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First Prototype of a Web Map Interface for ESA's Planetary Science Archive (PSA)

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Abstract

We present a first prototype of a Web Map Interface that will serve as a proof of concept and design for ESA's future fully web-based Planetary Science Archive (PSA) User Interface.

The PSA is ESA's planetary science archiving authority and central repository for all scientific and engineering data returned by ESA's Solar System missions [1]. All data are compliant with NASA's Planetary Data System (PDS) Standards and are accessible through several interfaces [2]: in addition to serving all public data via FTP and the Planetary Data Access Protocol (PDAP), a Java-based User Interface provides advanced search, preview, download, notification and delivery-basket functionality. It allows the user to query and visualise instrument observations footprints using a map-based interface (currently only available for Mars Express HRSC and OMEGA instruments).

During the last decade, the planetary mapping science community has increasingly been adopting Geographic Information System (GIS) tools and standards, originally developed for and used in Earth science. There is an ongoing effort to produce and share cartographic products through Open Geospatial Consortium (OGC) Web Services, or as standalone data sets, so that they can be readily used in existing GIS applications [3,4,5].

Previous studies conducted at ESAC [6,7] have helped identify the needs of Planetary GIS users, and define key areas of improvement for the future Web PSA User Interface. Its web map interface shall will provide access to the full geospatial content of the PSA, including (1) observation geometry footprints of all remote sensing instruments, and (2) all geo-referenced cartographic products, such as HRSC map-projected data or OMEGA global maps from Mars Express. It shall aim to provide a rich user experience for search and visualisation of this content using modern and interactive web mapping technology. A comprehensive set of built-in context maps from external sources, such as MOLA topography, TES infrared maps or planetary surface nomenclature, provided in both simple cylindrical and polar stereographic projections, shall enhance this user experience. In addition, users should be able to import and export data in commonly used open-GIS formats. It is also intended to serve all PSA geospatial data through OGC-compliant Web Services so that they can be captured, visualised and analysed directly from GIS software, along with data from other sources. The following figure illustrates how the PSA web map interface and services shall fit in a typical Planetary GIS user working environment.

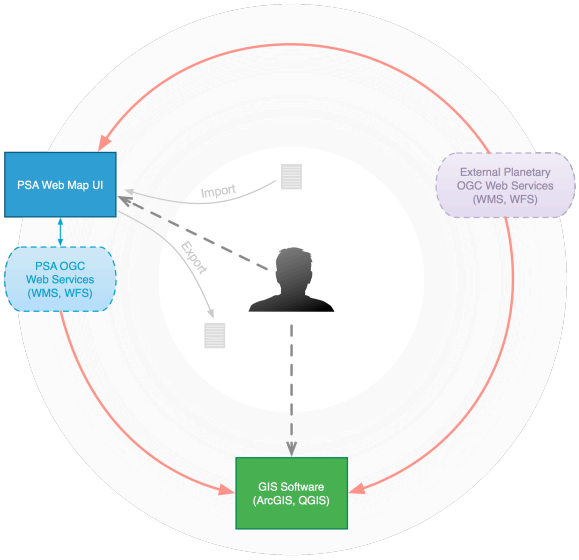

Figure 1: Planetary GIS user working environment

To consolidate the users requirements for such a web map interface and services, we are developing a first Web Map Interface prototype to explore functional as well as technical possibilities and issues, and to collect feedback from voluntary test users. The driving missions for the development of the future PSA User Interface are ExoMars 2016 (Trace Gas

Orbiter) and BepiColombo. We will therefore focus first on the ingestion of existing Mars Express surface mapping instruments data (HRSC and OMEGA), and the subsurface and atmosphere instruments data (MARSIS and SPICAM). We will then incorporate a subset of mapping instruments data from NASA's Messenger mission, and study the inclusion of simulated observation geometry footprints for BepiColombo.

The prototype back-end architecture will be implemented using open-source GIS frameworks: PostgreSQL/PostGIS for the database, MapServer and GeoServer for the web publishing module, OpenLayers and GeoExt for the web mapping client. Interfaces with existing GIS front-end software (such as ArcGIS or QGIS) will be investigated and tested in a second phase.

References

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