On the problem of using of the ICRF radio coordinates reference system

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Radio catalog ICRF2 was recommended by IAU in 2009 as the main radio coordinates reference system, with which the results of all observations within the optical range of wave lengths should be should be agreed. But on the one hand, it should be noted that ICRF2 catalog includes radio sources, with the coordinates measurement accuracy to be significantly worse than those in optical range. On the other hand, fraction of the formally identified sources by the coordinate coincidence is dramatically small. For this reason declared millisecond accuracy of radio coordinates for the ICRF2 catalog should be confirmed by an independent method of optical identification.

Our optical identification carried out with method described in [1], showed that the main part of radio sky was identified with optical sky incorrectly. Besides that we had discovered radio refraction in interstellar matter, which could consist several arc seconds and more in the fields characterized by high density of interstellar gas [2].

In the present work it is shown that reasonable identifications of optical and radio sky should be substantiated and confirmed by the fact of matching of several radio and optical objects at the investigated area within the first lobe of radio interferometer diagram. Only in this case the paradox of mismatch of main part of radio sources with the optical celestial objects could be solved.

The optical identifications were made for ten plates of one square degree each one. For these plates 96 radio sources was identified with stars brighter than 15^m and 17 radio sources was identified with diffuse objects in optics (See for details [3]). On the three plates appeared three radio sources from ICRF2 catalog (Fig. 1, 2, 3), and we identified them with the stars (Fig 1a, 2a, 3a), using our identifications method [1]. One can see an these figures contours of snapshot images of NVSS radioservey of NRAO observatory. It is clear, due to their large dimensions this radio sources can not be used as the reference objects to identify celestial radio objects with optical ones. The errors of initial identification of radio sky with the optical one are considered in paper [4]. In table 1 the coordinates of these radio objects (columns 2, 3) are suggested in accordance with ICRF2 catalog. Columns 8, 9 are corrections to right ascension and declination, which should be added to coordinates of ICRF2 radio sources, to obtain coordinates of optical objects, with which these radio sources are identified. Star names are presented in column 10 of Table 1. As a result of correct identification 25 stars and 2 objects with diffuse image were identified at three single-degree areas.

Table 1.

№	RA(J)	DEC (J)	z	m		Fig	ΔRA	ΔDEC	Name	Fig
1	2	3	4	5	6	7	8	9	10	11
	h m s	o ′ ″	z	m			m s	′ ″		
1	00 26 51.44	-11 12 52.42	1.115	19.4	Q	1	01 09.3	-27 25.0	HD2438	1a
2	00 29 14.24	+34 56 32.24	0.517	20.4	G	2	-03 22.2	+21 47.0	HD2154	2a
3	21 15 29.41	+29 33 38.36	1.514	19.5	Q	3	-02 32.4	+38 39.4	zet Cyg	3a

Conclusions:

Developed method of matching radio sky with optical objects, showed that the bright radio sources are identified mainly with stars in optics. This fact has a great importance for theoretical astrophysics, opening the way to study the stars radiation mechanisms, their evolution and investigation of interstellar matter properties by using revealed radio refraction in interstellar medium.

Suggested high precision catalog ICRF2 should be revised and cannot be used immediatly for identifications of radio and optical sky.

Bibliography

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3. *Lipovka A.A., Lipovka N.M.,* «Radio emission of the A1716 Cluster Galaxies and Group of Stars», Astrophysics, vol 56, issue 2, p241, 2013
4. *Lipovka A.A., Lipovka N.M.*, «The problems of identifications of radio sky with the optical ones. History and Perspectives», Geodesy and Cartography, №10, p. 2, 2013

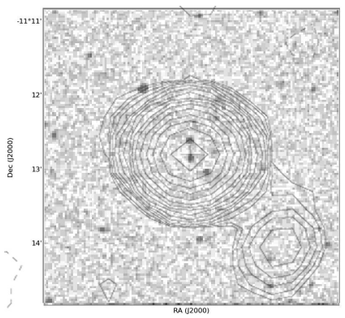

Fig 1

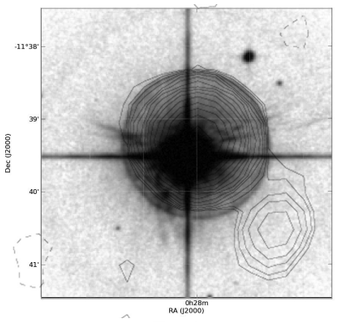

Fig 1a

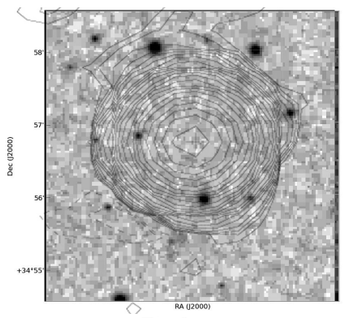

Fig 2

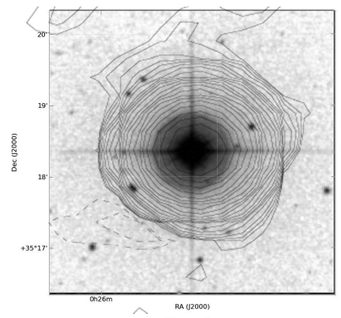

Fig 2a

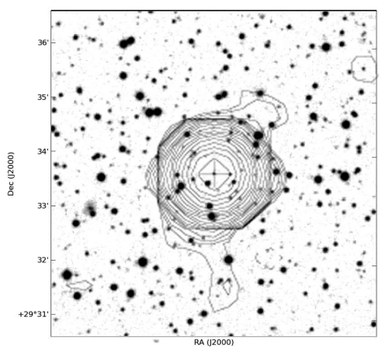

Fig 3

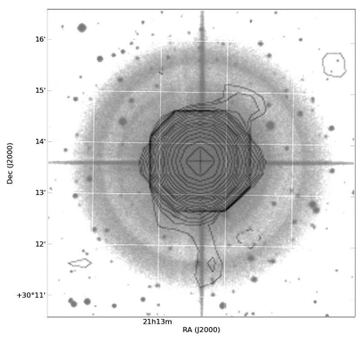

Fig 3a