

# PSA User Guide 5.6

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## CHANGE LOG

Reason for change	Issue	Revision	Date
Update CQL Section	1	0	21/03/2017
Update Product identifier	2	0	04/05/2017
Update Subinstruments	3	0	04/05/2017
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
Updates in User Interface	9	0	29/11/2017
Milliseconds removal	10	0	14/12/2017
Milliseconds inclusion	11	0	08/01/2018
EPN-TAP service	12	0	06/02/2018
Add Image View section	13	0	09/03/2018

Fix issues and update outdated information	14	0	10/04/2018
Merging 8.1 and 8.2 sections	15	0	24/05/2018
Fix some CQL parameters format	16	0	24/05/2018
Replace screenshots and edit table/image view descriptions	17	0	05/06/2018
Change download button functionality description, add Download View description.	18	0	11/09/2018
Added reason why OMEGA EXT6 release 7 is missing in section 6.1	19	0	22/10/2018
Including CDF Sparta format	20	0	29/11/2018
Including more CQL Examples	21	0	30/11/2018

## CHANGE RECORD

Reason for change	Issue	Date	Pages	Paragraph(s)
Update CQL Section	1	21/03/2017	page 15, Annex A	
Update Product identifier	2	04/05/2017	page 23, 3.3	Removing “except

			section, Table headers & columns subsection	<i>product identifier</i>
Update Subinstruments	3	04/05/2017	page 13, 3.2.1 section, Instruments subsection	Adding “This is applicable to ExoMars 2016, <i>Rosetta</i> , <i>Mars Express</i> and <i>Venus Express</i> .”
Update Annex A	4	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	05/05/2017	pages 32,33,35	Changing friendly names by original names in the URLs
Fix typos and formatting	6	09/05/2017	All document	Corrected typos and formatting throughout the document
Update Browsing optimization	7	10/05/2017	page 8	Adding the following text: <i>It is important to mention that the user interface is optimized for Chrome, Firefox and Safari browsers.</i>
Use friendly names in CQL fields	8	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	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	14/12/2017	pages 14,15,23,27	Milliseconds have been removed temporarily
Milliseconds inclusion	11	08/01/2018	pages 13, 15, 16, 20 - 22, 24 - 28	Adding milliseconds stuff
EPN-TAP service	12	06/02/2018	pages 45 - 57	EPN-TAP service usage notes
Add Image View section	13	09/03/2018	pages 30 - 33	Create a new section which describes the Image View
Fix issues and update outdated information	14	10/04/2018	pages 11-14, 17-19, 34, 35, 68	
Merging 8.1 and 8.2 sections	15	24/05/2018	pages 67-68	Merging 8.1 and 8.2 sections
Fix some CQL params format	16	24/05/2018		Some CQL params are out of format
Replace screenshots and edit table/image view descriptions	17	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
Change download button functionality description, add Download View description.	18	11/09/2018	pages 27-28, 37	Add descriptions and screenshots of the new downloading functionality and download manager.
Added reason why OMEGA EXT6 release 7 is missing in section 6.1	19	22/10/2018	page 62	Added text explaining OMEGA data pipeline issue leading to lack of release 7.
Including CDF Sparta format	20	29/11/2018	pages 38,39	Add a description and snapshot about CDF Sparta configuration in the Data Download manager
Including more CQL Examples	21	30/11/2018	page 20,22,23	Added the CQL Rosetta, EM16 parameters and ILIKE and NULL operators

## Table of Contents

<b>1 What is the PSA</b>	<b>7</b>
1.1 Goals and history of the PSA	7
1.2 Missions and objects of the Solar System available in the PSA	7
<b>2 Users of the PSA</b>	<b>8</b>
2.1 Anonymous user	8
2.2 Registered user	8
2.3 Registered and Privileged user	9
2.4 Login procedure	9
<b>3 User Interface</b>	<b>10</b>
3.1 Home View	10
3.2 Filter Menu	13
3.3 Table View	24
3.3.1 Product Detail	29
3.4 Image View	32
3.4.1 Product Detail	35
3.5 Connections between Table and Image View	35
3.6 Download View	37
<b>4 FTP Interface</b>	<b>37</b>
<b>5 Machine Access Interfaces</b>	<b>38</b>
5.1 PDAP	39
5.2 EPN-TAP	50
<b>6 Documentation and Additional Information</b>	<b>60</b>
6.1 Mission specific information	60
6.2 PSA documentation and information	62
<b>7 PDS3 and PDS4 format</b>	<b>62</b>
7.1 PDS3 format	62
7.2 The new PDS4 format	64
<b>8 Versions of the PSA</b>	<b>67</b>
<b>9 Contact</b>	<b>67</b>
<b>10 ANNEX A</b>	<b>68</b>

## 1 WHAT IS THE PSA

### 1.1 Goals and history of the PSA

The need for ESA to establish a science data archive for planetary exploration missions stemmed from 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 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 and judging its value for today, but also ensuring that it will still be useful to scientists several years from now. To do this, the PSA needs to be much more than a physical data store. The PSA is in fact the entire initiative, the set-up, the process and the implementation 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, and Rosetta) 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 PSA now playing a major role in the definition of archiving processes and standards with our international partners.

### 1.2 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
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 is the case for Hubble and a few ground based observations. The PSA does not contain the entire archive of Hubble relevant for planetary science.

## 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 datasets. This is the case for the ExoMars 2016 proprietary period data products which are not accessible to the public and therefore cannot be downloaded under the anonymous user option. Privileged users are managed by the PSA team. If you belong to a science instrument and would need privileged access to the data, the PSA team will only modify your privilege with a written notification from the Principal Investigator of the instrument.

## 2.4 Login procedure



When accessing the PSA website, the user is anonymous by default. If the user has a LDAP account (ESA credential access database), they can log into the system using the same credentials. To log-in the system, follow the steps below:

- Click on the **SIGN IN** icon text in the upper right.
- Introduce the credentials (user and password) and click on  icon:




*Login credentials popup*

The login popup has the following components:

- **USER** : LDAP Username
- **PASSWORD** : LDAP Password
-  : Submit credentials
-  : Erase credentials textboxes
- **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**

To log-out from the system:

- Click on your username label in the upper right.
- Click on the  **SIGN OUT** icon. You will see this message: **Thanks *username* for visiting PSA website. Goodbye!**

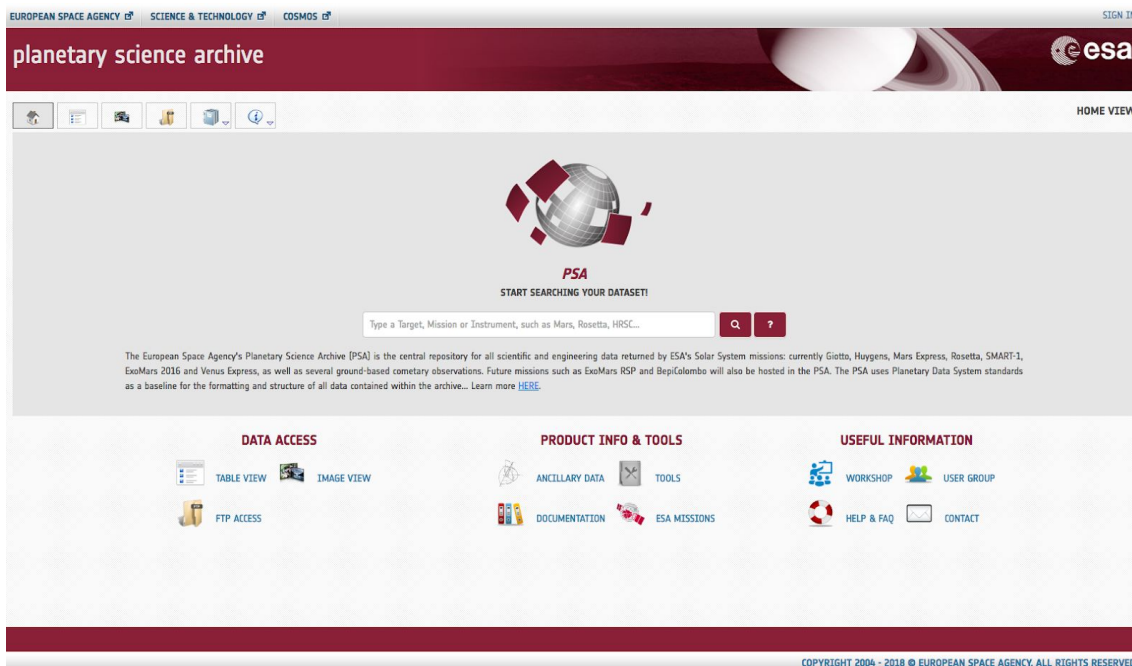
### 3 USER INTERFACE

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. The UI offers the user several ways to access the data of all of ESA's planetary missions such as a quick access, advanced filtering to get the information through a table list, ftp, and so on. The UI can be accessed through <http://psa.esa.int/psa> url.

It is important to mention that the user interface is optimized for Chrome, Firefox and Safari browsers.

#### 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:



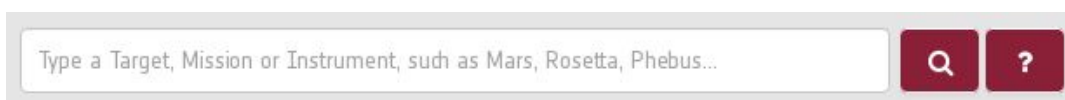
*Home View*

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 is a powerful and useful tool 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 on 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 [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 FTP: <ftp://psa.esac.esa.int/pub/mirror>
-  : Product Info & Tools, if clicked, this popup will be shown:













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



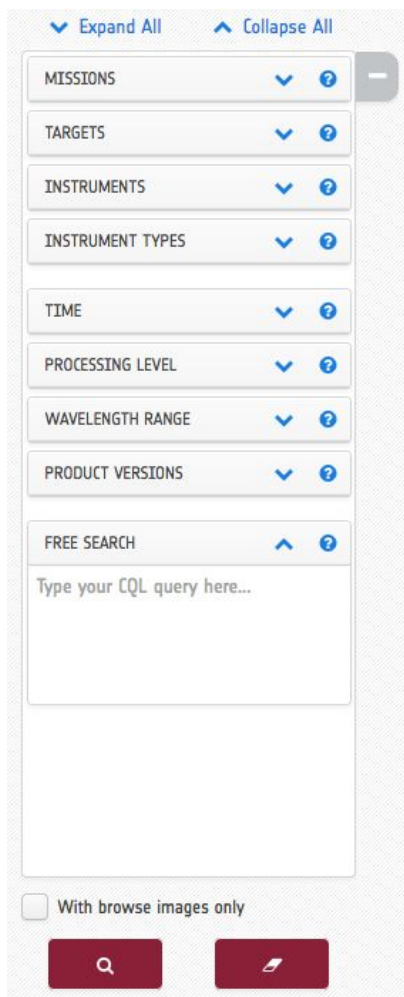
At the bottom, there are the following accesses which repeat the ones described above but are only accessible through the home page:

-  **TABLE VIEW** : A link to the Table View

-  **IMAGE VIEW** : A link to the Image View
-  **FTP ACCESS** : A link to <ftp://psa.esac.esa.int/pub/mirror>
-  **ANCILLARY DATA** : A link to <http://www.cosmos.esa.int/web/psa/ancillary-data>
-  **TOOLS** : A link to <http://www.cosmos.esa.int/web/psa/tools>
-  **DOCUMENTATION** : A link to <http://www.cosmos.esa.int/web/psa/documentation>
-  **ESA MISSIONS** : A link to <http://www.cosmos.esa.int/web/psa/missions>
-  **WORKSHOP** : A link to <http://www.cosmos.esa.int/web/psa/workshops>
-  **USER GROUP** : A link to <http://www.cosmos.esa.int/web/psa/psa-user-group>
-  **HELP & FAQ** : A link to <http://www.cosmos.esa.int/web/psa/faq>
-  **CONTACT** : A link to <http://www.cosmos.esa.int/web/psa/contact-us>










## 3.2 Filter Menu

The UI relies on a filter menu component where the user can launch queries to the system.



*Filter Menu Boxes*

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 get help and extra information of a specific filter menu box
- With browse images only : To show only products that have existing browse images
-  : To search for products
-  : To erase the filter menu selection

The behavior 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.

### 3.2.1 Search Parameters

#### Missions

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. This is applicable for ExoMars 2016 and Rosetta that have both an orbiter and a lander. It is also applicable to the ground-based data where you can select a specific observatory.

Clicking on a mission that has various host instruments 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.

## **Targets**

The target filter offers the possibility to query the PSA for all products belonging to 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**

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. This is applicable to ExoMars 2016, Rosetta, Mars Express and Venus Express.

When you click on an instrument the missions, targets, and instrument types will only list the applicable values for this instrument.

## **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 resampling is applied, thus edited or raw data can be used to reconstruct calibrated data.
- **Level 4 – Derived:** Data that have been resampled 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 resampled.
- **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 - 5um
Infrared (IR)	5um - 300um
Submillimeter (SUBMM)	300um - 1mm
Microwave (Micro)	1mm - 1m
Radio	1m - 300 000Km

## Product versions

This filter in the filter menu is to help selecting the versioning of the products. 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'.

Product versions has two selections of which only one can be selected at a time:

- All product versions
- Last product versions

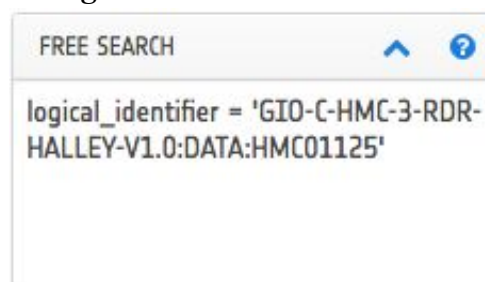
By default “Last product versions” is always selected to retrieve only the latest versions of the products. When the user switches to “All product versions”, all versions will be displayed.

## CQL Free Search

This section is intended to facilitate the User in using the Free Search Box provided in the PSA (See [Free Search Box](#) figure), alone or in conjunction with the other search parameters in the Filter Menu.

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*

For more info on the CQL Standard please refer to <http://www.loc.gov/standards/sru/cql/>  
<http://zing.z3950.org/cql/intro.html>

## 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'
```

### COMPARISON OPERATORS

The full list of comparison operators is =, <>, >, >=, <, <= (i.e. equal, not equal, greater than, greater than or equal to, less than, less than or equal to).

Example:

*start\_date\_time > '2016-12-01'*

### LIKE OPERATOR

More general text comparisons can be made using the **LIKE** operator. (case sensitive)

Example:

*instrument\_name LIKE '%LANDER%'*  
*instrument\_name LIKE '%ANCDR%'*

### ILIKE OPERATOR

More general text comparisons can be made using the **ILIKE** operator (case insensitive)

Example:

*instrument\_name ILIKE '%LaNDeR%'*

### NULL OPERATOR

Null comparisons can be made using the **NULL** operator. NOTE: Null does not mean empty, as the empty is a value itself, defined by “”.

Example:

*instrument\_name is NULL*

**Note:** CQL also allows the use of a wildcard (%) which matches any sequence of zero or more characters, so that, for instance, c%t will match any of the words cat, coat, crypt and counterargument.

### LOGICAL OPERATORS:

We also give the possibility to use LOGICAL OPERATORS such as **AND, OR, BETWEEN**.

Example:

*product\_class = 'Product\_Observational' AND instrument\_name = 'ACS'*

## **Queryable Parameters**

The following list of parameters can be used to query the PSA Database. Like operator will be less performant with respect to the “=”.

In Annex A, a complete list of allowed values is provided.

### **logical\_identifier**

*logical\_identifier = 'GIO-C-HMC-3-RDR-HALLEY-V1.0:DATA:HMC01125'*

**bundle\_logical\_identifier**

bundle\_logical\_identifier = 'MEX-M-OMEGA-2-EDR-FLIGHT-EXT2-V1.0'

**target\_name**

target\_name='Mars'

**target\_type**

target\_type='COMET'

**title**

title like '%RPCLAP%'

title like '%NOMAD%'

**version\_id**

version\_id = '1.0'

**product\_class**

product\_class = 'Product\_Observational'

product\_class like '%PDS3%'

**start\_date\_time**

start\_date\_time > '2016-12-01'

start\_date\_time < '2015-05-04 12:05:01.125'

**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'

**proprietary\_end\_date**

proprietary\_end\_date > '2016-12-19' and mission\_name <> 'ExoMars 2016'

**purpose**

purpose = 'Engineering'

**processing\_level**

processing\_level = '3'

processing\_level = '5'

processing\_level = 'Raw'

processing\_level = 'Partially Processed'

**bundle\_title**

bundle\_title = 'MEX-M-HRSC-3-RDR-V3.0'

*NOTE: For a complete list of Dataset names please visit the FTP (Section 4).*

**bundle\_version\_id**

bundle\_title = 'MEX-M-HRSC-3-RDR-V3.0' and bundle\_version\_id = '50.0'

**bundle\_publication\_date**

bundle\_publication\_date BETWEEN '2016-11-01' AND '2016-11-30' and mission\_name = 'Rosetta'

**bundle\_description**

bundle\_description LIKE '%MAPPROJECTED%'

**instrument\_type**

instrument\_type = 'CCD CAMERA'

**instrument\_name**

instrument\_name = 'OSIRIS'

**instrument\_host\_name**

instrument\_host\_name = 'Lander' AND mission\_name <> 'ExoMars 2016'

**mission\_name**

mission\_name = 'ExoMars 2016'

**postcard\_path**

postcard\_path LIKE '%'

**subinstrument\_name**

subinstrument\_name = 'DOSIMETRY'

subinstrument\_name LIKE '%'

***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'

### 3.2.2 How does the Filter menu work?

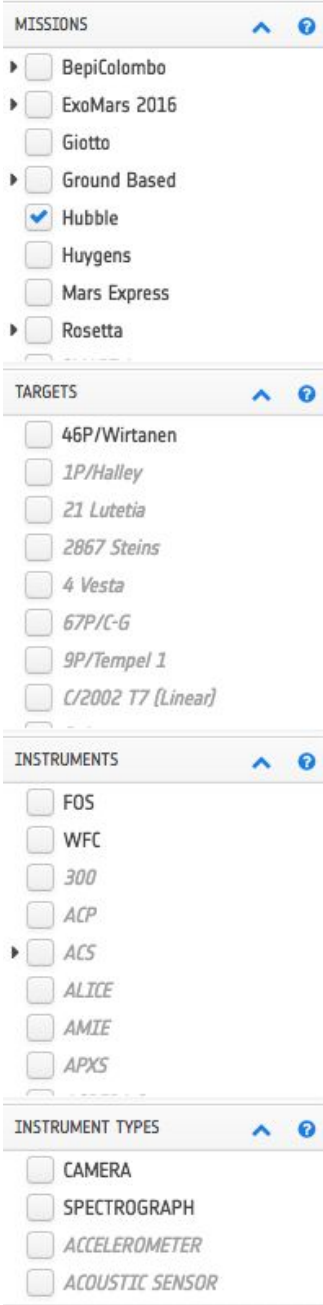
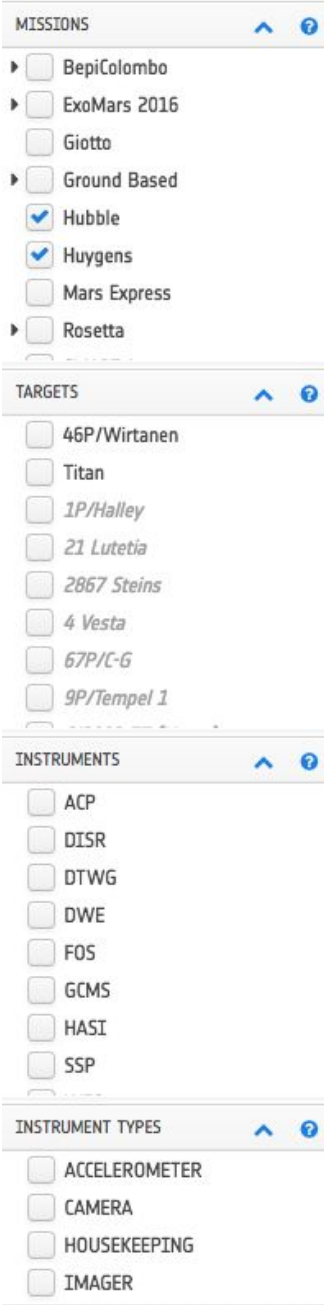
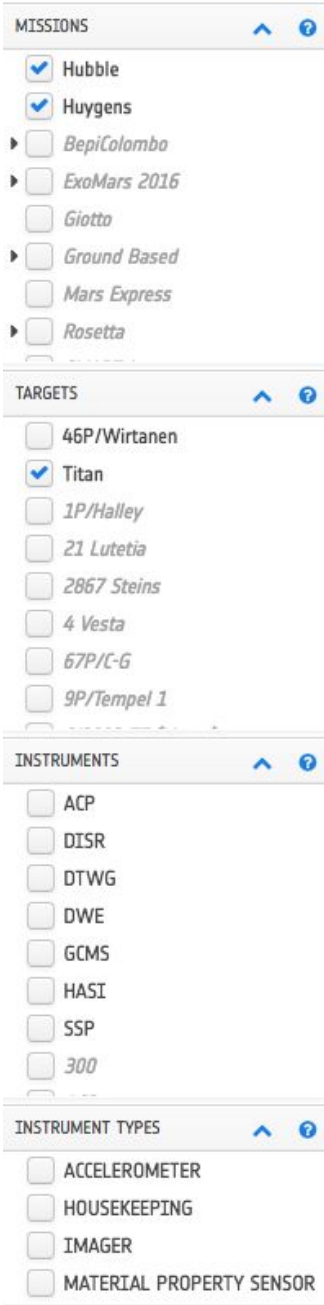
The filter menu is designed to guide the user among the feasible options which the PSA offers with regards to missions, instrument hosts, targets, instruments and sub instruments, and instrument types (the first 4 boxes).

Below are a few scenarios which describe the behaviour of the filter menu:

<p>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</p>	<p>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 options will be displayed in gray.</p>	<p>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.</p>
--	--	---

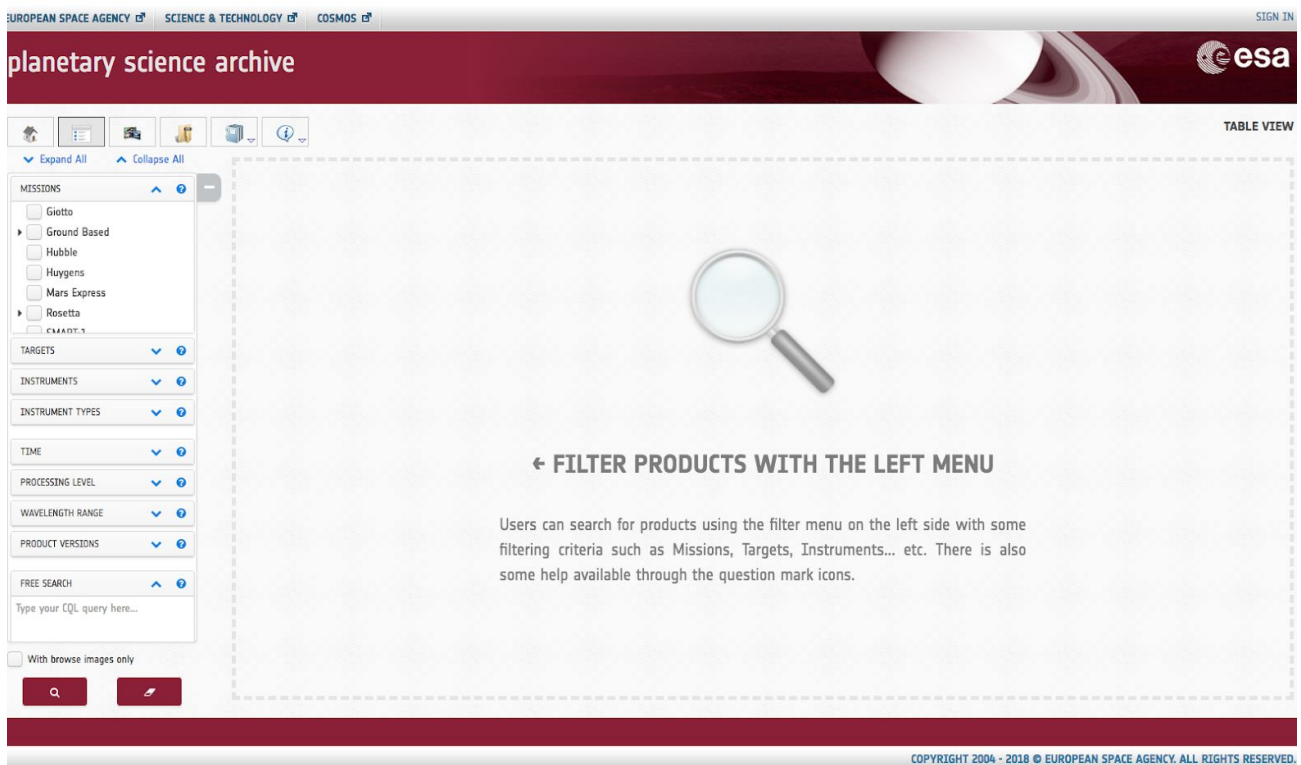


MISSIONS	TARGETS	INSTRUMENTS	INSTRUMENT TYPES
<input type="checkbox"/> BepiColombo <input type="checkbox"/> ExoMars 2016 <input type="checkbox"/> Giotto <input type="checkbox"/> Ground Based <input type="checkbox"/> Hubble <input type="checkbox"/> Huygens <input type="checkbox"/> Mars Express <input type="checkbox"/> Rosetta	<input type="checkbox"/> 21 Lutetia <input type="checkbox"/> 2867 Steins <input type="checkbox"/> 4 Vesta <input type="checkbox"/> 46P/Wirtanen <input type="checkbox"/> 67P/C-G <input type="checkbox"/> 9P/Tempel 1 <input type="checkbox"/> C/2002 T7 (Linear) <input type="checkbox"/> Deimos	<input type="checkbox"/> 300 <input type="checkbox"/> ACP <input type="checkbox"/> ACS <input type="checkbox"/> ALICE <input type="checkbox"/> AMIE <input type="checkbox"/> APXS <input type="checkbox"/> ASPERA-3 <input type="checkbox"/> ASPERA-4	<input type="checkbox"/> ACCELEROMETER <input type="checkbox"/> ACOUSTIC SENSOR <input type="checkbox"/> CAMERA <input type="checkbox"/> CCD
<input type="checkbox"/> BepiColombo <input type="checkbox"/> ExoMars 2016 <input type="checkbox"/> Giotto <input type="checkbox"/> Ground Based <input type="checkbox"/> Hubble <input type="checkbox"/> Huygens <input checked="" type="checkbox"/> Mars Express <input type="checkbox"/> Rosetta	<input type="checkbox"/> Deimos <input type="checkbox"/> Earth <input type="checkbox"/> Mars <input type="checkbox"/> Phobos <input type="checkbox"/> Sky <input type="checkbox"/> Solar Wind <input type="checkbox"/> Sun <input type="checkbox"/> 1P/Halley <input type="checkbox"/> 21 Lutetia	<input type="checkbox"/> ASPERA-3 <input type="checkbox"/> HRSC <input type="checkbox"/> MARSIS <input type="checkbox"/> MaRS <input type="checkbox"/> OMEGA <input type="checkbox"/> PFS <input type="checkbox"/> SPICAM <input type="checkbox"/> 300 <input type="checkbox"/> ACP	<input type="checkbox"/> CCD CAMERA <input type="checkbox"/> ELECTRON SPECTROMETER <input type="checkbox"/> IMAGING SPECTROMETER <input type="checkbox"/> INFRARED INTERFEROMETER
<input checked="" type="checkbox"/> Mars Express <input type="checkbox"/> BepiColombo <input type="checkbox"/> ExoMars 2016 <input type="checkbox"/> Giotto <input type="checkbox"/> Ground Based <input type="checkbox"/> Hubble <input type="checkbox"/> Huygens <input type="checkbox"/> Rosetta	<input type="checkbox"/> Deimos <input type="checkbox"/> Mars <input type="checkbox"/> Phobos <input type="checkbox"/> 1P/Halley <input type="checkbox"/> 21 Lutetia <input type="checkbox"/> 2867 Steins <input type="checkbox"/> 4 Vesta <input type="checkbox"/> 46P/Wirtanen	<input type="checkbox"/> ASPERA-3 <input checked="" type="checkbox"/> HRSC <input type="checkbox"/> MARSIS <input type="checkbox"/> MaRS <input type="checkbox"/> OMEGA <input type="checkbox"/> PFS <input type="checkbox"/> SPICAM <input type="checkbox"/> 300	<input type="checkbox"/> CCD CAMERA <input type="checkbox"/> ACCELEROMETER <input type="checkbox"/> ACOUSTIC SENSOR <input type="checkbox"/> CAMERA

<p>1) User clicks on Hubble</p>	<p>2) Afterwards clicks on another mission, Huygens for instance</p>	<p>3) As you can see, targets, instruments/sub instruments and instrument types from Huygens mission have also been highlighted and sorted to the top.</p>
 <p>MISSIONS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> BepiColombo</li> <li><input type="checkbox"/> ExoMars 2016</li> <li><input type="checkbox"/> Giotto</li> <li><input type="checkbox"/> Ground Based</li> <li><input checked="" type="checkbox"/> Hubble</li> <li><input type="checkbox"/> Huygens</li> <li><input type="checkbox"/> Mars Express</li> <li><input type="checkbox"/> Rosetta</li> </ul> <p>TARGETS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 46P/Wirtanen</li> <li><input type="checkbox"/> 1P/Halley</li> <li><input type="checkbox"/> 21 Lutetia</li> <li><input type="checkbox"/> 2867 Steins</li> <li><input type="checkbox"/> 4 Vesta</li> <li><input type="checkbox"/> 67P/C-G</li> <li><input type="checkbox"/> 9P/Tempel 1</li> <li><input type="checkbox"/> C/2002 T7 (Linear)</li> </ul> <p>INSTRUMENTS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> FOS</li> <li><input type="checkbox"/> WFC</li> <li><input type="checkbox"/> 300</li> <li><input type="checkbox"/> ACP</li> <li><input type="checkbox"/> ACS</li> <li><input type="checkbox"/> ALICE</li> <li><input type="checkbox"/> AMIE</li> <li><input type="checkbox"/> APXS</li> </ul> <p>INSTRUMENT TYPES</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> CAMERA</li> <li><input type="checkbox"/> SPECTROGRAPH</li> <li><input type="checkbox"/> ACCELEROMETER</li> <li><input type="checkbox"/> ACOUSTIC SENSOR</li> </ul>	 <p>MISSIONS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> BepiColombo</li> <li><input type="checkbox"/> ExoMars 2016</li> <li><input type="checkbox"/> Giotto</li> <li><input type="checkbox"/> Ground Based</li> <li><input checked="" type="checkbox"/> Hubble</li> <li><input checked="" type="checkbox"/> Huygens</li> <li><input type="checkbox"/> Mars Express</li> <li><input type="checkbox"/> Rosetta</li> </ul> <p>TARGETS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 46P/Wirtanen</li> <li><input type="checkbox"/> Titan</li> <li><input type="checkbox"/> 1P/Halley</li> <li><input type="checkbox"/> 21 Lutetia</li> <li><input type="checkbox"/> 2867 Steins</li> <li><input type="checkbox"/> 4 Vesta</li> <li><input type="checkbox"/> 67P/C-G</li> <li><input type="checkbox"/> 9P/Tempel 1</li> </ul> <p>INSTRUMENTS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ACP</li> <li><input type="checkbox"/> DISR</li> <li><input type="checkbox"/> DTWG</li> <li><input type="checkbox"/> DWE</li> <li><input type="checkbox"/> FOS</li> <li><input type="checkbox"/> GCMS</li> <li><input type="checkbox"/> HASI</li> <li><input type="checkbox"/> SSP</li> </ul> <p>INSTRUMENT TYPES</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ACCELEROMETER</li> <li><input type="checkbox"/> CAMERA</li> <li><input type="checkbox"/> HOUSEKEEPING</li> <li><input type="checkbox"/> IMAGER</li> </ul>	 <p>MISSIONS</p> <ul style="list-style-type: none"> <li><input checked="" type="checkbox"/> Hubble</li> <li><input checked="" type="checkbox"/> Huygens</li> <li><input type="checkbox"/> BepiColombo</li> <li><input type="checkbox"/> ExoMars 2016</li> <li><input type="checkbox"/> Giotto</li> <li><input type="checkbox"/> Ground Based</li> <li><input type="checkbox"/> Mars Express</li> <li><input type="checkbox"/> Rosetta</li> </ul> <p>TARGETS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> 46P/Wirtanen</li> <li><input checked="" type="checkbox"/> Titan</li> <li><input type="checkbox"/> 1P/Halley</li> <li><input type="checkbox"/> 21 Lutetia</li> <li><input type="checkbox"/> 2867 Steins</li> <li><input type="checkbox"/> 4 Vesta</li> <li><input type="checkbox"/> 67P/C-G</li> <li><input type="checkbox"/> 9P/Tempel 1</li> </ul> <p>INSTRUMENTS</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ACP</li> <li><input type="checkbox"/> DISR</li> <li><input type="checkbox"/> DTWG</li> <li><input type="checkbox"/> DWE</li> <li><input type="checkbox"/> GCMS</li> <li><input type="checkbox"/> HASI</li> <li><input type="checkbox"/> SSP</li> <li><input type="checkbox"/> 300</li> </ul> <p>INSTRUMENT TYPES</p> <ul style="list-style-type: none"> <li><input type="checkbox"/> ACCELEROMETER</li> <li><input type="checkbox"/> HOUSEKEEPING</li> <li><input type="checkbox"/> IMAGER</li> <li><input type="checkbox"/> MATERIAL PROPERTY SENSOR</li> </ul>


### 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:

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## planetary science archive

TABLE VIEW

Filter by string in the current page

Number of selected products: 0

Postcard	Product Identifier	Observation Start Time	Observation Stop Time	Target	Mission	Instrument	Processing Level
	H6468_0000_6R3.IMG	2016-12-31 20:56:13.660	2016-12-31 20:59:22.648	Mars	Mars Express	HRSC	3
	H6468_0000_ND3.IMG	2016-12-31 20:55:51.669	2016-12-31 20:59:01.666	Mars	Mars Express	HRSC	3
	H6468_0000_BI3.IMG	2016-12-31 20:55:29.672	2016-12-31 20:58:39.664	Mars	Mars Express	HRSC	3
	H6467_0000_S13.IMG	2016-12-31 09:58:43.964	2016-12-31 10:12:06.298	Mars	Mars Express	HRSC	3
	H6467_0000_IR3.IMG	2016-12-31 09:57:53.111	2016-12-31 10:11:53.017	Mars	Mars Express	HRSC	3
	H6467_0000_P13.IMG	2016-12-31 09:56:57.800	2016-12-31 10:11:38.563	Mars	Mars Express	HRSC	3
	H6467_0000_6R3.IMG	2016-12-31 09:53:44.843	2016-12-31 10:10:53.882	Mars	Mars Express	HRSC	3
	H6467_0000_ND3.IMG	2016-12-31 09:52:19.008	2016-12-31 10:10:37.017	Mars	Mars Express	HRSC	3
	H6467_0000_BI3.IMG	2016-12-31 09:50:37.951	2016-12-31 10:10:19.020	Mars	Mars Express	HRSC	3
	H6467_0000_P23.IMG	2016-12-31 09:42:28.691	2016-12-31 10:09:20.281	Mars	Mars Express	HRSC	3
	H6467_0000_RE3.IMG	2016-12-31 09:36:20.347	2016-12-31 10:08:56.178	Mars	Mars Express	HRSC	3
	H6467_0000_S23.IMG	2016-12-31 09:30:13.734	2016-12-31 10:08:29.584	Mars	Mars Express	HRSC	3
	H6465_0000_S13.IMG	2016-12-30 19:59:11.292	2016-12-30 20:12:10.680	Mars	Mars Express	HRSC	3
	H6465_0000_IR3.IMG	2016-12-30 19:58:21.409	2016-12-30 20:11:56.425	Mars	Mars Express	HRSC	3
	H6465_0000_P13.IMG	2016-12-30 19:57:26.207	2016-12-30 20:11:41.775	Mars	Mars Express	HRSC	3

Page: 1 18 >> Items/page: 5000 Displaying 1 - 5000 of 89314

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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:

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## planetary science archive

TABLE VIEW

NO DATA FOUND WITH THIS CRITERIA

This QUERY consists of an AND clause between the combination of the selected filters and, unfortunately, there is no available data for this request. Please feel free to modify your query and click the search button.

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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 Popup](#) section)
- 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)
- 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)








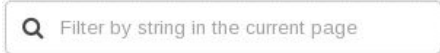

The column headers have a couple of features if they are clicked on:

- Drag & Drop: The table columns are draggable.
- Sorting: The table is sorted (ascending or descending, depending on the ▼ / ▲ icons) 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 5000.
-  : 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

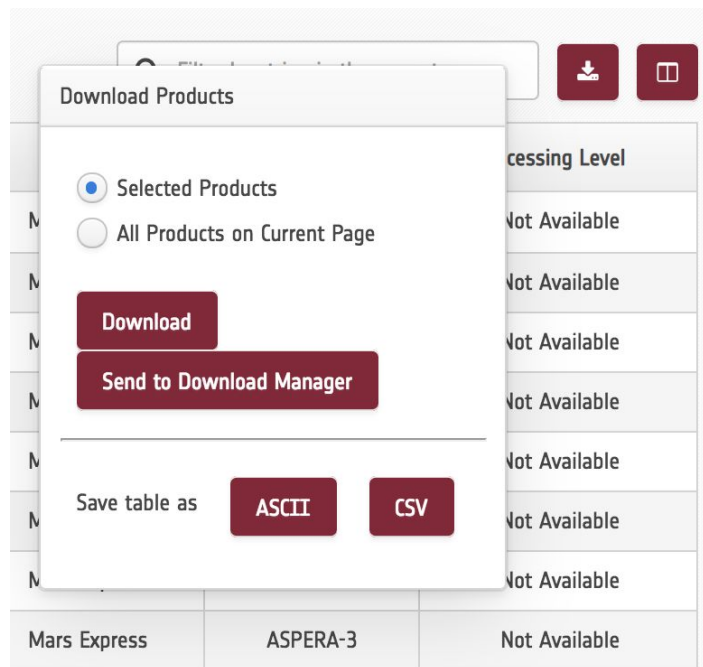
- Postcard
- Dataset Identifier
- Observation Start Time
- Observation Stop Time
- Target
- Mission
- Instrument
- Processing Level
- Instrument Host
- Instrument Type
- Sub Instrument
- Version
- Release
- Product Title

All     None

-  : To select all the columns/checkboxes
-  : To unselect all the column/checkboxes

*Column Selector*

-  : 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*

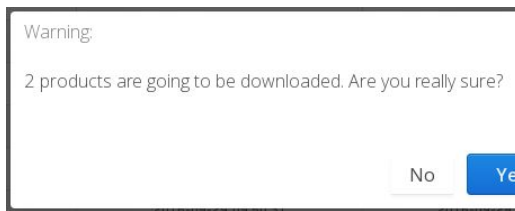
The popup allows the user to choose if they want to select for download only selected products or all the products in the current page. It is possible to download the products right away (after which the user has to choose if they want it in a .zip or .tar.gz format) or send them to the Download Manager 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.

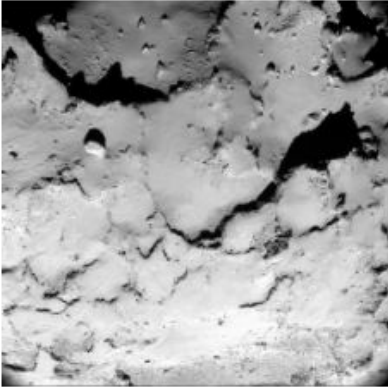
**Note:** Currently there is a maximum limit of *5000 products* when downloading a group of products.

### ***3.3.1 Product Detail***

When clicking on a specific product identifier, e.g. [ROS\\_CAM1\\_20160930T005910](#), 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:



ROS\_CAM1\_20160930T005910
✕



Summary
Geometry
Products
Documents

Product Identifier	ROS_CAM1_20160930T005910
Dataset Identifier	RO-C-NAVCAM-2-EXT3-MTP0...
Start Time	2016-09-30 00:59:09.011
Stop Time	2016-09-30 00:59:12.121
Target	67P/C-G
Mission	Rosetta
Instrument	NAVCAM
Processing Level	2
Instrument Host	Orbiter
Instrument Type	CCD CAMERA
Sub Instrument	Not Available
Version	1.1
Product Title	ROS_CAM1_20160930T005910

See Label File

*Product detail popup*

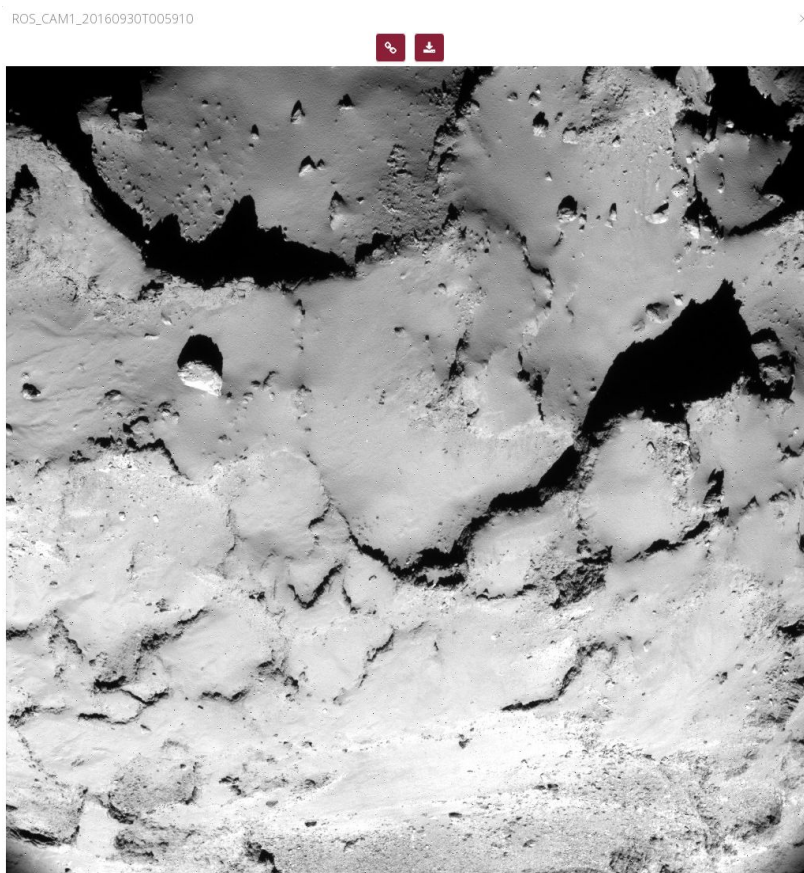
The product detail popup has the following elements:

- ROS\_CAM1\_20160930T005910: The product identifier
- Postcard or N/A image. See [Postcard viewer](#) section
- Summary : Tab with the product relevant info
- Geometry : Tab with the product geometrical info
- Products : Tab with the associated products of the given product
- Documents : Tab with the associated documents 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*.

## 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 a couple of 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 image in a detached browser tab
-  : To download the associated product

## 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. 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)

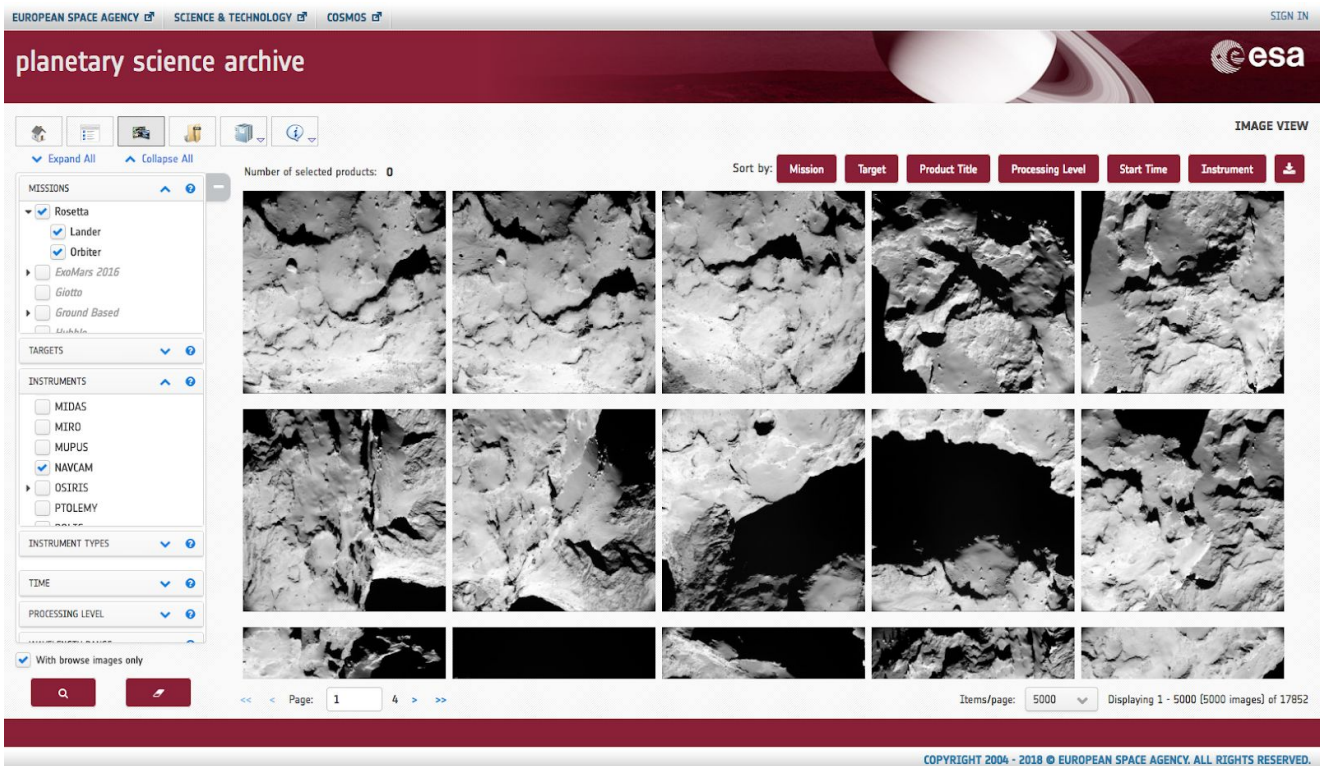
/**      IDENTIFICATION DATA ELEMENTS      **/
DATA_SET_ID              = "R0-C-NAVCAM-2-EXT3-MTP035-V1.0"
DATA_SET_NAME            = "ROSETTA-ORBITER 67P NAVCAM 2 ROSETTA EXTENSION 3 MTP035 V1.0"
PRODUCT_ID               = "ROS_CAM1_20160930T005910"
PRODUCT_CREATION_TIME    = 2016-10-13T10:20:16
PRODUCT_TYPE              = 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        = R0
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. 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:



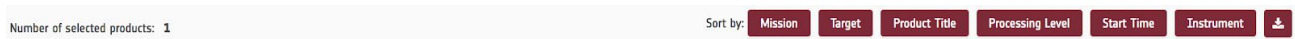
*Image View (with products)*

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





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*

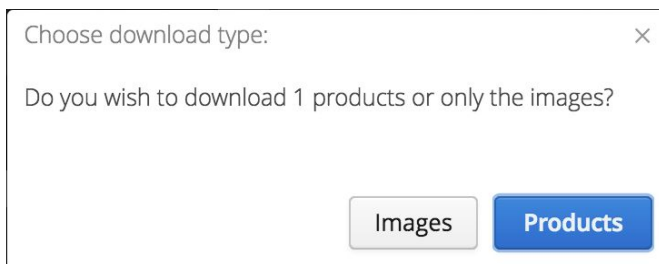
On the left side there is a number that specifies how many products have been marked as selected. On the right side there are some criterias (mission, target, product title, processing level, start time, instrument) that when clicked upon will sort the grid by that certain criteria. When clicking on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



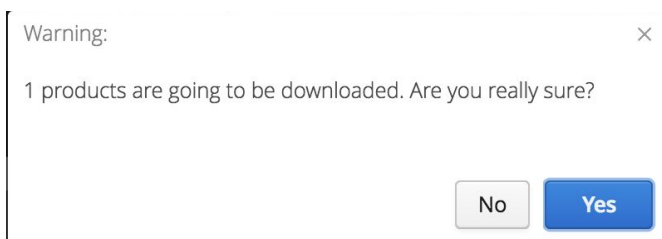
*Sorting buttons and downloading button*

The rightmost button in the panel downloads all 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:

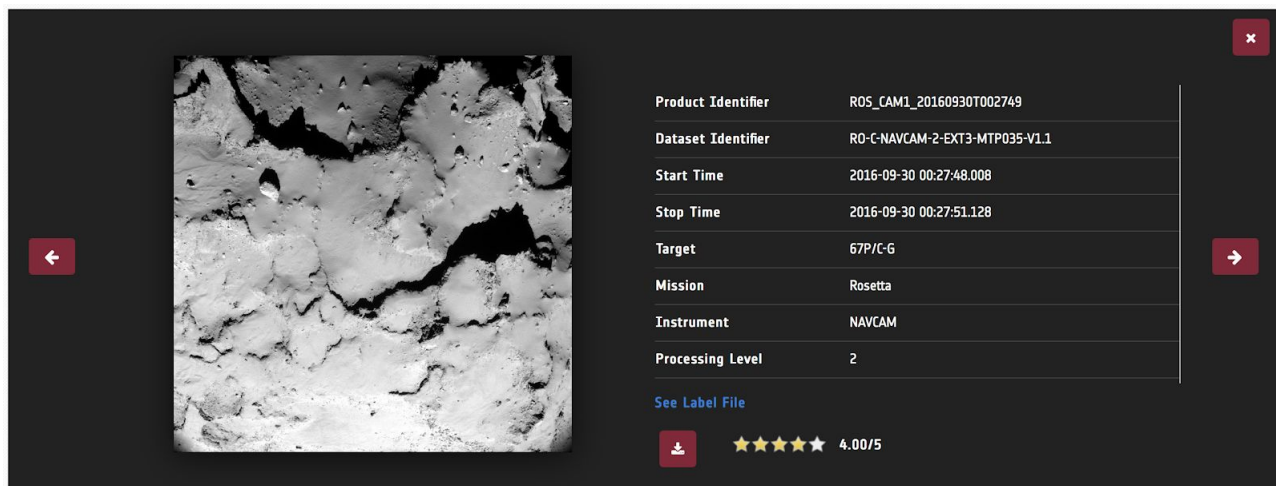


Second popup:



### 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. The product details includes almost the same information as the products details panel in the table view. 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 empty 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. Same applies to the label file link which triggers a label file viewer popup when clicked on.

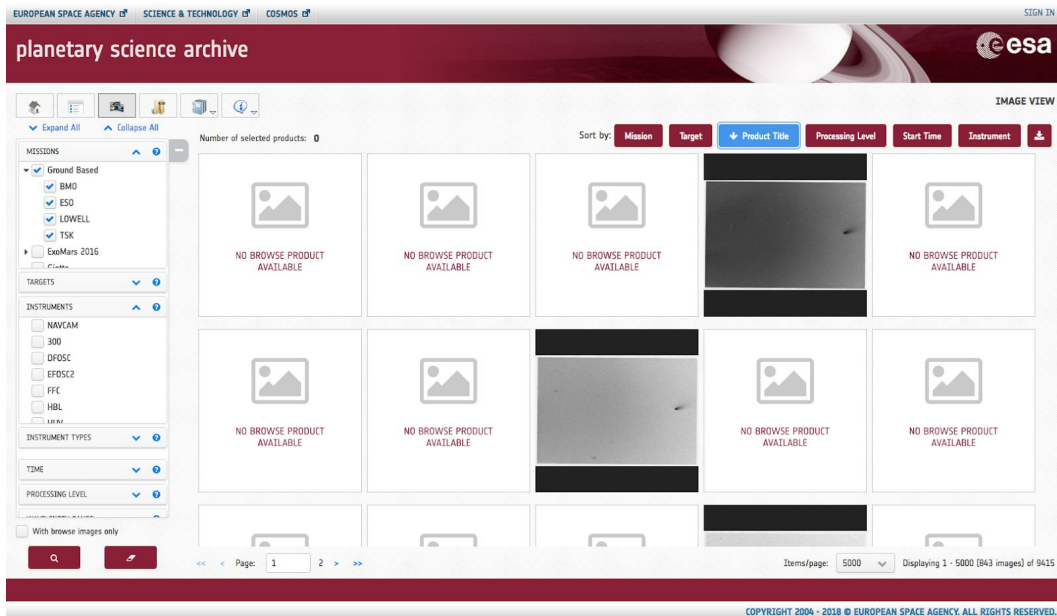
The panel also includes left and right arrow buttons to navigate between the images in the grid and a close button for dismissing the detail panel. Furthermore, under the product details summary there is a button for downloading the current product and rating stars to give a rating to the image on a scale 1-5. Next to the rating stars there is a number that displays the current average result from all the rating the users have given and the highest rating which is 5.

**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 Connections between Table and Image View

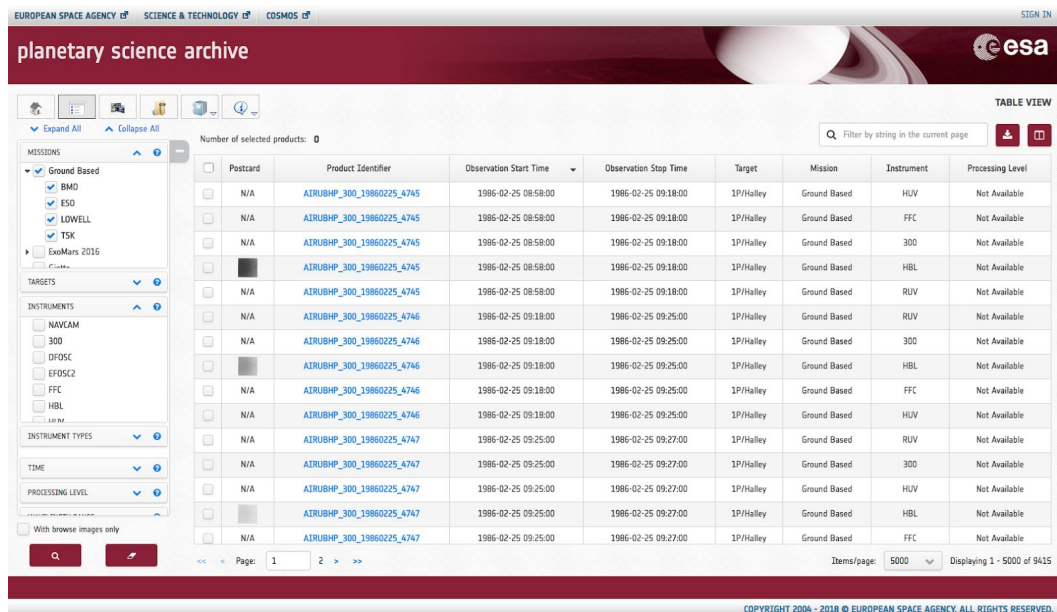
The previously described Table View and Image View share the same Filter Menu and the search results are also connected. When initiating a search in the Table View and switching




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 when the user has the “Products with browse images” selected, it applies to both of the views.



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


Same query shown in the Table View:



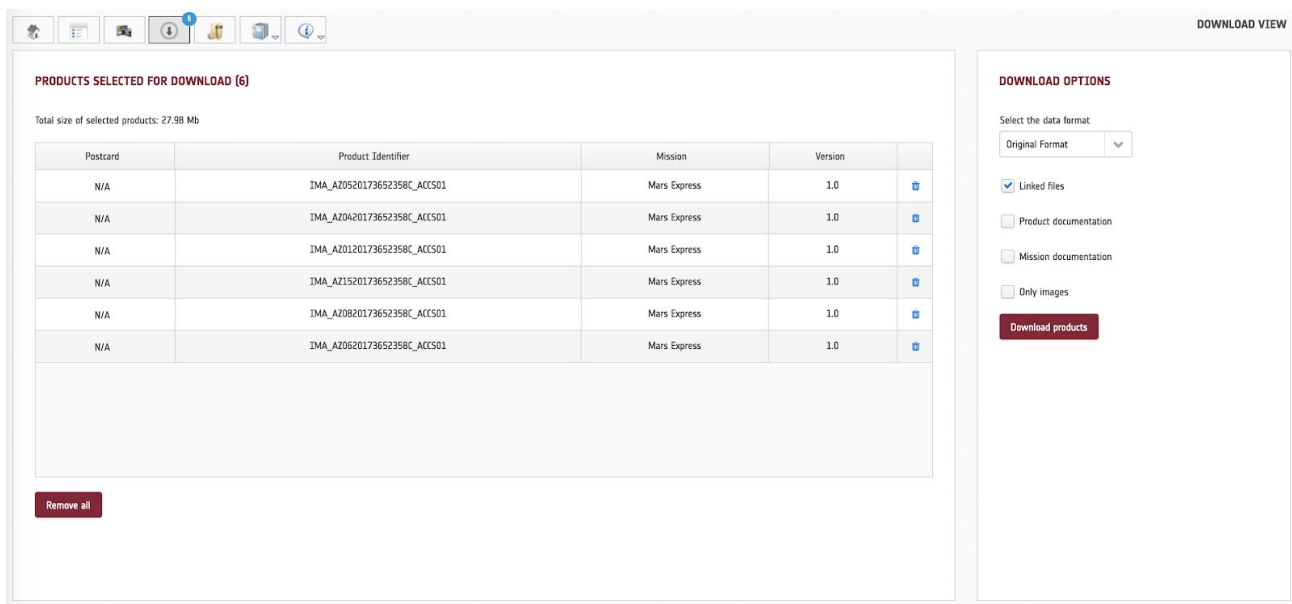
Postcard	Product Identifier	Observation Start Time	Observation Stop Time	Target	Mission	Instrument	Processing Level	
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4745	1986-02-25 08:58:00	1986-02-25 09:18:00	1P/Halley	Ground Based	HUV	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4745	1986-02-25 08:58:00	1986-02-25 09:18:00	1P/Halley	Ground Based	FFC	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4745	1986-02-25 08:58:00	1986-02-25 09:18:00	1P/Halley	Ground Based	300	Not Available
<input type="checkbox"/>		AIRUBHP_300_19860225_4745	1986-02-25 08:58:00	1986-02-25 09:18:00	1P/Halley	Ground Based	HBL	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4745	1986-02-25 08:58:00	1986-02-25 09:18:00	1P/Halley	Ground Based	RUV	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4746	1986-02-25 09:18:00	1986-02-25 09:25:00	1P/Halley	Ground Based	RUV	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4746	1986-02-25 09:18:00	1986-02-25 09:25:00	1P/Halley	Ground Based	300	Not Available
<input type="checkbox"/>		AIRUBHP_300_19860225_4746	1986-02-25 09:18:00	1986-02-25 09:25:00	1P/Halley	Ground Based	HBL	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4746	1986-02-25 09:18:00	1986-02-25 09:25:00	1P/Halley	Ground Based	FFC	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4746	1986-02-25 09:18:00	1986-02-25 09:25:00	1P/Halley	Ground Based	HUV	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4747	1986-02-25 09:25:00	1986-02-25 09:27:00	1P/Halley	Ground Based	RUV	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4747	1986-02-25 09:25:00	1986-02-25 09:27:00	1P/Halley	Ground Based	300	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4747	1986-02-25 09:25:00	1986-02-25 09:27:00	1P/Halley	Ground Based	HUV	Not Available
<input type="checkbox"/>		AIRUBHP_300_19860225_4747	1986-02-25 09:25:00	1986-02-25 09:27:00	1P/Halley	Ground Based	HBL	Not Available
<input type="checkbox"/>	N/A	AIRUBHP_300_19860225_4747	1986-02-25 09:25:00	1986-02-25 09:27:00	1P/Halley	Ground Based	FFC	Not Available

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

### 3.6 Download View

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

When user has sent some products to the Download View, it will look like the following:



*Download View with 6 products that have been added to be downloaded*

In the Download Manager the user can quickly review the products 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, linked files inclusion, product documentation inclusion, mission documentation inclusion and a possibility to download only image files. It is not possible to include linked files and have only images selected since they are conflicting.

If the user selects CDF (Common Data Format) in the Data Format combobox, all options will be disabled as they are not compatible with this output.



**PRODUCTS SELECTED FOR DOWNLOAD (3)**

Total size of selected products: 130.34 Mb

Postcard	Product Identifier	Mission	Version	
N/A	RPCMAG15011210000_RAW_GB_M3	Rosetta	6.0	
N/A	RPCMAG150527_CLF_GB_A60	Rosetta	5.0	
N/A	RPCMAG150320_CLF_IB_A60	Rosetta	5.0	

**DOWNLOAD OPTIONS**

Select the data format: CDF

Linked files

Product documentation

Mission documentation

Only images

*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 ×

Not all of the selected products are CDF compliant. Only the ones with CDF formats will be downloaded. Continue?

*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:

<ftp://psa.esac.esa.int/pub/mirror>

Unlike other interfaces, it has no search capability but users can quickly browse the content of the archive using the FTP-client application of their choice (Filezilla, SmartFTP, ...). 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 (2016):

- Cassini-Huygens
- 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)

Index of <ftp://npsa01.esac.esa.int/pub/mirror/>

 [Up to higher level directory](#)

Name	Size	Last Modified
 CASSINI-HUYGENS		16/10/2007 00:00:00
 EARTH		11/09/2009 00:00:00
 ExoMars2016		09/11/2016 18:42:00
 GIOTTO		17/10/2006 00:00:00
 HST		17/10/2006 00:00:00
 INTERNATIONAL-ROSETTA-MISSION		14/10/2016 03:00:00
 MARS-EXPRESS		19/05/2009 00:00:00
 PSA		13/05/2016 00:00:00
 SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY		20/08/2010 00:00:00
 VENUS-EXPRESS		15/09/2010 00:00:00

*PSA FTP access*

## 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 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/psa> ) .

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 <http://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, shortcutting 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:

#### 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.

### ***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?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](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](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=VEX-V-VRA-1/2/3-NMP-0105-V1.0)

[http://psa.esa.int/pdap/metadata?RESOURCE\\_CLASS=PRODUCT&DATA\\_SET\\_ID='MEX-M-HRS-C-3-RDR-V2.0'](http://psa.esa.int/pdap/metadata?RESOURCE_CLASS=PRODUCT&DATA_SET_ID='MEX-M-HRS-C-3-RDR-V2.0')

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=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](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](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'](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'](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'](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'](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'](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](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](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'](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\\_20160418t180000-20160418t235959'](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_20160418t180000-20160418t235959')



```

-<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.ID" datatype="char" arraysize="**"/>
    <FIELD ID="DATA_SET.DATA_SET_NAME" ucd="DATA_SET_NAME" utype="pds:DATA_SET.NAME" datatype="char" arraysize="**"/>
    <FIELD ID="DATA_SET.ACCESS_REFERENCE" ucd="DATA_ACCESS_REFERENCE" utype="pds:DATA_SET.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="**"/>
  </TABLE>
  <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>
      </TR>
      <TR>
        <TD>http://archives.esac.esa.int/npsa/pdap/download?RESOURCE_CLASS=DATASET&ID=AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0</TD>
      </TR>
      <TR>
        <TD>http://archives.esac.esa.int/npsa/pdap/files?DATA_SET_ID='AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0'</TD>
      </TR>
      <TR>
        <TD></TD>
      </TR>
      <TR>
        <TD></TD>
      </TR>
      <TR>
        <TD>0999-09-14T00:00:00</TD>
      </TR>
      <TR>
        <TD>1986-04-17T09:13:00</TD>
      </TR>
      <TR>
        <TD>1833</TD>
      </TR>
      <TR>
        <TD>EARTH</TD>
      </TR>
      <TR>
        <TD>HUV</TD>
      </TR>
      <TR>
        <TD>HASSELBLAD-ZEISS-UV-SONNAR-F4.3-105MM</TD>
      </TR>
      <TR>
        <TD>DATA_SET</TD>
      </TR>
      <TR>
        <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
<a href="#">FTP XML</a>	<a href="#">AIRUB-C-PHOTOCAM-2-EDR-HALLEY-1986-V1.0</a>	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 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/MISSION NAME" ucd="MISSION NAME" utype="pds:DATA SET/MISSION NAME" 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 NODE NAME" ucd="NODE NAME" utype="pds:DATA SET/PRODUCER NODE 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="PRODUCT/TARGET TYPE" ucd="TARGET TYPE" utype="pds:PRODUCT/TARGET TYPE" datatype="char" arraysize="*/"/>
-<<FIELD ID="PRODUCT/INSTRUMENT ID" ucd="INSTRUMENT ID" utype="pds:PRODUCT/INSTRUMENT ID" datatype="char" arraysize="*/"/>
-<<FIELD ID="PRODUCT/INSTRUMENT NAME" ucd="INSTRUMENT NAME" utype="pds:PRODUCT/INSTRUMENT NAME" datatype="char" arraysize="*/"/>
-<<FIELD ID="PRODUCT/START TIME" ucd="START TIME" utype="pds:PRODUCT/START TIME" datatype="char" arraysize="*/"/>
-<<FIELD ID="PRODUCT/STOP TIME" ucd="STOP TIME" utype="pds:PRODUCT/STOP TIME" datatype="char" arraysize="*/"/>
-<<FIELD ID="RESOURCE CLASS" ucd="RESOURCE CLASS" utype="pds:RESOURCE CLASS" datatype="char" arraysize="*/"/>
-<<TABLEDATA>
-<<TR>
-<<TD>
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L02_D2X_071320532_00.TAB
-<</TD>
-<</TR>
-<<TR>
-<<TD>
http://archives.esac.esa.int/npsa/psap/download?RESOURCE_CLASS=PRODUCT&ID=VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L02_D2X_071320532_00.TAB:1.0
-<</TD>
-<</TR>
-<<TR>
-<<TD>
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D2X_071320531_00.TAB
-<</TD>
-<</TR>
-<<TR>
-<<TD>
http://archives.esac.esa.int/npsa/postcards/repo/VENUSsEXPRESS/VEX-VVRA-1-2-3-NMP-0105-V1.0/BROWSE/V32ICL1L02_B2X_071320532_00.JPG
-<</TD>
-<</TR>
-<<TR>
-<<TD>
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D2X_071320531_00.TAB
-<</TD>
-<</TR>
-<<TR>
-<<TD>
http://archives.esac.esa.int/npsa/psap/download?RESOURCE_CLASS=PRODUCT&ID=VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D2X_071320531_00.TAB:1.0
-<</TD>
-<</TR>
-<<TR>
-<<TD>
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D2X_071320532_00.TAB
-<</TD>
-<</TR>
-<<TR>
-<<TD>
http://archives.esac.esa.int/npsa/postcards/repo/VENUSsEXPRESS/VEX-VVRA-1-2-3-NMP-0105-V1.0/BROWSE/V32ICL1L02_B2X_071320531_00.JPG
-<</TD>
-<</TR>
-<</TABLE>
+<</VOTABLE>

```

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-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L02_D2X_071320532_00.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:32:01.05	2007-05-12T07:00:43.95	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D2X_071320531_00.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:31:35.5	2007-05-12T07:00:39.5	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL1L02_D1X_071320531_00.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:31:31.05	2007-05-12T07:00:35.95	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_14.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:56:09	2007-05-12T07:00:56.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_13.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:56:09	2007-05-12T06:56:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_12.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:44:09	2007-05-12T06:50:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_11.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:38:09	2007-05-12T06:44:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_10.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:32:09	2007-05-12T06:38:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_09.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:26:09	2007-05-12T06:32:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_08.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:20:09	2007-05-12T06:26:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_07.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:14:09	2007-05-12T06:20:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_06.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:08:09	2007-05-12T06:14:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_05.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:02:09	2007-05-12T06:08:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_04.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:56:09	2007-05-12T06:02:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_03.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:50:09	2007-05-12T05:56:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1B_AGI_071320532_02.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:44:09	2007-05-12T05:50:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_01.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:38:09	2007-05-12T05:44:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_00.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:32:09	2007-05-12T05:38:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_09.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:26:09	2007-05-12T06:32:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_08.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:20:09	2007-05-12T06:26:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_07.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:14:09	2007-05-12T06:20:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_06.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:08:09	2007-05-12T06:14:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_05.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:02:09	2007-05-12T06:08:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_04.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:56:09	2007-05-12T06:02:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_03.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:50:09	2007-05-12T05:56:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_02.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:44:09	2007-05-12T05:50:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_01.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:38:09	2007-05-12T05:44:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL3L1A_AGI_071320532_00.RAW	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T05:32:09	2007-05-12T05:38:08.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_14.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:56:01	2007-05-12T07:00:43.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_13.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:50:01	2007-05-12T06:56:00.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_12.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:44:01	2007-05-12T06:50:00.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_11.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:38:01	2007-05-12T06:44:00.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_10.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:32:01	2007-05-12T06:38:00.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_09.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:26:01	2007-05-12T06:32:00.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_08.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:20:01	2007-05-12T06:26:00.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_07.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-1/2/3-NMP-0105-V1.0	2007-05-12T06:14:01	2007-05-12T06:20:00.9	
VEX-VVRA-1/2/3-NMP-0105-V1.0:DATA:V32ICL2L1B_D2X_071320532_06.TAB	VRA	VEX-VVRA-1/2/3-NMP-0105-V1.0	VEX-VVRA-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 != '2009-01-01T12:00:00'&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 1986-03-12T06:09:30 and stop time equals 1986-03-15T02:31:28 as a votable:

```
http://psa.esa.int/pdap/metadata?START_TIME = '1986-03-12T06:09:30'&STOP_TIME = '1986-03-15T02:31:28'&RESOURCE_CLASS=PRODUCT&RETURN_TYPE=VOTABLE
```

## 2. "Files" Service

It needs to 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, being VOTABLE the default one if not 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)

```
/usr/bin/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)

```
/usr/bin/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-V2.0

-> Call to PDAP (on command line)

```
wget 'http://psa.esa.int/files?DATA_SET_ID=MEX-M-HRSC-3-RDR-V2.0' > ds3.xml
```

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](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/postcards/repo/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-HALLEY1986-V1.0/DATA/19860328/AIRUBHP_FFC_19860328_5449.LBL
    </TD>
  </TR>
  <TR>
    <TD>
      http://archives.esac.esa.int/npsa/postcards/repo/EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY1986-V1.0/BROWSE/19860315/AIRUBHP_FFC_19860315_5123.JPG
    </TD>
  </TR>
  <TR>
    <TD>
      http://archives.esac.esa.int/npsa/postcards/repo/EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY1986-V1.0/DATA/19860310/AIRUBHP_FFC_19860310_5014.FIT
    </TD>
  </TR>
  <TR>
    <TD>
      http://archives.esac.esa.int/npsa/postcards/repo/EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY1986-V1.0/BROWSE/19860414/AIRUBHP_HBL_19860414_5951.JPG
    </TD>
  </TR>
  <TR>
    <TD>
      http://archives.esac.esa.int/npsa/postcards/repo/EARTH/AIRUB-C-PHOTOCAM-2-EDR-HALLEY1986-V1.0/BROWSE/19860318/AIRUBHP_FFC_19860318_5201.LBL
    </TD>
  </TR>
</TABLEDATA>
</DATA>
</TABLE>
</RESOURCE>
</VOTABLE>

```

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

Search Result (6462 files found)

FILENAME	DIRECTORY
<a href="#">AIRUBHP_FFC_19860328_5449.LBL</a>	/DATA/19860328/
<a href="#">AIRUBHP_FFC_19860315_5123.JPG</a>	/BROWSE/19860315/
<a href="#">AIRUBHP_FFC_19860310_5014.FIT</a>	/DATA/19860310/
<a href="#">AIRUBHP_HBL_19860414_5951.JPG</a>	/BROWSE/19860414/
<a href="#">AIRUBHP_FFC_19860318_5201.LBL</a>	/BROWSE/19860318/
<a href="#">AIRUBHP_HBL_19860316_5162.JPG</a>	/BROWSE/19860316/
<a href="#">AIRUBHP_FFC_19860227_4785.LBL</a>	/DATA/19860227/
<a href="#">AIRUBHP_HBL_19860306_4928.FIT</a>	/DATA/19860306/
<a href="#">AIRUBHP_FFC_19860413_5900.LBL</a>	/BROWSE/19860413/
<a href="#">AIRUBHP_FFC_19860416_6113.LBL</a>	/BROWSE/19860416/
<a href="#">AIRUBHP_HBL_19860223_4683.FIT</a>	/DATA/19860223/
<a href="#">AIRUBHP_FFC_19860410_5810.LBL</a>	/BROWSE/19860410/
<a href="#">AIRUBHP_FFC_19860417_6173.LBL</a>	/DATA/19860417/
<a href="#">AIRUBHP_FFC_19860416_6088.FIT</a>	/DATA/19860416/
<a href="#">AIRUBHP_FFC_19860414_5963.LBL</a>	/BROWSE/19860414/
<a href="#">AIRUBHP_HBL_19860308_4979.LBL</a>	/DATA/19860308/
<a href="#">AIRUBHP_FFC_19860221_SPT_B.LBL</a>	/DATA/SPOT/
<a href="#">AIRUBHP_HBL_19860405_5624.FIT</a>	/DATA/19860405/
<a href="#">AIRUBHP_FFC_19860416_6110.LBL</a>	/DATA/19860416/

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

### 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](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=GREACL](http://psa.esa.int/pdap/download?RESOURCE_CLASS=PRODUCT&ID=GREACL)

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](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](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](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](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.

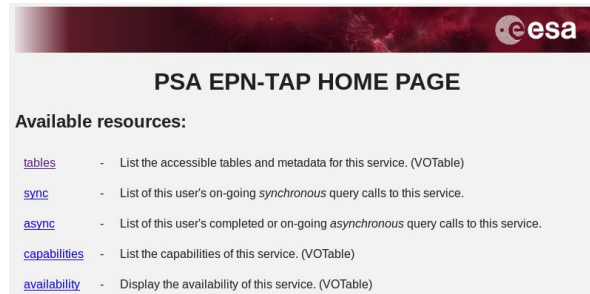
The EPN-Core parameters can be queried via HTTP calls to the EPN-TAP service using the [ADQL](#) query language. The standard response will be in [VOTable](#) (XML) format.

### 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 <i>synchronous</i> query calls to this service.
async	List of this user's completed or on-going <i>asynchronous</i> 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 canceled 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.

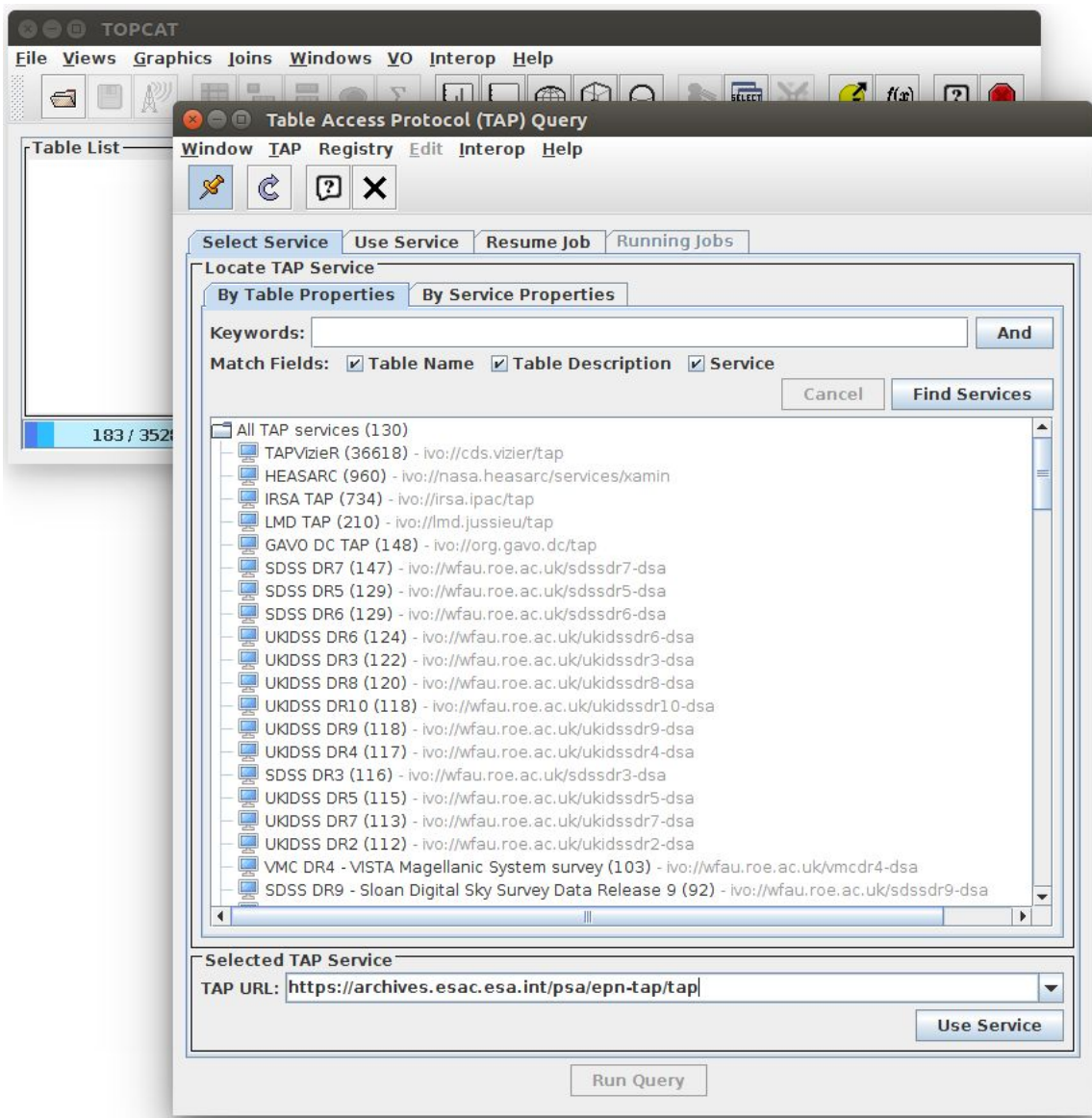
## **5.2.3 Accessing the EPN-TAP**

### **TOP CAT**

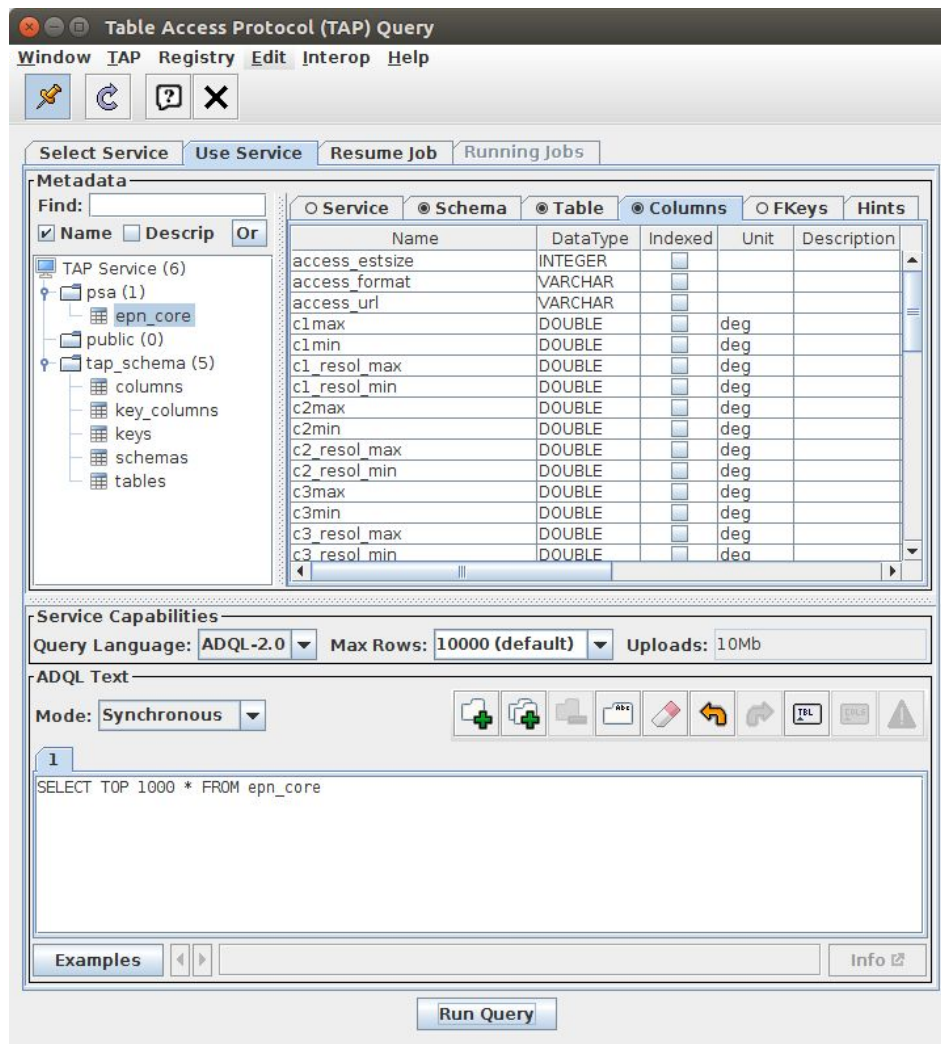
[TOPCAT](#) is a downloadable client (Java) which may be used for visualising tabular, and in particular [Virtual Observatory](#), data.

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:

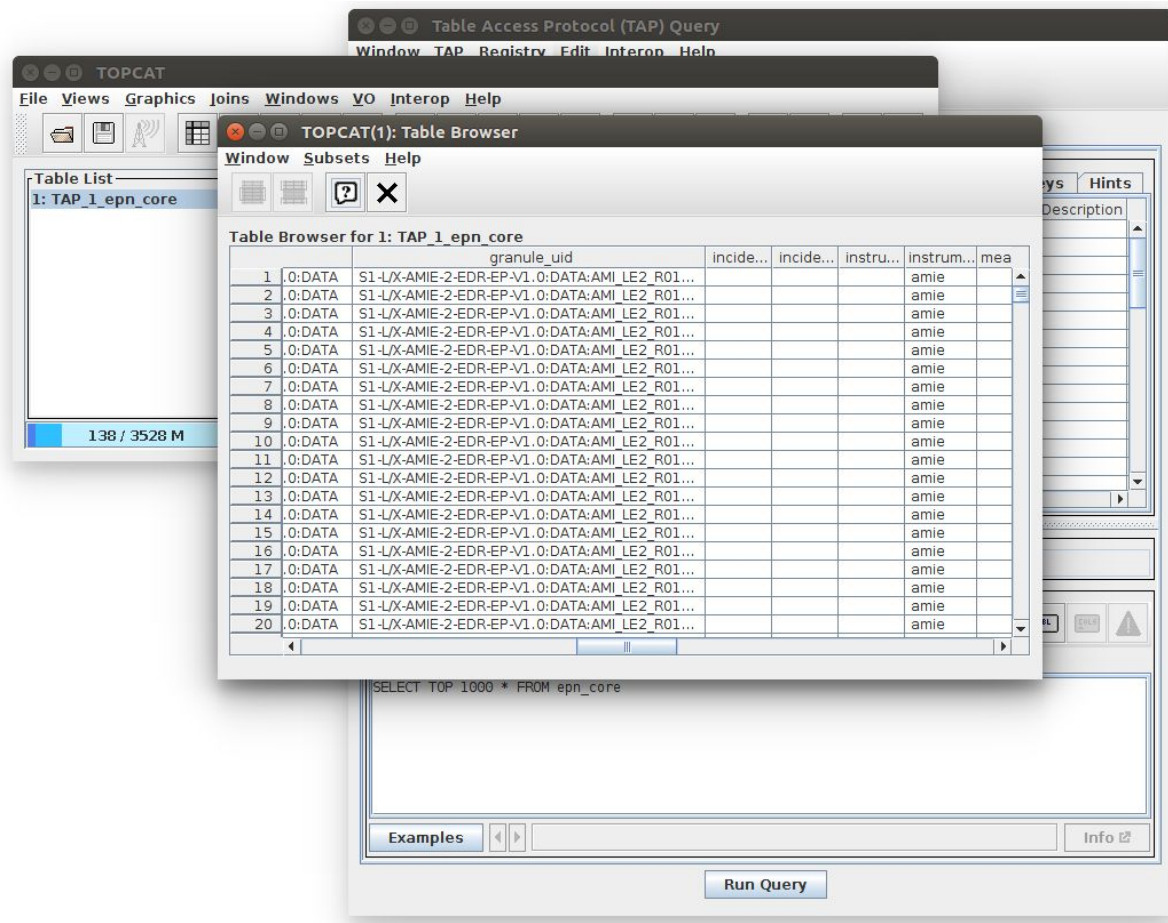




TOPCAT will list all the registered services. However, at the bottom of the "Select Service" tab a custom URL may be entered - as can be seen in the previous figure. Clicking *Use Service* will open the "Use Service" tab of the same dialog displaying the schemas exposed by the TAP service. Here can be 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 -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+npsa.epn\\_core+WHERE+\(lower\(target\\_name\)=+lower\('Mars'\)\)+OFFSET+2&REQUEST=doQuery&MAXREC=1000&FORMAT=JSON](http://psa.esa.int/epn-tap/tap/sync?LANG=ADQL&QUERY=SELECT+*+FROM+npsa.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>
- **sync?** - is the call to the synchronous web service
- **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/e pn-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](http://psa.esa.int/e pn-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/e pn-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":

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```

- <uws:job xsi:schemaLocation="http://www.ivoa.net/xml/UWS/v1.0 http://www.ivoa.net/xml/UWS/v1.0">
  <uws:jobId>1516981844990I</uws:jobId>
  <uws:runId xsi:nil="true"/>
  <uws:ownerId>anonymous</uws:ownerId>
  <uws:phase>EXECUTING</uws:phase>
  <uws:quote>-1</uws:quote>
  <uws:startTime>2018-01-26T16:50:44.995+0100</uws:startTime>
  <uws:endTime xsi:nil="true"/>
  <uws:executionDuration>1800</uws:executionDuration>
  <uws:destruction>2018-01-29T16:50:44.990+0100</uws:destruction>
  <uws:creationTime>2018-01-26T16:50:44.990+0100</uws:creationTime>
  <uws:locationId>anonymous/2018/01/26/1516981844990I</uws:locationId>
  <uws:name xsi:nil="true"/>
  - <uws:parameters>
    <uws:parameter id="phase" parameter_type="COMMON" parameter_data_type="String">RUN</uws:parameter>
    <uws:parameter id="request" parameter_type="COMMON" parameter_data_type="String">doQuery</uws:parameter>
    <uws:parameter id="maxrec" parameter_type="COMMON" parameter_data_type="Integer">1000</uws:parameter>
    - <uws:parameter id="query" parameter_type="COMMON" parameter_data_type="String">
      SELECT * FROM psa.epn_core WHERE (lower(target_name)= lower('Mars')) OFFSET 2
    </uws:parameter>
    <uws:parameter id="format" parameter_type="COMMON" parameter_data_type="String">JSON</uws:parameter>
    <uws:parameter id="progression" parameter_type="COMMON" parameter_data_type="String">EXECUTING_SQL</uws:parameter>
    <uws:parameter id="lang" parameter_type="COMMON" parameter_data_type="String">ADQL</uws:parameter>
  </uws:parameters>
  <uws:results> </uws:results>
  <uws:errorSummary xsi:nil="true"/>
</uws:job>

```

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:

This XML file does not appear to have any style information associated with it. The document tree is shown below.

```

-<uws:job xsi:schemaLocation="http://www.ivoa.net/xml/UWS/v1.0 http://www.ivoa.net/xml/UWS/v1.0">
  <uws:jobid>15169818449901</uws:jobid>
  <uws:runId xsi:nil="true"/>
  <uws:ownerId>anonymous</uws:ownerId>
  <uws:phase>COMPLETED</uws:phase>
  <uws:quote>-1</uws:quote>
  <uws:startTime>2018-01-26T16:50:44.995+0100</uws:startTime>
  <uws:endTime>2018-01-26T16:50:45.643+0100</uws:endTime>
  <uws:executionDuration>1800</uws:executionDuration>
  <uws:destruction>2018-01-29T16:50:44.990+0100</uws:destruction>
  <uws:creationTime>2018-01-26T16:50:44.990+0100</uws:creationTime>
  <uws:locationId>anonymous/2018/01/26/15169818449901</uws:locationId>
  <uws:name xsi:nil="true"/>
  <uws:parameters>
    <uws:parameter id="phase" parameter_type="COMMON" parameter_data_type="String">RUN</uws:parameter>
    <uws:parameter id="request" parameter_type="COMMON" parameter_data_type="String">doQuery</uws:parameter>
    <uws:parameter id="maxrec" parameter_type="COMMON" parameter_data_type="String">1000</uws:parameter>
  -<uws:parameter id="query" parameter_type="COMMON" parameter_data_type="String">
    SELECT * FROM psa.epn_core WHERE (lower(target_name)= lower('Mars')) OFFSET 2
  </uws:parameter>
  <uws:parameter id="format" parameter_type="COMMON" parameter_data_type="String">JSON</uws:parameter>
  <uws:parameter id="lang" parameter_type="COMMON" parameter_data_type="String">ADQL</uws:parameter>
  </uws:parameters>
  <uws:results>
    <uws:result id="result" xlink:type="simple" xlink:href="http://psaint01.n1data.lan:8080/psa-epn-tap/tap/async/15169818449901/results/result" mime="application/json" size="775384" rows="1000"/>
  </uws:results>
  <uws:errorSummary xsi:nil="true"/>
</uws:job>

```

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](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](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)

### 2) 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](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)

3) 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](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)

4) 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](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)

5) 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](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.

### 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 as 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.

<b><i>Collection Type</i></b>	<b><i>Description</i></b>	<b><i>Typical PDS4 Product Classes in this Collection Type</i></b>

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

*Table 1: PDS4 Collection Types*

## 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](mailto:psahelp@cosmos.esa.int).

## 10 ANNEX A

This list collects the allowed values in the PSA CQL Free Search Box. They have been displayed in alphabetical order.

### **mission\_name**

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

### **mission\_id**

"CASSINI-HUYGENS"  
"EARTH"  
"GIOTTO"  
"HST"  
"INTERNATIONAL-ROSETTA-MISSION"  
"MARS-EXPRESS"  
"SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY"  
"urn:esa:psa:em16:context:investigation.em16"  
"VENUS-EXPRESS"

### **instrument\_host\_name**

"BMO"  
"ESO"  
"Lander"  
"LOWELL"

"Orbiter"  
"TSK"

### **instrument\_host\_id**

"EARTH\_BMO"  
"EARTH\_ESO"  
"EARTH\_LOWELL"  
"EARTH\_TSK"  
"EDM"  
"INTERNATIONAL-ROSETTA-MISSION\_RL"  
"INTERNATIONAL-ROSETTA-MISSION\_RO"  
"MEX"  
"urn:esa:psa:em16:context:instrument\_host.edm"  
"urn:esa:psa:em16:context:instrument\_host.tgo"

### **instrument\_name**

"300"  
"ACP"  
"ACS"  
"ALICE"  
"Amelia"  
"AMIE"  
"ASPERA-3"  
"ASPERA-4"  
"CaSSIS"  
"COMARS+ "  
"CONCERT"  
"COSAC"  
"COSIMA"  
"D-CIXS"  
"DeCa"  
"DFOSC"  
"DID"  
"DISR"  
"DREAMS"  
"DTWG"  
"DWE"  
"EFOSC2"  
"FFC"  
"FOS"  
"FRIEND"  
"GCMS"  
"GIADA"  
"GRE"  
"HASI"  
"HBL"  
"HMC"  
"HRSC"

"HUV"  
"IMS"  
"JPA"  
"LANDER\_ANCDR"  
"MAG"  
"MAG (Venus Express)"  
"MaRS"  
"MARSIS"  
"MIDAS"  
"MIRO"  
"NAVCAM"  
"NOMAD"  
"OMEGA"  
"OPE"  
"OSIRIS"  
"PFS"  
"PHOT"  
"PIA"  
"RCC"  
"ROSINA"  
"RPC"  
"RSI"  
"RUV"  
"SD2"  
"SIR"  
"SPEDE"  
"SPICAM"  
"SPICAV"  
"SPICAV-SOIR"  
"SSP"  
"VeRA"  
"VIRTIS (Rosetta)"  
"VIRTIS (Venus Express)"  
"VMC"  
"WFC"  
"XSM"

#### **instrument\_id**

"CASSINI-HUYGENS\_HP\_ACP"  
"CASSINI-HUYGENS\_HP\_DISR"  
"CASSINI-HUYGENS\_HP\_DTWG"  
"CASSINI-HUYGENS\_HP\_DWE"  
"CASSINI-HUYGENS\_HP\_GCMS"  
"CASSINI-HUYGENS\_HP\_HASI"  
"CASSINI-HUYGENS\_HP\_SSP"  
"EARTH\_BMO\_300"  
"EARTH\_BMO\_FFC"  
"EARTH\_BMO\_HBL"  
"EARTH\_BMO\_HUV"

"EARTH\_BMO\_RUV"  
"EARTH\_ESO\_DFOSC"  
"EARTH\_ESO\_EFOSC2"  
"EARTH\_LOWELL\_PHOT"  
"EARTH\_TSK\_RCC"  
"GIOTTO\_GIO\_DID"  
"GIOTTO\_GIO\_GRE"  
"GIOTTO\_GIO\_HMC"  
"GIOTTO\_GIO\_IMS"  
"GIOTTO\_GIO\_JPA"  
"GIOTTO\_GIO\_MAG"  
"GIOTTO\_GIO\_OPE"  
"GIOTTO\_GIO\_PIA"  
"HST\_HST\_FOS"  
"HST\_HST\_WFPC2"  
"INTERNATIONAL-ROSETTA-MISSION\_RL\_COSAC"  
"INTERNATIONAL-ROSETTA-MISSION\_RL\_LANDER\_ANCDR"  
"INTERNATIONAL-ROSETTA-MISSION\_RL\_SD2"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_ALICE"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_CONSERT"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_COSIMA"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_GIADA"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_MIDAS"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_MIRO"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_NAVCAM"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_OSINAC"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_OSIWAC"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_ROSINA"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCICA"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCIES"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCLAP"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCMAG"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCMIP"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_RSI"  
"INTERNATIONAL-ROSETTA-MISSION\_RO\_VIRTIS"  
"MARS-EXPRESS\_MEX\_ASPERA-3"  
"MARS-EXPRESS\_MEX\_HRSC"  
"MARS-EXPRESS\_MEX\_MARSIS"  
"MARS-EXPRESS\_MEX\_MRS"  
"MARS-EXPRESS\_MEX\_OMEGA"  
"MARS-EXPRESS\_MEX\_PFS"  
"MARS-EXPRESS\_MEX\_SPICAM"  
"SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY\_S1\_AMIE"  
"SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY\_S1\_DCIXS"  
"SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY\_S1\_SIR"  
"SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY\_S1\_SPEDE"  
"SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY\_S1\_XSM"  
"urn:esa:psa:em16:context:instrument.acs\_\_tgo"  
"urn:esa:psa:em16:context:instrument.amelia\_\_edm"  
"urn:esa:psa:em16:context:instrument.cassis\_\_tgo"

"urn:esa:psa:em16:context:instrument.comars\_\_edm"  
"urn:esa:psa:em16:context:instrument.deca\_\_edm"  
"urn:esa:psa:em16:context:instrument.dreams\_\_edm"  
"urn:esa:psa:em16:context:instrument.frend\_\_tgo"  
"urn:esa:psa:em16:context:instrument.nomad\_\_tgo"  
"VENUS-EXPRESS\_VEX\_ASPERA4"  
"VENUS-EXPRESS\_VEX\_MAG"  
"VENUS-EXPRESS\_VEX\_SPICAV"  
"VENUS-EXPRESS\_VEX\_SPICAV-SOIR"  
"VENUS-EXPRESS\_VEX\_VIRTIS"  
"VENUS-EXPRESS\_VEX\_VMC"  
"VENUS-EXPRESS\_VEX\_VRA"

### **subinstrument\_name**

"180"  
"339"  
"340"  
"355"  
"371"  
"403"  
"979"  
"BE"  
"COPS"  
"DFMS"  
"DOSIMETRY"  
"ELECTRA Status Long Term TM"  
"ELS"  
"HK"  
"HK0"  
"HK1"  
"HK16"  
"HK17"  
"HK18"  
"HK2"  
"HK3"  
"HK\_BE"  
"HK\_MIR"  
"HK\_NIR"  
"HK\_TIR"  
"ICA"  
"IES"  
"IMA"  
"LAP"  
"LNO"  
"MAG"  
"MIP"  
"MIR"  
"NAC"  
"NEUTRON"

"NIR"  
 "NPD"  
 "NPI"  
 "RTOF"  
 "S/C ACS Temperature Long Term TM"  
 "S/C CASSIS Temperature Long Term TM"  
 "S/C FREND Temperature Long Term TM"  
 "SCI"  
 "S/C NOMAD Temperature Long Term TM"  
 "SINBAD"  
 "SO"  
 "Solar Array Angles Long Term TM"  
 "Spacecraft Deck Temperature"  
 "TIR"  
 "UVIS"  
 "WAC"

### **subinstrument\_id**

"INTERNATIONAL-ROSETTA-MISSION\_RO\_OSINAC:NAC"  
 "INTERNATIONAL-ROSETTA-MISSION\_RO\_OSIWAC:WAC"  
 "INTERNATIONAL-ROSETTA-MISSION\_RO\_ROSINA:COPS"  
 "INTERNATIONAL-ROSETTA-MISSION\_RO\_ROSINA:DFMS"  
 "INTERNATIONAL-ROSETTA-MISSION\_RO\_ROSINA:RTOF"  
 "INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCICA:ICA"  
 "INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCIES:IES"  
 "INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCLAP:LAP"  
 "INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCMAG:MAG"  
 "INTERNATIONAL-ROSETTA-MISSION\_RO\_RPCMIP:MIP"  
 "MARS-EXPRESS\_MEX\_ASPERA-3:ELS"  
 "MARS-EXPRESS\_MEX\_ASPERA-3:IMA"  
 "MARS-EXPRESS\_MEX\_ASPERA-3:NPI"  
 "urn:esa:psa:em16:context:instrument.acs\_\_tgo:BE"  
 "urn:esa:psa:em16:context:instrument.acs\_\_tgo:HK\_BE"  
 "urn:esa:psa:em16:context:instrument.acs\_\_tgo:HK\_MIR"  
 "urn:esa:psa:em16:context:instrument.acs\_\_tgo:HK\_NIR"  
 "urn:esa:psa:em16:context:instrument.acs\_\_tgo:HK\_TIR"  
 "urn:esa:psa:em16:context:instrument.acs\_\_tgo:MIR"  
 "urn:esa:psa:em16:context:instrument.acs\_\_tgo:NIR"  
 "urn:esa:psa:em16:context:instrument.acs\_\_tgo:TIR"  
 "urn:esa:psa:em16:context:instrument.cassis\_\_tgo:HKo"  
 "urn:esa:psa:em16:context:instrument.cassis\_\_tgo:HK16"  
 "urn:esa:psa:em16:context:instrument.cassis\_\_tgo:HK17"  
 "urn:esa:psa:em16:context:instrument.cassis\_\_tgo:HK18"  
 "urn:esa:psa:em16:context:instrument.cassis\_\_tgo:HK3"  
 "urn:esa:psa:em16:context:instrument.comars\_\_edm:SCI"  
 "urn:esa:psa:em16:context:instrument.dreams\_\_edm:HK"  
 "urn:esa:psa:em16:context:instrument.dreams\_\_edm:HK1"  
 "urn:esa:psa:em16:context:instrument.dreams\_\_edm:HK2"  
 "urn:esa:psa:em16:context:instrument.frend\_\_tgo:DOSIMETRY"

"urn:esa:psa:em16:context:instrument.frend\_\_tgo:NEUTRON"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:180"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:244"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:339"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:340"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:355"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:356"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:371"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:372"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:403"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:404"  
 "urn:esa:psa:em16:context:instrument\_host.tgo:84"  
 "urn:esa:psa:em16:context:instrument.nomad\_\_tgo:LNO"  
 "urn:esa:psa:em16:context:instrument.nomad\_\_tgo:SINBAD"  
 "urn:esa:psa:em16:context:instrument.nomad\_\_tgo:SO"  
 "urn:esa:psa:em16:context:instrument.nomad\_\_tgo:UVIS"  
 "urn:esa:psa:em16:context:investigation.em16:180"  
 "urn:esa:psa:em16:context:investigation.em16:340"  
 "urn:esa:psa:em16:context:investigation.em16:979"  
 "VENUS-EXPRESS\_VEX\_ASPERA4:ELS"  
 "VENUS-EXPRESS\_VEX\_ASPERA4:IMA"  
 "VENUS-EXPRESS\_VEX\_ASPERA4:NP1"  
 "VENUS-EXPRESS\_VEX\_ASPERA4:NP2"  
 "VENUS-EXPRESS\_VEX\_ASPERA4:NPI"

### **instrument\_type**

"ACCELEROMETER"  
 "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"  
 "IMAGER"  
 "IMAGING CAMERA"  
 "IMAGING SPECTROMETER"  
 "INFRARED INTERFEROMETER"  
 "INFRARED SPECTROMETER"  
 "Instrument"  
 "ION MASS SPECTROMETER"  
 "LINEAR ARRAY CAMERA"



"MAGNETOMETER"  
"Mass spectrometer"  
"MASS SPECTROMETER"  
"MATERIAL PROPERTY SENSOR"  
"MUTUAL IMPEDANCE PROBE"  
"Neutron Detector"  
"PHOTOELECTRIC PHOTOMETER"  
"PHOTOPOLARIMETER"  
"PLASMA INSTRUMENT"  
"RADAR"  
"RADIOMETER"  
"RADIO SCIENCE"  
"SCANNING PROBE MICROSCOPE"  
"SPECTROGRAPH"  
"Spectrometer"  
"SPECTROMETER"  
"TELESCOPE"  
"ULTRAVIOLET SPECTROMETER"

#### **processing\_level**

"1"  
"2"  
"3"  
"4"  
"5"  
"6"  
"N"  
"Partially Processed"  
"Raw"

#### **target\_name**

"16 CYG B"  
"1P/Halley"  
"21 Lutetia"  
"2867 Steins"  
"46P/Wirtanen"  
"4 Vesta"  
"58 AQL"  
"67P/C-G"  
"9P/Tempel 1"  
"Actarus"  
"Aldebaran"  
"Area 98"  
"C/2002 T7 (Linear)"  
"Calibration"

"Checkout"  
"Dark"  
"Dark Sky"  
"Deimos"  
"Earth"  
"Flatfield"  
"HD 42560"  
"Internal Source"  
"Interplanetary Dust"  
"Jupiter"  
"Landolt SA 104"  
"LANDOLT SA 92"  
"M1"  
"M42"  
"M83"  
"Mars"  
"Mercury"  
"Moon"  
"NON SCIENCE"  
"Phobos"  
"PI2 ORIONIS"  
"Plasma"  
"Pleiades"  
"Saturn"  
"Scorpius"  
"Sirius"  
"Sky"  
"Solar Wind"  
"Star"  
"Sun"  
"Theta CRT"  
"Titan"  
"Vega"  
"Venus"  
"XI2 CETI"  
"Zeta Cas"

**target\_id**

"16 CYG B"  
"1P/HALLEY"  
"21 LUTETIA"  
"2867 STEINS"  
"46P/WIRTANEN"  
"4 VESTA"  
"58 AQL"  
"67P/CHURYUMOV-GERASIMENKO 1 1969 R1"  
"9P/TEMPEL 1 1867 G1"  
"ALDEBARAN"  
"ARCTURUS"

"AREA 98"  
"CALIBRATION"  
"CHECKOUT"  
"C/LINEAR 2002 T7"  
"COMET"  
"DARK"  
"DEIMOS"  
"EARTH"  
"FLAT FIELD"  
"HALLEY"  
"INTERNAL SOURCE"  
"INTERPLANETARY DUST"  
"LANDOLT SA 92"  
"M1"  
"M42"  
"M83"  
"MOON"  
"N/A"  
"NULL"  
"PI2 ORIONIS"  
"PLASMA"  
"PLEIADES"  
"SATURN"  
"SCORPIUS"  
"SKY"  
"SOLAR WIND"  
"STAR"  
"THETA CRT"  
"TITAN"  
"urn:esa:psa:context:target:planet.mars"  
"urn:esa:psa:context:target:star.hd\_42560"  
"urn:nasa:pds:context:target:calibration.dark\_sky"  
"urn:nasa:pds:context:target:calibration.non\_science"  
"urn:nasa:pds:context:target:open\_cluster.pleiades"  
"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:satellite.phobos"  
"urn:nasa:pds:context:target:star.landolt\_sa\_104"  
"urn:nasa:pds:context:target:star.sirius"  
"urn:nasa:pds:context:target:sun.sun"  
"VEGA"  
"VENUS"  
"XI2 CETI"  
"ZETA CAS"

### **target\_type**

"ASTEROID"

"Calibration"  
"CALIBRATION"  
"COMET"  
"DUST"  
"GALAXY"  
"Open Cluster"  
"Planet"  
"PLANET"  
"PLASMA CLOUD"  
"Satellite"  
"SATELLITE"  
"Star"  
"STAR"  
"Sun"