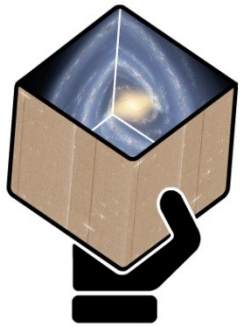
GENIUS
Final Report
for WP4-T4.4
(INTA)

gaia



Enrique Solano
Instituto Nacional de Técnica Aeroespacial (INTA)

Overview

- **WP4**:
  - Title: *Tools for data exploitation*
  - Goal: *Development of powerful data exploitation tools allowing a scientific use of the Gaia data beyond the basic queries provided by the main archive interface.*
- **Task 4.4:**
  - Title: *VO tools and services*
  - *TOPCAT, VOSA, Clusterix*

VOSA

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

Goal: Determination of physical parameters (Teff, logg, [M/H], radius, mass, age,...) from the SED fitting to theoretical models.

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

Stars and brown dwarfs (Change) — File: LOri1-10av.txt (info) (Change)

Model Fit | Template fit

Model fit+

Best fit results

Click in the object name to see the best fits for that object.

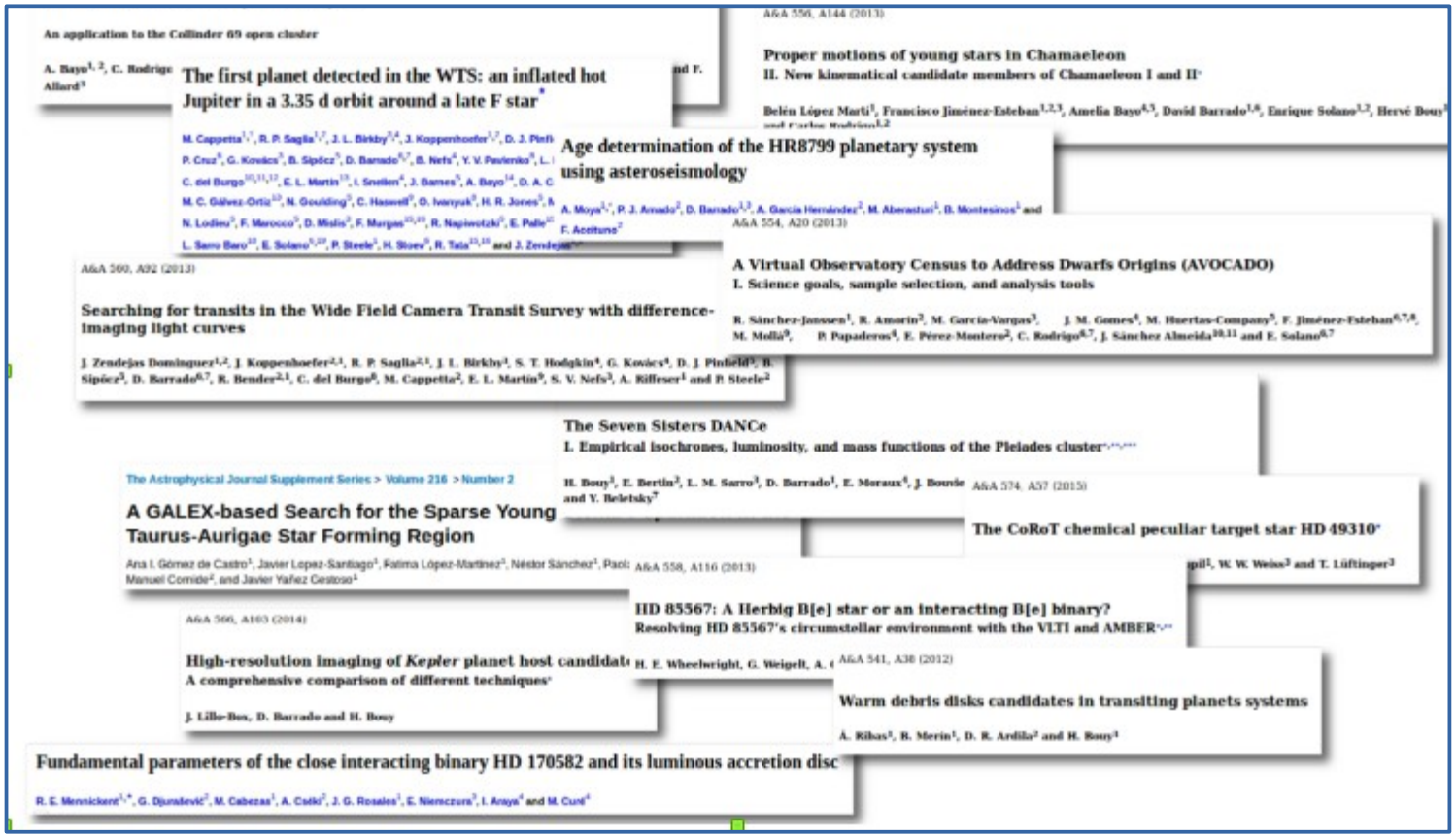
Hide graphs | Delete this fit | Refine excess

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}	$\Delta L_{bol}/L_{sun}$	λ_{max}	A_v	ΔT_{eff}	Δlogg	ΔMeta.	ΔA_v	N_{fit}/N_{tot}	Data VOtables
LOri001	83.446583	9.9273611	400.	BT-Settl CIFIST	3900	4.5	0	alpha:0	9.175e+0	1.389e-20	1.743e-10	2.773e-12	0.59	8.694e-1	1.383e-2	115608	0.1	23.75	0.0865	0	0.0448	17/18	Syn.Spec.
LOri002	84.043167	10.148583	400.	BT-Settl CIFIST	3900	2.5	0	alpha:0	1.952e+1	1.837e-20	2.417e-10	4.955e-12	0.61	1.205e+0	2.471e-2	115608	0.955	35.71	0	0	0.0547	17/18	Syn.Spec.
LOri003	83.981000	9.9420833	400.	BT-Settl CIFIST	4300	5.5	0	alpha:0	1.200e+1	1.210e-20	2.223e-10	5.662e-12	0.62	1.108e+0	2.823e-2	115608	0.955	46.73	0.162	0	0.0565	17/18	Syn.Spec.
LOri004	83.948125	9.7640278	400.	BT-Settl CIFIST	3700	5.5	0	alpha:0	4.849e+0	1.557e-20	1.702e-10	2.536e-12	0.60	8.489e-1	1.265e-2	115608	0.64	0	0.204	0	0.0518	17/18	Syn.Spec.
LOri005	83.473542	9.7188889	400.	BT-Settl CIFIST	4000	2.5	0	alpha:0	1.110e+1	1.359e-20	1.898e-10	2.243e-12	0.60	9.463e-1	1.118e-2	220883	0.55	9.95	0	0	0.0369	18/18	Syn.Spec.
LOri006	83.817750	9.9216111	400.	BT-Settl CIFIST	4100	5.5	0	alpha:0	4.541e+0	1.100e-20	1.734e-10	3.221e-12	0.58	8.646e-1	1.606e-2	115608	0.73	26.29	0.0853	0	0.0566	14/15	Syn.Spec.
LOri007	83.623125	9.8163056	400.	BT-Settl CIFIST	4000	5.5	0	alpha:0	5.181e+0	9.578e-21	1.416e-10	2.838e-12	0.63	7.062e-1	1.415e-2	220883	0.685	33.17	0	0	0.0545	18/18	Syn.Spec.
LOri008	83.991542	9.9091111	400.	BT-Settl CIFIST	4000	5.5	0	alpha:0	8.610e+0	1.096e-20	1.519e-10	2.867e-12	0.61	7.573e-1	1.430e-2	115608	0.415	19.9	0.0853	0	0.058	17/18	Syn.Spec.
LOri009	83.693083	10.109889	400.	BT-Settl CIFIST	4300	5	0	alpha:0	1.727e+0	7.100e-21	1.358e-10	1.595e-12	0.63	6.771e-1	7.954e-3	115608	0.685	17.06	0.312	0	0.0276	17/18	Syn.Spec.
LOri010	83.637333	10.144750	400.	BT-Settl CIFIST	4000	5	0	alpha:0	1.418e+1	7.198e-21	1.042e-10	1.854e-12	0.61	5.198e-1	9.244e-3	220883	0.145	44.9	0.188	0	0.0409	18/18	Syn.Spec.

VOSA

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

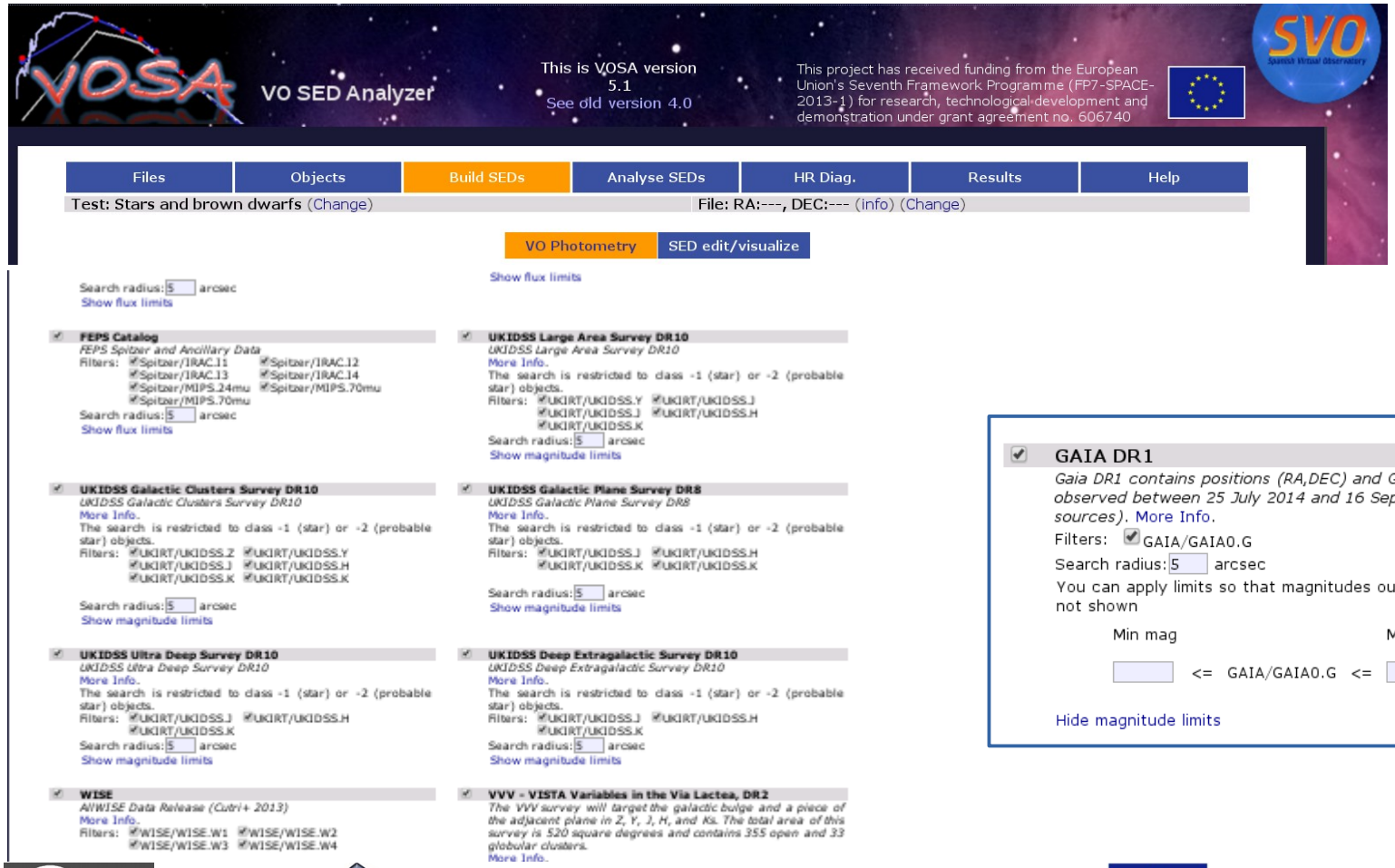
Available since 2008.
More than 800 users.
More than 1.600.000 objects.
More than 80 refereed papers.

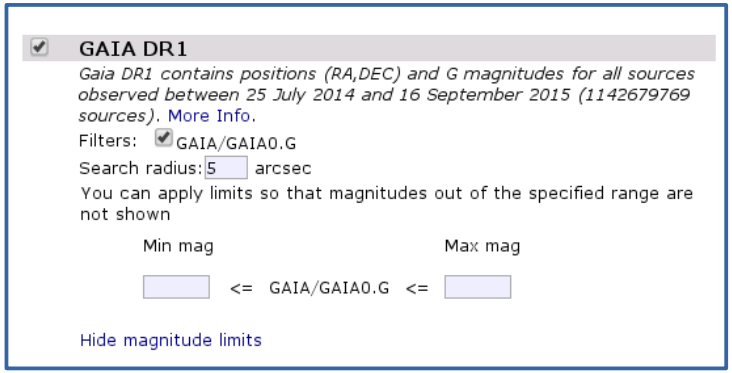


VOSA

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

SED building: Gaia DR1 included in the list of photometric catalogues VOSA uses to build the SED.

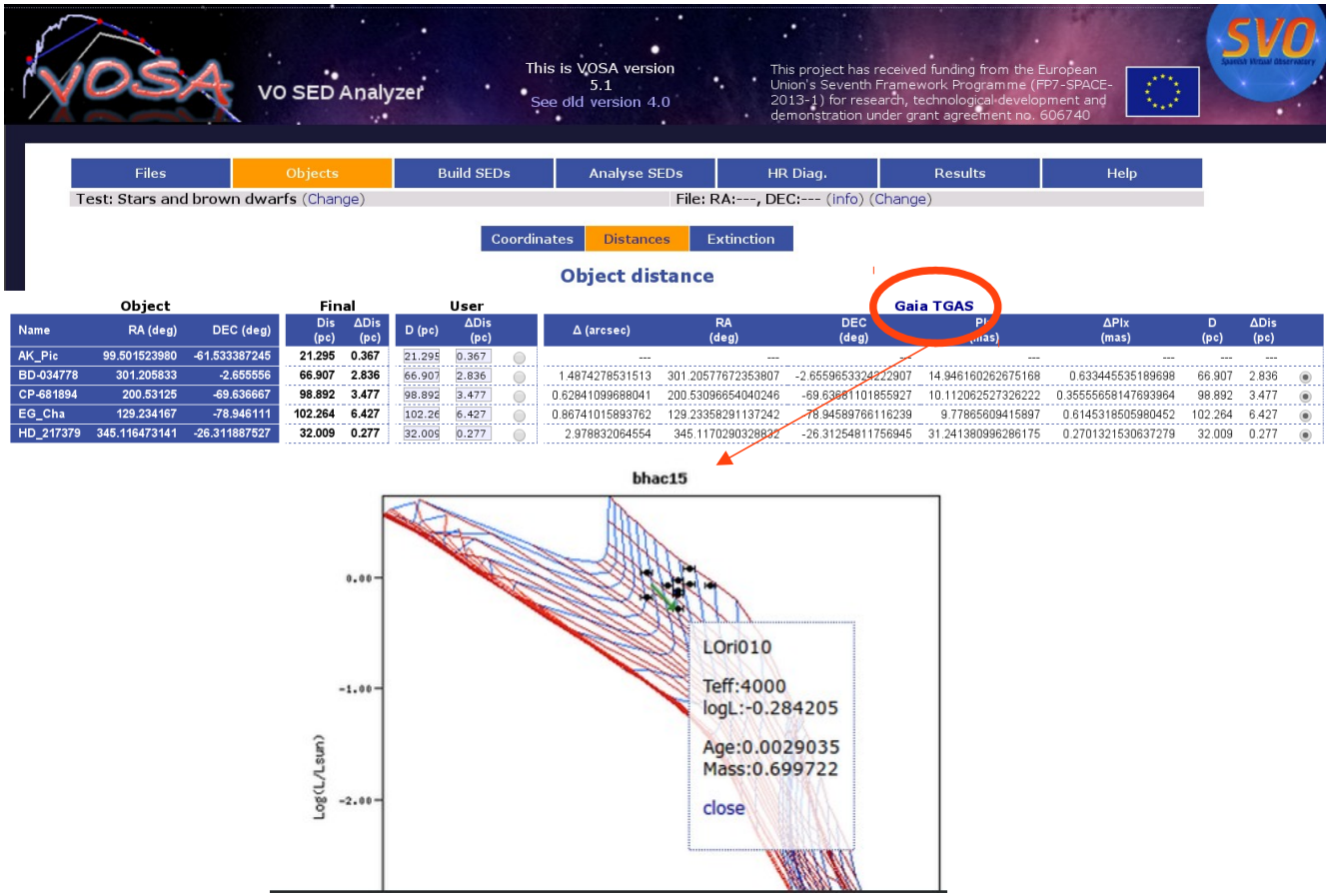




VOSA

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

Phys. parameter determination: TGAS distances available from VOSA to estimate bolometric luminosities.



VOSA

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

New architecture to scale VOSA to Big Data:

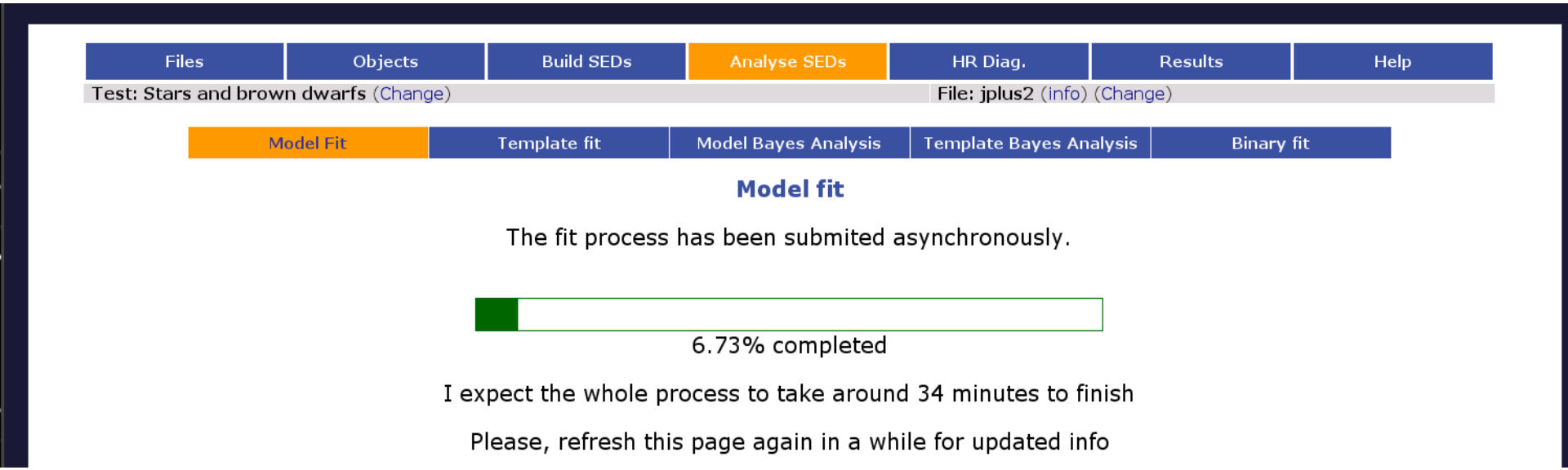
Distributed environment.

Parallelized computing.

Asynchronous jobs.

Front-end redesigned.

VOSA is now able to handle files with tens of thousands of objects.



Clusterix 2.0

http://clusterix.cab.inta-csic.es

Clusterix 2.0 *is an interactive web-based application to calculate the grouping probability of a list of objects using proper motions and the non parametric method described in Galadí-Enríquez et al. 1998. It also allows the possibility of gathering physical parameters (parallaxes, radial velocities, proper motions,...) from Vizier and estimating effective temperatures, surface gravities and metallicities using VOSA.*

Step 1/3: Information gathering (coordinates and physical parameters)

Search by Id

Usage: ID M45
Radius 5 deg
Catalogue TGAS/DR1
Search

Search by Coordinates

Usage: RAJ2000(deg),DEJ2000(deg)
Radius arcmin
Catalogue GAIA/DR1

Search in Webda ?

Search by file?

Choose file No file chosen

Clear

Clusterix 2.0 is the result of a collaboration agreement between the Centro de Astrobiología (CAB, INTA-CSIC) and the Universidad de Barcelona based on a previous work done at the Masaryk University. It has been developed in the framework of the GENIUS project and is maintained by the Spanish Virtual Observatory at the Data Archive Unit of the CAB (INTA-CSIC)
If you use this service in your research, please include the following acknowledgment in any resulting publications: "Based on Clusterix 2.0 service at CAB (INTA-CSIC)".

This project has received funding from the European Union's Seventh Framework Programme (FP7-SPACE-2013-1) for research, technological development and demonstration under grant agreement no. 606740.

SVO - CAB (INTA-CSIC). Version 1.0

Clusterix 2.0

http://clusterix.cab.inta-csic.es

Step 2/3: Region selection

$$\Psi_{\mathrm{f}}^{\mathrm{k}}(\mu_{xi}, \mu_{yj})$$

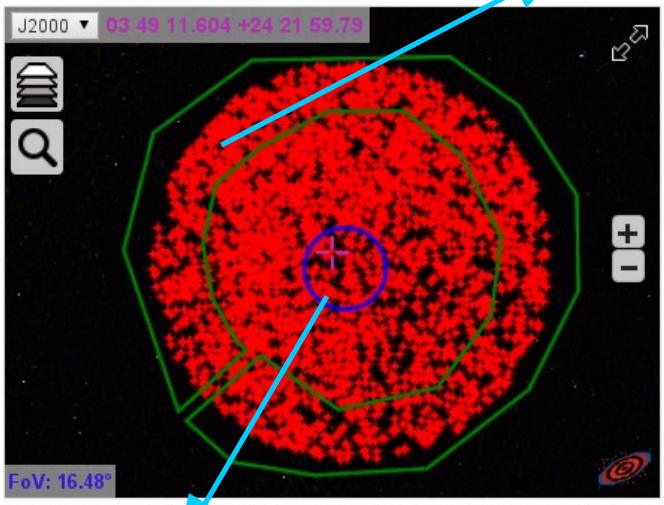
Cluster info: M45_5_deg_TGAS

Selection of the "cluster" and "field" regions

Area type: (•) Polygon ( ) Circle

Cluster (shift):
56.9489,23.9631,1.0275;

Field (ctrl):
59.2397,21.7632 57.1368,2



To draw areas sel… the area type (poligon or circle) in the radio button and press left-shift key for defining a cluster or left-ctrl key for defining a field.

$$\Psi_{\mathrm{c+f}}^{\mathrm{k}}(\mu_{xi}, \mu_{yj})$$

…clicking on the image. After the second point you will see the …e shift/ctrl and click on the image. That will close the polygon.
…center of the polygon.
A small blue circle will appear to remember you the center.
Release the shift/ctrl key and click on the desired outer limit/radius of the circle you want to draw. The blue circle will disappear and the final circle will appear.
Coordinates must be in J2000 (deg)

Membership determination parameters

Maximum μ (mas/yr): 100.0
Maximum μ err (mas/yr): 10.0

Smooth param (no unit): 6.420576433 Silverman rule: 6.420576433

γ threshold: 3.0

Submit Clean

Step 3/3. Determination of membership probabilities

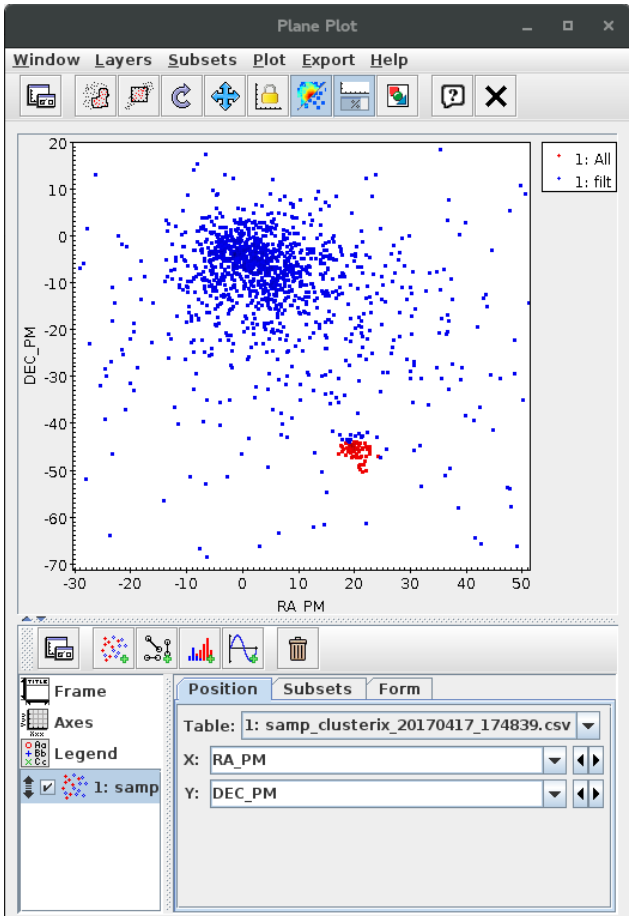
SAMP Save as

$$P_c^k(\mu_{xi},\mu_{yj}) = \frac{\Psi_{c+f}^k(\mu_{xi},\mu_{yj}) - \Psi_f^k(\mu_{xi},\mu_{yj})}{\Psi_{c+f}^k(\mu_{xi},\mu_{yj})}$$

```
#   Results were retrieved using Clusterix software
#   http://clusterix.cab.inta-csic.es/
#   In case of problems, please, report to: clusterix_archive_support@cab.in
#
#   Labels:
#
#       STAR_NO identificator of star retrieved from the input data
#       RA      right ascension of a star
#       DEC     declination of a star
#       PM_RA   proper motion in alpha
#       PM_DEC  proper motion in delta
#       PROB    probability that star belongs to evaluated open cluster
#       FLAG    M=Membership   NM=No membership
#
#   Parameters:
#
#       CLUSTER INFO: M45_5_deg_TGAS
#       PROPER MOTION CUTOFF: 100.00 mas/yr
#       PROPER MOTION ERR CUTOFF: 10.00 mas/yr
#       SMOOTH PARAMETER: 6.42
#       GAMMA FACTOR: 3.00
#
#       Boundaries can be circles (Ra(J2000)-center,Dec(J2000)-center, radius degrees) or
#       polygons (Ra,Dec Ra,Dec Ra,Dec ...). Each boundary is separated by ;

#       CLUSTER BOUNDARIES:
#       56.9489,23.9631,1.0275;
#
#       FIELD BOUNDARIES:
#       59.2397,21.7632 57.1368,20.4117 54.4734,20.9335 52.9596,22.7285 52.6240,24.6696 53.6630,26.7712 55.2726,2
10,27.2971 59.6181,29.1955 53.9118,29.2663 51.9734,27.9665 50.4601,25.6624 50.5435,23.2572 51.9978,20.8227 54.78
#
#
#       EXPECTED NUMBER OF MEMBERS: 61
#
#       For Webda clusters, STAR_NO is the merge of the Data source reference and the star number: Ref_Star
#
#STAR_NO        RA (J2000)       DEC (J2000)    PM_RA   PM_DEC  PROB FLAG   Initial guess

117             57.820366       23.826412       20.27   -47.40  0.97    M       C
152             57.987022       23.901766       19.73   -47.15  0.97    M       C
11              56.657089       23.787523       19.65   -47.11  0.97    M       C
162             57.714436       23.328882       19.51   -47.28  0.97    M       C
```



Clusterix 2.0

http://clusterix.cab.inta-csic.es

Gather information from VO services

☐ Proper Motion	Radius	arcsec ▾	TGAS ▾
☐ Radial Velocity	Radius	arcsec ▾	Gaia ESO ▾
☐ Parallax	Radius	arcsec ▾	TGAS ▾

☐ VOSA Photometry ?

Clear

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SVO - CAB (INTA-CSIC). Version 1.0

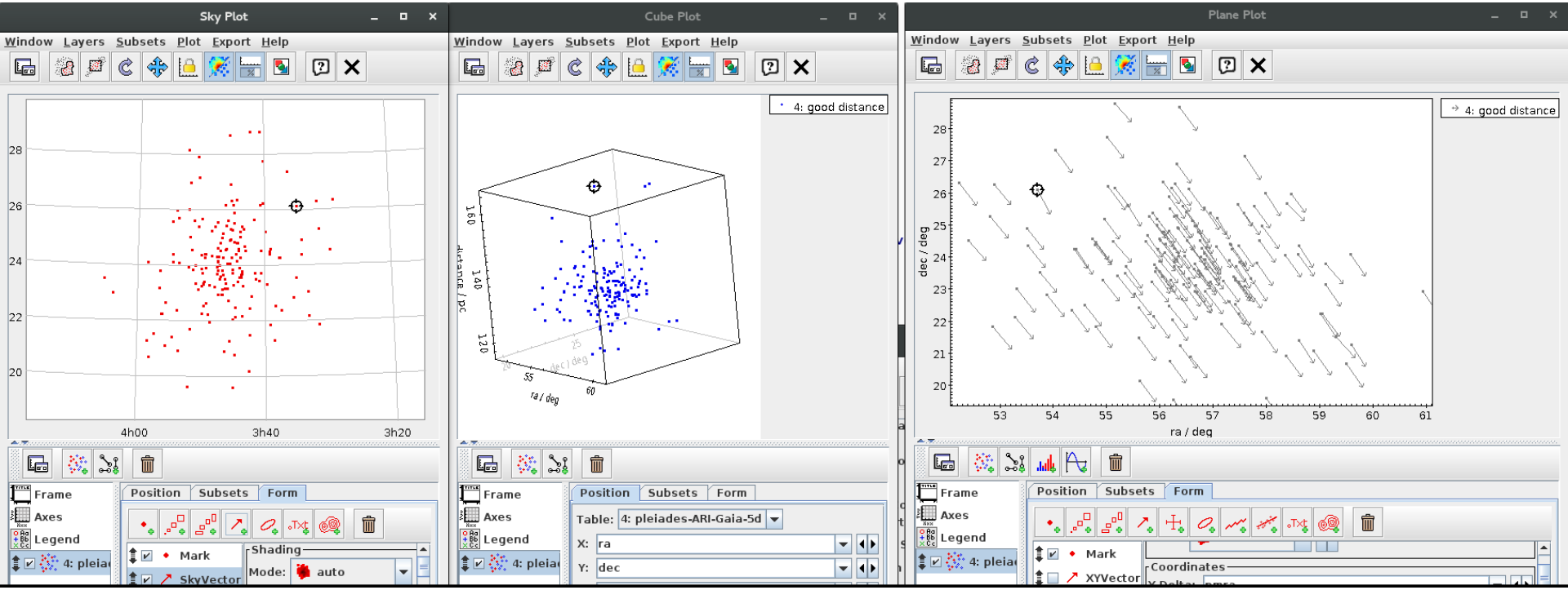
Universitat de Barcelona

gaia GENIUS

CENTRO DE ASTROBIOLOGÍA
ASOCIADO AL NASA ASTROBIOLOGY INSTITUTE
CSIC INTA

Clusterix 2.0

http://clusterix.cab.inta-csic.es



Sustainability

http://clusterix.cab.inta-csic.es

- *VOSA and Clusterix have been developed in the framework of the Spanish Virtual Observatory, a project hosted at INTA since 2004.*
  - *Maintenance and new developments (on a best effort basis) are guaranteed.*

Clusterix 2.0

Future enhancements:

Tangencial velocities instead of proper motions.

Access to Gaia DR2 data.

N-dimensional scenario.

Asynchronous jobs.