OAG COMMON PROPER MOTION WIDE PAIRS SURVEY TUTORIAL II

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1. HISTORICAL INTRODUCTION

The stellar proper motions were highlighted by E. Halley during the XVIII century. Comparing the stellar positions of Ptolemy's catalogue, Almagest, to the Flamsted catalogue ones discovered that there was a significant difference only in some of them. Anyway, some differences were so large that there could not be explained by astrometric mistakes. The incorporation of stellar proper motions to the astronomical theory meant a break to the classical idea of fixed stars.

By the end of XVIII century W. Herschel, meanwhile he was working in the search of stellar parallax, discovered double stars in its modern meaning. Some of them showed orbits around a common mass centre. There were the orbital binaries. Other pairs followed similar linear tracks meaning some gravitational link between each other. There were the binaries with common proper motions. Finally, there was a group with tracks not linked, known today as optical pairs.

The first CPM great catalogue is ascribed to S.W. Burnham who, at the beginning of the XX century, included 360 pairs with the naming "Common Proper Motions" in his "General Catalogue of Double Stars".
In the middle of XX century H. Giclas included 197 pairs with the naming "Giclas Double Stars" in his catalogue "Proper motions Survey".

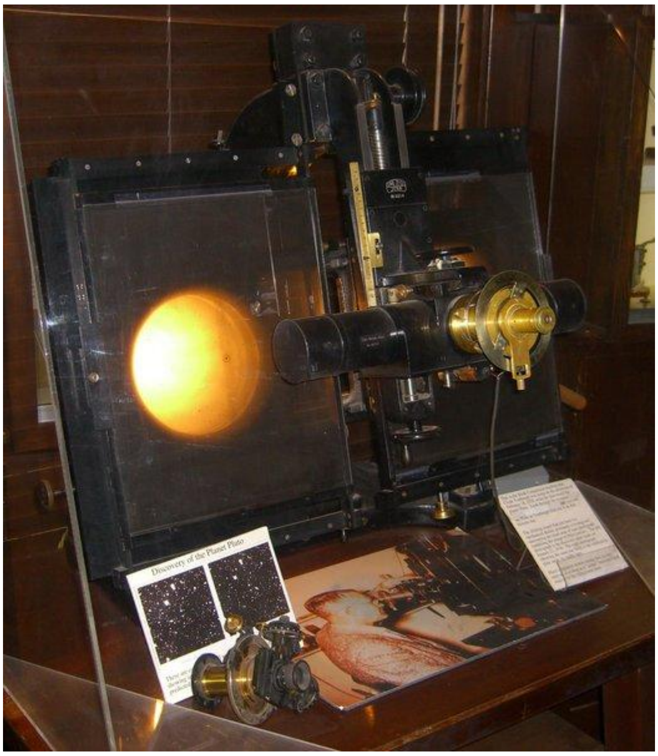
But W. Luyten was who made the main contribution to the stellar proper motions with a persistent work that last for a good share of XX century. W. Luyten was worried about the lack of knowledge of solar neighbourhood population and worked in the concept of reduced proper motions or, put it another way, the connection between the stellar proper motions and the absolute and relative magnitudes as a way to get the stellar distance. That is why he needed a census as large as possible of stars with proper motions. Trough the imaging blinking of different epochs he picked up material that finally remain in some catalogues: LFT (Luyten Five Tenths) in 1955 with 1,849 stars, LTT (Luyten Two Tenths) in 1961 with 16,994 stars. Later new versions were published: LHS (Luyten Half Second) with 3,583 stars and NLTT (New Luyten Two Tenths) with 58,000 stars. Some of these stars have a binary character and they are included in the catalogue LDS (Luyten Double Stars) with 6,170 entries.

2. OAG CPMWPS /Common Proper Motion Wide Pairs Survey

During 2008 the OAG participated in the "Garraf Survey" coordinated by J.A. Caballero from Astrophysical Department of Universidad Complutense de Madrid. In this survey we searched companions with CPM of near 2,000 NLTT stars between 500 and 1000 marcsec/year throughout the Virtual Observatory tools. 160 candidates were detected and 6 new pairs were discovered, presently under study. This experience allowed us to start, the same year, the "OAG CPM Wide Pairs Survey".

The OAG-CPMWPS is a survey based in the idea of exploring in a visual and systematic way the whole sky, with the aim of finding out new pairs with common proper motion (CPM). This visual method allows us to detect pairs that were unnoticed working with other methods based in crossing catalogues and automatic processing of them.

For the visual search we work with squared images with an apparent field of 1 min RA and 15' DEC called Basic Prospection Unit (BPU).
Basically it comes to use a methodology witch emulates the one used by the professionals by the beginning of the 20th century witch worked with the blinking microscope.



Blinking microscope (Lowell Observatory)

With this instrument one can observe two images taken in different epochs from the same region of the sky quickly switching. If one of them presents a new object it would be seen as an intermittent point. Something similar happens if, instead of a new object, there was a position change in one star. With this instrument one can detect both double stars and its proper motion. Nowadays one uses computer programs in order to do the same work although in a faster and more precise way.

Summarizing, our method consist in set a blinking between the images from POSS1 and POSS2 surveys and crossing them with the catalogues USNOB1 and NOMAD1. From them we obtain the CPM data of the detected pairs. We use as well UCAC3 catalogue if it includes the stars. Additionally we make the relative astrometry of the new pairs, measuring the separation and the position angle on the images.

We select stars without any magnitude limit and with CPM > 50 mas/yr in at least one of the two coordinates (RA or DEC). The limit of 50 mas/yr is set as a discriminator element between stars with proper motions by chance (background stellar contamination) and stars with real CPM. We don't limit the magnitude due the importance of recent discoveries of pairs with low mass and large separation (hundreds an even thousands of astronomical units of projected distance).

Due the systematic character of the study we don't dismiss the detection of low mass and high separation systems with CPM not found yet. We expect the detection of several thousands of pairs (6000 estimated) over 50 mas/yr. Until today we have explored from 00 h. until 11 h in RA and from -20º until +20º in DEC. The result of this work is the detection and inclusion in WDS catalogue after the revision made by Dr. B.Mason and his USNO team of 634 new pairs. (May 2011)

Being a long time project the coordination encourages the incorporation to the project of new teams interested in this line of investigation.

3. OAG CPMWPS METHODOLOGY

Following there is a summary of the survey methodology including the changes and improvements from the beginning 2008 until now.
Despite the methodology has not barely changed, new tools have been added in order to automate several steps and make the method agiler and easier to the eleven teams witch are working now.

OAG-AAS CPMWPS Workshop (February and July 2010)

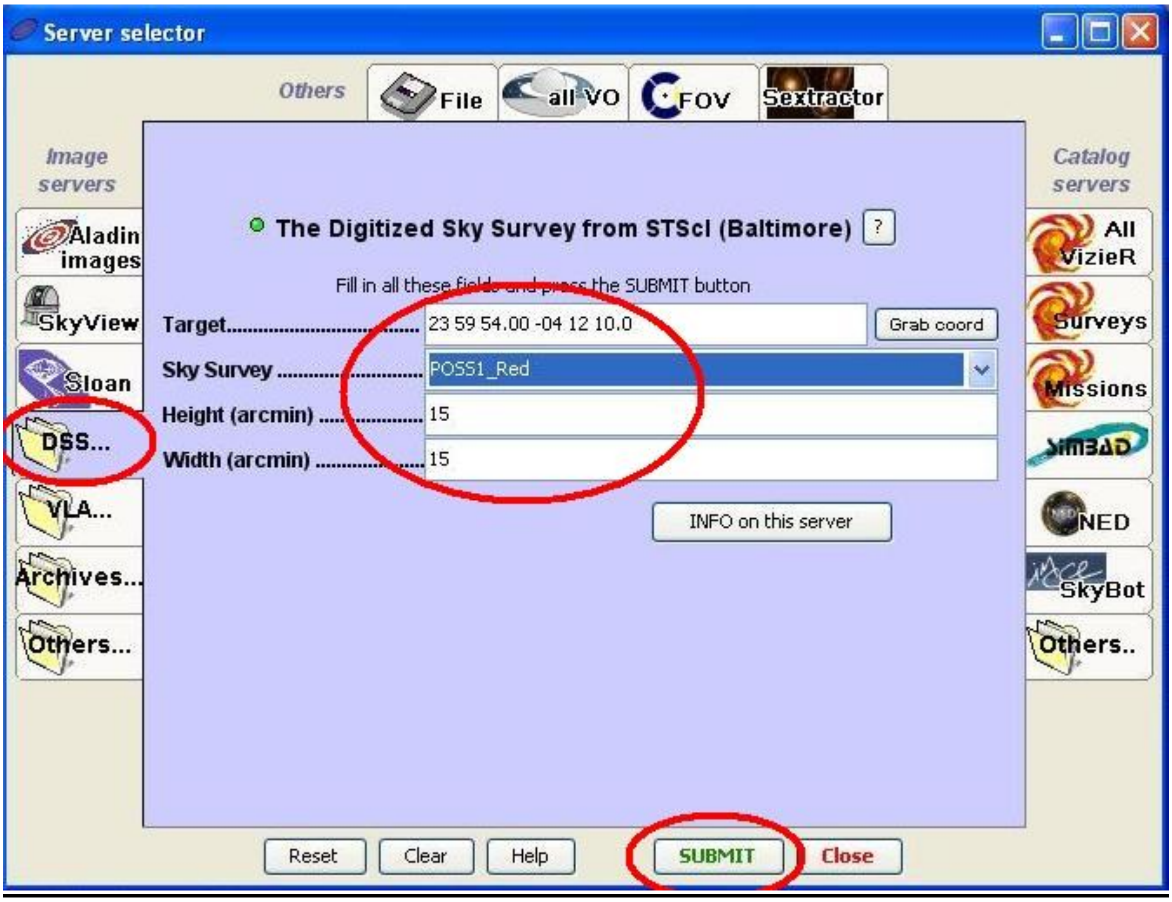
3.1. ORIGINAL METHODOLOGY (2008-2010)

The original method is based in the images processing with Aladin applet for the detection of double stars with CPM > 50 mas/yr. It is strongly recommended the lecture of the complete Aladin manual for configuration, presentation and other functions.

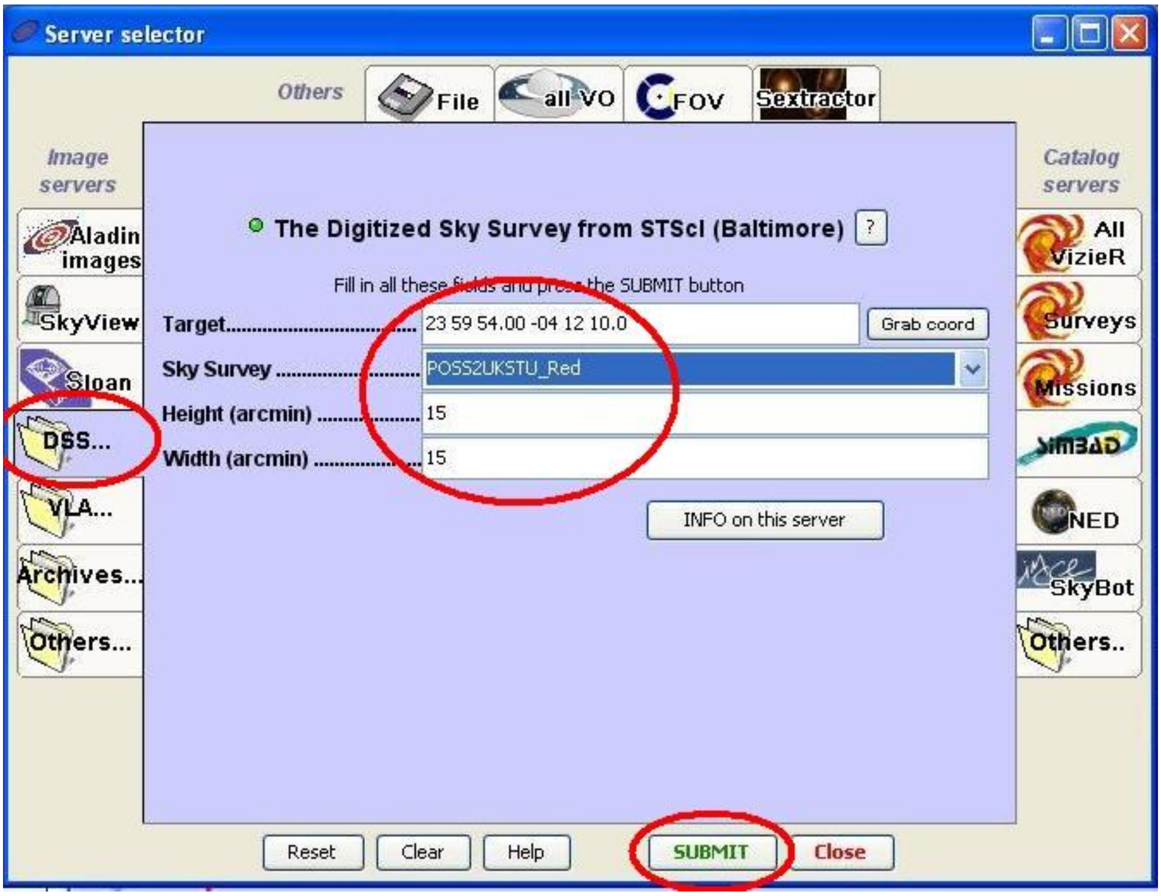
Aladin Applet: http://aladin.u-strasbg.fr/java/nph-aladin.pl
Aladin Manual: http://aladin.u-strasbg.fr/java/AladinManual6.pdf

3.1.1 - Image downloading.

a/ Click **File/Load astronomical image** or directly on **"folder"** icon placed on the top left end of your main Aladin screen.
b/ A **Server selector** window is unfolded. Click on the **DSS** icon from the column **Image servers** and select the **Baltimore** server.
c/ A new window is unfolded where the equatorial coordinates should be introduced (Ex. 11 23 45 -20 00 09) in the **Target** box. An apparent field of 15' x 15' should be introduced in the **Height/Width** boxes. Then the **POSS1 Red** (1st epoch) image should be submitted.



Then the process should be repeated for **POSS2** image.



We will use these two images to detect CPM pairs.

3.1.2 - Connecting screens (Basic Prospection Unit. BPU)

Look at the following practical example in connecting two sequential screens of 15 x 15 arcmin. We will work in ascendant or descendent columns of 1 min in RA and 15 min in DEC.

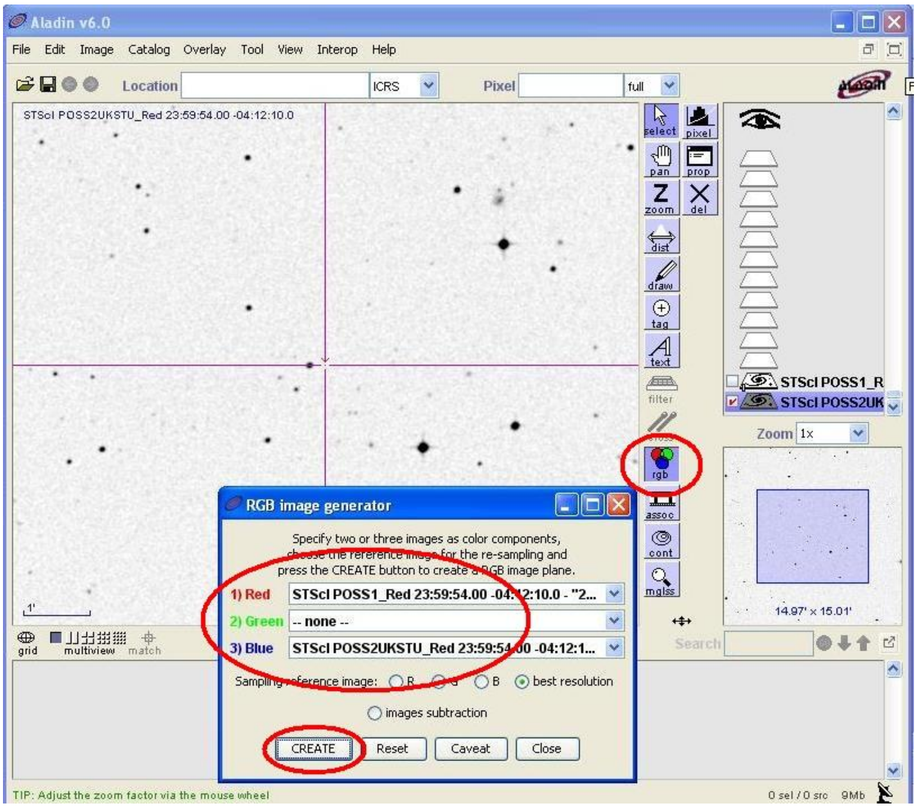
N	AR	DEC
01	00:00:00	-00:00:00
02	00:00:00	-00:15:00
03	00:00:00	-00:30:00
04	00:00:00	-00:45:00
05	00:00:00	-01:00:00
....	....	....
....	....	....
....	....	....
80	00:00:00	-19:45:00
81	00:01:00	-00:00:00
82	00:01:00	-00:15:00

And so from each minute in RA until complete the whole hour assigned.

In order to start working with one sector we should introduce the equatorial coordinates in the **DSS** window **(ex 00:00:00 +00:00:00)** in the target box and click **Submit**.
Once the screen test is finished, the whole information and layers from the Aladin main screen should be deleted. Then the new coordinates should be introduced.

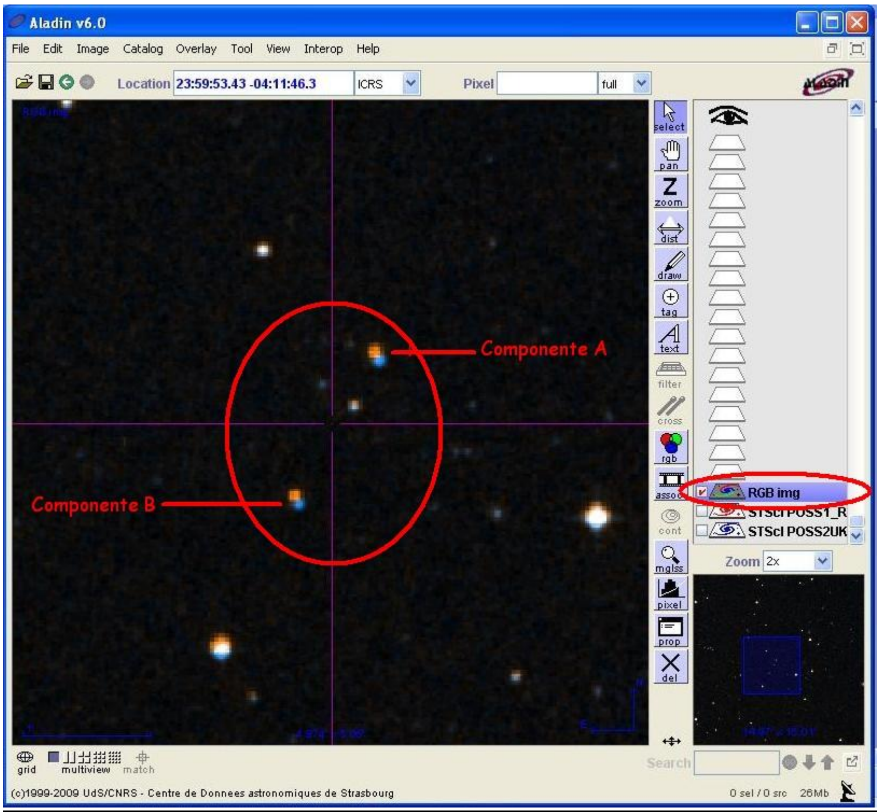
3.1.3 - Chromatic blinking RGB.

a/ Click on the **rgb** icon (tree coloured circles) situated in the on the right of your main screen. A **RGB image generator** window will be unfolded.



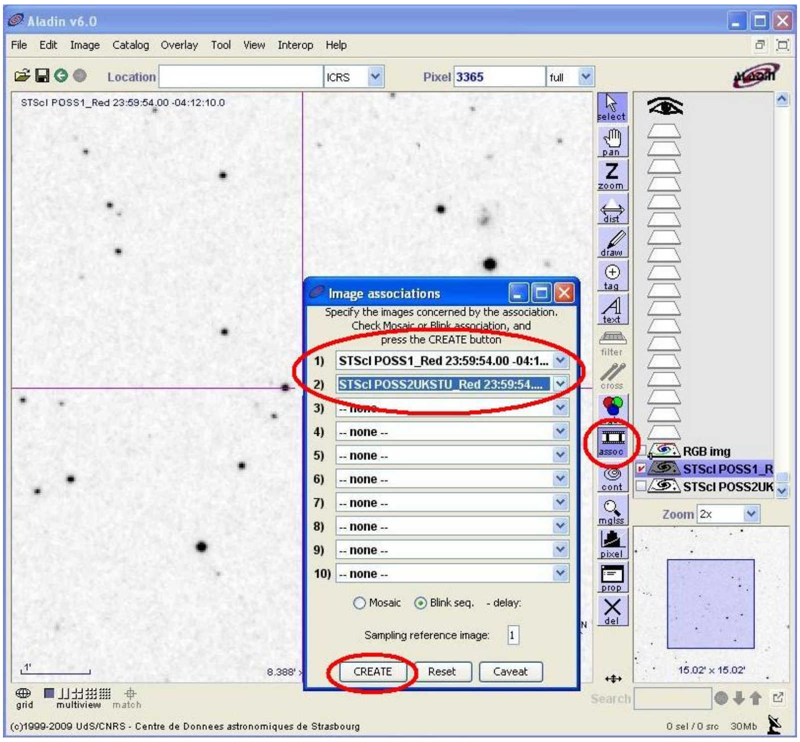
Each image is associated to one colour (red and blue, for example) and **Create** button should be clicked. Then a new image which shows stars in two colours is created, one colour for each reference survey.

The stars that show CPM stand out as two colour points separated and parallels.



3.1.4 - Dynamic blinking.

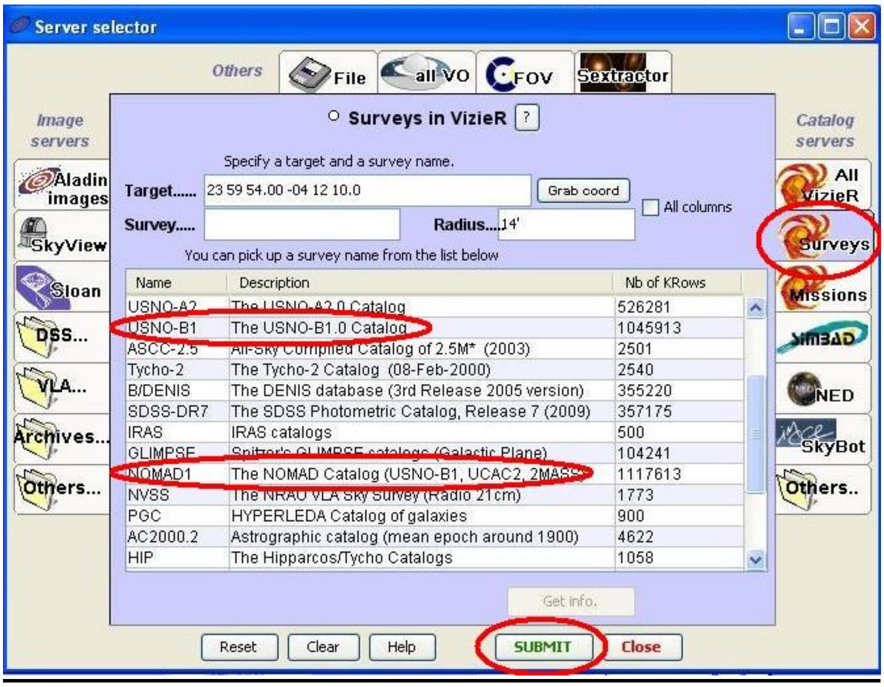
a/ Click on the **assoc** icon (film icon) situated in the right column of your main screen. A window called **image association** is unfolded.



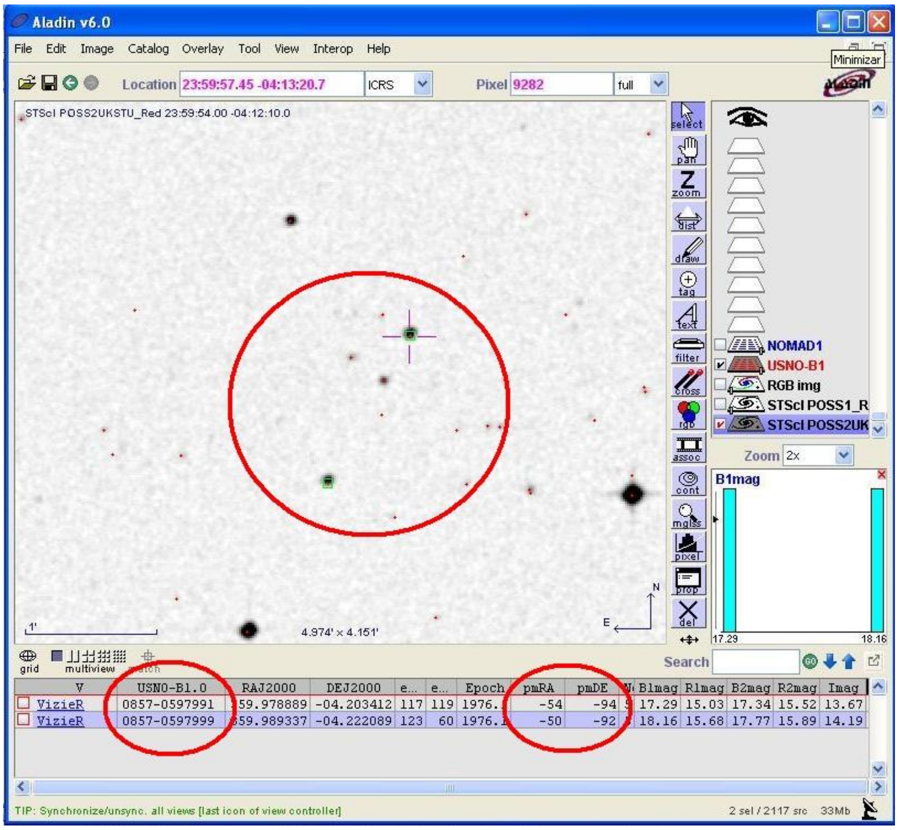
Each image is associated to a number (one and two in our case). Click on **Create** button and an animation which shows the two switching images is created.

3.1.5 - Loading catalogues

a/ Click **File / Load Catalog** or directly to the icon "**folder"** situated on the top left corner of the main screen.
b/ The **Server selector** window is unfolded. Click on the **Surveys** icon of the **Catalog servers**.



c/ A new screen is unfolded where we can select and submit the catalogues. The catalogues are shown in layers that we can activate/deactivate in the main screen.



Target

Detection of Wide (>5″) Star Pairs (WSP) with common proper motions higher that 50 marc-sec/year without binarity criteria in any catalogue consulted using Virtual Observatory tools

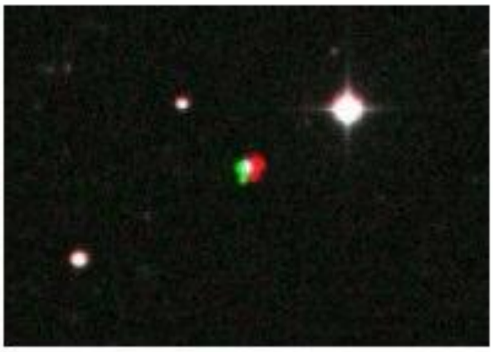


Figure 2
XMI 104 (RGB)

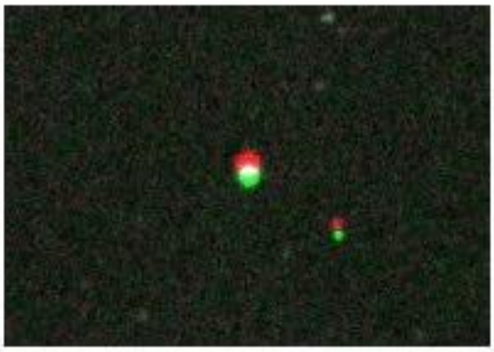


Figure 3
XMI 111 (RGB)

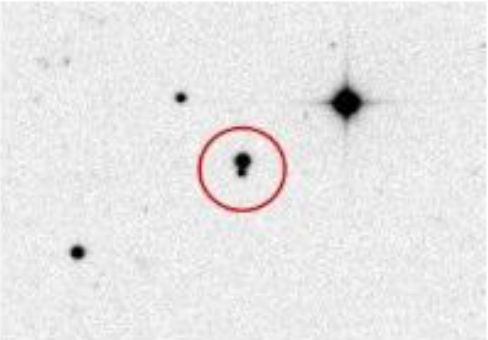


Figure 4
XMI 104 POSS2 Colour inverted

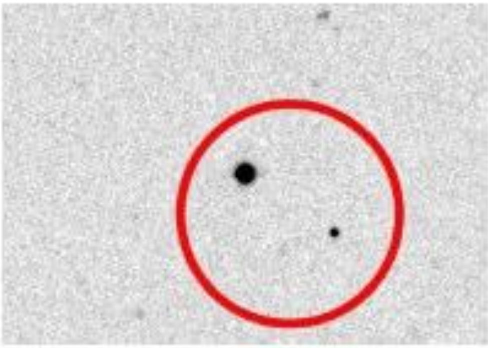


Figure 5
XMI 111 POSS2 Colour inverted

In the figures below there are two examples of common proper motion pairs detected making use of GRB blink tool. To detect the proper motions we used two images from POSS1 and POSS2 surveys obtained in 1954 and 1991. Stars with motions higher than 50 marsec/year stand out over the fixed stellar background. There are probably thousands of pairs to be detected, catalogued and studied which may be physical systems.

3.2. ACTUAL METODOLOGY (2010-2011)

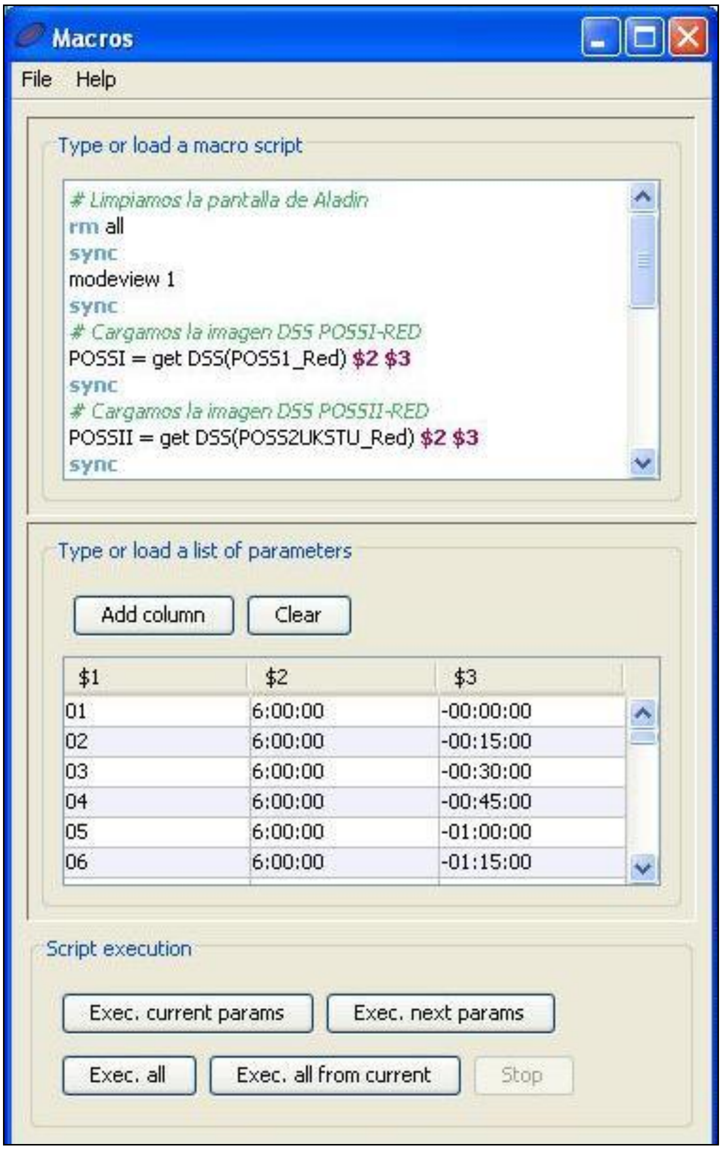
Since November 2010 following the experience acquired for the coordination team thanks to the assistance to the IV Course of SVO (Spanish Virtual Observatory), directed by E. Solano, one decided to take one more step to the automation in revision searching and data processes.

¡¡And all without loosing the visual and systematic essence of the survey!!

In this second phase our working methodology is based in a macro that works with the script write specifically to facilitate the task of searching new pairs in the survey environment. This macro uses a list with the coordinates RA and DEC in .txt, for each BPU so that the image downloading is made sequentially.

3.2.1 - Loading the script and the parameters list

a/ Launch **Aladin Applet** : http://aladin.u-strasbg.fr/java/nph-aladin.pl
b/ Click **Macro Controller** (in the **Tool** menu). **Macros** screen will appear.



c/ Charge the Script: After selecting the **Load Script** option we indicate witch file contains the script and click on the **Load Script** button. The script written for this project is called **Macro Survey OGDSSv01.txt** (the actual version may be different of the showed in this document).
d/ Load the parameter list after selecting **Load Params** option in the file menu option we indicate witch file contains the parameters and click on the **Load Params** button. The parameters file facilitated for this project is called **00h +20º**.txt (characters in blue will change depending on the AR and DEC of the sector assigned. This list will contain the AR and DEC for each of BPU that we should explore and an ordinal number for each coordinate. The content of the parameters list can be seen at the button of **Macros** screen.
The different parameters are written in the script as **$1, $2, $3…** according to the heading columns of the list **(Anexo 1- Archivo parámetros).**

3.2.2 - How does the script work?

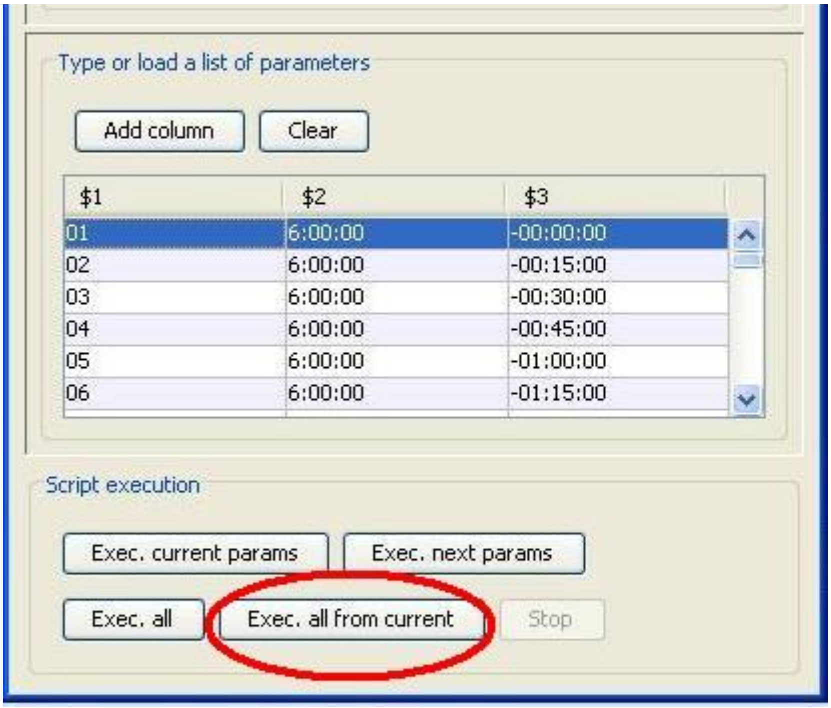
A script is a list of instructions witch uses the macro to do some operations. Written one after another in a text file we achieve that once they have been charged, they are executed automatically in the established order without the need of repeat the whole actions for each BPU.

The script is submitted for the coordination to the interested teams.

3.2.3 - Searching process.

Once the script and the parameters list have been charged in the **Macros** screen we can begin to see the BPU included in the parameters list.

a/ We select the first BPU and click the button **Exec All from** current to charge the coordinates of the selected zone.



b/ The images and catalogue contained in the script will be charged.
c/ Once charged, we will be able to see the RGB image during 10 seconds before the macro charge the new BPU.

NOTE: We advise to work with Mozilla FireFox so that other browsers have been shown unstable in working with the script. Anyway, each team should test the script in his or her PC

4. COMPILATION DATA

As it has taken place in the methodology, the compilation data process has changed from the beginning until now. This evolution result in the fact that the teams only pick up the strictly necessary data (avoiding waste of time and unnecessary mistakes) and that the data is compiled in a format easy to integrate to our and USNO databases.

4.1. Phase 1 (2008 –2010)

The data obtained for each observer will be sent to coordination in a Excel file in a format designed for this purpose **(Anexo 2- Hoja Datos Fase 1)**

NAME: NAME OF PAIR. Researcher name or WDS code.
COMP: DESIGNATION OF COMPONENTS (A, B…).
IDENTIFICATION: IDENTIFICATION OF COMPONENTS... We use USNOB1 when all components have identification in this catalogue. If one of the components doesn't have identification in USNOB1 we use NOMAD1 catalogue for all components.
AR/DEC J2000: AR/DEC J2000 POSITION FOR ALL COMPONENTS AND COORDINATES SOURCE. We use USNOB1 when all components have coordinates in this catalogue. If one of the components doesn't have coordinates in USNOB1 we use NOMAD1 catalogue for all components.
MAGNITUDE: MAGNITUDE OF COMPONENTS (A.B…) catalogued in NOMAD1. By default we give V mag and if it isn't possible we give R mag.
PM RA: PROPER MOTIONS (PM) IN AR in marsec/year.

PM DEC: PROPER MOTIONS (PM) IN DEC in marsec/year.
PM SOURCE: PROPER MOTION (PM) SOURCE CATALOGUE. We use USNOB1 when all components have Proper Motions in this catalogue If one of the components doesn't have proper motions in USNOB1 we use NOMAD1 catalogue for all components.
THETA: THETA. Position Angle measured from the brightest star to the dimmest star in V mag or R mag. The measures have been gotten from POSS2 (Red) images trough an optimization centroide method using Virtual Observatory tools.
RHO: RHO. Angular Separation measured from the brightest star to the dimmest star in V mag or R mag. The measures have been gotten from POSS2 (Red) images trough an optimization centroide method using Virtual Observatory tools.
EPOCH: EPOCH. Date of the image we have made Theta/Rho measures in thousandths of year. All Theta/Rho measures have been made in POSS2 (Red) images.
OBSERVATIONS: NOTES.
Note: These catalogs don't have proper motions for some close secondary stars despite they show very similar proper motion in the blinking images. In these cases, due the high suspect of common proper motions, we include Theta/Rho multiepoch measures that support the common proper motion character between the two components.

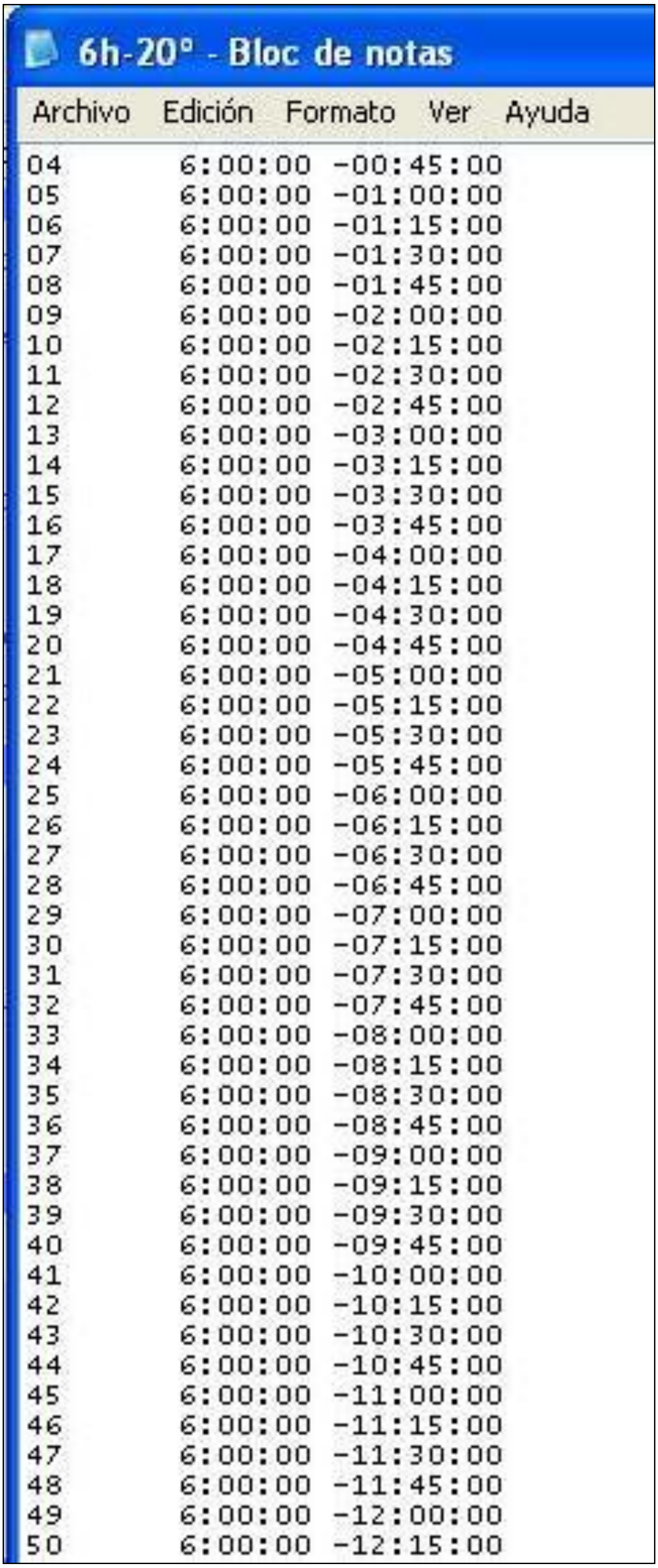
4.2 Phase 2 (2010-2011)

The changes in this new format are referred to:
a/ Limitation in the format data options in order to minimize the typing mistakes.
b/ The utilization of a macro to convert the Excel file to a ASCII text with the USNO required format.

The data obtained for each team or observer is submitted to the coordination in a Excel file in a format designed for this purpose **(Anexo 3- Hola de datos Fase 2)** witch will be converted in ASCII file and finally sent to USNO **(Anexo 4- Archivo ASCII Fase 2)**

COMP: DESIGNATION OF COMPONENTS (A, B…).
IDENTIFICATION: IDENTIFICATION OF COMPONENTS... We use USNOB1 when all components have identification in this catalogue. If one of the components doesn't have identification in USNOB1 we use NOMAD1 catalogue for all components.
COORD. SRC: Catalogue source of ICRS coordinates
AR/DEC ICRS: AR/DEC ICRS POSITION FOR ALL COMPONENTS AND COORDINATES SOURCE. We use USNOB1 when all components have coordinates in this catalogue. If one of the components doesn't have coordinates in USNOB1 we use NOMAD1 catalogue for all components.
COLOR MAG: PHOTOMETRIC COLOUR OF THE MAGNITUDE. By default V magnitude. If it is not possible R or 2MASS
MAG MAGNITUDE OF COMPONENTS (A.B…) catalogued in NOMAD1.
PM RA: PROPER MOTIONS (PM) IN AR in marsec/year.
PM DEC: PROPER MOTIONS (PM) IN DEC in marsec/year.
PM SRC: PROPER MOTION (PM) SOURCE CATALOG. We use USNOB1 when all components have Proper Motions in this catalogue If one of the components doesn't have proper motions in USNOB1 we use NOMAD1 catalogue for all components.
THETA: THETA. Position Angle measured from the brightest star to the dimmest star in V mag or R mag. The measures have been gotten from POSS2 (Red) images trough an optimization centroide method using Virtual Observatory tools.
RHO: RHO. Angular Separation measured from the brightest star to the dimmest star in V mag or R mag. The measures have been gotten from POSS2 (Red) images trough an optimization centroide method using Virtual Observatory tools.
EPOCH: EPOCH. Date of the image we have made Theta/Rho measures in thousandths of year. All Theta/Rho measures have been made in POSS2 (Red) images.
CODE: Discoverer Code.
OBSERVATIONS: NOTES.
Note: These catalogs don't have proper motions for some close secondary stars despite they show very similar proper motion in the blinking images. In these cases, due the high suspect of common proper motions, we include Theta/Rho multiepoch measures that support the common proper motion character between the two components.

(Anexo 1- Archivo parámetros).



04	6:00:00	-00:45:00
05	6:00:00	-01:00:00
06	6:00:00	-01:15:00
07	6:00:00	-01:30:00
08	6:00:00	-01:45:00
09	6:00:00	-02:00:00
10	6:00:00	-02:15:00
11	6:00:00	-02:30:00
12	6:00:00	-02:45:00
13	6:00:00	-03:00:00
14	6:00:00	-03:15:00
15	6:00:00	-03:30:00
16	6:00:00	-03:45:00
17	6:00:00	-04:00:00
18	6:00:00	-04:15:00
19	6:00:00	-04:30:00
20	6:00:00	-04:45:00
21	6:00:00	-05:00:00
22	6:00:00	-05:15:00
23	6:00:00	-05:30:00
24	6:00:00	-05:45:00
25	6:00:00	-06:00:00
26	6:00:00	-06:15:00
27	6:00:00	-06:30:00
28	6:00:00	-06:45:00
29	6:00:00	-07:00:00
30	6:00:00	-07:15:00
31	6:00:00	-07:30:00
32	6:00:00	-07:45:00
33	6:00:00	-08:00:00
34	6:00:00	-08:15:00
35	6:00:00	-08:30:00
36	6:00:00	-08:45:00
37	6:00:00	-09:00:00
38	6:00:00	-09:15:00
39	6:00:00	-09:30:00
40	6:00:00	-09:45:00
41	6:00:00	-10:00:00
42	6:00:00	-10:15:00
43	6:00:00	-10:30:00
44	6:00:00	-10:45:00
45	6:00:00	-11:00:00
46	6:00:00	-11:15:00
47	6:00:00	-11:30:00
48	6:00:00	-11:45:00
49	6:00:00	-12:00:00
50	6:00:00	-12:15:00

(Anexo 2- Hoja Datos Fase 1)

NAME	COMP.	IDENTIFICATION	RA/DEC (J2000)	MAGNITUDE	PM RA	PM DEC	PM SOURC.	TETHA	RHO	EPOCH	OBSERVATIONS
NVL	A	USNOB1 0778-0094699	06 00 49.36-12 09 01.7	V 10.6	-10	-90	USNOB1	268.9	13.43	1953.868	**B NO PM TETHA/RHO MULTIEPOCH Magnitud V de "B" estimada por comparación con USNOB1 0778-0094787. Posible saturación en las imágenes.**
	B			V 11.5				270.3	14.30	1990.899	
NVL	A	USNOB1 0761-0069727	06 02 19.638-13 52 51.04	V 14.7				278.0	13.71	1953.868	**A/B NO PM TETHA/RHO MULTIEPOCH**
	B	USNOB1 0761-0069723	06 02 18.711-13 52 48.94	V 16.2				280.6	13.60	1993.052	
NVL	A	USNOB1 0892-0073965	06 04 15.546-00 46 30.00	R 16.5	22	-72	USNOB1	33.0	6.34	1990.797	**Si se tienen en cuenta los errores reportados por los catálogos, este par pasaría el filtro, DeltaPM<10mas/a**
	B	USNOB1 0892-0073966	06 04 15.732-00 46 25.40	R 17.3	22	-60	USNOB1				
NVL	A	USNOB1 0882-0109840	06 03 37.127-01 46 36.18	V 16.5	8	-114	USNOB1	198.3	41.13	1955.885	**B NO PM TETHA/RHO MULTIEPOCH**
	B	USNOB1 0882-0109833	06 03 36.227-01 47 12.62	V 17.9			USNOB1	198.3	41.01	1990.825	
NVL	A	USNOB1 0844-0069009	06 04 13.737-05 32 12.43	V 13.7	54	-70	USNOB1	264.8	184.56	1989.025	
	B	USNOB1 0844-0068925	06 04 01.366-05 32 28.40	V 15.4	52	-70	USNOB1				
NVL	A	USNOB1 0730-0112761	06 05 42.807-16 54 00.30	V 13.3				87,9 AB 34,4 AC	63,90 AB 65,70 AC	1953.866	**A/B & B/C NO PM TETHA/RHO MULTIEPOCH Posible triple?**
	B	USNOB1 0731-0111744	06 05 47.241-16 53 58.00	V 17.3							
	C	USNOB1 0731-0111730	06 05 45.351-16 53 05.79	V 13.7				87,9 AB 33,4 AC	63,06 AB 65,40 AC	1993.052	
NVL	A	USNOB1 0724-0105330	06 05 54.811-17 30 30.87	R 17.1	34	-50	USNOB1	109.0	36.98	1953.866	**B NO PM TETHA/RHO MULTIEPOCH**
	B	USNOB1 0724-0105340	06 05 57.195-17 30 41.14	R 17.5				107.8	36.92	1992.077	
NVL	A	USNOB1 0865-0073412	06 06 34.487-03 29 35.03	V 14.1	-2	-56	USNOB1	64.1	8.48	1953.995	**B NO PM TETHA/RHO MULTIEPOCH**
	B	USNOB1 0865-0073415	06 06 34.764-03 29 31.92	V 15.5				64.3	8.49	1989.025	
NVL	A	USNOB1 0761-0071971	06 07 37.036-13 49 28.99	V 11.8	60	-42	USNOB1	100.1	27.69	1953.868	**B NO PM TETHA/RHO MULTIEPOCH**
	B	USNOB10761-0071982	¡06 07 38.760-13 49 32.38	V 16.8				100.1	26.64	1993.052	
NVL	A	USNOB1 0759-0078399	06 08 02.658-14 03 00.57	V 16.8				229.1	200.53	1953.868	**A/B NO PM TETHA/RHO MULTIEPOCH**
	B	USNOB1 0759-0078329	06 07 52.273-14 05 12.27	V 17.9				228.7	200.33	1993.052	

(Anexo 3- Hoja Datos Fase 2)

COMP.	IDENTIFICATION	COORD. SRC.	COORDINATES ICRS	COLOR MAG.	MAG.	PM RA	PM DEC	PM SRC.	TETHA	RHO	EPOCH	CODE	OBSERVATIONS
A	0825-0026963	USNO B1	02 01 14.019 -07 28 35.42	R	13.3	100.0	-168.0	USNO B1	154.6	260.58	1991.701	A Bernal	
B	0825-0026921	USNO B1	02 01 06.505 -07 24 40.96	R	13.2	96.0	-172.0	USNO B1					
A	0821-0023507	USNO B1	02 01 16.747 -07 52 19.34	V	13.6	-30.0	-88.0	USNO B1	17.6	46.93	1991.701	A Bernal	
B	0821-0023511	USNO B1	02 01 17.691 -07 51 34.35	V	15.5	-32.0	-90.0	USNO B1					
A	0718-0022704	USNO B1	02 02 10.566 -18 08 28.75	R	17.7	6.0	-94.0	USNO B1	180.2	10.32	1991.912	A Bernal	
B	0718-0022705	USNO B1	02 02 10.576 -18 08 39.01	R	19.1	0.0	-92.0	USNO B1					
A	0753-0019816	USNO B1	02 02 13.245 -14 40 53.25	R	17.9	104.0	-146.0	USNO B1	326.1	144.60	1996.942	A Bernal	
B	0752-0020091	USNO B1	02 02 18.803 -14 42 53.67	R	18.1	88.0	-142.0	USNO B1					
A	0758-0028330	USNO B1	02 02 29.226 -14 09 55.03	V	16.3	-16.0	-60.0	USNO B1	216.7	38.99	1996.942	A Bernal	
B	0758-0028325	USNO B1	02 02 27.625 -14 10 26.38	V	17.8	-12.0	-56.0	USNO B1					
A	0726-0030783	NOMAD 1	02 02 34.707 -17 18 50.38	R	12.7	83.4	-4.7	NOMAD 1	344.3	14.09	1991.912	A Bernal	
B	0726-0030780	NOMAD 1	02 02 34.467 -17 18 37.68	R	16.9	82.0	-8.0	NOMAD 1					
A	0775-0028240	USNO B1	02 03 04.327 -12 29 01.98	R	14.2	-44.0	-120.0	USNO B1	214.5	466.20	1996.942	A Bernal	
B	0774-0028883	USNO B1	02 02 46.353 -12 35 26.06	R	15.0	-48.0	-124.0	USNO B1					
A	1447-1807552	2 MASS	02 06 14.546 -18 07 54.56	J	13.2	82.0	-234.0	NOMAD 1	51.5	3.43	1991.912	A Bernal	
B	1471-1807526	2 MASS	02 06 14.713 -18 07 52.67	J	13.7				55.5	3.78	1953.866		
A	0785-0020300	USNO B1	02 06 55.344 -11 26 23.19	R	15.1	-52.0	-34.0	USNO B1	279.7	94.62	1991.701	A Bernal	
B	0785-0020288	USNO B1	02 06 49.002 -11 26 07.08	R	17.0	-50.0	-30.0	USNO B1					
A	700 -0022869	USNO B1	02 09 17.434 -19.57 55.02	V	16.3	44.0	64.0	USNO B1	177.2	11.72	1991.912	A Bernal	
B	700 -0022870	USNO B1	02 09 17.497 -19 58 06.53	V	16.6	46.0	66.0	USNO B1					
A	0844-0020363	USNO B1	02 11 43.338 -05 30 47.86	V	11.6	98.0	14.0	USNO B1	60.1	538.98	1993.847	A Bernal	
B	0845-0020700	USNO B1	02 12 14.639 -05 26 19.59	V	14.8	108.0	18.0	USNO B1					
A	0705-0023592	USNO B1	02 11 44.081 -19 26 42.54	V	13.6	-36.0	-64.0	USNO B1	52.3	37.04	1991.912	A Bernal	
B	0705-0023596	USNO B1	02 11 46.188 -19 26 19.78	V	17.5	-28.0	-62.0	USNO B1					

(Anexo 4- Archivo ASCII Fase 2)

04 +20 ABL - Bloc de notas

Archivo Edición Formato Ver Ayuda

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A USNOB1 0923-0054343 040012.53+022348.4 R 13.5 156.0 -42.0 USNOB1 92.1 792.6 1995.798 ABL
B USNOB1 0923-0054472 040105.45+022319.2 R 14.3 172.0 -34.0 USNOB1
A USNOB1 0911-0040460 040123.56+010649.1 R 14.5 108.0 -24.0 USNOB1 27.0 37.90 1995.798 ABL
B USNOB1 0911-0040463 040124.71+010722.8 R 16.4 108.0 -22.0 USNOB1
A USNOB1 1073-0054981 040144.78+171946.0 R 14.9 50.0 -40.0 USNOB1 94.4 87.96 1992.837 ABL
B USNOB1 1073-0054997 040150.90+171939.0 R 18.2 42.0 -36.0 USNOB1
A USNOB1 1011-0036083 040208.45+110719.8 R 12.6 108.0 -94.0 USNOB1 98.2 30.34 1988.948 ABL
B USNOB1 1011-0036088 040210.48+110715.6 R 18.0 102.0 -96.0 USNOB1
A USNOB1 1080-0058378 040446.55+180036.4 R 18.1 12.0 -56.0 USNOB1 266.5 110.70 1989.973 ABL
B USNOB1 1080-0058350 040438.77+180032.2 R 18.2 12.0 -48.0 USNOB1
C USNOB1 1080-0058388 040449.37+180151.8 R 19.3 10.0 -50.0 USNOB1 29.2 83.70 1989.973 ABL
A USNOB1 1005-0037328 040625.05+103314.4 R 16.8 52.0 -30.0 USNOB1 65.0 68.94 1988.948 ABL
B USNOB1 1005-0037336 040629.30+103343.8 R 17.8 52.0 -20.0 USNOB1
A USNOB1 0991-0037118 040640.12+090958.0 V 14.7 50.0 -30.0 USNOB1 314.5 16.59 1988.948 ABL
B USNOB1 0991-0037117 040639.33+091009.8 V 16.0 52.0 -30.0 USNOB1
A USNOB1 1048-0041184 040713.14+145246.7 V 12.5 -48.0 -16.0 USNOB1 331.1 77.70 1992.837 ABL
B USNOB1 1048-0041177 040710.57+145354.5 V 13.9 -50.0 -16.0 USNOB1
A USNOB1 0928-0057080 040823.87+024850.2 R 12.9 -76.0 -70.0 USNOB1 341.5 68.82 1992.733 ABL
B USNOB1 0928-0057072 040822.42+024955.6 R 18.1 -64.0 -66.0 USNOB1
A USNOB1 1061-0043398 041023.13+161105.2 V 14.4 2.0 -72.0 USNOB1 4.3 45.39 1992.837 ABL
B USNOB1 1061-0043400 041023.34+161150.7 V 17.8 -6.0 -66.0 USNOB1
A USNOB1 1071-0050148 041024.80+170610.7 V 14.5 56.0 -50.0 USNOB1 204.6 147.54 1992.837 ABL
B USNOB1 1070-0044252 041020.51+170357.2 V 14.8 60.0 -42.0 USNOB1
A USNOB1 0973-0050309 041029.74+071838.4 R 13.7 4.0 -52.0 USNOB1 225.4 102.72 1992.733 ABL
B USNOB1 0972-0051007 041024.78+071726.6 R 17.7 4.0 -60.0 USNOB1
A USNOB1 0920-0043039 041157.51+020137.7 R 11.2 8.0 -66.0 USNOB1 91.2 97.80 1989.991 ABL
B USNOB1 0920-0043068 041204.12+020133.4 R 18.7 8.0 -62.0 USNOB1 92.7 99.50 1951.008
A NOMAD1 0910-0042485 041233.74+010236.7 J 10.1 -92.0 -140.0 NOMAD1 298.0 8.46 1989.991 ABL
B NOMAD1 0910-0042484 041233.38+010239.7 J 12.0    NOMAD1 298.0 7.61 1951.008
A USNOB1 1047-0041556 041348.83+144758.6 R 16.8 30.0 -84.0 USNOB1 146.4 4.80 1989.844 ABL
B USNOB1 1047-0041557 041348.90+144756.8 R 17.4 26.0 -74.0 USNOB1 139.6 4.42 1953.773
A NOMAD1 0924-0055691 041352.38+022922.6 V 11.6 4.0 -55.6 NOMAD1 153.6 13.50 1990.866 ABL
B NOMAD1 0924-0055697 041352.78+022910.9 V 13.0 4.7 -63.8 NOMAD1 153.8 13.48 1951.008
A USNOB1 1095-0047503 041420.95+193446.8 V 8.2 16.0 -52.0 USNOB1 348.7 81.06 1989.973 ABL
B USNOB1 1096-0048776 041419.81+193606.7 V 14.4 14.0 -48.0 USNOB1
A USNOB1 1034-0048198 041548.47+132518.3 V 17.1 14.0 -54.0 USNOB1 308.5 124.86 1989.844 ABL
B USNOB1 1034-0048175 041541.73+132636.1 V 17.6 6.0 -44.0 USNOB1
A USNOB1 1088-0048542 041613.11+185304.2 V 12.2 112.0 -30.0 USNOB1 236.1 163.20 1989.973 ABL
B USNOB1 1088-0048510 041603.57+185133.2 V 13.9 104.0 -30.0 USNOB1
A USNOB1 1013-0038404 041619.35+112112.5 R 15.8 60.0 -118.0 USNOB1 282.3 12.33 1990.814 ABL
B USNOB1 1013-0038401 041618.54+112115.0 R 19.6 66.0 -114.0 USNOB1
A USNOB1 1047-0042106 041658.49+144618.7 R 14.7 14.0 -50.0 USNOB1 32.4 102.00 1989.844 ABL
B USNOB1 1047-0042115 041702.29+144744.8 R 18.5 20.0 -52.0 USNOB1
A USNOB1 1079-0060205 041747.07+175635.3 V 13.2 18.0 -46.0 USNOB1 117.5 49.04 1989.973 ABL
B USNOB1 1079-0060214 041750.07+175612.9 V 15.1 20.0 -50.0 USNOB1
A USNOB1 1084-0055640 041750.63+182830.9 V 13.6 110.0 -26.0 USNOB1 123.0 733.80 1989.973 ABL
B USNOB1 1083-0066532 041833.85+182153.0 V 15.7 114.0 -38.0 USNOB1
A USNOB1 0987-0040271 041902.85+084527.1 V 15.6 -16.0 42.0 USNOB1 287.8 50.32 1990.814 ABL
B USNOB1 0987-0040260 041859.62+084542.7 V 16.9 -8.0 52.0 USNOB1
A USNOB1 1075-0058821 041908.01+173129.1 V 8.4 110.0 -28.0 USNOB1 349.6 179.70 1989.844 ABL
B USNOB1 1075-0058794 041905.78+173423.5 V 17.1 98.0 -22.0 USNOB1
A USNOB1 1035-0042370 042032.01+133419.6 V 9.8 -70.0 -40.0 USNOB1 305.7 74.94 1989.844 ABL
B USNOB1 1035-0042356 042027.81+133503.5 V 15.2 -72.0 -40.0 USNOB1
A USNOB1 0971-0049214 042234.83+071110.3 V 13.6 54.0 -2.0 USNOB1 37.1 48.64 1986.768 ABL
B USNOB1 0971-0049226 042236.81+071149.1 V 14.0 50.0  USNOB1
A USNOB1 0997-0058262 042250.96+094616.8 V 8.1 12.0 -58.0 USNOB1 58.1 183.84 1990.814 ABL
B USNOB1 0997-0058299 042301.53+094753.7 V 12.6 22.0 -60.0 USNOB1
A USNOB1 1070-0047564 042316.83+170041.9 V 16.3 90.0 -12.0 USNOB1 335.6 28.18 1989.844 ABL
B USNOB1 1070-0047559 042316.00+170107.8 V 17.6 88.0 -2.0 USNOB1
A USNOB1 1058-0055741 042447.99+155229.2 R 13.3 102.0 -28.0 USNOB1 311.9 187.92 1989.844 ABL
B USNOB1 1058-0055665 042428.25+155303.7 R 14.4 102.0 -18.0 USNOB1
A USNOB1 0973-0053542 042458.03+071837.7 V 16.8 50.0 -20.0 USNOB1 234.4 6.93 1986.768 ABL
B USNOB1 0973-0053540 042457.71+071834.5 V 17.2 44.0 -26.0 USNOB1 236.1 6.11 1953.861
A USNOB1 1013-0039855 042551.25+112258.0 R 16.6 -28.0 -66.0 USNOB1 320.6 6.34 1990.814 ABL
B USNOB1 1013-0039854 042551.03+112301.6 R 18.3 -34.0 -68.0 USNOB1 320.1 7.90 1955.946
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5. COORDINATION

The coordination will assign the sectors (areas of 1 h in RA and 20º in DEC) to the interested teams. We expect to finish the sectors of the first 12 h in RA of the equatorial zone (+/- 20º in DEC) during 2011. The sectors assignation and status table is available at www.oagarraf.net
The timing to finish one sector assigned is 6 month. The coordination reserves the right to finish one sector incomplete to maintain the pacing of the survey. The partial results are equally valid so they can be submitted and included in the survey after their revision.
The measures of the angular parameters will be done by the coordination. The teams will be able to do them if they have knowledge about it.
The designation of new systems will be done following the international rules before they have been revised by USNO/WDS. Any observer will assign neither codes nor designations.

6. PUBLICATION AND DIFUSION

With the aim to maintain the survey consistency, the sending of the publications to the professional teams is a matter only of the coordination witch will respect the credits of the observers and teams.
The results may not be published by self before its confirmation. Once published, they will be able to be reproduced respecting the whole credits.

7. ACCEPTATION

The participation in this project implies the acceptation of these instructions.

8. ACKNOWLEDGMENTS

The coordination is extremely grateful to Brian Mason and his colleagues at USNO (EEUU) for their accurate revision and publication in the WDS web site of measurements, to Bob Argyle for their support in the publication of the results in the Webb Society Circulars of Double Star Section and to J.A. Caballero and E. Solano of Centro de Astrobiologia, Madrid (SPAIN) and to the Spanish Virtual Observatory (SVO) team for their support in the Virtual Observatory tools.

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