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ESA's Planetary Science Archive: Status, activities and strategy

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1. Introduction

The European Space Agency's Planetary Science Archive (PSA) is the central repository for all scientific and engineering data returned by ESA's planetary missions, making them accessible to the world-wide scientific community.

The PSA currently holds data from Mars Express, Venus Express, SMART-1, Huygens, Rosetta and Giotto, as well as several ground-based observations of comets. It will be used for archiving on ExoMars, BepiColombo and for the European contributions to Chandrayaan-1.

The PSA team is currently working on transferring to a new archiving standard for our future missions, and is developing a strategy that will greatly improve the service provided to our user community.

2. The PDS Standards: current status

It was decided at an early stage that in order to maximise the cross-compatibility of ESA and NASA data, all PSA holdings would comply with NASA's PDS Standards for formatting and labelling files.

Currently, all legacy and active missions are archived following the so-called 'PDS3' standards, which were the most current version available at the time of mission acceptance for Huygens, SMART-1, Mars Express, Venus Express and Rosetta.

The Standards are based around a 'Data Dictionary' containing a set of keywords that can be used to provide all of the information required to access and analyse the science data.

PSA maintain their own 'PSA Data Dictionary', built up from the PDS version and appending many of their own 'local data dictionaries' to specify information pertinent only to individual ESA missions.

2.1 The future: PDS evolution and the IPDA

The PDS is currently completing a radical overhaul of its archiving standards to the so-called 'PDS4'. This will entail not only an update to the rules and recommendations for archiving and preserving data long-term, but also a change to the language used to describe all data, from ODL to XML.

PDS4 aims to provide a framework for capturing planetary science data results in international archives based on a homogeneous set of standards that can be extended as needed for international usage. Indeed, one of the key drivers has been to enable international adoption of the standards, and NASA has been very open to inputs from other international archiving agencies throughout the development process.

One major focus of international involvement has been the International Planetary Data Alliance (IPDA), an international collaboration of space agencies with a mission of providing access to scientific data returned from Solar System missions archived at international data centers. PSA provides the ESA membership of the IPDA.

A key IPDA project that is currently underway is the implementation of the new PDS4 data standards within agencies outside of NASA. PSA are co-leading this project, using the upcoming BepiColombo and ExoMars 2016 missions to

develop our first PDS4 data models. This will form the basis of the future PSA content and is a vital part of our development strategy.

Other active projects in 2014 include the implementation of interoperability for sharing of the Chandrayaan-1 data, and the development of recommendations for managing international archive colaborations.

3. PSA Data Access

The PSA offers several interfaces to query and retrieve data from the PSA archive.

A java-based user interface provides advanced search, preview, download, notification and delivery basket functionality. You can search at the data set or data product level using a wide variety of query parameters (illumination condition, planetary features, instrument modes, etc). Visual querying of geographically referenced data, currently available only for Mars Express HRSC and OMEGA instruments, is also possible.

In addition to this interface, the PSA provides access to all publicly available data via an anonymous FTP server. Unlike the other interfaces, it has no search capability but you can quickly browse the content of the archive using the FTP-client application of your choice.

Lastly, expert users can develop software applications that need to query and retrieve data from the PSA archive by bypassing the java-based user interface. This is made possible by the ESA's Planetary Archive InterOperability system (PAIO). The PAIO is a server-side implementation of the Planetary Data Access Protocol (PDAP) being developed by the International Planetary Data Aliiance (IPDA) in order to enable interoperability of planetary data archive systems.

3.1 The future: Map searches and GIS functionality

Recently, the PSA has established a technical working group to explore the possibilities in terms of providing GIS support and accessibility through the PSA interfaces and data holdings [1]. Details of this activity are presented in a separate abstract [1], and

will be one of the focal pints in terms of generating requirements and a strategy for the future PSA.

4. PSA User Group

A major focus for the PSA in 2013 was the establishing of the PSA User Group (PSA-UG), and the set up of their first meeting. The PSA-UG is comprised of 6 members chosen to ensure an appropriate range of expertise in disciplines important for the PSA. They shall be a major driver for the future development of the PSA and its data content, and will be a focus for the interests of the scientific community. In 2013, a questionnaire has been distributed to the community, requesting feedback on the PSA activities and support. 2014 has seen a follow up questionnaire and the first recommendations from the PSA-UG. See http://archives.esac.esa.int/psa/psa-ug for details.

5. Conclusion

The PSA is the core repository for science data from all of ESA's planetary missions. There is a clear strategy to evolve the PSA services and content to meet the needs of the current user community. The involvement of the community in the process of development is key, and the PSA User Group has been established with this in mind.

The future is bright for the PSA, and the upcoming BepiColombo and ExoMars 2016 missions will benefit fully from the changes being planned and implemented in the coming months and years.

References

[1] Manaud, N. et al., First Prototype of a Web Map Interface for ESA's Planetary Science Archive (PSA), EPSC, 8-12 September 2014, Portugal, 2014.