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Deliverable D6.9

Deliverable Title: Forecast Service of Stellar Occultations by Satellites
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Contributing beneficiaries: IMCCE

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Co-ordinator: Prof Nigel Mason, University of Kent

1. **Nature:** R = Report, P = Prototype, D = Demonstrator, O = Other

2. **Dissemination level:**

PU	PP	RE	CO
Public	Restricted to other programme participants (including the Commission Service)	Restricted to a group specified by the consortium (including the Commission Services)	Confidential, only for members of the consortium (excluding the Commission Services)

Explanation of work carried out in WP:

The *VOccDB* data service provides prediction and parameters of stellar occultations by the main planetary satellites. Observations of stellar occultations help to better determine the size and the shape of the occulting body (target), as well as its astrometric position at the milli-arcsecond level precision, relying on the Gaia catalogue. The service includes such predictions for the coming 10 years (nearly 5000 events). Only the main moons of giant planets Jupiter, Saturn, Uranus and Neptune are considered in the event prediction database. Predictions are provided over the period 2024-2033, up to visual magnitude 12 for the largest satellites and magnitude 14 for smaller ones. For each stellar occultation prediction, the database provides global circumstances and observational data, date and timing of the occultation, star position and magnitude, expected duration and magnitude drop, etc.

This service is delivered by ObsParis / IMCCE as *VOccDB*, and is published and cured by PADC at Observatoire de Paris. It is related to the *MoonsProp* service that was recently published by IMCCE (MS79), which provides the most comprehensive database of the physical and dynamical properties of planetary satellites. The *VOccDB* service is responsive to EPN-TAP, the Virtual Observatory protocol developed in VESPA and approved by IVOA (<https://ivoa.net/documents/EPNTAP>). It can therefore be queried by the VESPA portal and other TAP clients such as TOPCAT; it is fully interoperable with other EPN-TAP services in the field of small bodies by using a common protocol and metadata vocabulary (EPNCore).

The table is exposed here: https://voparis-vespa-client.obspm.fr/planetary/data/display/?&service_access_url=http://voparis-tap-planeto.obspm.fr/tap&service_schema=voccdb

Parameters are explained on this page: <https://epn.imcce.fr/voccdb.html>

The data itself consists in a set of parameters included in the metadata table — it can therefore conveniently be downloaded in TOPCAT which readily provides all sorts of plots/displays (Fig. 1). In addition to a complete description of the observing configuration and predicted properties (e.g. magnitude drop), the table includes parameters related to the VOevents protocol, to enable future uses such as dissemination of alerts to observers, etc. Besselian elements are included to help compute local visibility and circumstances. Global visibility charts are provided for each event. Finally, the ephemerides of the events are provided under Datalink (call to Miriade web service).

Future developments include the extension of the service to predicted stellar occultations by selected asteroids.

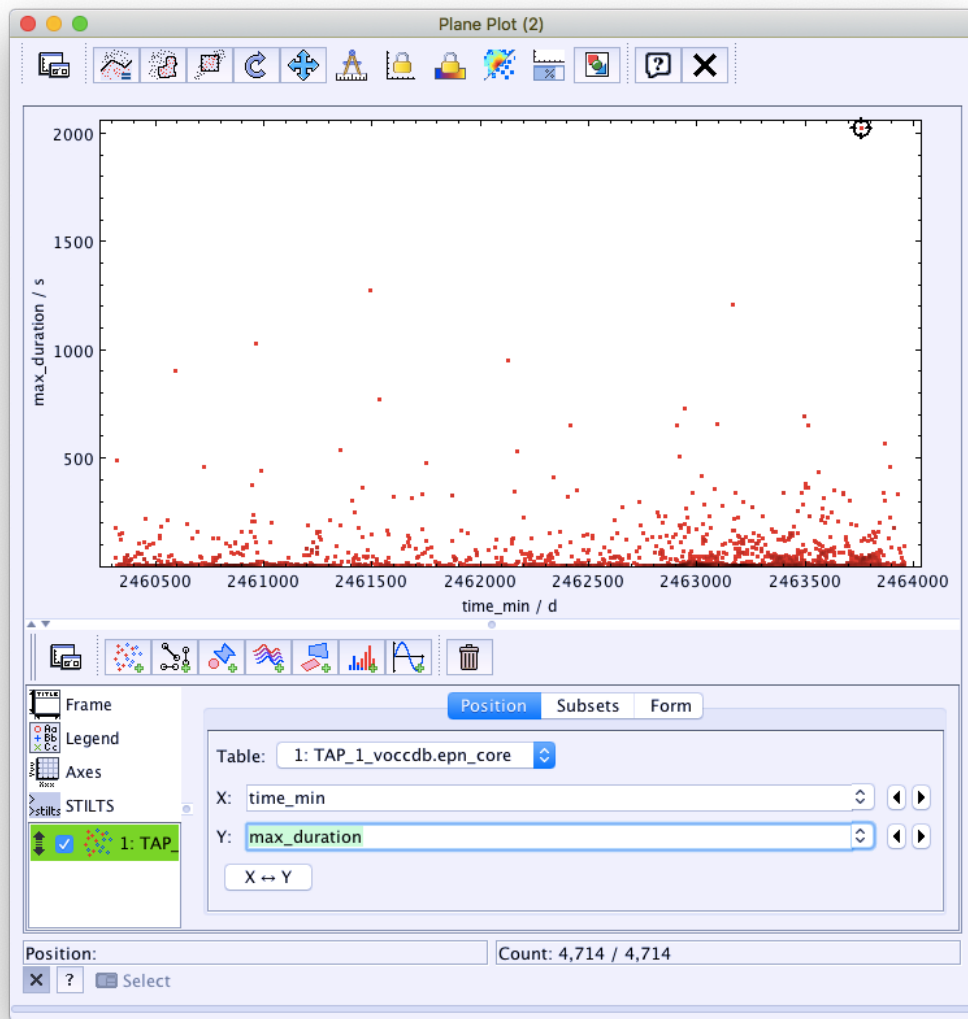


Fig.1: Duration of stellar occultations by satellites in the next 10 years, as plotted in TOPCAT (x = time in Julian Days).