Archives 101

Space Science Archives
Why and How?

***Sébastien Besse**, ESA's Planetary Science Archive (PSA) Lead Scientist*

sbesse@sciops.esa.int

Some caveats with my lectures

1. **I am a geologist, a remote sensing (VIS/NIR) scientist**
   → My science is on surfaces of the Moon, Mercury and Small bodies
   → I will not consider heliophysics, although it is part of planetary science

2. **I work with space missions, thus I am much more familiar with Space Agencies Archives (ESA, NASA, ISRO, JAXA, ROSCOMOS etc..)**

   → I will use ESA's archive as a good example of what an archive should be, I am very much biased here obviously! Our interactions should provide feedback for me to improve the archive! I am here to serve you.

3. **I am the science Lead of ESA's Planetary Science Archive since 1 years, thus I do not pretend I know everything**

   → If you realize latter that some statements where inaccurate, apologize in advance. Also be aware that interpretation and judgement is very important in the Archive world, like it is in Science in general ☺

Organisation of Lectures

1. **Space Science Archives Why and How?** Today 15h-16h

→ **You will become supportive of archives**

2. **Practical session – Getting the data you need!** Today 16h30-17h30

→ **You will become the source of "complains" to the archives**

3. **Tools useful for exploring science datasets** Monday 15h-16h

→ **You will become the source of "requirements" to the archives**

4. **Practical session – Understanding you download** Monday 16h30-17h30

→ **You will become the first generation of "archive" educated scientists that will provide "complete and well-documented" datasets to be archived in the future**

What is a Lead Scientist?

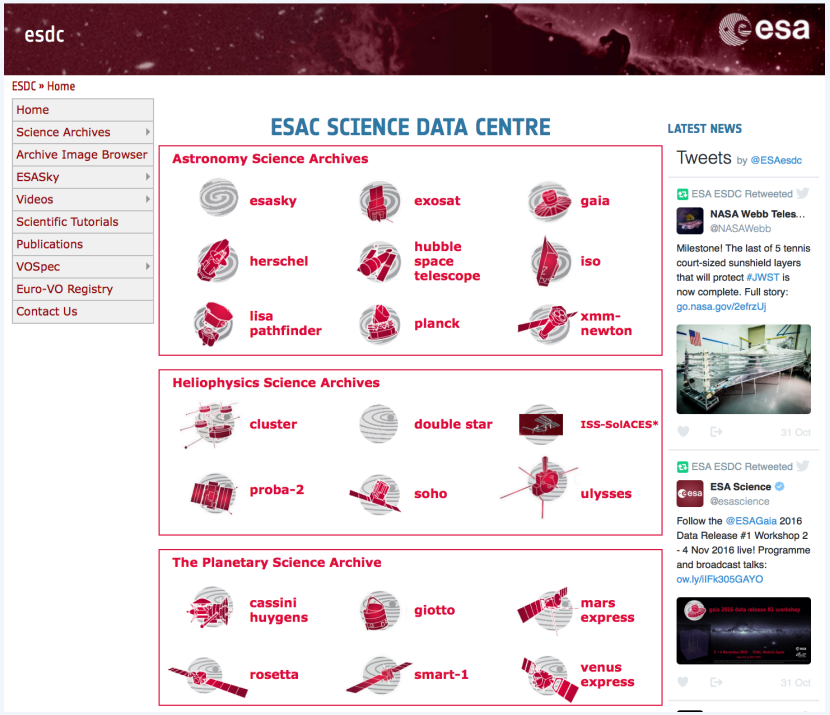
We are 5 persons are ESAC supporting several archives divided in three themes

- Astronomy
- Heliophysic
- **Planetary Science**

Our job is simple to describe

1. Coordinate the development of ESA's archive
2. Improve the science usefulness of ESA's science archives
3. Collect the needs of the science community
4. Implement theses needs as much and fast as possible

ESAC Science Data Centre



http://www.cosmos.esa.int/web/esdc/

What is an archive ?

What is your definition of archiving?

What should be an archive in space science?

What is an archive ?

What is your definition of archiving?

What should be an archive in space science?

PRESERVE and PRESENT RELIABLE SPACE SCIENCE PRODUCTS

- Preserve for several decades in a readable format
- Present to all the stakeholders (scientists, missions, media, citizens, etc..)
- Reliable means science-ready products with appropriate documentation

An archive to whom, for what ?

Present and Preserve reliable space science datasets

To whom?

- Missions in operations/development, Scientists
- Media, Teachers
- Citizens

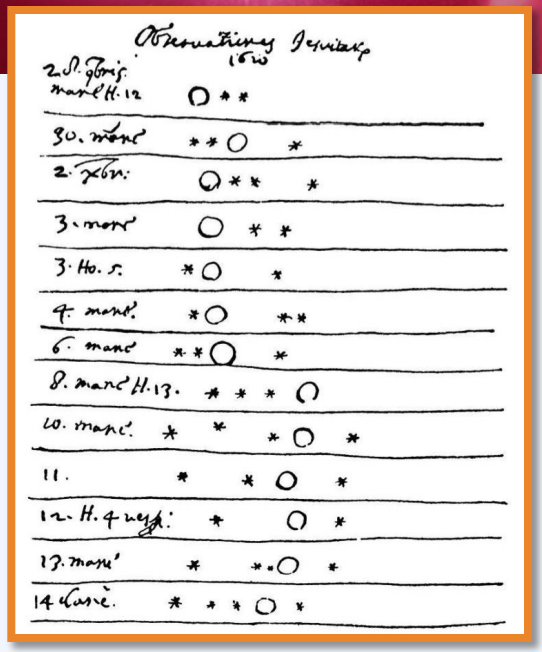
To do what?

- To perform Science, planning of observations
- For education, information and enjoy the Universe

Be sure you are exploring an archive that will address your needs!

A very short history of space science archives

History of Planetary Science Archive



Why are we archiving?

Archiving is done since hundreds of years to preserve knowledge

Since few decades and the migration to digital format, the amount of science products has significantly increased, and we were not ready to archive them.

→ Observations, datasets have been lost!

→ Galileo, Giotto datasets will never be fully recover

It is crucial to preserve all possible information of today's scientific experiments, and in the mean time to recover experiments from the past

History of Planetary Science Archive

Exploration to the Moon (60's)

- Preserve all the photography of the lunar surface
- Preserve the lunar samples (2/3 kept for future generations)

Exploration of Halley's comet (80's)

- The international community initiated a huge effort for preserving the datasets from this historical event
- The **PDS Initiative** started with this

The Rosetta mission (00's)

- The European Scientific community asked for a plan to preserve the upcoming datasets
- **ESA's Planetary Science Archive** started in 2004

History of Planetary Science Archive

Archiving your datasets (10's)

- NASA ROSES, you have to propose a data management plan
- No real equivalent in Europe….yet

Cite the source of your data (15's)

- Journals are now asking authors to describe where the data have been collected
- Archives are working on this as well to simplify and enhance the access to scientific datasets

Moving to the big data era (now)

- **Gaia** is producing Terabytes of data
- **Rosetta** has double the volume of data in the PSA archive

Let's go in the details of

WHY and HOW

Archives 101

Space Science Archives WHY and how?

1. To ensure we preserve experiments
    a. Not repeat the same experiment several times
    b. Monitor over long period of time (e.g, Solar Activity over 40 years!) This is important for active objects!

2. To maximize the science exploitation of datasets
    a. Duplication/Verification of science results
    b. Discovery of new scientific results

Archives 101

Space Science Archives why and HOW?

If the **WHY** is relatively straightforward, the **HOW** is subject to everything we discussed before and to the interpretation of humans ...

The **HOW** is driven by the two questions we discussed before

1. To Whom?
2. For What?

IAC winter school audiance

For Scientists (who)

To do Science (what)

This is the general targets that scientific archives are addressing.

Thus, HOW do you reach this goal?

What are the key needs of an archive

1. Obtain products to archive
    a. From Instrument PIs
    b. From Scientists

2. Qualify the products that will be archived
    a. Readable format for decades
    b. Scientifically relevant and reviewed

3. Distribute the archived products
    a. Distribute products to the community
    b. Develop tools to help searching through and ever increasing number of science products

What are the key needs of an archive

1. Obtain products to archive

a. From Instrument PIs

For Space missions, PIs have obligations to deliver all the observations they have performed with the experiment: Calibration and Science.

→ Raw and Calibrated products

For ground-based or laboratory experiments, fewer rules that results in fewer products being preserved

b. From Scientists

Derived science products can also be archived to help in the progression of science (e.g., mineralogical maps of sulfates on Mars, temperature profile in Venus atmosphere, etc…)

Based on the will of scientists to do some effort to properly archive those products
Based on the ability of an archive to welcome these products

What are the key needs of an archive

2. Qualify the products that will be archived
    a. **Readable format for decades**

The *International Planetary Data Alliance* recommend the use of the **P**lanetary **D**ata **S**ystem (PDS) format to archive science datasets. Space Agency are enforcing this format.

This ensure a long term readable format, which might not be the case for a datasets you archive locally, yourself, at your institute. The cost is that it is an effort to be compliant to this standard. The benefit is forever.

    a. **Scientifically relevant and reviewed**

Archives should scientifically review the datasets being archived to ensure scientific usefulness of the products. This include for the most important, 1) an appropriate scientific calibration, and 2) a thorough documentation of the experiment, its observations and calibrations

Space agencies perform scientific peer-review

What are the key needs of an archive

3. Distribute the archived products

   a. Distribute products to the community

Ensure that your audience has access to all the relevant products in the most simple way possible.

This is often done by an ftp-like download of the experiment products

   b. Develop tools to help searching through and ever increasing number of science products

Facilitate the search of datasets with the use of « metadata » to narrow-down the scientific product needed for the science objectives.

This is today's hot topic that helps improving the science usefulness of an archive (e.g., OSIRIS camera has >100.000 images of 67P/C-G).

Why do you need to be aware of this ?

You will probably be upset because you will not find the datasets you want although you are certain they exists!

This could be because

1. They are not archived (e.g., TRAPPIST observations of comets)

2. They are not compliant with the standard or have not been reviewed as scientifically correct (e.g., VIRTIS observations of asteroid (2867) Steins)

3. The product are not easily searchable in the archives, because the data provider did not described properly his datasets and/or because the archive has no mean to search for this type of observations (e.g., Occultation to see VENUS atmosphere with Venus Express instruments)

Archives 101

Space Science Archives why and HOW?

1. By obtaining scientific datasets from the community, datasets that are well described
    a. Archives relies 100% on the community they serve
    b. Archives have the responsibility to archive scientifically validated products

2. By presenting these products in a meaningful way
    a. This is the hot topic, more details on this upcoming

Archives 101

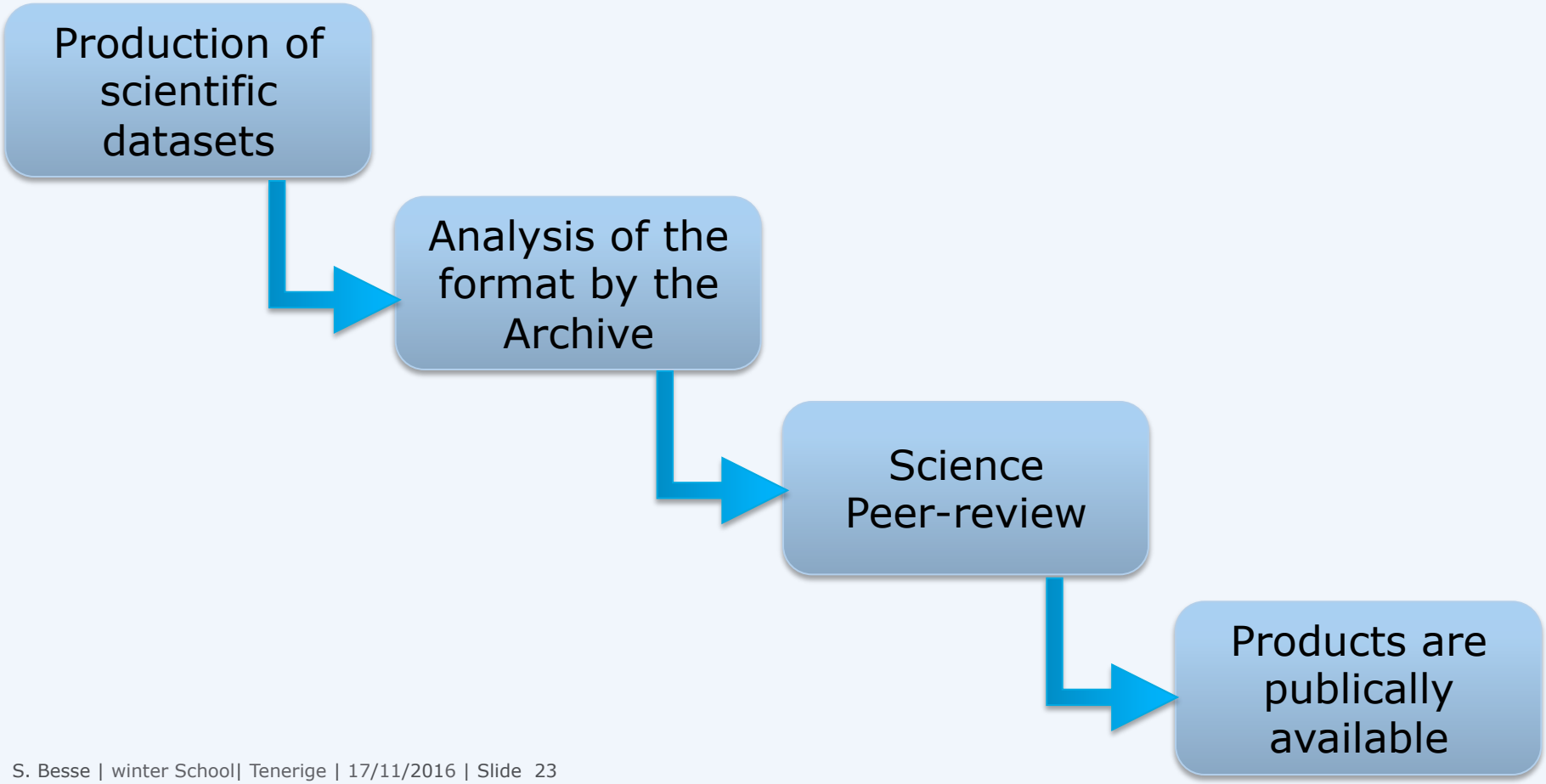
HOW

Few points need further details and information

1. Delivery mechanism to a Space Agency Archive
2. Planetary Data System – PDS
3. Science Review

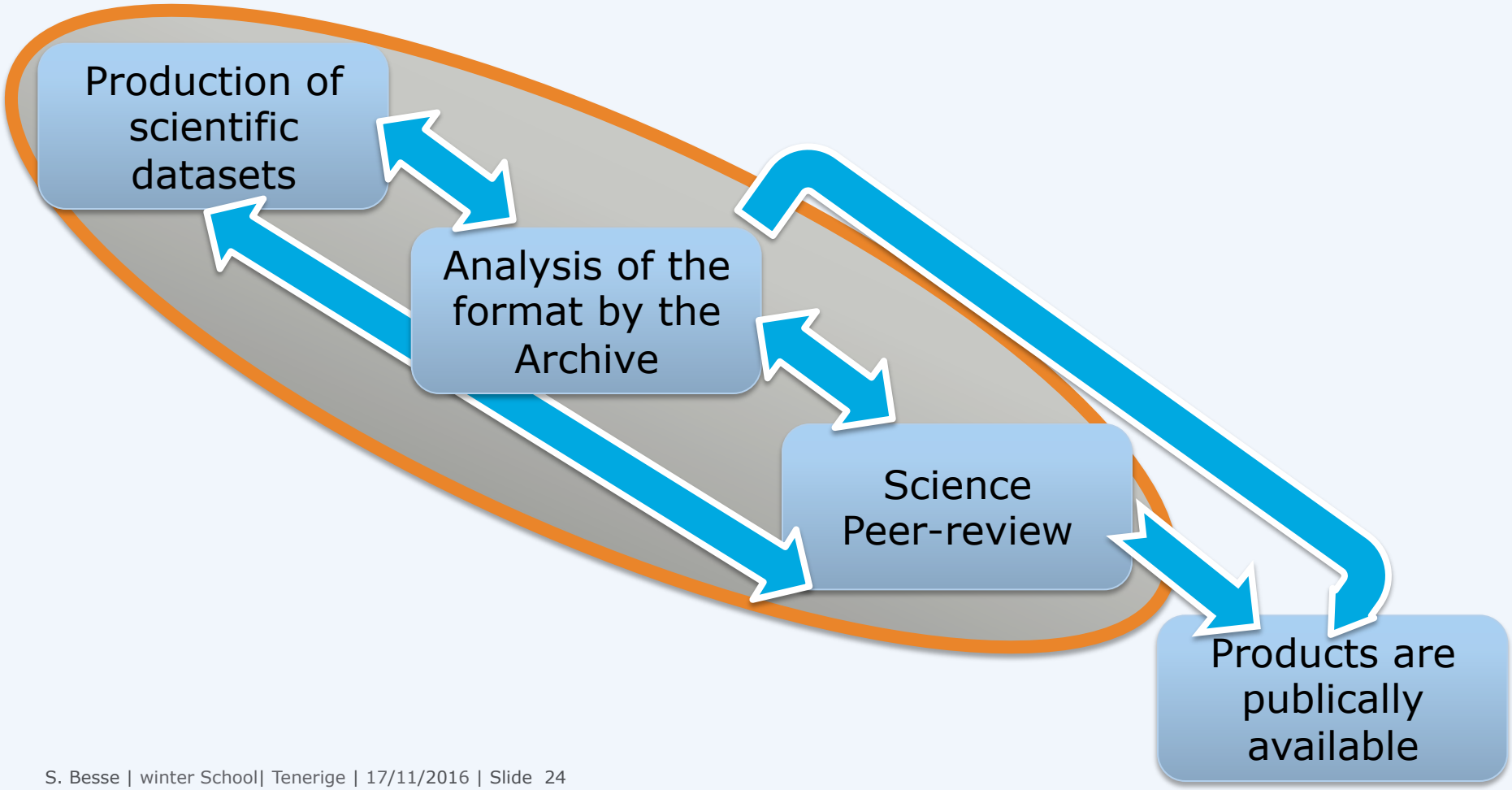
Delivery Mechanism to an archive

Here, we assume an archive that use the PDS standard



Delivery Mechanism to an archive

Here, we assume an archive that use the PDS standard



Planetary Data System standard

PDS is a standard to ensure long term preservation of datasets

It currently uses the version 3 (PDS3). Since 2014, new missions are using the version 4 (PDS4) which is simpler to implement and developp.

PDS3/4 define how your archive should be structured, what are the keywords to use (e.g., primary, secondary, etc..), and how metadata should be filled (e.g., string or float values).

PDS3/4 define the content and the format of your data. An external user/provider might found that it is “too much”, but this is meant to ensure long-long term preservation of the data.

ExoMars 16, BepiColombo, Osiris-Rex are using PDS4

Rosetta, MarsExpress, Mars Reconnaissance Orbiter use PDS3.

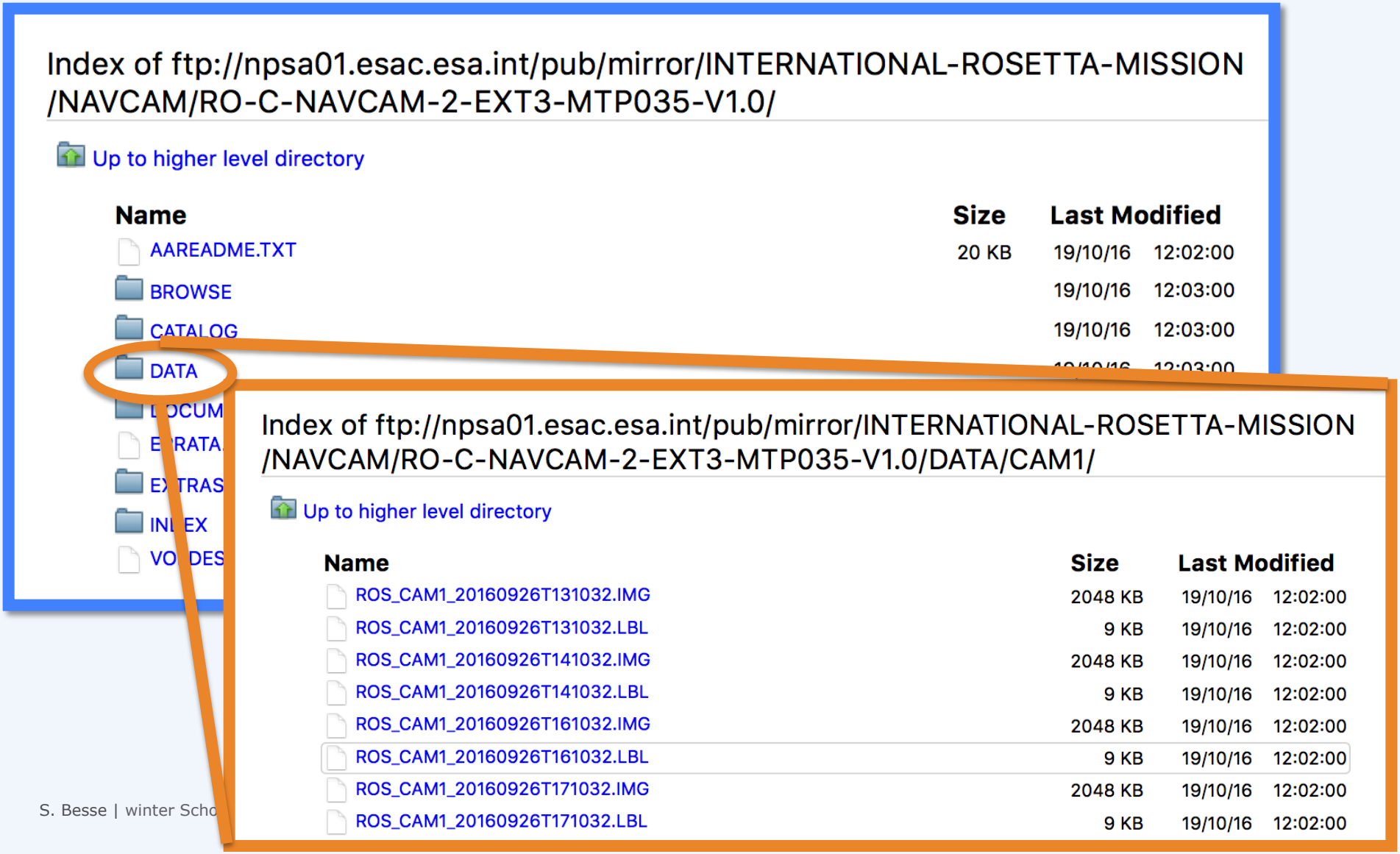
Planetary Data System standard

Index of ftp://npsa01.esac.esa.int/pub/mirror/INTERNATIONAL-ROSETTA-MISSION/NAVCAM/RO-C-NAVCAM-2-EXT3-MTP035-V1.0/

Up to higher level directory

Name	Size	Last Modified
AAREADME.TXT	20 KB	19/10/16 12:02:00
BROWSE		19/10/16 12:03:00
CATALOG		19/10/16 12:03:00
DATA		19/10/16 12:03:00
DOCUMENT		19/10/16 12:03:00
ERRATA.TXT	2 KB	19/10/16 12:01:00
EXTRAS		19/10/16 12:03:00
INDEX		19/10/16 12:03:00
VOLDESC.CAT	4 KB	19/10/16 12:01:00

Planetary Data System standard



Index of ftp://npsa01.esac.esa.int/pub/mirror/INTERNATIONAL-ROSETTA-MISSION/NAVCAM/RO-C-NAVCAM-2-EXT3-MTP035-V1.0/

Up to higher level directory

Name	Size	Last Modified
AAREADME.TXT	20 KB	19/10/16 12:02:00
BROWSE		19/10/16 12:03:00
CATALOG		19/10/16 12:03:00
DATA		
DOCUM		
ERRATA		
EXTRAS		
INDEX		
VOLDES		

Index of ftp://npsa01.esac.esa.int/pub/mirror/INTERNATIONAL-ROSETTA-MISSION/NAVCAM/RO-C-NAVCAM-2-EXT3-MTP035-V1.0/DATA/CAM1/

Up to higher level directory

Name	Size	Last Modified
ROS_CAM1_20160926T131032.IMG	2048 KB	19/10/16 12:02:00
ROS_CAM1_20160926T131032.LBL	9 KB	19/10/16 12:02:00
ROS_CAM1_20160926T141032.IMG	2048 KB	19/10/16 12:02:00
ROS_CAM1_20160926T141032.LBL	9 KB	19/10/16 12:02:00
ROS_CAM1_20160926T161032.IMG	2048 KB	19/10/16 12:02:00
ROS_CAM1_20160926T161032.LBL	9 KB	19/10/16 12:02:00
ROS_CAM1_20160926T171032.IMG	2048 KB	19/10/16 12:02:00
ROS_CAM1_20160926T171032.LBL	9 KB	19/10/16 12:02:00

Planetary D

Index of ftp://npsa(
/NAVCAM/RO-C-NA

Up to higher level direc

Name

AAREADME.TXT
BROWSE
CATALOG
DATA
DOCUM
ERRATA
EXTRAS
INDEX
VOLDES

```
PDS_VERSION_ID                  = PDS3

/***       FILE CHARACTERISTICS                                          ***/
FILE_NAME                       = "ROS_CAM1_20160926T131032.LBL"
RECORD_TYPE                     = FIXED_LENGTH
RECORD_BYTES                    = 2048
FILE_RECORDS                    = 1024
INTERCHANGE_FORMAT              = BINARY

/***       POINTERS TO DATA OBJECTS                                      ***/
^IMAGE                          = ("ROS_CAM1_20160926T131032.IMG",1)

/***       IDENTIFICATION DATA ELEMENTS                                  ***/
DATA_SET_ID                     = "RO-C-NAVCAM-2-EXT3-MTP035-V1.0"
DATA_SET_NAME = "ROSETTA-ORBITER 67P NAVCAM 2 ROSETTA EXTENSION 3 MTP035 V1.0"
PRODUCT_ID                      = "ROS_CAM1_20160926T131032"
PRODUCT_CREATION_TIME           = 2016-10-13T10:19:39
PRODUCT_TYPE                    = EDR
PROCESSING_LEVEL_ID             = "2"
IMAGE_TIME                      = 2016-09-26T13:10:32.205
START_TIME                      = 2016-09-26T13:10:32.195
STOP_TIME                       = 2016-09-26T13:10:32.215
SPACECRAFT_CLOCK_START_COUNT    = "1/433516142.50017"
SPACECRAFT_CLOCK_STOP_COUNT     = "1/433516142.51327"
MISSION_ID                      = "ROSETTA"
MISSION_NAME                    = "INTERNATIONAL ROSETTA MISSION"
MISSION_PHASE_NAME              = "ROSETTA EXTENSION 3 MTP035"
INSTRUMENT_HOST_ID              = RO
INSTRUMENT_HOST_NAME            = "ROSETTA-ORBITER"
TARGET_NAME                     = "67P/CHURYUMOV-GERASIMENKO 1 (1969 R1)"
TARGET_TYPE                     = "COMET"
OBSERVATION_TYPE                = "NAVIGATION IMAGE"
PRODUCER_ID                     = "ESA-ESAC"
PRODUCER_FULL_NAME              = "BERNHARD GEIGER"
PRODUCER_INSTITUTION_NAME       = "EUROPEAN SPACE AGENCY-ESAC"
```

Index
/NAV
Up

ON

ROS_CAM1_20160926T131032.LBL	9 KB	19/10/16	12:02:00
ROS_CAM1_20160926T141032.IMG	2048 KB	19/10/16	12:02:00
ROS_CAM1_20160926T141032.LBL	9 KB	19/10/16	12:02:00
ROS_CAM1_20160926T161032.IMG	2048 KB	19/10/16	12:02:00
ROS_CAM1_20160926T161032.LBL	9 KB	19/10/16	12:02:00
ROS_CAM1_20160926T171032.IMG	2048 KB	19/10/16	12:02:00
ROS_CAM1_20160926T171032.LBL	9 KB	19/10/16	12:02:00

Planetary Data System standard

PDS is a standard to ensure long term preservation of datasets

There are tools to help you working with the PDS standard (e.g., READPDS (IDL), NASAVIEW to read images, etc..)

PDS standard is flexible, you can both have .IMG or .FITS, you can have ascii/ binary table, everybody will be equally unhappy ☹

PDS3 flexibility has reached is limit, PDS4 is much better structured for flexibility of all the planetary science data.

One of the work of the archives now is to clean 15 years of PDS3 divergence and merge it with PDS4 new structure...

Science peer-review

At this stage, we have a PDS compliant datasets

The Archive should consults the potential users of the datasets and ask them to perform a scientific review (i.e., exactly the same as a scientific publication).
Typically, three questions are asked to the reviewers:

1. Can you reproduce scientific results published in the literature?
2. Is the description of the instruments, the calibration, and all the observations sufficiently documented?
3. Is there anything that could mislead the use of the datasets by scientists, in the calibration, in the documentation, in anything?

Reviewers raise concerns, this is presented to the instrument science team to be discussed.
Science teams will often accept the issue and change the datasets for the archive, revision of the previous archives and/or update of the upcoming ones.

Archives 101

Space Science Archives

Examples of some Archive actors

Space Agencies

NASA : PDS, divided in Nodes, All Nasa's missions and instruments exploring the Solar system. Some ground-based supporting missions or targets of the Solar system.
It does not take into account missions dedicated to the Sun-Earth interactions.
pds.nasa.gov

ESA : PSA, all ESA's missions exploring the Solar System. Some ground-based supporting missions (Venus Express, Rosetta upcoming).
It does not take into account missions dedicated to the Sun-Earth interactions.
psa.esa.int

JAXA : Darts, All JAXA's mission exploring the Solar System.

darts.isas.jaxa.jp

ROSCOSMOS : Internal to distribute products to mission scientists

ISRO, **CNSA**, and others are developing very fast

PDS: The Planetary Data System

HOME | ABOUT PDS | PDS4 | DATA | TOOLS & DOCUMENTS | RELATED SITES | CONTACT US | CITING PDS3 DATA | POLICIES | ROADMAP

New Releases

November 7, 2016
Nasaview (3.14.0)
October 6, 2016
Cassini Data Release 47
October 1, 2016
Odyssey Data Release 57
September 20, 2016
PDS Data Dictionary 1R99 Release
Previous Releases
Get notified of new releases

Quick Searches

Mars Science Laboratory
Mercury
Venus
Mars
Jupiter
Saturn
Uranus, Neptune, Pluto
Rings
Asteroids
Comets
Planetary Dust
Earth's Moon
Solar Wind

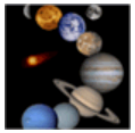
PDS Nodes

Atmospheres
Geosciences
Cartography and Imaging Sciences
Navigational & Ancillary Information (NAIF)
Planetary Plasma Interactions (PPI)
Ring-Moon Systems
Small Bodies

Community Announcement:

PSD's Approach to Data Management Plans (DMPs) and ROSES Data Management Plans for PDS Archiving are the presentations shown at the "Writing Data Archive Plans Workshop" held at the LPSC Monday, March 21, 2016.

Welcome to the PDS



The PDS archives and distributes scientific data from NASA planetary missions, astronomical observations, and laboratory measurements. The PDS is sponsored by NASA's Science Mission Directorate. Its purpose is to ensure the long-term usability of NASA data and to stimulate advanced research. All PDS data are publicly available and may be exported outside of United States under "Technology and software Publicly Available" (TSPA) classification. Learn more about PDS.

If you are an individual proposer preparing a proposal to a NASA Research and Analysis (R&A) program, you can start from here.

If you're beginning a new archiving project, you must use PDS4 and you can start from here.

If you're developing a dataset in response to Planetary Data Archiving, Restoration and Tools (PDART), you can start from here.

If you're developing a dataset in response to SMALL INNOVATIVE MISSIONS FOR PLANETARY EXPLORATION (SIMPLEx) , you can start from here.

Researchers

Search or browse for data sets

Get notified (subscribe) when new data becomes available

Find images from planetary missions

Find tools for viewing and working with PDS data

Learn about PDS data format and structure

Data Providers

PDS3 Archiving Standards

PDS4 Archiving Standards and Documents

PDS Node Contacts

Data Reviewers

The peer review process

PDS Node Contacts

Proposers

Information for PDS3 proposers

Information for PDS4 proposers

Response to PDART

Response to Discovery AO

Response to SALMON-2 AO

Response to SIMPLEx

ROSES 2008-2016 support in the PDS

Archiving Check-list for PI-Led Proposals

EUROPEAN SPACE AGENCY | SCIENCE & TECHNOLOGY | COSMOS | SIGN IN

planetary science archive

PSA 5.0 RC5

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, Venus Express, Rosetta, SMART-1 and ExoMars 16, as well as several ground-based cometary observations. Future missions such as 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

TABLE VIEW | MAP VIEW

FTP ACCESS | IMAGE VIEW

PRODUCT INFO & TOOLS

ANCILLARY DATA | TOOLS

DOCUMENTATION | ESA MISSIONS

USEFUL INFORMATION

WORKSHOP | USER GROUP

HELP & FAQ | CONTACT

DARTS Data Archives and Transmission System

Google Search

- For Researchers
- ▶ DATA
  - - HTTP
- ▶ Space Astronomy
  - - Suzaku
  - - ASCA
  - - Ginga
  - - Tenma
  - - AKARI
  - - IRTS
  - - HALCA
- ▶ Solar System Science
  - - Hinode
  - - Yohkoh
  - - Hisaki
  - - Reimei
  - - Geotail
  - - Akebono
  - - HAYABUSA
  - - KAGUYA
  - - AKATSUKI
  - - SMILES
  - - APOLLO(NASA)
  - - Viking(NASA)
  - * Sample Curation Data
- ▶ Microgravity Science
  - - Kibo

▶ Japanese

Data ARchives and Transmission System (DARTS) is a multi-disciplinary space science data archive for, e.g., astrophysics, solar physics, solar-terrestrial physics, lunar and planetary science, and microgravity science. Please read "About DARTS".

News & Announcements

▶ System Maintenance

(1 Nov. 2016) For maintenance activities, service becomes unavailable in the following periods. We are sorry for your inconvenience.
2016-11-2 10:00 -- 15:00 (JST)

Old News & Announcements

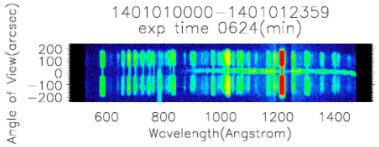
Recent Topics

Full-release of the SELENE (KAGUYA) High Definition Television (HDTV) data

All the data taken by the high definition television (HDTV) onboard the SELENE (KAGUYA) lunar orbiter are released. The SELENE HDTV was developed in cooperation with JAXA and NHK, and it took full HD images all around the Moon. Originally, operations was planned for one-year, but in the end, the instrument took more than 600 movies over the full 21 month SELENE mission life. Considering high scientific values of the HDTV data, DARTS opens the whole movies and still images that are extracted from the high resolution movies.
The image in the right-hand side (click to start movie) indicates the "earth-set" in the south-pole region, where many countries are planning to land and explore in near future. (September 2016)

EXCEED data on-board "Hisaki" released

The dataset of the extreme ultraviolet spectroscope (EXCEED) onboard the Hisaki satellite is now published on DARTS. Hisaki started a big observing campaign for Jupiter's aurora and plasma from May 2016 in collaboration with the JUNO explorer and Hubble space telescope. This campaign will uncover plasma accelerations and heating at magnetic rotators. (August 2016)



Other archives groups, structures

Sun-Earth datasets

Cluster Science Archive (http://www.cosmos.esa.int/web/csa)
SolACES (http://isssolac.esac.esa.int/iss-solaces/index.html)
Soho (https://sohowww.nascom.nasa.gov/data/archive/index_ssa.html)
Nasa CDA (http://cdaweb.gsfc.nasa.gov)

Laboratory archives

Grenoble spectral database (http://ghosst.osug.fr)

Relab (http://www.planetary.brown.edu/relab/)

VESPA (http://vespa.obspm.fr/planetary/data/epn/query/all/)

Astronomy archives

Herschel (http://www.cosmos.esa.int/web/herschel/science-archive)

Hubble, eHST (http://archives.esac.esa.int/ehst/)

NASA REFLECTANCE EXPERIMENT LABORATORY

RELAB Users Manual and Instructions:
-PDF format
-Word format

RELAB Publications:
-by author
-by date

Data:
>RELAB SPECTRAL DATABASE
-Related Data Collections

Software:
-Modified Gaussian Model (MGM) software

RELAB Spectral Database

Proper Acknowledgment:

The above copyright notice essentially says RELAB Public data can be used freely except for any commercial purposes or product. A copyright tag should go with the data so its origin doesn't get lost when passed from hand to hand.

When any data from the RELAB Public Database are used or presented in a research presentation, document, or publication, the PI and the source of the data should be acknowledged. A typical acknowledgment would include: "This research utilizes spectra acquired by <investigator's name(s)> with the NASA RELAB facility at Brown University."

Please send the RELAB Operator Takahiro Hiroi reference information for any publication resulting from the use of RELAB data so it can be included in the RELAB bibliography available on the web.

Home Search User

GhoSST

"Grenoble Astrophysics and Planetology Solid Spectroscopy and Thermodynamics" database service

Last news:

- February 4th 2014: **GhoSST v0.6 online!**
- September 25th 2012: **First public version of GhoSST online!**

The GhoSST service contains:

- An **experimental database on "spectroscopy of solids"** of planetary and astrophysical interests. It covers different types of natural and synthetic solid samples (molecular solids / ices, minerals and rocks, organics and carbonaceous materials, meteorites, ...) measured with various spectroscopic techniques from the VUV to the mm ranges (transmission, reflectance, Raman and Fluorescence emissions, microscopy, ...) and providing their spectra, as well as a list of their absorption bands (molecular solids only).

  This **solid spectroscopic database** provides to the community various sets of laboratory data necessary for the analysis of the numerous spectroscopic observations of surfaces, atmospheric aerosols and grains of the solar system objects (planets, satellites, asteroids, comets, TNO, ...), and of interstellar and circum-stellar grains generated by the planetary space missions, space-born observatories and ground-based telescopes. It will be also of strong use by scientists performing laboratory experiments on solids samples or analyzing samples of extraterrestrial matter. Part of these data will be also useful for many terrestrial studies (glaciology and snow studies, aerosols, geology, etc.).

  This database is online since September 25th 2012 and in the process of data ingestion.

- A **database on the "physical properties molecular solids"** based on bibliographical reviews and critical analyses of published data (measurements, theoretical calculations ...) completed by our own measurements and computations. It should to allow astrophysicists, planetary scientists and geophysicists to model the various physical processes of the universe involving molecules in the condensed state and their exchanges with the gas phase. The development of this database still needs to be funded.

All VO | Custom resource | Direct Query | Advanced Query | Help

Submit | Reset

Main Parameters

Target Name

Granule UID

Granule GID

Obs ID

Time selection

Data range is included in

Time Min

Target Class

Asteroid
Comet
Dwarf Planet
Exoplanet

Dataproduct Type

Catalog
Cube
Dynamic Spectrum
Image

Measurement Type

The range between

Time Max

Plotting tools

- TOPCAT
- Aladin
- SPLAT
- CASSIS
- 3DView

Example queries

Saturn in March 2012

Archives 101

Space Science Archives

Some numbers for ESA's Planetary Science archive

Numbers of the PSA

12 men-year

→ development of new archives (ExoMars 2016, BepiColombo)

→ populating active archives (Rosetta, MarsExpress)

→ preserve legacy missions (Giotto, Vex, Smart-1, Huygens)

70 instruments

→ Including in-situ Vs. remote sensing

→ 50 more upcoming by 2024 (JUICE, BepiColombo, Exomars RSP)

45 TB of data

→ coming from 70 instruments, 8 missions, spread over 20 years

→ 10TB increase in the past 6 months (Rosetta!)

Numbers of the PSA

9 missions

→ In Legacy Phase (Giotto, Vex, Smart-1, Huygens)

→ In Post-Operation Phase (Rosetta)

→ In Operation Phase (ExoMars 2016, MarsExpress)

→ In Development (BepiColombo, Juice)

6 months of proprietary period

→ In average for all instruments.

→ This is when the data is delivered to the Archive, it can take more time to be public (PDS standard, Scientific peer-review, interactions, …)

7 millions products

→ 5 millions for Rosetta only (with >100.000 images Osiris+Navcam)

...

...