

Why is it interesting to you?

S.Besse PSA Science Lead

sbesse@sciops.esa.int





## What is the PSA?

## What is it becomming!

# What are the benefits for science





### **Planetary Science Archive (PSA)**

- → Repository of ESA' missions for exploration of the Solar System
- → It contains <u>science</u> datasets, as well as <u>engineering</u> datasets of spacecrafts and instruments
- → It uses a common format with other international planetary missions, the Planetary Data System format (PDS)
- → PSA has the commitment to provide access to ESA' missions scientific and engineering datasets for <u>decades to the public</u>.





#### **Core statement**

ESDC (Esac Science Data Center) and PSA aim at providing science ready datasets to the scientific community so that they can be analysed to produce scientific results.

Presenting and Preserving reliable scientific datasets

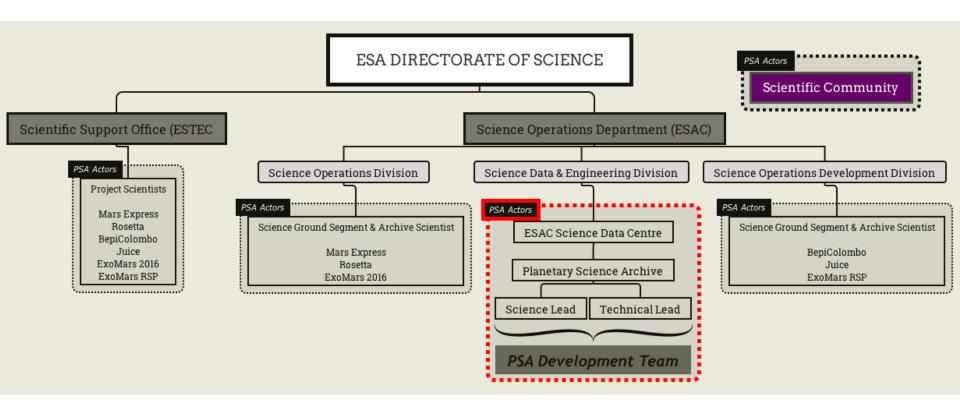
ESA, ESDC and PSA believe strongly that science will benefit from a scientific customized interface that help searching through the ever increasing number of datasets in archives.

This new development of the PSA will help scientists to make new and more complex scientific discoveries in the upcoming decades.



#### **The Planetary Science Archive structure**





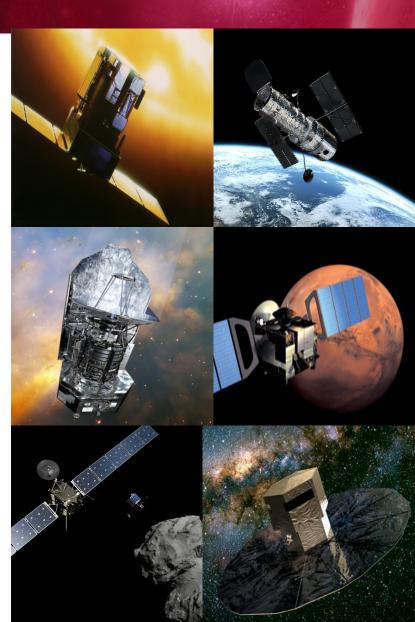


#### **ESAC Science Data Centre (ESDC)**

The Digital Library of the Universe



- Science archives co-located at ESAC
  - Astronomy, Planetary, Solar Heliospheric
- Different types of data:
  - Raw data, calibrated data, high level science products, documentation, SPICE, ...
  - All data public and available for free after a proprietary period
- Need to be kept readily available for different users:
  - Scientific Community (public access)
  - PI teams and observers (controlled access)
  - Science Operations Teams (privileged access)
- Archive Strategy Plan for 5-20+ years















cassini-huygens



smart-1



mars express



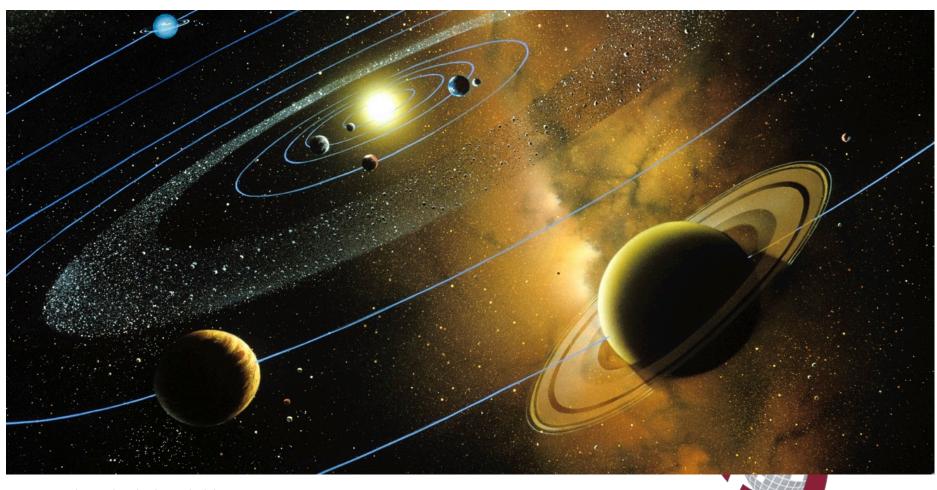
rosetta

exomars





### We work at redshift **0.000000000001**





#### To Whom are we providing services?

- 1- Missions in operation
  - Quick view of datasets, secured interface for sharing products
- 2- Scientists to perform their research
  - Reliable peer-reviewed science ready data
  - Interface to search their favourite datasets
- 3- Public, teachers, journalists, and anybody that needs science datasets
  - Facilitate access to public datasets
  - Disseminate the exploration of the universe





#### **Services provided to the community**

- 1. FTP repository will all datasets
- 2. Search interfaces (Metadata, maps)
- 3. Documentations
- 4. Ancillary datasets
- 5. Workshop and training
- 6. Support in the creation of archive compliant datasets





## What is the PSA?

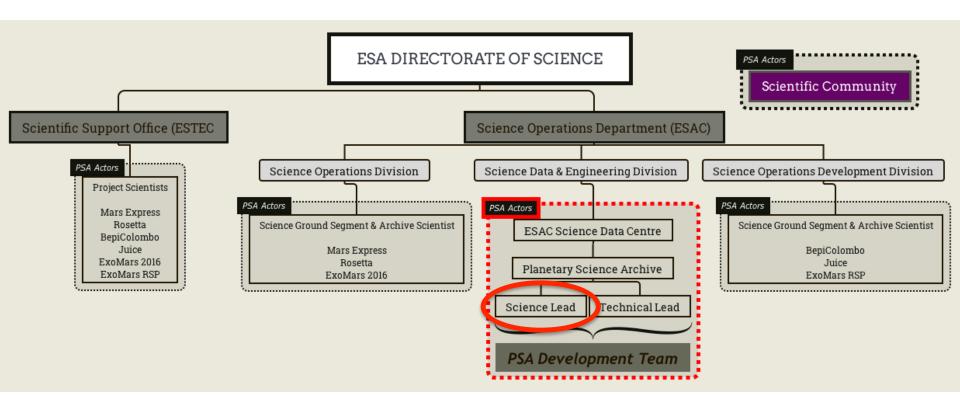
## What is it becomming!

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#### **PSA Changes**









#### To Whom are we providing services?

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## The PSA 5.0 will <u>improve and increase</u> significantly the quality of the services

- 1. Will continue to provide the same services, <u>improved</u> with a new hardware, <u>new interface</u> and <u>thin layer</u> access
- 2. New service with the **GIS technology** to visualize the datasets in context (projected into the surface, registration of observations, etc.)
- 3. <u>Improved metadata</u> to select datasets with specific conditions (geometry of observations, timing, etc..)
- 4. Maximize the **interoperability** and **comparison** with other archives (possibility to confront BepiColombo with MESSENGER products)
- 5. Facilitate datasets access for scientists, make products from science missions more affordable (and all of that for free!)

#### **PSA Changes**



### To do these changes, we rely on

- 1. The PSA team: Archive Scientists, Archive Engineers
- 2. All ESA interested parties can/should propose ideas
  - → Tell us what you found interesting in other archives
  - → Tell us yours needs to obtain the science datasets
  - → Tell us what you think will make PSA better
- 3. The scientific community, represented at the PSA by the PSA User Group (E. Hauber, S. Fornasier, A. Munoz, P. Tortora, J. Soucek, F. Altieri, E. Sefton-Nash)
- 4. Whoever as something to say !!!





## What is the PSA?

What is it becomming!

# What are the benefits for science



#### **Benefits for science**



#### We will make your life easier to explore the Solar System

- 1. You will be able to search for a specific products, make sure it is the one you need before you have to download it
- 2. You will be able to compare it to products of other missions to see if that is the product you want
- 3. You will be able to combine scientific datasets with spacecraft and engineering products if needed
- 4. In two minutes, you will get what you want (providing you know what you want!)



#### Step 1 - Arrive at PSA



EUROPEAN SPACE AGENCY To SCIENCE & TECHNOLOGY To

#### planetary science archive



HOME

#### **PSA**

#### START SEARCHING YOUR DATASET!

cam

The European Space Agency's Planetary ( NAVCAM [instrument]

currently including Giotto, Huygens, Mar SPICAM [instrument]

ground-based cometary observations. Future missions such as ExoMars 16, ExoMars 18, and Bepicolombo will also be mosted in the roa. The roa uses rialietary bata System standards as a baseline for the formatting and structure of all data contained within the archive... Learn more HERE.

#### **DATA ACCESS**









#### PRODUCT INFO & TOOLS



ANCILLARY DATA





DOCUMENTATION SEA MISSIONS

#### **USEFUL INFORMATION**

neering data returned by ESA's Solar System missions:









#### **Step 2 - Result of initial query**

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EUROPEAN SPACE AGENCY 12 SCIENCE & TECHNOLOGY 127 planetary science archive **TABLE VIEW** ▲ Hide All Show All Q Filter v 0 **Postcard Product Identifier** Observation Start Time -**Observation Stop Time Processing Level** Target Mission Instrument Targets ROS\_CAM1\_20150310T232252 2015-03-10 23:22:52 2015-03-10 23:22:53 67P/C-G Rosetta NAVCAM Instruments ROS\_CAM1\_20150310T232252F 2 2015-03-10 23:22:52 2015-03-10 23:22:53 67P/C-G NAVCAM Rosetta ✓ NAVCAM NOMAD ROS\_CAM1\_20150310T231832 2 2015-03-10 23:18:32 2015-03-10 23:18:33 67P/C-G NAVCAM Rosetta OMEGA ROS\_CAM1\_20150310T231832F 2015-03-10 23:18:32 2015-03-10 23:18:33 67P/C-G NAVCAM 2 Rosetta OPE OSIRIS ROS CAM1 20150310T230852 2015-03-10 23:08:52 2015-03-10 23:08:53 67P/C-G Rosetta NAVCAM PFS ROS\_CAM1\_20150310T230852F 2015-03-10 23:08:52 2015-03-10 23:08:53 67P/C-G Rosetta NAVCAM Phebus PHOT ROS\_CAM1\_20150310T230432 2015-03-10 23:04:32 2015-03-10 23:04:33 67P/C-G NAVCAM 2 Rosetta Instruments Types ROS\_CAM1\_20150310T230432F 2015-03-10 23:04:32 2015-03-10 23:04:33 67P/C-G NAVCAM 2 Rosetta . ROS\_CAM1\_20150310T220002 2015-03-10 22:00:02 2015-03-10 22:00:02 67P/C-G NAVCAM 2 Rosetta v 0 Time ROS\_CAM1\_20150310T220002F 2015-03-10 22:00:02 2015-03-10 22:00:02 67P/C-G NAVCAM 2 Rosetta v 0 Processing Level 3 ROS\_CAM1\_20150310T200002 2015-03-10 20:00:02 2015-03-10 20:00:02 67P/C-G Rosetta NAVCAM 2 2 Free Search ROS\_CAM1\_20150310T200002F 2015-03-10 20:00:02 2015-03-10 20:00:02 67P/C-G Rosetta NAVCAM Type your CQL query here... ROS\_CAM1\_20150310T183443 2 2015-03-10 18:34:43 2015-03-10 18:34:44 67P/C-G NAVCAM

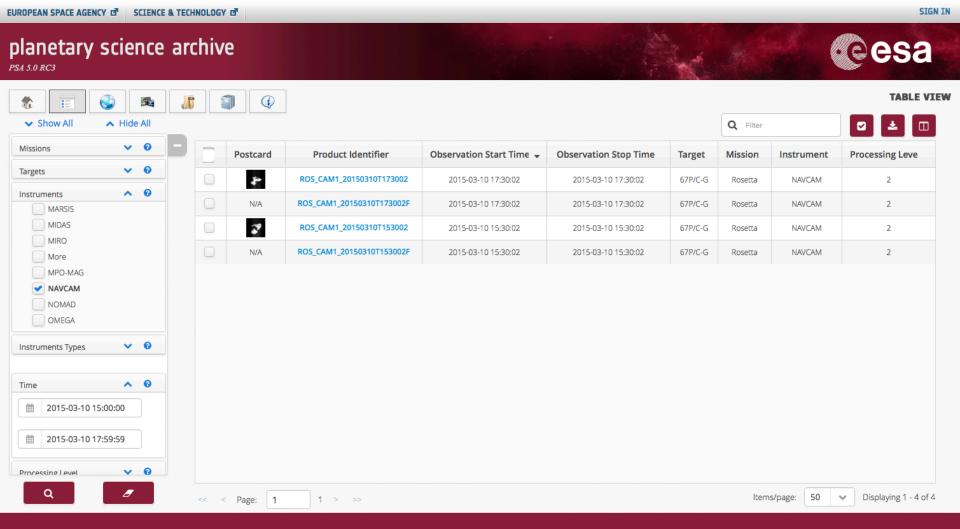
Displaying 1 - 50 of 15697

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Items/page:

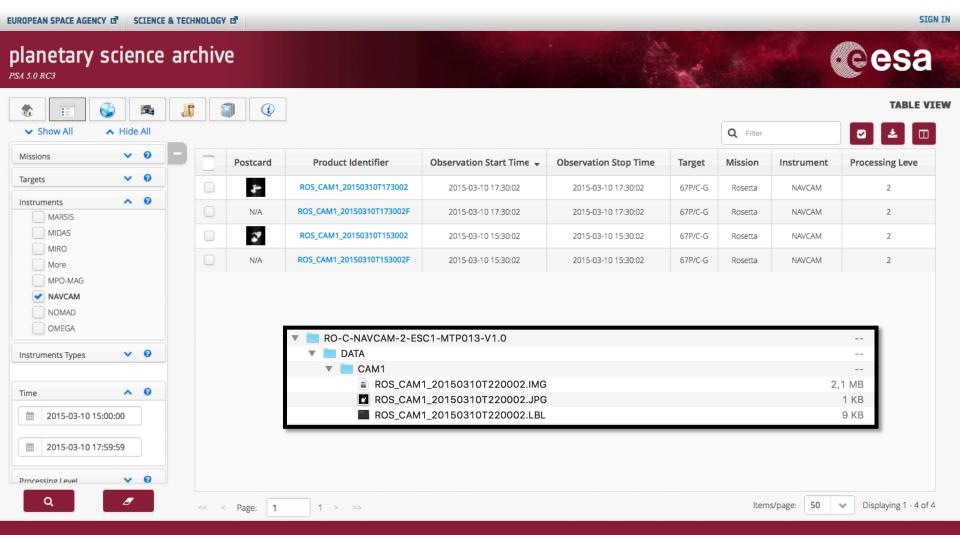
## Step 3 – refine query, downloading products





## Step 3 – refine query, downloading products





#### **Crossed mission searches**

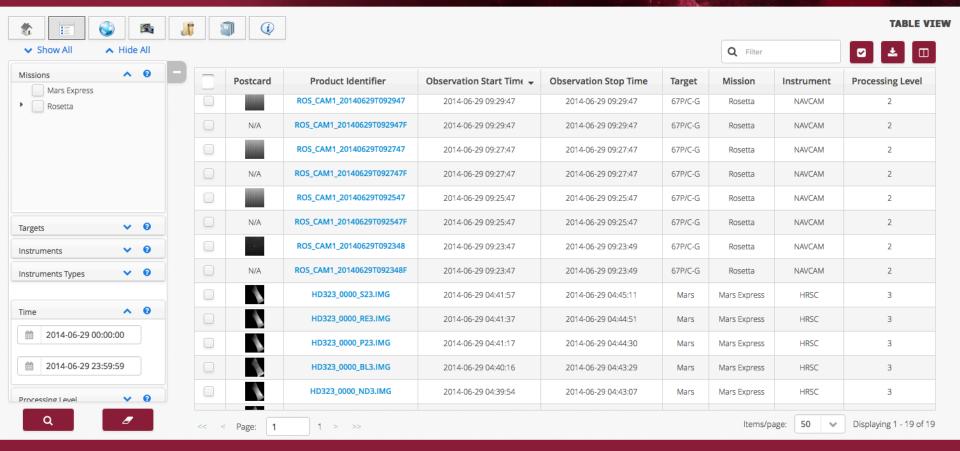


EUROPEAN SPACE AGENCY (27 SCIENCE & TECHNOLOGY (27 SIGNI

#### planetary science archive

PSA 5.0 RC3





#### **PSA** in few numbers – Why is it difficult?



1. 70

2. 45

3. 12



#### **PSA** in few numbers – Why is it difficult?

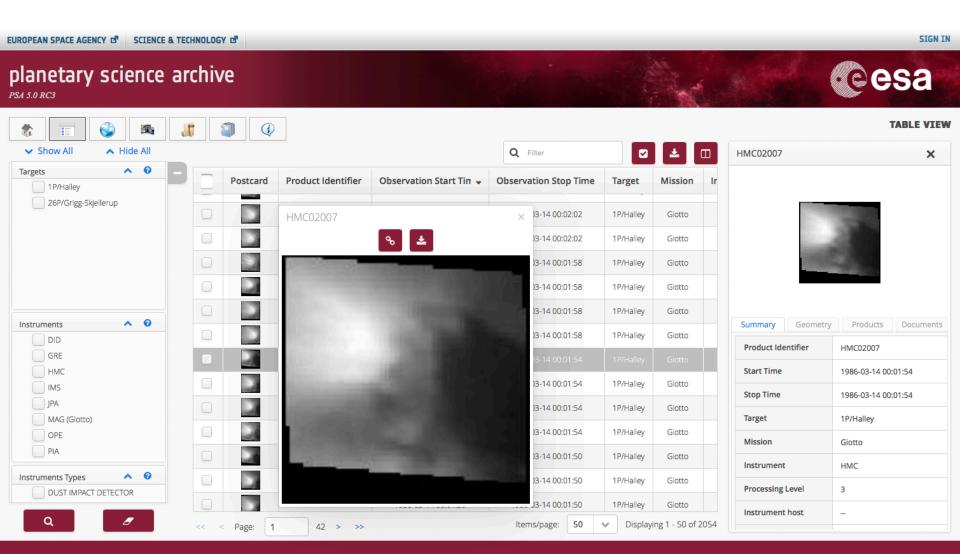


- 1. 70, the number of instruments we host now, 50 more when you include the upcoming Juice, BepiColombo and ExoMars RSP
- 2. 45 TB of data which probably sounds like a joke for Gaia, but take into account that it is coming from 70 instruments, of 8 missions over 20 years
  - → In the past 6 months, we increased by 10 TB
- 3. 12 years of a common format (PDS) updates and interpretations
- 4. And others
  - a. Remote sensing Vs. In-situ instruments
  - b. Geometries
  - c. Changes to the PDS4 format (applicable to EM16 and future missions



#### **Interactions of filters**





#### **Customise your interface**

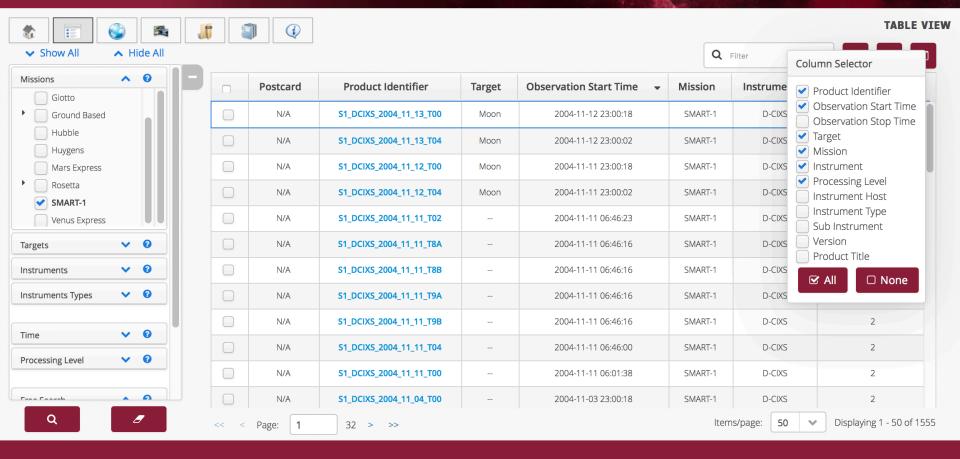


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#### planetary science archive

PSA 5.0 RC2





#### More data → Go to the FTP



If you need more then few data

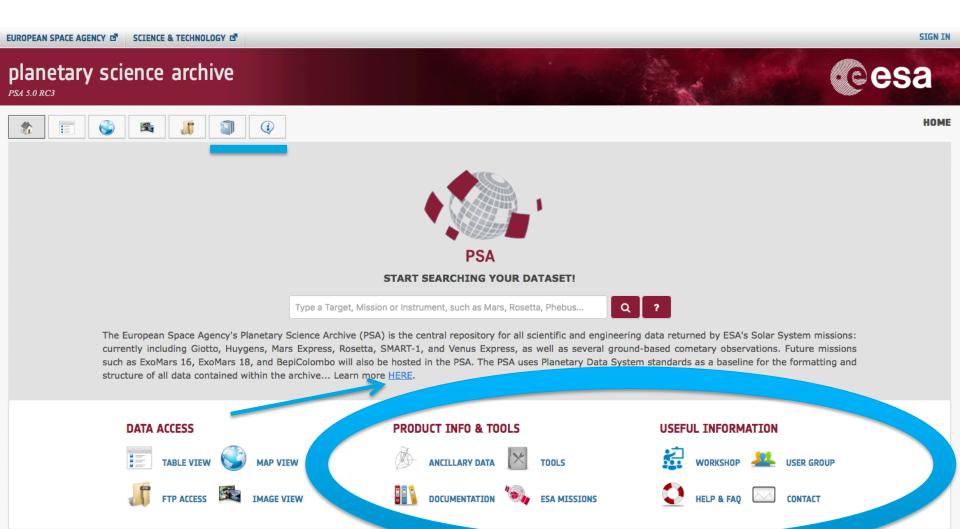
You have the **FTP** 

**Everything is here** 

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Nam		Date Modified	Size	Kind
	CASSINI-HUYGENS	16 Oct 2007 00:00		Folder
	ACP	03 Mar 2009 00:00		Folder
	DISR	16 Oct 2007 00:00		Folder
	DTWG	11 Jun 2011 00:00		Folder
	DWE DWE	17 Oct 2006 00:00		Folder
	▶ GCMS	03 Mar 2009 00:00		Folder
	► HASI	18 Oct 2006 00:00		Folder
	HUYGENS_HK	17 Oct 2006 00:00		Folder
	▶ SSP	27 Mar 2007 00:00		Folder
<b> </b>	EARTH	11 Sep 2009 00:00		Folder
<b> </b>	ExoMars2016	25 May 2016 15:58		Folder
▶	GIOTTO	17 Oct 2006 00:00		Folder
▶	HST HST	17 Oct 2006 00:00		Folder
▼	INTERNATIONAL-ROSETTA-MISSION	03 Jul 2015 00:00		Folder
	▶ ■ ALICE	14 Jan 2016 00:00		Folder
	► CONSERT	24 Aug 2013 00:00		Folder
	► COSAC	31 Jan 2014 00:00		Folder
	► COSIMA	03 Dec 2015 00:00		Folder
	▶ I GIADA	09 Jul 2016 03:00		Folder
	▶ MIDAS	15 Apr 2016 03:00		Folder
	▶ ■ MIRO	15 Aug 2016 03:00		Folder
	▶ NAVCAM	29 Aug 2016 03:00		Folder
	▶ OSINAC	28 Jun 2016 03:00		Folder
	► OSIWAC	28 Jun 2016 03:00		Folder
	▶ ■ ROSINA	09 Jul 2016 08:24		Folder
	▶ ■ RPCICA	16 Jun 2016 03:00		Folder
	▶ ■ RPCIES	19 Apr 2016 03:00		Folder
	► RPCLAP	25 May 2016 14:33		Folder
	► RPCMAG	11 Jul 2016 12:27		Folder
	► RPCMIP	31 Mar 2016 03:00		Folder
	▶ ■ RSI	14 Jan 2014 00:00		Folder
	▶ <b>■</b> SD2	05 Feb 2014 00:00		Folder
	▶ 🔃 SHAPE	15 Apr 2016 14:07		Folder
	▶ ■ SPICE	31 Mar 2016 10:00		Folder
	▶ ■ VIRTIS	05 Aug 2016 03:00		Folder
▶ [	MARS-EXPRESS	19 May 2009 00:00		Folder
▶ [	PSA	13 May 2016 12:36		Folder
▶ [	SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY	20 Aug 2010 00:00		Folder
▶ [	VENUS-EXPRESS	15 Sep 2010 00:00		Folder

#### **More informations on COSMOS**





#### A protected archive ©



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HOME

#### planetary science archive

























#### **PSA**

#### START SEARCHING YOUR DATASET!

Type a Target, Mission or Instrument, such as Mars, Rosetta, Phebus...





The European Space Agency's Planetary Science Archive (PSA) is the central repository for all scientific and engineering data returned by ESA's Solar System missions: currently including Giotto, Huygens, Mars Express, Rosetta, SMART-1, and Venus Express, as well as several ground-based cometary observations. Future missions such as ExoMars 16, ExoMars 18, and BepiColombo will also be hosted in the PSA. The PSA uses Planetary Data System standards as a baseline for the formatting and structure of all data contained within the archive... Learn more HERE.

#### DATA ACCESS









#### **PRODUCT INFO & TOOLS**



ANCILLARY DATA





DOCUMENTATION ESA MISSIONS



#### **USEFUL INFORMATION**









#### **Summary of current status**



- Data from all the past missions and missions in operations are searchable by: Missions, Instruments, Targets, Time, Processing level, instrument types
- 2. Data can be sorted out by various criteria
- 3. Browse products can be seen in the interface, this helps in some case to identify if the product is useful for your purposes
  - → Often not provided by the data provider
- 4. Information and help is provided through the PSA Cosmos website





## What is the PSA?

What is it becomming!

# What are the UPCOMING benefits for science



#### Extra features being developed



### We are working on important updates

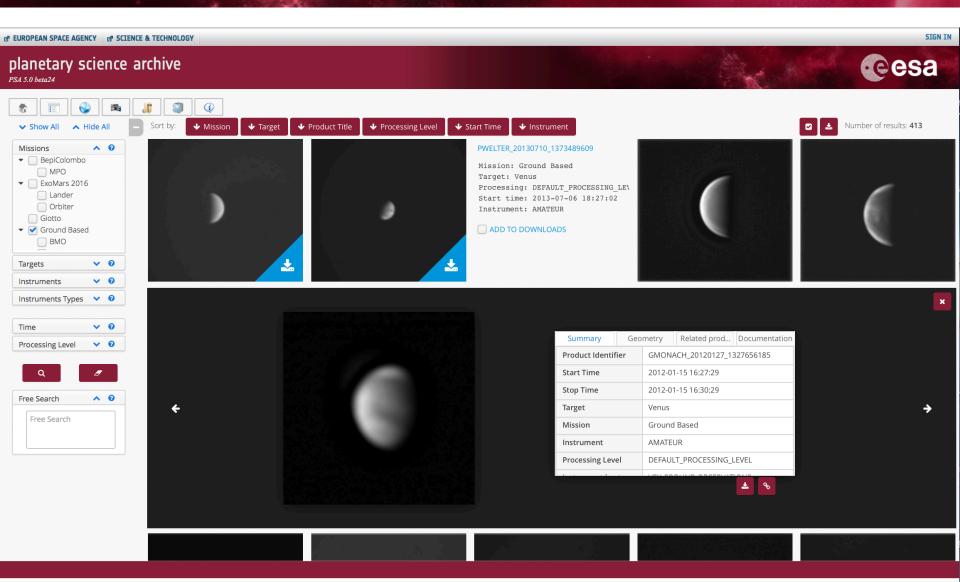
- 1. Image Gallery
  - → Towards the scientific community
  - → Towards the rest of the word
- 2. Geographical Information System (GIS)
  - → Projection of products into the surfaces

Together with an improved reliability on all metadata of the products

PSA is one general tool that offer and will offer different ways to search and visualize datasets

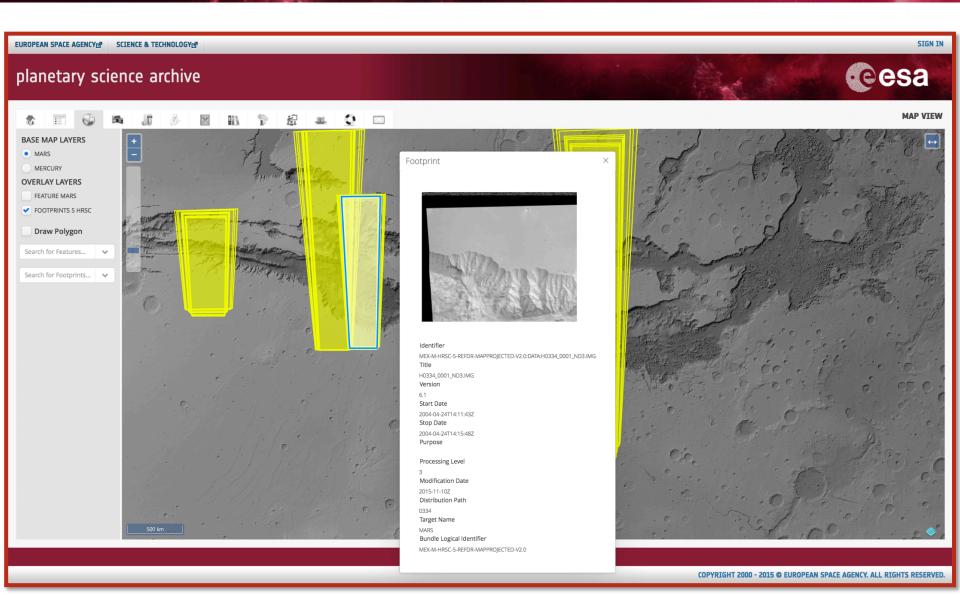
#### **Image Gallery**





#### Geographical Information System (GIS)



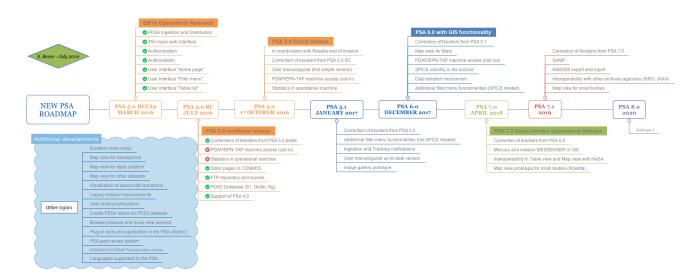


#### Roadmap for the next years



# Roadmap has significantly shifted, but only so that you get more reliable products

- 1. 2016: First release, EM16 Operational archive, PDS4 ready
- 2. 2017: Image Gallery, GIS on Mars, Interoperability prototype
- 3. 2018: BepiColombo Operational archive in PDS4
- 4. 2019, 2020, etc.. (Juice, ExoMars RSP, PDS3 to PDS4, ...)





#### Conclusions



### The upcoming new the PSA will...

- .. Be an operational archive hosting more then 8 Millions scientific products coming from 70 instruments with two different formats (PDS4, PDS3)
- .. Offer multiple functionalities to search and visualize the datasets you need to make new science discoveries
- .. Not be the last one, a busy roadmap for the next 5 years ensures significant improvement for the science usability of ESA's missions
- .. Is the work of many people that are listening for your next inputs, so don't be shy!

