VOSA 2: the new generation

VOSA VO SED Analyzer

http://svo2.cab.inta-csic.es/theory/vosa

Files | Objects | VO Phot. | SED | Chi-2 Fit | Bayes Analysis | HR Diag. | Save Results | Log

Stars and brown dwarfs (Change) **File: C69 only confirmed spec** (info) (Change)

Model Fit | Template fit

Model fit+

- Bestfit
- C69-IRAC-001
- C69-IRAC-002
- C69-IRAC-003
- C69-IRAC-004
- C69-IRAC-005
- C69-IRAC-006
- C69-IRAC-007
- C69-Sub-004
- C69-Sub-005
- C69-X-E-104
- C69XE-009
- C69XE-040
- C69XE-064
- C69XE-072
- DM003
- DM005
- DM006
- DM007
- DM008
- DM009
- DM010
- DM013
- DM014

Best fit+ results

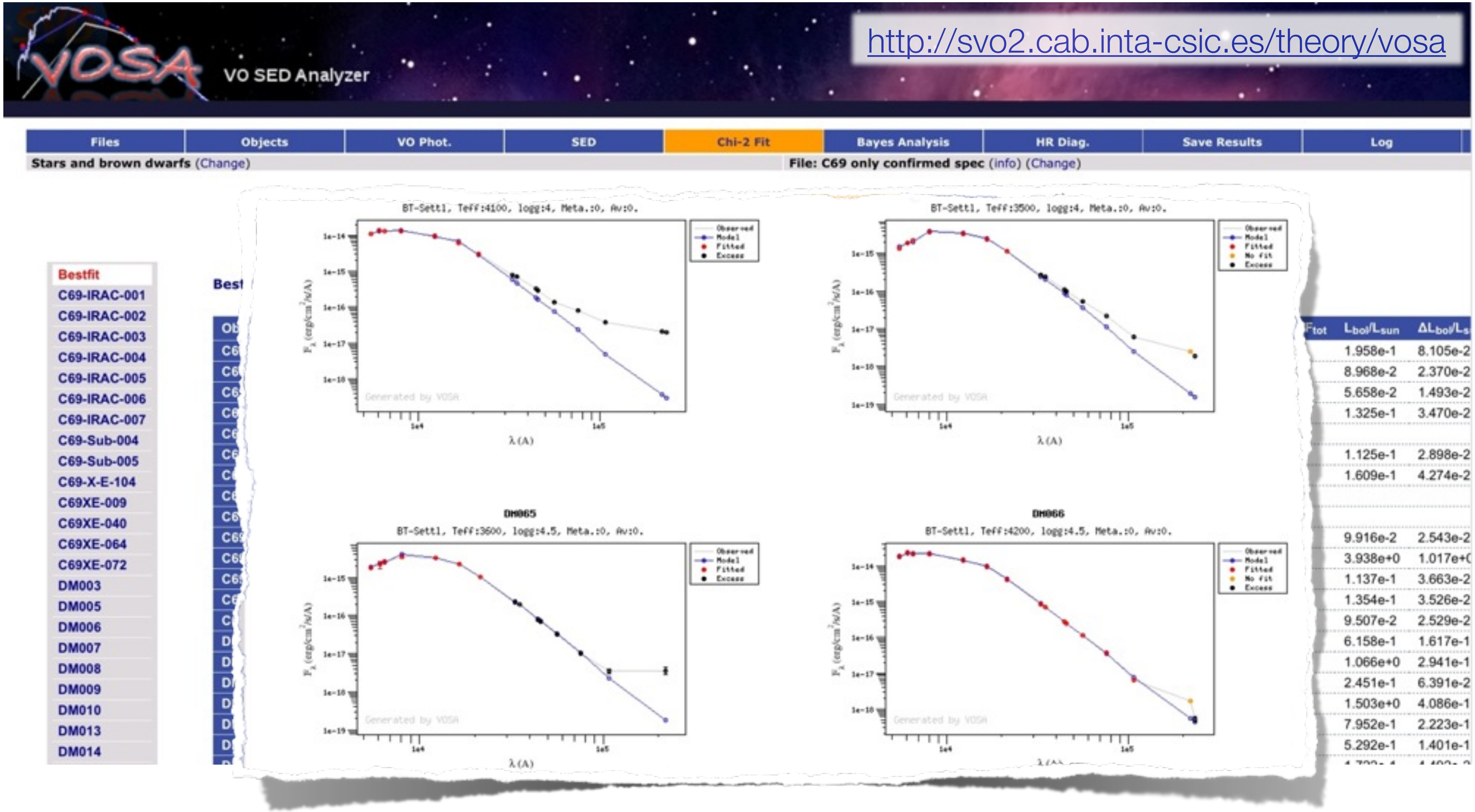
Show graphs | Delete this fit

Object	RA	DEC	D (pc)	Model	T_{eff}	logg	Meta.	more	χ^2	M_d	F_{tot}	ΔF_{tot}	F_{obs}/F_{tot}	L_{bol}/L_{sun}	$\Delta L_{bol}/L_{s}$
C69-IRAC-001	84.2339859	9.5229902	400.000	BT-Settl	3000	3.5	0	alpha:0	2.988e+2	5.344e-21	3.927e-11	6.435e-12	0.66	1.958e-1	8.105e-2
C69-IRAC-002	84.230545	9.7799978	400.000	BT-Settl	3300	3.5	0	alpha:0	3.507e+1	2.703e-21	1.798e-11	2.563e-13	0.44	8.968e-2	2.370e-2
C69-IRAC-003	83.962204	9.6491137	400.000	BT-Settl	3300	3.5	0	alpha:0	5.799e+0	1.719e-21	1.135e-11	1.574e-13	0.43	5.658e-2	1.493e-2
C69-IRAC-004	83.8685303	10.0409756	400.000	BT-Settl	3200	4	0	alpha:-0.2	1.040e+1	4.467e-21	2.658e-11	3.129e-13	0.44	1.325e-1	3.470e-2
C69-IRAC-005	83.8555679	9.9132547	0.000								Not enough points to make a fit				
C69-IRAC-006	83.7191086	9.9305677	400.000	BT-Settl	3000	4	0	alpha:-0.2	2.375e+1	4.670e-21	2.255e-11	1.724e-13	0.29	1.125e-1	2.898e-2
C69-IRAC-007	83.516304	9.8700848	400.000	BT-Settl	2800	4	0	alpha:-0.2	5.962e+1	9.047e-21	3.227e-11	5.043e-13	0.40	1.609e-1	4.274e-2
C69-Sub-004	83.79483333333334	9.935138888888888	0.000								Not enough points to make a fit				
C69-Sub-005	83.78791666666666	9.910027777777776	0.000								Not enough points to make a fit				
C69-X-E-104	83.98154	9.869463	400.000	BT-Settl	3200	4	0	alpha:-0.2	8.021e+2	3.374e-21	1.989e-11	1.284e-13	0.54	9.916e-2	2.543e-2
C69XE-009	83.829475	9.9151335	400.000	Kurucz	4750	3.50	0.00	---	2.416e+1	2.689e-20	7.898e-10	6.560e-12	0.22	3.938e+0	1.017e+(
C69XE-040	84.209405	9.9066	400.000	BT-Settl	3200	3.5	0	alpha:0	2.022e+0	3.818e-21	2.280e-11	1.646e-12	0.50	1.137e-1	3.663e-2
C69XE-064	83.842427	9.8995644	400.000	BT-Settl	3400	4	0	alpha:-0.2	1.606e+2	3.423e-21	2.716e-11	2.798e-13	0.52	1.354e-1	3.526e-2
C69XE-072	84.114436	9.7571574	400.000	BT-Settl	3300	4	0	alpha:0	6.157e+0	2.879e-21	1.906e-11	3.055e-13	0.49	9.507e-2	2.529e-2
DM003	83.46541666666666	9.639305555555556	400.000	BT-Settl	3800	4	0	alpha:0	2.117e+1	1.066e-20	1.235e-10	1.555e-12	0.53	6.158e-1	1.617e-1
DM005	83.50833333333333	9.685055555555554	400.000	BT-Settl	4300	4.5	0	alpha:0	3.738e+0	1.138e-20	2.137e-10	5.557e-12	0.58	1.066e+0	2.941e-1
DM006	83.52058333333335	9.951055555555554	400.000	BT-Settl	3600	3.5	0	alpha:0	4.409e+1	5.183e-21	4.916e-11	5.277e-13	0.48	2.451e-1	6.391e-2
DM007	83.52304166666666	9.713	400.000	BT-Settl	4500	3.5	0	alpha:0	3.551e+1	1.309e-20	3.014e-10	6.597e-12	0.62	1.503e+0	4.086e-1
DM008	83.55704166666668	9.488833333333334	400.000	BT-Settl	4300	4.5	0	alpha:0	1.085e+1	8.370e-21	1.595e-10	4.719e-12	0.60	7.952e-1	2.223e-1
DM009	83.63670833333332	9.991916666666667	400.000	BT-Settl	4200	4.5	0	alpha:0	4.731e+0	6.241e-21	1.061e-10	1.572e-12	0.58	5.292e-1	1.401e-1

~200 regular users, cited in ~ 50 papers

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

VOSA 2: the new generation



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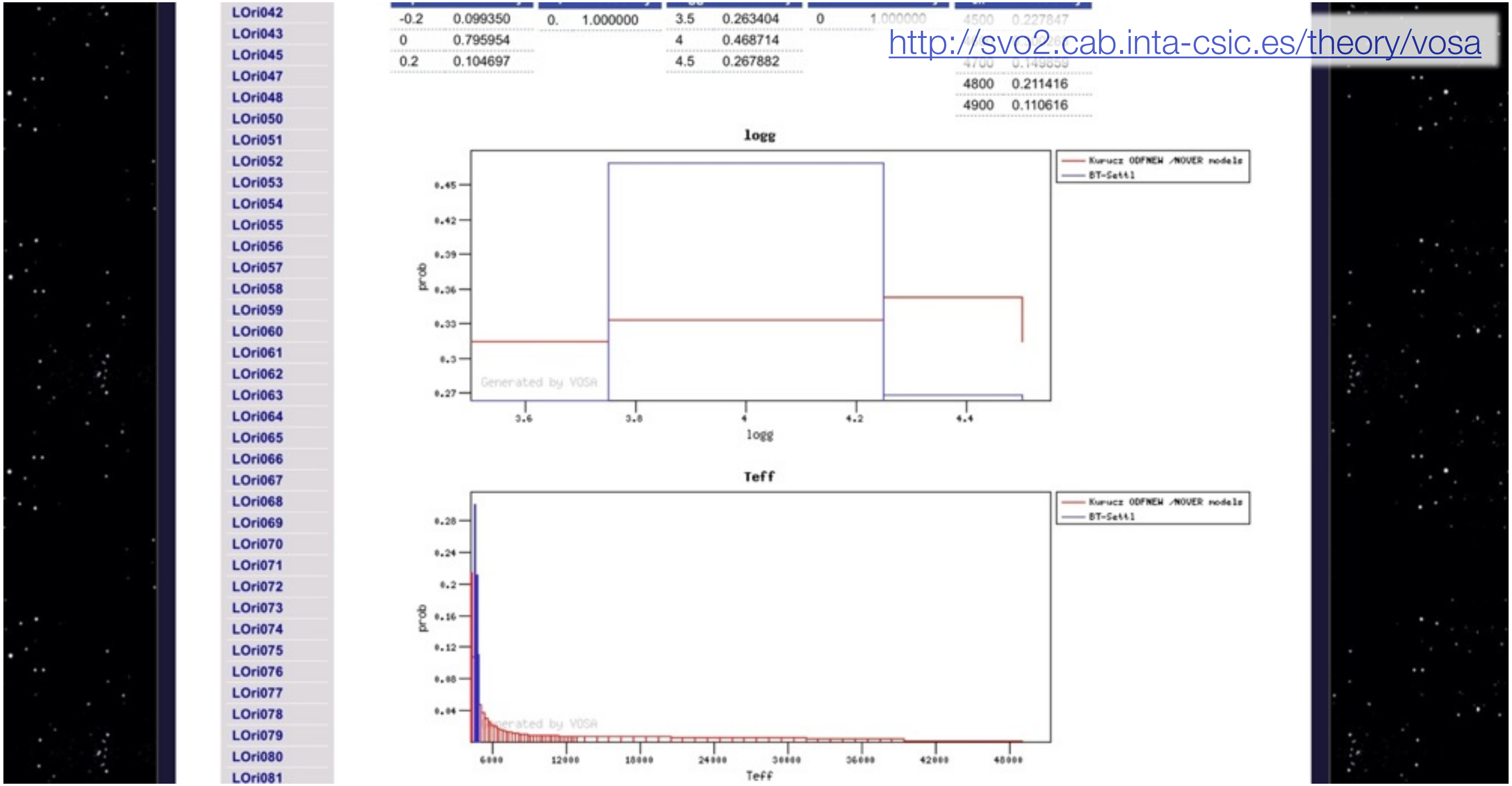

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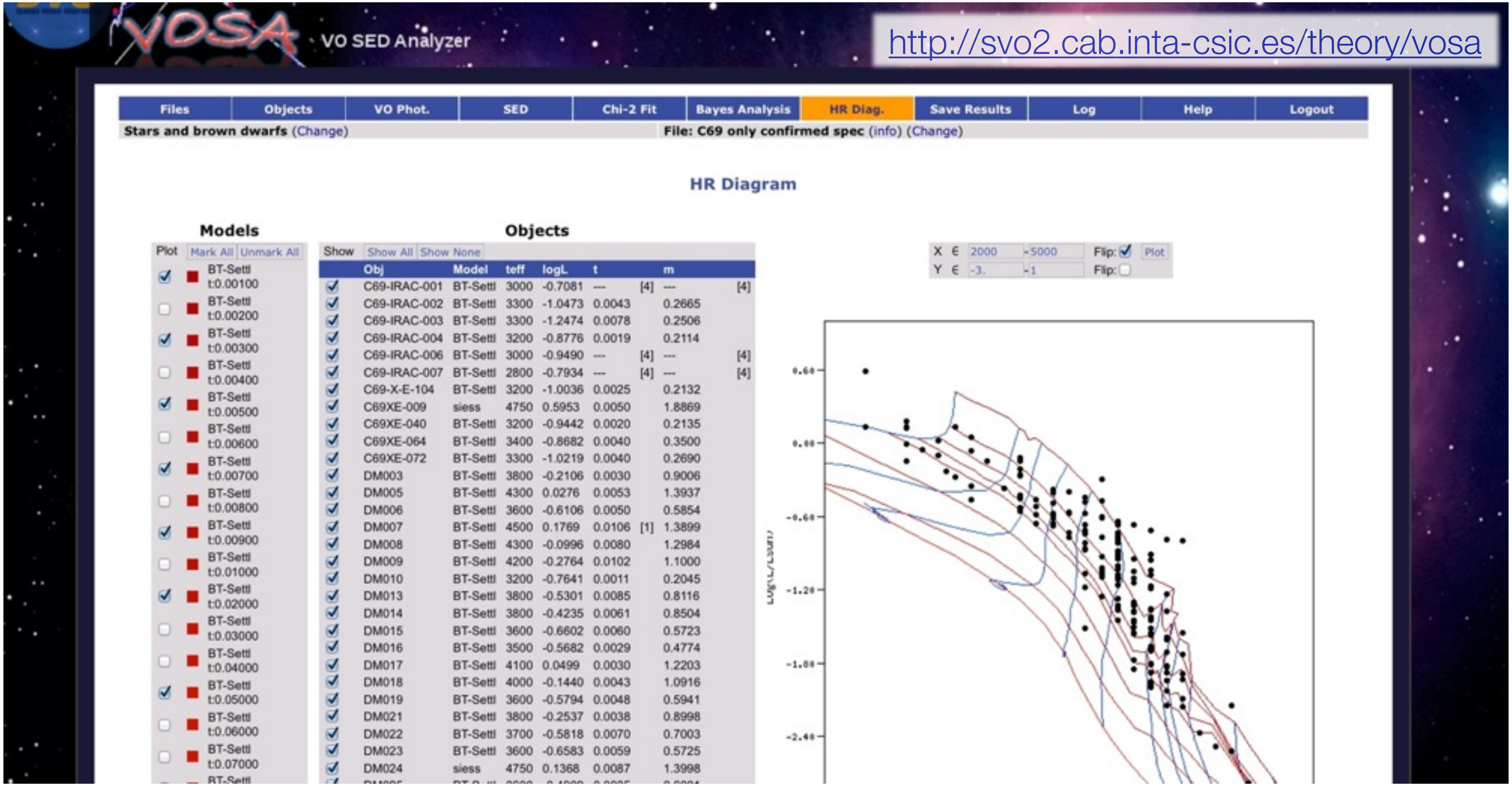
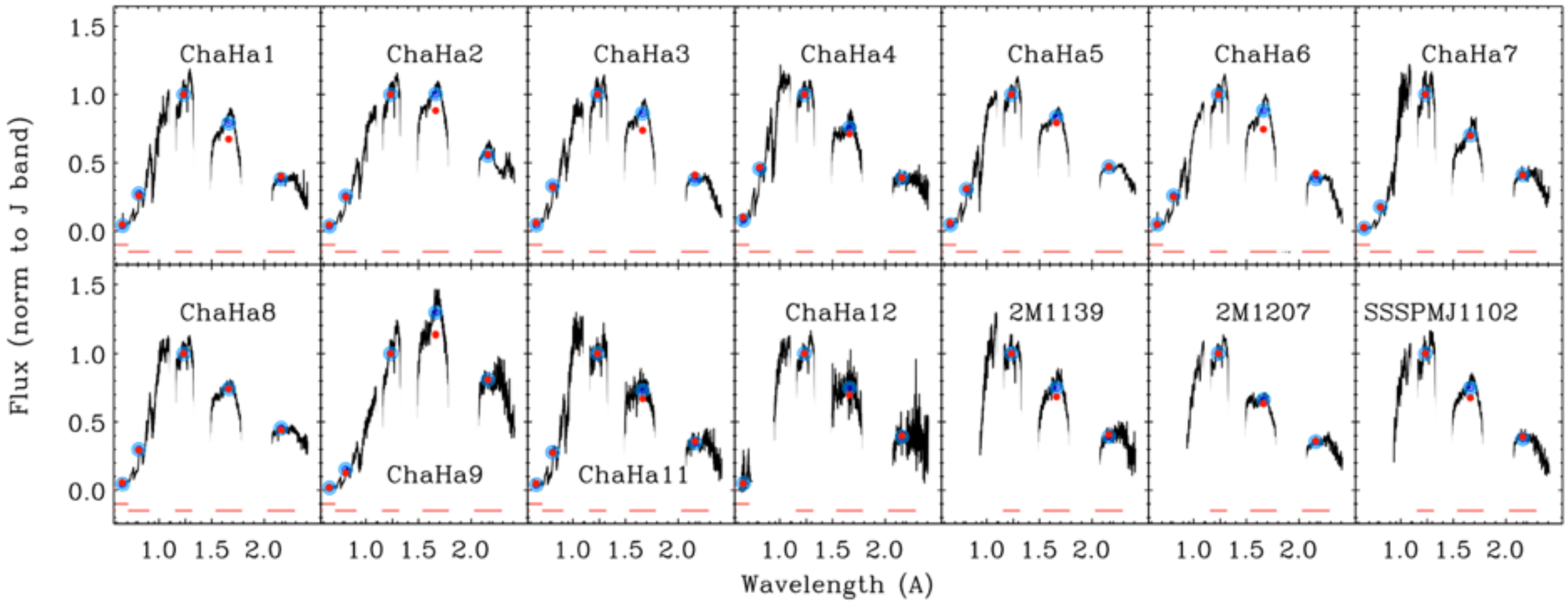


~200 regular users, cited in ~ 50 papers

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

Cases that benefit from the new VOSA: Late M-type members of Cha I and TWA

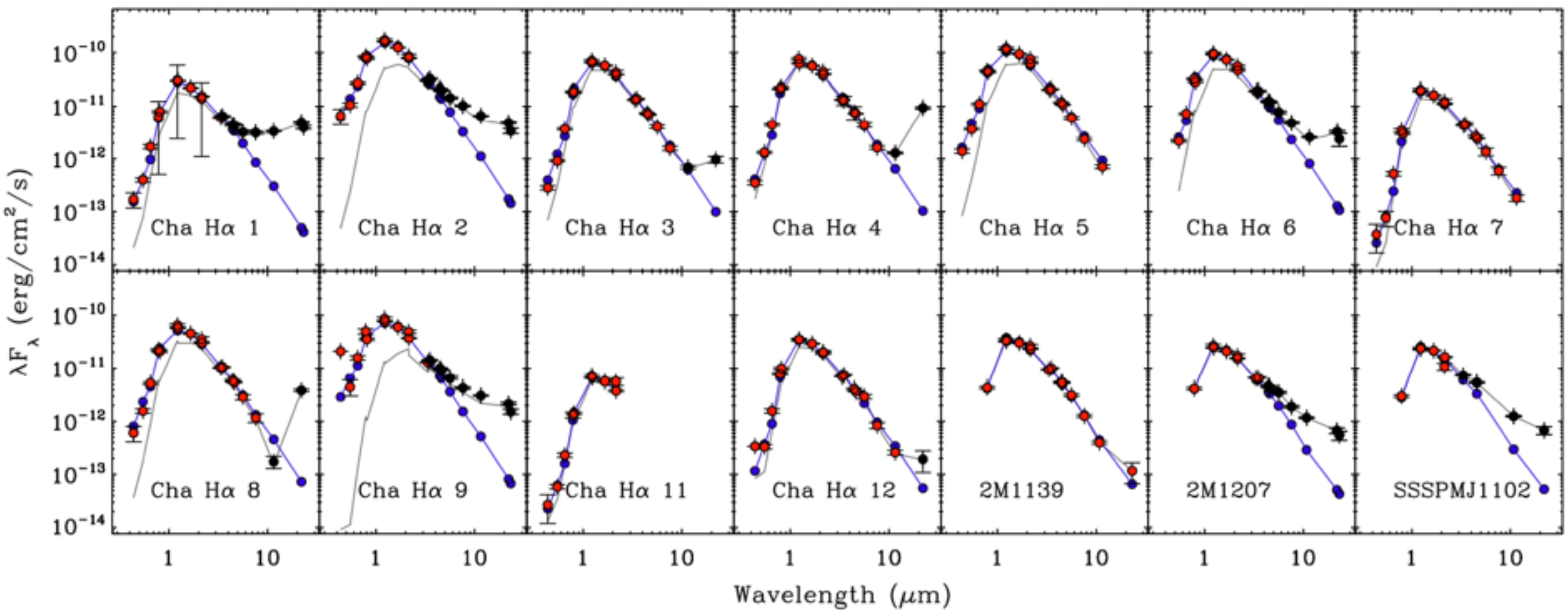
- ✓ Spectral types (optical) M6 - M9 (dust settling)
- ✓ Well populated SEDs
- ✓ Optical + NIR spec avaialble



VOSA results of the sample

✓ Good fits for most of the objects

✓ Significant parameters



Bayo et al. (2014b subm.)

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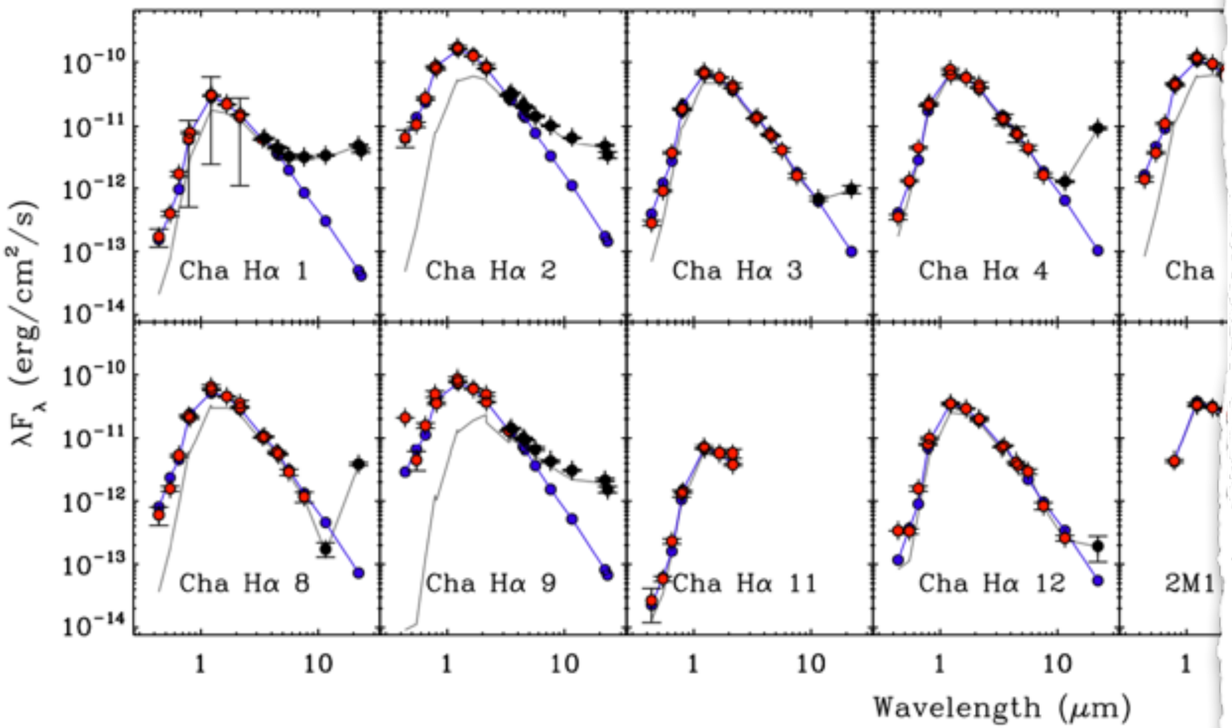
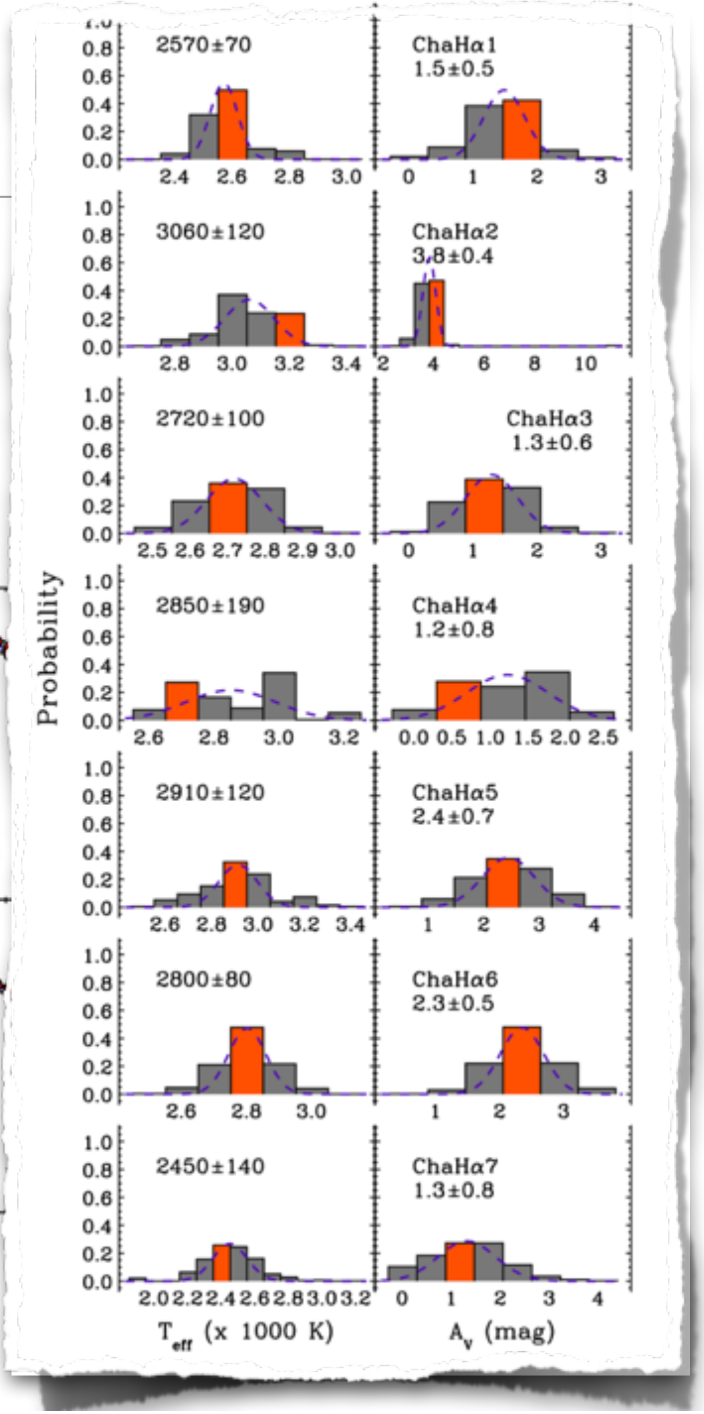
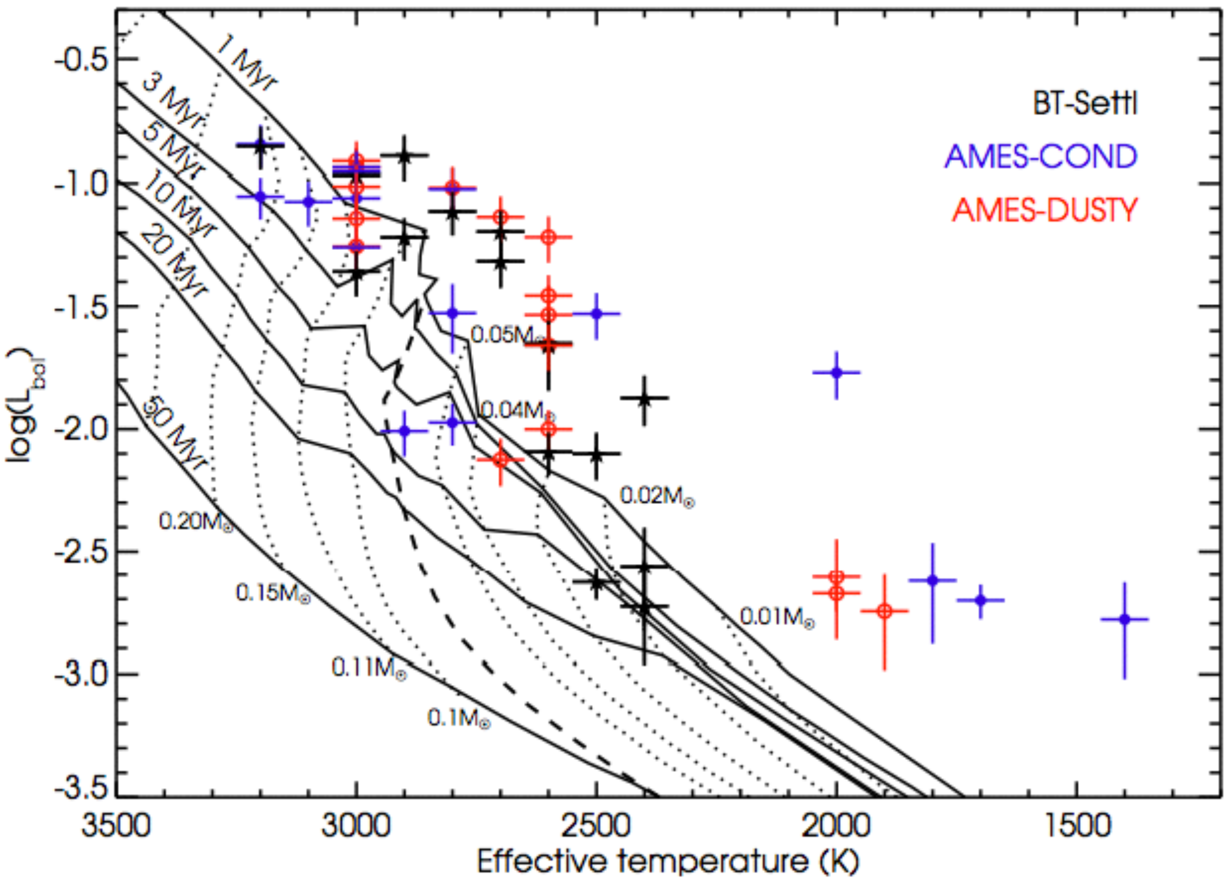




Bayo et al. (2014b subm.)

VOSA makes easy to compare the impact of dust treatment in determined masses -> IMF

- Non-realistic masses with the limiting cases



Bayo et al. (2014b subm.)

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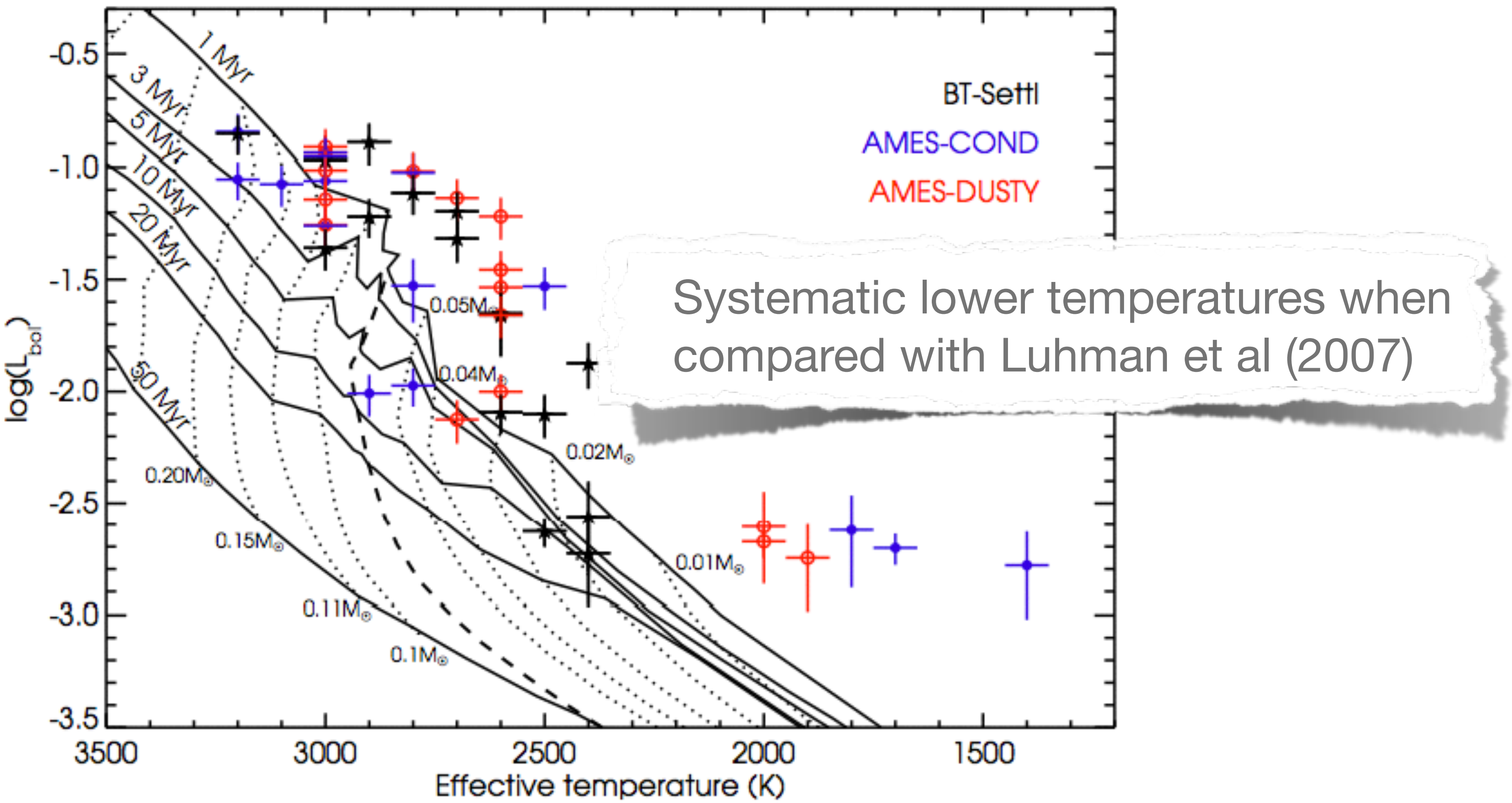
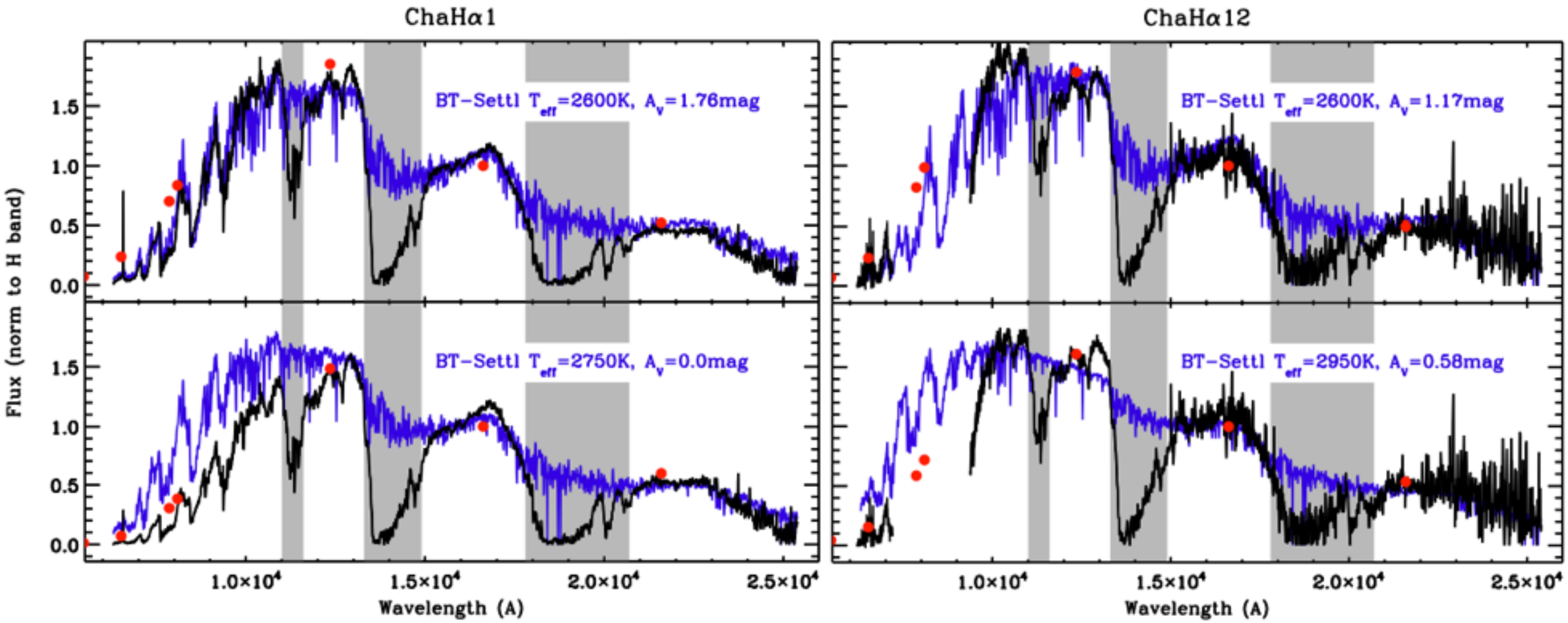


Bayo et al. (2014b subm.)

Our determinations favored when reaching higher level of detail

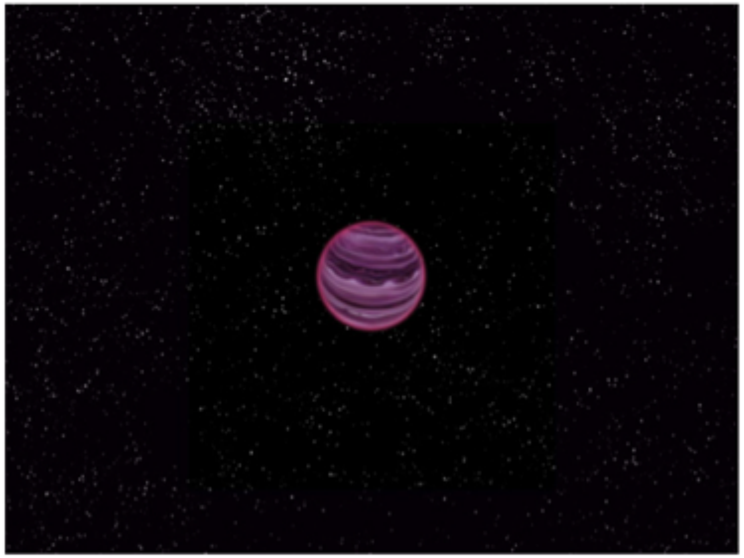


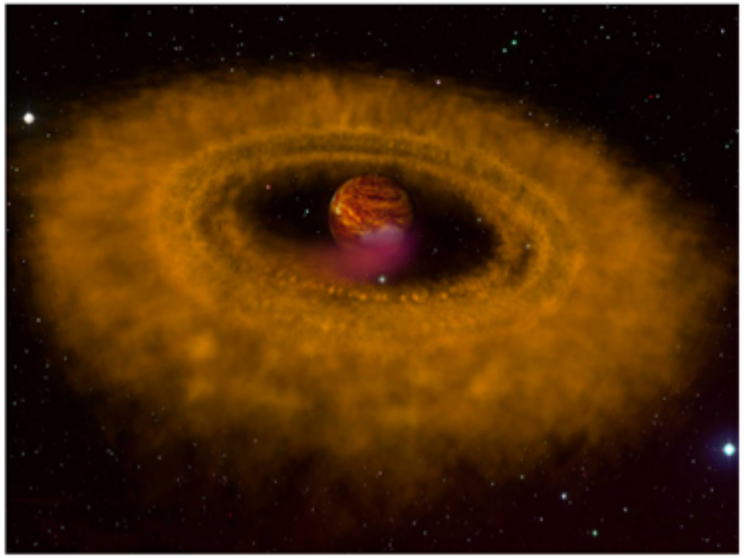
Bayo et al. (2014b subm.)

Cases that benefit from (& not only) the new VOSA: A much COOLER object

- Combined press-release: this is how our cool neighbors formed?

Astronomers including Niall Deacon of the Max Planck Institute for Astronomy (MPIA) captured an image of an unusual free-floating planet. As the object has no host star, it can be observed and examined much easier than planets orbiting stars, promising insight into the details of planetary atmospheres. Can an object with as low a mass as this have formed directly, in the same way that stars form? Independent observations by a group led by MPIA's Viki Joergens suggest that this is the case: They discovered that a similar but much younger free-floating object is drawing material from its surrounding just like a young star. This has important consequences for star formation models in general.





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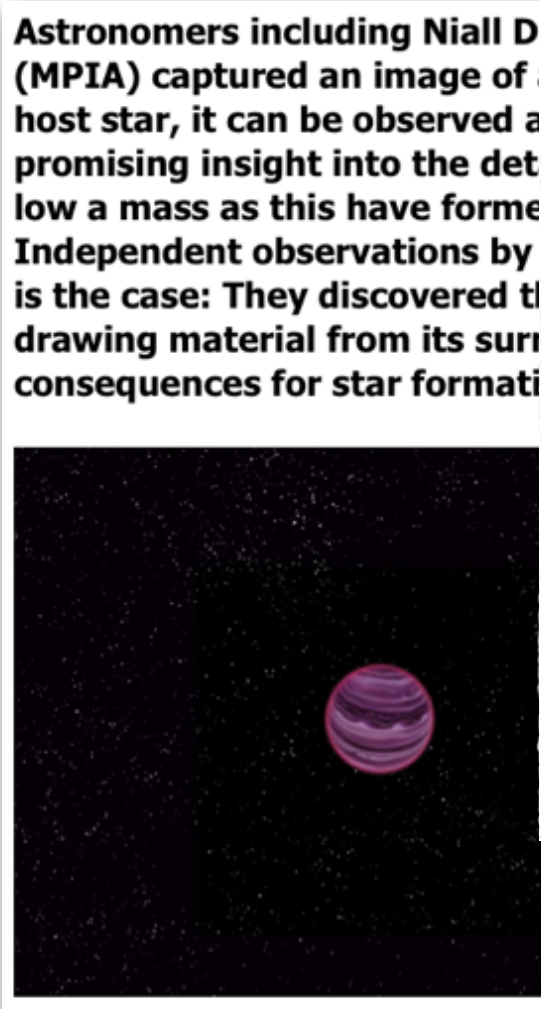
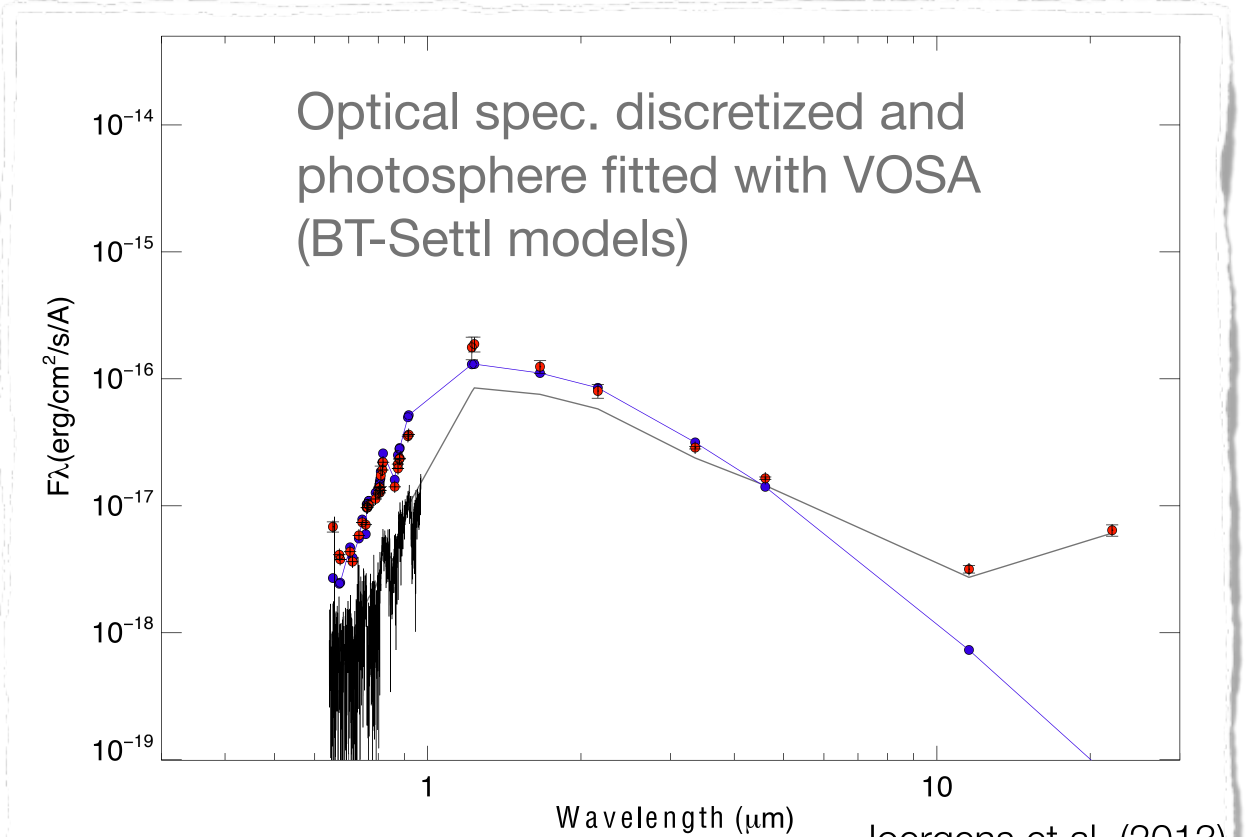
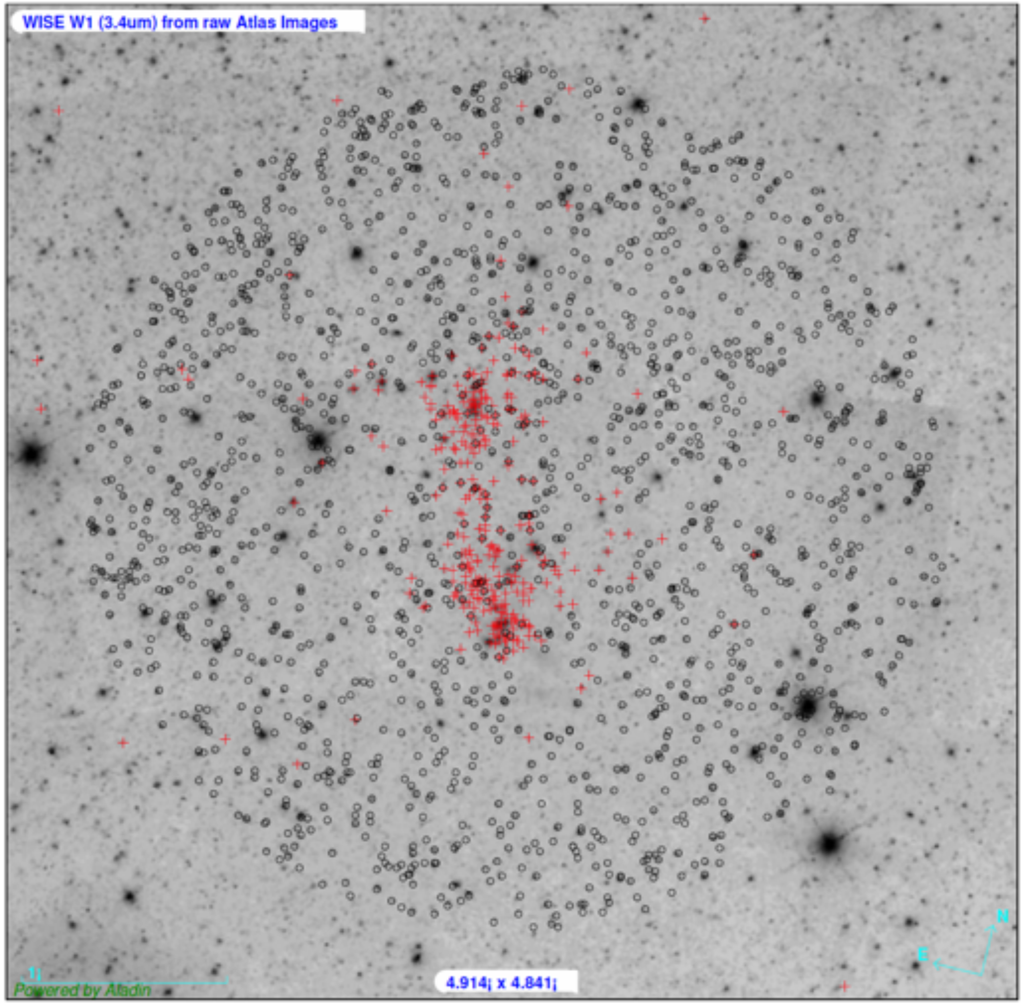




Joergens et al. (2013)

Cases that benefit from (& not only) the new VOSA: Mine archives to achieve complete censuses

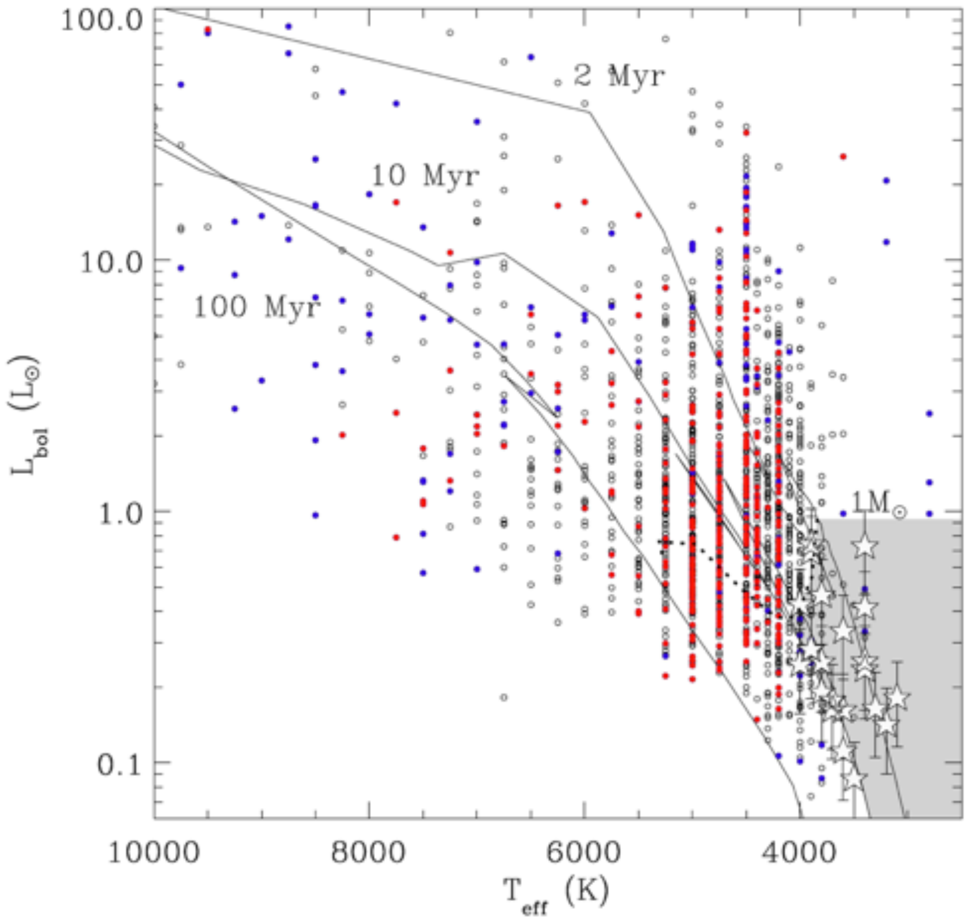
- Every WISE source in a 2deg radius (~5.8 pc) with photospheric colors



Bayo et al. 2014a (submitted)

Cases that benefit from (& not only) the new VOSA: Mine archives to achieve complete censuses

- Every WISE source in a 2deg radius (~5.8 pc) with photospheric colors
- Build SEDs with VOSA, fit models -> determine physical parameters



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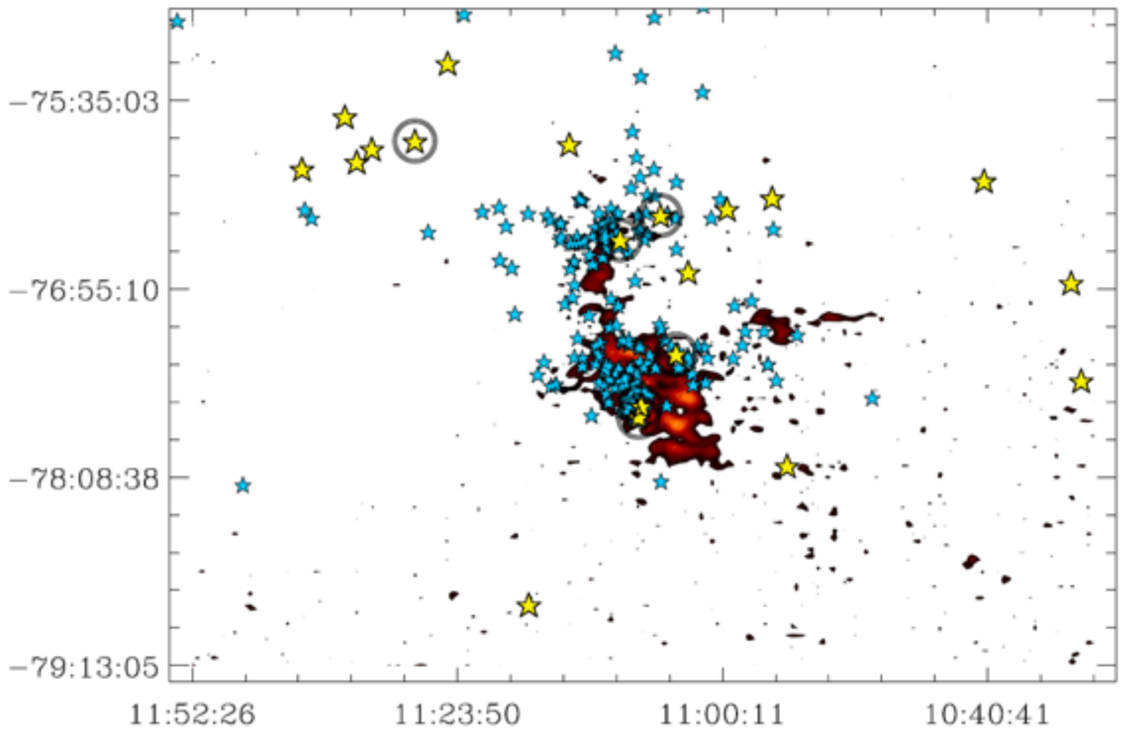
- Select candidates: different spatial distribution?



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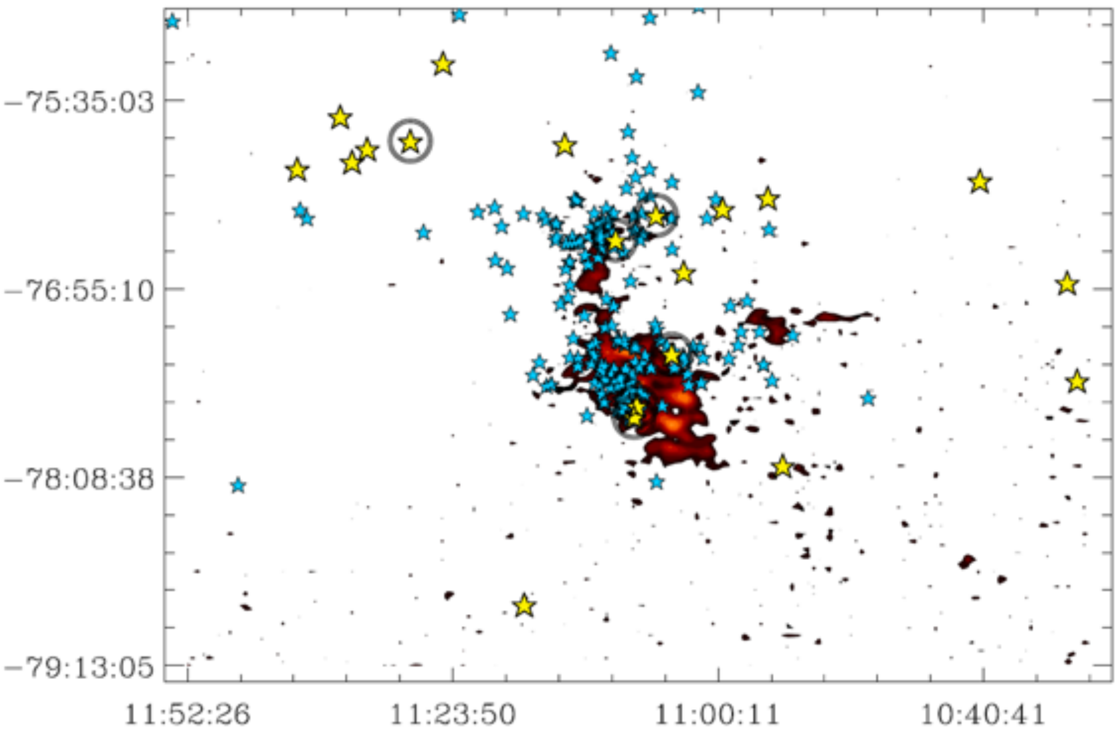
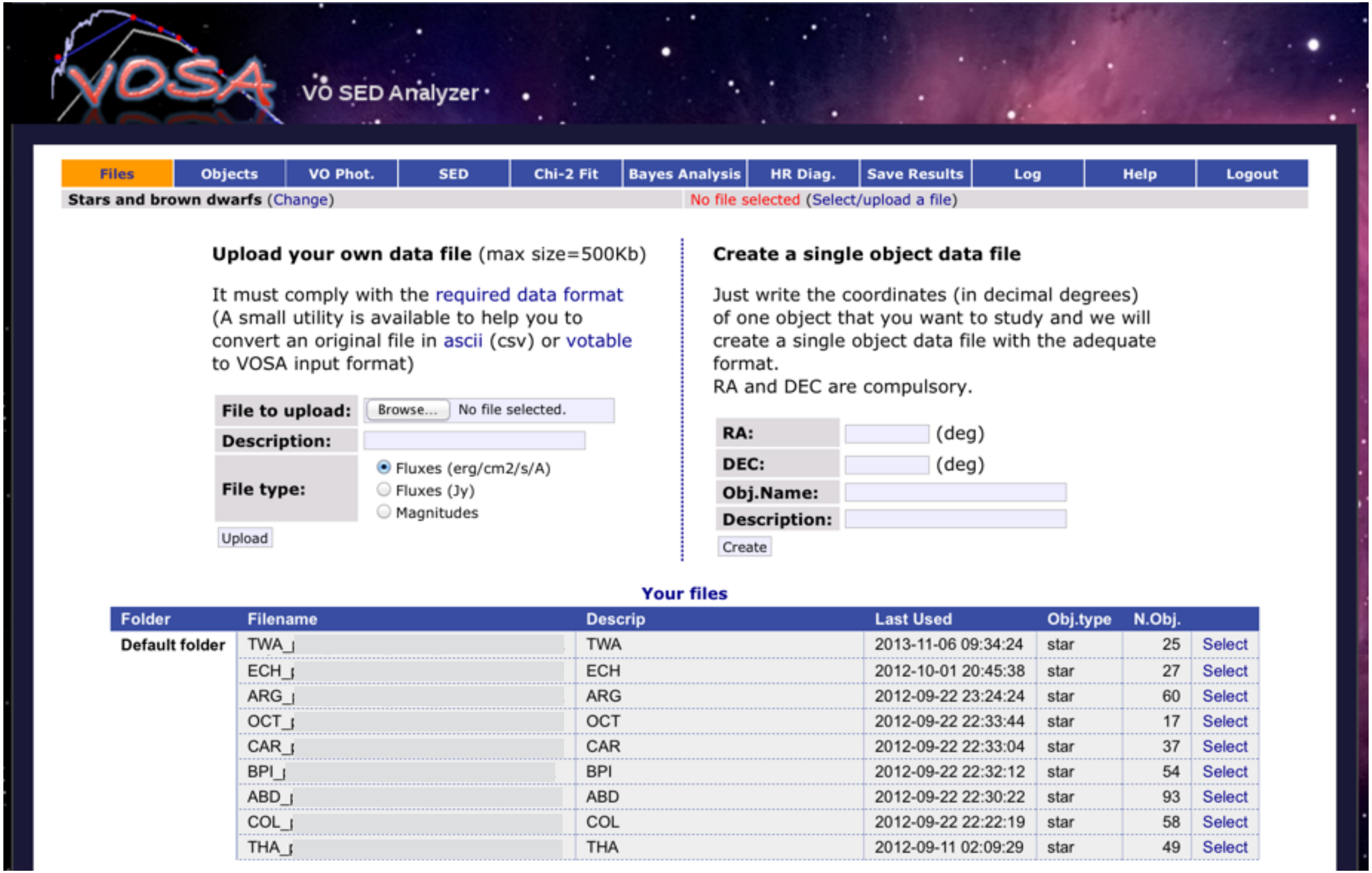
Cases that benefit from (& not only) the new VOSA: Mine archives to achieve complete censuses

- Every WISE source in a 2deg radius (~5.8 pc) with photospheric colors
- Build SEDs with VOSA, fit models -> determine physical parameters
- Select candidates: different spatial distribution?
- Confirm candidates: NTT/EFOSC2 data (preliminary) -> 65% success



Bayo et al. 2014a (submitted)

Cases that benefit from the new VOSA:
Disk evolution in low-mass stars



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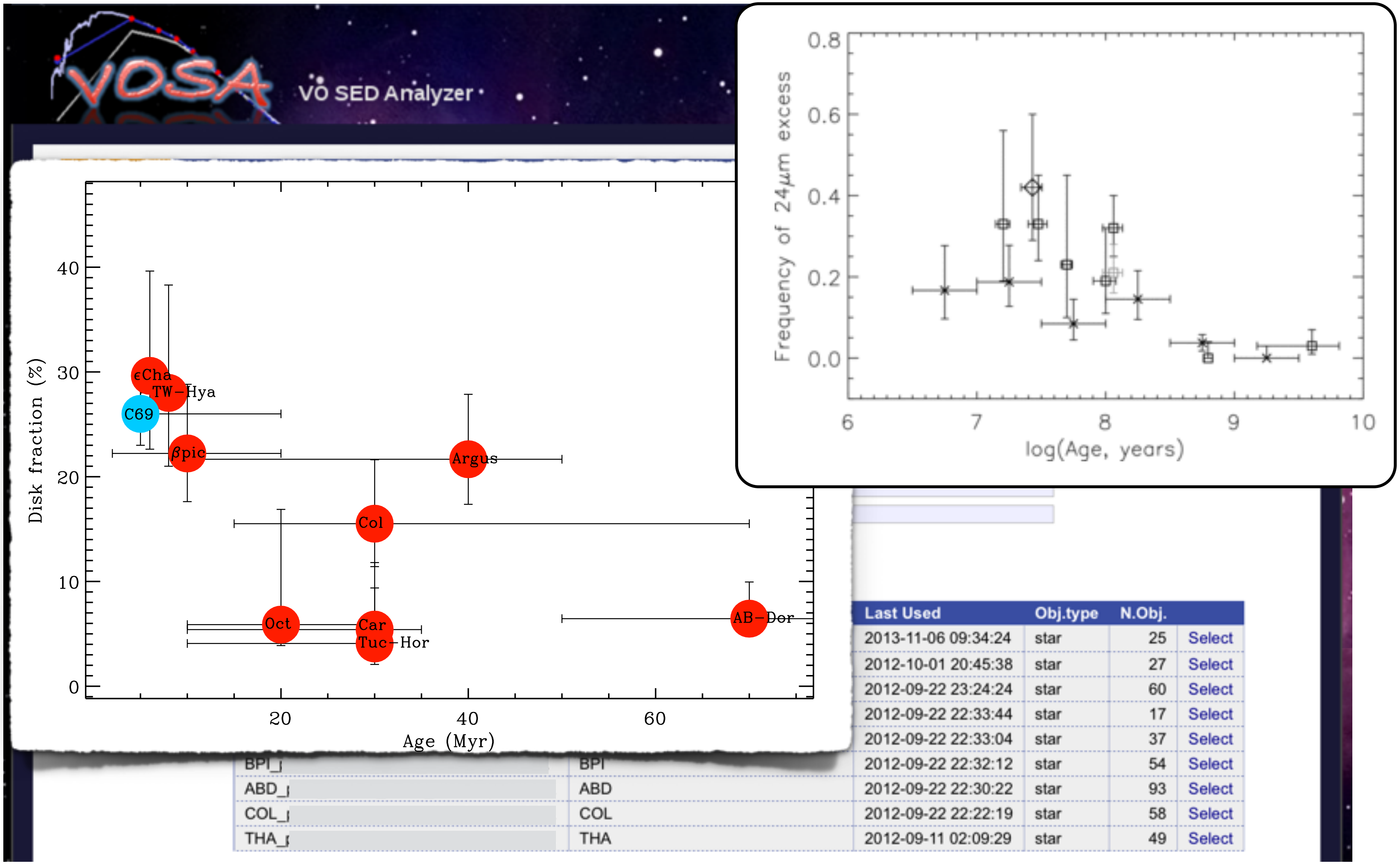
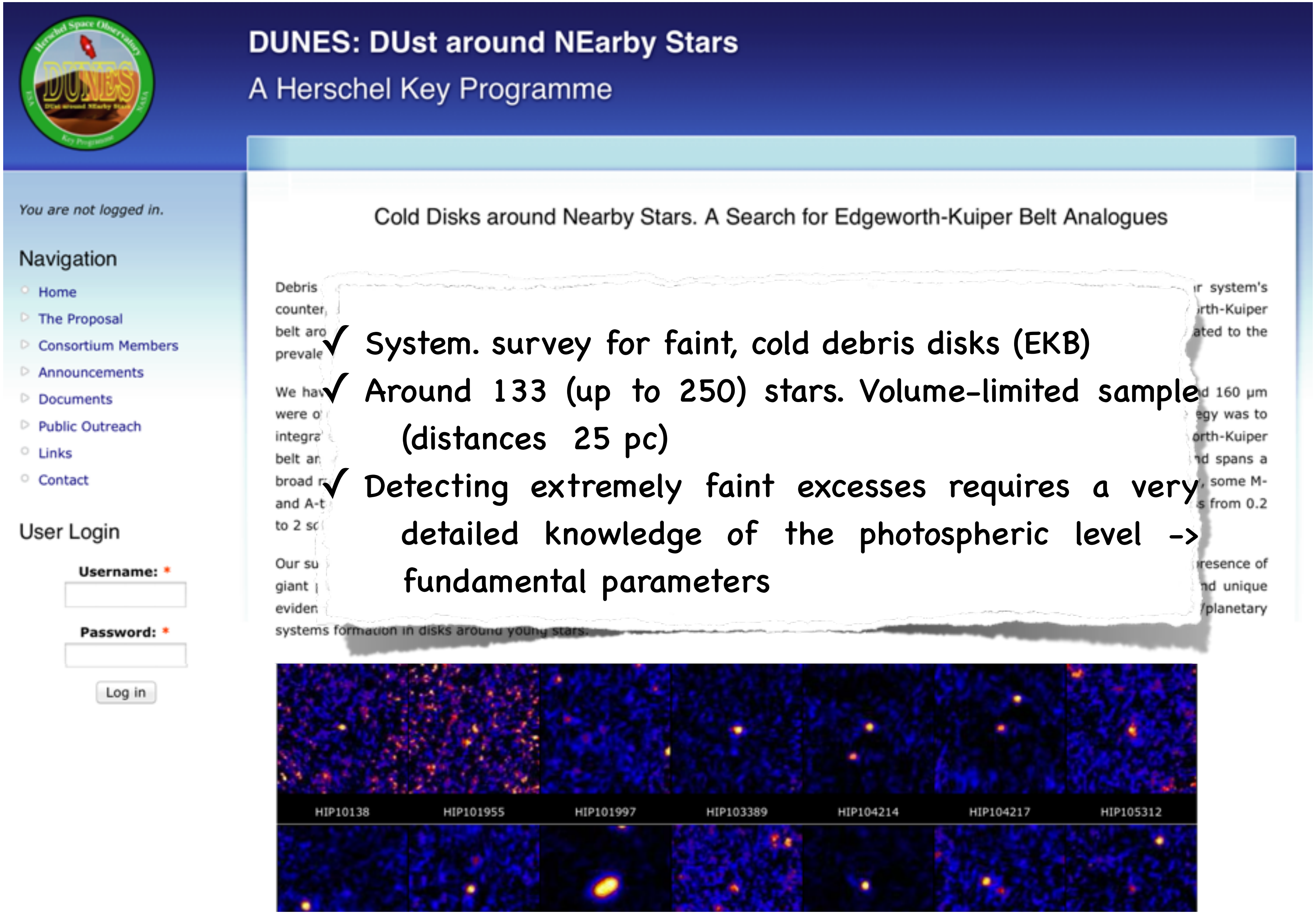


The happy endings…

- Data related:
  - CDS wonders vs pain of getting, for example, IOP tables
  - The “sasmirala” atlas
- Tool related (development)
  - The final AVO science demo
  - The birth of VOSA (and its continuous development)
  - The DUNES-VO tool

The DUNES prep. work



- ✓ System. survey for faint, cold debris disks (EKB)
- ✓ Around 133 (up to 250) stars. Volume-limited sample (distances 25 pc)
- ✓ Detecting extremely faint excesses requires a very detailed knowledge of the photospheric level -> fundamental parameters

The DUNES prep. work

DUNES

DUst around NEarby Stars

A Herschel Key Programme

VO Discovery Tool

Developed in the framework of the DUNES and GASPS projects, this Virtual Observatory tool allows accessing, visualizing, filtering and retrieving relevant information already available in astronomical archives and services.

List of object names (one line each)

List of object coordinates (one line each)

Format allowed:

350.123456 -17.33333

20 54 05.689 37 01 17.38

10:12:45.3 -45:17:50

Radius: 2 ○ arcmin ● arcsec

The DUNES prep. work

VO Discovery Tool

Developed in the framework of the DUNES and GASPS projects, this Virtu
visualizing, filtering and retrieving relevant information already available in

Filters:

- **Exclude CCDM sources:**
  - CCDM astrometric binaries.
  - CCDM sources with known orbit.
  - CCDM sources with rho < [ ] arcse
  - All CCDM sources.
- **Exclude stars in SB9**
- **Exclude stars in Catalogue of Eclipsing Binari**
- **Exclude stars in WDS**

Services:

- **Photometric Data**

uvbyß Strömgren photometry	Hauck - Mermilliod	Radius:	10	arcsec
JHK photometry	2MASS	Radius:	5	arcmin / arcsec
IRAS photometry	Point Source Catalogue	Radius:	20	arcmin / arcsec
	Faint Source Catalogue	Radius:	20	arcmin / arcsec
Tycho-2 photometry	The Tycho-2 Catalogue of the 2.5 Million Brightest Stars	Radius:	5	arcmin / arcsec

- **VO Services**
  - Catalogs
  - Images
  - Spectra

- **Physical Parameters** (search radius 30 arcsec)

Teff , logg , [Fe/H] , E(B-V)	Explore Vizier: Teff	logg	[M/H]	E(B-V)
Vsini	Gleboki (2000)	Reiners - Schmitt (2003)	Explore vizier	
Period	Explore vizier			
Spec. Type	Explore vizier			
Age	Explore vizier			
Radial Velocity	Explore vizier			
Proper Motion	Hipparcos	Tycho-2	Explore vizier	
Space Velocity	Explore vizier			
Parallax	Hipparcos	Explore vizier		

OBJ	HIP
HIP 171	171

Photometry

Source	distance (arcmin)
Strömgren (II/215)	
Strömgren (II/215)	
Strömgren (II/215)	
Strömgren (II/215)	
2MASS (II/246)	0.01517
2MASS (II/246)	0.01517
2MASS (II/246)	0.01517
IRAS/PSC (II/125)	
IRAS/PSC (II/125)	
IRAS/PSC (II/125)	
IRAS/PSC (II/125)	
IRAS/FSC (II/156A)	
IRAS/FSC (II/156A)	
IRAS/FSC (II/156A)	
IRAS/FSC (II/156A)	
Tycho-2 (I/259 /tyc2)	
Tycho-2 (I/259 /tyc2)	
NStED	
NStED	
NStED	
NStED	
NStED	
NStED	
NStED	
NStED	
NStED	
NStED	
NStED	
NStED	
Spitzer/FEPS	
Spitzer/FEPS	
Spitzer/FEPS	
Spitzer/FEPS	
Spitzer/FEPS	
Spitzer/FEPS	
Spitzer/FEPS	

- For NStED and

OBJ	HIP
HIP 171	171

Teff

Catalog Name	Catalog Code	Distan (deg
Thevenin, 1998	III/193	0.0000
Prugniel+ 2007	III/251	0.0000

logg

Catalog Name	Catalog Code	Distanc (deg)
Thevenin, 1998	III/193	0.00000
Prugniel+ 2007	III/251	0.00000

[M/H]

Catalog Name	Catalog Code	Dist (d
Thevenin, 1998	III/193	0.00
Prugniel+ 2007	III/251	0.00

E(B-V))

Catalog Name	Catalog Code	D
CPIRSS	I/270	
Casagrande+, 2011	J/A+A/530/A138	

Vsini

Catalog Name	Catalog Code	Dista (de					
Glebocki+ 2005	III/244	0.00					
Glebocki+ 2005	III/244	0.00					
Glebocki+ 2005	III/244	0.00					
Glebocki+ 2005	III/244	0.00					
Glebocki+ 2005	III/244	0.00					
Hoffleit+, 1991	V/50	0.000					
Herrero+, 2012	J/A+A/537/A147	0.000					
Takeda+, 2005	J/PASJ/57/13	0.000005	3		vsini	km/s	phys.veloc.rotat

Sptype

Catalog Name	Catalog Code	Distance (deg)	Sptype	Sptype error	NomCol	Units	UCD
Luyten 1979	I/87B	0.0007	G1		Sp		src.spType
Roeser+, 1988	I/146	0.000536	G0		Sp		src.spType

Age

Catalog Name	Catalog Code	Distance (deg)	Age	Age error	NomCol	Units	UCD
Holmberg+, 2009	V/130	0.00038	14.7		age	Gyr	time.age
XHIP	V/137D	0.002928	14.7		age	Gyr	time.age
Casagrande+, 2011	J/A+A/530/A138	0.00038	7.24		ageEP	Gyr	time.age

Space Velocity

Catalog Name	Catalog Code	Distance (deg)	SpaceV	SpaceV error	NomCol	Units	UCD
XHIP	V/137D	0.002928	74.4		vT	km/s	phys.veloc
XHIP	V/137D	0.002928	82.8		UVW	km/s	phys.veloc

Proper Motion

Catalog Name	Catalog Code	Distance (deg)	ProperM	ProperM error	NomCol	Units	UCD
Luyten 1979	I/87B	0.0007	1.295		pm	arcsec/yr	pos.pm
Bakos+ 2002	I/279	0.000215	1.29		pm	arcsec/yr	pos.pm
Bakos+ 2002	I/279	0.000215	1.295			arcsec/yr	pos.pm

Parallax

Catalog Name	Catalog Code	Distance (deg)	Parallax	Parallax error	NomCol	Units	UCD
Turon+ 1993	I/196	0.000577	86	4	Plx	mas	pos.parallax.trig
ESA 1997	I/239	0.002928	80.63	3.03	Plx	mas	pos.parallax.trig
Kharchenko+	I/280B	0.002928	80.63	3.01	Plx	mas	pos.parallax.trig
2004		0.00293	80.6300	3.0300	Plx	mas	pos.parallax.trig

Bolometric Luminosity

Catalog Name	Catalog Code	Distance (deg)	BolomLumin	BolomLumin error	NomCol	Units	UCD
XHIP	V/137D	0.002928	0.67		Lum	Lsun	phys.luminosity
Takeda+, 2007	J/PASJ /59/335	0.002925	-0.16		logL	[solLum]	phys.luminosity
Takeda+, 2007	J/PASJ /59/335	0.002925	-0.164		logL2	[solLum]	phys.luminosity
Biazzo+, 2007	J/AN/328/938	0.000005	-0.22	0.03	logL	[10-7W]	phys.luminosity

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    - The “sasmirala” atlas
- Tool related (development)
    - The final AVO science demo
    - The birth of VOSA (and its continuous development)
    - The DUNES-VO tool
- Tool related (exploitation)
    - High proper motion object characterization (UCSD, HSD) , galaxy morphology, …..

What do these cases have in common?

Opportunity (timely combination of the right people in the right place or the right links)

↓

Communication!!

The “to be continued” stories…

- Multiple epochs of spectra of multiple objects (maybe CASSIS? and the new data-link options?): only specific wl range, systematic line characterization (EW, FWHM, etc) …
- What we hear in science conferences when talking about the VO:
  - “Didn’t that started 10 years ago and it is still not working?” (that I got in a job interview)
  - “Where can I even find the list of software? where do I start?” (download the VO)
- The most common comment from the International Workshop on Spectral Stellar Libraries (IWSSL13):
  - “Why should I go through the effort of making my library VO-compliant?”
  - “What is really useful in the VO for spectra?”
- More synth. models in the VO (example going on: all the phoenix “family”, connect with the successful cases)

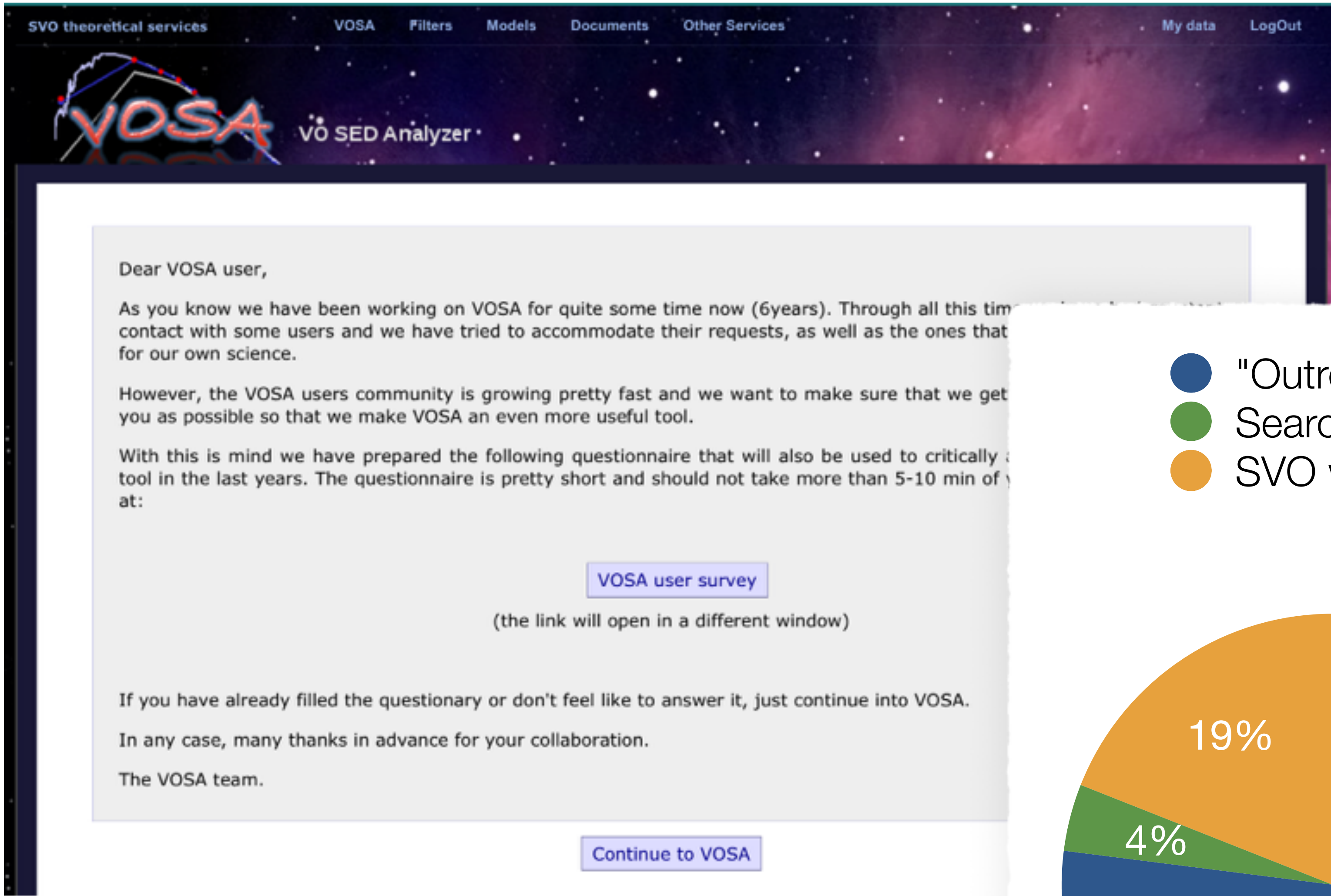
My two cents?

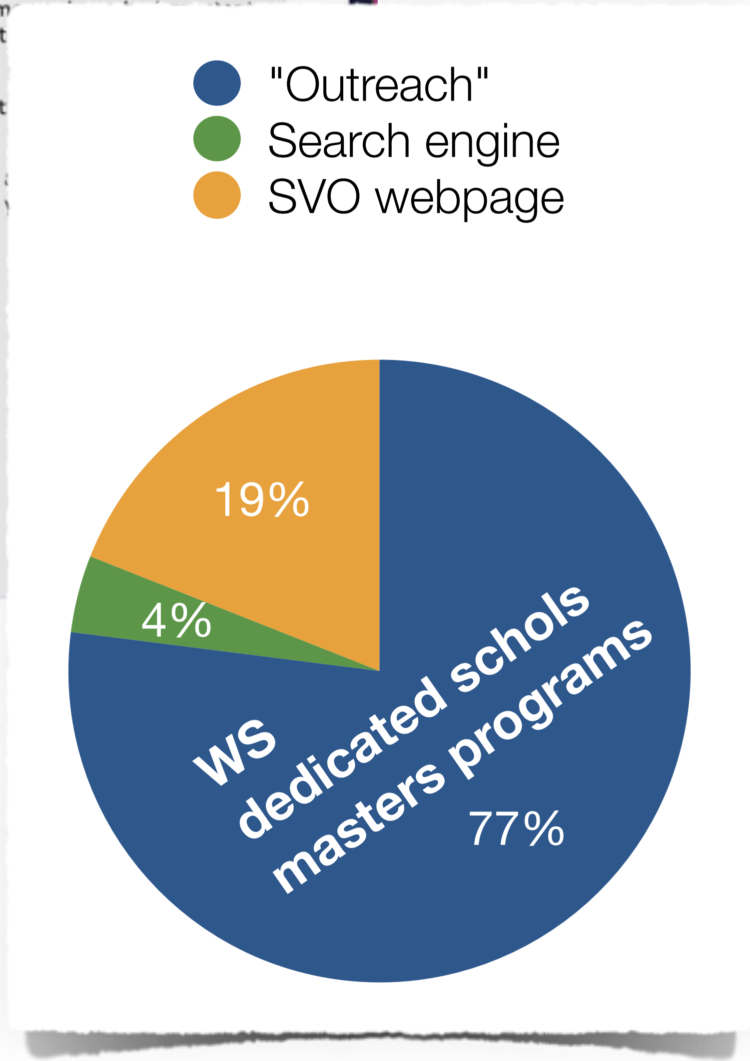
- Maybe include a bit more of astronomer’s presentations of the kind:

  “This is my problem and this is what I cannot do in the VO”

- Important to choose from the right crowd that can “speak the language” (or are willing to try, but there are quite a few! :))

- Try to keep up with “outreach” through schools, it does work!





- How did you know about VOSA and start to use it?

Thank you

for your attention!