Astrometry in the VO?

Well… more “taking advantage” than “producing”…

Amelia Bayo

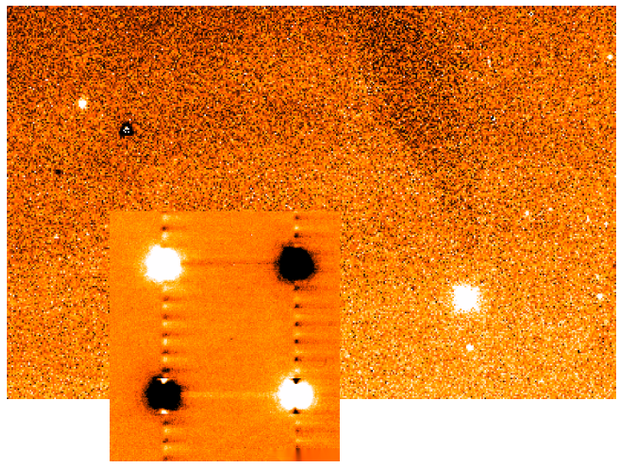
Disclaimer: some slides shamelessly stolen from E. Solano, or B. Vollmer

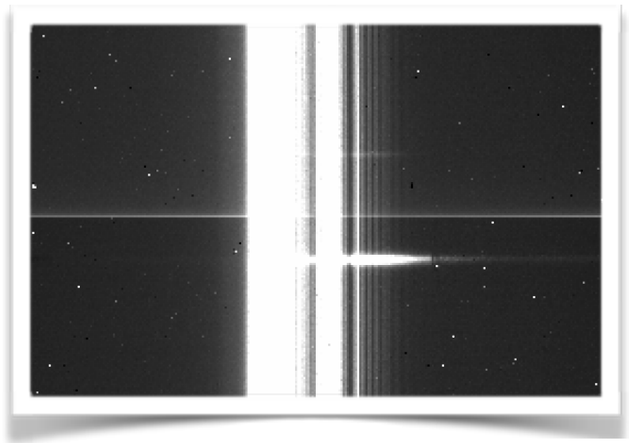
Outline

- What is that thing of the VO? Why would I need it?
- What kind of science cases related to astrometry have benefited from the VO initiative?
- Can I “do astrometry” in the VO?

What are “Astronomical data”??

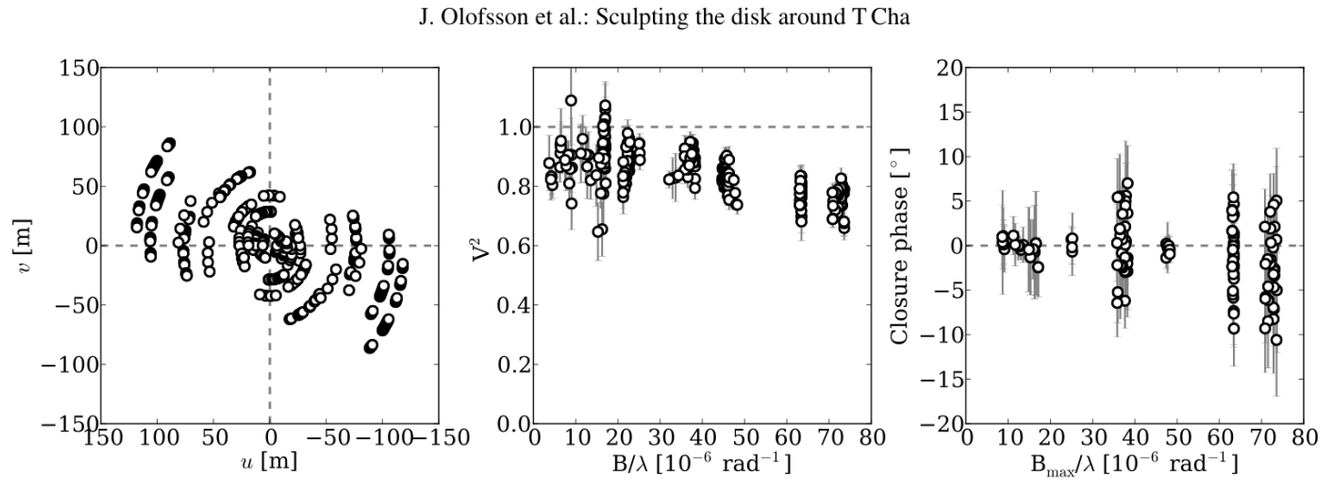
- Raw images





- 2-D spectra

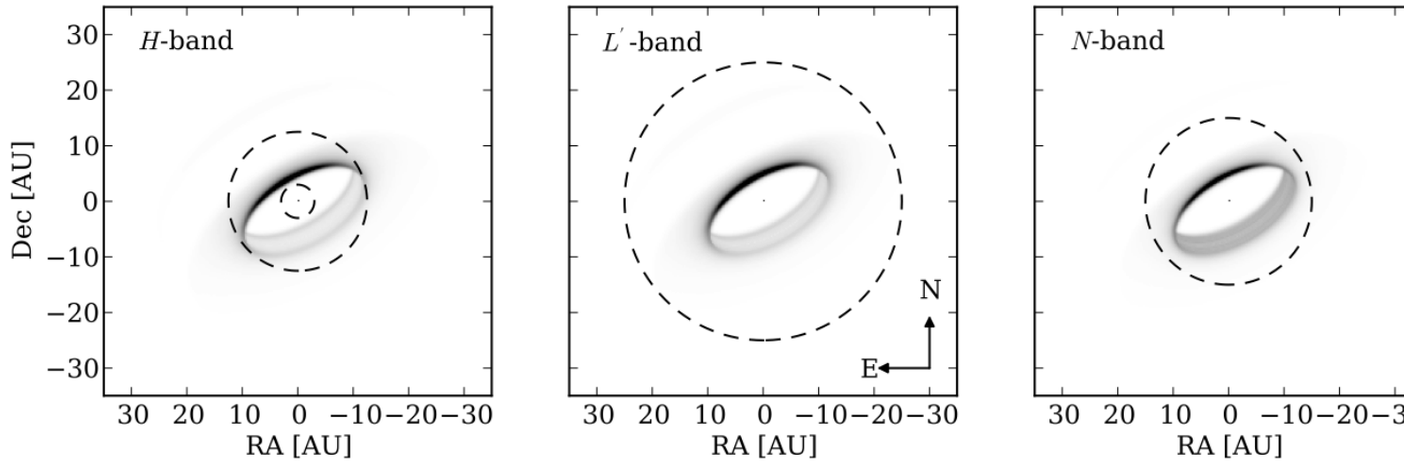
- A collection of visibilities from some interferometer?

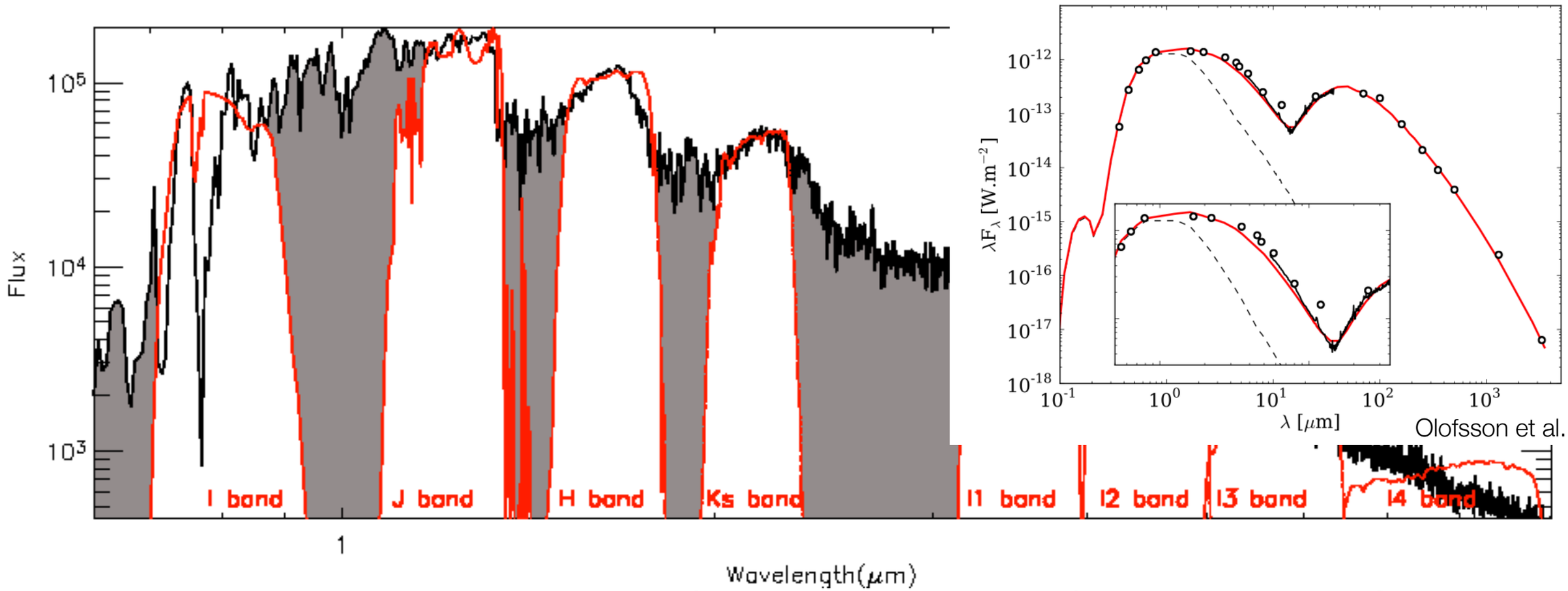


- Theoretical models: predicted images, fluxes, spectra, low or high resolution simulations of structures, etc.

What are “Astronomica

- Calibrated images with all metad





Olofsson et al. 2013

- Theoretical predictions of stellar/population spectra (what resolution? high? extremely low, -SED-), of a functional form for the behavior of a multiple system, etc.

What are “Astronomical data”??

- A catalog of parameters derived “directly” from one dataset, from several including literature, (line widths, velocities, strengths, integrated fluxes, periods, etc.).

- The results from some model fitting (not only derived parameters but goodness of the fit, etc.), some more “handwaving” or just general interpretation of the data in a broader context.

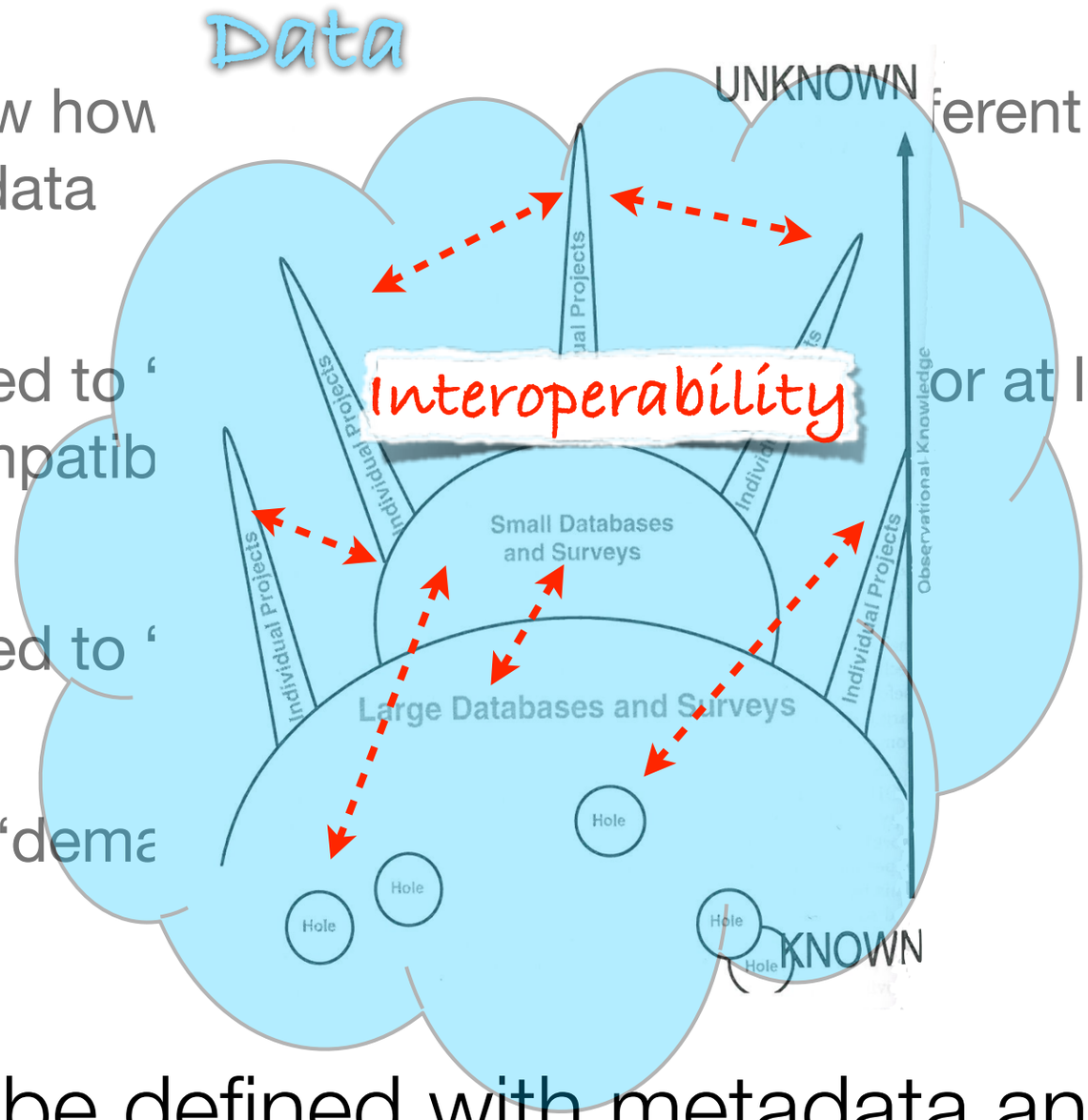
- Momentum maps, any kind of direct or “massaged” projections of a cube

- .....

All of the above!!!

How do we deal with this mess??

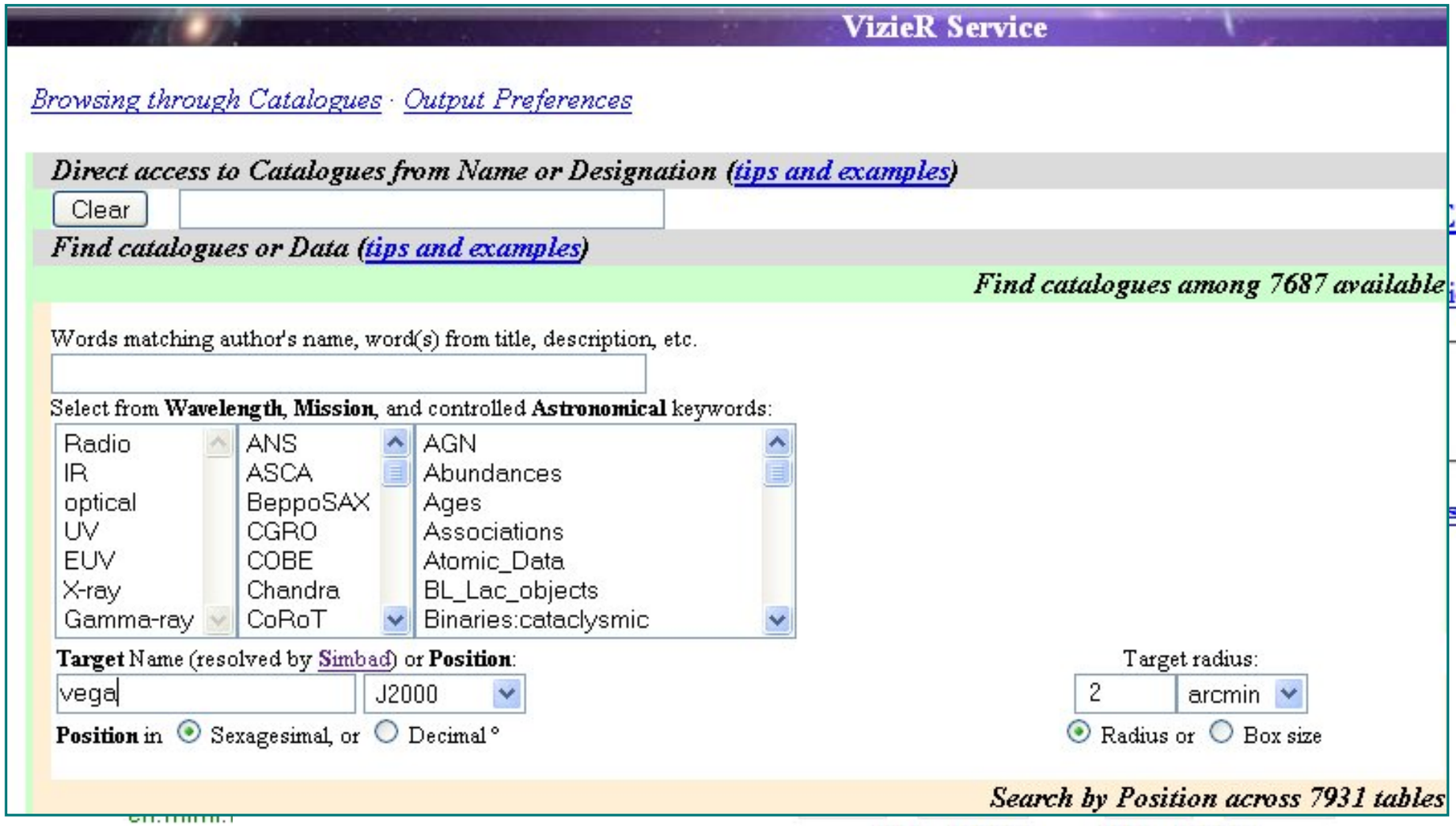
- One needs to know how ferent servers, for the different kinds of data
- Data providers need to ‘ or at least interpret the questions in a compatib
- Provided it to the “dema

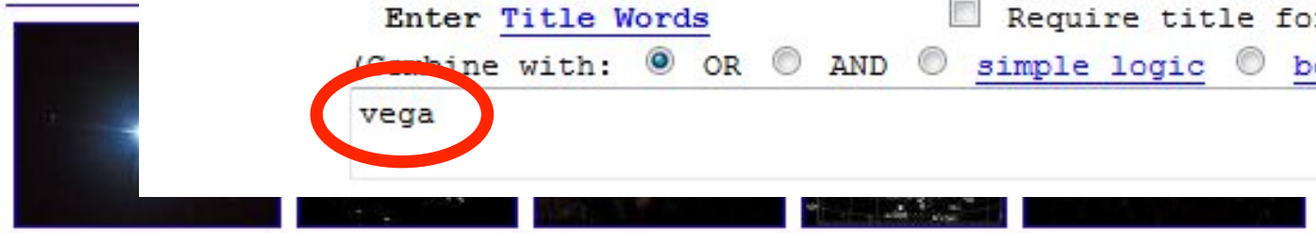


Data needs to be defined with metadata and standardization is needed for this exchange to be efficient!

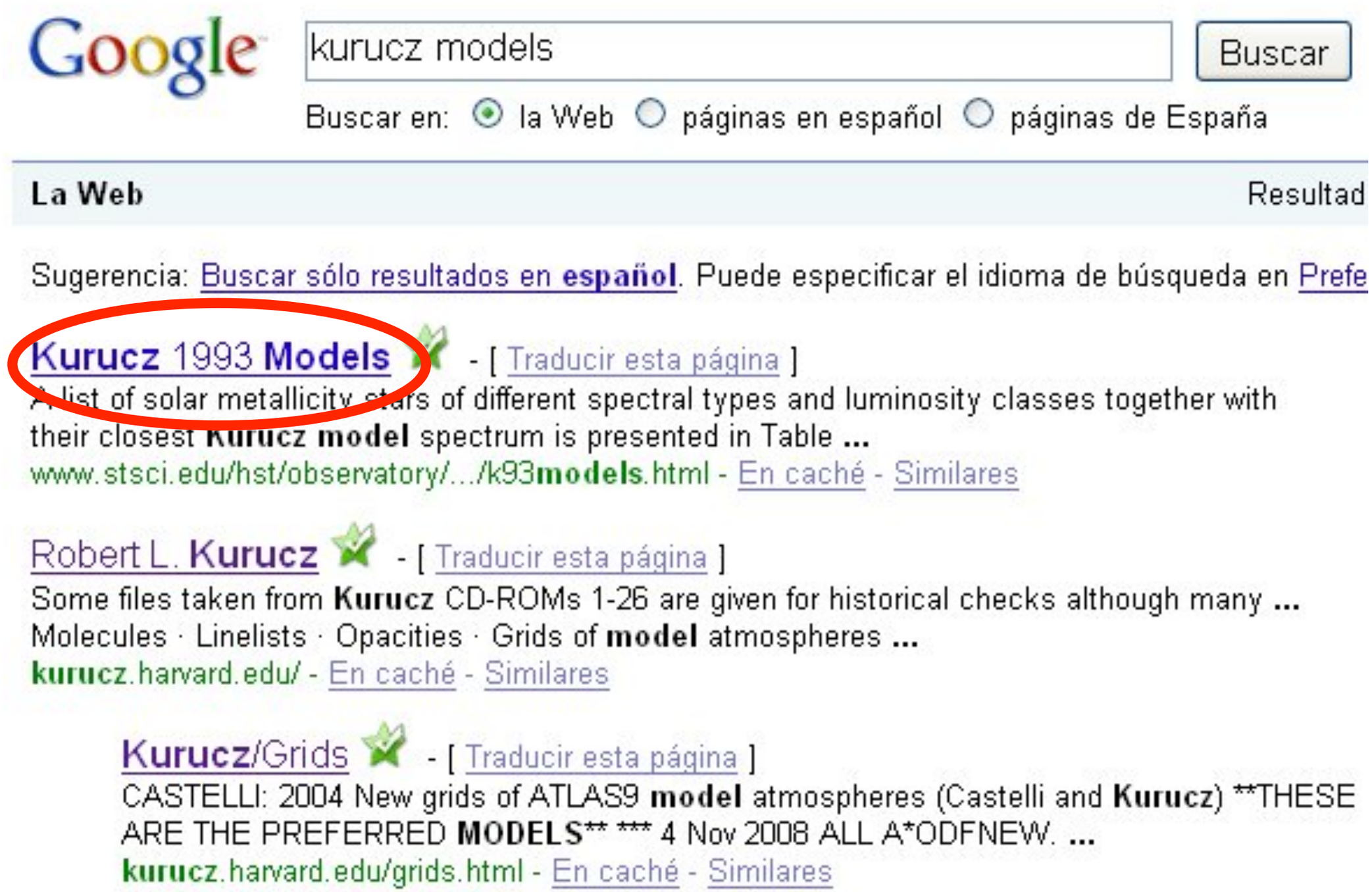
Why do we need a “Virtual” Observatory?

“I want to know everything about Vega”





Adding theoretical data: example



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[1] Available via anonymous FTP from ftp://calvin.physast.uga.edu/pub/NextGen or via the WWW URL http://dilbert.physast.uga.edu/~yeti.

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Table of Contents

Adding theoretical data: example

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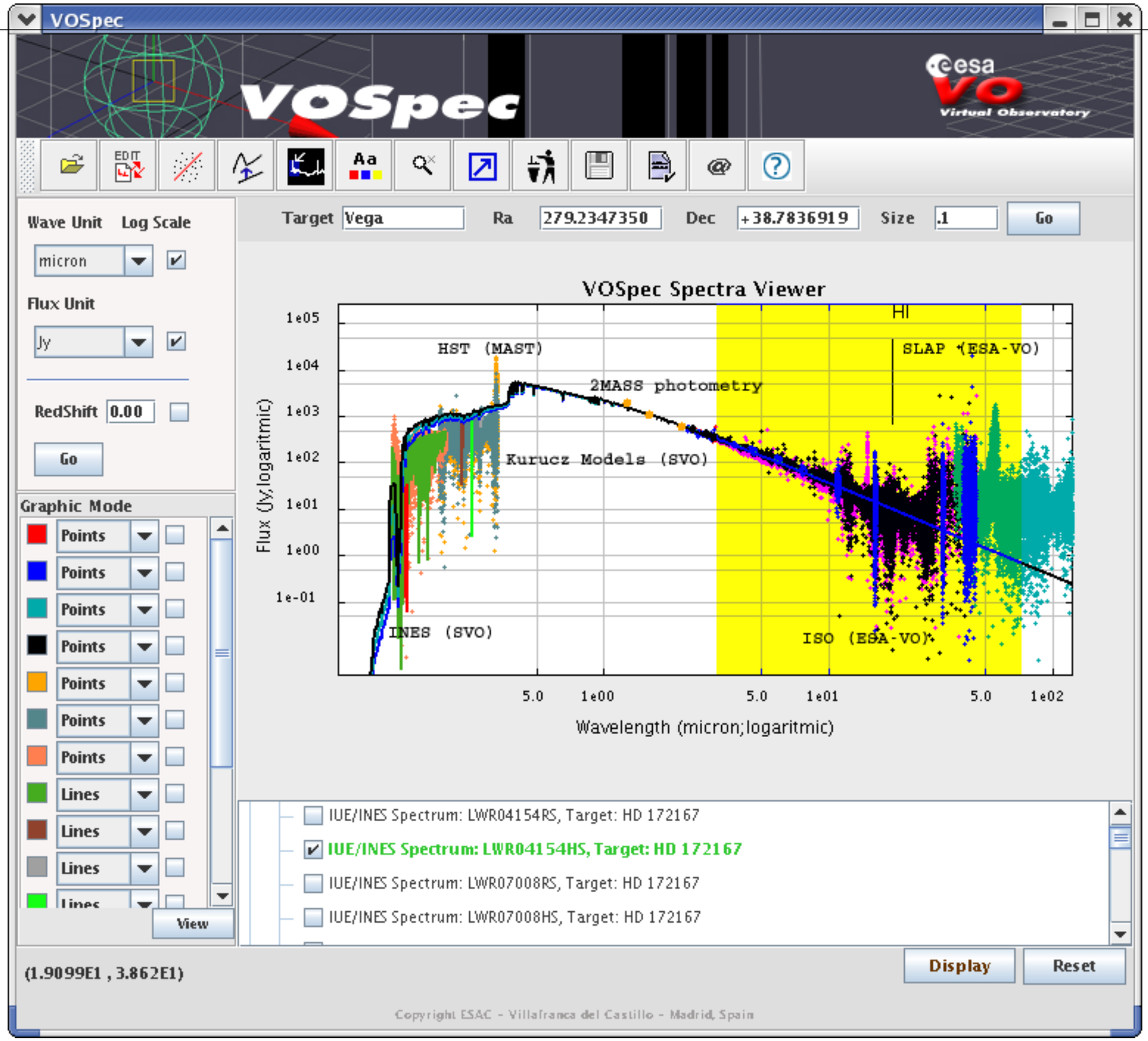
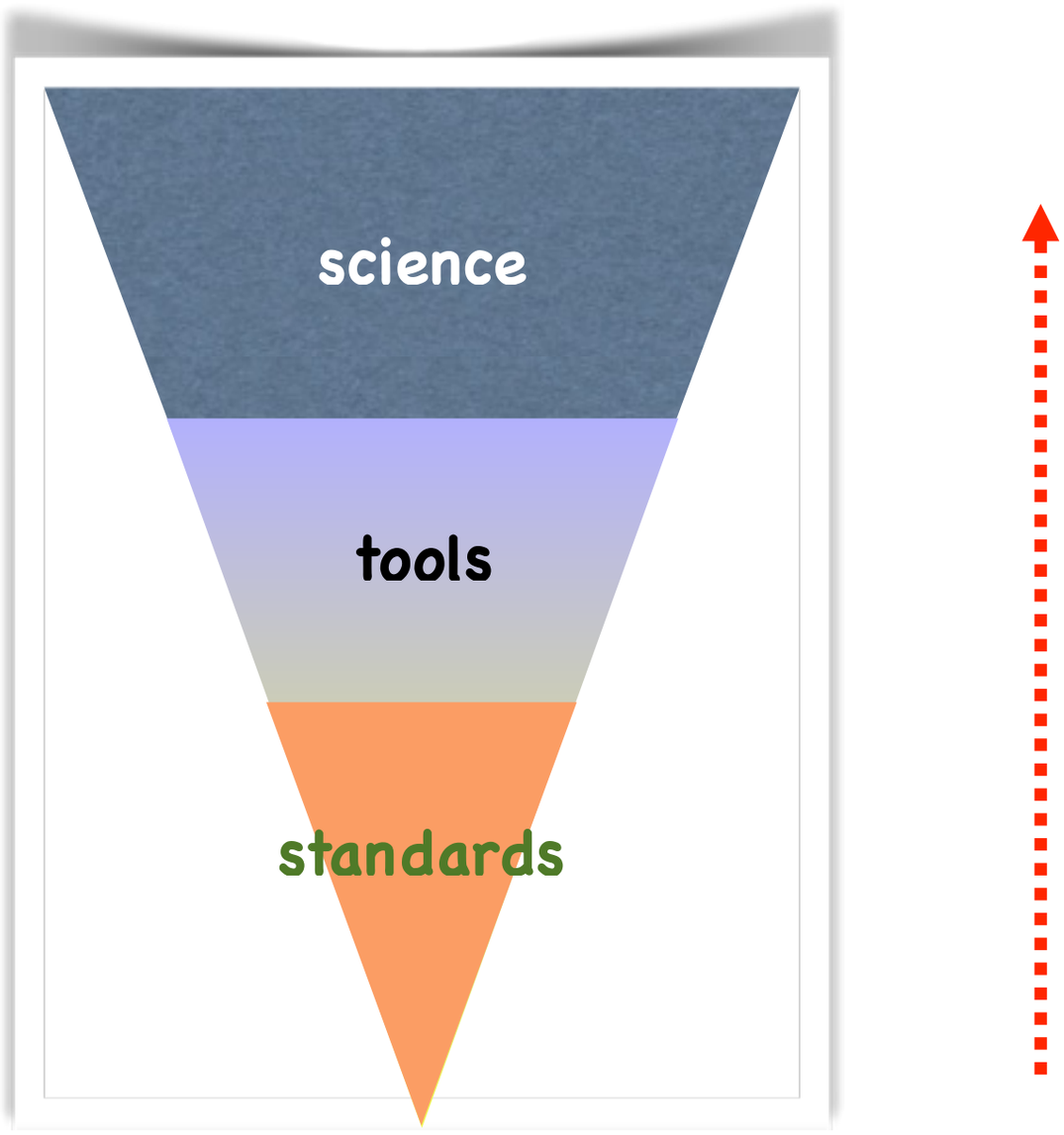
SDSC GRID  [+0.0]  VTURB 2.0 KM/S   L/H 1.25
      PROGRAM READFLUX
C     SAMPLE PROGRAM READS THIS FILE ON UNIT 1
      DIMENSION Hnu(1221),HnuCONT(1221),WAVE(1221)
      CHARACTER*80 TITLE
      DO 11 ISKIP=1,22
   11 READ(1,1)
C     wavelength in nm
      READ(1,1)WAVE
    1 FORMAT(10F10.2)
      DO 8 MODEL=1,500
C     ergs/cm**2/s/hz/ster
      READ(1,2,END=9)TITLE
    2 FORMAT(A80)
      PRINT 3,MODEL,TITLE
    3 FORMAT(I5,1X,A80)
      READ(1,4)Hnu
      READ(1,4)HnuCONT
    4 FORMAT(8E10.4)
    8 CONTINUE
    9 CALL EXIT
      END
      9.09      9.35      9.61      9.77      9.96     10.20     10.38     10.56
     10.77     11.04     11.40     11.78     12.13     12.48     12.71     12.84
     13.05     13.24     13.39     13.66     13.98     14.33     14.72     15.10
     15.52     15.88     16.20     16.60     17.03     17.34     17.68     18.02
     18.17     18.61     19.10     19.39     19.84     20.18     20.50     21.05
     21.62     21.98     22.30     22.68     23.00     23.40     24.00     24.65
```

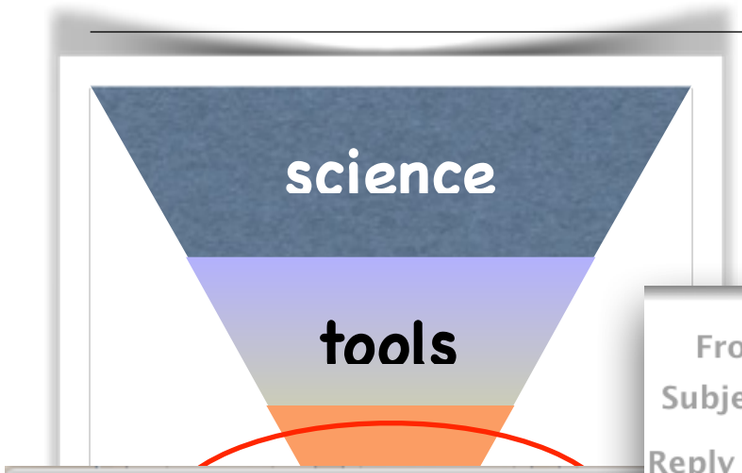
Adding theoretical data: example with VO



The VO approach



Principles of the philosophy behind the VO




```
SIMPLE  =                    T /FITS
BITPIX  =                   16 /No.B
NAXIS   =                    2 /No.d
NAXIS1  =                 1782 /Leng
NAXIS2  =                 1786 /Leng
EXTEND  =                    T /
DATE    = '21/03/12          ' /Date
ORIGIN  = 'CASB -- STScI     ' /Orig
PLTLABEL= 'SF02904           ' /Obse
PLATEID = 'A21Q              ' /GSSS
REGION  = 'XP695             ' /GSSS
DATE-OBS= '1989/11/07        ' /UT d
UT      = '##################' /UT t
EPOCH   =  1.9898502197270E+03 /Epoc
PLTRAH  =                    5 /Plat
PLTRAM  =                   22 /
PLTRAS  =  4.6105959333330E+01 /
PLTDECSN= '+                 ' /Plat
PLTDECD =                   10 /
PLTDECM =                    5 /
PLTDECS =  3.0591079999998E+01 /
EQUINOX =  2.0000000000000E+03 /Juli
EXPOSURE=  7.0000000000000E+01 /Expo
BANDPASS=                   35 /GSSS
PLTGRADE=                    0 /Plat
PLTSCALE=  6.7199996948240E+01 /Plat
SITELAT = '+33:24:24.00      ' /Lati
SITELONG= '-116:51:48.00     ' /Long
TELESCOP= 'Palomar 48-in Schm' /Tele
CNPIX1  =                 3294 /X corner  (pixels)
CNPIX2  =                18277 /Y corner
DATATYPE= 'INTEGER*2         ' /Type of Data
SCANIMG = 'XP695_A21Q_01_00.PIM' /Name of original scan
SCANNUM =                    1 /Identifies scan of the plate
DCHOPPED=                    F /Image repaired for chopping effects
```

From send mail ONLY to astro-ph <no-reply@arXiv.org>

Subject **astro-ph daily 39 new + 8 crosses received 151**

Reply to astro-ph@arXiv.org

To astro-ph daily title/abstract distribution <rabble@arXiv.org>

Date: Fri, 26 Sep 2014 14:15:30 GMT (61kb)

Title: Representations of Time Coordinates in FITS
Authors: Arnold H. Rots, Peter S. Bunclark, Mark R. Calabretta, Steven L. Allen, Richard N. Manchester, William T. Thompson
Categories: astro-ph.IM
Comments: FITS WCS Paper IV: Time. 27 pages, 11 tables
\\
In a series of three previous papers, formulation and specifics of the representation of World Coordinate Transformations in FITS data have been presented. This fourth paper deals with encoding time. Time on all scales and precisions known in astronomical datasets is to be described in an unambiguous, complete, and self-consistent manner. Employing the well--established World Coordinate System (WCS) framework, and maintaining compatibility with the FITS conventions that are currently in use to specify time, the standard is extended to describe rigorously the time coordinate. World coordinate functions are defined for temporal axes sampled linearly and as specified by a lookup table. The resulting standard is consistent with the existing FITS WCS standards and specifies a metadata set that achieves the aims enunciated above.
\\ (http://arxiv.org/abs/1409.7583 , 61kb)

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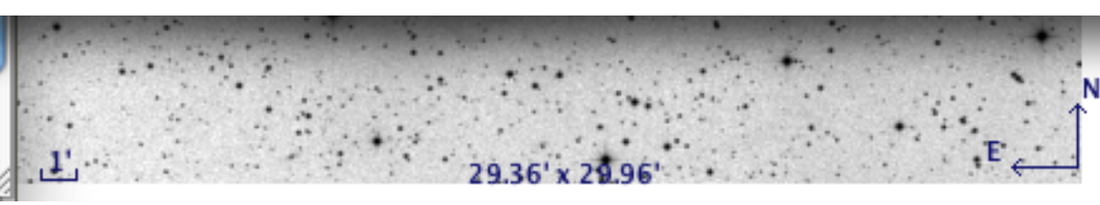
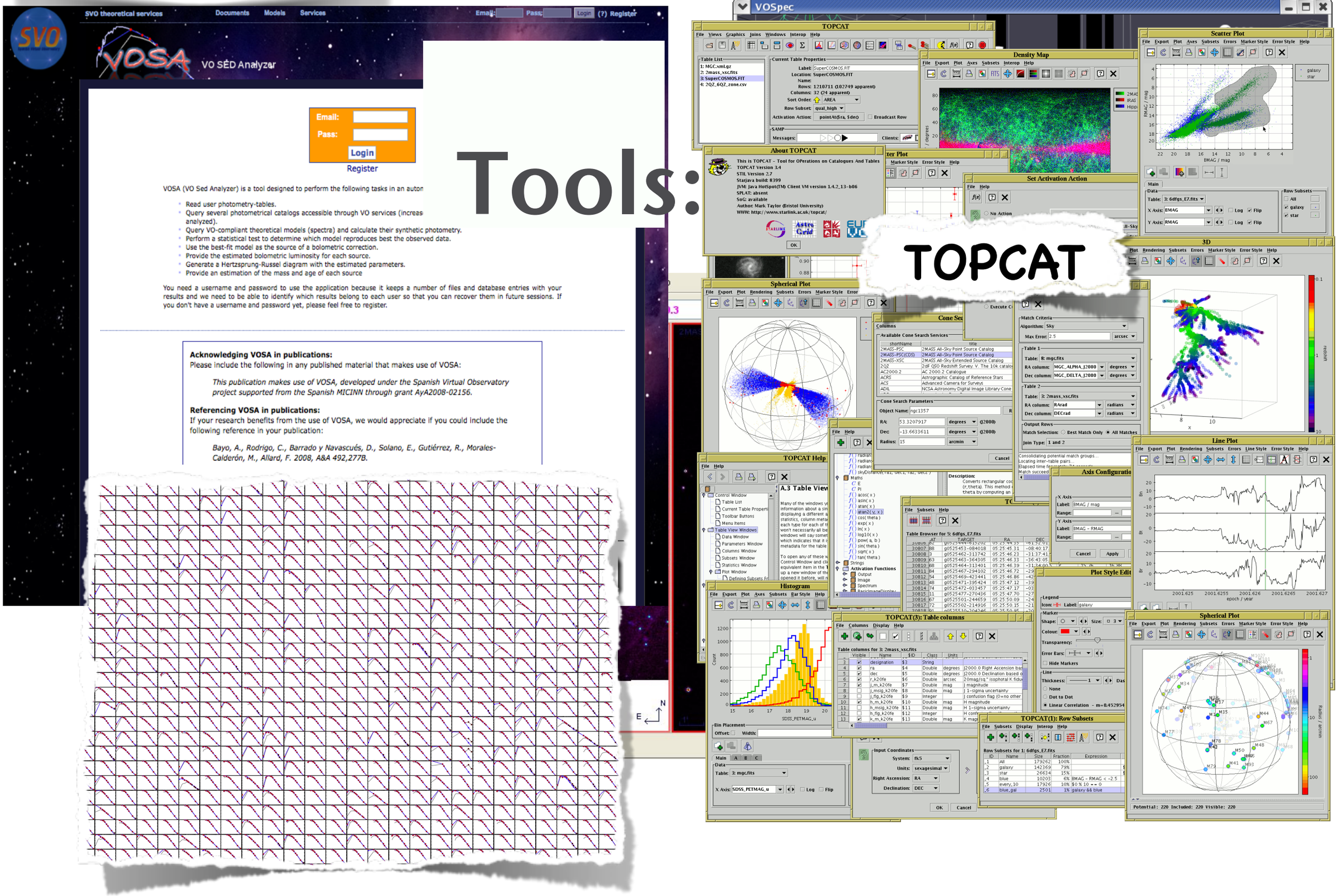


Principles of the philosophy behind the VO



Principles of the philosophy behind the VO: tools

Applications/Services (alphabetical)

- **Aladin**
- **AstroStat**
- **CASSIS**
- **CDS Cross-Match Service**
- **Iris**
- **Seleste**
- **Skyview**
- **SIMBAD**
- **Specview**
- **SPLAT**

Applications/Services (by function)

- **Search for Images:** Aladin, Data Discovery Tool, TOPCAT
- **Search for Spectra:** VOSpec, SPLAT, Aladin, Data Discovery Tool, TOPCAT, CASSIS
- **Search for Catalogues/Tables:** Aladin, Data Discovery Tool, TOPCAT, VizieR, Xamin, TAPHandle
- **Image Visualisation:** Aladin
- **Catalogue/Table Visualisation:** TOPCAT, VOPlot
- **Catalogue Cross-matching:** Aladin, CDS Cross-Match Service, TOPCAT/STILTS, Cross-Comparison Tool
- **Scatter, 3D plots and histograms:** TOPCAT, VOPlot
- **Statistics:** AstroStat
- **Coverage Maps:** Aladin
- **Table format conversion:** TOPCAT/STILTS, VOConvert
- **SEDs:** Iris, VOSA, VOSpec

- **TAPHandle**
- **TOPCAT/STILTS**
- **VAO Cross-Comparison Tool**
- **VAO Data Discovery Tool**
- **VAO Time Series Search Tool**
- **VisIVO**
- **VizieR**
- **VOConvert**
- **VOPlot**
- **VOSA**
- **VOSpec**
- **Xamin**

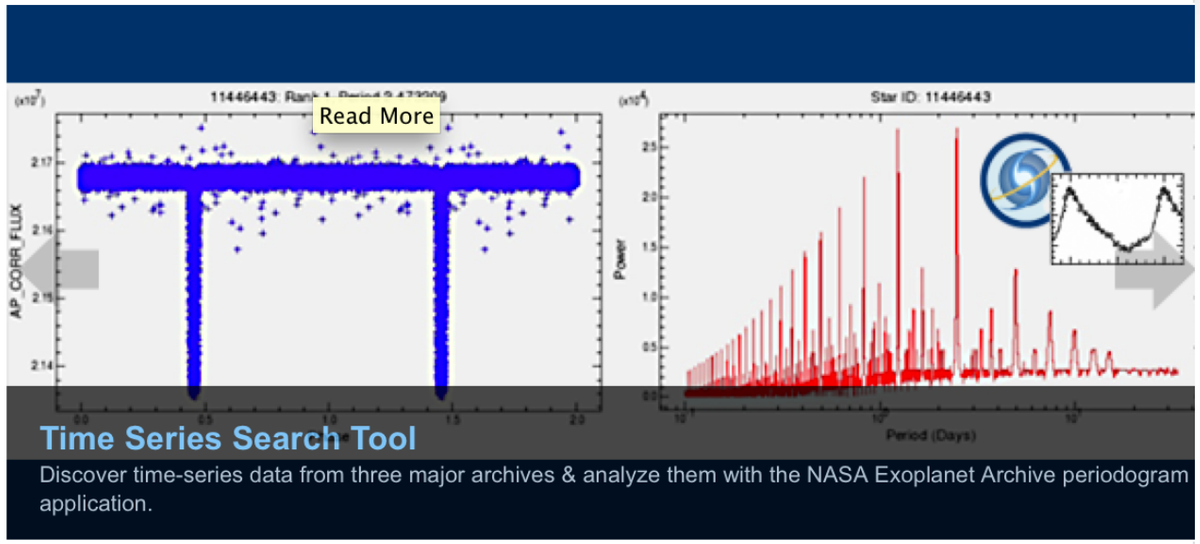
Other VO Compliant Tools:

IRAF, SAOImage DS9

- **May 2014 IVOA Newsletter now available**

Principles of the philosophy behind the VO: tools

Home | Science Tools & Services | About the VAO | VO News | Support & Community | Contact & Connect



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VAO Tools & Services

- **Data Discovery Tool** – Retrieve astronomical data about a given position or object in the sky.
- **Iris: SED Analysis Tool** - Find, plot, and fit spectral energy distributions (SEDs) with this desktop application.
- **Time Series Search Tool** – Discover time-series data from three major archives & analyze them with the NASA Exoplanet Archive periodogram application.
- **Cross-Comparison Tool** – Perform fast positional cross-matches between an input table of up to 1 million sources and common astronomical source catalogs.
- **VOClient** – Access the VO from Your Desktop.
- Science Service Monitor

More News from the VO

- Montage BSD 3-Clause License
- IVOA Newsletter 012 – May 2014
- VO Client Release – Access the VO from Your Desktop
- Aladin v8
- Comet VOEvent Implementation Update
- CASSIS Spectrum Analyzer Update
- VisIVO Contest 2014
- VAO@AAS223

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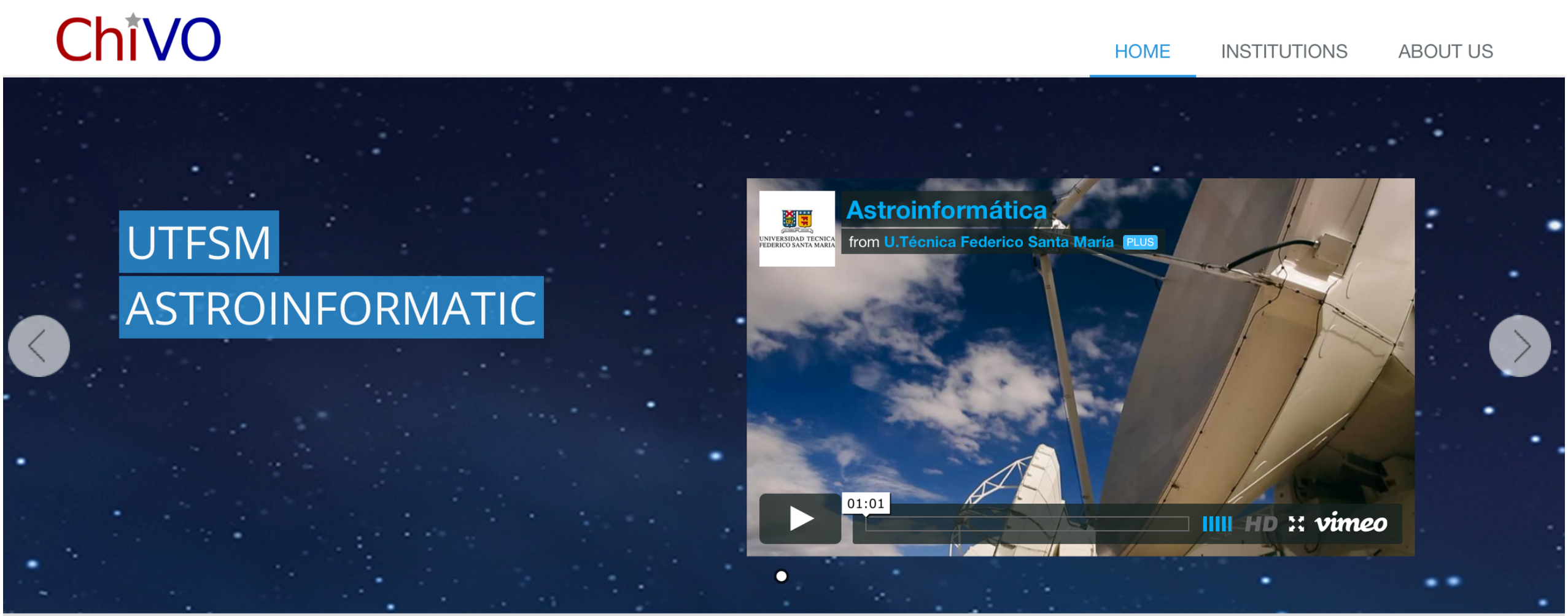
VOStat

(rev 2)

Statistical Analysis for the Virtual Observatory

Start using VOStat right now

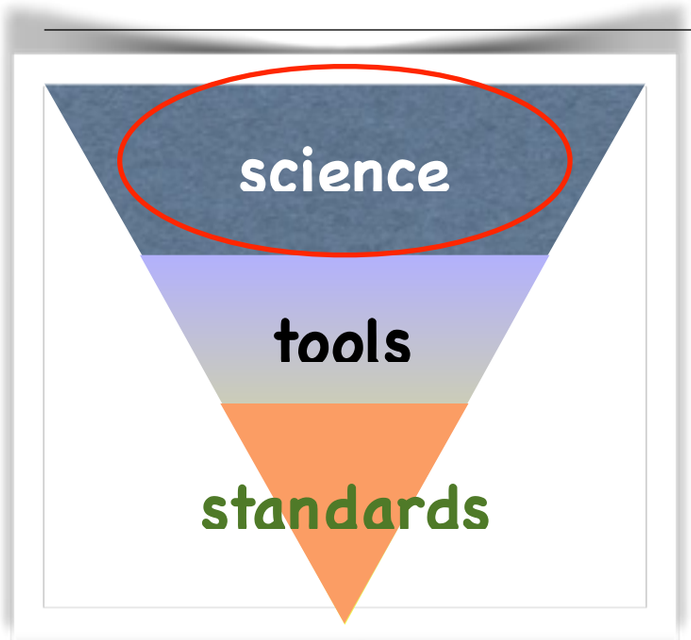
Chile is part of this effort



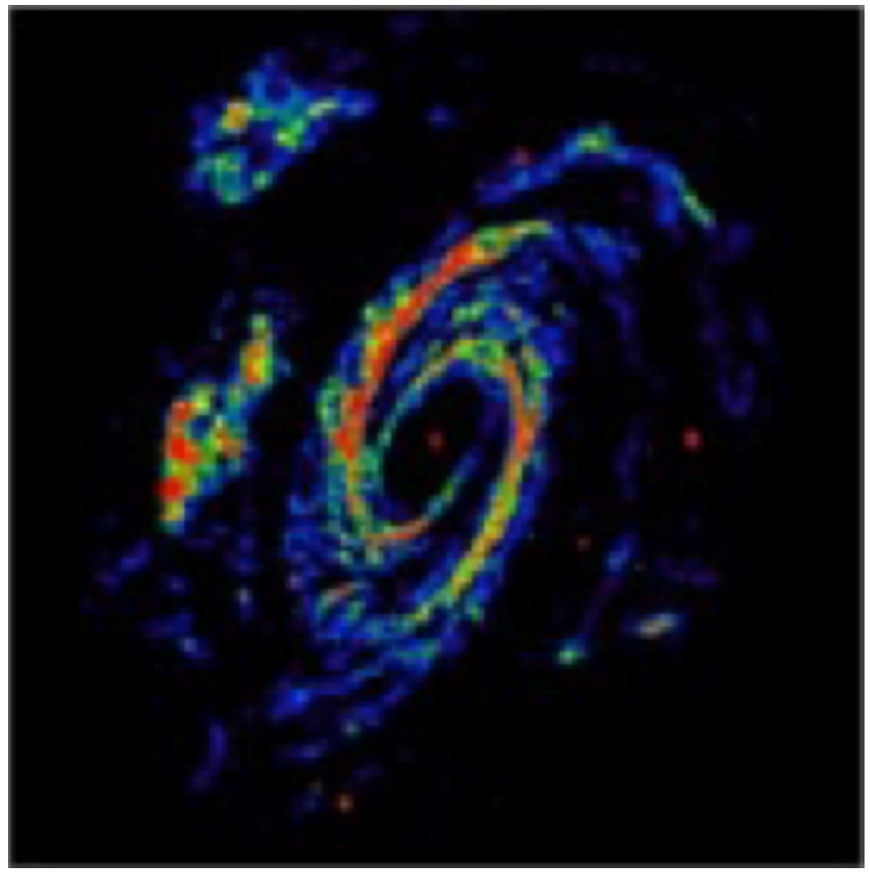
What is CHIVO?

The Chilean Virtual Observatory (CHIVO) is a VO developed in Chile and it is one of many VO projects currently underway in the world. It was born out of the need to archive data that require large storage capacities and the need to develop new tools for the analyzing large volumes of data and better algorithms for intelligent processing of astronomical data, this due to the volumes of large scale data that will generate the astronomical observatories in Chile, mainly the ALMA project that will generate over 1TB of data per day, and in this form be to able to store the data in the

Principles of the philosophy behind the VO



Science:



- Multiwavelength
- Exotic objects identification

Does really anybody use the VO??

Disclaimer: I am not claiming to be complete or unbiased, in fact quite some part is a collection of my own experiences

What do these papers “talk” about?

“H-index” of ~50 vs SDSS ~70 (to be taken with a pinch of salt,
and I personally believe these comparisons are… not too smart)


galaxies
stars
surveys
parameters
observational
galaxy
starburst
radio
mining
kinematics
dynamics
instrumentation
open
telescopes
catalogs
stellar
evolution
content
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infrared
lenticular
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solar
dwarfs
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magnetospheric
catalogues
clusters
spectroscopic
gravitational
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astronomy
management
sunspots
development
information
paleomagnetism
geomagnetism
associations
cosmology
continuum
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system
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photometry
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luminosity
asteroids
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emission
astronomy
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magnetic
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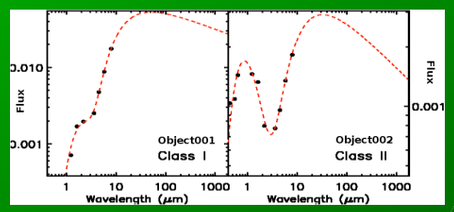
subdwarfs
early-type
open
white
sequence
planetary
interferometric
instrumentation
information
continuum
numerical
bursts
universe
archives
low-mass
radio
solar
technology
observational

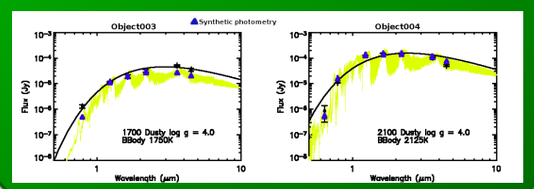
Warning! self-promotion

Blackbody fittings (combinations, modified by different β)

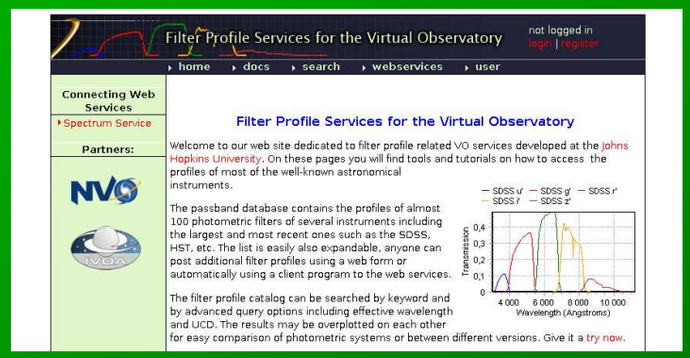


Under development

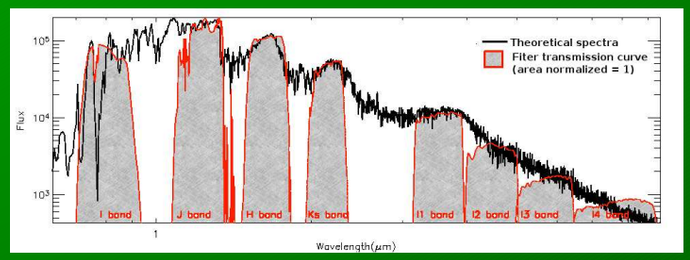
Synthetic photometry fittings



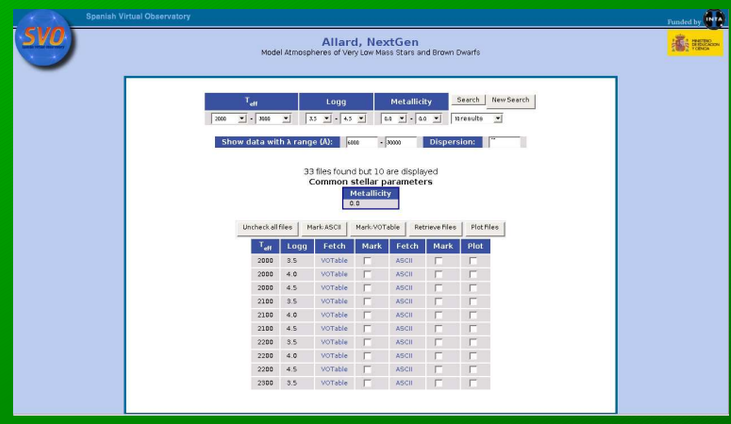
Filter selection.



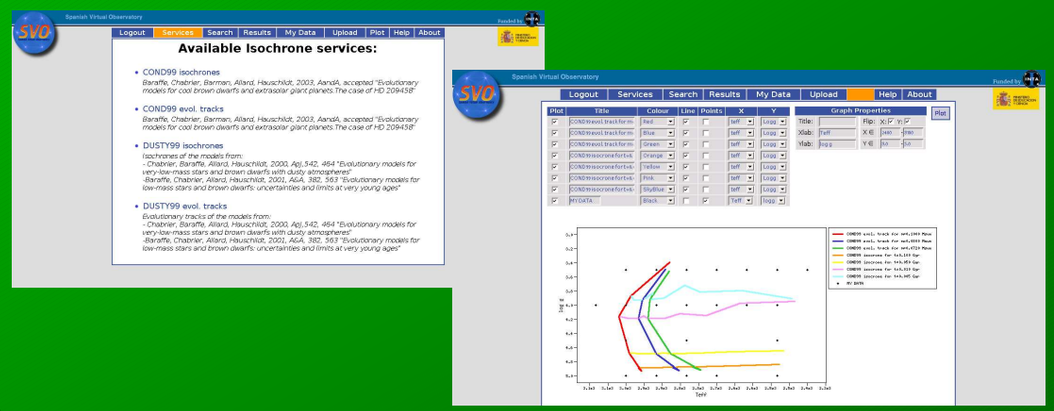
Filter+Synthetic spectra = Synthetic photometry.



Obtaining synthetic spectra.



Comparison with theoretical isochrones and evolutionary tracks.

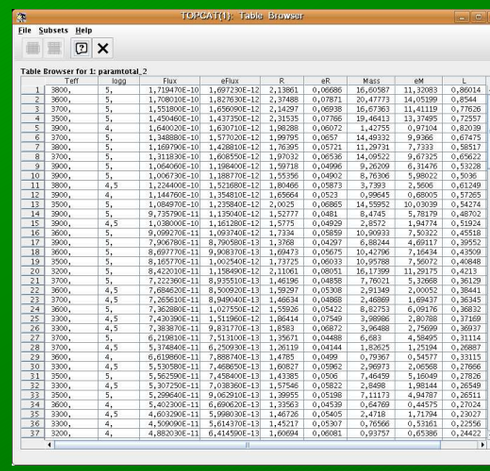


Estimation of physical parameters.

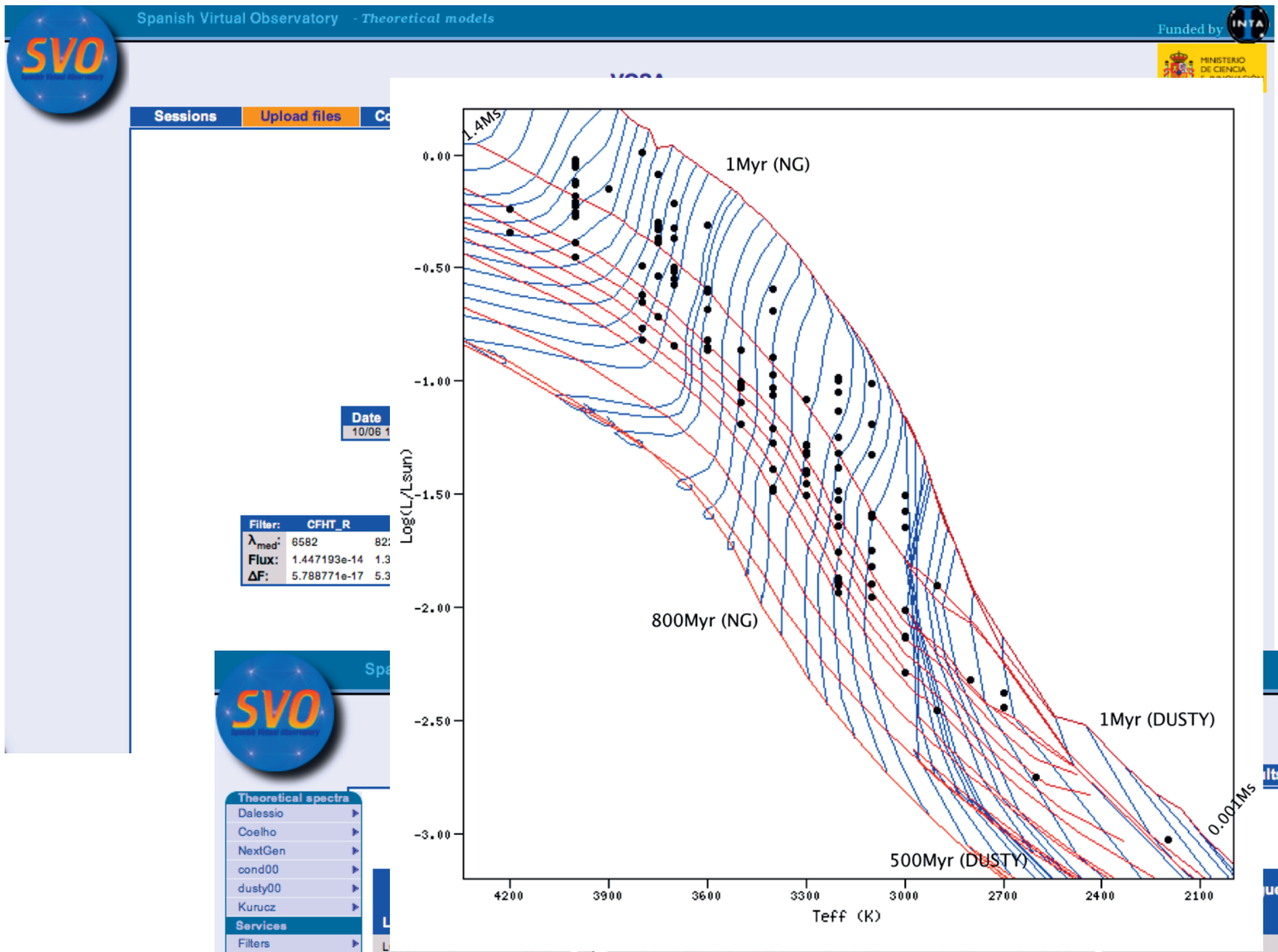
$$\log g = 4.44 + \log M(M_\odot) - 2\log R(R_\odot)$$

$$d(\mathrm{pc}) = 2.26 \times 10^{-8} R_*(R_\odot) \sqrt{\left(\frac{\mathbf{F}_{\mathrm{Model}}}{\mathbf{F}_{\mathrm{Obs}}}\right)}$$

$$\mathrm{F_{Obs}} = \left(\frac{\mathbf{M}\mathbf{G}}{\mathbf{g}d}\right)^2 \sigma \mathbf{T}_{\mathrm{eff}}{}^4$$



And VOSA came to life!

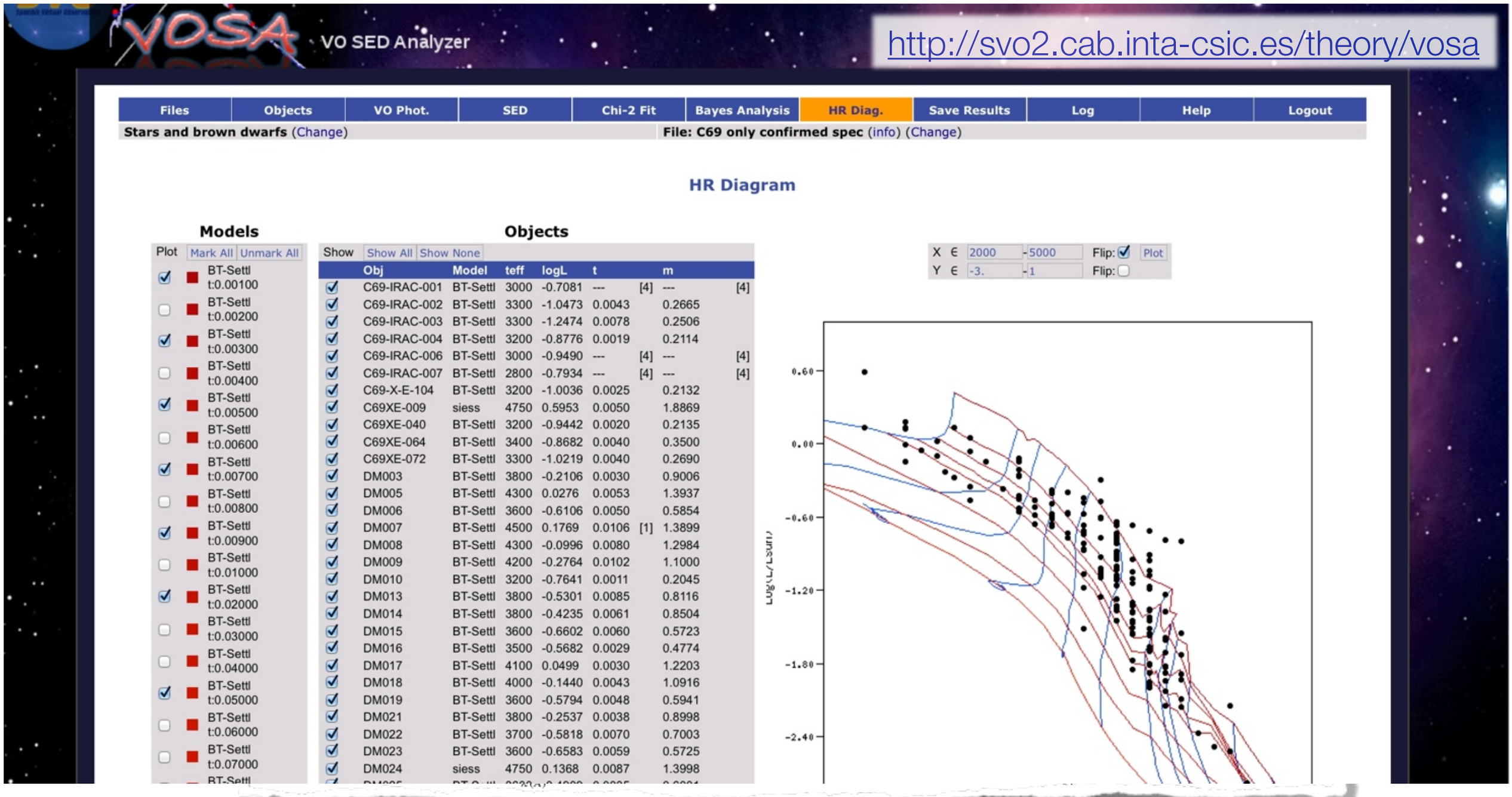


Bayo et al. (2008)

And there was room for improvement

- “Limited to” / “conceived for” stars and brown dwarfs, what about older sources? and more massive? and ~~science-fiction~~ uhmm extragalactic studies?
- Reflected in the available collections of models: Kurucz, NextGen, COND, DUSTY and not many more
- Brute force fitting but no study of the relevance of the individual parameters to the fit
- No A_V estimation
- Not design to work with a single object (input format)
- Variety of catalogs offered but you can always do better and also look for more than photometry
- No Isochrone interpolation, make it even more VO!
- Anything else in the wish-list?

VOSA 2: the new generation



~200 regular users, cited in ~ 50 papers

Bayo et al. (2008, 2014a subm.)

Some examples: 2.- A product from “YOU”

- Data related:
  - CDS wonders vs pain of getting, for example, IOP tables

04370+2559 (A, B)	2	4.3	\sim K3-M1	C	A \gg B 20, 21	
04385+2550 (A, B)	2	18.9	M0	C	A \gg B 22, 2	
CoKu Tau/3 (A, B)	2	2.05	M1	C	A > B	1
CZ Tau (A, B)	2	0.32	M3	W	A \sim B	1
DD Tau (A, B)	2	0.56	M3+M3	C	A \sim B	1
DF Tau (A, B)	2	0.09	M0.5+M3	C	A \sim B	1
DH Tau	2	15	M2+M2	C	DH > DI	7, 8
DK Tau (A, B)	2	2.30	K9+M1	C	A > B	1, 7
DQ Tau (A, B)	2	SB	K5	C	A \sim B	12
F04192+2647 (A, B)	2	23.3	\ldots	\ldots	A > B	23
F04297+2246 (A, B)	2	6.6	\ldots	\ldots	A > B	23
FM Tau	2	37.3	M2	C	FM < V773	7, 8
FO Tau (A, B)	2	0.15	M2+M2	C	A \sim B	1
FQ Tau (A, B)	2	0.76	M3+M3.5	C	A \sim B	1, 17
FS Tau (Aa, Ab, B)	3	0.23 (Aa, Ab), 20 (A-B)	M1+M4 (Aa, Ab)	C	Aa > Ab 1, 24	
FV Tau (A, B)	2	0.72	K5+K6	C	A \sim B, FV > FV/c	1
FX Tau (A, B)	2	0.89	M1+M4	C+W	A > B	1, 6
FZ Tau	2	16.9	M0+K5	C	FZ > FY	7, 8
GG Tau (A, B)	4	10.3	\ldots	C	A \gg B 1	
GG Tau (Aa, Ab)	2	0.25	K7+M0.5	C	Aa \gtrsim Ab	1
GG Tau (Ba, Bb)	2	1.48	M5.5+M7.5	C	Ba > Bb 1	
GH Tau (A, B)	2	0.31	M1.5+M2	C	A \sim B	1
GI Tau	2	12.9	K6	C	GI \sim GK	5, 6
GK Tau (A, B)	2	2.5	K7	C	A \gg B 5, 6	
GN Tau (A, B)	2	0.33	M2.5	C	A \sim B	1, 26
Haro 6-37 (Aa, Ab, B)	3	2.62(A, B), 0.33 (Aa, Ab)		K7+M1	C	Aa > Ab, A > B 1, 11
HK Tau (A, B)	2	2.34	M1+M2	C	A \gg B 1, 7	
HN Tau (A, B)	2	3.11	K5+M4	C	A \gg B 1	
HP Tau (A, B)	2	0.017	K2	C	A > B	7, 8, 15
IS Tau (A, B)	2	0.22	K7+M4.5	C+W	A > B	1
IT Tau (A, B)	2	2.39	K3+M4	C	A \gtrsim B	1, 6
RW Aur (A, B, C)	3	1.42 (A-BC), 0.12 (B-C)	K1+K5 (A, B)	C	A > B \gg C	1, 10
T Tau (N, Sa, Sb)	3	0.70 (N-S), 0.1 (Sa-Sb)	K0	C	N \sim Sa \sim Sb	1, 3
UX Tau (A, B, C)	4	5.86 (A-B), 2.63 (A-C)	K5+M2+M5	C+W+W	A > B, A \gg C	1
UX Tau (Ba, Bb)	2	0.138	M2	W	Ba > Bb 11	
UY Aur (A, B)	2	0.88	M0+M2.5	C	A \gtrsim B	1, 17
UZ Tau (A, Ba, Bb)	4	SB (A), 3.54(A-Ba), 0.37 (Ba-Bb)		M1+M2+M2	C	A > B, Ba \sim Bb 1, 13
V710 Tau (A, B)	2	3.17	M0.5+M2	C+W	A \sim B	1
V773 Tau (AB, C, D)	4	SB (AB), 0.12 (AB-C), 0.24 (AB-D)		K2+M0 (AB, C)	W+C	D > C > AB 1, 4
V807 Tau (A, Ba, Bb)	3	0.30 (A-B), 0.04 (Ba-Bb)		K7+M3	C+W	A > B, Ba \sim Bb 25, 1
V892 Tau (Aa, Ab, B)	3	0.06, 4.10	B9+M2	W	Aa \sim Ab, A \gg B	16, 19
V955 Tau (A, B)	2	0.33	K5+M1	C	A > B	1
VY Tau (A, B)	2	0.66	M0	W	A > B	1
XZ Tau (A, B)	2	0.30	M3+M1.5	C	B > A	1
ZZ Tau IRS	2	35	M4.5	C	ZZ IRS > ZZ	2
ZZ Tau (A, B)	2	0.04	M3	C	A \gtrsim B	9

TOPCAT(33): Table Browser

er for 33: J_A+A_560_A76_clusters

	ID	Name	Cat	GLON
1	1	BH 131	(01),13	300.116
2	2	[MCM2005b] 32	09	300.131
3	3	BH 132	01	300.263
4	4	VVV CL013	14	300.343
5	5	[FSR2007] 1616	11	300.474
6	6	[MCM2005b] 33	09	300.507
7	7	Ruprecht 105	01	300.885
8	8	G3CC 5	17	300.913
9	9	[DBS2003] 77	05	300.966
10	10	VVV CL015	14	300.967
11	11	VVV CL016	14	300.984
12	12	[DBS2003] 78	05	301.118
13	13	VVV CL017	14,17	301.137
14	14	[FSR2007] 1622	11	301.416
15	15	G3CC 6	17	301.643
16	16	NGC 4609	01	301.895
17	17	G3CC 7	17	301.947
18	18	Hogg 15	01	302.047
19	19	VVV CL018	14	302.158
20	20	[MCM2005b] 34	09	302.433
21	21	[FSR2007] 1630	11	302.612
22	22	[DBS2003] 79	05	302.64
23	23	[DBS2003] 80	05	302.806
24	24	Teutsch 109	02	303.652
25	25	G3CC 8	17	303.927
26	26	G3CC 9	17	304.002
27	27	VVV CL019	14	304.805
28	28	[MCM2005b] 35	09	304.845
29	29	VVV CL020	14	304.87
30	30	G3CC 10	17	304.887
31	31	[DBS2003] 82	05	304.928
32	32	[DBS2003] 131	05,17	305.259
33	33	[DBS2003] 130	05	305.269
34	34	VVV CL021	14	305.277
35	35	[DBS2003] 132	05	305.321
36	36	Danks 1	01,17	305.338
37	37	VVV CL022	14	305.362
38	38	[MCM2005b] 36	09	305.383
39	39	Danks 2	01,17	305.392
40	40	VVV CL023	14	305.438

Some examples: 2.- A product from “YOU”

Asmus et al 2014

TOPCAT(31): Table Browser

Table Browser for 31: TAP_1_sasmirala.objects

	name	raj2000	dej2000
1	3C 390.3	280.5375	79.77139
2	NGC 1275	49.95083	41.51167
3	NGC 6251	248.13333	82.53778
4	3C 305	222.33989	63.27055
5	NGC 5866	226.62292	55.76333
6	Mrk 266NE	204.57414	48.27806
7	Mrk 266SW	204.57213	48.27556
8	M51a	202.46958	47.19528
9	NGC 4258	184.73958	47.30389
10	Mrk 3	93.90167	71.0375
11	NGC 3147	154.22375	73.40083
12	4C +73.08	147.44108	73.23976
13	M81	148.88833	69.06528
14	UGC 5101	143.965	61.35306
15	NGC 3690E	172.14012	58.56294
16	NGC 3690W	172.12925	58.56131
17	NGC 3998	179.48375	55.45361
18	NGC 3982	179.11708	55.12528
19	NGC 3718	173.14542	53.06806
20	IRAS 08572+3915	135.10583	39.065
21	PKS 2158-380	330.32125	-37.77333
22	NGC 7130	327.08125	-34.95111
23	NGC 7172	330.50792	-31.86972
24	IC 1459	344.29417	-36.46222
25	NGC 7496	347.44708	-43.42806
26	NGC 7552	349.045	-42.58472
27	NGC 7582	349.59792	-42.37056
28	NGC 7590	349.72833	-42.23917
29	NGC 7314	338.9425	-26.05056
30	PKS 2354-35	359.25292	-34.75917
31	ESO 602-25	337.85625	-19.03444
32	MR 2251-178	343.52417	-17.58194
33	Mrk 915	339.19375	-12.54528
34	3C 445	335.95625	-2.10361
35	Mrk 926	346.18125	-8.68583
36	NGC 7592W	349.59084	-4.41574
37	ESO 297-18	24.655	-40.01139

Description

PKS 2158-380/MCG-6-48-13 is a radio-loud lenticular galaxy at a redshift of z = 0.0334 (D ~149 Mpc) with a Sy 2 nucleus [veron-cetty_catalogue_2010] and was first studied in detail by [fosbury_very_1982]. HST observations revealed three compact but resolved sources in the nucleus instead of one central source (total extend ~ 1arcsec ~ 0.7 kpc; PA~ 90°; [boyce_faint_1996, zirbel_ultraviolet_1998]). In addition, water maser emission was detected in this object [kondratko_discovery_2006]. No *Spitzer* data are available for PKS 2158-380, which was imaged with VISIR in the SIC filter in 2006 [van_der_wolk_dust_2010]. A compact MIR nucleus is weakly detected in the image. The low S/N prevents a quantitative analyses of the source morphology but the latter seems different than that seen in HST, as only one source was detected. Our nuclear photometry is consistent with the value in [van_der_wolk_dust_2010].

[boyce_faint_1996] P. J. Boyce, M. J. Disney, F. Macchetto, A. Boksenberg, J. C. Blades, and C. D. Mackay. Faint object camera observations of complex nuclear structure in PKS 2158-380. . *A&A* , **305** pp. 715, January 1996.

[fosbury_very_1982] R. A. E. Fosbury, A. Boksenberg, M. A. J. Snijders, I. J. Danziger, M. J. Disney, W. M. Goss, M. V. Penston, W. Wamsteker, K. J. Wellington, and A. S. Wilson. Very extended ionized gas in radio galaxies. i - a radio, optical and ultraviolet study of PKS 2158-380 . *MNRAS* , **201** pp. 991–1008, December 1982.

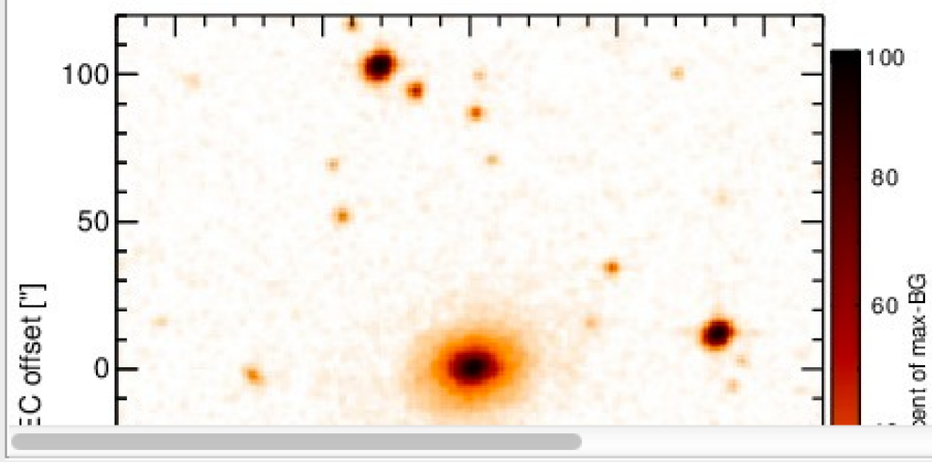
[kondratko_discovery_2006] P. T. Kondratko, L. J. Greenhill, J. M. Moran, J. E. J. Lovell, T. B. H. Kuiper, D. L. Jauncey, L. B. Cameron, J. F. Gómez, C. García-Miró, E. Moll, I. de Gregorio-Monsalvo, and E. Jiménez-Bailón. Discovery of water maser emission in eight AGNs with 70 m antennas of NASA's deep space network . *ApJ* , **638** pp. 100–105, February 2006.

[van_der_wolk_dust_2010] G. van der Wolk, P. D. Barthel, R. F. Peletier, and J. W. Pel. Dust tori in radio galaxies . *A&A* , **511** pp. 64, February 2010.

[veron-cetty_catalogue_2010] M.-P. Véron-Cetty and P. Véron. A catalogue of quasars and active nuclei: 13th edition . *A&A* , **518** pp. 10, July 2010.

[zirbel_ultraviolet_1998] Esther L. Zirbel and Stefi A. Baum. The ultraviolet continuum emission of radio galaxies. i. description of sources from the hubble space telescope archives . *ApJS* , **114** pp. 177, February 1998.

Images



URL: http://dc.zah.uni-heidelberg.de/sasmirala/q/prod/qp/PKS%202158-380

Some examples: 3.-

A&A 525, A29 (2011)
DOI: 10.1051/0004-6361/201015223
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Astronomy & Astrophysics

Identification of blue high proper motion objects in the Tycho-2 and 2MASS catalogues using Virtual Observatory tools

F. M. Jiménez-Esteban[1,2,3], J. A. Caballero[4], and E. Solano[1,2]

✓ Bright objects with blue colors and high proper motions are rare on the sky

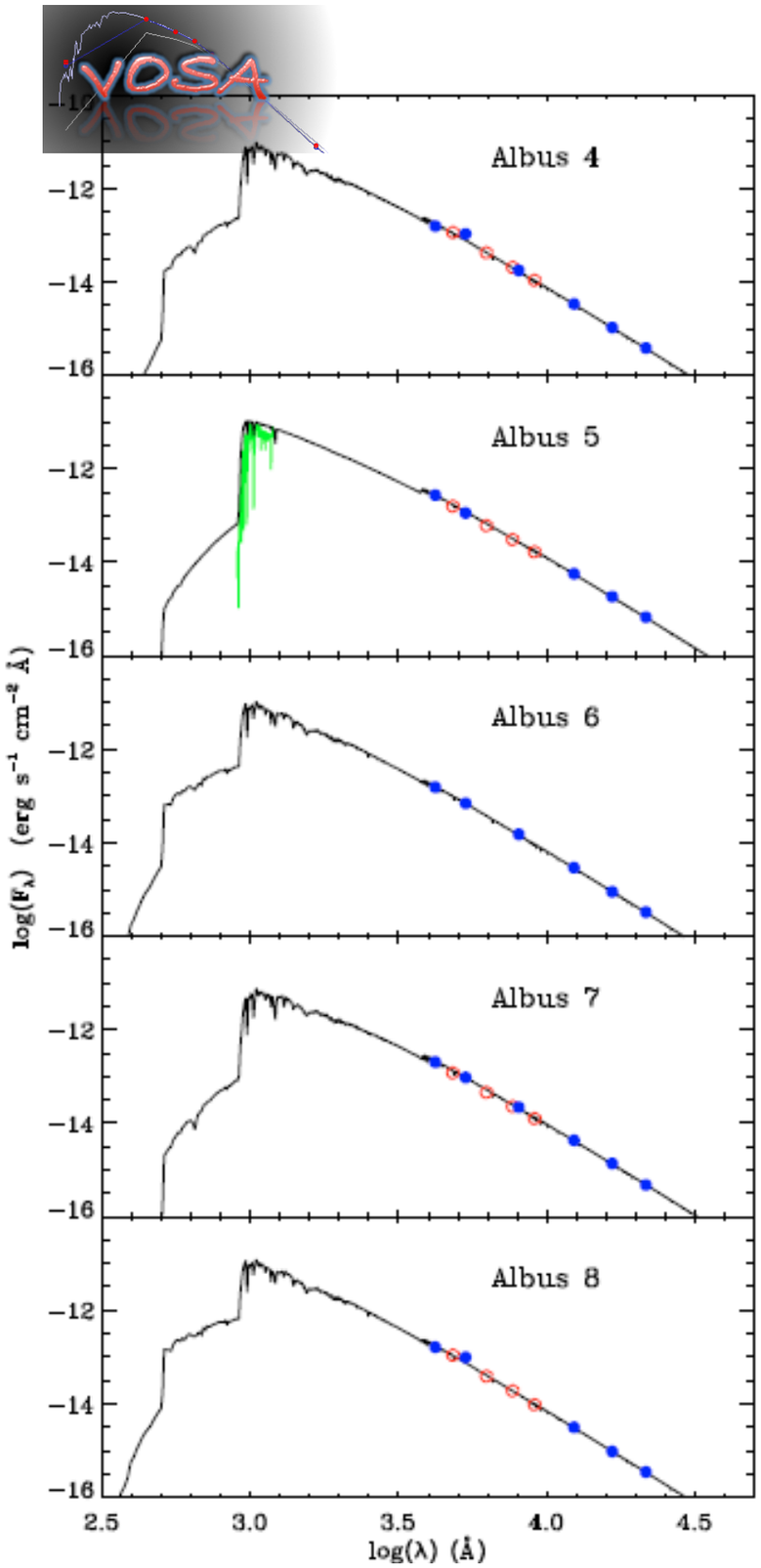
The "usual suspects": Nearby white dwarfs, hot subdwarfs, runaway stars or early type stars in nearby young moving groups

Important in many fields

✓ WDs are used as spectrophotometric standards

✓ Early-type stars in young moving groups are fundamental to understand the evolution of star-forming regions (closer -> studies in greater detail)

Some examples: 3.-



A&A 525, A29 (2011)
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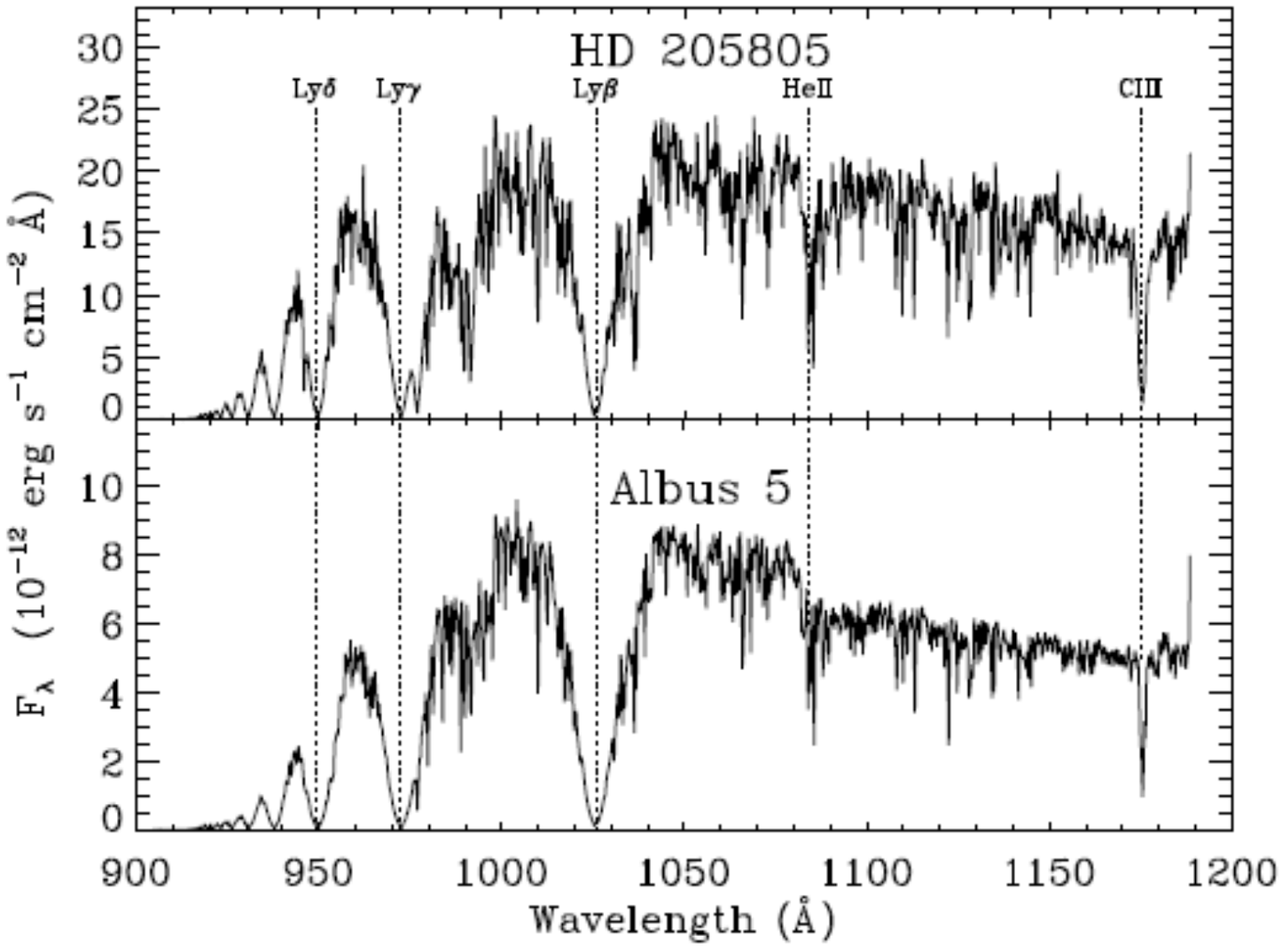
SED Building Tool: Search Form

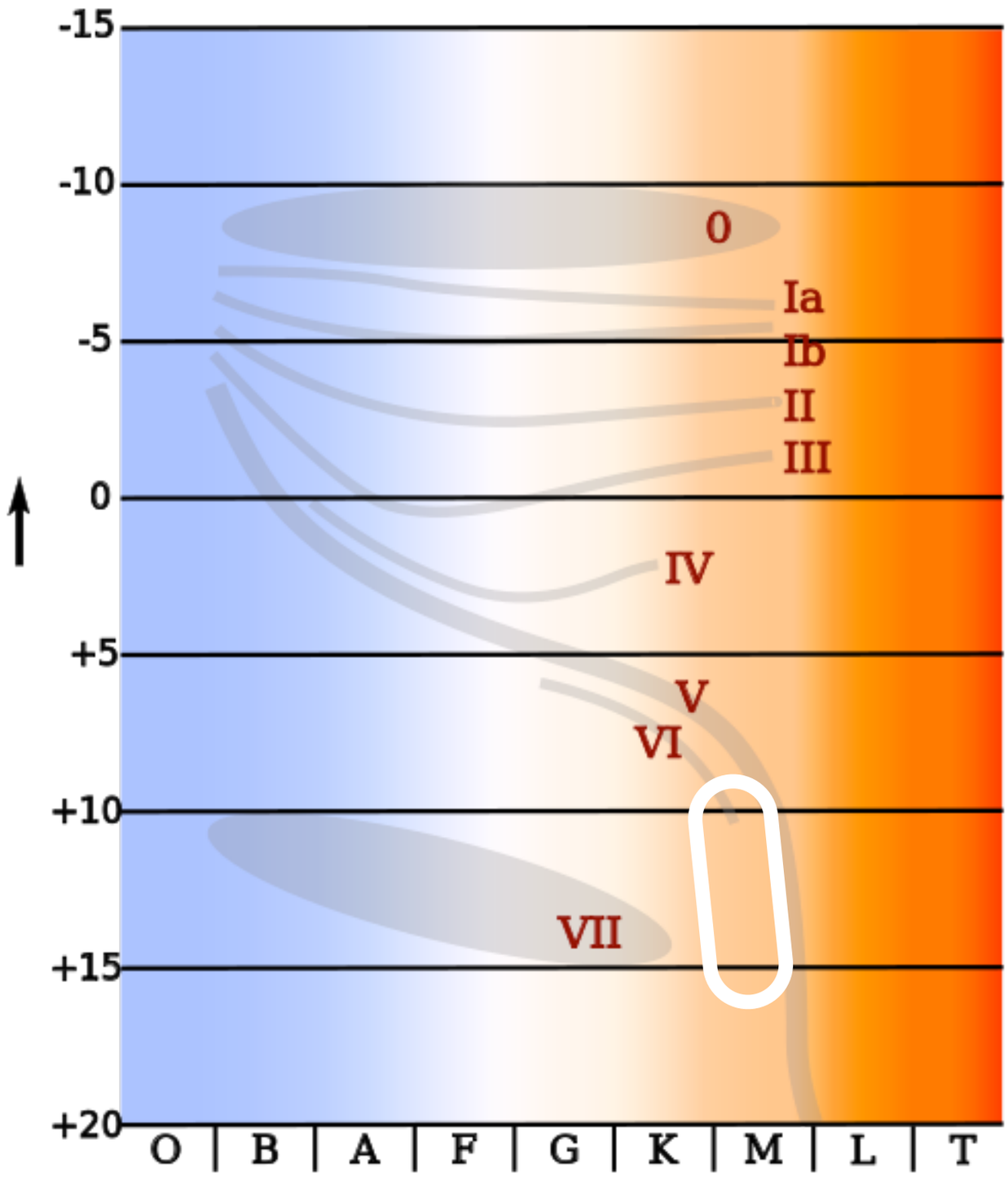


Some examples: 4.-

New ultracool subdwarfs identified in large-scale surveys using Virtual Observatory tools ⋆ ⋆⋆

Part I: UKIDSS LAS DR5 vs SDSS DR7

N. Lodieu[1,2], M. Espinoza Contreras[1], M. R. Zapatero Osorio[3], E. Solano[4,5], M. Aberasturi[4,5], and E. L. Martín[3]



✓Metal-poor dwarfs with spectral types later than M7

✓Less lum. (act. hotter) than their solar met. counterparts

✓Population II. Tracers of the galact. chem. history

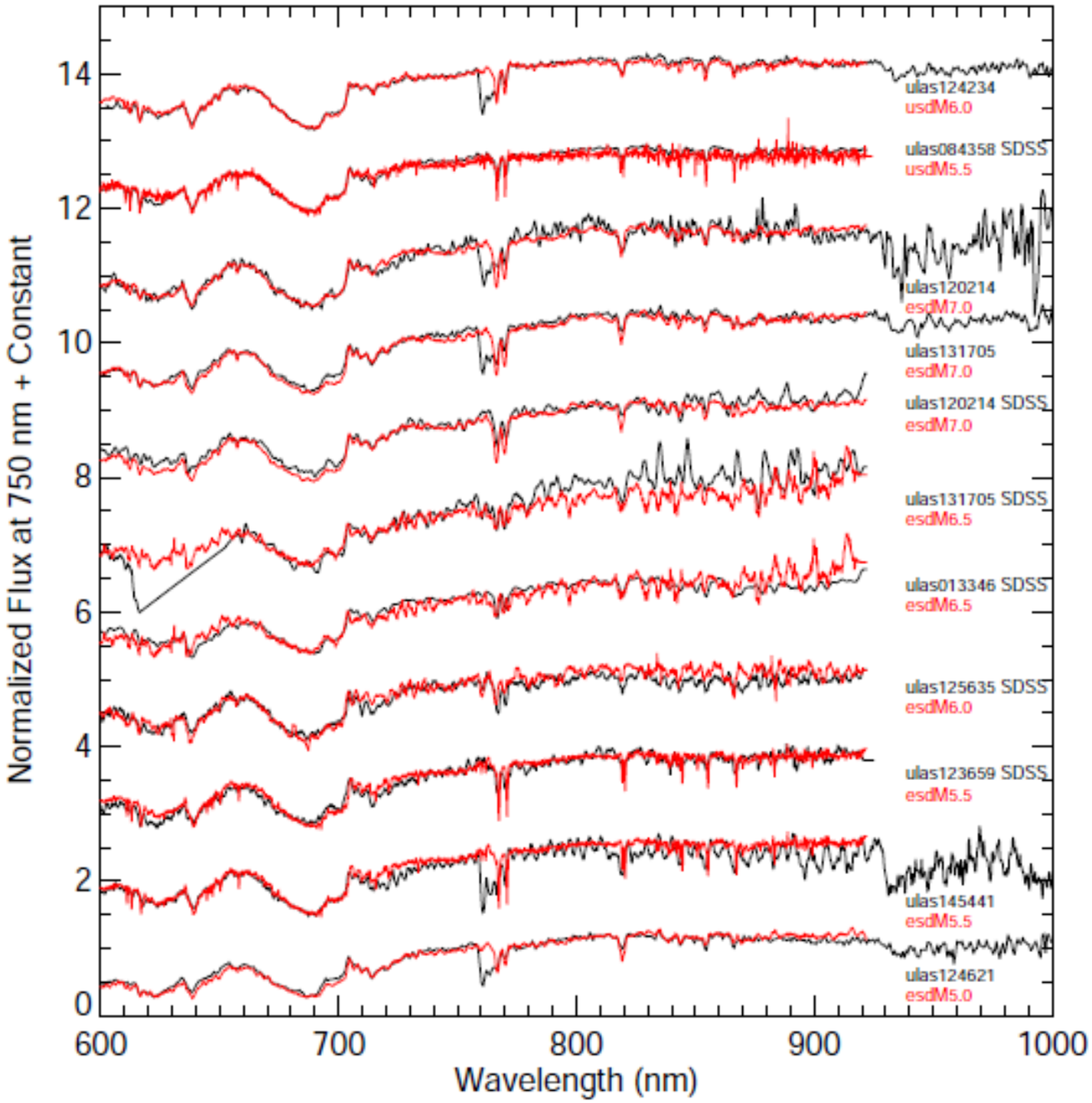
✓Rare objects: around 50 in 2011

Some examples: 4.-

New ultracool subdwarfs identified in large-scale surveys using Virtual Observatory tools ⋆ ⋆⋆

Part I: UKIDSS LAS DR5 vs SDSS DR7

N. Lodieu[1,2], M. Espinoza Contreras[1], M. R. Zapatero Osorio[3], E. Solano[4,5], M. Aberasturi[4,5], and E. L. Martín[3]



✓ 20 new spectroscopically confirmed UCSDs

✓ > 80% success rate after proper motion refinement

Some examples: 5.-

A&A 530, A2 (2011)
DOI: 10.1051/0004-6361/201016324
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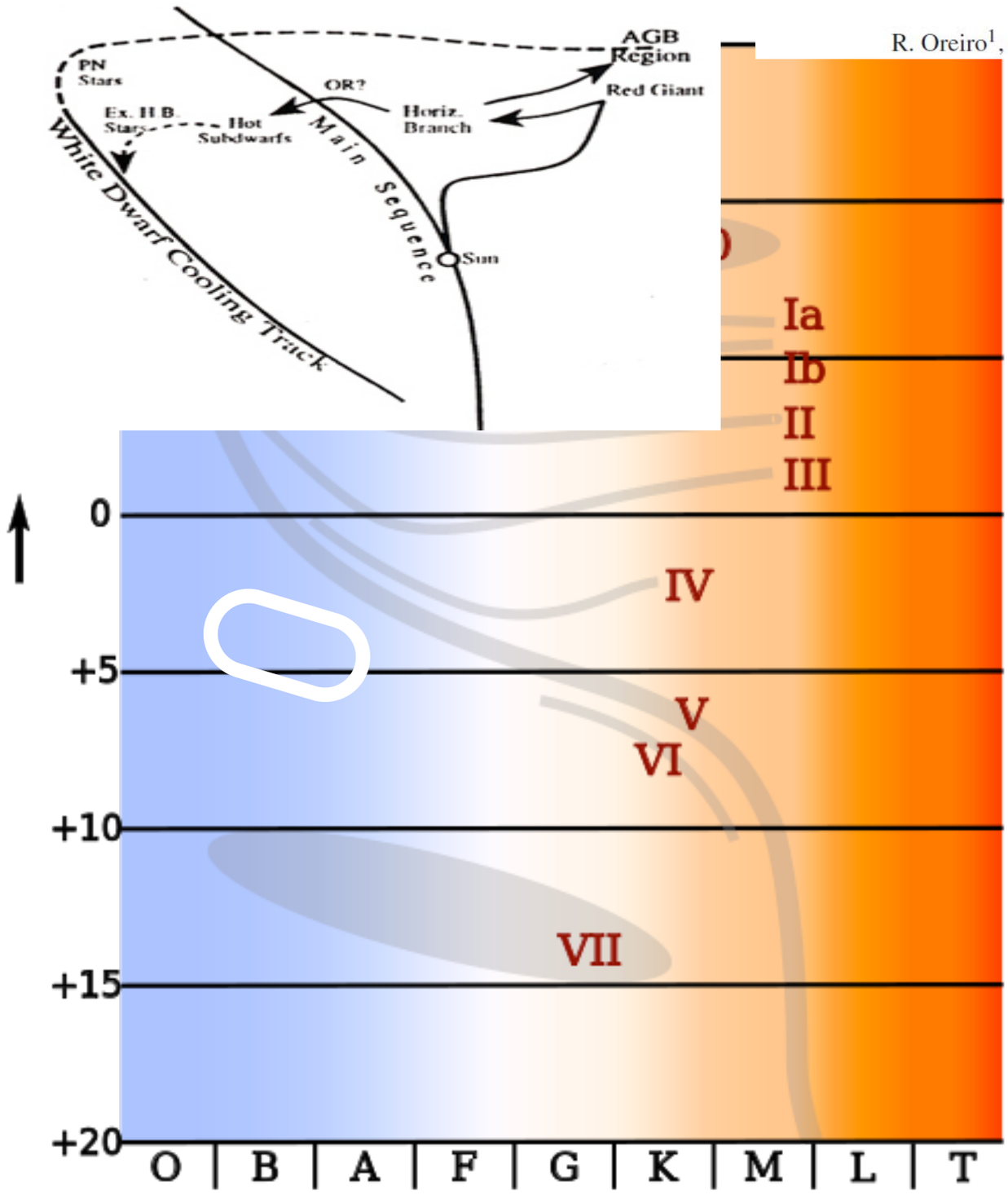
Astronomy & Astrophysics

A search for new hot subdwarf stars by means of Virtual Observatory tools

R. Oreiro[1], C. Rodríguez-López[2,3], E. Solano[4], A. Ulla[3], R. Østensen[5], and M. García-Torres[6]



✓Uncertain origin

✓Need of significant number of "bona-fide" hot sds. to perform statistical studies

✓Problems to identify them: High degree of contamination (WDs, CVs, OBs,...)

Some examples: 5.-

A&A 530, A2 (2011)
DOI: 10.1051/0004-6361/201016324

Astronomy & Astrophysics

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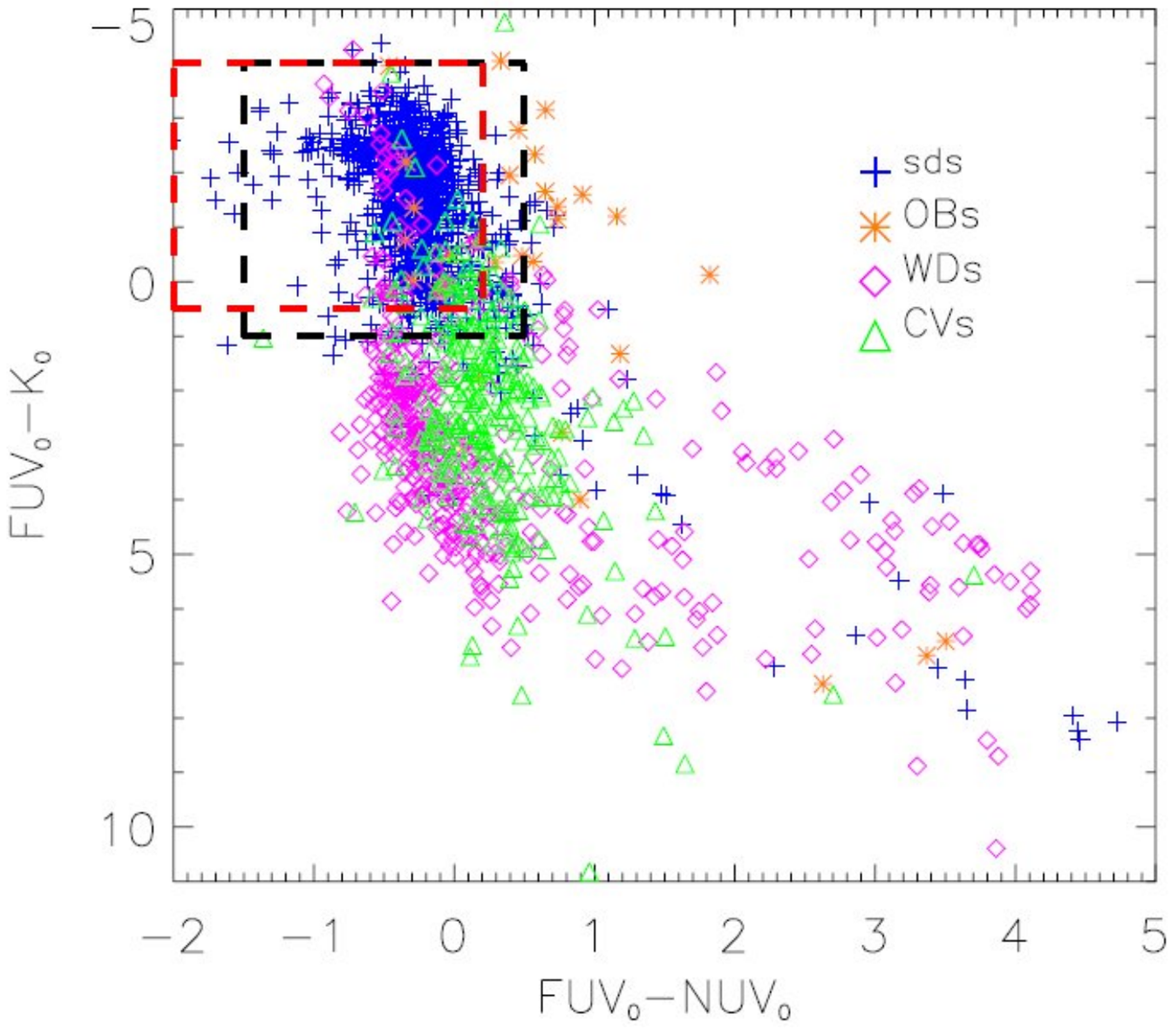


Looking for blue targets?

X-match: GALEX-2MASS

Some examples: 5.-

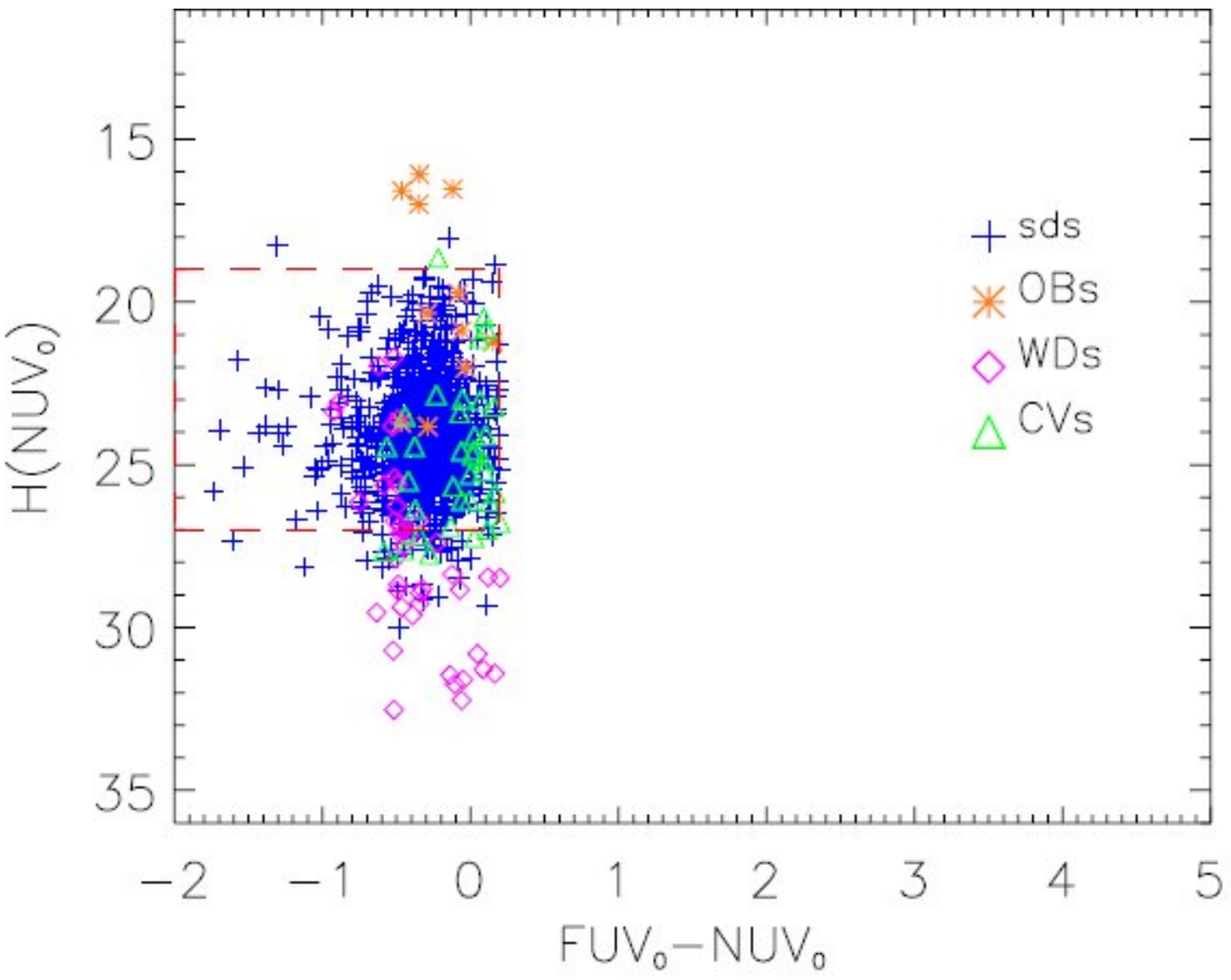
A&A 530, A2 (2011)
DOI: 10.1051/0004-6361/201016324

Astronomy & Astrophysics

A search for new hot subdwarf stars by means of Virtual Observatory tools

R. Oreiro[1], C. Rodríguez-López[2,3], E. Solano[4], A. Ulla[3], R. Østensen[5], and M. García-Torres[6]

Add SuperCosmos for ppm…



Remember the reduced ppm diagram?

Some examples: 5.-

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Astronomy & Astrophysics

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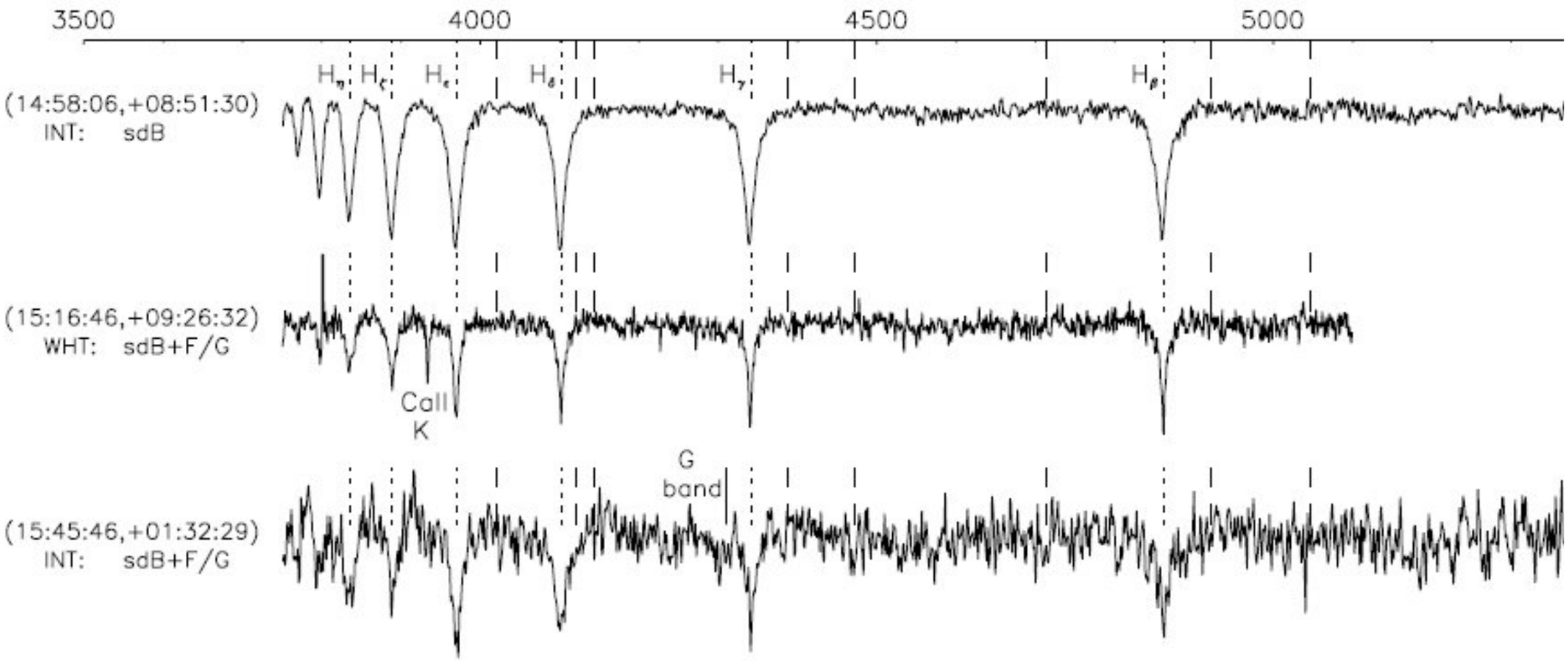
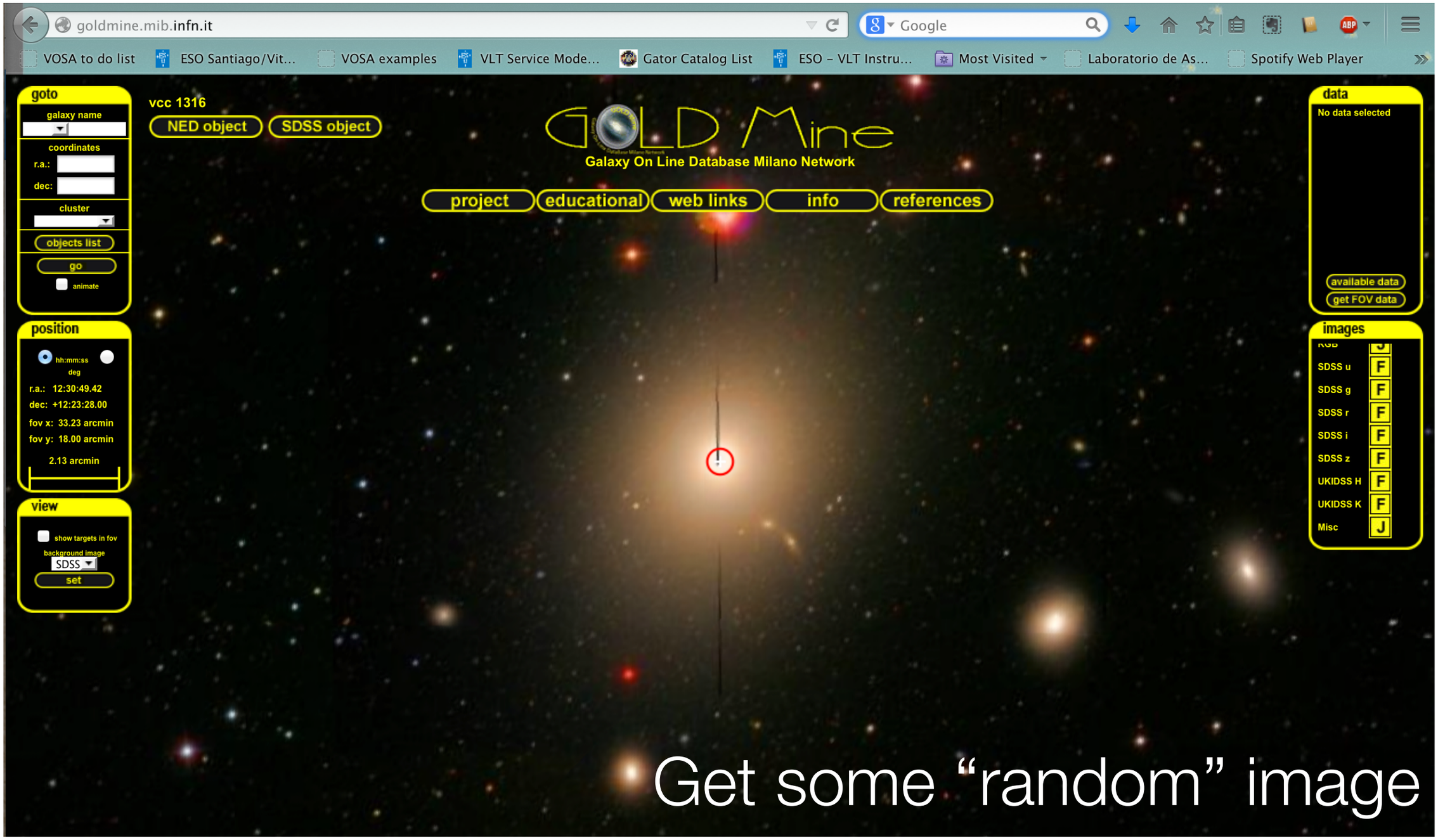


87% success rate!!

OK, but are there tools for astrometrists in the VO?

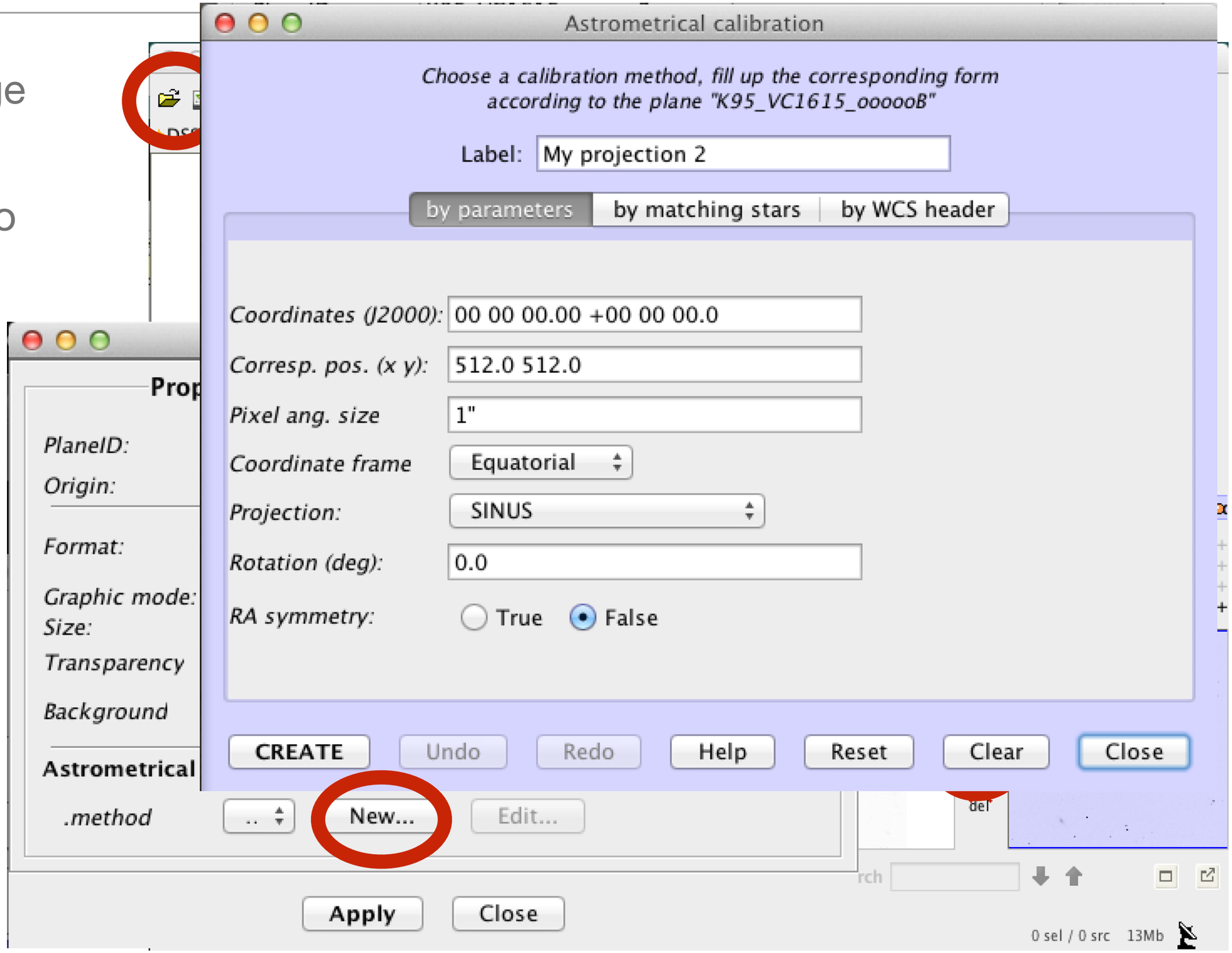
Errrr… not really :(but some simple things can be done

Aladin: astrometric calibration



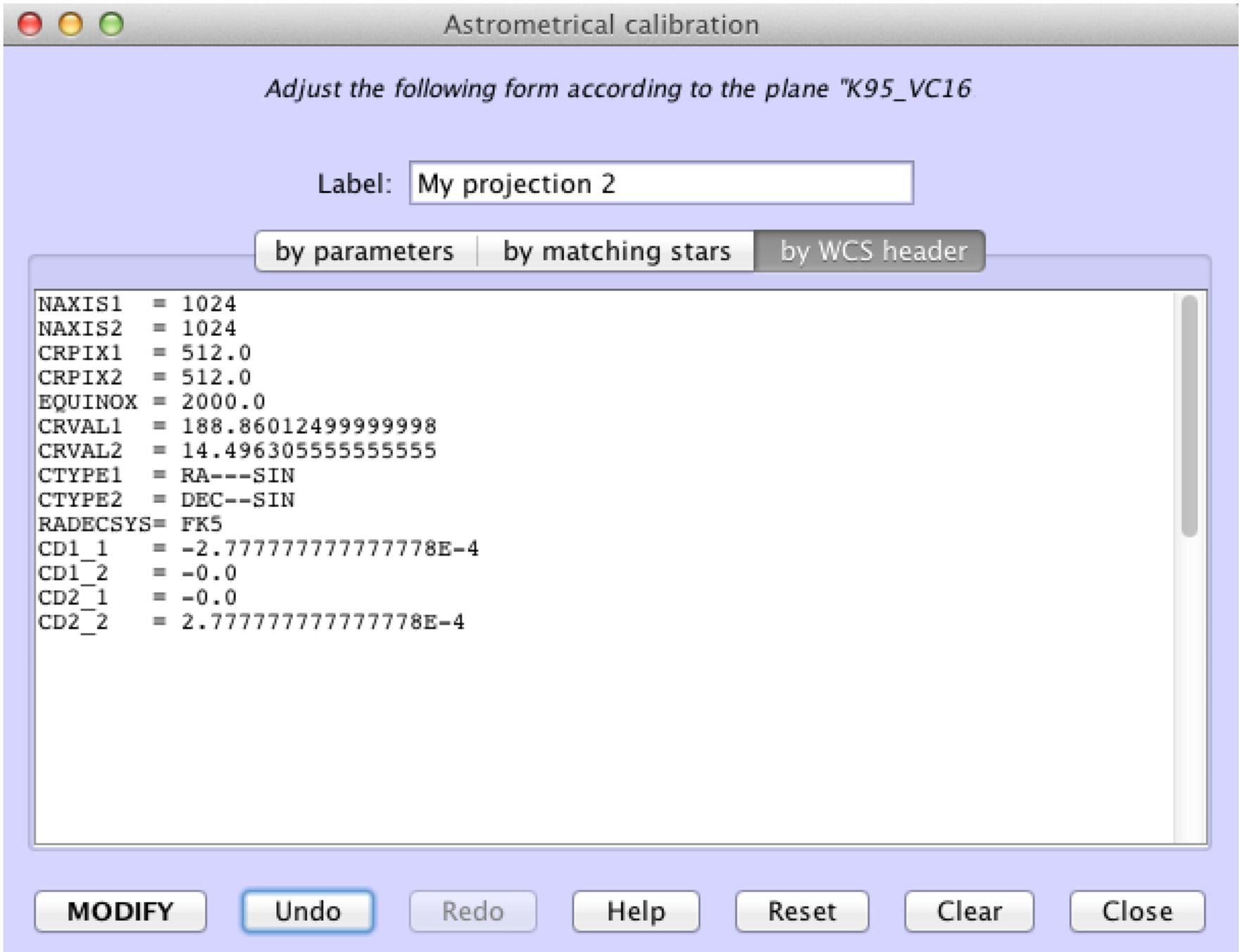
Aladin: astrometric calibration

- Open the image
- Get header info
- Create a new astrometric calibration



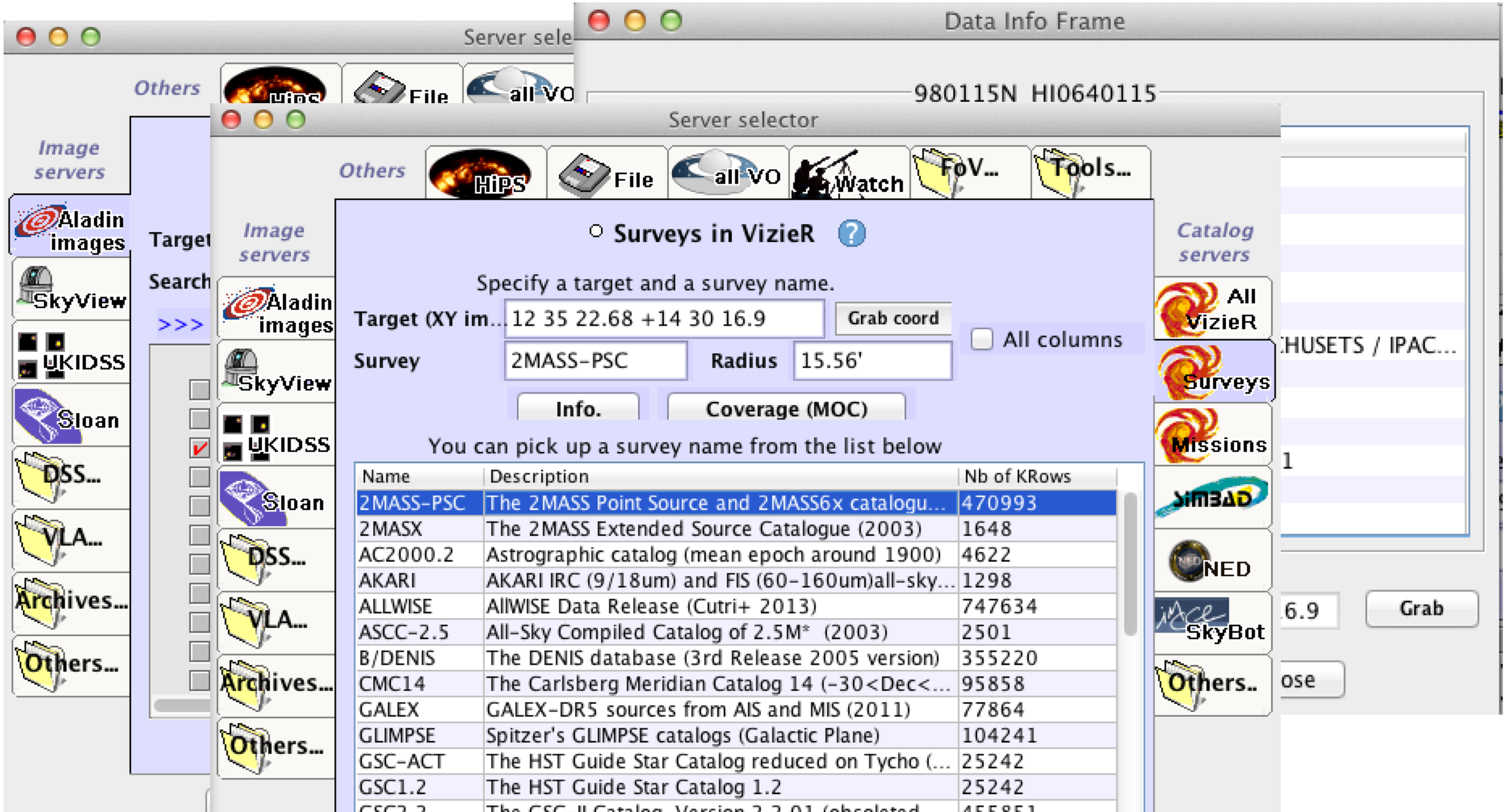
Aladin: astrometric calibration

- Include one object (coordinates and associated pixels) and pixel size



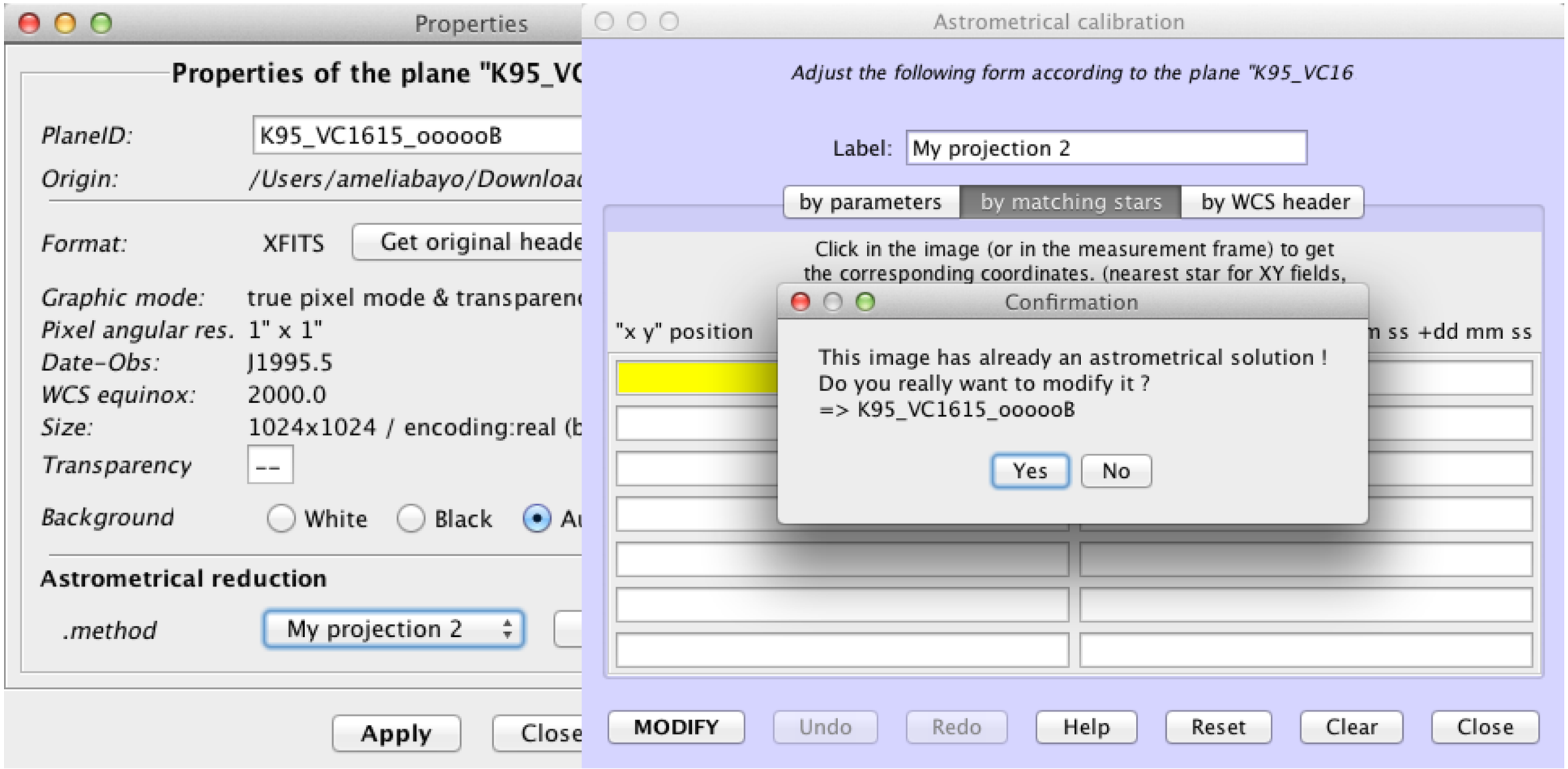
Aladin: astrometric calibration

- Load a calibrated image from the VO and a catalog to “anchor” the claibration



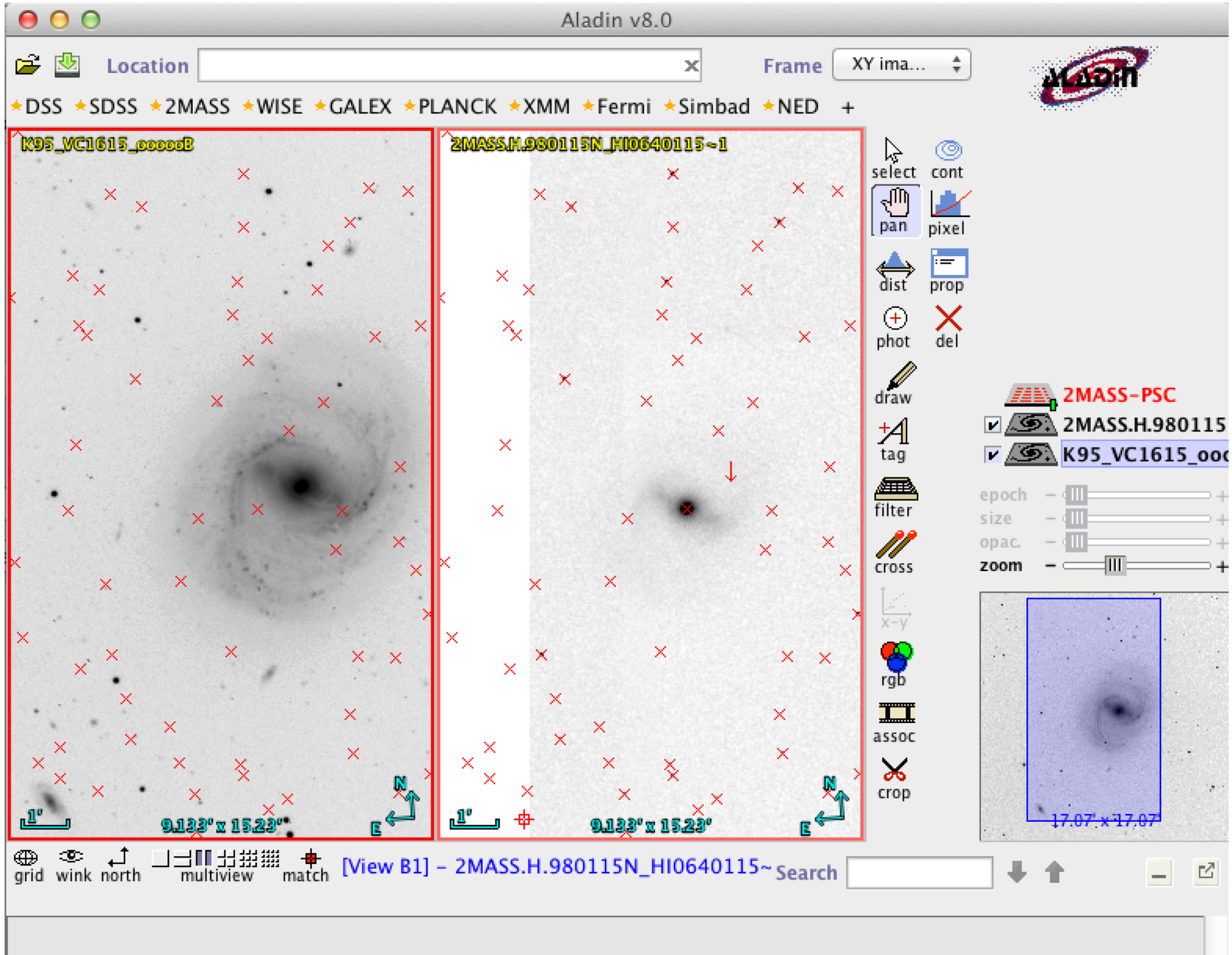
Aladin: astrometric calibration

- Let's improve our "first calibration"



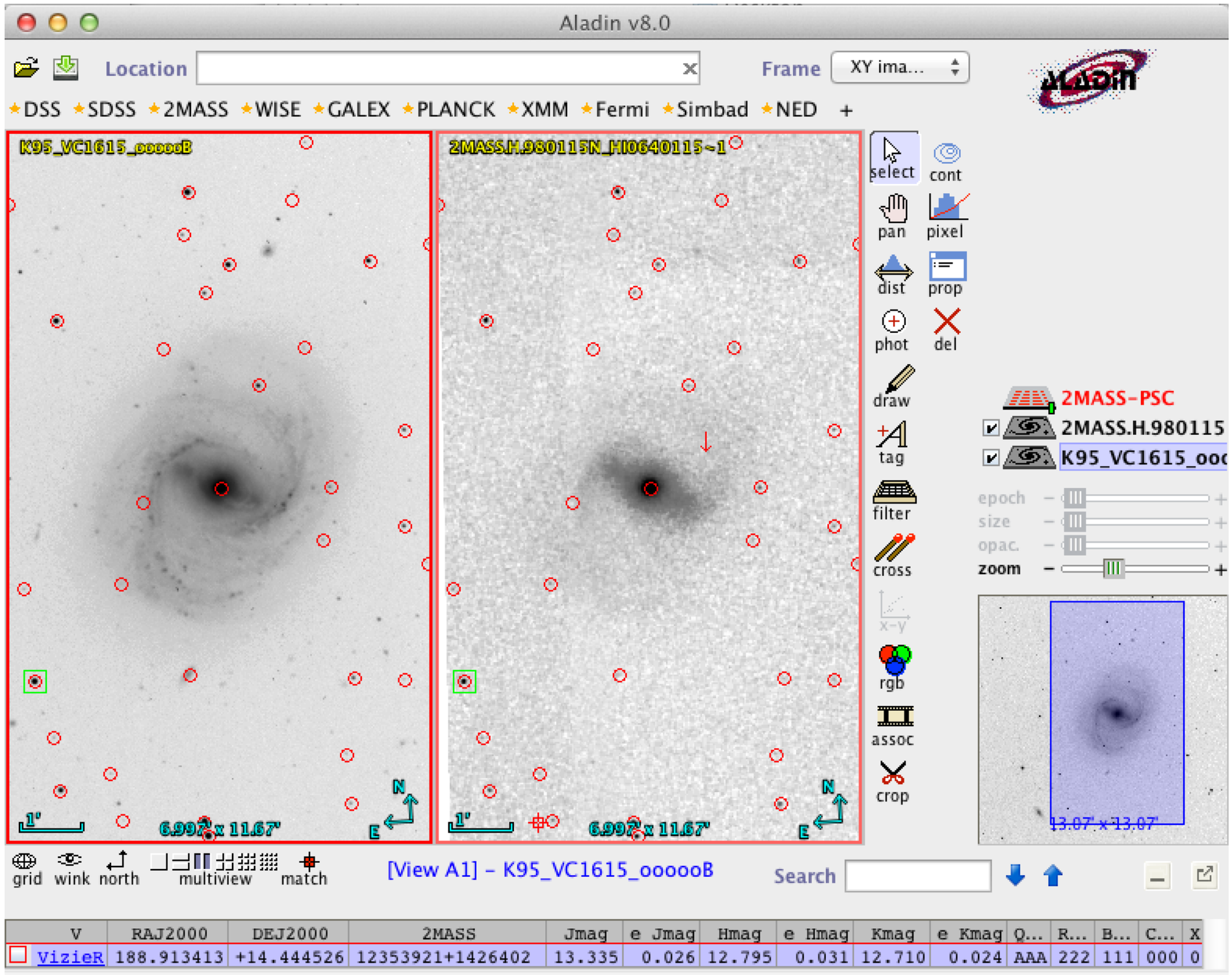
Aladin: astrometric calibration

- Matching stars…



Aladin: astrometric calibration

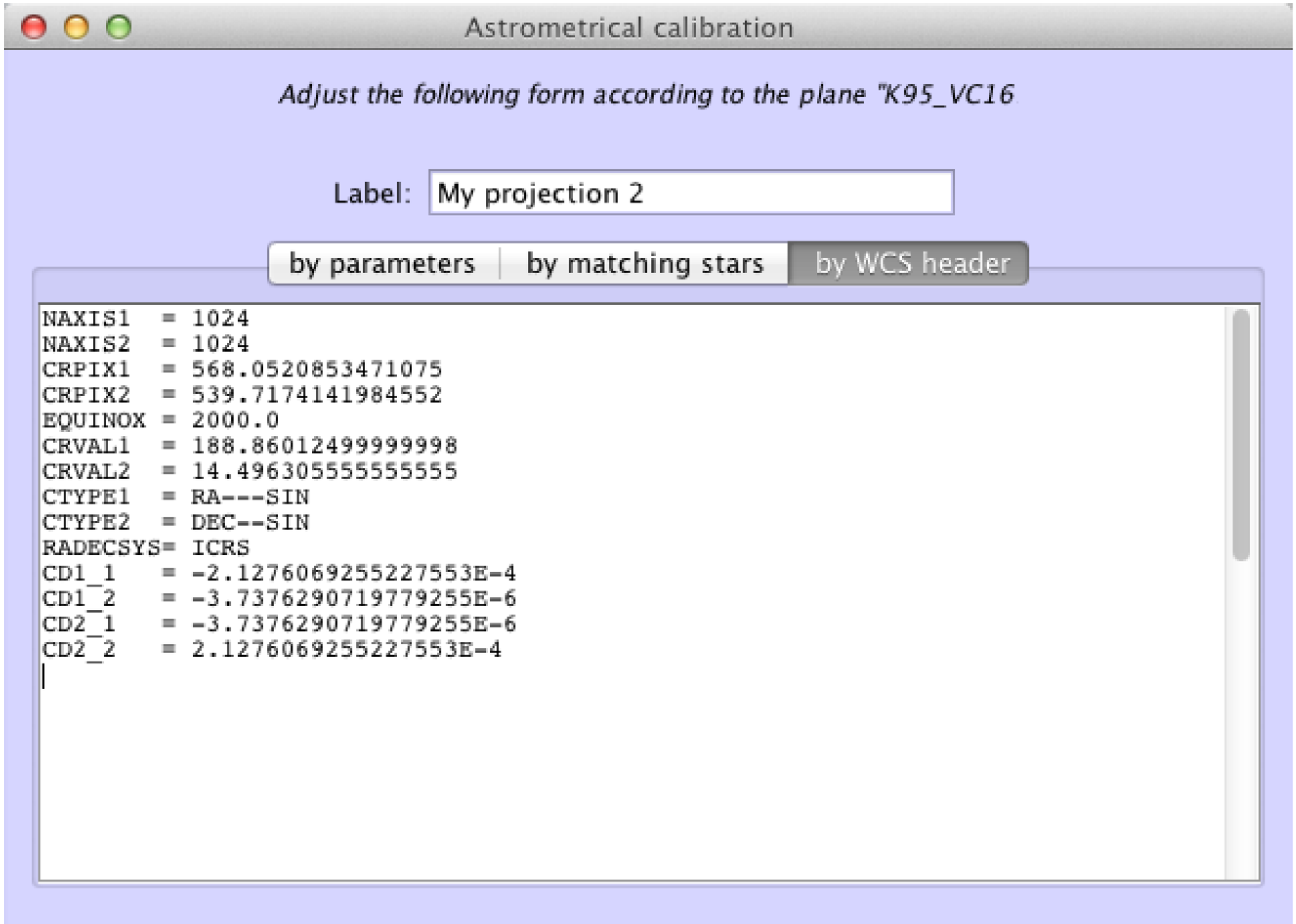
- Until we are happy…



V	RAJ2000	DEJ2000	2MASS	Jmag	e Jmag	Hmag	e Hmag	Kmag	e Kmag	Q...	R...	B...	C...	X
VizieR	188.913413	+14.444526	12353921+1426402	13.335	0.026	12.795	0.031	12.710	0.024	AAA	222	111	000	0

Aladin: astrometric calibration

- Something changed…



Aladin: astrometric calibration

- Useful for a first quick look but problems… where do I start…

1. What algorithm was used for the centering?

2. Can I use J2000.0 catalogs without problems?

3. “Slightly” manual, don’t you think?

4. Imagine doing this for the FoV of the wide field imagers in VISTA, VST or the ESO 2p2?

5. I could continue for a while…

Thank you!...

... enjoy playing with the VO because it is useful but it is nowhere close to be perfect!