Damocloids dynamical evolution

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Damocloids are asteroids that move along highly-inclined orbits (some of them are on retrograde orbits), and have Tisserand invariants similar to those for Halley-type comets. Damocloids are believed to be transitional population between Oort-cloud cometary nuclei and Halley-type comets, or inactive nuclei of Halley-type comets. In this paper we performed the task of orbital-evolution modeling for 93 currently known Damocloids, 1 Gyr backward and forward in time, using the integration package SWIFTER. We included the Sun, the eight planets, and Pluto as massive bodies in our simulation. The initial state vectors for test particles and planets were taken from JPL's HORIZONS service. The timestep of integration was 7.305 days. We present the Damocloids orbital parameter distributions and discuss the results of the simulation for Damocloids' inclination changes with time, as well as some of the most interesting individual evolutionary tracks. The dynamic lifetime of the Damocloid population is estimated. It was shown that the population of Damocloids retains highly-inclined orbits during the integration time into the past and into the future. Thus, the population of Damocloids may indeed represent the dynamical relationship of comets on inclined orbits (Halley-type comets) with a hypothetical spherical Oort Cloud.

Acknowledgements: We acknowledge David E. Kaufmann, the author of the Swifter software package, Hal Levison and Martin Duncan, the authors of the previously created Swift package.