

PDC 2019
Washington, DC, USA

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New NEO Characterization Results

Statistics of the close encounters predictions by the world services

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Keywords: close approaches, close encounters, near-Earth asteroids, ephemerides

Moments of the closest approach of near-Earth objects (NEOs) with the Earth and their corresponding minimal distances are usually used to characterize or illustrate impact risks. These quantities result from orbital fitting, and subsequent orbital propagation, using the astrometric and radar data on NEOs collected at the IAU Minor Planet Center (MPC). Such services are provided regularly by the MPC itself (Forthcoming Close Approaches To The Earth [1] and the Running Tallies [2]), the JPL Center for NEO Studies (CNEOS) [3], the ESA SSA-NEO Coordination Centre (NEOCC) [4] through its Space Situational Awareness Programme. The same database of the measurements should imply similarity in the orbital fitting for NEOs if the weighting of the measurements and dynamical modeling are the same. The similarity in orbital elements and orbital propagation for the near future should result in the similarity in the timing and distances of the close encounters with the Earth. We present and analyze statistics of the future close encounters with the Earth within 0.05 AU for the near-Earth asteroids propagated for one year ahead by the various services mentioned above, and the newly opened service DynAstVO of the IMCCE at Paris Observatory PADC centre (see Desmars et al. 2019, this conference). We have found that in several cases, the services do not provide even the same sets of close encounters entries, and different accuracies in the timing and minimal distances calculations with respect to the JPL HORIZONS on-line solar system data and ephemeris computation service [5] taken as the reference here. Moreover, we point out the fact that the number of close approaches in the current predictions is underestimated with respect to the more complete search provided by DynAstVO service [6].

Acknowledgements. Anatoliy Ivantsov, the invited researcher at IMCCE, would like to thank the support provided by Paris Observatory through its transverse activity on space weather and near-Earth objects ESTERS.

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