

VESPA: Developing the Planetary Science Virtual Observatory

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Abstract

One goal of the Europlanet-RI programme was to set the basis for a European Virtual Observatory (VO) in Planetary Science. The objective in this initial step was to save time during searches in big archives and small databases, as well as to facilitate data access and visualization. The system is based on a new access protocol based on TAP, a specific client to query the available services, and intensive recycling of tools developed for the Astronomy VO. Some new databases were also produced in the Europlanet-RI framework. This system will be extended to all fields of Planetary Science in the frame of the Horizon 2020 programme, and open to external data providers.

1. Introduction

A prototype Virtual Observatory dedicated to Planetary Science has been set up in the framework of the Europlanet-RI program. Most of the activity was dedicated to the definition of standards to handle data in this field. The aim was to facilitate searches in big archives as well as sparse databases, to make on-line data access and visualization possible, and to allow small data providers to make their data available in an interoperable environment with minimum effort. This system makes intensive use of studies and developments led in Astronomy (IVOA), Solar Science (HELIO), and space archive services (IPDA). It remains consistent with extensions of IVOA standards.

2. Architecture

The architecture is to connect existing data services with IVOA protocols (Cone Search, TAP...) or with the IPDA protocol (PDAP) whenever relevant (Fig. 1). However, a more general standard has been devised to handle the specific complexity of Planetary Science, e.g. in terms of measurement types and coordinate frames. This protocol, named EPN-TAP, is based on TAP and includes precise requirements to describe the contents of a data service. Those are declared in standard IVOA registries. A light framework (DaCHS/GAVO) and a procedure have been identified to install topical data services, and several hands-on sessions have been organized in the past two years.

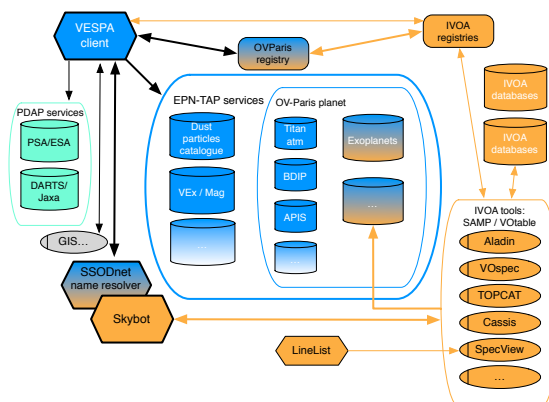


Figure 1: Data access and visualization services. The origin of the standards and tools is indicated (orange: IVOA, blue: Europlanet, cyan: IPDA, gray: OGC)

A full client called VESPA has been developed at VO-Paris (Fig. 2). It is able to use all the mandatory parameters in EPN-TAP, plus extra parameters from individual services. The results can be sent to VO visualization tools such as TOPCAT, SpecView, or Aladin though the SAMP protocol. Demonstrators have been implemented to send images in opensource GIS tools and build mosaics, and to read and visualize PDS3 data files on-line. A resolver for target names and an ephemeris service are also available.

3. Horizon 2020

The Europlanet Consortium will answer a call for research infrastructures in Horizon 2020. This project includes a follow-on of the VO activity aimed at distributing more data, and improving the connected tools. This activity is also called VESPA, which stands for Virtual European Solar and Planetary Access.

The activity will be organized around 5 science themes (surfaces, atmospheres, small bodies, magnetospheres, spectroscopy). The science themes will setup new, selected data services, and will work on improving the interfaces between domains. Of particular importance is the study of an interoperable link between the VO and Geographic Information Systems now currently used for planetary surfaces; the SSHADE project is a network of about 15 European spectroscopy laboratories that will distribute their data in a consistent service accessible to observers in support of data interpretation; projection of high-resolution data on shape models of small bodies will be made possible; several large data services related to atmospheres and plasma environments will be also become interoperable. Actions common to all science themes will be grouped in tasks: tools & interfaces, workflows, standards & sustainability. The latter will be in charge of formalizing the Europlanet standards and have them validated by higher-level consortia (IVOA,

IPDA, IAU...). This will insure the sustainability of the Planetary Science VO after the end of the programme.

An important part of the program will consist in annual calls for new data services open to the community. The selected teams will get dedicated support to set up EPN-TAP services from their data, typically corresponding to published works. The benefit for the teams will be in terms of visibility of their science work, and VO techniques knowledge transfer. We expect to be able to implement 15 such services during the program lifetime. In addition, a few significant amateur services will be considered for implementation in the same system. Training of potential users is also a crucial part of the program, and will focus on tutorials and hands-on sessions during conferences in Europe (see session MTI6 in this conference).

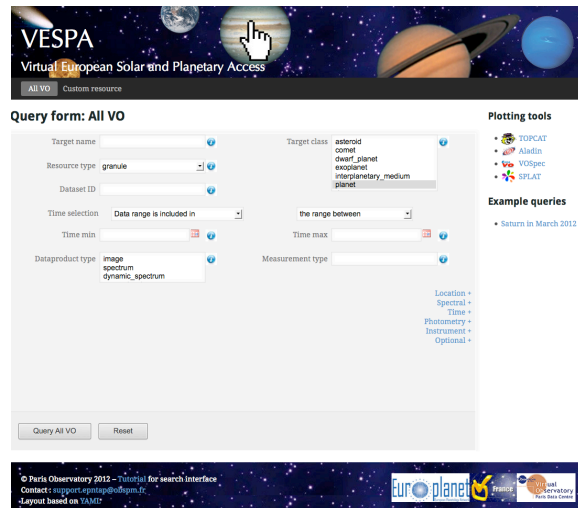


Figure 2: VESPA interface:
<http://voparis-europlanet-new.obspm.fr>

Acknowledgements

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