

# EPN-TAP and EPNcore v2.0

S. Erard, B. Cecconi, P. Le Sidaner, M. Demleitner, M. Taylor  
and the VESPA/Europlanet team

IVOA Virtual Interop. Nov 2, 2021



# EPN-TAP / Motivation

- Europlanet EU programme(s): consistent access to Solar System data (including derived data)? VO framework seemed appropriate. Scope = Planetary Science, Heliophysics, exoplanets
- Difficulties:
  - Moving objects / targets, seldom clearly identified in existing archives
  - Targets are resolved: many coordinate systems - related to targets or configurations
  - More diverse types of measurements:
    - Not only (reflected) light, but also particles, e-m fields + laboratory samples
- TAP is adapted to searches in catalogues (one of the main expected usages)
- ObsCore provides similar concepts for general parameters
  - Missing vocabulary to name observing and configuration parameters
    - but this exists to some extent in PDS (space archives) and SPASE (plasma related)
- Missing UCDs for reflected light, in-situ measurements and samples

EPN-TAP = Usual TAP mechanism

EPNCore metadata vocabulary + associated UCDs

Set of rules related to services and tables

# EPN-TAP status

- First published in Astronomy and Computing (Erard et al 2014) — v1.0
- Proto-version 2.0 presented by Baptiste Cecconi at Interop 2015, Sesto
- **Mature v2.0 submitted as a Working Draft to DAL WG, October 2020**  
<https://ivoa.net/documents/EPNTAP/20201027/WD-epntap-2.0-20201027.html>

Presented at Interop, Nov 2020

Relies on publication of 57 data services worldwide (~ 20 teams)

- **Passed PR after last Interop, July 2021**  
<https://www.ivoa.net/documents/EPNTAP/20210721/>

Big update in June / July: doc, UCDs, units, lists of values, some parameter names

- **Finalized version, October 22, 2021** (*please check date*)  
<https://ivoa.net/documents/EPNTAP/>

With detailed check for consistency based on validator, mixin, clients, and 20+ existing services

# Europlanet VESPA: Data services connected via EPN-TAP / field

Open  
Open in test | upgrade required  
Drafted  
Scheduled 2024 (selection)  
• New or upgraded in 2020/21  
• New content in 2020/21

## Atmospheres

- Titan profiles - CIRS (Cassini, LESIA)
- Venus spectroscopy - VIRTIS (VEx, LESIA)
- Mars Climate Database (modeling, LMD)
- Venus profiles - SPICAV/SOIR (VEx, IASB-BIRA)
- Mars profiles - SPICAM (MEx, LATMOS)
  - All MEx derived atmospheric products
  - Venus cloud products (LATMOS)
  - ExoMars/NOMAD (BIRA-IASB)

## Small bodies

- M4ast (ground based spectroscopy, IMCCE)
- 1P/Halley spectroscopy (IKS / Vega-1, LESIA)
- BaseCom (Nançay Obs, LESIA)
- TNOs are cool (Herchel & Spitzer + compilation, LESIA & LAM & Utinam)
- SBNaf (from H2020 prog, Konkoly Obs)
  - Cometary lines catalogue (IAPS)
  - Vesta & Ceres spectroscopy - VIR/DAWN (IAPS)
- DynAstVO: NEO refined parameters (IMCCE)
- MPCorb: Small bodies orbital cat (Heidelberg)
  - Rosetta ground-based support (Edinburgh)
  - 67P illumination config (IRAP)
  - Meteor showers predictions (IMCCE)
  - Occultations predictions, ast & sat (IMCCE)
  - LuckyStar, occultations (ERC prog, LESIA)
  - Natural satellites db (IMCCE)
- VizieR asteroid spectra (LESIA / CDS)

## Solid spectroscopy

- SSHADE ices & minerals spectro (IPAG & network)
  - Planetary Spectral Library (DLR)
  - PDS spectral library (LESIA)
  - Berlin Reflectance Spectral Lib (DLR)
  - Hoserlab (Winnipeg U)

## Surfaces

- CRISM WCS service (MRO, Jacobs U)
- Mars craters (Jacobs U, + update by GEOPS)
- USGS planetary maps WMS (Jacobs U)
- PlanMap: geol maps (H2020 prog, Jacobs U)
  - M3 WMS service (Chandrayaan-1, Jacobs U)
  - HRSC nadir images, WMS (MEx, Frei Univ)
  - OMEGA cubes and maps (MEx, IAS)
- VIMS satellites, w/geometry (Cassini, LPG)
  - MarsSI GIS (Lyon)
  - Global spectral param of Mercury (DLR)

## Magnetospheres / radio

- APIS (HST/Cassini, LESIA)
- NDA (Jupiter & Sun radio, LESIA/CDN)
- AMDA (CDPP / IRAP)
  - MAG data (VEx, IWF Graz)
- MASER & related services (LESIA)
  - RadioJove (LESIA & US amateur network)
  - Iitate HF data of Jupiter (Tohoku Univ, Jap)
  - UTR-2 Juno ground support (Kharkiv)
  - MDISC & JASMIN (modeling, UCL)
  - Cluster & Themis data (IAP, Prague)
  - IMPEx models (from FP7 prog, IWF Graz)
- Hisaki (Tohoku Univ., Jap)
  - Transplanet (CDPP / IRAP)
- LOFAR Jupiter (CBK/PAS, Warsaw)
  - Magnetic field simus (LMSU)
  - ASPERA & MARSIS atm obs (MEx, Iowa U)

## Solar

- HELIO AR & 1T3 solar features (from FP7 prog, LESIA)
- Bass2000 (LESIA)
  - Radio Solar db (Nançay, LESIA)
- CLIMSO (Pic du Midi, IRAP)
- IPRT/AMATERAS (Tohoku Univ, Jap)
- Gaia-DEM (SDO, IAS)
- EIT\_syn (SoHO, IAS)
- e-Callisto (Windisch, Sw)

## Generic / interdisciplinary

- BDIP (LESIA)
- PVOL (UPV/EHU & amateur network)
  - Telescopic planetary spectra collection (LESIA)
  - PSA complete archive (ESA)
- HST planetary data (LESIA, to CADC archive)
  - Catalogues of planetary maps (Budapest)
  - VizieR\_planets: Planetary Science catalogues (CDS)
    - Gas absorption cross-sections (Granada)
    - Planets then satellites characteristics (LESIA/IMCCE)
    - Nasa dust catalogue (IAPS)
    - Stellar spectra, support for observations & exopl. (LESIA)
    - DARTS (JAXA - currently via PDAP)
    - ESAsky planetary data (ESA)
    - Interface with VAMDC (TBD)

## Exoplanets

- Encyclopedia of exoplanets (compilation, LUTH/LESIA)
  - Catalogue of exo disks (LESIA)
  - Interface with DACE (Geneva)
  - ARTECS climate simulations (AOTS/INAF)
  - Atmospheric studies (UCL)
- Exotopo: exoplanet surface simulations (GEOPS)

# EPN-TAP news

- Some feedback and comments collected since last Interop on RFC page, being processed

Please comment (*before Nov 14*):

<https://wiki.ivoa.net/twiki/bin/view/IVOA/EPNTAPV20RFC>

- External inputs (Europlanet, CNES, providers, users, new services) already addressed

## **Support:**

- EPN-TAP validator in taplint / stilts (minor corrections after 3.4-2)
- Several reference implementations
- Existing mixin in DaCHS-bêta, checked and completed (will be included in 2.4.1)
- EPN-TAP tutorial in DaCHS-bêta:

<http://docs.g-vo.org/DaCHS/tutorial.html#epn-tap>

- Existing services are updated using the new mixin, checked with taplint, then manually with VESPA portal & TOPCAT

# Open issues

- Number of parameters will keep growing with more extensions. Need for more UCDs!
- Closed lists of values will be maintained in vocabularies
- Datalink new style being worked out (compliance with DaCHS v2)
  - Need to access datalinks for several granules
- Some flexibility expected in ADQL? Non-ambiguous support of contours, etc
  - Pagination would help
- Extra standards required:
  - Target names (small bodies) => IAU / SSODNet service
  - Coordinate systems => being listed. Body-fixed frames need be OGS compliant
  - Observatory / space mission catalogues and ID => current VO project

# Work Plan

- All existing services are in v2.0, being reviewed and updated to latest version
- Servers to be updated to DaCHS 2.4.1 when released
- Most services preserved on a gitlab at Obs Paris (definition files only)
  
- EPN-TAP services declared in the registry being reviewed  
(many remnants of older versions)
  
- TAP clients can query all services
- Optimized clients: VESPA portal (to be updated); EPN-TAP lib in CASSIS and 3Dview (java)
  
- XSD schema was issued for v1.0, to be updated
- Existing PDS4 dictionary for connecting with space archives