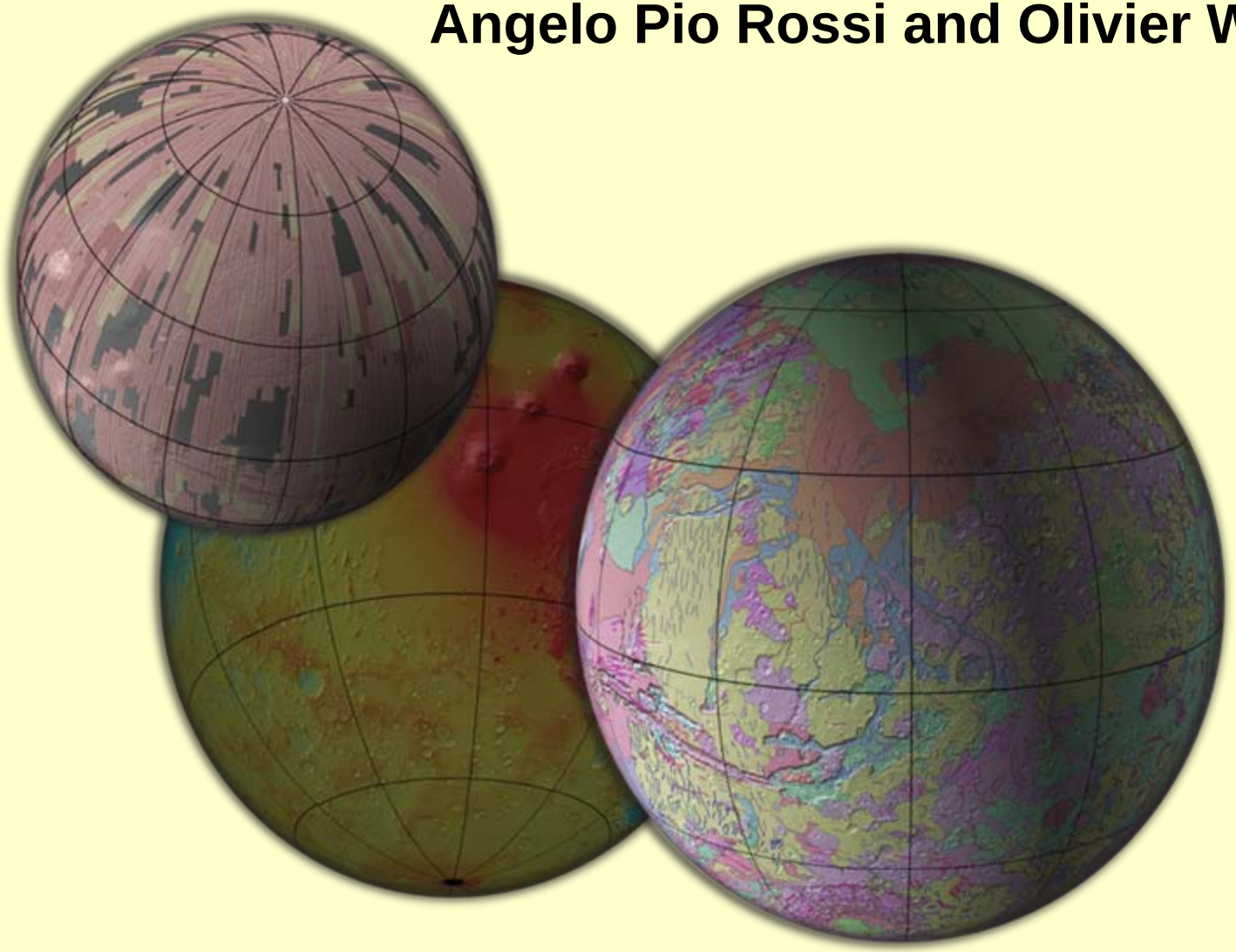
Introduction to PDS and ESA data archives

Angelo Pio Rossi and Olivier Witasse



Content of this presentation

- Introduction to the archives and to the PDS standard
- The ESA Planetary Science Archive
- Tools
- Forums, links etc..
- Data workshops
- A few exemples / demo

Planetary Archives: PDS

PDS: Planetary Data System

- PDS - the organization
  - An organization that archives and distributes all of NASA's planetary mission data (and much other planetary data) according to PDS standards
- PDS - the archiving standard
  - A standard that defines how to label data products in order to make them automatically readable and interpretable and how to document everything for future generations
- PDS - the archive
  - A distributed but centrally searchable archive of all data from NASA's planetary missions

PDS Goals

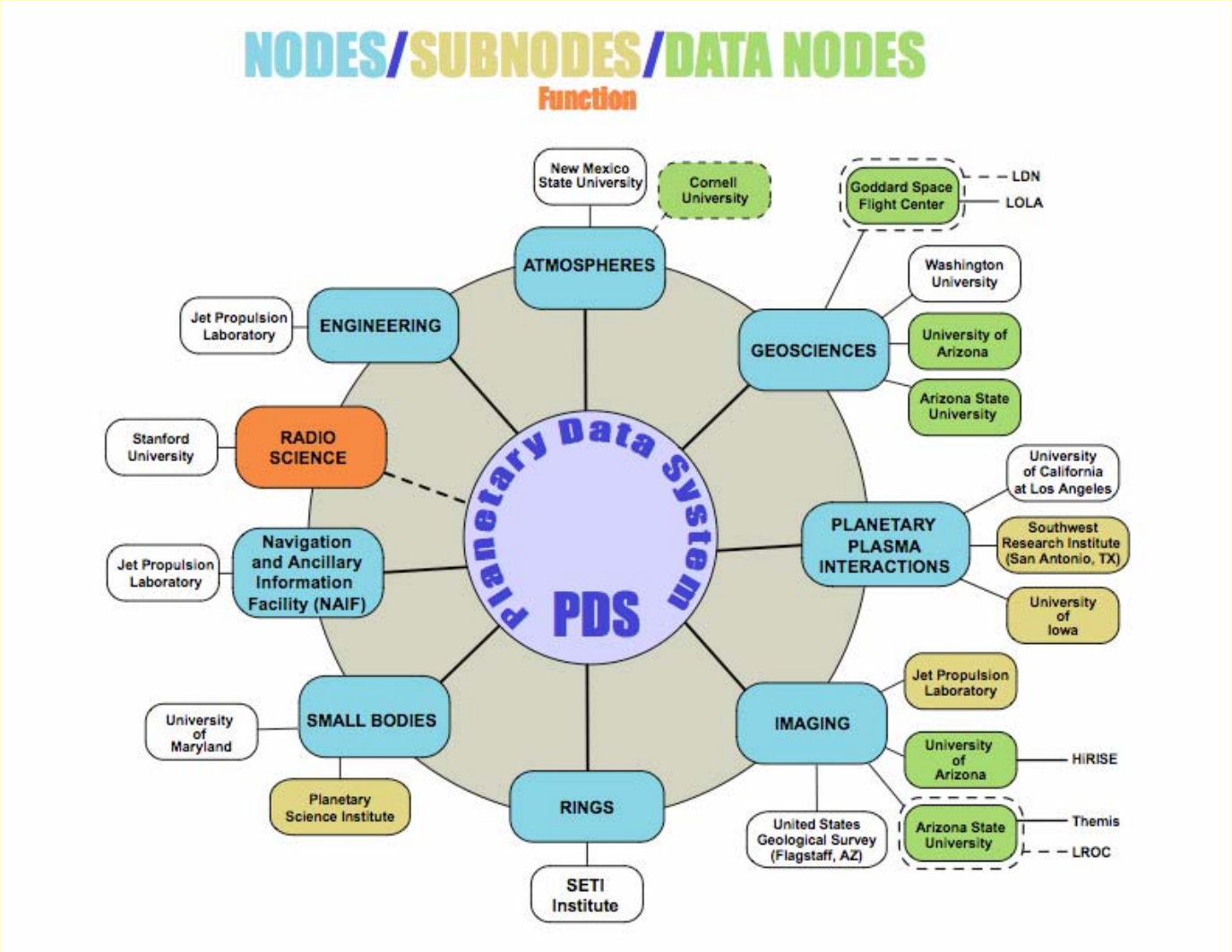
- Ensure that all data from NASA's planetary missions are archived in a manner that will make them usable far into the future
- Acquire and archive other planetary data relevant to NASA's missions
- Distribute the data to researchers
- Provide appropriate tools for finding the right data
- Work with non-US partners to ensure compatible archiving of all planetary missions

- A wealth of data - waiting to be analyzed!

PDS organization

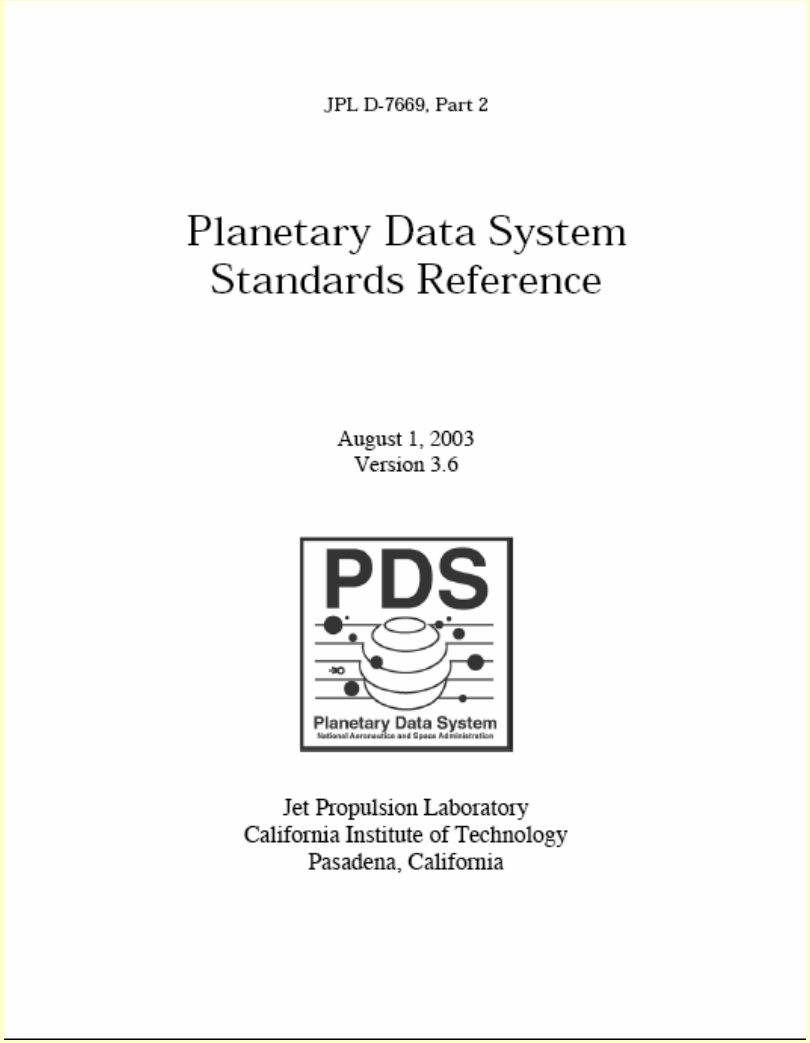
- **PDS is a distributed system, with Discipline Nodes headed by various scientific specialists**
  - DN leads selected competitively based on management and on scientific approach to data
  - PDS started as part of the R&A program run by active researchers
- **PDS has centralized capabilities for searching data at all the nodes and also a central repository for PDS-wide documents, standards, policies, etc.**
  - At the Engineering Node at JPL
- **Individual scientific discipline nodes provide capabilities that are special to their area as well as archiving all the data relevant to that discipline**

PDS organization



PDS Standard

- Standards go back to Proto-PDS in late 1980s, prior to the current structure of discipline nodes
- Standards allow many different types of data
- Standard evolves to accommodate new needs



JPL D-7669, Part 2

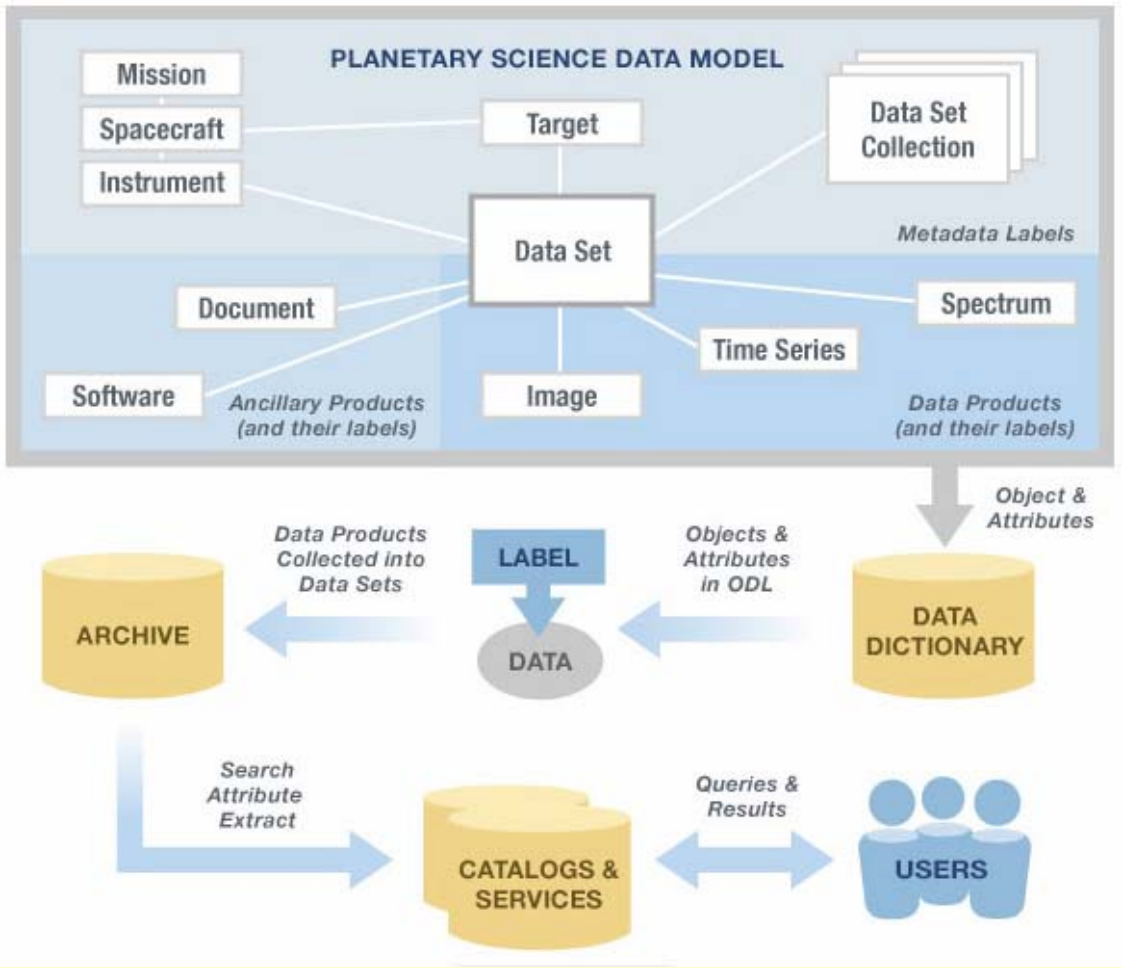
Planetary Data System
Standards Reference

August 1, 2003
Version 3.6

PDS
Planetary Data System

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

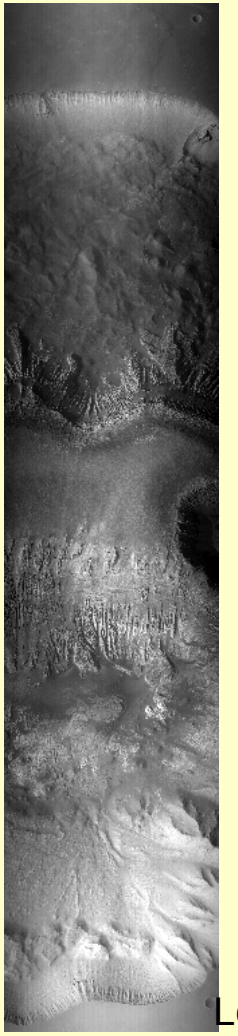
PDS Data Model



Processing Levels

Level	Type	Data Processing Level Description
1	Raw Data	Telemetry data with data embedded.
2	Edited Data	Corrected for telemetry errors and split or decommutated into a data set for a given instrument. Sometimes called Experimental Data Record. Data are also tagged with time and location of acquisition. Corresponds to NASA Level 0 data.
3	Calibrated Data	Edited data that are still in units produced by instrument, but that have been corrected so that values are expressed in or are proportional to some physical unit such as radiance. No resampling, so edited data can be reconstructed. NASA Level 1A.
4	Resampled Data	Data that have been resampled in the time or space domains in such a way that the original edited data cannot be reconstructed. Could be calibrated in addition to being resampled. NASA Level lB.
5	Derived Data	Derived results, as maps, reports, graphics, etc. NASA Levels 2 through 5.
6	Ancillary Data	Nonscience data needed to generate calibrated or resampled data sets. Consists of instrument gains, offsets, pointing information for scan platforms, etc.
7	Correlative Data	Other science data needed to interpret space-based data sets. May include ground-based data observations such as soil type or ocean buoy measurements of wind drift.
8	User Description	Description of why the data were required, any peculiarities associated with the data sets, and enough documentation to allow secondary user to extract information from the data.

Processing Levels



Raw

Level 0

Radiometrically corrected

Level 1

Geometrically corrected

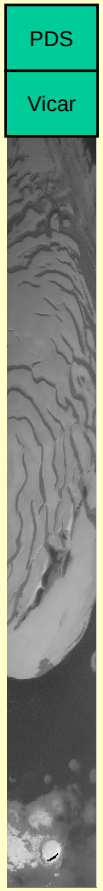
Level 2

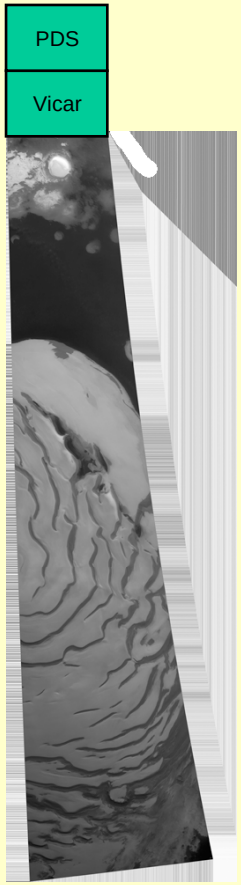
! HRSC: Terminology !

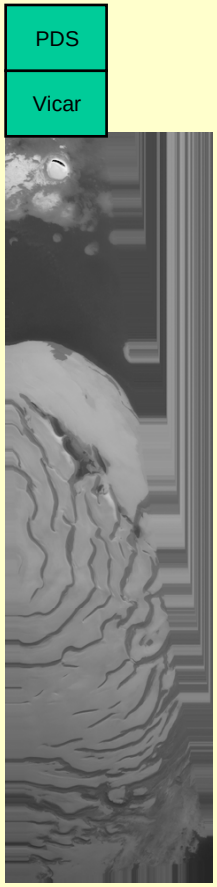
label(s)

image →

processing level →







Level2

Level3

Level4

Level 1

Level 2

ISIS Terminology

PDS (e.g. .IMG)

Raw import

ISIS .cub Level 0

Radiometric correction

ISIS .cub Level 1

Geometric correction - Map projection

ISIS .cub Level 2

Data Products

- **Product = image or spectrum or time series, etc. including label and, e.g., supplementary data**
- **Labels are like FITS headers**
  - Keyword = value format
- **Important differences from FITS**
  - Label can be attached to data product or a separate file (FITS headers must be attached)
  - Keywords are ALL defined (FITS defines only a few and allows almost unlimited user-defined keywords)
  - Format of data is not prescribed (FITS requires, e.g., 2880-byte records) but the format must be described in the label
  - There are significant differences among discipline nodes, e.g., in how data are formatted

PDS sample label

```
PDS_VERSION_ID                  = PDS3
RECORD_TYPE                     = "FIXED_LENGTH"
RECORD_BYTES                    = 2880
FILE_RECORDS                    = 3298

^HEADER                         = "MV0173728448_9001040_001_R.FIT"
^IMAGE                          = ("MV0173728448_9001040_001_R.FIT", 18)
^EXTENSION_QUALITY_HEADER       = ("MV0173728448_9001040_001_R.FIT", 1475)
^EXTENSION_QUALITY_IMAGE        = ("MV0173728448_9001040_001_R.FIT", 1476)
^EXTENSION_SNR_HEADER           = ("MV0173728448_9001040_001_R.FIT", 1841)
^EXTENSION_SNR_IMAGE            = ("MV0173728448_9001040_001_R.FIT", 1842)

DATA_SET_ID                     = "DIF-C-MRI-3/4-9P-ENCOUNTER-V2.0"
INSTRUMENT_HOST_NAME            = "DEEP IMPACT FLYBY SPACECRAFT"
INSTRUMENT_HOST_ID              = "DIF"
INSTRUMENT_NAME                 = "
    DEEP IMPACT MEDIUM RESOLUTION INSTRUMENT - VISIBLE CCD"
INSTRUMENT_ID                   = "MRI"

/***** PRODUCT INFORMATION *****/
PRODUCT_ID                      = "MV0173728448_9001040_001_R_FIT"
PRODUCT_NAME                    = "
  DI FLIGHT DATA, REDUCED MRI, MV0173728448_9001040_001_R.FIT"
PRODUCT_CREATION_TIME           = 2006-11-13T16:50:25
PRODUCT_TYPE                    = "RDR"

/***** TIME INFORMATION *****/
START_TIME                      = 2005-07-04T05:56:59.927
STOP_TIME                       = 2005-07-04T05:57:00.227
DEEPIMPACT:IMAGE_MID_TIME       = 2005-07-04T05:57:00.077
START_JULIAN_DATE_VALUE         = 2453555.7479159
STOP_JULIAN_DATE_VALUE          = 2453555.7479193
MID_JULIAN_DATE_VALUE           = 2453555.7479176
SPACECRAFT_CLOCK_START_COUNT          = "1/0173728448.130"
SPACECRAFT_CLOCK_STOP_COUNT           = "1/0173728448.207"
DEEPIMPACT:SPACECRAFT_CLOCK_MID_COUNT = "1/0173728448.169"
DEEPIMPACT:TIME_FROM_IMPACT_VALUE     = 745.812 <S>
EARTH_RECEIVED_TIME                   = 2005-07-04T06:04:26.236
```

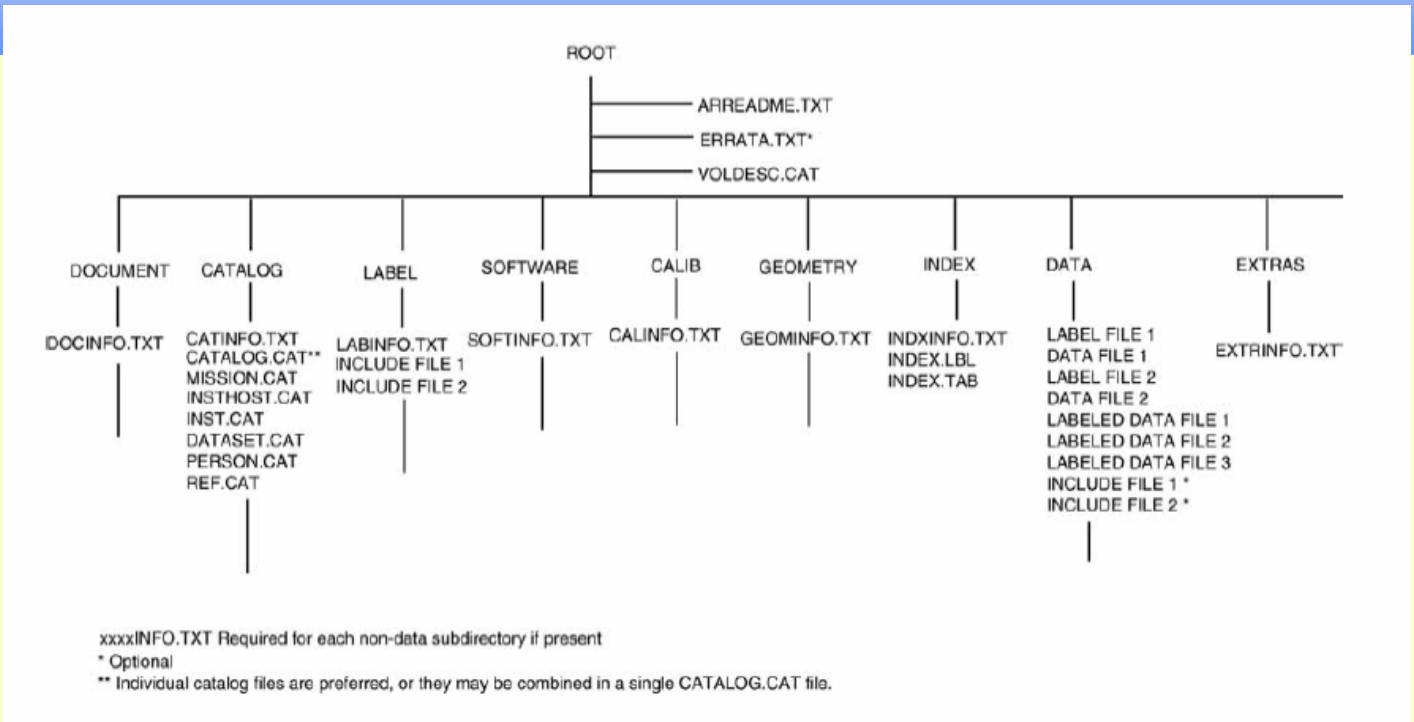
```
/***** OBSERVATION INFORMATION *****/
MISSION_PHASE_NAME                = "9P ENCOUNTER"
DEEPIMPACT:MISSION_ACTIVITY_TYPE = "IMPACT IMAGING"
OBSERVATION_TYPE                  = "IMPACT IMAGING"
TARGET_NAME                       = "9P/TEMPEL 1 (1867 G1)"
INSTRUMENT_MODE_ID                      = 1
DEEPIMPACT:COMPRESSED_IMAGE_VALUE       = "DECOMPRESSED"
COMPRESSOR_ID                           = 1
OBSERVATION_ID                          = 9001040
IMAGE_NUMBER                            = 1
DEEPIMPACT:COMMANDED_IMAGE_COUNT        = 1
FILTER_NUMBER                           = 6
FILTER_NAME                             = "CLEAR6"
CENTER_FILTER_WAVELENGTH                = 650 <NM>
DEEPIMPACT:MINIMUM_EXPOSURE_DURATION    = 3.500 <MS>
DEEPIMPACT:COMMANDED_EXPOSURE_DURATION = 297.000 <MS>
DEEPIMPACT:INTERFRAME_DELAY_DURATION    = 0.000 <MS>
DEEPIMPACT:INTEGRATION_DURATION         = 300.500 <MS>
INSTRUMENT_TEMPERATURE        =  (   293.290 <K>,
                                     292.812 <K>,
                                        "UNK",
                                     292.702 <K>,
                                     271.414 <K>,
                                     177.834 <K>,
                                     155.691 <K>,
                                     154.224 <K>,
                                     152.577 <K>,
                                     147.842 <K>,
                                       0.000 <K> )
INSTRUMENT_TEMPERATURE_POINT  =  ( "INSTRUMENT CONTROLLER PROCESSING
BOARD",
                                   "CCD SIGNAL PROCESSING BOARD",
                                   "IR SIGNAL PROCESSING BOARD",
                                   "LVPS SIGNAL PROCESSING BOARD",
                                   "CCD PREAMP BOX",
                                   "CCD ON-CHIP SENSOR",
                                   "OPTICAL BENCH",
                                   "PRIMARY MIRROR",
```

PDS sample label

```
SPICE_FILE_NAME =  ("NAIFSTARNAMES_2005321_V01.TPC",
                    "IMPACTTOI_0006.TPC",
                    "NAIF0008.TLS",
                    "PCK00008.TPC",
                    "DI_TEMPEL1_V01.TPC",
                    "DIF_SCLKSCET_00015_SCIENCE.TSC",
                    "DII_SCLKSCET_00008_SCIENCE.TSC",
                    "DI_V16.TF",
                    "DIF_HRI_V10.TI",
                    "DIF_MRI_V10.TI",
                    "DII_ITS_V10.TI",
                    "DIF_SC_050112_050809.BC",
                    "DIF_SC_050225_HIGHRATE.BC",
                    "DIF_SC_050704_HIGHRATE.BC",
                    "DII_SC_050112_050703.BC",
                    "DII_SC_050703_050704.BC",
                    "STARS_2005321_V01.BSP",
                    "JUP164_20YEAR.BSP",
                    "DII_PREENC174_NAV_V1.BSP",
                    "DIF_PREENC174_NAV_V1.BSP",
                    "DI_TEMPEL1_SSD_V1.BSP",
                    "DI_FINALENC_NAV_V3_TO2006048.BSP")
RIGHT_ASCENSION                 = 224.043927540 <DEG>
DECLINATION                     = 41.581518858 <DEG>
CELESTIAL_NORTH_CLOCK_ANGLE     = 145.4768 <DEG>
SOLAR_NORTH_POLE_CLOCK_ANGLE    = 115.8491 <DEG>
QUATERNION                      =
    (0.907518398910, 0.313026713217, -0.264899587444, -0.0908451485989)
QUATERNION_DESC                 = "QUATERNION_DESC.ASC"
DEEPIMPACT:INST_EMEJ2000_VELOCITY_VECTOR   =
    (-3.310424037940e-006 <RAD/S>,-2.898796555130e-003 <RAD/S>,
    -2.273291180330e-003 <RAD/S>)
DEEPIMPACT:TARGET_SC_POSITION_VECTOR   =
    (631.162 <KM>, 615.444 <KM>, -782.227 <KM>)
DEEPIMPACT:TARGET_SC_VELOCITY_VECTOR   =
    (-8.6027 <KM/S>, -3.3706 <KM/S>, 4.3114 <KM/S>)
TARGET_CENTER_DISTANCE          = 1178.5653 <KM>
SC_SUN_POSITION_VECTOR          =
```

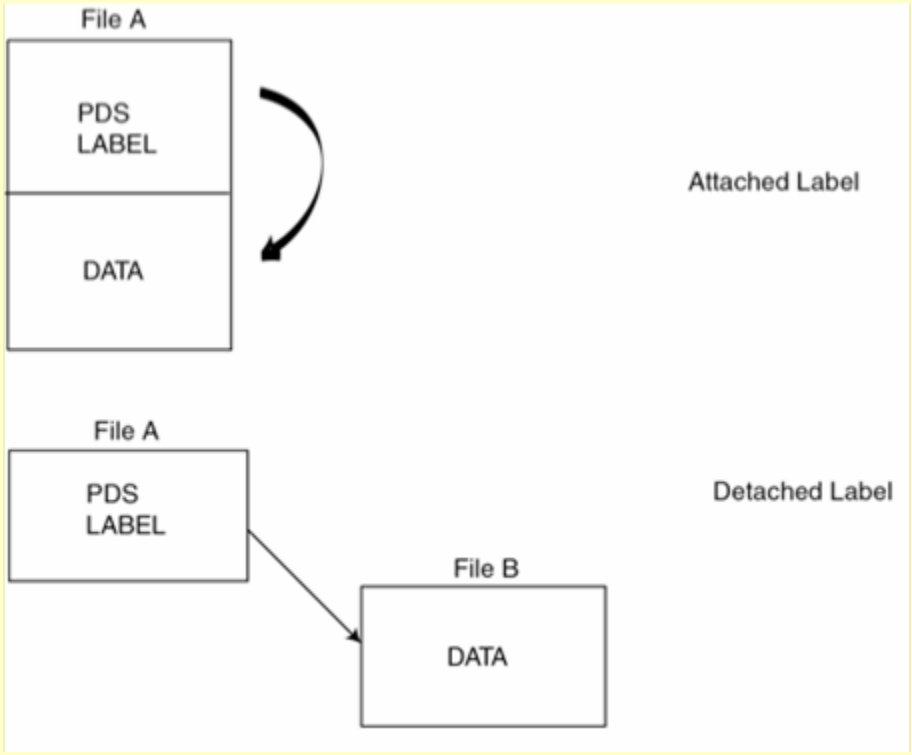
```
OBJECT                          = HEADER
  BYTES                           = 48960
  HEADER_TYPE                     = "FITS"
  INTERCHANGE_FORMAT              = "BINARY"
  RECORDS                         = 17
  DESCRIPTION                     = "
  FITS format defined in NASA/Science Office Standards Technology
100-1.0
  "
END_OBJECT                      = HEADER

OBJECT                          = IMAGE
  LINE_SAMPLES                      = 1024
  LINES                             = 1024
  SAMPLE_BITS                       = 32
  SAMPLE_TYPE                       = "IEEE_REAL"
  AXIS_ORDER_TYPE                   = "FIRST_INDEX_FASTEST"
  LINE_DISPLAY_DIRECTION            = "UP"
  SAMPLE_DISPLAY_DIRECTION          = "RIGHT"
  UNIT                              = "W/[M**2 SR UM]"
  MINIMUM                           = 1.49198e-001
  MAXIMUM                           = 2.29177e+000
  MEDIAN                            = 6.15966e-001
  STANDARD_DEVIATION                = 4.63193e-001
END_OBJECT                      = IMAGE

OBJECT                          = EXTENSION_QUALITY_HEADER
  BYTES                           = 2880
  HEADER_TYPE                     = "FITS"
  INTERCHANGE_FORMAT              = "BINARY"
  RECORDS                         = 1
  DESCRIPTION                     = "
  This extension contains a quality map for the primary image array.
  Each of the one-byte pixels in this map is composed of eight bits.
Each
  bit represents a specific characteristic about the corresponding pixel
  in the primary image array.  For a raw image, only the bit for a
```

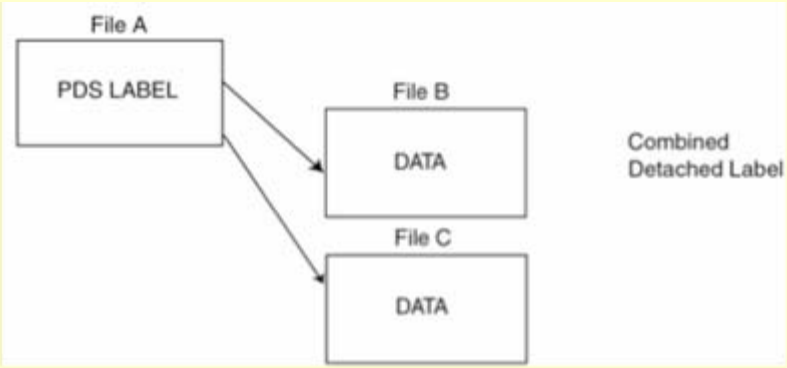
PDS data organization



- **PDS requires a lot of ancillary information**
  - Both raw and calibrated (physical units) data are required from NASA missions
  - Geometry is required either in the labels or in separate files or in SPICE
  - Catalog files are used to load the central search facility
  - Documents (including ascii versions) are required to explain enough that any intelligent scientist 20 years from now should be able to recalibrate and use the data (with the help of library references)

Attached & detached labels





Using PDS archives

File types

.img

These are PDS binary image files with attached or detached PDS labels. They may be found in the /data directory. They can be displayed using an SBN utility for IDL, ReadPDS.

.jpg

These are lossy compressed image files which may appear in the data/, document/ or calibration (calib/) directory. They will be accompanied by a PDS label and can be opened using most image manipulation software (like XV, Photoshop, etc.) or a browser.

.lbl

The PDS label files describe the contents of each dataset in detail, field-by-field, and are a PDS archive requirement. This includes a physical description of the storage format as well as a logical explanation of the significance or content of each field. Labels accompany most files on the volume and are ASCII text, so they can be read with any standard text editor or browser.

.pdf

These are Adobe Portable Document Format (PDF) files. They may be found in the document/ or calibration (calib/) directory and should have an associated PDS label. They can be opened using Adobe Acrobat Reader.

.pds

The PDS is planning to start archiving spectral cubes. The .pds extension is just a place holder for these spectral cubes. The PDS data cubes will be data files requiring specialized software to display and manipulate. The USGS has developed and made available software for this purpose. Integrated Software for Imagers and Spectrometers (ISIS) combines basic capabilities of image processing, analysis and display of 2- and 3-dimensional data with specialized planetary cartographic functionality.

.png

These are Portable Network Graphics images, a bitmapped image format using lossless compression. They may appear in the document/ or calibration (calib/) directory. They can be opened using most image manipulation software (like XV, Photoshop, etc.) or a browser.

.tab

These are ASCII table files. Table files may be found in most directories. The tables should be accompanied by PDS labels. The tables should be displayable in a standard text editor or browser.

.tar

These files are tape archive format files, which are used to simplify storage and downloads of large data sets. They preserve the directory structure of the data set volume. Data reviewers and archive users may encounter .tar files when downloading an entire data directory or a large set of documentation. Tar files can be opened by using GNU Tar software, WinZip or a similar program.

.tif

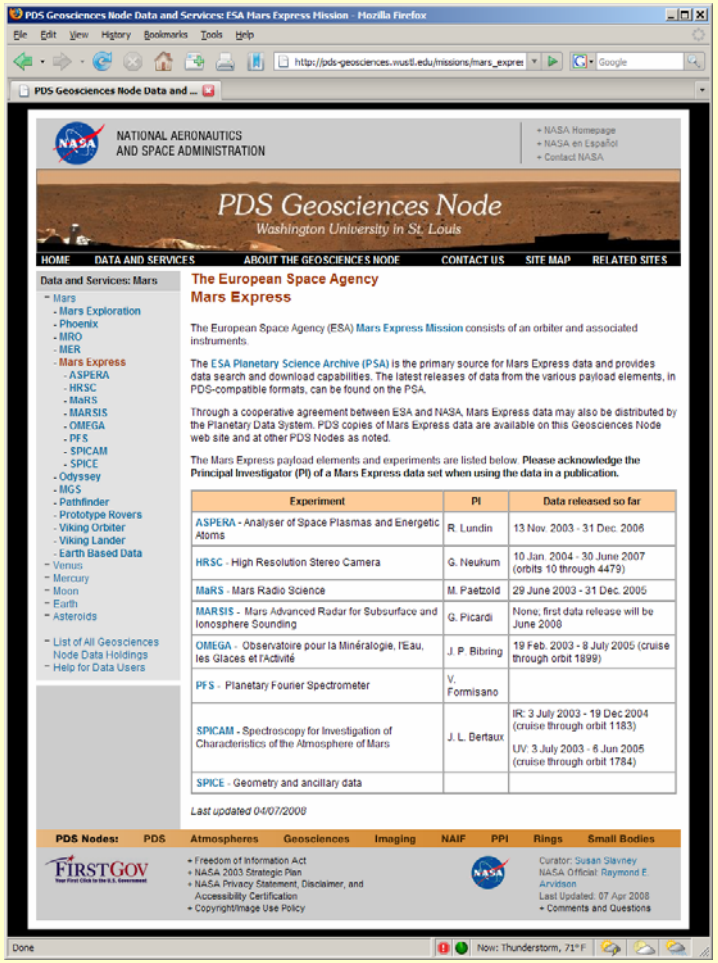
Tagged Image File Format files are image files that may appear in the document/ or calibration (calib/) directory. They can be opened using most image manipulation software (like XV, Photoshop, etc.) or a browser.

.txt

These text files are flat ASCII files, but usually denote documentation files which either a) have no accompanying PDS label; or b) have a minimal PDS label attached to the top of the file. They provide additional information to explain archive directories and contents. They can be read with any standard text editor or a browser.

PDS Geosciences Node

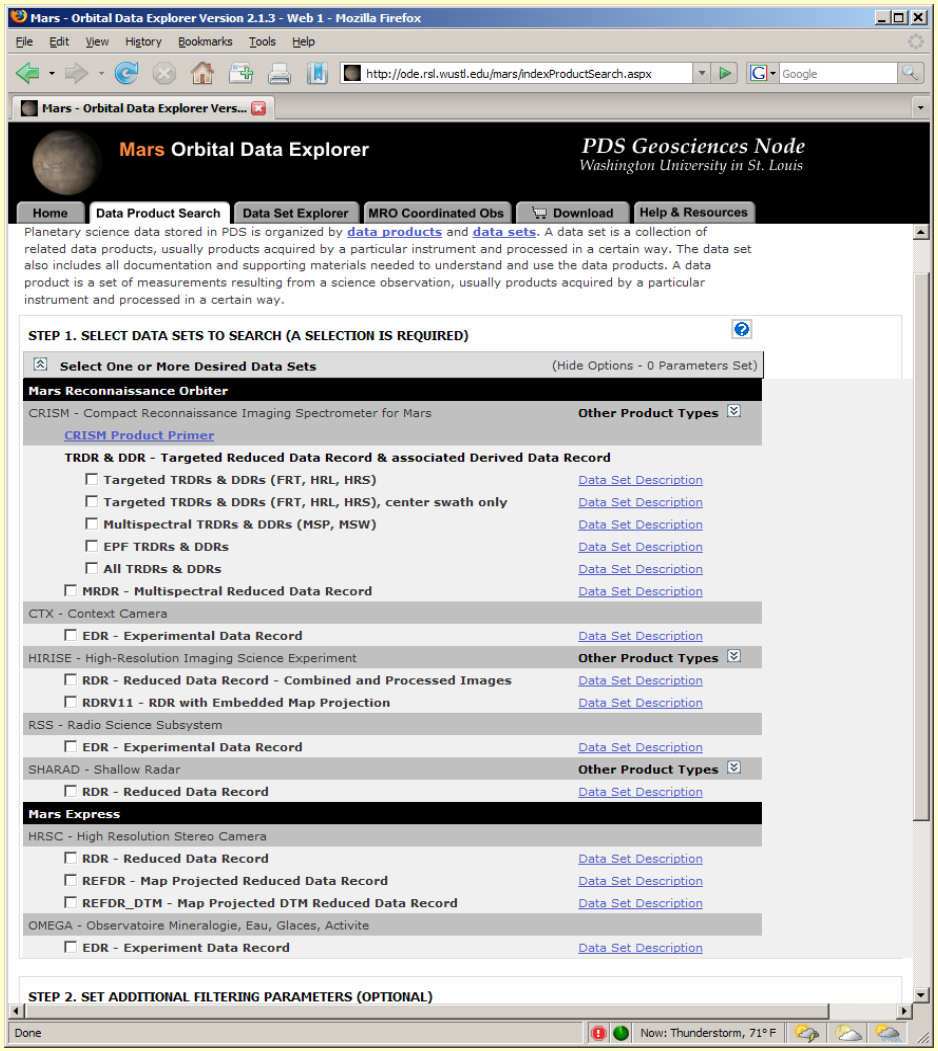
- **How to access the PDS copy of Mars Express data?**
  - Mars Express data are available from Geosciences Node via:
    - FTP
    - HTTP download
    - Search interface – Orbital Data Explorer (ODE)
  - See URL above for the main PDS Mars Express page from the Geosciences Node.
  - There is a page for each MEX instrument with more detailed information about data from that instrument.
  - The main Geosciences Node web page (http://pds-geosciences.wustl.edu/) has a “What’s New” section to announce recent additions.
  - Geosciences Node pages note that the PSA is the primary source for Mars Express data.

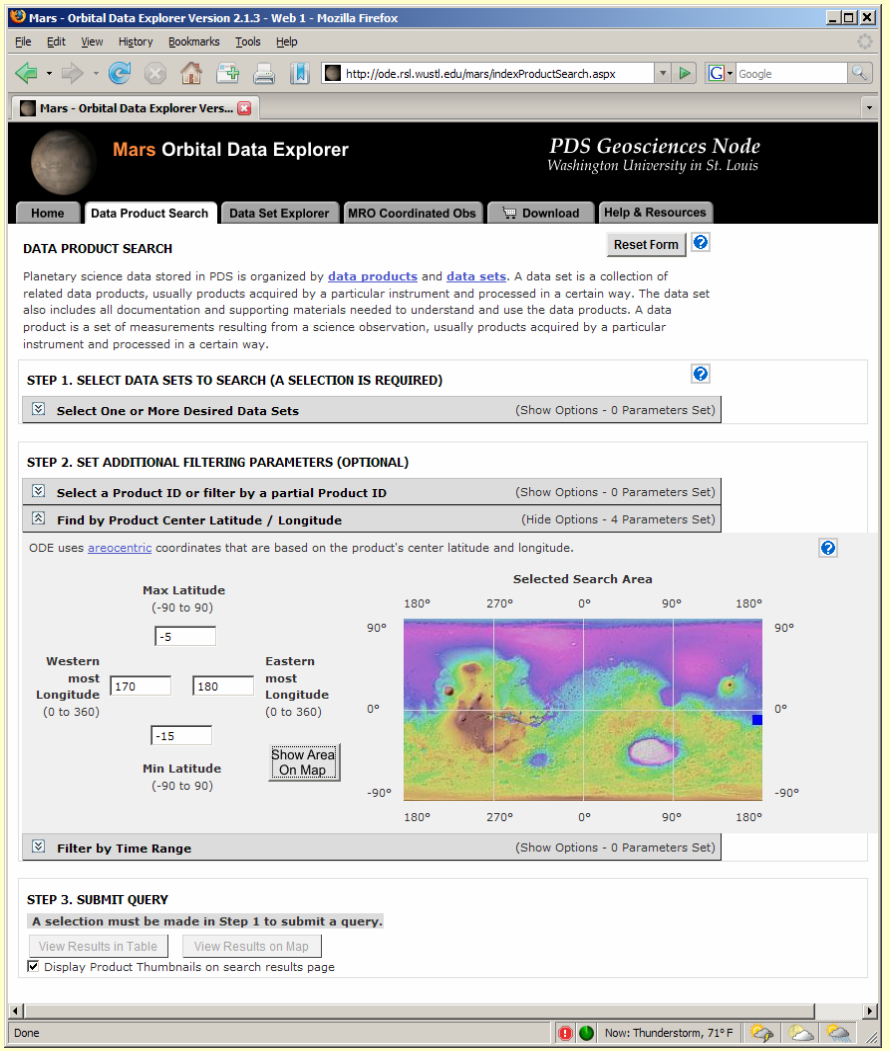


Orbital Data Explorer

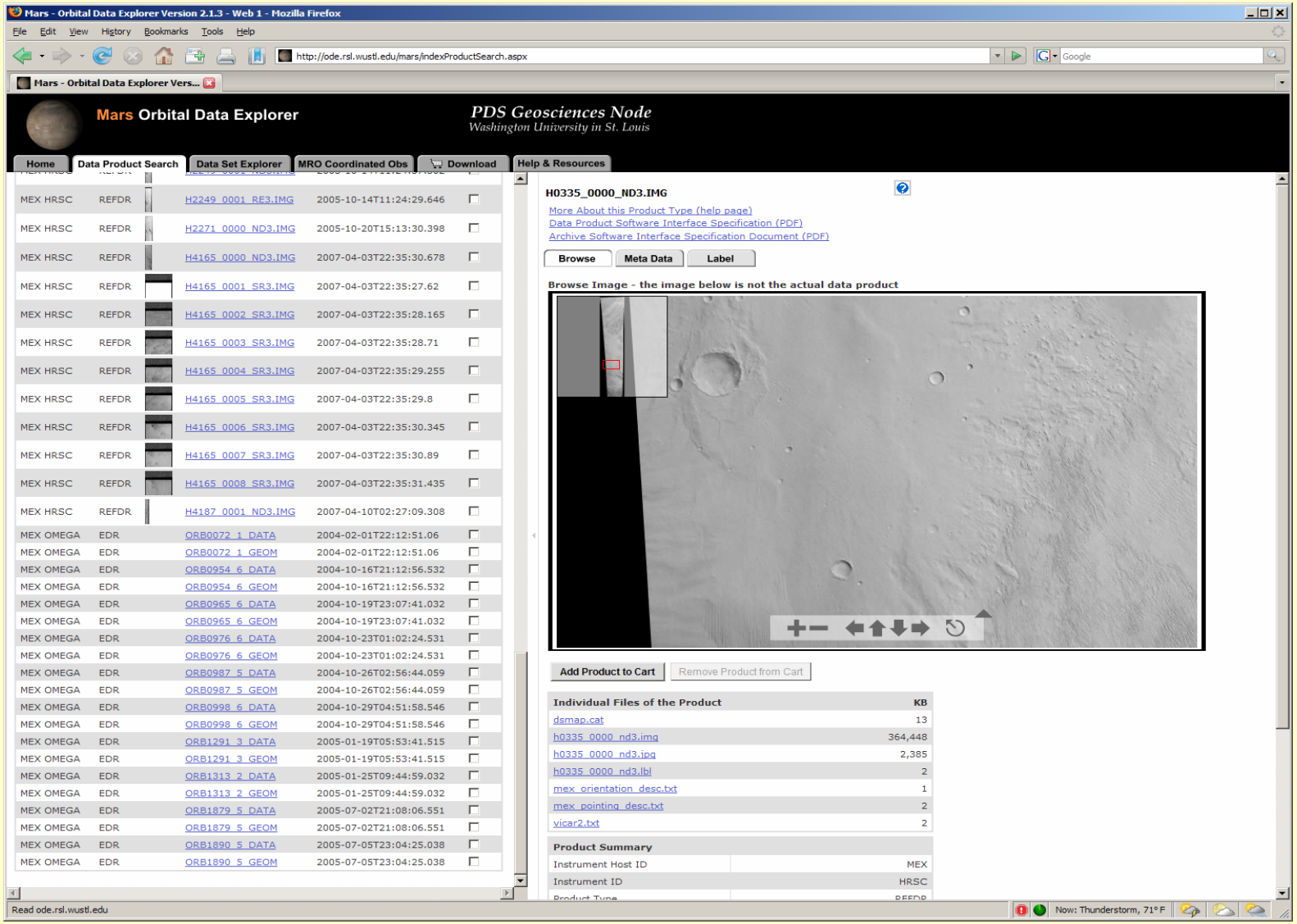
- For users that need to locate specific subsets of data, the Geosciences Node has developed a web-based tool for Mars orbital data – known as the Orbital Data Explorer (ODE).
- Originally developed to support access to MRO data archives (CRISM, HiRISE, and SHARAD).
- It has been expanded to include Mars Express OMEGA and HRSC data.
- Provides a tool to search for data by area on Mars or data acquisition time for multiple instruments on multiple spacecraft.
- Users can browse through and download selected data.
- ODE will soon be further expanded to include MGS MOLA and Odyssey GRS data sets.
- http://ode.rsl.wustl.edu/mars/

ODE Search Forms



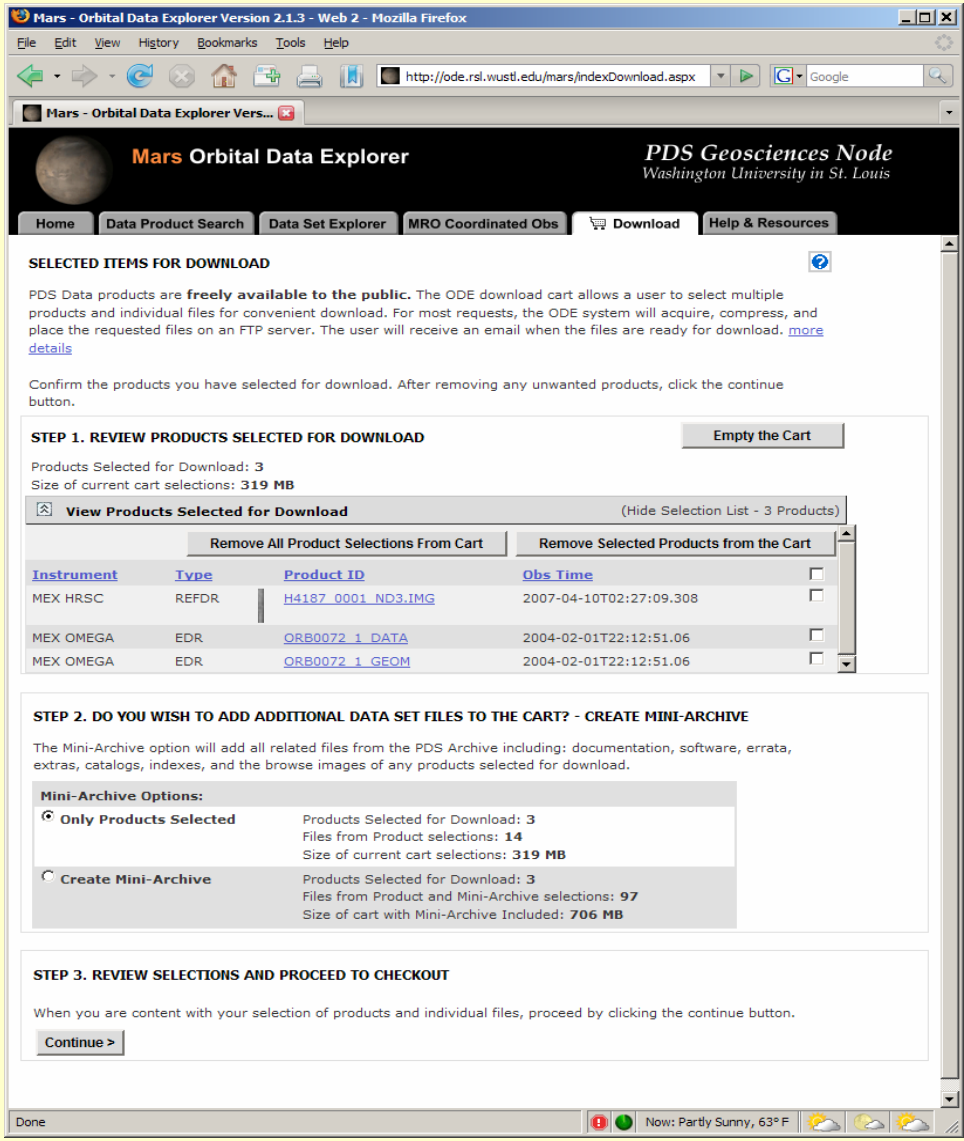


ODE browse results



ODE data download

- **Individual files can be downloaded from the ‘Browse’ or ‘Data Set Explorer’ pages.**
- **Products can also be add to a cart for downloading.**
- **Through the cart method, users can select to download**
  - Only data products
  - Products and all supporting information (documentation, software, etc.)
- **Cart selections are packaged into zip or tar files and downloaded by ftp.**



Pilot

Unified Planetary Coordinates (UPC) Database

- Provides improved metadata for planetary images
- Reads position & pointing from PDS labels
- Converts to unified coordinates
- Calculates ‘improved’ pointing & location data
- Can be used by other delivery services
- Requires camera model in ISIS3
- Primarily supports images used in cartography and geologic mapping
- Mars: Vik.Or., MOC, CTX, HiRISE, TH IR
- Moon: Clementine UVVIS & NIR

Planetary Image Locator Tool (PILOT)

- Map interface for UPC footprints (visual check on what UPC is calculating)
- Improved data identification because of increased accuracy of geometric information
- Standardizes map coordinates and projection for all included datasets (no need to know ‘native’ systems)
- Built-in updating possible, benefits from improvements in image pointing, etc. that result from cartographic processing
- Provides POC for obtaining UPC database

Planetary Archives: PSA

PSA Definition and Purpose

The *Planetary Science Archive* (PSA) is the initiative, the setup, the process and the implementation to preserve data from ESA's spacecraft to planetary bodies, as well as supplementary information acquired in laboratories or ground-based observatories.

The prime objectives of the PSA are:

- to support the experimenter teams in the preparation for the spacecraft and ground-based long-term archives
- to enable and ensure the (long-term) preservation of these archives
- distribution of scientific useful data to the world wide scientific community
- provision of supplementary data services aiming to maximize the usage of planetary mission data and ease the scientific data analysis.

The PSA will be advised by a PSA Scientific Advisory Group that meets at least yearly.

Planetary Science Archive

Users Quick Guide

Classical User Interface

By J. Zender and D. J. Heather

9 June 2008, Version 2.1

Step 1

a) Open the PSA www home page at http://www.rssd.esa.int/psa

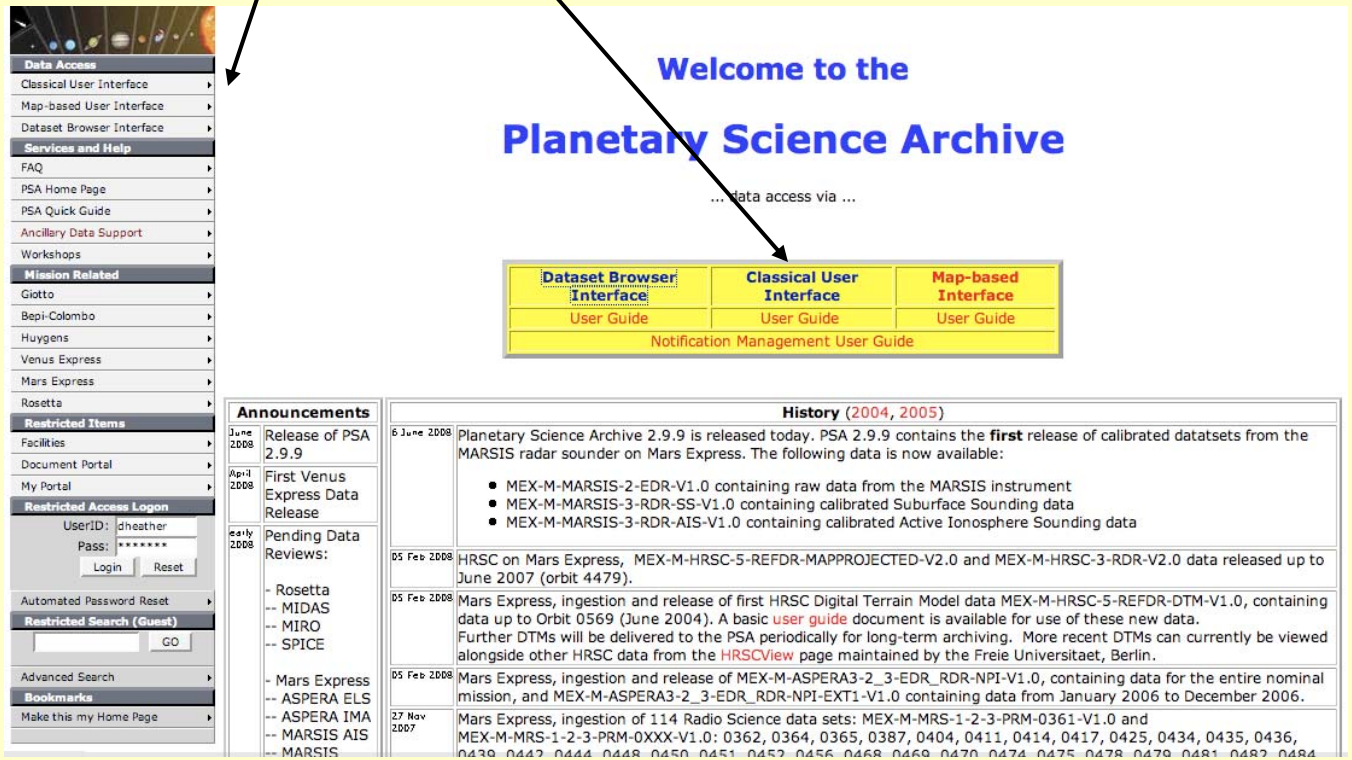
b) Select “Classical User Interface” on your left or in the yellow box

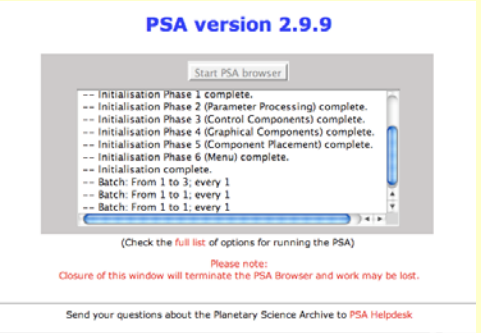
Step 2

a) You must click ‘Trust’ to accept the certificate and run the PSA applet.

Step 3

The “PSA Browser Start Page” will appear on your screen and will automatically start to load



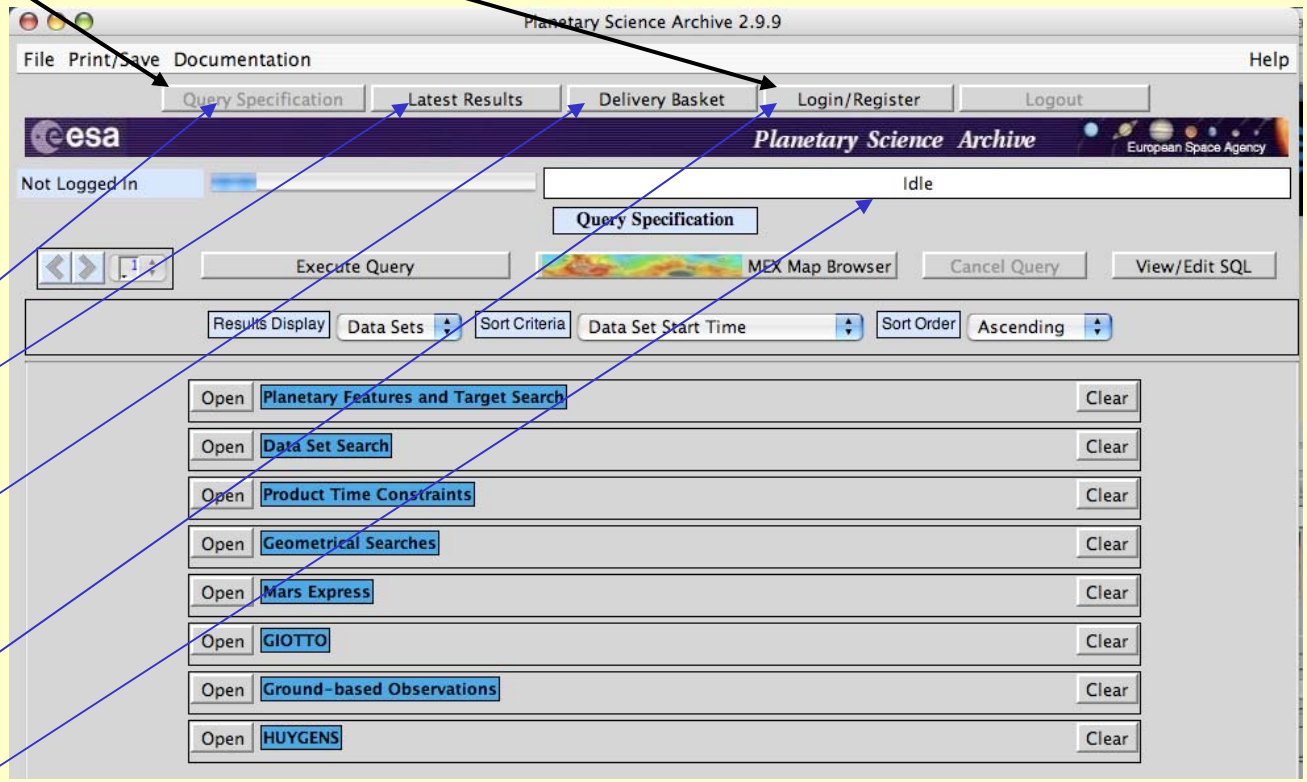


Login/Registering

Step 4

a) Select the “Login/Register” View and login or request new user id.

b) After having logged in, select the “Query Specification” View



The Planetary Science Archive (PSA) is structured in 5 different ‘views’,

a) The “Query Specification” view, that allows you to define your query against the database

b) The “Latest Result” view, that allows you to view the result of your previous query.

c) The “Delivery Basket” view, that allows you to select your items of interest and order them later (free of charge).

d) The “Login/Register”, that you should know by now (if not, please register to have the full functionality of the PSA)

e) The “Request Monitor” view to monitor your requests

By clicking/selecting the individual views you can ‘walk around’ in the PSA.

Define Your Query

Step 3

a) Open a “Query Panel” and select your search criteria

b) Select your “Result Display” view options

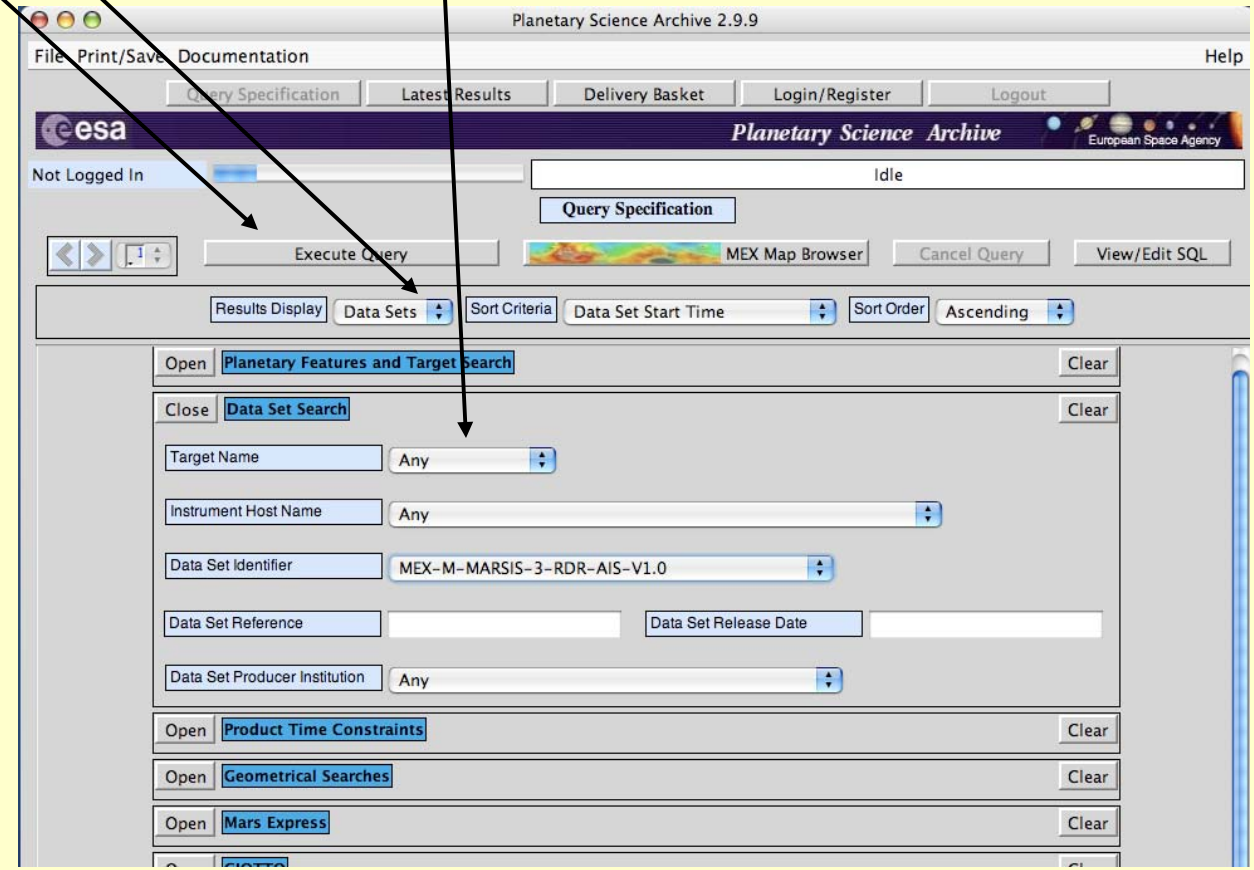
c) Execute the query

Opening several “Query Panels” will logically-AND the constraints within the individual query panels.

Not opening any “Query Panel” will result in the display of all available datasets

The PSA contains data conform to the Planetary Data System Standard. A ‘Data Product’ is e.g. a PDS-labeled file containing an image. A ‘Data Set’ is a full directory hierarchy containing documentation, catalogues, indexes, data products and any other information.

In the “Result Display” view options, you can select to see Data Products, Data Sets or both in the “Result Panel”

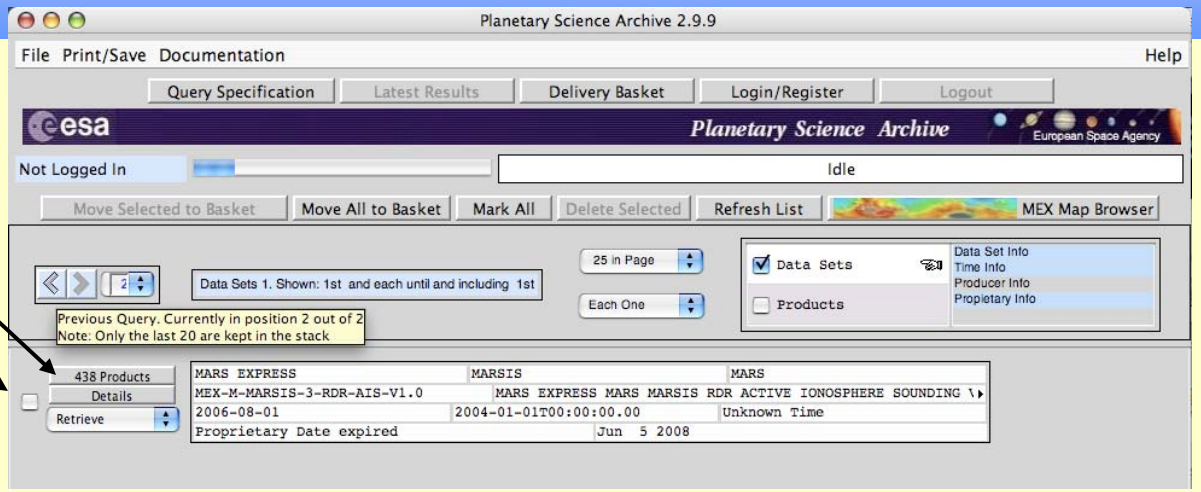


Browse your Results and Select

Step 4

a) If you want individual data products, 'view' the products by clicking on 'xxx Products'

b) If you want to download the whole data set, 'mark' the dataset as selected and move it to the Delivery Basket

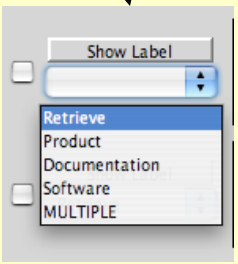


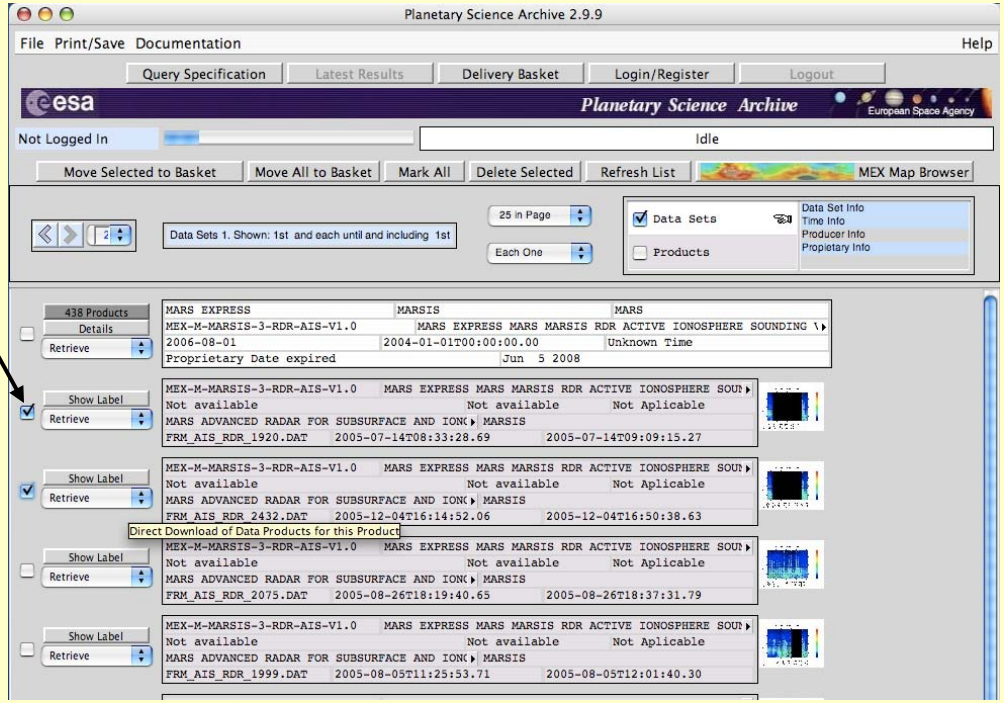
Step 4:

c) 'mark' the data products that you want to download as selected and move them into the Delivery Basket

Step 4 Alternative:

You can download a Data Products, associated software and documentation directly, using the 'Retrieve' menu on the left side of each Data Product





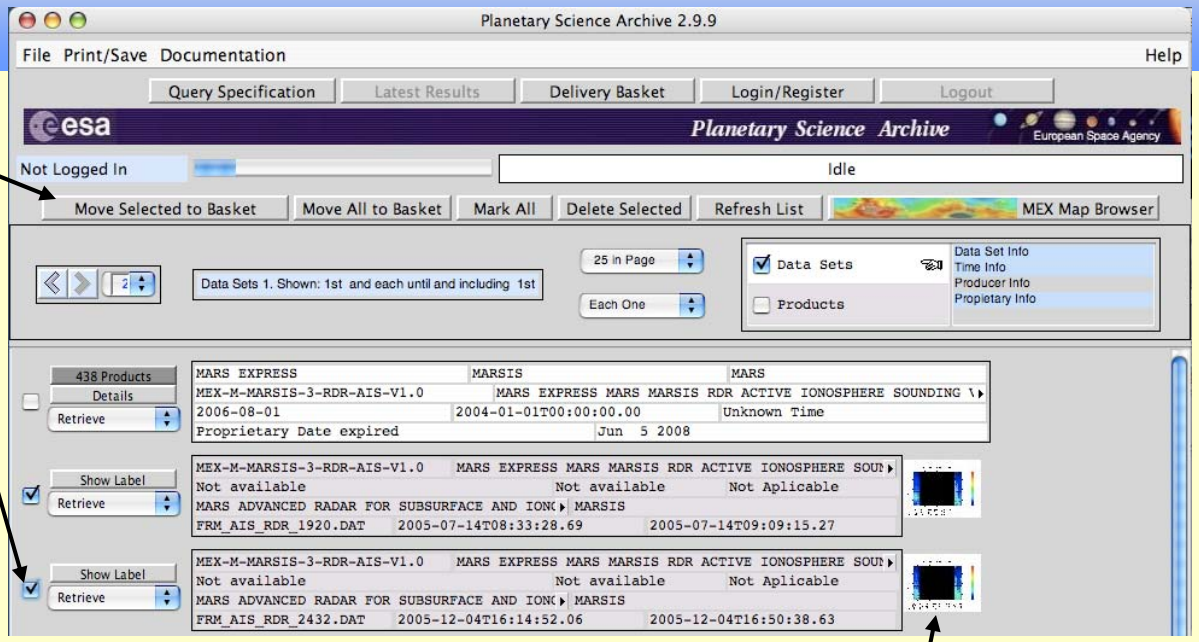
Order via the Delivery Basket

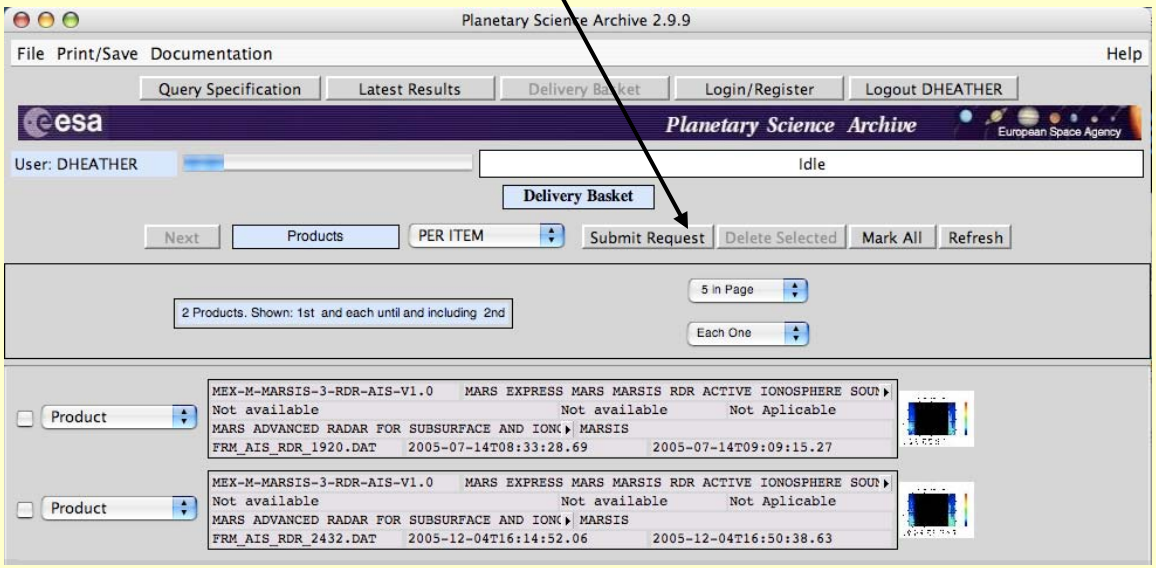
Step 5:

a) ‘mark’ the Data Product(s) that you want to download and move it to the basket

b) You can then open the Delivery Basket window

c) When you are happy with your selections, click on ‘Submit Request’





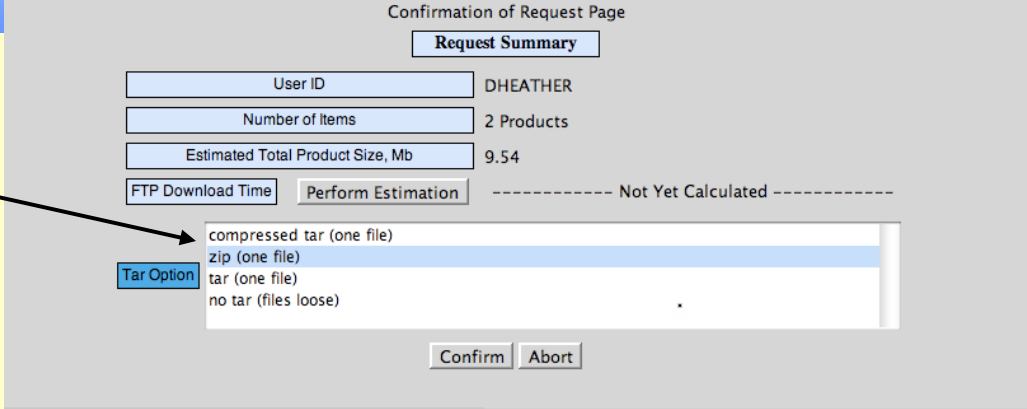
To have a somewhat larger view of the data product, click on the icon and it will be displayed in a separate window.

Downloading / Retrieving the Data

Step 6:

a) ‘select’ your data packing option

b) ‘Confirm’ and wait for an email that will inform you on the ftp retrieval of the data you have selected



To: dheather@rssd.esa.int

```
Dear Planetary Science Archive User,

Your retrieval request has been successfully processed.

Please follow the instructions below to access/browse the
ftp area where your data is located:

ftp psa.esac.esa.int
anonymous
<your email address as password>
prompt
cd /pub/dheather
binary
dir

Alternatively, you can also access your files directly from
your browser at:
        ftp://psa.esac.esa.int/pub/dheather/DHEATHER21647.zip
where you will be able to see some of the products on-line.

Your data will remain at this location for 7 days.


The Planetary Science Archive (PSA) can be accessed at

        http://www.rssd.esa.int/psa

You can also get more information about the PSA project by
accessing the PSA web pages at the same address.

If you have any comments or questions, please contact the PSA HelpDesk
at the following email address:

     psahelp@rssd.esa.int


Regards,

 The PSA Team
```

Your email confirmation contains all you need to know to download the data within the next week from the PSA server.

Planetary Science Archive

Users Quick Guide

PSA Data Set Browser Interface

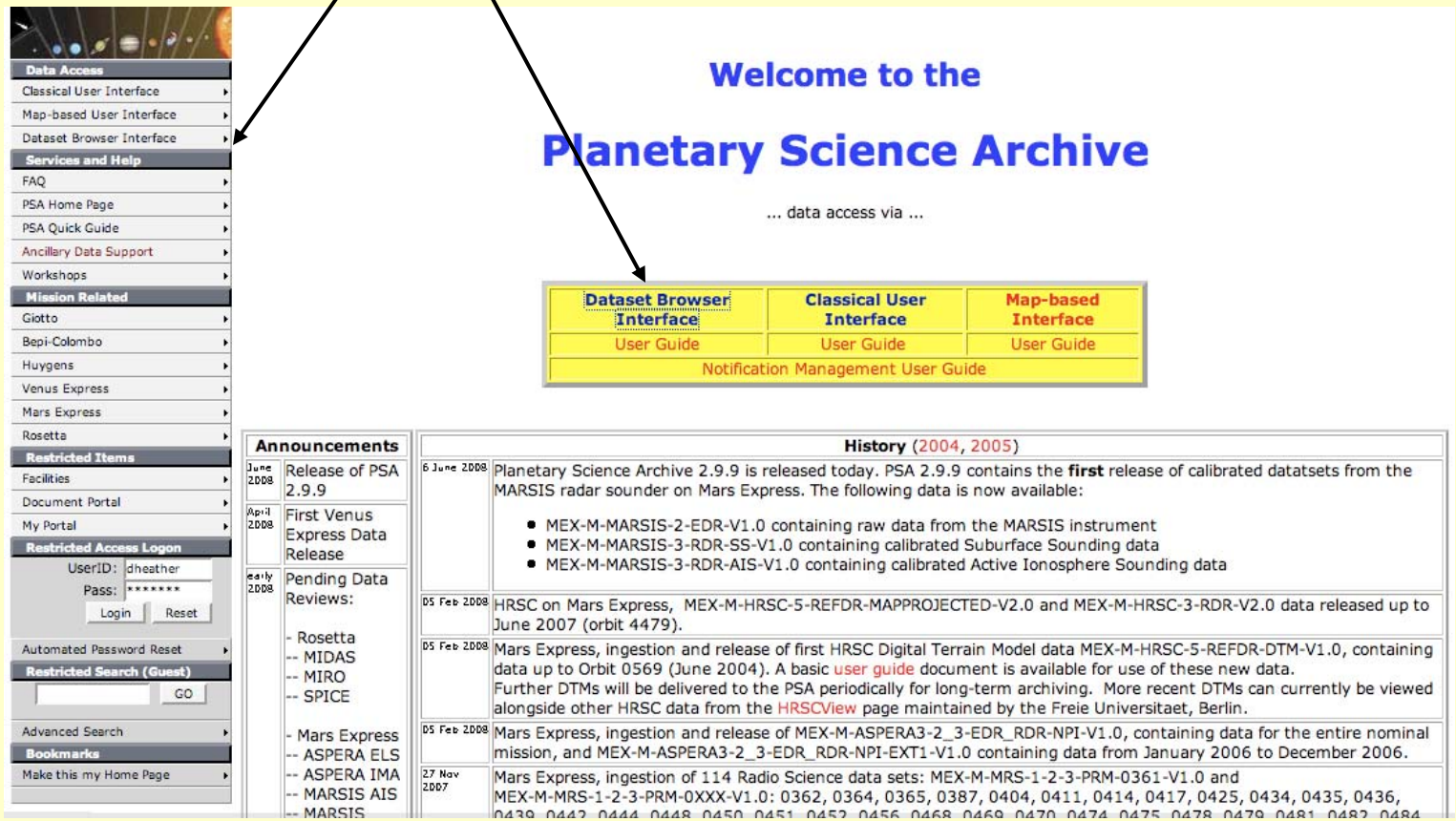
By J. Zender and D. J. Heather

09 June 2008, Version 1.1

Step 1

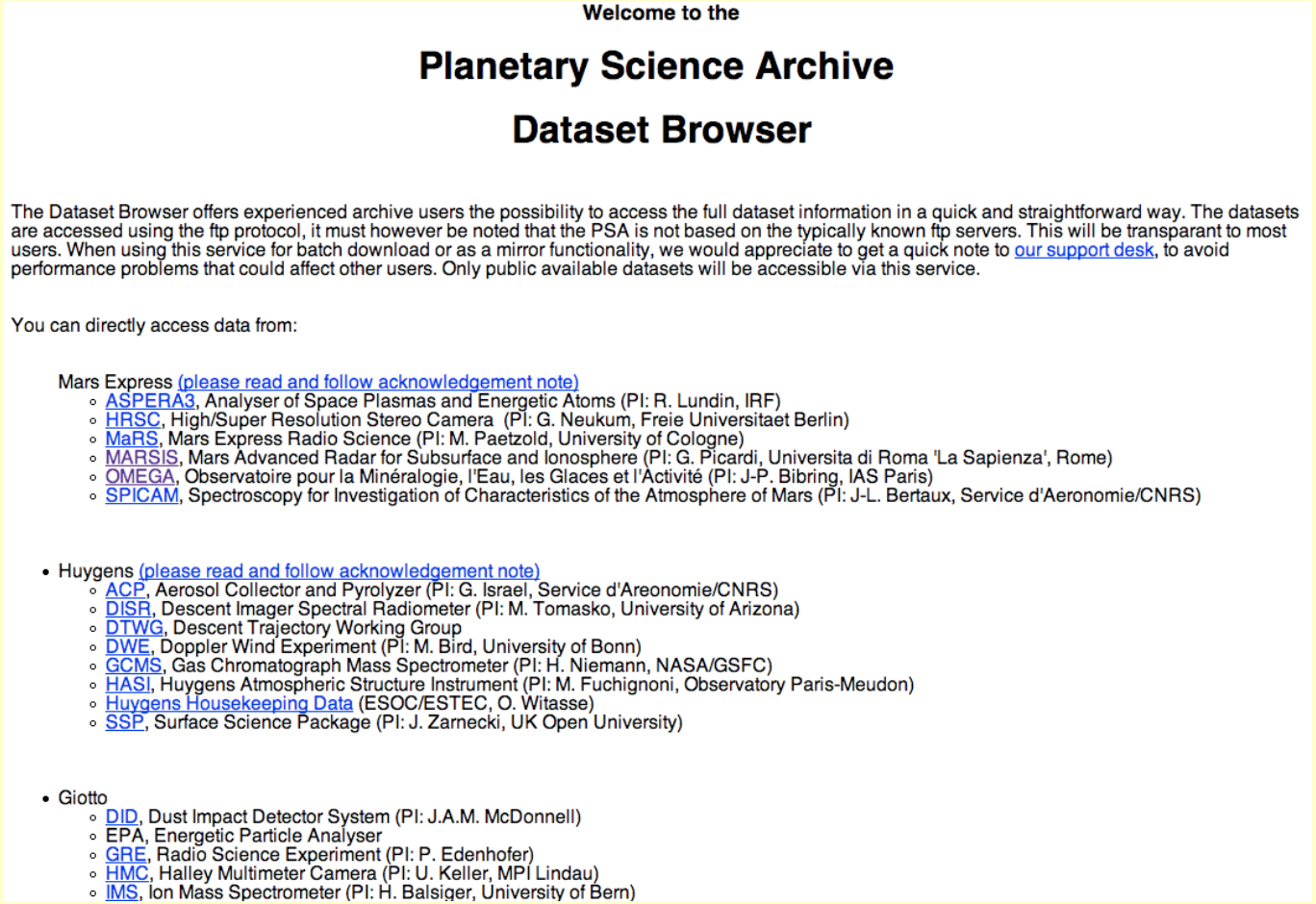
a) Open the PSA www home page at http://www.rssd.esa.int/psa

b) Select “Data set Browser Interface” on your left or in the yellow box



Direct Browsing of Datasets

- **From the Dataset Browser entry page, select the instrument of interest.**
- **Only public datasets are available through this interface! So you will not find**
  - Datasets before public release
  - Datasets in Peer Review



Welcome to the

Planetary Science Archive

Dataset Browser

The Dataset Browser offers experienced archive users the possibility to access the full dataset information in a quick and straightforward way. The datasets are accessed using the ftp protocol, it must however be noted that the PSA is not based on the typically known ftp servers. This will be transparant to most users. When using this service for batch download or as a mirror functionality, we would appreciate to get a quick note to our support desk, to avoid performance problems that could affect other users. Only public available datasets will be accessible via this service.

You can directly access data from:

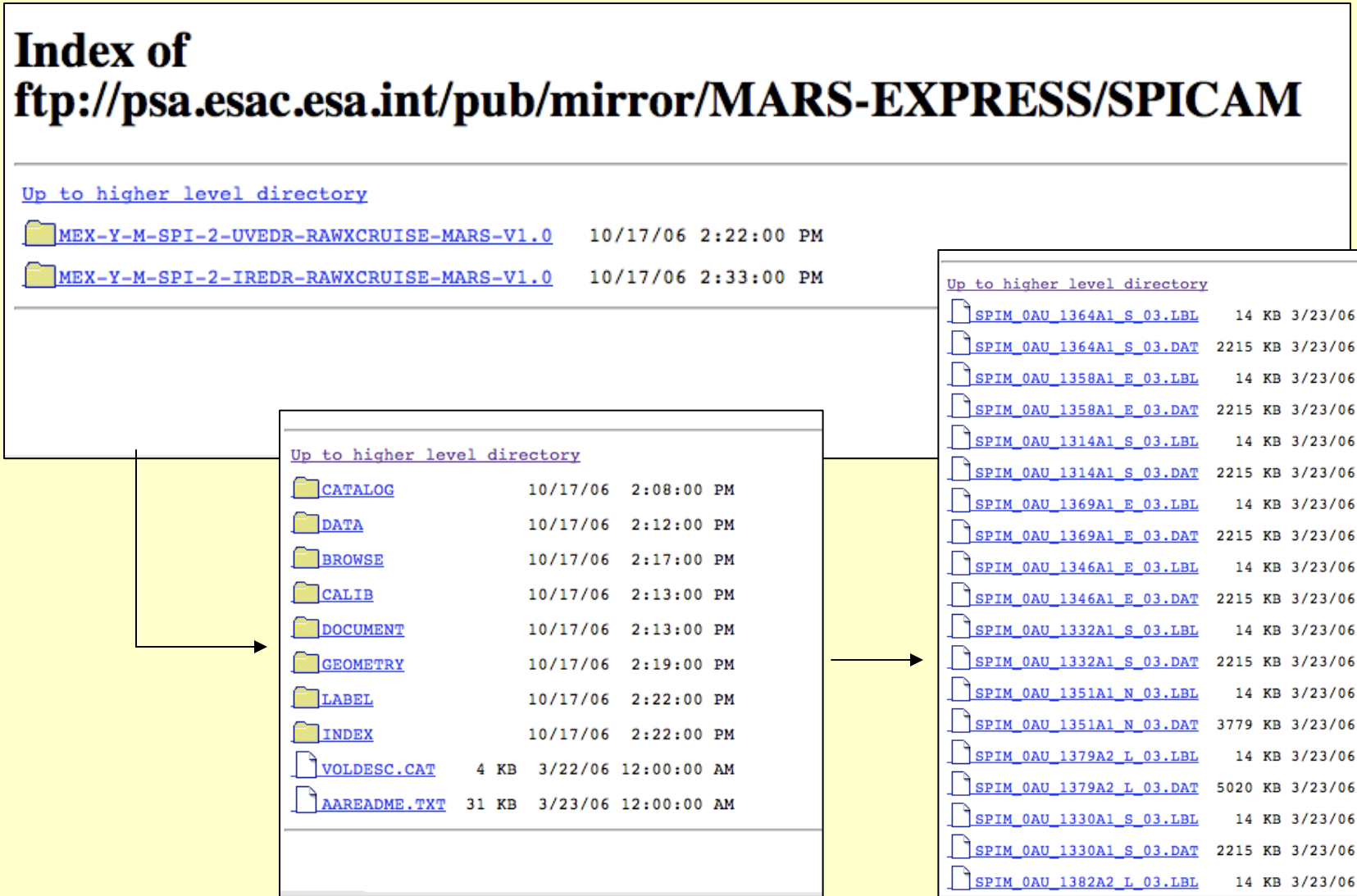
Mars Express (please read and follow acknowledgement note)
- ASPERA3, Analyser of Space Plasmas and Energetic Atoms (PI: R. Lundin, IRF)
- HRSC, High/Super Resolution Stereo Camera (PI: G. Neukum, Freie Universitaet Berlin)
- MaRS, Mars Express Radio Science (PI: M. Paetzold, University of Cologne)
- MARSIS, Mars Advanced Radar for Subsurface and Ionosphere (PI: G. Picardi, Universita di Roma 'La Sapienza', Rome)
- OMEGA, Observatoire pour la Minéralogie, l'Eau, les Glaces et l'Activité (PI: J-P. Bibring, IAS Paris)
- SPICAM, Spectroscopy for Investigation of Characteristics of the Atmosphere of Mars (PI: J-L. Bertaux, Service d'Aeronomie/CNRS)

- Huygens (please read and follow acknowledgement note)
  - ACP, Aerosol Collector and Pyrolyzer (PI: G. Israel, Service d'Areonomie/CNRS)
  - DISR, Descent Imager Spectral Radiometer (PI: M. Tomasko, University of Arizona)
  - DTWG, Descent Trajectory Working Group
  - DWE, Doppler Wind Experiment (PI: M. Bird, University of Bonn)
  - GCMS, Gas Chromatograph Mass Spectrometer (PI: H. Niemann, NASA/GSFC)
  - HASI, Huygens Atmospheric Structure Instrument (PI: M. Fuchignoni, Observatory Paris-Meudon)
  - Huygens Housekeeping Data (ESOC/ESTEC, O. Witasse)
  - SSP, Surface Science Package (PI: J. Zarnecki, UK Open University)

- Giotto
  - DID, Dust Impact Detector System (PI: J.A.M. McDonnell)
  - EPA, Energetic Particle Analyser
  - GRE, Radio Science Experiment (PI: P. Edenhofer)
  - HMC, Halley Multimeter Camera (PI: U. Keller, MPI Lindau)
  - IMS, Ion Mass Spectrometer (PI: H. Balsiger, University of Bern)

Direct Browsing of Datasets II

> Browse through the dataset in the usual way.



Index of ftp://psa.esac.esa.int/pub/mirror/MARS-EXPRESS/SPICAM

Up to higher level directory

MEX-Y-M-SPI-2-UVEDR-RAWXCRUISE-MARS-V1.0	10/17/06 2:22:00 PM
MEX-Y-M-SPI-2-IREDR-RAWXCRUISE-MARS-V1.0	10/17/06 2:33:00 PM

Up to higher level directory

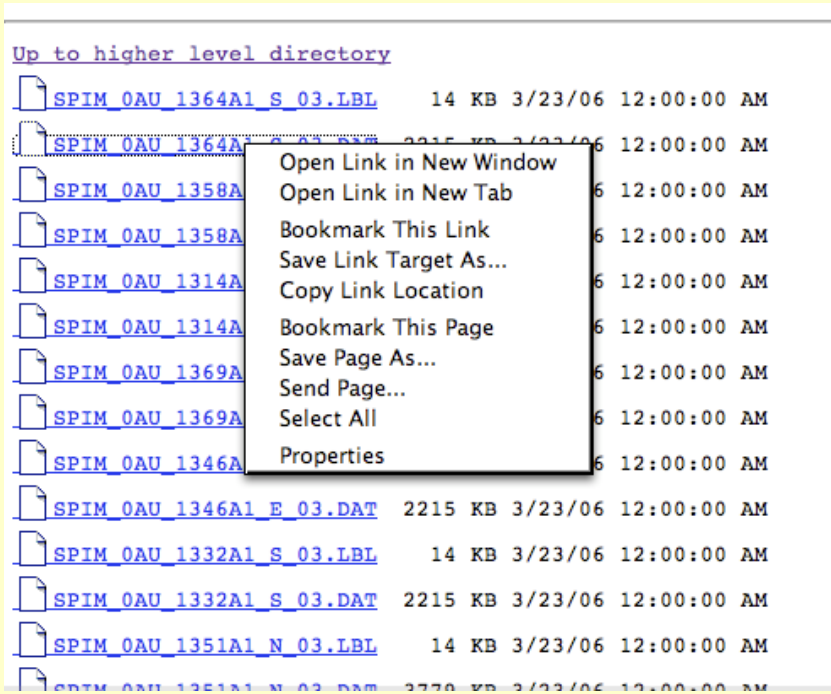
CATALOG		10/17/06 2:08:00 PM
DATA		10/17/06 2:12:00 PM
BROWSE		10/17/06 2:17:00 PM
CALIB		10/17/06 2:13:00 PM
DOCUMENT		10/17/06 2:13:00 PM
GEOMETRY		10/17/06 2:19:00 PM
LABEL		10/17/06 2:22:00 PM
INDEX		10/17/06 2:22:00 PM
VOLDESC.CAT	4 KB	3/22/06 12:00:00 AM
AAREADME.TXT	31 KB	3/23/06 12:00:00 AM

Up to higher level directory

SPIM_0AU_1364A1_S_03.LBL	14 KB	3/23/06 12:00:00 AM
SPIM_0AU_1364A1_S_03.DAT	2215 KB	3/23/06 12:00:00 AM
SPIM_0AU_1358A1_E_03.LBL	14 KB	3/23/06 12:00:00 AM
SPIM_0AU_1358A1_E_03.DAT	2215 KB	3/23/06 12:00:00 AM
SPIM_0AU_1314A1_S_03.LBL	14 KB	3/23/06 12:00:00 AM
SPIM_0AU_1314A1_S_03.DAT	2215 KB	3/23/06 12:00:00 AM
SPIM_0AU_1369A1_E_03.LBL	14 KB	3/23/06 12:00:00 AM
SPIM_0AU_1369A1_E_03.DAT	2215 KB	3/23/06 12:00:00 AM
SPIM_0AU_1346A1_E_03.LBL	14 KB	3/23/06 12:00:00 AM
SPIM_0AU_1346A1_E_03.DAT	2215 KB	3/23/06 12:00:00 AM
SPIM_0AU_1332A1_S_03.LBL	14 KB	3/23/06 12:00:00 AM
SPIM_0AU_1332A1_S_03.DAT	2215 KB	3/23/06 12:00:00 AM
SPIM_0AU_1351A1_N_03.LBL	14 KB	3/23/06 12:00:00 AM
SPIM_0AU_1351A1_N_03.DAT	3779 KB	3/23/06 12:00:00 AM
SPIM_0AU_1379A2_L_03.LBL	14 KB	3/23/06 12:00:00 AM
SPIM_0AU_1379A2_L_03.DAT	5020 KB	3/23/06 12:00:00 AM
SPIM_0AU_1330A1_S_03.LBL	14 KB	3/23/06 12:00:00 AM
SPIM_0AU_1330A1_S_03.DAT	2215 KB	3/23/06 12:00:00 AM
SPIM_0AU_1382A2_L_03.LBL	14 KB	3/23/06 12:00:00 AM

Data Download

- **When using a web browser, please insure to use an appropriate method to download your data,**
  - E.g. in MOZILLA the ‘Save Link Target As…”
- **Be aware that you download only the file selected, …**
  - Detached label files (e.g. LBL and DAT) need to be both downloaded to get the full data product!
  - Any linked files, .e.g. ^DESCRIPTION = “INSTRUMENT.PDF” will not be attached to the downloaded file!



Accessing the PSA archive with an FTP-client

- **You will be able to connect to the PSA archive with any ftp client, e.g. ncftp, ftp, fuqu, etc**
  - Using ftp://psa.esac.esa.int/pub/mirror
  - Or directly the mission related subpage ftp://psa.esac.esa.int/pub/mirror/MARS-EXPRESS

Automatic Download Scripts / Mirror Scripts

- **You can use any automatic download script (mirror, etc) to recursively download the data on the PSA.**

- **Before installing a regular download scheme on your side (mirror, etc), please inform us by sending a short note to psahelp@rssd.esa.int. We will keep an eye on the load of network and server such that other users are not disturbed. In such cases, we will contact you and propose alternative time periods and options to download the data you are interested in.**

- **Be aware that the files that you see in your www-browser or your ftp-client are not the physical files, but a link into the PSA database system. When downloading data, the PSA server resolves the link on the fly and delivers the data back to you.**

- **When building mirror scripts, you can compare your data items against size or time with the ones on the PSA server.**

Be careful when using automatic downloads, as the size of the datasets can be huge (several 100GBytes or larger)! Please contact the PSA Helpdesk beforehand.

Planetary Science Archive

Users Quick Guide

Map Based User Interface

By J. Zender and D. J. Heather

09 June 2008, Version 1.1

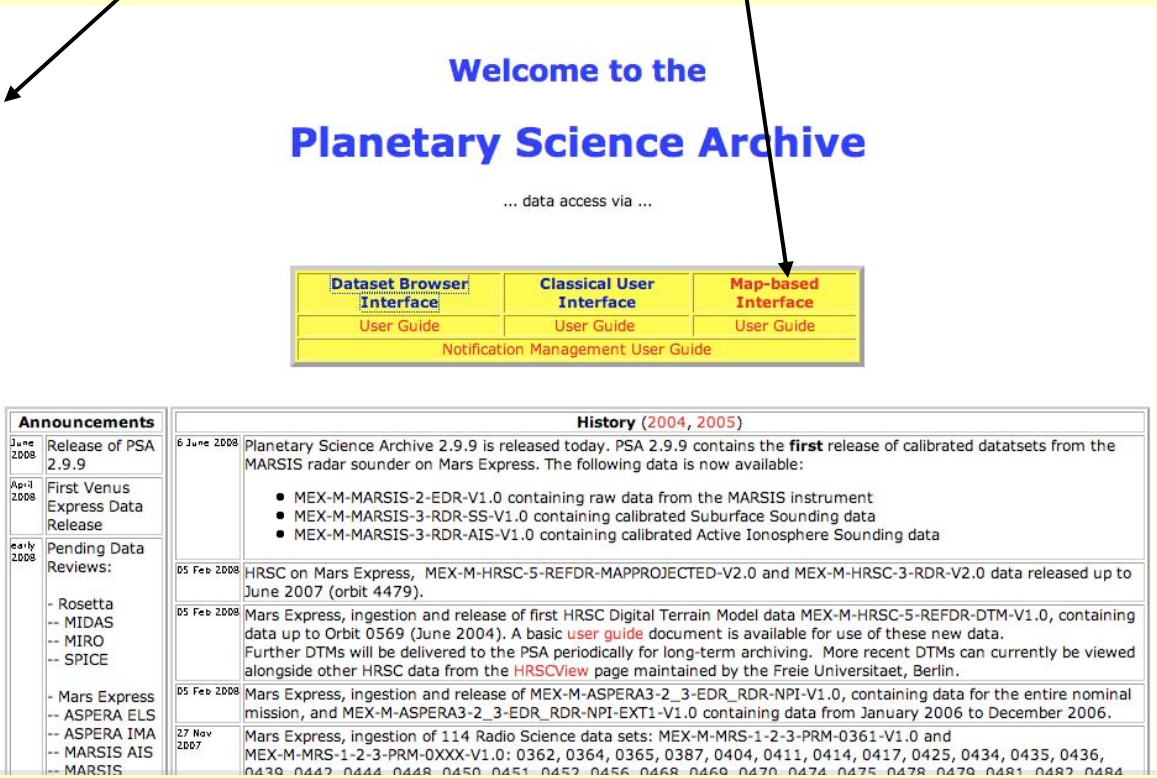
Step 1

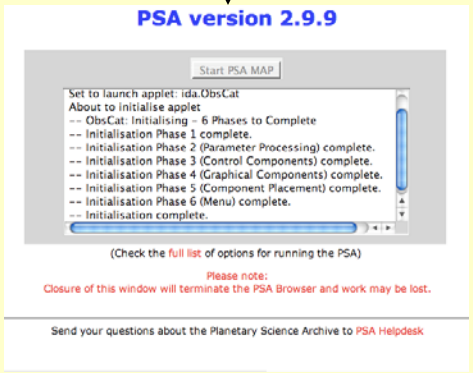
a) Open the PSA www home page at http://www.rssd.esa.int/psa

b) Select “Map-based User Interface” on your left or in the yellow box

Step 2

The “PSA Browser Start Page” will appear on your screen. The applet will initiate automatically.





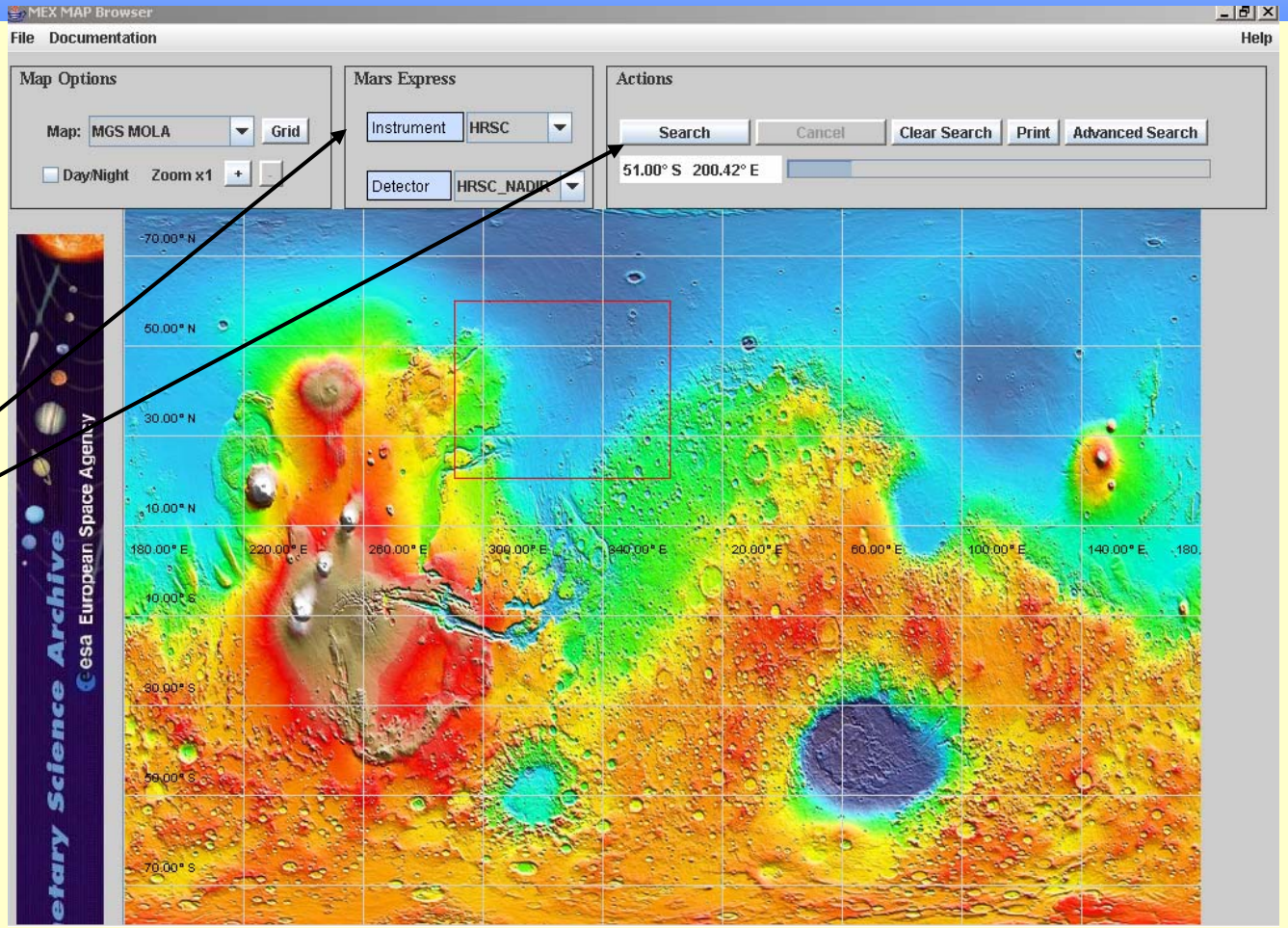
Step 1

a) Define a Region of Interest (ROI) by marking an area on the map with your mouse.

b) A red-colored rectangle will be visualize your ROI

c) Select your Instrument of choice and, if required, an instrument detector

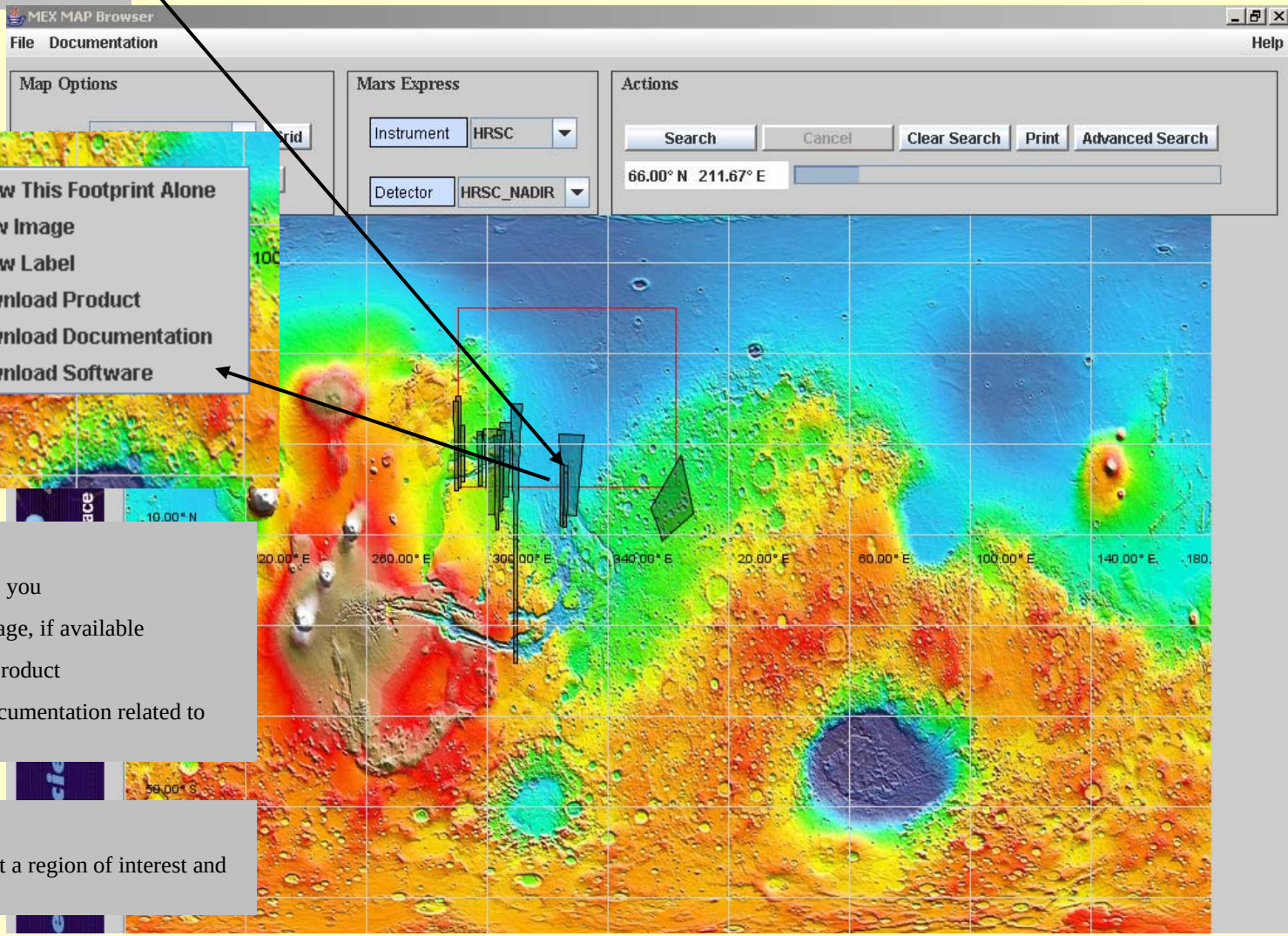
d) Execute the query



Step 2

a) Analyze the footprint resulting from your query

b) Select a footprint by moving the mouse over it and pressing a mouse button



Step 3

a) Select a service offered to you

  a) View browse image, if available

  b) Download data product

  c) Download all documentation related to this data product

Step 4

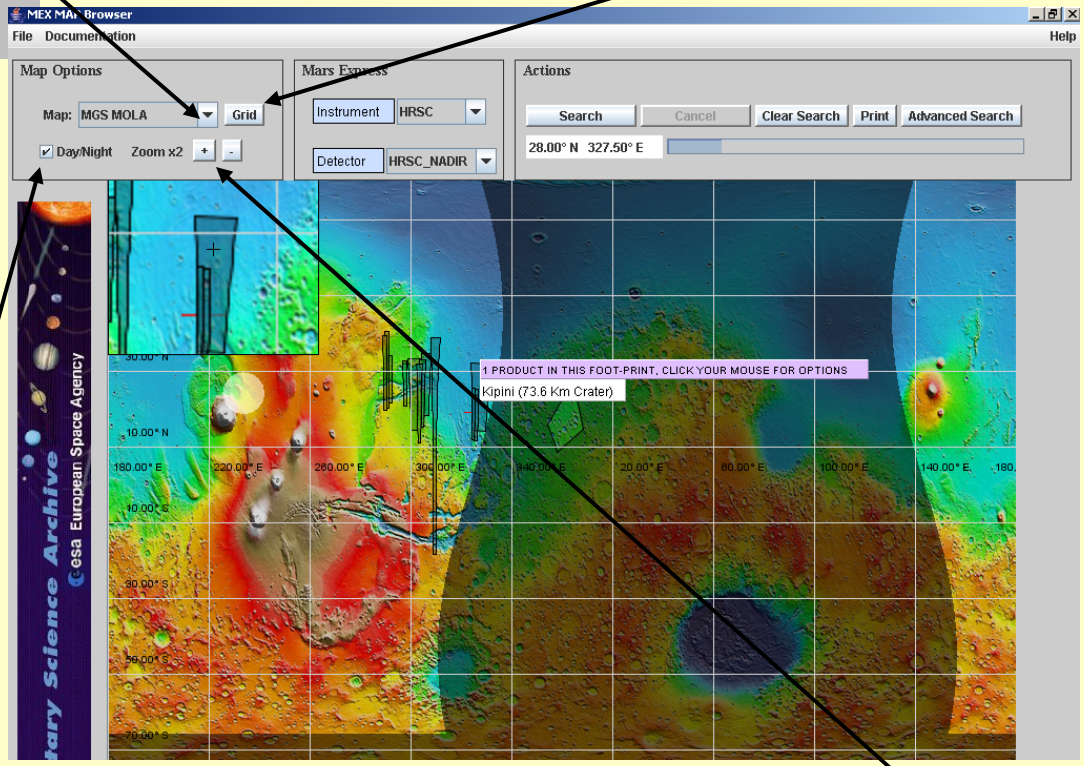
a) Clear your search, reselect a region of interest and run your query

Options

Option 1: Background map

- Select between several background maps
- Load an own map via the FILE entry of the Main Menu.

Option 4: visualize a grid on top of your background image



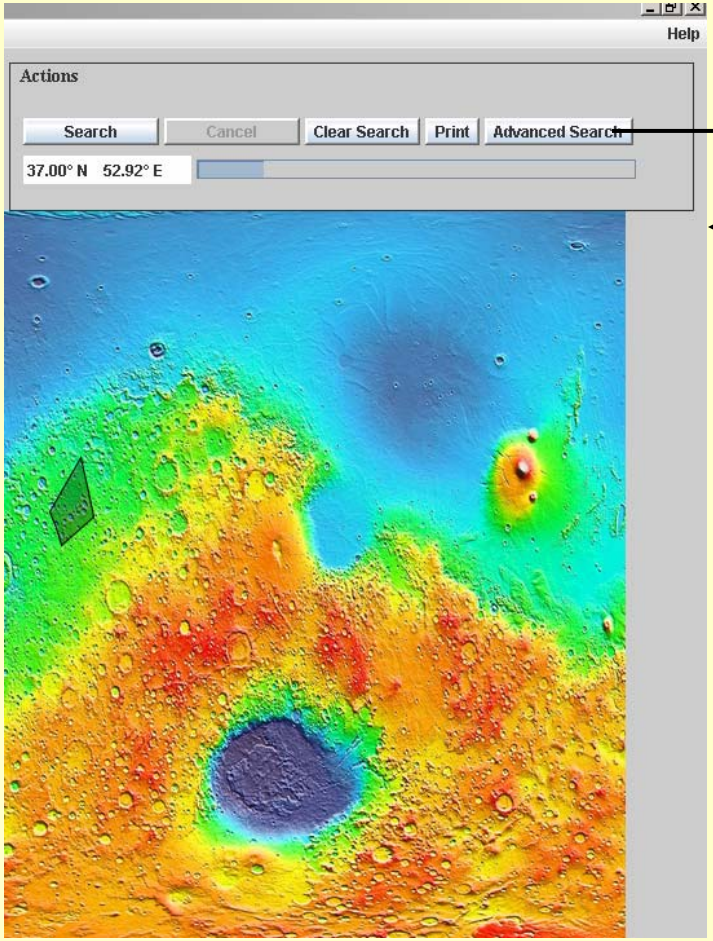
Option 2: visualize day night boundary and the intersection of the Sun to the center of Mars.

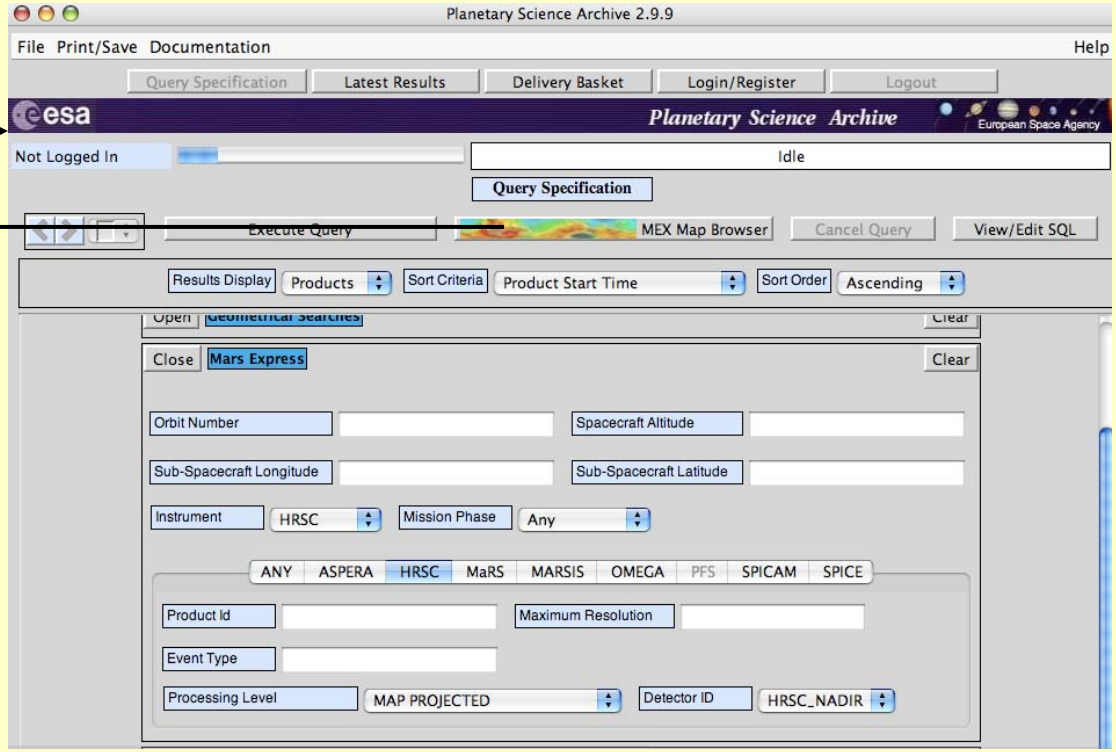
Option 3: display a zoom window that allows you to better select individual data products

Map-based Interface vs Advanced Interface

Switch between the map-based interface to the advanced interface of the PSA and vice versa.

The results you receive from your queries from within the advanced interface are taken over to the map-based interface and displayed there in case of Mars data for which geometry information is existing (HRSC, OMEGA) is available. This gives you the full flexibility of the advanced interface coupled to the visual power of the map-based concept.





Planetary Science Archive

Users Quick Guide

Notification Management

By J. Zender and D. J. Heather

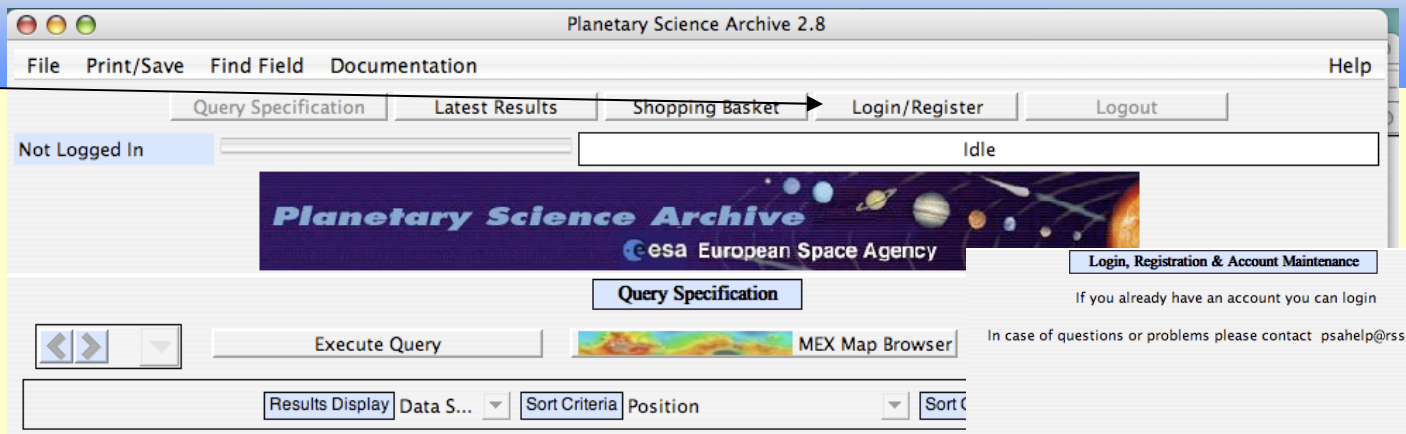
08 June 2007, Version 1.1

Overview

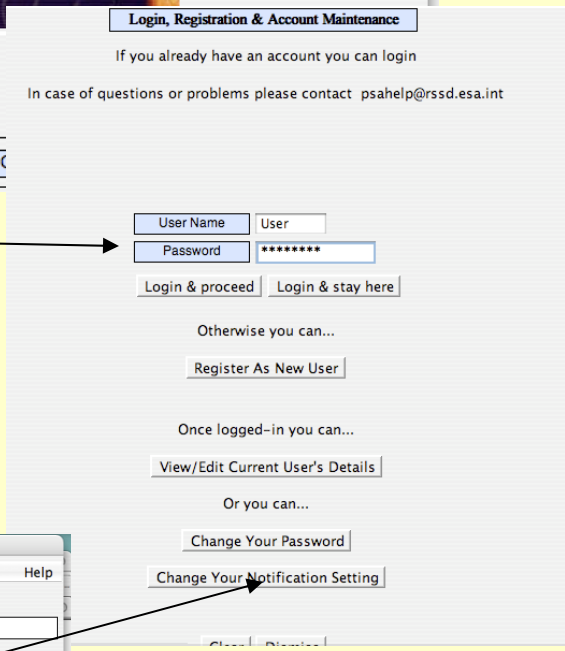
- Registration
- Notification Rules
- Notification via Email
- Comments and Suggestions

Registration I

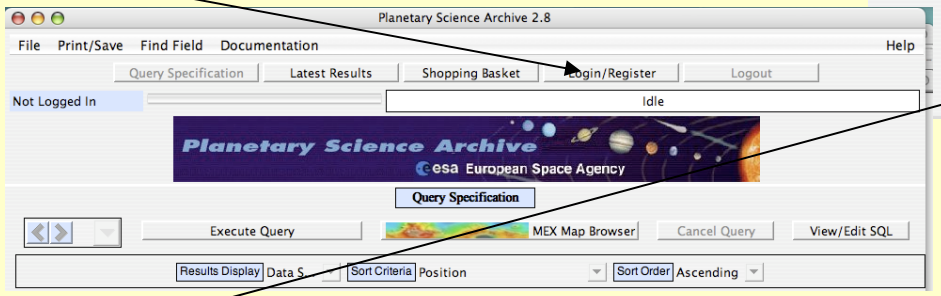
1. **Goto Login Page**



2. **Login with your user id / password**

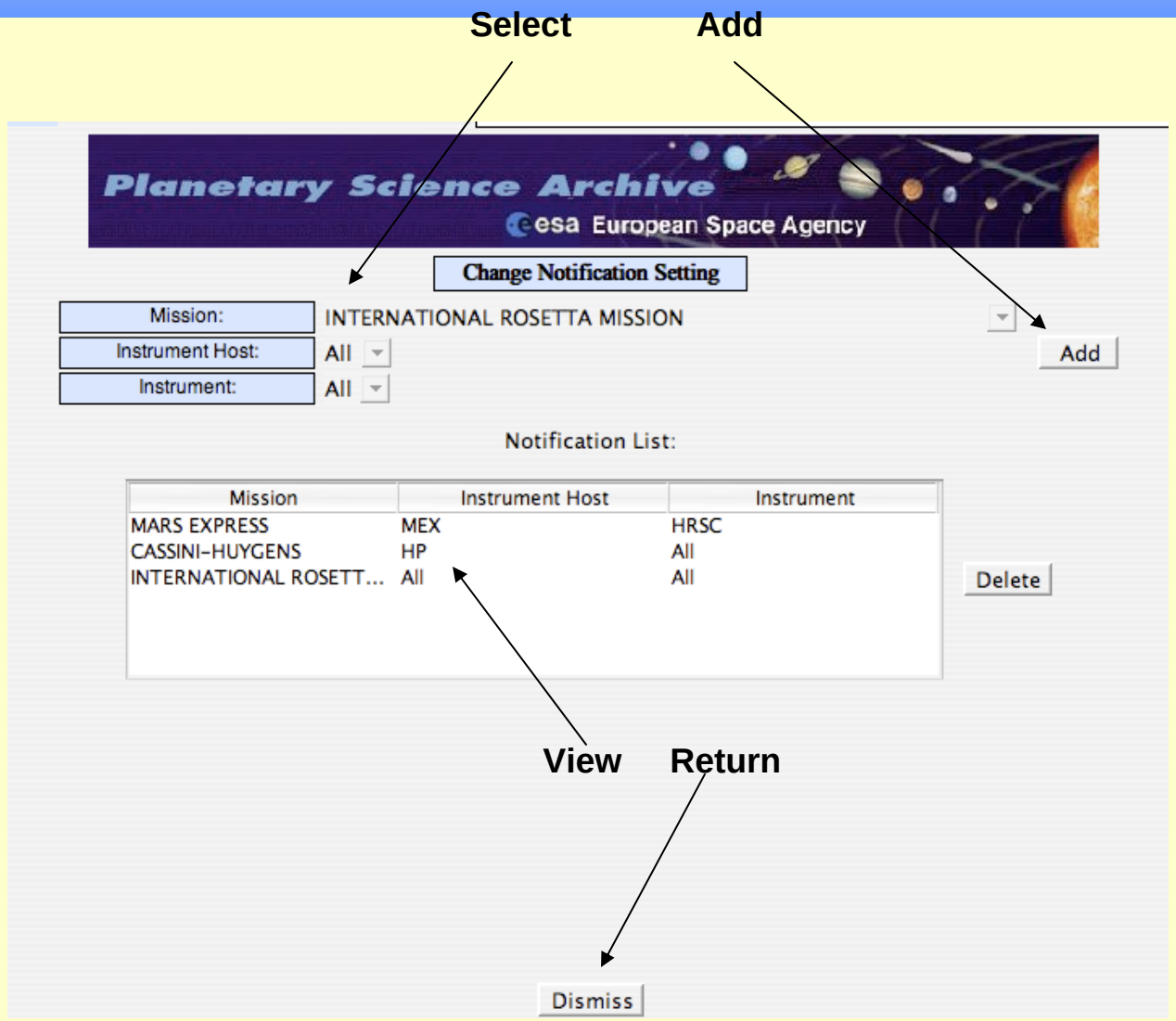


3. **Goto Login Page**



4. **Select 'Change Notification Setting'**

Registration II



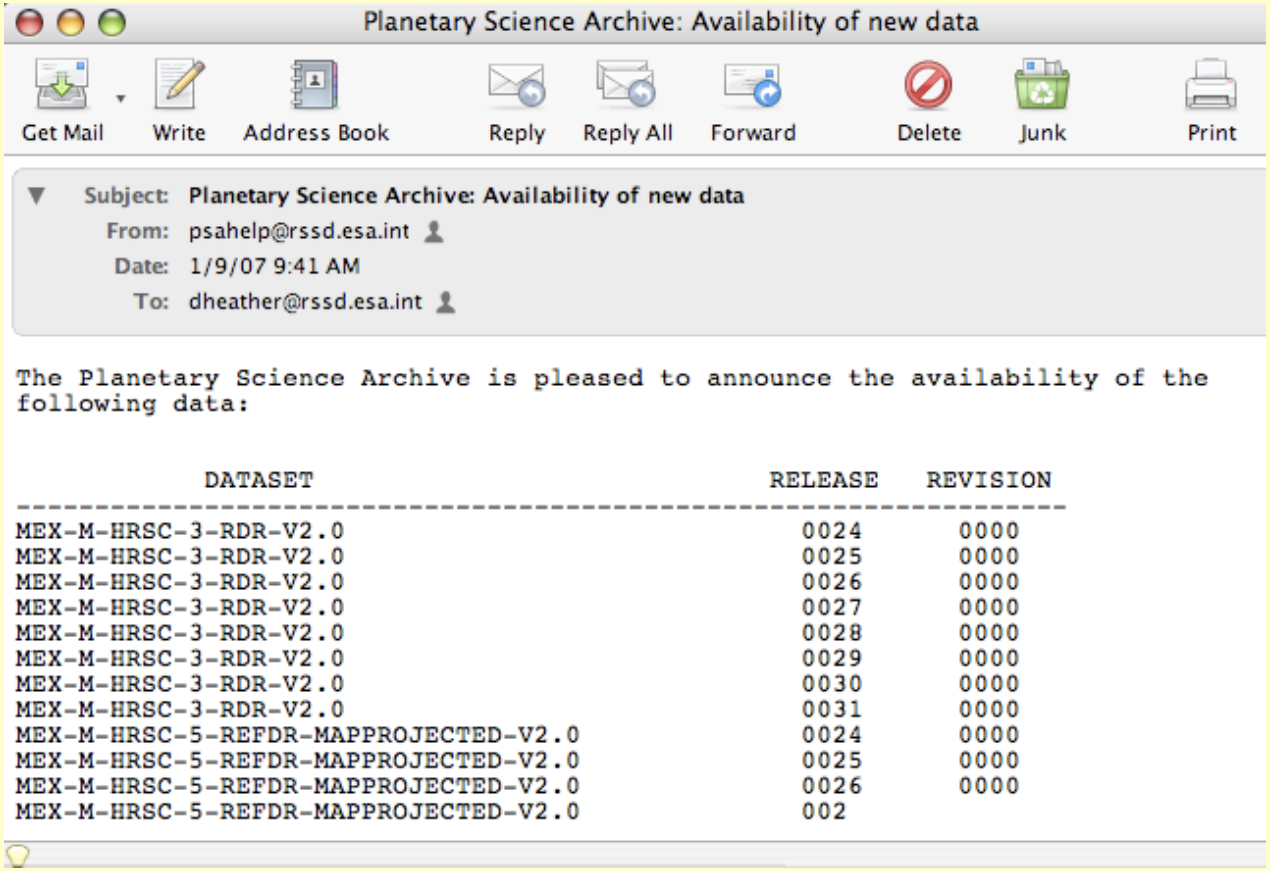
Notification Rules

- **Notification will be done shortly after**
  - A new dataset was ingested into the archive
  - A new dataset release was ingested into the archive
  - The ERRATA.TXT was modified, in other words an important piece of information about the dataset was made available.
- **Notification will be done using email service**
  - Ensure that your PSA account setting, especially your email address is correct
- **You will be informed on the following changes:**

Mission	Instrument Host (Spacecraft)	Instrument	Notification
ALL	ALL	ALL	You will be informed on any change in the archive.
SPECIFIC	ALL	ALL	You will be informed an any change relating to data for a specific mission.
SPECIFIC	SPECIFIC	ALL	You will be informed on any change relating to data obtained from a specific spacecraft.
SPECIFIC	SPECIFIC	SPECIFIC	You will be informed on any change relating to a specific instrument.

Notification via Email

Once you have registered, you will receive e-mails with announcements of the new data in the archive that you are interested in.



Comments and Suggestions

- **Please send us your remarks psahelp@rssd.esa.int**
- **In case of problems, please visit the FAQ page before contacting us**
- **In case you can not find the data you are looking for, please read the Mission Specific pages on the PSA home page (http://www.rssd.esa.int/psa)**

Data workshops

Mars Express Data workshops

- **Goal:**
  - Explain the archive in general
  - Facilitate the access, use, processing and analysis of the data
  - Meet members of Instrument Teams

- **~ 1 week training session, 20-25 ‘students’**

- **HRSC and OMEGA workshops in 2007 and 2008**
- **MARSIS and Radio-Science in 2008**
- **MRO CRISM User Data Workshop**
  http://crism.jhuapl.edu/CRISM_workshop_2009/

- **Important: ESA PSA tutorials, hands-on are available on the web:**

  http://www.rssd.esa.int/mexdataworkshops

Tools

Software Tools

- PDS Tools (including NASAview)
- http://pds.nasa.gov/tools/release/software_download.cfm
- ISIS3
- http://isis.astrogeology.usgs.gov/
- HiRISE IAS Viewer
- http://hiweb.lpl.arizona.edu/iasclient/

Software Tools II

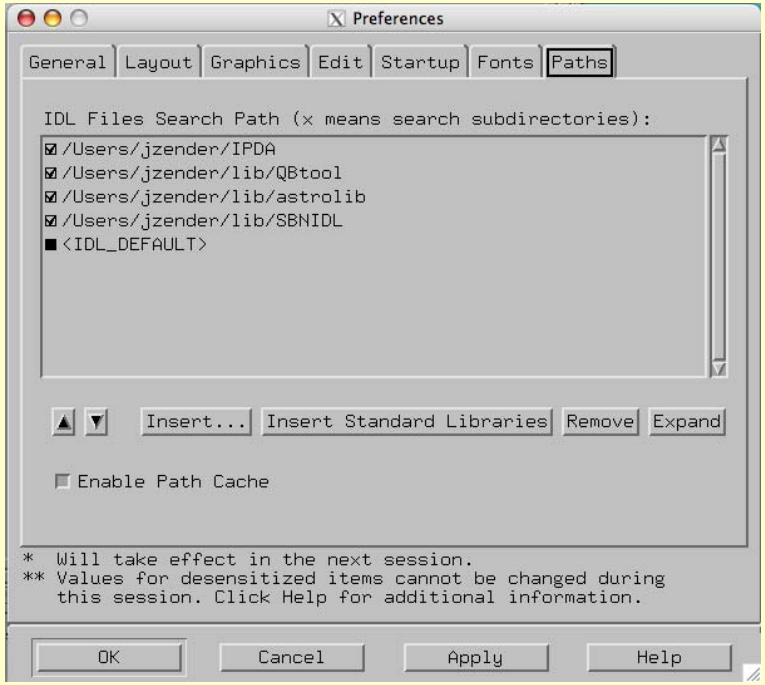
- JMARS
- http://jmars.asu.edu/wiki/
- Davinci
- http://davinci.asu.edu/
- GDAL
- http://www.gdal.org/

Useful tools

- **Simple Viewers (all free, available on-line)**
  - NASAView - intended for all PDS products but has some limitations (I broke it yesterday on a product from Geosciences)
  - ds9 and fv - useful only for PDS-labeled FITS files
- **A good analysis environment**
  - IDL (somewhat expensive)
    - A versatile environment for “exploring” your data as well as analyzing it
    - Library of astronomical routines at NASA-GSFC
    - Needs an I/O routine such as SBN’s readpds.pro (which works on many but not all products)
  - ISIS (free)
    - Widely used by planetary geologists with many built-in functions
    - Supported via Imaging Node of PDS at USGS
    - I/O works only with products designed for ISIS compliance (not FITS)
  - IRAF (free)
    - Can be used only for PDS-labelled FITS files since there are not (yet) any I/O routines for PDS-labeled products
- **SPICE (free)**
  - Tool for working out geometry of measurements (if not already in keywords or for updating the values)
  - Supported via NAIF on many platforms & languages

ReadPDS

- **ReadPDS is an IDL package that is maintained and distributed by PDS's Small Bodies Node (SBN). It allows most PDS compliant products to be read in to the IDL software.**
- **To retrieve the latest fully tested release or previous releases, check out the page http://pdssbn.astro.umd.edu/nodehtml/software.shtml**
- **Within your IDLDE, select the File->Preferences and check that you path contains the ReadPDS.**



ReadPDS 2

- To run the ReadPDS you also need to have the astrolib library installed. If not already done, you can retrieve the astrolib library at http://idlastro.gsfc.nasa.gov/ .
- Read the aareadme.txt file distributed with the ReadPDS package. There is no further way to test your installation than to call a procedure within IDL. So, on your IDLDE command input, enter e.g.:
- If the routine READPDS is compiled successfully, your installation is ok.

```
IDL> data = readpds('')
% Compiled module: READPDS.
% Compiled module: FILE_WHICH.
% Compiled module: PATH_SEP.
% Compiled module: HEADPDS.
Error: file  could not be opened -
  File either corrupted or invalid file name.
% CLOSE: Variable is undefined: UNIT.
% Error occurred at: HEADPDS            65 /Users/jzender/lib/SBNIDL/headpds.pro
%                    READPDS           186 /Users/jzender/lib/SBNIDL/readpds.pro
%                    $MAIN$
% Execution halted at: $MAIN$
```

Software Tools III

- QGIS
- http://www.qgis.org/
- Planetary WMS (web mapping server)
- http://webgis.wr.usgs.gov/ogc/Examples.htm
- PROJ4
- http://trac.osgeo.org/proj/

Software Tools IV

- SPICE
- http://naif.jpl.nasa.gov/naif/
- GMT
- http://gmt.soest.hawaii.edu/
- GRASS
- http://grass.itc.it/
- HRSCVIEW and additional HRSC software
- http://hrscview.fu-berlin.de/software.html

Other archives

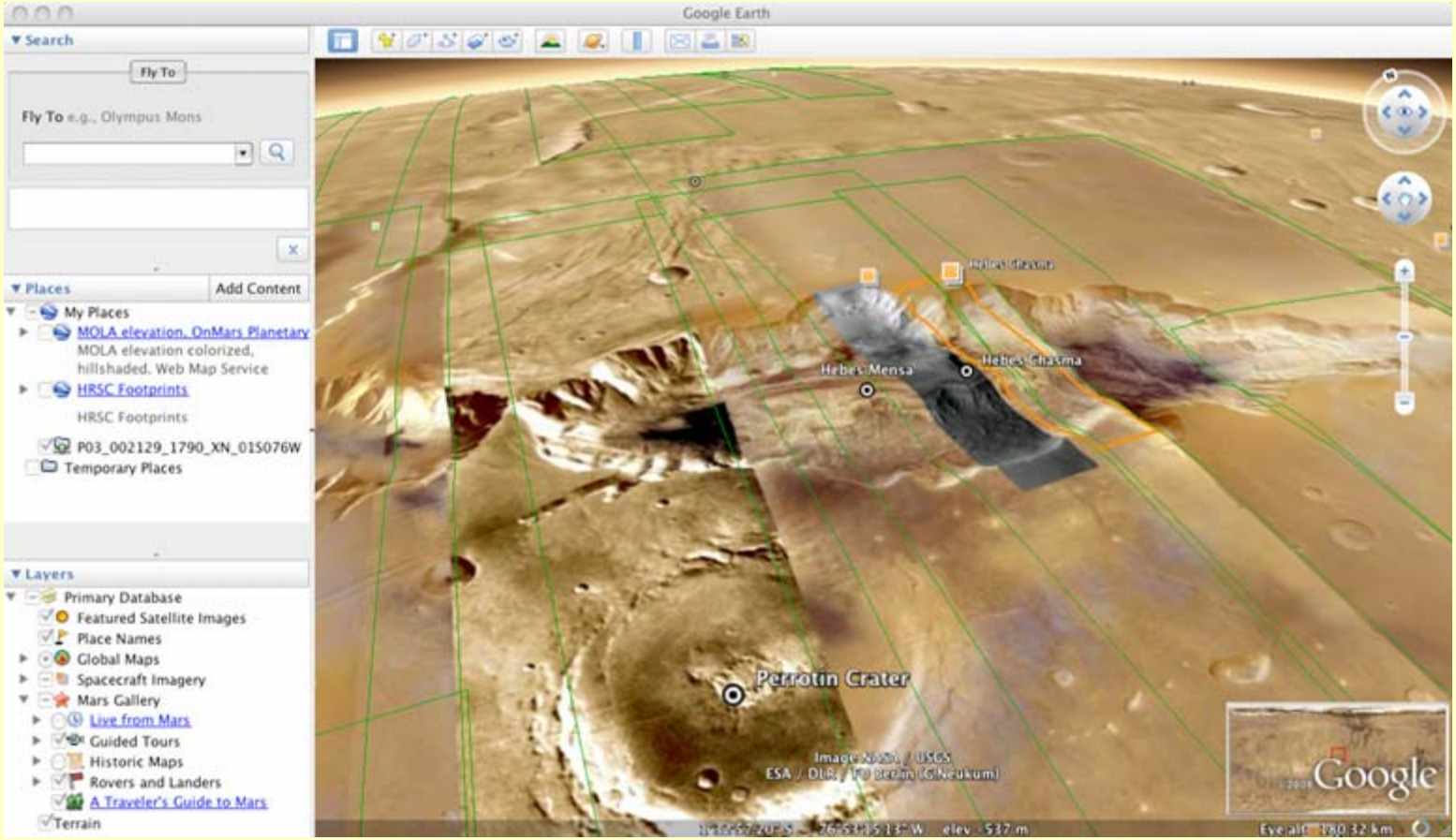
Ways to find/access data II

- **CRISM MAP**
  - http://crism-map.jhuapl.edu/
- **USGS PIGWAD**
  - http://webgis.wr.usgs.gov/
- **Malin Space Science Systems**
  - http://www.msss.com/
- **USGS Map-a-Planet**
  - http://www.mapaplanet.org/

Ways to find/access data

- **USGS PILOT**
  - http://pilot.wr.usgs.gov/
- **THEMIS Mars image explorer**
  - http://themis-data.asu.edu/
- **HRSCVIEW**
  - http://hrscview.fu-berlin.de/
- **Google Earth**
  - http://earth.google.com/

Google Earth



Forum/Documentation

- USGS ISIS3 Support Forum
- http://isis.astrogeology.usgs.gov/IsisSupport/
- Planetarygis
- http://www.planetarygis.org/
- Orrey.us
- http://orrery.us/

Getting started tips...

- Consider investing some time**: if one does not want to put reasonable effort, it is much better to spend the time doing something else.**
- **Consult all relevant documentation and try to repeat simple examples here or on the software documentation page.**
- **Check the forums (e.g. isis3 support) and post questions (after having carefully searched for possible answers already available!!!).**
- **Check for new data/software releases (and sign up for notifications, e.g. isis3, ESA PSA).**
- **Keep in touch (ask/provide help) with your friends/colleagues, e.g. with mailing lists, etc. Some critical mass of users in your professional neighborhood helps a lot!**

- **Examples, demos**