MAO C 08A COMBINED CATALOGUE OF RADIO SOURCE POSITIONS CREATED IN THE COURSE OF PREPARATION FOR THE ICRF2

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ABSTRACT. Twelve combined catalogues of radio source positions were created at the Main Astronomical Observatory of the NAS of Ukraine (the acronym "GAOUA" was used by the IERS) with the Kiev arc length method since 1991. In the course of preparation for the second realization of the ICRF we created the new combined catalogue (designated as maoC08a) on the basis of individual solutions provided by the IVS Working Group on the ICRF2. In this paper, the method of combining the individual catalogues as well as the results of comparison of the maoC08a and individual catalogues are briefly discussed.

1. INTRODUCTION

Ya. Yatskiv and A. Kuryanova (1990) have proposed and realized new method for combination of individual catalogues of radio source (RS) positions. By using this method a series of combined catalogues of radio sources positions designated "RSC(GAOUA) YY C" in 1997-2005 and "RSC(MAO) 08 C 01" in 2008 were created at the Main Astronomical Observatory of NAS of Ukraine (see O. Molotaj, V. Telnuk-Adamchuk and Ya. Yatskiv, 2000, A. Kurjanova and Ya. Yatskiv, 1993, Ya. Yatskiv and A. Kuryanova, 1993, Ya. Yatskiv, A. Kurjanova and S. Lytvyn, 2005).

2. INITIAL CATALOGUES USED FOR CREATION OF THE MAO C08a

General information on individual catalogues of RS positions is given in Table 1.

Table 1: General characteristics of CRF solutions

Catalogue	Number of sources		Software	Analysis center
aus007a	1564	1516	OCCAM 6.2	GA
bkg001a	3019	2978	CALC 10.00, SOLVE 2007.10.31	BKG
gsf007b	3414	3378	CALC 10.00, SOLVE 2008.12.05	GSFC
iaa08c	2961	2918	QUASAR	IAA
mao008a	3555	3512	StellBreeze	MAO
opa008b	3244	3214	CALC 10.00, SOLVE 2008.12.05	OP
usn010b	3414	3380	CALC 10.00, SOLVE 2007.11.08	USNO
maoC08a	3572	3572	Combined	MAO

In the column "Number of sources" the numbers of all sources in catalogues and the numbers of sources used for creation of the combined catalogue are given. From 212 defining RS eight sources were excluded: seven from them were suspected in lack of stability and their coordinates were estimated as local parameters in individual solutions and one source (1903-802), which was missed in bkg001a solution.

3. MAO C08a COMBINED CATALOGUE AND ITS COMPARISON WITH INDIVIDUAL ONES

MAO C08a catalogue which consists of 3572 RS was compared with individual catalogues in the following way:

– parameters of transformation model between two catalogues were estimated with the LS method,

– the model was applied to coordinates of one of catalogues and weighted root means squares residuals (RMSR) for right ascensions and declinations were calculated,

– based on comparison of three catalogues (the combined and two individual ones) the so-called external uncertainties were evaluated.

The results of comparison are discussed in S. Bolotin and S. Lytvyn (2010). Here we present the RMSR for various pairs of catalogues (see Table 2).

Table 2: RMS of weighted post-fit residuals ($\Delta\alpha\cos\delta$ and $\Delta\delta$) in μas

ID	aus007a		bkg001a		gsf007b		iaa008c		mao008a		opa008b		usn010b	
maoC008a	155	208	39	37	27	30	45	42	43	54	27	39	27	41
aus007a			137	200	141	218	139	204	139	238	141	229	135	221
bkg001a					40	39	47	46	59	61	42	42	42	69
gsf007b							49	64	41	46	15	15	24	29
iaa008c									59	52	46	40	49	49
mao008a											41	46	46	55
opa008b													24	28

Note: First number is RMSR for $\Delta\alpha\cos\delta$ and second number is RMSR for $\Delta\delta$.

One can see that RMSR for all catalogues except aus007a are the same order. For estimation of so-called "external uncertainties" of catalogues ($\sigma_1, \sigma_2, \sigma_3$) we have used coordinate differences of two individual catalogues and combined one (see Table 3). Addition information on this evaluation of catalogues one can find in S. Bolotin, S. Lytvyn (2010).

Table 3: Comparison of catalogues: estimation of external uncertainties (in μas)

Coordinate	Index		σ_1,	σ_2,	σ_3,
	1	2	μas	μas	μas
α	bkg001a	gsf007b	88	23	10
δ	bkg001a	gsf007b	115	30	7
α	gsf007b	mao008a	26	55	12
δ	gsf007b	mao008a	33	62	10
α	gsf007b	usn010b	24	25	11
δ	gsf007b	usn010b	29	41	9

4. CONCLUSIONS

Based on results of our study we can conclude that

– systematic random error differences between individual catalogues (except aus007a) and combined one are small (about 50 μas).

– upper limit of precision of the maoC08a catalogue is on the level of 50 μas.

5. REFERENCES

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