# Comparison of preliminary StarMapper positions with Carlsberg meridian circle observations

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ABSTRACT. The process of satellite attitude reconstruction carried out at RGO enables the assumed positions of the stars taken from INCA to be improved. The attitude reconstruction is determined from polynomial fits to the residuals between the observed StarMapper positions and those taken from INCA. The degree of the polynomial is such that smoothing occurs over a typical arc length of about $10^{\circ}$. The positions from different passes are combined, giving a typical internal accuracy for a star of $0''.02$ in RA and Dec. The observations discussed here were accumulated from provisional magnetic tapes received from Darmstadt before the end of 1990.

There were 13,600 stars common to StarMapper (SMp) and Carlsberg Meridian Catalogue No.4 (CMC4) in the declination range $-45^{\circ}$ to $+90^{\circ}$. The stars are predominantly from the IRS and are in the magnitude range 7.0 to 9.0. Two-dimensional plots of the systematic differences in RA and Dec, CMC4–SMp, in the declination range $-35^{\circ}$ to $+80^{\circ}$ were drawn. These were compared with the systematic differences CMC4–FK5 and BORD–FK5 published by Morrison *et al.* (1990).

It is difficult to come to any firm conclusions from this preliminary comparison. In some respects, the StarMapper system seems to follow the FK5 which is the system of INCA. On the other hand, some of the zonal errors in FK5, clearly revealed by BORD and CMC4, are not present in StarMapper. Perhaps these apparently contradictory results can best be understood as follows.

These preliminary results from the StarMapper do not give complete coverage of the sky. There are gaps, and areas with only one or two passes. In regions of poor coverage, StarMapper tends to follow the system of the IRS which is not necessarily coincident with the FK5. In regions of good coverage StarMapper tends to smooth out zonal errors in INCA that are about $10^{\circ}$ in extent. The resultant system of this preliminary StarMapper survey is a hybrid, with some features of INCA but not all of them.

The systematic errors ($0''.1$ to $0''.2$) are an order of magnitude greater than the internal mean errors. This is indicative of correlations in parts of the sky between the attitude reconstruction solutions and the star positions. Of course, these correlations will diminish with greater coverage. The final system of positions from StarMapper (TYCHO) will be fitted to the IDT system which will be free of these zonal errors.

## Reference

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