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AN FK5 ANALYSIS FROM RG1 ASTROLABE CATALOGUE

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Resumen: El catalogo RG1 fue elaborado a partir de las observaciones hechas con un Astrolabio de Danjon en la estacion de Rio Grande. Contiene unas 130 posiciones de estrellas del FK4 y FK4 Sup. en el sistema B1950 (Mondinalli et al. 1985). Estas posiciones pueden transformarse al sistema J2000. De esta manera, las posiciones del RG1 pueden compararse con las posiciones del FK5 simplemente transformando estas ultimas a la epoca media de observacion del RG1 (1981.5). Las posiciones de las estrellas del FK5 fueron obtenidas de una comunicacion privada de H. Schwan que incluye solamente las coordenadas de las 1535 estrellas fundamentales del FK4, de manera que la comparacion solo es posible para unas 90 estrellas comunes. Los resultados son muy satisfactorios. Los errores sistematicos del FK4 en la region estudiada, particularmente en ascencion recta, han desaparecido. Las desviaciones tipicas de las diferencias RG1-FK5 son de 0.014 seg. en ascension recta y 0.12 seg. de arco en declinacion. No obstante, subsisten diferencias individuales del orden de 0.4 seg. de arco en ambas coordenadas presumiblemente debidas al FK5.

Abstract: RG1 Danjon Astrolabe Catalogue was elaborated from Rio Grande Station observations. It includes about 130 FK4 and FK4 Sup. stars in the B1950 system (Mondinalli et al., 1985). These coordinates can be transformed to the J2000 system. In this way, RG1 positions may be compared with those from FK5 simply transforming those from the latter to the mean epoch of RG1 (1981.5). FK5 positions were obtained from H. Schwan's work (private communication) and includes only the 1535 FK4 fundamental stars; so comparison with RG1 is only possible for 90 common stars. Results are quite satisfactory because FK4 systematic errors, particularly those affecting right ascension, have disappeared. Typical rms differences between RG1 and FK5, are 0.014 sec. in right ascension and 0.12 arc sec. in declination. However, individual differences in both coordinates up to 0.4 arc sec., presumably due to FK5 positions, are still present.

Key words: ASTROMETRY

I. INTRODUCTION

The RG1 catalogue contains corrections to 130 FK4 and FK4 Sup. stars observed at Rio Grande station with the Danjon Astrolabe OPL 01 (Mondinalli et al., 1985). The mean epoch of this catalogue is 1981.5. The corrections obtained for the fundamental catalogue positions were largely

compared with other existing catalogues: Perth 70 (Hog et al.,1976), San Juan (Manrique, 1976), Santiago (Noel et al., 1974), Valinhos (Clauzet, 1982) and CGA (Billaud et al.,1978). The results of these comparisons demonstrated conclusively that RG1 is a good catalogue. It also conspicuously confirmed the systematic FK4 errors in the austral region of the sky (Anguita et al., 1973).

The FK5 catalogue (with exception of the 1535 FK4 stars) is not available as yet. J2000 coordinates and proper motions for these stars were provided by H. Schwan (private communication).

RG1 is a very good test for FK5 in the austral region mainly because it is not included in the FK5 compilation.

II. THE COMPARISON METHOD

The RG1 B1950 positions were transformed to system J2000 by means of Project MERIT Standards (1983) procedures. The mean epoch of these transformed positions remains 1981.5.

The FK5 J2000 positions were transformed to epoch 1981.5 using FK5 proper motions. In this way, both positions are directly comparable thus being possible to obtain the differences RG1-FK5.

III. RESULTS

Figures 1 to 4 plot the RG1-FK4 and RG1-FK5 differences for each common star in both coordinates against declination. Fig. 1 clearly shows the systematic differences of right ascensions in the declination region -75 to -65 deg. (Anguita et al., 1973, Mondinalli et al., 1985). Fig. 2 shows that RG1-FK5 differences in right ascension are strongly reduced in comparison with those from RG1-FK4, likewise the systematic trends have disappeared. The rms of the differences about the mean is 0.014 seg.

Figures 3 and 4 represent declination comparisons of RG1-FK4 and RG1-FK5, respectively. Again, a very important reduction of typical differences is evident. Rms of the differences is about 0.23 arc sec. for RG1-FK4 and 0.12 for RG1-FK5. However, some strong differences are still present.

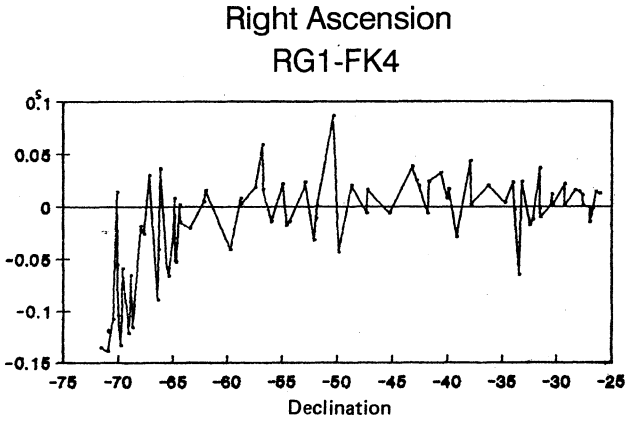

Fig. 1

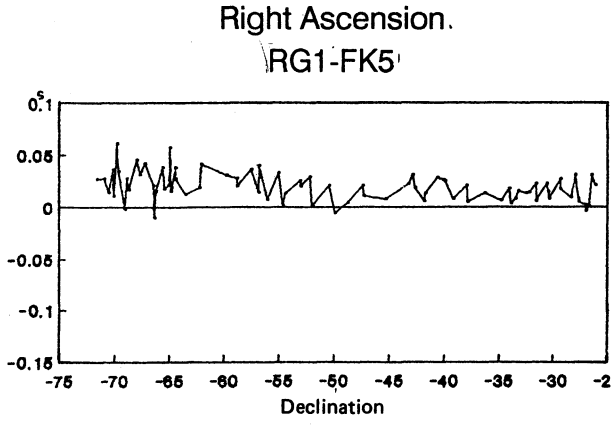

Fig. 2

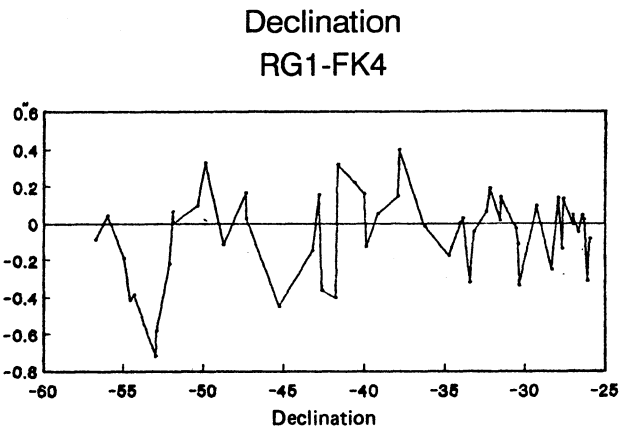

Fig. 3

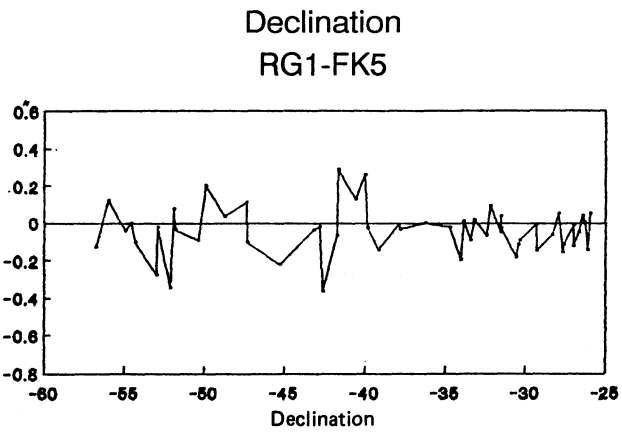

Fig. 4

Then, comparisons between FK5 positions and Perth 70 catalogue were also made to add information to those stars with important RG1-FK5 differences (Table 1). Perth 70 positions were corrected in the same way as RG1 to refer them to J2000 system, and FK5 proper motions were used to transform mean epoch of Perth 70 to 1981.5.

As Table 1 shows, it seems clear that six strong RG1-FK5 differences (indicated with *) may be attributed to RG1 errors. For the remaining stars, RG1-FK5 differences are of the same order as Perth-FK5 ones. Consecuently, these important differences may be due to individual FK5 errors which may reach 0.05 sec. in right ascensions and 0.3 arc sec. in declinations.

TABLE I

Analysis of RG1-FK5 strong differences

R.A.(sec)			DEC.(")		
FK5	Perth - FK5	RG1 - FK5	FK5	Perth - FK5	RG1 - FK5
10	-0.005	+0.057 *	303	+0.05	-0.28 *
196	+0.045	+0.042	306	-0.05	+0.26 *
272	+0.036	+0.040	651	+0.16	+0.20
281	+0.050	+0.046	1159	-0.10	-0.34 *
348	+0.018	+0.061 *	1268	+0.14	+0.29
876	+0.027	+0.041 *	1605	-0.32	-0.22
			1617	-0.25	-0.36

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