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ON DETERMINATION OF ZERO-POINTS OF FK5 USING OBSERVATIONS OF MINOR PLANETS IN NIKOLAEV

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2422 photographic observations of 19 selected minor planets (SMP) covering the 1961–1995 interval were obtained at the Nikolaev astronomical observatory NASU (Ukraine) using the zonal astrograph. All of them were reduced to the PPM star catalogue, 12 of the 19 planets having the sufficient number of observations were chosen for processing.

The DE200/LE200 and DE403/LE403 (Standish et al., 1995) planetary ephemerides are used to compute the positions of the Earth and other planets. The equations of motion of the SMP along with the equations of variation were integrated numerically by the 15th order Everhart method taking into account the perturbations from all major planets. In the variant of computations, based on the DE200 ephemeris, the perturbations from 5 minor planets (NN 1, 2, 4, 7, 324) were taken into account. In the second one, based on DE403, the perturbations from 300 minor planets were accounted for. When processing observations the method of least squares was used. Besides the 72 coordinates and components of velocities of the 12 SMP we determined the zero-point corrections of the FK5 and some periodic errors of the catalogue along with the corrections of the longitude of the Sun and the motion of the equinox. Errors of unit weight for the planets have values ranging from 0.15'' (1 Ceres) to 0.21'' (40 Harmonia). The zero-point corrections obtained are $\Delta A = +0.063'' \pm 0.049''$, $\Delta D = +0.058'' \pm 0.005''$; the Sun longitude correction is $\Delta L = +0.031'' \pm 0.048''$; motion of the equinox $\Delta \dot{A} = +0.064'' \pm 0.107''/cy$ when DE200 is taken. When DE403 is taken $\Delta A = +0.093'' \pm 0.051''$, $\Delta D = +0.057'' \pm 0.005''$; $\Delta L = +0.053'' \pm 0.049''$; $\Delta \dot{A} = -0.083'' \pm 0.109''/cy$.

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FUTURE CONTROL OF THE HIPPARCOS FRAME USING MERLIN

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MERLIN¹ radio positions of 20 radio stars are used to link the Hipparcos reference frame to the International Celestial Reference Frame. The accuracy of the link at the epoch 1995.7 using these radio stars is 1.7 milliarcseconds. Further observations are planned to check the accuracy of the link in the future.

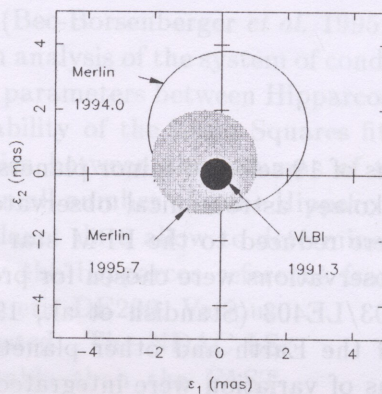


Figure 1: Measurements of the offset in the galactic plane of the origin of the ICRF from that of Hipparcos. The radii of the circles denote one standard error. The dates are the epochs of the determinations.

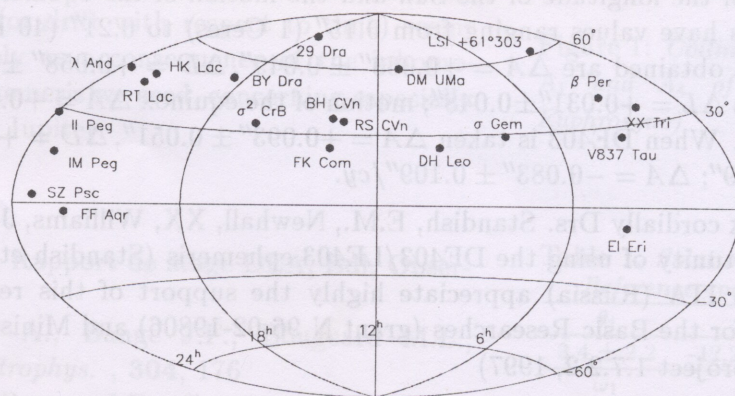


Figure 2: Distribution of link sources.

¹MERLIN is a real-time radio-linked radio interferometer array with a maximum baseline of 217 km, giving a resolution of ~ 40 mas at 5 GHz, operated by the University of Manchester on behalf of the Particle Physics & Astronomy Research Council.