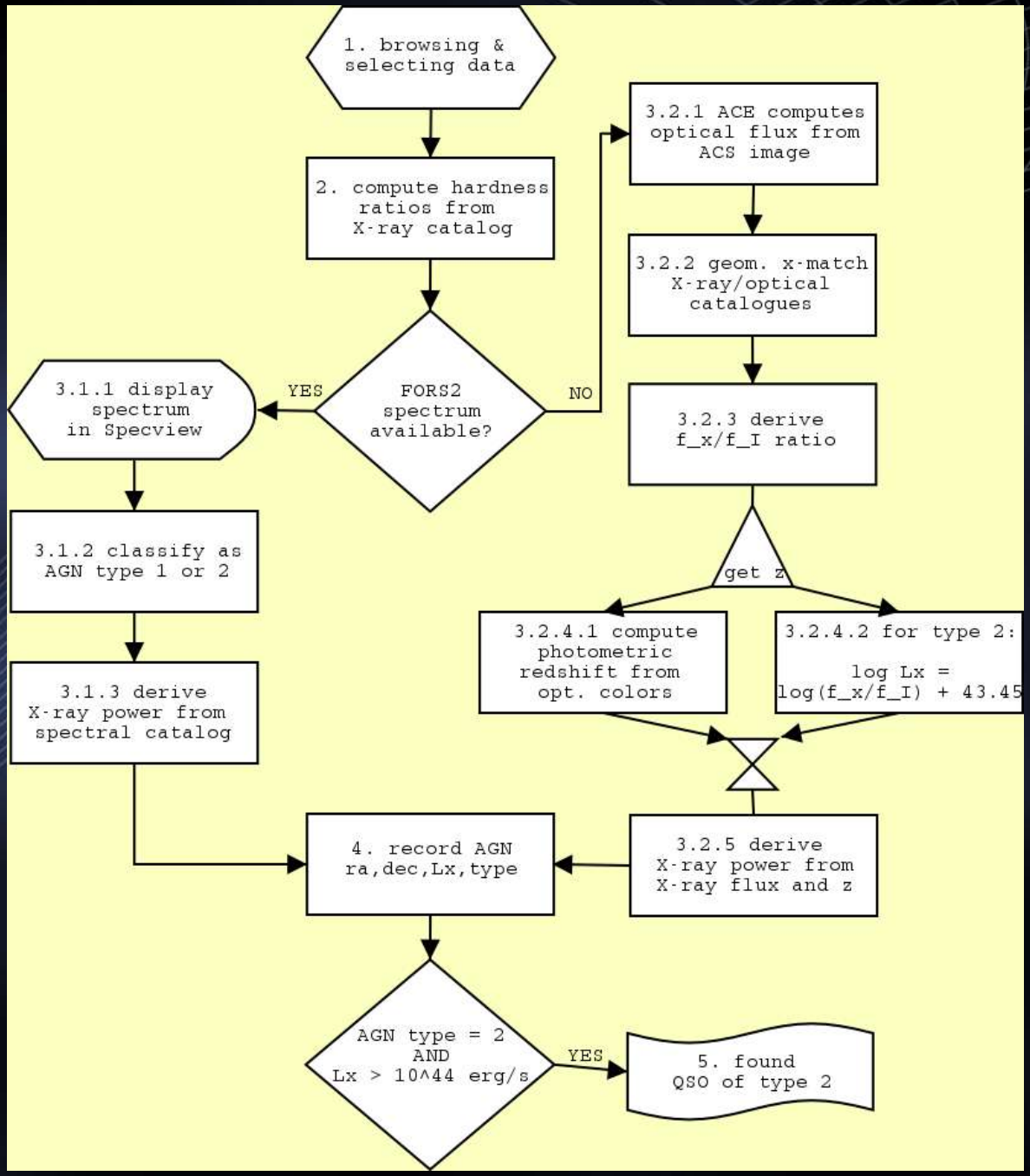
"This was just supposed to be a feasibility demo. We just wanted it to find all the brown dwarfs that others could find, to show that this was a valid approach," said Alex Szalay, director of the NVO project and Alumni

Stars in Open Clusters

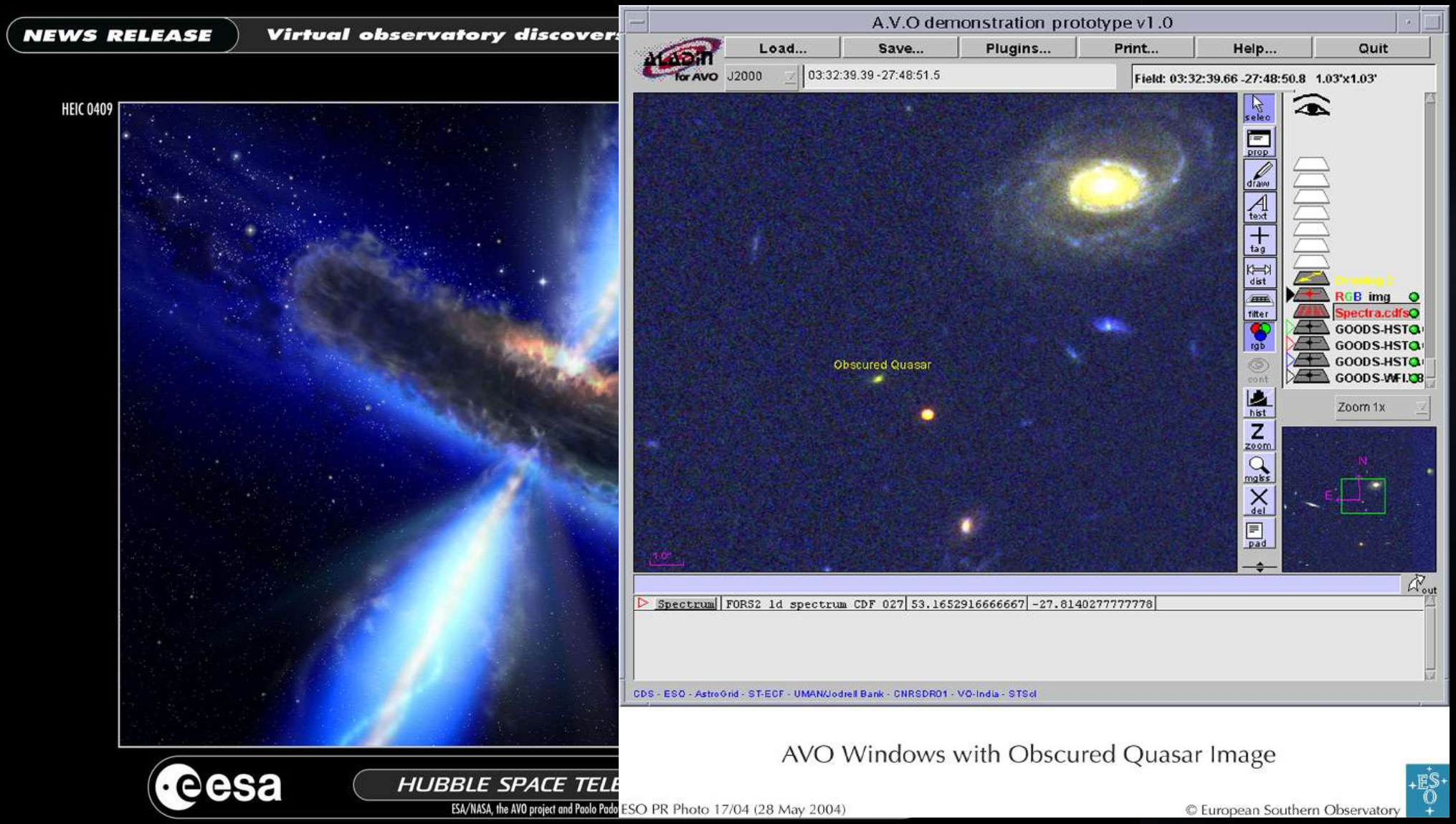
- Locate stellar data for the Pleiades cluster
  - Use the Hipparcos and Tycho catalogue
  - Find the parallaxes for stars in the cluster: ~ 9 mas in this case
  - Deredden the B-V colour
    - (B-V)o = (B-V) – E(B-V) = (B-V) – 0.04
  - Plot Vmag vs (B-V)o to see the HR diagramme for the stars
  - Those of the ZAMS have parallaxes ~9 mas : cluster members
  - Those outliers : field stars
    - Use of Aladin to quickly select objects and view on the image plane
- This scenario showing use of Aladin given by Padovani at the ESO NEON Archive School (2004)
  - http://www.eso.org/~ppadovan/neon.demo

AstroGrid/AVO Demo 2004

discovering distant quasars from multi-λ data



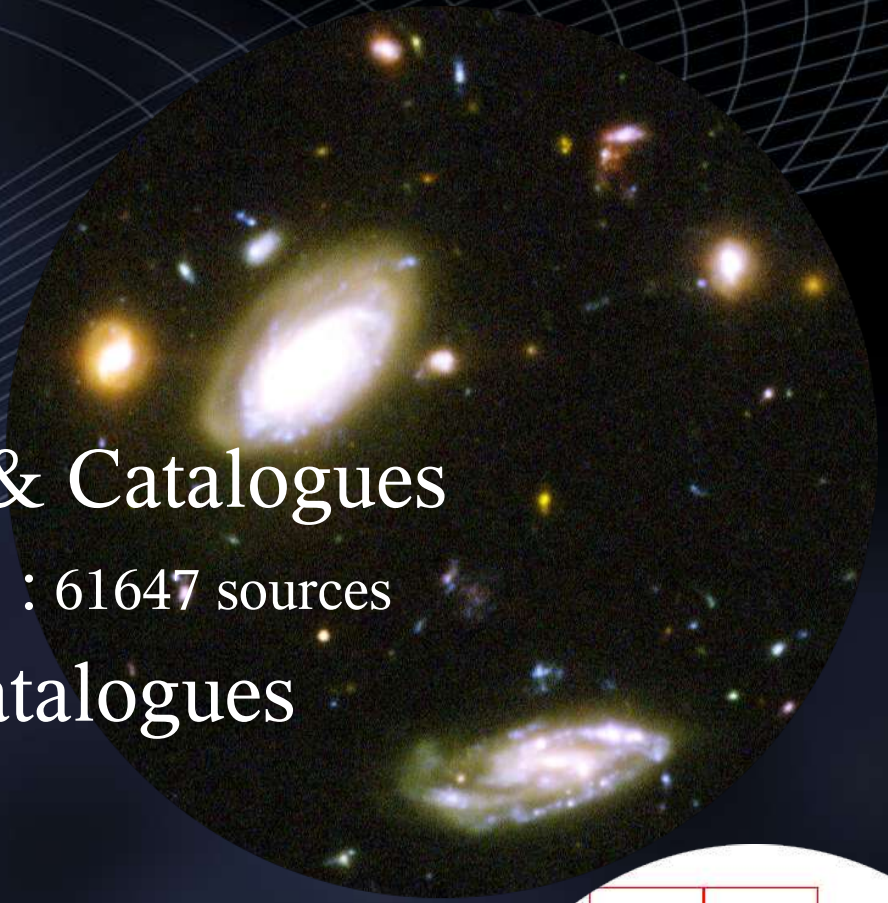
1st Science from the AVO



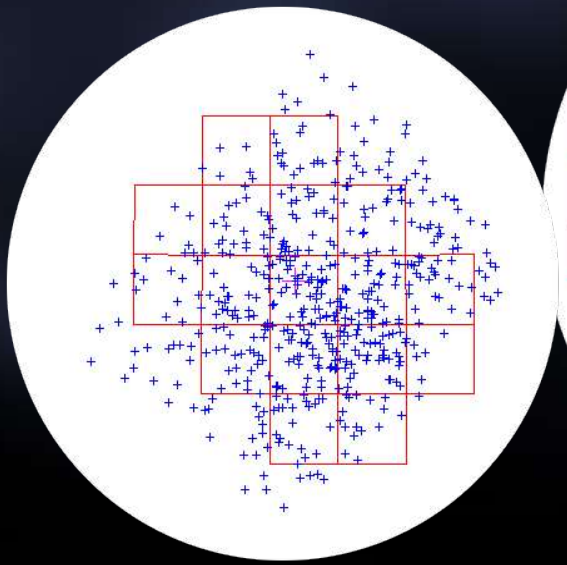
AVO Windows with Obscured Quasar Image

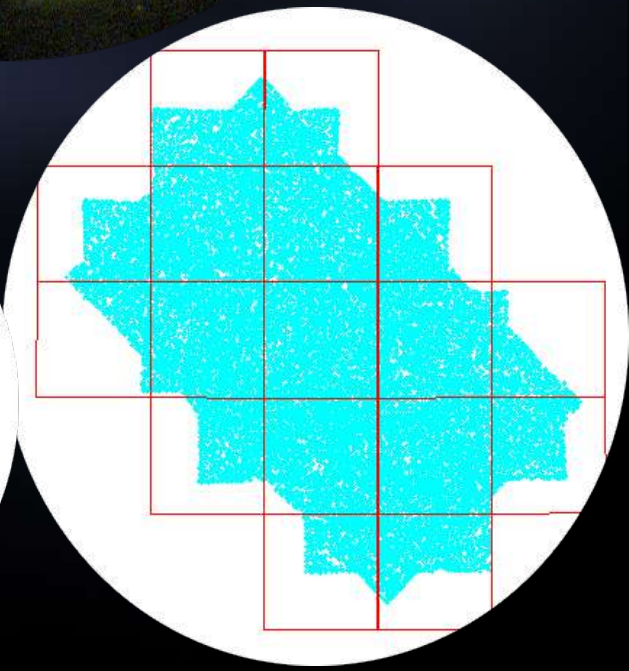
ESO PR Photo 17/04 (28 May 2004)

Data



- GOODS: *Bviz* Images & Catalogues
  - CDF-S (+UDF), HDF-N : 61647 sources
- Deep X-ray Chandra Catalogues
  - Alexander et al. 2003
  - HDF-N 2Ms (503)
  - CDF-S 1Ms (326)

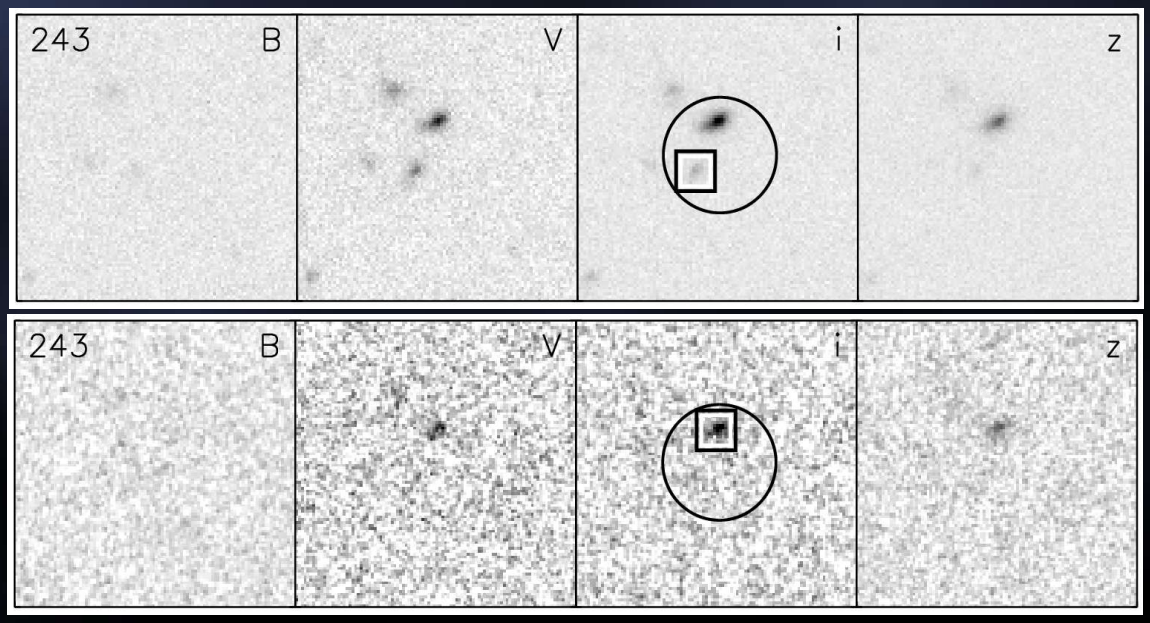




Thanks to Mark Allen @ CDS

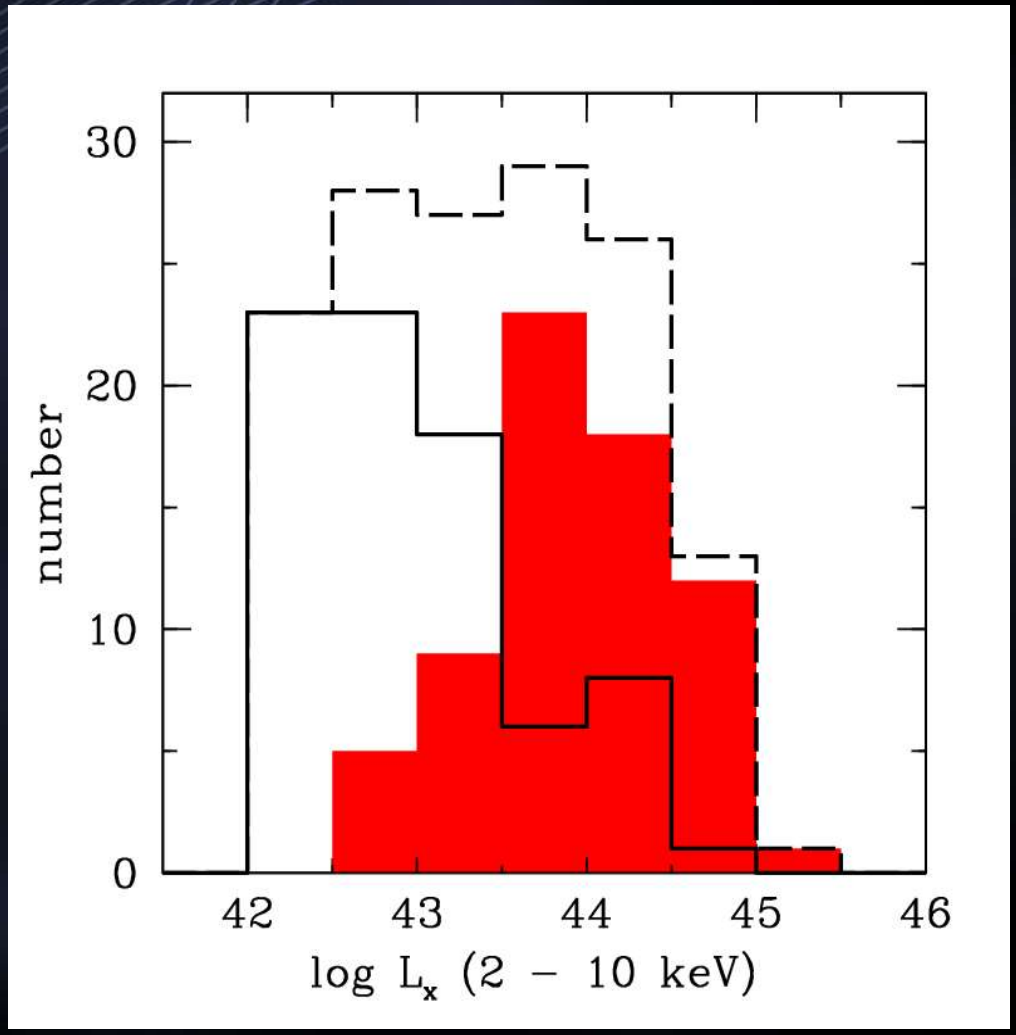
Results : NEW Type 2 AGN

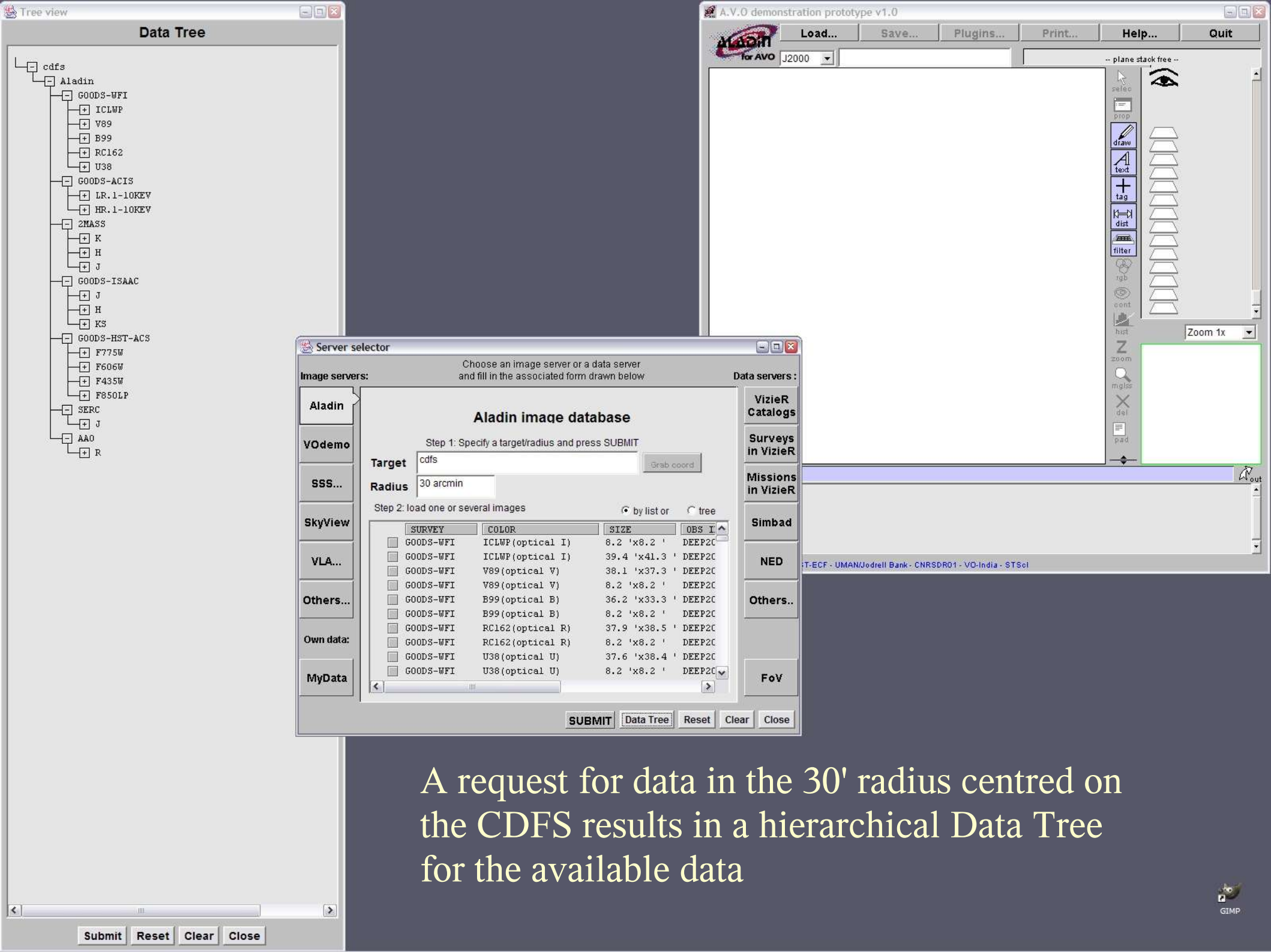
- 68 new type 2 AGN candidates
- 31 have QSO luminosities of $L_x > 10^{44}$ erg s^{-2}
  - Only 9 previously known in GOODS fields
  - Now 40 QSO 2s: Quadrupled the QSO 2s in the GOODS fields
- QSO 2 numbers higher than predictions



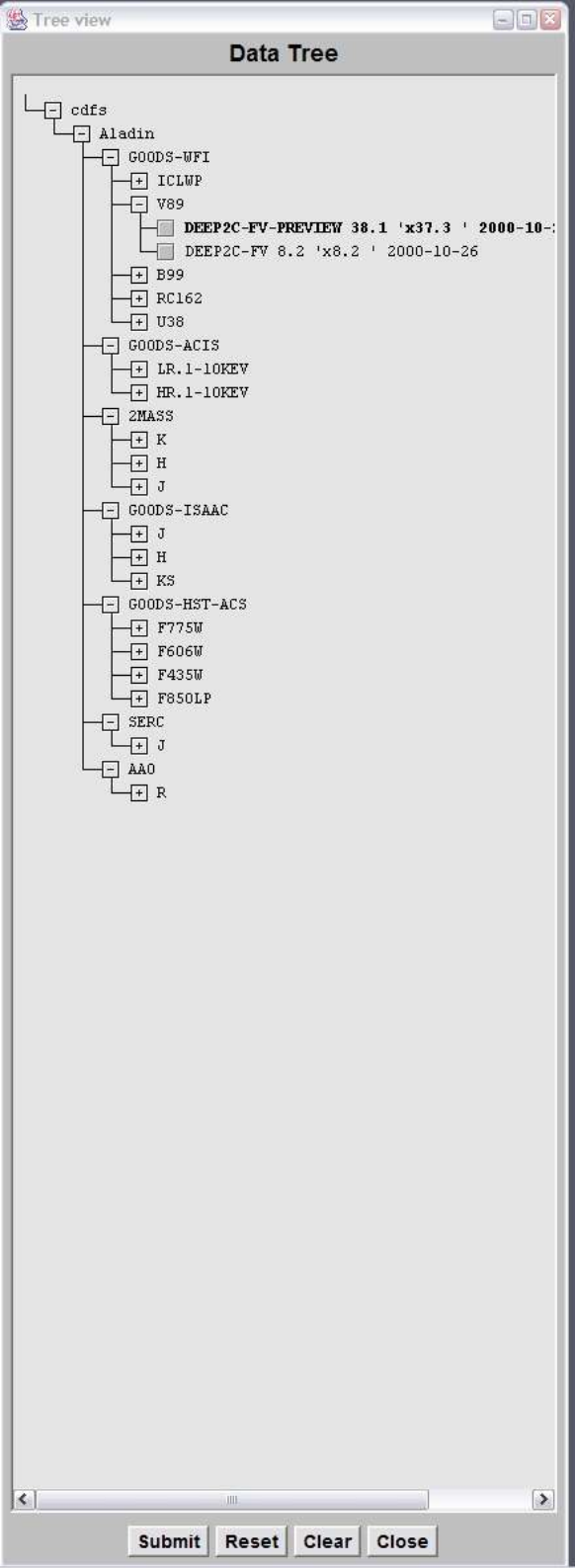
Luminosity distribution

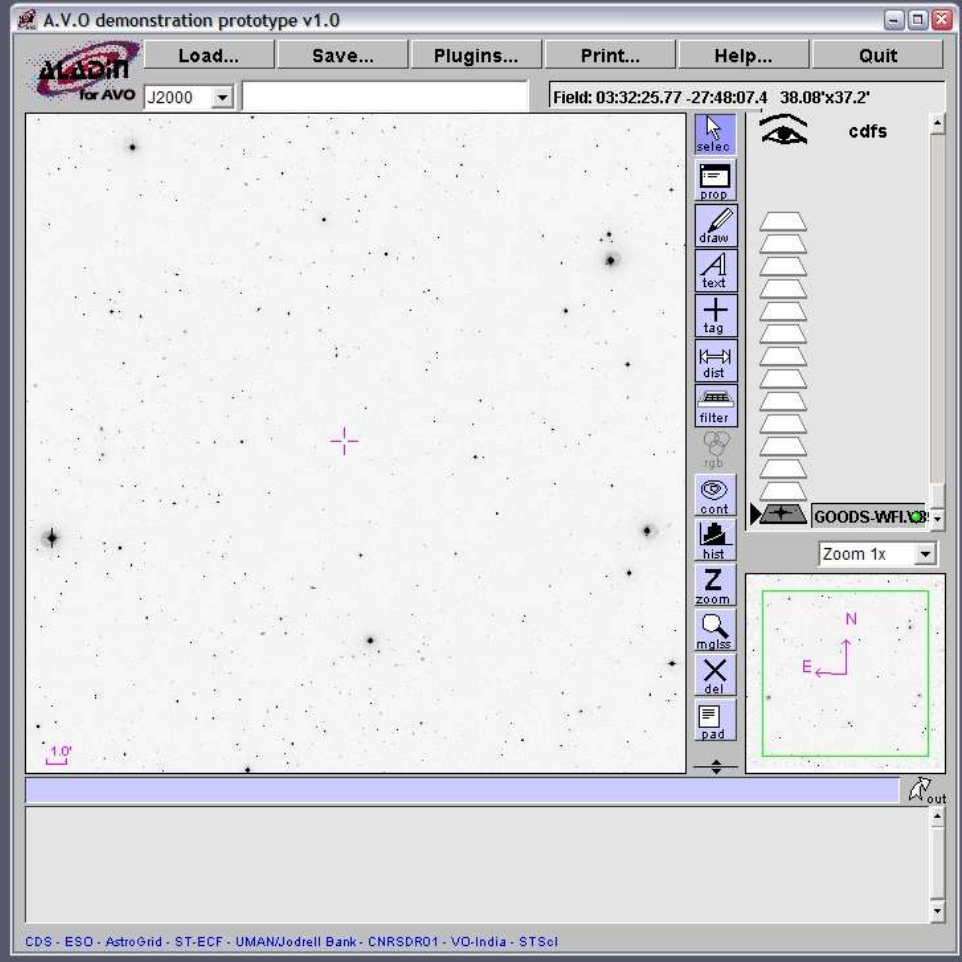
- New type 2 AGN
- Fills a gap luminosity distrib.
- AGN 2 $<z_{est}>$~2.9
- QSO 2 $<z_{est}>$~3.7





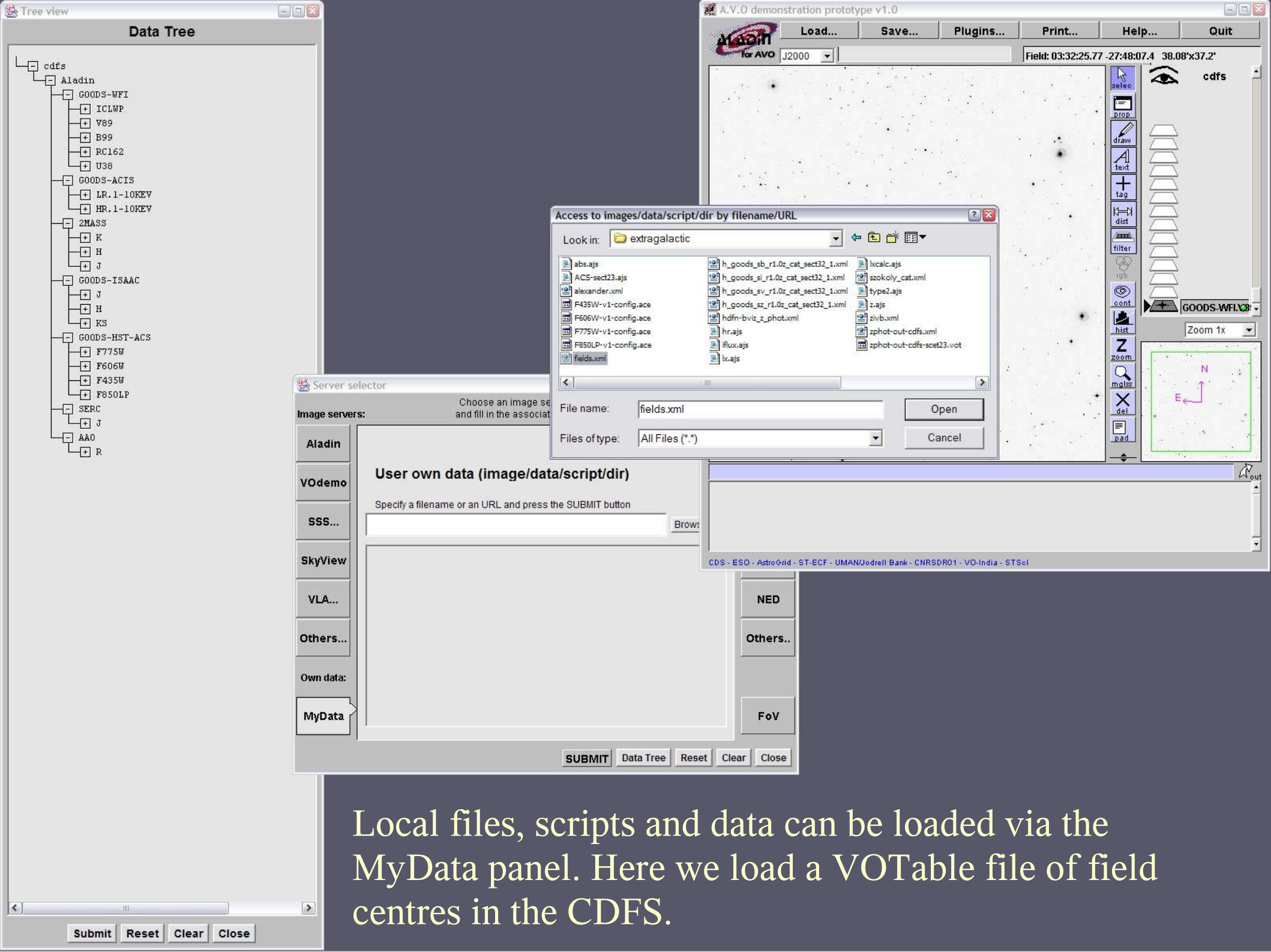
A request for data in the 30' radius centred on the CDFS results in a hierarchical Data Tree for the available data



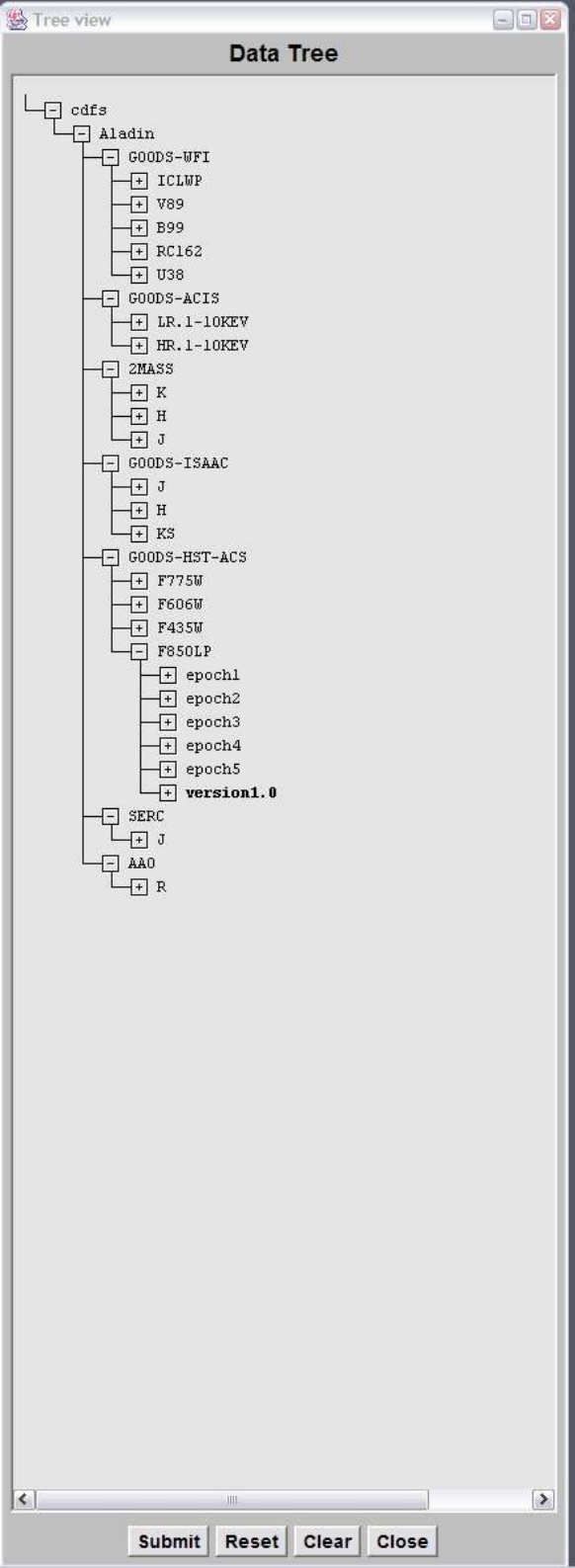


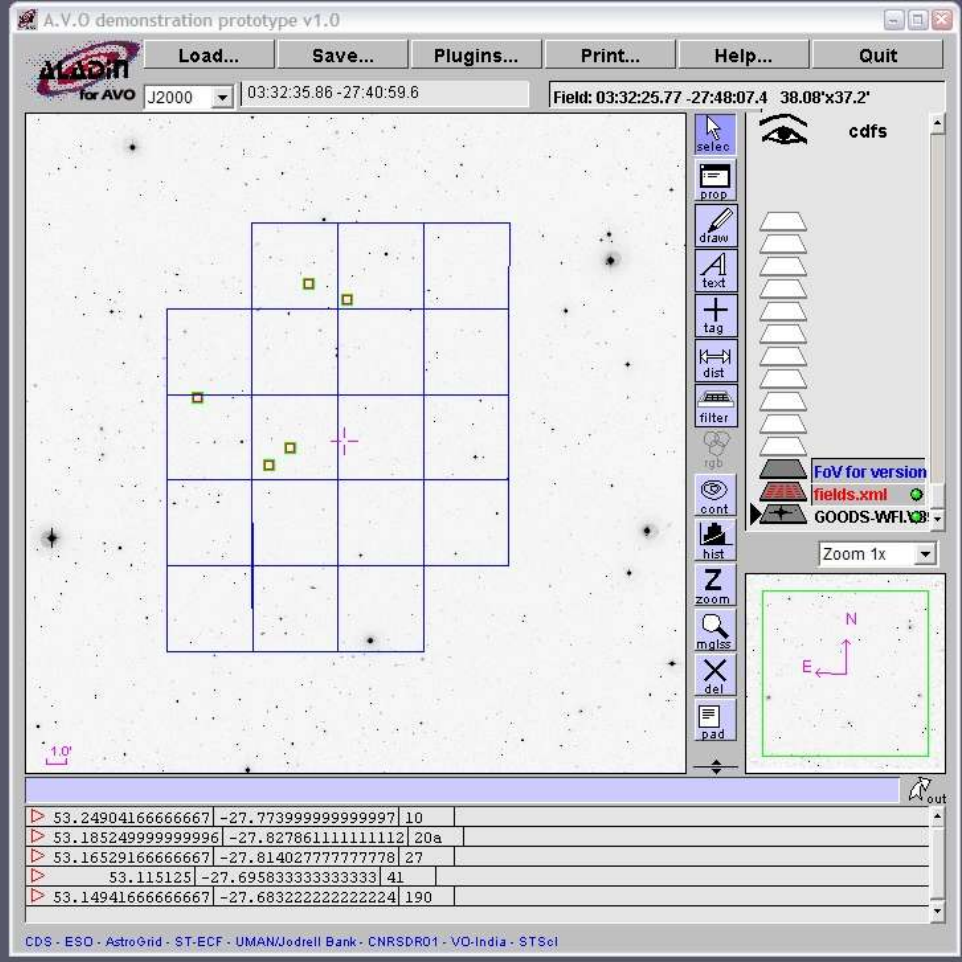
Data can be loaded directly from the data tree.

Here we load a V-band WFI preview image of the whole CDFS



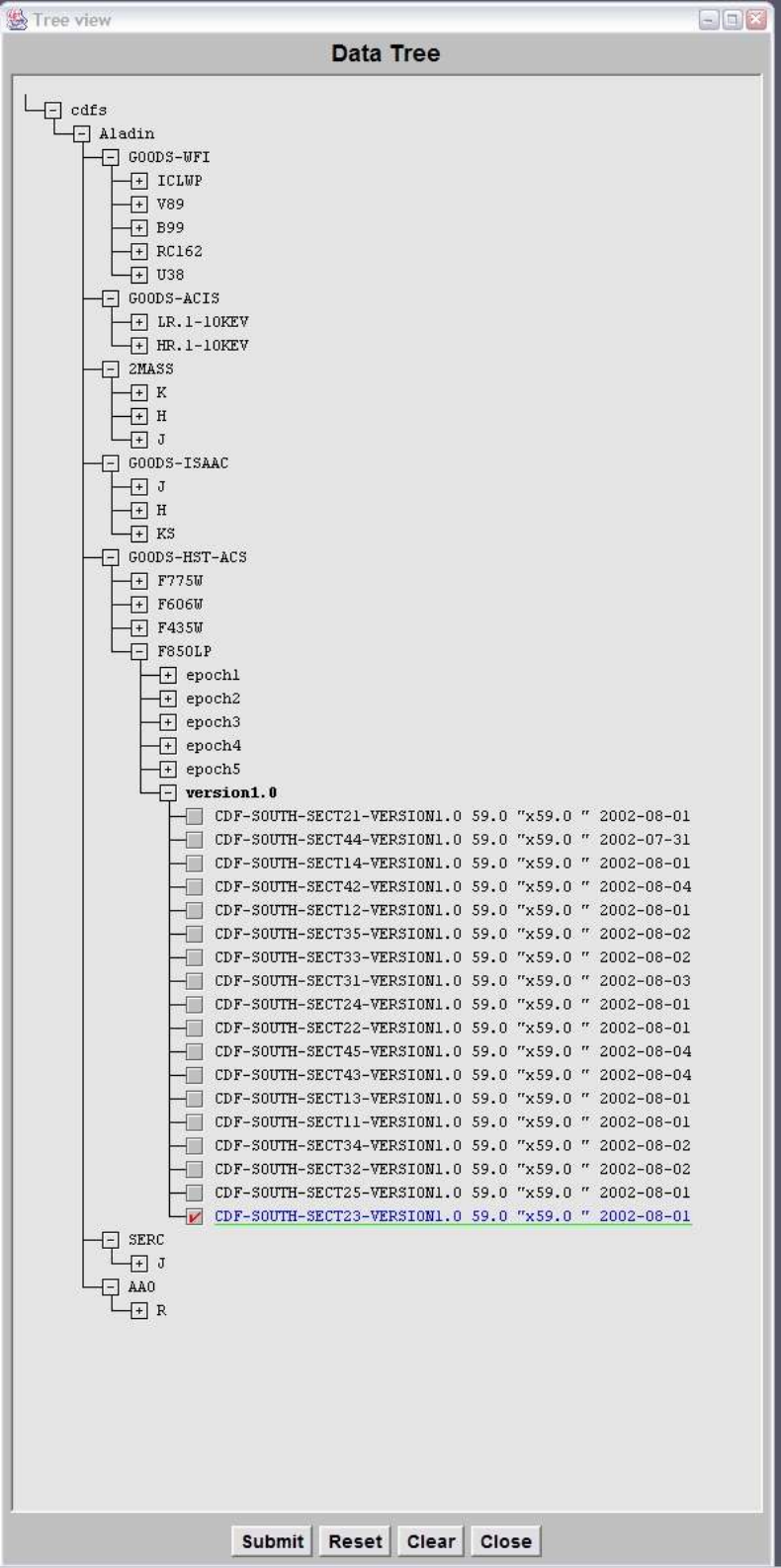
Local files, scripts and data can be loaded via the MyData panel. Here we load a VOTable file of field centres in the CDFS.

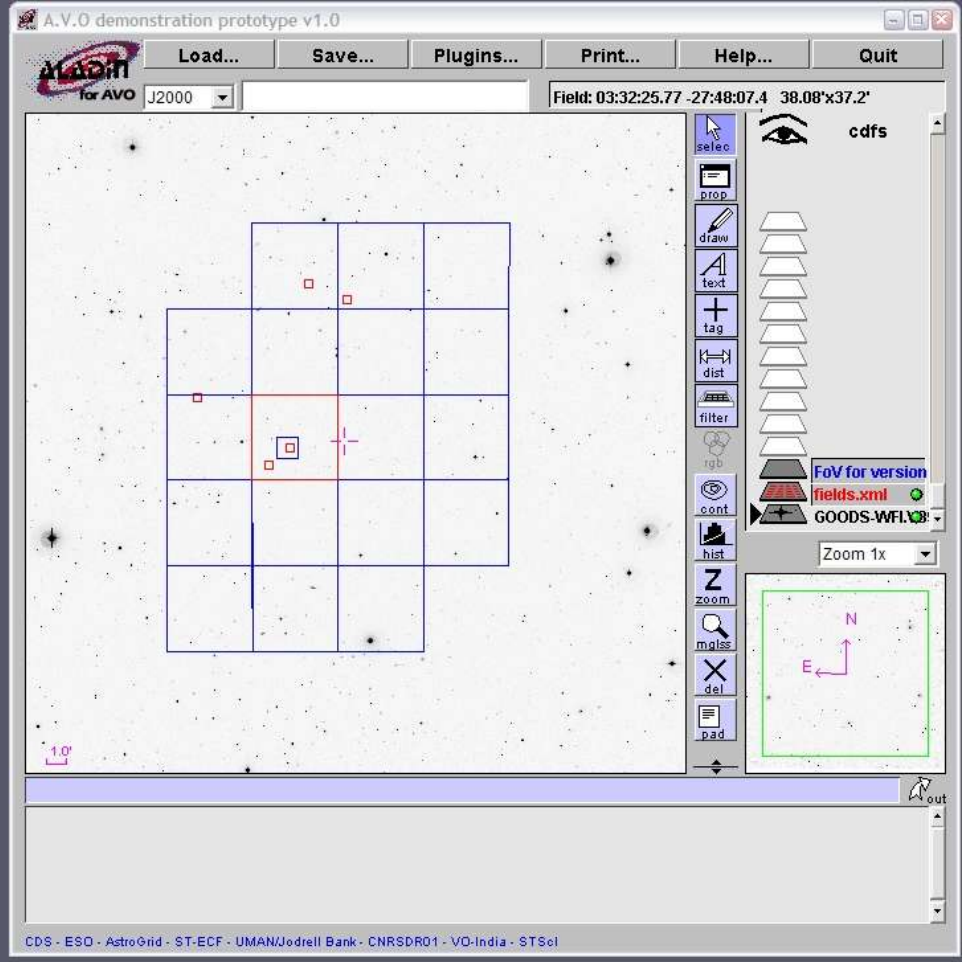




Field of view outlines are interactively drawn while browsing the data tree.

Here we have loaded the GOODS ACS version 1.0 field of view into the stack.

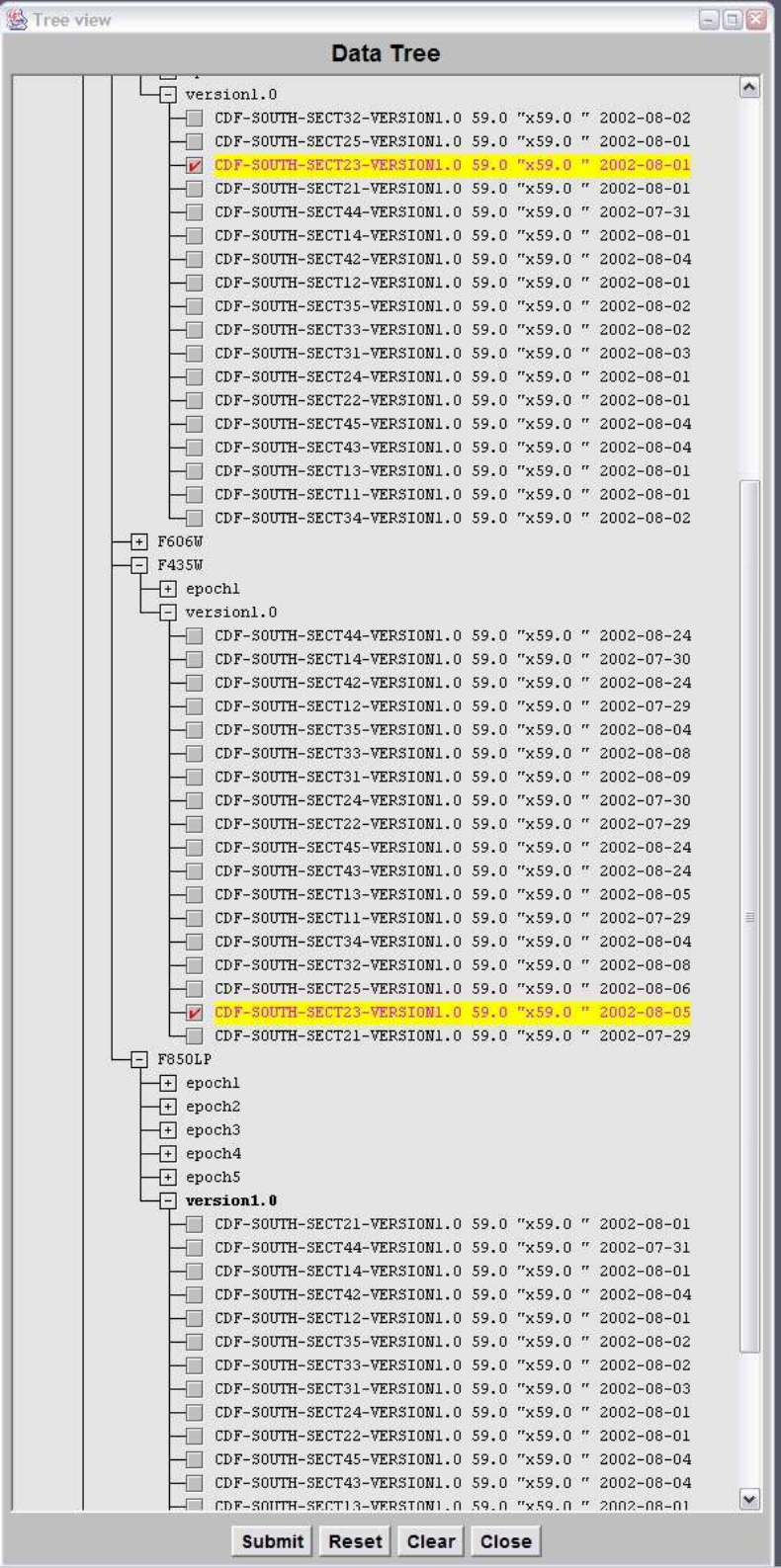


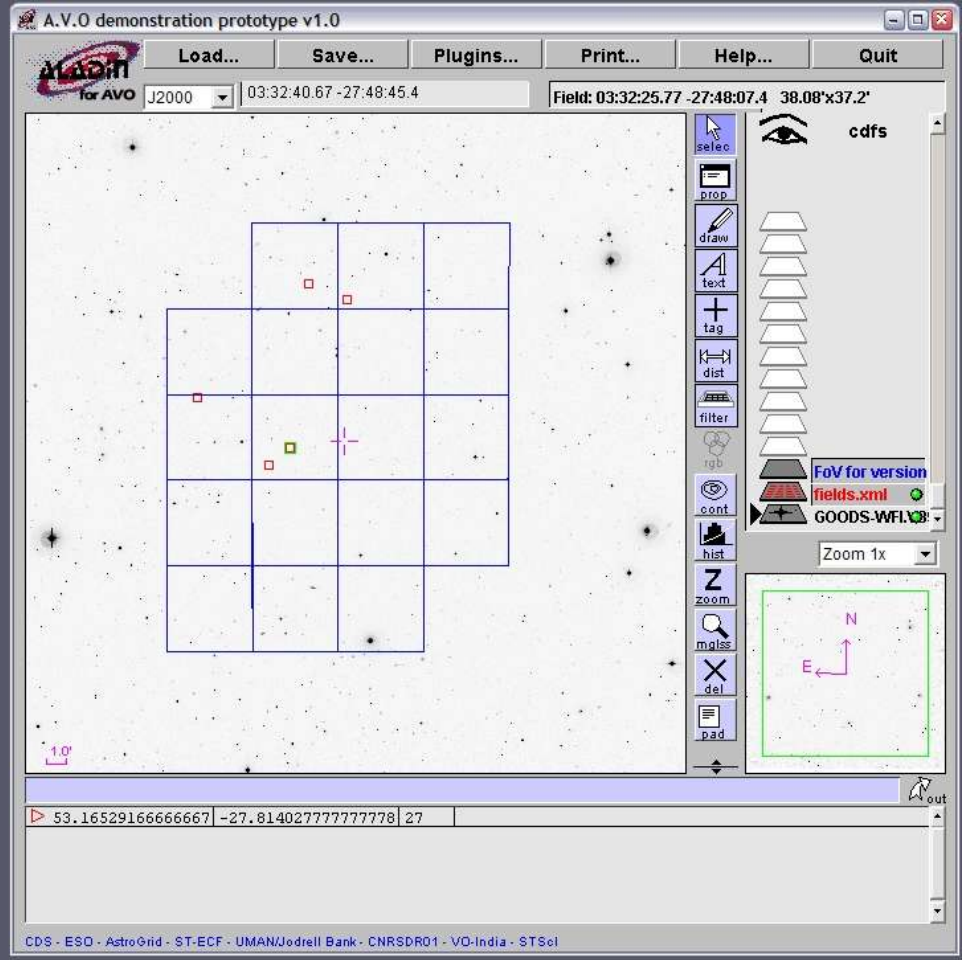


Clicking on the image selects all the releveant data in the tree.

The small blue box represents the outline of the image cutout that will be generated on the fly when the request is submitted.

GIMP

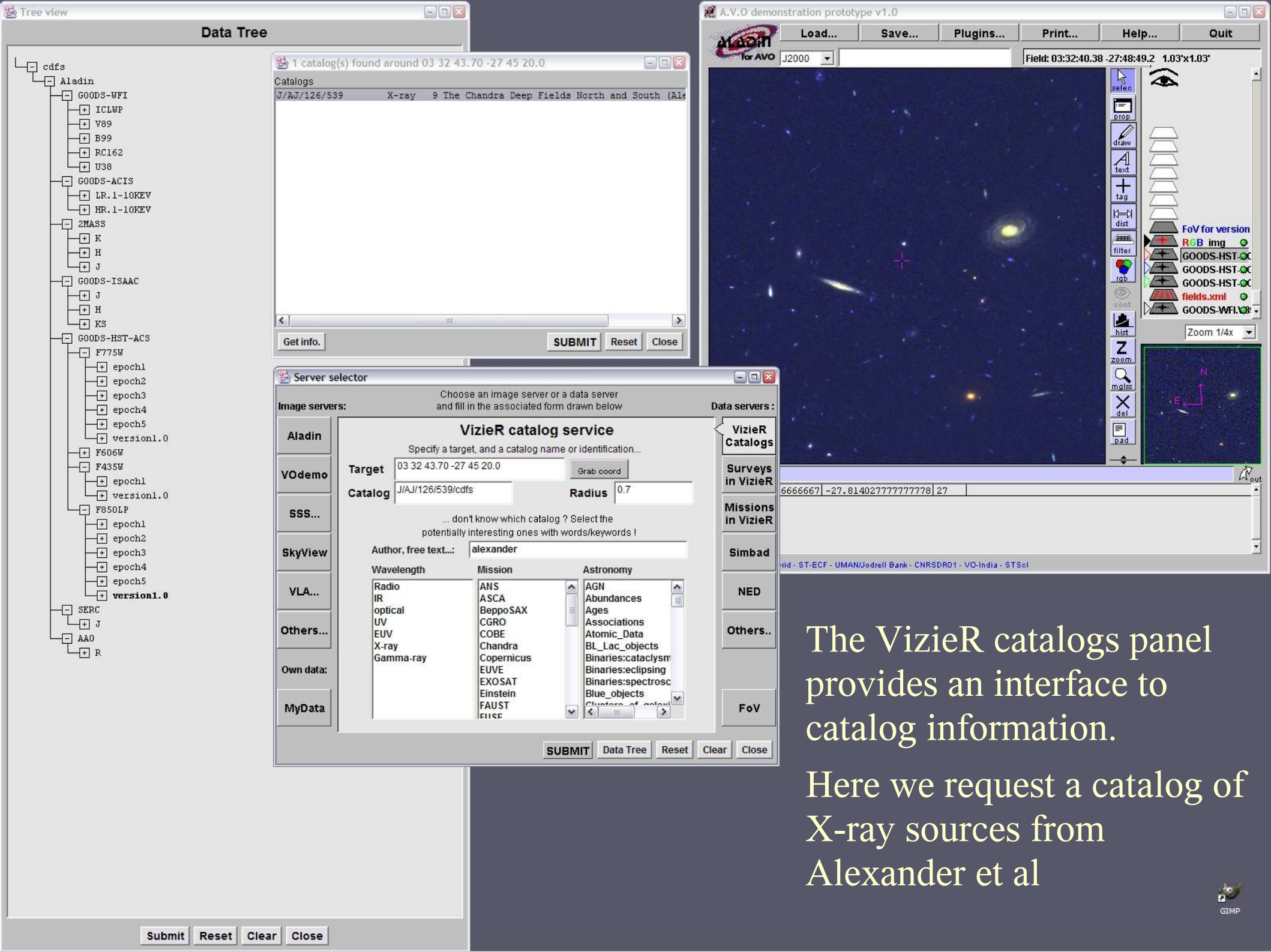




Multiple images can be loaded simultaneously.

Here we open the F850LP, F775W and F435W (z, i, b) nodes of the tree in order to obtain image cutouts from these 3 bands.

GIMP


Tree view
Data Tree
cdfs
Aladin
GOODS-WFI
ICLWP
V89
B99
RC162
U38
GOODS-ACIS
LR.1-10KEV
HR.1-10KEV
2MASS
K
H
J
GOODS-ISAAC
J
H
KS
GOODS-HST-ACS
F775W
epoch1
epoch2
epoch3
epoch4
epoch5
version1.0
F606W
F435W
epoch1
version1.0
F850LP
epoch1
epoch2
epoch3
epoch4
epoch5
version1.0
SERC
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Submit
Reset
Clear
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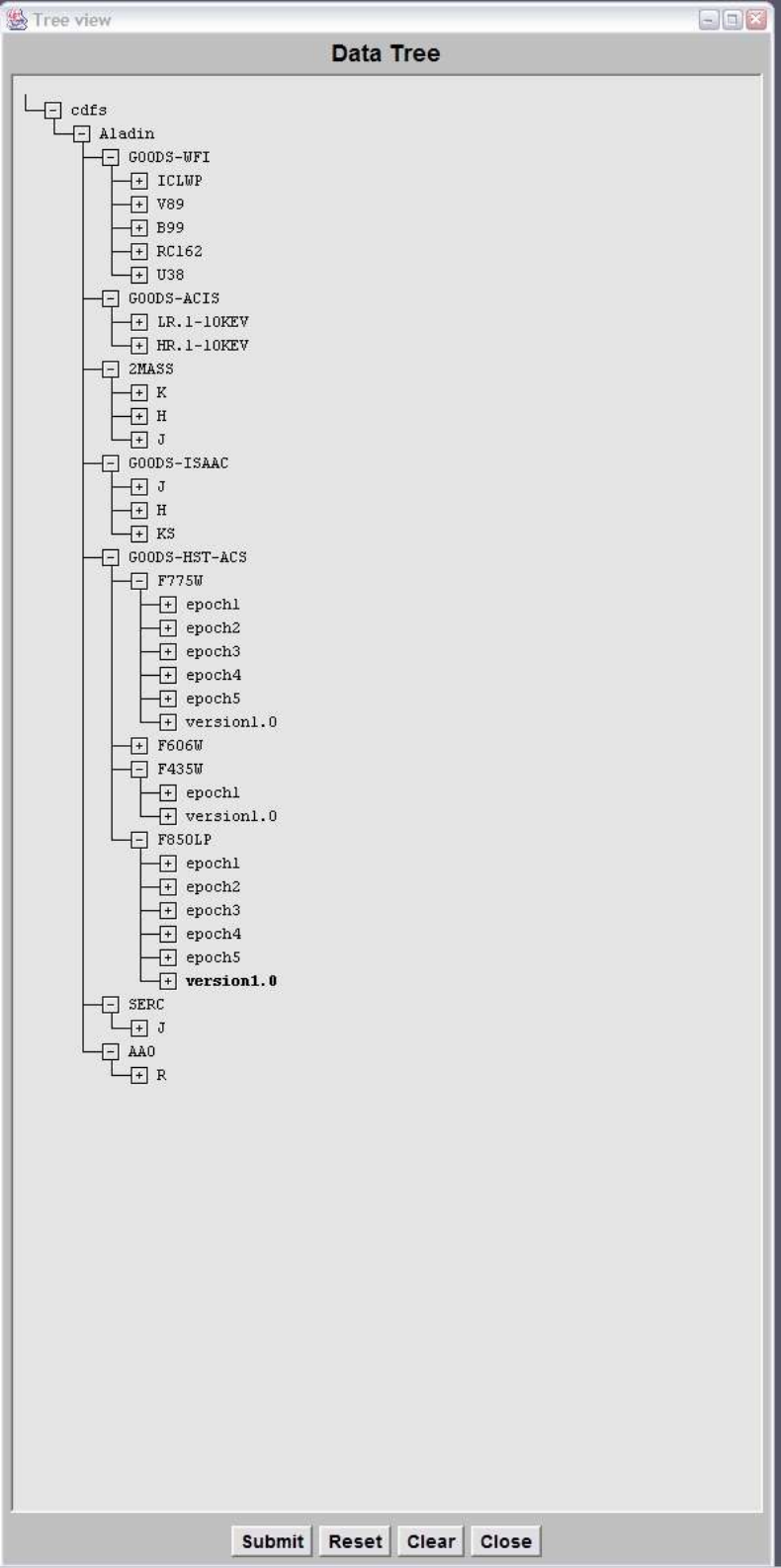
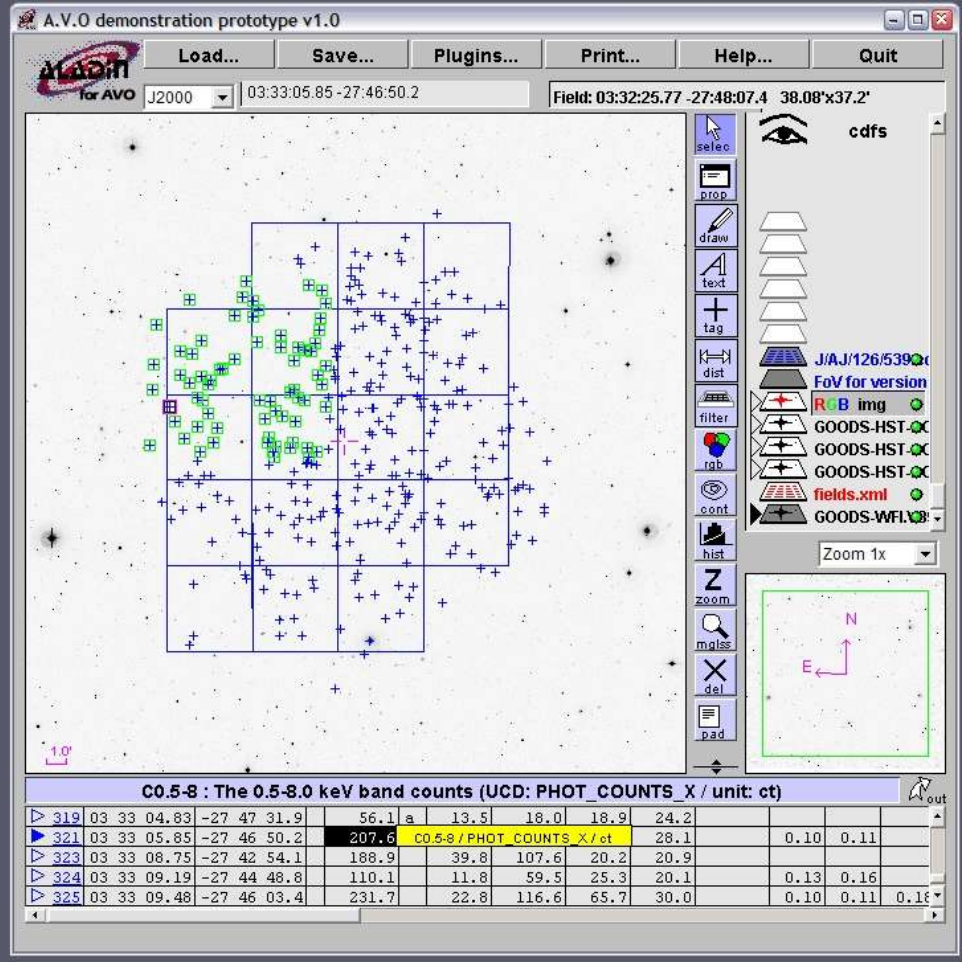
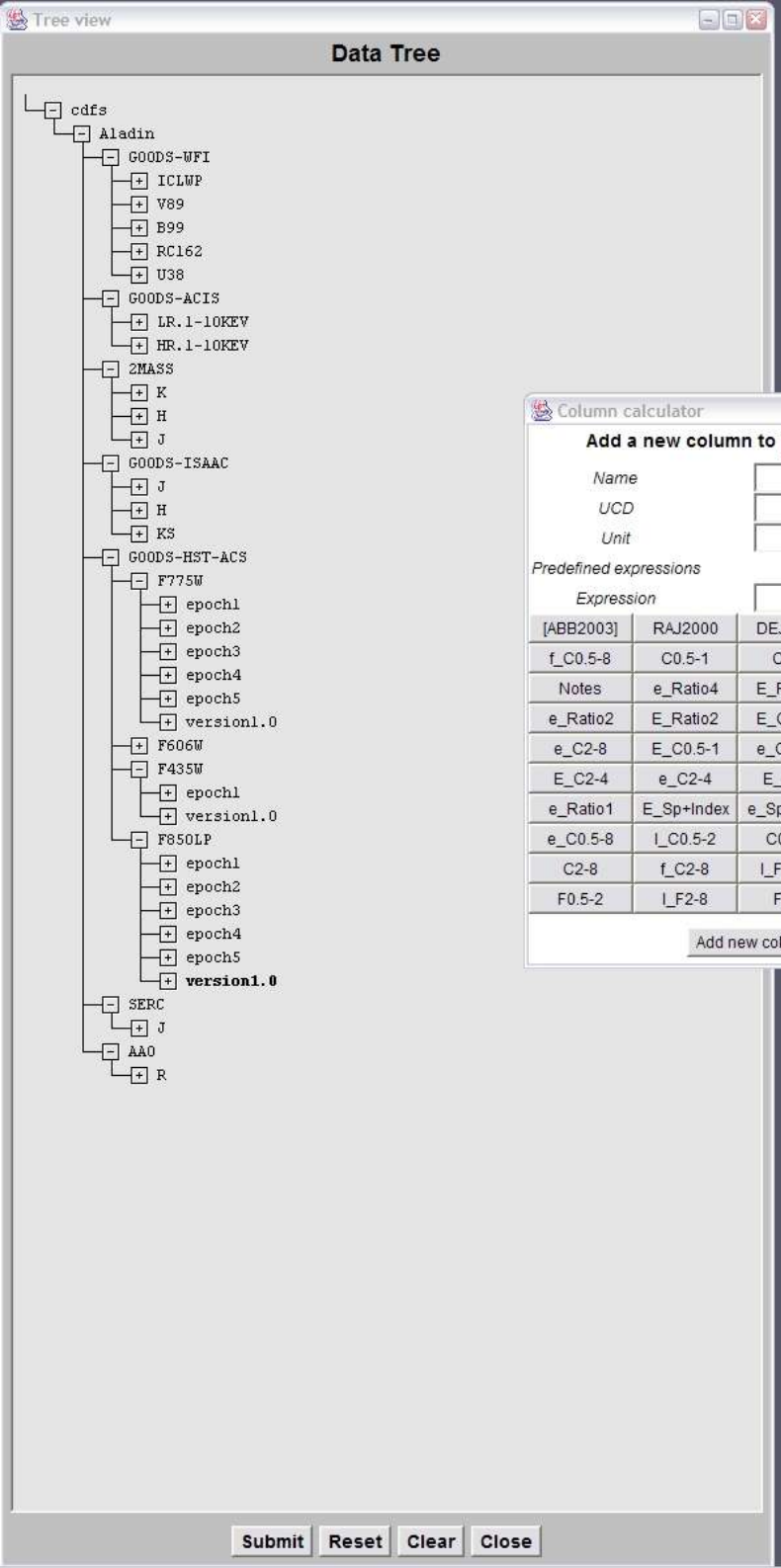
1 catalog(s) found around 03 32 43.70 -27 45 20.0
Catalogs
J/AJ/126/539 X-ray 9 The Chandra Deep Fields North and South (Ale
Get info.
SUBMIT
Reset
Close
Server selector
Image servers:
Choose an image server or a data server
and fill in the associated form drawn below
Data servers :
Aladin
VOdemo
SSS...
SkyView
VLA...
Others...
Own data:
MyData
VizieR catalog service
Specify a target, and a catalog name or identification...
Target
03 32 43.70 -27 45 20.0
Grab coord
Catalog
J/AJ/126/539/cdfs
Radius
0.7
... don't know which catalog ? Select the
potentially interesting ones with words/keywords !
Author, free text...:
alexander
Wavelength
Radio
IR
optical
UV
EUV
X-ray
Gamma-ray
Mission
ANS
ASCA
BeppoSAX
CGRO
COBE
Chandra
Copernicus
EUVE
EXOSAT
Einstein
FAUST
Astronomy
AGN
Abundances
Ages
Associations
Atomic_Data
BL_Lac_objects
Binaries:cataclysm
Binaries:eclipsing
Binaries:spectrosc
Blue_objects
VizieR Catalogs
Surveys in VizieR
Missions in VizieR
Simbad
NED
Others..
FoV
SUBMIT
Data Tree
Reset
Clear
Close
A.V.O demonstration prototype v1.0
Load...
Save...
Plugins...
Print...
Help...
Quit
for AVO
J2000
Field: 03:32:40.38 -27:48:49.2 1.03'x1.03'
selec
prop
draw
text
tag
dist
filter
rgb
cont
hist
zoom
mglss
del
pad
FoV for version
RGB img
GOODS-HST-
GOODS-HST-
GOODS-HST-
fields.xml
GOODS-WFI
Zoom 1/4x
N
E
6666667 -27.814027777777778 27
rid - ST-ECF - UMAN/Jodrell Bank - CNRSDR01 - VO-India - STScI
The VizieR catalogs panel provides an interface to catalog information.
Here we request a catalog of X-ray sources from Alexander et al
GIMP

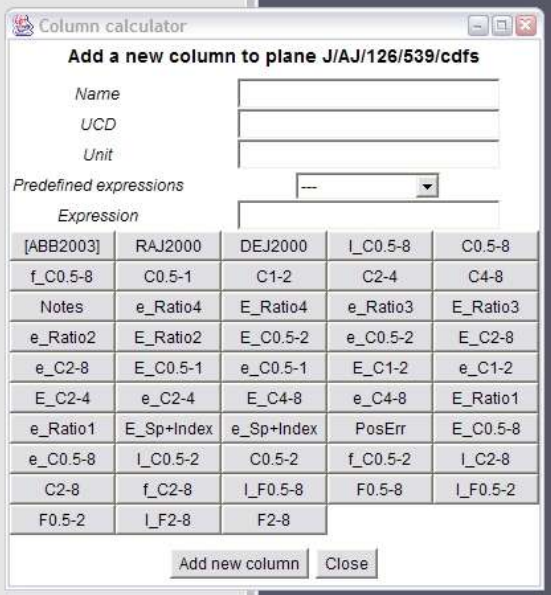


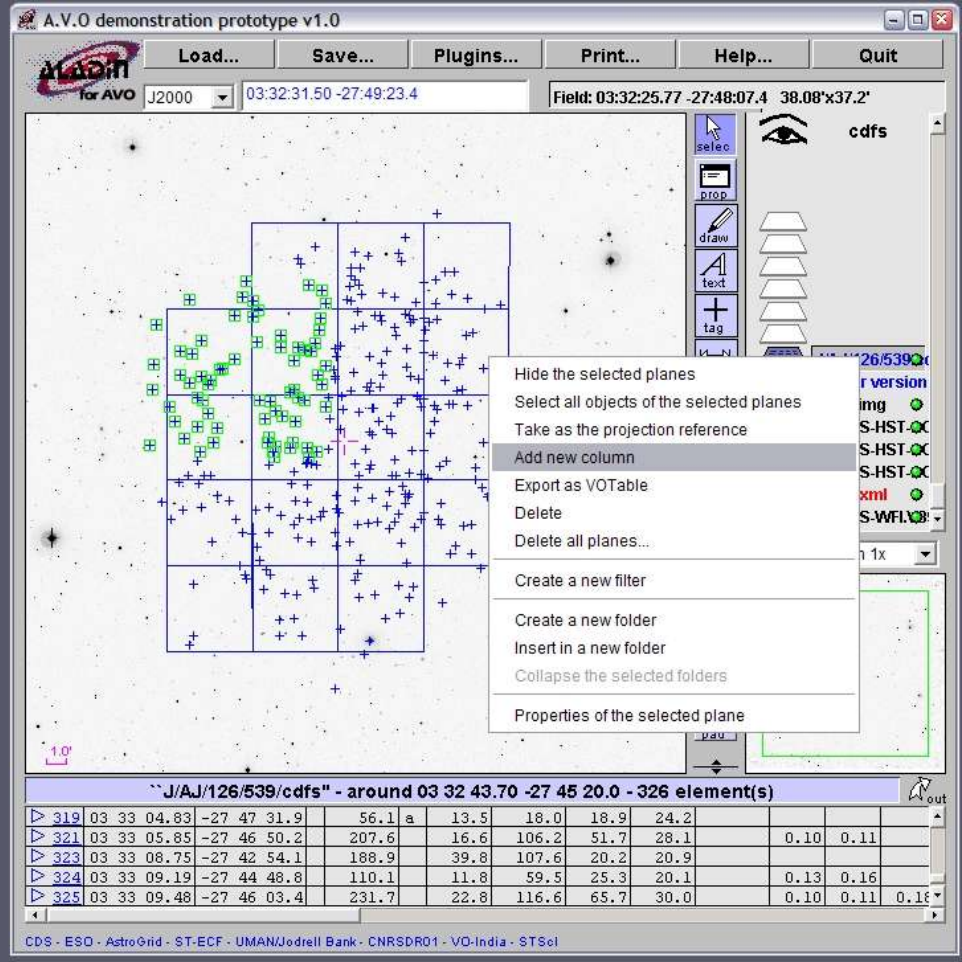


Catalog points are overlaid on the image.

Column metadata such as UCDs and units are displayed

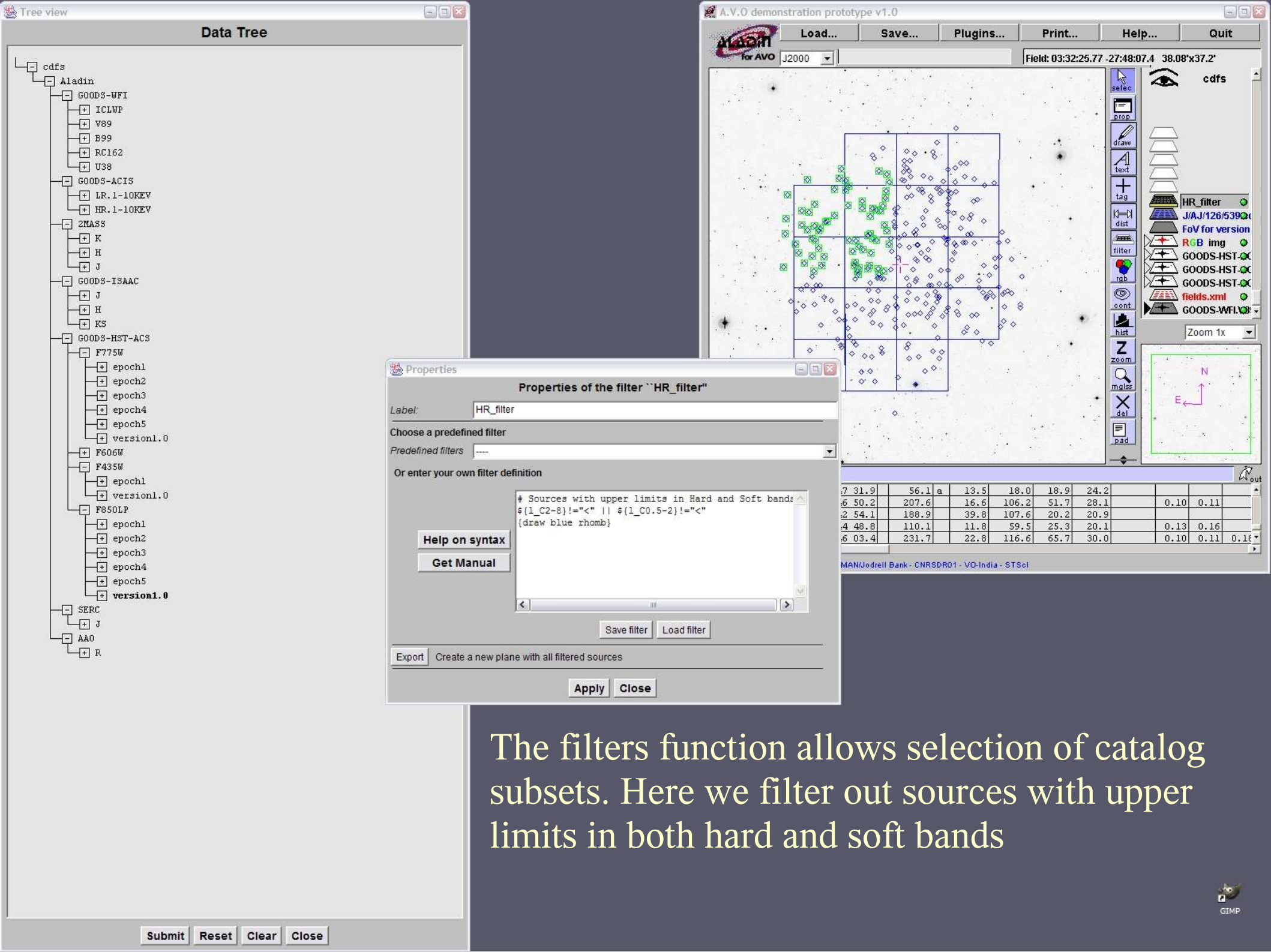




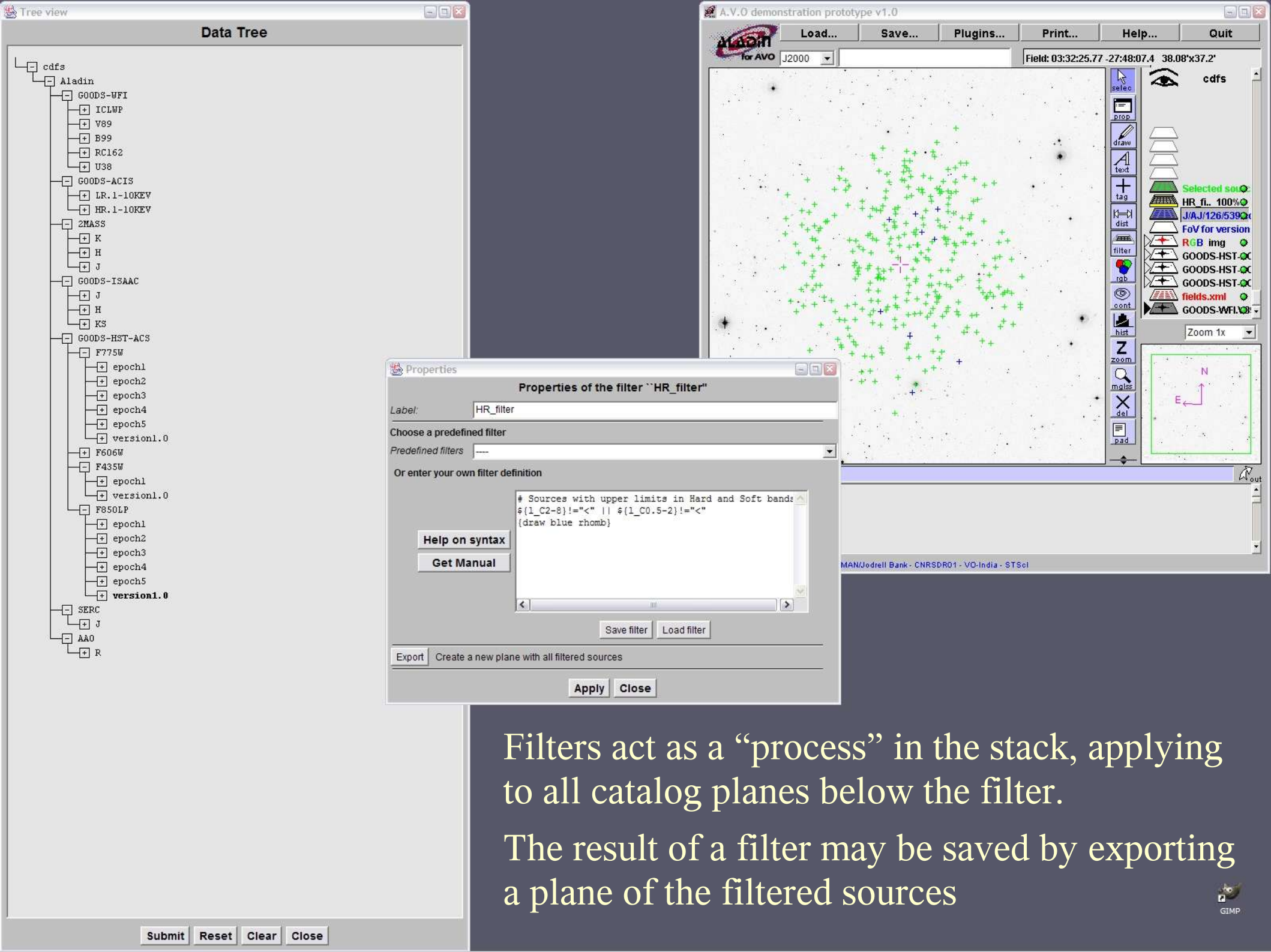


The Column calculator allows generation of new catalog columns

Here we calculate the Hardness Ratio using the hard and soft X-ray count rates from the Alexander catalog

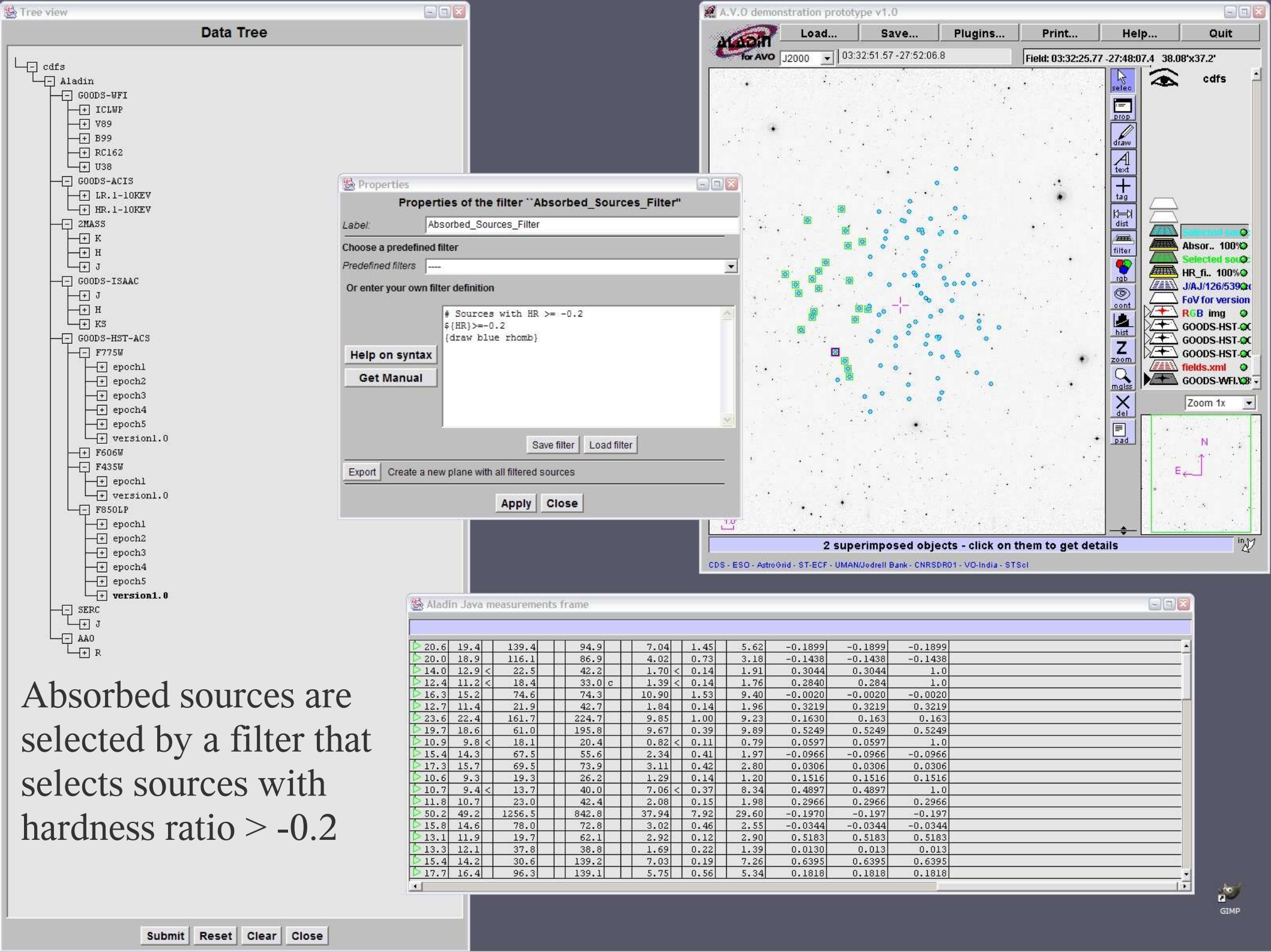


The filters function allows selection of catalog subsets. Here we filter out sources with upper limits in both hard and soft bands

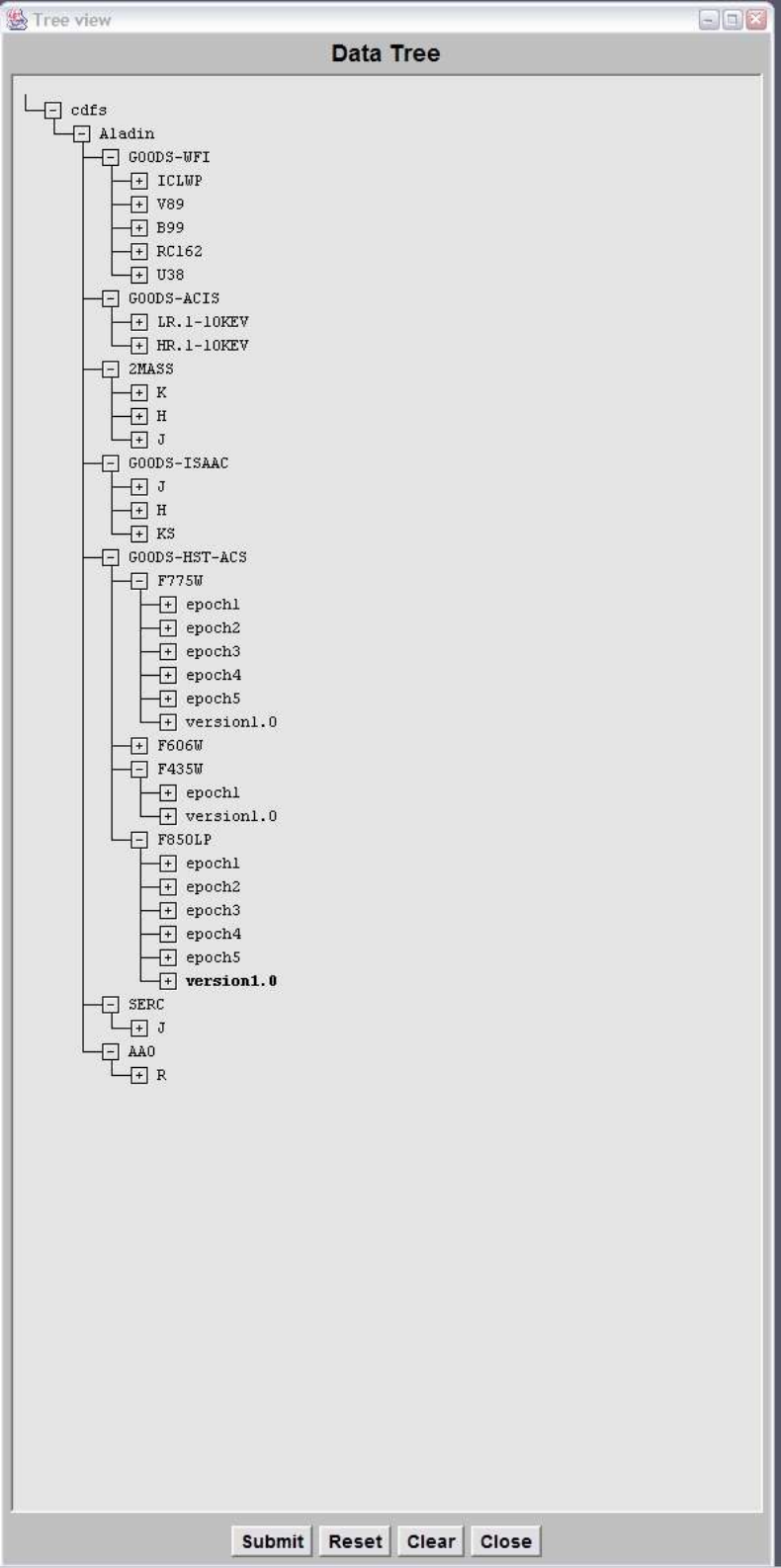


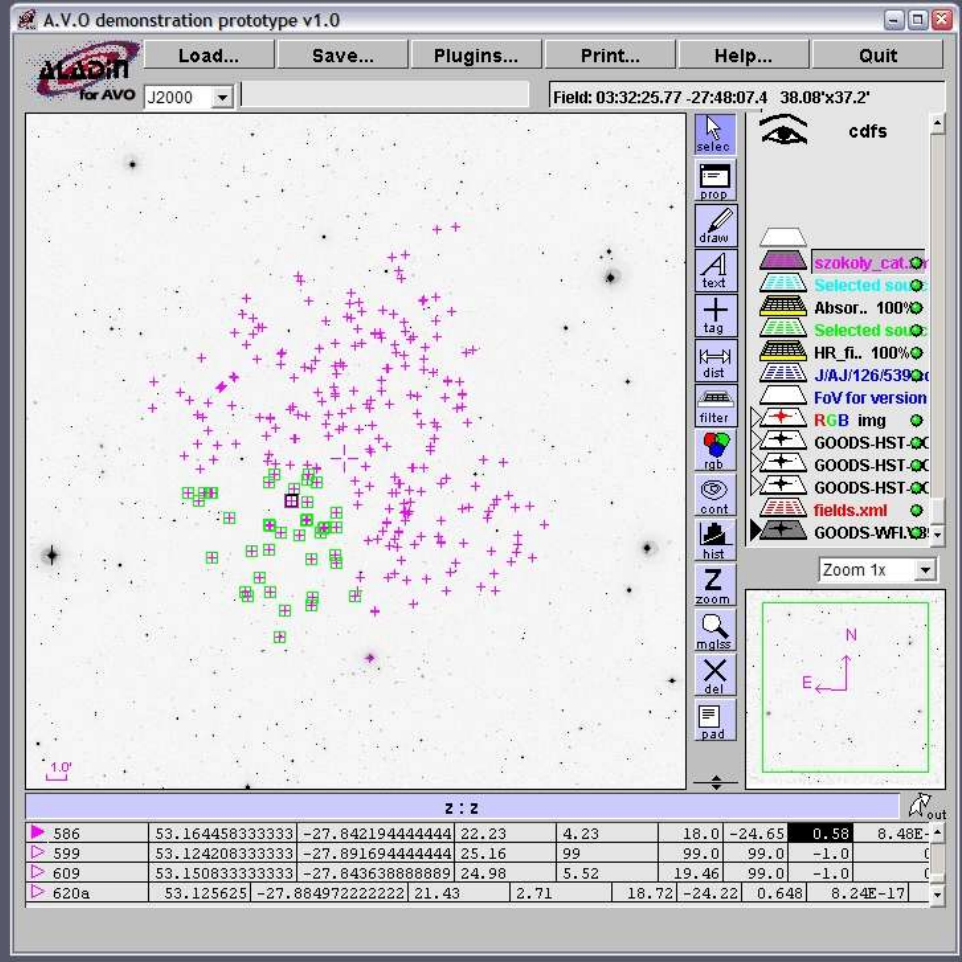
Filters act as a “process” in the stack, applying to all catalog planes below the filter.

The result of a filter may be saved by exporting a plane of the filtered sources



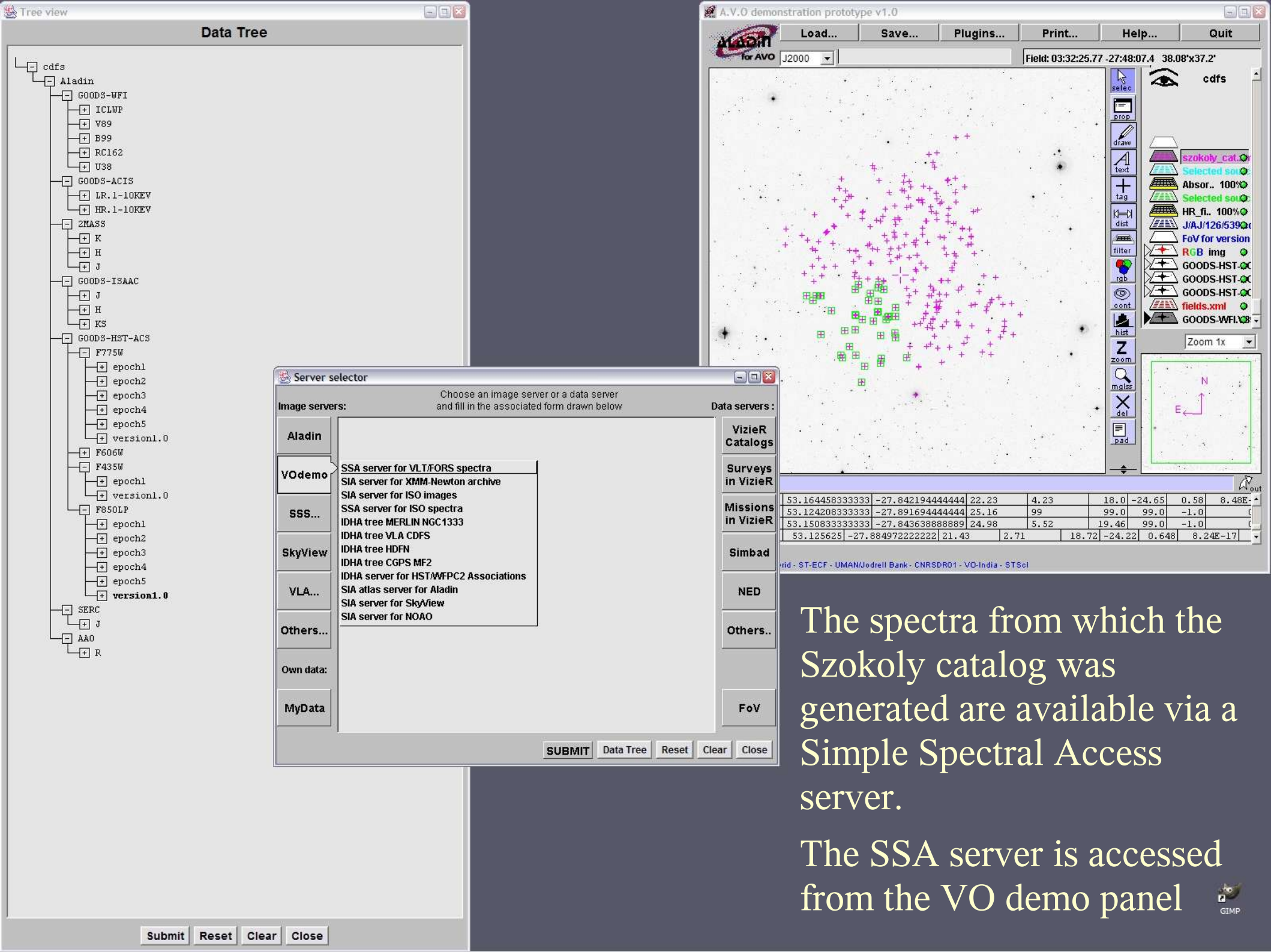
Absorbed sources are selected by a filter that selects sources with hardness ratio > -0.2





The Szokoly et al catalog of redshifts of CDFS sources derived from VLT-FORS spectra is loaded.

GIMP


Tree view
Data Tree
cdfs
Aladin
GOODS-WFI
ICLWP
V89
B99
RC162
U38
GOODS-ACIS
LR.1-10KEV
HR.1-10KEV
2MASS
K
H
J
GOODS-ISAAC
J
H
KS
GOODS-HST-ACS
F775W
epoch1
epoch2
epoch3
epoch4
epoch5
version1.0
F606W
F435W
epoch1
version1.0
F850LP
epoch1
epoch2
epoch3
epoch4
epoch5
version1.0
SERC
J
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Submit
Reset
Clear
Close
Server selector
Choose an image server or a data server
and fill in the associated form drawn below
Image servers:
Data servers :
Aladin
VOdemo
SSS...
SkyView
VLA...
Others...
Own data:
MyData
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
SIA server for NOAO
VizieR Catalogs
Surveys in VizieR
Missions in VizieR
Simbad
NED
Others..
FoV
SUBMIT
Data Tree
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A.V.O demonstration prototype v1.0
Load...
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J2000
Field: 03:32:25.77 -27:48:07.4 38.08'x37.2'
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J/AJ/126/539
FoV for version
RGB img
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GOODS-WFI
Zoom 1x
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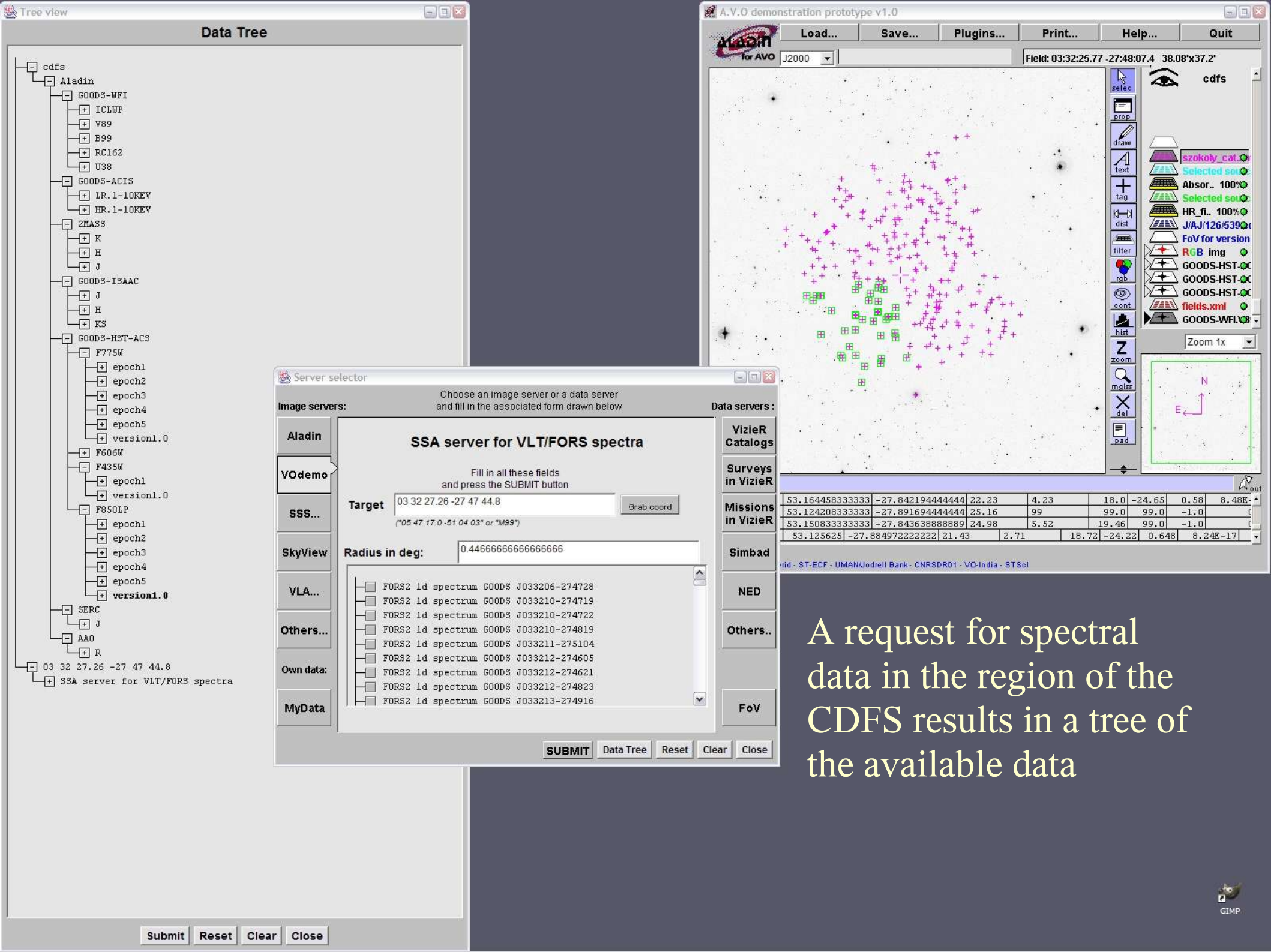
53.164458333333 -27.842194444444 22.23 4.23 18.0 -24.65 0.58 8.48E-
53.124208333333 -27.891694444444 25.16 99 99.0 99.0 -1.0
53.150833333333 -27.843638888889 24.98 5.52 19.46 99.0 -1.0
53.125625 -27.884972222222 21.43 2.71 18.72 -24.22 0.648 8.24E-17
rid - ST-ECF - UMAN/Jodrell Bank - CNRSDRO1 - VO-India - STScI
The spectra from which the Szokoly catalog was generated are available via a Simple Spectral Access server.
The SSA server is accessed from the VO demo panel
GIMP


Tree view
Data Tree
cdfs
Aladin
GOODS-WFI
ICLWP
V89
B99
RC162
U38
GOODS-ACIS
LR.1-10KEV
HR.1-10KEV
2MASS
K
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J
GOODS-ISAAC
J
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KS
GOODS-HST-ACS
F775W
epoch1
epoch2
epoch3
epoch4
epoch5
version1.0
F606W
F435W
epoch1
version1.0
F850LP
epoch1
epoch2
epoch3
epoch4
epoch5
version1.0
SERC
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03 32 27.26 -27 47 44.8
SSA server for VLT/FORS spectra
Submit
Reset
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Server selector
Image servers:
Choose an image server or a data server
and fill in the associated form drawn below
Data servers :
Aladin
VOdemo
SSS...
SkyView
VLA...
Others...
Own data:
MyData
SSA server for VLT/FORS spectra
Fill in all these fields
and press the SUBMIT button
Target
03 32 27.26 -27 47 44.8
Grab coord
("05 47 17.0 -51 04 03" or "M99")
Radius in deg:
0.44666666666666666
FORS2 ld spectrum GOODS J033206-274728
FORS2 ld spectrum GOODS J033210-274719
FORS2 ld spectrum GOODS J033210-274722
FORS2 ld spectrum GOODS J033210-274819
FORS2 ld spectrum GOODS J033211-275104
FORS2 ld spectrum GOODS J033212-274605
FORS2 ld spectrum GOODS J033212-274621
FORS2 ld spectrum GOODS J033212-274823
FORS2 ld spectrum GOODS J033213-274916
VizieR Catalogs
Surveys in VizieR
Missions in VizieR
Simbad
NED
Others..
FoV
SUBMIT
Data Tree
Reset
Clear
Close
A.V.O demonstration prototype v1.0
Load...
Save...
Plugins...
Print...
Help...
Quit
Aladin for AVO
J2000
Field: 03:32:25.77 -27:48:07.4 38.08'x37.2'
cdfs
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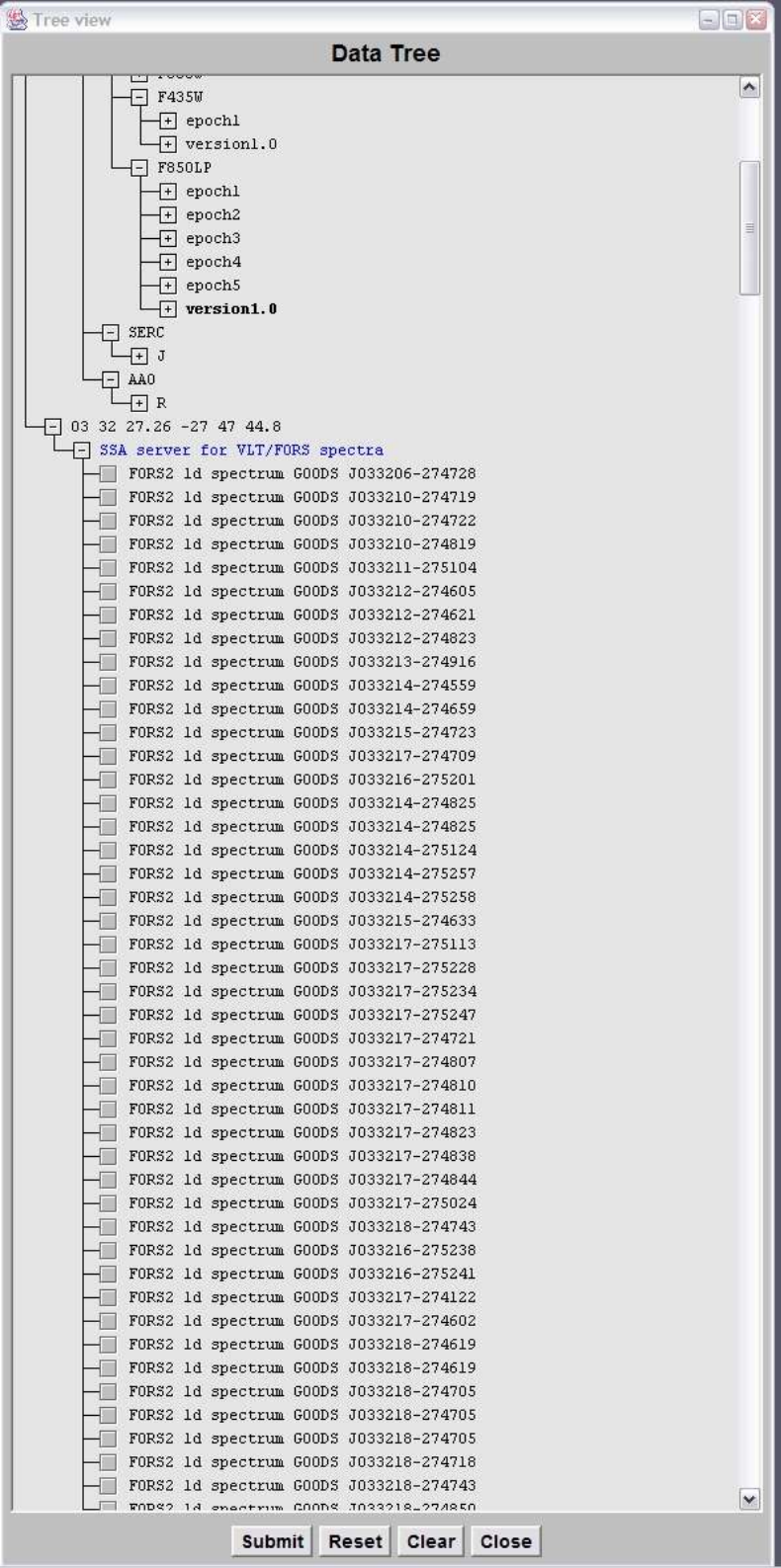
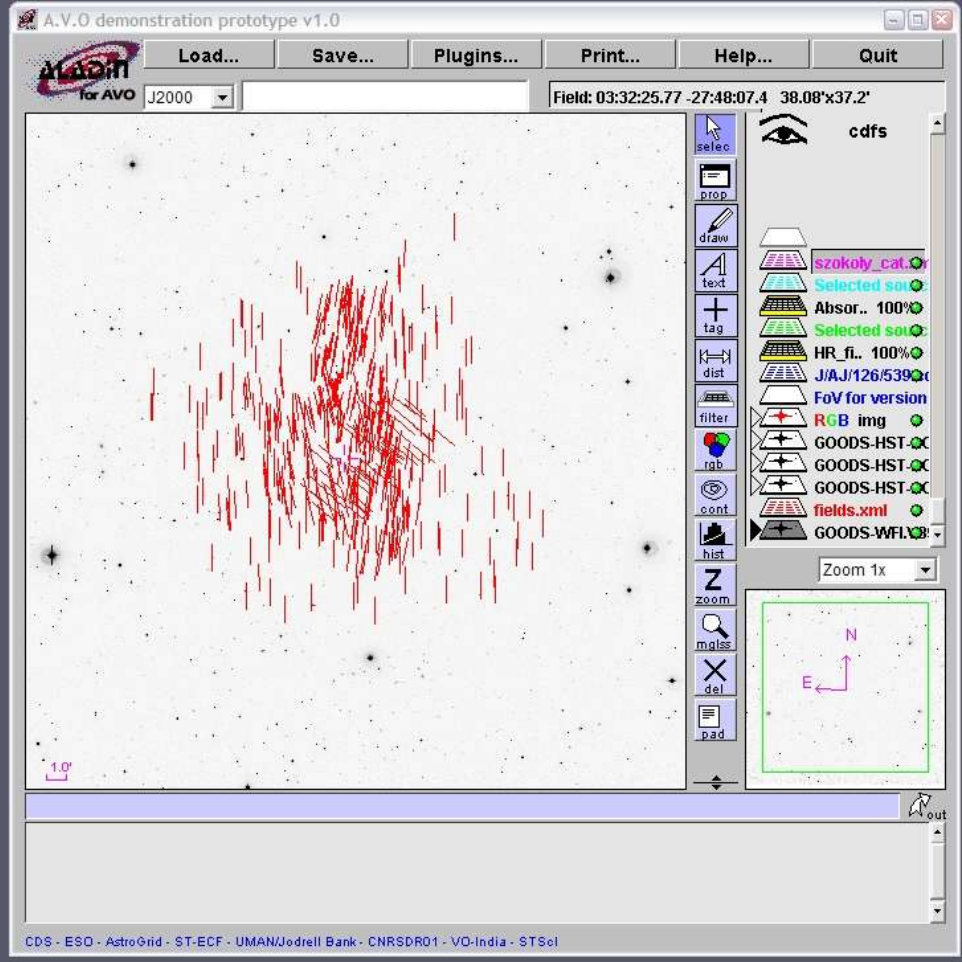
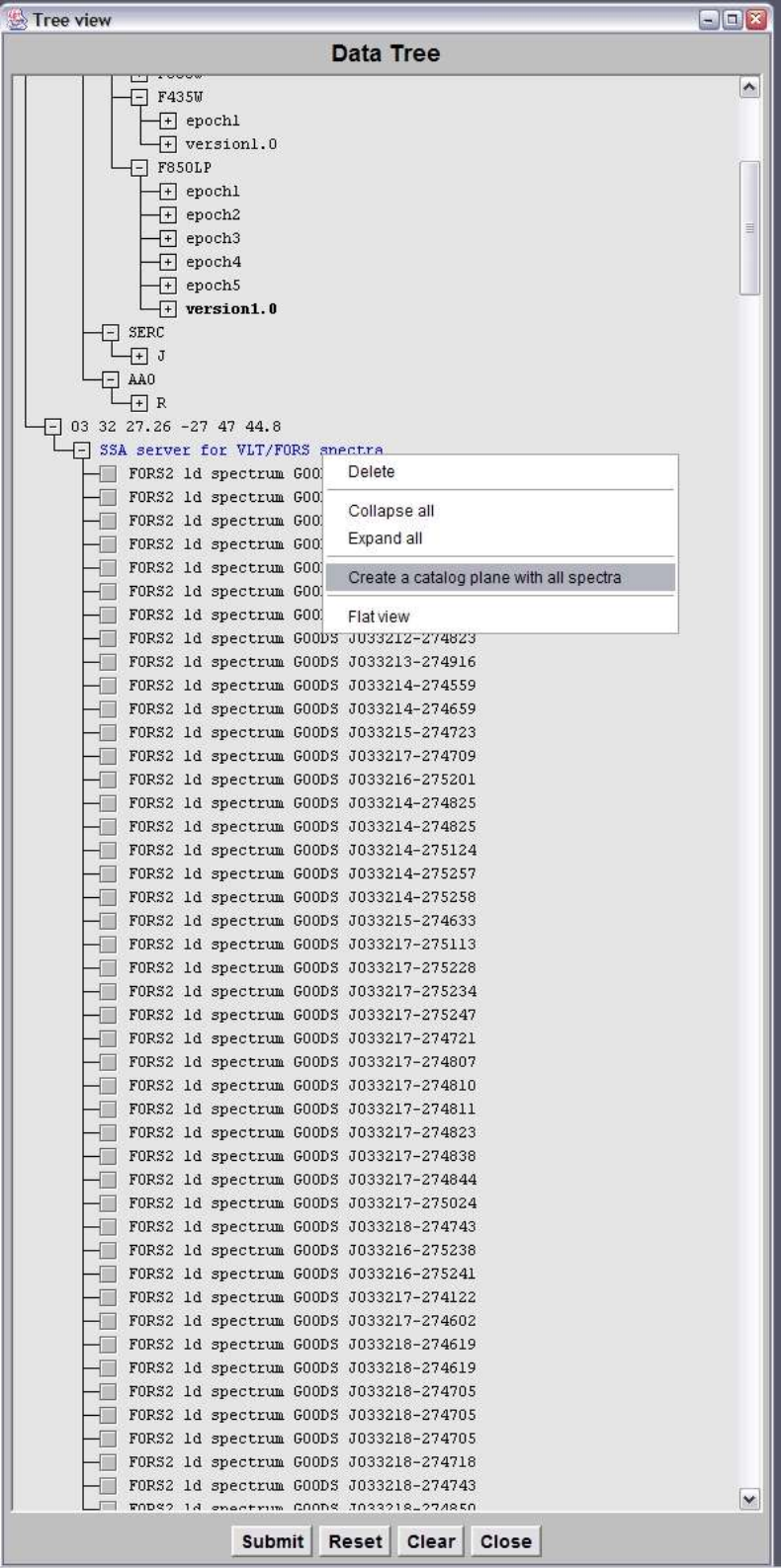
draw
text
tag
dist
filter
rgb
cont
hist
zoom
mglss
del
pad
szokoly_cat.
Selected sou
Absor.. 100%
Selected sou
HR_fi.. 100%
J/AJ/126/539
FoV for version
RGB img
GOODS-HST-
GOODS-HST-
GOODS-HST-
fields.xml
GOODS-WFI
Zoom 1x
N
E
53.164458333333 -27.842194444444 22.23 4.23 18.0 -24.65 0.58 8.48E-
53.124208333333 -27.891694444444 25.16 99 99.0 99.0 -1.0
53.150833333333 -27.843638888889 24.98 5.52 19.46 99.0 -1.0
53.125625 -27.884972222222 21.43 2.71 18.72 -24.22 0.648 8.24E-17
ST-ECF - UMAN/Jodrell Bank - CNRSDRO1 - VO-India - STScI
A request for spectral data in the region of the CDFS results in a tree of the available data
GIMP

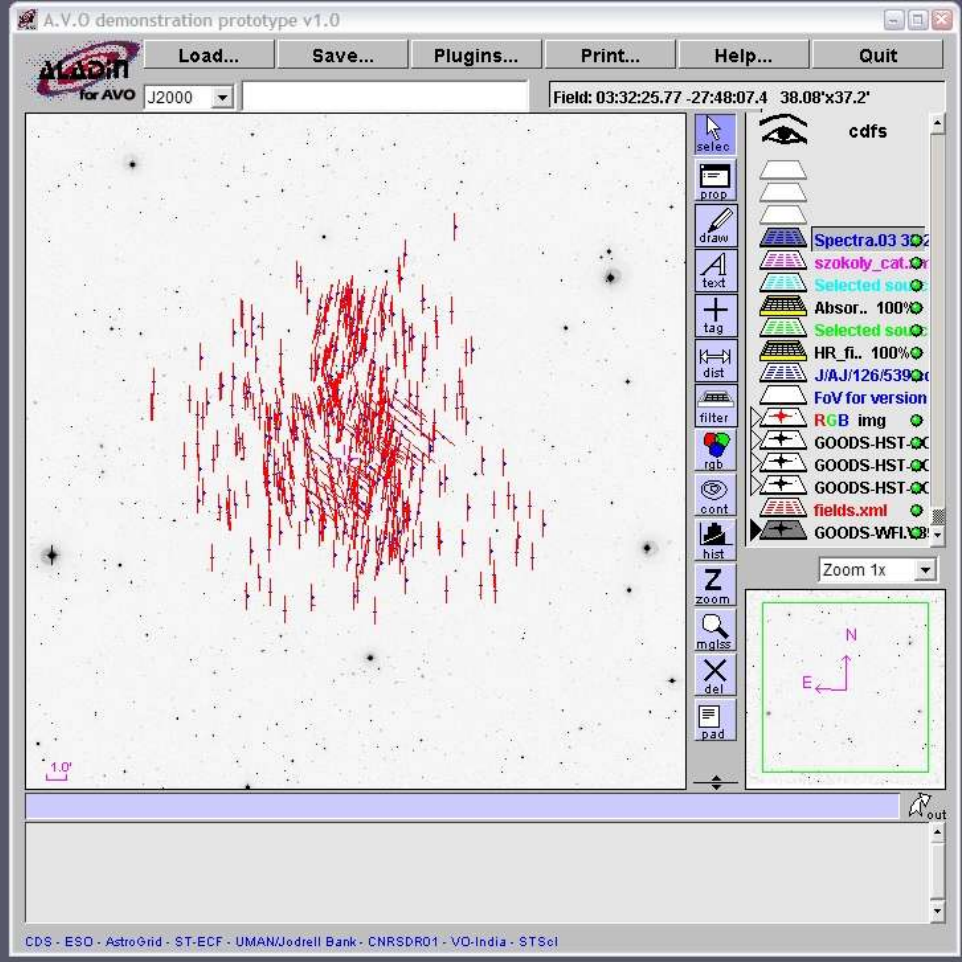




The positions of the spectral data, and where possible the slit position angle is drawn on the image.

GIMP

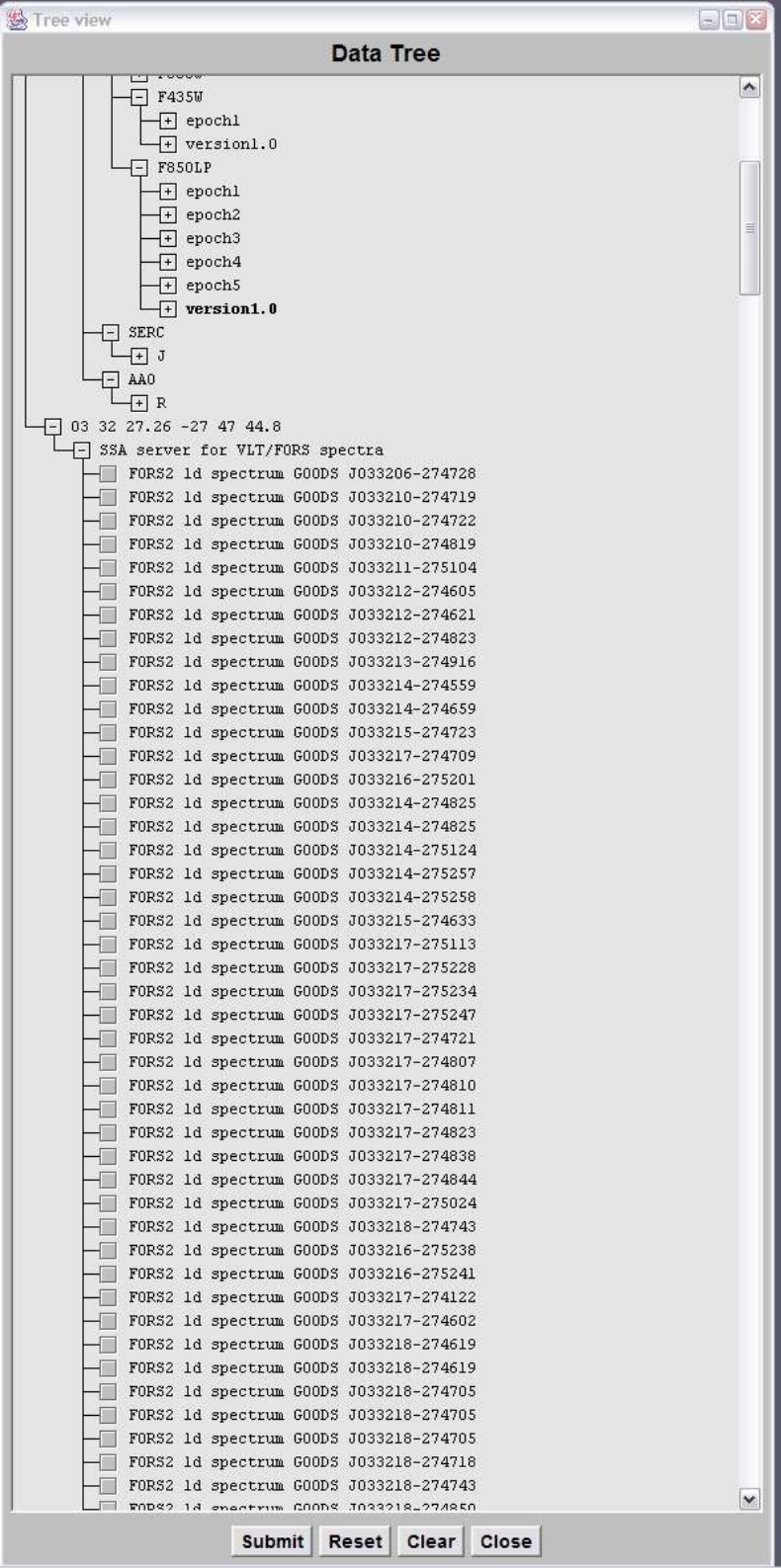


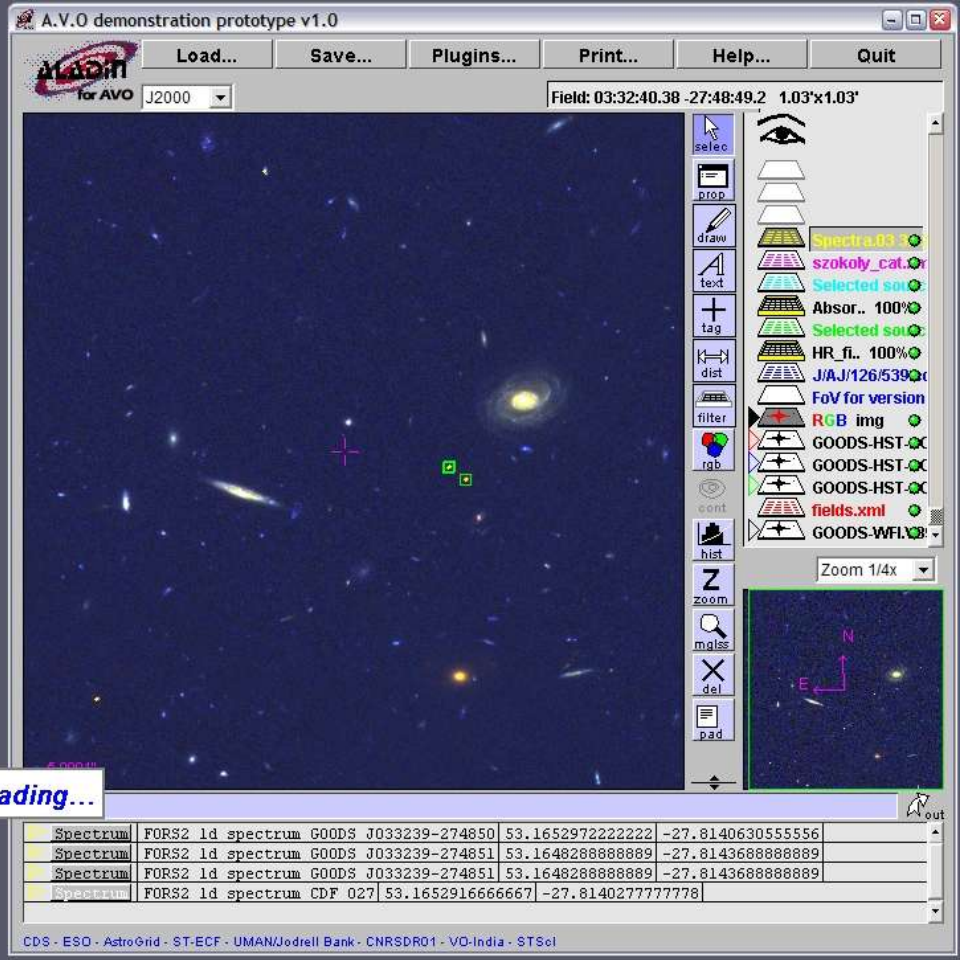


Spectra may be loaded directly from the data tree

It is also possible to make a catalog plane of the spectral data positions to more clearly link the spectra to the images

GIMP

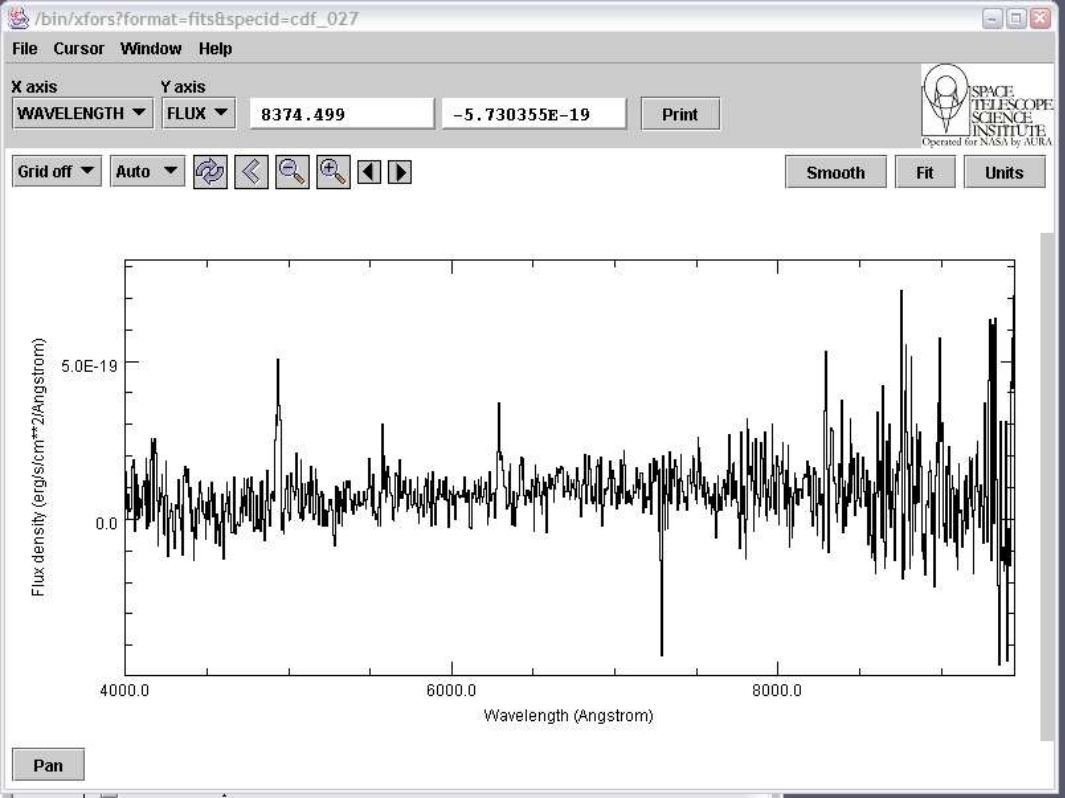


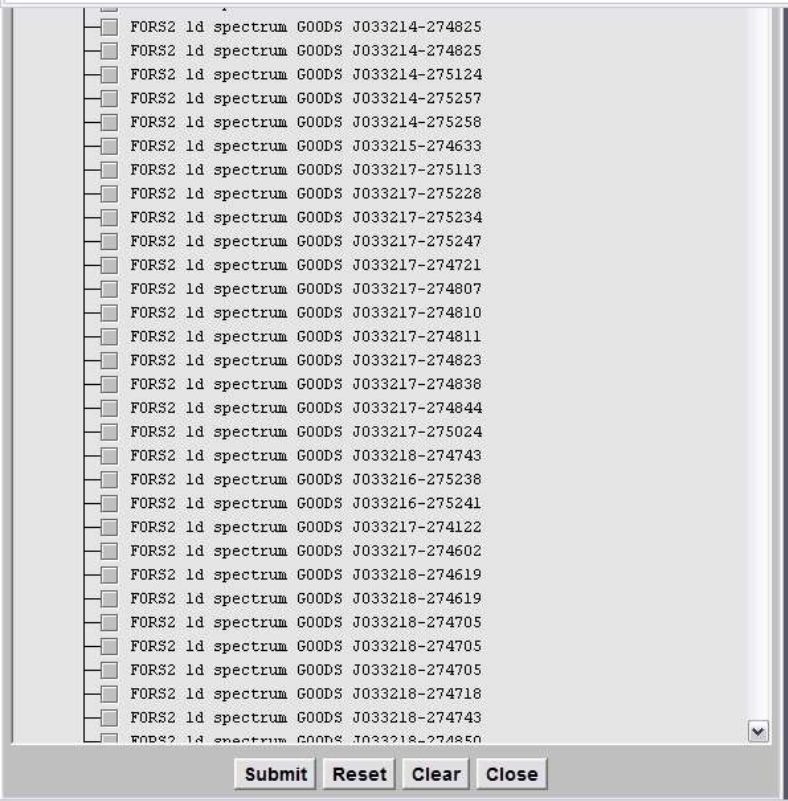


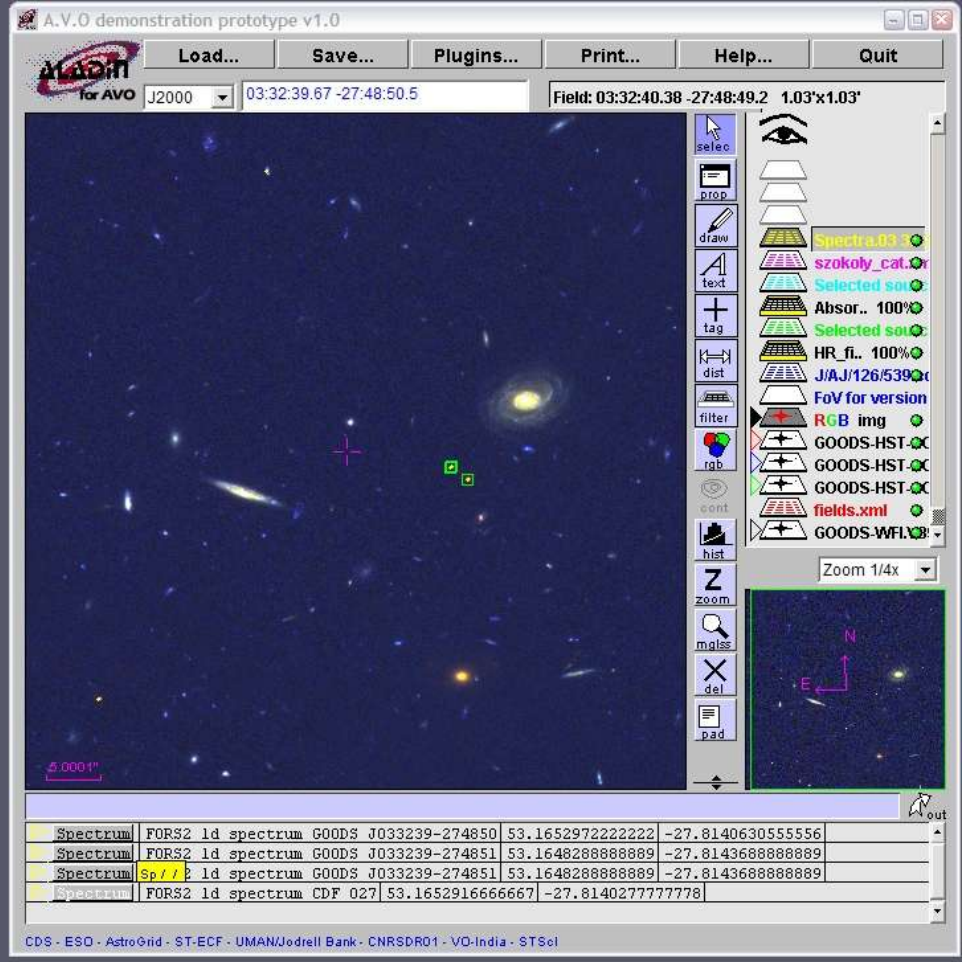
Clicking on the spectrum link in the catalog fires up Specview

Here we load the spectrum for the CDF 027 source

GIMP

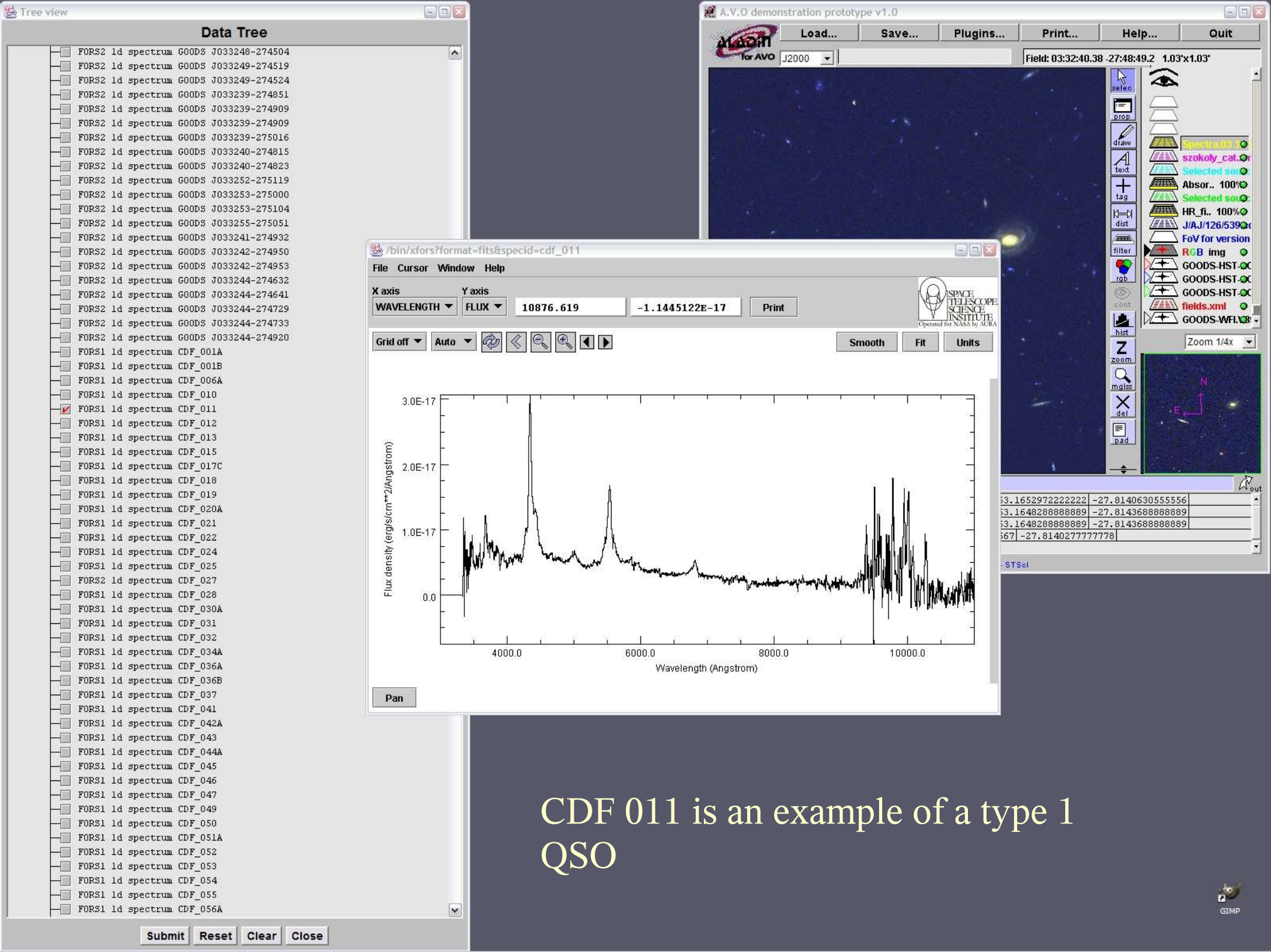




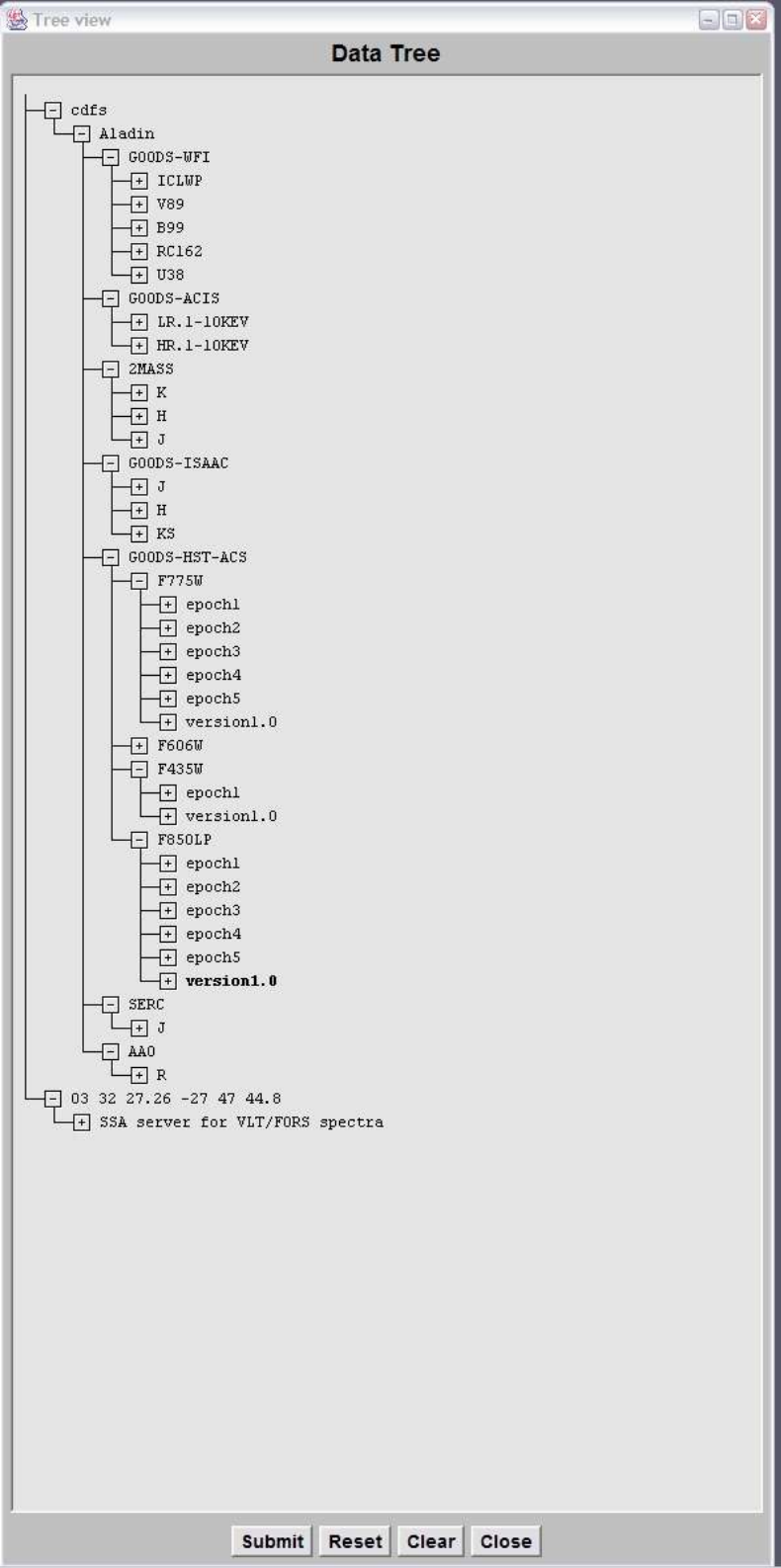


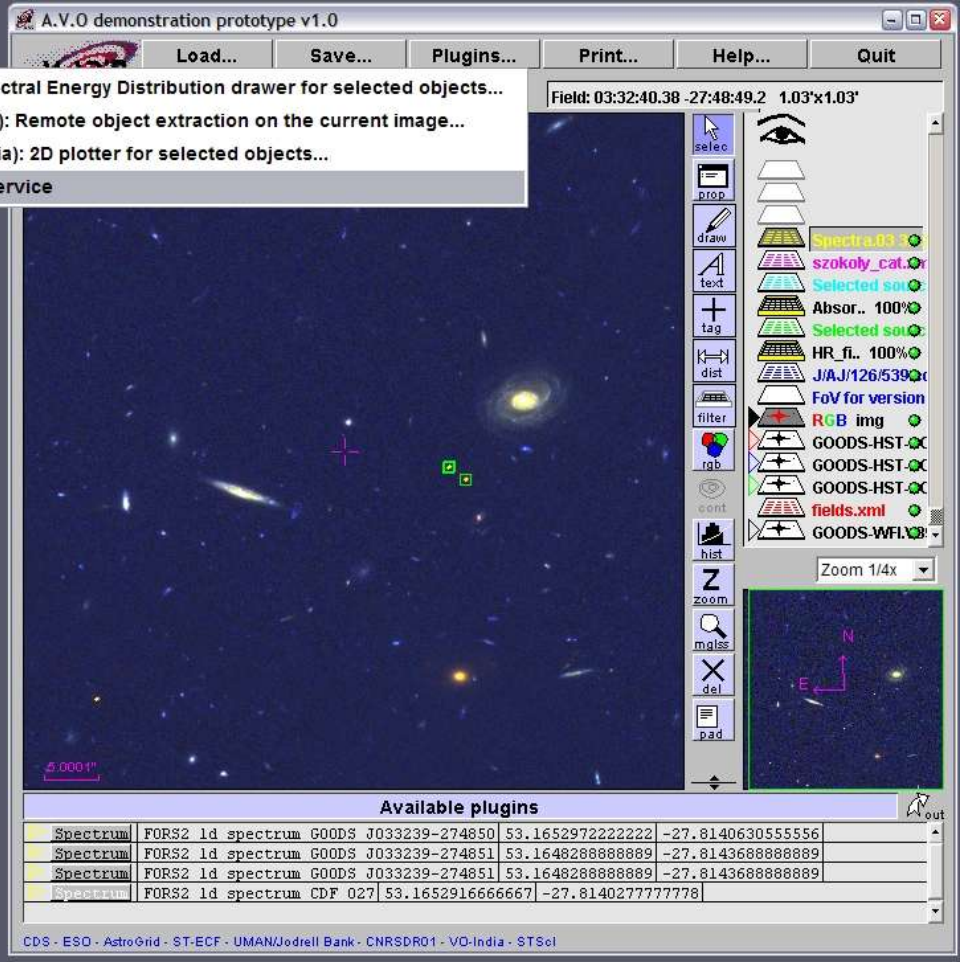
CDF 027 is a type 2 QSO (z=3.046) discovered by the CDFS team.

Zooming into the spectral display shows Ly-alpha and CIV emission lines

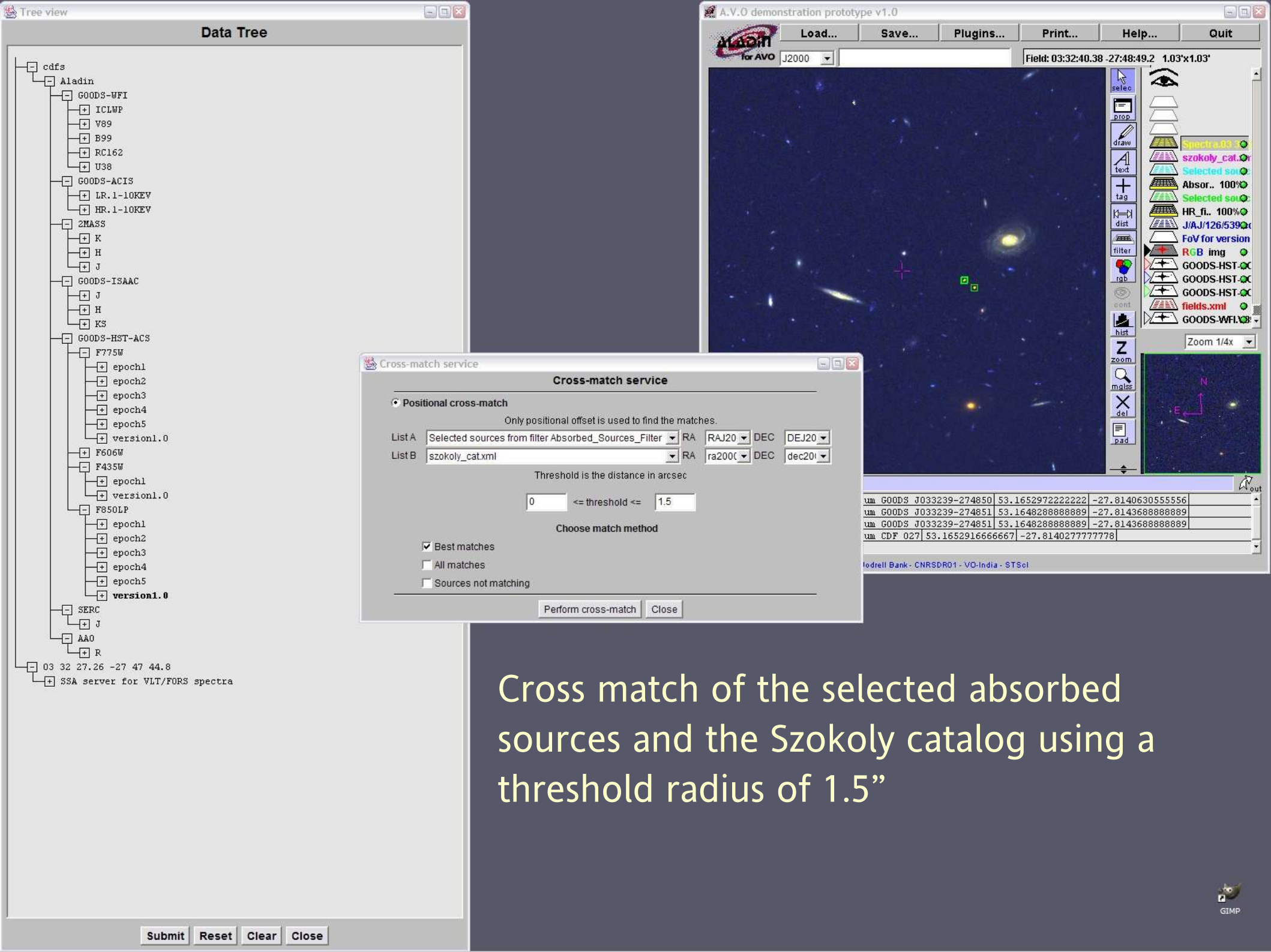


CDF 011 is an example of a type 1 QSO

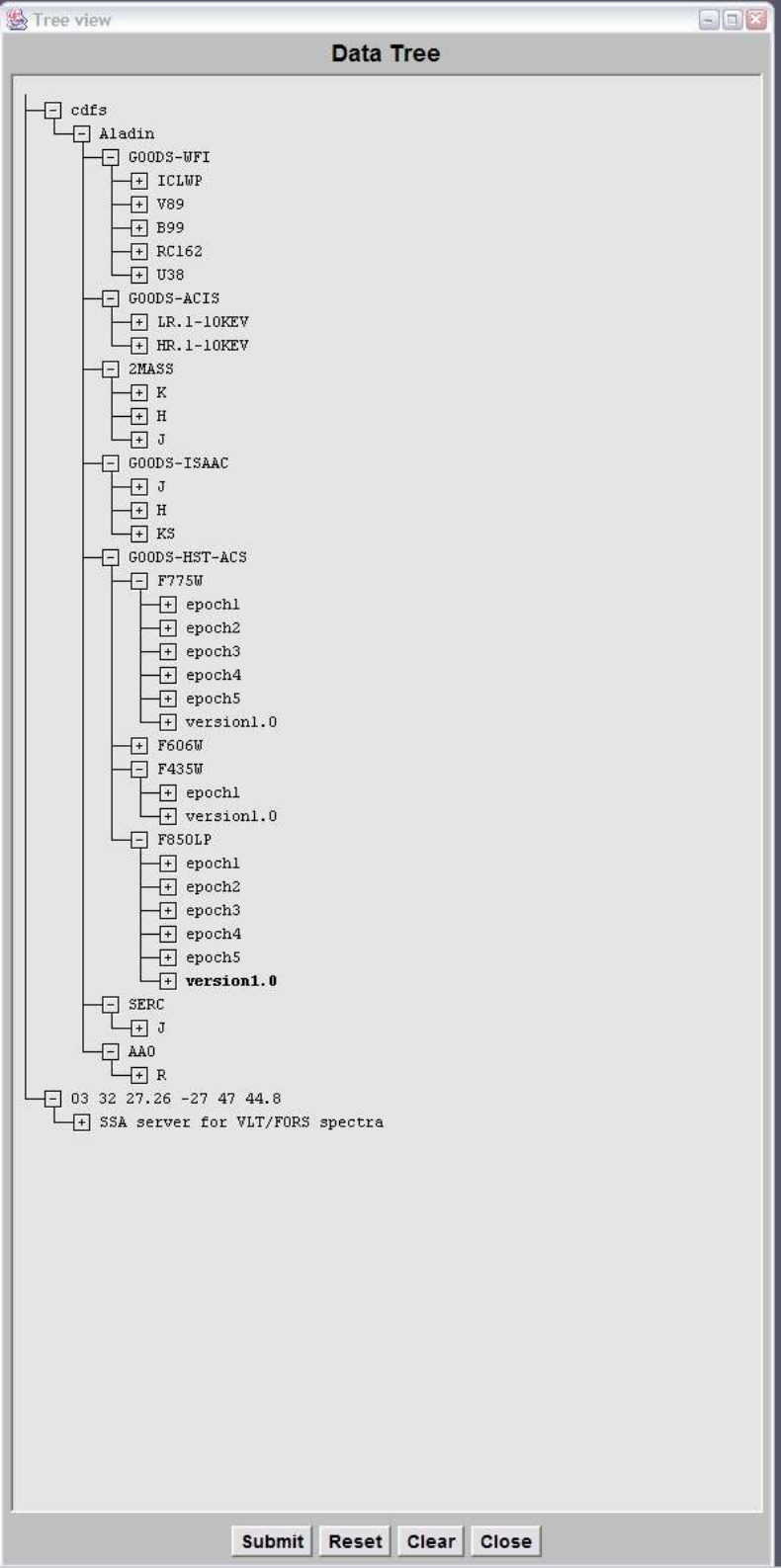


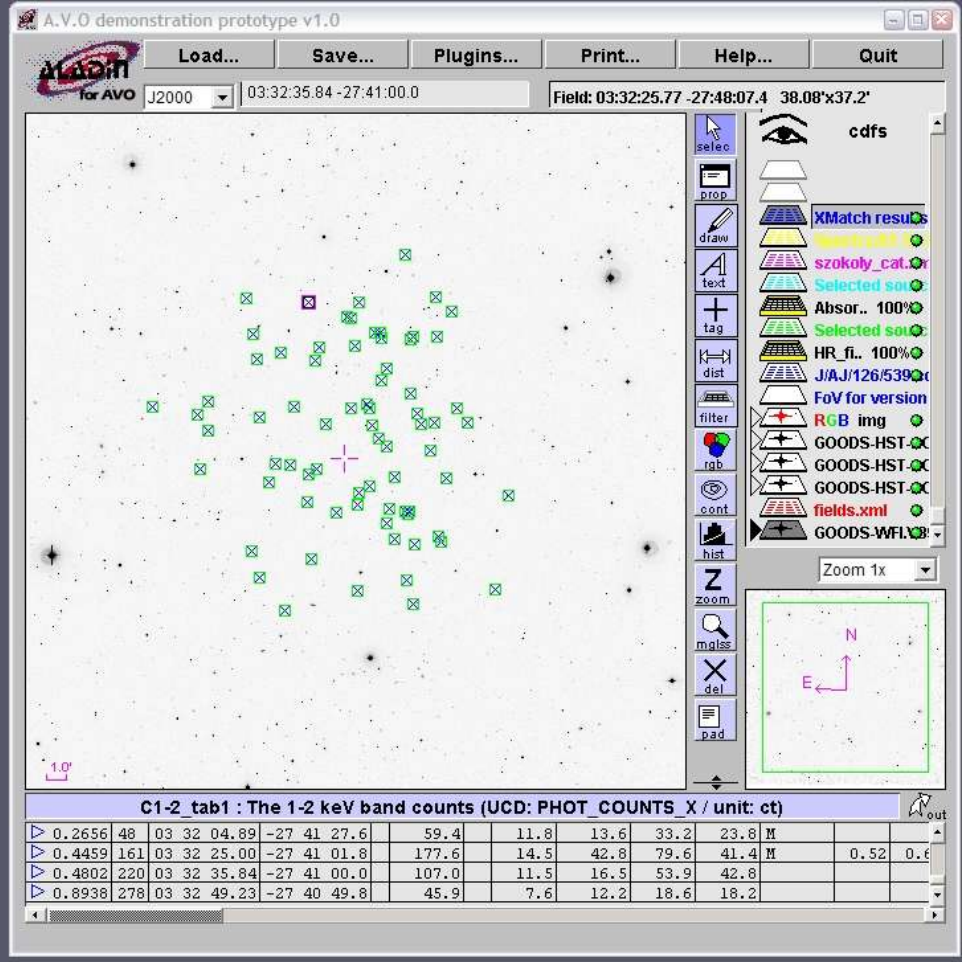


A cross-match service for catalog planes is available from the Plugins menu



Cross match of the selected absorbed sources and the Szokoly catalog using a threshold radius of 1.5”

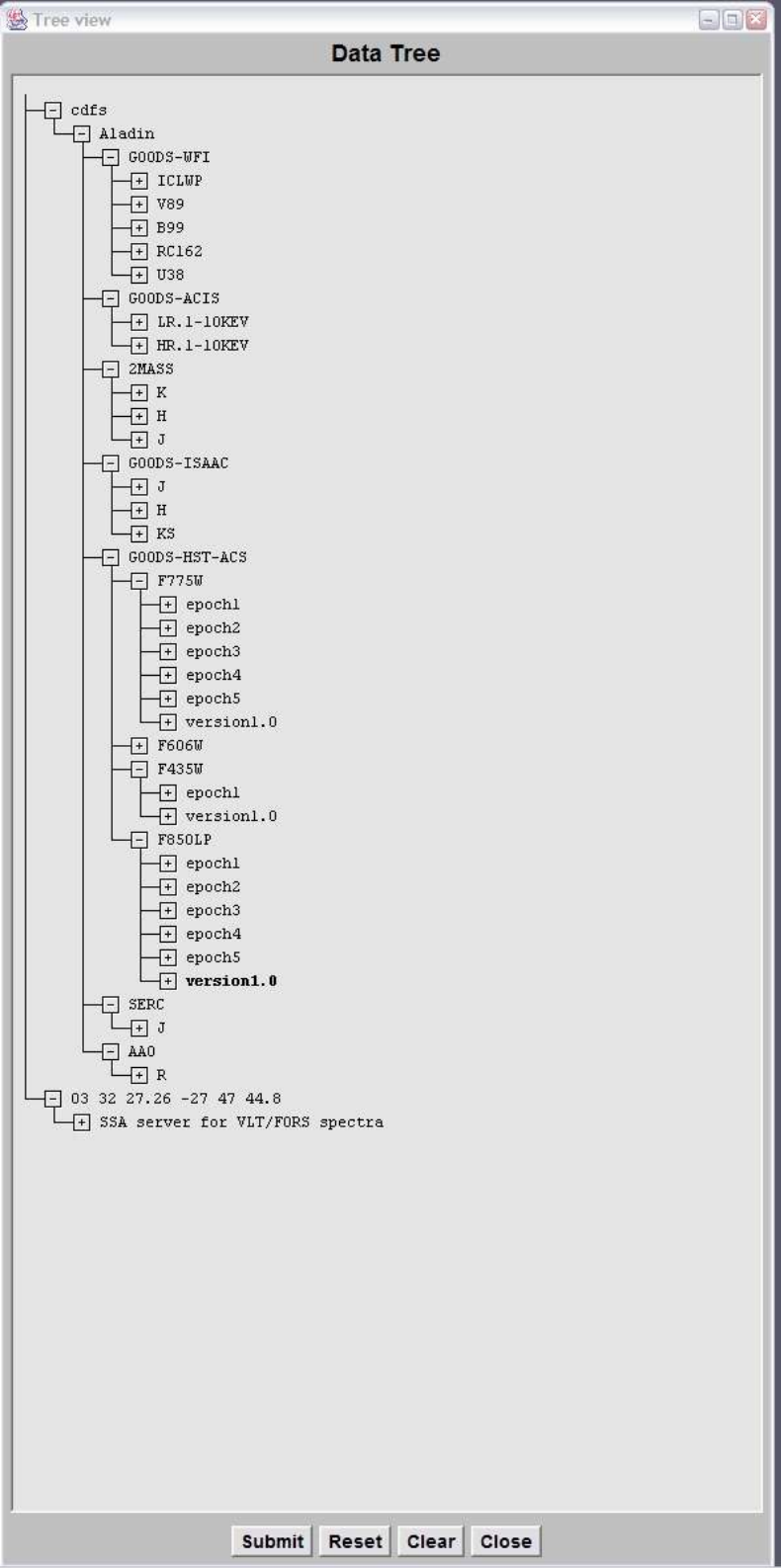


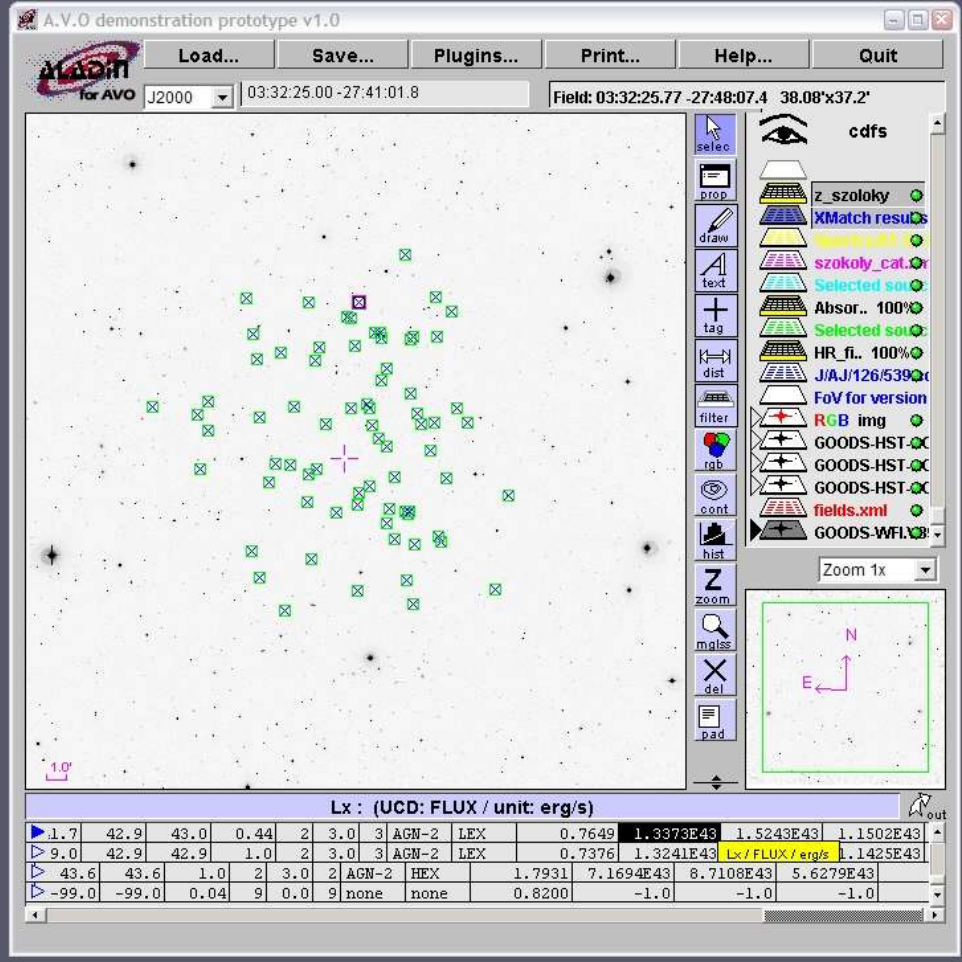


The cross match result consists of a new plane with the joined tables.

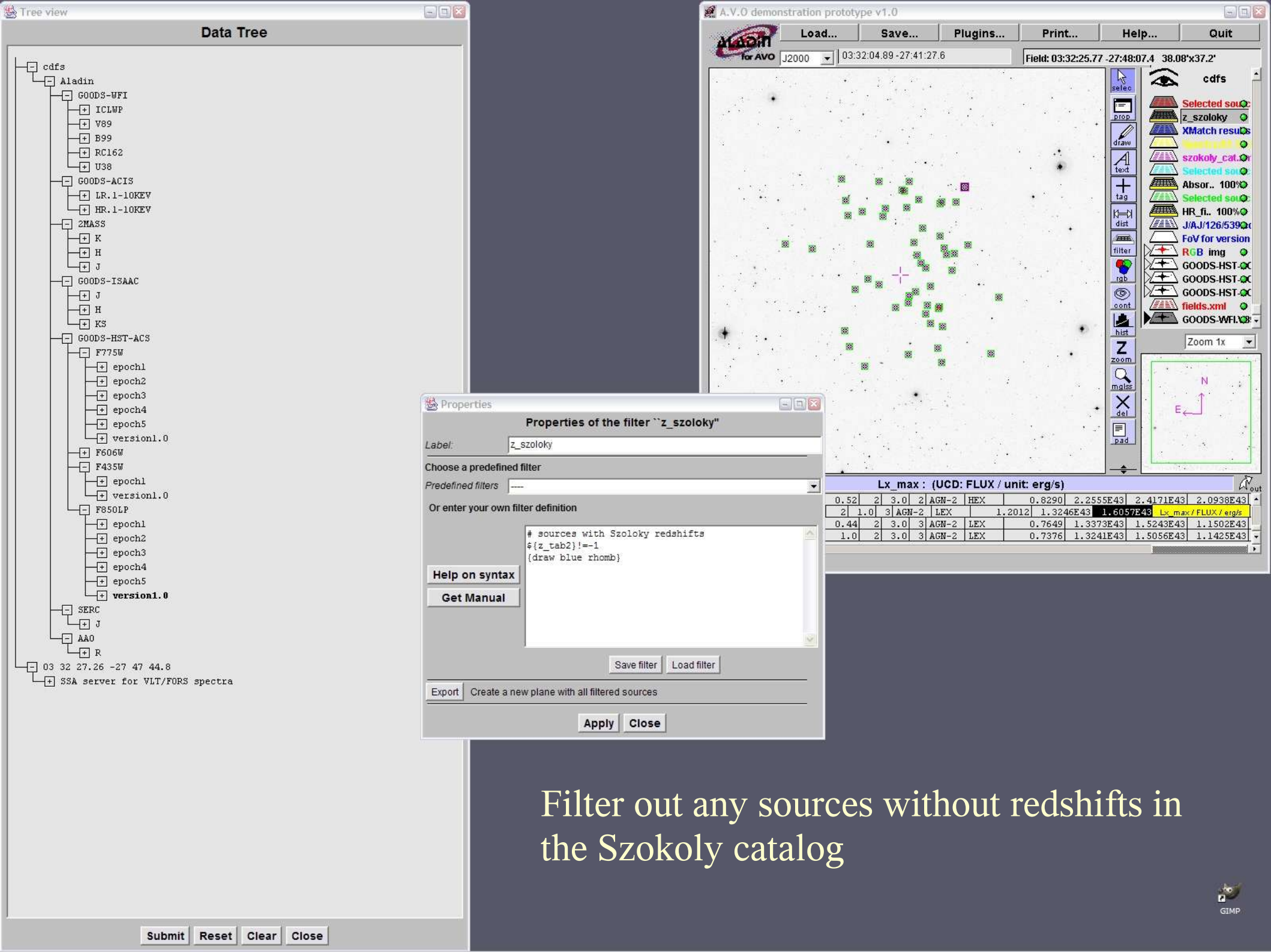
For our sources we now have a table with X-ray fluxes and redshifts

GIMP





Using the cross-match result we now calculate the X-ray luminosity, and corresponding uncertainty


Tree view
Data Tree
cdfs
Aladin
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epoch4
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SSA server for VLT/FORS spectra
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A.V.O demonstration prototype v1.0
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FoV for version
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GOODS-HST-
GOODS-HST-
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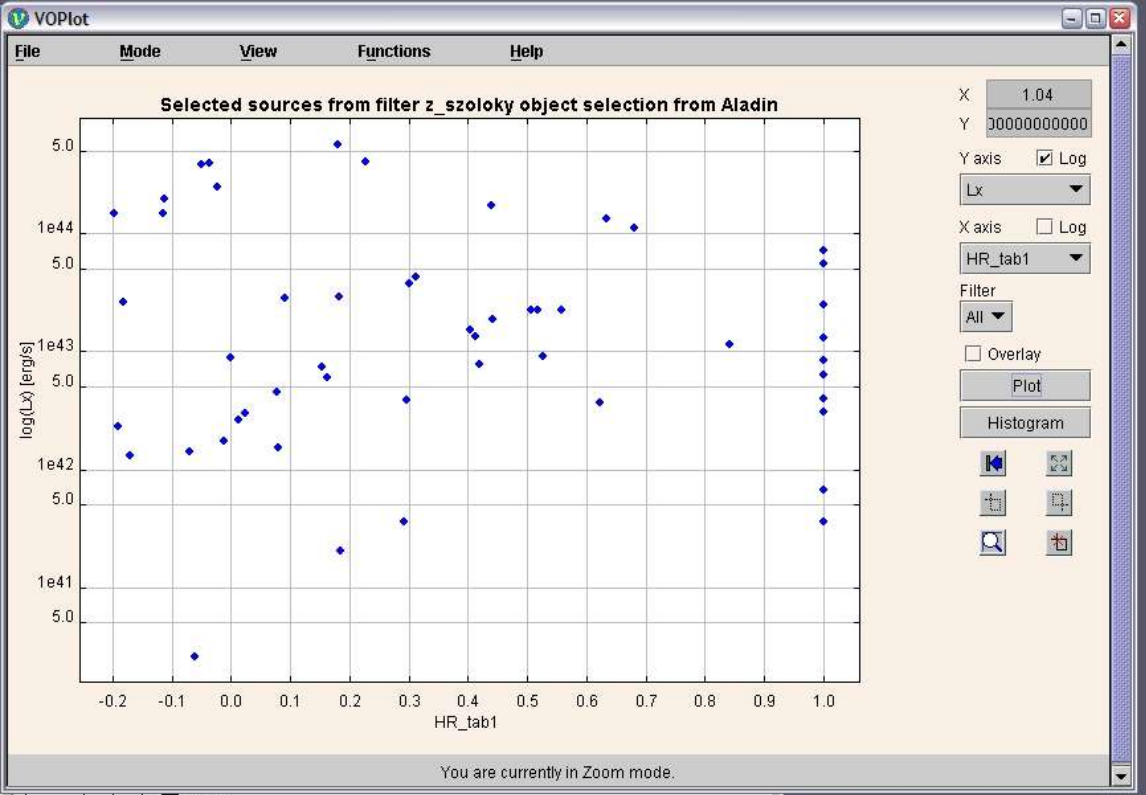
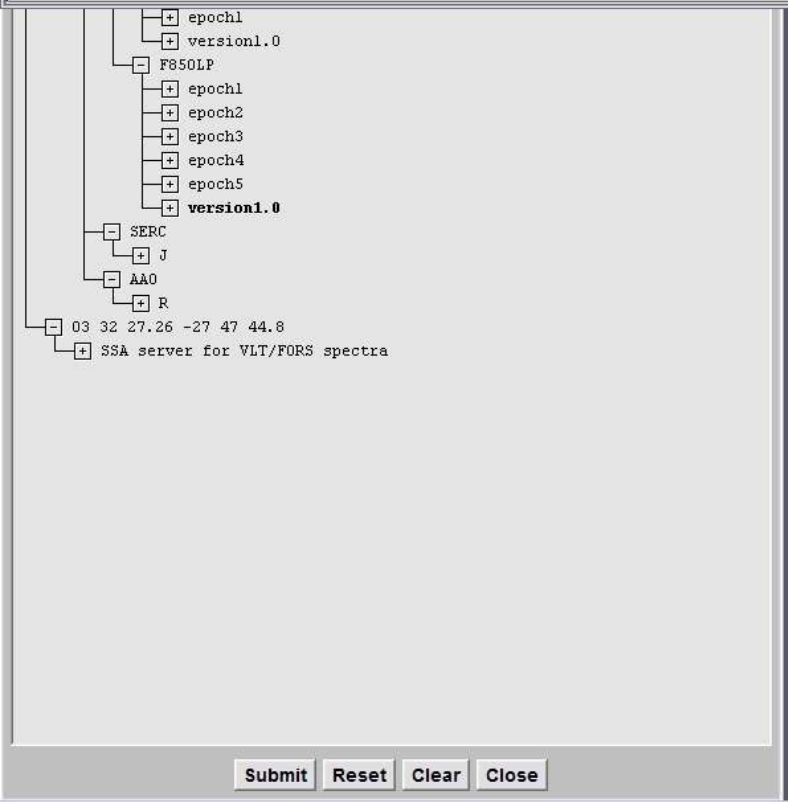
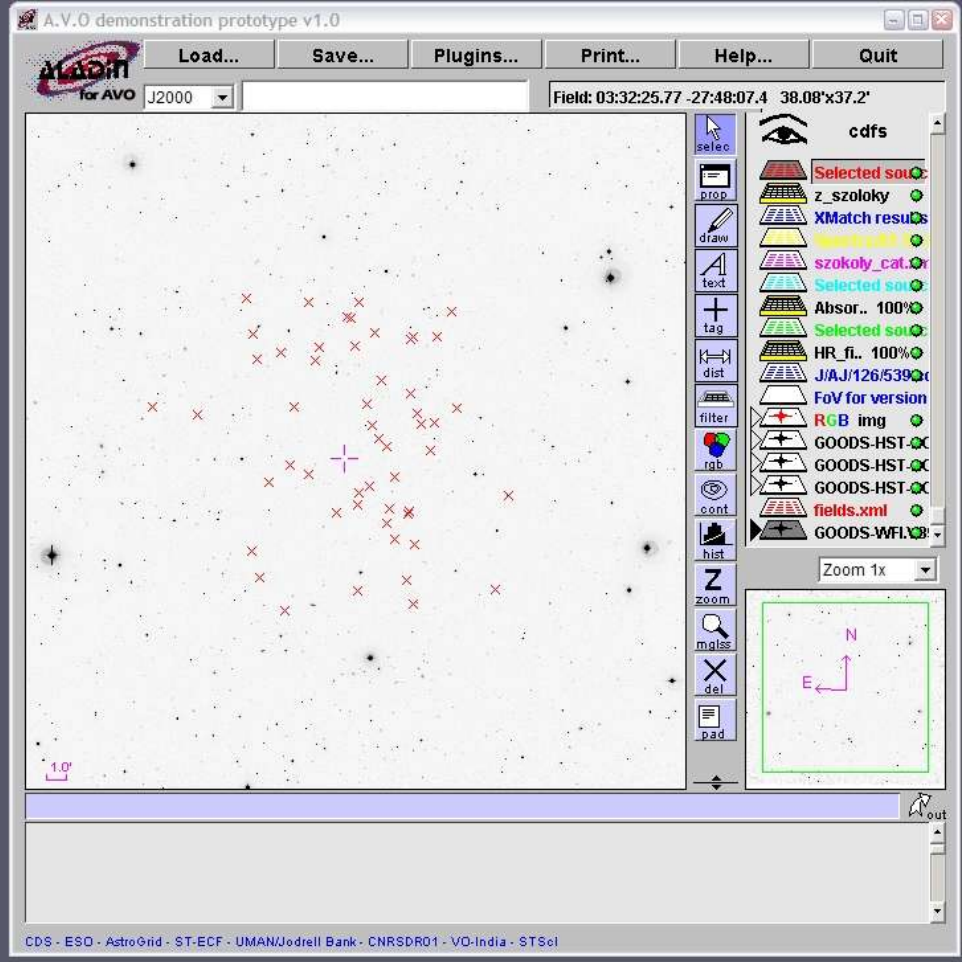
0.52 2 3.0 2 AGN-2 HEX 0.8290 2.2555E43 2.4171E43 2.0938E43
2 1.0 3 AGN-2 LEX 1.2012 1.3246E43 1.6057E43 Lx_max / FLUX / erg/s
0.44 2 3.0 3 AGN-2 LEX 0.7649 1.3373E43 1.5243E43 1.1502E43
1.0 2 3.0 3 AGN-2 LEX 0.7376 1.3241E43 1.5056E43 1.1425E43
Properties
Properties of the filter ``z_szoloky"
Label:
z_szoloky
Choose a predefined filter
Predefined filters

Or enter your own filter definition
sources with Szoloky redshifts
${z_tab2}!=-1
{draw blue rhomb}
Help on syntax
Get Manual
Save filter
Load filter
Export
Create a new plane with all filtered sources
Apply
Close
Filter out any sources without redshifts in the Szokoly catalog
GIMP



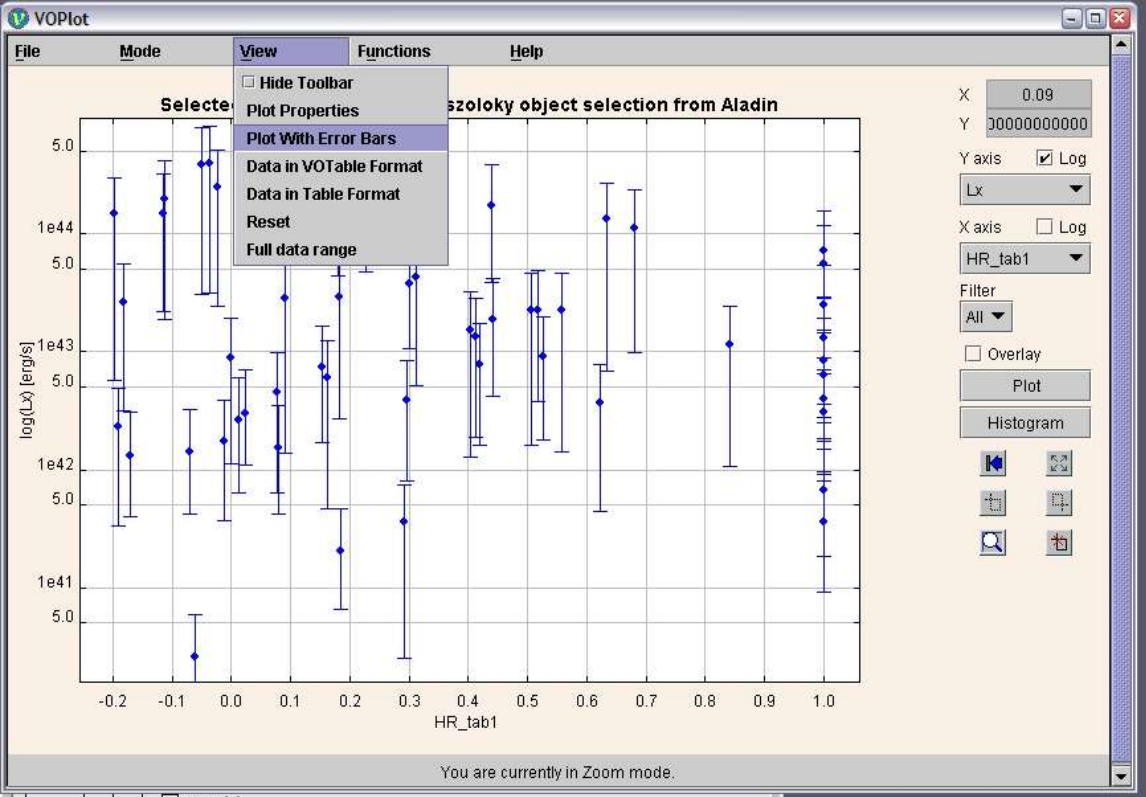


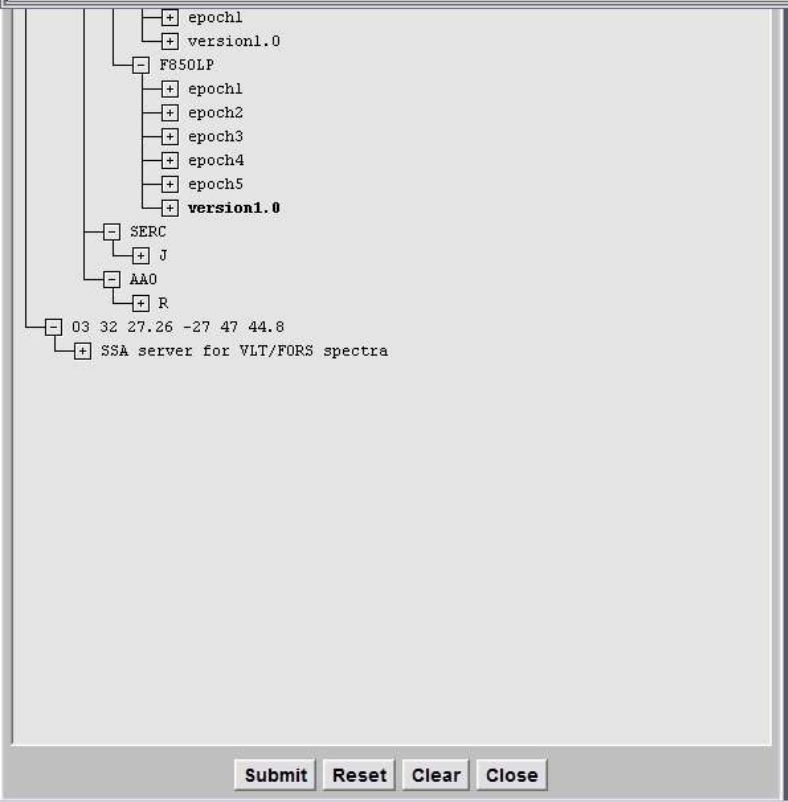


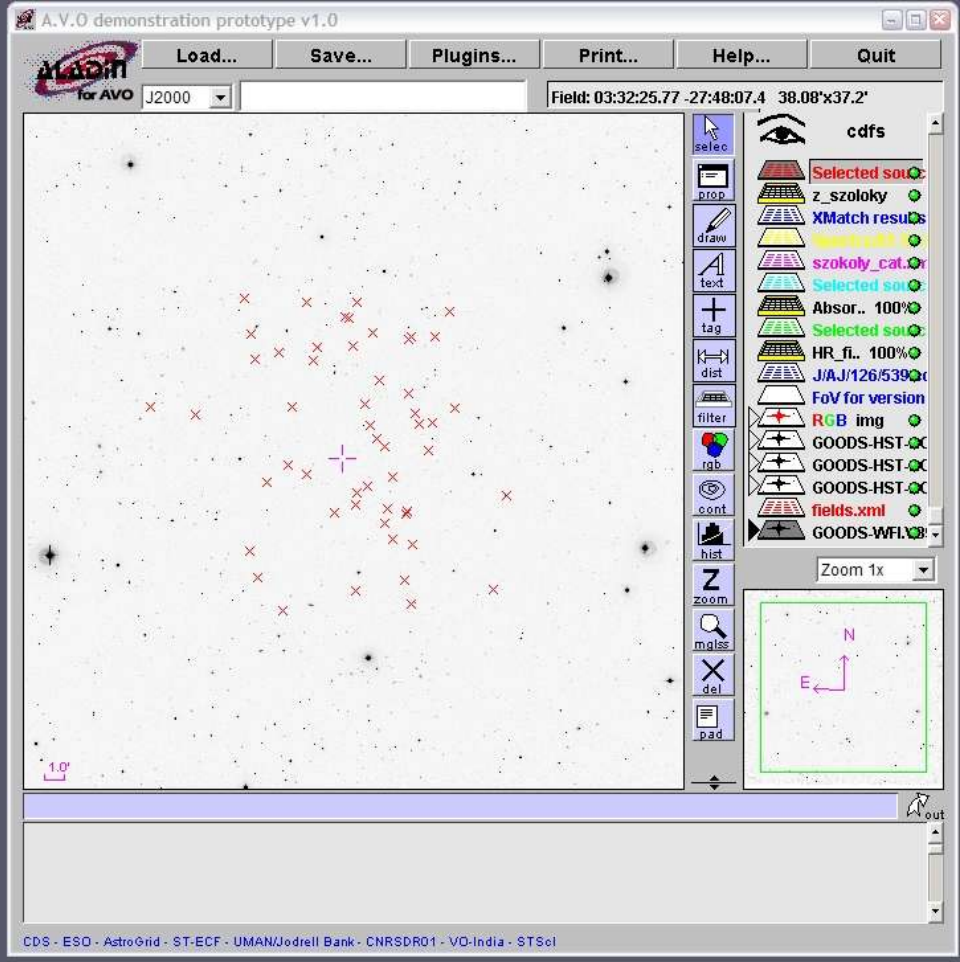
The VOPlot tool in the plugin menu allows plotting of columns from catalog planes

Here we plot the X-ray luminosity against the hardness ratio

GIMP

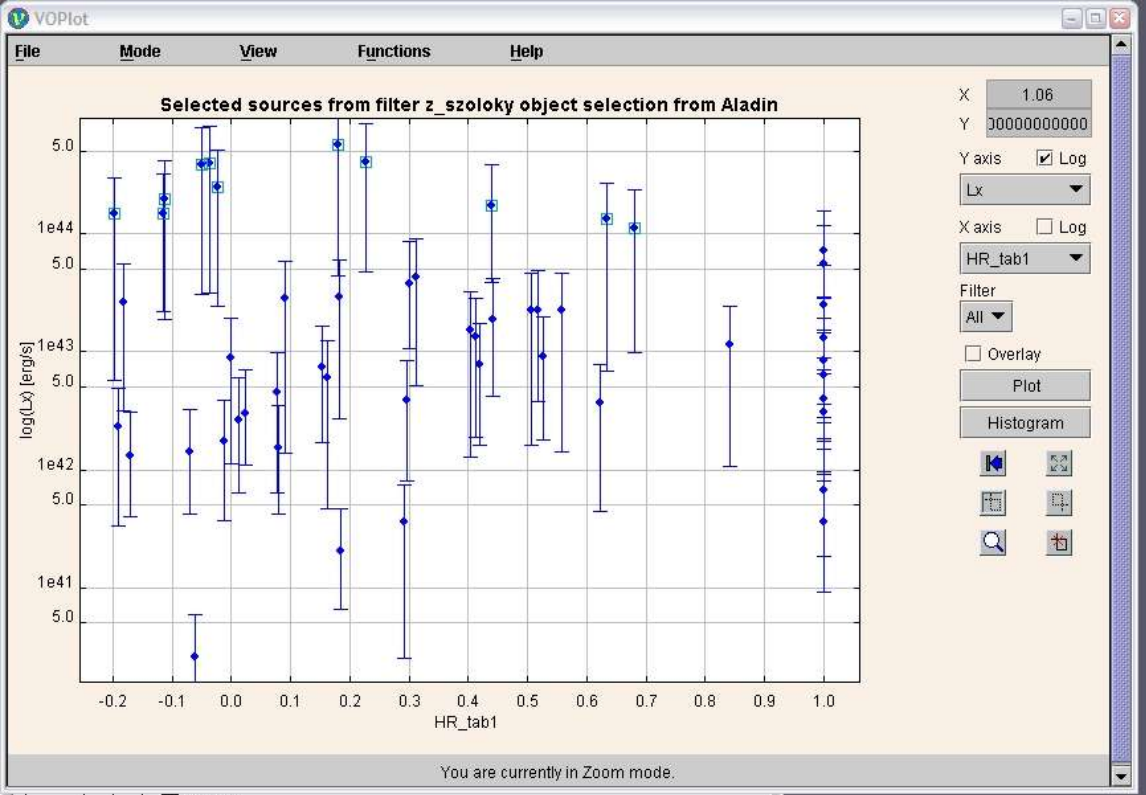


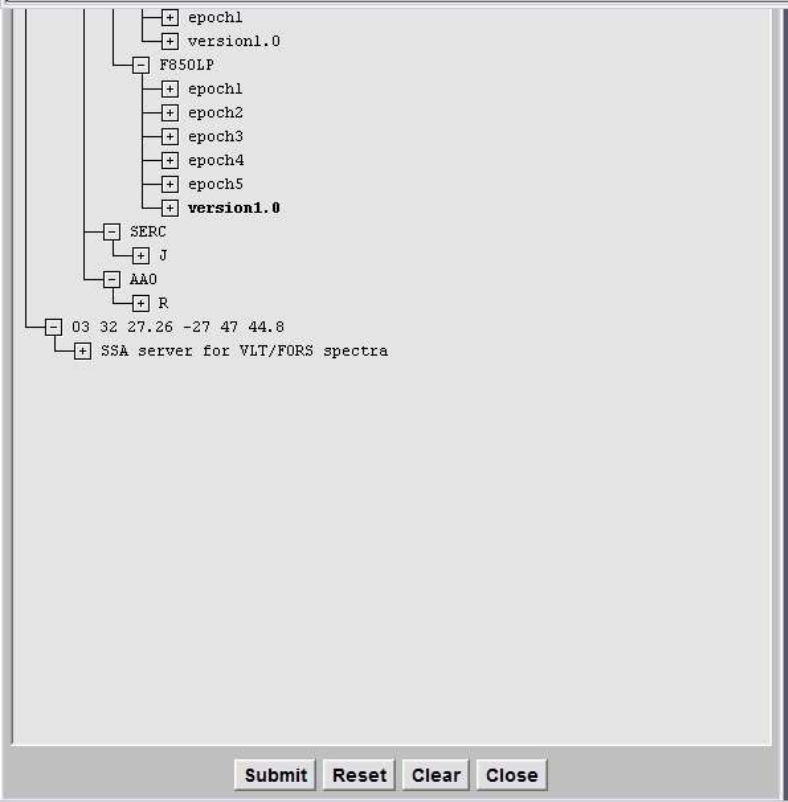


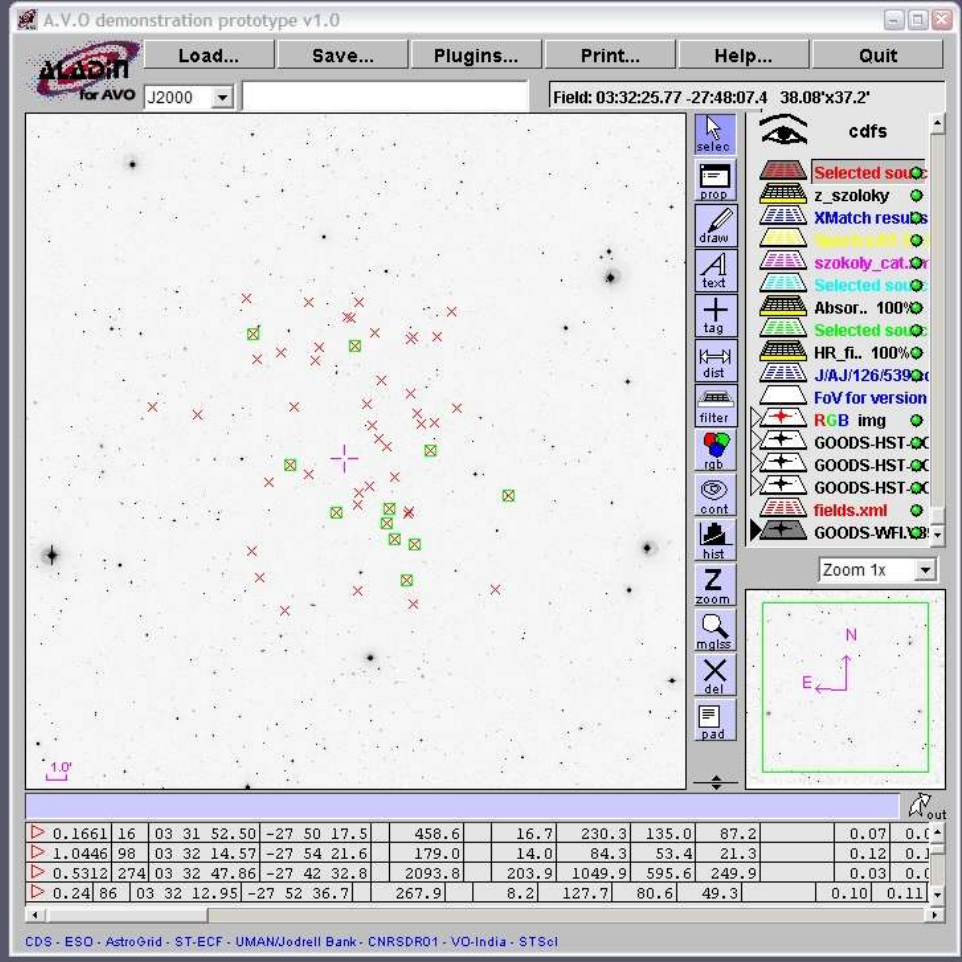


Error bars may be plotted using the interface in the View menu

GIMP





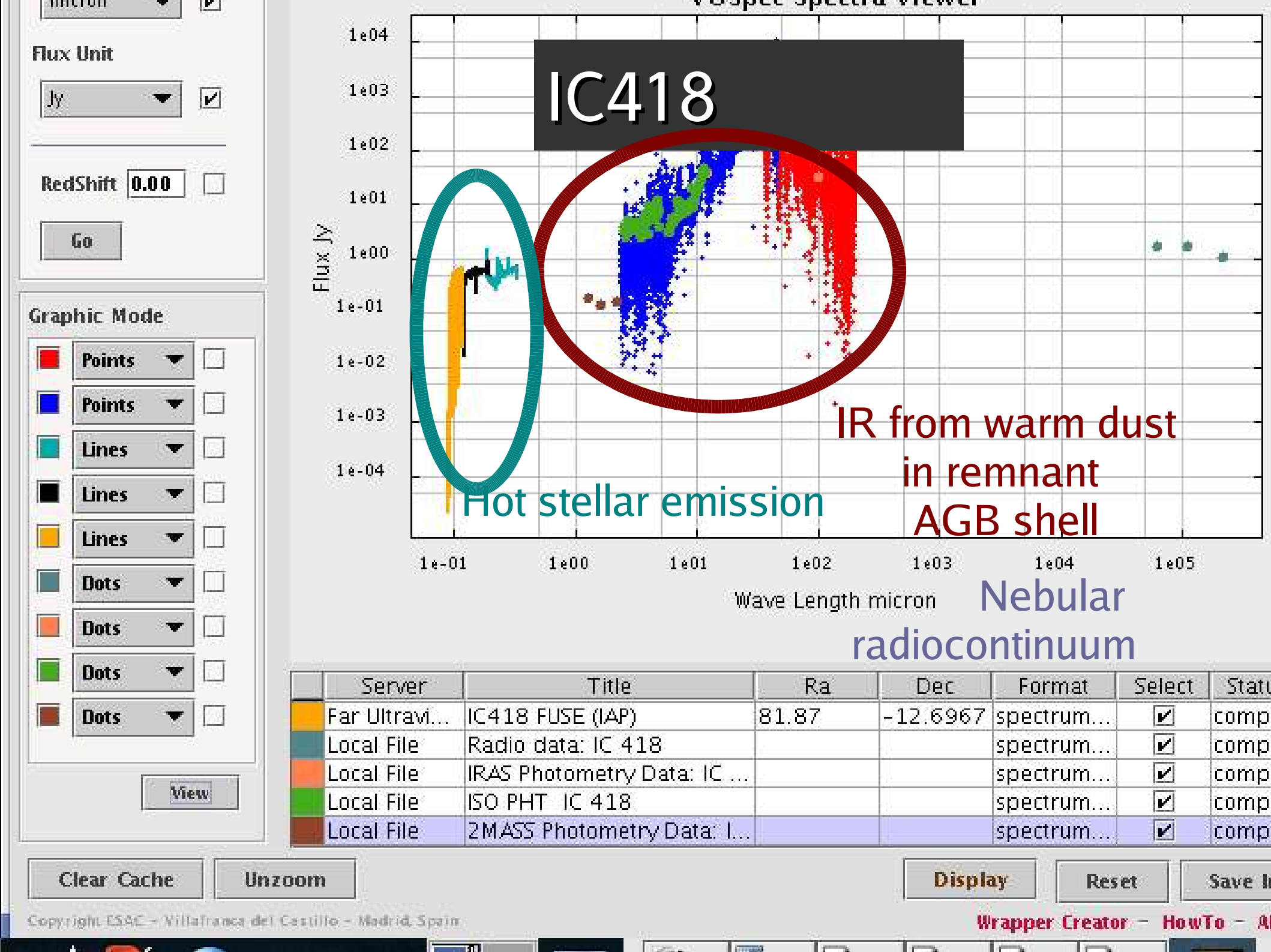


The VOPlot 'select points' mode shows the selected points highlighted on the image

Here we show the locations of all the sources with Lx>10^44: our objects of interest:

Type 2 QSO's.

Using VOSpec

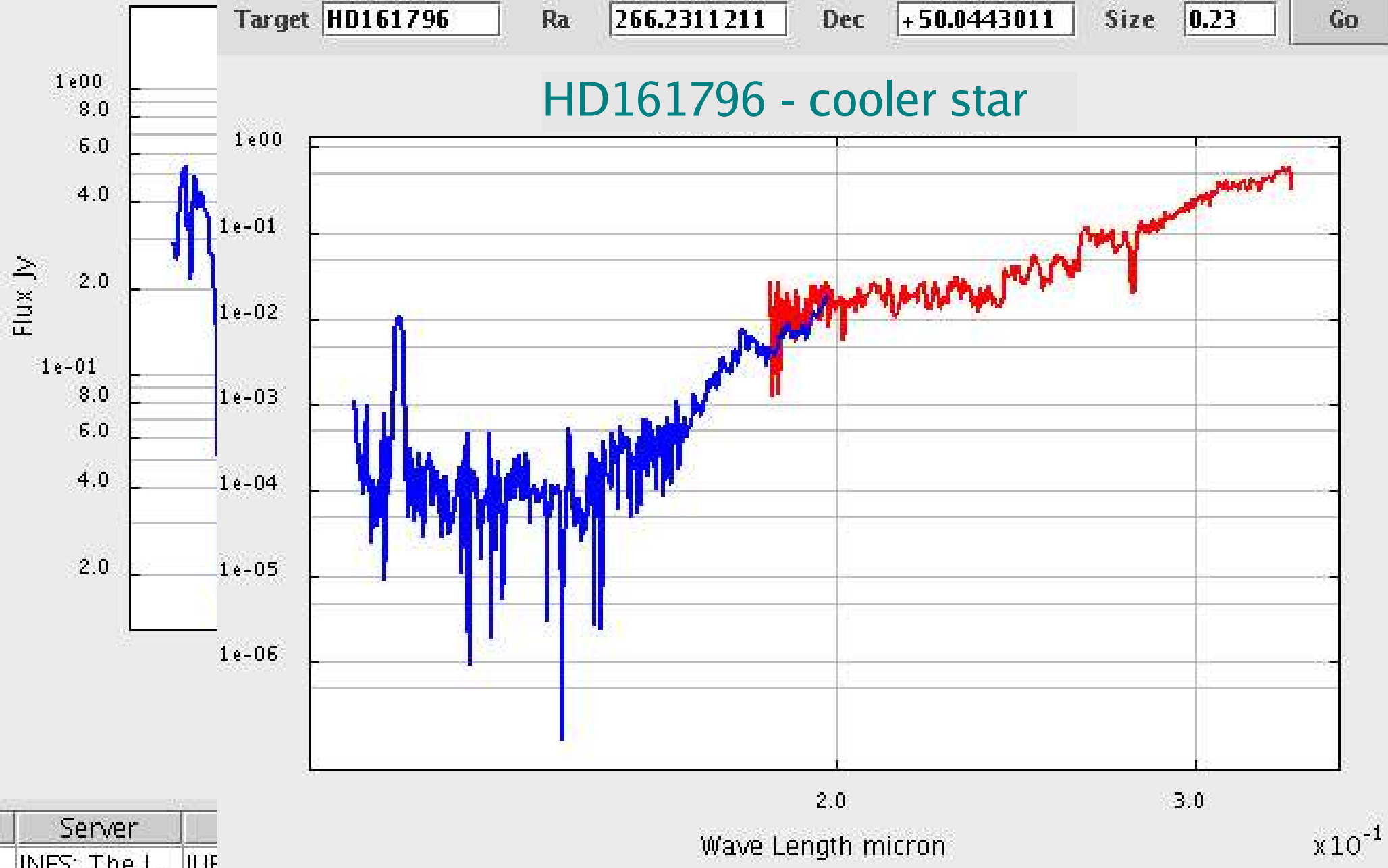

Flux Unit
Jy
RedShift 0.00
Go
Graphic Mode
Points
Points
Lines
Lines
Lines
Dots
Dots
Dots
Dots
View
IC418
Flux Jy
1e04
1e03
1e02
1e01
1e00
1e-01
1e-02
1e-03
1e-04
1e-01
1e00
1e01
1e02
1e03
1e04
1e05
Wave Length micron
Hot stellar emission
IR from warm dust
in remnant
AGB shell
Nebular
radiocontinuum
Server
Title
Ra
Dec
Format
Select
Far Ultravi...
IC418 FUSE (IAP)
81.87
-12.6967
spectrum...
Local File
Radio data: IC 418
spectrum...
Local File
IRAS Photometry Data: IC ...
spectrum...
Local File
ISO PHT IC 418
spectrum...
Local File
2MASS Photometry Data: I...
spectrum...
Clear Cache
Unzoom
Display
Reset
Wrapper Creator
HowTo

Target IC418 Ra 81.8675156 Dec -12.6972958 Size 0.1 Go

IC418 - hot uv stellar emission

Target HD161796 Ra 266.2311211 Dec +50.0443011 Size 0.23 Go

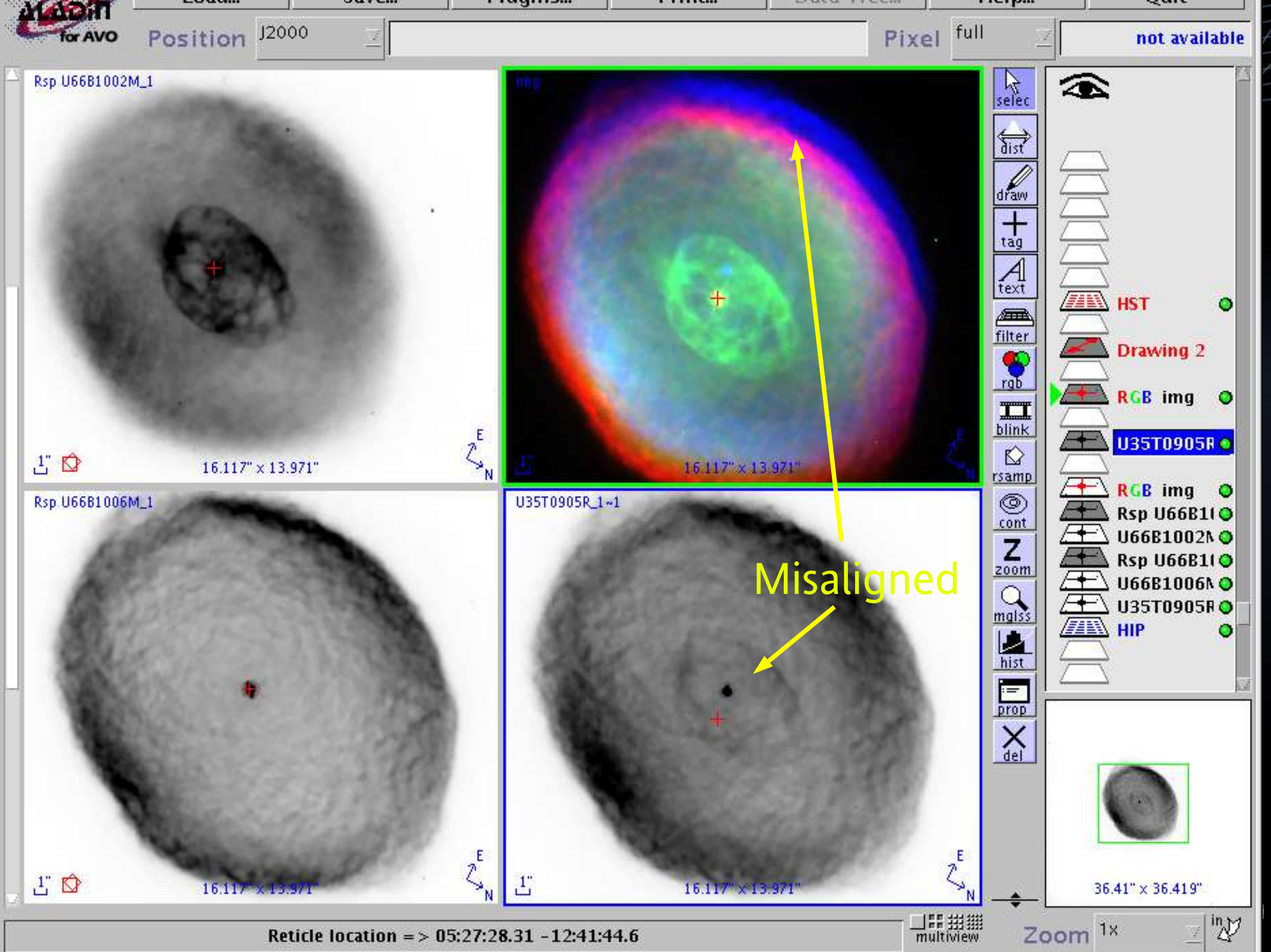
HD161796 - cooler star

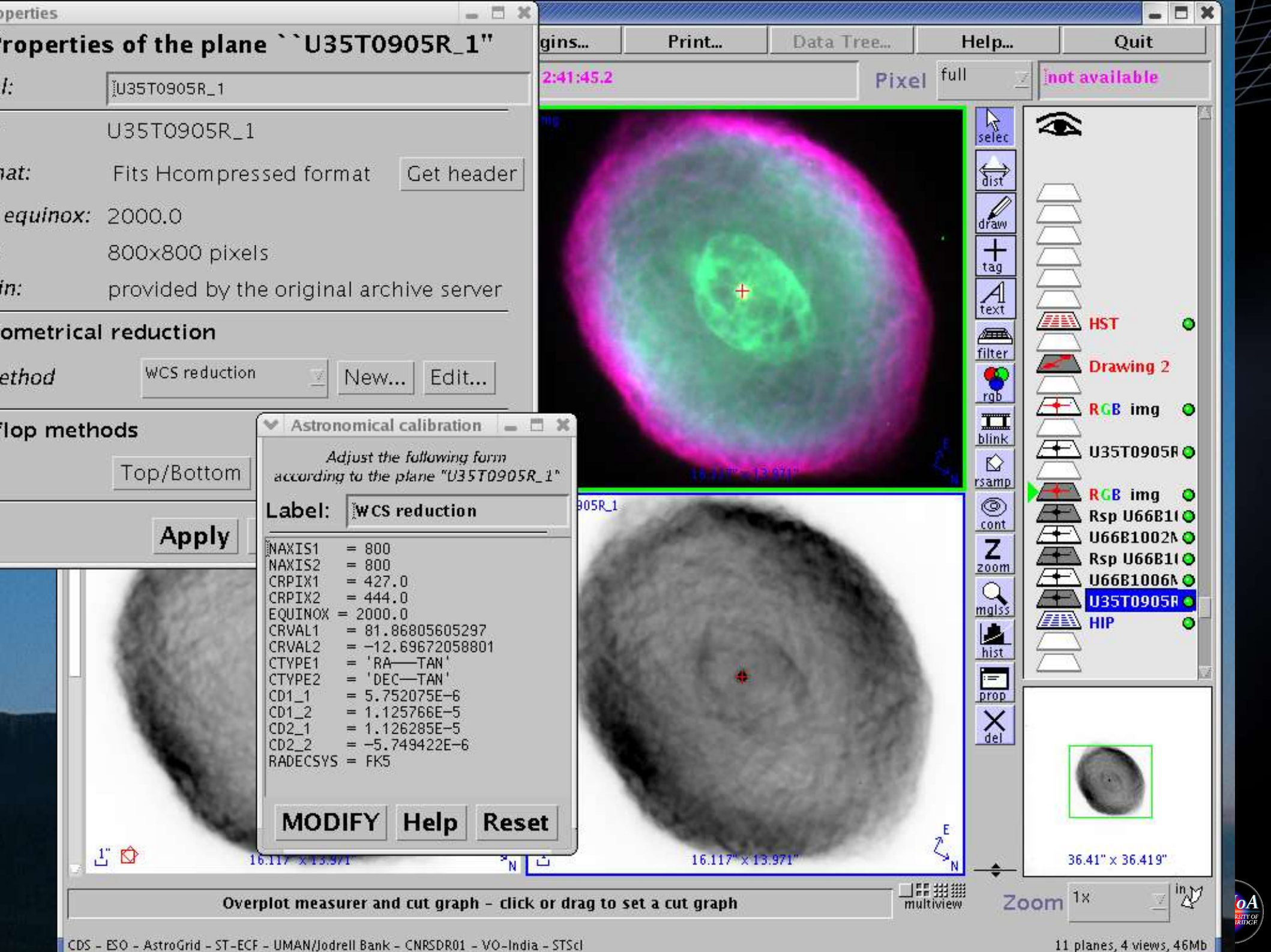


Server	
INES: The I...	IUE
INES: The I...	IUE/INES Spectrum: SWP431... 81.8675 -12.69... spectru... ready

Narrow-band imaging of IC418

- Review of VO Client Side Tools
- Construct false-colour image
- Make use of the HST archive
  - [N II] (F658N)
    - Low excitation line
  - H-alpha (F656N)
  - [O III] (F502N)
    - Higher excitation line
- Simple over lay of images shows mis-alignment
  - Due to mismatch in the astrometric reductions
- Use of Aladin to enable astrometric alignment
  - And create the final RGB image ...


Position
J2000
Pixel
full
not available
Rsp U66B1002M_1
16.117" x 13.971"
U35T0905R_1~1
Misaligned
Rsp U66B1006M_1
16.117" x 13.971"
HST
Drawing 2
RGB img
U35T0905R
RGB img
HIP
36.41" x 36.419"
Reticle location => 05:27:28.31 -12:41:44.6
Zoom
1x


roperties of the plane ``U35T0905R_1"
U35T0905R_1
Fits Hcompressed format
Get header
2000.0
800x800 pixels
provided by the original archive server
ometrical reduction
WCS reduction
New...
Edit...
flop methods
Top/Bottom
Apply
Astronomical calibration
Adjust the following form
according to the plane "U35T0905R_1"
Label:
WCS reduction
NAXIS1 = 800
NAXIS2 = 800
CRPIX1 = 427.0
CRPIX2 = 444.0
EQUINOX = 2000.0
CRVAL1 = 81.86805605297
CRVAL2 = -12.69672058801
CTYPE1 = 'RA---TAN'
CTYPE2 = 'DEC--TAN'
CD1_1 = 5.752075E-6
CD1_2 = 1.125766E-5
CD2_1 = 1.126285E-5
CD2_2 = -5.749422E-6
RADECSYS = FK5
MODIFY
Help
Reset
Print...
Data Tree...
Help...
Quit
Pixel
full
not available
HST
Drawing 2
RGB img
U35T0905R
RGB img
HIP
16.117" x 13.971"
36.41" x 36.419"
Overplot measurer and cut graph - click or drag to set a cut graph
multiview
Zoom
1x
CDS - ESO - AstroGrid - ST-ECF - UMAN/Jodrell Bank - CNRSDR01 - VO-India - STScI
11 planes, 4 views, 46Mb

Lecture 5: Acknowledgements + Refs

- Slides 5-8 describing some new Aladin features from Allen: see http://www.euro-vo.org/internal/Avo/SwgMeeting06/tools.pdf
- Slides 26-53 are from Mark Allen and illustrate the 'extragalactic' science case demonstration: see http://www.euro-vo.org/twiki/bin/view/Avo/SwgMeeting04
  - You can follow that demonstration using the detailed instructions given http://www.euro-vo.org/twiki/bin/view/Avo/ExtragalacticScenario
  - The science paper (Padovani, Allen, Rosati, Walton, 2004) is at: http://ukads.nottingham.ac.uk/cgi-bin/nph-bib_query?bibcode=2004A%26A...424..545P&db_key=AST&high=412cbd1d6f00525
- Slides 54-58 due to Anita Richards – elements of the 'stellar' case from the AVO Jan 2005 demo – see http://www.euro-vo.org/twiki/bin/view/Avo/SwgMeeting06
- Other credits as noted in the individual slides.

Next Lecture:
Workflow based demonstrations