

Study of an Open Web Mapping Service for ESA's Planetary Surface Data Sets

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1 Background

The Open Geospatial Consortium (OGC) is the international standards organization that establishes and promotes the development and implementation of open standards for Earth-based geospatial content and web services [1]. Geographic Information System (GIS) applications that implement these standards have become invaluable tools for researchers to efficiently capture, manipulate, visualise, fuse and analyse geospatial data sets from various sources.

During the last decade, the planetary mapping science community has increasingly been adopting the tools and standards used in Earth science. There is an ongoing effort to produce and share cartographic products through OGC Web Services, or as standalone products, so that they are readily usable in existing GIS applications [2][3].

In addition to these efforts, the International Planetary Data Alliance (IPDA) is developing and promoting standards like the Planetary Data Access Protocol (PDAP) to ensure interoperability among planetary science archive systems [4]. The PDAP is a fairly simple but extendable protocol based on the PDS Dictionary and Data Model. Although it is not designed to process raster map products, it already offers partial support for cartographic meta-data associated to map-projected data.

2 Rationale

Data from all of ESA's planetary missions are made available via the Planetary Science Archive (PSA) [5]. All PSA data are compliant with NASA's Planetary Data System (PDS) standards and formats, and can be accessed through the developing PDAP protocol and a number of Java-based graphical user interfaces. However, the data themselves and the user interfaces currently lack full interoperability with existing Planetary OGC Web Services and GIS-ready products and

tools. This makes it difficult for PSA end-users to process their mapping data of interest and prepare them for scientific analysis. Figure 1 illustrates the missing 'bridge' between the PSA interface and OGC-compliant mapping applications.

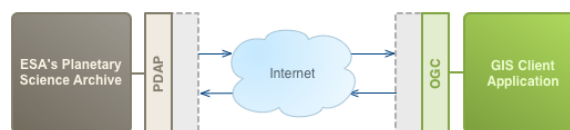


Figure 1: Bridging PDAP and OGC protocols

3 Study Overview

The aim of this study is to understand how open GIS technology and standards can be used to manage, process, and stream the geospatial content of the PSA archive across the Internet into existing mapping applications and software libraries.

To support this goal, we will design and develop an OGC-compliant web mapping service prototype providing a specific interface for client applications to search, process, retrieve and visualise the Mars Express/OMEGA mapping spectrometer data [6] currently available in the PSA.

The interface will be designed to accommodate future needs as additional planetary surface data become available or additional functionalities are required. It is anticipated that this web mapping service will provide a practical open framework contributing to the international efforts to define an extension of the PDAP data model for planetary surface data [7][8].

Although it has been demonstrated that OGC web mapping standards can be applied to the planetary science domain, they have limitations that currently prevent the use of their full capability. This study will document such limitations and feed potential recommendations into the Planetary OGC Interoperability

Experiment (Planetary IE), an international initiative coordinated by USGS Astrogeology Science Center to ensure that the planetary community will properly leverage future OGC specifications [9].

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References

- [1] Open Geospatial Consortium (OGC), <http://www.opengeospatial.org>
- [2] Hare and Plesea. Planetary GIS Updates for 2007. 39th Lunar and Planetary Science Conference (2008)
- [3] Frigeri et al. A working environment for digital planetary data processing and mapping using ISIS and GRASS GIS. Planetary and Space Science (2011)
- [4] International Planetary Data Alliance (IPDA), <http://planetarydata.org>
- [5] ESA's Planetary Science Archive (PSA), <http://www.rssd.esa.int/psa>
- [6] OMEGA Experiment to Archive Interface Control Document, <http://goo.gl/41x7V>
- [7] JRA4 Task #2: Interoperable Data Access, <http://goo.gl/TTkA7>
- [8] IPDA GIS Project, <http://goo.gl/xmafD>
- [9] Hare et al. Planetary OGC Interoperability Experiment. 42th Lunar and Planetary Science Conference (2011)