PDC 2017
Tokyo, Japan

Please send your abstract to iaapdc (at) iaamail.org

You may visit www.pdc.iaaweb.org

(please choose one box to be checked)
(you may also add a general comment - see end of the page)

☐ **New NEO Characterization Results**

DynAstVO: the Europlanet orbital Near-Earth asteroid database

Josselin Desmars[a,b,*], Daniel Hestroffer[a], William Thuillot[a], Pedro David[a], Pierre Le Sidaner[c], Stéphane Érard[b]

[a] *IMCCE, Observatoire de Paris, PSL Research University, UMR8028 CNRS, UPMC, Université Lille1, 77 avenue Denfert-Rochereau, F-75014 Paris, France*
[b] *LESIA, Observatoire de Paris, PSL Research University, UMR8109 CNRS, UPMC Univ. Paris 06, Univ. Paris Diderot, Sorbonne Paris Cité (LESIA,), 5, place Jules Janssen, 92190 Meudon, France*
[c] *DIO-PADC, Observatoire de Paris, PSL Research University, UMS2201 CNRS, 61 avenue de lObservatoire, F-75014 Paris, France*

Keywords: NEAs, Orbits, Database

DynAstVO is a new database related to Near Earth Asteroids asteroids. It is developed within the Europlanet 2020 RI and the Virtual European Solar and Planetary Access (VESPA) frameworks. The database provides the orbital elements, observational information, minimum distances with planets and the Minimum Orbit Intersection Distance, orbital uncertainty and the associated covariance matrix and ephemeris in SPICE kernel files. The database is automatically updated, every day, according to the Daily Orbit Update published in Minor Planet Electronic Circulars. When new observations are available at MPC, or a new object is discovered, the new orbit and auxiliary data are automatically computed. The global processing of DynAstVO is presented in Fig. 1.

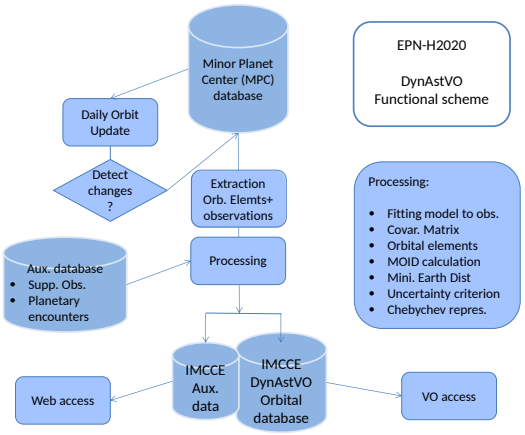

Figure 1: Block diagram of DynAstVO processing

*Josselin Desmars
Email address: josselin.desmars@obspm.fr (Josselin Desmars)

The orbit determination process comes from [1] and consists in an integration of equations of motion and variational equations. Orbital elements are determined by a Levenberg-Marquadt inversion algorithm. The dynamical model takes into account the gravitational perturbations of the Sun, the eight planets, the Moon and Pluto (positions are from INPOP13c [2] and the four main asteroids (Ceres, Pallas, Vesta and Hygiea, with positions preliminary computed by the program), the corrections of relativistic effects of the Sun, the dynamical flatness of Sun and the Earth. Corrections from bias in stellar catalogue following [3] are applied, as well as the weighting scheme.

DynAstVO conforms to EPN-TAP environment [4] and is accessible as webservice through Virtual Observatory protocols or classical web access at the address `http://vespa.obspm.fr/`. Orbital elements are given at two different epochs: one epoch specific to the asteroid which is approximately between the first and last date of the object's observations and one epoch common to all asteroids corresponding to the 1st of July of the current year. SPICE kernel ephemerides are provided for the 1980-2030 period. Auxiliary databases are also produced such as circumstances of minimum distances with inner planets of solar system.

Finally, we present a comparison with other well established databases such as Astorb, MPCORB, NEODyS and JPL, in particular in term of ephemeris and their accuracy. The database will be extended by including MOID data, IP, and post-mitigation tools [5].

Comments:
(Poster)

References

[1] J. Desmars, Detection of Yarkovsky acceleration in the context of precovery observations and the future Gaia catalogue, A&A 575 (2015) A53.

[2] A. Fienga, H. Manche, J. Laskar, M. Gastineau, A. Verma, INPOP new release: INPOP13c., 2014. Scientific notes available on `http://www.imcce.fr/fr/presentation/equipes/ASD/inpop/`.

[3] D. Farnocchia, S. R. Chesley, A. B. Chamberlin, D. J. Tholen, Star catalog position and proper motion corrections in asteroid astrometry, Icarus 245 (2015) 94–111.

[4] S. Erard, B. Cecconi, P. Le Sidaner, J. Berthier, F. Henry, M. Molinaro, M. Giardino, N. Bourrel, N. André, M. Gangloff, C. Jacquey, F. Topf, The EPN-TAP protocol for the Planetary Science Virtual Observatory, Astronomy and Computing 7 (2014) 52–61.

[5] S. Eggl, D. Hestroffer, W. Thuillot, D. Bancelin, J. L. Cano, F. Cichocki, Post mitigation impact risk analysis for asteroid deflection demonstration missions, Advances in Space Research 56 (2015) 528–548.