Comparison of original orbits of Oort Cloud new comets given in various catalogues II. Different solutions from different observations

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Recent observational and theoretical studies have greatly revealed the dynamical nature of the Oort Cloud and its evolutionary history. However, many issues are yet to be known. Our goal is to understand current structure of this cloud as well as its dynamical origin. For estimating the current structure of the Oort Cloud, key information lies in the original orbit of the Oort Cloud new comets (OCNCs) that are defined at a distance where these objects do not receive gravitational perturbation from major planets (such as at r = 250 au from the Sun before comets enter into the planetary region). There have been several attempts to obtain OCNC's original orbits, but it never has been an easy task. This requires numerical orbit propagation of the observed comets with high accuracy including perturbation from major disturbing bodies. In addition, non-gravitational forces often play significant roles here. First and foremost, the orbit determination of OCNC includes substantially large uncertainty because of limited number of observational arcs and very large eccentricity of the comets (~1). Here I show our result of comparison of various catalogues of OCNCs' original orbital elements at r = 250 au: So-called the Warsaw catalogue by Krolikowska, the ephemeris given by MPC (Minor Planet Center), and that given by Horizons/JPL. In particular, I pay attention to the difference of the original semimajor axis among the several different solutions that the Warsaw catalogue and the MPC ephemeris have in comparison with the solutions given by Horizons/JPL - such as the difference between the solution 1 in the Warsaw catalogue and the solution from Horizons/JPL, the solutions 1 and 2 in the Warsaw catalogue, the solutions 2 and 3 in the MPC ephemeris and so forth. The resulting orbits that these solutions yield look overall similar, but sometimes they show stark difference for some reason.

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