esac

European Space Astronomy Centre
P.O. Box 78
28691 Villanueva de la Cañada
Madrid
Spain
Tel. (34) 91 813 1100
Fax (34) 91 813 1139
www.esa.int

PSA USER MANUAL

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CHANGE LOG

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Update Annex A	4	0	04/05/2017
Update PDAP example urls	5	0	05/05/2017
Fix typos and formatting	6	0	09/05/2017
Update Browsing optimization	7	0	10/05/2017
Use friendly names	8	0	05/06/2017
(no change)	-	0	14/09/2017
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Milliseconds inclusion	11	0	08/01/2018
EPN-TAP service	12	0	06/02/2018
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Fix issues and update outdated information	14	0	10/04/2018
Replace screenshots and edit table/image view descriptions	15	0	05/06/2018
Merging 8.1 and 8.2 sections	16	0	25/05/2018
Fix some CQL parameters format	17	0	25/05/2018
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Added reason why OMEGA EXT6 release 7 is missing in section 6.1	20	0	22/10/2018
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Including more CQL examples	22	0	30/11/2018
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Updated for PSA release 5.7-beta2	23	1	28/03/2019
Updated for PSA release 5.8	24	0	20/02/2019
Included Advanced Search Panel	24	1	24/06/2019

Updated by a full review of the document	24	2	21/08/2019
Add CQL example for PDS4	24	3	28/08/2019
Updated annex sections	24	4	29/08/2019
Updated 1.1 and 1.3	24	5	03/09/2019
PDAP metadata information updated	24	6	04/09/2019
FTP information updated	24	7	29/10/2019
Machine Access Interface updated	24	8	29/10/2019
Updated MEX geogen sets included	24	9	30/10/2019
User Interface updated	24	10	04/11/2019
Corrected Annex B examples	24	11	05/11/2019
Updated Section 2	24	12	12/11/2019
Updated User Interface	24	13	12/11/2019
Updated Annex B	24	14	13/11/2019
Updated Section 3.4.1	24	15	28/01/2020
Updated Section 2.4	24	16	02/03/2020
Updated Section 3.2.2.2.1	25	0	01/06/2020
Added Section 3.2.2.2.2	25	1	02/06/2020
Updated Section 3.3.1	25	2	08/06/2020
Updated Section 3.2.1.2 and Annex B	25	3	11/06/2020
Updated Sections 3.2.2.1 and 3.2.2.1.2	25	4	11/06/2020
Updated Operators Case insensitiveness	25	5	30/06/2020
Add map view section and update screenshots	25	6	20/08/2020
Updated map view section infomration and screenshots	25	7	12/11/2020
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67P Orbital update	26	1	03/02/2021
FTP links updated	27	0	09/09/2021

CHANGE RECORD

Reason for change	Issue.Revision	Date	Pages	Paragraph(s)
Update CQL Section	1.0	21/03/2017	"page 15	Annex A"
Update Product identifier	2.0	04/05/2017	"page 23, 3.3 section Table headers & columns subsection"	Removing “except product identifier”
Update Subinstruments	3.0	04/05/2017	"page 13, 3.2.1 section Instruments subsection"	"Adding “This is applicable to ExoMars 2016, Rosetta, Mars Express and Venus Express.”
Update Annex A	4.0	04/05/2017	Annex A	"Adding target_id and subinstrument_id elements. Items are also displayed by alphabetical order to be much easier

				to find them."
Update PDAP example urls	5.0	05/05/2017	"pages 32,33,35"	Changing friendly names by original names in the URLs
Fix typos and formatting	6.0	09/05/2017	All document	Corrected typos and formatting throughout the document
Update Browsing optimization	7.0	10/05/2017	page 8	"Adding the following text: It is important to mention that the user interface is optimized for Chrome, Firefox and Safari browsers."
Use friendly names in CQL fields	8.0	05/06/2017	-	Update CQL field names to use *_name attributes for friendly names
No change in content (updated version to be aligned with software version)	-	14/09/2017	-	-
Update User Interface sections Filter Menu, Table View and Product Detail	9.0	29/11/2017	"pages 13, 15, 16, 20 - 22, 24 - 28"	Changing the descriptions and screenshots to match the changes in the software UI
Milliseconds removal	10.0	14/12/2017	"pages 14,15,23,27"	Milliseconds have been removed temporarily
Milliseconds inclusion	11.0	08/01/2018	"pages 13, 15, 16, 20 - 22, 24 - 28"	Adding milliseconds stuff
EPN-TAP service	12.0	06/02/2018	pages 45 - 57	EPN-TAP service usage notes
Add Image View section	13.0	09/03/2018	pages 30 - 33	Create a new section which describes the Image View
Fix issues and update outdated information	14.0	10/04/2018	"pages 11-14, 17-19, 34, 35, 68"	-
Replace screenshots and edit table/image view descriptions	15.0	05/06/2018	pages 10, 14, 24 - 25, 32, 34 - 35	Replace screenshots because banner was changed; change descriptions because there was added a new checkbox to the filter menu
Merging 8.1 and 8.2 sections	16.0	24/05/2018	pages 67-68	Merging 8.1 and 8.2 sections
Fix some CQL parameters format	17.0	24/05/2018	-	Some CQL params are out of format
Change download button functionality description, add Download View description	18.0	11/09/2018	pages 27-28, 37	Add descriptions and screenshots of the new downloading functionality and download manager.
Minor images update to be compliant with confluence, image caption updated	19.0	15/10/2018	all	Images added by confluence page editor, some images caption updated/added.
Added reason why OMEGA EXT6 release 7 is missing in section 6.1	20.0	22/10/2018	page 62	Added text explaining OMEGA data pipeline issue leading to lack of release 7.

Including CDF Sparta format	21.0	29/11/2018	page 38,39	Add a description and snapshot about CDF Sparta configuration in the Data Download manager
Including more CQL examples	22.0	30/11/2018	page 20,22,23	Add a description and snapshot about CDF Sparta configuration in the Data Download manager
Updated for PSA release 5.7-beta1	23.0	28/01/2019	Section 3.2.1 and Annex B Section 3.3.1 Section 3.6	Added Geogen parameters description and complete list with examples Updated with Document Tab information Added CDF conversion functionality and table with the products applicable CQL links removal
Updated for PSA release 5.7-beta2	23.1	28/03/2019	Section 3.2.1 Annex B	Added section 3.2.1.1 to describe Geometry parameters in filter menu CQL Free Search moved to Annex B, added Geogen parameters complete table list with individual descriptions and examples and including the new undo icon on the filter menu
Updated for PSA release 5.8	24.0	20/02/2019	Section 3.6	Updated CDF products download warning message
Updated for Advanced Search Panel	24.1	24/06/2019	Section 3.2	Filter menu section adapted to include Advanced Search Panel
Updated by a full review of the document	24.2	21/08/2019	Section 1.2 Section 2.3 Section 3 Section 3.2.1.1	Added section for a General Overview Registered users privileges rephrased Technologies info moved to Annex C Search parameters rephrased
Updated CQL parameters examples	24.3	28/08/2019	Annex B	New logical_identifier example for PDS4
Updated annex sections	24.4	29/08/2019	All annex Sections Annex B Annex B	Added title for all annex sections Operators section in table with description added Queryable parameters section in table with PDS3 keywords and PDS4 attributtes added
Update Section 1.1 and 1.3	24.5	03/09/2019	Sections 1.1 and 1.3	Sections updated with the latest missions
PDAP metadata information updated	24.6	04/09/2019	Section 5.1	PDAP output fields information added
FTP information updated	24.7	29/10/2019	Section 4	Completed mission list and introduced GSF
Machine Access Interface updated	24.8	29/10/2019	Section 5.2.3	Fix VESPA outdated details, Topcat screenshots and curl command
Expanded MEX geogen dataset list	24.9	30/10/2019	Section 3.2.1.2	Now geogen applies to most MEX sets, exclusions listed
User Interface updated	24.10	04/11/2019	Section 3	Fix a typo and some comments
Corrected Annex B examples	24.11	05/11/2019	Annex B	Correct some examples and improve formatting
Updated Section 2	24.12	12/11/2019	Section 2	Expanded info on login & permissions

Updated User Interface	24.13	12/11/2019	Section 3	Implemented feedback and general reformatting
Updated Annex B	24.14	13/11/2019	Annex B	Allowed values explanation
Updated Section 3.4.1	24.15	28/01/2020	Section 3.4.1	Added explanation for buttons, rating and social media icons
Updated Section 2.4	24.16	02/03/2020	Section 2.4	Update login procedure after the introduction of Single Sign On
Updated Section 3.2.2.2.1	25.0	01/06/2020	Section 3.2.2.2.1	Update Housekeeping search in the Rosetta Advance Search Panel
Added Section 3.2.2.2.2	25.1	02/06/2020	Section 3.2.2.2.2	Added CaSSIS instrument EM16 Advance Search Panel
Updated Section 3.3.1	25.2	08/06/2020	Section 3.3.1	Added Product tab with Housekeeping products
Updated missions computed by Geogeon	25.3	11/06/2020	Section 3.2.1.2 Annex B: Geogen Parameters	Informed about the new 5 Rosetta instruments computed by Geogen
Updated common Advanced Search Panel	25.3	11/06/2020	Section 3.2.2.1 Section 3.2.2.1.2	Added new geometry filters in common Advanced Search Panel
Updated Operators Case insensitiveness	25.5	30/06/2020	Annex B CQL operators	Table added with case sensitive and insensitive examples
Add Map view section and update screenshots	25.6	20/08/2020	Section 3.5	Added section related to Map View
Updated map view section infomration and screenshots	25.7	12/11/2020	Section 3.5	Updated section related to Map View
Update CQL Section	26.0	03/02/2021	ANNEX A, ANNEX B	Added new CQL parameter
67P Orbital View	26.1	03/02/2021	ANNEX A, ANNEX B	3D map view latitude longitude display
FTP links updated	27.0	09/09/2021	Sections 3.1.2 and 4	Replace ftp based link by https based link

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1. WHAT IS THE PLANETARY SCIENCE ARCHIVE

1.1 Goals and history of the Planetary Science Archive

The need for the European Space Agency (ESA) to establish the planetary science data archive (PSA) for planetary exploration missions arose after the approval of Rosetta as the first cornerstone of the Horizon 2000 programme. Rosetta became the starting point for the definition of the PSA, with the view that it should become mandatory for all future ESA planetary missions to use it to store and disseminate their science data.
The core objective of the PSA is the provision of a centralised repository that will preserve and deliver scientific peer-reviewed data products from all of ESA's planetary missions to the scientific community. This means not only storing the data and knowledge over the course of a mission, but ensuring that it will still be useful to scientists years from now. To do this, the PSA needs to be much more than a physical data store. The PSA is in fact involved throughout a mission, from the data definition, through to the user interface by which end users can find the data. This serves to preserve data from ESA's spacecraft to planetary bodies, as well as supplementary information such as calibration files and supporting observations from ground-based observatories.
The decision to have a single archive serving all planetary missions has allowed the PSA to directly serve the planetary community as a whole with all of our data (e.g. Giotto, Mars Express, Venus Express, Huygens, SMART-1, Rosetta, ExoMars 2016, and BepiColombo) via a single access point.
The first version of the PSA was released in 2003, with Giotto and some Ground-Based data sets, and was quickly complemented by the first releases of the Mars Express mission data. Since then, the PSA has undergone several evolutions and has grown to incorporate data from all of ESA's planetary missions, with the PSA now playing a major role in the definition of archiving processes and standards with our international partners.

1.2 General Overview

As the central repository of the ESA for scientific and engineering data returned by ESA's planetary missions, the PSA archives raw, calibrated and higher level data from those missions. The PSA is part of, and physically located at, the European Space Astronomy Centre (ESAC) and its main goals are to:

- preserve the data collected by ESA planetary missions, or international missions in which ESA participates, for a long period,
- ensure the data's short and long term usability by means of standardisation, documentation and simple file formats and to
- provide open and free access to all published data.

All items stored in the PSA must conform to the PDS (Planetary Data System) standards. These standards define, among other things,:

- a framework for the distribution of files in folders (the file structure of the archive),
- a way to describe the format of the data providing considerable flexibility for the actual data format and
- a way to document the data using metadata (labels).

There are currently two versions of the PDS Standard in use: PDS3 and PDS4. PDS3 was in use for many years thus many of the data found in the PSA currently are in this format. The last missions to use the PDS3 standard are Mars Express and Rosetta, whereas new missions (e.g. Exomars and BepiColombo) use PDS4 . PDS4 is a major update of the standards with significant changes to adopt modern technologies, standards and practices. One of the major changes is that PDS3 uses ODL (Object Description Language) whereas PDS4 uses the more

modern and widely recognised XML (Xtensible Markup Language) standard as the language for the label.

All the data within PSA can be accessed by a web interface, where users will find an online graphical user interface with search capabilities, documentation and a link to an FTP repository. The web interface is suitable for searching and downloading specific products. It allows users to search via different filters such as mission, target, instrument type, instrument, acquisition time, wavelength, or processing level. Using a query language it is possible to do more complex searches filtering by different metadata parameters. For bulk downloads it is possible to use an FTP client connected to the public PSA FTP server, and services are also offered to allow software to programmatically search and retrieve data.

1.3 Missions and objects of the Solar System available in the PSA

The PSA offers access to the European Space Agency space missions exploring the Solar System since 1986. The following table lists the missions available and the main targets observed during the course of the mission.

GIOTTO	1P/Halley
SMART-1	Moon
VENUS EXPRESS	Venus
MARS EXPRESS	Mars, Phobos, Deimos
HUYGENS	Titan
ROSETTA	67P/Churyumov-Gerasimenko (21) Lutetia (2867 Steins)
EXOMARS 2016	Mars
BEPICOLOMBO	Mercury (starting in 2021)
HUBBLE	46P/Wirtanen
GROUND-BASED	1P/Halley 46P/Wirtanen

The list of targets is by no means exhaustive, the user is invited to use the PSA interfaces to explore the database and find additional targets they might need.
In addition to ESA's space missions, the PSA also hosts specific scientific products from space- and ground-based observatories in support to ESA's space missions. This includes relevant Hubble and ground based observations selected by each contributing mission team.

2. USERS OF THE PSA

2.1 Anonymous user

By default, all users of the PSA are anonymous. Users can access most of the data products of the PSA without the need to log-in. Specific products which are under evaluation or proprietary period will require specific privileges and thus a registration at the PSA.

2.2 Registered user

Regular users of the PSA can register using the login procedure described in section 2.4. Benefits of being registered are for now limited, but they will be expanded in the near future. For instance, saving queries, customised look and feel, resuming downloads are functionalities that will be implemented for registered users.
As of 2017, registered users can be informed by email of specific new features being released within the PSA. The PSA team is committed to not spam the users of the PSA with emails.

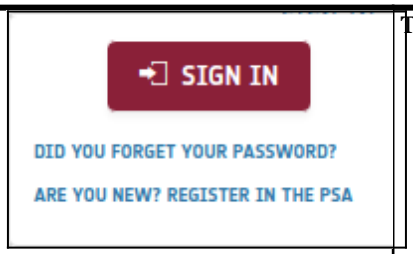
2.3 Registered and Privileged user

Registered users can be given privileges to get access to specific proprietary datasets. Privileged users are managed by the PSA team. The Archive Scientists monitor permissions given by the relevant PIs and project scientists and either pass this information to the PSA team or in some cases also manage the access directly.

2.4 Login procedure

If you are not registered in the PSA, you can be directed to registration via the sign in procedure (see below). This registration sets up an ESA "LDAP" account which is a single account allowing access to many ESA services and internal sites depending on your level of involvement with ESA mission teams. Once registered you can login to the system by following the steps below:

- Click on the SIGN IN icon text in the upper right.
- Click on the SIGN IN button that appears in the login popup panel. You will be redirected to the Cosmos login page.
- Introduce your credentials and click on LOGIN.



Login popup

The login popup has the following components:

- SIGN IN : Button to access the Cosmos login page.
- DID YOU FORGET YOUR PASSWORD? : a link to https://cas.cosmos.esa.int/cas/passwd
- ARE YOU NEW? REGISTER IN THE PSA : a link to http://www.cosmos.esa.int/web/psa/self-registration

- If credentials are recognised, you will see this message: **Welcome, *username* to PSA website**
- Otherwise, you will see this message: **Unauthorised. Bad credentials**

Being redirected to the Cosmos webpage for authentication allows the PSA to use *Single Sign On*.
With this mechanism, accessing other archives employing the same technique would waive the users from having to introduce their credentials once and again.

To log-out from the system:

- Click on your username label in the upper right.
- Click on the 

icon. You will see this message: **Thanks *username* for visiting PSA website. Goodbye!**

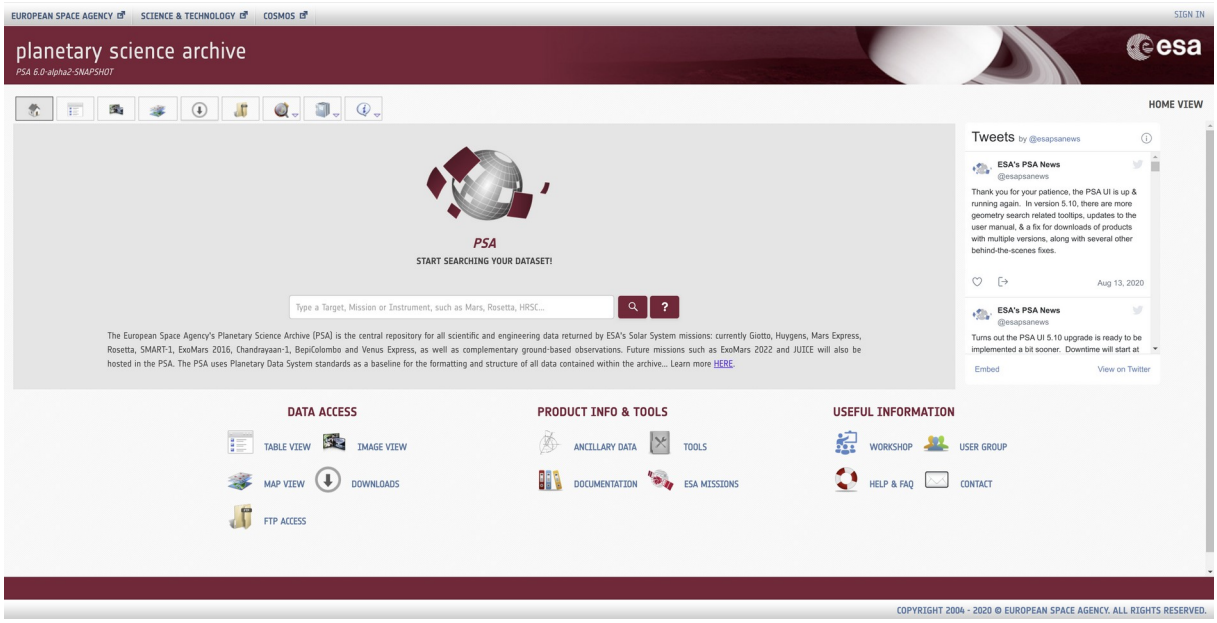
Logging out does not remove the authentication token for the *Single Sign On*, which is active for some time in the browser.
This means that, if you log in again afterwards, you might be logged into the PSA without being asked to re-enter your username and password.

3. USER INTERFACE

The User Interface (UI) offers the user several ways to access data from all of ESA's planetary missions, including quick browse, advanced filtering, data download etc. The UI can be accessed through the URL http://psa.esa.int .
It is important to mention that the user interface is optimised for the Chrome, Firefox and Safari browsers. Further information about the technologies used in the PSA can be found in Annex C.

3.1 Home View

The home view is the first page which is shown to the user when accessing the PSA. An overview snapshot of the home view can be found below:

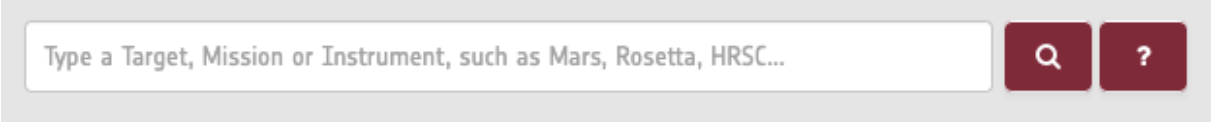


Home View

At the top-right of the page, there is a mechanism to log-in & log-out the system. For further details on this, see the Login procedure section.
The home view is made up of the following components:

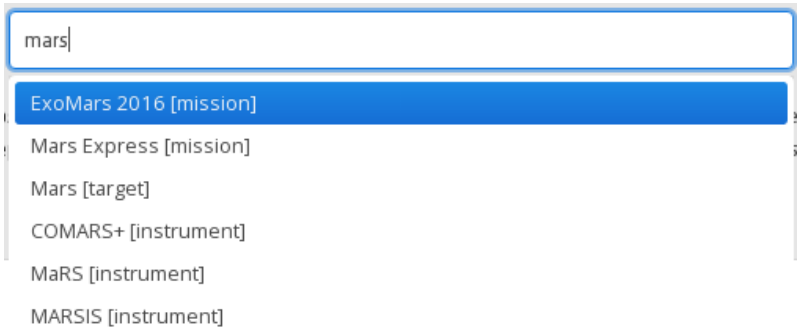
3.1.1 Search Bar

The search bar offers simple method to launch a query to retrieve data quickly. It allows the user to filter by mission, instrument or target only. A combination of instruments and missions for example is not allowed.



Search bar

If the user starts typing in the search bar, the system will give the matched options from missions, targets or instruments as long as there are datasets/products which relate to those items. As an example, see the next picture:



Search bar predicted text

Once the user has selected the desired option, the next step will be either to click on the  icon or just press the return key. The system will display the corresponding data which matches the query through a table list (see the Table View section)

For further info, the user can hover the mouse over the  icon (or just click on it) to get some online examples.

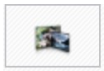
3.1.2 Links to search interfaces and documentation

The home view relies on links and buttons to navigate within the application (table view, map view…) as well as some external links to documentation, tools, FAQ…etc. The complete list of buttons and links of the home view is the following, starting with the upper ones:

- 

: A link to http://www.esa.int/ESA
- 

: A link to http://sci.esa.int/home/
- 

: A link to http://cosmos.esa.int/
-  : A link to the Home View
-  : A link to the Table View
-  : A link to the Image View
-  : A link to the Map View
-  : A link to Download Veew

-  : A link to the FTP: https://archives.esac.esa.int/psa/ftp
-  : Product Info & Tools, if clicked, this popup will be shown:

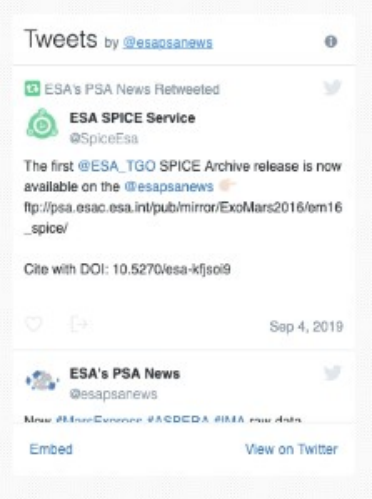
-  : Useful Information, if clicked, this popup will be shown:

At the bottom, there are the following accesses which repeat the ones described above but are only accessible through the home page:

-  : A link to the Table View
-  : A link to the Image View
-  : A link to the Map View
-  : A link to the Download View
-  : A link to https://archives.esac.esa.int/psa/ftp
-  : A link to http://www.cosmos.esa.int/web/psa/ancillary-data
-  : A link to http://www.cosmos.esa.int/web/psa/tools
-  : A link to http://www.cosmos.esa.int/web/psa/documentation

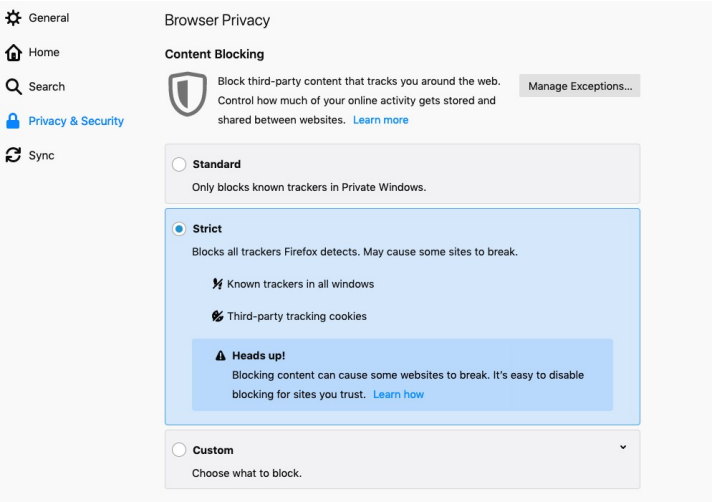
-  : A link to http://www.cosmos.esa.int/web/psa/missions
-  : A link to http://www.cosmos.esa.int/web/psa/workshops
-  : A link to http://www.cosmos.esa.int/web/psa/psa-user-group
-  : A link to http://www.cosmos.esa.int/web/psa/faq
-  : A link to http://www.cosmos.esa.int/web/psa/contact-us

There is a panel on the right part to show the Tweets from ESA's PSA news account (https://twitter.com/esapsanews):



ESA's PSA News Twitter Panel

Note: The Twitter panel will not appear if using Firefox browser with the following configuration: "Privacy & Security" → "Content Blocking" → "Strict".



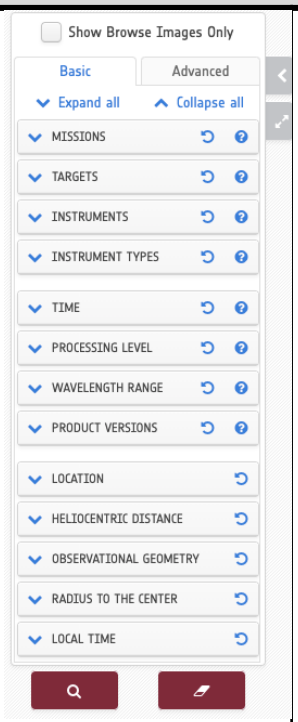
Firefox browser security configuration

3.2 Filter Menu

When a mission, instrument or target query is launched from the home view the view switches to the table view to list the results. These results can then be further refined using a filter menu displayed to the left of the screen. Each filter item can be expanded to see the options available:

3.2.1 Basic Search Panel

The basic search panel contains all the common fields applicable to any of the mission within the PSA.

Basic Menu	
	The filter menu comprises the following elements: •  : To collapse the filter menu •  : To expand the filter menu •  : To expand all the filter menu boxes •  : To hide all the filter menu boxes •  : To expand a specific filter menu box •  : To hide a specific filter menu box •  : To reset the specific filter menu box •  : To get help and extra information of a specific filter menu box •  : To show only products that have existing browse images •  : To search for products •  : To erase the filter menu selection The behaviour of the filter menu is done such that the different options are interconnected. See the How does the Filter menu work? section to know how the filter menu works.

Filter Menu Boxes

3.2.1.1 Search Parameters

Missions & Instruments Hosts

If applicable, a mission can be expanded to its various host platforms such as “Lander” and “Orbiter”.

The mission filter offers the possibility to query the PSA for all products belonging to a single mission, or a combination of missions. Just tick the box(es) of the mission(s) you need and start your query.
If applicable, a mission can be expanded to its various host platforms. For example ExoMars 2016 and Rosetta that have both an orbiter and a lander and in these cases the orbiter is considered to be one host and the lander the other. By convention ground-based observatories are also considered as hosts, therefore under "ground-based" you can select a specific observatory.

Clicking on a mission that has various hosts will automatically select all the host platforms. When you click on a mission, the targets, instruments and instrument types will only list the keywords relevant for that mission.
Note: Some missions (e.g., Rosetta) host several million science products. Performance will be affected if the user searches science products only using the mission filter.

Here are listed some instrument hosts and their meaning:

Instrument host	Meaning	Mission
BMO	Bochum Mobile Observatory	Ground-Based
ESO	European Southern Observatory	Ground-Based
TSK	Pik Terskol Observatory	Ground-Based

Targets

The target filter offers the possibility to query the PSA for all products which derive from observations of a single target, or a combination of targets. Just tick the box of the target you need and start your query.
Targets which have been identified as star, calibration or galaxy types are grouped under the same folder (i.e., star, calibration, galaxy). If you select one of these folders, all the targets within the group will be selected.
When you click on a target the missions, instruments and instrument types will only list the applicable values for that target.

Instruments & Sub-Instruments

The instrument filter offers the possibility to query the PSA for all products belonging to a single instrument, or a combination of instruments. Just tick the box of the instrument you need and start your query.
If applicable, an instrument can be expanded to its various sub-instruments, where appropriate.
When you click on an instrument the missions, targets, and instrument types will only list the applicable values for this instrument.

For convenience the ExoMars housekeeping (hk) data is accessed separately to the science data. Therefore in the filter menu an instrument such as CaSSIS which has no sub-instruments will still be split into science (sci) plus several hk types. An instrument with sub-instruments, such as NOMAD is split into areas containing the sub-instruments plus the hk types at this level.

Instrument Types

The instrument type filter offers the possibility to query the PSA for all products belonging to

a single instrument type, or a combination of instrument types. Just tick the box of the instrument type you need and start your query.
When you click on an instrument type the missions, targets, and instruments will only list the applicable values for this instrument type.

Time

The time filter offers the possibility to query the PSA for all products belonging to a specified period of time, up to milliseconds resolution. Select the time range of the observations you want and start your query.
Note that any products that partially cover the time interval entered will also be retrieved.
The time standard used is UTC. You can either click on a given date using the calendar and then type the time if needed, or you can manually enter the date and time using the syntax:
YYYY-MM-DD HH:MM:SS.mmm
For example: 2016-02-23 15:30:45.125
If only the date is selected and no time is added, the default time will be as follows:

- start time will be "Date 00:00:00.000"
- stop time will be "Date 23:59:59.999"

Processing Level

The processing level filter offers the possibility to query the PSA for all products belonging to a single processing level or multiple levels. Select the processing level(s) of the observations you want and start your query.
Processing levels are common to PDS3 and PDS4 formats, with the exception of "Partially processed" that is only applicable to PDS4 products (i.e., ExoMars, BepiColombo). These levels are:

- **Level 1 – Telemetry**: Telemetry data with data embedded.
- **Level 2 – Raw**: Corrected for telemetry errors and split or decommutated into a data set for a given instrument. Sometimes called Experimental Data Record. Data are also tagged with time and location of acquisition. Sometimes it is called "edited".
- **Partially processed**: Partially processed data is data in an intermediate stage of calibration. It is a concept specific to PDS4.
- **Level 3 – Calibrated**: Calibrated data that are still in units produced by the instrument, but that have been corrected so that values are expressed in or are proportional to some physical unit such as radiance. No re-sampling is applied, thus edited or raw data can be used to reconstruct calibrated data.
- **Level 4 – Derived**: Data that have been re-sampled in the time and/or space domain(s) in such a way that the original edited data cannot be reconstructed anymore. Could be calibrated in addition to being re-sampled.
- **Level 5 - Derived**: Derived results, such as maps, reports, graphics, etc.
- **Level 6 - Derived**: Non-science data needed to generate calibrated or higher level data sets. Consists of instrument gains, offsets, pointing information for scan platforms, etc.

Wavelength range

The wavelength range allows the user to filter by the desired electromagnetic spectrum in which the products were taken, from the Gamma Ray to Radio Wave. There is also the possibility to select a "Not Applicable" option in case the user is interested in products with no wavelength associated.
The wavelength names and their ranges are as follows:

Gamma Rays (GR)	<10pm
X-Rays (XR)	10pm - 10nm

Ultraviolet (UV)	10nm - 390nm
Visible (VIS)	390nm - 700nm
Near Infrared (NIR)	700nm - 5µm
Infrared (IR)	5µm - 300µm
Sub-millimetre (SUBMM)	300µm - 1mm
Microwave (Micro)	1mm - 1m
Radio	1m - 300 000Km

Product versions
The "Product Versions" filter menu allows the user to select different versions of a product. In case of PDS3, the versions of the products are extracted from the DATA_SET_ID mandatory keyword that includes the version in the form of '...-Vx.x'. For PDS4 products, each product has an individual version number.
Product versions has two selections of which only one can be selected at a time:

- All product versions
- Last product versions

By default "Last product versions" is always selected to retrieve only the latest versions of the products. When the user switches to "All product versions", all versions will be displayed. Note that Version is a hidden column in the Table View by default, and the user must use the "Show/Hide Columns" button to show the Version column in order to see the version numbers.

3.2.1.2 Geometry Parameters
The geometric parameters are generated from SPICE-based map-projected geometry and associated geometrical parameters of the observed target. These calculations are performed by the GEOGEN tool, a piece of software developed by the PSA for this purpose. Therefore these values are independently calculated from the values calculated by instrument teams and reported in the products labels and might differ from them. In the case of the Rosetta mission, the differences between the values in products labels and the values calculated by the PSA for all latitude, longitude and altitude related parameters might differ significantly from the values reported by instrument teams in the product labels. The reason is that subtle differences in the definition and calculation of these parameters by the PSA and the instrument teams can lead to large differences in the values for an extremely irregular body such us 67P comet. For example, some Rosetta instruments such as MIRO calculate the sub spacecraft latitude and longitude as cometrocentric magnitudes independently of the comet nucleus shape whereas PSA takes into account the nucleus shape by calculating the latitude and longitude of the closest point of the comet nucleus to the spacecraft.

The reason for PSA doing its own geometry calculations is twofold:

- Provide consistent values calculated always in the same way for all instruments making them comparable.
- Have always geometry values even for products missing them in their labels.

Note: Currently this search by geometry parameters is applicable to most of the Mars Express datasets and 5 Rosetta intruments (NAVCAM, OSIRIS, ALICE, VIRTIS and MIRO) . Exceptions include the HRSC Phobos set (MEX-MSA-HRSC-5-REFDR-PHOBOS-MAPS-V1.0, since Phobos geometry is not currently supported by the PSA UI), and all of the MaRS radio science datasets (as they each cover large portions of the Martian atmosphere).

Location

This filter allows a search on either a combination of latitude and longitude during remote sensing or a combination of RA/DEC during flight. When one of these combinations is selected the filter expands to allow start and end values of each parameter to be entered. Only decimal entries of the angles are allowed.

Table for LAT/LON parameters:

LAT/LON parameters	Descriptions
Min Latitude	Area minimum limit latitude where maximum observation latitude of the footprint have to be included.
Max Latitude	Area maximum limit latitude where minimum observation latitude of the footprint have to be included.
Min Longitude	Area minimum longitude where Easternmost observation longitude of the footprint have to be included.
Max Longitude	Area maximum longitude where Westernmost observation longitude of the footprint have to be included.

Table for RA/DEC parameters:

RA/DEC parameters	Descriptions
Min/Max RA	Right ascension of the position vector of the target body centre as seen from the spacecraft in the Earth mean equator and equinox frame (J2000).
Min/Max DEC	Declination of the position vector of the target body centre as seen from the spacecraft in the Earth mean equator and equinox frame (J2000).

Heliocentric Distance

This filter allows to search by limiting the distance from the centre of the sun to the spacecraft at the reference time. The limits are defined by minimum and maximum and the unit is kilometres.

Observational Geometry

This filter allows selection of a range of three geometry parameters:

- The phase angle is the angle between the vectors from the surface point to the spacecraft and from the surface point to the Sun.
- The incidence angle is the angle between the local vertical at a given surface point and the vector from that the surface point to the sun.
- The emission angle is the angle between the surface normal at a given surface point and the vector from the surface point to the spacecraft.

Radius to the Centre

This allows a user to enter a range of distance from the spacecraft to the centre of the target body, in kilometres.

Local Time

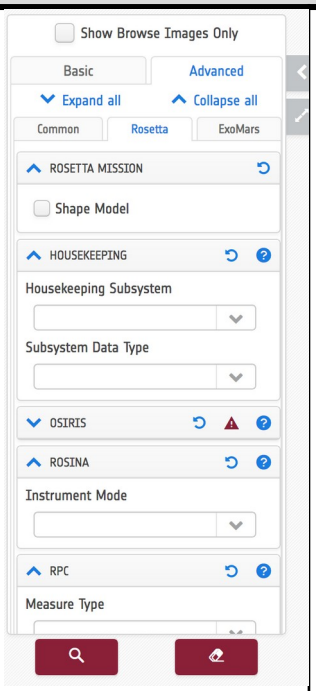
This filter allows a user to search on a range of local true solar time i.e. the angle between the planetocentric longitude of the Sun, as viewed from the centre of the target body, and the planetocentric longitude of the sub-spacecraft nadir point, expressed on a “24 hour” clock.

The times may be entered manually in the form hh:mm:ss or they may be selected from menus which will appear if the calendar icon is selected.

3.2.2 Advanced Search Panel

This search panel contains several tabs, one for each mission within the PSA and an additional one to include common parameter for all the missions.

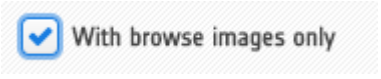
Advanced Search Menu



The filter menu comprises the following elements:

- 
: To collapse the filter menu
- 
: To expand the filter menu
- 

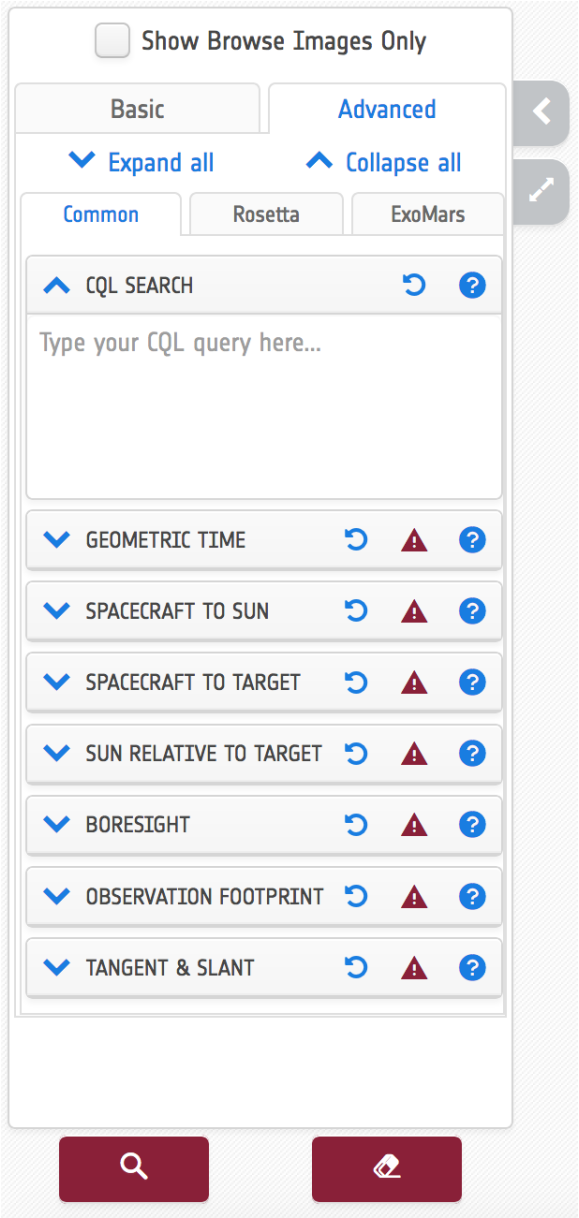
: To expand all the filter menu boxes
- 

: To hide all the filter menu boxes
- 
: To expand a specific filter menu box
- 
: To hide a specific filter menu box
- 
: To reset the specific filter menu box
- 
: To get help and extra information of a specific filter menu box
- 

: To show only products that have existing browse images
- 
: To search for products
- 
: To erase the filter menu selection

3.2.2.1 Common Panel

This search panel contains several tabs, one for each mission within the PSA and an additional one to include common parameter for all the missions (except for the geometry parameters).



Common Advanced Search

3.2.2.1.1 CQL Free Search

This section is intended to allow searches on a much broader set of parameters than visible in the user interface, using a language called "Common Query Language". Searches can be performed , alone or in conjunction with the other search parameters in the Filter Menu (See *Free Search Box* figure below). A description of the syntax and queryable parameters is given in "Annex B".

3.2.2.1.2 Geometry Parameters

The geometric parameters are generated from SPICE-based map-projected geometry and associated geometrical parameters of the observed target. These calculations are performed by the so-called GEOGEN tool, a piece of software developed by the PSA for this purpouse. Therefore these values are independentlly calculated from the values calculated by instrument teams and reported in the products labels and might difer from them. In the case of Rosetta mission for the 67P comet, the diferences between the values in products labels and the values calculated by the PSA for all latitude, longitude and altitude relarted

parameters might differ significantly from the values reported by instrument teams in the product labels. The reason is that subtle diferences in the definition and calculation of these parameters by the PSA and the instrument teams can lead to large diferences in the values for an extrimelly irregular body such us 67P comet. For example, some Rosetta instruments such as MIRO calculate the sub spacecraft latitude and longitude as cometrocentric magnitudes independentlly of the comet nucleus shape whereas PSA takes into account the nucleus shape by calculating the latitude and longitude of the closest point of the comet nucleus to the spacecraft.

The reason for PSA doing its own geometry calculations is twofold:

- Provide consistent values calculated allways in the same way for all instruments making them comparable.
- Have always geometry values even for products missing them in their labels.

Note: Currently this search by geometry parameters is applicable to most of the Mars Express datasets and 5 Rosetta intruments (NAVCAM, OSIRIS, ALICE, VIRTIS and MIRO) . Exceptions include the HRSC Phobos set (MEX-MSA-HRSC-5-REFDR-PHOBOS-MAPS-V1.0, since Phobos geometry is not currently supported by the PSA UI), and all of the MaRS radio science datasets (as they each cover large portions of the Martian atmosphere).

Geometric Time

This filter allows to search for products by the time corresponding to the observation footprint, and the reference time at which the geometry parameters were computed. The time standard used is UTC, and can be manually enter either using the syntax: YYYY-MM-DD HH:MM:SS.mmm or clicking on the calendar to select the date and then typing the time

- Observation Time: Select the time range from the earliest and latest time of the observation footprint. These times are different from the observational times in the Basic Searh Panel, when there are several footprints for an observation.
- Reference Time: Select the min and max reference time at which the parameters were computed.

Spacecraft to Sun

These filters provide geometry searches related to the velocity, position, distance and coordinates from the spacecraft to the sun. The limits are defined by minimum and maximum values.

- Spacecraft Sun Velocity: X,Y and Z components of the velocity vector of Sun relative to the spacecraft, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time. Units are in kilometers/second.
- Spacecraft Sun Position: X,Y and Z components of the position vector of Sun relative to the spacecraft, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time. Units are in kilometers.
- Spacecraft Solar Distance: Distance from the spacecraft to the center of the sun at the reference time. Units are in kilometers.
- Sun Rigth Ascension/Declination: Coordinates of the position vector of the Sun as seen from the spacecraft in the Earth mean equator and equinox frame (J2000). Units are in Degrees.

Spacecraft to Target

These filters provide geometry searches related to the velocity, position, altitude, coordinates and solar zenith angle from the spacecraft to the target. The limits are defined by minimum and maximum values.

- Spacecraft Target Velocity: X,Y and Z components of the velocity vector of the target body center relative to the spacecraft, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated. Units are in kilometers/second.
- Spacecraft Target Position: X,Y and Z components of the position vector of the target body center relative to the spacecraft, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated. Units are in kilometers.
- Spacecraft Altitude: Distance from the spacecraft to the sub-spacecraft point on the target body at the reference time. Units are in kilometers.
- Sub Spacecraft Latitude/Longitude: Coordinates of the sub-spacecraft point on the target body at the reference time. Units are in Degrees.
- Sub Spacecraft Solar Zenith Angle: Solar zenith angle at the sub-spacecraft point on the target surface at the reference time. It is the angle subtended between the direction towards the Sun and the local normal at the surface. Units are in Degrees.

Sun Relative to Target

These filters allow to make searches for the Sun relative to target parameters. The limits are defined by minimum and maximum values and units are in degrees.

- Sub Solar Latitude/Longitude: Coordinates of the sub-solar point on the target body at the reference time. The sub-solar point is the point on a body's reference surface where a line from the body center to the sun intersects that surface.
- Solar Longitude: Planetocentric longitude (Ls) of the sun for the target body at the reference time. The planetocentric longitude is the angle between the body-sun vector at the time of interest and the body-sun vector at the vernal equinox.

Boresight

The following boresight related values can be filtered in this box. The limits are defined by minimum and maximum values and units are in degrees.

- Boresight Right Ascension/Declination: Coordinates of the detector boresight vector, in the Earth mean equator and equinox frame (J2000), at the reference time.
- Boresight Solar Elongation: Separation angle between the detector line-of-sight and the position vector of the Sun as seen from the spacecraft, at the reference time.
- Boresight Target Angle: The separation angle between the detector line-of-sight and the target body center as seen from the spacecraft, at the reference time.

Observation Footprint

This filter allows to search by the latitude and longitude of the observation footprint center point. The limits are defined by minimum and maximum values and units are in degrees.

Tangent & Slant

This filter provides searches by the tangent altitude and the slant distance. The limits are defined by minimum and maximum values and units are in kilometers.

The tangent altitude is the distance from the target body surface nearest point to the detector line-of-sight.

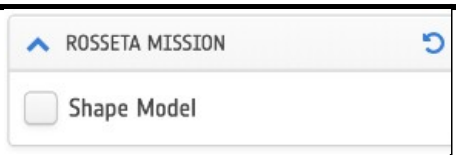
The slant distance is the distance from the spacecraft to the nearest point on the detector line-of-sight to the target body surface.

3.2.2.2 Missions Panel

Some of the missions include an advanced search panel for detailed searches.

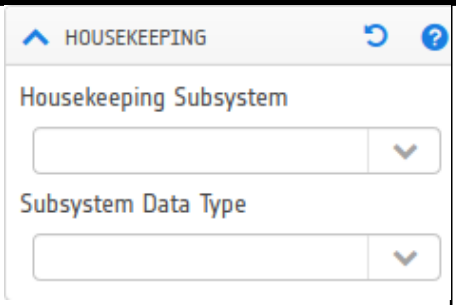
3.2.2.2.1 Rosetta ASP

The Advanced Search Panel for Rosetta mission:



Rosetta Mission

When checked it will query for DATA_SET_ID= "RO-C-MULTI-5-67P-SHAPE-xx"



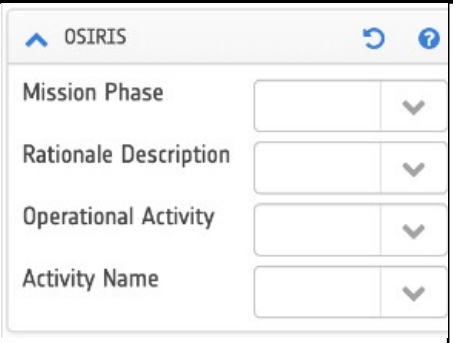
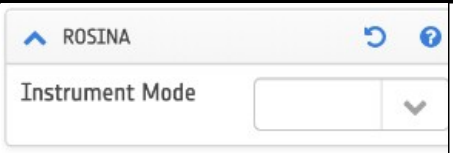
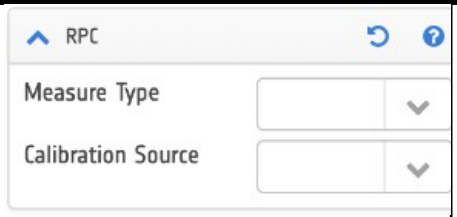
Housekeeping

The Rosetta Housekeeping data can be selected from the 'Housekeeping' panel in the filter menu. Within that panel, there are 2 drop-down fields that, in combination, will allow for a user to identify the spacecraft subsytem and type of data they are interested in.

Housekeeping Subsystem:
The 'Housekeeping Subsystem' identifies, at a high level, the Rosetta spacecraft subsystem from which the Engineering data has been obtained. For example, STARTRACKER would indicate housekeeping measurements from one of the star tracker units onboard the spacecraft. The possible values available are provided below along with a brief description of their content:

- ANTENNASTATUS: Antenna Communication System data. Data bit rate and transponder selection are provided for the High, Medium and Low Gain Antennas.
- AOCGEN: Attitude & Orbit Control Management System and Wheel offloading data.
- EDAC: Error Detection & Correction System data for the AOCMS and DMS systems as well as for the NAVCAM and Star Trackers.
- HGAAPM: High Gain Antenna (HGA) and Antenna Pointing Mechanism data including measured Azimuth & Elevation angles, as well as different pointing errors and displacement errors.
- IMP: Inertial Measurement Package subsystem data, including gyroscope attitude measurements.
- NAVCAM: Housekeeping parameters from Rosetta's two Navigation Cameras, including operating modes of the prime and backup cameras. Note that the NAVCAM science data are found in separate science data sets.
- OCMRCS: Orbit Control Manouevres and the Thruster based Reaction Control Subsystem data, including measured impulse, acceleration and disturbance torques for OCM, and the number of on-cycles for the RCS.
- RWL: Reaction Wheel data, including reaction wheel friction, measured angular momentum & wheel direction.
- SOLARARRAY: Housekeeping data for the two Rosetta Solar Array Panels and the Power Subsystem, including solar array (mis)alignment, incidence angle & displacement errors, and power subsystem master bus voltage, currents etc.
- STARTRACKER: Housekeeping data for Rosetta's two Rosetta Star Trackers (STR A & B), including operating mode, # of tracked stars, angular velocity, mean & Std Dev background, star coordinates & magnitudes.
- TCS: Thermal Control System data for numerous instruments, antennas & subsystems present on the spacecraft external surfaces

Subsystem Data Type:
Once the Housekeeping Subsystem is identified, the next drop-down field called 'Subsystem Data Type' allows for the user to drill down deeper and identify the specific type of data they would like to retrieve. There are many possibilities available for this parameter, so not all can be described here. Note that the list of available options for this selection is narrowed down depending on

	the Housekeeping Subsystem selected, so it is strongly recommended to follow that process unless you are an experienced user. Full details of the various data types available for each housekeeping subsystem are available in the User Guide document, found in the DOCUMENT directory of each Rosetta Housekeeping data set. As an example, a user may be interested in the wheel offloading at a certain time in the mission. In this case, AOCGEN is selected as the 'Housekeeping Subsystem', and the user is presented with the following options for the Subsystem Data Type: CURRENT_AOCS_MODE WOL_MANAGER WOL_PHASE_DURATION After selecting their chosen data type, the user can then follow the standard procedure to select the time period they are interested in before executing the search.
	**OSIRIS** Image on the left side shows the fields for the search. All of them allow search by drop-down list possible values. • Mission Phase: Indication of the Rosetta Long-term, Medium-term and Short-term Planning cycles (LTP, MTP and STP respectively) that are applicable to a given observation. • Rationale Description: Tag used to identify the top level scientific rationale behind an observation. • Operational Activity: Tag used to identify the high level operational objective applicable to a given observation. • Activity Name: Tag used to indicate the type of observation intended (e.g. gas, dust, nucleus etc.). Example of search values: • Mission Phase = STP130 • Rationale desc = NUCLEUS • Operational Act = TAG_NUCLEUS • Activity Name = STP130_APPROACH
	**ROSINA** Image on the left side shows the fields for the search. All of them allow search by drop-down list possible values. See document ROSINA_DATA_USERS_GUIDE.PDF for an explanation, and DFMS_MODE_DESC.ASC, RTOF_MODE_DESC.ASC and COPS_MODE_DESC.ASC for a list and definition of all modes. Example of search values: • Instrument mode = M0871
	**RPC** Image on the left side shows the fields for the search. All of them allow search by drop-down list possible values. • Measurement Type: The type of scientific parameter or physical quantity that was derived from the measured data. • Calibration Source: The instrument used as a source of the calibration data. Example of search values: • Measure Type = "OPERATIONAL PARAMETERS" • Calibration source = "RPCMIP"

COSIMA

Image on the left side shows the fields for the search:

- Substrate Id: Values range from "1C1" to "3D8" where the first number can be "1" for top, "2" for middle or "3" for the low substrate, and the target holders are numbered from "C1" to "D8".
- Substrate X: Substrate X co-ordinate, in the range of 0-10000 micrometers. The origin is in the lower left corner.
- Substrate Y: Substrate Y co-ordinate, in the range of 0-10000 micrometers. The origin is in the lower left corner.
- Substrate Z: Substrate Z co-ordinate, in the range of -1000-1000 micrometers. The origin is the nominal ion beam focus.
- Spectrum polarization: *S*pectrum ion polarity (positive or negative ions), either "POSITIVE" or "NEGATIVE".

With respect to the allowed input for every field:

- Field "Substrate Id" allows search by drop-down list possible values.
- Fields "Substrate X, Y and Z" are prepared to receive a range of values.
- Field "Spectrum Polarization" is a checkbox where positive and negative value can be checked.

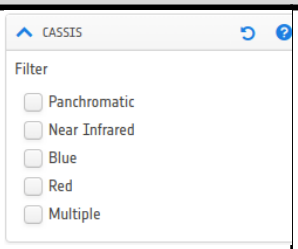
Example of search values:

- Substrate Id = 1C7
- Substrate X = min: 0 - max: 2000
- Substrate Y = min: 500 - max: 9000
- Substrate Z = min: -100 - max: 150
- Spectrum Polarization = Positive

3.2.2.2.2 Exomars 16 ASP

The Advanced Search Panel for EM16 mission:

Exomars 16 ASP



CaSSIS

Image on the left side shows the fields for the search:

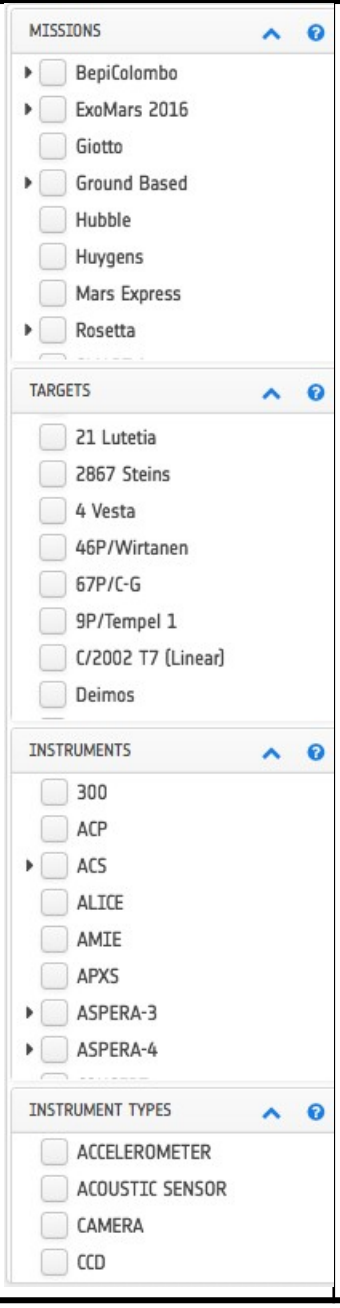
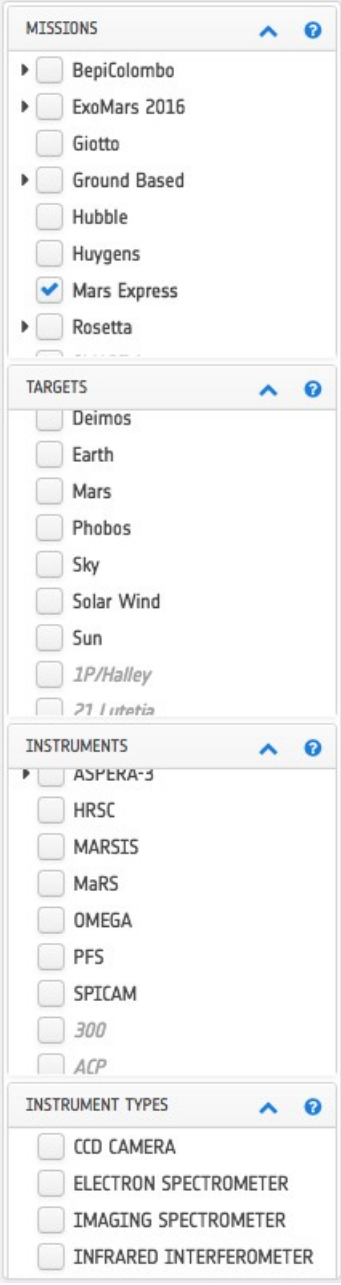
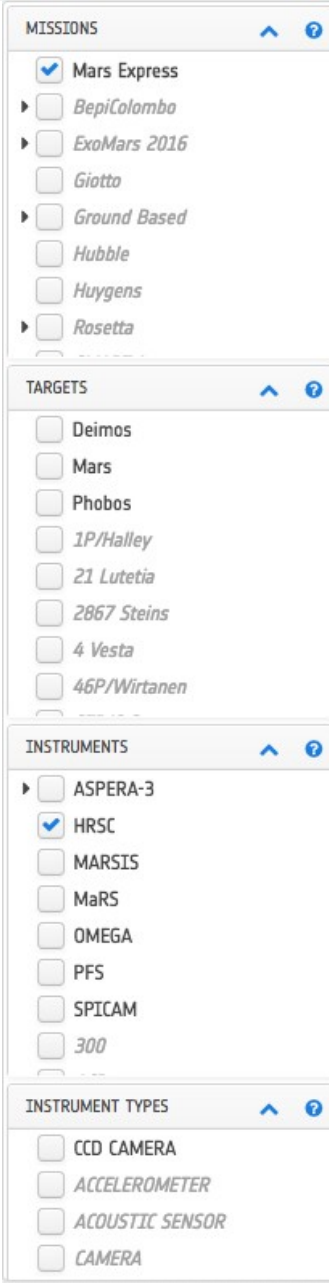
Filter:

- PAN: CaSSIS panchromatic filter centred at 677.4 nm
- NIR: CaSSIS nir-infrared filter centred at 940.2 nm
- BLUE: CaSSIS blue filter centred at 497,4 nm
- RED: CaSSIS red filter centred at 835.4 nm
- MULTI: Images taken by the entire CaSSIS detector, used for calibration purposes

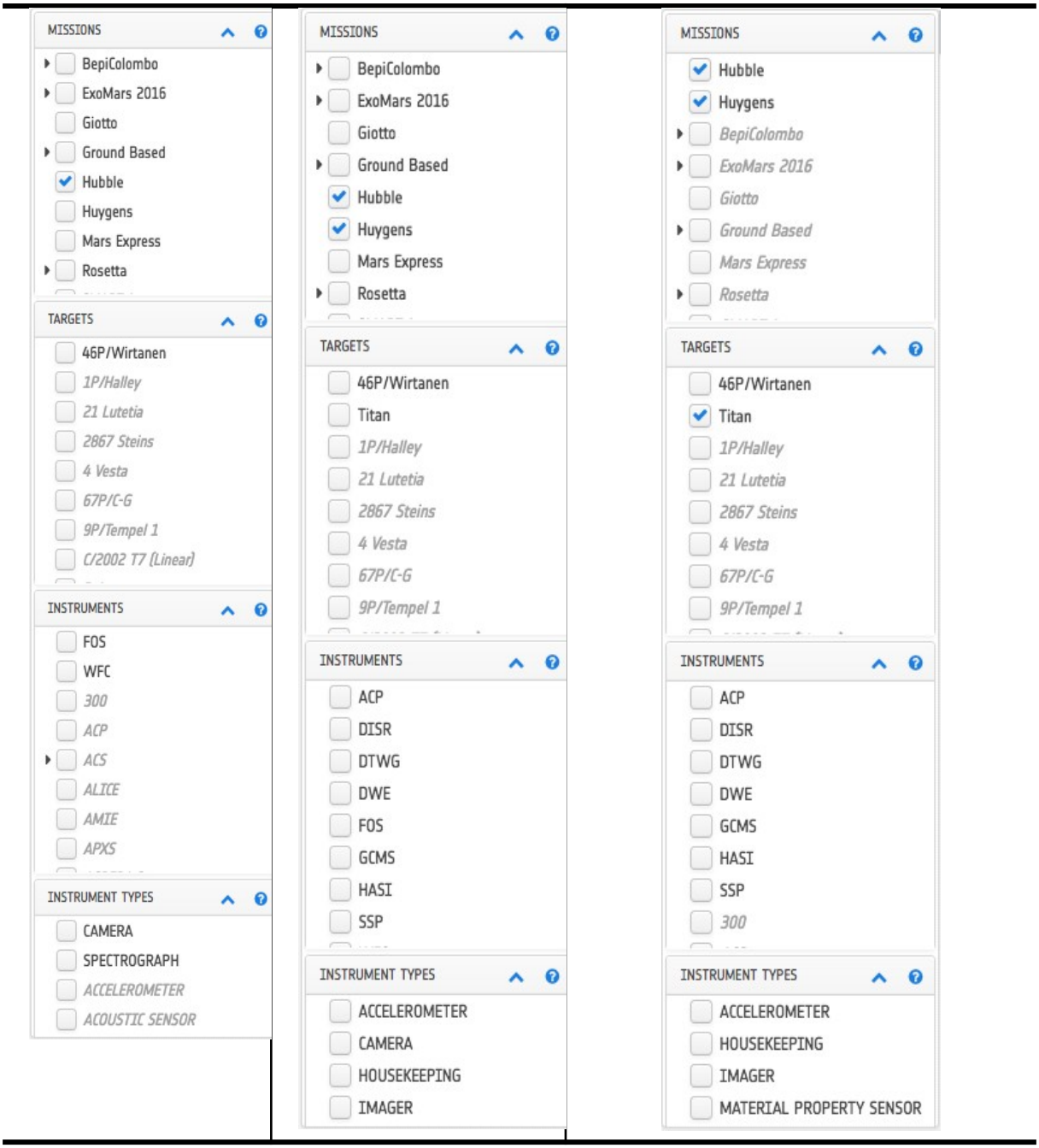
3.2.3 How does the Filter menu work?

The filter menu is designed to guide the user among the feasible options which the PSA offers with regards to missions, instrument hosts, targets, instruments and sub instruments, and instrument types (the first 4 boxes).
Below are a few scenarios which describe the behaviour of the filter menu:

1) After the initial loading the filter menu shows all missions/platforms, targets, instruments/sub instruments and instrument types which come from the products, so that the user can search for products which exist in the database	2) When the user clicks on a mission, i.e. Mars Express, the targets, instruments/sub instruments, and instrument types associated to Mars Express will be displayed in bold black text and sorted to the top of the lists in alphabetical order. The options that are not selected but are applicable will be displayed in black text. The non matching	3) Afterwards, when the user clicks on an instrument of the given list, i.e. HRSC, then only the associated missions, targets and instruments will be shown in black text.

	options will be displayed in gray.	
		

1) User clicks on Hubble	2) Afterwards clicks on another mission, Huygens for instance	3) As you can see, targets, instruments/sub instruments and instrument types from Huygens mission have also been highlighted and sorted to the top.



3.3 Table View

The table view is the page where the user can search for products given a search criterion. The data products are displayed in this view by means of a table - a list of all the products matching the query. When the user first opens this view the following components can be seen below:

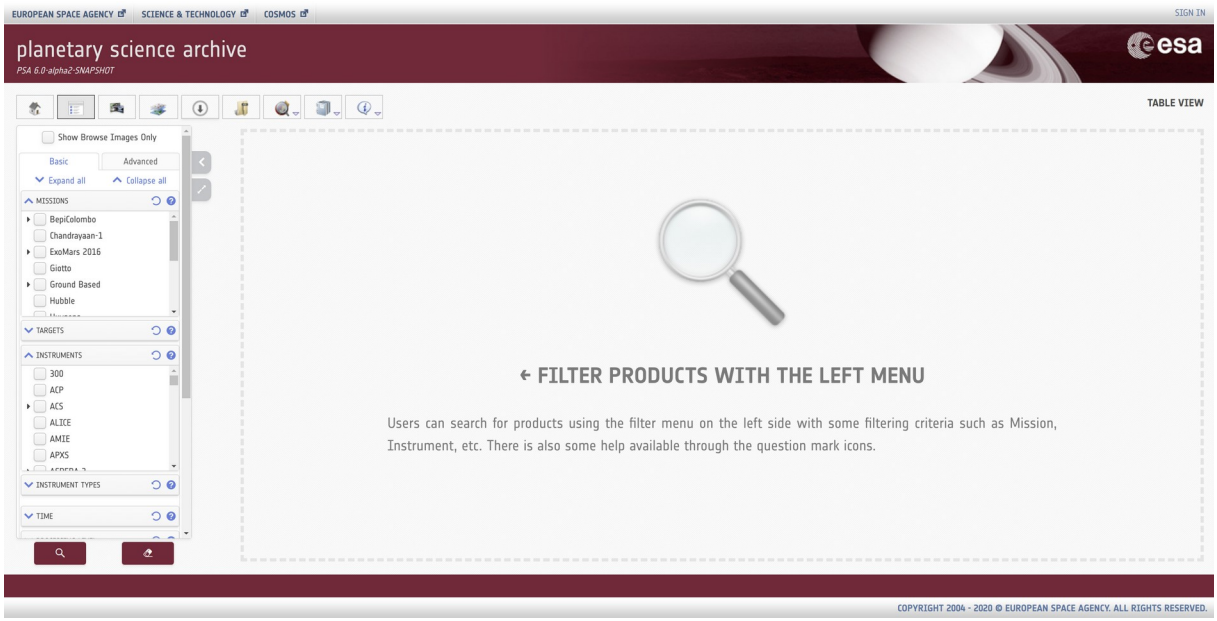


Table View by default (no result)

In the centre of the table view there is a blank container which encourages the user to launch a query to retrieve science products giving a search criterion.

After clicking on  icon, a query is launched (i.e by Mars Express mission), showing the next info:

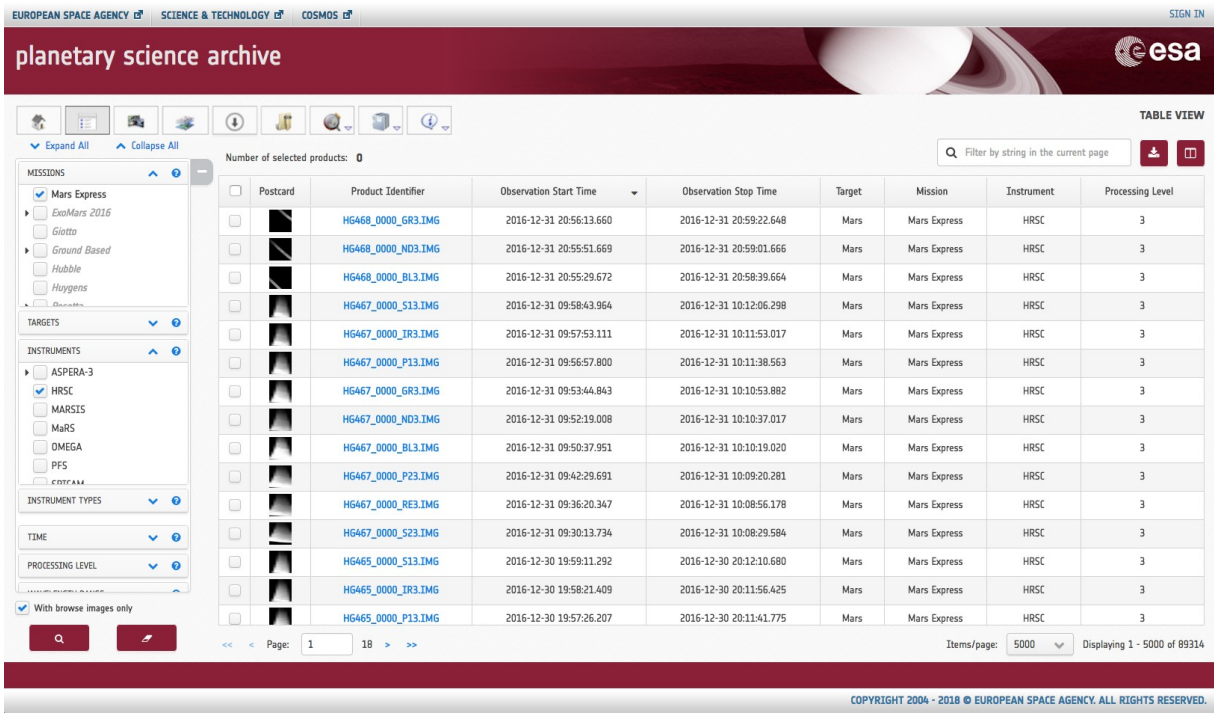


Table View (with Mars Express - HRSC data)

If the query does not have any products to return, a message will be displayed instead of the table of products which invites the users to modify their query:

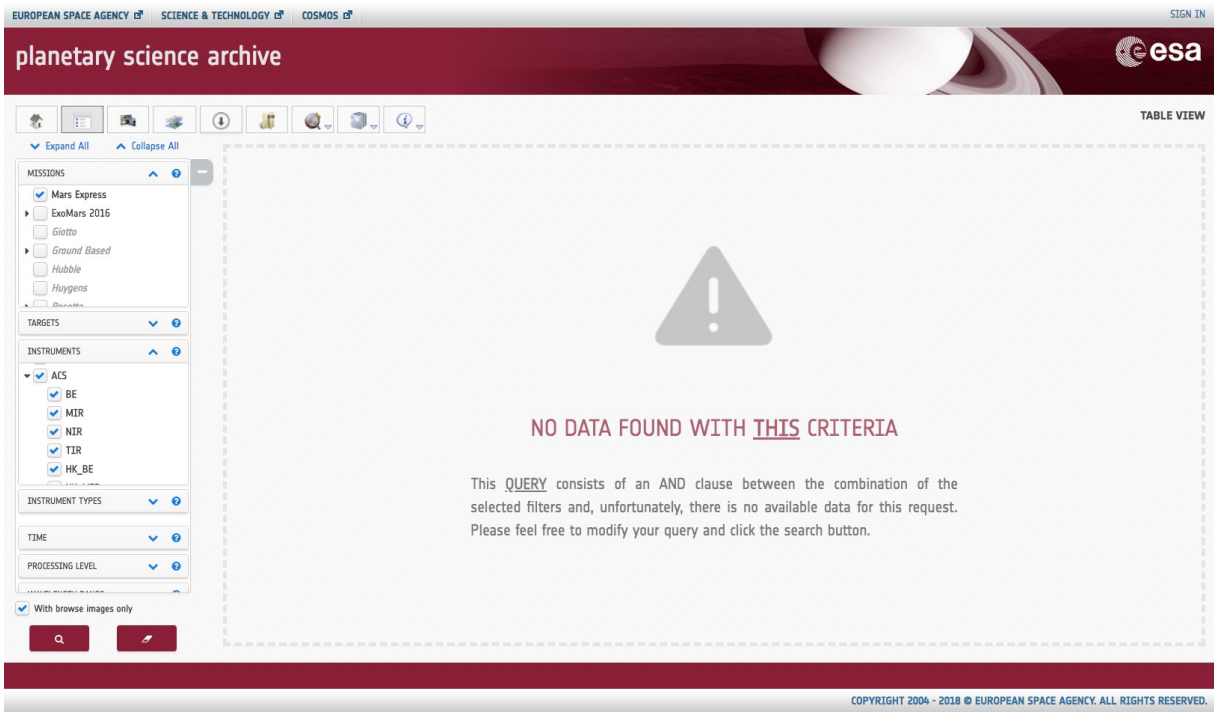


Table View (with no product to show)

Furthermore, when the user hovers over the message with the mouse, a tooltip with the CQL query that had been generated, will be visible. In this way, the user can get more information about the unsuccessful retrieval of result.

Table header and columns

The table view comes with the following headers and columns:

- Checkbox selection (displayed by default, non-removable)
  - Checkbox selected:
    - Header: All of the current page rows are selected (i.e. for download only)
    - Row: the specific row is selected
  - Checkbox unselected:
    - Header: All of the current page rows are unselected
    - Row: the specific row is unselected
- Postcard (displayed by default):
  - If the image is clicked, a postcard popup will be opened (See Postcard Viewer Popup section)
  - Proprietary postcards show a padlock in place of the postcard
- Product Identifier (displayed by default, non-removable):
  - If the product identifier is clicked, the product detail panel will be opened on the right side (see Product Detail section)
- Dataset Identifier (hidden by default)
- Observation Start Time (displayed by default)

- Observation Stop Time (displayed by default)
- Target (displayed by default)
- Mission (displayed by default)
- Instrument (displayed by default)
- Processing Level (displayed by default)
- Release Date (displayed by default)
- Wavelength Range (hidden by default)
- Instrument Host (hidden by default)
- Instrument Type (hidden by default)
- Sub Instrument (hidden by default)
- Version (hidden by default)
- Release (hidden by default)
- Product Title (hidden by default)

The column headers have a couple of features if they are clicked on:

- Drag & Drop: The table columns are draggable.
- Sorting: The table is sorted (ascending or descending, depending on the / icons, which are usually hidden and shown upon clicking in the grey space at the top of the column) by the selected header/column, **except** the *checkbox selection*, and *postcard* headers.

Table controls / features

The table view comes with the following controls/features:

- 

: To navigate among pages. Controls:
  - 

: Textbox to go to a specific page
  -

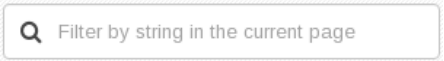
: To go to the first page
  -

: To go to the previous page
  -

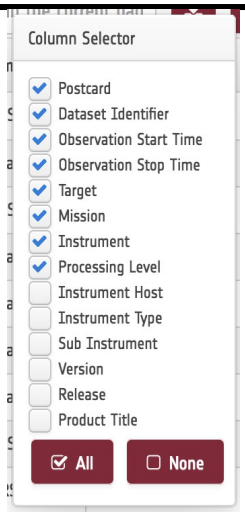
: To go to the next page
  -

: To go to the last page
- 

: To show the number of items per page. This value can be 10,25,50,100,500,1000,2000 or 3000.
- 

: To inform the user which elements are being displayed. Depends on the number of items per page and the page the user is on.
- 

: To filter in the current page and show only the results which match the text input
- 
: To open a popup to select the visible/hidden columns in the table view. By default, the visible columns are the following:

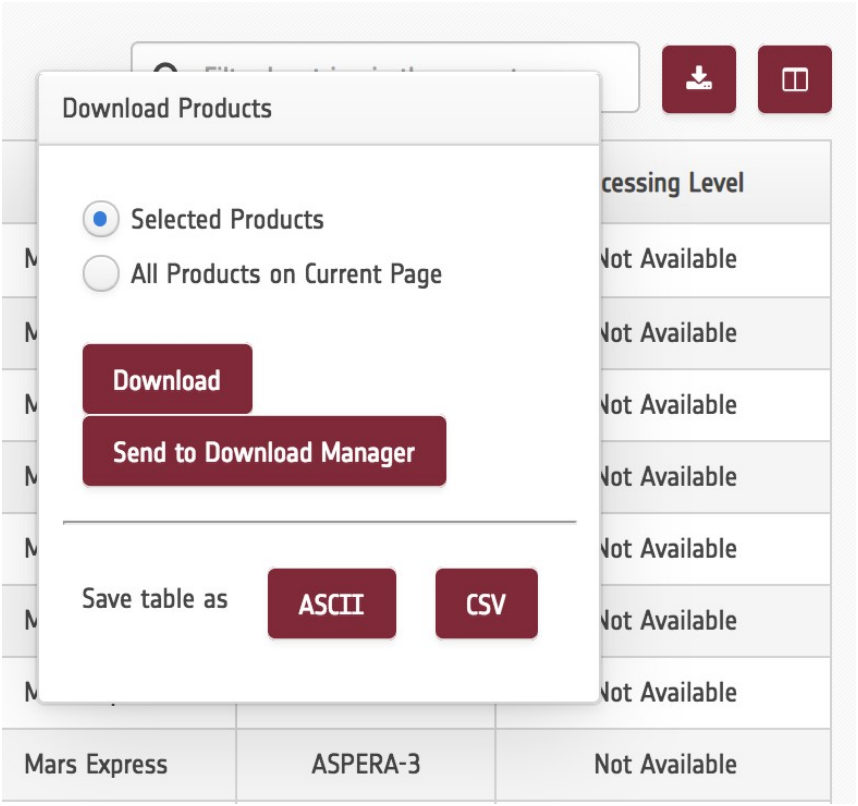


Column Selector

All : To select all the columns/checkboxes

None : To unselect all the column/checkboxes

- : To download the selected products (through the checkboxes) or send them to the Download View from the table view. When the user clicks on the icon, a popup appears with more download related selections:



Download popup

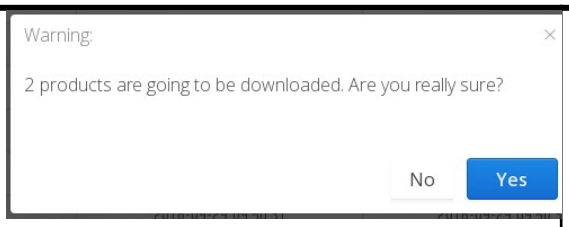
The download process is explained in further detail here

The popup allows the user to choose if they want to select for download only selected products or all the products in the current page. It is possible to download the products right away (after which the user has to choose if they want it in a .zip or .tar.gz format) or send them to the Download Manager where it is possible to add more filters. Also the popup includes a possibility to download the current table as ASCII or CSV format.

When the user sends products to the Download Manager then the total number of products in the Download Manager will also be shown as a number on the button in the menu buttons:

6 products are added to the Download Manager

When the user has decided to download the products right away and has also selected the download format (.zip or .tar.gz) a message popup will be shown asking the user to confirm the download process for the selected products, e.g. 2 products as shown in the example below:



Download process confirmation popup

No : To cancel the download process

Yes : To confirm the download process

It must be mentioned that the user can still keep on browsing in the PSA UI application while a download is being processed.
Note: Currently there is a maximum limit of 3000 *products* when downloading a group of products.

3.3.1 Product Detail

When clicking on a specific product identifier, e.g. FRM_AIS_RDR_7709.DAT , the product details will be displayed on the right side of the table view to provide the user with additional information about a specific product. As an example:

Product detail popup

The product detail popup has the following elements:

- FRM_AIS_RDR_7709.DAT: The product identifier
- Postcard or N/A image. See Postcard Viewer Popup section
- Summary : Tab with the product relevant info
- Documents : Tab with the associated documents of the given product
- Geometry : Tab with the product geometrical info
- Related : Tab with the associated products of the given product
- List of products attributes
- See Label File : Access the label file information of the product. See Label File Viewer section.

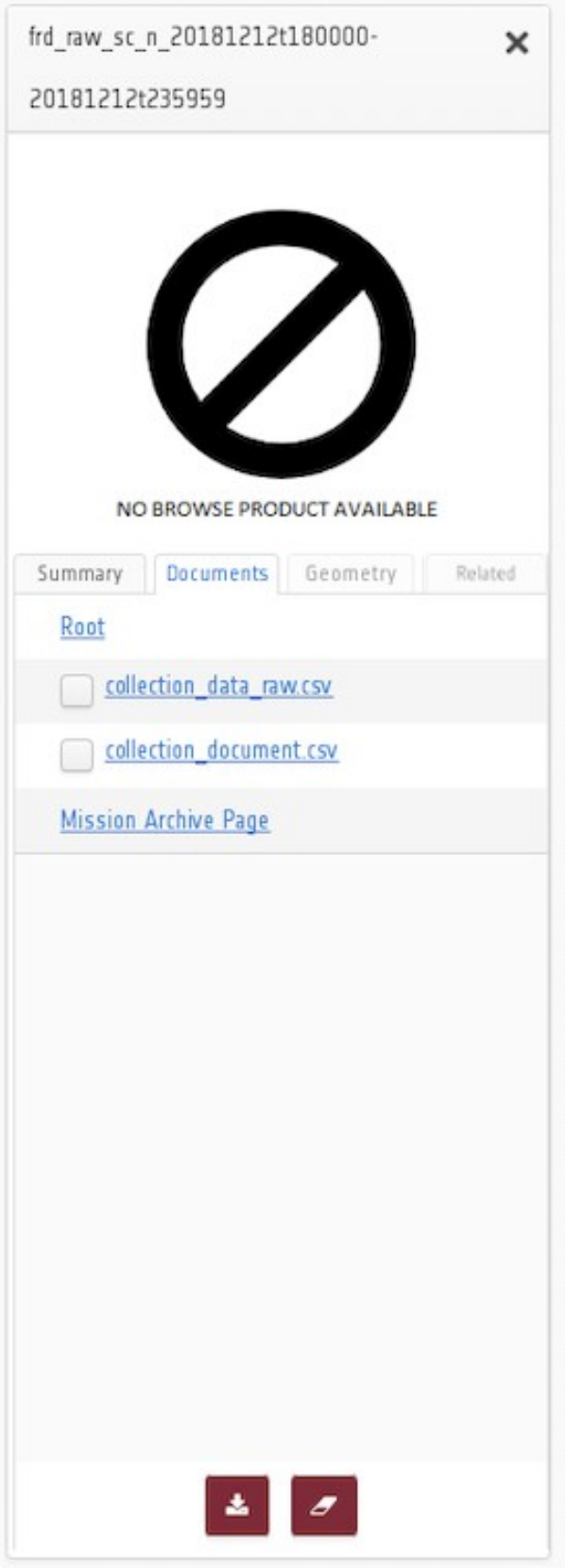
NOTE: If the product does not have any associated postcard/browse product, a forbidden icon will be displayed stating *NO BROWSE PRODUCT AVAILABLE*.

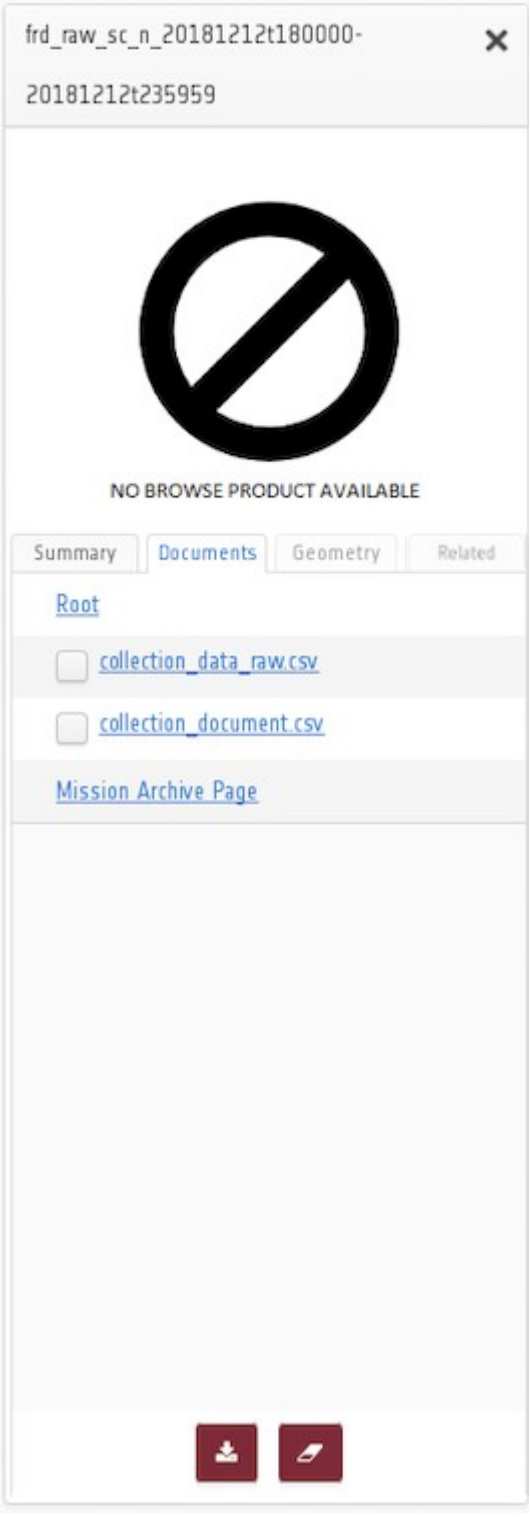
Document tab

The Documents tab shows the associated documents and additional information available for the selected product. The contents of this view will be different depending of the format of the product (PDS3 vs PDS4) and can also vary according to mission or instrument needs.

PDS3	PDS4
• Link to the root directory of the dataset/bundle in	• Link to the root directory of the

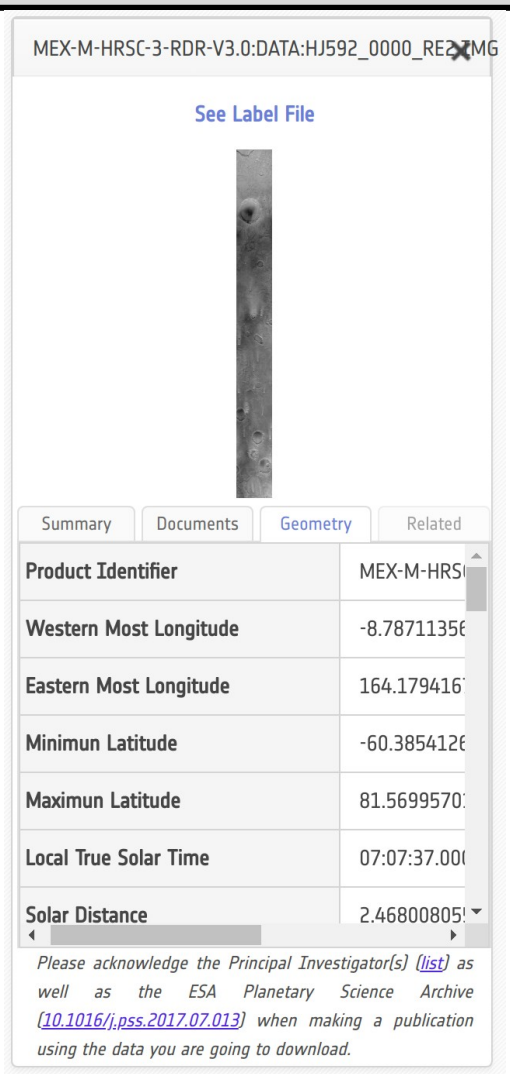
the FTP/HTTP • Link to the document directory/collection in the FTP/HTTP • Links to the AAREADME and the ERRATA files in the FTP/HTTP • Links to the Dataset.cat file and Catalog directory/collection in the FTP/HTTP • Link to the PSA web page for the relevant mission of the product	dataset/bundle in the FTP/HTTP • Link to the document directory/collection in the FTP/HTTP • Link to the PDS4 collection inventory files in the FTP/HTTP • Link to the PSA web page for the relevant mission of the product


frd_raw_sc_n_20181212t180000-
20181212t235959
NO BROWSE PRODUCT AVAILABLE
Summary
Documents
Geometry
Related
Root
collection_data_raw.csv
collection_document.csv
Mission Archive Page


frd_raw_sc_n_20181212t180000-
20181212t235959
NO BROWSE PRODUCT AVAILABLE
Summary
Documents
Geometry
Related
Root
collection_data_raw.csv
collection_document.csv
Mission Archive Page

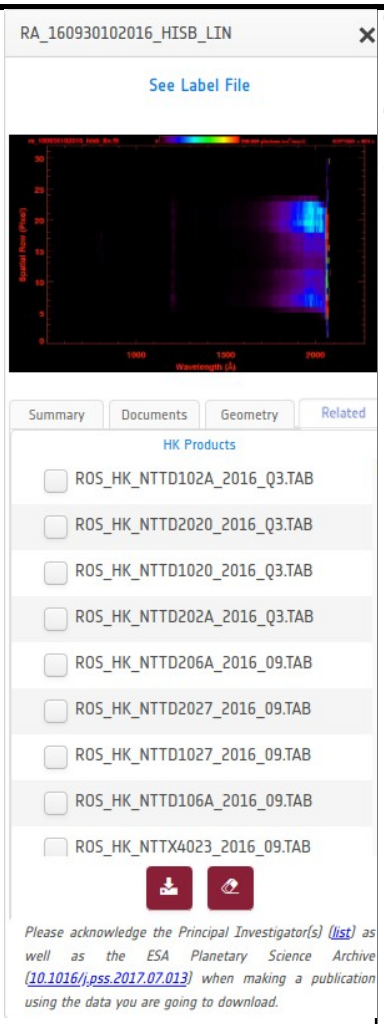
The Geometry tab shows the associated geometrical information available for the selected product. The contents of this view will be different depending of the format of the product (PDS3 vs PDS4) and can also vary according to mission or instrument needs.

PDS3



Related tab

The Related tab shows the associated products available for the selected product. The contents of this view will also offer specific information about the Housekeeping products associated to specific Rosetta products.



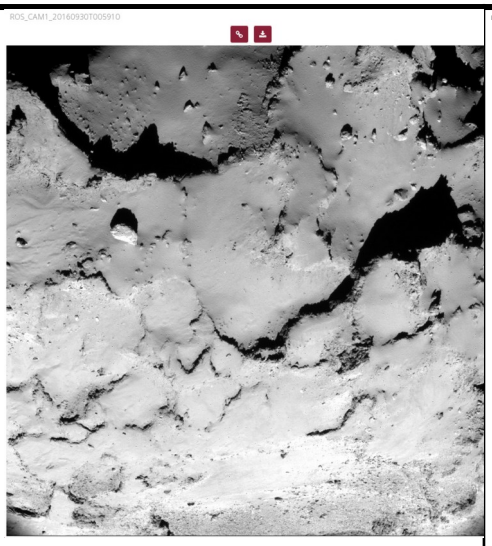
HK Products tab

The HK products tab shows the list of the Housekeeping products associated to the selected Rosetta product (e.g. RA_160930102016_HISB_LIN from ALICE instrument).

The listed HK products' start/stop times partially or fully overlap the selected product's start/stop times . The user is allowed then to download the required HK products either directly or by sending them to the Data Download Manager view.

Postcard Viewer Popup

If the selected product in the product detail popup contains postcard(s) (also called browse products) clicking on the image will launch a popup showing a high resolution image of the product and its logical identifier as well as buttons to download the associated product and open the image in a detached browser tab. As an example:



Postcard viewer popup

The postcard viewer popup has the following elements:

-  : To open the full resolution image in a detached browser tab
-  : To download the associated product

PDS3 Label File Viewer Popup

If the selected product in the product detail popup contains a detached label file (.LBL extension) a label file link called See Label File will be displayed at the bottom. Clicking this link will open a label file popup containing the relevant information. Currently this is only supported for PDS3 detached labels and hence not every product offers view. As an example:

ROS_CAM1_20160930T005910 PRODUCT LABEL FILE

```
PDS_VERSION_ID                = PDS3

/***      FILE CHARACTERISTICS                                          ***/
FILE_NAME                     = "ROS_CAM1_20160930T005910.LBL"
RECORD_TYPE                   = FIXED_LENGTH
RECORD_BYTES                  = 2048
FILE_RECORDS                  = 1024
INTERCHANGE_FORMAT            = BINARY

/***      POINTERS TO DATA OBJECTS                                      ***/
^IMAGE                        = ("ROS_CAM1_20160930T005910.IMG",1)

/***      IDENTIFICATION DATA ELEMENTS                                  ***/
DATA_SET_ID                   = "RO-C-NAVCAM-2-EXT3-MTP035-V1.0"
DATA_SET_NAME = "ROSETTA-ORBITER 67P NAVCAM 2 ROSETTA EXTENSION 3 MTP035 V1.0"
PRODUCT_ID                    = "ROS_CAM1_20160930T005910"
PRODUCT_CREATION_TIME         = 2016-10-13T10:20:16
PRODUCT_TYPE                  = EDR
PROCESSING_LEVEL_ID           = "2"
IMAGE_TIME                    = 2016-09-30T00:59:10.566
START_TIME                    = 2016-09-30T00:59:09.011
STOP_TIME                     = 2016-09-30T00:59:12.121
SPACECRAFT_CLOCK_START_COUNT  = "1/433817859.31233"
SPACECRAFT_CLOCK_STOP_COUNT   = "1/433817862.38441"
MISSION_ID                    = "ROSETTA"
MISSION_NAME                  = "INTERNATIONAL ROSETTA MISSION"
MISSION_PHASE_NAME            = "ROSETTA EXTENSION 3 MTP035"
INSTRUMENT_HOST_ID            = RO
INSTRUMENT_HOST_NAME          = "ROSETTA-ORBITER"
TARGET_NAME                   = "67P/CHURYUMOV-GERASIMENKO 1 (1969 R1)"
TARGET_TYPE                   = "COMET"
OBSERVATION_TYPE              = "NAVIGATION IMAGE"
PRODUCER_ID                   = "ESA-ESAC"
PRODUCER_FULL_NAME            = "BERNHARD GEIGER"
PRODUCER_INSTITUTION_NAME     = "EUROPEAN SPACE AGENCY-ESAC"
```

Label file viewer popup

3.4 Image View

The image view is the page where the user can search for products in the same way as in the table view. The only difference is how the results are being presented. In the image view only products that have postcards will be shown and the others are hidden, provided the

checkbox is ticked (which is ticked by default). Pagination is used also for this view but in each page the postcard images are displayed as a grid. When the user applies a search query the view would look like this:

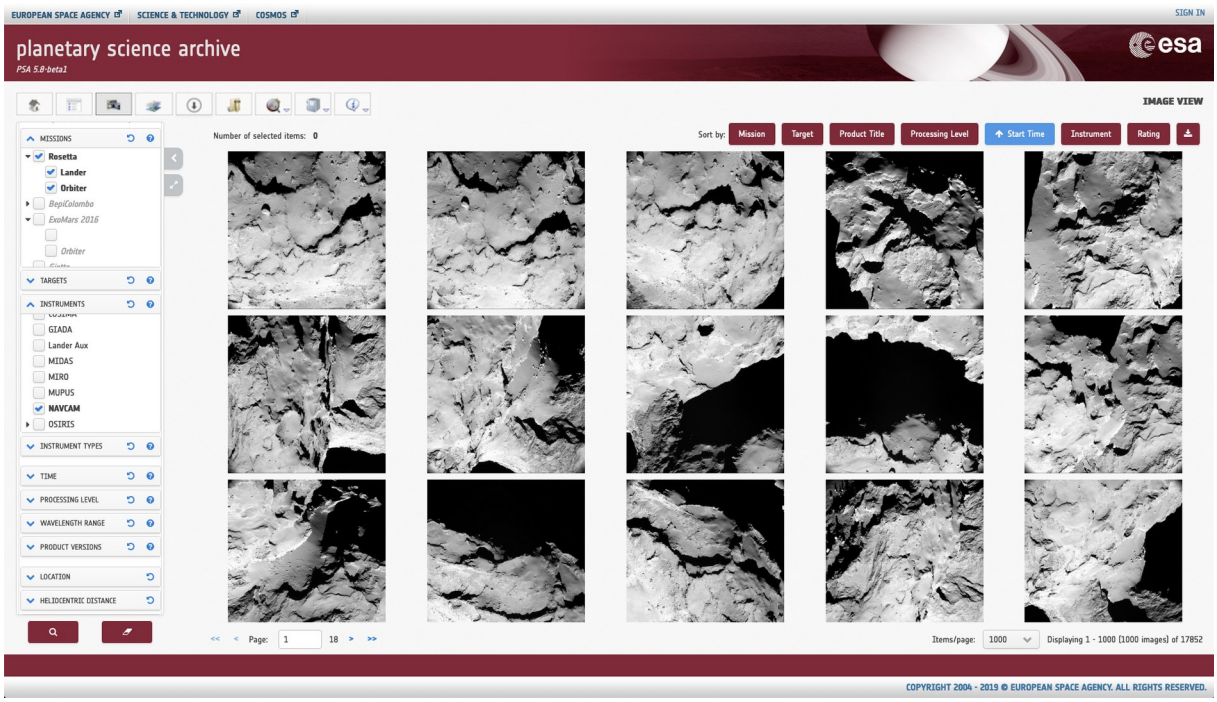
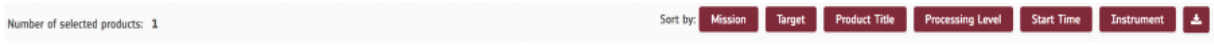


Image View (with products)

When the user hovers over an image with a mouse some key information about the product will be displayed (product identifier, mission name, target name, instrument name) accompanied by a checkbox to select the image for further actions such as downloading. This is how the image would look like if the user slides the cursor on it:

Browse product information when hovering the mouse

On top of the images there is a panel that contains some information and buttons to sort and download the products which looks like this:



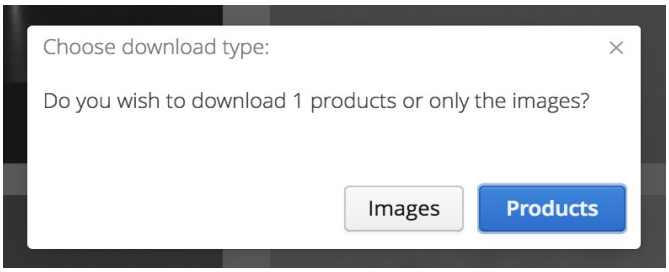
Action bar in the Image View

On the left side there is a number that specifies how many products have been marked as selected. On the right side there are some criteria (mission, target, product title, processing level, start time, instrument) that when clicked upon will sort the grid by that certain criteria. When clicking on the same criterion the sort order will be toggled between ascending and descending. When a sort has been applied the buttons will appear as the following:

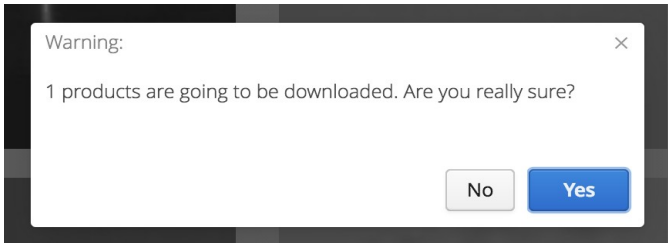
Sorting buttons and downloading button

The rightmost button in the panel downloads the selected products. First it will display a popup asking if the user wants to download only images or the whole products. The second popup is for confirmation and making sure that the amount of selected items is correct.

First popup:

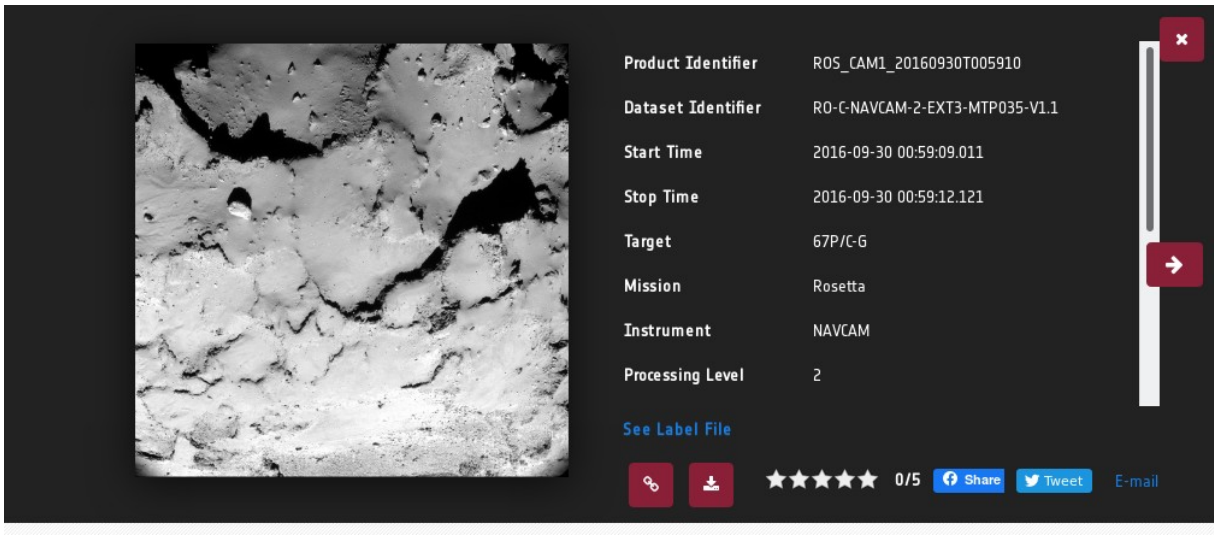


Second popup:



3.4.1 Product Detail

When clicking on an image in the grid then a panel with included product details will open under the row in which the clicked image is located. As an example:



Detail View of a product including the Product Details

The product details inside the panel contain exactly the same information as in the table view. Only the Geometry, Products and Documents tabs are not being displayed. When clicking on the image inside the panel the Postcard viewer popup will open which is equal to the one in table view. The same applies to the label file link (if present) which triggers a Label file viewer popup when clicked on.

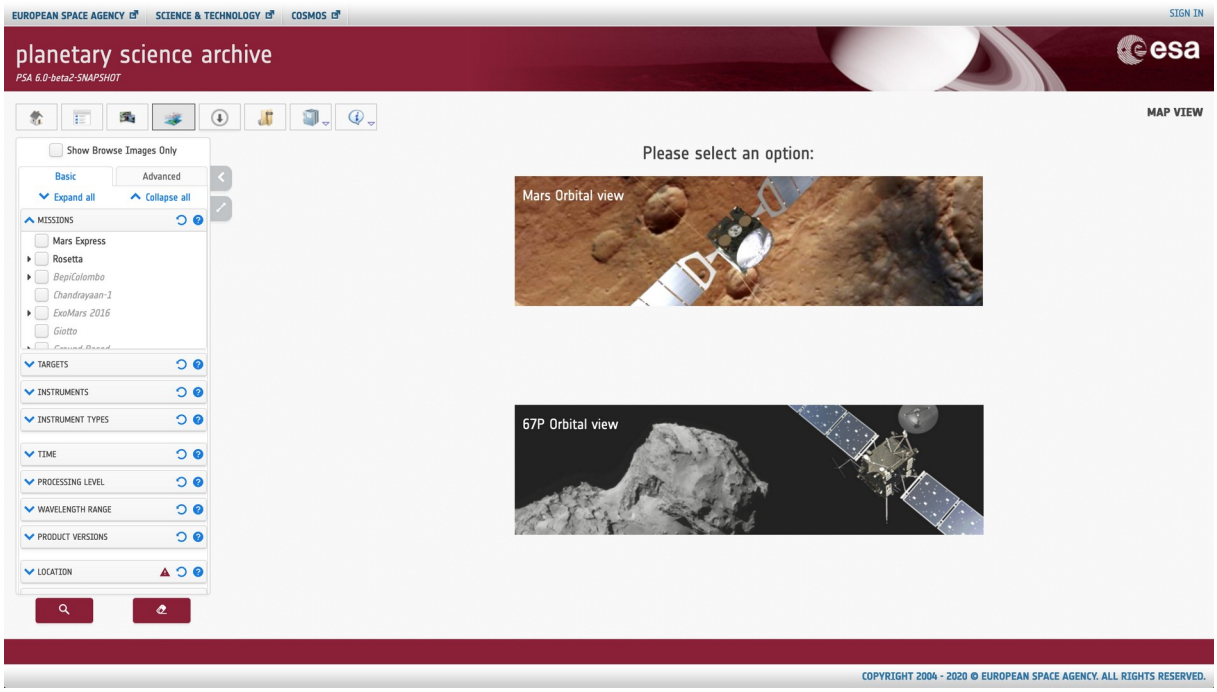
The panel also includes left and right arrow buttons to navigate between the images in the grid and a close button for dismissing the detail panel. Furthermore, under the product details summary there are:

-  : To open the full resolution image in a detached browser tab
-  : To download the associated product
-  : Rating stars to give a rating to the image on a scale 1-5 and the current average result from all the rating the users have given and the highest rating (5).
-  : Sharing the image: publication on Facebook, tweet via Twitter and sending by email.

Note: If the product does not have any associated postcard/browse product, a forbidden icon will be displayed stating NO BROWSE PRODUCT AVAILABLE.

3.5 Map views

The map view is the page where the user can search for products given a search criterion. The data products are displayed in this view by means of a table and in a 2D map or 3D scene - a list of all the products matching the query. When the user opens this view the following components are shown:



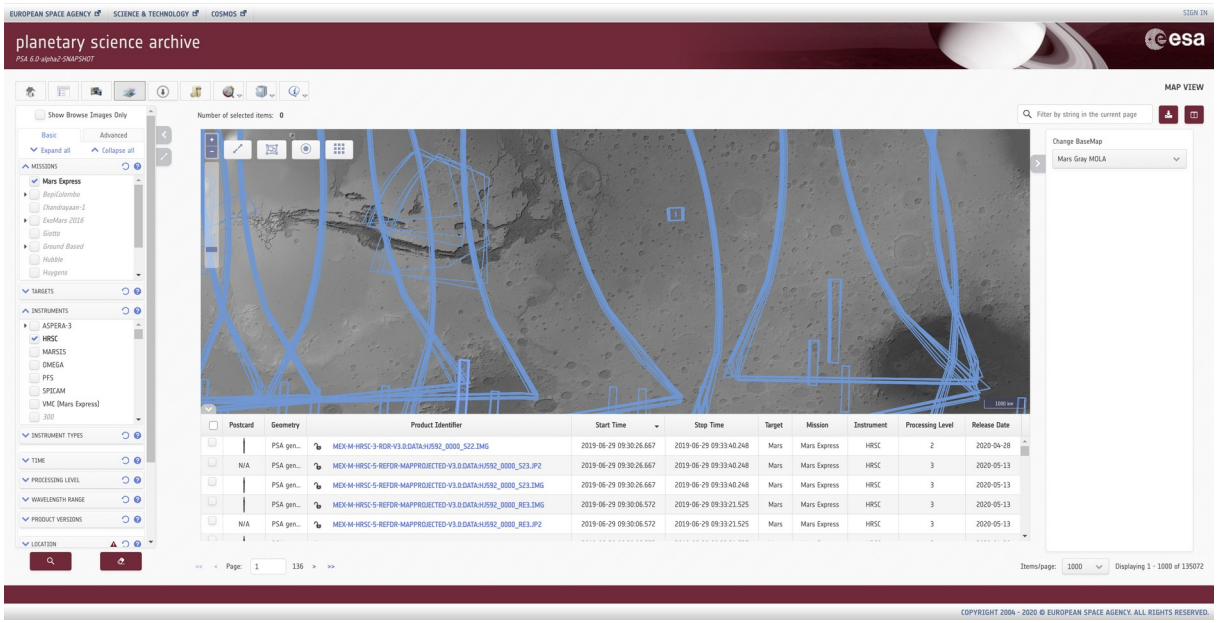
Map View by default (no result)

In the center of the view, there are 2 options to perform a pre-selected search, although the user can also do a personalized search using the left panel, the first option will open the 2D Mars Orbital map and the second option will open the **3D map** for 67P Orbital.

If the user performs a search with results that cannot be shown in any of the map views, a warning message shall appear in the background indicating "The results of this query cannot be displayed in a map view". It includes a description showing the options to launch a search displayable in the map views.

3.5.1 Mars Orbital

After clicking on the landing page in "*Mars Orbital Data*" or after clicking on  icon, a query is launched (i.e by Mars Express mission), showing the next map and information:

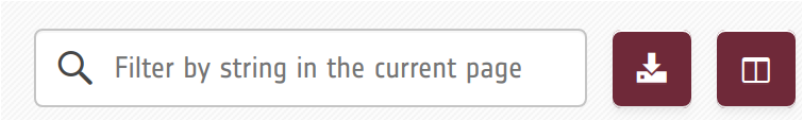


Map View (with Mars Express - HRSC data)

It consists of three main components:

- **Map** : A 2d map projected in EPSG 4326 that corresponds to the conventional WGS84 system used for the representation of the cartography at world-wide level with the projected footprints.
- **GIS Menu:** Right panel to interact with the map.
- **Table**: A table with the alphanumeric information of the footprints represented on the map.

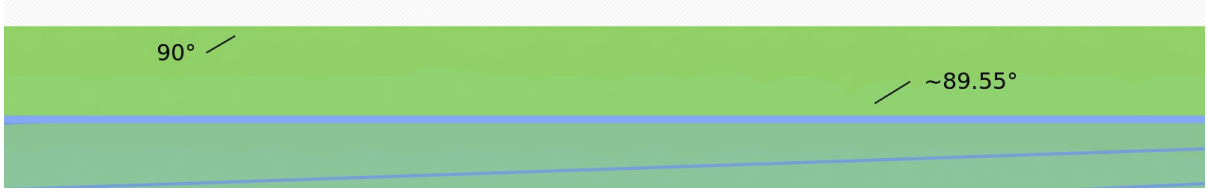
The Map View has the same as Table View, which is explained in the Table View section (**Table controls / features**),



Filter data by String in the current page

The **filter panel** on the left is the same as the one described in the Table view (see Table View section).

Note : Currently the footprints do not reach up to 90 degrees, they reach up to 89.55 degrees aprox, so the searches near 90 degrees don't work.



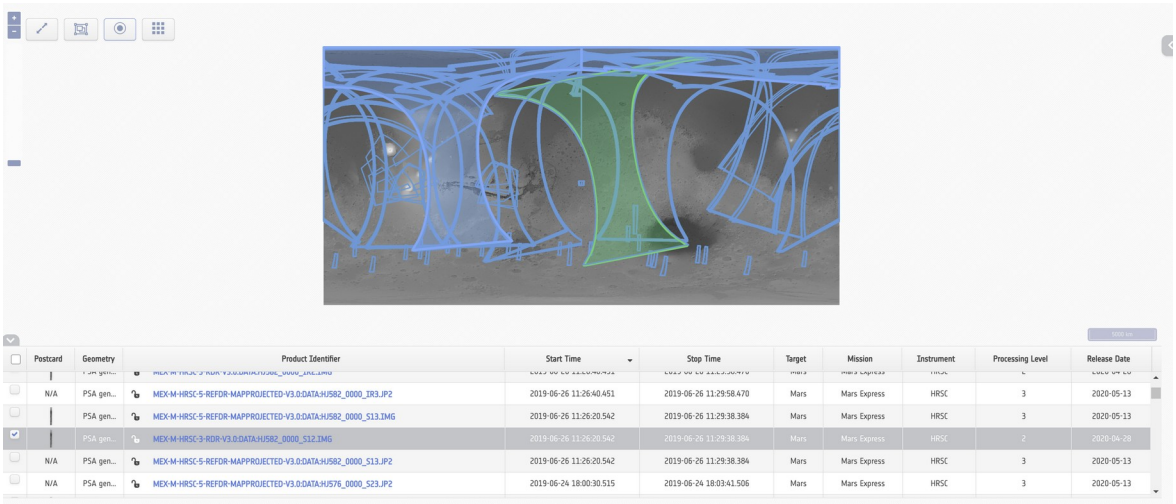
Approximation at 90 degrees

Map controls / features

The map view comes with the following controls/features.

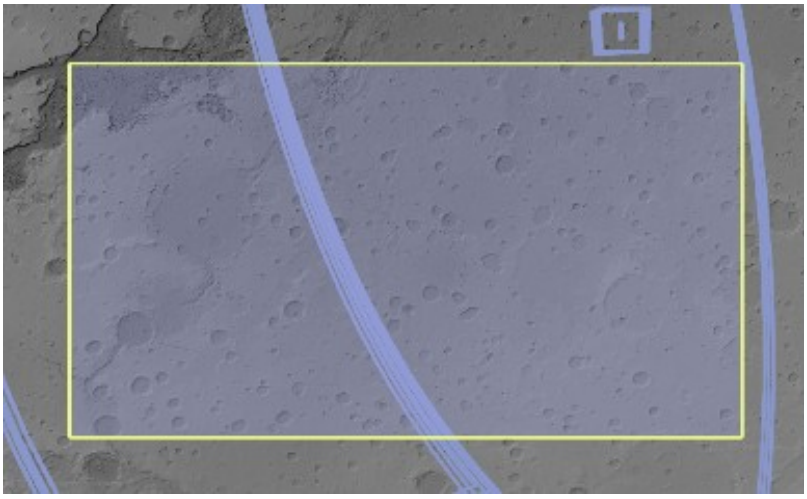
The map has the following controls, at the top left:

- : To zoom in on the map by clicking on the buttons or moving the slider.
-  : Puts the map on full screen. The user can hide the rest of the panels manually.



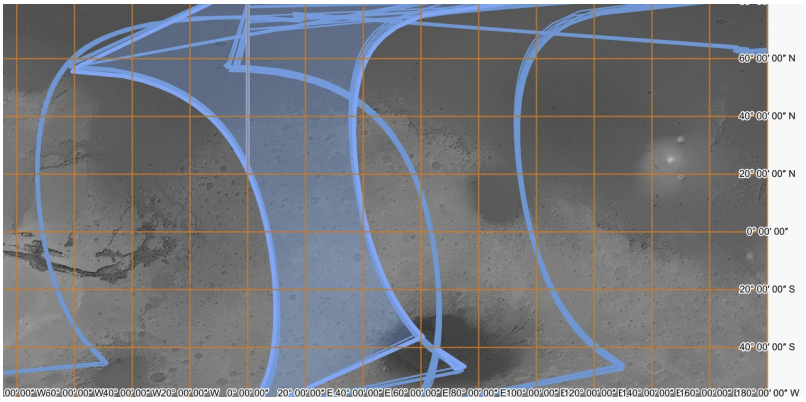
Full Screen action

-  : To select the footprints by means of a region of interest (ROI). Just click on the button and define a square on the map by holding down the left click,If we press the button again we clean the existing selection.



Select Region of interest action

-  : To reset the map to the original position.
-  : To display/hide a grid on the map.

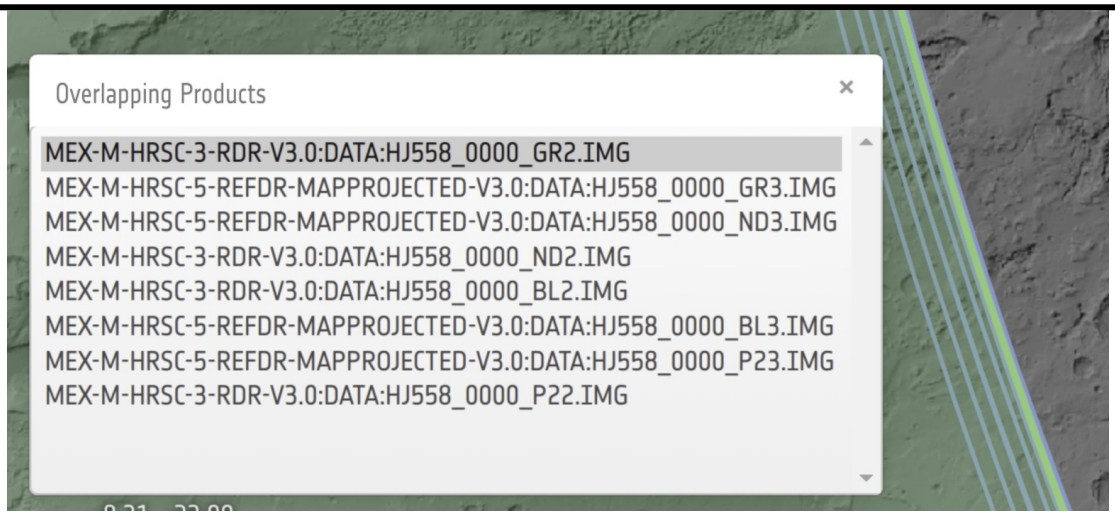


Graticule element

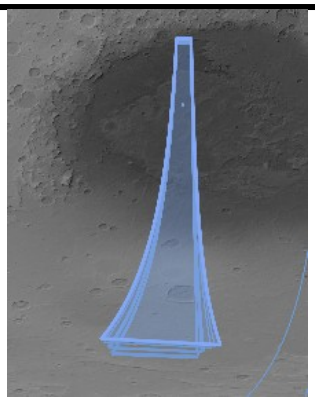
- *Cursor Coordinates* : When we move over the map we can see the cursor coordinates at the bottom of the map 

.

When the user move over the footprints you will see that it changes color (hover action, "blue color") which with the left click you will select the footprint, the product detail panel will be opened on the right side. If there are overlaped footprints, a context menu will appear,when the first on the list is the one closest to the user's click, in which we can select a product and the product detail panel will be opened on the right side too (see Product Detail section).

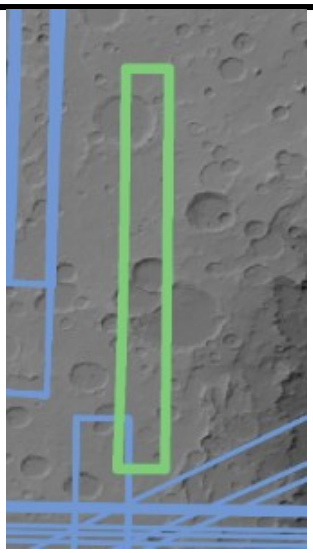


Overlaping context menu



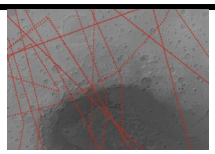
Hove

red footprint



Selec

ted footprint

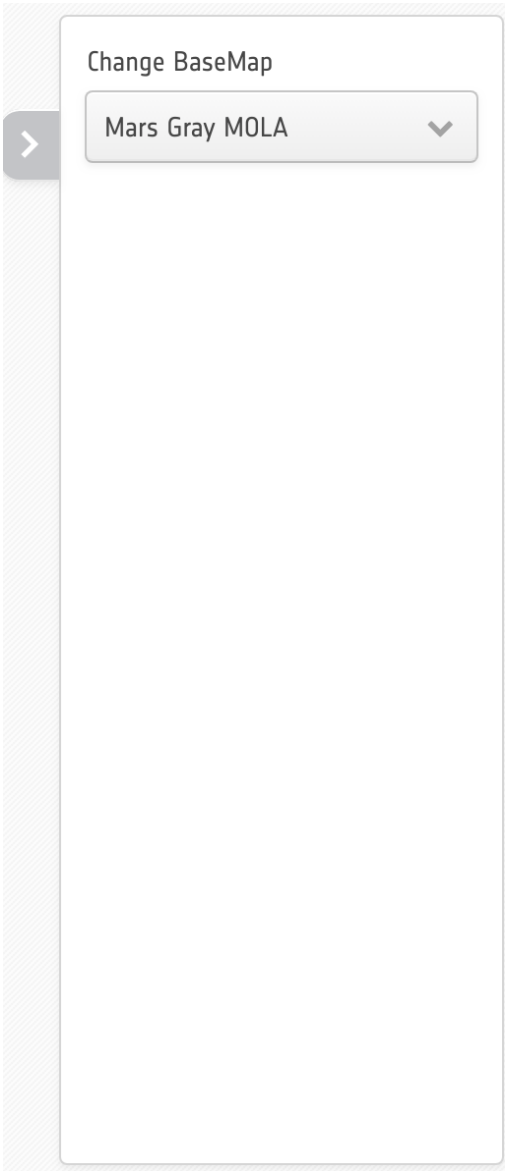


Private photoprint (dashed red line)

GIS Menu controls / features

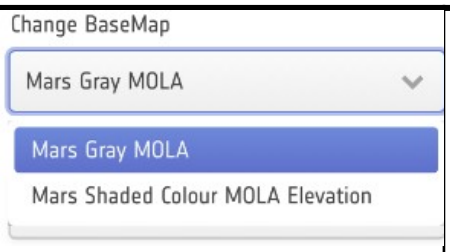
The GIS menu comes with the following controls/features.

We have another menu, on the right side, called "Geographic Information System (GIS) Menu", which we open or close with .



GIS Right Menu

This right menu contains different options:



From this drop-down menu we can change the Basemap. Currently we can select between:

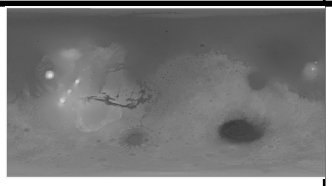
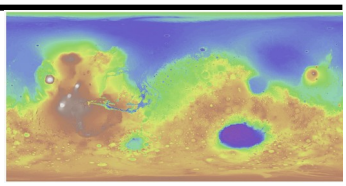
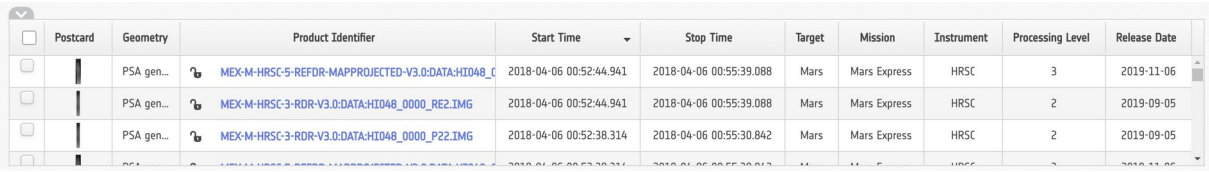
Mars Gray MOLA	**Mars Shaded Colour MOLA Elevation**
	
Mars Gray MOLA Basemap	*Mars Colour MOLA Elevation BaseMap*

Table header and columns

The table view comes with the following headers and columns:

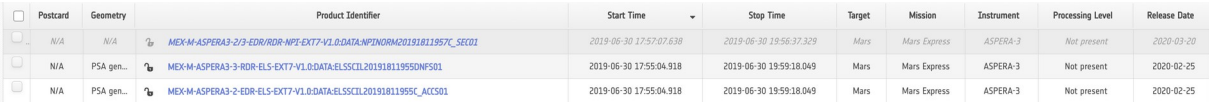
- Checkbox selection (displayed by default, non-removable)
  - Checkbox selected:
    - Header: All of the current page rows are selected (i.e. for download only)
    - Row: the specific row is selected
  - Checkbox unselected:
    - Header: All of the current page rows are unselected
    - Row: the specific row is unselected
- Postcard (displayed by default):
  - If the image is clicked, a postcard popup will be opened (See Postcard Viewer Popup section)
  - Proprietary postcards show a padlock in place of the postcard
- Geometry (displayed by default)
- Product Identifier (displayed by default, non-removable):
  - If the product identifier is clicked, the product detail panel will be opened on the right side (see Product Detail section)
- Observation Start Time (displayed by default)
- Observation Stop Time (displayed by default)
- Target (displayed by default)
- Mission (displayed by default)
- Instrument (displayed by default)
- Processing Level (displayed by default)
- Release Date (displayed by default)



Postcard	Geometry	Product Identifier	Start Time	Stop Time	Target	Mission	Instrument	Processing Level	Release Date
	PSA gen...	MEX-M-HRSC-5-REFDR-MAPPROJECTED-V3.0:DATA:HI048_0	2018-04-06 00:52:44.941	2018-04-06 00:55:39.088	Mars	Mars Express	HRSC	3	2019-11-06
	PSA gen...	MEX-M-HRSC-3-RDR-V3.0:DATA:HI048_0000_RE2.IMG	2018-04-06 00:52:44.941	2018-04-06 00:55:39.088	Mars	Mars Express	HRSC	2	2019-09-05
	PSA gen...	MEX-M-HRSC-3-RDR-V3.0:DATA:HI048_0000_P22.IMG	2018-04-06 00:52:38.314	2018-04-06 00:55:30.842	Mars	Mars Express	HRSC	2	2019-09-05

Result Table View (with Mars Express - HRSC data)

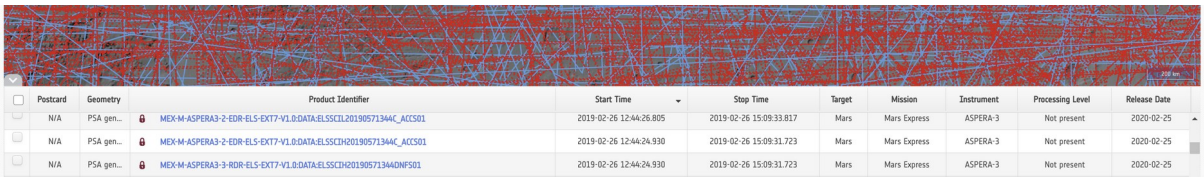
When products cross the has no geometry the row appear in grey on the table and the value in Geometry column is "N/A".



Postcard	Geometry	Product Identifier	Start Time	Stop Time	Target	Mission	Instrument	Processing Level	Release Date
N/A	N/A	MEX-M-ASPERA3-2/3-EDR/RDR-NPI-EXT7-V1.0:DATA:NPINORM20191811957C_SEC01	2019-06-30 17:57:07.638	2019-06-30 19:56:37.329	Mars	Mars Express	ASPERA-3	Not present	2020-03-20
N/A	PSA gen...	MEX-M-ASPERA3-3-RDR-ELS-EXT7-V1.0:DATA:ELSSCIL20191811955DNFS01	2019-06-30 17:55:04.918	2019-06-30 19:59:18.049	Mars	Mars Express	ASPERA-3	Not present	2020-02-25
N/A	PSA gen...	MEX-M-ASPERA3-2-EDR-ELS-EXT7-V1.0:DATA:ELSSCIL20191811955C_ACCS01	2019-06-30 17:55:04.918	2019-06-30 19:59:18.049	Mars	Mars Express	ASPERA-3	Not present	2020-02-25

Result Table View (with Mars Express - ASPERA data)

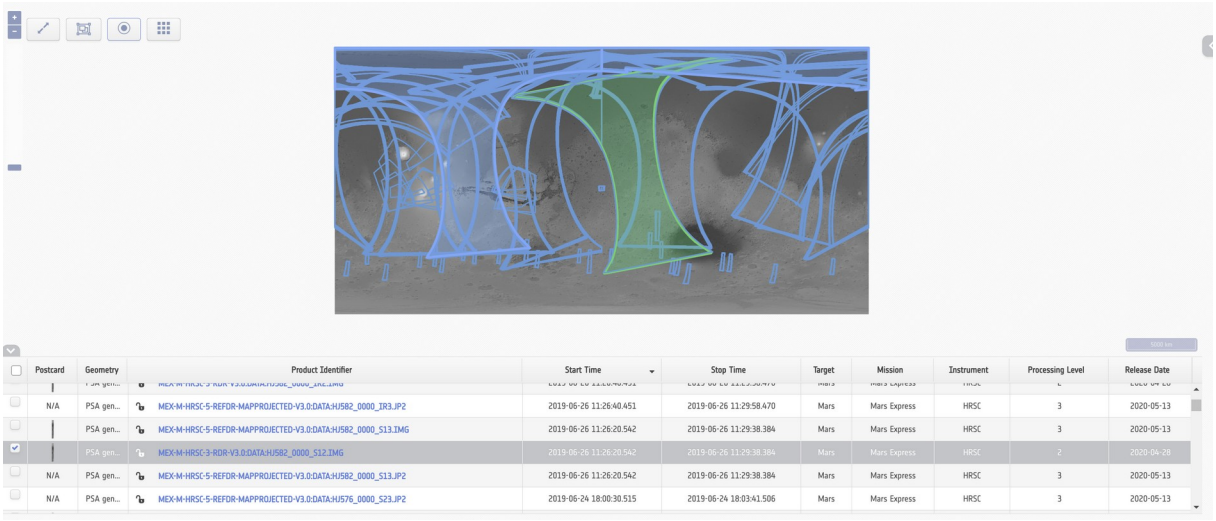
If the product is private, it will be shown on the map in a red and dashed style. The private products on the table are represented with the safety lock in red color and closed (see the product Identifier column)



Result Table View (with Mars Express - ASPERA private data)

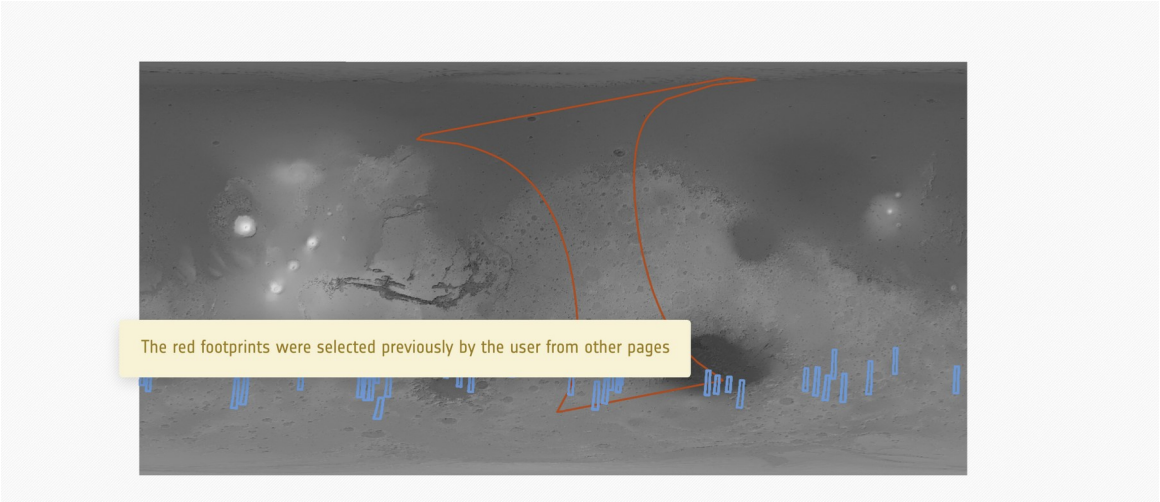
Keeping footprint visibility among pages if selected

In the map View we can maintain products even if we change pages and thus be able to compare footprints.To do this, we have to search for example **HRSC** and select a product in the table:



Map View (with Mars Express - HRSC data)

If we switch to the next page we can still see the footprint selected on the previous page of a red color. It will also inform the user with a message:

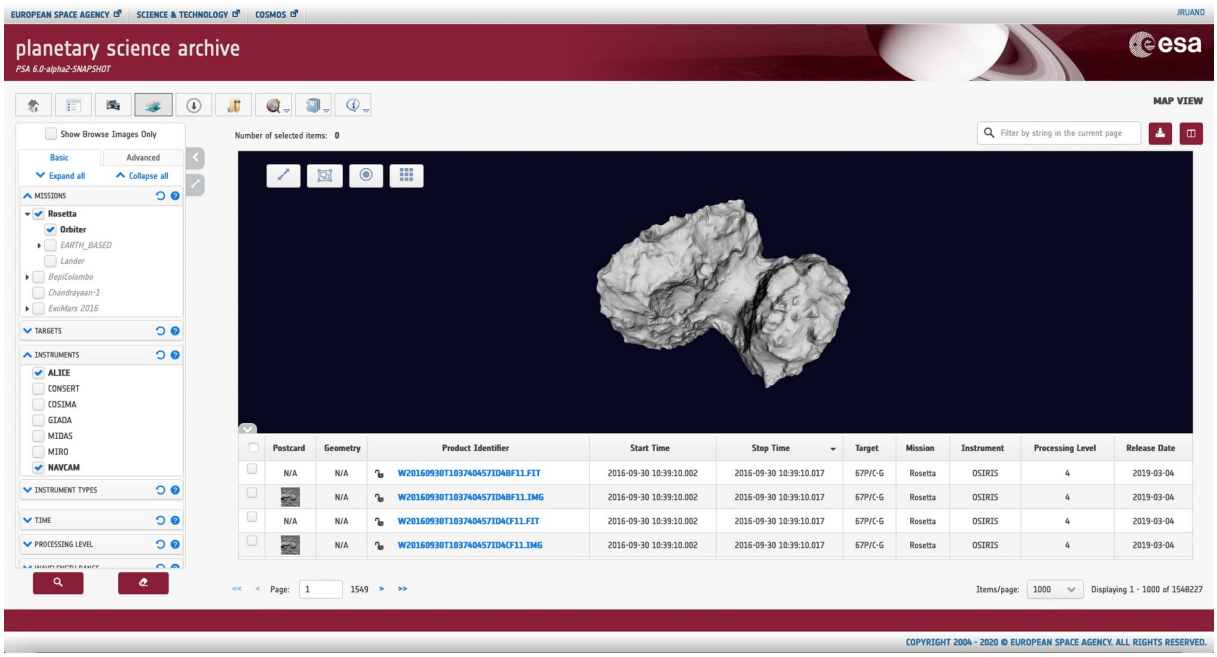


Map View (with Mars Express - HRSC data and previous footprint elected)

To deselect it, simply return to the previous page and uncheck it from the table.

3.5.2 67P Orbital

After clicking on the landing page in "*67P Orbital view*" or after clicking on  icon, a query is launched for Rosetta mission, showing the next map and information:

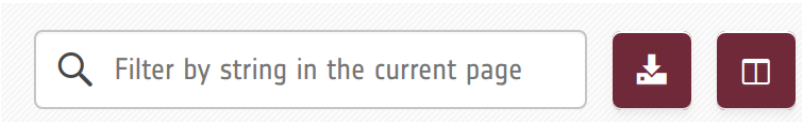


Map View (with Rosetta - Alice, NavCam and Osiris data)

It consists of three main components:

- **Map**: a 3D map viewer showing the 67P 3D model.
- **Map controls:** top left buttons to interact with the map.
- **Table**: A table with the alphanumeric information of the products that can be represented on the map.

The Map View has the same as Table View, which is explained in the Table View section (**Table controls/features**),



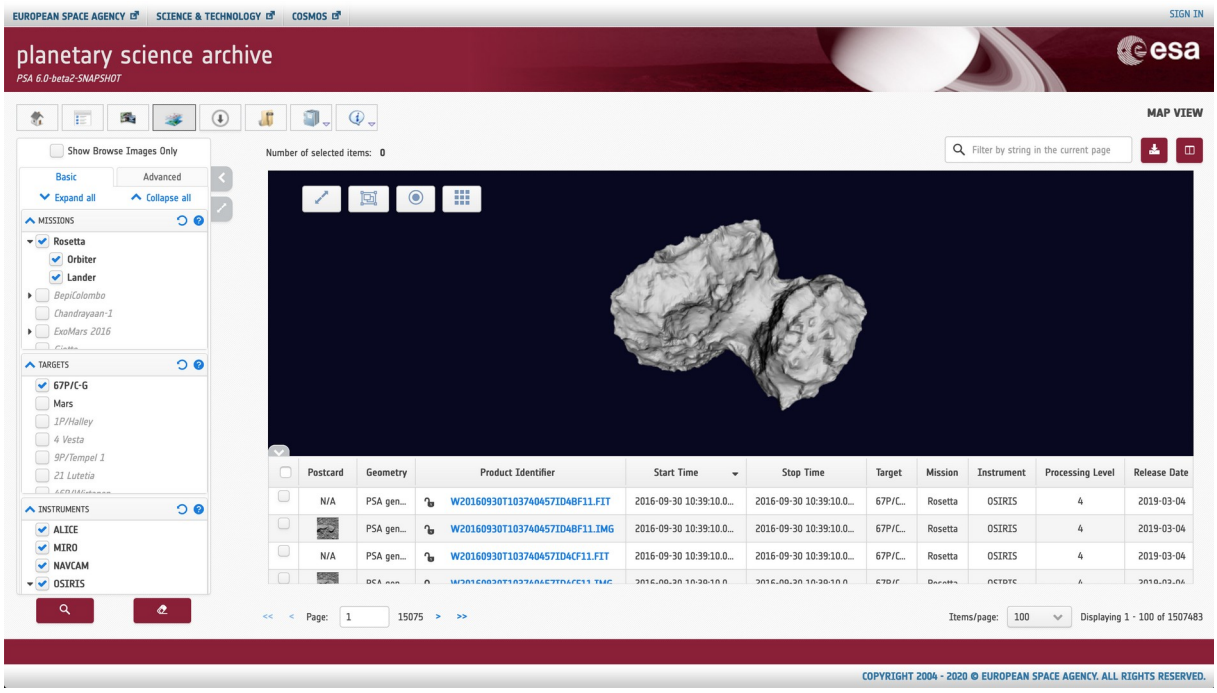
Filter data by String in the current page

The **filter panel** on the left is the same as the one described in the Table view (see Table View section).

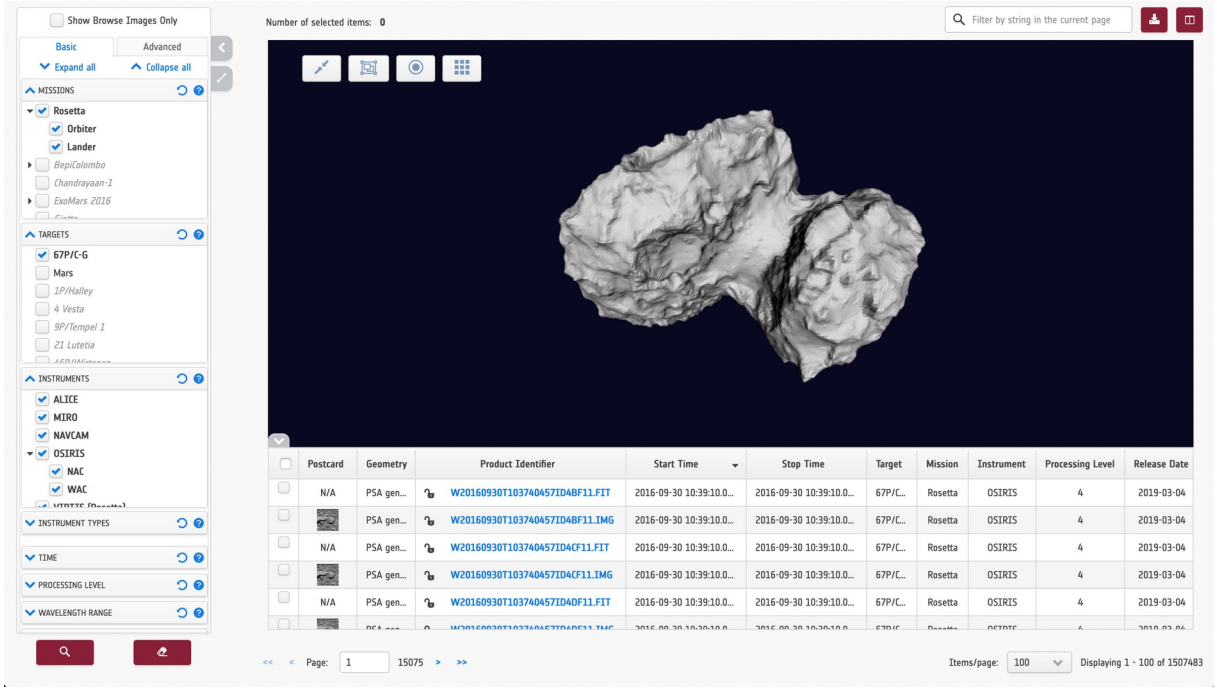
Scene controls / features

The 3D view comes with following controls at the top left of the map view:

-  **Normal/Full view**: Switch the map view to normal/full screen. Depending on the previous status the user will hide/show the top and bottom panels.

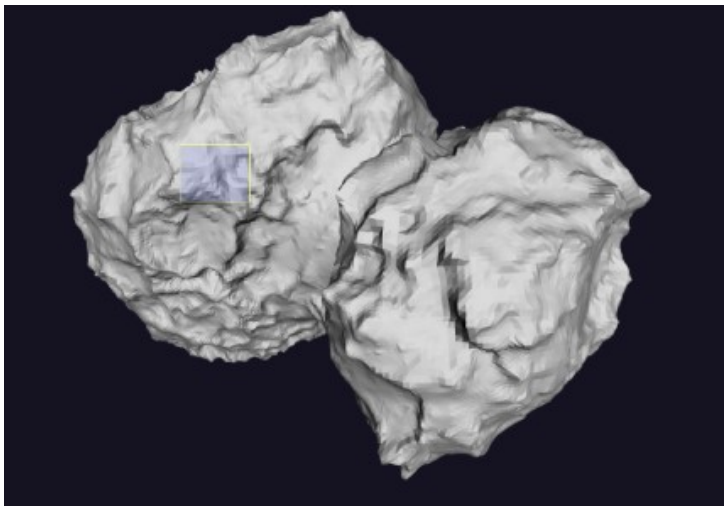


3D map normal view



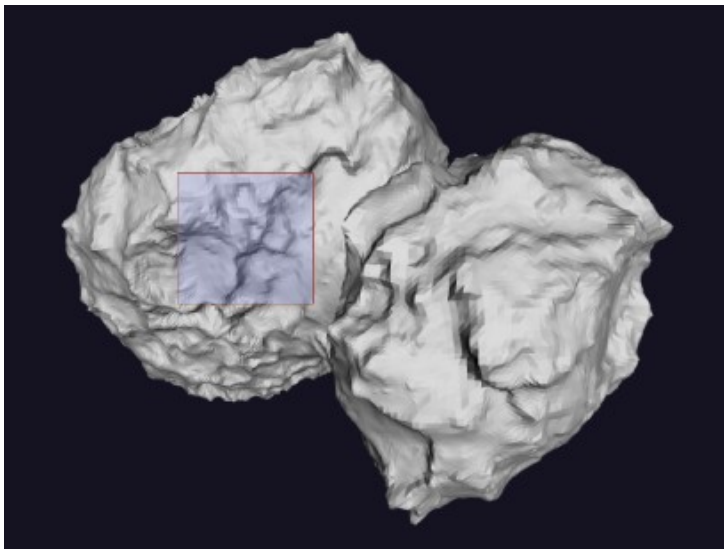
3D map full view

-  **Region of interest:** to select the products by means of a region of interest (ROI). Click on the button and define a rectangle on the map by holding down the left click. When the click is released it will calculate the intersection of the drawn rectangle with the 3D model surface and launch the search applying the ROI criteria.



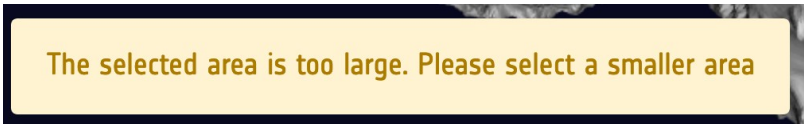
Rectangle is drawn on the 67P model (Allowed area)

In order to avoid the collapse of the application, since a great deal of computing capacity is needed, the maximum area to be selected has been restricted. This is indicated to the user with a red border color, if the rectangle changes to red it means that the maximum area has been exceeded.



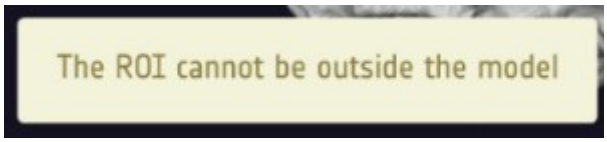
The rectangle is drawn on the 67P model (Not allowed area)

If the user wants to make a very large area anyway, the following message will appear:



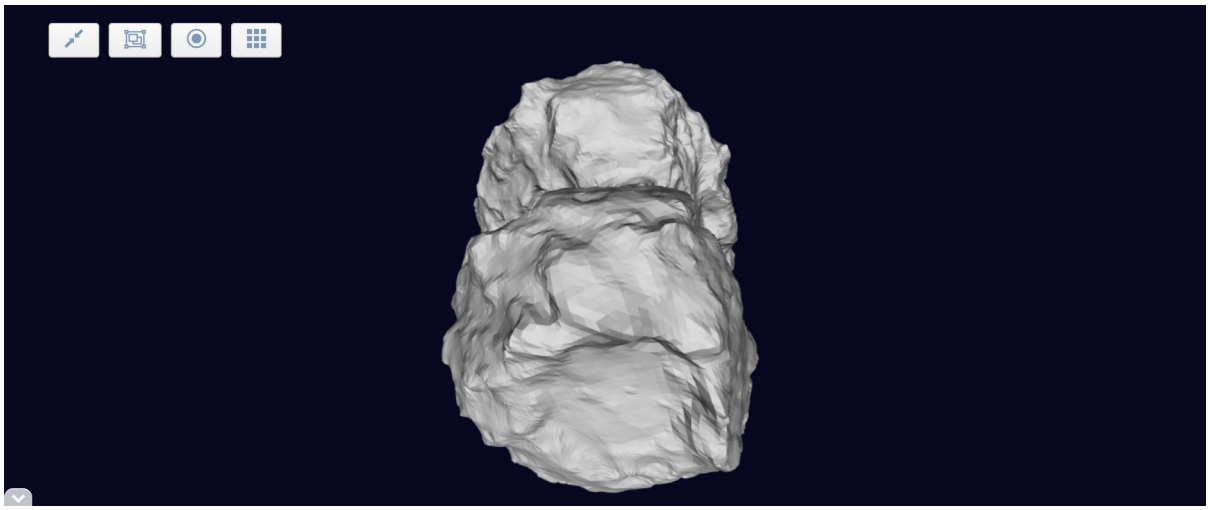
Area too large

It also avoids being able to select outside the model :

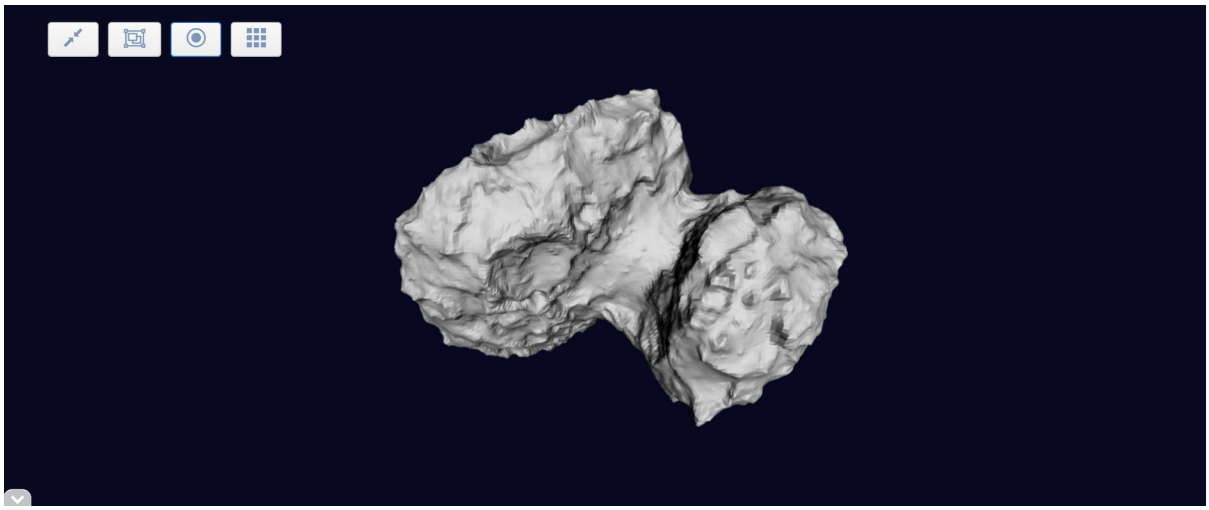


ROI outside the model

-  **Zoom & center by default:** set the default zoom and the camera position.

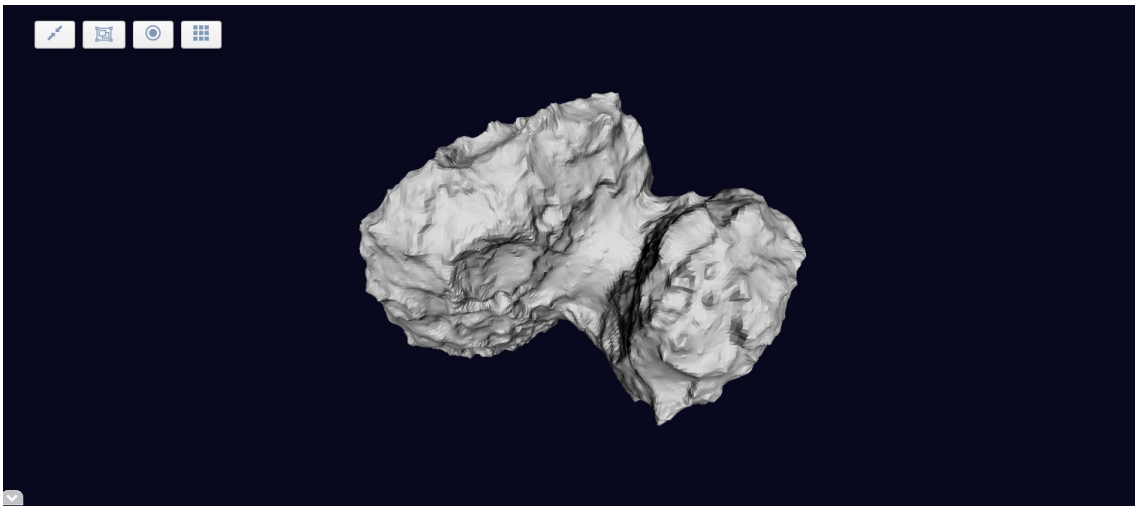


Viewer camera zoom and position changed from the default

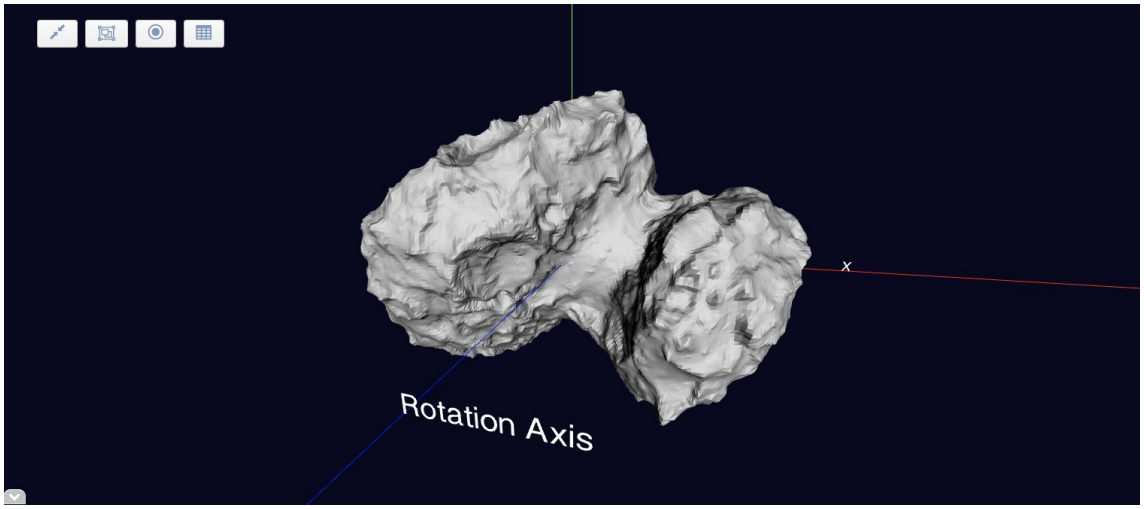


Viewer camera zoom and position reset to default

-  **Show/hide axis:** with this function, the axis can be shown/hidden.



A xes are hidden



Axes are shown

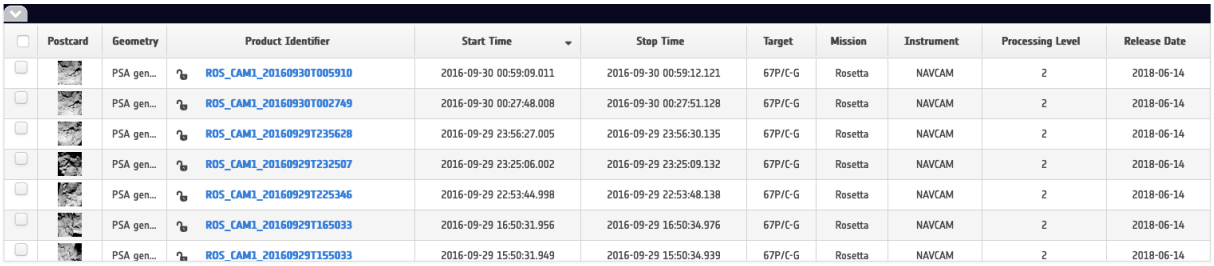
Products table (header and columns)

The table view comes with the following headers and columns:

- Checkbox selection (displayed by default, non-removable)
  - Checkbox selected:
    - Header: All of the current page rows are selected (i.e. for download only)
    - Row: the specific row is selected
  - Checkbox unselected:
    - Header: All of the current page rows are unselected
    - Row: the specific row is unselected
- Postcard (displayed by default):
  - If the image is clicked, a postcard popup will be opened (See Postcard Viewer Popup section)
  - Proprietary postcards show a padlock in place of the postcard
- Geometry (displayed by default)
- Product Identifier (displayed by default, non-removable):

- If the product identifier is clicked, the product detail panel will be opened on the right side (see Product Detail section)

- Observation Start Time (displayed by default)
- Observation Stop Time (displayed by default)
- Target (displayed by default)
- Mission (displayed by default)
- Instrument (displayed by default)
- Processing Level (displayed by default)
- Release Date (displayed by default)



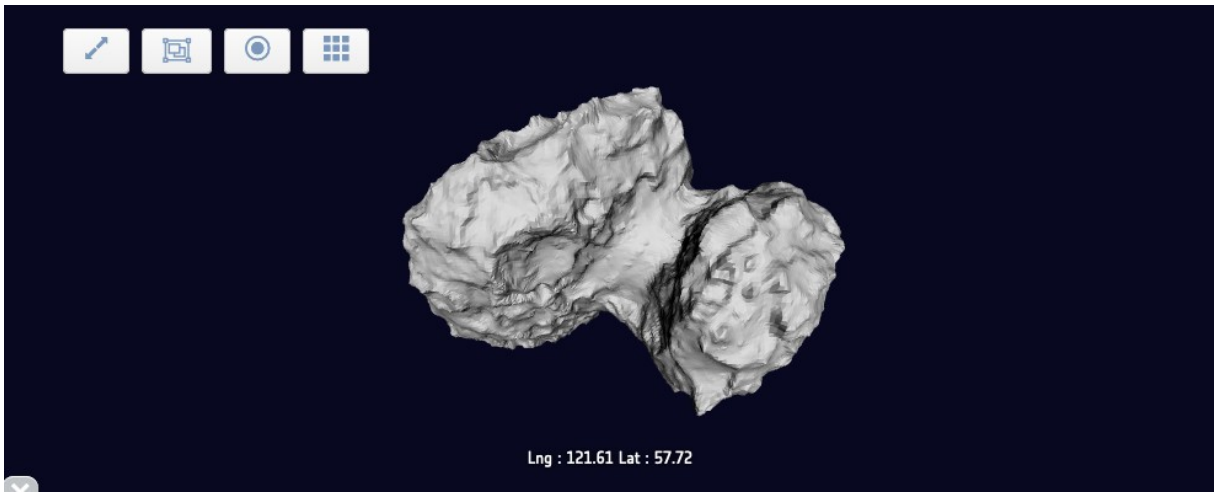
Postcard	Geometry	Product Identifier	Start Time	Stop Time	Target	Mission	Instrument	Processing Level	Release Date
	PSA gen...	ROS_CAM1_20160930T005910	2016-09-30 00:59:09.011	2016-09-30 00:59:12.121	67P/C-G	Rosetta	NAVCAM	2	2018-06-14
	PSA gen...	ROS_CAM1_20160930T002749	2016-09-30 00:27:48.008	2016-09-30 00:27:51.128	67P/C-G	Rosetta	NAVCAM	2	2018-06-14
	PSA gen...	ROS_CAM1_20160929T235628	2016-09-29 23:56:27.005	2016-09-29 23:56:30.135	67P/C-G	Rosetta	NAVCAM	2	2018-06-14
	PSA gen...	ROS_CAM1_20160929T232507	2016-09-29 23:25:06.002	2016-09-29 23:25:09.132	67P/C-G	Rosetta	NAVCAM	2	2018-06-14
	PSA gen...	ROS_CAM1_20160929T225346	2016-09-29 22:53:44.998	2016-09-29 22:53:48.138	67P/C-G	Rosetta	NAVCAM	2	2018-06-14
	PSA gen...	ROS_CAM1_20160929T165033	2016-09-29 16:50:31.956	2016-09-29 16:50:34.976	67P/C-G	Rosetta	NAVCAM	2	2018-06-14
	PSA gen...	ROS_CAM1_20160929T155033	2016-09-29 15:50:31.949	2016-09-29 15:50:34.939	67P/C-G	Rosetta	NAVCAM	2	2018-06-14

Products table

3D Map

The 3D map contains the visualization part of the shape model and all the 3D functionality associated with this object. The user has controls to play with the 3D model by using the mouse or touchpad:

- **Scroll**: with this functionality, the user can zoom in and zoom out to the model.
- **Drag**: the user can rotate the model to the desired position by dragging functionality. If the user clicks at any part on the 3D map, holds the click and moves, the shape model will rotate until the click is released.
- **Hover:** when the user hovers the mouse over the 3D model surface the longitude and latitude shall be displayed on the bottom part of the comet view.



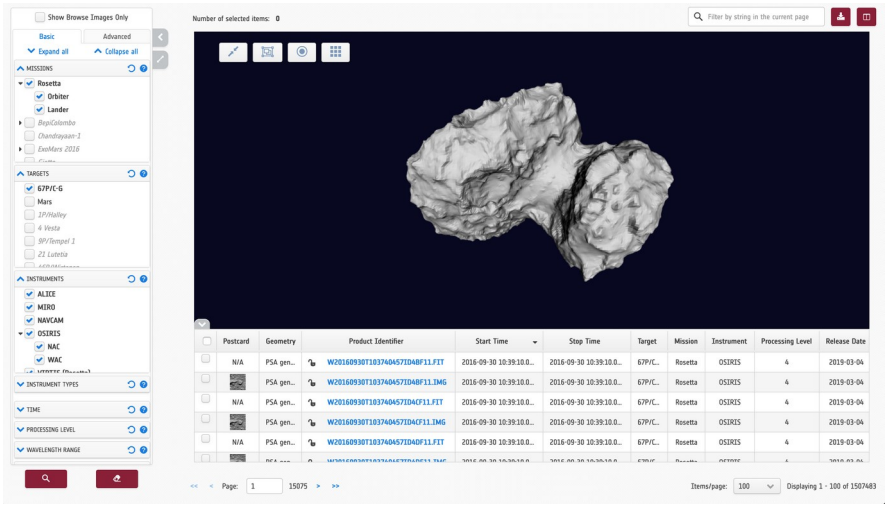
3D Map

Use of 67P Orbital Map View

This specific view is aimed at projecting footprints of Rosetta products that can be shown at the comet model surface and searching a by region of interest selected by the user:

Show footprint on Comet

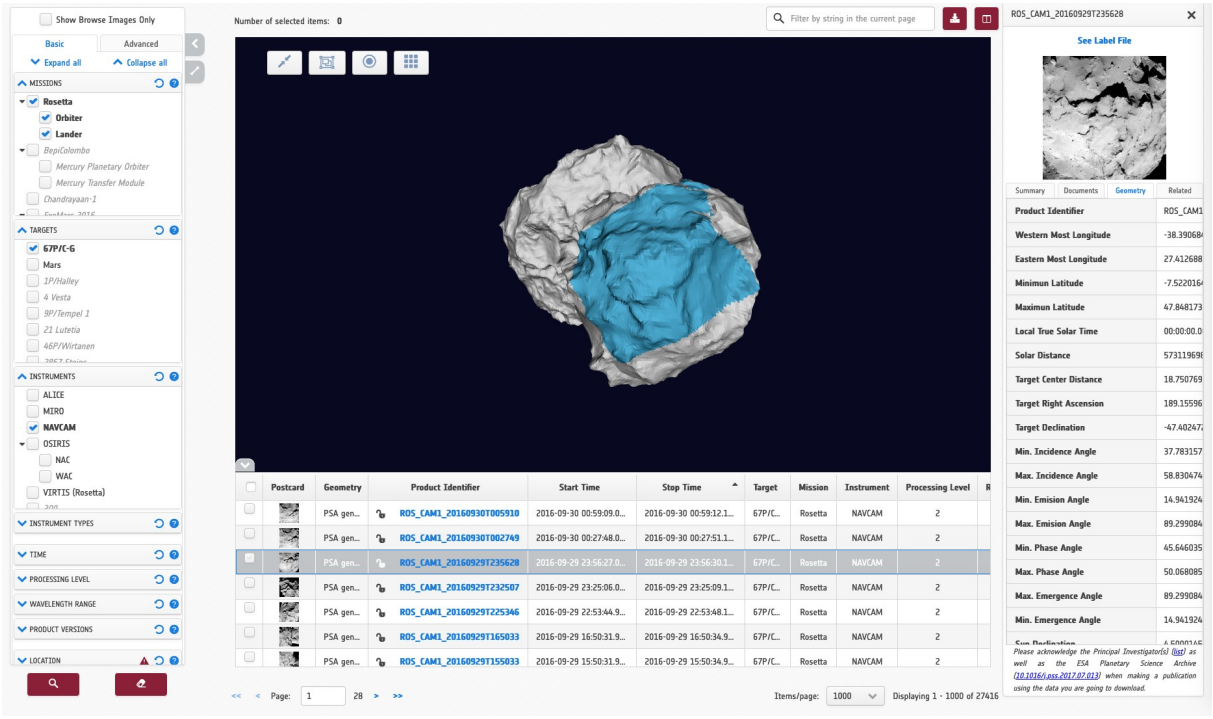
When the user performs a search by selecting mission Rosetta on the map view, the 67P map view shall be loaded. It shall include all the features described previously.



67P Orbital Map is loaded

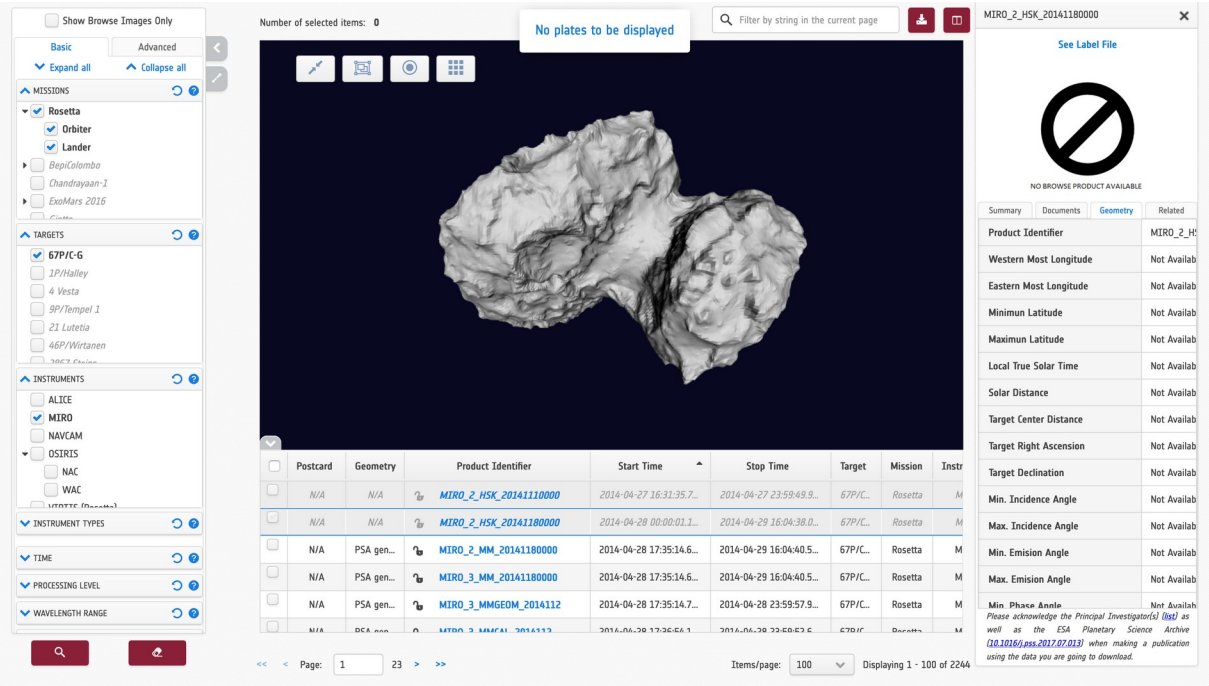
By selecting a product on the table it will either:

- Show the footprint of the product projected on the comet surface. The camera will be moved by calculating the new position to see better the displayed footprint.



Product footprint projected on the comet surface

- Show a message informing that the product has "No plates to be displayed". The rows in light grey with the text in grey as well indicate that the product is not projectable on the surface, to let the user know this information before selecting the product.

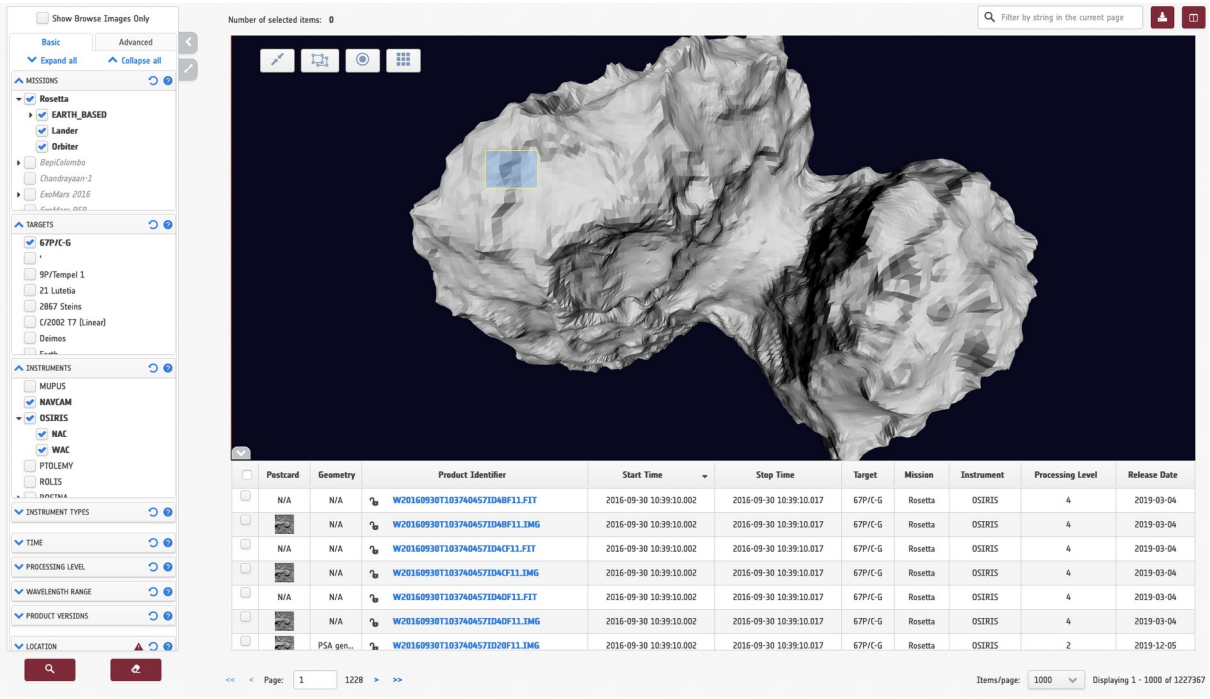


Product footprint has no plates to be displayed

Search by ROI

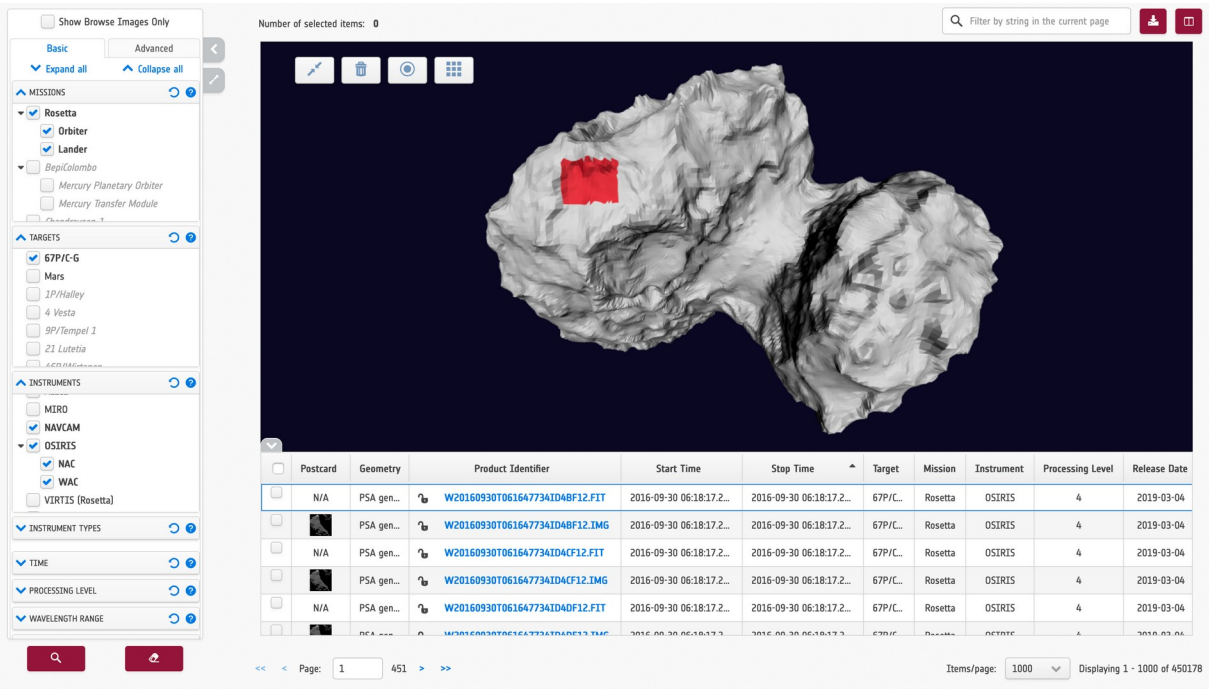
When the 67P orbital map is loaded on the view and the products are displayed on the table, the user can refine the search by applying a selected region of interest. To perform this refinement the user has to:

- Click on the region of interest button, after that the 67P model rotation is blocked in order to allow the user to paint a rectangle on the 3D map(described before), and if the area is correct a warning will appear (Calculating ROI ...) to the user indicating that their request is being processed.



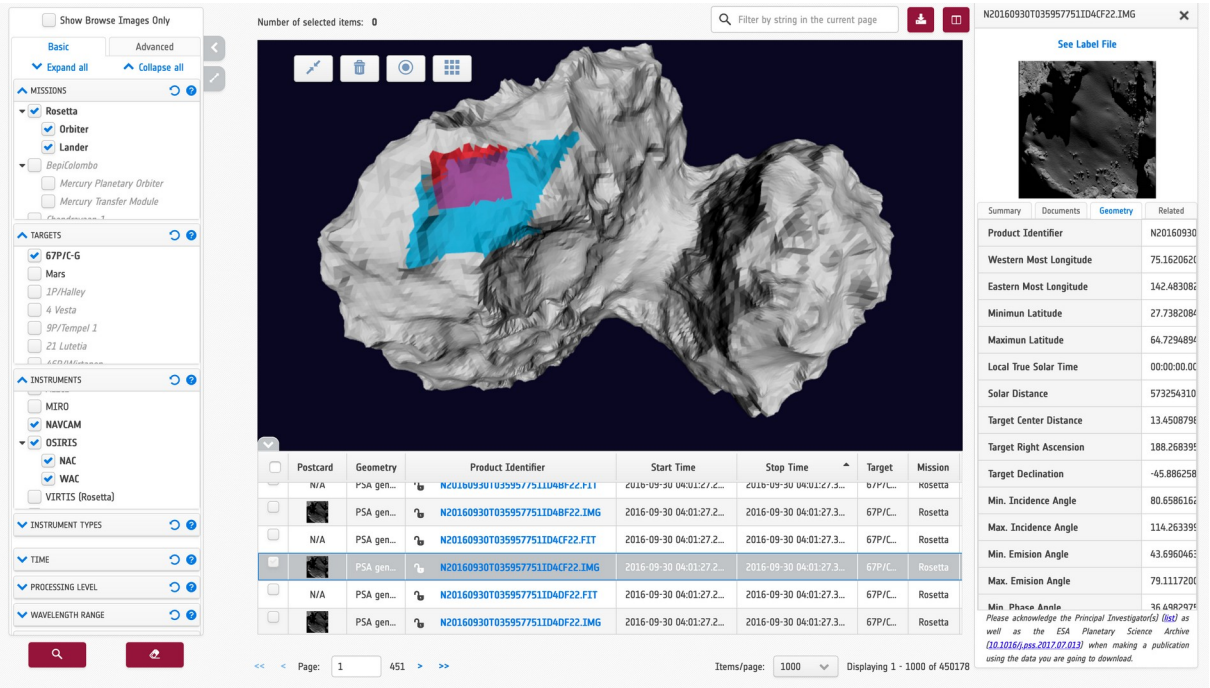
ROI rectangle is drawn

- After the rectangle, the intersection of the rectangle with the model will be calculated and painted on the surface, and the products on the table will be filtered with the matching area:



ROI is calculated and products filtered

- If any of the products in the table is selected it will be painted on the surface. The plates overlapped, belonging to ROI and footprint, are painted in different color:



ROI, footprint and overlap projected on the surface.

- To remove the selected ROI the button with the "Trash" icon  has to be clicked. It shall remove the region selected and launch the query without taking into account any ROI, only the filter panel.

67P Orbital Map View Data

The data contained in PSA for products of Rosetta mission that can be projected on the comet surface is a subset of the whole data contained for the mission, this subset includes all the data related to the comet phase.

The instruments that contain data to be properly displayed in the 3D map are the following: ALICE, MIRO, NAVCAM, OSIRIS and VIRTIS.

3.6 Connections between Table and Image View

The previously described Table View and Image View share the same Filter Menu and the search results are also connected. When initiating a search in the Table View and switching to the Image View then the user can see the same results presented differently. Results that do not have any browse products have a placeholder instead of a browse product in the Image View. Both of the views use pagination. It is also possible to show only the products with browse products using the “Products with browse images” option; this applies to both views.

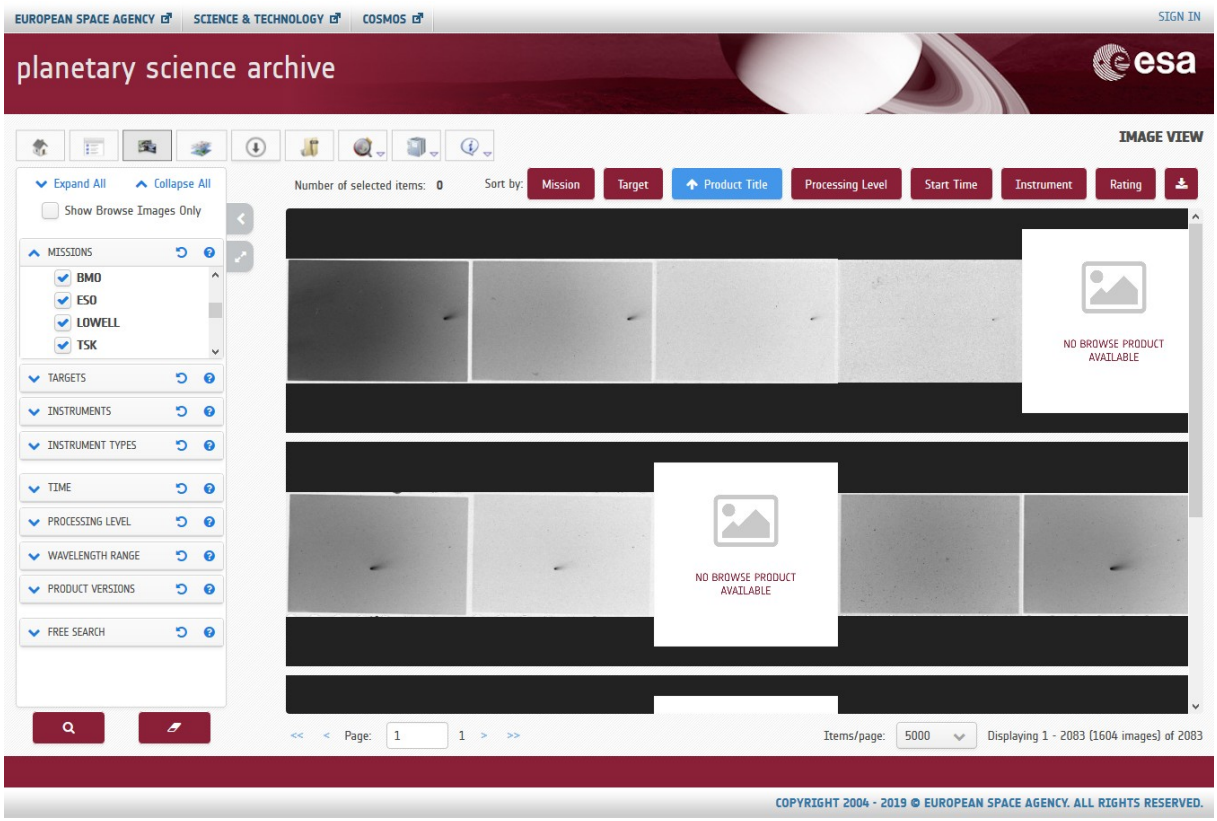


Image View (showing all products, with and without browse products)

Same query shown in the Table View:

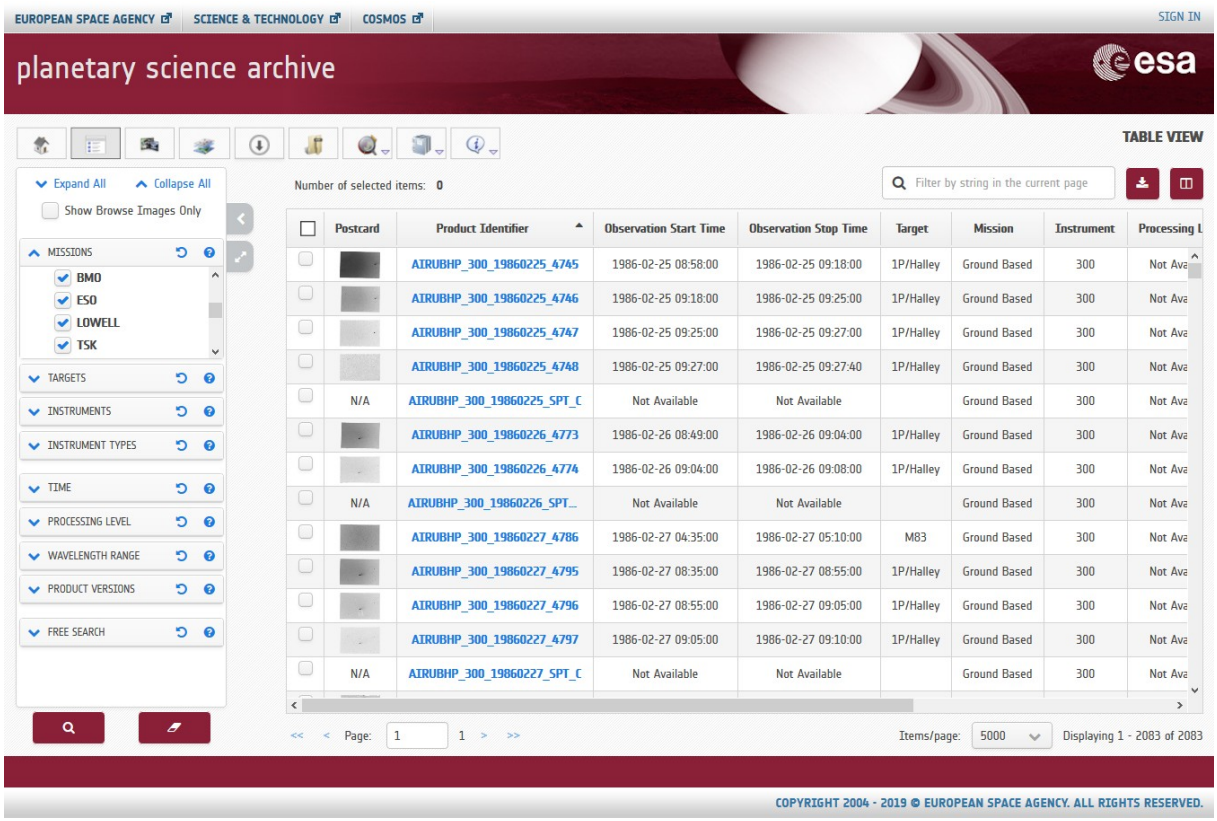


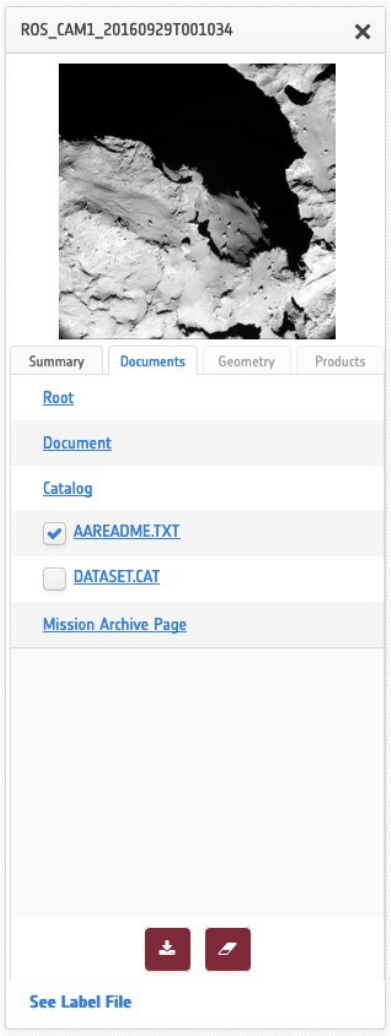
Table View (showing all products, with and without browse products)

3.7 Download View

The Download View or Download Manager is a view which initially does not include any products/documents. The user can send products/documents to the Download View by using the option in the downloading popup after clicking the download icon  in the Table or Image View. The process is as follows:

1. Select product(s) in the View by marking the checkbox.
2. Click on button  .
3. It shall open a popup where the option  has to be selected. It shall send the product(s) to the Download View.

In order to send documents to the Download View the details panel Documents tab has to be opened:

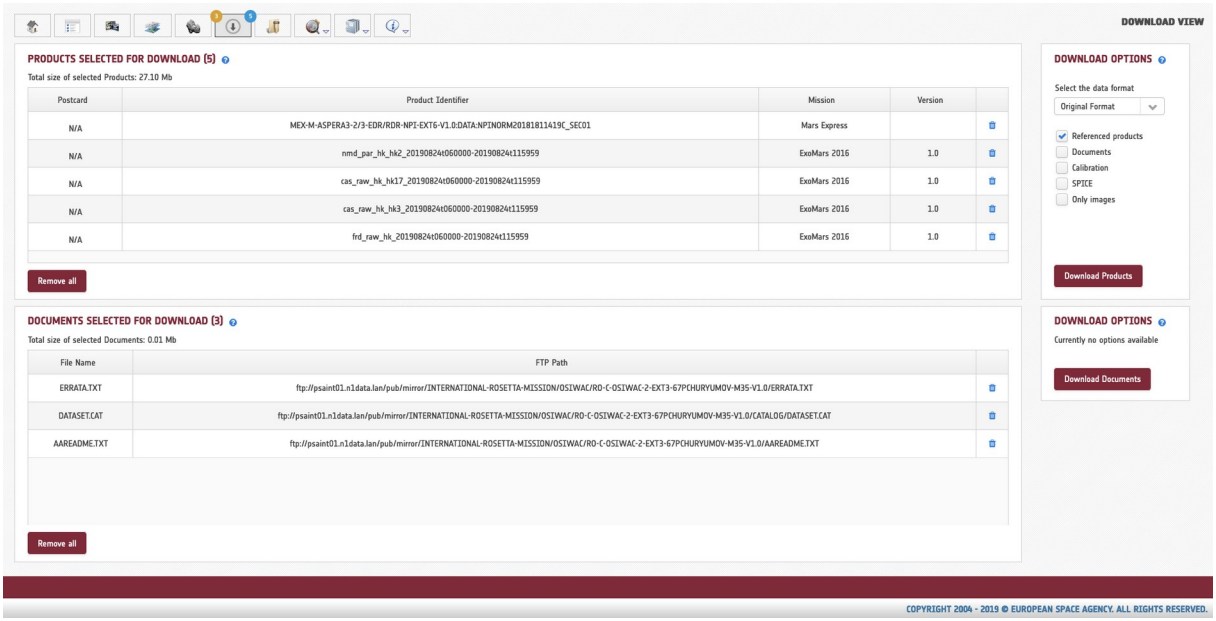


If the user select the documents to send download it will open the same option to send to Download Manager.

When user has sent some products/documents to the Download View, the button to open the View shall be updated with the number of products/documents sent: number in yellow for documents and blue for products 

.

The Download View will look like the following:



Download View with 5 products and 3 documents that have been added to be downloaded

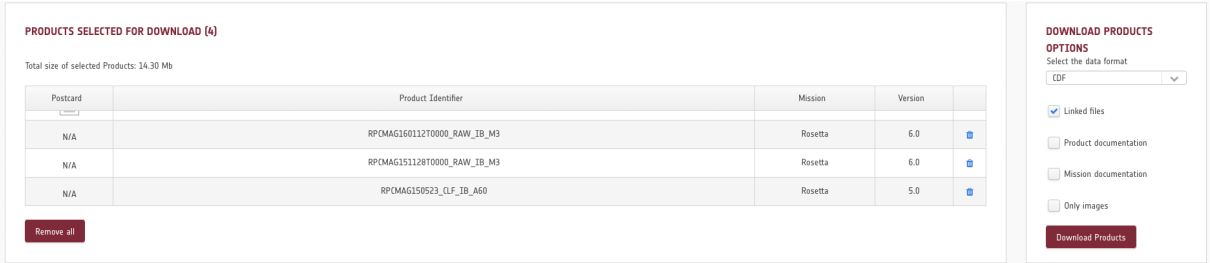
In the Download Manager the user can quickly review the products/documents and remove them (either one by one using the small bin icon or all of them) if they are not relevant. The user can also see an approximate download size. On the right side there is a panel with download options which includes the data format selection, referenced products inclusion, document collections (mission and instrument bundles) inclusion, calibration collection inclusion, SPICE bundle inclusion and possibility to download only image files. It is not possible to include referenced products and have only images selected since they are conflicting.

3.7.1 Download formats

For some specific products there is also the possibility to download them in CDF (Common Data Format). The list of products applicable to be downloaded in this format is shown in the following table:

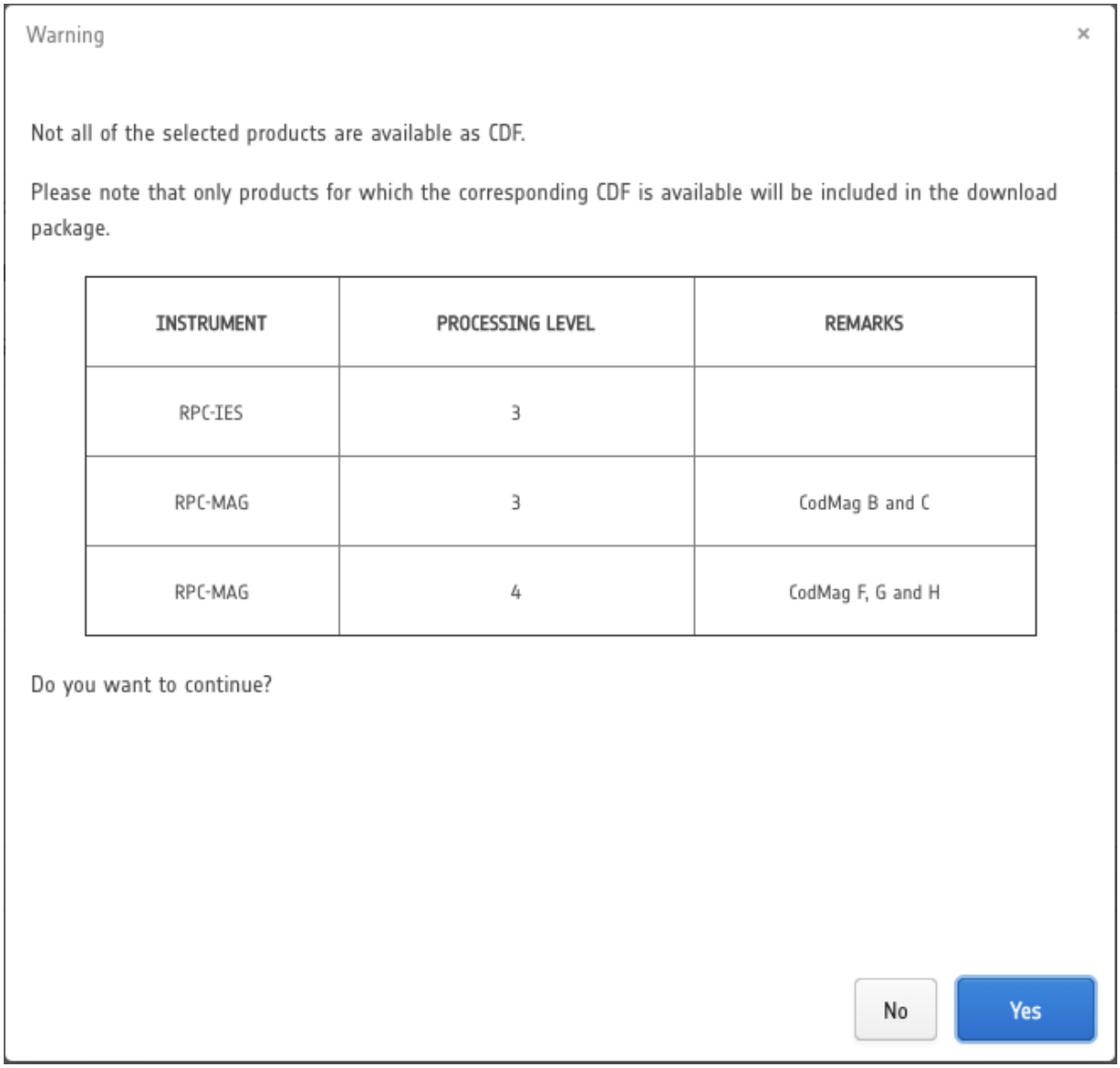
INSTRUMENT	PROCESSING LEVEL	REMARKS
RPC-IES	3	
RPC-MAG	3	CODMAC B and C
RPC-MAG	4	CODMAC F, G and H

The CDF (Common Data Format) option in the Data Format combobox can be selected in order to download the set of products from the list that are applicable:



Download View showing the CDF format option

In this case, when downloading, the system will detect if all of the products to be downloaded have CDF as format. Otherwise, a message will be shown (See figure below), asking the user if he/she wants to continue downloading only the CDF associated products.



Warning message shown in case not all of the products are CDF compliant

4. FTP INTERFACE

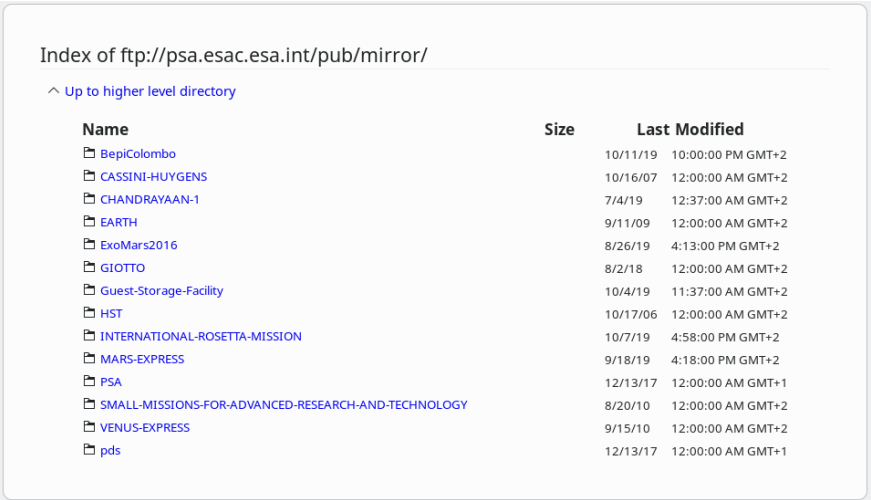
To access all publicly available PSA data via an anonymous FTP server Users can go to this URL: https://archives.esac.esa.int/psa/ftp. Unlike other interfaces, it has no search capability but users can quickly browse the content of the archive and download bundles in PDS format using the web browser.

For employing other FTP-client application of the user's choice (Filezilla, SmartFTP, ...), the URL to be used is ftp://psa.esac.esa.int/pub/mirror. Most of these clients offer the capability to pause / resume interrupted downloads, download entire directories, browse the structure among the different missions...

If you don't know which data sets you are looking for, we recommend using the User Interface (Filter Menu).

This is the current list of missions hosted by the PSA FTP (2019):

- BepiColombo
- Cassini-Huygens
- Chandrayaan-1
- Ground Based (EARTH)
- ExoMars 2016
- Giotto
- Hubble (HST)
- Rosetta (INTERNATIONAL-ROSETTA-MISSION)
- MEX (MARS-EXPRESS)
- VEX (VENUS-EXPRESS)
- SMART1 (SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY)



PSA FTP access
It is also possible to access the Guest Storage Facility (GSF), a repository where scientists from the plantary community can upload and share scientific products valuable for the community (more info here).

5. MACHINE ACCESS INTERFACES

In addition to the aforementioned FTP and Web GUI interfaces, there is another way to access the PSA that is not intended to be visual but to be mainly used through a machine access or programmatically with scripts. This is the Machine Access, which currently consists of two interfaces, PDAP and EPN-TAP, allowing access to the PSA with the idea of retrieving scientific metadata and downloading data directly from the archive with no visual software required.
There are currently available 2 interfaces that provide this access: PDAP, following IPDA standards and EPN-TAP that complies with EuroPlanet VESPA project .

5.1 PDAP

5.1.1 Introduction

As mentioned and described thoroughly in this document, the standard and most common way to access to the PSA is a powerful Web-based interface (http://psa.esa.int) .
In order to allow external applications / scripts / machine access routines to access the archived data, as well as for expert or normal users who need to retrieve data directly from the archive bypassing the standard User Interface, a PDAP compliant software has been developed and can be accessed on http://psa.esa.int/pdap.
This software is split into three main services:
1. A service that allows queries to the PSA database to obtain metadata (accessible at http://psa.esa.int/pdap/metadata).
2. A service that enables the retrieval of information on the files and contents of a given dataset (accessible at http://psa.esa.int/pdap/files).
3. A service that enables the retrieval of files from the archive repository (accessible at http://psa.esa.int/pdap/download).
All these services can be accessed either through a standard browser (using the corresponding URLs) or through a command-line instruction running the URL by using a tool of choice that can deal with URL requests such as wget or curl.
In any case, due to the large amount of data to be transferred in some occasions (a response may contain a few hundreds of thousands of rows) it is highly recommended to use a command line tool to make the call instead of using a web browser.
These services allow to easily access planetary products directly from the command line and can be integrated with user scripts.

Our interoperability services comply with the IPDA standard (please check the International Planetary Data Alliance web pages https://planetarydata.org for more details and IPDA PDAP v1.0 to know more about PDAP protocol)
By linking to the PSA PDAP server, the user can establish hyperlinks to the relevant script to be able to download on the fly the products from the PSA directly, short-cutting the PSA User Interface.

5.1.2 Connecting to the PDAP service

Below there is a description of the different services the PSA PDAP offers, with some examples for each one and the allowed/mandatory parameters that must be included in each request for every service:

5.1.2.1 "Metadata" Service

This service must be called using the following base URL: http://psa.esa.int/pdap/metadata

This should be followed by one or more of the following input parameters:

```
[RESOURCE_CLASS=<?>][&]DATASET_ID=<?>[&]INSTRUMENT_TYPE=<?
>[&]INSTRUMENT_NAME=<?>[&]TARGET_TYPE=<?>[&]TARGET_NAME=<?>[&]RETURN_TYPE=<?
>[&]START_TIME</<=/>/>=/!/=\[&\]STOP_TIME/>=/!/=<?>[&]DATASET_RELEASE_DATE</
<=/>/>=/!/=<???>
```

or

```
[RESOURCE_CLASS=<?>][&]PRODUCT_ID=<?>[&]INSTRUMENT_TYPE=<?
>[&]INSTRUMENT_NAME=<?>[&]TARGET_TYPE=<?>[&]TARGET_NAME=<?>[&]RETURN_TYPE=<?
>[&]START_TIME</<=/>/>=/!/=\[&\]STOP_TIME/>=/!/=<?>[&]DATASET_RELEASE_DATE</
<=/>/>=/!/=<???>
```

Note that the "&" is literal and has to be written whenever different parameters are given (standard in HTTP). Also note that in the case of date or time parameters (START_TIME, STOP_TIME and DATASET_RELEASE_DATE) , the "/" character shows the different alternative characters that can be put after the parameter, such as 'equals', 'equals or greater than', 'greater than', 'equals or less than', 'less than' and 'not equals'.

All available parameters:

- *'RESOURCE_CLASS'*

('DATA_SET' or 'PRODUCT' are currently the only accepted values, 'MAP_PROJECTED' will be included in the future. 'DATA_SET' is the default if a value is not specified)

- *'DATA_SET_ID' / 'PRODUCT_ID'*
  - (exclusive parameters, one or the other)
- '*INSTRUMENT_TYPE*'
- *'INSTRUMENT_NAME'*
- *'TARGET_TYPE'*
- *'TARGET_NAME'*
- *'RETURN_TYPE'*

('VOTABLE', 'HTML' and 'ASCII' are the only accepted values, VOTABLE is the default if a value is not specified)

- *'START_TIME'* (YYYY-MM-DDThh:mm:ss[.fff])
  - example: 1997-12-03T16:18:39.000]
- *'STOP_TIME'* (YYYY-MM-DDThh:mm:ss[.fff])
  - example: 1997-12-15T19:29:33.000
- *'DATASET_RELEASE_DATE'* (YYYY-MM-DD)
  - example: 2017-01-21

Mandatory parameters: none.
If no parameter is given, all the datasets in the archive are returned in a VOTABLE output format.

Metadata Output fields

The output fields from the standard are described in the PDAP specification. It can be consulted in IPDA PDAP document.

There are some additional fields that are not part of the specification. These fields are included in the PSA as an added value for the particularity of the archive (inherited from the old PSA PAIO service that was providing this information):

- DATA_SET.XML_DESCRIPTION: provides a URL to the file service that, for a given dataset, lists all the files within the dataset with all details and the possibility of downloading them individually.
- DATA_SET.NPRODUCTS: number of products contained in the dataset.
- DATA_SET.RELEASE_DATE: publication date of the dataset.

Examples of Metadata requests to the PDAP service

1) Query to "Metadata" service in order to get information on a specific dataset (specifying return type for output format or not)
http://psa.esa.int/pdap/metadata?RESOURCE_CLASS=DATA_SET&DATA_SET_ID=AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0
http://psa.esa.int/pdap/metadata?DATA_SET_ID=AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0&RETURN_TYPE=VOTABLE (figure A)
http://psa.esa.int/pdap/metadata?DATA_SET_ID=AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0&RETURN_TYPE=HTML (figure B, on a HTML table instead)

2) Query to "Metadata" service in order to get information on a specific dataset (adding quotes to the DATA_SET_ID parameter is optional)
http://psa.esa.int/pdap/metadata?RESOURCE_CLASS=DATA_SET&DATA_SET_ID=VEX-V-VRA-1/2/3-NMP-0105-V1.0
http://psa.esa.int/pdap/metadata?RESOURCE_CLASS=DATA_SET&DATA_SET_ID='MEX-M-HRSC-3-RDR-V3.0'

3) Queries to "Metadata" service in order to get overall information on a specific dataset (first URL) or detailed information for each product inside the dataset (second URL)
http://psa.esa.int/pdap/metadata?RESOURCE_CLASS=DATA_SET&DATA_SET_ID=VEX-V-VRA-1/2/3-NMP-0105-V1.0
http://psa.esa.int/pdap/metadata?RESOURCE_CLASS=PRODUCT&DATA_SET_ID=VEX-V-VRA-1/2/3-NMP-0105-V1.0 (figure C)

4) Query to return all the available datasets in the PSA (on a VOTable)
http://psa.esa.int/pdap/metadata
http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE

5) Query to get information about a product:
http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE&RESOURCE_CLASS=PRODUCT&PRODUCT_ID='S1-L/X-AMIE-2-EDR-EEP-V1.0:DATA:AMI_EE3_040829_00094_00015'

6) Get bundles/datasets filtering by INSTRUMENT_HOST_NAME:
http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE&RESOURCE_CLASS=DATA_SET&INSTRUMENT_HOST_NAME='EDM'

7) Get the latest available (based on the value specified for DATASET_RELEASE_DATE) bundles/datasets in the archive by INSTRUMENT_HOST_NAME:
http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE&RESOURCE_CLASS=DATA_SET&INSTRUMENT_HOST_NAME='EDM'&DATASET_RELEASE_DATE>='20161125'

8) Get bundles/datasets by Mission Name:
http://psa.esa.int/pdap/metadata?

RETURN_TYPE=VOTABLE&RESOURCE_CLASS=DATA_SET&MISSION_NAME='ExoMars 2016'

9) Get the latest available (based on the value specified for DATASET_RELEASE_DATE) bundles/datasets in the archive by Mission Name:
http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE&RESOURCE_CLASS=DATA_SET&MISSION_NAME='ExoMars 2016'&DATASET_RELEASE_DATE>='20161125'

10) Get products by INSTRUMENT_HOST_NAME (e.g, Rosetta Lander) :

http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE&RESOURCE_CLASS=PRODUCT&INSTRUMENT_HOST_NAME=RL

11) Get products by TARGET_NAME:
http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE&RESOURCE_CLASS=PRODUCT&TARGET_NAME=JUPITER

12) Get products by INSTRUMENT_ID:
http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE&RESOURCE_CLASS=PRODUCT&INSTRUMENT_ID='urn:esa:psa:em16:context:instrument.nomad__tgo'

13) Get products by PRODUCT_ID:
http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE&RESOURCE_CLASS=PRODUCT&PRODUCT_ID='urn:esa:psa:em16_tgo_cas:data_raw:cas_raw_hk_hko_20171113t120000-20171113t175959'

```
−<VOTABLE version="1.1">
 −<RESOURCE type="results">
    <DESCRIPTION>PSA Metadata Query Service</DESCRIPTION>
    <INFO name="QUERY_STATUS" value="OK"/>
   −<TABLE>
      <FIELD ID="DATA_SET.DATA_SET_ID" ucd="DATA_SET_ID" utype="pds:DATA_SET.DATA_SET_ID" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.DATA_SET_NAME" ucd="DATA_SET_NAME" utype="pds:DATA_SET.DATA_SET_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.DATA_ACCESS_REFERENCE" ucd="DATA_ACCESS_REFERENCE" utype="pds:DATA_SET.DATA_ACCESS_REFERENCE" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.XML_DESCRIPTION" ucd="XML_DESCRIPTION" utype="pds:DATA_SET.XML_DESCRIPTION" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.PRODUCER.FULL_NAME" ucd="FULL_NAME" utype="pds:DATA_SET.PRODUCER.FULL_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.PRODUCER.INSTITUTION_NAME" ucd="INSTITUTION_NAME" utype="pds:DATA_SET.PRODUCER.INSTITUTION_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.PRODUCER.NODE_NAME" ucd="NODE_NAME" utype="pds:DATA_SET.PRODUCER.NODE_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.START_TIME" ucd="START_TIME" utype="pds:DATA_SET.START_TIME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.STOP_TIME" ucd="STOP_TIME" utype="pds:DATA_SET.STOP_TIME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.NPRODUCTS" ucd="NPRODUCTS" utype="pds:DATA_SET.NPRODUCTS" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.MISSION_NAME" ucd="MISSION_NAME" utype="pds:DATA_SET.MISSION_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.INSTRUMENT_ID" ucd="INSTRUMENT_ID" utype="pds:DATA_SET.INSTRUMENT_ID" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.INSTRUMENT_NAME" ucd="INSTRUMENT_NAME" utype="pds:DATA_SET.INSTRUMENT_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.TARGET_NAME" ucd="TARGET_NAME" utype="pds:DATA_SET.TARGET_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="RESOURCE_CLASS" ucd="RESCLASS" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SET.RELEASE_DATE" ucd="RELEASE_DATE" utype="pds:DATA_SET.RELEASE_DATE" datatype="char" arraysize="*"/>
     −<DATA>
       −<TABLEDATA>
         −<TR>
            <TD>AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0</TD>
            <TD>AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0</TD>
           −<TD>
              http://archives.esac.esa.int/npsa/pdap/download?RESOURCE_CLASS=DATASET&ID=AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0
            </TD>
           −<TD>
              http://archives.esac.esa.int/npsa/pdap/files?DATA_SET_ID='AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0'
            </TD>
            <TD/>
            <TD/>
            <TD/>
            <TD>0999-09-14T00:00:00</TD>
            <TD>1986-04-17T09:13:00</TD>
            <TD>1833</TD>
            <TD>EARTH</TD>
            <TD>HUV</TD>
            <TD>HASSELBLAD-ZEISS-UV-SONNAR-F4.3-105MM</TD>
            <TD/>
            <TD>DATA_SET</TD>
            <TD>2006-03-01</TD>
          </TR>
        </TABLEDATA>
      </DATA>
    </TABLE>
  </RESOURCE>
</VOTABLE>
```


Figure A: response from a metadata request for a dataset (output as a votable)

Search Result (1 Data Sets found)

FTP Files	DATA_SET_ID	DATA_SET_NAME	PRODUCTS	INSTRUMENT_ID	TARGET_NAME	START_TIME	STOP_TIME	DATASET_RELEASE_DATE
FTP XML	AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0	AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0	1833	HUV		0999-09-14T00:00:00	1986-04-17T09:13:00	2006-03-01

Figure B: response from a metadata request for a dataset (output formatted as a HTML)


```
<VOTABLE version="1.1">
  <RESOURCE type="results">
    <DESCRIPTION>PSA Metadata Query Service</DESCRIPTION>
    <INFO name="QUERY_STATUS" value="OK"/>
    <TABLE>
      <FIELD ID="PRODUCTPRODUCT_ID" ucd="PRODUCT_ID" utype="pds:PRODUCTPRODUCT_ID" datatype="char" arraysize="*"/>
      <FIELD ID="PRODUCTDATA_ACCESS_REFERENCE" ucd="DATA_ACCESS_REFERENCE" utype="pds:PRODUCTDATA_ACCESS_REFERENCE" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SETDATA_SET_ID" ucd="DATA_SET_ID" utype="pds:DATA_SETDATA_SET_ID" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SETDATA_SET_NAME" ucd="DATA_SET_NAME" utype="pds:DATA_SETDATA_SET_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SETMISSION_NAME" ucd="MISSION_NAME" utype="pds:DATA_SETMISSION_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SETPRODUCER.FULL_NAME" ucd="FULL_NAME" utype="pds:DATA_SETPRODUCER.FULL_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SETPRODUCER.INSTITUTION_NAME" ucd="INSTITUTION_NAME" utype="pds:DATA_SETPRODUCER.INSTITUTION_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="DATA_SETPRODUCER.NODE_NAME" ucd="NODE_NAME" utype="pds:DATA_SETPRODUCER.NODE_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="PRODUCTTARGET_NAME" ucd="TARGET_NAME" utype="pds:PRODUCTTARGET_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="PRODUCTTARGET_TYPE" ucd="TARGET_TYPE" utype="pds:PRODUCTTARGET_TYPE" datatype="char" arraysize="*"/>
      <FIELD ID="PRODUCTINSTRUMENT_ID" ucd="INSTRUMENT_ID" utype="pds:PRODUCTINSTRUMENT_ID" datatype="char" arraysize="*"/>
      <FIELD ID="PRODUCTINSTRUMENT_NAME" ucd="INSTRUMENT_NAME" utype="pds:PRODUCTINSTRUMENT_NAME" datatype="char" arraysize="*"/>
      <FIELD ID="PRODUCTSTART_TIME" ucd="START_TIME" utype="pds:PRODUCTSTART_TIME" datatype="char" arraysize="*"/>
      <FIELD ID="PRODUCTSTOP_TIME" ucd="STOP_TIME" utype="pds:PRODUCTSTOP_TIME" datatype="char" arraysize="*"/>
      <FIELD ID="PRODUCTICON_ACCESS_REFERENCE" ucd="ICON_ACCESS_REFERENCE" datatype="char" arraysize="*"/>
      <FIELD ID="RESOURCE_CLASS" ucd="RESCLASS" datatype="char" arraysize="*"/>
    <DATA>
      <TABLEDATA>
        <TR>
          <TD>
            VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L02_D2X_071320532_00.TAB
          </TD>
          <TD>
            http://archives.esac.esa.int/npsa/pdap/download?RESOURCE_CLASS=PRODUCT&ID=VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L02_D2X_071320532_00.TAB::1.0
          </TD>
          <TD>VEX-V-VRA-1/2/3-NMP-0105-V1.0</TD>
          <TD>VEX-V-VRA-1/2/3-NMP-0105-V1.0</TD>
          <TD>Venus Express</TD>
          <TD/>
          <TD/>
          <TD/>
          <TD>Venus</TD>
          <TD>PLANET</TD>
          <TD>VRA</TD>
          <TD/>
          <TD>2007-05-12T05:32:01.05</TD>
          <TD>2007-05-12T07:00:43.95</TD>
          <TD>
            http://archives.esac.esa.int/npsa/postcards/repo/VENUSsEXPRESS/VEX-V-VRA-1-2-3-NMP-0105-V1.0/BROWSE/V32ICL2L02_B2X_071320532_00.JPG
          </TD>
          <TD>PRODUCT</TD>
        </TR>
        <TR>
          <TD>
            VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D2X_071320531_00.TAB
          </TD>
          <TD>
            http://archives.esac.esa.int/npsa/pdap/download?RESOURCE_CLASS=PRODUCT&ID=VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D2X_071320531_00.TAB::1.0
          </TD>
          <TD>VEX-V-VRA-1/2/3-NMP-0105-V1.0</TD>
          <TD>VEX-V-VRA-1/2/3-NMP-0105-V1.0</TD>
          <TD>Venus Express</TD>
          <TD/>
          <TD/>
          <TD/>
          <TD>Venus</TD>
          <TD>PLANET</TD>
          <TD>VRA</TD>
          <TD/>
          <TD>2007-05-12T05:31:35.5</TD>
          <TD>2007-05-12T07:00:39.5</TD>
          <TD>
            http://archives.esac.esa.int/npsa/postcards/repo/VENUSsEXPRESS/VEX-V-VRA-1-2-3-NMP-0105-V1.0/BROWSE/V32ICL1L02_B2X_071320531_00.JPG
          </TD>
          <TD>PRODUCT</TD>
        </TR>
        <TR></TR>
```


Figure C: response from a metadata request for a product (output as a votable)

Search Result (187 products found)

PRODUCT_ID	INSTRUMENT_ID	DATA_SET_ID	DATA_SET_NAME	START_TIME	STOP_TIME
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L02_D2X_071320532_00.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:32:01.05	2007-05-12T07:00:43.95
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D2X_071320531_00.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:31:35.5	2007-05-12T07:00:39.5
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D1X_071320531_00.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:31:31.05	2007-05-12T07:00:35.95
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_14.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:56:09	2007-05-12T07:00:56.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_13.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:50:09	2007-05-12T06:56:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_12.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:44:09	2007-05-12T06:50:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_11.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:38:09	2007-05-12T06:44:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_10.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:32:09	2007-05-12T06:38:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_09.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:26:09	2007-05-12T06:32:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_08.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:20:09	2007-05-12T06:26:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_07.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:14:09	2007-05-12T06:20:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_06.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:08:09	2007-05-12T06:14:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_05.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:02:09	2007-05-12T06:08:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_04.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:56:09	2007-05-12T06:02:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_03.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:50:09	2007-05-12T05:56:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_02.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:44:09	2007-05-12T05:50:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_01.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:38:09	2007-05-12T05:44:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AG1_071320532_00.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:32:09	2007-05-12T05:38:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_14.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:56:09	2007-05-12T07:00:56.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_13.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:50:09	2007-05-12T06:56:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_12.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:44:09	2007-05-12T06:50:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_11.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:38:09	2007-05-12T06:44:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_10.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:32:09	2007-05-12T06:38:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_09.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:26:09	2007-05-12T06:32:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_08.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:20:09	2007-05-12T06:26:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_07.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:14:09	2007-05-12T06:20:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_06.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:08:09	2007-05-12T06:14:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_05.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:02:09	2007-05-12T06:08:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_04.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:56:09	2007-05-12T06:02:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_03.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:50:09	2007-05-12T05:56:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_02.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:44:09	2007-05-12T05:50:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_01.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:38:09	2007-05-12T05:44:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AG1_071320532_00.RAW	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:32:09	2007-05-12T05:38:08.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_14.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:56:01	2007-05-12T07:00:43.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_13.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:50:01	2007-05-12T06:56:00.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_12.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:44:01	2007-05-12T06:50:00.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_11.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:38:01	2007-05-12T06:44:00.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_10.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:32:01	2007-05-12T06:38:00.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_09.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:26:01	2007-05-12T06:32:00.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_08.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:20:01	2007-05-12T06:26:00.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_07.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:14:01	2007-05-12T06:20:00.9
VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_06.TAB	VRA	VEX-V-VRA-1/2/3-NMP-0105-V1.0	VEX-V-VRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:08:01	2007-05-12T06:14:00.9

Figure D: response from a metadata request for a product (output formatted as a HTML)

Additional Examples of Metadata requests to the PDAP service

Below can be found some other examples that show different combinations of parameters for constructing a URL request, as well as filtering and constraining the search by dates:
A1) Get overall information on Rosetta datasets released from December 1st of 2016 as a VOTable:

http://psa.esa.int/pdap/metadata?RETURN_TYPE=VOTABLE&RESOURCE_CLASS=DATA_SET&MISSION_NAME='INTERNATIONAL ROSETTA MISSION'&DATASET_RELEASE_DATE>='20161201'

A2) Get overall information on datasets that belong to NAVCAM instrument with a start time higher than 2015-02-11T00:12:11 and stop time older than 2016-01-01T12:00:00 as a VOTable:

http://psa.esa.int/pdap/metadata?START_TIME>='2015-02-11T00:12:11Z'&STOP_TIME<='2016-01-01T12:00:00Z'&RESOURCE_CLASS=DATA_SET&RETURN_TYPE=VOTABLE&INSTRUMENT_ID=NAVCAM

A3) Get overall information on datasets with a stop time newer than 2009-01-01T12:00:00 as a VOTable:

http://psa.esa.int/pdap/metadata?STOP_TIME>'2009-01-01T12:00:00'&RESOURCE_CLASS=DATA_SET&RETURN_TYPE=VOTABLE

A4) Get overall information on datasets with a stop time different than 2009-01-01T12:00:00 as a VOTable:

http://psa.esa.int/pdap/metadata?STOP_TIME != '2099-01-01T12:00:00'&RESOURCE_CLASS=DATA_SET&RETURN_TYPE=VOTABLE

A5) Get overall information on datasets with a stop time older than 1996-01-01T12:00:00 as a VOTable:

http://psa.esa.int/pdap/metadata?STOP_TIME<'1996-01-01T12:00:00Z'&RESOURCE_CLASS=DATA_SET&RETURN_TYPE=VOTABLE

A6) Get information on all products with a start time equals 2008-09-04T18:38:21.321 and stop time equals 2008-09-06T04:38:17.062 as a votable:

http://psa.esa.int/pdap/metadata?START_TIME = '2008-09-04 18:38:21.321'&STOP_TIME = '2008-09-06 04:38:17.062'&RESOURCE_CLASS=PRODUCT&RETURN_TYPE=VOTABLE

5.1.2.2 "Files" Service

This service should be called on the following base URL: http://psa.esa.int/pdap/files

It will have to be followed by one or more of the following input parameters:

`DATA_SET_ID=<?>[&]RETURN_TYPE=<?>`

All available parameters:

- *'DATA_SET_ID'*
- *'RETURN_TYPE'*
    - 'VOTABLE', 'HTML' and 'ASCII' are the only accepted values; VOTABLE is the default if none is specified

Mandatory parameters: *'DATA_SET_ID'*

Examples of Files requests to the PDAP service

1) Files within dataset VEX-V-VMC-3-RDR-EXT1-V3.0

Call to PDAP (on command line)
curl -L 'http://psa.esa.int/pdap/files?DATA_SET_ID=VEX-V-VMC-3-RDR-EXT1-V3.0' > ds1.xml

2) Files within dataset AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0

Call to PDAP (on command line, and in this case, since the results are a low number of rows, on a web browser too)
curl -L 'http://psa.esa.int/pdap/files?DATA_SET_ID=AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0' > ds2.xml ***(figure E)***

3) Files within dataset MEX-M-HRSC-3-RDR-V3.0

Call to PDAP (on command line)
wget -O ds3.xml 'http://psa.esa.int/pdap/files?DATA_SET_ID=MEX-M-HRSC-3-RDR-V3.0'

4) Query to get a specific file within a dataset (the DATASET.CAT in this case) after having previously called the Files service (http://psa.esa.int/pdap/files?DATA_SET_ID=AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0)
for the given dataset:

http://psa.esa.int/pdap/fileaccess?ID=EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0/CATALOG/DATASET.CAT

```
<VOTABLE version="1.1">
 <RESOURCE type="results">
  <DESCRIPTION>PSA Metadata Query Service</DESCRIPTION>
  <INFO name="QUERY_STATUS" value="OK"/>
  <TABLE>
   <FIELD ID="Reference" ucd="DATA_LINK" utype="Reference" datatype="char" arraysize="*"/>
   <FIELD ID="DataSetId" ucd="DATA_SET_ID" utype="DataSetId" datatype="char" arraysize="*"/>
   <FIELD ID="ProductId" ucd="PRODUCT_ID" utype="ProductId" datatype="char" arraysize="*"/>
   <FIELD ID="RELATIVE_DIRECTORY" ucd="RELATIVE_DIRECTORY" utype="RELATIVE_DIRECTORY" datatype="char" arraysize="*"/>
   <FIELD ID="Filename" ucd="FILENAME" utype="Filename" datatype="char" arraysize="*"/>
  <DATA>
   <TABLEDATA>
    <TR>
     <TD>
      http://archives.esac.esa.int/npsa/postcards/repo/EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0/DATA/19860328/AIRUBHP_FFC_19860328_5449.LBL
     </TD>
     <TD>AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0</TD>
     <TD>AIRUBHP_FFC_19860328_5449</TD>
     <TD>/DATA/19860328/</TD>
     <TD>AIRUBHP_FFC_19860328_5449.LBL</TD>
    </TR>
    <TR>
     <TD>
      http://archives.esac.esa.int/npsa/postcards/repo/EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0/BROWSE/19860315/AIRUBHP_FFC_19860315_5123.JPG
     </TD>
     <TD>AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0</TD>
     <TD>AIRUBHP_FFC_19860315_5123</TD>
     <TD>/BROWSE/19860315/</TD>
     <TD>AIRUBHP_FFC_19860315_5123.JPG</TD>
    </TR>
    <TR>
     <TD>
      http://archives.esac.esa.int/npsa/postcards/repo/EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0/DATA/19860310/AIRUBHP_FFC_19860310_5014.FIT
     </TD>
     <TD>AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0</TD>
     <TD>AIRUBHP_FFC_19860310_5014</TD>
     <TD>/DATA/19860310/</TD>
     <TD>AIRUBHP_FFC_19860310_5014.FIT</TD>
    </TR>
    <TR>
     <TD>
      http://archives.esac.esa.int/npsa/postcards/repo/EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0/BROWSE/19860414/AIRUBHP_HBL_19860414_5951.JPG
     </TD>
     <TD>AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0</TD>
     <TD>AIRUBHP_HBL_19860414_5951</TD>
     <TD>/BROWSE/19860414/</TD>
     <TD>AIRUBHP_HBL_19860414_5951.JPG</TD>
    </TR>
    <TR>
     <TD>
      http://archives.esac.esa.int/npsa/postcards/repo/EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0/BROWSE/19860318/AIRUBHP_FFC_19860318_5201.LBL
     </TD>
     <TD>AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0</TD>
     <TD>AIRUBHP_FFC_19860318_5201</TD>
     <TD>/BROWSE/19860318/</TD>
     <TD>AIRUBHP_FFC_19860318_5201.LBL</TD>
```


Figure E: response from a dataset files request (output as a votable)

Search Result (6462 files found)

FILENAME	DIRECTORY
AIRUBHP_FFC_19860328_5449.LBL	/DATA/19860328/
AIRUBHP_FFC_19860315_5123.JPG	/BROWSE/19860315/
AIRUBHP_FFC_19860310_5014.FIT	/DATA/19860310/
AIRUBHP_HBL_19860414_5951.JPG	/BROWSE/19860414/
AIRUBHP_FFC_19860318_5201.LBL	/BROWSE/19860318/
AIRUBHP_HBL_19860316_5162.JPG	/BROWSE/19860316/
AIRUBHP_FFC_19860227_4785.LBL	/DATA/19860227/
AIRUBHP_HBL_19860306_4928.FIT	/DATA/19860306/
AIRUBHP_FFC_19860413_5900.LBL	/BROWSE/19860413/
AIRUBHP_FFC_19860416_6113.LBL	/BROWSE/19860416/
AIRUBHP_HBL_19860223_4683.FIT	/DATA/19860223/
AIRUBHP_FFC_19860410_5810.LBL	/BROWSE/19860410/
AIRUBHP_FFC_19860417_6173.LBL	/DATA/19860417/
AIRUBHP_FFC_19860416_6088.FIT	/DATA/19860416/
AIRUBHP_FFC_19860414_5963.LBL	/BROWSE/19860414/
AIRUBHP_HBL_19860308_4979.LBL	/DATA/19860308/
AIRUBHP_FFC_19860221_SPT_B.LBL	/DATA/SPOT/
AIRUBHP_HBL_19860405_5624.FIT	/DATA/19860405/
AIRUBHP_FFC_19860416_6110.LBL	/DATA/19860416/
AIRUBHP_HBL_19860314_5109.LBL	/BROWSE/19860314/
AIRUBHP_300_19860227_4786.JPG	/BROWSE/19860227/
AIRUBHP_FFC_19860402_5558.FIT	/DATA/19860402/
AIRUBHP_FFC_19860414_5975.JPG	/BROWSE/19860414/
AIRUBHP_FFC_19860417_6141.JPG	/BROWSE/19860417/
AIRUBHP_FFC_19860416_6125.JPG	/BROWSE/19860416/
AIRUBHP_HBL_19860322_5282.FIT	/DATA/19860322/
AIRUBHP_HBL_19860307_4953.FIT	/DATA/19860307/
AIRUBHP_FFC_19860324_5333.FIT	/DATA/19860324/
AIRUBHP_HBL_19860327_5409.LBL	/DATA/19860327/
AIRUBHP_FFC_19860414_5960.LBL	/DATA/19860414/
AIRUBHP_FFC_19860226_4769.LBL	/DATA/19860226/
AIRUBHP_HBL_19860410_5824.LBL	/BROWSE/19860410/
AIRUBHP_FFC_19860330_5499.LBL	/BROWSE/19860330/
AIRUBHP_HBL_19860222_4658.FIT	/DATA/19860222/
AIRUBHP_FFC_19860417_6188.JPG	/BROWSE/19860417/
AIRUBHP_HBL_19860315_5137.JPG	/BROWSE/19860315/
AIRUBHP_FFC_19860228_4815.FIT	/DATA/19860228/
AIRUBHP_HBL_19860321_5257.FIT	/DATA/19860321/
AIRUBHP_FFC_19860415_6025.FIT	/DATA/19860415/
AIRUBHP_FFC_19860416_6116.JPG	/BROWSE/19860416/
AIRUBHP_FFC_19860218_4523.FIT	/DATA/19860218/
AIRUBHP_HBL_19860413_5851.FIT	/DATA/19860413/
AIRUBHP_HBL_19860404_SPT_F.FIT	/DATA/SPOT/
AIRUBHP_FFC_19860326_5387.LBL	/BROWSE/19860326/

Figure F: response from a dataset files request (output formatted as a HTML)

5.1.2.3 "Download" Service

It needs to be called on the following base URL: http://psa.esa.int/pdap/download
It will have to be followed by one or more of the following input parameters:
ID=<?>*[&]RESOURCE_CLASS*=<?>

All Available parameters:

- *'ID'*

(can be either a dataset ID or a product ID)

- *'RESOURCE_CLASS'*

('DATASET' or 'PRODUCT' are the only accepted values)
Mandatory parameters: *'ID'* and *'RESOURCE_CLASS'*

Examples of Downloads from PDAP service

1) Request for a dataset

http://psa.esa.int/pdap/download?RESOURCE_CLASS=DATASET&ID=VEX-V-VRA-1/2/3-NMP-0105-V1.0

After some seconds, a file will start to be downloaded to your machine and this will contain all the data from the dataset with its original structure in a single zip file.

2) Request for a specific product
http://psa.esa.int/pdap/download?RESOURCE_CLASS=PRODUCT&ID=MEX-M-VMC-3-RDR-EXT7-V1.0:DATA:MEXVMC_2002690039

http://psa.esa.int/pdap/download?RESOURCE_CLASS=PRODUCT&ID=MEX-M-VMC-3-RDR-EXT7-V1.0:DATA:MEXVMC_2002690039

After a couple of seconds, a file will start to be downloaded to your machine and this will contain all the files that belong to the requested product on its original structure, within a single zip file.

5.1.3 Combination of PDAP services

Finally, a few examples of types of complex searches and operations that can be made with the PDAP service, including how to combine several calls to the PSA PDAP services:

1) Query to get information on a specific dataset:

http://psa.esa.int/pdap/metadata?DATA_SET_ID=AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0&RETURN_TYPE=VOTABLE ***(figure A)***

... and by extracting from the response the "Data Access Reference" the user will be able to download the dataset like this:

http://psa.esa.int/pdap/download?RESOURCE_CLASS=DATASET&ID=AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0

2) If the product download is needed, it can be done through the same service as above for DATASET, this time with PRODUCT as RESOURCE_CLASS:

http://psa.esa.int/pdap/metadata?RESOURCE_CLASS=PRODUCT&DATA_SET_ID=VEX-V-VRA-1/2/3-NMP-0105-V1.0&RETURN_TYPE=VOTABLE ***(figure C)***

... Again, the "Data Access Reference" will let you download the product by running:

http://psa.esa.int/pdap/download?RESOURCE_CLASS=PRODUCT&ID=VEX-V-VRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L1A_AG2_071320531_00.RAW::1.0

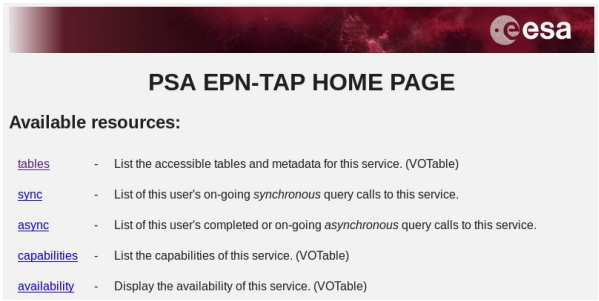
5.2 EPN-TAP

5.2.1 Introduction

The EPN-TAP (EuroPlanet-Table Access Protocol) service is a VO data access protocol designed to search and retrieve Planetary Science data in general. This protocol will allow the user to select a subset of data from an archive in a standard way, based on the IVOA Table Access Protocol (TAP). It provides a REST-based interface to the archived meta data according to the parameters specified in the EPN-Core data model.
The EPN-Core parameters can be queried via HTTP calls to the EPN-TAP service using the ADQL query language. The standard response will be in VOTable (XML) format.

5.2.2 Resources

The URL for the PSA EPN-TAP service is: http://psa.esa.int/epn-tap/tap
Schema name: psa
Although typical usage of the EPN-TAP service will be through machine interfaces and external clients, opening the above URL within a browser will show the "home" page for the PSA EPN-TAP service:



This page lists the resources available through the PSA EPN-TAP service:

tables	List the accessible tables and metadata for this service. (VOTable)
sync	List of this user's on-going *synchronous* query calls to this service.
async	List of this user's completed or on-going *asynchronous* query calls to this service.
capabilities	List the capabilities of this service. (VOTable)
availability	Display the availability of this service. (VOTable)

Each of the above resources may be accessed by appending the given word to the end of the EPN-TAP service URL, e.g. http://psa.esa.int/epn-tap/tap/tables

Tables resource

http://psa.esa.int/epn-tap/tap/tables

This URL will list (in a VOTable) the details of all the database schemas, tables and views exposed by the TAP service.
There are 3 schemas exposed by the PSA service:

- **PUBLIC**
  - Required by the TAP service.
- **TAP_SCHEMA**
  - Required by the TAP service and TAP clients to be able to identify which schemas and tables are exposed by a TAP service.
- **PSA**
  - The schema within which the **epn_core** table/view is stored.

Sync resource

http://psa.esa.int/epn-tap/tap/sync?

This URL is used to make synchronous queries to the service - these are queries that will run in the client that calls them and will be cancelled if the client is closed.
Further parameters should be specified after the '?' in the URL, these are described in further detail in the section below.

Async resource

http://psa.esa.int/epn-tap/tap/async?

This URL is used in the same way as the sync resource URL except the queries will be ran asynchronously - i.e. the queries will run on the server and the user/client can access the results when the query is complete.

Performing an async query will return to the user an identification number for the query which can be used to track the status of the query and then later retrieve the results.

Capabilities resource

http://psa.esa.int/epn-tap/tap/capabilities
This URL describes the capabilities of the service such as the allowed query languages (currently only ADQL) and the output formats for results (e.g. VOTable, CSV, JSON).

Availability resource

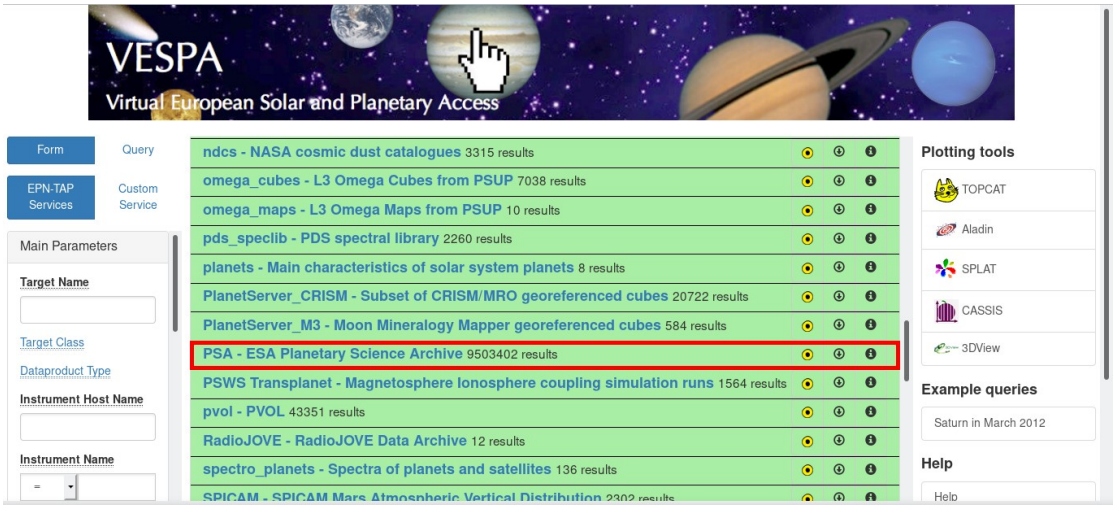
http://psa.esa.int/epn-tap/tap/availability

This URL informs a client whether the service is available or not.

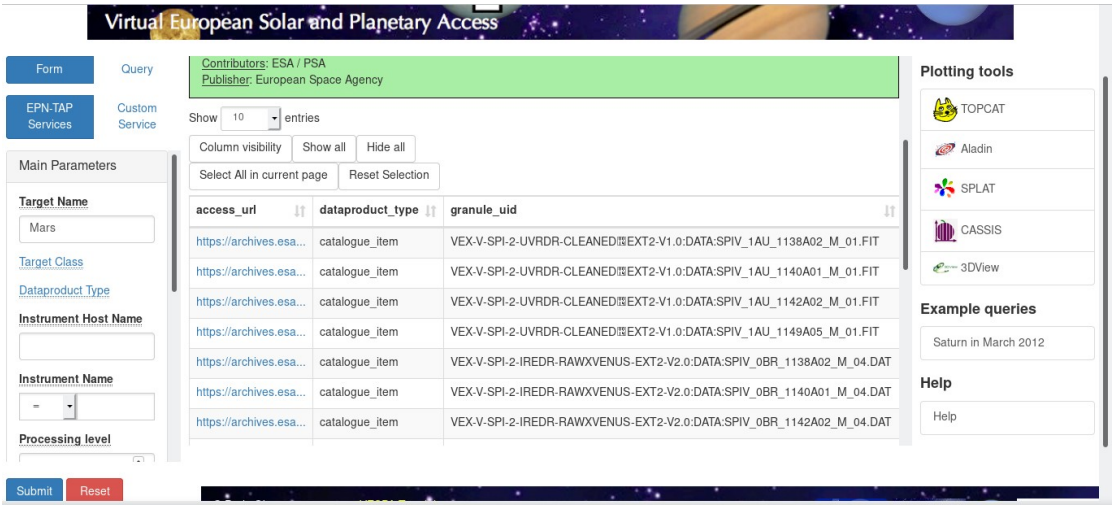
5.2.3 Accessing the EPN-TAP

VESPA Query Interface

The best client for querying EPN-TAP services is the VESPA Query Interface . This client allows all registered EPN-TAP services to be queried using the search form , e.g.:

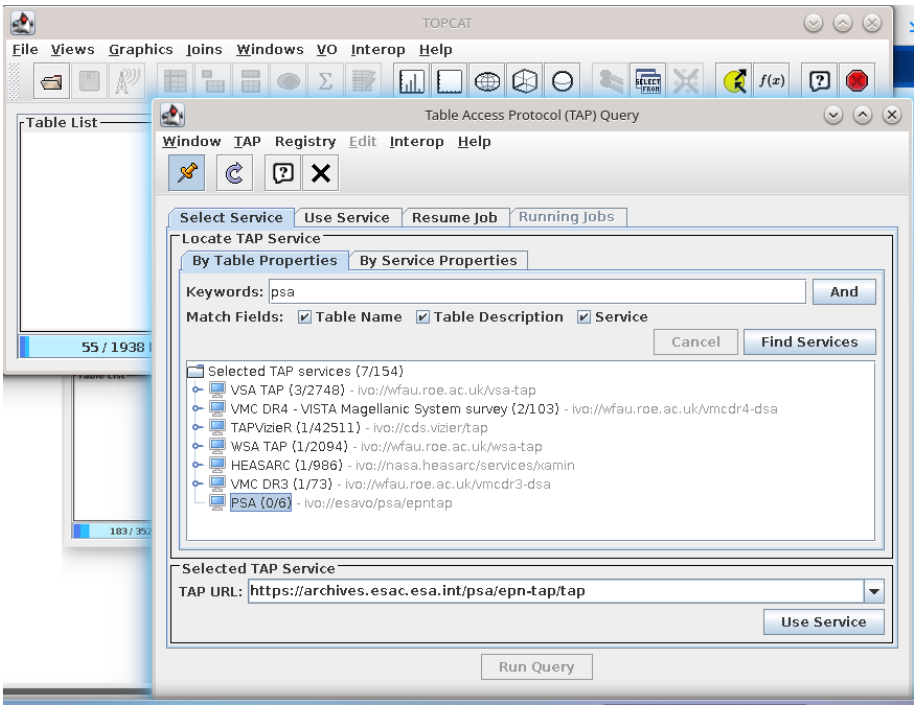


The available resources page will look similar to the following:

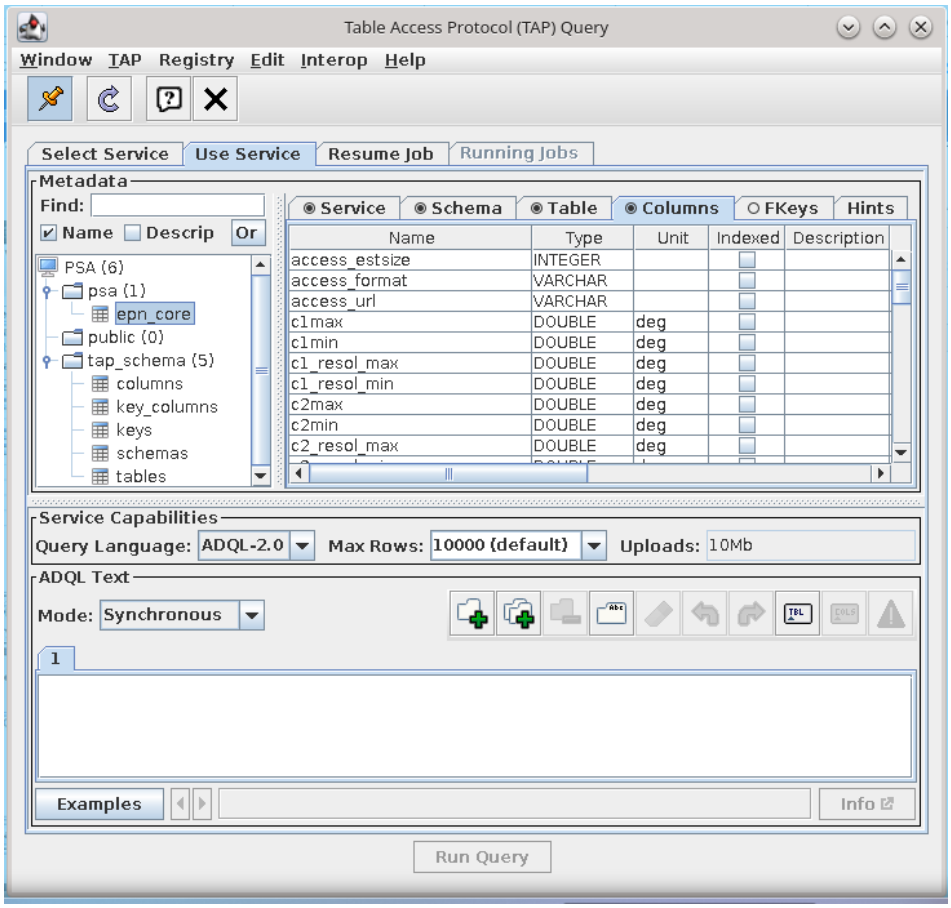


TOP CAT

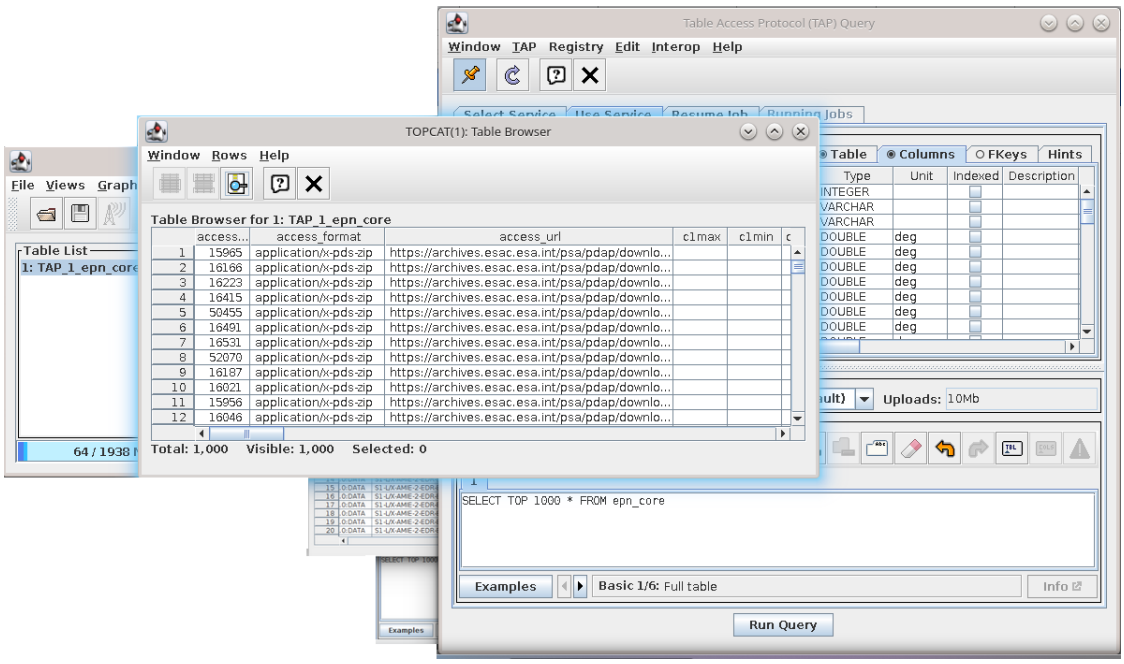
TOPCAT is a downloadable client (Java) which may be used for visualising tabular, and in particular Virtual Observatory , data.
TOPCAT can be used to connect to a TAP server by clicking *VO->Table Access Protocol (TAP) Query* menu item from the top toolbar. This will open the following dialog:



Similarly to the VESPA client above, TOPCAT will list all the registered services, allowing us to filter by name, in this case it is "PSA".
Clicking *Use Service* will open the "Use Service" tab of the same dialog displaying the schemas exposed by the TAP service. Here can be seen the **epn_core** table and the columns which may be used in a given query.



In the bottom of the previous image can be seen the ***Examples*** button which will bring up an example query in the box above. Clicking *Run Query* will run the query against the service and bring up the following results:



HTTP URL

As well as the above specially designed clients for TAP services, a TAP service can be accessed directly using the URL on the command line or using a web browser (e.g. Firefox, Chrome, etc.)

For example, the following query can be performed on the command line to output the results to the specified file:

$ curl -L -X POST " http://psa.esa.int/epn-tap/tap/sync?LANG=ADQL&QUERY=SELECT+*FROM+psa.epn_core+WHERE+target_name=+'Mars'&REQUEST=doQuery&MAXREC=1000 " -o "psa-epn-tap_mars_results.xml"

Constructing a Query

Mandatory parameters

The following parameters must be specified whenever making a sync or async TAP query:

Parameter Name	Permissible Values	Usage
LANG	ADQL	LANG=ADQL
QUERY	<ADQL Query>	QUERY=SELECT+*+FROM+psa.epn_core
REQUEST	doQuery	REQUEST=doQuery

Additionally, async requests should specify the "phase" to ensure the request is started or in order to cancel a request:

Parameter Name	Permissible Values	Usage
PHASE	RUN ABORT	PHASE=RUN

Optional parameters

The following parameters may be specified whenever making a sync or async TAP query. If not specified, default values will be used.

Parameter Name	Permissible Values	Default Value	Usage
MAXREC	<integer number>	10000	MAXREC=1000
FORMAT	VOTABLE JSON CSV	VOTABLE	FORMAT=JSON

Example: Query by Target Name

Synchronous example

Syntax : <tap_service-url>/ **sync?** **LANG**=ADQL **&** **QUERY**=<ADQL Query> **&** **REQUEST**=doQuery **&** **MAXREC**=<integer> **&** **FORMAT**=<Results format>

Example :

http://psa.esa.int/epn-tap/tap/ sync?LANG= ADQL &QUERY= SELECT+*+FROM+psa.epn_core+WHERE+(lower(target_name)=+lower('Mars'))+OFFSET+2 &REQUEST= doQuery &MAXREC= 1000 &FORMAT= JSON

- <tap_service-url> - is the EPN-TAP service URL e.g. http://psa.esa.int/epn-tap/tap
- **LANG=** - informs the service which language the query is in. For the PSA EPN-TAP, only ADQL is supported.
- **&** - each parameter must be separated by an ampersand (convention for specifying GET/POST parameters in HTTP requests)

- **QUERY=** - the query to make against the archive. Depending on the client typically this string of text must have certain non-numeric-alphabetical characters replaced with HTTP acceptable character (i.e. spaces replaced by +. And brackets (and) are replaced by %28 and %29 respectively. For more information on acceptable characters see here . A breakdown of the above query:
    - SELECT * FROM - the parameters from the epn_core model to return in the results. Here '*' denotes select all parameters possible.
    - npsa.epn_core - this tells the TAP service which database schema and table to use. For the PSA EPN-TAP service this will always be npsa.epn_core
    - WHERE - all the parameters following this word, until OFFSET, define the query specifics:
        - lower(...) - is an ADQL2.1 function that convert the text within the brackets to lower case.
        - target_name='Mars' - will query the epn_core model only for those results which have the target_name equal to "Mars"
    - OFFSET - this parameter is used for pagination. Specifying an offset of 2 in this case, given a MAXREC of 1000 will return 1000 results starting with the 1001st up to the 2000th retrievable from the database (if this many results exist). Note this parameter was included only in ADQL2.1 and therefore may not be supported by all clients, e.g. TOPCAT.
- **REQUEST=** - informs the service to perform the query
- **MAXREC=** - informs the service the maximum number of results to return. This is useful not only to limit the size of the results but also allows clients to implement pagination over a service in combination with the ADQL OFFSET parameter.
- **FORMAT=** - the file format of the returned results. In this example the results will be returned as a JSON.

Asynchronous example

Syntax : <tap_service-url>/ **async? PHASE**=RUN **&** **LANG**=ADQL **&** **QUERY**=<ADQL Query> **&** **REQUEST**=doQuery **&** **MAXREC**=<integer> **&** **FORMAT**=<Results format>

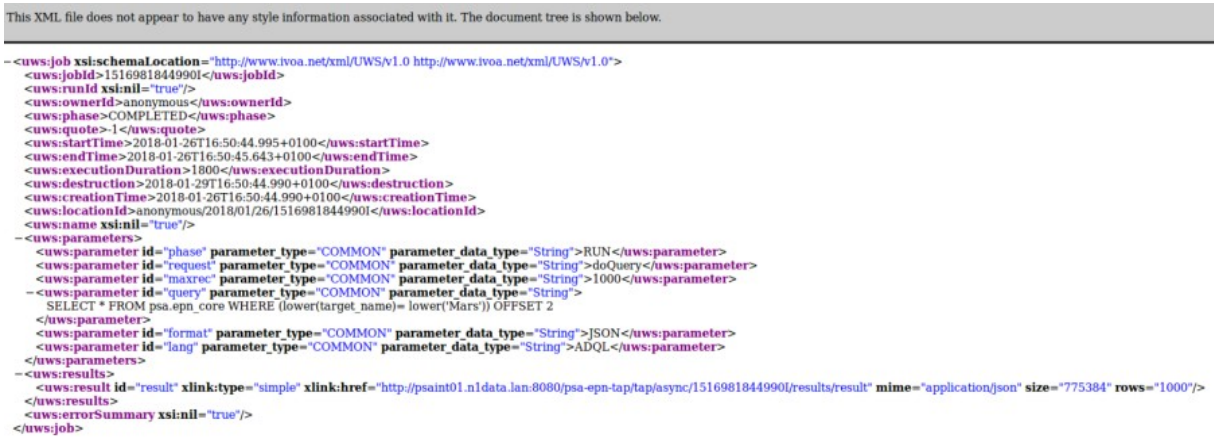
Example :

http://psa.esa.int/epn-tap/tap/async? PHASE =RUN &LANG =ADQL &QUERY =SELECT+*+FROM+psa.epn_core+WHERE+(lower(target_name)=+lower('Mars')) +OFFSET+2 &REQUEST =doQuery &MAXREC =1000 &FORMAT =JSON

- **PHASE=** - informs the service what to do with the query. When creating the query it is necessary to state PHASE=RUN in order for it to start. Omitting this will create the query but not start it.

An asynchronous request will return a URL of the job ID (e.g. http://psa.esa.int/epn-tap/tap/async/1516981844990I) which will return the metadata for the job started as a VOTable including the status of the job. E.g. this job is "EXECUTING":

When the job has "COMPLETED", the previously provided URL will give a result similar to the following image which includes the URL to retrieve the final results:



The "/results" page generated for the results of the job contains metadata about the result.
E.g.: http://psa.esa.int/epn-tap/tap/async/15169818449901/results

The "/results/result" page is the final link to the results of job. E.g.: http://psa.esa.int/epn-tap/tap/async/15169818449901/results/result

Use Case Examples

The following examples will work asynchronously by specifying the async resource and including the PHASE=RUN parameter.

1. Query by Target Name

Case sensitive, default binary VOTable format

http://psa.esa.int/epn-tap/tap/sync?LANG=ADQL&QUERY=SELECT+*+FROM+psa.epn_core+WHERE+target_name+=+'mars'&REQUEST=doQuery&MAXREC=1000

Case insensitive, in JSON format

http://psa.esa.int/epn-tap/tap/sync?

LANG=ADQL&QUERY=SELECT+*+FROM+psa.epn_core+WHERE+(lower(target_name)+=+lower('Mars'))&REQUEST=doQuery&MAXREC=1000&FORMAT=JSON

1. Query by Target Class

Case sensitive, CSV format

http://psa.esa.int/epn-tap/tap/sync?LANG=ADQL&QUERY=SELECT+*+FROM+psa.epn_core+WHERE+target_class+=+'planet'&REQUEST=doQuery&MAXREC=1000&FORMAT=CSV

1. Query by Granule UID (unique identifier - product logical identifier)

http://psa.esa.int/epn-tap/tap/sync?LANG=ADQL&QUERY=SELECT+*+FROM+psa.epn_core+WHERE+granule_uid+=+'MEX-M-HRSC-5-REFDR-MAPPROJECTED-V3.0:DATA:H1454_0005_SR3.JP2'&REQUEST=doQuery&MAXREC=1000

1. Query by Granule GID (group identifier - collection logical identifier)

http://psa.esa.int/epn-tap/tap/sync?LANG=ADQL&QUERY=SELECT+*+FROM+psa.epn_core+WHERE+granule_gid+=+'MEX-M-HRSC-5-REFDR-MAPPROJECTED-V3.0:DATA'&REQUEST=doQuery&MAXREC=1000

1. Query by observation time

http://psa.esa.int/epn-tap/tap/sync?LANG=ADQL&QUERY=SELECT+*+FROM+psa.epn_core+WHERE+target_name+=+'mars'+AND+time_max+<=+2457234.50000000+AND+time_min+>+2457023.50000000&REQUEST=doQuery&MAXREC=1000

6. DOCUMENTATION AND ADDITIONAL INFORMATION

6.1 Mission specific information

Mars Express (MEX)
All public MEX data is available via the PSA. A copy is also available at NASA's PDS Geosciences Node. The data is formatted using PDS3 and data reviews are conducted by the PSA. Most instruments deliver their data split into different sets based on main mission phases, e.g. the nominal mission, extension 1, and so on. There may be further subdivisions into separate datasets based on subinstruments or level/type of data.
Exceptions to the mission phase divisions are: 1) HRSC, which combines all data of a single level/type into their own datasets covering the entire mission; and 2) MaRS, where each radio science observation is delivered as a separate dataset.
In the OMEGA EXT6 dataset there is no release 7. This is because the instrument team's data pipeline is set up create releases for every 100 orbits. For release 7 this happened to cover a set of orbits that was completely devoid of observations due to eclipse and other operational constraints. As the pipeline could not be updated, a dummy release was created instead. This release was not ingested into the PSA, as it does not actually contain any scientific or engineering data.

Venus Express (VEX)
All public VEX data is available via the PSA. The data is formatted using PDS3 and data reviews were conducted by the PSA. Most instruments delivered their data divided into different sets based on main mission phases, e.g. the nominal mission, extension 1, and so on. There may be further subdivisions into separate datasets based on subinstruments or level/type of data.
One exception to the mission phase divisions is VeRA, where each radio science observation was delivered as a separate dataset.
Please note that though raw/level 2 data is available from MAG in the PSA, this data still contains all the spacecraft artifacts which could lead to misinterpretations without a detailed understanding of the spacecraft and its environment. Users are thus advised to use the level 3 and/or 4 data from MAG instead. For those wishing to work on level 2 data, please contact the PI team to discuss such a project.

Rosetta
PSA holds all public data available from the Rosetta mission. A copy is also available at NASA's PDS Small Bodies Node. The format for Rosetta data is PDS3. All data is reviewed by both PSA and PDS and is published simultaneously in both archives.
Especially for users accessing the data through the FTP interface, it is important to understand the concept of a dataset, namely that a dataset in PDS3 is a self-contained set of files within a directory with a standardized subdirectory structure containing not only the data products but also documentation and other files.
Each dataset contains products of one instrument, usually for one mission phase (time interval) and usually of one single processing level.
The following instruments have special characteristics:

- COSIMA: Datasets are incremental. Each dataset with an increased version number contains all the data products from the previous version plus new data products. The added products are newer in acquisition time and were not ready for inclusion in older versions. This is an exception to the general rule for other instruments where new data is grouped in new datasets.

- RSI: Each observation is delivered as a separate dataset including all processing levels. For other instruments each processing level has its own dataset.
- RPC-ICA and RPC-MIP: Browse products can be applicable to several data products. For other instruments there is a one to one relation.
- OSIRIS (NAC and WAC): Datasets cover time intervals defined by the Medium Term Plan time slots used during spacecraft operations. Datasets of other instruments cover time intervals defined by the mission phases which are longer time intervals.

Huygens
The complete Huygens archive is available in the PSA. Improved versions of the DISR and GCMS data sets are being prepared for ingestion. Further details will be provided once the data are finalised for inclusion in the archive.

Giotto
The PSA holds all public data available from the Giotto mission. Giotto was an international mission and data are jointly archived at PSA and NASA's PDS Small Bodies Node. At the time of the mission, it was not possible to produce a PDS3 archive for the EPA, NMS and RPA experiments, so products from these instruments are not yet available. Work is underway to recover as much of these data as possible for inclusion in the Giotto archive. The HMC images are also being reprocessed with improved calibrations and a change from attached to detached labels. Once these are prepared in PDS3 format and reviewed with our PDS colleagues, they will be included in the Giotto archive.

6.2 PSA documentation and information

This section will be populated as soon as possible.

7. PDS3 AND PDS4 FORMAT

7.1 PDS3 format

7.1.1 PDS3 introduction

The PDS3 Standards have been the baseline for archiving planetary science data sets for several decades. This version of the standards has gone through several minor updates in those years, but at its core there have remained a number of key aspects that have allowed for scientific users to quickly and easily pick up and use the data from a compliant archive.
Firstly, the standards were designed around the usage of a human readable plain ASCII language called ODL (Object Description Language) to fully describe the data being archived. All scientific products and files contained within an archive are required to have a plain ASCII label that follows a simple KEYWORD = VALUE format to describe its essential aspects. The keywords and values that can be used are controlled through a central PDS Dictionary that is accessible to the public, so a user can at any time look up their meaning.
The scientific products in a PDS3 archive must all have a description of the data format, allowing a user to understand how the bytes can be read, and also a number of other important metadata that will help a user understand how the data should be interpreted (e.g., times, geometry, temperatures etc.). These metadata are also key to facilitate searches or specific products within a large collection. PDS provides an online dictionary where one can search for the definitions of the various keywords: https://pds.nasa.gov/tools/dd-search/
In addition to the ODL labelling of the files within a data set, the PDS3 Standards also established a set of requirements and recommendations for the inclusion of key documents and supplementary information that would be needed to fully understand and use the science data in the decades to come, regardless of the type of computer or software available to read the data in. This included rules as to how to include technical documentation pertinent to the data set, plus a set of required plain ASCII files that would provide an overview of some key aspects such as the scientific instrument, mission or target. In combination, the ODL labelled data files and the comprehensive set of plain ASCII documentation required by PDS3 should allow for users both now and in the future to understand how data were obtained, and how they should be read and interpreted.
PDS3 has been the benchmark archiving standard for several decades, and has tried to evolve in line with the needs of the data providers and scientific community, but with limited success. The complexity of new instrumentation has driven data providers to adapt and use the data structures permitted by the PDS3 Standards in ways that were never foreseen when they were developed.
Over decades of use, the PDS3 Standards have grown and become unwieldy and cumbersome as they try to accommodate the needs of new missions and instruments. This has driven the need for a new, modern version 4: PDS4.

PDS compliant data can be produced/analyzed with the tools found here.

7.1.2 Missions following PDS3 format

The missions archived in PDS3 format are:
· Giotto
· Huygens
· Mars Express
· Rosetta
· SMART-1
· Venus Express
In addition to these missions there are a number of supporting Earth Based observations that

are also archived in PDS3 format.
Rosetta was the last mission to be archived in PDS3 format. Data from all new missions is expected to be in PDS4 format.

7.2 The new PDS4 format

7.2.1 PDS4 Introduction

PDS version 4 (PDS4) was developed to bring both the archiving process and use of the archived data into the modern era. It is adapted to online dissemination and aims to build on PDS3 experience to solve some of its limitations.

7.2.2 PDS4 Products

PDS4 is based on products and all products must adhere to one of a small number of product classes defined in the standard. All data products are observational products hence use the Product_Observational class and other classes such as Product_Document are used to describe other data entities within the archive.
PDS4 recognises four base data structures: array, table, parsable byte stream, and encoded byte stream. These data structures are tightly constrained. If data cannot be described in terms of these PDS4 base structures, they cannot be archived under PDS4 and must be revised. This constraint leads to some PDS3 structures not being compatible with PDS4. In addition, PDS has approved certain external standards as acceptable for its archival holdings (e.g. FITS, CDF/A), that also follow the four base data structures.
The current implementation of the PDS4 system uses XML for all labels and PDS3 keywords become PDS4 attributes, which can be grouped into classes. Format and content rules as well as conventions to be followed when designing a PDS4 compliant product are captured using a rigorous and well-defined Information Model. This is key to guarantee consistency when using the standards and for validating compliance of the data products, and provides a significant improvement with respect to PDS3. This Information Model is translated into XML files, called XML Schemas and Schematron. This information model is structured in a hierarchy of data dictionaries at common level (aimed to be used by all international archives) and at discipline level (with rules and attributes focused on a specific scientific discipline e.g. geometry, cartography), forming the top level, with the possibility of adding extensions to the information model at project level. This provides the needed flexibility to ensure all aspects needed to describe the data are present. A PSA dictionary is being developed to ensure standardised attribute names across missions in the PSA as much possible. Instrument and mission specific local dictionaries are also currently being developed for ExoMars 2016 and BepiColombo missions. PDS4 is the largest upgrade in history of the PDS, and is a significant step towards an online distributed international archive.

7.2.3 PDS4 Data Structures

The highest level of organisation defined in PDS4 is called "bundle" (top-level directory). Each bundle is organised into a number of "collections" (sub-directories), each collection containing a set of closely related products based on their type and purpose. The types of collections allowed in PDS4 are listed in Table 1.
Products assigned to a collection are organised into lower level subdirectories, following the most convenient criteria for each type of data and typically this follows mission phase initially with further subdirectories either dividing into smaller time periods or by sub-instrument.
PDS4 recognises five main processing levels, Telemetry, Raw, Partially Processed, Calibrated and Derived. The Calibrated level can only apply for data where all instrument artefacts are removed, e.g. for ExoMars TGO these include calibrated spectra and images. Derived data has enhanced scientific processing such as Digital Terrain Models (DTM) from stereo images, species maps, atmospheric profiles etc. PDS4 labels replace the PDS3 proprietary Object Description Language (ODL) with the Extensible Markup Language (XML). In the PSA these

data processing levels are split into separate data collections, e.g. data_raw, data_partially_processed etc.

Collection Type	***Description***	***Typical PDS4 Product Classes in this Collection Type***
data	Contains primary products i.e. scientific data resulting from instrument observations.	Product_Observational
calibration	Contains calibration products used at any stage of the calibration process.	Product_Observational Product_Document Product_File_Text
document	Contains documentation and supporting information to assist in understanding and using the primary products.	Product_Document Product_File_Text
geometry	Contains geometry products including pointing, orientation and positioning information typically provided in tables of calculated values.	Product_Observational Product_Document
browse	Contains browse products including overview representations or quick-look plots/reports of the primary products.	Product_Browse Product_Thumbnail Product_Document
miscellaneous	Contains miscellaneous products including any additional information and documentation products not easily classified as one of the other collections.	Product_Observational Product_Document Product_File_Text
context	Contains products that provide descriptions of the mission, spacecraft, instrumentation and targets.	Product_Context
spice_kernels	Contains SPICE kernels.	Product_SPICE_Kernel
xml_schema	Contains XML Schemas and related products used for generating and validating the products.	Product_XML_Schema

7.2.4 Missions following PDS4 format

All newer missions will be in PDS4 format. These missions include:
· Bepi Colombo
· Exo Mars 2016
· Exo Mars Rover and Surface Platform
· Future missions

8. VERSIONS OF THE PSA

PSA versioning is based on a 3-digit software versioning style widely used within the software community which relies on 3 digits to define a specific release of the software. The two digits of a version are given in the format X.Y.Z with the following meaning:

- X: Major → Important milestones and major updates
- Y: Minor → Smaller updates to the software
- Z: Patch → Bug fixes

For further info on semantic versioning, please visit this site: https://semver.org/
This User Guide refers to the current version of the PSA taking the first two digits (X.Y), skipping the patches/bug fixing (only new/updated features). The PSA version can be seen from the User Interface at the upper-left corner as shown in the next figure:

PSA current version (X.Y.Z in the figure) can be found at the UI upper-left corner

For instance, given a 5.6.1 as the PSA versioning (displaying PSA 5.6.1 in the User Interface), the User Guide will refer the 5.6 version.

9. CONTACT

Should you have any comments or questions, you can contact the PSA either using the link on the website or directly by e-mail (see below).
To use the form on the website, simply navigate to the 'Contact Us' page and click on the link to the form. Fill in the appropriate sections (note that all fields with a '*' are required), and when ready, click 'Submit'. We will forward your request onto the relevant expert within our team and get back to you as soon as we can.
It is also possible to email the PSA Help Desk directly through the following address: psahelp@cosmos.esa.int .

10. ANNEX A - CQL SEARCH ALLOWED VALUES

This list collects the allowed values in the PSA CQL Free Search Box.

mission_name

BepiColombo
Chandrayaan-1
ExoMars 2016
Giotto
Ground Based
Hubble
Huygens
Mars Express
Rosetta
SMART-1
Venus Express

instrument_host_name / instrument_host_id

mission_name	instrument_host_name	instrument_host_id	meaning
Huygens	HP	CASSINI-HUYGENS_HP	Huygens Probe
Huygens	CH1ORB	CHANDRAYAAN-1_CH1ORB	Chandrayaan -1 Orbiter
Ground Based	BMO	EARTH_BMO	Bochum Mobile Observatory
Ground Based	ESO	EARTH_ESO	European Southern Observatory
Ground Based	LOWELL	EARTH_LOWELL	Lowell Observatory
Ground Based	TSK	EARTH_TSK	Pik Terskol Observatory
Giotto	GIO	GIOTTO_GIO	Giotto
Hubble	HST	HST_HST	Hubble Space Telescope
Rosetta	RL	INTERNATIONAL-ROSETTA-MISSION_RL	Rosetta Lander
Rosetta	RO	INTERNATIONAL-ROSETTA-MISSION_RO	Rosetta Orbiter
Mars Express	MEX	MARS-EXPRESS_MEX	Mars Express
Venus Express	N/A	VENUS-EXPRESS_VEX	Venus Express
SMART-1	S1	SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY_S1	SMART-1

ExoMars 2016	TRACE GAS ORBITER	urn:esa:psa:context:instrument_host:spacecraft.tgo	Trace Gas Orbiter
ExoMars 2016	EDM	urn:esa:psa:context:instrument_host:spacecraft.edm	Schiaparelli EDM
BepiColombo	Mercury Planetary Orbiter	urn:esa:psa:context:instrument_host:spacecraft.mpo	Mercury Planetary Orbiter
BepiColombo	Mercury Transfer Module	urn:esa:psa:context:instrument_host:spacecraft.mtm	Mercury Transfer Module

instrument_name / instrument_id

mission_name	instrument_name	instrument_id	meaning
Huygens	ACP	CASSINI-HUYGENS_HP_ACP	Aerosol Collector Pyrolyser
Huygens	DISR	CASSINI-HUYGENS_HP_DISR	Descent Imager and Spectral Radiometer
Huygens	DTWG	CASSINI-HUYGENS_HP_DTWG	Descent Trajectory Working Group Probe
Huygens	DWE	CASSINI-HUYGENS_HP_DWE	Doppler Wind Experiment
Huygens	GCMS	CASSINI-HUYGENS_HP_GCMS	Gas Chromatograph and Mass Spectrometer
Huygens	HASI	CASSINI-HUYGENS_HP_HASI	Huygens Atmospheric Structure Instrument
Huygens	HUYGENS_HK	CASSINI-HUYGENS_HP_HUYGENS_HK	Huygens Housekeeping Data
Huygens	SSP	CASSINI-HUYGENS_HP_SSP	Surface Science Package
Chandrayaan-1	C1XS	CHANDRAYAAN-1_CH1ORB_C1XS	Chandrayaan-1 X-ray Spectrometer
Ground Based	300	EARTH_BMO_300	PENTACON-OPTICS-F4-300MM
Ground Based	FFC	EARTH_BMO_FFC	Flat-Field Camera
Ground Based	HBL	EARTH_BMO_HBL	HASSELBLAD-ZEISS-PLANAR-F2-110MM
Ground Based	HUV	EARTH_BMO_HUV	HASSELBLAD-ZEISS-UV-SONNAR-F4.3-105MM
Ground Based	RUV	EARTH_BMO_RUV	ROLLEI-ZEISS-

			UV-SONNAR-F4.3-105MM
Ground Based	DFOSC	EARTH_ESO_DFOSC	Danish Faint Object Spectrograph and Camera
Ground Based	EFOSC2	EARTH_ESO_EFOSC2	ESO Faint Object Spectrograph and Camera v.2
Ground Based	PHOT	EARTH_LOWELL_PHOT	Photoelectric Photometer
Ground Based	RCC	EARTH_TSK_RCC	AMEI Two-Channel Focal Reducer
Giotto	DID	GIOTTO_GIO_DID	Dust Impact Detection System
Giotto	GRE	GIOTTO_GIO_GRE	Giotto Radio Experiment
Giotto	HMC	GIOTTO_GIO_HMC	Halley Multicolour Camera
Giotto	IMS	GIOTTO_GIO_IMS	Ion Mass Spectrometer
Giotto	JPA	GIOTTO_GIO_JPA	Johnstone Plasma Analyser
Giotto	MAG	GIOTTO_GIO_MAG	Magnetometer
Giotto	NMS	GIOTTO_GIO_NMS	Neutral Mass Spectrometer
Giotto	OPE	GIOTTO_GIO_OPE	Optical Probe Experiment
Giotto	PIA	GIOTTO_GIO_PIA	Particulate Impact Analyser
Hubble	FOS	HST_HST_FOS	Faint Object Spectrograph
Hubble	WFPC2	HST_HST_WFPC2	Wide Field and Planetary Camera 2
Rosetta	APXS	INTERNATIONAL-ROSETTA-MISSION_RL_APXS	Alpha-p-X-ray spectrometer
Rosetta	CIVA	INTERNATIONAL-ROSETTA-MISSION_RL_CIVA	Comet Infrared and Visible Analyser
Rosetta	CONSERT	INTERNATIONAL-ROSETTA-MISSION_RL_CONSERT	Comet Nucleus Sounding Experiment by Radio wave Transmission
Rosetta	COSAC	INTERNATIONAL-ROSETTA-MISSION_RL_COSAC	Cometary Sampling and Composition experiment
Rosetta	ANCDR	INTERNATIONAL-ROSETTA-MISSION_RL_LANDER_ANCDR	Lander Ancillary Data
Rosetta	MUPUS	INTERNATIONAL-ROSETTA-MISSION_RL_MUPUS	Multi-Purpose Sensors for Surface and Subsurface

			Science
Rosetta	PTOLEMY	INTERNATIONAL-ROSETTA-MISSION_RL_PTOLEMY	Ptolemy gas analyser
Rosetta	ROLIS	INTERNATIONAL-ROSETTA-MISSION_RL_ROLIS	Rosetta Lander Imaging System
Rosetta	SD2	INTERNATIONAL-ROSETTA-MISSION_RL_SD2	Sample Drilling and Distribution unit
Rosetta	SESAME	INTERNATIONAL-ROSETTA-MISSION_RL_SESAME	Surface Electric Sounding and Acoustic Monitoring Experiment
Rosetta	ALICE	INTERNATIONAL-ROSETTA-MISSION_RO_ALICE	Alice spectrometer
Rosetta	COSIMA	INTERNATIONAL-ROSETTA-MISSION_RO_COSIMA	Cometary Secondary Ion Mass Analyzer
Rosetta	GIADA	INTERNATIONAL-ROSETTA-MISSION_RO_GIADA	Grain Impact Analyser and Dust Accumulator
Rosetta	MIDAS	INTERNATIONAL-ROSETTA-MISSION_RO_MIDAS	Micro-Imaging Dust Analysis System
Rosetta	MIRO	INTERNATIONAL-ROSETTA-MISSION_RO_MIRO	Microwave Instrument for the Rosetta Orbiter
Rosetta	NAVCAM	INTERNATIONAL-ROSETTA-MISSION_RO_NAVCAM	Navigational Camera
Rosetta	OSINAC	INTERNATIONAL-ROSETTA-MISSION_RO_OSINAC	OSIRIS Narrow Angle Camera
Rosetta	OSIWAC	INTERNATIONAL-ROSETTA-MISSION_RO_OSIWAC	OSIRIS Wide Angle Camera
Rosetta	NA	INTERNATIONAL-ROSETTA-MISSION_{-RO,-RL-}_SPICE	Orbiter/Lander SPICE data
Rosetta	ROSINA	INTERNATIONAL-ROSETTA-MISSION_RO_ROSINA	Rosetta Orbiter Spectrometer for Ion and Neutral Analysis
Rosetta	RPC	INTERNATIONAL-ROSETTA-MISSION_RO_RPCICA	Ion Composition Analyser
Rosetta	RPC	INTERNATIONAL-ROSETTA-MISSION_RO_RPCIES	Ion and Electron Sensor
Rosetta	RPC	INTERNATIONAL-ROSETTA-MISSION_RO_RPCLAP	Langmuir Probe
Rosetta	RPC	INTERNATIONAL-ROSETTA-MISSION_RO_RPCMAG	Fluxgate Magnetometer
Rosetta	RPC	INTERNATIONAL-ROSETTA-MISSION_RO_RPCMIP	Mutual Impedance Probe
Rosetta	RSI	INTERNATIONAL-ROSETTA-MISSION_RO_RSI	Radio Science Investigation
Rosetta	VIRTIS	INTERNATIONAL-ROSETTA-MISSION_RO_VIRTIS	Visible and Infrared Thermal Imaging

			Spectrometer
Mars Express	ASPERA-3	MARS-EXPRESS_MEX_ASPERA-3	Analyzer of Space Plasmas and Energetic Atoms, 4th version
Mars Express	HRSC	MARS-EXPRESS_MEX_HRSC	High Resolution Stereo Camera
Mars Express	MARSIS	MARS-EXPRESS_MEX_MARSIS	Mars Advanced Radar For Subsurface and Ionosphere Sounding
Mars Express	MaRS	MARS-EXPRESS_MEX_MRS	Mars Express Radio Science
Mars Express	NA	MARS-EXPRESS_MEX_N/A	Not applicable
Mars Express	OMEGA	MARS-EXPRESS_MEX_OMEGA	Observatoire Mineralogie, Eau, Glaces, Activite
Mars Express	PFS	MARS-EXPRESS_MEX_PFS	Planetary Fourier Spectrometer
Mars Express	SPICAM	MARS-EXPRESS_MEX_SPICAM	SPectroscopy for the Investigation of Characteristics of the Atmosphere of Mars
Mars Express	NA	MARS-EXPRESS_MEX_SPICE	SPICE Data
SMART-1	AMIE	SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY_S1_AMIE	Advanced Moon Microimaging Experiment
SMART-1	DCIXS	SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY_S1_DCIXS	Demonstration of a Compact Imaging X-Ray Spectrometer
SMART-1	SIR	SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY_S1_SIR	Spectrometer InfraRed
SMART-1	SPEDE	SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY_S1_SPEDE	Spacecraft Potential Electrons and Dust Experiment
SMART-1	XSM	SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY_S1_XSM	X-ray Solar Monitor
Venus Express	NA	VENUS-EXPRESS_N/A_N/A	Not applicable
Venus Express	ASPERA-4	VENUS-EXPRESS_VEX_ASPERA4	Analyzer of Space Plasmas and Energetic Atoms v4
Venus Express	MAG	VENUS-EXPRESS_VEX_MAG	Venux Express Magnetometer
Venus Express	SPICAV	VENUS-EXPRESS_VEX_SPICAV	Spectroscopy for Investigation of Characteristics of the Atmosphere of Venus
Venus Express	SPICAV-SOIR	VENUS-EXPRESS_VEX_SPICAV-SOIR	SPICAV's "Solar Occultation at

			Infrared" channel
Venus Express	NA	VENUS-EXPRESS_VEX_SPICE	SPICE data
Venus Express	VIRTIS	VENUS-EXPRESS_VEX_VIRTIS	Visible and Infrared Thermal Imaging Spectrometer
Venus Express	VMC	VENUS-EXPRESS_VEX_VMC	Venus Monitoring Camera
Venus Express	VeRA	VENUS-EXPRESS_VEX_VRA	*Venus Radio Science*
ExoMars 2016	ACS	urn:esa:psa:context:instrument:acs.tgo	Atomspheric Chemistry Suite
ExoMars 2016	CaSSIS	urn:esa:psa:context:instrument:cassis.tgo	Colour and Stereo Surface Imaging System
ExoMars 2016	FREND	urn:esa:psa:context:instrument:frend.tgo	Fine Resolution Epithermal Neutron Detector
ExoMars 2016	NOMAD	urn:esa:psa:context:instrument:nomad.tgo	Nadir and Occultation for MArs Discovery
ExoMars 2016	DREAMS	urn:esa:psa:context:instrument:dreams.edm	Dust Characterisation, Risk Assessment, and Environment Analyser on the Martian Surface
BepiColombo	BERM	urn:esa:psa:context:instrument:berm.mpo	BepiColombo Radiation Monitor
BepiColombo	ISA	urn:esa:psa:context:instrument:isa.mpo	Italian spring accelerometer
BepiColombo	MAG	urn:esa:psa:context:instrument:mag.mpo	Mercury Planetary Orbiter Magnetometer
BepiColombo	MIXS	urn:esa:psa:context:instrument:mixs.mpo	Mercury Imaging X-ray Spectrometer
BepiColombo	SIXS	urn:esa:psa:context:instrument:sixs.mpo	Solar Intensity X-ray and particle Spectrometer
BepiColombo	MCAM	urn:esa:psa:context:instrument:mcam.mtm	BepiColombo Monitoring Cameras

subinstrument_name / subinstrument_id

mission	subinstrument_name	subinstrument_id	instrument_id
ExoMars 2016	BE	urn:esa:psa:context:instrument:acs.tgo:be	urn:esa:psa:context:instrument_host:spacecraft.tgo
BepiColombo	CAM1	urn:esa:psa:context:instrument:mcam.mtm:cam1	urn:esa:psa:context:instrument_host:spacecraft.mtm

BepiColombo	CAM2	urn:esa:psa:context:instrument:mcam.mtm:cam2	urn:esa:psa:context:instrument_host:spacecraft.mtm
BepiColombo	CAM3	urn:esa:psa:context:instrument:mcam.mtm:cam3	urn:esa:psa:context:instrument_host:spacecraft.mtm
Rosetta	COPS	INTERNATIONAL-ROSETTA-MISSION_RO_ROSINA:COPS	INTERNATIONAL-ROSETTA-MISSION_RO_ROSINA
Rosetta	DFMS	INTERNATIONAL-ROSETTA-MISSION_RO_ROSINA:DFMS	INTERNATIONAL-ROSETTA-MISSION_RO_ROSINA
ExoMars 2016	DOSIMETRY	urn:esa:psa:context:instrument:frend.tgo:dosimetry	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	dreams-h	urn:esa:psa:context:instrument:dreams.edm:dreams-h	urn:esa:psa:context:instrument:dreams:edm
ExoMars 2016	dreams-p	urn:esa:psa:context:instrument:dreams.edm:dreams-p	urn:esa:psa:context:instrument:dreams:edm
Mars Express	ELS	MARS-EXPRESS_MEX_ASPERA-3:ELS	MARS-EXPRESS_MEX_ASPERA-3
Venus Express	ELS	VENUS-EXPRESS_VEX_ASPERA4:ELS	VENUS-EXPRESS_VEX_ASPERA4
ExoMars 2016	HK	urn:esa:psa:context:instrument:acs.tgo:hk	urn:esa:psa:context:instrument:cassis.tgo
Exomars 2016	HK	urn:esa:psa:context:instrument:dreams.edm:hk	urn:esa:psa:context:instrument:dreams:edm
ExoMars 2016	HK	urn:esa:psa:context:instrument:frend.tgo:hk	urn:esa:psa:context:instrument:frend.tgo
ExoMars 2016	HK0	urn:esa:psa:context:instrument:cassis.tgo:hk0	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	HK1	urn:esa:psa:context:instrument:cassis.tgo:hk1	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	HK1	urn:esa:psa:context:instrument:dreams.edm:hk1	urn:esa:psa:context:instrument:dreams:edm
ExoMars 2016	HK1	urn:esa:psa:context:instrument:nomad.tgo:hk1	urn:esa:psa:context:instrument:nomad.tgo
ExoMars 2016	HK16	urn:esa:psa:context:instrument:cassis.tgo:hk16	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	HK17	urn:esa:psa:context:instrument:cassis.tgo:hk17	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	HK18	urn:esa:psa:context:instrument:cassis.tgo:hk18	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	HK2	urn:esa:psa:context:instrument:cassis.tgo:hk2	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	HK2	urn:esa:psa:context:instrument:dreams.edm:hk2	urn:esa:psa:context:instrument:dreams:edm
ExoMars 2016	HK2	urn:esa:psa:context:instrument:nomad.tgo:hk1	urn:esa:psa:context:instrument:nomad.tgo
ExoMars 2016	HK3	urn:esa:psa:context:instrument:cassis.tgo:hk3	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	HK_BE	urn:esa:psa:context:instrument:acs.tgo:hk_be	urn:esa:psa:context:instrument:acs.tgo
ExoMars 2016	HK_MIR	urn:esa:psa:context:instrument:acs.tgo:hk_mir	urn:esa:psa:context:instrument:acs.tgo

ExoMars 2016	HK_NIR	urn:esa:psa:context:instrument:acs.tgo:hk_nir	urn:esa:psa:context:instrument:acs.tgo
ExoMars 2016	HK_TIR	urn:esa:psa:context:instrument:acs.tgo:hk_tir	urn:esa:psa:context:instrument:acs.tgo
BepiColombo	IB	urn:esa:context:instrument:mag.mpo:ib	urn:esa:psa:context:instrument:mag.mpo
Rosetta	ICA	INTERNATIONAL-ROSETTA-MISSION_RO_RPCICA:ICA	INTERNATIONAL-ROSETTA-MISSION_RO_RPCICA
Rosetta	IES	INTERNATIONAL-ROSETTA-MISSION_RO_RPCIES:IES	INTERNATIONAL-ROSETTA-MISSION_RO_RPCIES
Mars Express	IMA	MARS-EXPRESS_MEX_ASPERA-3:IMA	MARS-EXPRESS_MEX_ASPERA-3
Venus Express	IMA	VENUS-EXPRESS_VEX_ASPERA4:IMA	VENUS-EXPRESS_VEX_ASPERA4
Rosetta	LAP	INTERNATIONAL-ROSETTA-MISSION_RO_RPCLAP:LAP	INTERNATIONAL-ROSETTA-MISSION_RO_RPCLAP
ExoMars 2016	LNO	urn:esa:psa:context:instrument:nomad.tgo:lno	urn:esa:psa:context:instrument:nomad.tgo
Rosetta	MAG	INTERNATIONAL-ROSETTA-MISSION_RO_RPCMAG:MAG	INTERNATIONAL-ROSETTA-MISSION_RO_RPCMAG
Exomars 2016	marstem	urn:esa:psa:context:instrument:dreams.edm:marstem	urn:esa:psa:context:instrument:dreams:edm
ExoMars 2016	metwind	urn:esa:psa:context:instrument:dreams.edm:metwind	urn:esa:psa:context:instrument:dreams:edm
Rosetta	MIP	INTERNATIONAL-ROSETTA-MISSION_RO_RPCMIP:MIP	INTERNATIONAL-ROSETTA-MISSION_RO_RPCMIP
ExoMars 2016	MIR	urn:esa:psa:context:instrument:acs.tgo:mir	urn:esa:psa:context:instrument:acs.tgo
BepiColombo	MIXS-C	urn:esa:psa:context:instrument:mixs.mpo:mixs-c	urn:esa:psa:context:instrument:mag.mpo
BepiColombo	MIXS-T	urn:esa:psa:context:instrument:mixs.mpo:mixs-t	urn:esa:psa:context:instrument:mag.mpo
Rosetta	NAC	INTERNATIONAL-ROSETTA-MISSION_RO_OSINAC:NAC	INTERNATIONAL-ROSETTA-MISSION_RO_OSINAC
ExoMars 2016	NEUTRON	urn:esa:psa:context:instrument:frend.tgo:neutron	urn:esa:psa:context:instrument:frend.tgo
ExoMars 2016	NIR	urn:esa:psa:context:instrument:acs.tgo:nir	urn:esa:psa:context:instrument:acs.tgo
Venux Express	NPD	VENUS-EXPRESS_VEX_ASPERA4:NP1	VENUS-EXPRESS_VEX_ASPERA4
Venus Express	NPD	VENUS-EXPRESS_VEX_ASPERA4:NP2	VENUS-EXPRESS_VEX_ASPERA4
Mars Express	NPI	MARS-EXPRESS_MEX_ASPERA-3:NPI	MARS-EXPRESS_MEX_ASPERA-3
Venus Express	NPI	VENUS-EXPRESS_VEX_ASPERA4:NPI	VENUS-EXPRESS_VEX_ASPERA4
BepiColombo	OB	urn:esa:psa:context:instrument:mag.mpo:ob	urn:esa:psa:context:instrument:mag.mpo
Rosetta	RTOF	INTERNATIONAL-ROSETTA-MISSION_RO_ROSINA:RTOF	INTERNATIONAL-ROSETTA-MISSION_RO_ROSINA

ExoMars 2016	SCI	urn:esa:psa:context:instrument:cassis.tgo:sci	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	SCI	urn:esa:psa:context:instrument:dreams.edm:sci	urn:esa:psa:context:instrument:dreams:edm
ExoMars 2016	SINBAD	urn:esa:psa:context:instrument:nomad.tgo:sinbad	urn:esa:psa:context:instrument:cassis.tgo
ExoMars 2016	sis	urn:esa:psa:context:instrument:dreams.edm:sis	urn:esa:psa:context:instrument:dreams:edm
BepiColombo	SIXS-P	urn:esa:psa:context:instrument:sixs.mpo:sixs-p	urn:esa:psa:context:instrument:mag.mpo
BepiColombo	SIXS-X	urn:esa:psa:context:instrument:sixs.mpo:sixs-x	urn:esa:psa:context:instrument:mag.mpo
ExoMars 2016	SO	urn:esa:psa:context:instrument:nomad.tgo:so	urn:esa:psa:context:instrument:nomad.tgo
ExoMars 2016	TIR	urn:esa:psa:context:instrument:acs.tgo:tir	urn:esa:psa:context:instrument:acs.tgo
ExoMars 2016	UVIS	urn:esa:psa:context:instrument:nomad.tgo:uvis	urn:esa:psa:context:instrument:nomad.tgo
Rosetta	WAC	INTERNATIONAL-ROSETTA-MISSION_RO_OSIWAC:WAC	INTERNATIONAL-ROSETTA-MISSION_RO_OSIWAC

instrument_type

Accelerometer
ACCELEROMETER
ACOUSTIC SENSOR
Camera
CAMERA
CCD
CCD CAMERA
DRILL
Dust Detector
DUST DETECTOR
DUST IMPACT DETECTOR
ELECTRON SPECTROMETER
ELECTROSTATIC ANALYZER
FRAME CCD REFLECTING TELESCOPE
FRAMING CAMERA
GAS CHROMATOGRAPH
GAS ISOTOPE RATIO ANALYSER
HOUSEKEEPING
Imager
IMAGER
IMAGING CAMERA
IMAGING SPECTROMETER
INFRARED INTERFEROMETER

INFRARED SPECTROMETER
ION MASS SPECTROMETER
LINEAR ARRAY CAMERA
Magnetometer
MAGNETOMETER
Mass spectrometer
MASS SPECTROMETER
MATERIAL PROPERTY SENSOR
MUTUAL IMPEDANCE PROBE
N/A
Neutron Detector
PENETROMETER THERMAL PROBE
PHOTOELECTRIC PHOTOMETER
PHOTOPOLARIMETER
PLASMA INSTRUMENT
RADAR
RADIOMETER
RADIO SCIENCE
SCANNING PROBE MICROSCOPE
SPECTROGRAPH
Spectrometer
SPECTROMETER
TELESCOPE
ULTRAVIOLET SPECTROMETER
UNK

processing_level

processing_level (PDS3 - PDS4)	meaning
1 - Telemetry	Telemetry data with data embedded.
2 - Raw	Corrected for telemetry errors and split or decommutated into a data set for a given instrument. Sometimes called Experimental Data Record. Data are also tagged with time and location of acquisition. Sometimes it is called "edited".
3 - Calibrated	Calibrated data that are still in units produced by the instrument, but that have been corrected so that values are expressed in or are proportional to some physical unit such as radiance. No re-sampling is applied, thus edited or raw data can be used to reconstruct calibrated data.
Partially Processed	Partially processed data is data in an intermediate stage of calibration. It is a concept

(PDS4)	specific to PDS4.
4 - Derived	Data that have been re-sampled in the time and/or space domain(s) in such a way that the original edited data cannot be reconstructed anymore. Could be calibrated in addition to being re-sampled.
5 - Derived	Derived results, such as maps, reports, graphics, etc.
6 - Derived	Non-science data needed to generate calibrated or higher level data sets. Consists of instrument gains, offsets, pointing information for scan platforms, etc.

target_name

16 CYG B
1P/Halley
21 Lutetia
2867 Steins
46P/Wirtanen
4 Vesta
58 AQL
67P/C-G
9P/Tempel 1
Aldebaran
ALPHA LYR
ALPHA_SCO
Arcturus
Area 98
BIAS
C/2002 T7 (Linear)
Calibration
Checkout
Dark
DARK SKY
Deimos
DUST
Earth
Flatfield
FOMALHAUT
HD 100889
HD 15318
HD 30739
HD 42560
Internal Source
Interplanetary Dust
Jupiter

Landolt SA 92
M1
M2 DEIMOS
M42
M83
Mars
Mercury
Moon
NON SCIENCE
Phobos
Plasma
PLEIADES
Pluto
Saturn
Scorpius
Sirius
Sky
SOLAR_SYSTEM
SOLAR WIND
SPACECRAFT_DECK
Star
Sun
Titan
Vega
Venus
Zeta Cas

target_id
16 CYG B
1P/HALLEY
21 LUTETIA
2867 STEINS
354P/LINEAR 58 2010 A2
46P/WIRTANEN
4 VESTA
58 AQL
67P/CHURYUMOV-GERASIMENKO 1 1969 R1
9P/TEMPEL 1 1867 G1

ACHERNAR
ALDEBARAN
ALPHA CAS
ALPHA_SCO
ARCTURUS
AREA 98
BETA CAR
BETA CEN
BETA HYI
CALIBRATION
CALLAMP
CANOPUS
CHECKOUT
C/LINEAR 2002 T7
C/MACHHOLZ 2004 Q2
COMET
CTE
DARK
DEIMOS
EARTH
EPS AQR
ETA BOO
FLAT FIELD
FOMALHAUT
HALLEY
INTERNAL SOURCE
INTERPLANETARY DUST
JUPITER
M1
M1 PHOBOS
M2 DEIMOS
M42
M83
MAINTENANCE
MARS
MERCURY
MOON
N/A
NULL
PHOBOS
PLASMA

PLEIADES
PLUTO
SATURN
SCAT LIGHT
SCORPIUS
SKY
SOLAR WIND
STAR
STARFIELD
TITAN
UNK
urn:esa:psa:context:target:open_cluster.pleiades
urn:esa:psa:context:target:star.hd_100889
urn:esa:psa:context:target:star.hd_15318
urn:esa:psa:context:target:star.hd_30739
urn:esa:psa:context:target:star.hd_42560
urn:esa:psa:context:target:star.landolt_sa_104
urn:esa:psa:context:target:star.landolt_sa_92
urn:nasa:pds:context:target:calibration.bias
urn:nasa:pds:context:target:calibration.dark_sky
urn:nasa:pds:context:target:calibration_field.dark_sky
urn:nasa:pds:context:target:calibration.non_science
urn:nasa:pds:context:target:calibrator.non_science
urn:nasa:pds:context:target:calibrator.spacecraft_deck
urn:nasa:pds:context:target:dust.dust
urn:nasa:pds:context:target:planetary_system.solar_system
urn:nasa:pds:context:target:planet.earth
urn:nasa:pds:context:target:planet.jupiter
urn:nasa:pds:context:target:planet.mars
urn:nasa:pds:context:target:planet.mercury
urn:nasa:pds:context:target:plasma_stream.solar_wind
urn:nasa:pds:context:target:satellite.m1_phobos
urn:nasa:pds:context:target:satellite.moon
urn:nasa:pds:context:target:satellite.phobos
urn:nasa:pds:context:target:star.alpha_lyr
urn:nasa:pds:context:target:star.alpha_sco
urn:nasa:pds:context:target:star.fomalhaut
urn:nasa:pds:context:target:star.sirius
urn:nasa:pds:context:target:sun.sun
VEGA
VENUS

ZETA CAS
ZETA OPH

target_type
ASTEROID
Calibration
CALIBRATION
Calibration Field
Calibrator
COMET
Dust
DUST
Dwarf Planet
GALAXY
N/A
NOT_SPECIFIED
NULL
Planet
ASTEROID
Calibration
CALIBRATION
COMET
DUST
GALAXY
Open Cluster
Planet
PLANET
PLASMA CLOUD
Satellite
SATELLITE
Star
STAR
Sun
PLANET
Planetary System
PLASMA CLOUD
Plasma Stream
Satellite

SATELLITE
Star
STAR
Star Cluster
Sun
UNK

filter

Filters used to take images:
BLU
EX1
NIR
MUL
PAN
RED

instrument_mode_id

Instrument-specific mode id:
07
08
09
10
11
12
13
14
15
16
17
18
19
20
5
7
9
AVERAGED
CNT
CTS_DUAL_CONT
CTS_SUBMM_CONT
DUAL_CONT
ENGINEERING
HIS

HK
IMAGING
M0000
M0055
M0150
M0151
M0152
M0153
M0154
M0155
M0157
M0160
M0162
M0163
M0171
M0173
M0181
M0183
M0200
M0202
M0205
M0212
M0215
M0217
M0220
M0222
M0232
M0242
M0245
M0250
M0251
M0260
M0262
M0314
M0316
M0320
M0322
M0324
M0326
M0332
M0334

M0336
M0342
M0396
M0500
M0502
M0504
M0505
M0507
M0510
M0511
M0512
M0513
M0514
M0515
M0516
M0517
M0520
M0521
M0522
M0523
M0524
M0526
M0527
M0528
M0529
M0530
M0532
M0540
M0543
M0553
M0554
M0560
M0562
M0564
M0566
M0570
M0572
M0580
M0582
M0600
M0601

M0602
M0620
M0621
M0622
M0630
M0631
M0632
M0861
M0871
M1004
M1012
M1040
M1042
M1052
M1060
M1062
M1070
M1072
M9000
M9999
N/A
NORMAL
PINGPONG
PIX
SID1
SID2
SID3
SID4
SID5
SID6
SUBMM_CONT
TWOD_X

mission_phase_name

COMET ESCORT 1
COMET ESCORT 1 MTP010
COMET ESCORT 1 MTP011
COMET ESCORT 1 MTP012
COMET ESCORT 1 MTP013
COMET ESCORT 2
COMET ESCORT 2 MTP014
COMET ESCORT 2 MTP015

COMET ESCORT 2 MTP016
COMET ESCORT 2 MTP017
COMET ESCORT 3
COMET ESCORT 3 MTP018
COMET ESCORT 3 MTP019
COMET ESCORT 3 MTP020
COMET ESCORT 3 MTP021
COMET ESCORT 4
COMET ESCORT 4 MTP022
COMET ESCORT 4 MTP023
COMET ESCORT 4 MTP024
COMMISSIONING
CRUISE 2
CRUISE 4-1
CRUISE 4-2
CRUISE 5
EARTH SWING-BY 1
EARTH SWING-BY 2
EARTH SWING-BY 3
FIRST SCIENCE SEQUENCE
GROUND
LONG TERM SCIENCE
LUTETIA FLY-BY
MARS SWING-BY
POST HIBERNATION COMMISSIONING
PRE DELIVERY CALIB SCIENCE
PRELANDING
PRELANDING MTP004
PRELANDING MTP005
PRELANDING MTP006
PRELANDING MTP007
PRELANDING MTP008
PRELANDING MTP009
RENDEZVOUS MANOEUVRE 1
ROSETTA EXTENSION 1
ROSETTA EXTENSION 1 MTP025
ROSETTA EXTENSION 1 MTP026
ROSETTA EXTENSION 1 MTP027
ROSETTA EXTENSION 2
ROSETTA EXTENSION 2 MTP028
ROSETTA EXTENSION 2 MTP029

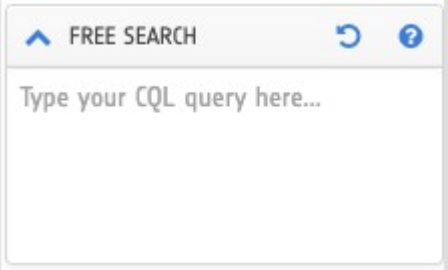
ROSETTA EXTENSION 2 MTP030
ROSETTA EXTENSION 3
ROSETTA EXTENSION 3 MTP031
ROSETTA EXTENSION 3 MTP032
ROSETTA EXTENSION 3 MTP033
ROSETTA EXTENSION 3 MTP034
ROSETTA EXTENSION 3 MTP035
SEPARATION DESCENT LANDING
STEINS FLY-BY
STEINS_FLY-BY

data_set_parameter_name
DENSITY
ELECTRON
ION
MAGNETIC FIELD
ELECTRIC FIELD SPECTRAL DENSITY
PLASMA WAVE SPECTRUM
WAVE ELECTRIC FIELD AMPLITUDE
WAVE ELECTRIC FIELD PHASE
HOUSEKEEPING PARAMETERS
OPERATIONAL PARAMETERS

11. ANNEX B - CQL PARAMETERS

CQL Free Search

The language used in the PSA to query all available metadata is CQL (Contextual Query Language).
CQL is written using a familiar text-based syntax, and is thus more readable and better-suited for manual authoring.



Free Search Box

Operators

The CQL statements have to be typed in a particular format so that you get the desired result without any errors. The parameter has to be on the left, followed by the operator and then the value.
This is an example of a valid query in CQL format:

logical_identifier = 'GIO-C-HMC-3-RDR-HALLEY-V1.0:DATA:HMC01125'

logical_identifier = '%acs_raw_sc_tir_20190408t132714-20190408t152456-6128-1'

Name	Operator	Description	Example of use
Comparison	=, <>, >, >=, <, <=	These operators are used to search for content where the value of the specified field is "equal, not equal, greater than, greater than or equal to, less than, less than or equal to" (respectively) the specified value.	start_date_time > '2016-12-01'
LIKE	LIKE	More general text comparisons can be made using the LIKE operator (case sensitive). It is used in a WHERE clause to search for a specified pattern in a column. The wildcard used in conjunction with the LIKE operator is %.	instrument_name LIKE '%LANDER%' instrument_name LIKE '%ANCDR%'
ILIKE	ILIKE	Is the same as LIKE operator but with the only difference it is case INsensitive.	instrument_name ILIKE '%LaNDer%'
NULL	NULL	A field with a NULL value is a field with no value. Null does not mean empty, as the empty is a value itself, defined by ''.	instrument_name is NULL
Logical AND	AND	Used to combine multiple clauses, allowing you to refine your search. Displays a record if all the conditions separated by AND are TRUE.	product_class = 'Product_Observational' AND instrument_name = 'ACS'
Logical OR	OR	Used to combine multiple clauses, allowing you to refine your search. Displays a record if any of the conditions separated by OR is TRUE.	product_class = 'Product_Observational' OR instrument_name = 'ACS'

BETWEEN	BETWEEN	Selects values within a given range. The values can be numbers, text, or dates.	stop_date_time BETWEEN '2016-12-08' AND '2016-12-10'

IMPORTANT NOTE: Please note that all searches are case sensitive in the CQL Free Search. If you desire to perform some case INsensitive string searches, the ILIKE operator can be used in replacement of other operators as presented here:

Operator	Operator symbol	Sensitiveness	Input Example	Potential output
Equality	=	Case sensitive	instrument_type = 'Camera'	All 'Camera' occurrences as instrument_type
	ILIKE	Case insensitive	instrument_type ILIKE 'Camera'	All 'camera', 'Camera', 'CAMERA', etc occurrences as instrument_type
Inequality	<>	Case sensitive	instrument_type <> 'Camera'	All ocurrences different as 'Camera' as instrument_type
	NOT ILIKE	Case insensitive	instrument_type NOT ILIKE 'Camera'	All ocurrences different as 'Camera', 'camera', 'CAMERA', etc as instrument_type
Likeness	LIKE	Case sensitive	instrument_type LIKE '%Spectrometer%'	All 'Spectrometer', 'Imaging Spectrometer' and 'Mass Spectrometer' occurrences as instrument_type
	ILIKE	Case insensitive	instrument_type ILIKE '%Spectrometer%'	All 'Spectrometer', 'Imaging Spectrometer', 'Mass Spectrometer' and all of their upper/lower case possibilities occurrences as instrument_type
Unlikeness	NOT LIKE	Case sensitive	instrument_type NOT LIKE '%Spectrometer%'	All different as 'Spectrometer', 'Imaging Spectrometer' and 'Mass Spectrometer' occurrences as instrument_type
	NOT ILIKE	Case insensitive	instrument_type NOT ILIKE '%Spectrometer%'	All different as 'Spectrometer', 'Imaging Spectrometer', 'Mass Spectrometer' and all of their upper/lower case possibilities occurrences as instrument_type

Queryable Parameters

The following list of parameters can be used to query the PSA Database. The table includes the following columns:

- "Queryable Parameter": name used in the CQL search.
- "Examples of use": example of a query using the parameter.
- "Equivalent PDS3 keyword": keyword name used in the PDS3 labels within PDS3 compliant products.
- "Equivalent PDS4 Attribute": attribute name that comes in the PDS4 labels within PDS4 compliant products.
- "Name on the GUI": name used in different places of the interface (e.g. in the column name of the table view).

Queryable Parameter	Examples of use	Equivalent PDS3 keyword	Equivalent PDS4 Attribute	Name on the GUI
mission_name	mission_name = 'ExoMars 2016'	N/A (values in Annex A)	Product_Observational.Observation_Area.Investigation_Area.name	Mission
target_name	target_name='Mars'	N/A (values in Annex A)	Product_Observational.Observation_Area.Target_Identification.name	Target

target_type	target_type='COMET'	TARGET_TYPE	Product_Observational.Observation_Area.Target_Identification.type	-
instrument_host_name	instrument_host_name = 'Lander'	N/A (values in Annex A)	Product_Observational.Observation_Area.Observing_System.Observing_System_Component.name	Instrument Host
instrument_name	instrument_name = 'OSIRIS'	N/A (values in Annex A)	Product_Observational.Observation_Area.Observing_System.Observing_System_Component.name	Instrument
instrument_type	instrument_type = 'CCD CAMERA'	INSTRUMENT_TYPE	Product_Observational.Observation_Area.Observing_System.Observing_System_Component.type (value "Spacecraft" for Instrument host) (value "Instrument" for Instrument)	Instrument Type
subinstrument_name	subinstrument_name = 'DOSIMETRY' subinstrument_name LIKE '%'	N/A (values in Annex A)	Product_Observational.Observation_Area.Mission_Area.psa:Sub-Instrument.psa:name	-
start_date_time	start_date_time > '2016-12-01' start_date_time < '2015-05-04 12:05:01.125'	START_TIME	Product_Observational.Observation_Area.Time_Coordinates.start_date_time	Start Time
stop_date_time	start_date_time > '2016-12-01' AND stop_date_time < '2016-12-10' stop_date_time BETWEEN '2016-12-08' AND '2016-12-10'	STOP_TIME	Product_Observational.Observation_Area.Time_Coordinates.stop_date_time	Stop Time
processing_level	processing_level = '3' processing_level= '5' processing_level = 'Raw' processing_level = 'Partially Processed' *NOTE: The value must be wrapped with single quotes even if it is a number.*	PROCESSING_LEVEL_ID	Product_Observational.Observation_Area.Primary_Result_Summary.processing_level	Processing Level
version_id	version_id = '1.0'	N/A	Product_Observational.Identification_Area.version_id	Version
bundle_version_id	bundle_version_id = '50.0' (Example works with "Mars Express" mission)	N/A	Product_Bundle.Identification_Area.version_id	-
logical_identifier	logical_identifier = 'GIO-C-HMC-3-RDR-HALLEY-V1.0:DATA:HMCo	N/A	Product_Observational.Identification_Area.logical_identifier	Product Iden

	1125' logical_identifier = '%acs_raw_sc_tir_20190408t132714-20190408t152456-6128-1'			tifier
bundle_logical_identifier	bundle_logical_identifier = 'MEX-M-OMEGA-2-EDR-FLIGHT-EXT2-V1.0'	DATA_SET_ID	Product_Bundle.Identification_Area.logical_identifier	Data set Identifier
title	title like '%RPCLAP%' title like '%NOMAD%'	PRODUCT_ID	Product_Observational.Identification_Area.title	Product Title
product_class	product_class = 'Product_Observational' product_class like '%PDS3%' (Set for every PDS3 product since there's no equivalent)	N/A	Product_Observational.Identification_Area.product_class	-
bundle_title	bundle_title = 'MEX-M-HRSC-3-RDR-V3.0' bundle_title like '%CaSSIS%' *NOTE: For a complete list of Dataset names please visit the FTP (Section 4).*	DATA_SET_NAME (in label or cat file)	Product_Bundle.Identification_Area.title	-
bundle_description	bundle_description LIKE '%MAPPROJECTED%'	DATA_SET_ID	Product_Bundle.Bundle.description	-
bundle_publication_date	bundle_publication_date BETWEEN '2016-11-01' AND '2016-11-30'	N/A	N/A	-
proprietary_end_date	proprietary_end_date > '2016-12-19'	N/A	N/A	-
postcard_path	postcard_path LIKE '%esa/psa/em16_tgo_cas%' postcard_path = '%cas_raw_sc_browse_%.png'	N/A	N/A	-
purpose	purpose = 'Engineering'	N/A	Product_Observational.Observation_Area.Primary_Result_Summary.purpose	-

	NOTE: Purpose is empty for PDS3 products.			
data_set_parameter_name	data_set_parameter_name LIKE '%PLASMA WAVE SPECTRUM%'	DATA_SET_PARAMETER_NAME	N/A	-

Some parameters may seem confusing since they differ between PDS3 and PDS4 or are not even present in one of them, this table aims to clarify them

parameter	possible values / explanation
bundle_title	Title of the bundle to which the product belongs.
bundle_description	Description of the bundle to which the product belongs.
purpose	PDS4 Specific. **Calibration** - Data collected to determine the relationship between measurement values and physical units. **Checkout** - Data collected during operational tests **Engineering** - Data collected about support systems and structures, which are ancillary to the primary measurements. **Navigation** - Data collected to support navigation **Observation Geometry** - Data used to compute instrument observation geometry, such as SPICE kernels. **Science** - Data collected primarily to answer questions about the targets of the investigation.
product_class	PDS4 Specific. **Product_AIP** - Archival Information Package **Product_Ancillary** - Product that contains data that are supplementary to observational data and cannot reasonably be associated with any other non-observational data class **Product_Attribute_Definition** - The Product Attribute Definition provides an attribute definition in XML encoding **Product_Browse** - The Product Browse class defines a product consisting of one encoded byte stream digital object. **Product_Bundle** - A Product_Bundle is an aggregate product and has a table of references to one or more collections. **Product_Class_Definition** - The Product Class Definition provides a class definition in XML encoding. **Product_Collection** - A Product_Collection has a table of references to one or more basic products. The references are stored in a table called the inventory. **Product_Context** - The Product Context class describes something that provides context and provenance for an observational product. **Product_DIP** - The Product DIP class defines a product for the Dissemination Information Package. **Product_DIP_Deep_Archive** - The Product DIP_Deep_Archive class defines a product for the Dissemination Information Package for the deep archive. **Product_Data_Set_PDS3** - The Data Set PDS3 product is used to create proxy labels for the data sets in the PDS3 Data Set catalog. **Product_Document** - A Product Document is a product consisting of a single logical document that may comprise one or more document editions. **Product_File_Repository** - The Product File Repository class consists of a single text file. This product is used to register a file in a repository. **Product_File_Text** - The Product File Text consists of a single text file with ASCII character encoding. **Product_Instrument_Host_PDS3** - An Instrument Host product describes an instrument host. This product captures the PDS3 catalog instrument host information. **Product_Instrument_PDS3** - An Instrument product describes an instrument. This product captures the PDS3 catalog instrument information. **Product_Metadata_Supplemental** - The Product_Metadata_Supplemental class is used to provide new, and/or improved, metadata for some or all of the basic products in a

	single collection. **Product_Mission_PDS3** - An Mission product describes a mission. This product captures the PDS3 catalog mission information. **Product_Native** - Product_Native is used to describe digital objects in the original format returned by the spacecraft or experimental system when that format cannot be described using one of the PDS4 formats specified for observational data. **Product_Observational** - A Product_Observational is a set of one or more information objects produced by an observing system. **Product_Proxy_PDS3** - The Product Proxy PDS3 class defines a product with enough information to register a PDS3 data product. **Product_SIP** - The Product SIP class defines a product for the Submission Information Package. **Product_SIP_Deep_Archive** - The Product SIP Deep Archive class defines a Submission Information Package (SIP) for the NASA planetary science deep archive. **Product_SPICE_Kernel** - The Product SPICE Kernel class defines a SPICE kernel product. **Product_Service** - The Product Service class defines a product for registering services. Service descriptions from this product are used to register services as intrinsic registry objects. **Product_Software** - Product Software is a product consisting of a set of one or more software formats. **Product_Subscription_PDS3** - The Product_Subscription_PDS3 class provides the list of subscriptions for a PDS3 subscriber. **Product_Target_PDS3** - A target product describes a target. This product captures a reduced set of the PDS3 catalog target information. **Product_Thumbnail** - The Product Thumbnail class defines a product consisting of one encoded byte stream digital object. **Product_Update** - The Product Update class defines a product consisting of update information and optional references to other products. **Product_Volume_PDS3** - A Product Volume PDS3 product captures the PDS3 volume information. **Product_Volume_Set_PDS3** - A Product Volume Set PDS3 product captures the PDS3 volume set information. **Product_XML_Schema** - The Product_XML_Schema describes a resource used for the PDS4 implementation into XML. **Product_Zipped** - The Product_Zipped is a product with references to other products. The referenced products and all associated products and files are packaged into a single ZIP file.

Like operator will be less performant with respect to the "=".
In Annex A, a complete list of allowed values is provided.

Geogen parameters

Geogen parameters (parameters with prefix “geogen_”) provide geometrical information on the products in the archive. This is done using internal tool (PSA developed) that calculate geometry of the products based on the latest available SPICE kernels. We use the same kernels for all instruments to provide consistency. This does not replace geometry provided by the instrument team. Currently those parameters are only available for Mars Express instruments (excluding MaRS), and 5 Rosetta instruments (NAVCAM, OSIRIS, ALICE, VIRTIS and MIRO) . This set of parameters will be added for the rest of the missions in the future.

This list collects the Geogen parameters, description and examples.

Name	Description	Example
geogen_center_latitude	Latitude of the observation footprint center point.	geogen_center_latitude > -39.45
geogen_center_longitude	Longitude of the observation	geogen_center_longitude > -46.03

	footprint center point.	
geogen_westernmost_longitude	Westernmost observation longitude of the footprint.	geogen_westernmost_longitude BETWEEN -17.93 AND 120.71
geogen_easternmost_longitude	Easternmost observation longitude of the footprint.	geogen_easternmost_longitude < -174.38
geogen_minimum_latitude	Minimum observation latitude of the footprint.	geogen_minimum_latitude > -29.49
geogen_maximum_latitude	Maximum observation latitude of the footprint.	geogen_maximum_latitude > -52.44
geogen_local_true_solar_time	Local solar time for the surface point, evaluated at the reference time. The local solar time is the angle between the planetocentric longitude of the Sun, as viewed from the center of the target body, and the planetocentric longitude of the surface point, expressed on a “24 hour” clock.	geogen_local_true_solar_time < '00:16:38'
geogen_solar_longitude	Planetocentric longitude (Ls) of the sun for the target body at the reference time. The planetocentric longitude is the angle between the body-sun vector at the time of interest and the body-sun vector at the vernal equinox.	geogen_solar_longitude > 4.52
geogen_sub_solar_latitude	Latitude of the sub-solar point on the target body at the reference time.	geogen_sub_solar_latitude > -18.57

	The sub-solar point is the point on a body's reference surface where a line from the body center to the sun center intersects that surface.	
geogen_sub_solar_longitude	Longitude of the sub-solar point on the target body at the reference time. The sub-solar point is the point on a body's reference surface where a line from the body center to the sun center intersects that surface.	geogen_sub_solar_longitude > 24.23
geogen_solar_distance	Distance from the center of the sun to the center of the target body at the reference time.	geogen_solar_distance < 206666750.3
geogen_spacecraft_solar_distance	Distance from the spacecraft to the center of the sun at the reference time.	geogen_spacecraft_solar_distance > 207353078.5
geogen_spacecraft_altitude	Distance from the spacecraft to the sub-spacecraft point on the target body at the reference time.	geogen_spacecraft_altitude < 326
geogen_target_center_distance	Distance from the spacecraft to the center of the target body at the reference time.	geogen_target_center_distance < 1334
geogen_sub_spacecraft_latitude	Latitude of the sub-spacecraft point on the target body at the reference time.	geogen_sub_spacecraft_latitude > -73.40
geogen_sub_spacecraft_longitude	Longitude of the sub-	geogen_sub_spacecraft_longitude < -104.53

	spacecraft point on the target body at the reference time. Solar zenith angle at the sub-spacecraft point on the target body surface at the reference time.	
geogen_sub_spacecraft_solar_zenith_angle	The solar zenith angle is the angle subtended between the direction towards the Sun and the local normal at the surface.	geogen_sub_spacecraft_solar_zenith_angle < 29.5
geogen_target_right_ascension	Right ascension of the position vector of the target body center as seen from the spacecraft in the Earth mean equator and equinox frame (J2000).	geogen_target_right_ascension < 0.0602
geogen_target_declination	Declination of the position vector of the target body center as seen from the spacecraft in the Earth mean equator and equinox frame (J2000).	geogen_target_declination < -17.0544
geogen_sun_right_ascension	Right ascension of the position vector of the Sun as seen from the spacecraft in the Earth mean equator and equinox frame (J2000).	geogen_sun_right_ascension > 21.0951
geogen_sun_declination	Declination of the position vector of the Sun as seen from the spacecraft in the Earth mean equator and equinox frame	geogen_sun_declination < 19

	(J2000).	
geogen_x_sc_sun_position	X component of the position vector from spacecraft to Sun, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_x_sc_sun_position < -20802868
geogen_y_sc_sun_position	Y component of the position vector from spacecraft to Sun, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_y_sc_sun_position > -214032850
geogen_z_sc_sun_position	Z component of the position vector from spacecraft to Sun, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_z_sc_sun_position < -77268319
geogen_x_sc_sun_velocity	X component of the velocity vector of Sun relative to the spacecraft, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_x_sc_sun_velocity < -27.5
geogen_y_sc_sun_velocity	Y component of the velocity vector of Sun relative to the spacecraft, expressed in J2000 coordinates,	geogen_y_sc_sun_velocity > -23.1

	and corrected for light time and stellar aberration, evaluated at the reference time.	
geogen_z_sc_sun_velocity	Z component of the velocity vector of Sun relative to the spacecraft, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_z_sc_sun_velocity > -13.4
geogen_x_sc_target_position	X component of the position vector from the spacecraft to target body center, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_x_sc_target_position < -3091.489
geogen_y_sc_target_position	Y component of the position vector from the spacecraft to target body center expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_y_sc_target_position < -1734.5
geogen_z_sc_target_position	Z component of the position vector from the spacecraft to target body center expressed in J2000 coordinates, and corrected for light time and stellar aberration,	geogen_z_sc_target_position > -745.7

	evaluated at the reference time.	
geogen_x_sc_target_velocity	X component of the velocity vector of the target body center relative to the spacecraft, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_x_sc_target_velocity > 1.01
geogen_y_sc_target_velocity	Y component of the velocity vector of the target body center relative to the spacecraft, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_y_sc_target_velocity > -2.35
geogen_z_sc_target_velocity	Z component of the velocity vector of the target body center relative to the spacecraft, expressed in J2000 coordinates, and corrected for light time and stellar aberration, evaluated at the reference time.	geogen_z_sc_target_velocity < -3.36
geogen_min_incidence_angle	Minimum incidence angle. The incidence angle is the angle between the local vertical at a given surface point and the vector from the surface point to	geogen_min_incidence_angle BETWEEN 1.6275 and 5.6275

	the sun.	
geogen_max_incidence_angle	Maximum incidence angle. The incidence angle is the angle between the local vertical at a given surface point and the vector from that the surface point to the sun.	geogen_max_incidence_angle BETWEEN 3.5575 and 7.2354
geogen_min_emission_angle	Minimum emission angle. The emission angle is the angle between the surface normal at a given surface point and the vector from the surface point to the spacecraft.	geogen_min_emission_angle > 3.23
geogen_max_emission_angle	Maximum emission angle. The emission angle is the angle between the surface normal at a given surface point and the vector from the surface point to the spacecraft.	geogen_max_emission_angle < 15.58
geogen_min_phase_angle	Minimum phase angle. The phase angle is the angle between the vectors from the surface point to the spacecraft and from the surface point to the Sun.	geogen_min_phase_angle > 0.0827
geogen_max_phase_angle	Maximum phase angle. The phase angle is the angle between the vectors from the surface point to the spacecraft	geogen_max_phase_angle < 3.5121

	and from the surface point to the Sun.	
geogen_min_slant_distance	Minimum slant distance. The slant distance is the distance from the spacecraft to the nearest point on the detector line-of-sight to the target body surface.	geogen_min_slant_distance < 298.7
geogen_max_slant_distance	Maximum slant distance. The slant distance is the distance from the spacecraft to the nearest point on the detector line-of-sight to the target body surface.	geogen_max_slant_distance > 493.1
geogen_min_tangent_altitude	Minimum tangent altitude. The tangent altitude is the distance from the target body surface nearest point to the detector line-of-sight.	geogen_min_tangent_altitude < 5.174
geogen_max_tangent_altitude	Maximum tangent altitude. The tangent altitude is the distance from the target body surface nearest point to the detector line-of-sight.	geogen_max_tangent_altitude < 113.8
geogen_boresight_right_ascension	Right ascension of the detector boresight vector, in the Earth mean equator and equinox frame (J2000), at the reference time.	geogen_boresight_right_ascension < 41.4073
geogen_boresight_declination	Declination of the detector	geogen_boresight_declination < -39.2410

	boresight vector, in the Earth mean equator and equinox frame (J2000), at the reference time.	
geogen_boresight_target_angle	The separation angle between the detector line-of-sight (boresight) and the target body center as seen from the spacecraft, at the reference time.	geogen_boresight_target_angle > 2.9
geogen_boresight_solar_elongation	Separation angle between the detector line-of-sight and the position vector of the Sun as seen from the spacecraft, at the reference time.	geogen_boresight_solar_elongation < 97.07

Mission specific CQL Parameters

ROSETTA

instrument_mode_id

instrument_mode_id = 'HIS'

mission_phase_name

mission_phase_name = 'STEINS FLY-BY'

sc_sun_position_vector

sc_sun_position_vector_x > 110872140

sc_sun_position_vector_y > 267917580

sc_sun_position_vector_z > 131121700

sc_target_position_vector

sc_target_position_vector_x > -817927.13

sc_target_position_vector_y > -549707.76

sc_target_position_vector_z > -85231.949

sc_target_velocity_vector

sc_target_velocity_vector_x > 7.1284906
sc_target_velocity_vector_y > 4.7832867
sc_target_velocity_vector_z > 0.73860746

target_center_distance
target_center_distance > 19177175.213011

sub_spacecraft_latitude
sub_spacecraft_latitude > 27.479987

sub_spacecraft_longitude
sub_spacecraft_longitude > 260.61168

solar_elongation
solar_elongation > 147.98474

EM16

solar_longitude
solar_longitude = 16.544

spacecraft_heliocentric_distance
spacecraft_heliocentric_distance = 1.479

solar_elongation
solar_elongation = 112.286

subsolar_longitude
subsolar_longitude = 115.76

subsolar_latitude
subsolar_latitude = 66.543

cassis_off_nadir_angle
cassis_off_nadir_angle = 7.865

phase_angle_filter
phase_angle_filter = 70.136

incidence_angle_filter

incidence_angle_filter = 67.378

emission_angle_filter
emission_angle_filter = 9.133

sub_cassis_longitude
sub_cassis_longitude = 27.64

sub_cassis_latitude
sub_cassis_latitude = -34.097

filter
filter = 'PAN'

12. ANNEX C - PSA TECHNOLOGIES

The PSA relies on a new user interface (UI) implemented using Vaadin technologies, which is an open-source web framework for rich internet applications (RIA) based on GWT and Java.