eur●PLANET 2024
Research Infrastructure

H2020-INFRAIA-2019-1

Europlanet 2024 RI has received funding from the
European Union's Horizon 2020 Research and Innovation Programme under

Grant agreement no: 871149

Deliverable D7.5

Deliverable Title:	New release of TOPCAT or report including extended Planetary Science support, with use cases
Due date of deliverable:	31 January 2022
Nature[1]:	Demonstrator
Dissemination level[2]:	PU
Work package:	WP7
Lead beneficiary:	OBSPARIS
Contributing beneficiaries:	
Document status:	Final

Start date of project:	01 February 2020
Project Duration:	48 months
Co-ordinator:	Prof Nigel Mason

---

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)

Executive Summary / Abstract:

VESPA makes extensive use of the existing tools developed in the Virtual Observatory (VO) to support astronomy data. TOPCAT is one of the major VO tools, specialized in handling and visualizing tabular data. Extra functions dedicated to the support of Planetary Science data have been implemented in the past years, in the framework of collaborations within the IVOA. In Europlanet 2024 RI, a series of use cases were identified to guide the development of new functions of interest. This document provides a summary of such functions, implemented since the onset of the programme.

TOPCAT is a java application developed by Mark Taylor at University of Bristol. This current version corresponds to deliverable D7.5 of Europlanet 2024 RI.

1   Graphic functions and I/O

Version 4.7.1 (released in May 2020) already contained improved support for footprints, making plots of image contour and coverages much easier.
This was later refined and extended from user feedback in version 4.7.2 (released in July 2020).

Version 4.8 (released in Jan 2021) included improved support for I/O and statistics.

Formats specific to the planetary science and heliophysics communities are being implemented in the current beta version, to be released early in 2022:

- Implementation of PDS4 tables, to support space mission archives (with detailed inputs from ESA/PSA)
- Consistency with JCDF library for heliophysics
- Extended support for datalink - allowing data providers to handle documents associated to individual granules in data services

VESPA users also benefit from many TOPCAT upgrades triggered by use cases from the astronomy community.

2   Data exchange

TOPCAT includes a SAMP hub to exchange data between VO applications. This allows the user to send data products from the VESPA portal to TOPCAT, but also to exchange information in real time with other VO tools such as Aladin and CASSIS.

SAMP also makes it possible to send data from web pages, although this functionality used to be blocked on https servers. The issue was eventually solved at the onset of the Europlanet 2024 RI programme, except in the Safari browser (on Mac OS).

3   EPN-TAP service validator

Starting with version 4.8.2 (released in Oct 2021), the associated taplint library includes a validator of EPN-TAP services compliant with the current version of the EPN-TAP standard. The existence of such a validator is actually an IVOA requirement to validate EPN-TAP as a VO standard in the coming months.
The validator is kept updated to follow adjustments to the EPN-TAP standard during the final review phase and tests performed on existing data services.
In the current beta version (to be released in Feb 2022), the validation process has also been made more flexible and now allows tables to be checked one by one (as opposed to checking the complete server content).

4   Tutorials

VESPA user tutorials are available on the VESPA GitHub: https://github.com/epn-vespa/tutorials

Several of them demonstrate the use of TOPCAT in specific situations, e. g., Mapping sparse spatial data, Displaying CRISM cubes, Comparing vertical profiles in the atmosphere of Mars, Identifying overlapping images from different services, etc. The TOPCAT documentation itself is rich with examples of applications (http://www.star.bris.ac.uk/~mbt/topcat/sun253.pdf)

5   Availability

The current version of TOPCAT is distributed on the site of the University of Bristol: http://www.star.bris.ac.uk/~mbt/topcat/