

# PROPER MOTION OF THE BARNARD'S STAR

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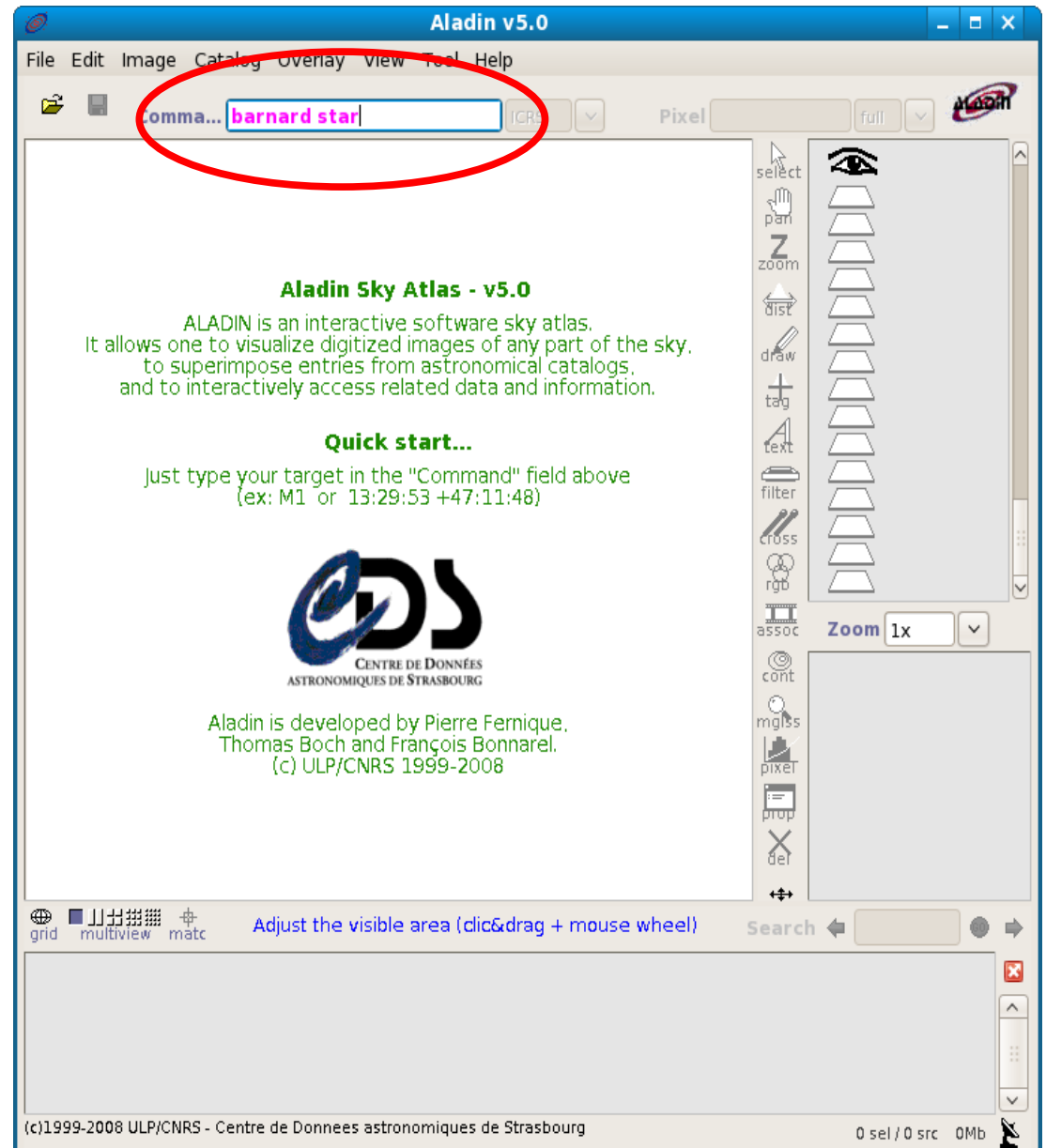
INAF – Trieste Astronomical Observatory

# View the Barnard's star

Open Aladin

In the “command” field  
insert “barnard star”

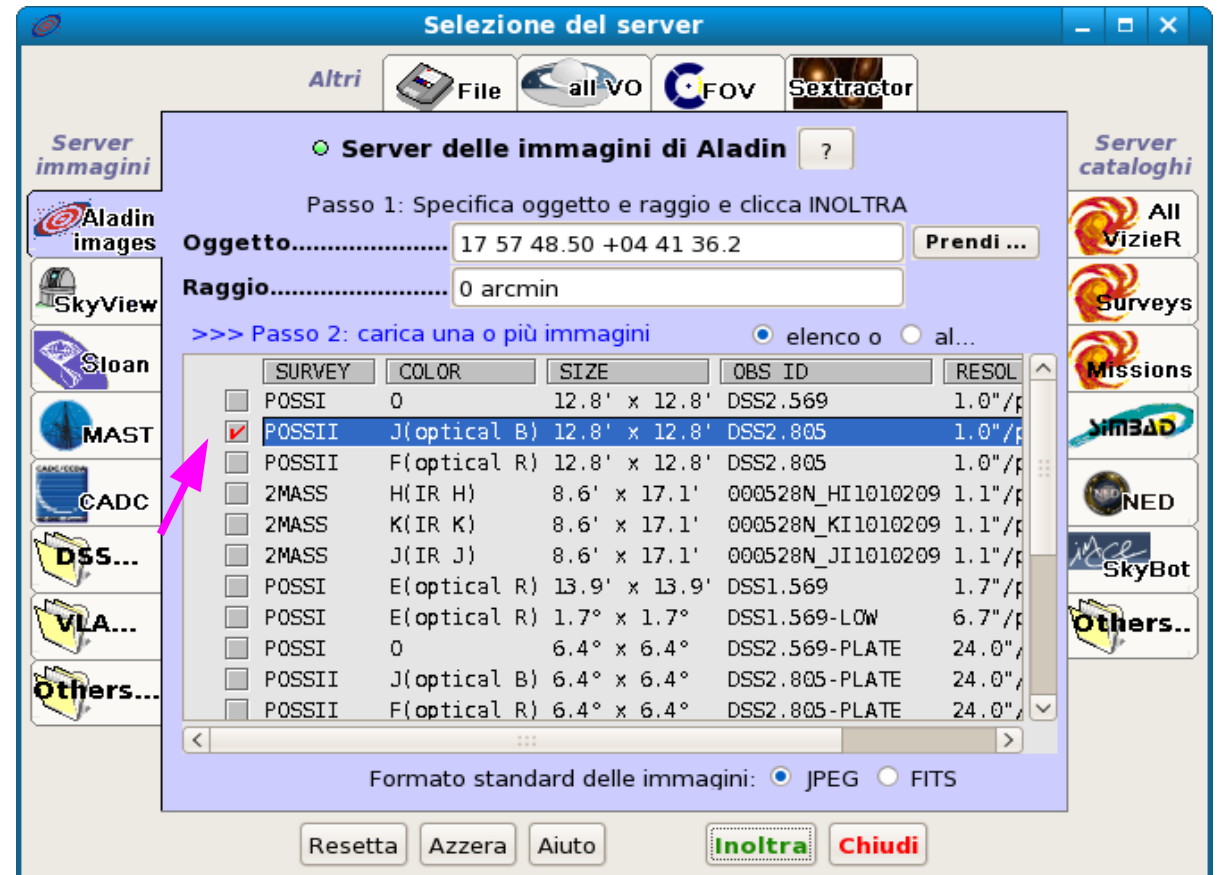
Click “enter”



# Load the second image

Load Aladin image server

Click “submit” to view the list of available images

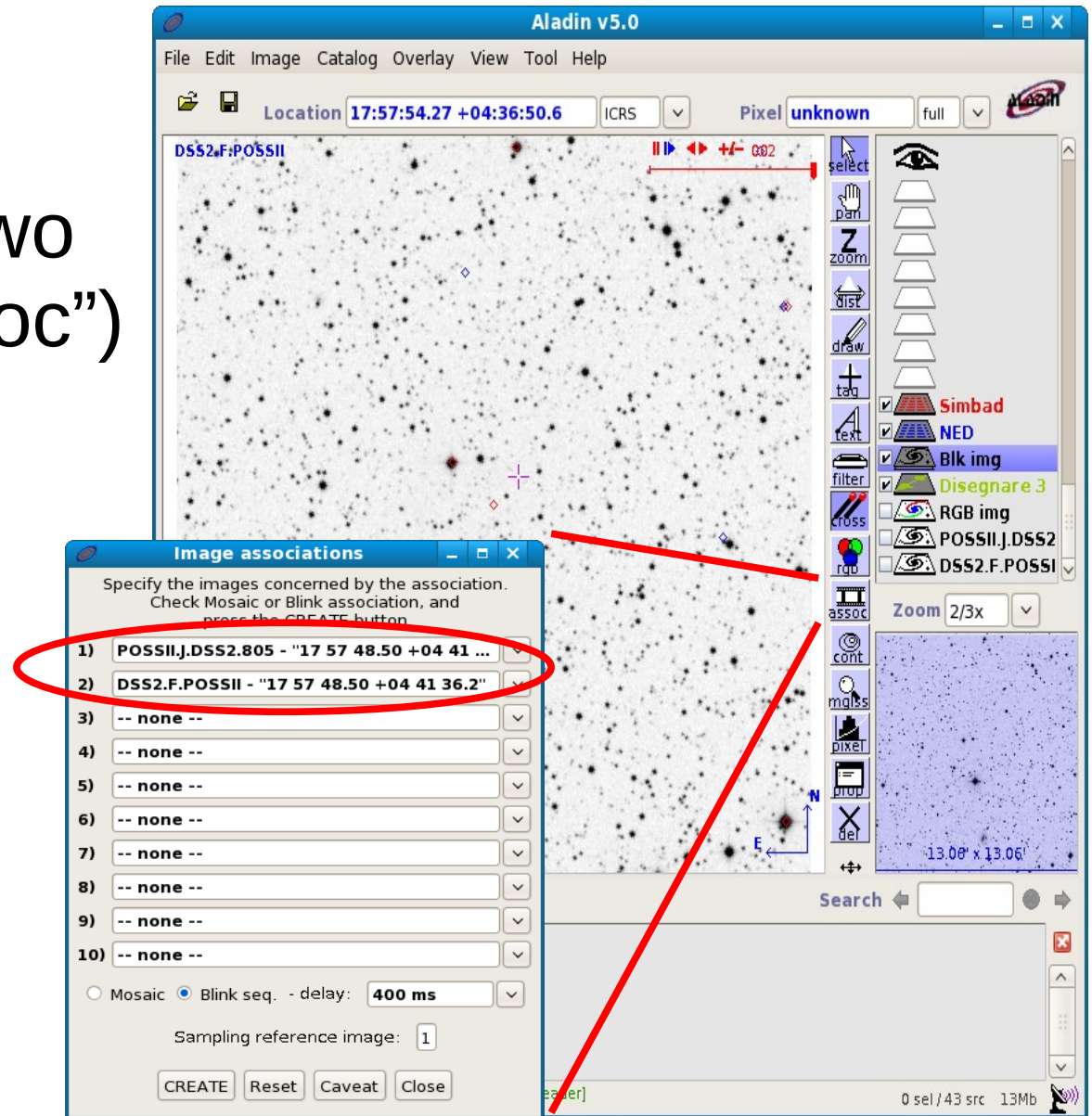


Select “POSS II J” and click “submit”

# View the shift

Create a blink sequence with the two images (button "assoc")

Note the shift of the Barnard's star between the two images



# Compute the proper motion

Create a composite image to evaluate the shift

Compute the time interval between the two images

Compute the proper motion (units of "/year)

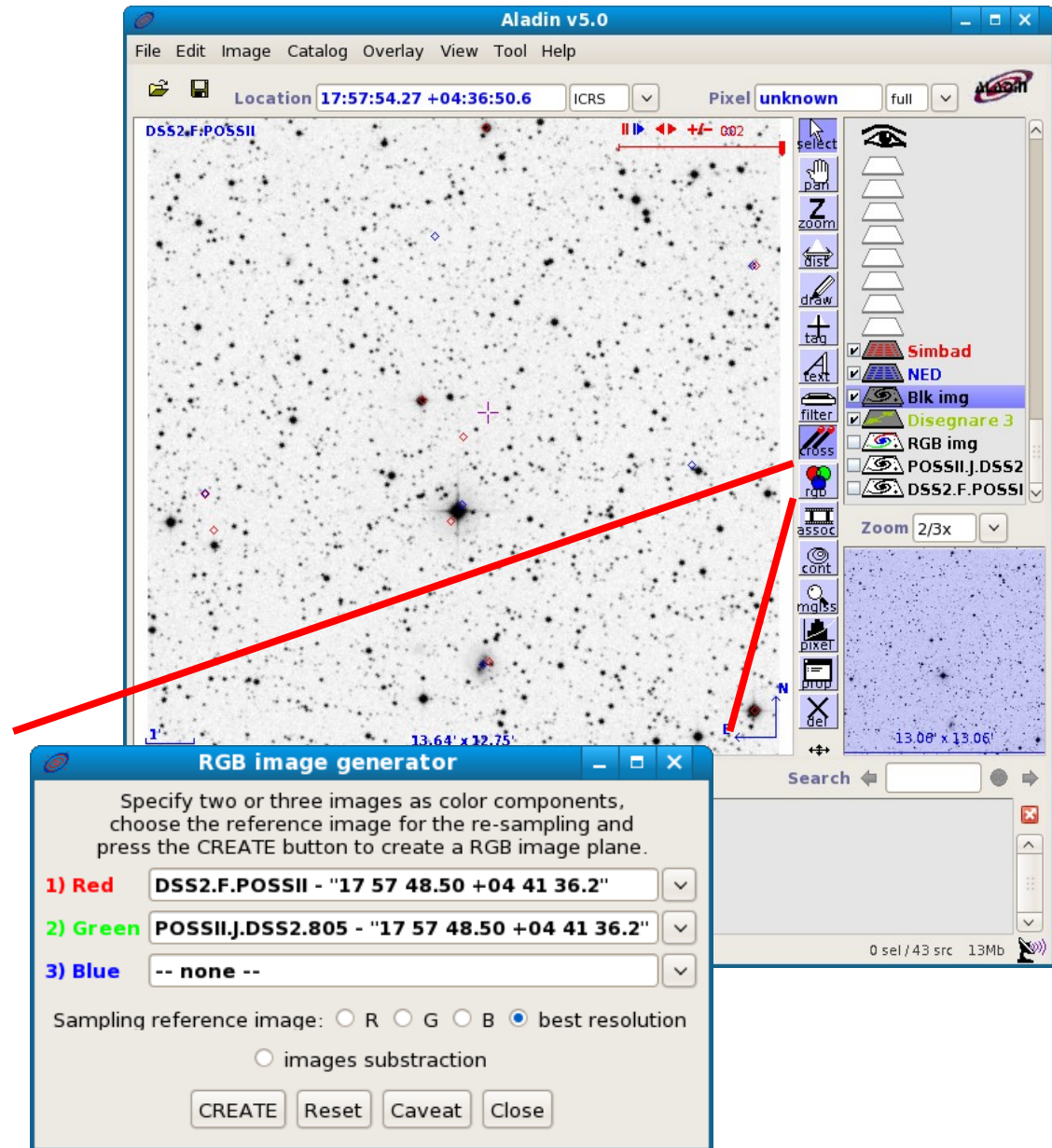
Compare the result with the Simbad one

# Create the composite image

Click the button  
“RGB”

Select the two  
images

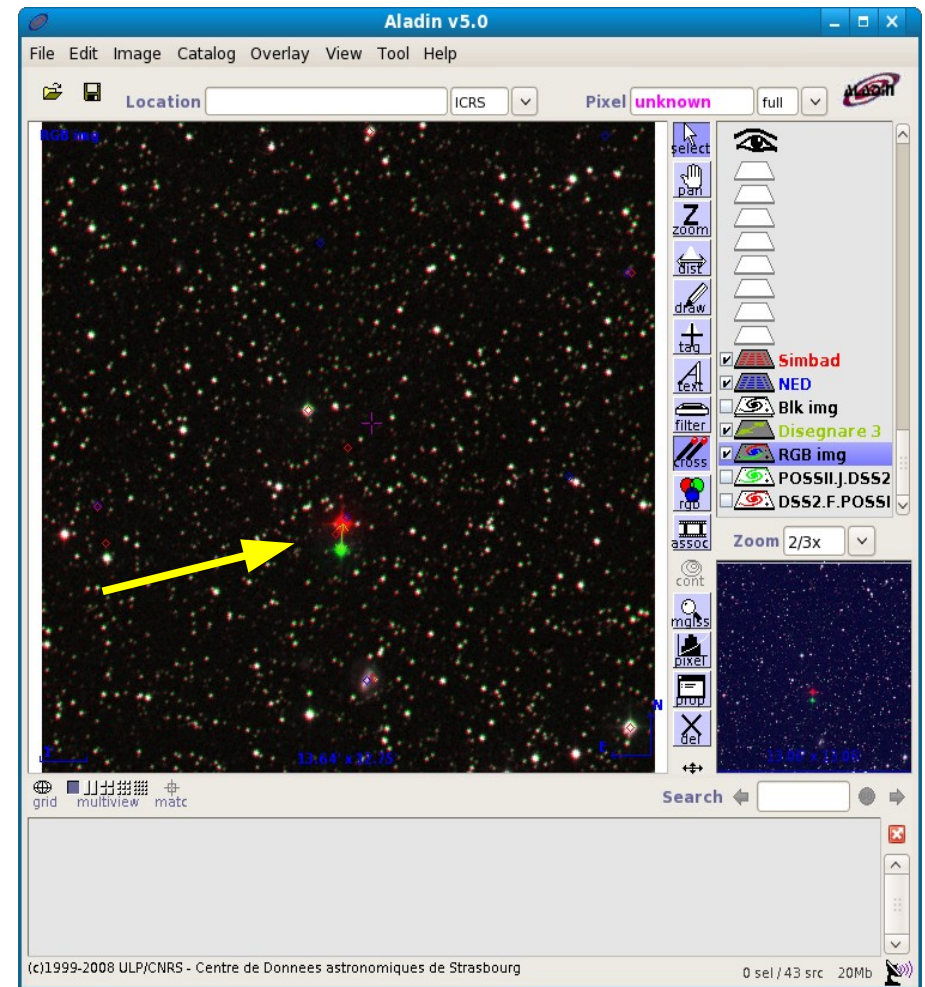
Click “CREATE”



# Create the composite image

The two different positions of the Barnard's star appear one in red and the other one in green

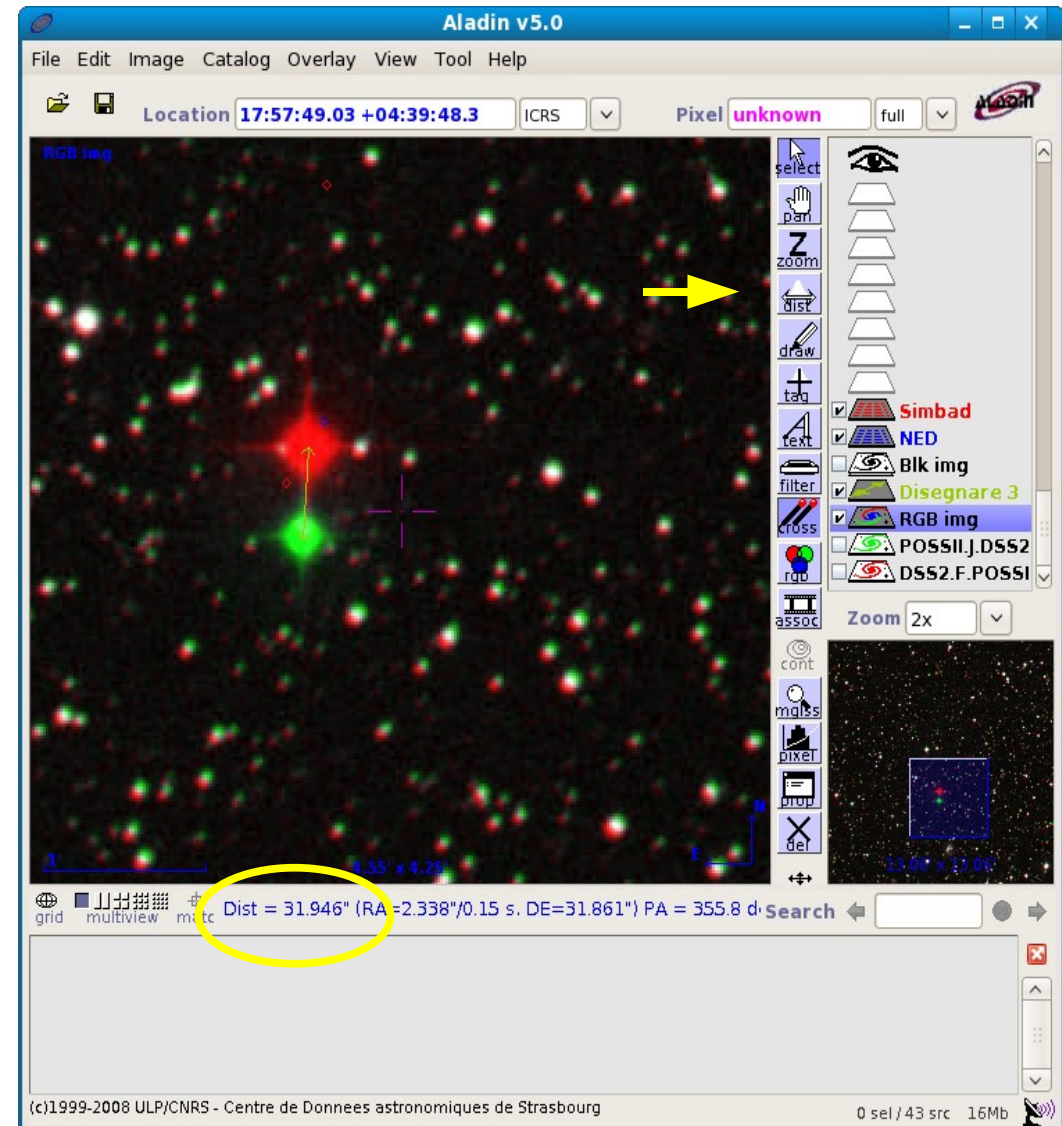
The other stars don't have an evident proper motion therefore they appear overlaid



# Evaluate the distance

Click “dist” and draw the distance vector between the two stars

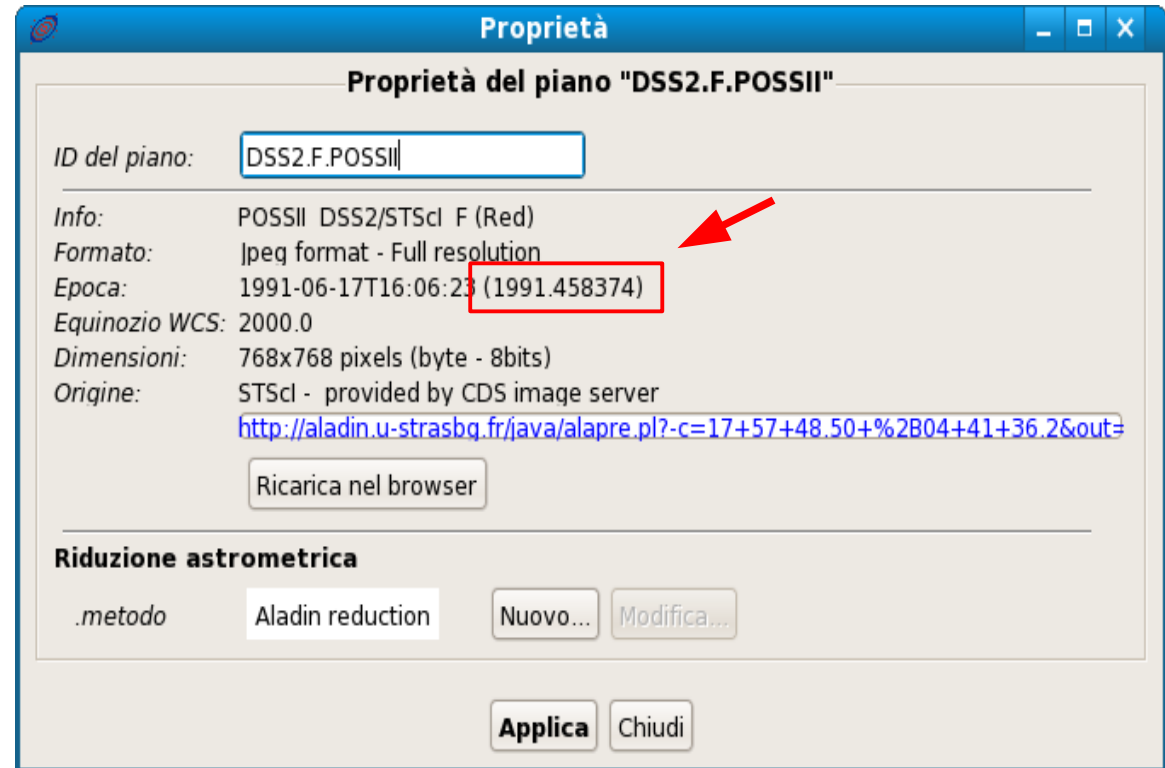
Look at the distance: 32”





# Evaluate the time interval

Right click on the plane of each image and open the image properties window



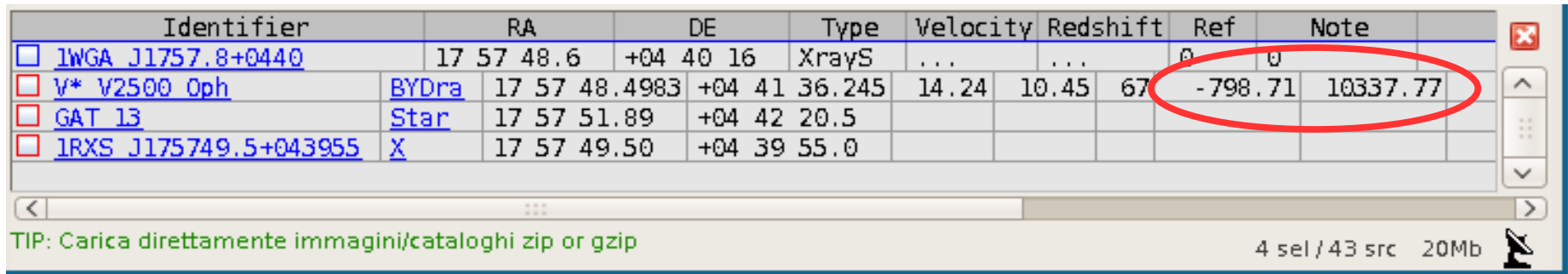
Compute the time interval (year):

$$1991.458374 - 1988.364502 = 3.093872 \text{ years}$$

# Compute the proper motion

The proper motion of the Barnard's star is given by:

$$\text{proper motion} = \frac{\text{distance}}{\text{time}} = \frac{32}{3.09} = 10.35''/\text{year}$$



Identifier	RA	DE	Type	Velocity	Redshift	Ref	Note
<input type="checkbox"/> <a href="#">IWGA J1757.8+0440</a>	17 57 48.6	+04 40 16	XrayS	...	...	0	0
<input type="checkbox"/> <a href="#">V* V2500 Oph</a>	<a href="#">BYDra</a> 17 57 48.4983	+04 41 36.245	14.24	10.45	67	-798.71	10337.77
<input type="checkbox"/> <a href="#">GAT 13</a>	<a href="#">Star</a> 17 57 51.89	+04 42 20.5					
<input type="checkbox"/> <a href="#">IRXS J175749.5+043955</a>	<a href="#">X</a> 17 57 49.50	+04 39 55.0					

TIP: Carica direttamente immagini/cataloghi zip or gzip

4 sel / 43 src 20Mb

In the Simbad database we have

$$\text{proper motion} = (0.798^2 + 10.337^2)^{1/2} = 10.36''/\text{year}$$

# Tangential velocity

Click on the name of the Barnard's star (V\* V2500 Oph) to open the Simbad web page

MAIN ID	OTYPE	RA	DEC	COO ...	COO ...	C...	PMRA	PMDEC
<input type="checkbox"/> <a href="#">1WGA J1757.8+0440</a>		17 57 48.6	+04 40 16	XrayS	...	...	0	0
<input type="checkbox"/> <a href="#">V* V2500 Oph</a>	<a href="#">BYDra</a>	17 57 48.4983	+04 41 36.245	14.24	10.45	67	-798.71	10337.77
<input type="checkbox"/> <a href="#">GAT 13</a>	<a href="#">Star</a>	17 57 51.89	+04 42 20.5					
<input type="checkbox"/> <a href="#">1RXS J175749.5+043955</a>	<a href="#">X</a>	17 57 49.50	+04 39 55.0					

The parallaxes is  $\pi = 0.549''$ ,  
from which  $r = 1/\pi = 1.82$  pc

The tangential velocity is  
 $v_t = \text{proper motion} \cdot r = 90$  km/s

## V\* V2500 Oph -- Variable of BY Dra type

Other object types: [EB\\*](#) ( ) , [BY\\*](#) ( ) , \* (AC2000,ASCC,ED,(Ci,G,LFT,LHS,LSPH,LTP,NLTP) , [V\\*](#) (

ICRS coord. (ep=2000 eq=2000): 17 57 48.4983 +04 41 36.245 ( ~Unkn

FK5 coord. (ep=2000 eq=2000): 17 57 48.498 +04 41 36.25 ( ~Unkn

FK4 coord. (ep=1950 eq=1950): 17 55 22.71 +04 33 14.1 ( ~Unkn

Gal coord. (ep=2000 eq=2000): 031.0087 +14.0627 ( ~Unkn ) [ 14

Proper motions *mas/yr* [error ellipse]: -798.71 10337.77 A [1.66 1.22 67] ;

Radial velocity / Redshift / cz: km/s -106.8 [-] / z -0.000356 [-] ,

Parallaxes *mas*: 549.30 [1.58] A [1997A&A...323L..49J](#)

Spectral type: M4Ve (C) ~

Fluxes (7):

B 11.28 [-] c ~

V 9.54 [-] c ~

R 8.7 [-] E [2003AJ....125..984M](#)

I 7.9 [-] E [2003AJ....125..984M](#)

J 5.24 [-] c [2003yCat.2246....0C](#)

H 4.83 [-] c [2003yCat.2246....0C](#)

K 4.52 [-] c [2003yCat.2246....0C](#)