This program allow you to measure as easy as possible Af[rho] (1) quantity. You can retrive this program at URL cara.uai.it in tools page of this site.

Requirements are :

- * PC 100% compatible.
- * CPU 486 DX minimum.
- * Memory 8 Mbytes minimum.
- * 5 Mbytes of free hard disk space.
- * Operating system : Windows 9X/ME/XP(tm).
- * Mouse or equivalent pointing device.

The pakage is distribuited as zip file. You can un-zip it in a temporary folder and run setup program. In the folder where you have installed the program you will find four files :

- * Wafrho1.exe : The program
- * License.txt : License (disclaimer agreement -sigh!-)
- * Readme.txt : Some notes on the last version.
- * Soft00Cmt.txt :The sample of MPC comet's orbital data file.

You must check that your system have in a path a folder named "WINDOWS". If you have not it please make it! If you open Wafrho1.exe you must see on your monitor the "main panel" window :

Option OrbitalElements LocalCatalog NetRequest Vie Dervation datas	WSelected ?	
CARA code TRB[1]	Star's catalog code Seconds of exposure ADU count	V-Magnitude (Johnson) 0 Color index B-V 9 Magnitude error 9
Resolution X/Y arcsec/pixel 2.20 2.20	Compute color index DWARFS	Compute color index GIANTS
Annotations Url/@mail themar@tin.it Photometric Band - (only allowed values)	(V-R) - Calculated [V-I) - Calculated [V-S) - Calculated [V-S] - CAlcu	B-Magnitude (Johnson) 0 R-Magnitude (Cousins) 0 I -Magnitude (Cousins) 0 S -Magnitude 0
Comet	Phase Earth distance (AU) Sun Distance (AU)	RA DEC
windows size ! ADU count 1-2-3	Sec_Sec	conds exposure f comet frame
	Press for AF(RHO) COMPUTE	
a na sana ang ang ang ang ang ang ang ang ang	i an	to the second

Pic.1 The main panel window.

Your very first operation is to define in the program your **Observatory Card**. You can do it clicking the **option** menu. Please take agreements with CARA data base administrator (his mail indexes are at URL cara.uai.it) for your observatory code. The usual form is XXX[n].

File Option rbitalElements LocalC OberVation datas CARA observatory code TRB[1] CARA code TRB[1 Date /Time (GG/MM/AAAA) 27/11 Resolution X/Y arcsec/pixel 220 Annotations Longitude site 09:29:14.51 E Uit/@mail Ihemar@tin.it Photometric Band - (only allowed value Sc Values of comet Pixel win windows size! Photometric Band - (only allowed value Exception Values of comet Pixel win windows size! Pixel Soria automatic Pixel win windows size! </th <th>🚾 Wafrho1 v1.53 Wha</th> <th>fro1_v1.53 - Set Default</th> <th></th> <th></th>	🚾 Wafrho1 v1.53 Wha	fro1_v1.53 - Set Default		
OberVation datas CARA Observatory code TRB[1] CARA code IRB[1 Date /Time (GG/MM/AAAA) 27711 Resolution X/Y arcsec/pixel 220 Annotations Latitude site 99:29:14:51 E Uh/Qmail themar@tin.it Photometric B and - (only allowed value Focal lenght (mm) 280 Values of comet Diserver's name C:\Programm\SAD\Wafrho1\Soft00 Photometric B and - (only allowed value Focal lenght (mm) 1800 Press for automatic Pixel Scale X arcsec/pixel 220 Diserver's Qmail Ihemar@tin.it Press for automatic Pixel wine C:\Programm\SAD\Wafrho1\Soft00 Mill. Lens of comet Comet data file Browse C:\Programm\SAD\Wafrho1\Soft00 URL for orbital datas http://cfa-wwww.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt ito an existent file	File Option OrbitalElements LocalCa			
CARA code TRB(1) (Facility-Site)'s name Stazione Astronomica Descartes Date /Time (GG/MM/AAAA) 27/11 Latituide site 45:09:06:21 N Date /Time (GG/MM/AAAA) 27/11 Latituide site 09:29:14:51 E Annotations Latituide site 09:29:14:51 E color index GIANTS Annotations Latituide site 28 msl color index GIANTS Utl/Qmail Ithemar@tin.it Telescope SC (Cousins) 0 Photometric Band - (only allowed valu Focal lenght (mm) 1800 (Cousins) 0 (Cousins) 0 Values of comet Pixel Scale X arcsec/pixel 2.20 Diserver's @mail Ihemar@tin.it DEC RA DEC Dec <td< th=""><th>Obervation datas</th><th>CARA Observatory code</th><th>TRB[1]</th><th></th></td<>	Obervation datas	CARA Observatory code	TRB[1]	
Date /Time (GG/MM/AAAA) 27/11 Observer's name Trabatil Roberto Resolution X/Y arcsec/pixel 220 Longitude site 09:29:14:51 E polor index GIANTS Annotations Altitude site 28 msl (Johnson) 0 Utr/@mail Theseope SC (Johnson) 0 Photometric Band - (only allowed value Focal lenght (mm) 1800 (Cousins) 0 Values of comet Pixel Scale X arcsec/pixel 2.20 RA Dec RA DEC Press for automatic Pixel win ADU cc ADU cc C:\Programmi\SAD\Wafrho1\Soft00 RA DEC DEC Image: C:\Programmi\SAD\Wafrho1\Soft00Cmt.txt Press for save data as Save Default Option and EXIT it o an existent file it o an existent file it o an existent file	CARA code TRB[1	(Facility-Site)'s name	Stazione Astronomica Descartes	(Johnson)
Date /Time (GG/MM/AAAA) 27/11 Latituide site 45:09:06:21 N Tor Resolution X/Y arcsec/pixel 22:0 Longitude site 09:29:14:51 E bolor index GIANTS Annotations		Observer's name	Trabatti Roberto	-V
Resolution X/Y arcsec/pixel 2.20 Longitude site 09:29:14.51 E polor index GIANTS Annotations Ititude site 28 msl (Johnson) 0 Url/@mail Ihemar@tin.it Telescope SC (Johnson) 0 Photometric Band - (only allowed value Focal lenght (mm) 1800 0 (Cousins) 0 Values of comet Focal lenght (mm) 1800 0 0 0 Comet Pixel Scale X arcsec/pixel 2.20 RA DEC 0 Press for automatic Pixel win windows size ! ADU cc Comet data file Browse C:\Programmi\SAD\Wafrho1\Soft00 Image: C:\Programmi\SAD\Wafrho1\Soft00 URL for orbital datas Image: Save Default Option and EXIT ato an existent file ato an existent file	Date /Time (GG/MM/AAAA) 27/11	Latituide site	45:09:06.21 N	ror
Annotations Altitude site 28 msl Utl/@mail Utl/@mail Utl/@mail Utl/@mail Utl/@mail Telescope SC Utl/@ulowed value Photometric B and - (only allowed value Diameter (mm) 280 (Cousins) 0 Values of comet Diameter (mm) 1800 (Cousins) 0 Comet Discret Y arcsec/pixel 2.20 RA DEC RA Press for automatic Pixel win Ablu oc C:\Programmi\SAD\Wafrho1\Soft00 RA DEC DEC UPL for orbital datas UPL for orbital datas Intp://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt Intp://cfa-www.harvard.edu/iau/Ephemerides/Soft00Cmt.txt a to an existent file	Resolution X/Y arcsec/pixel 2.20	Longitude site	09:29:14.51 E	color index GIANTS
Utl/@mail themar@tin.it Telescope SC [Johnson] Utl/@mail Photometric Band - (only allowed vak Telescope SC [Cousins] [Cou	Annotations	Altitude site	28 msl	
Photometric Band - (only allowed value Diameter (mm) 280 (Codums)	Url/@mail themar@tin.it	Telescope	sc	(Johnson) U
Photometric Band - (only allowed Valuer Focal lenght (mm) 1800 Values of comet CCD Sensor kaf 401e Pixel Scale X arcsec/pixel 2.20 Pixel Scale Y arcsec/pixel 2.20 Pixel Scale Y arcsec/pixel 2.20 Dbserver's @mail themar@tin.it Comet Observer's @mail Dbserver's @mail C:\Programmi\SAD\Wafrho1\Soft00 Tyco 2 path Browse. C:\Documents and Settings\roberto URL for orbital datas http://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt a to an existent file	Distance in David Carls - Hannel and	Diameter (mm)	280	(Cousins)
Values of comet CCD Sensor kaf 401 e Comet Pixel Scale X arcsec/pixel 2.20 Pixel Scale Y arcsec/pixel 2.20 Observer's @mail themar@tin.it Comet Dobserver's @mail Observer's @mail C:\Programmi\SAD\Wafrho1\Soft00 Tyco 2 path Browse. Dtl co Tyco 2 path URL for orbital datas Inter://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt Save Default Option and EXIT a to an existent file	Photometric Band - (only allowed Valu	Focal lenght (mm)	1800	
Pixel Scale X arcsec/pixel 2.20 Comet Pixel Scale X arcsec/pixel 2.20 Pixel Scale Y arcsec/pixel 2.20 Observer's @mail Ithemar@tin.it Observer's @mail C:\Programmi\SAD\Wafrho1\Soft00 Tyco 2 path Browse. URL for orbital datas http://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt Save Default Option and EXIT	-Values of comet-	CCD Sensor	kaf 401e	
Comet Pixel Scale Y arcsec/pixel 2.20 Press for automatic windows size ! Pixel win ADU cc DEC Comet data file Browse. C:\Programmi\SAD\Wafrho1\Soft00 Tyco 2 path Browse. C:\Documents and Settings\roberto URL for orbital datas Inter://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt Press for save data as Save Default Option and EXIT	values of comet	Pixel Scale X arcsec/pixel	2.20	RA
Press for automatic windows size ! Pixel win ADU cc Dbserver's @mail themar@tin.it Comet data file Browse. Discreter's @mail C:\Programmi\SAD\Wafrho1\Soft00 Tyco 2 path Browse. Durce URL for orbital datas Image: http://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt Save Default Option and EXIT	Comet	Pixel Scale Y arcsec/pixel	2.20	
Press for automate ADU cc ADU cc Comet data file Browse. Tyco 2 path Browse. C:\Programm\\SAD\\Wafrho1\Soft00 URL for orbital datas URL for orbital datas Image: Comet data as Press for save data as Save Default Option and EXIT Ito an existent file	Press (as automatical Pixel win	Observer's @mail	themar@tin.it	
Tyco 2 path Browse. C:\Documents and Settings\roberto URL for orbital datas URL for orbital datas http://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt Image: Cometal data at	windows size ! ADU cc	Comet data file Browse.	C:\Programmi\SAD\Wafrho1\Soft00	
URL for orbital datas URL for orbital datas Inttp://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt Inttp://cfa-www.harvard.edu/iau/Ephemerides/Comets/S		Tyco 2 path Browse	C:\Documents and Settings\roberto	
Image: http://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt Press for save data as Save Default Option and EXIT to an existent file		URL for orbital datas		
Press for save data as Save Default Option and EXIT to an existent file		http://cfa-www.harvard.edu/iar	u/Ephemerides/Comets/Soft00Cmt.txt	
	Press for save data as	Save Defa	ult Option and EXIT	a to an existent file

Pic.2 The default values window.

Mandatary input data are :

- * Observatory code.
- * The arcsec pixel scale X/Y of your telescope/CCD system.
- * The folder where the program can find the comet's orbital data file and its name.

Without these data the program don't run. When you save the input data the program returns to the main panel. You can see that some input fields of main panel take data from default values. You can change it in main panel, but you can always restore the default values with the item <u>refresh defaults</u> of **option menu**. If you need, you can see the default values in the file Wafrho15.ini at WINDOWS folder. Please do not edit it! At least you can delete it and remade it with the program itself.

Now you are ready to perform your measuraments. Set the correct date and time of observation. Choose among the comets shown in the combo box. The program automatically computes the position of comet in the sky, phase angle and its Earth distance and Sun distance.

🔤 Wafrho1 v1.53		
File Option OrbitalElements LocalCatalog NetRequest View	vSelected ?	
Cobervation datas	Values of reference star frame	
CARA code TRB[1] Date /Time (GG/MM/AAAA) 27/11/2004 15.50.25 Resolution X/Y arcsec/pixel 2.20 2.20 Annotations Url/@mail themar@tin.it Photometric Band - (only allowed values)	Star's catalog code Seconds of exposure ADU count Compute color index DWARFS (V-R) - Calculated (V-I) - Calculated (V-S) - Calculated	V-Magnitude (Johnson) 0 Color index B-V Magnitude error Compute color index GIANTS B-Magnitude (Johnson) 0 R-Magnitude (Cousins) 0 I -Magnitude (Cousins) 0 S - Magnitude (Cousins) 0
Values of comet Comet C/2004 Q2 (MACHHOLZ) ▼ C/2004 G1 (LINEAR) ▲ Press for P/2004 H2 (LARSEN) Windo P/2004 H2 (LARSEN) C/2004 H3 (LINEAR) ↓ P/2004 H3 (LARSEN) ↓ C/2004 H3 (LINEAR) ↓ P/2004 H2 (LARSEN) ↓ C/2004 K1 (CATALINA) ↓ P/2004 K2 (MCNAUGHT) ↓ C/2004 L1 (LINEAR) ↓ C/2004 L2 (LINEAR) ↓	Phase 30.45 Earth distance (AU) 0.6 Sun Distance (AU) 1.5 Sun Distance (AU) 1.5 Sector Press for AF(RHO) COMPUTE	56501 RA 04:58:44.74 50046 DEC -28:03:55.23 comet frame
C/2004 Q1 [NEA1] C/2004 Q1 [TUCKER] C/2004 Q2 [MACHHOLZ] P/2004 R1 [MCNAUGHT] C/2004 R2 [ASAS] P/2004 R3 [LINEAR-NEAT] C/2004 RG113 [LINEAR]	Press for	append to data to an existent file

Pic.3 Choose the comet from combo box.

Now you must select the filter band (2)(3) of your observation. The next step will be the reference stars(4) measurament. You have several mode to choose reference star values (at least if you know them you can simply input them manually!).

The program allow you to choose stars from Tycho-2 (5) catalog, if you have one. The catalog's folder is declared in default option menù. In **Catalog menu** you can open a window where the program look at stars around comet's position.

afrho v1.53 - View Tyo	:ho-2 catalog	(local)					_ 🗆 ×
R/ Scan position from :	04:58:44.7	4 Area (de	grees 1-3): 1	🗖 Only	HIPPA	RCOS star
DEC	-28:03:55.2	3		SC	CAN		
Tycho Hipparc	Ra	Dec	V mag	B-V	M error	Sp	•
6472 00030 1 000000 6472 00053 1 000000	04:55:24.70 04:57:09.24	-27:55:17.04 -27:31:36:58	11.759 11 541	+1.2240 +0.9140	+0.1390 +0.1050	К5 К2	
6472 00062 1 000000 6472 00065 1 000000	04:54:55.15	-28:01:05.95	12.085	+1.0000	+0.1770	K2	
6472 00066 1 000000 6472 00070 1 000000	04:56:59.15	-27:59:53.93	09.590	+0.6270	+0.0000	G5	
6472 00097 1 000000 6472 00104 1 000000	04:57:32.73	-27:40:04.88	10.153	+0.7750	+0.1510	68 K2	
6472 00108 1 000000 6472 00110 1 000000	04:55:34.48 04:57:26.38	-28:04:49.19 -27:57:18.14	11.442 11.051	+0.5030 +1.5440	+0.0900 +0.0709	F7 **	
6472 00157 1 022912 6472 00194 1 000000	04:55:49.96 04:55:41.45	-27:42:16.50 -27:48:15.87	08.456 10.464	+1.4780 +0.6360	+0.0130	** G2	
6472 00250 1 000000 6472 00251 1 000000 6472 00271 1 000000	04:55:48.75 04:55:00.03 04:57:15.29	-28:04:05.15 -27:50:45.83 -27:44:19.61	10.046 10.510 10.315	+1.2580 +0.2660 +0.8950	+0.0300 +0.0410 +0.0340	K5 A9 K1	
6472 00283 1 000000 6472 00287 1 000000	04:56:29.41 04:55:38.34	-28:06:01.96	11.744 10.694	+1.5070 +0.7770	+0.1390 +0.0509	** G8	
6472 00297 1 000000 6472 00336 1 000000 6472 00338 1 000000	04:55:26.99 05:00:56.97 04:59:41.18	-28:03:24.37 -28:01:31.11 -28:01:21.60	11.330 12.323 10.979	+1.1250 +0.2540 +0.9190	+0.0910 +0.1800 +0.0680	K2 A9 K2	-
Double click on list for U	PDATE main p	anel and EXIT					
Catalog file ready !							
Append selected Sta	rs to CheckList] 0	bject in cł	neck list: 00)4		EXIT

Pic.4 Tycho-2 (5) search catalog window.

You can search stars in a area from one to three degrees around comet position. You can check and search only Hipparcos (6) stars if you are lucky and have some of them in your field of view. You can select several stars and add them to a check list in memory or, with double click, choose one for measuraments.

An others options are offer to you, but only if you have a open connection with internet! In the **NetRequest** menu you can choose the item <u>Vizier/Simbad star search</u> to find reference star data from Simbad (7) server, if you know the code of the star.

Vizier server	Simbad server	Hippan 2281	cos code Ask		ycho code	Ask
vizier.u-strasbg.fr) V mag.	B-V	error	spectral	type/description	
A 00 29 09.988 DEC	+00 02 26.61 8.86	1.122	0.032	K2	Star	
states in advantage de state.	ad.u-strasba.fr answer :	Ok Found da	ita!			
vizier.u-strdsbg.tr simb						

Pic.5 Vizier/Simbad search.

Elsewhere with the item <u>Vizier/Hipparcos list</u> you can open a window where through Vizier (8) server you have access to Hipparcos (6) catalog with the same options showed in "local catalog". You can also change the center of scan area to find more reference stars.

Wafrl	afrho1 v1.53 Vizier list of Hipparcos stars from coordinates								
<u></u>	<u>ا</u>	Scan pos	ition from :		Vizier	server	vizier vizier	.u-strasbg.fr .u-strasbg.fr	•
RA	A 04	58 45.08 D	EC -28 04 0	.38	Area (degre	ees 1-3):	vizier	.cfa.harvard.edu .hia.nrc.ca	
	ipparc 23243 23176 23133 22912 23125 22907 23127 23236 23552 23559 23559 23559 22821 23534 22821 23534 22619 23232 22815 23231		Dec -27:49:55.19 -28:26:24.00 -27:26:16.80 -27:42:14.40 -28:53:13.19 -27:03:50.39 -27:42:03.60 -26:54:18.00 -26:54:18.00 -28:29:42.00 -28:52:51.60 -27:39:2.39 -29:02:34.80 -28:58:08.40 -28:03:25.19 -29:34:33.60 -26:43:40.80 -26:43:40.80 -27:31:19.19	V mag 09.240 07.610 08.340 08.460 09.720 09.720 09.720 09.840 09.610 07.760 09.840 09.8500 10.220 09.460 10.170 09.830 08.550 0.08.510	B-V +0.6830 +0.2280 +1.4510 +1.6120 +0.9100 +0.5290 +0.6240 +1.1470 +0.7530 +0.8000 +1.4460 +0.7530 +0.8000 +0.5240 +1.1500 +1.2050 +0.4700	M error +0.0210 +0.0030 +0.0120 +0.0120 +0.0150 +0.0150 +0.0150 +0.0270 +0.0270 +0.0270 +0.0270 +0.0240 +0.0150 +0.04950 +0.04950 +0.0490 +0.0140 +0.0140 +0.0120	vizier Nc(1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Inia. Inic. coa Inia. Inic. coa G3/G5V G5IV A5V K2IICNIVpv K3/K4V K3V K3/K4V K3V K3/K4V K3/III G5/V/V G5/V/V G5/V/V K3/III K3/III K3/K5/V K3/III K3/III K3/III K3/III K3/III K3/III K3/III K3/III K3/K4V K3/K4V K3/K4V K3/K4V	
Double click on list for UPDATE main panel and EXIT Try :http://vizier.u-strasbg.fr/viz-bin/asu-acl?&-out.add=.&-oc=deg&-out.**=.&- source=I/239/hip_main&-mime=TSV&-out.form=TSV&-c.ra=04 58 45.08&-c.dec=-28 04 0.38&-c.rm.min=100&									
	Appen	id selected Sta	rs to CheckList		Object	in check	list: OC		EXIT

Pic.6 Vizier Hipparcos search.

If you have added stars to a check list you can wiew them with menu **ViewSelected** and item <u>ViewChecKList</u>. In this window you see your selected stars. You can save the list in a file for afterwards operation, restore a previous saved list, clear the present list.

afrho1 v1.53 Selec	t star from C	heckList				
Star code HIP 0000022907 HIP 00000022822 HIP 00000022821 TYC 6472 00030 1 TYC 6472 00070 1 TYC 6472 00070 1 HIP 00000022912 TYC 6472 00271 1	Ra 04:55:41.90 04:54:40.73 04:55:24.70 04:55:59.15 04:57:26.38 04:55:49.96 04:57:15.29	Dec -28:33:46.80 -28:52:51.60 -29:02:34.80 -27:55:17.04 -27:59:53.93 -27:57:18.14 -27:42:16.50 -27:44:19.61	V mag 08.130 07.760 10.220 11.759 09.590 11.051 08.456 10.315	B-√ +1.0720 +1.1470 +0.7530 +1.2240 +0.7380 +1.5440 +1.4780 +0.8950	M error +0.0100 +0.0110 +0.0150 +0.1390 +0.0210 +0.0709 +0.0130 +0.0340	Spectral class K3/K4V K0/K1III G5IV/V K5 G5 ** ** K1
Double click on list fo	r UPDATE main	n panel and EXI checklist on file	T RE	STORE check	list from file	EXIT

Pic.7 Check list window.

With double click you can choose a star for measuraments. In main panel at reference star section are carried the values of V-magnitude, B-V index color values, the name and the spectral class of reference star. You must only add the time of exposure of your reference star's CCD frame and its ADU (9) values . Now you have two button for reduction of index color , one for dwarfs, one for giant star. The program reports the results of reduction (10)(11) in main panel.

Now you can input the values of the comet. In apposite section of main panel, with the button named "automatic window size" the program suggests you the size of measuraments windows in pixel (the program compute square windows of 100.000, 50.000, 25,000 km of side). You can changed these values but the program allow a window of 100.000 km maximum . Under the windows size values you must input ADU (9) values calculated on comet's CCD frame and the time of exposure in seconds. Now you can try the Af[rho] (1) calculation. If all input data are OK you will see in the lower frame of main panel the ouput data computed by program.

Dervation datas			r frame	
CARA code Date /Time (GG/MM/AA/	TRB[1]	Star's catalog code Seconds of exposure ADU count	TYC 60 255000	V-Magnitude (Johnson) 10.464 Color index B-V +0.6360 Magnitude error +0.0400
Resolution X/T arcsec/pi	xei j2.20 j2.20	Compute color	index DWARFS	Compute color index GIANTS
Annotations TYC 6472 Url/@mail themar@tir Photometric Band - (only	001941 G2 n.it allowed values) III	(V-R) - Calculated (V-I) - Calculated (V-S) - Calculated	0.35267 0.69653 0.57401	B-Magnitude (Johnson) 11.10 R-Magnitude (Cousins) 10.11 I -Magnitude (Cousins) 9.77 S -Magnitude 9.83
Values of comet	MACHHOLZ) R Ru	Phase 30.45 Eart Sun	h distance (AU) 🛛	.66501 RA 04:58:44.74 .50046 DEC -28:03:55.23
	-		100 A 10 A 10	1992 999 1997 († 1997 - 1992 999 999 999 999 999 999 999 999 99
Press for automatic windows size !	Pixel window 1-2-3 V ADU count 1-2-3 Vu	42 21 567890 254678	Se }	conds exposure of comet frame
Press for automatic windows size !	Pixel window 1-2-3 V ADU count 1-2-3 Vu	42 21 567890 254678 Press for AF(RH0) COMPUTE	Se c	conds exposure of comet frame
Press for automatic windows size !	Pixel window 1-2-3 ADU count 1-2-3	42 21 567890 254678 Press for AF(RHO) COMPUTE 001219 00049 TYC TRB[1] the	Se c :mar@tin.it	conds exposure 60 of comet frame 60 TYC 6472 00194 1 G2
Press for automatic windows size ! CK04Q020 20041127.66 0 CK04Q020 20041127.66 0	Pixel window 1-2-3 ADU count 1-2-3 0.665 1.500 30.45 \$ 8.123 049534 00 0.665 1.500 30.45 \$ 9.021 025065 00	42 21 567890 254676 Press for AF(RH0) COMPUTE 001219 00049 TYC TRB[1] the 001053 00042 TYC TRBI11 the	smar@tin.it	Conds exposure of comet frame 60 TYC 6472 00194 1 G2 TYC 6472 00194 1 G2
Press for automatic windows size ! CK04Q020 20041127.66 0 CK04Q020 20041127.66 0 CK04Q020 20041127.66 0	Pixel window 1-2-3 ADU count 1-2-3 0.665 1.500 30.45 \$ 8.123 049534 00 0.665 1.500 30.45 \$ 9.021 025065 00 0.665 1.500 30.45 \$ 9.891 012533 00	42 21 567890 254678 Press for AF(RH0) COMPUTE 001219 00049 TYC TRB[1] the 001053 00042 TYC TRB[1] the 000945 00038 TYC TRBI11 the	semar@tin.it emar@tin.it emar@tin.it emar@tin.it	Conds exposure of comet frame 60 TYC 6472 00194 1 G2 TYC 6472 00194 1 G2 TYC 6472 00194 1 G2

Pic.8 Af[rho] values computed.

You can save them in an new file or append them to an esistent file. This file is formatted with CARA data base specification.

Other options that program offer you is the computation of comet's ephemeris and the specification of comet's orbital parameter. You can access it at **OrbitalElements** menu.

🔤 Wafrho1 v1.53	
File Option OrbitalEler	ments LocalCatalog NetRequest ViewSelected ?
Obervation Orbit da	-Values of reference star frame-
CARA cod	CARA Star's catalog code 17 Microwitedo (Johnson)
Date /Time (GG/	frho1 v.1.53 - Ephemeris generator
Resolution X/Y a	C/2004 Q2 (Machholz) from date: 2//11/2004 step (days): 4 items: 11 COMPUTE
Annotations	Orbital Elements :
Uri/@mail June	Elements are calculated for the current standard epoch
Photometric Band	C/2004 Q2 (Machholz) Epoch 2005/1/30.00 TT = JDT 2453400.5
-Values of comet-	T 2005/1/24.91 TT
	q 1.205088 Equinox(2000) ecc: 0.999502 Peri: 19.5023 Node: 93.6269 Incl :38.5891
Comet [L72	
Press for auto	Date TT BA (2000) Decl Delta r Flong Phase M1
windows si	2004/11/27 04:59:31.41 -28:15:25.01 0.6734 1.5063 129.30 30.45 6.42
	2004/12/01 04:54:26.83 -26:54:47.54 0.6232 1.4715 130.90 30.42 6.15 2004/12/05 04:49:30.45 -25:04:30 30 0.5750 1.4391 132.55 30.31 5.99
	2004/12/09 04:41:43.77 -22:37:22.88 0.5293 1.4062 134.22 30.12 5.60
	2004/12/13 04:34:10.52 -19:26:14.85 0.4867 1.3761 135.84 29.89 5.32
	2004/12/17 04:25:56.77 -15:22:49.99 0.4479 1.3478 137.27 29.69 5.05 2004/12/21 04:17:10.14 -10:19:50.18 0.4138 1.3216 1.38.27 29.69 4.80
	2004/12/25 04:07:59.13 -04:12:50.16 0.3856 1.2976 138.48 30.15 4.56
P	2004/12/29 03:58:32.93 +02:56:28.57 0.3644 1.2760 137.53 31.35 4.37
	2005/01/06 03:39:35.86 +19:26:38.95 0.3472 1.2408 131.46 36.43 4.14
	Generated by Waf[rho]1 @ http://cara.uai.it
	SAVE as text file

Pic.9 Ephemeris generator.

In this window you can set the start date, the number of item to compute (max 99) and the step in days between items (max 15). You can save the computation of ephemeris in a text file.

Wafrho1 v1.53		X
File Option OrbitalElements LocalCatalog NetRer	Vafrho1 v1.53 - Edit orbital elements	
Date /Time (GG/MM/AAAA) 27/11/2004 115 Resolution X/Y arcsec/pixel 2.20 2.20 Annotations	MPC Code (Periodic) / Code (Unumbered) : Extended name Perihelium date ''T'' AAAA/MM/GG.Gi Main anomaly Epoch AAAA/MM/GG:	CK04Q020 C/2004 Q2 (Machholz) GGG: 2005/01/24.9146 2005/01/30
Url/@mail [themar@tm.it Photometric Band - (only allowed values)	Radius at perihelium q 1.205088	Eccentricity e 0.999502
Comet C/2004 Q2 (MACHHOLZ) Press for automatic Pixel window 1-2-3	Longitude asc. node	Magnitude coeff. 9 05.5
ADU count 1-2-3	EXIT UPDATE data ADD as new SAVE as file	Magnitude coeff. k 04.0
Press for save data as new file		Press for append to data to an existent file

Pic.10 Orbit data editor.

In this window you can edit and change the comet's orbital data. You can update esistent data or add a new comet's orbital data in program memory. You can save it as a new orbital data file formatted with MPC specification.

You can also access to orbital data file through internet choosing item "Get MPC comet data file" of "NetRequest" menu.

33	Wafrl	101 v1.53			- IX
File	Option	OrbitalElen	ients LocalCatalog NetRequest ViewSelected ?		
_ ОБе	ervatic	Wafrho1 v1	53 - Retrive orbital data		
		Wannol VI			
	ARA c				
D.	-L- JT:	1	http://cfa-www.harvard.edu/iau/Ephemerides/Comets/Soft00Cmt.txt	CONNECT	
Da	ate 711	00000			
Re	esoluti	10009P	2005 07 5.3214 1.506065 0.517580 178.8407 68.9434 10.5294 20050130 5.510.0 9P71empel 2005 02 15 0384 1 426861 0 535387 195 5585 117 8488 12 0177 20050130 5.010.0 10P/Tempel	-	
٨٣	onotati	0021P	2005 07 2.7793 1.037926 0.705662 172.5453 195.4302 31.8108 20050130 9.0 6.0 21P/Giacobini-Z	inner	
	LO	0028P	2002 12 27.3067 1.551634 0.775383 346.9398 346.9861 14.1916 20050130 8.5 6.0 28P/Neujmin	an Manha	
	n/@m	0025F	2004 07 7.3344 3.723424 0.044073 46.7037 312.7067 3.3311 20050130 4.0 4.0 23F73Criwassilar 2002 12 24.1962 1.879021 0.501509 13.2941 119.7604 8.1292 20050130 9.5 6.0 30P/Reinmuth	in-wachi	
Pł	notome	0031P	2002 01 18.0212 3.412325 0.193330 18.4350 114.2004 4.5496 20050130 5.0 8.0 31P/Schwassma	nn-Wach	
		0036P	2005.04 1.3335 1.833019 0.569268 45.8238 60.7949 12.9273 20050130 6.5 8.0 32P7/Jomas Sola 2003.07 6.4619 3.088434 0.258611 2021925 182.3960 .9.9334 20050130 .8.5 6.0 36PA//bioble		
-Val	ues of	0037P	2005 08 1.7130 1.572446 0.541514 329.2320 315.1109 8.9586 20050130 10.5 4.8 37P/Forbes		
		0039P	2002 12 20.9820 5.470144 0.243452 56.3189 331.5433 1.9433 20050130 5.0 6.0 39P/0terma		-
	Comet	0040P	2004 01 22,8973 1.796247 0.632913 47,2006 134,7334 11,5381 20050130 5.512.0 40P7Valsala 2004 07 15.9446 2.014800 0.585176 147,1575 150,3850 3.9856 20050130 13.0 6.0 42P/Neuimin		_
		0043P	2004 03 17.9421 1.578525 0.544920 187.3363 254.6489 18.5237 20050130 8.0 6.0 43P/Wolf-Harrin	ngton	
	Pre	0047P	2009.01.15.7168 2.672818 0.340639 357.8951 358.5620 13.5742 20050130 1.0.11.2 47P/Ashbrooks 2004.10.11.9473 2.309951 0.366560 207.6992 117.3277 13.6578 20050130 10.0.6.0 49P/Johnson	Jackson	
	Ŵ	0040F	2005 02 24.5569 1.368551 0.611599 330.7011 121.6484 18.3020 20050130 11.3 4.4 49P/Arend-Rig	aux	
		0053P	2003 10 9.4451 2.414873 0.552290 134.0833 149.0021 6.6100 20050130 7.7 4.8 53P/Van Biesbro	eck	
		0056P	2005 01 15.0207 2.535226 0.503867 44.0369 346.2714 8.1555 20050130 8.5 6.0 56751augnter-Bi	urnnam 🗾 🛛	
		•		•	
		0.00		EVIT 1	
		SAV	z as file	EXII	
		Press f	or save data as new file Press for append to data to a	n existent file	



In this window the program look at orbital data at the URL showed in input field. If it finds them, you can save them in a file formatted with MPC specification.

This project will be always a work in progress!!See CARA site at URL cara.uai.it for revisions and news.

References::

- (1) http://cara.uai.it/pages/afrho.html
- (2) http://cara.uai.it/pages/photom.html
- (3) http://cara.uai.it/pages/events.html
- (4) http://cara.uai.it/pages/before.html
- (5) http://cdsweb.u-strasbg.fr/viz-bin/Cat?I/259
- (6) http://cdsweb.u-strasbg.fr/viz-bin/Cat?I/239
- (7) http://simbad.u-strasbg.fr/sim-fid.pl
- (8) http://vizier.u-strasbg.fr/viz-bin/VizieR
- (9) http://cara.uai.it/pages/before.html
- (10)http://simbad.u-strasbg.fr/cgi-bin/cdsbib?1993SAAOC..15....1C
- (11)http://cara.uai.it/pages/papers.html