Optical positions of ICRF sources using UCAC3 reference-stars

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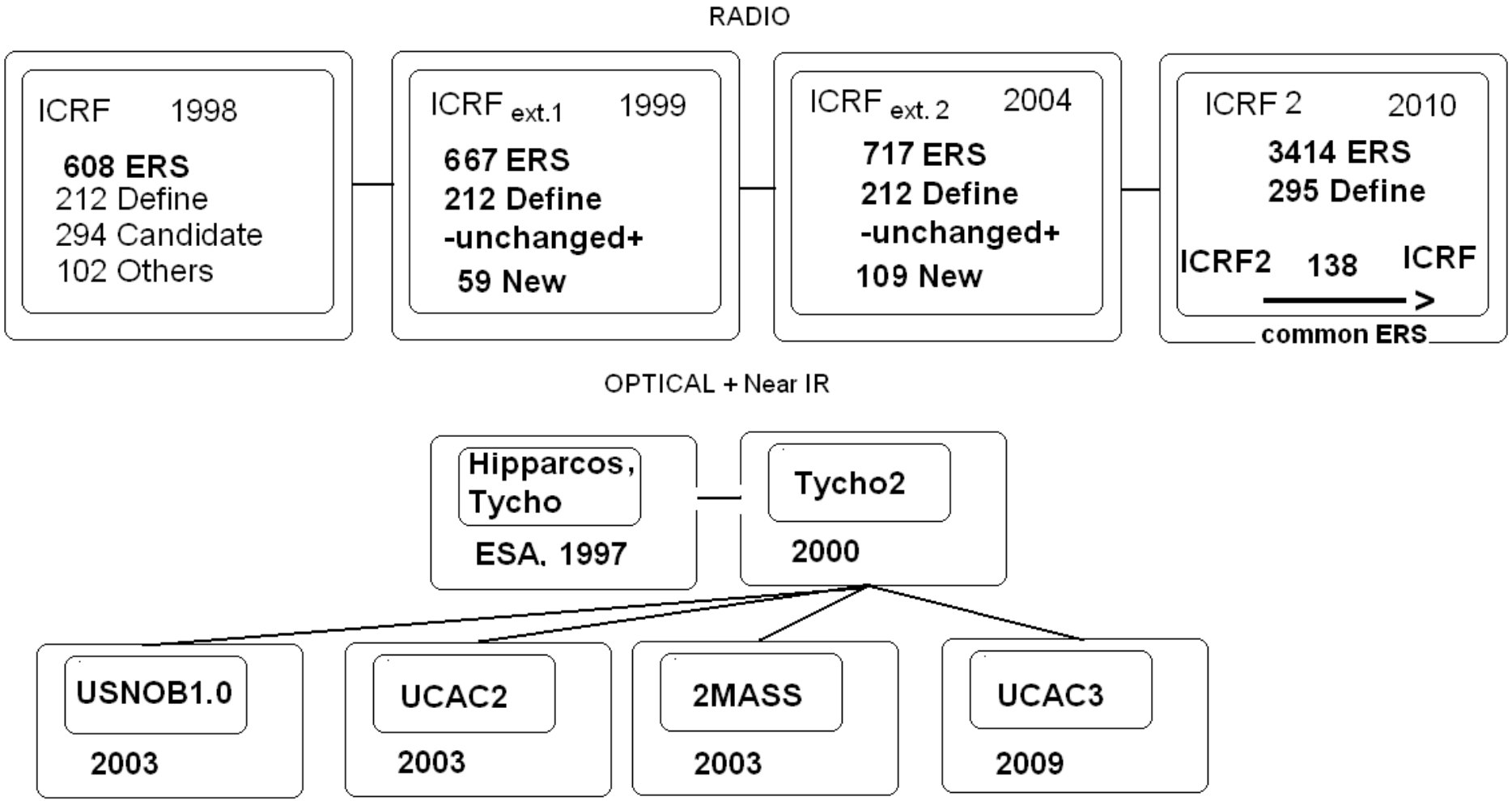


Observations

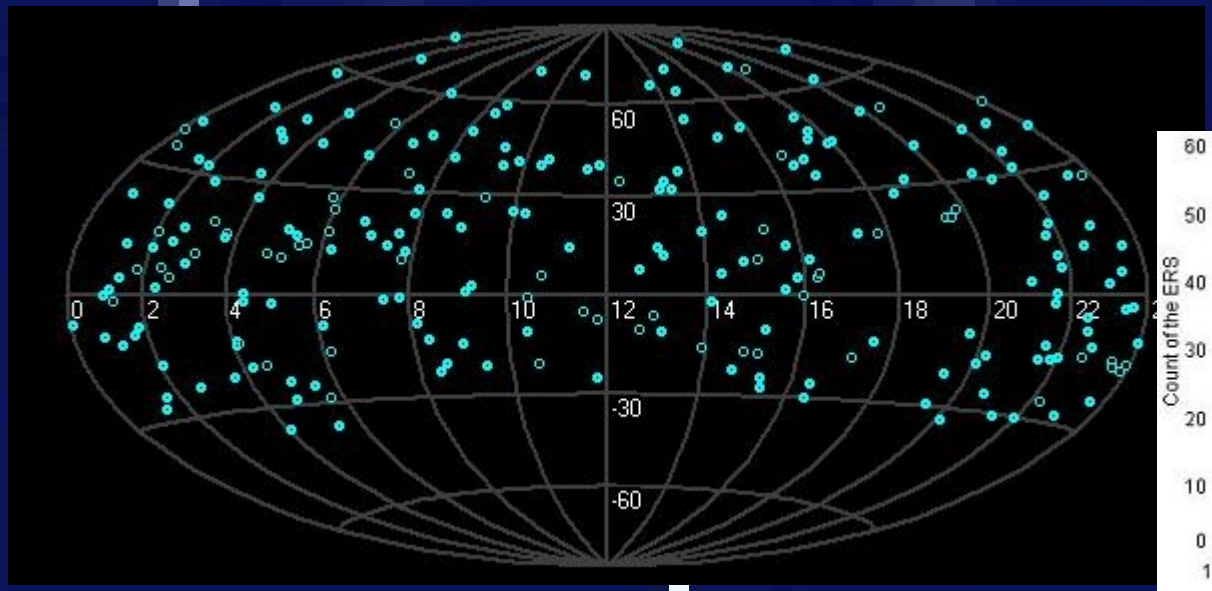
1.5-m telescope (RTT150), Bakyrlytepe (Turkey)
D=1500 mm, F=11600 mm

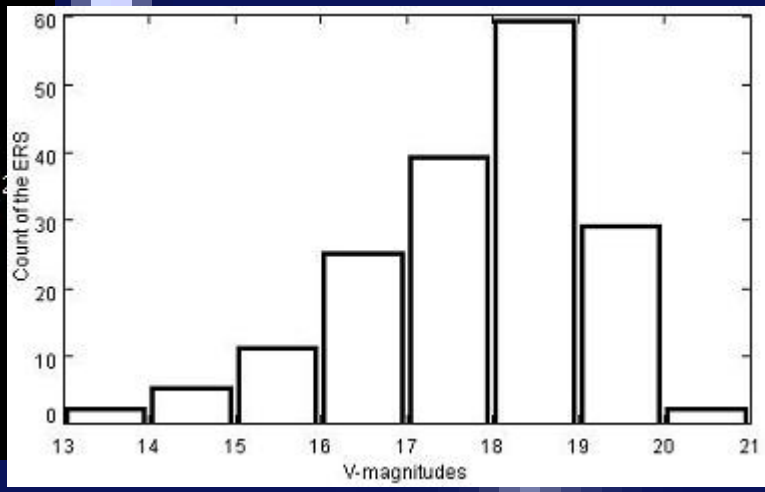
1) Size of CCD – 1530 x1020, scale – 0".16/pixel
field of view – 4'.1 x 2'.7, size of pixel – 9μm x 9μm
(2000 September – 2002 May, 127 fields around ERS)

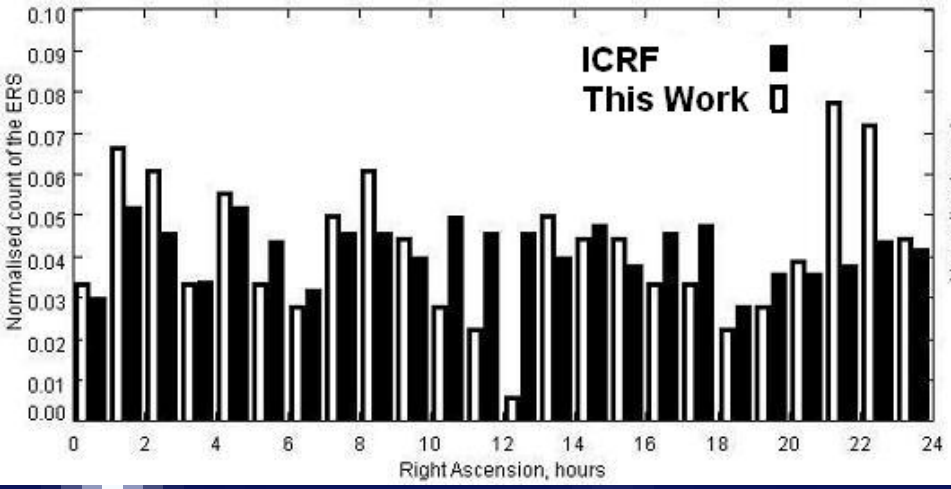
2) Size of CCD – 2048 x2048, scale - 0".24/pixel
field of view – 8'.1x8'.1, size of pixel – 13.5μm x 13.5μm
(2003 May – September, 67 fields around ERS)

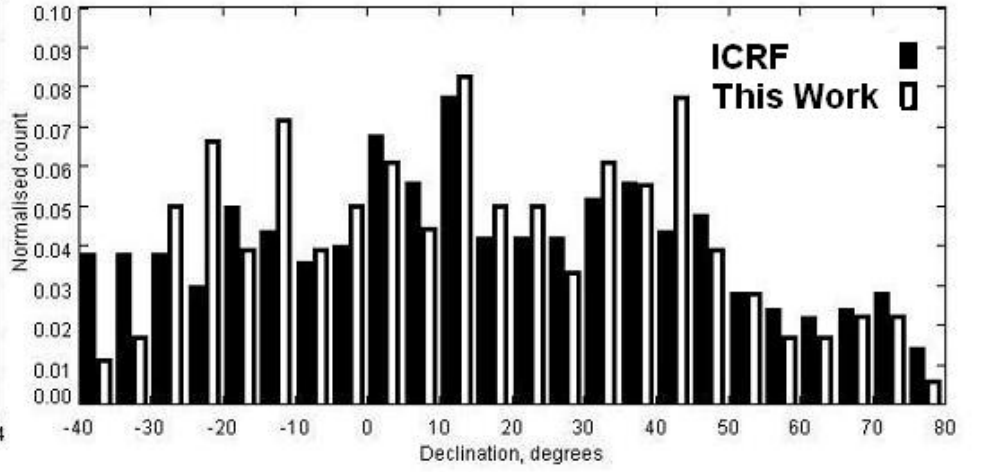
1-m telescope at the Yunnan Observatory (China)
D=1016 mm, F=13000 mm
Size of CCD - 1024x1024, scale – 0 ".37/pixel
field of view - 6'.4x6'.4, size of pixel - 24 μm x 24 μm

Observations

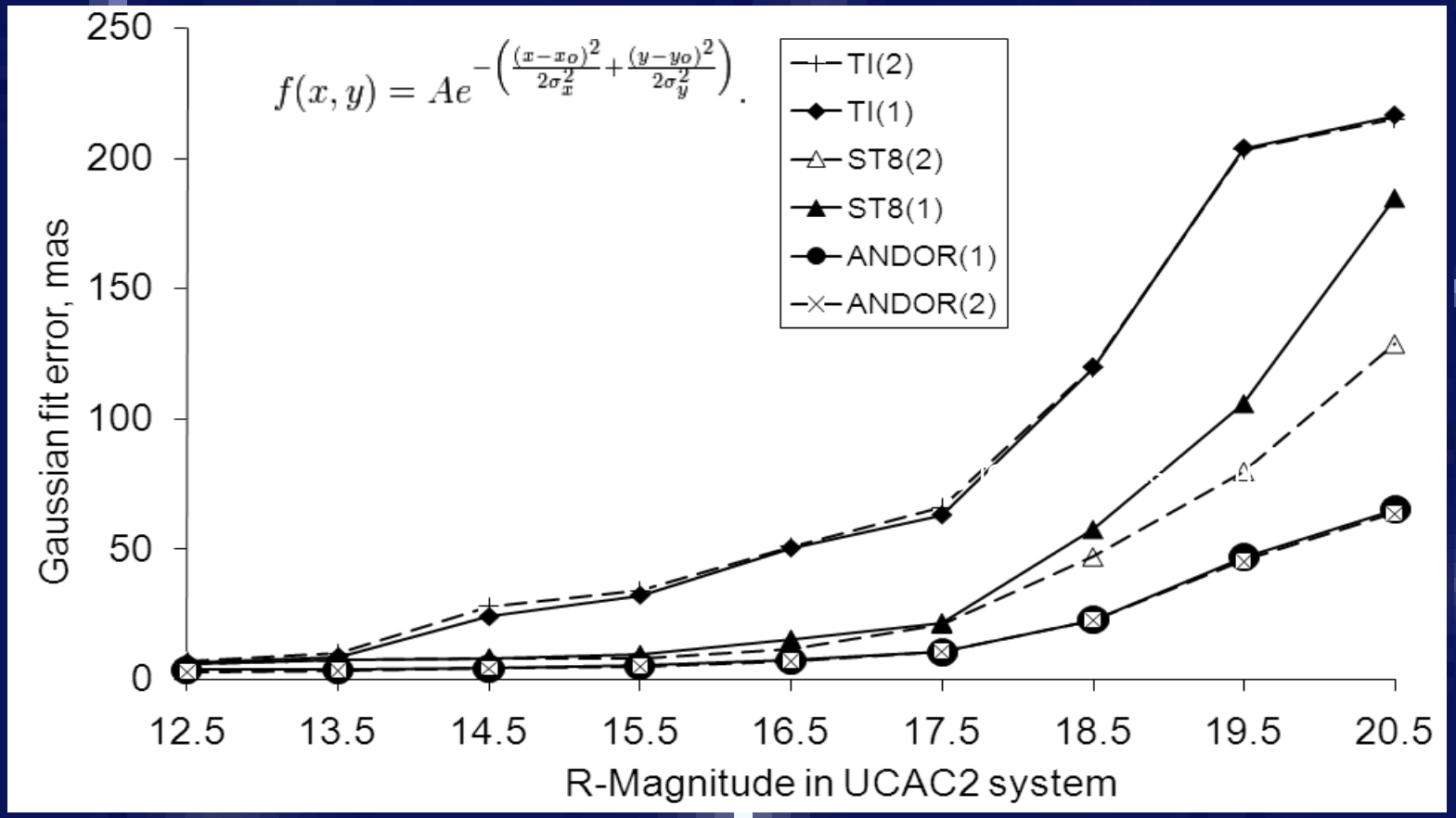








Reductions



The magnitude limit for RTT 150 was estimating to be 21^m as for 1m YNO telescope -19^m.

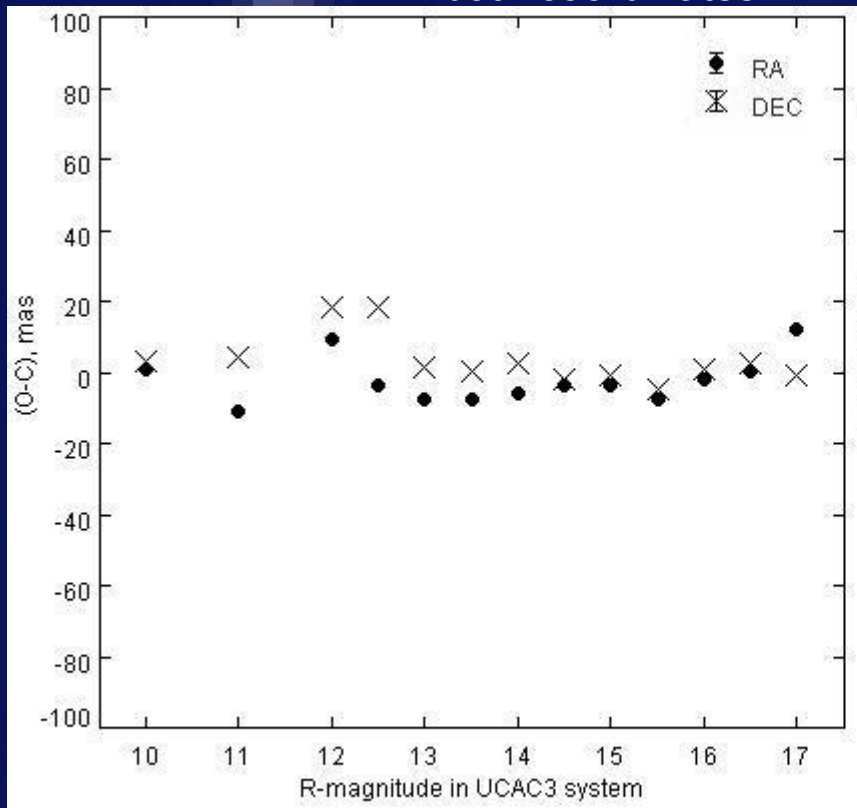
Astrometric Reductions

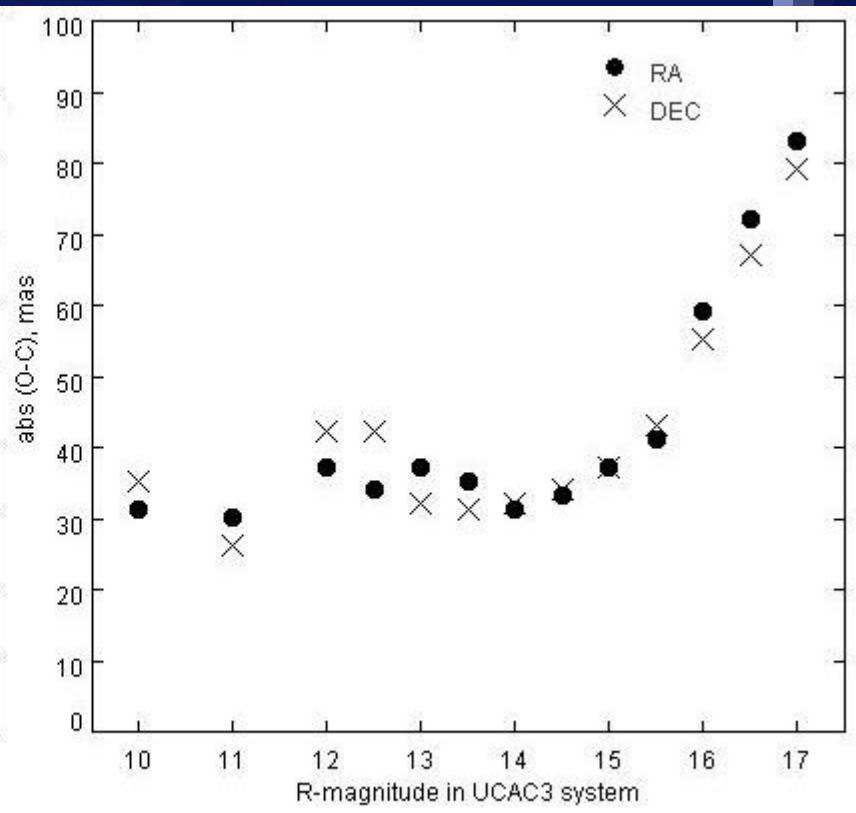
$$\xi_s = c + ax + by$$

$$\eta_s = f + dx + cy$$

The average number of observations of one star is 6.

The mean Standard Errors for reference stars are about 15 mas in both coordinates.

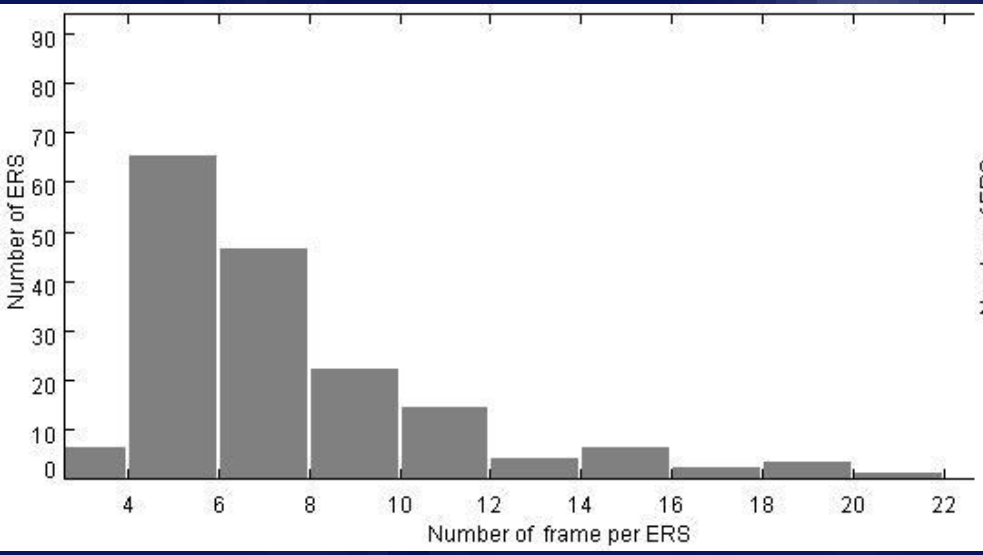


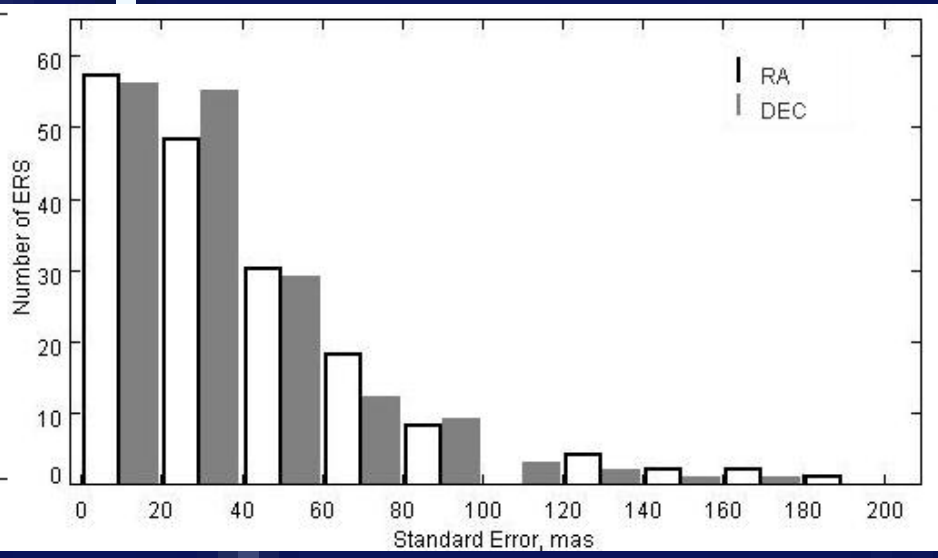


RESULT
1. OPTICAL POSITION

The optical positions of 171 optical counterparts of ERS were obtained.

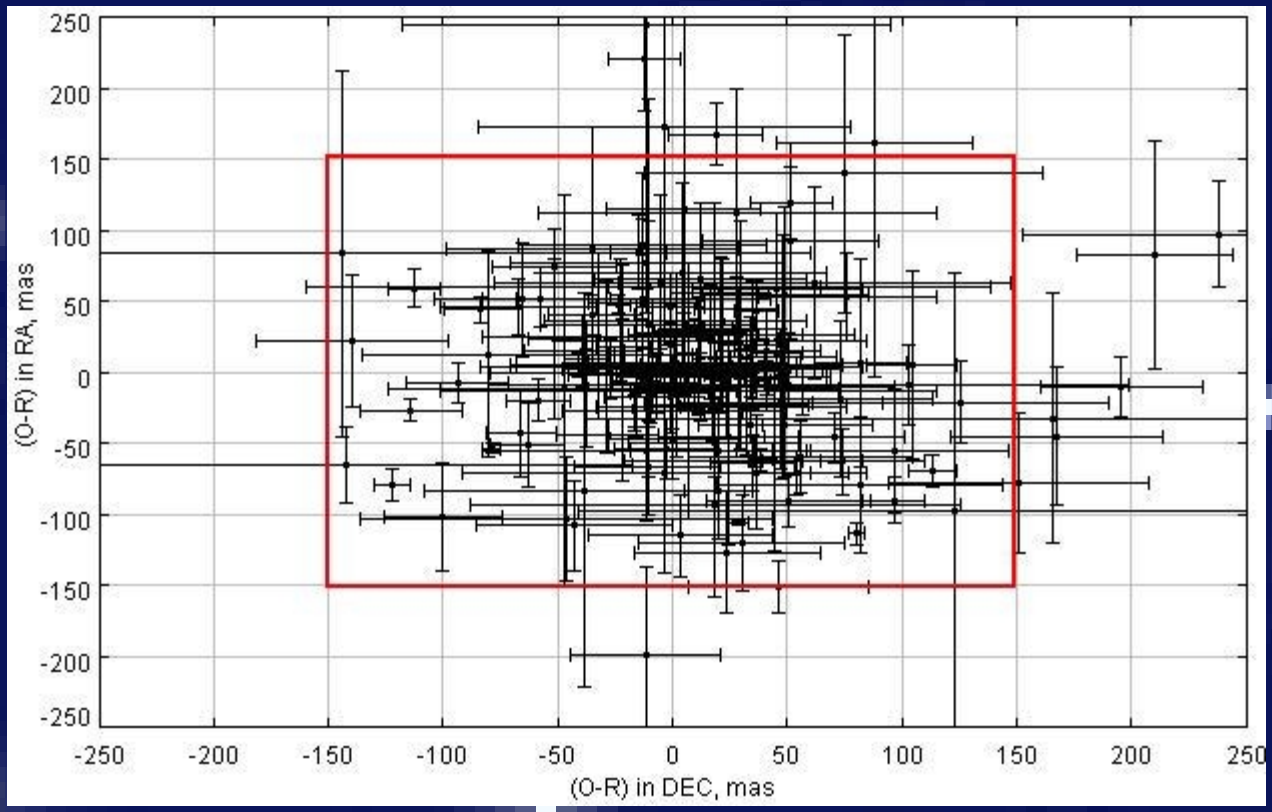
The mean values of formal standard errors are about **40** mas in both coordinates.





15 ERS from 171 have standard errors of a single position more than 100 mas

RESULT
2. Optical minus radio differences



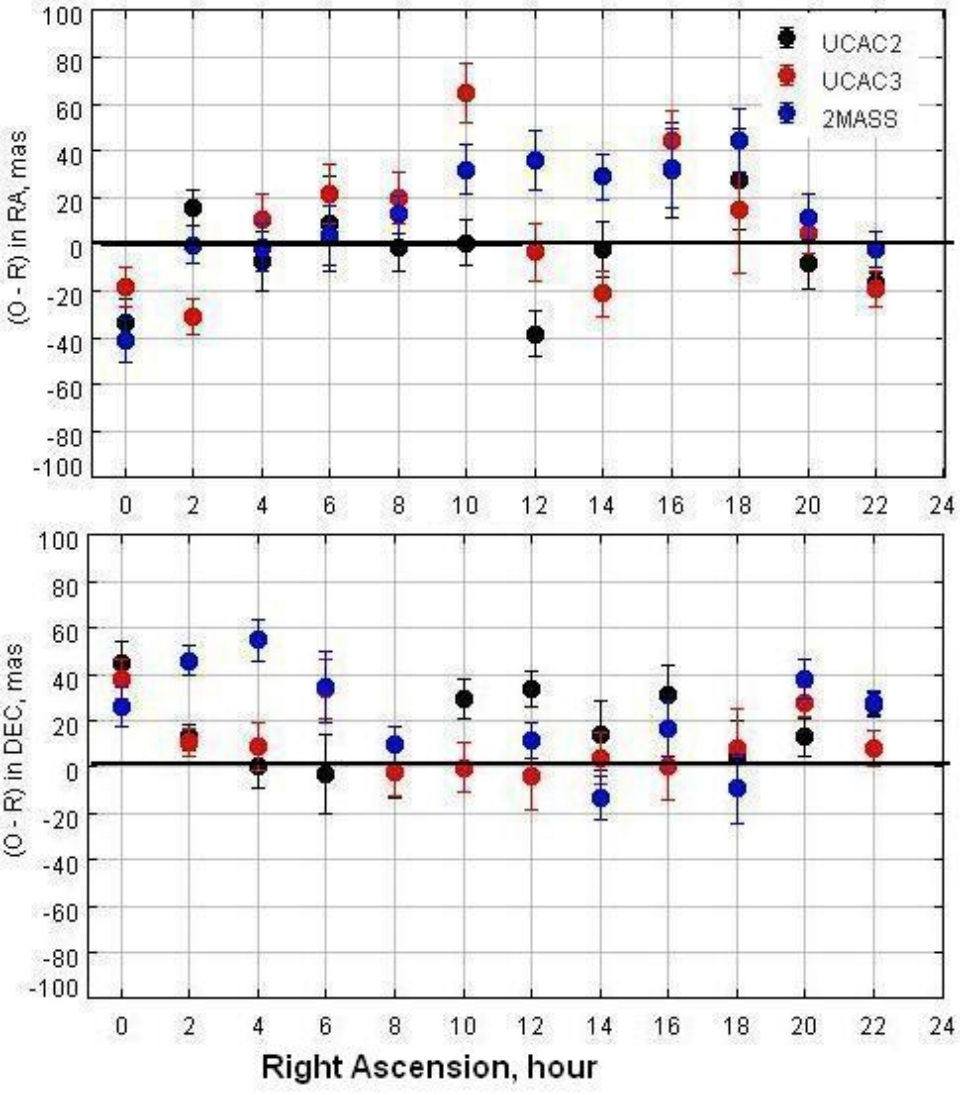
The mean values of optical minus radio positions differences are :

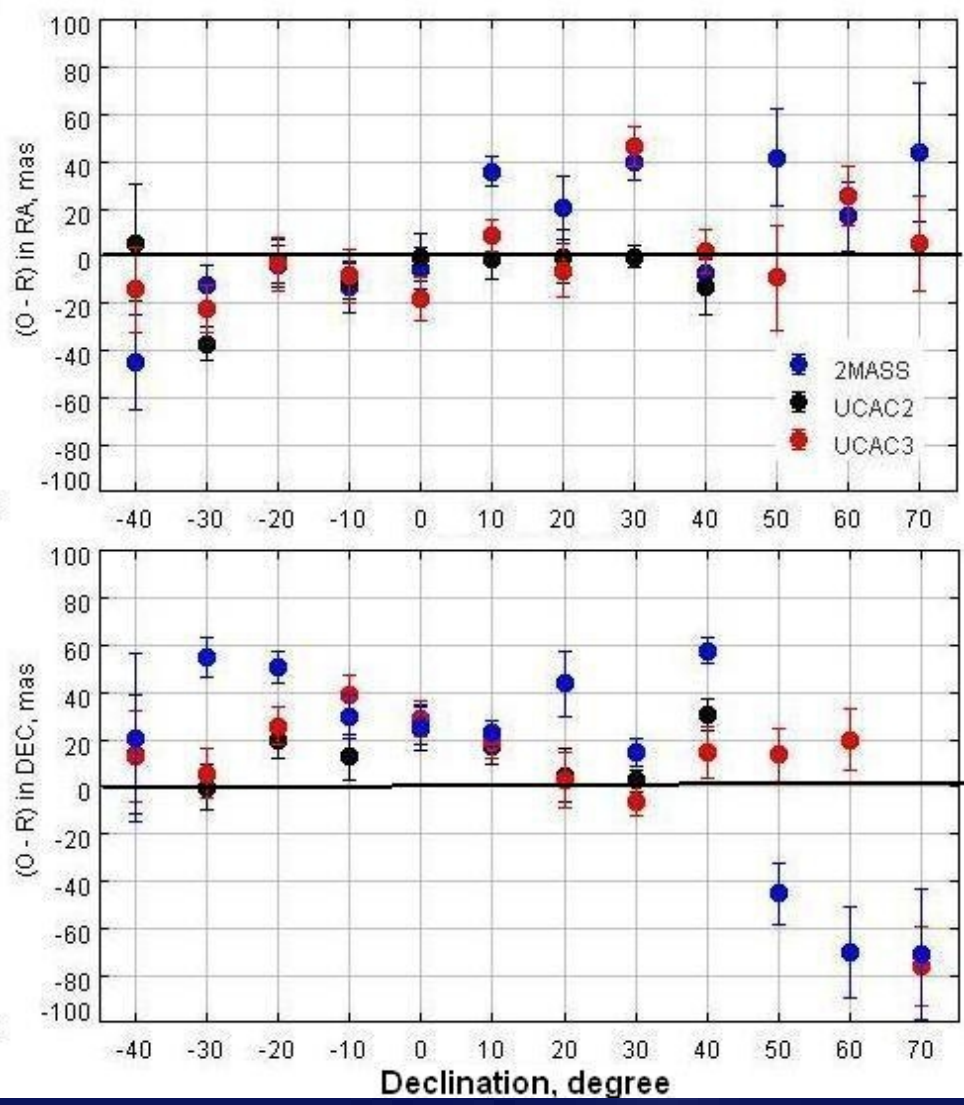
$\Delta\alpha\cos\delta$ = -6 ± 4 (52) **mas**, **$\Delta\delta$ =11±4** (49) **mas**

RESULT
3. The Comparisons with previous reductions

Catalog	Δαcosδ, *mas*	Δδ, *mas*	N	Plate Solution		N stars
				σ_α	σ_δ	
UCAC2	-7 ±4 (46)	13 ±4 (42)	113	39	38	11
UCAC3	-9 ±5 (48)	15 ±4 (43)	113	57	57	16
2MASS	-8 ±6 (68)	33 ±7 (76)	113	87	88	33

RESULT
3. The Comparisons with previous reductions





Radio/Optical Alignment

$$\Delta\alpha_{O\text{-}R}\cos\delta = \omega_x \sin\delta\cos\alpha + \omega_y \sin\delta\sin\alpha - \omega_z\cos\delta,$$

$$\Delta\delta_{O\text{-}R} = -\omega_x\sin\alpha + \omega_y\cos\alpha$$

Catalog	w_x	w_y	w_z	σ	N
UCAC2	-0,2±5,8	7,2±5,5	7,0±4,5	43	130
UCAC3	-0,1±6,1	6,4±5,8	-1,8±3,5	57	152

There is no significant rotation between systems within an accuracy of 6 mas.

Conclusions

- Astrometric positions for optical counterparts of 171 ERS from the ICRF ext.2 list were obtained using reference stars from the UCAC3 catalog in declination zone from – 40 to +80 degrees. The mean standard errors of a single position are 40 mas.
- The mean offsets between the ICRF radio positions and our optical positions related to the UCAC3 catalog are -6 ± 4 (52) mas and 11±4 (49) mas in right ascension and declination, respectively.
- The UCAC3 Catalog is a good densification of Hipparcos reference frame and can be used as reference astrometric catalog for all areas in the celestial sphere even in small CCD-fields.
- Zonal differences between UCAC3 and 2MASS catalogers on their accuracy levels are not significant.

Thank you !