

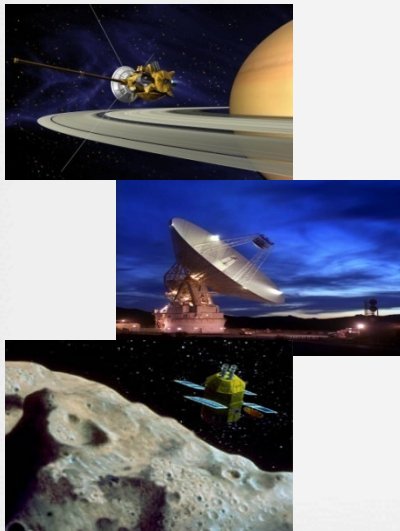


International Planetary Data Alliance

IPDA Update

Dan Crichton
Steve Hughes
Tom Stein
Ray Walker

September 2015



Mission of IPDA*

- “Facilitate global access to, and exchange of, high quality scientific data products managed across international boundaries”
- Support construction of compatible archives
- Support sharing of tools and software services
- Define “data standards within the IPDA, including the data models and derived dictionaries, based on the NASA Planetary Data System (PDS) that is the de-facto standard for all planetary data at the time of the IPDA founding”

* Extracted from IPDA Charter, July 2007

From Sep 2013 to July 2015

.IPDA

Steering Committee Members : 2013-2015

28 Members

12 Countries / International Institutions

Technical experts group

~20 Members

General activities

Annual meeting, usually in August, 20-30 participants

Regular teleconferences every 2 months 10-20 participants

Participation in related meetings : **COSPAR**, EGU, AGU, EPSC, etc...

IPDA Website <https://planetarydata.org>



Focus in 2011-2015 (selection)

- Development of common definitions and requirements for international archiving agreements
- Development and Coordination with PDS on the next generation PDS (PDS4) to enable construction of compatible planetary archives
- Development of access protocols for accessing planetary archives
- Development of international registries to enable registration and search of data, tools and services
- Standards related to geometry and navigation

Japan Meeting

- Held at JAXA, July 22-24, 2016
 - 3 Day Meeting
- Representation from ESA, JAXA, ISRO, CNES, NASA
- Significant discussions around use of PDS4 for upcoming international missions



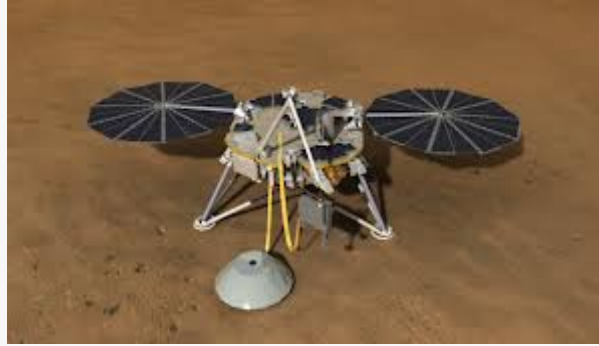
Attendees

- Cyril Chauvin (Obs. Paris)
- Baptiste Cecconi (Obs. Paris)
- Stéphane Erard (Obs. Paris)
- Christophe Arviset (ESA)
- Gopala Krishna (ISRO)
- Naru Hirata (Aizu Univ.)
- Pierre Le Sidaner (Obs. Paris)
- Tom Stein (NASA/PDS)
- Daniel Crichton (NASA/JPL)
- Alain Sarkissian (LATMOS/UVSQ/CNRS)
- Santa Martinez (ESA)
- Steve Hughes (NASA/JPL)
- Ray Walker (NASA/NSF/PDS/HPDE)
- Toshiaki Takeshima (JAXA, C-SODA director)
- Yoshiaki Ishihara (JAXA)
- Shin Ogawa (JAXA)

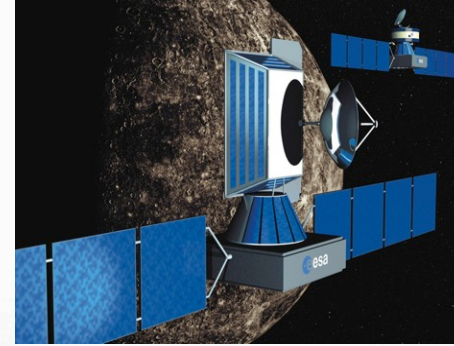
PDS4 Planned Mission Support



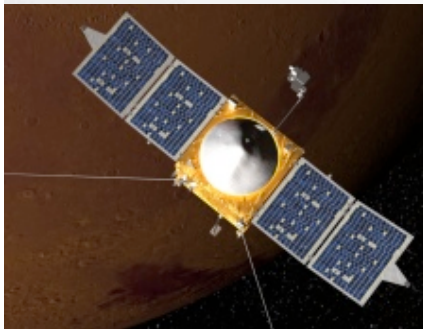
LADEE (NASA)



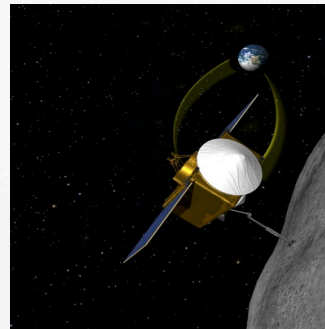
InSight (NASA)



BepiColumbo (ESA/JAXA)



MAVEN (NASA)



Osiris-REx (NASA)



**ExoMars
(ESA/Russia)**



**JUICE
(ESA)**

...also Hyabussa-2, Chandryaan-2

ESA

- Major focus will be an upgrade of the the PSA the next few years.
 - Will be based on PDS4
 - Should help to improve services for interoperability
- PDS4 Missions
 - ExoMars: Joint mission between ESA/IKI
 - BepiColombo: Joint mission between ESA/JAXA
 - JUICE: nothing started yet
- Key concerns/needs
 - Tension with the level of specificity in PDS4
 - Agreement to use validate tool and other core PDS4 tools
 - Coordination at common and discipline levels of information model
 - Training
- Santa Martinez will be joining the CCB

Archiving Guide

2 APPLICABLE STANDARDS

2.1 PDS Standards

2.1.1 *PDS4 Requirements for BepiColombo*

The combination of the documents listed below give the set of common requirements that apply across PDS.

- The [PDS4 Data Dictionary](#) (DDDB) is the fundamental reference for definitions of classes and attributes (see PDS4 terminology in section 2.1.2).
- The [PDS4 Information Model](#) (IM) is the fundamental reference for PDS4 structure; its requirements can be validated automatically using eXtensible Markup Language (XML) schemas.
- The [PDS4 Standards Reference](#) (SR) is a compilation of policies, rules, and other PDS4 constraints that are not given explicitly in the previous references.

BepiColombo has defined ***mission-specific requirements*** (highlighted in red in the present document) that further constrain — but do not conflict with — the common PDS4 requirements. These specific rules apply to all BepiColombo science data to be ingested and preserved in the BepiColombo archive.

PDS4 Schemas

All requirements, data structures and permissible values mentioned above are available in the form of XML Schema and Schematron files, which can be used to automatically validate the PDS4 labels. Common [PDS4 schemas](#) (common requirements) are supplied by the PDS. Specific BepiColombo PDS4 schemas (mission specific requirements) are supplied by the SGS. See Annex E for more information on the PDS4 schemas.

JAXA

- Mission Status
 - Hisaki (Sprint A)
 - Space telescope
 - FITS
 - Will be SPICE
 - Akatsuki
 - Targeting to be injected into Venus orbiter December 2015
 - Data pipeline is PDS3 (including FITS)
 - Compatible with Venus Express
 - Some interest with
 - Action: potential increase of VEX project to be NASA, ESA, JAXA
 - Hayabusa 2
 - Mission to return samples from asteroid
 - December 2015 Earth swing-by
 - PDS4 and SPICE
 - Collaboration with OSIRIS-Rex to be archived in PDS4 and SPICE
 - Preparation Deadline (March 2018); First release (Dec 2020)
 - Bepi Colombo MMO – ESA lead
- Key concerns/needs
 - Training but learning from O-Rex

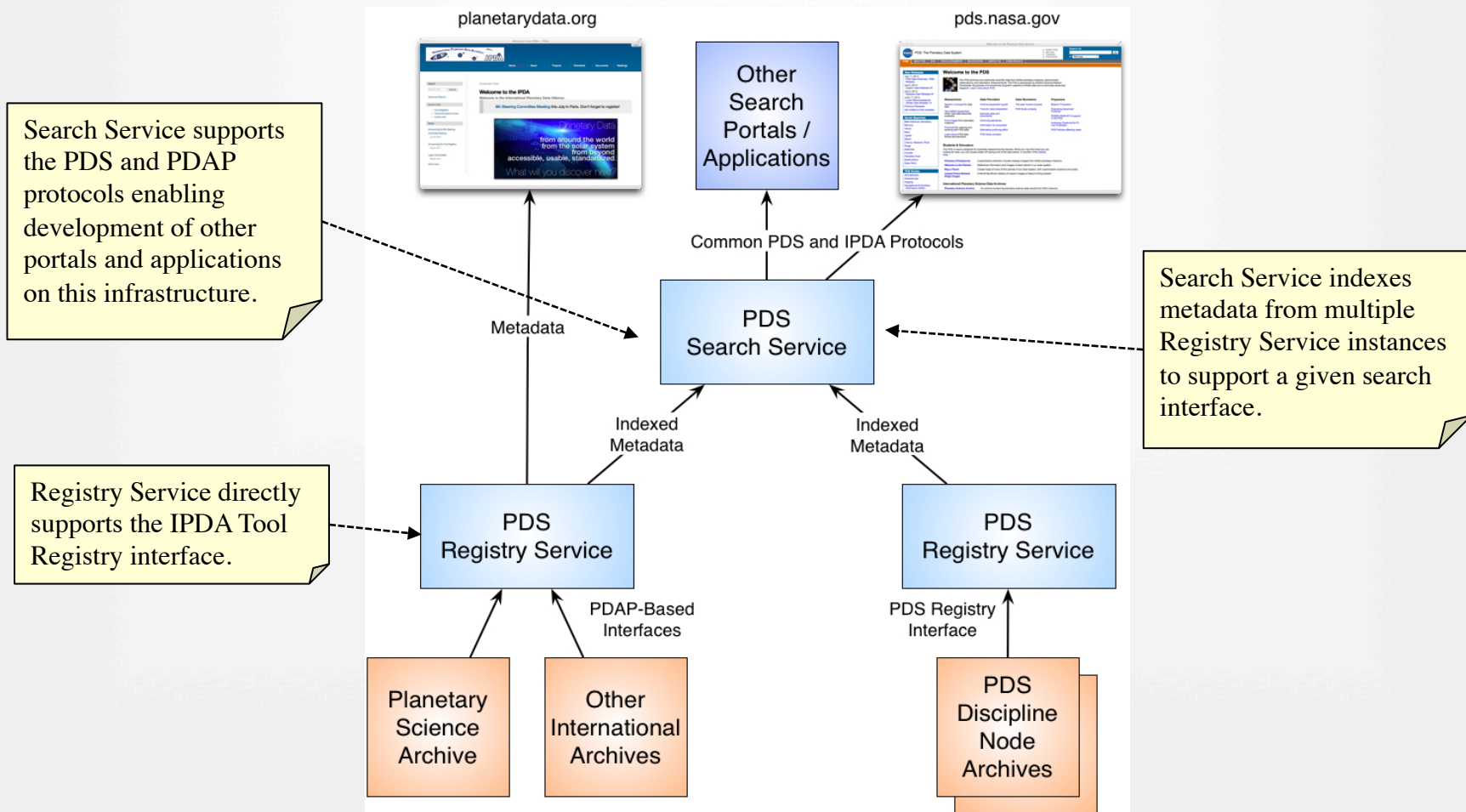
ISRO

- **Mission Status**
 - Chandrayaan
 - PDS3
 - PDAP interface under development
 - Hosting data in compressed format for performance
 - Mars Orbiter Mission (MOM)
 - PDS3
 - Data processing
 - Will use for PDS4 experiments
 - About another year of operation until out of fuel
 - Chandrayaan-2
 - PDS4 archive
 - Plan to develop pipeline for 5 payloads
- **Key concerns/needs**
 - PDS4 startup (training, consultancy, tools, etc)

International Search/Access

- Discussed and demonstrated search and access to international archives.
- Discussion on search engine technology and PDS4 search service.
 - Interest by ESA as they work towards the PSA upgrade.
- Documentation for interfacing with the PDS4 Registry and Search Services posted to the IPDA Standards website.
 - Discussion on access vs search protocols
- Discussed status of Chandrayaan-1 data being into the PDS4 system at pds.nasa.gov

Architecture



Search for Venus Express Via Web-Based Interface

The screenshot shows the PDS Search Results page for the query "venus express". The page includes a navigation menu with options like HOME, ABOUT PDS, DATA, TOOLS & DOCUMENTS, RELATED SITES, CONTACT US, and CITING PDS DATA. A search bar at the top right contains the query "venus express" and a "Go" button. The main content area is titled "Search Results" and shows "1-50 of 533 results (0.013 seconds)". A "Refine Your Search" sidebar on the left lists various facets such as Agency (ESA, NASA), Type (Data Set, Instrument), Target (Planet, Other), Investigation (Mars Express, Venus Express), and Instrument (Radio Science, Magnetometer). The search results list several data sets, each with a title, description, and start time. A yellow box highlights the "Data Sets and Information" section of the results.

Agency facet allows users to select between ESA and NASA results.

PSA data sets currently link directly to a PSA web-based interface.
Future work includes providing a jump page similar to how PDS data sets are handled.

IPDA Agreements

- Gopala Krishna, IPDA Chair
- Tom Stein, IPDA Deputy Chair
- Separation of the IPDA public website from IPDA internal documents and needs
- Several projects renewed and defined for FY16
- Next telecon scheduled for October 2015
- 2016 Meeting at ESAC
 - Some discussion about flipping between Europe and U.S. going forward

2015-2016 Projects

- Data Access Protocols (Isa, Baptiste, Sean)
- Website Project (Dan)
- Registry and Search (Sean, Dan)
- PDS4 Implementation (Santa, Steve)
- MOU Project (Yukio, Reta)
- IVOA/IPDA Coordination (Baptiste)
- Citing IPDA (Alain)

Outreach and IPDA Networking

- EPSC/DPS 2011
 - IPDA Session
- PV 2011
- AGU 2011-2014
- LPSC March 2012
- VAO April 2012
- 2012 Planetary Data Workshop
- COSPAR 2012, 2014
- LPSC 2011-2014
- EPSC 2013-2014
- IVOA 2014
- Planetary GIS Workshop 2015
- 2015 Planetary Data Workshop
- PV 2015
- AGU 2015
- COSPAR 2016



Major Takeaways

- All agencies engaged in PDS4 now
 - ESA/PSA is interfacing with IKI and JAXA
- Santa M to provide an assessment report on PDS4
 - Suggested improvements to standards and tools
- Significant support for CCB and structured delivery process
 - Agreement to leverage core tools and model
 - If new capabilities are needed, they are built on top of the core
- Continued interest in PDS4 training

Thank you for your attention