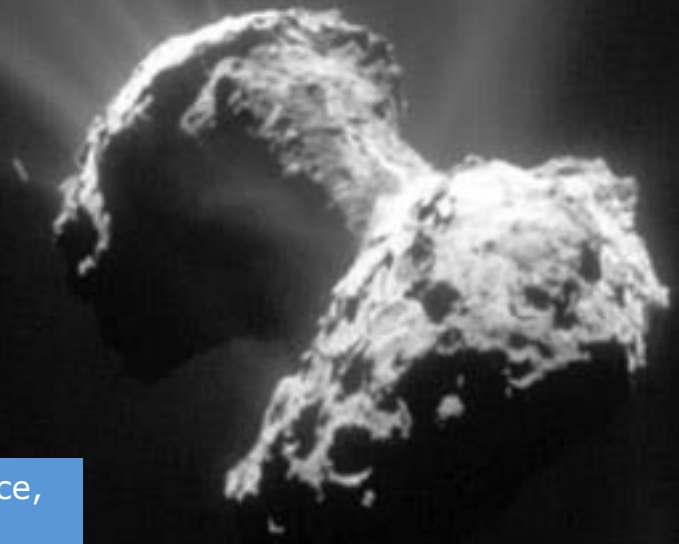
ESA Planetary Science Archive Architecture and Data Management



Christophe Arviset
Head of Data and Engineering Division
ESA Science Directorate
Christophe.Arviset@esa.int

Planetary Science Informatics and Data Analytics Conference,
St Louis, 24/April/2018

@carviset

ESAC Science Data Centre, Madrid, Spain

All ESA Space Science Archives co-located at ESAC

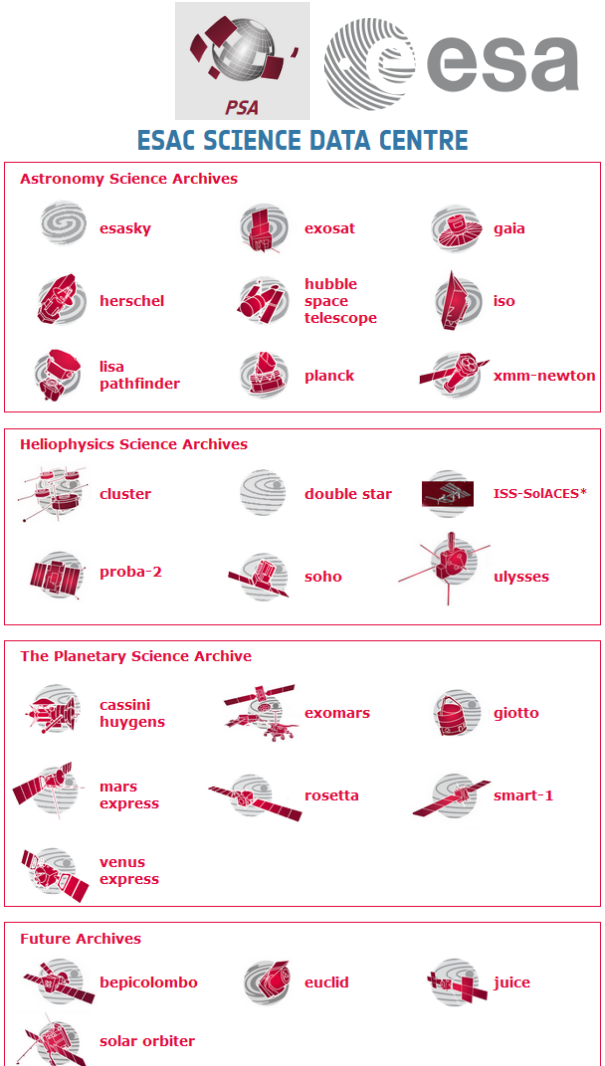
- Astronomy, Planetary, Heliophysics

Science Archives to serve various stakeholders

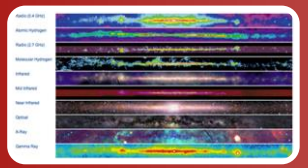
- Scientists (controlled / public access)
- Science Grounds Segments (privilege access)
- Public, media, teachers (public access)

Open data policy

- After a proprietary period defined by the mission
- All data available on-line : archives.esac.esa.int

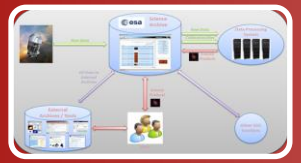


ESA Science Data Archives Strategy



Enable maximum ***scientific exploitation*** of data sets

Enable efficient ***long-term preservation*** of data, software and knowledge, using modern technology



Enable cost-effective archive production by ***integration in, and across, projects***

Planetary Science Archive (PSA)

Repository and added value services of **ESA missions data** for exploration of the Solar System

PSA contains **science datasets**, **documentation** of the instruments, as well as **engineering datasets** of spacecrafts and instruments (i.e., HK)

PSA uses a common format with other international planetary missions, the **Planetary Data System (PDS)**

PSA is committed to provide access to ESA' missions scientific and engineering datasets for **decades to the community**.

Preserving, Presenting and Promoting reliable science data products

ESA Planetary Science Missions

Development

bepicolombo

exomars

juice

Operations

mars express

rosetta

cassini-huygens

smart-1

Post-Operations

giotto

Legacy

venus express

PSA in numbers

10 missions, 76 instruments

- Including in-situ and remote sensing
- 44 more instruments to come by 2022

50TB of data and 12 millions products

- Collected over 20 years

~50 users per day

- Access through GUI and machine access protocols

6TB of data downloaded per month

- MEX HRSC is the most popular, Rosetta OSIRIS and NAVCAM are next

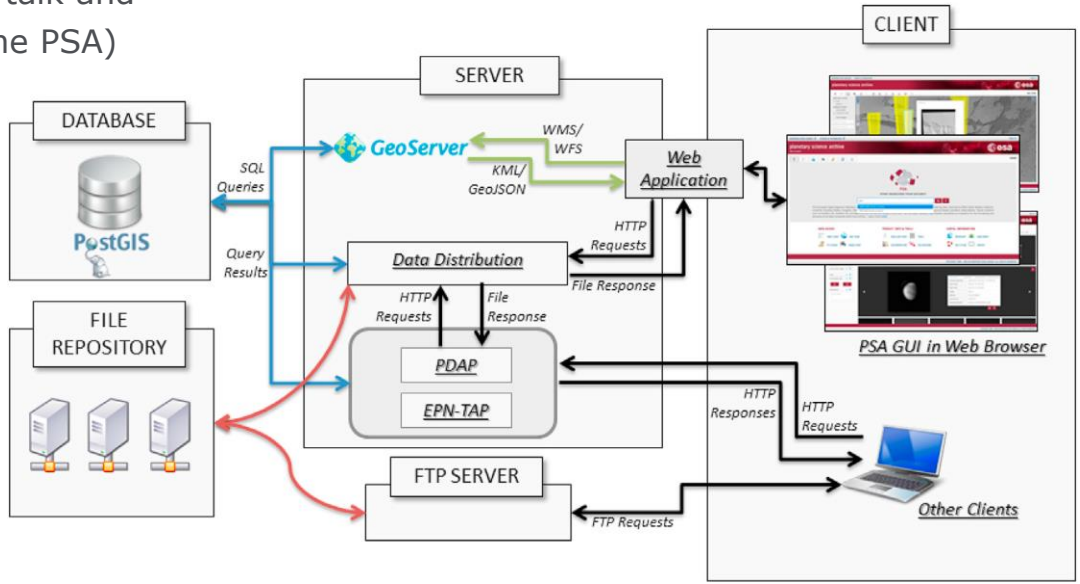
PSA System modular 3-tier Architecture

Stable back-end

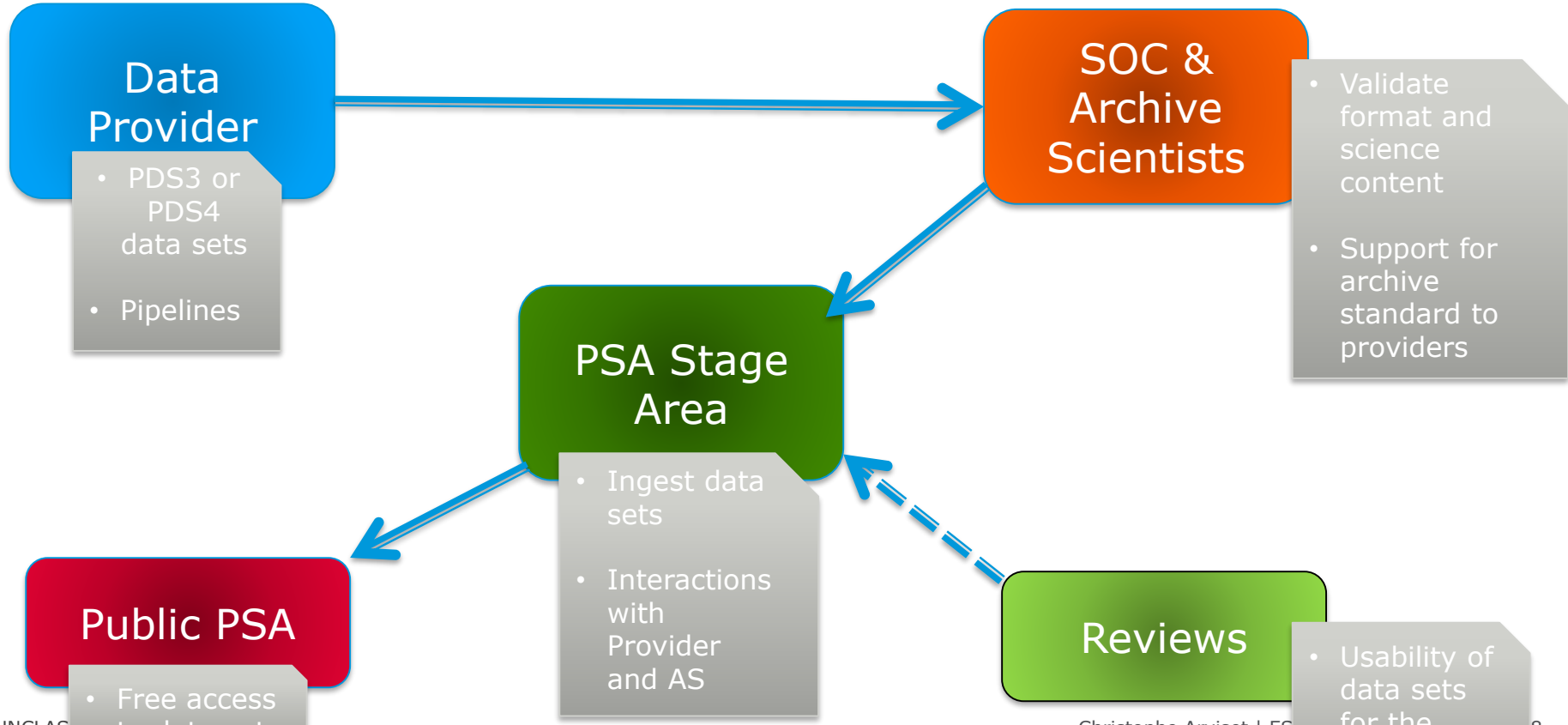
- All science data on on-line disks
- All metadata into RDBMS
- PDS3 and PDS4 Handling (see T.Lim talk and J.Saiz Poster, PDS4 Data and Challenges in the PSA)

Support various types of front-ends

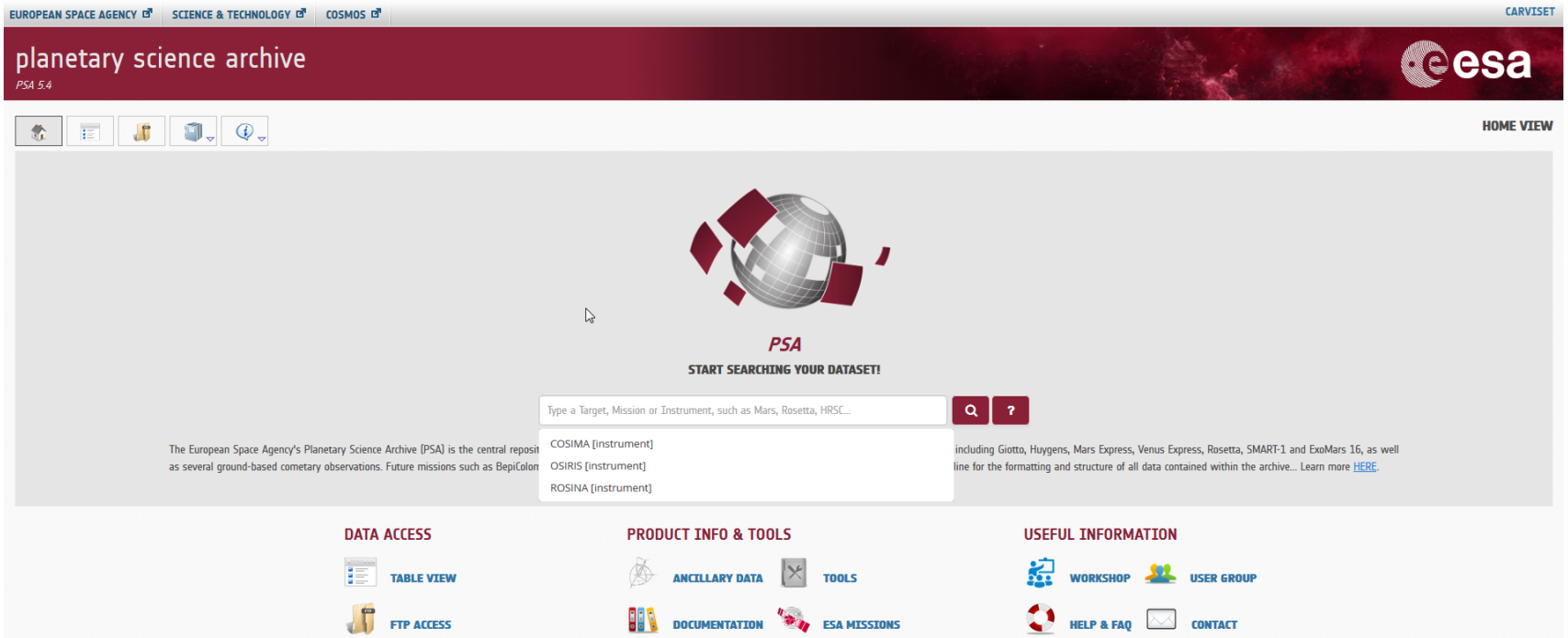
- PSA GUI, web thin layer (Vaadin)
- Machine scriptable interface
- IDPA interoperability standards
- GIS interfaces (to come)

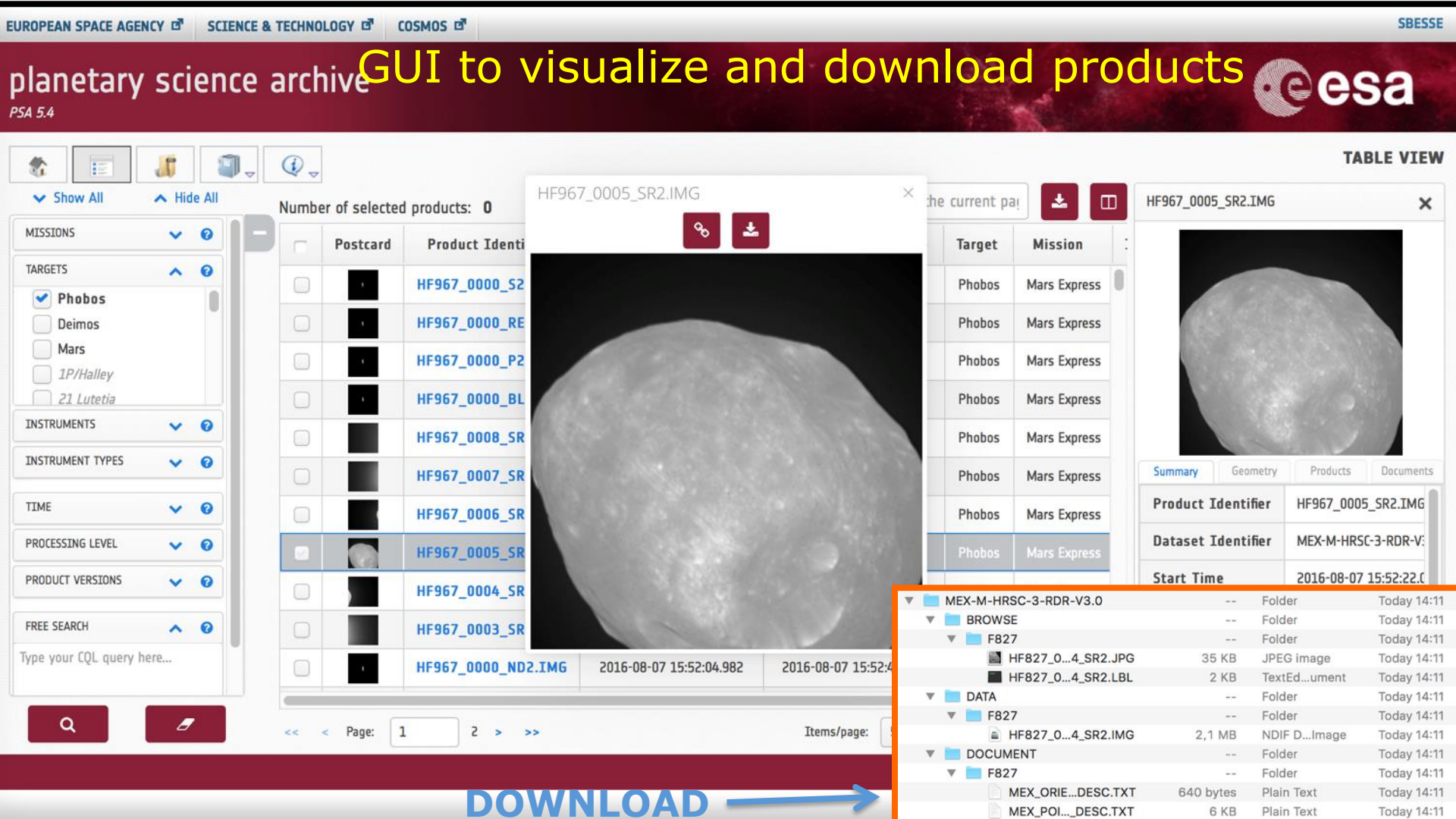


PSA workflow



PSA Services – psa.esa.int




EUROPEAN SPACE AGENCY
SCIENCE & TECHNOLOGY
COSMOS
SBESSE
planetary science archive
PSA 5.4
GUI to visualize and download products
esa
TABLE VIEW
Show All
Hide All
Number of selected products: 0
MISSIONS
TARGETS
Phobos
Deimos
Mars
1P/Halley
21 Lutetia
INSTRUMENTS
INSTRUMENT TYPES
TIME
PROCESSING LEVEL
PRODUCT VERSIONS
FREE SEARCH
Type your CQL query here...
Postcard
Product Identi
Target
Mission
HF967_0000_S2
HF967_0000_RE
HF967_0000_P2
HF967_0000_BL
HF967_0008_SR
HF967_0007_SR
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Page:
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MEX-M-HRSC-3-RDR-V3.0
BROWSE
F827
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35 KB
JPEG image
HF827_0...4_SR2.LBL
2 KB
TextEd...ument
DATA
HF827_0...4_SR2.IMG
2,1 MB
NDIF D...Image
DOCUMENT
MEX_ORIE...DESC.TXT
640 bytes
Plain Text
MEX_POI..._DESC.TXT
6 KB
Folder
Today 14:11
DOWNLOAD

All data also accessible at once via FTP

Index of ftp://psa.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		30/01/2018 09:42:00
GIOTTO		17/10/2006 00:00:00
HST		17/10/2006 00:00:00
INTERNATIONAL-ROSETTA-MISSION		06/02/2018 17:23:00
MARS-EXPRESS		19/05/2009 00:00:00
PSA		13/12/2017 14:45:00
SMALL-MISSIONS-FOR-ADVANCED-RESEARCH-AND-TECHNOLOGY		20/08/2010 00:00:00
VENUS-EXPRESS		15/09/2010 00:00:00
pds		13/12/2017 14:42:00

Index of ftp://psa.esac.esa.int/pub/mirror/INTERNATIONAL-ROSETTA-MISSION/

Up to higher level directory

Name	Size	Last Modified
ALICE		08/05/2017 00:00:00
APXS		10/07/2017 00:00:00
CIVA		06/02/2018 17:23:00
CONSERT		03/04/2017 00:00:00
COSAC		05/09/2017 00:00:00
COSIMA		02/06/2017 00:00:00
GIADA		17/07/2017 00:00:00
LANDER_ANCDR		14/10/2016 00:00:00
MIDAS		21/02/2018 12:00:00
MIRO		23/10/2017 12:00:00
MUPUS		06/02/2018 14:15:00
NAVCAM		28/08/2017 00:00:00
OSINAC		23/02/2018 12:00:00
OSIWAC		23/02/2018 12:00:00
PTOLEMY		22/09/2017 00:00:00
ROLIS		19/05/2017 00:00:00
ROMAP		06/02/2018 17:23:00
ROSINA		30/08/2017 00:00:00
RPCICA		28/08/2017 00:00:00
RPCIES		06/09/2017 00:00:00
RPCLAP		28/02/2018 12:01:00
RPCMAG		20/04/2017 00:00:00
RPCMIP		16/08/2017 00:00:00
RSI		23/02/2018 12:01:00
SD2		07/02/2018 12:00:00
SESAME		05/09/2017 00:00:00
SHAPE		12/01/2018 17:41:00
SPICE		31/03/2016 00:00:00
VIRTIS		23/10/2017 12:00:00

Machine access protocols : PDAP and EPN/TAP

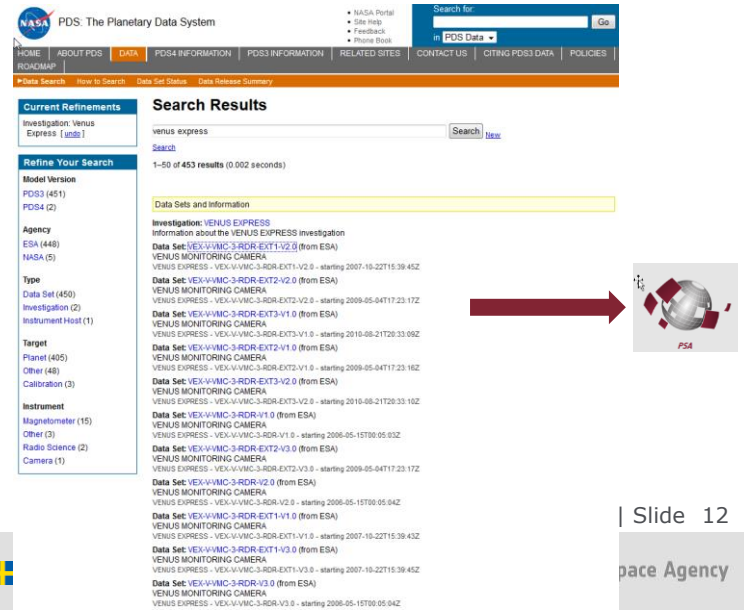
Data interoperability from IPDA protocols

Planetary Data Access Protocol (PDAP)

- PDS/PSA regular exchanges
- To be used to mirror BepiC data in JAXA
- Users query the content of the database

EuroPlanet Table Access Protocol (EPN-TAP)

- PSA/VESPA exchanges
- Users query the content of the database



PSA Archive Image Browser

Easy access to “nice” images from Rosetta NAVCAM and OSIRIS cameras

https://imagearchives.esac.esa.int/

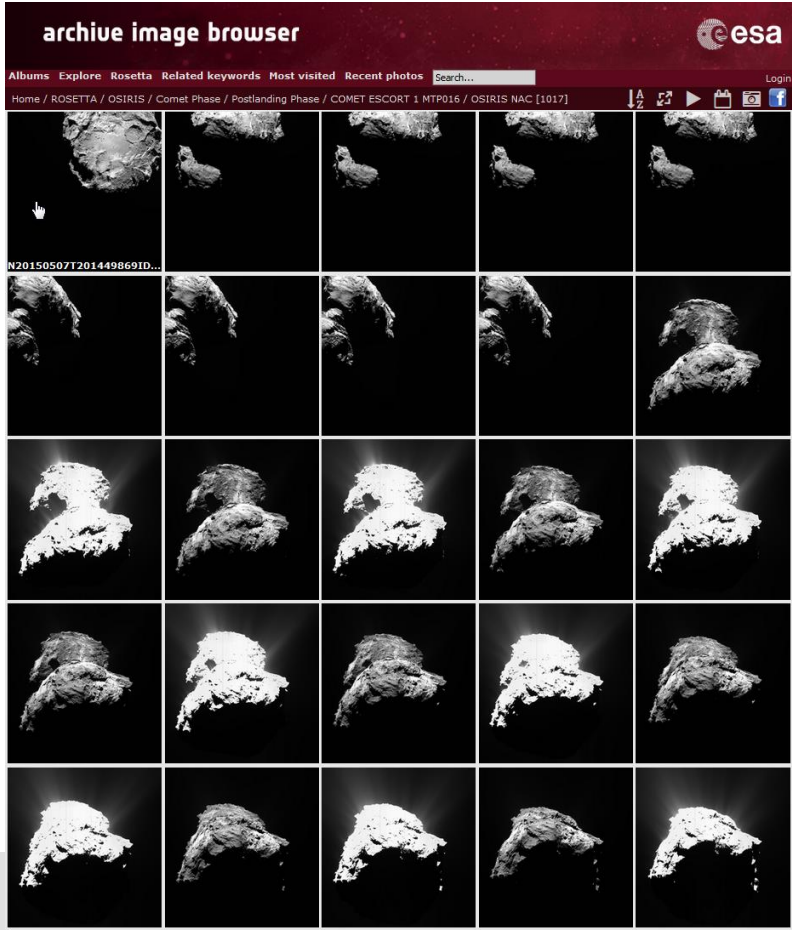
Browsing through images, “flickr” like

Mainly geared towards general public and education

Access to real science data and link to PSA GUI

Could be expanded to other missions

- Planetary and others

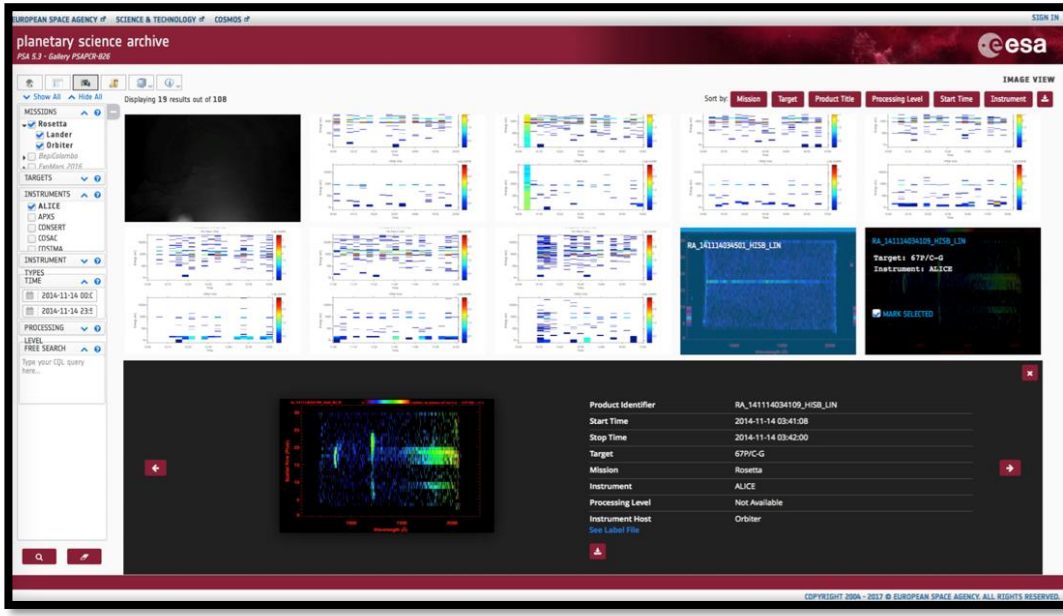


Coming soon: Image Gallery (2018)

Embedded into standard PSA GUI

- Same search criteria
- Return browse products only

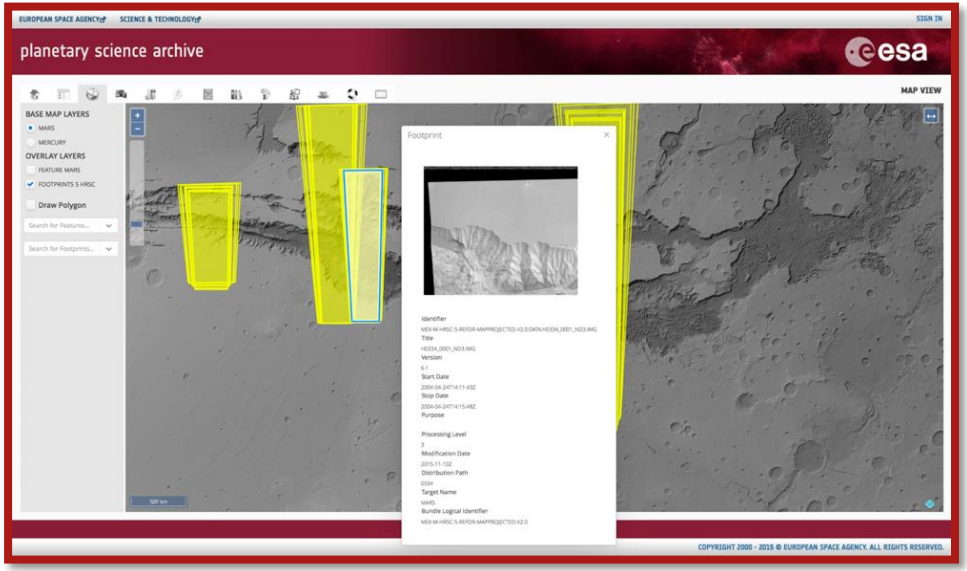
- Towards the scientific community
- Towards general public and education



Coming later: GIS Interface (2019-2020)

Geographical Information System

- Projection of products, retrieval of products from surface
- Needs of uniformed geometry information, interoperability protocols
- Major functionality for planetary science



Combining Mars Express and Exomars

Combining ESA and non ESA missions through IPDA protocols

Planetary Science Archive – psa.esa.int

One science archive offering different ways to search and visualize ESA planetary science datasets for the benefit of planetary science

PSA ensures long time preservation of ESA planetary datasets which is a key aspect of science investigation that takes many years

PSA ensures that archives are accessible to the science community, the general public in a way that will enhance the visibility of ESA's robotic exploration of the Solar System.