
IPDA activities for Planetary VO (Technical View)

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Planetary Science Archive (PSA) - Science Archives and VO Team
European Space Astronomy Centre (ESAC)
European Space Agency

International Planetary Data Alliance (IPDA)

- The *International Planetary Data Alliance* (IPDA) is an international effort focused on the development and collaboration of standards for data archiving and promotion of interoperability among planetary science data archive systems in order to share scientific results returned from exploration of the solar system.
- Created to allow other institutions than ESA/NASA to share their Planetary Data
- Ensuring interoperability promoting standards like PDAP. Work ongoing for other protocols
- Projects defined within IPDA to work on interoperability
- Recently met in Montreal (usually one per year + teleconfs)
- IPDA Technical Experts Group created to deal with technical issues
- Participants from all over the world

IPDA Project Definition

- Based in time limited projects (no working groups)
- Every project has a project leader and a group of members
- Creation, closure, extension, etc are Steering Committee decisions
- Projects are usually reviewed during Steering Committee meetings
- Current projects (as an example):
 - IPDA Requirements document (PDS & All)
 - Standard Data Model, assessment of draft (STFC)
 - PDAP specification assessment of draft (JAXA)
 - Data dictionary modelling (PDS & All)
 - Venus Express Interoperability (PDS/PSA)
 - Small Bodies interoperability demonstrator (JAXA)
 -
- Rotative IPDA Chair:
 - Current IPDA chair: Maria Teresa Capria (INAF/IASF)
 - Next IPDA chair: Yasumasa Kasaba (Tohoku Univ., Japan)

IPDA Web Repository

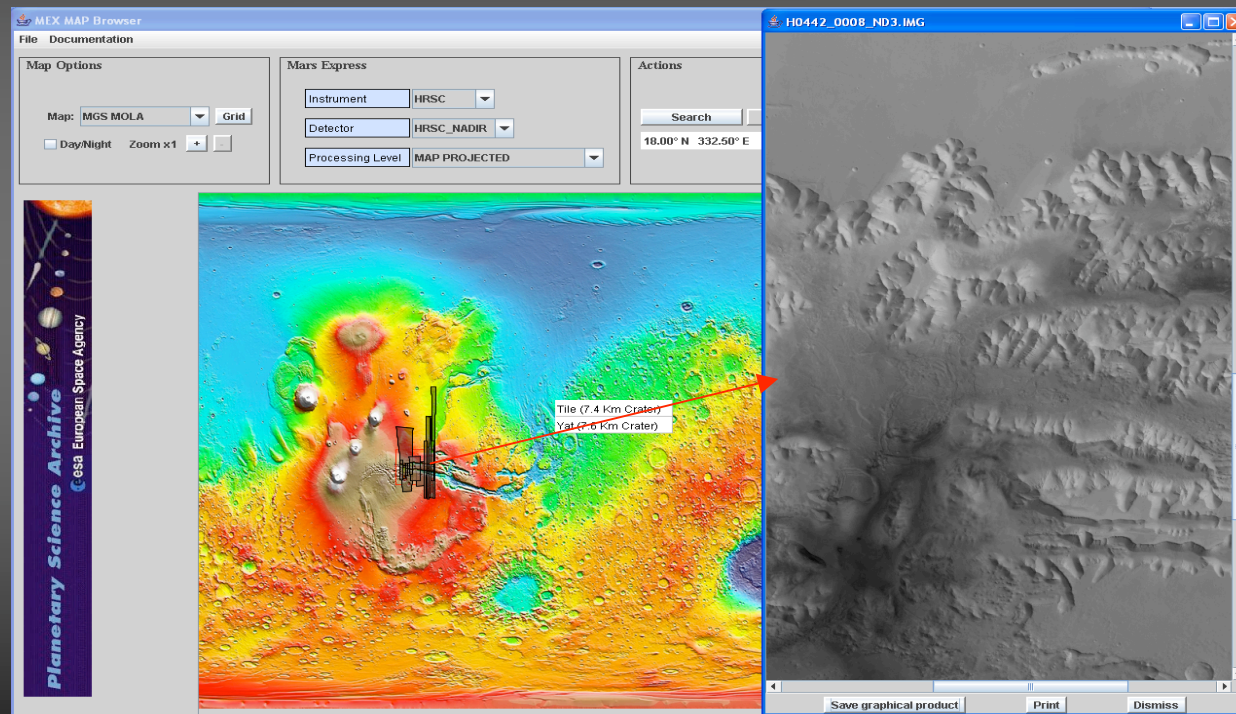


■ <http://planetarydata.org>

Links to VO for astronomy and other VOs

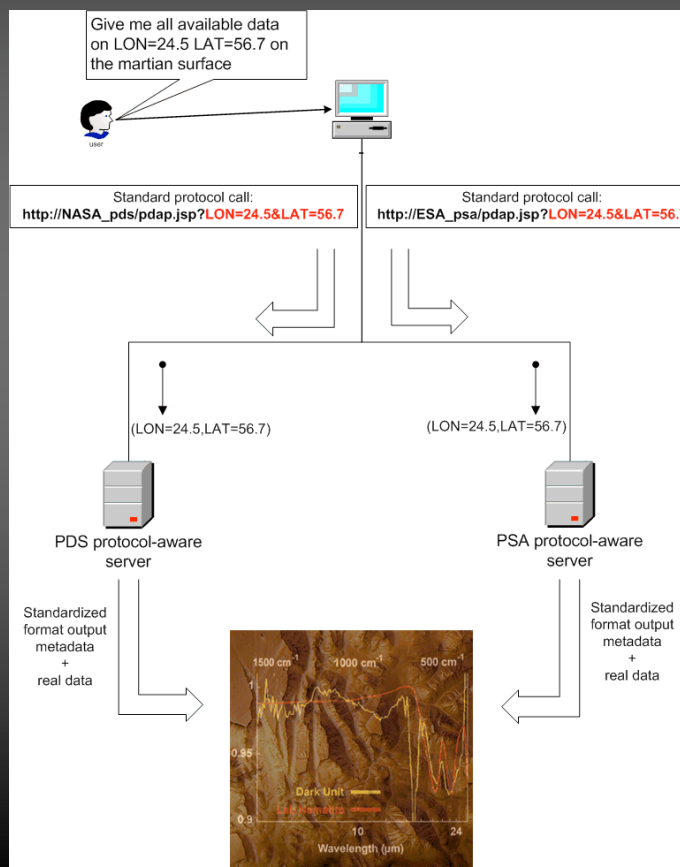
- Synergy between projects (special session in IVOA interop meeting at Trieste)
- Protocols created are close enough to be interoperable in the future by general clients but they contain specific Planetary characteristics
 - Use of VOTable and Simple protocols concept for PDAP
 - Not need of specific data models or dictionary (semantics) from scratch
 - Use of PDS keywords
 - Not urgent need of harvestable registries
- Try to use the best of both worlds:
 - Knowledge of planetary data from planetary community
 - Experience in interoperability from other VOs
- Some people involved in IPDA are also IVOA members, e.g., for PSA members:
 - Christophe Arviset (PSA) is the IVOA Technical Coordinator
 - Pedro Osuna (PSA) is the IVOA-VOQL chairman and IPDA Technical Expert Group project leader
 - Jesus Salgado (PSA) is IVOA-DAL vice-chairman and PDAP project leader

PSA: Planetary Science Archive



<http://www.rssd.esa.int/index.php?project=PSA>

Interoperability use case



Planetary Data Access Protocol

- Interoperability project created and main delivery:
 - **PDAP (Planetary Data Access Protocol)**
- Concept was born at the ESA/PSA and NASA/PDS Technical Interoperability Meeting, held January 10-12, 2006 in Madrid Spain
- Current version v0.4 working draft, under review
- Protocol to access Datasets, products and images
 - Prepared by PSA(ESA) and PDS(NASA) technical experts
 - Two servers implementations already in place (PDS and PSA)
 - Two client implementations, different flavors
 - PSA Mars Map client: Geometrical searches for PDS/PSA products
 - PDS dataset/product browser: PSA datasets/products access through PDAP

Planetary Data Access Protocol

- PDAP is a two steps protocol:
 - Metadata Access: Software Clients search for available data that match certain criteria. The matching criteria includes specific protocol metadata and PDS keywords
 - Data Retrieval: Software client retrieve through a synchronous HTTP GET/POST request using a reference URL returned from first step
- Any PDAP server service implementation should be registered. Registration allows service discovery and get access to publisher/curation information
 - Interchange default format is VOTable (XML). This format can be easily parsed by a client and displayed in different ways

PDAP input fields

- GET/POST HTTP based protocol (service URL and keyword=value)
- DATA_SET_ID, PRODUCT_ID
- Data Set or Product specific PDS keywords: INSTRUMENT_TYPE, INSTRUMENT_NAME, TARGET_TYPE, TARGET_NAME, MISSION_NAME
- Time Constraints: START_TIME, END_TIME and geometrical constraints
- Different granularity levels: RESOURCE_CLASS (DATA_SET, PRODUCT, IMAGE)
- Different response output: RETURN_TYPE (VOTABLE, HTML, ASCII)
- Input fields could have different meaning at different granularity levels
- RESOURCE_CLASS=METADATA gives service capabilities

PDAP output fields

- Default output in VOTable format
- General Data Set, Product or Image information. Attribute pointing to the corresponding PDS keyword
- Link to access the data
- Dublin core information (Publisher, Contributor, Publishing date, Rights)
- For Image granularity level, apart from central longitude and latitude, footprint information is added for every record in a simple way
 - POLYGON(LON_1:LAT_1,LON_2:LAT_2,....,LON_n:LAT_n)

PSA-DH PDAP Map Client

IOI-Mars v0.1 (beta)

File Help

Data Base

PDAP Server Directory

☐ PSA

PDAP Server Port

Latitude GE LE

Longitude GE LE

Start Time GE LE

Stop Time GE LE

Orbit number GE LE

Instrument Name

Any...

Select ROI

Clear

Submit Query

Cancel

Pointer coordinates

67.1085 47.221

Projection

☒ Cylindrical

☐ Polar North

☐ Polar South

Center longitude

0

1

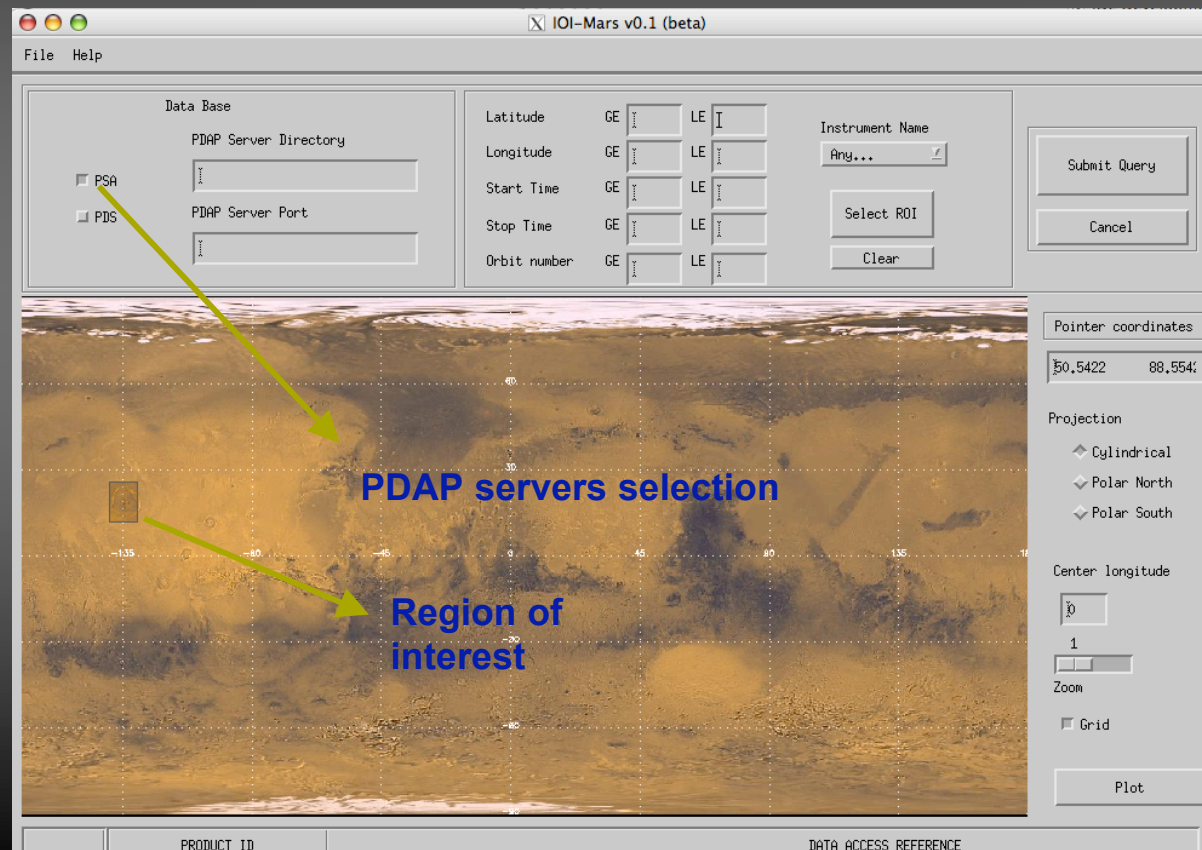
Zoom

☐ Grid

Plot

	PRODUCT_ID	DATA_ACCESS_REFERENCE
0	%H0032_0004_SR2.IMG	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=HEX-H-HRSC-3-RDR-V2.0&productID=H0032_0004_SR2
1	%H0032_0001_SR2.IMG	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=HEX-H-HRSC-3-RDR-V2.0&productID=H0032_0001_SR2
2	%H0032_0000_S12.IMG	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=HEX-H-HRSC-3-RDR-V2.0&productID=H0032_0000_S12
3	%H0032_0000_N02.IMG	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=HEX-H-HRSC-3-RDR-V2.0&productID=H0032_0000_N02
4	%H0032_0000_IR2.IMG	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=HEX-H-HRSC-3-RDR-V2.0&productID=H0032_0000_IR2
5	%H0032_0000_RE2.IMG	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=HEX-H-HRSC-3-RDR-V2.0&productID=H0032_0000_RE2
6	%H0032_0000_S22.IMG	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=HEX-H-HRSC-3-RDR-V2.0&productID=H0032_0000_S22

Map based queries



Map based queries (II)

IOI-Mars v0.1 (beta)

File Help

Data Base

PSA PDAP Server Directory

PDS PDAP Server Port

Latitude GE 19.0 LE 19.1

Longitude GE 225.0 LE 225.9

Instrument Name Ang...

Submit Query

Cancel

Start Time GE LE

Stop Time GE LE

Select ROI

Clear

Orbit number GE LE

Pointer coordinates

63.3133 10.120

Projection

Cylindrical

Polar North

Polar South

Center longitude

0

1

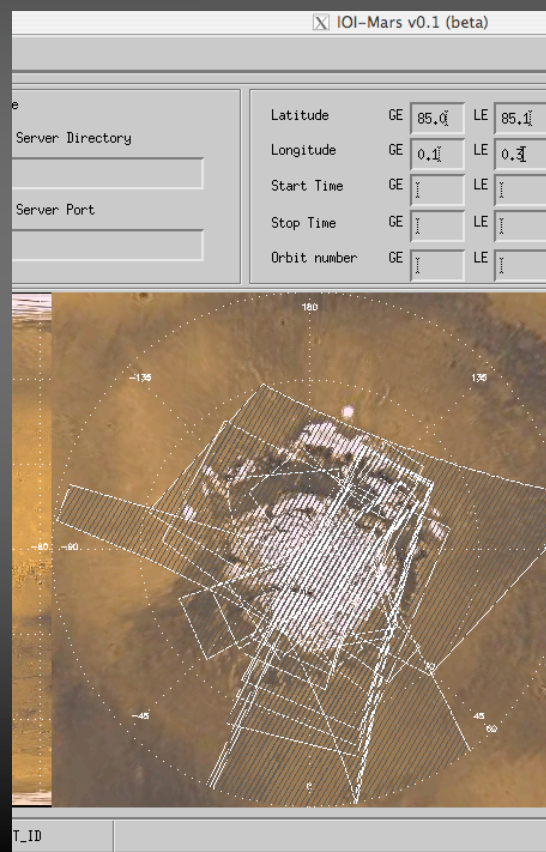
Zoom

Grid

Plot

PDS Server find 8 products and
PSA server 43 products
(difficult to visualize as GRS
footprints are small)

	PRODUCT_ID	DATA_ACCESS_REFERENCE
40	YORB0501_4_GEOMY	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=MEX-M-OMEGA-2-EDR-FLIGHT-V1.0&productID=ORB0501_4
41	YORB0501_4_DATAY	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=MEX-M-OMEGA-2-EDR-FLIGHT-V1.0&productID=ORB0501_4
42	YORB1437_2_DATAY	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=MEX-M-OMEGA-2-EDR-FLIGHT-V1.0&productID=ORB1437_2
43	YORB1437_2_GEOMY	http://psa.esac.esa.int:8000/aio/jsp/product.jsp?dataSetID=MEX-M-OMEGA-2-EDR-FLIGHT-V1.0&productID=ORB1437_2
44	GAMMA_SPECTRA_20040208	jpl.nasa.gov/prod?object=urn:eda:rmi:PDS_Geo_Product&keywordQuery=OFSN+X3D+data/odg-m-grs-2-edr-v1/edge1_xxxx/2004/20040208
45	GAMMA_SPECTRA_20051127	jpl.nasa.gov/prod?object=urn:eda:rmi:PDS_Geo_Product&keywordQuery=OFSN+X3D+data/odg-m-grs-2-edr-v1/edge1_xxxx/2005/20051127
46	HEND_SPECTRA_20040208	jpl.nasa.gov/prod?object=urn:eda:rmi:PDS_Geo_Product&keywordQuery=OFSN+X3D+data/odg-m-grs-2-edr-v1/edge1_xxxx/2004/20040208



Query construction

- Both servers receive same query and return VOTable responses
- http://psa.esac.esa.int/aio/jsp/metadata.jsp?RESOURCE_CLASS=IMAGE&TARGET_NAME=MARS&MINIMUM_LATITUDE>19.0&MAXIMUM_LATITUDE<19.1&MINIMUM_LONGITUDE>225.8&MAXIMUM_LONGITUDE<225.9
- http://www.planetarydata.org/grs/pdap.jsp?RESOURCE_CLASS=IMAGE&TARGET_NAME=MARS&MINIMUM_LATITUDE>19.0&MAXIMUM_LATITUDE<19.1&MINIMUM_LONGITUDE>225.8&MAXIMUM_LONGITUDE<225.9

- Client uses “<” “>” operators to constraint the region of interest (note this has been deprecated to prevent the use of these symbols and to define ranges in a more flexible way). Recommended:

<http://psa.esac.esa.int/aio/jsp/metadata.jsp?>

[RESOURCE_CLASS=IMAGE&](#)

[RETURN_TYPE=VOTABLE&](#)

[TARGET_NAME=MARS&LATITUDE=19.0/19.1&LONGITUDE=225.8/225.9](#)



Scheme



Query Type



Response return format



And Query!!!

PDS OODT/PDAP Client

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

+ NASA Homepage
+ NASA en Español
+ Contact NASA

Planetary Data System

Home Data Services Tools Documents Related Sites About PDS Sitemap

Data Set Quick Search

Select one or more parameters from below, then hit Go!
Click on to filter parameters. Click on parameter name for more information.

Missions: (pick one or many and Filter)

Mariner 10
Mariner69
Mariner71
Mars Exploration Rover
Mars Express
Mars Global Surveyor

Target Name: (pick one to Filter)

All

Instrument Type: (pick one to Filter)

All

Instruments: (pick one or many and Filter)

2 Channel Photometer
A Star Tracker Camera
Accelerometer
Adv. Solid-State Array Spectroradiometer
Airborne Visible/IR Imaging Spectrometer
Airsar

Advanced Search | Power Search

Active Missions
Active Missions contains a list of currently active mission data sets from which to select.

New Data
New Data contains a list of data set sources from the latest mission data release.

Search Options
Quick Search allows the user to search using standard PDS parameters. An Advanced Search is for experienced users with detailed knowledge of PDS mission data and science. A Power Search is for those with a detailed knowledge of the PDS internal organization.

NASA Privacy Statement Copyright Feedback Sitemap System Requirements

FIRSTGOV
Your First Click in the U.S. Government

+ Freedom of Information Act
+ NASA 2003 Strategic Plan
+ NASA Privacy Statement, Disclaimer, and Accessibility Certification
+ Copyright/Image Use Policy

NASA

Curator: Valerie L. Henderson
Webmaster: Brian Truong
NASA Official: William Knopf
Last Updated: 16 Sep 2006
+ Comments and Questions

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION

+ NASA Homepage
+ NASA en Español
+ Contact NASA

Planetary Data System

Home Data Services Tools Documents Related Sites About PDS Sitemap

Search Results (233 data sets found)

Data Set	Instrument Host	Information About the Data Set	Data Products & Related Files	Other Resources
1. MARS EXPRESS ASPERA-3 RAW EDR ELECTRON SPECTROMETER V1.0		View Information for MEX-M-ASPERA3-2-EDR-ELS-V1.0	Search for Products with PSA query service	
2. MARS EXPRESS ASPERA-3 RAW EDR NEUTRAL PARTICLE IMAGER V1.0		View Information for MEX-M-ASPERA3-2-EDR-NPI-V1.0	Search for Products with PSA query service	
3. MARS EXPRESS ESOC AUXILIARY DATA V1.0		View Information for MEX-M-ESOC-6-AUXILIARY-DATA-V1.0	Search for Products with PSA query service	
4. HRSC REDRs		View Information for MEX-M-HRSC-3-RDR-V2.0	Search for Products with PSA query service	
5. HRSC REDRs		View Information for MEX-M-HRSC-5-REFDR-MAPPROJECTED-V2.0	Search for Products with PSA query service	
6. MARS EXPRESS MARS MRS CRUISE 1 V1.0		View Information for MEX-M-MRS-1/2/3-CR1-0009-V1.0	Search for Products with PSA query service	
7. MARS EXPRESS MARS MRS CRUISE 1 V1.0		View Information for MEX-M-MRS-1/2/3-CR1-0011-V1.0	Search for Products with PSA query service	
8. MARS EXPRESS MARS MRS MISSION COMMISSIONING V1.0		View Information for MEX-M-MRS-1/2/3-MCO-0013-V1.0	Search for Products with PSA query service	
9. MARS EXPRESS MARS MRS MISSION COMMISSIONING V1.0		View Information for MEX-M-MRS-1/2/3-MCO-0015-V1.0	Search for Products with PSA query service	
10. MARS EXPRESS MARS MRS MISSION COMMISSIONING V1.0		View Information for MEX-M-MRS-1/2/3-MCO-0016-V1.0	Search for Products with PSA query service	
11. MARS EXPRESS MARS MRS MISSION COMMISSIONING V1.0		View Information for MEX-M-MRS-1/2/3-MCO-0017-V1.0	Search for Products with PSA query service	
12. MARS EXPRESS MARS MRS MISSION COMMISSIONING V1.0		View Information for MEX-M-MRS-1/2/3-MCO-0018-V1.0	Search for Products with PSA query service	
13. MARS EXPRESS MARS MRS MISSION COMMISSIONING V1.0		View Information for MEX-M-MRS-1/2/3-MCO-0021-V1.0	Search for Products with PSA query service	
14. MARS EXPRESS MARS MRS MISSION COMMISSIONING V1.0		View Information for MEX-M-MRS-1/2/3-MCO-0022-V1.0	Search for Products with PSA query service	
15. MARS EXPRESS MARS MRS MISSION COMMISSIONING V1.0		View Information for MEX-M-MRS-1/2/3-MCO-0024-V1.0	Search for Products with PSA query service	
16. MARS EXPRESS MARS MRS MISSION COMMISSIONING V1.0		View Information for MEX-M-MRS-1/2/3-MCO-0026-V1.0	Search for Products with PSA query service	

VEX Interoperability Project Definition

- PDS Atmospheres Node should have access to VEX Datasets @ PSA
- PDS Atmospheres Node should not need to copy across the data from PSA but data location URLs will point to PSA
- PDS Atmospheres Node should be able to create a uniform display for datasets located at PDS and at PSA
- **First approach:**
 - PDS Atmospheres Node will download the index file every night (or every time the file is updated) from PSA
 - Using a index file parser, a view of the dataset will be displayed at PDS pages
 - Final pointers will be to the ftp mirror located at PSA

PDAP approach for VEX Interoperability Project

- Include a new granularity level for files in dataset, there is not need for a full download of the data set for review
- Asking for a certain data set, the service will provide a VOTable representation of the dataset, one row per file
- Every row will contain the file name, relative directory to data set top level and a URL to retrieve this single file
- Every row could contain extra metadata per row, as a group id, file type, etc
- **PDAP approach to the use case:**
 - PDS Atmospheres Node will query for new data sets at PSA and the corresponding VOTable(s) data set descriptions
 - Using a VOTable parser, a view of the dataset will be displayed at PDS pages
 - URL Pointers are provided, so the server has the freedom to use static or dynamic links

PDAP approach advantages

- All the files inside the data set will be present in the VOTable response. No files lost
- URLs are provided in the response. More freedom and extensible for other data providers. No need of creation of mirrors with a specific directory structure
- Extra metadata could be added to allow better searches of files (like files for a specific product)
- It could be used in combination of other PDAP queries
- Extensible for proprietary data using dynamic links that could check proprietary rights
- Extensible to google-ize searches to file level by extending PDAP

PAIO (PSA Archive InterOperability) (I)

Planetary Science Archive
European Space Agency

PSA Archive InterOperability System (PAIO) v2.0b1

[PAIO Home](#)
[PAIO Login/Logout](#)
[PAIO Metadata Query](#)
[PAIO Data Request](#)
[PAIO Users Manual](#)
[PAIO Client files](#)

[PSA Home](#)
[Contact PSA HelpDesk](#)

Username: AIOURL

Planetary Science Archive
European Space Agency

PSA Archive InterOperability System (PAIO) v2.0b1

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[PAIO Data Request](#)
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[PAIO Client files](#)

[PSA Home](#)
[Contact PSA HelpDesk](#)

Username: AIOURL

PAIO Metadata Query

Metadata Query

Data Set Id eg. TSK-C-RCC-CAL-RSA-WIRTANEN-V1.0 or empty

Product Id eg. TSK_C_RCC_3_19970303T165718 or empty

Target Name eg. 46P/WIRTANEN or empty

Mission Name

RESOURCE_CLASS

DATA_SET

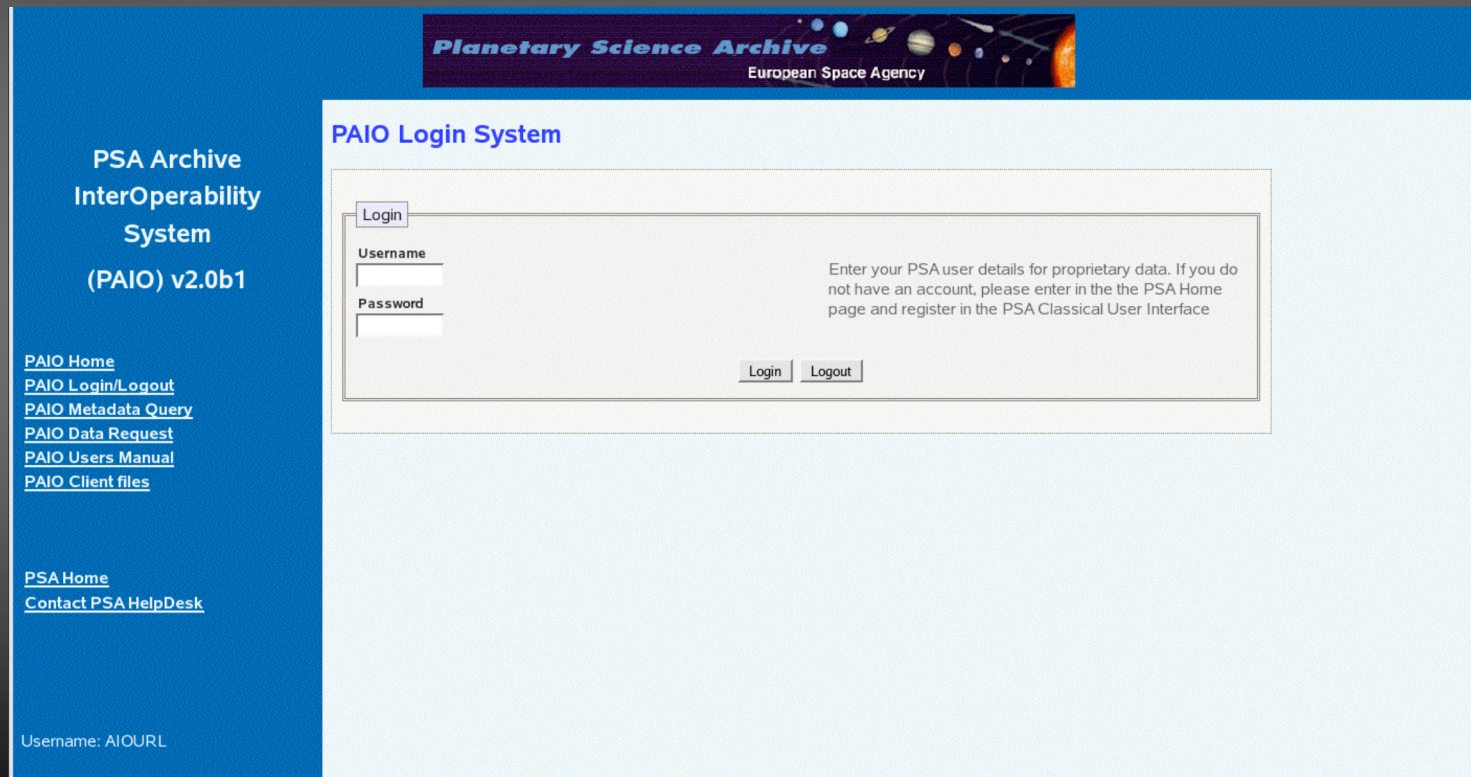
RETURN_TYPE

Some example URLs created using the Metadata Query System are:

http://satss01.esac.esa.int:8080/aio/jsp/metadata.jsp?RETURN_TYPE=HTML
for all DataSets (default RESOURCE_CLASS is DataSet)

[illegible]

PAIO (PSA Archive InterOperability) (III)



The screenshot shows the PAIO Login System interface. At the top, there is a banner for the Planetary Science Archive (PSA) by the European Space Agency. The main content area is titled "PAIO Login System" and contains a login form. The form has fields for "Username" and "Password", and a "Login" button. A "Logout" button is also present. A message on the right side of the form states: "Enter your PSA user details for proprietary data. If you do not have an account, please enter in the the PSA Home page and register in the PSA Classical User Interface". On the left side of the interface, there is a sidebar with links for "PSA Archive InterOperability System (PAIO) v2.0b1", including "PAIO Home", "PAIO Login/Logout", "PAIO Metadata Query", "PAIO Data Request", "PAIO Users Manual", and "PAIO Client files". Below these links, there are links for "PSA Home" and "Contact PSA HelpDesk". At the bottom left, the text "Username: AIOURL" is displayed.

IPDA Technical Experts group

- Created to ensure knowledge sharing between technical members
 - Pedro Osuna project leader (ESA/PSA)
 - Alain Sarkissian CNRS-France
 - Richard Moreno CNES-France
- Activities concentrated in three different aspects:
 - Data Access Protocols
 - The main focus on this one should concentrate on the already existing PDAP (Planetary Data Access Protocol) without pre-empting the possibility of creation of other protocols in a future
 - Validation Tools
 - The main focus of this one should concentrate on the possibility to create a collective Validation Tool
 - PDS standard evolution
 - The main focus of this one should concentrate in the evolution of the PDS and its usage within the IPDA

Conclusions

- IPDA is an independent organization created by and for the planetary community
- IPDA intends to support, share knowledge and solve issues within the planetary community
- Main organizations with planetary data are already represented and it is open to new ones
- Interoperability is one of the main activities within the IPDA (e.g. PDAP effort), but it intends to give support on:
 - Long-term data preservation
 - Data modeling and data dictionary
 - PDS use and evolution
 - Volume verification
 - Archiving