

Implementation of an EPN-TAP Service to Improve Accessibility to the Planetary Science Archive

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Abstract

To increase the accessibility of the scientific data from the European Space Agency's (ESA) planetary science and exploration missions, the Planetary Science Archive (PSA) has been redesigned and access to the new web search interface was made available to public during the beginning of 2017. [1]

To complement the web access, a focus has been made to improve the interoperability of the archive in order to provide the scientific community with a means to utilise the wide variety of existing tools and protocols and enhance the exploitability of the planetary data holdings. To this end, an EPN-TAP service has been under development for the PSA, currently in a beta-testing phase. We will present the challenges faced, and possible solutions, in implementing an EPN-TAP service for an archive hosting a significantly large amount of data as well as our experience providing this service for data following the Planetary Data System (PDS) standards.

1. Introduction

The Planetary Science Archive (PSA) is the European Space Agency's (ESA) repository of science data from all planetary science and exploration missions. The PSA provides access to scientific datasets through various interfaces at <http://psa.esa.int/>. All datasets are scientifically peer-reviewed by independent scientists, and are compliant with the Planetary Data System (PDS) standards [7].

In order to maximise the scientific exploitation of ESA's planetary data holdings, significant improvements have been made by utilising the latest technologies and implementing widely recognised open standards. The new PSA, released during the beginning of 2017 [1], supports Geographical

Information Systems (GIS) by implementing the standards approved by the Open Geospatial Consortium (OGC) as well as increasing interoperability with the international community [5] by implementing recognised planetary science protocols such as the PDAP (Planetary Data Access Protocol) [6] and EPN-TAP (EuroPlanet-Table Access Protocol) [2].

2. Multi-mission, multi-format archive

The PSA hosts scientific data from each of the ESA planetary missions, some of which are already in the legacy phase whereas others are actively generating new data sets. The most recent mission to launch, ExoMars2016 [4], is the first of these to provide data following the latest PDS4 standards. When re-engineering the PSA to handle the new standards, challenges have been faced combining the standards into a single consistent model and due to the large quantity of data hosted. Table 1 lists the details of the current science data holdings of the PSA.

Table 1: Details of the current PSA science data holdings as of 28th April 2017.

Mission	Status	PDS Version	No. Scientific Products
Giotto	Legacy	PDS3	2054
Huygens	Legacy	PDS3	7695
SMART1	Legacy	PDS3	604527
Venus	Legacy	PDS3	1130780
Express	Post-Operations	PDS3	57835657
Rosetta			
Mars Express	Operational	PDS3	797809
ExoMars2016	Operational	PDS4	189162

3. EPN-TAP implementation

Efforts to adapt the VO (Virtual Observatory) protocols to planetary data have resulted in the EPN-TAP designed by Europlanet-H2020-RI/VESPA. [2] As EPN-TAP is an extension of the IVOA TAP [3], it is therefore compatible with all the relevant VO tools.

The EPN-TAP service is implemented as a web application and accessed via REST-based HTTP requests. Access to the PSA metadata is provided by an implementation of the EPNCORE parameters as a table in a PostgreSQL relational database. This table is then exposed to the TAP service. One of the main challenges faced has been to provide a service that performs quickly enough given the large number of results that must be queried and returned (potentially several million depending on the query). This may be addressed through the chosen data model implementation and database strategy. The other main challenge has been how to provide the service based on PDS products and retrieve the necessary search parameters from the data.

4. Summary and Conclusions

The re-engineered PSA has a focus on improved access and search-ability to ESA's planetary science data. In addition to the new web interface released in January 2017, the new PSA supports several common planetary protocols in order to increase the visibility and ways in which the data may be queried and retrieved.

Work is on-going to provide an EPN-TAP service covering as wide a range of parameters as possible to facilitate the discovery of scientific data and interoperability of the archive.

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