GIS ARCHITECTURE AND APPLICABILITY ON THE PLANETARY SCIENCE ARCHIVE. R. Docasal[1] , I. Barbarisi[1] , J. Saiz[1] , C. Rios[1] , A. Montero[1] , C. Laantee[1] , J. Osinde[1] , J. Ruano[1] , S. Besse[1] , J. Arenas[1] , B. Merin[1] , C. Arviset[1], [1]ESA/ESAC Camino Bajo del Castillo s/n, Ur. Villafranca del Castillo, 28691 Villanueva de la Cañada, Madrid, Spain, rdocasal@sciops.esa.int

Introduction: Geographical information systems (GIS) are becoming increasingly used for planetary science. GIS are computerised systems for the storage, retrieval, manipulation, analysis, and display of geographically referenced data.

Some data stored in the Planetary Science Archive (PSA)[1] have spatial metadata associated to them. To facilitate users in handling and visualising spatial data in GIS applications, the PSA should support interoperability with interfaces implementing the standards approved by the Open Geospatial Consortium (OGC). These standards are followed in order to develop open interfaces and encoding that allow data to be exchanged with GIS Client Applications such as OpenLayers. Access to this data for use in web applications can be provided through OGC Web Service (OWS) implementations. An existing open source server is GeoServer, an instance of which has been deployed for the PSA, that uses the OGC standards to allow the sharing, processing and editing of data and spatial data through the Web Map Service (WMS) and Web Feature Service (WFS) standards. On the back-end side, a PostgreSQL/PostGIS instance allows the spatial queries.

The final goal is to convert the PSA (accessible through http://psa.esa.int) into an archive which enables science exploitation of ESA's planetary missions datasets. This can be facilitated through the GIS framework, offering interfaces (both web GUI and scriptable APIs) that can be used more easily and scientifically by the community, and that will also enable the community to build added value services on top of the PSA.

Some of the current operational ESA planetary missions, such as Mars Express, ExoMars 2016, and BepiColombo, as well as other futures such as ExoMars 2020, Juice…etc will benefit of a GIS tool to visualize their targets (Mars, Mercury, Jupiter…) allowing spatial queries to retrieve geometrical information like features, footprints, rover path tracking, rover drill sites…etc.

GIS architecture: The PSA relies on 3-tiered system for the GIS architecture (see Figure 1). The database layer is composed by a PostgreSQL database with the PostGIS extension to store the spatial info. The server layer has a GeoServer as a map server which offers the web application (implemented with Vaadin) the WMS and WFS answers in some formats such as Geojson, xml…etc. Finally, the client layer is defined by a browser which renders the map through the OpenLayers library. Other external GIS tools like QGIS might be used to get the PSA spatial data through either the GeoServer or the database.

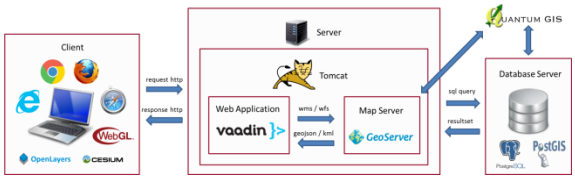

Figure 1: GIS architecture diagram for the PSA

GIS applicability: GIS technology on the PSA will offer a common way to filter (by mission, instrument, target, dates, geometry…) and search for spatial data, even for legacy missions, thanks to the homogenization of the geometrical information performed by the Geogen tool. There are two main use cases: Spatial data retrieval of PDS3/PDS4 products based on a criteria search and the possibility of selecting PDS3/PDS4 products from a particular area of interest (by either zooming or drawing). All of this within a friendly environment which will allow the user navigate through the layers, pan, zoom…etc. ExoMars 2020 will bring useful use cases related to the Rover such as its path tracking, drill sites, mosaicked images location…etc. The map view is integrated on the current PSA (see Figure 2) as the other views (Table, Image) giving other perspective of displaying results when it comes to search for spatial data.

Figure 2: GIS applicability in the PSA

References: [1] Besse, S. et al., (2017) Planetary and Space Science;