
# VO as a tool for the scientific exploitation of Gaia data

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# The Virtual Observatory and the ICTS

- VO is not an ICTS *"stricto sensu"* as it is not included in the official list.

BUT

- VO is an ICTS *"de facto"* as it meets most of the ICTS's requirements:
  - VO is a virtual community-oriented research infrastructure.
  - VO is a service to carry out cutting edge research and development activities.
  - VO a key infrastructure for the interchange and preservation of data and knowledge.

# Meeting objectives

Objetivos:

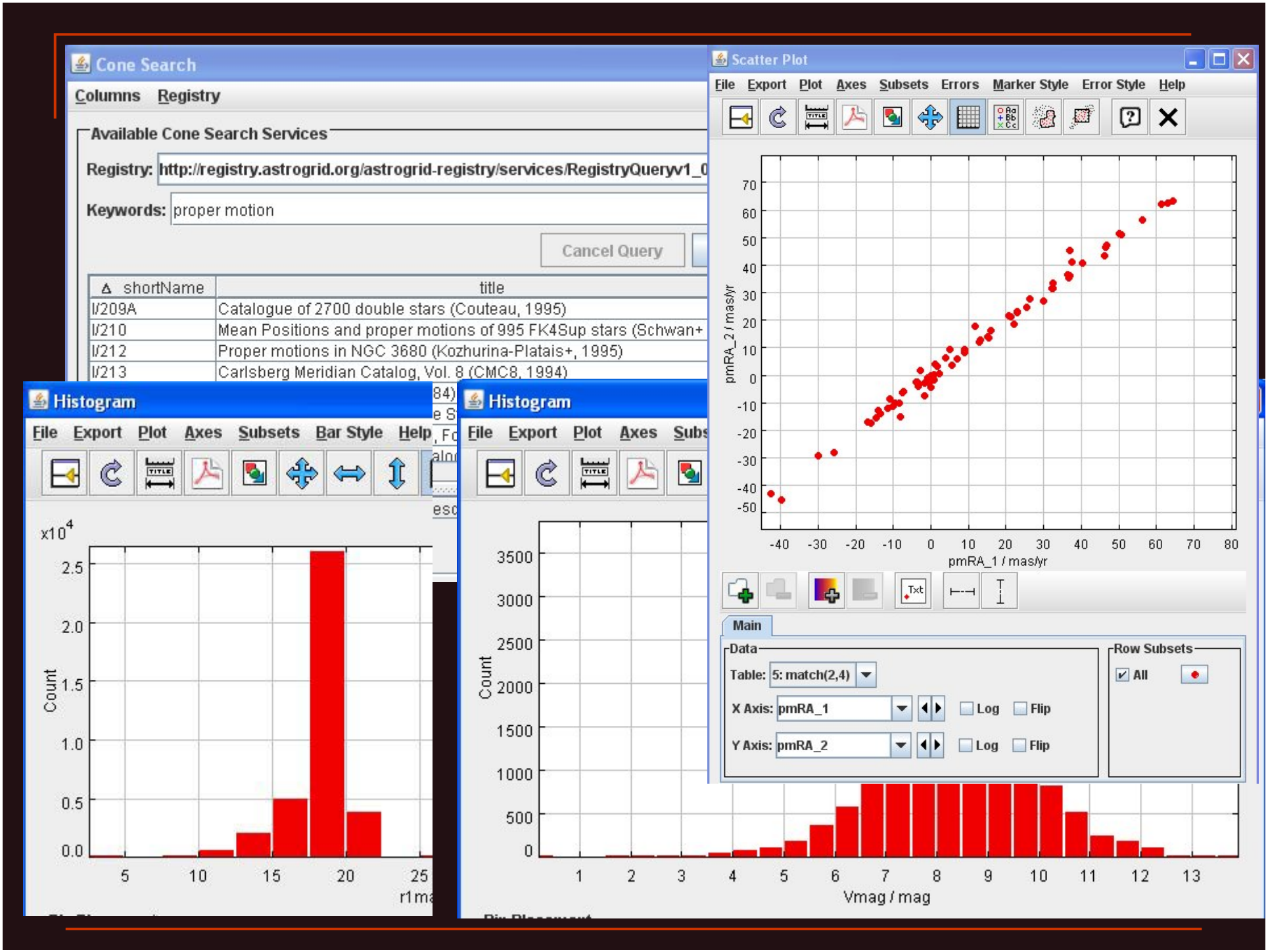
Reunir a los científicos involucrados en el desarrollo de la misión (preparación y explotación científica) con los agentes gestores de las ICTS para valorar:

- las necesidades de la comunidad española en Gaia
- las posibles aportaciones en el contexto actual y futuro de las ICTS españolas.

- Lines of work
  - Data validation
  - Scientific analysis of complementary data
  - Management of complementary data.

# Data validation

- Ensure that Gaia data are usable and the errors are well known and within the expected limits.
- Comparison with previous, “controlled” datasets.
- Example: Proper motions
  - Many catalogues: Hipparcos, Tycho-2, PPMXL, SuperCosmos, UCAC-3, UKIDSS,…
  - Different
    - Wavelength and spatial coverage,…
    - Astrometric accuracy, photometric depth,...
  - How to discover the catalogues that can be of interest?
  - How to manage the information provided by these catalogues? → VO-tools


Cone Search
Columns Registry
Available Cone Search Services
Registry: http://registry.astrogrid.org/astrogrid-registry/services/RegistryQueryv1_0
Keywords: proper motion
Cancel Query
shortName
title
I/209A
Catalogue of 2700 double stars (Couteau, 1995)
I/210
Mean Positions and proper motions of 995 FK4Sup stars (Schwan+
I/212
Proper motions in NGC 3680 (Kozhurina-Platais+, 1995)
I/213
Carlsberg Meridian Catalog, Vol. 8 (CMC8, 1994)
Histogram
File Export Plot Axes Subsets Bar Style Help
x10^4
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Histogram
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pmRA_2 / mas/yr
pmRA_1 / mas/yr
Main
Data
Table: 5: match(2,4)
X Axis: pmRA_1
Y Axis: pmRA_2
Log
Flip
Row Subsets
All

# Complementary data

- In many fields, Gaia will have to be complemented with spectroscopic data.
  - Gaia-ESO survey: Open clusters and halo and disk stars. (Negueruela et al.)
  - Red clump stars (Carrera et al.)
  - FGK stars (Montes)
  - Massive stars (Simón-Díaz et al.)
  - Low-mass objects (Caballero)
  - Asteroids (Duffard et al., de León et al.)
  - Outliers (Manteiga et al.)

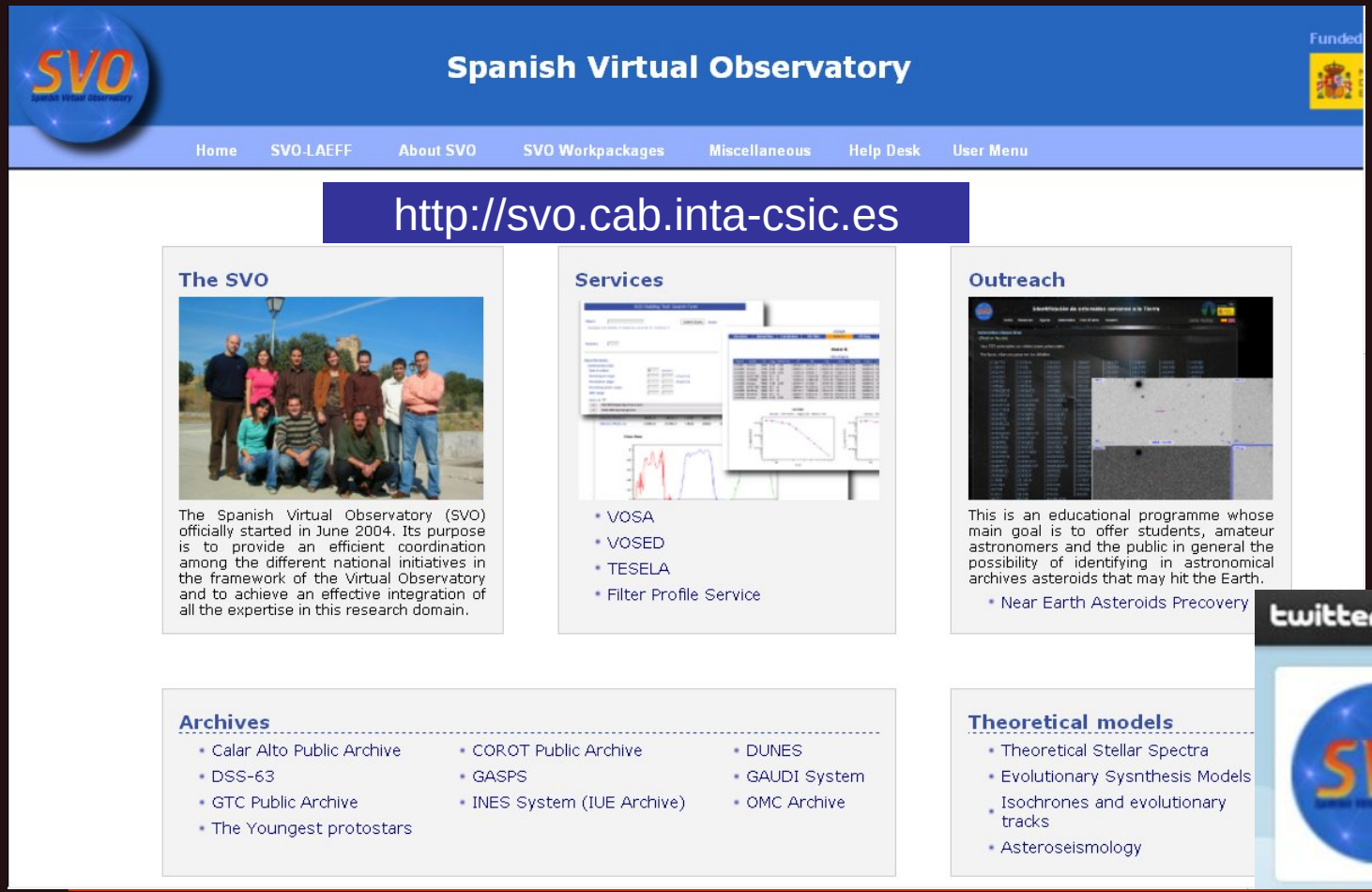
Virtual Observatory as a discovery and analysis tool

# Management of complementary data

- If you really want an easy and efficient data interchange with other astronomical resources, the VO is the best course to follow.
  - Make your analysis easier.
  - Good advertisement of your work (when the datasets become public).

# How to articulate all these potential VO contributions?

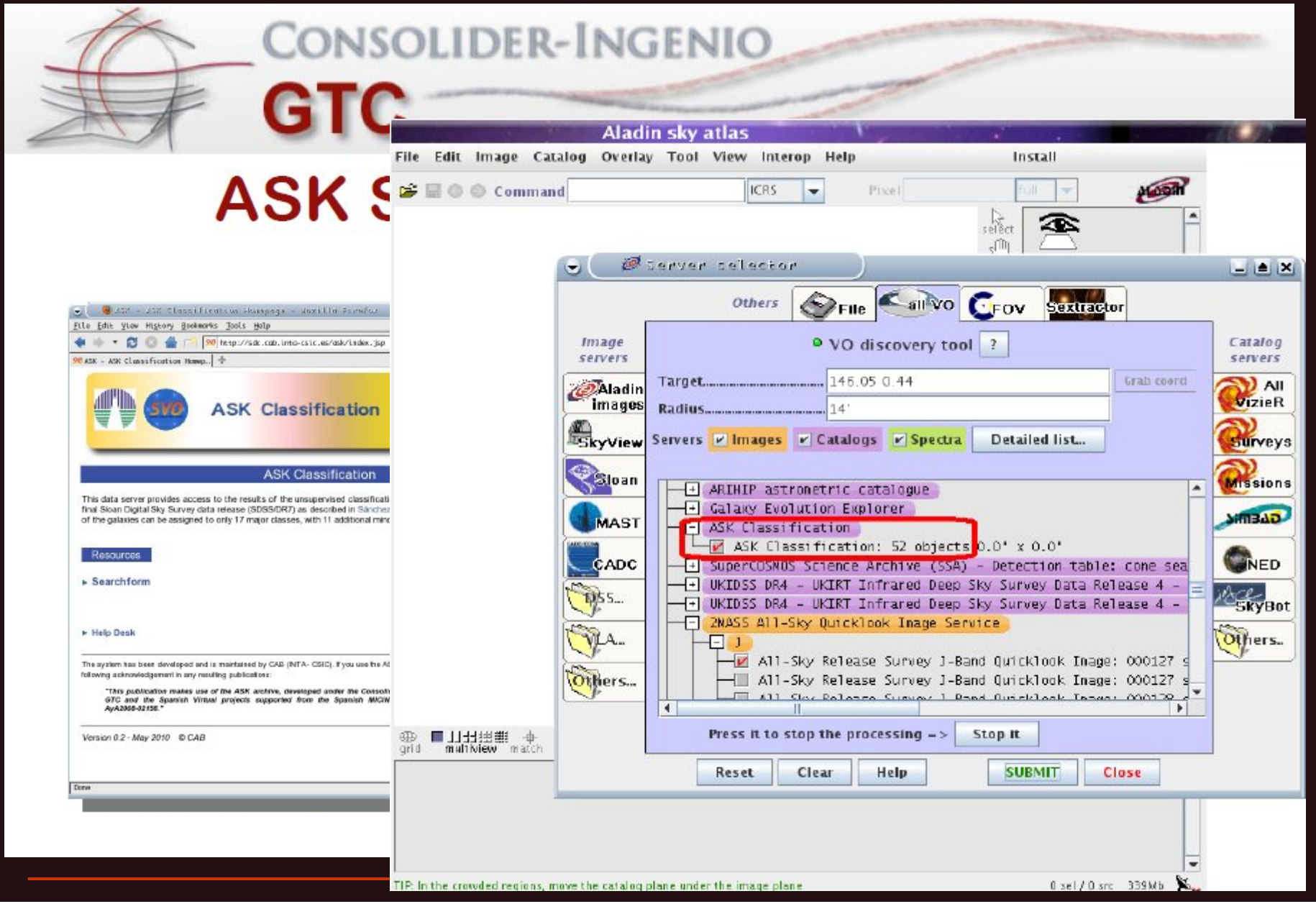
- SVO charter: "*Provide technical and scientific support at VO activities in Spain*".




Funded projects

- 2005
- 2006 – 2008
- 2009 – 2011
- 2012 – 2014

# A successful example: the Consolider-GTC project



# Science

- VO group's role:
  - Identify potential VO-science cases.
  - Feasibility assessment from the VO point of view.
  - VO support (even developing new VO tools)

- Almost 30% of the VO refereed paper published since 2009 are from SVO.

# Science

| | Authors | Title |
|---|---|---|
| 1 | ☐ 2012A&A...539A..86J<br>Jiménez-Esteban, F. M.; Caballero, J. A.; Dorda, R.; Miles-Páez, P. A.; Solano, E. | 1.000<br>Identifica<br>Observat |
| 2 | ☐ 2011MNRAS.417.3061C<br>Cardiel, N.; Jiménez-Esteban, F. M.; Alacid, J. M.; Solano, E.; Aberasturi, M. | 1.000<br>TESELA: |
| 3 | ☐ 2011A&A...529A.108L<br>López Martí, B.; Jiménez-Esteban, F.; Solano, E. | 1.000<br>A proper |
| 4 | ☐ 2011A&A...525A..29J<br>Jiménez-Esteban, F. M.; Caballero, J. A.; Solano, E. | 1.000<br>Identifica<br>Observat |

| Project | Remaining Work load | Main Milestones | Summer 2011 | Autumn 2011 | Winter 2012 | Spring 2012 | Summer 2012 | Autumn 2012 |
|---|---|---|---|---|---|---|---|---|
| A1.- TESELA | Heavy | USNO-B1 implementation publication | | X | | | | |
| | | Presentation of the work in the IV Science with the GTC meeting | | X | | | | |
| | | Search for blank fields | | | X | | | |
| | | **Catalogue paper submission** | | | | X | | |
| A2.- Ca Triplet | Medium | Pseudo-spectra generation and RGBs identification | X | | | | | |
| | | Fit CaT lines and stellar metallicity | | X | | | | |
| | | Presentation of the work in the IV Science with the GTC meeting | | X | | | | |
| | | **Paper submission** | | | X | | | |
| A3.- Tycho2-2MASS | Heavy | **2nd paper submission** | X | | | | | |
| | | Cross-match with SIMBAD and kinematic analysis | X | | | | | |
| | | **3rd paper submission** | | | | X | | |
| | | GTC proposal | | X | | | | |
| | | GTC data reduction/analysis | | | | | X | |
| A4.- Debris Disks | Medium | VOSA analysis | X | | | | | |
| | | **Paper submission** | | | X | | | |
| | | Ask for Canaricam | | X | | | | |
| | | Reduction/Analysis of Canaricam data | | | | | X | |
| A5.- Cataclysmic Variables | Medium | Search of CVs candidates | X | | | | | |
| | | Observing time application | | X | | | | |
| | | Reduction/Analysis of data | | | | | X | |
| B1.- Content of RSG | Light | **1st paper submission** | X | | | | | |
| | | Observations with the AAT | X | | | | | |
| | | AAT Data Reduction | | X | | | | |
| | | AAT Data Analysis | | | X | | | |
| | | **AAT Paper submission** | | | | | X | |
| B2.- IRAS16339-4717 | Light | VLT data reduction | X | | | | | |
| | | VLT data analysis | | X | | | | |
| | | **VLT Paper submission** | | | | X | | |
| C1.- AVOCADO | Light | **1st paper submission** | X | | | | | |
| | | SEDs and morphological analysis | | X | | | | |
| | | **2nd and 3rd papers submission** | | | X | | | |
| | | Spectra analysis | | | | X | | |
| | | **4th paper submission** | | | | | X | |

# Science. VO schools.

- Goal: Make astronomers familiar with VO-tools
- Most effective way to interact with the community.

- SVO schools: 5 (2009-2011)
  - Granada. Oct. 2009
  - Tenerife. Mar. 2010
  - Madrid. Jun. 2010
  - Barcelona. Oct. 2010
  - Madrid. Nov. 2011

- Participants: 143
- Classified as

Poor/satisfactory/good/very good/excellent

- 70% of the participants have used VO-tools after the schools.

# Summary

- Development of archive systems for complementary datasets.
- Support in the use of VO tools.
- Training (VO-schools).

- Basic idea:
  - The type of collaborations that VO offers to the Gaia community has proved to be very fruitful in other similar projects like Consolider-GTC.