MACE 2004

C.A.R.A.

CURRENT STATUS OF THE PROJECT AND RESULTS ON RECENT COMETS

http://cara.uai.it

Giannantonio Milani

What is CARA

- The CARA (Cometary Archive for Amateur astronomers), introduced last year at MACE, is a numerical database of photometric data concerning comets obtained following a specific coordinated program.

- Photometric data are based on the Af[rho] quantity and at present concern dust continuum only, but we are testing specific filters for the study of gas component too

- The development and the management of this data base is the current main target of CARA.This project is (and probably always will be) *work in progress*. Who will contribute to it will be welcomed !!

What is needed ?

- To perform photometric measurements useful for the CARA project a CCD with linear response is needed
- The use of proper filters is strongly encouraged: R and I (Cousins), R (Gunn), 647 nm narrowband filter close to S (Vilnius)
- Unfiltered data can be considered for some "dusty" and/or faint comets if filtered observations are not available, and can be applied also for a first approach with photometry
- Any telescope can be used, but reflectors are preferred
- Images must be pre processed (dark frame subtracted and flat field corrected) and have a suitable signal to noise ratio

Why to use the Af[rho] quantity

- The Af[rho] quantity was introduced by Michael A' Hearn et al. (Astron. J.89,579) with the aim of comparing photometric dataset obtained with different instruments and geometric circumstances

- Af[rho] refers to the stationary coma model and, when this condition is true, it is independent from the measuring window used; this greatly reduces instrumental differences

- It allows to obtain sets of data comparable with the ones obtained with professional equipments

The archive format

- The archive contains a limited number of significative data written in a format useful for an immediate analysis

- comet name, date, heliocentric and geocentric distances, phase angle, photometric band, measuring window radius (km), Af[rho] (cm) and error, Observer code, URL, note

Namecomet	aaaammgg.dd	DELTA	R-Hel	Alph	B	mm.mm	rad-km	Af[rho]	err+-	REF	OBSCODE	URL	NOTE
CK01Q040	20040513.85	0.393	0.963	85.47	I	5.658	012438	0006167	00069	HIP	LIG(2)		HIP 40134
CK01Q040	20040513.85	0.393	0.963	85.47	I	6.454	006031	0006106	00068	HIP	LIG(2)		HIP 40134
CK01Q040	20040513.85	0.393	0.963	85.47	S	5.791	024876	0003073	00037	HIP	LIG(2)		HIP 40134 647 nm filter
CK01Q040	20040513.85	0.393	0.963	85.47	S	6.630	012438	0002839	00034	HIP	LIG(2)		HIP 40134 647 nm filter
CK01Q040	20040513.85	0.393	0.963	85.47	S	7.434	006031	0002793	00035	HIP	LIG(2)		HIP 40134 647 nm filter
CK01Q040	20040513.88	0.394	0.963	85.46	S	5.444	026596	0004123	00226	GSC	SOS		Passing clouds 646 nm filter
CK01Q040	20040513.88	0.394	0.963	85.46	S	6.103	012839	0004632	00256	GSC	SOS		Passing clouds 647 nm filter
CK01Q040	20040513.88	0.394	0.963	85.46	S	7.030	006420	0004203	00223	GSC	SOS		Passing clouds 647 nm filter
CK01Q040	20040513.88	0.394	0.963	85.46	S	7.542	003668	0004310	00249	GSC	SOS		Passing clouds 647 nm filter
CK01Q040	20040513.88	0.394	0.963	85.46	S	4.722	048323	0004248	00028	HIP	MIL		647 nm filter HIP 41319
CK01Q040	20040513.88	0.394	0.963	85.46	S	5.526	023752	0004120	00028	HIP	MIL		647 nm filter HIP 41319
CK01Q040	20040514.83	0.412	0.962	84.69	R	5.014	048335	0004263	00028	HIP	TIR		
CK01Q040	20040514.83	0.412	0.962	84.69	R	5.647	025318	0004545	00031	HIP	TIR		
CK01Q040	20040514.83	0.412	0.962	84.69	R	6.682	011508	0003855	00028	HIP	TIR		
CK01Q040	20040514.86	0.412	0.962	84.66	S	6.210	012417	0004604	00188	HIP	TIR		647 nm filter
CK01Q040	20040514.86	0.412	0.962	84.66	S	6.973	006209	0004558	00187	HIP	TIR		647 nm filter
CK01Q040	20040514.86	0.412	0.962	84.66	S	8.205	003104	0002931	00121	HIP	TIR		647 nm filter
CK01Q040	20040515.87	0.433	0.962	83.76	I	4.354	038875	0007944	00080	SAO	TRB(1)		SAO 97928 Cnc 35
CK01Q040	20040515.87	0.433	0.962	83.76	I	4.953	024880	0007148	00072	SAO	TRB(1)		SAO 97928 Cnc 35
CK01Q040	20040515.87	0.433	0.962	83.76	I	5.869	012440	0006151	00062	SAO	TRB(1)		SAO 97928 Cnc 35
CK01Q040	20040515.87	0.433	0.962	83.76	I	6.844	006220	0005012	00051	SAO	TRB(1)		SAO 97928 Cnc 35
CK01Q040	20040518.88	0.502	0.963	80.72	S	6.200	026885	0003182	00162	HIP	SOS	www.afamweb.com	Thin cyrrus
CK01Q040	20040518.88	0.502	0.963	80.72	S	6.786	014027	0003554	00183	HIP	SOS	www.afamweb.com	Thin cyrrus
CK01Q040	20040518.88	0.502	0.963	80.72	S	7.596	007013	0003371	00178	HIP	SOS	www.afamweb.com	Thin cyrrus

Recent improvements in the CARA project

- Development of a dedicated software (by Roberto Trabatti) with the goal of achieving the highest possible standardization of data and to make data reduction more user fiendly

- Most observers routinely produce R,I filtered data

- Reference stars are now selected with more narrow and specific criteria (close to G2V solar type; B-V between 0.4 and 0.8, mainly from Hipparcus Cat.)

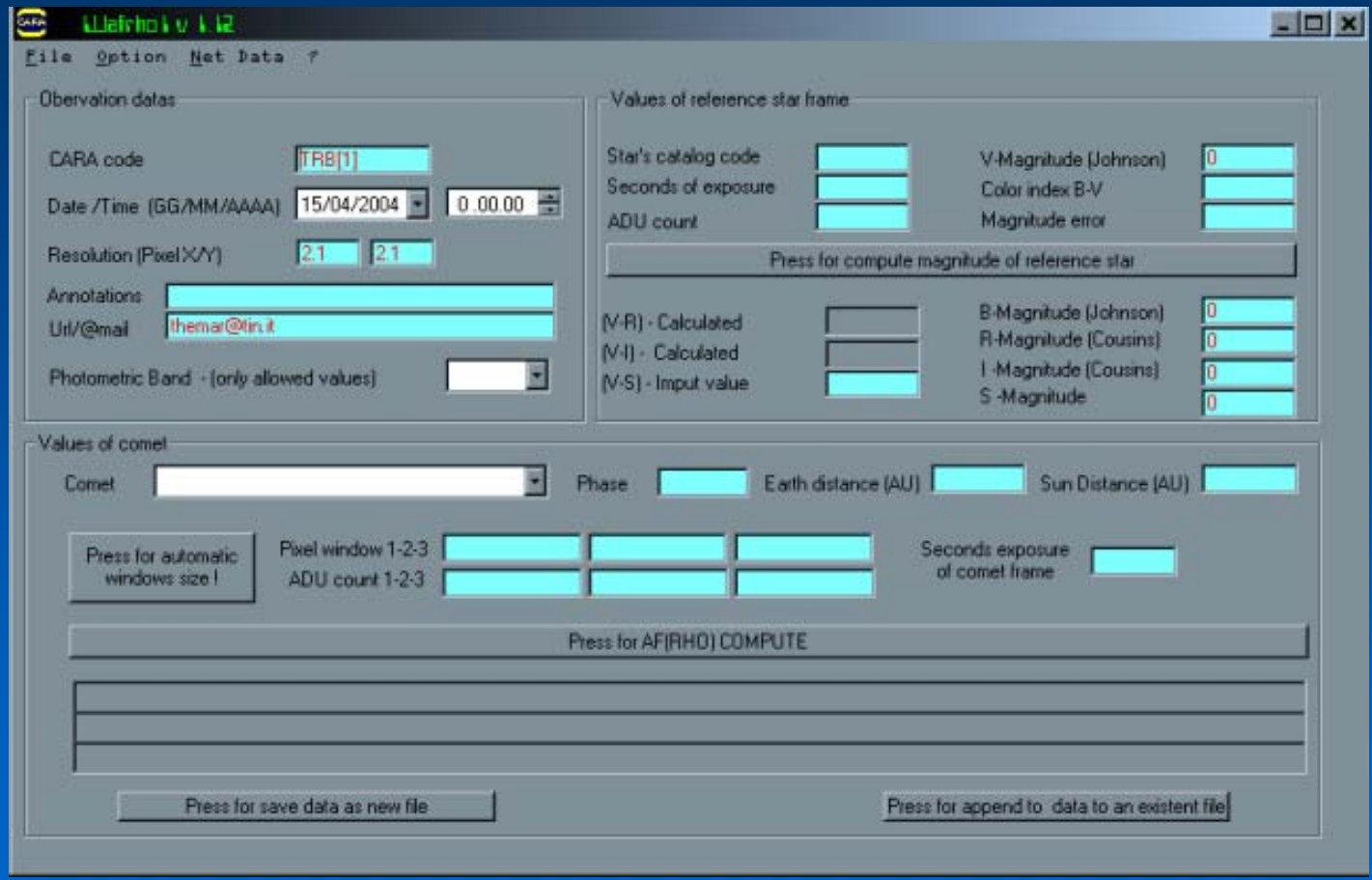
- A specific photometric band was added for bright comets based on a 647 nm filter (10 nm fwhm); it is very close to the S photometric band (Vilnius) so that appropriate magnitudes can be derived for the selected stars

OS platforms

- We are developing clients for two OS platforms
-  Win/xx OS : Seem to be the most popular platform used by amatour astronomers. The most commercial CCD camera have software drivers that run only under this OS (they are commercial...).
-  Linux OS : Under this platform we have access to the Unix software routines and packages used by professional astronomers. We prefer work under this OS !! But probably we will must write our own software drivers for our (poor) CCD.

win/xx platform -Wafrho1.exe -

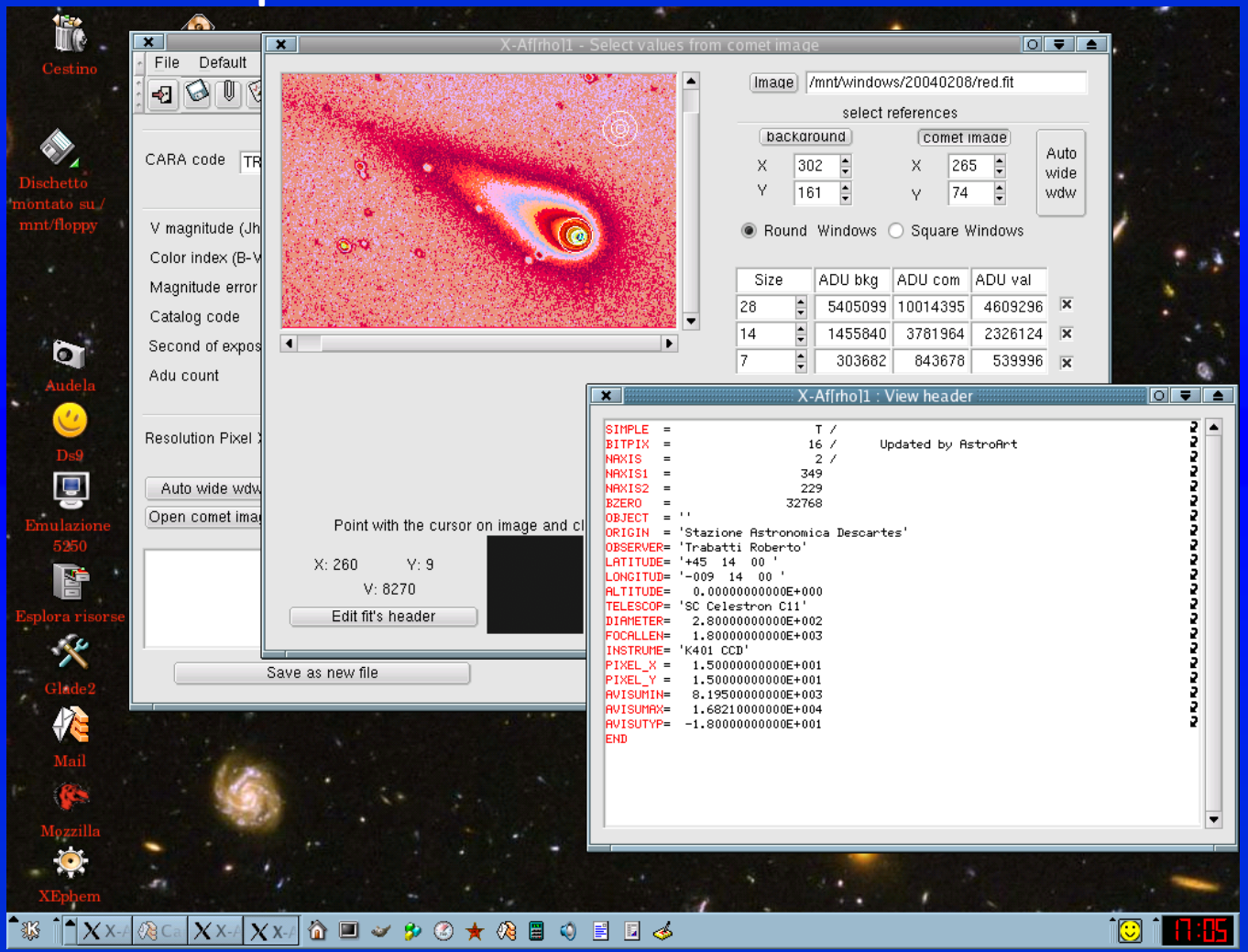
- Main panel



You can follow the whole measurament process through main panel

Linux platform – xafrho1.exe -

- Fit's header panel



Linux version includes a tool for performing aperture photometry.

First results on recent comets

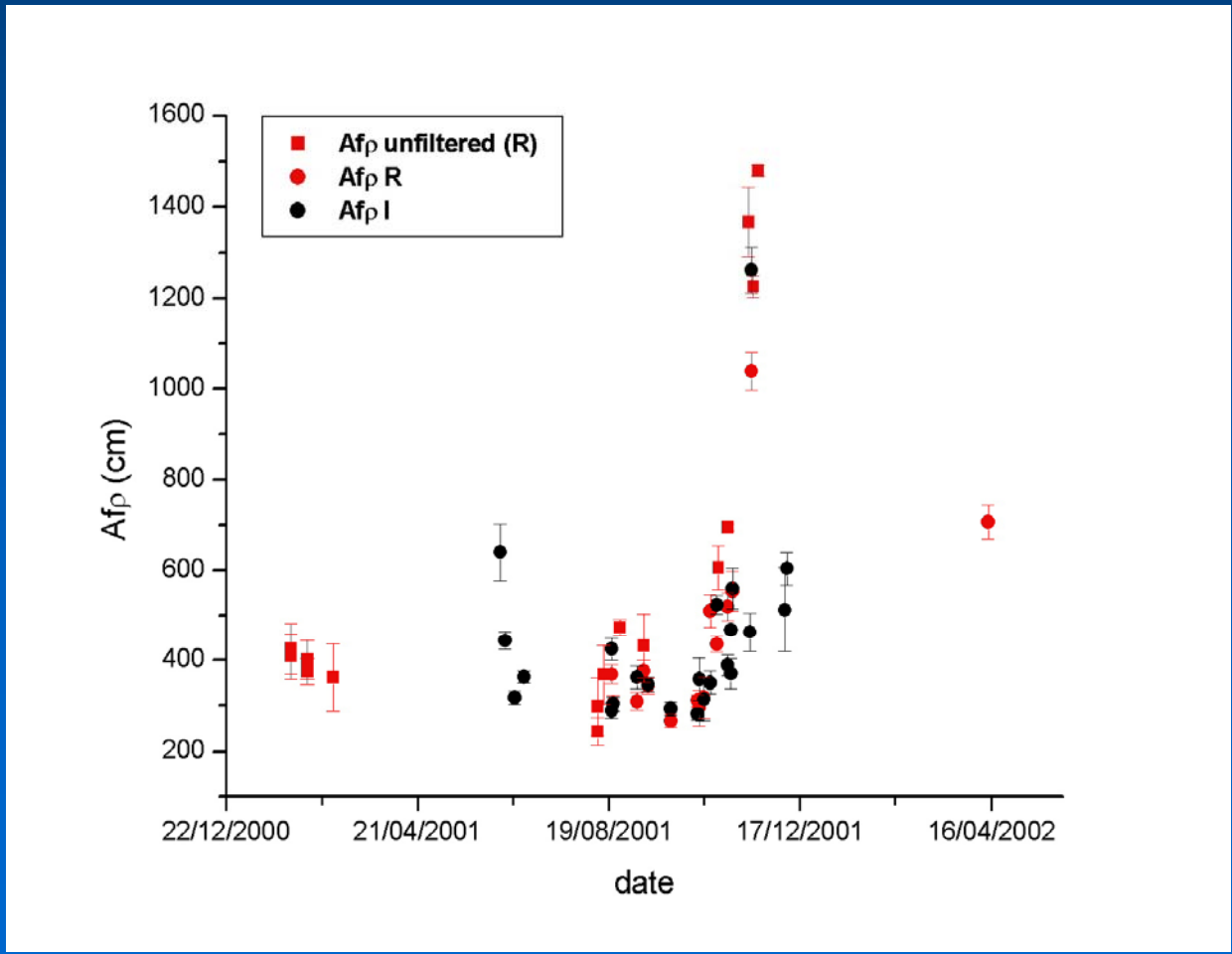
- Some results obtained on recent comets are presented

- Early data were obtained with unfiltered observations as well with R and I (Cousins) filters

- Both observing and analysis procedure have been greatly improved in past months, so data concerning recent comets are of better quality than early ones. Some data have been also re-analized.

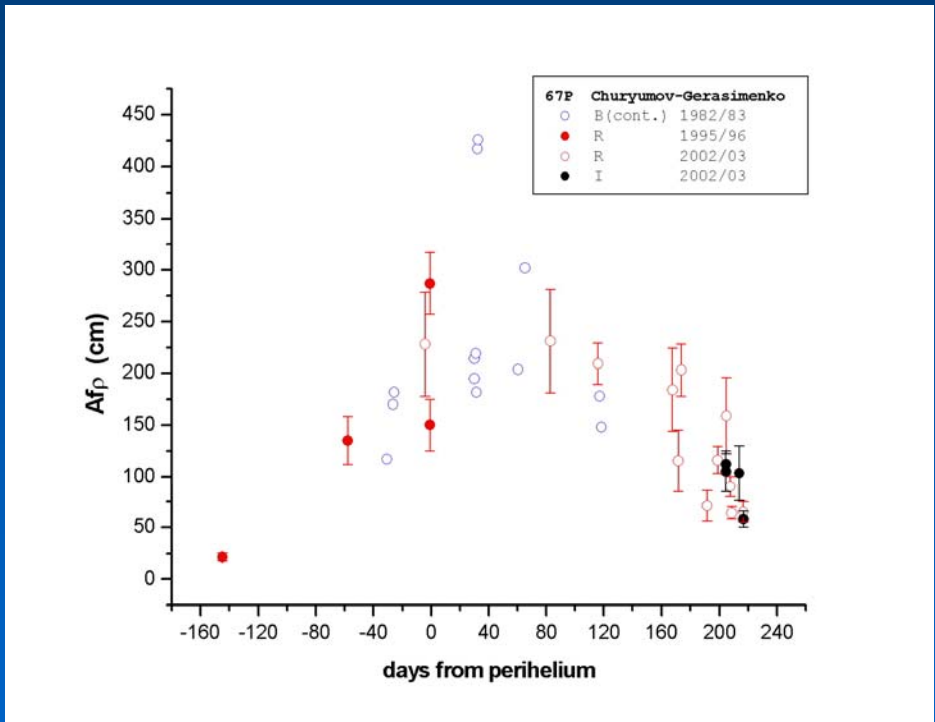
C/2000 WM1 (LINEAR)

- The first comet intensively observed for testing our observing and analysis procedure was C/2000 WM1
- An outburst occurred detected around mid November (2001 Nov. 15-20)



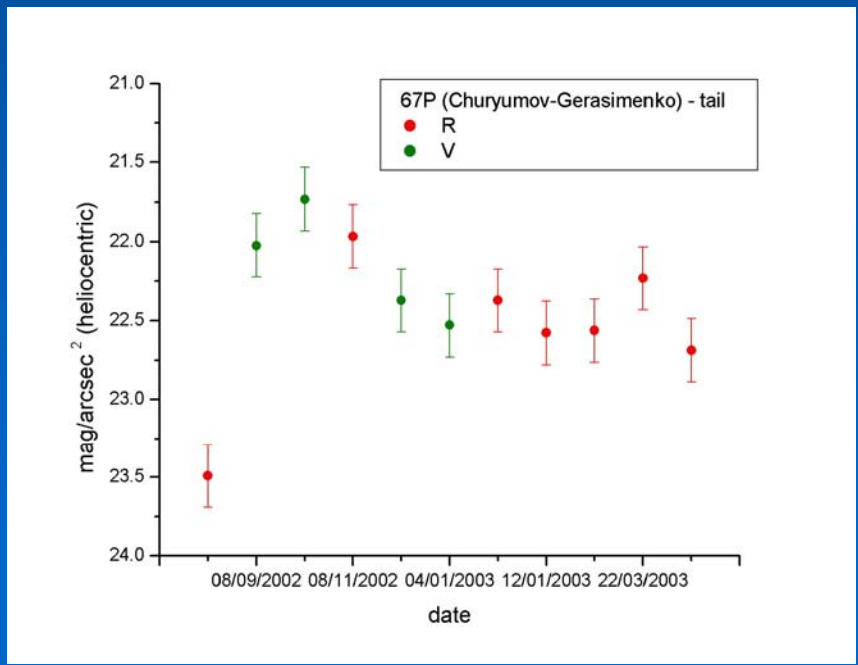
67/P Churyumov-Gerasimenko

- The Af[rho] measurements, tail imaging and photometry provided useful data for ROSETTA scientists
- CARA data appear in some talks presented at the ROSETTA workshops and in papers concerning this comet



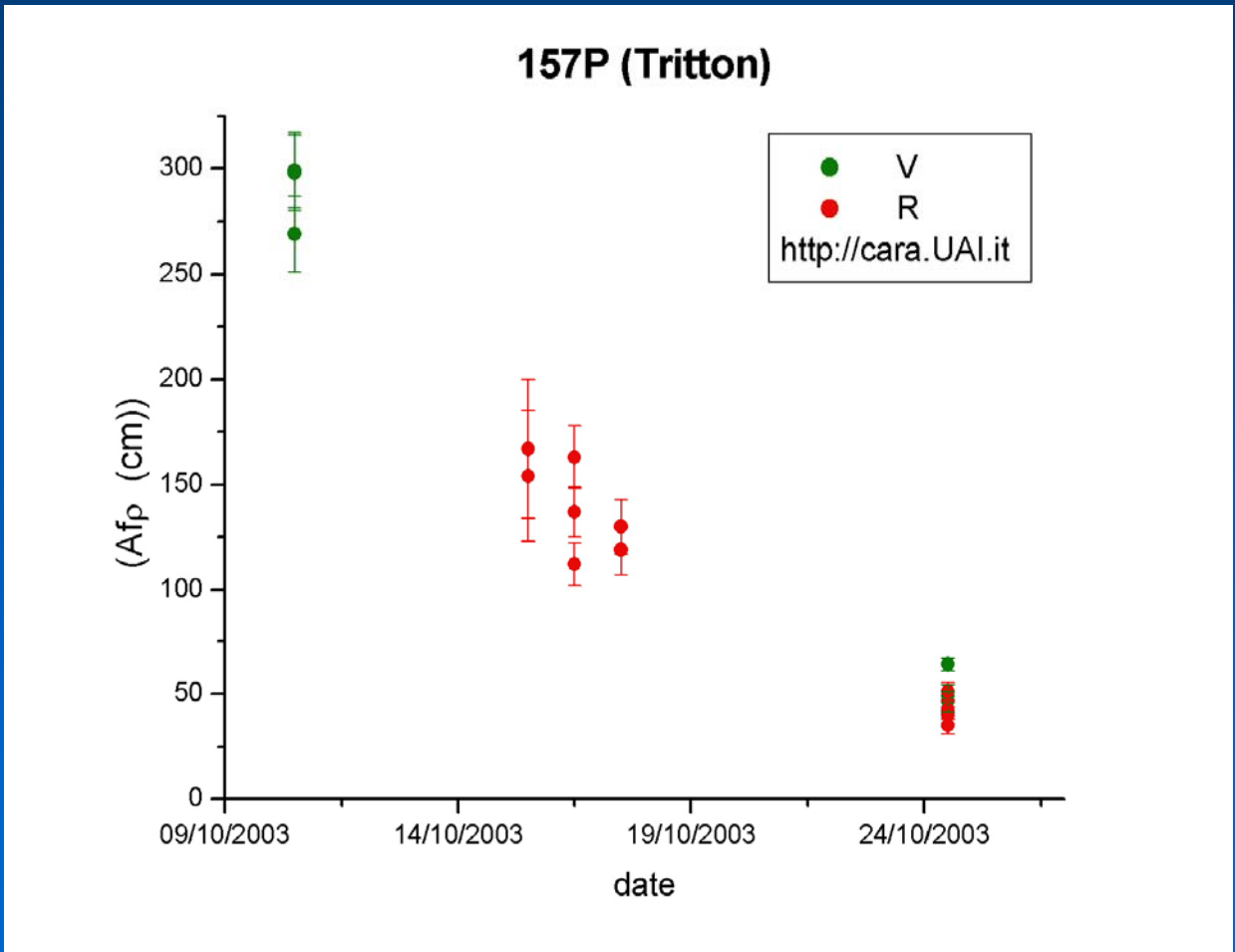
Average Af[rho] light curve

tail photometry



157P Tritton

- The fading of the comet was well monitored by Af[rho] quantity mesurements, V data were included as in this phase C_2 contamination was negligible



Who are we?

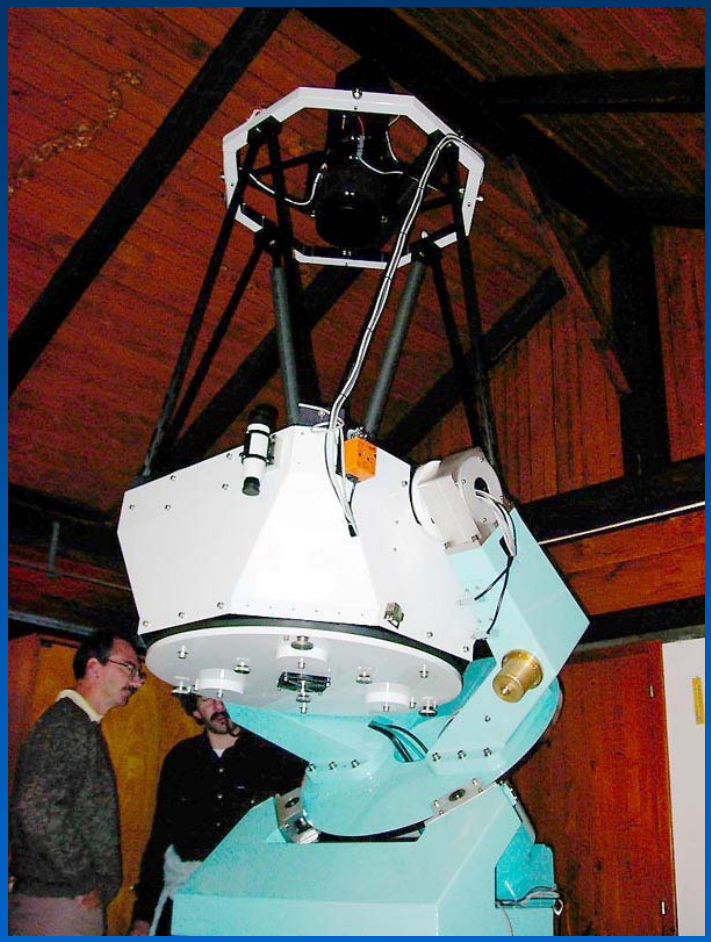
- The project was developed and supported with the contribution of several people

- Among observers particular thanks go to: Rolando Ligustri, Giovanni Sostero, Roberto Trabatti, Diego Tirelli, Martino Nicolini, Daniele Carosati, Lorenzo Focardi, Luca Buzzi, Andrea Aletti, Herman Mikuz, Stephane Garro, Carlo Vinante, and many others...

- Among professional astronomers we thanks in particular: Marco Fulle, Gian Paolo Tozzi, Gyula Szabo', Mauro Barbieri

- We often meet twice a year to discuss results and improve the project; anyone interested is welcome

Next CARA meeting:
June 19-20 - Crni Vrh, Slovenia



For information : http://cara.uai.it

- This project is (and probably always will be) *work in progress*. Who will contribute to it will be welcomed !!