Determining of reference star for Winafro

By Erik Bryssinck (2009-2011) – http:// cara.uai.it
Version 2

The choice of a good reference star is VERY important for producing good afrho-measurements.

So there are a lot of agreements to make, such as:

- choice of star only in catalog I239 (Hipparcos and /of Tycho main)
- choice of color index of the star (B-V) (between 0.5 and 0.7 or 0.4 and 0.8 (see further)
- distance of the comet and the reference star = max. 1 degree in distance of the comet
- magnitude of the referencestar versus error in magnitude: about 9 and 10 but the Magnitude error must as low as possible.
- Magnitude error of ref. Stars must be < 0.05, if no reference star, with a margin of error smaller than 0.05 magnitude, can be found, this parameter can be increased to 0.1

With this knowledge, we must carefully select a good reference star. Now the question: how can be search this referencestar on a proper and quick way ?

What we is first at all search of a HIPPARCOS star, if we can't find a Hipparcosstar we select a Tycho main star that complies the rules mentioned above.
A choice for searching the referencestar could be:

http://webviz.u-strasbg.fr/viz-bin/VizieR?-source=I/239/tyc_main

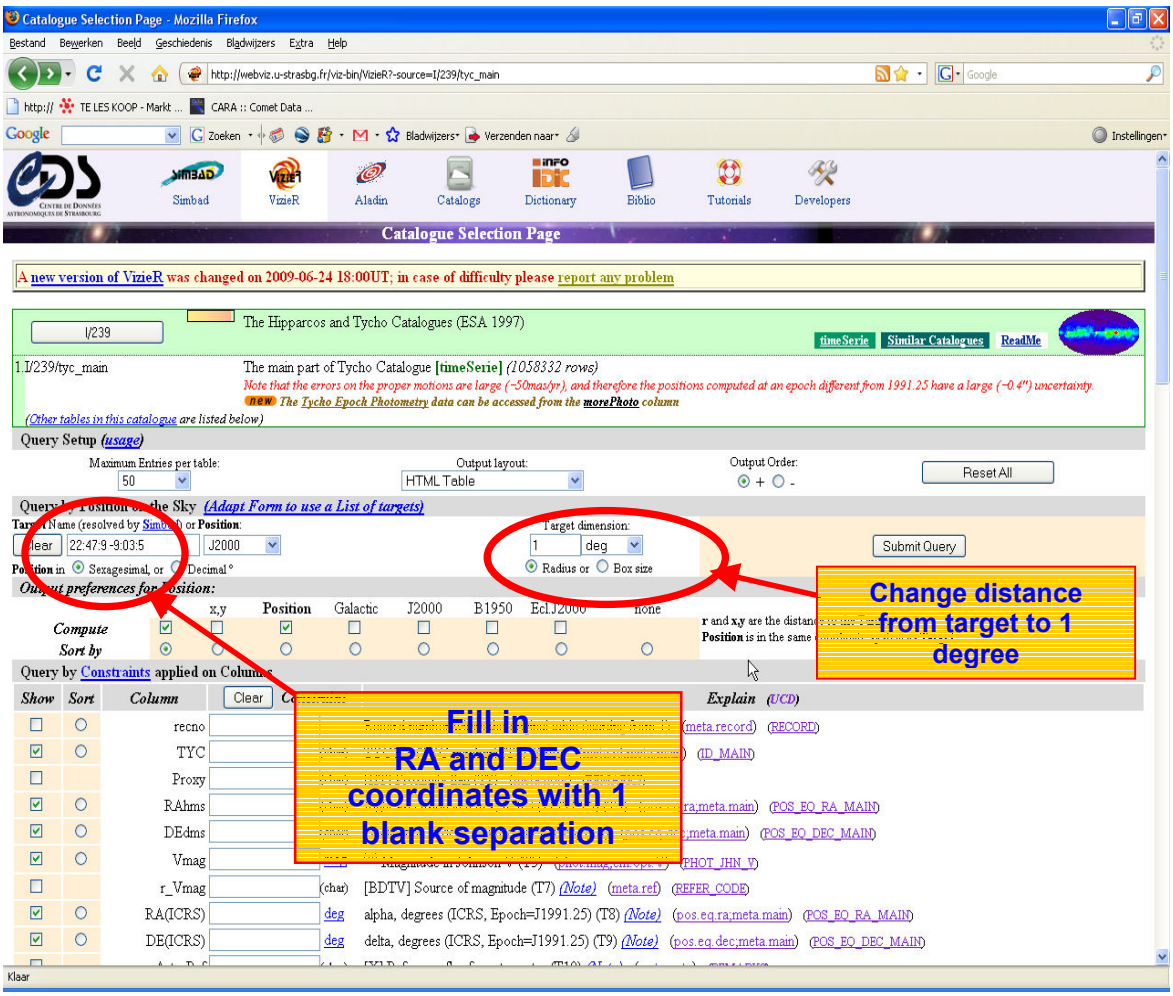


fig 1

What must be done:

1. position of the target in the sky: first the RA en DECL. coordinates of the comet. First the RA than give 1 SPACE end fill the DECL. coordinate in.

2. Distance of the target were you want search for stars: Here fill in '1' 'degree'.

3. In the left column 'Show', leave all marks and as extra: set "HIPPARCOS" = 'ON', 'Btmag' = OFF, 'e_B-V' = 'ON' .

4. For the 'B-V' set a search window between 0.5 and 0.7 or the ultimate values when you can find a proper reference star: 0.4 and 0.8. fill in as: '0.5' 'SPACE' '..' 'SPACE' '0.7'. Why ? Our sun has a B-V index of 0.656 *(ref: Astronomical Society of the Pacific, Publications (ISSN 0004-6280), vol. 104, no. 681, p. 1035-1038.),* the light that scattered on the dust of the comet is the same light of our sun. To get a high accuracy , it is best that we take a reference star with almost the same spectrum as our Sun.

5. Push ' Submit Query'

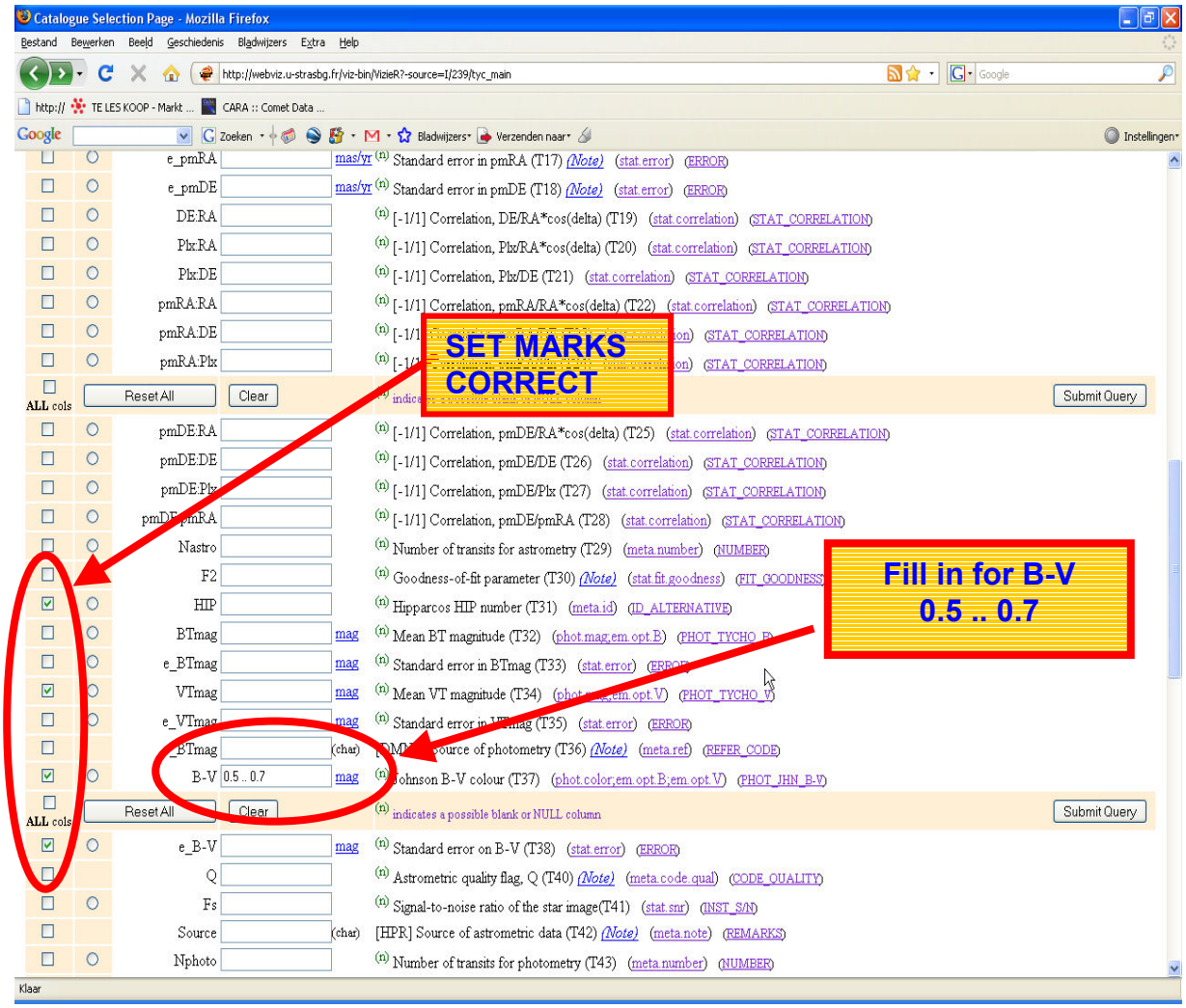


fig 2

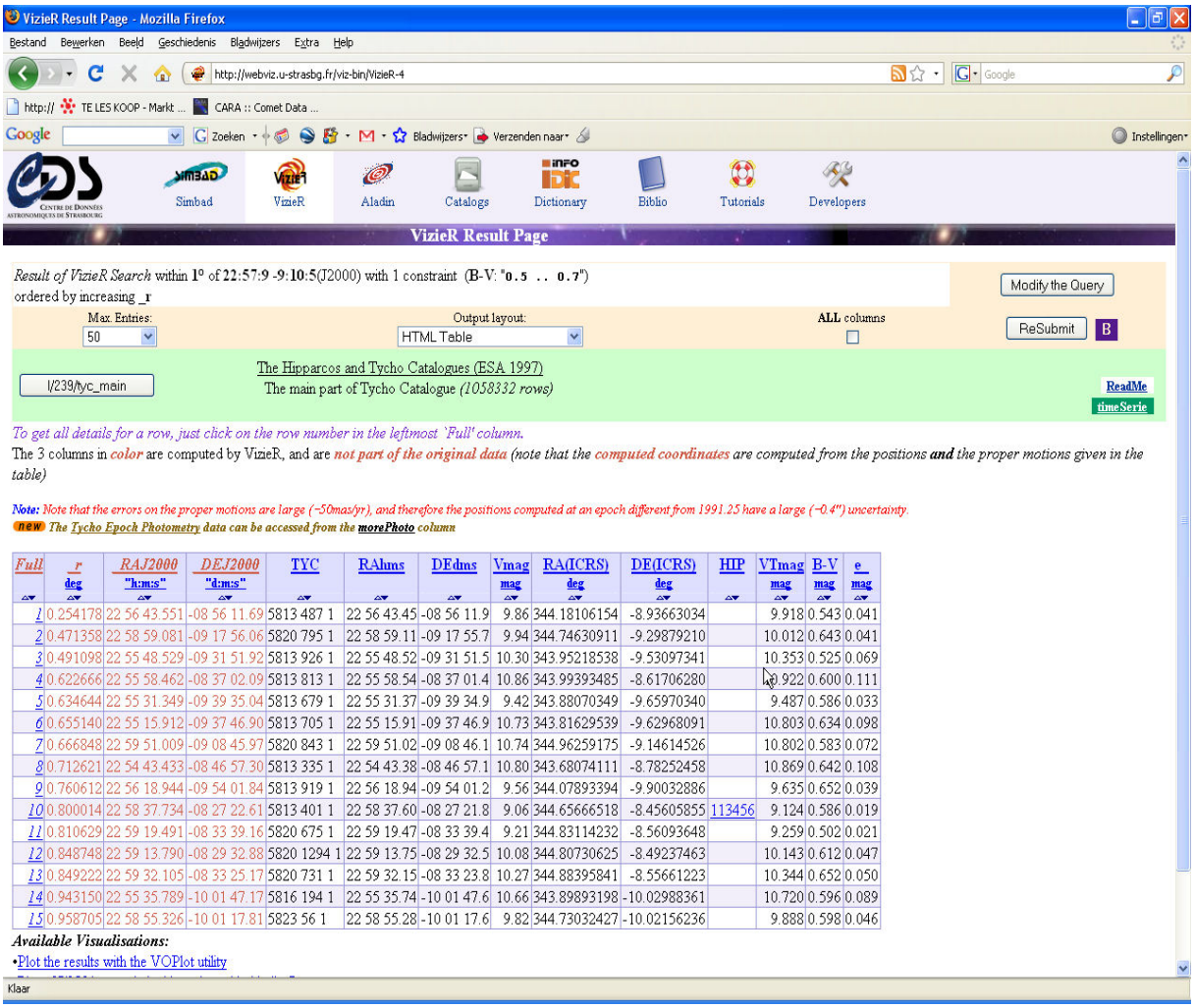
The result you get is: (see below fig 3)

A list, sorted in distance to the comet, this is very useful to determine whether you have a star in your field of view of the comet.

you see that there is a Hipparcos star meets the criteria: in this example: **Hipparcos 113456** in a distance of 0.8 degrees of the comet.

you can also see the nearest star that meets the criteria is **Tycho 5813 487 1** in a distance of 0.253 degrees of the comet. So possible in the same FOV, the error of magnitude is not very hig. error values higher than 0.1 should be avoided, you best take a low error value.
Which reference star should we take for imaging ?

First I should take the **Hipparcos 113456** star and second, if the star is in the same FOV of my image, I should take **TYCHO 5813 487 1**. If not in the same FOV I should take **TYCHO 5813 679** 1 **because the low error in magnitude**



Full	r deg	RAJ2000 "h:m:s"	DEJ2000 "d:m:s"	TYC	RAdms	DEdms	Vmag mag	RA(ICRS) deg	DE(ICRS) deg	HIP	VTmag mag	B-V mag	e mag
1	0.254178	22 56 43.551	-08 56 11.69	5813 487 1	22 56 43.45	-08 56 11.9	9.86	344.18106154	-8.93663034		9.918	0.543	0.041
2	0.471358	22 58 59.081	-09 17 56.06	5820 795 1	22 58 59.11	-09 17 55.7	9.94	344.74630911	-9.29879210		10.012	0.643	0.041
3	0.491098	22 55 48.529	-09 31 51.92	5813 926 1	22 55 48.52	-09 31 51.5	10.30	343.95218538	-9.53097341		10.353	0.525	0.069
4	0.622666	22 55 58.462	-08 37 02.09	5813 813 1	22 55 58.54	-08 37 01.4	10.86	343.99393485	-8.61706280		10.922	0.600	0.111
5	0.634644	22 55 31.349	-09 39 35.04	5813 679 1	22 55 31.37	-09 39 34.9	9.42	343.88070349	-9.65970340		9.487	0.586	0.033
6	0.655140	22 55 15.912	-09 37 46.90	5813 705 1	22 55 15.91	-09 37 46.9	10.73	343.81629539	-9.62968091		10.803	0.634	0.098
7	0.666848	22 59 51.009	-09 08 45.97	5820 843 1	22 59 51.02	-09 08 46.1	10.74	344.96259175	-9.14614526		10.802	0.583	0.072
8	0.712621	22 54 43.433	-08 46 57.30	5813 335 1	22 54 43.38	-08 46 57.1	10.80	343.68074111	-8.78252458		10.869	0.642	0.108
9	0.760612	22 56 18.944	-09 54 01.84	5813 919 1	22 56 18.94	-09 54 01.2	9.56	344.07893394	-9.90032886		9.635	0.652	0.039
10	0.800014	22 58 37.734	-08 27 22.61	5813 401 1	22 58 37.60	-08 27 21.8	9.06	344.65666518	-8.45605855	113456	9.124	0.586	0.019
11	0.810629	22 59 19.491	-08 33 39.16	5820 675 1	22 59 19.47	-08 33 39.4	9.21	344.83114232	-8.56093648		9.259	0.502	0.021
12	0.848748	22 59 13.790	-08 29 32.88	5820 1294 1	22 59 13.75	-08 29 32.5	10.08	344.80730625	-8.49237463		10.143	0.612	0.047
13	0.849222	22 59 32.105	-08 33 25.17	5820 731 1	22 59 32.15	-08 33 23.8	10.27	344.88395841	-8.55661223		10.344	0.652	0.050
14	0.943150	22 55 35.789	-10 01 47.17	5816 194 1	22 55 35.74	-10 01 47.6	10.66	343.89893198	-10.02988361		10.720	0.596	0.089
15	0.958705	22 58 55.326	-10 01 17.81	5823 56 1	22 58 55.28	-10 01 17.6	9.82	344.73032427	-10.02156236		9.888	0.598	0.046

fig 3

Previous procedure describes the settings on the website of Vizier. The link below gives all the significant dates. E is easy to use. You could get a degree from the window increase to 2 or 3 degree and possibly the magnitude of error in the reference star increased from <0.05 to <0.1

Copy and paste this link to your browser
http://tiny.cc/hmttb

The stars could be verified in Winafrho to check of they are in the catalog that is delivered with winafrho.
(see fig 4 + 5)

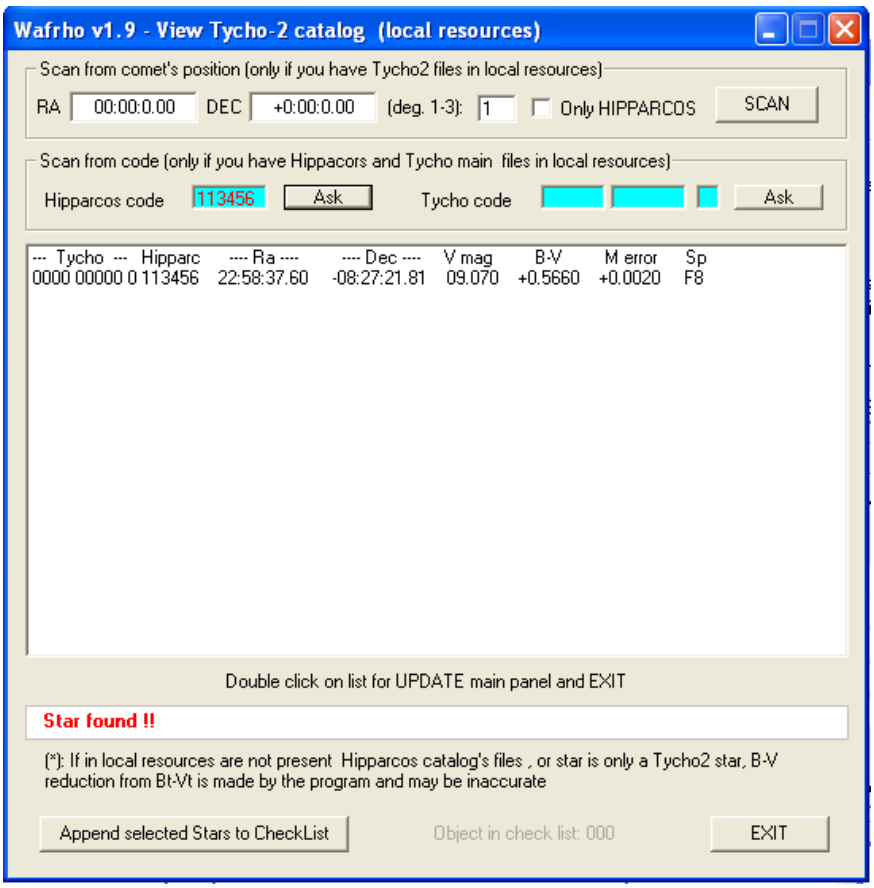


fig 4

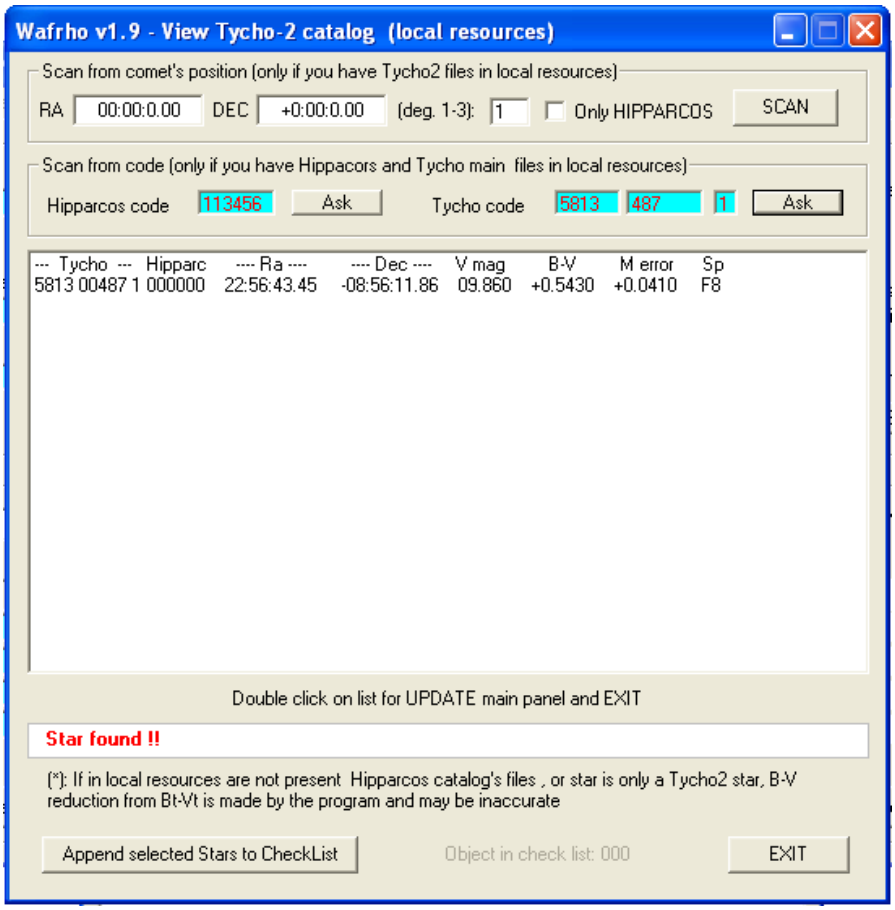


fig 5

Erik Bryssinck – Belgium – http://cara.uai.it
July - 2011