

X2 – Cross-Division A-F Commission Solar System Ephemerides

During this period, optical observers and data processing centers (MPC, NASA, ESA, NEODyS) consolidated the adoption of the ADES format, which was approved by Commission 20 at the 2015 IAU General Assembly. The transition process is on-going, but important applications are already in place such as the NEO Confirmation Page targets data processing for JPL-Scout and NEODyS-NEOScan computations. The next major challenge is preparing to process the increased flow of astrometric data due to the start of big surveys such as the Vera Rubin Telescope, the NEO Surveyor mission, and the Fly-Eye Telescope. The data flow is expected to increase by up to two orders of magnitude relative to the current data flow, which primarily comes from the operational surveys. In view of this increased data volume, the Minor Planet Center is making the necessary preparations and major software and data flow architecture reviews are undergoing. Similar adaptations are necessary for the other data processing centers. On the planetary side, the next-generation, general-purpose planetary and lunar ephemerides called DE440/DE441 were delivered in 2020 by JPL. Compared to the previous general-purpose ephemerides DE430, seven years of new data have been added with improved dynamical models and data calibration.

Since 2016, three new versions of INPOP planetary and lunar ephemerides have been delivered by the IMCCE team: INPOP17a, INPOP19, and INPOP21a. They benefit from an improved modeling of the Moon rotation and orbit (INPOP17a), the introduction of Bayesian methods for the asteroid mass determination and the regular inputs of Juno, Mars Express and ExoMars data (INPOP19a, INPOP21a). Perturbations by TNOs have been included since 2020 after the introduction of recently analyzed Cassini observations. Constraint on the size of the Moon core has been obtained, INPOP21a gave a better description of the distribution of the mass for the outer solar system and new constraints on dilaton and graviton theories have been published using INPOP19a and INPOP20a.

In 2021 the IAA - Russian Academy of Sciences released a new version of planetary ephemerides, EPM2021, after 4 years since last release.

In 2021 the JPL-Sentry team announced the implementation of a new impact monitoring method that replaces the Line-of-Variations method. This development is important because the new method is fully independent of the previous ones, thus improving the reliability of the results and of the cross-check validation with NEODyS and ESA.