

THE NEW PLANETARY SCIENCE ARCHIVE (PSA): EXPLORATION AND DISCOVERY OF SCIENTIFIC DATASETS FROM ESA'S PLANETARY MISSIONS.

S. Besse¹, C. Vallat¹, I. Barbarisi¹, C. Arviset¹, G. De Marchi², M. Barthelemy¹, D. Coia¹, M. Costa¹, R. Docasal¹, D. Fraga¹, E. Grotheer¹, D. J. Heather¹, T. Lim¹, A. Macfarlane¹, S. Martinez¹, C. Rios¹, F. Vallejo¹, J. Saiz¹

¹ESA/ESAC Camino Bajo del Castillo s/n, Ur. Villafranca del Castillo, 28692 Villanueva de la Canada, Madrid, Spain; ²ESA/ESTEC, 2200 AG Noordwijk, Netherlands

Introduction: The Planetary Science Archive (PSA) is the European Space Agency's (ESA) repository of science data from all planetary science and exploration missions. The PSA provides access to scientific datasets through various interfaces at <http://psa.esa.int> [1]. All datasets are scientifically peer-reviewed by independent scientists, and are compliant with the Planetary Data System (PDS) standards.

The PSA is currently implementing a number of significant improvements [2], mostly driven by the evolution of the PDS standard, and the growing need for better interfaces and advanced applications to support science exploitation.

Space missions and targets available at the PSA: As of the end of 2016, the PSA is hosting data from all of ESA's missions that explored the Solar System, excluding the Sun and the Sun-Earth interactions addressed by the Heliospheric archive of ESA. This includes ESA's first planetary mission Giotto that explored the nucleus of comet 1P/Halley with a 800km flyby in 1989. Science data from the Venus Express spacecraft that orbited Venus for several years, the Mars Express mission that is still orbiting Mars and observing its moons Phobos and Deimos, and the SMART-1 mission that explored the Moon are available at the PSA. Data products from the descent module Huygens that explored the surface of Titan for the first time are accessible through the PSA as well. The PSA also contains all science data from Rosetta, perhaps the most ambitious mission of ESA's Solar System exploration programme to date, with the exploration of comet 67P/Churyumov-Gerasimenko and asteroids Steins and Lutetia. The year 2016 has seen the arrival of a new ESA mission with the ExoMars 2016 data being ingested into the PSA.

In the upcoming years, at least three new projects are foreseen to be fully archived at the PSA. The first datasets from the BepiColombo mission will be ingested after the launch scheduled in 2018. Following BepiColombo will be the ExoMars Rover Surface Platform (RSP) that is expected to navigate on the surface of Mars in 2020. The upcoming Jupiter ICy moon Explorer (JUICE) will also archive its observations of Jupiter, the Galilean satellites and the numerous objects of the Jupiter system in the PSA.

In addition to ESA's missions, a few ground-based support programmes are also available. This is in particular the case for the Venus Express and Rosetta

ground-based support.

Development: The newly designed PSA enhances the user experience and significantly reduces the complexity for users to find their data by promoting one-click access to the scientific datasets with more specialised views when needed. This includes a better integration with Planetary Geographical Information System (GIS) analysis tools and Planetary interoperability services (search and retrieve data, supporting e.g. PDAP, EPN-TAP). It will be also up-to-date with versions 3 and 4 of the PDS standards, as PDS4 will be used for ESA's ExoMars and upcoming BepiColombo missions. Users will have direct access to documentation, information and tools that are relevant to the scientific use of the dataset, including ancillary datasets, Experiment-to-Archive ICD (EAICD) or Software Interface Specification (SIS) documents, and any tools/help that the PSA team can provide. A login mechanism provides additional functionalities to the users to help their searches (e.g. saving queries, managing default views).

Roadmap: The PSA released its new interface in January 2017. The home page (Figure 1) provides a direct and simple access to the scientific data, aiming to help scientists to discover and explore their content. Users will also have access to documentation, information and tools relevant to the scientific use of the dataset. The archive can be explored through a set of parameters that allow the selection of products through space and time (Figure 2). Quick views provide information needed for the selection of appropriate scientific products.

During the year 2017, the PSA team will focus their efforts on developing a map search interface using GIS technologies to display ESA planetary datasets, an image gallery providing navigation through images to explore the datasets, and interoperability with international partners (i.e. NASA, JAXA, ISRO, ROSCOSMOS, etc.)

Furthermore, additional metadata will be made searchable through the interface (i.e., geometry), and with a dedication to improve the content of 20 years of space exploration.

References: [1] Besse, S. et al., (2017) Planetary and Space Science (submitted); [2] Macfarlane, A. et al., (2017) Planetary and Space Science (submitted).

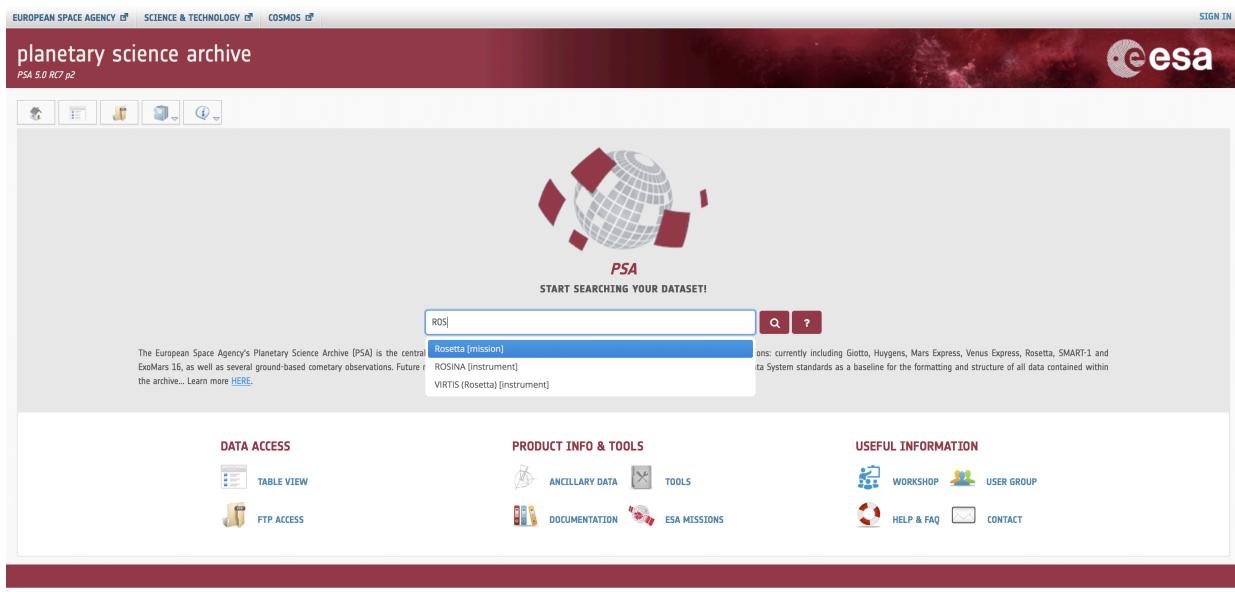


Figure 1. Home page of the new Planetary Science Archive. Icons at the bottom link to various services that the PSA offers such as access to important documentation, contact form, etc. At the center, the search bar provides rapid access to data products from a mission, a target or a specific instrument.

Product Identifier	Start Time	Stop Time	Target	Mission	Instrument	Processing Level
ROS_CAM1_20160930T005910	2016-09-30 00:59:09	2016-09-30 00:59:12	67P/C-G	Rosetta	NAVCAM	2
ROS_CAM1_20160930T002749	2016-09-30 00:27:48	2016-09-30 00:27:51	67P/C-G	Rosetta	NAVCAM	2

Figure 2. Display of the results after an initial query on the instrument NAVCAM and a refinement of the time period for the last day of operation of the Rosetta spacecraft (September 30th, 2016). All the results are displayed as a list, if the number of results is above 5000 products it is paginated. On the left side, the filter menu offers additional parameters to refine the query (e.g., Targets, Processing level, etc.). On the right side, the detail panel displays additional information as well as a visualisation of the browse products if available. Both panels are retractable to optimize the visualisation of the products list.