

Virtual European Solar & Planetary Access (**VESPA**): Year 3

Stéphane Erard
Baptiste Cecconi
Pierre Le Sidaner
François Andrieu
Angelo Pio Rossi
Mikhail Minin
Pierre Fernique
Chiara Marmo
Vincent Génot
Nicolas André
Michel Gangloff
William Thuillot
Daniel Hestroffer

PADC / Observatoire de Paris

Jacobs Univ, Bremen

CDS, Strasbourg
GEOPS, Univ Paris Sud
IRAP, CDPP

IMCCE

Nick Achilleos
Kevin Benson
Bernard Schmitt
Maria Teresa Capria
Benoît Carry
Ricardo Hueso
Anni Määttänen
Ehouarn Millour
Ondrej Santolík
Jan Soucek
Manuel Scherf
Tarek Al-Ubaidi
Ann Carine Vandaele

UCL, London

IPAG, Grenoble
IAPS, Rome
OCA, Nice + IMCCE
EHU/PVU, Bilbao
LATMOS
LMD, Paris
IAS, Prague

IWF, Graz

IASB-BIRA, Brussels

eur  PLANET



ESPC 2018, Berlin

18/9/2018

stephane.erard@obspm.fr

VESPA

User:

- System to search databases
- Relies on Europlanet infrastructure + IVOA standards
- Connects databases anywhere
 - access to all Europlanet data services
- **Decentralized system:** data remain where the expertise is located

Data Provider:

- **A tool box to make data available** - especially derived data related to publications, but also simulations / codes
- **System open to any contributor, support from VESPA team is possible**

VESPA includes 18 contributing participants (labs) in 13 beneficiary institutes:

Observatoire de Paris
(IMCCE, LESIA)



IAPS/INAF Rome



Jacobs Univ. Bremen



CNRS
(IRAP IPAG LATMOS
GEOPS CDS)



IWF Graz



IASB-BIRA Brussels



UCL London



IAP Prague



+ Contributions from
the community

UPV/EHU Bilbao



IGN/PAS Wrocław



Univ. Bern



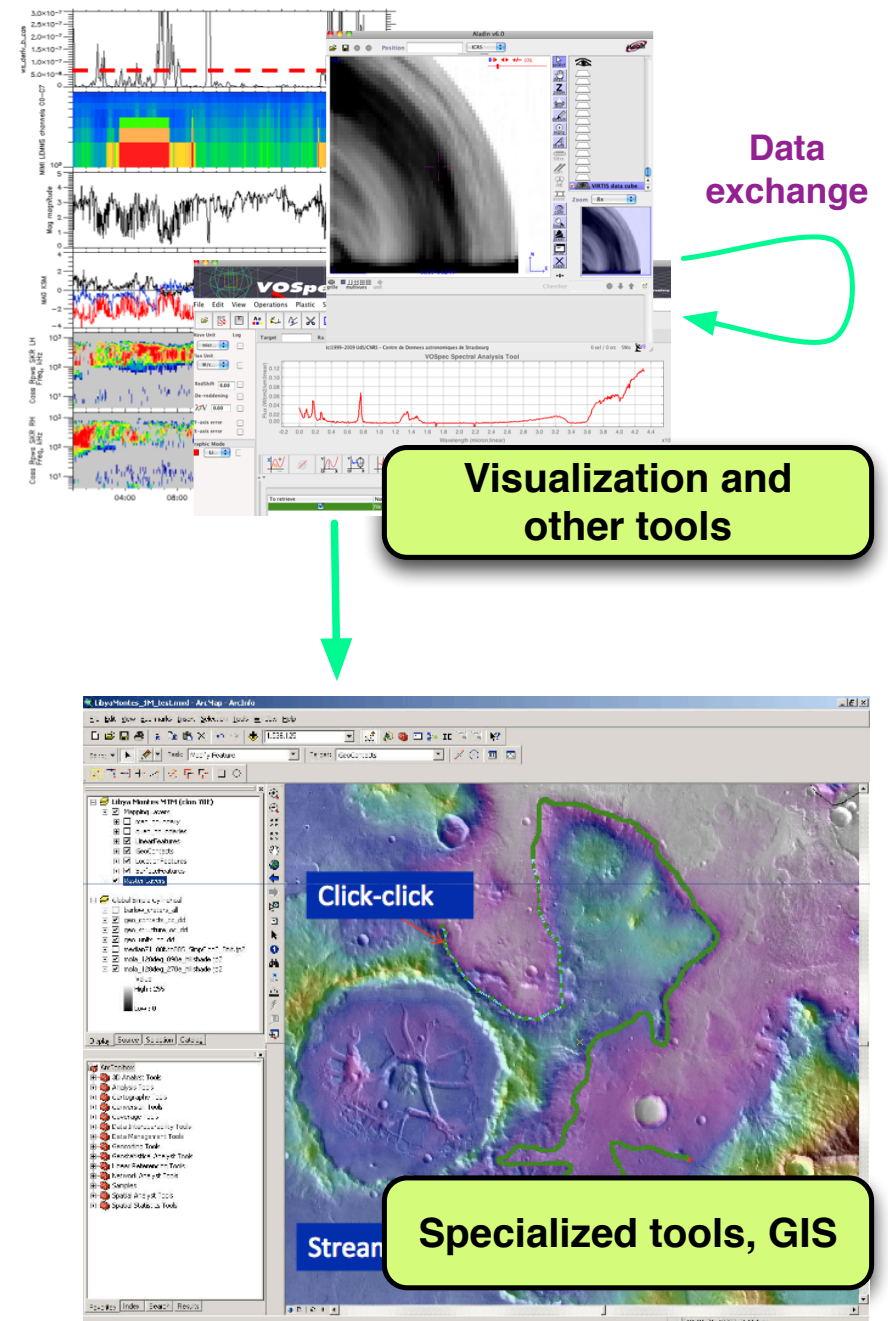
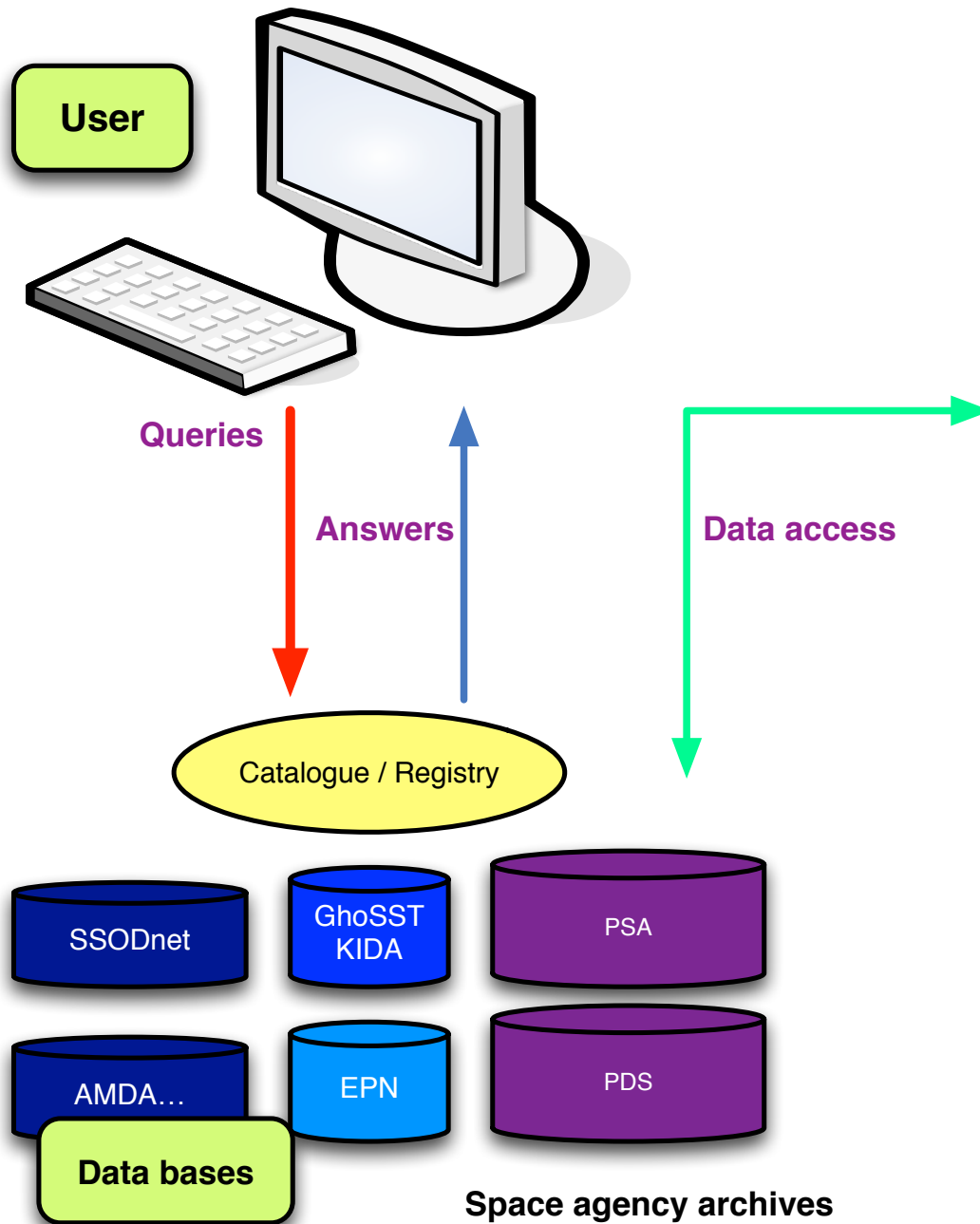
SINP/Lomonosov Univ.



GFI Toulouse



User's experience

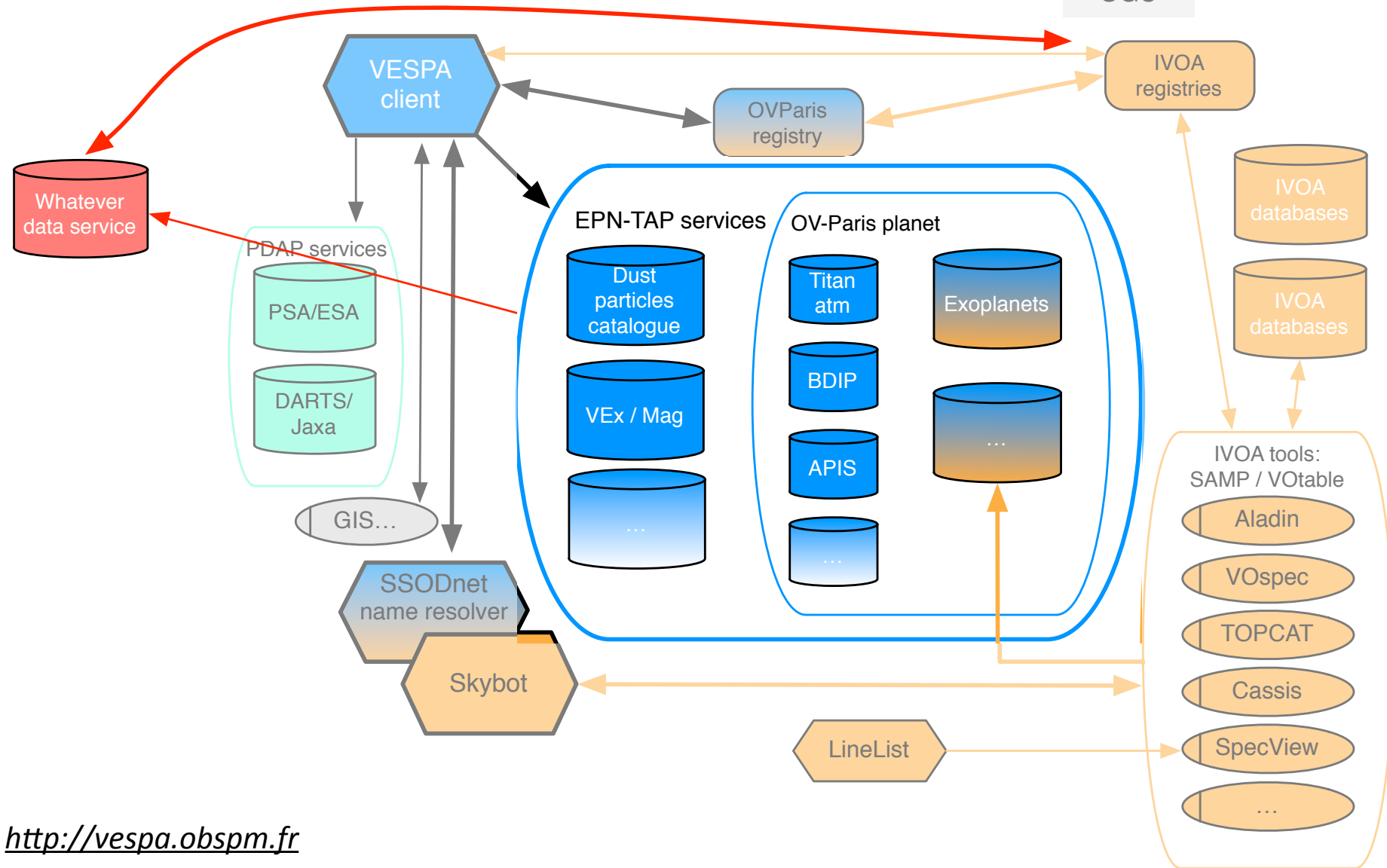
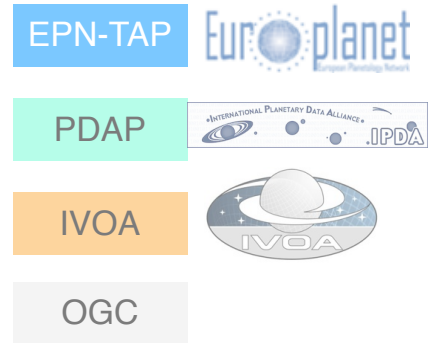


A Virtual Observatory in Planetary Science

Built on astronomical VO developments

+ previous European programs: IMPEX, HELIO, VAMDC...

+ interfaces with: PDS, GIS/OGC, etc...





Current VESPA interface

<http://vespa.obspm.fr>

Submit **Reset**

Main Parameters

Target Name <input type="text"/>	Target Class <input type="text" value="Asteroid"/> Comet Dwarf Planet Exoplanet
Granule UID <input type="text"/>	Dataproduct Type <input type="text" value="Catalog"/> Cube Dynamic Spectrum
Granule GID <input type="text"/>	Measurement Type <input type="text"/>
Obs ID <input type="text"/>	Time selection Data range is included in <input type="text" value="-"/>
Time Min	<input type="text"/> The range between <input type="text" value=""/>
Time Max	<input type="text"/>

Location
Spectral
Time
Photometry
Instrument
Optional

Submit **Reset**

Plotting tools

- TOPCAT
- Aladin
- SPLAT
- CASSIS
- 3DView

Example queries

Saturn in March 2012

VESPA
Virtual European Solar and Planetary Access

All VO Custom resource Direct Query Advanced Query Help

Submit Reset

Main Parameters

Target Name
Granule URL
Granule GID
Obs ID
Time selection
Time Min

Location
Spectral
Time
Photometry
Instrument
Optional

Submit Reset

© Paris Observatory 2016
Contact : support.epntap

EPN Resources

abs_cs - Data for numerical modeling of planetary atmospheres	13 results	
AMDA - CDPP AMDA DataBase	892514 results	
APIS - Astronomical Planetary Imaging and Spectroscopy	32053 results	
BASECOM - The Nançay Cometary Database	15611 results	
BDIP - Base de Données d'Images Planétaires	16906 results	
BIRA-IASB TAP - Profiles from SPICAV-SOIR/VEX	1612 results	
CLIMSO - CLIMSO coronagraphs at pic du midi de Bigorre	94923 results	
CRISM - CRISM data from Earth Server 2	2669 results	
ExoPlanet - Extrasolar Planets Encyclopaedia	3569 results	
HFC1AR - Heliophysics Feature Catalog active regions	948627 results	
HFC1T3 - Heliophysics Feature Catalog type 3 radio bursts	90845 results	
litate - litate HF data	2757 results	
IKS - IR spectroscopy of comet Halley	206 results	
ILLU67P - Illumination maps of 67P	151200 results	
IMPEX_EPN20 - IMPEX Simulation Data	1730 results	
M4AST - M4AST - Modeling for Asteroids	6370 results	
Mars_Craters - Martian Impact Craters	384344 results	

Plotting tools

- TOPCAT
- Aladin
- SPLAT
- CASSIS
- 3DView

Example queries

Saturn in March 2012

Current VESPA interface

<http://vespa.obspm.fr>

VESPA
Virtual European Solar and Planetary Access

Target Name: EPN Resources

Granule UID: abs_cs - Data for numerical modeling of planetary atmospheres 13 results

Granule UID: AMDA - CDPP AMDA DataBase 892514 results

Granule UID: APIS - Asteroidal Planetary Imaging and Spectroscopy 32053 results

Results in service WEx

Show 10 entries

Column visibility Show all Hide all

Select All in current page Reset Selection

granule_uid	dataproducit_type	target_name	time_min (d)	time_max (d)	access_url
VI0026_07G	spectral_cube	Venus	2006-05-16T17:12:20.414	2006-05-16T17:23:00.457	ftp://psa.esac.esa.i...
VI0026_07C	spectral_cube	Venus	2006-05-16T17:12:20.414	2006-05-16T17:23:00.457	ftp://psa.esac.esa.i...
VV0026_07G	spectral_cube	Venus	2006-05-16T17:12:20.424	2006-05-16T17:23:00.466	ftp://psa.esac.esa.i...
VV0026_07C	spectral_cube	Venus	2006-05-16T17:12:20.424	2006-05-16T17:23:00.466	ftp://psa.esac.esa.i...
VI0026_08C	spectral_cube	Venus	2006-05-16T17:27:48.478	2006-05-16T17:38:31.261	ftp://psa.esac.esa.i...
VI0026_08G	spectral_cube	Venus	2006-05-16T17:27:48.478	2006-05-16T17:38:31.261	ftp://psa.esac.esa.i...
VV0026_08G	spectral_cube	Venus	2006-05-16T17:27:48.672	2006-05-16T17:38:31.453	ftp://psa.esac.esa.i...
VV0026_08C	spectral_cube	Venus	2006-05-16T17:27:48.672	2006-05-16T17:38:31.453	ftp://psa.esac.esa.i...
VT0027_00C	spectral_cube	Venus	2006-05-18T01:25:15.669	2006-05-18T02:01:54.510	ftp://psa.esac.esa.i...
VT0027_00G	spectral_cube	Venus	2006-05-18T01:25:15.669	2006-05-18T02:01:54.510	ftp://psa.esac.esa.i...

Showing 91 to 100 of 15,682 entries

Page 10 of 1569

First Previous Next Last

Earth Footprints

Data Selection Metadata Selection All Data All Metadata

Current VESPA interface

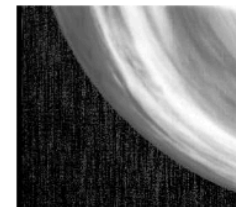
<http://vespa.obspm.fr>

Plotting tools

- TOPCAT
- Aladin
- SPLAT
- CASSIS
- 3DView

Example queries

Saturn in March 2012



VESPA
Virtual European Solar and Planetary Access

Target Name: EPN Resources

Granule UID: abs_cs - Data for numerical modeling of planetary atmospheres 13 results

Granule UID: AMDA - CDPP AMDA DataBase 892514 results

Granule UID: APIS - Asteroidal Planetary Imaging and Spectroscopy 32053 results

Results in service WEx

Show 10 entries

Column visibility Show all Hide all

Select All in current page Reset Selection

granule_uid	dataprodukt_type	target_name	time_min (d)	time_max (d)	access_url
VI0026_07G	spectral_cube	Venus	2006-05-16T17:12:20.414	2006-05-16T17:23:00.457	ftp://psa.esac.esa.i...
VI0026_07C	spectral_cube	Venus	2006-05-16T17:12:20.414	2006-05-16T17:23:00.457	ftp://psa.esac.esa.i...
VV0026_07G	spectral_cube	Venus	2006-05-16T17:12:20.424	2006-05-16T17:23:00.466	ftp://psa.esac.esa.i...
VV0026_07C	spectral_cube	Venus	2006-05-16T17:12:20.424	2006-05-16T17:23:00.466	ftp://psa.esac.esa.i...
VI0026_08C	spectral_cube	Venus	2006-05-16T17:27:48.478	2006-05-16T17:38:31.261	ftp://psa.esac.esa.i...
VI0026_08G	spectral_cube	Venus	2006-05-16T17:27:48.478	2006-05-16T17:38:31.261	ftp://psa.esac.esa.i...
VV0026_08G	spectral_cube	Venus	2006-05-16T17:27:48.672	2006-05-16T17:38:31.453	ftp://psa.esac.esa.i...
VV0026_08C	spectral_cube	Venus	2006-05-16T17:27:48.672	2006-05-16T17:38:31.453	ftp://psa.esac.esa.i...
VT0027_00C	spectral_cube	Venus	2006-05-18T01:25:15.669	2006-05-18T02:01:54.510	ftp://psa.esac.esa.i...
VT0027_00G	spectral_cube	Venus	2006-05-18T01:25:15.669	2006-05-18T02:01:54.510	ftp://psa.esac.esa.i...

Showing 91 to 100 of 15,682 entries

Data Selection Metadata Selection All Data All Metadata

Current VESPA interface

<http://vespa.obspm.fr>

To plot / analysis tools

Plotting tools

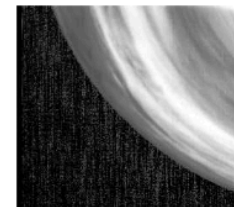
- TOPCAT
- Aladin
- SPLAT
- CASSIS
- 3DView

Plotting tools

- TOPCAT
- Aladin
- SPLAT
- CASSIS
- 3DView

Example queries

Saturn in March 2012



Data services connected via EPN-TAP

Currently:

44 interoperable data services connected, from 15 institutes worldwide
(~20 in dev)

Encompass many aspects of Solar System studies:

- surfaces
- small bodies / satellites / rings / dynamics
- atmospheres
- magnetospheres / radio observations
- solar physics / planetary plasmas
- exoplanets
- solid spectroscopy / experimental reference data

Several high-quality amateur services preselected (PVOL, RadioJove...)

Data services connected via EPN-TAP / field

Open
Open in test
In development
Being studied

Atmospheres

- Titan profiles - CIRS (Cassini, LESIA)
- Venus spectroscopy - VIRTIS (VEx, LESIA)
- * - Mars Climate Database (modeling, LMD-LESIA)
- Venus profiles - SPICAV/SOIR (VEx, IASB-BIRA)
- * - Mars profiles - SPICAM (MEx, LATMOS)
 - All MEx derived atmospheric products (via MEx IDS)
 - EuroVenus derived products (via C. Wilson)
 - Venus cloud products (LATMOS)

Small bodies

- M4ast (ground based spectroscopy, IMCCE)
- 1P/Halley spectroscopy - (IKS / Vega-1, LESIA)
- BaseCom - (Nançay obs, LESIA)
- TNOs are cool - (Herchel & Spitzer + compilation, LESIA & LAM & Utinam)
- * - Cometary lines catalogue (IAPS)
- * - Vesta & Ceres spectroscopy - VIR/DAWN (IAPS)
- * - DynAstVO: NEO refined parameters (IMCCE)
- MPCorb: Small bodies orbital cat (MPC/Heidelberg)
 - Rosetta ground-based support (via C. Snodgrass)
 - 67P illumination config (IRAP)

Surfaces

- * - CRISM WMS service (MRO, Jacobs U)
 - Mars craters (Jacobs U, + update by GEOPS)
 - USGS planetary maps (Jacobs U)
- * - M3 WMS service (Chandrayaan-1, Jacobs U)
- * - HRSC data (MEx, Frei Univ)
- * - OMEGA cubes and maps (MEx, IAS)
 - MarsSI GIS (Lyon)

Solid spectroscopy

- * - SSHADE: ices & minerals (IPAG & network)
- * - Planetary Spectral Library (DLR)
- * - PDS spectral library (LESIA)
 - Berlin Reflectance Spectral Lib (DLR)

Magnetospheres / radio

- * - APIS (HST, LESIA)
 - NDA (Jupiter radio Nançay, LESIA)
 - AMDA (CDPP / IRAP)
 - MAG data (VEx, IWF Graz)
 - MASER & Juno support (LESIA)
 - RadioJove (LESIA & US amateur network)
 - Iitate HF data of Jupiter (Tohoku Univ, Jap)
 - UTR-2 Juno ground support (Kharkiv, Ukr.)
 - MDISC (modeling, UCL)
 - Cluster data (IAP Prague)
 - Interface with IMPEX models (IWF Graz)
- * - Hisaki (Tohoku Univ., Jap)
- * - Transplanet (CDPP / IRAP)
- * - LOFAR Jupiter (SRC/PAS, Varsovie)

Exoplanets

- * - Encyclopedia of exoplanets (compilation, LUTH/LESIA)
 - Transit observations (Bern)
 - Interface with DACE (Geneva)

Solar

- HELIO AR & 1T3 solar features catalogues (LESIA)
- * - Bass2000 (LESIA)
 - Radio Solar db (Nançay, LESIA)
 - CLIMSO (Pic du Midi, IRAP)
 - Iitate AMATERAS (Tohoku Univ, Jap)

Generic / interdisciplinary

- BDIP (LESIA)
 - Planets then satellites characteristics (LESIA/IMCCE)
 - PVOL (UPV/EHU & amateur network)
 - Gas absorption cross-sections (Granada)
- * - Nasa dust catalogue (IAPS)
 - Stellar spectra, support for observations & exopl. (LESIA)
- * - Telescopic planetary spectra collection (LESIA)
 - Interface with VAMDC (TBD)
- * - PSA complete archive (ESA)
- * - HST planetary data (LESIA, to CADC archive)
 - DARTS (JAXA - currently via PDAP)

* New/big update in yr3

Data services connected via EPN-TAP / field

Open
Open in test
In development
Being studied

Atmospheres

- Titan profiles - CIRS (Cassini, LESIA)
- Venus spectroscopy - VIRTIS (VEx, LESIA)
- * - Mars Climate Database (modeling, LMD-LESIA)
- Venus profiles - SPICAV/SOIR (VEx, IASB-BIRA)
- * - Mars profiles - SPICAM (MEx, LATMOS)
- All MEx derived atmospheric products (via MEx IDS)
- EuroVenus derived products (via C. Wilson)
- Venus cloud products (LATMOS)

Small bodies

- M4ast (ground based spectroscopy, IMCCE)
- 1P/Halley spectroscopy - (IKS / Vega-1, LESIA)
- BaseCom - (Nançay obs, LESIA)
- TNOs are cool - (Herchel & Spitzer + compilation, LESIA & LAM & Utinam)
- * - Cometary lines catalogue (IAPS)
- * - Vesta & Ceres spectroscopy - VIR/DAWN (IAPS)
- * - DynAstVO: NEO refined parameters (IMCCE)
- MPCorb: Small bodies orbital cat (MPC/Heidelberg)
- Rosetta ground-based support (via C. Snodgrass)
- 67P illumination config (IRAP)

Surfaces

- * - CRISM WMS service (MRO, Jacobs U)
- Mars craters (Jacobs U, + update by GEOPS)
- USGS planetary maps (Jacobs U)
- * - M3 WMS service (Chandrayaan-1, Jacobs U)
- * - HRSC data (MEx, Frei Univ)
- * - OMEGA cubes and maps (MEx, IAS)
- MarsSI GIS (Lyon)

Solid spectroscopy

- * - SSHADE: ices & minerals (IPAG & network)
- * - Planetary Spectral Library (DLR)
- * - PDS spectral library (LESIA)
- Berlin Reflectance Spectral Lib (DLR)

Magnetospheres / radio

- * - APIS (HST, LESIA)
- NDA (Jupiter radio Nançay, LESIA)
- AMDA (CDPP / IRAP)
- MAG data (VEx, IWF Graz)
- MASER & Juno support (LESIA)
- RadioJove (LESIA & US amateur network)
- Iitate HF data of Jupiter (Tohoku Univ, Jap)
- UTR-2 Juno ground support (Kharkiv, Ukr.)
- MDISC (modeling, UCL)
- Cluster data (IAP Prague)
- Interface with IMPEX models (IWF Graz)
- * - Hisaki (Tohoku Univ., Jap)
- * - Transplanet (CDPP / IRAP)
- * - LOFAR Jupiter (SRC/PAS, Varsovie)

Exoplanets

- * - Encyclopedia of exoplanets (compilation, LUTH/LESIA)
- Transit observations (Bern)
- Interface with DACE (Geneva)

Solar

- HELIO AR & 1T3 solar features catalogues (LESIA)
- * - Bass2000 (LESIA)
- Radio Solar db (Nançay, LESIA)
- CLIMSO (Pic du Midi, IRAP)
- Iitate AMATERAS (Tohoku Univ, Jap)

Generic / interdisciplinary

- BDIP (LESIA)
- Planets then satellites characteristics (LESIA/IMCCE)
- PVOL (UPV/EHU & amateur network)
- Gas absorption cross-sections (Granada)
- * - Nasa dust catalogue (IAPS)
- Stellar spectra, support for observations & exopl. (LESIA)
- * - Telescopic planetary spectra collection (LESIA)
- Interface with VAMDC (TBD)
- * - PSA complete archive (ESA)
- * - HST planetary data (LESIA, to CADIC archive)
- DARTS (JAXA - currently via PDAP)

* New/big update in yr3

Favorite VESPA tools

Only some tools are presented here

Favorite ones:

TOPCAT (tables, mutipurpose)

Aladin, DS9 (images/cubes) + **ImageJ, APERICubes...**

CASSIS, SPLAT-VO (spectra) + **VOspec, SpecView**

3Dview, MATISSE (3D visu, shape models) + **Cosmographia**

Autoplot (time series)

+ Use ephemeris-related services:

Miriade, ViSiON (in Miriade), **SkyBot, name resolver** (from IMCCE)

Some services include specific tools together with the data:

AMDA, SSHADE... (more and more accessible from outside)

All tools exchange data via the SAMP protocol

Next steps

- **More data services!** - including from external contributors
- **Process answers from multiple services**
- **Finalize VO-GIS interface** - including geofits
- **Develop interface with lab spectroscopy services**
(minerals and ices spectra, band lists, etc) - now 4 services implemented
- **Bridge EPNCore and PDS4**
- **Connect simulation services, use with related data services**
requires different protocols
- **Formalize docs / standards => submit to IPDA & IVOA**
and refine/complete tutorials
- **Longer term (> 2019) => extract knowledge from data:**
data processing, feature extraction, machine learning...

<http://vespa.obspm.fr>

<http://www.europlanet-vespa.eu/>

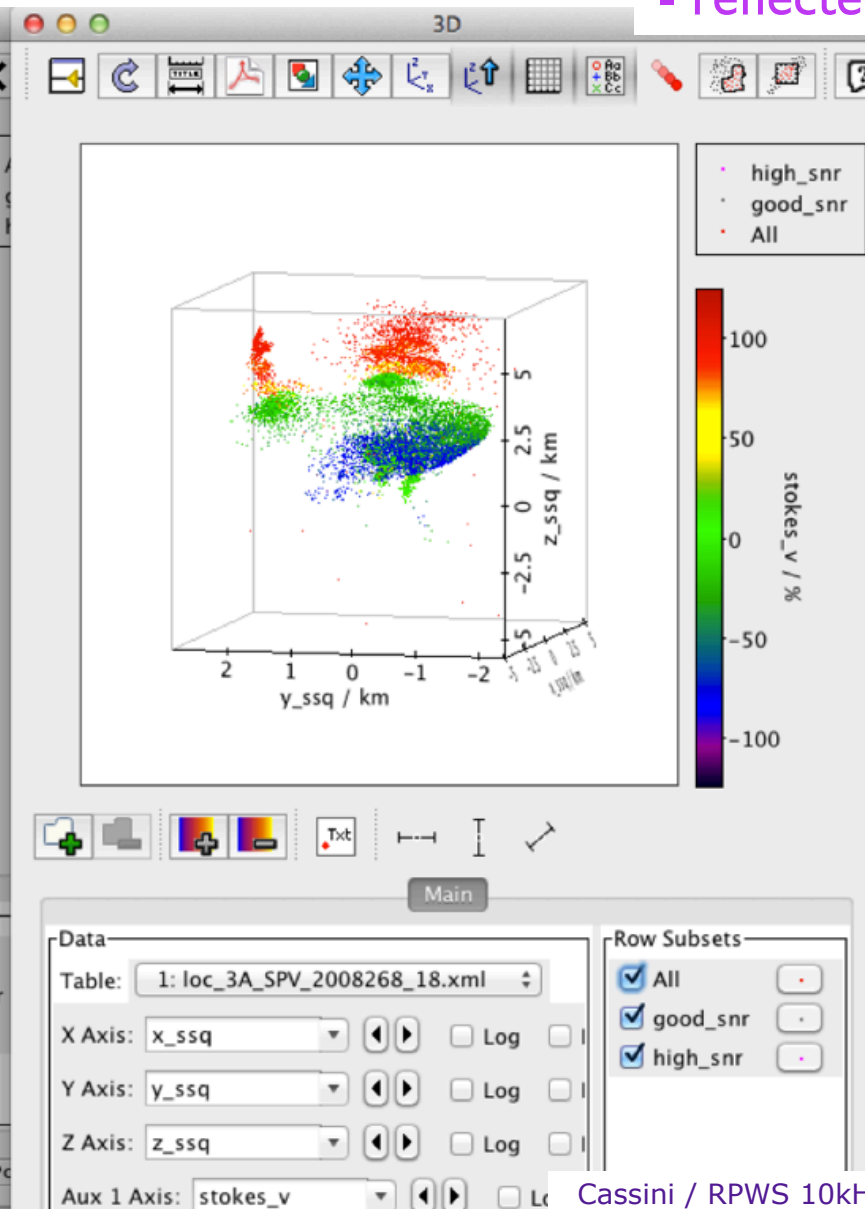
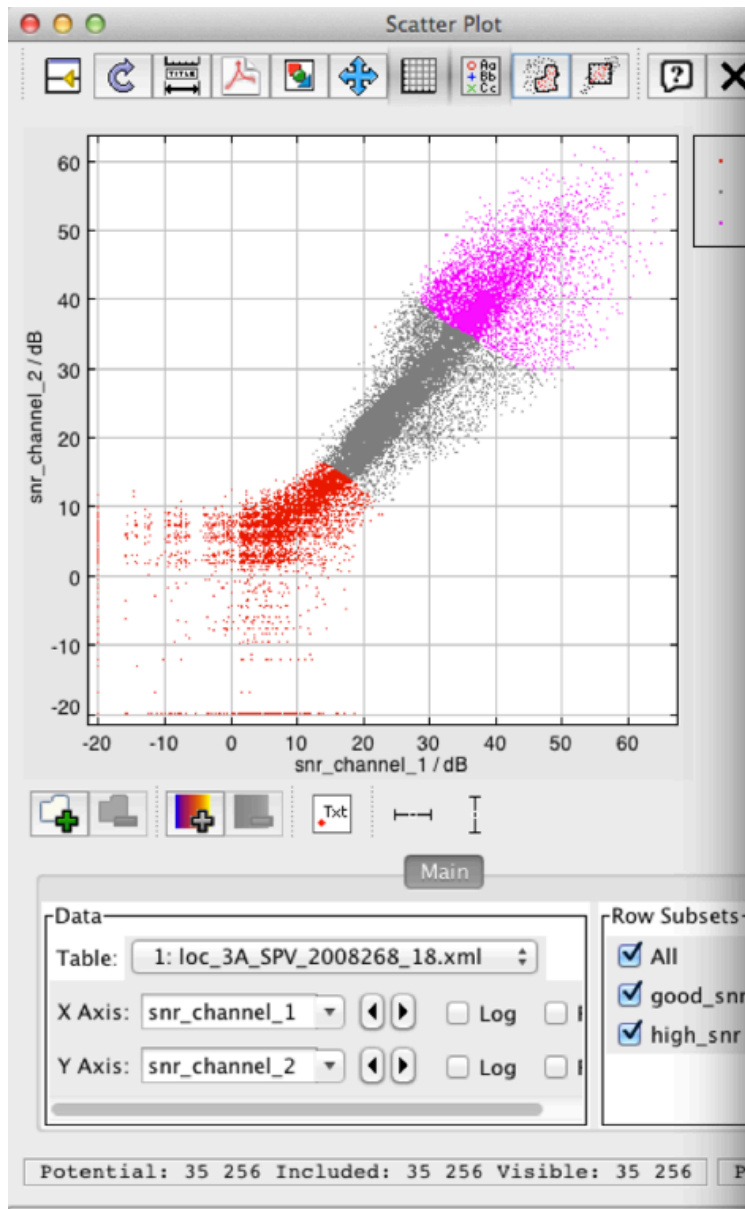
Next VESPA call to be open in December 2018 (last one in the current program)

Favorite VESPA tools

TOPCAT (Bristol Univ):

Allows data selection

- by formula or graphically
- reflected in other plots

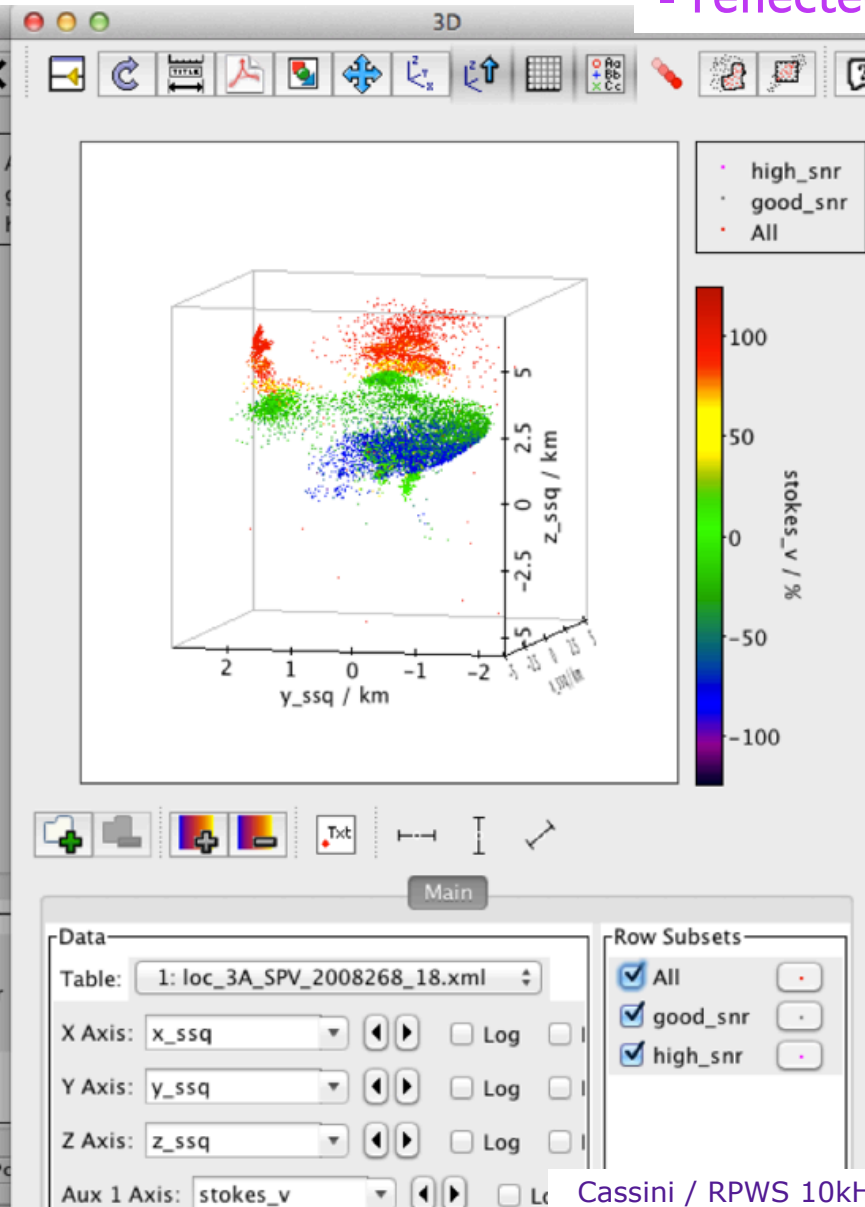
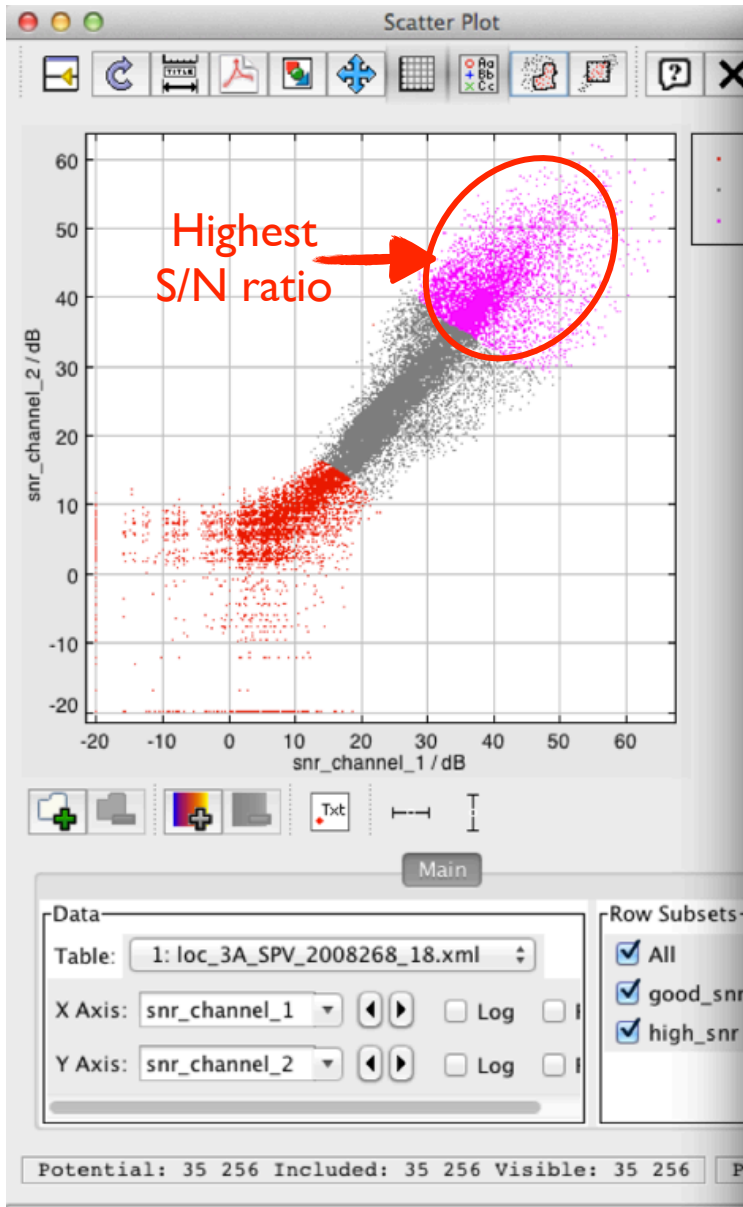


Favorite VESPA tools

TOPCAT (Bristol Univ):

Allows data selection

- by formula or graphically
- reflected in other plots



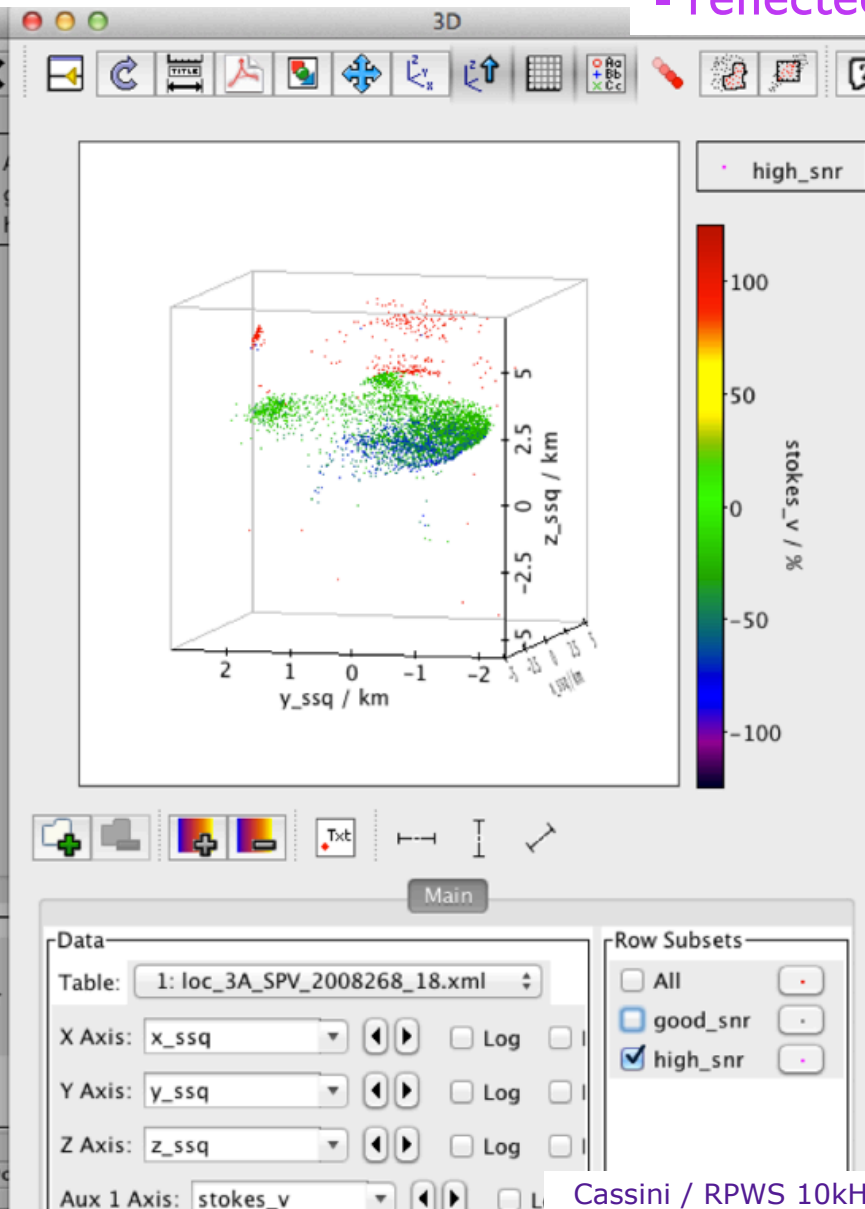
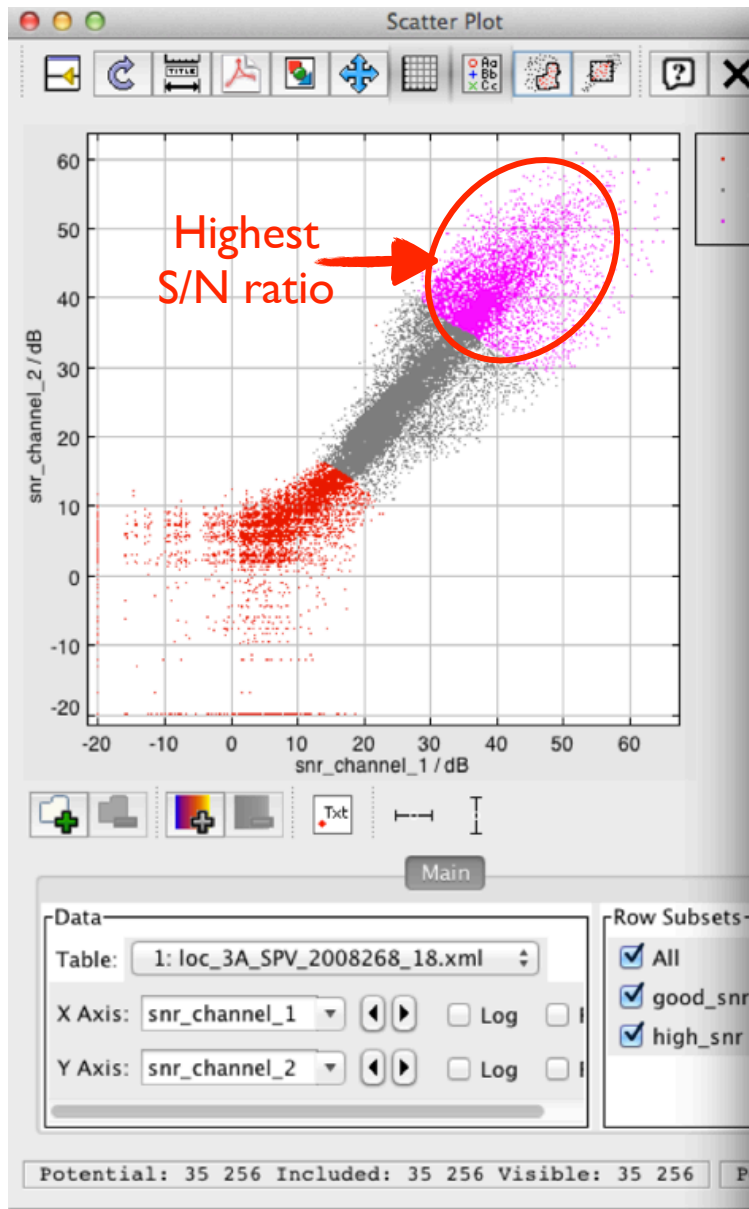
Favorite VESPA tools

TOPCAT (Bristol Univ):

Allows data selection

- by formula or graphically

- reflected in other plots

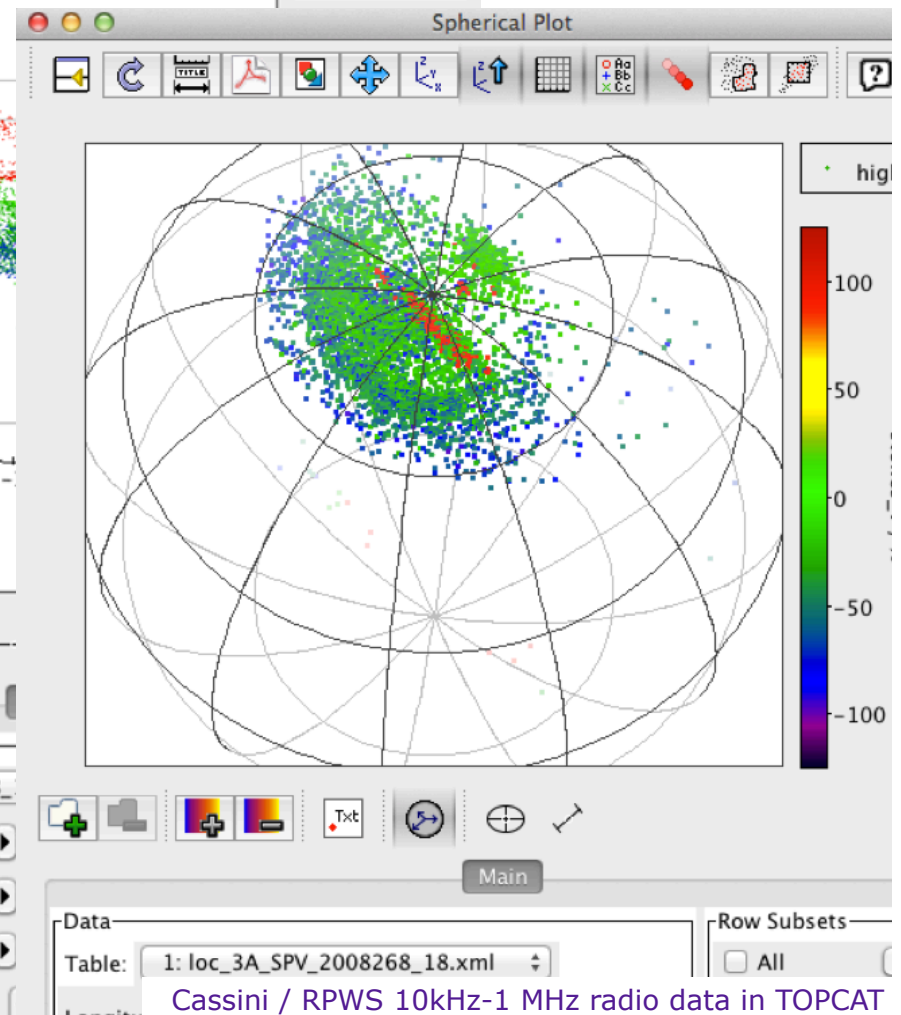
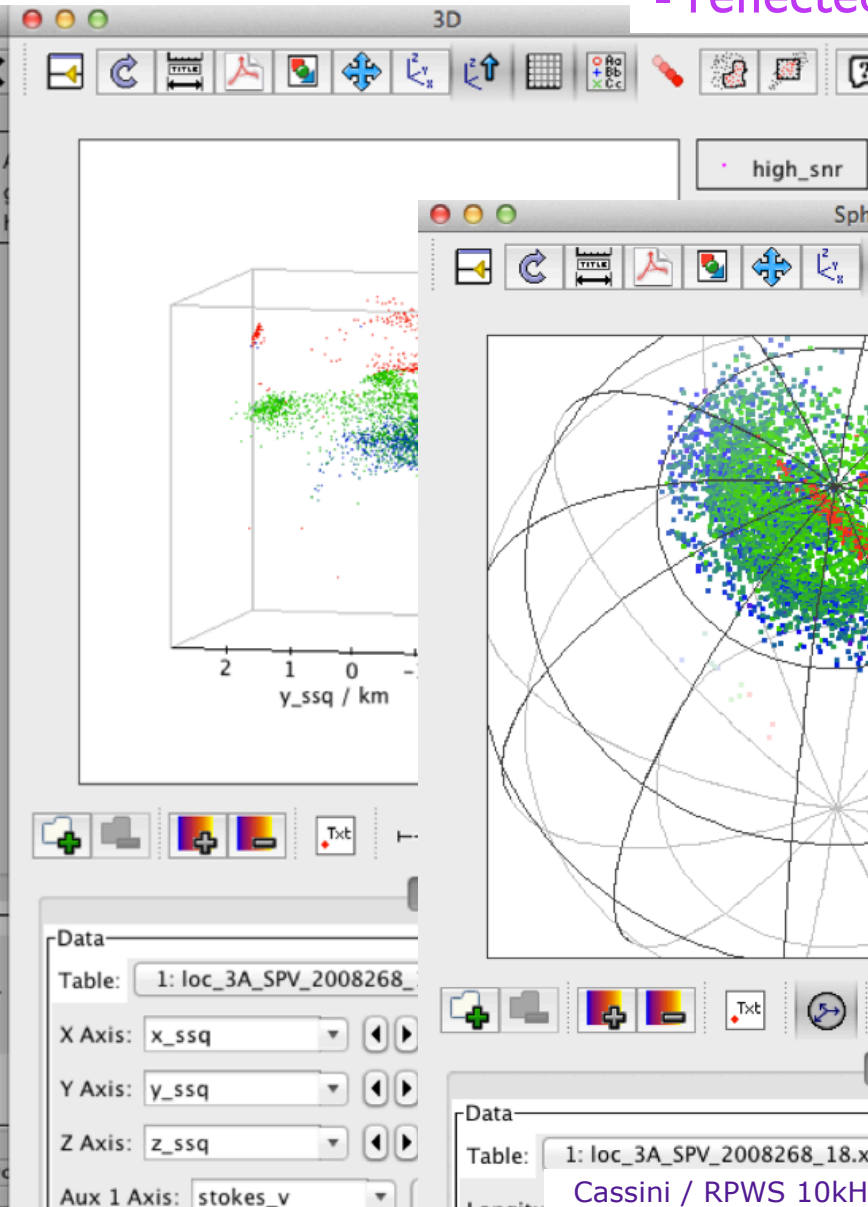
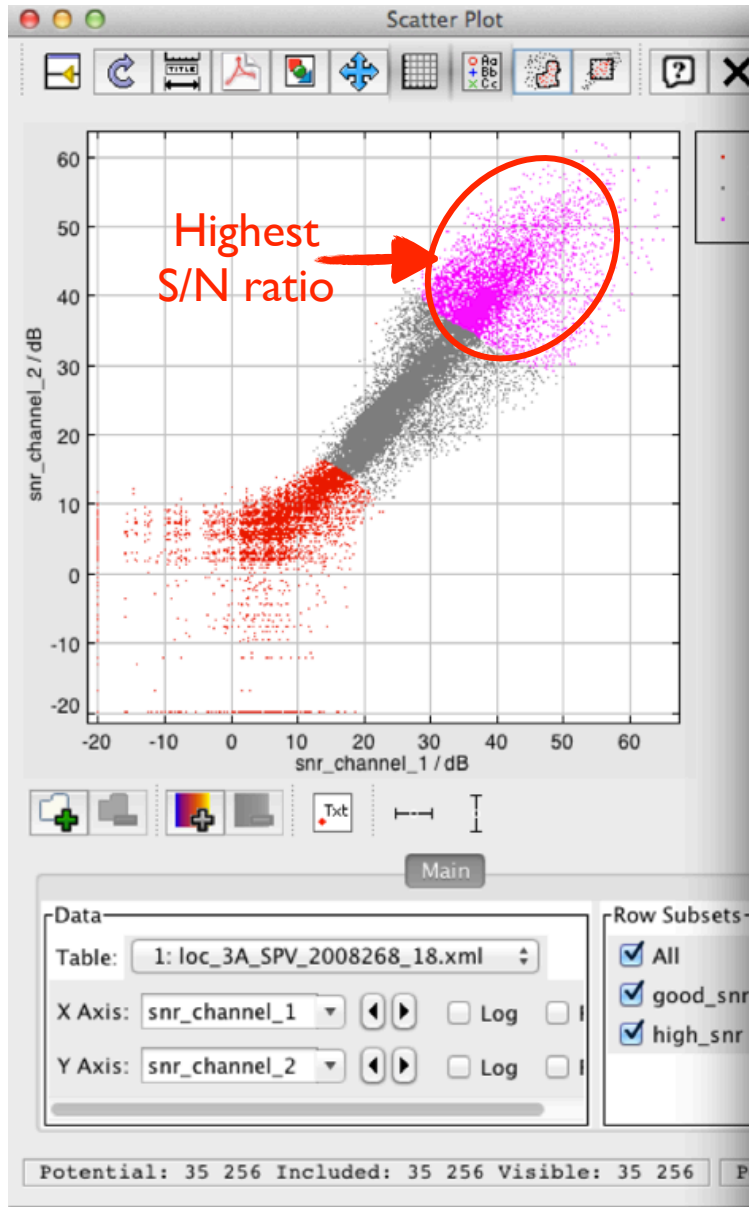


Favorite VESPA tools

TOPCAT (Bristol Univ):

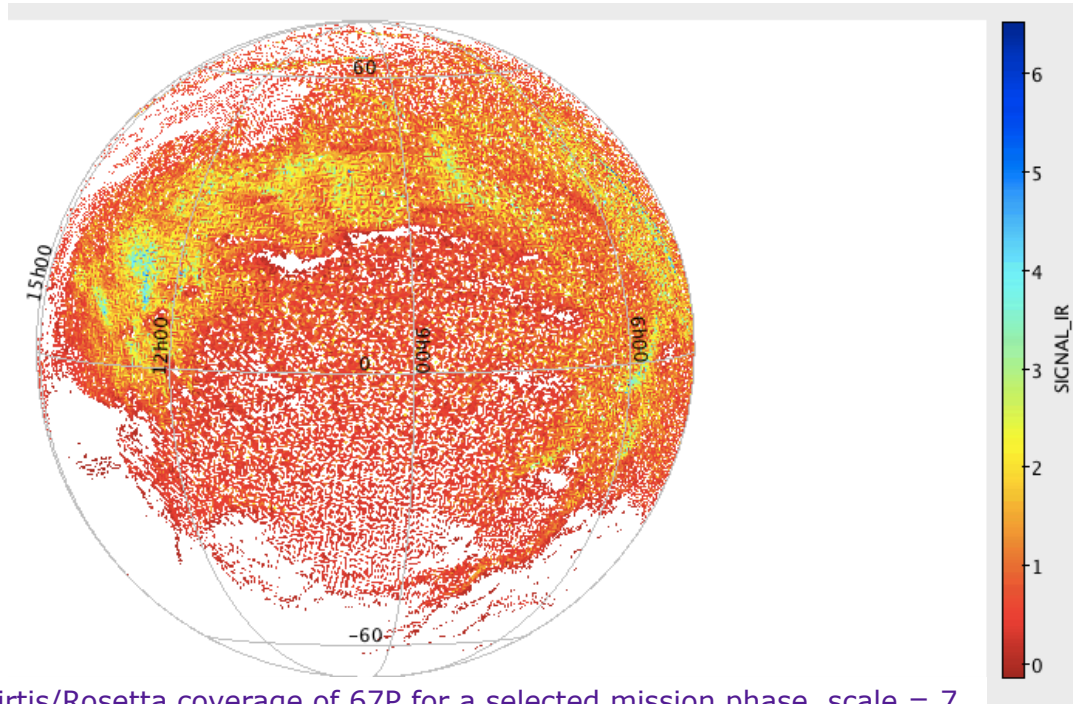
Allows data selection

- by formula or graphically
- reflected in other plots



Cassini / RPWS 10kHz-1 MHz radio data in TOPCAT

New VESPA functions Multiresolution maps in TOPCAT



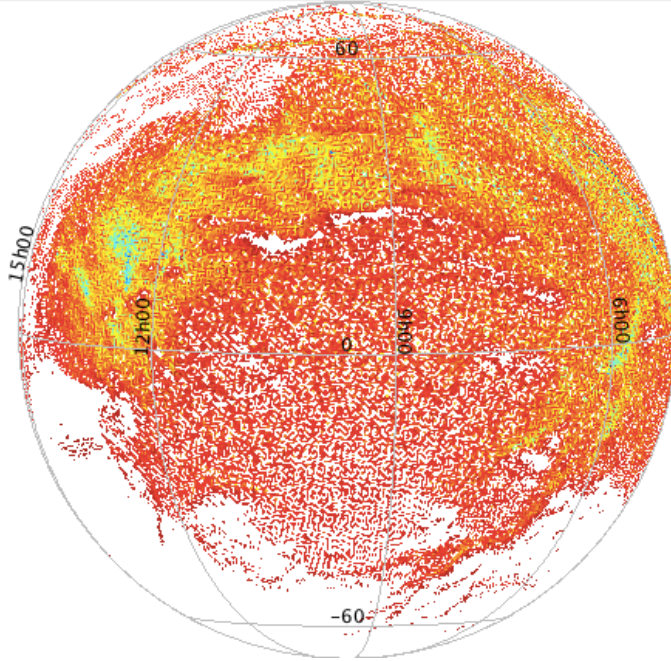
Virtis/Rosetta coverage of 67P for a selected mission phase, scale = 7

**Start from a table of sparse
observations (lon/lat)**

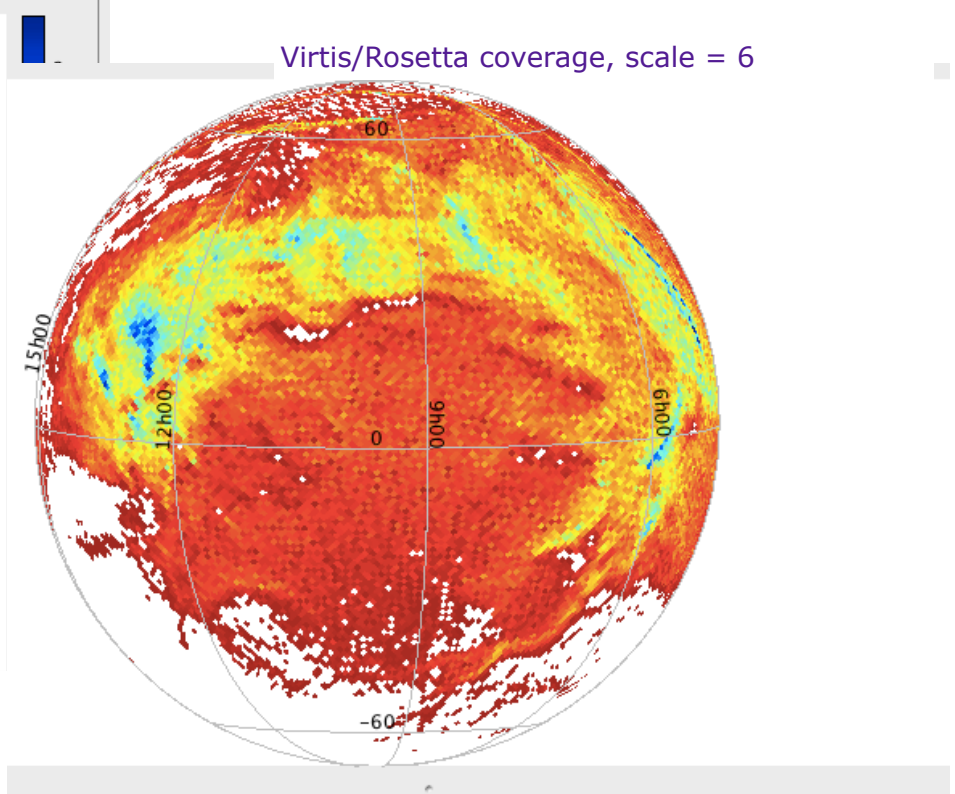
VIRTIS/Rosetta on 67P

New VESPA functions

Multiresolution maps in TOPCAT



Virtis/Rosetta coverage of 67P for a selected mission phase, scale = 7



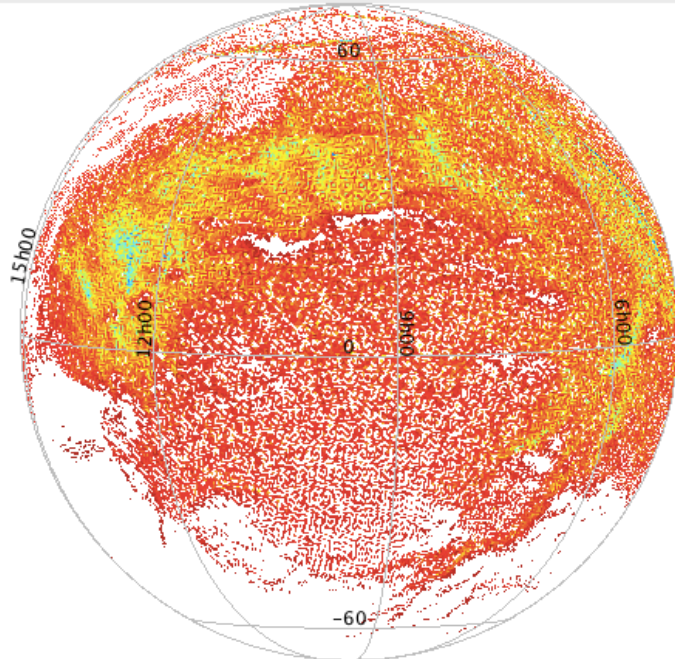
Start from a table of sparse observations (lon/lat)

VIRTIS/Rosetta on 67P

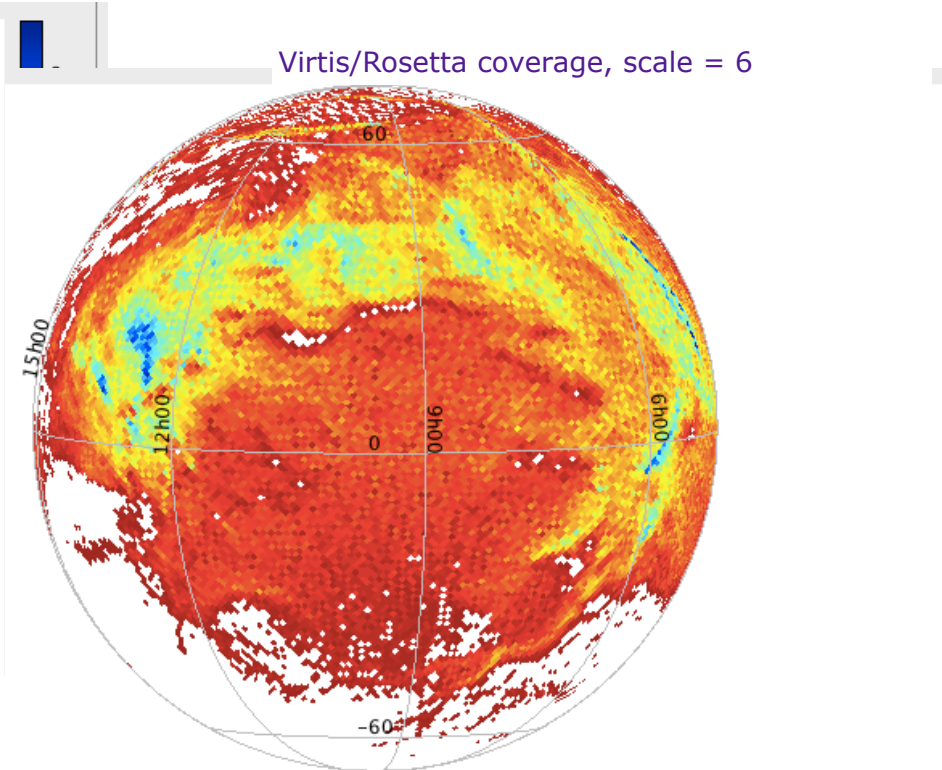
Integrate / average on healpix cells

New VESPA functions

Multiresolution maps in TOPCAT



Virtis/Rosetta coverage of 67P for a selected mission phase, scale = 7



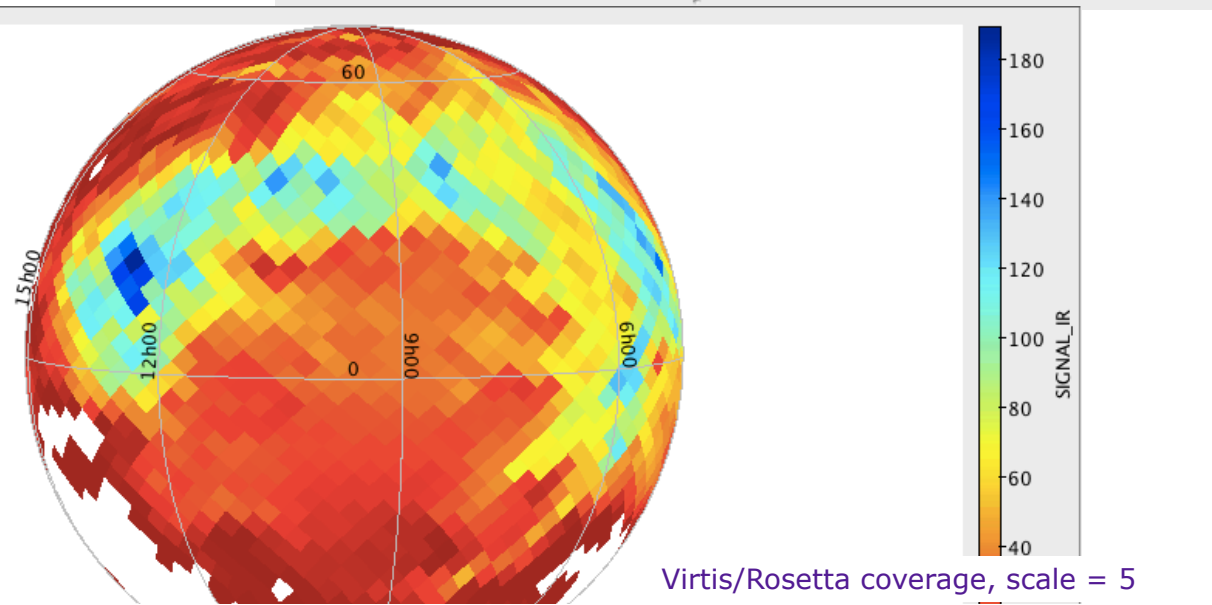
Virtis/Rosetta coverage, scale = 6

Start from a table of sparse observations (lon/lat)

VIRTIS/Rosetta on 67P

Integrate / average on healpix cells

Modify resolution / scale on the fly



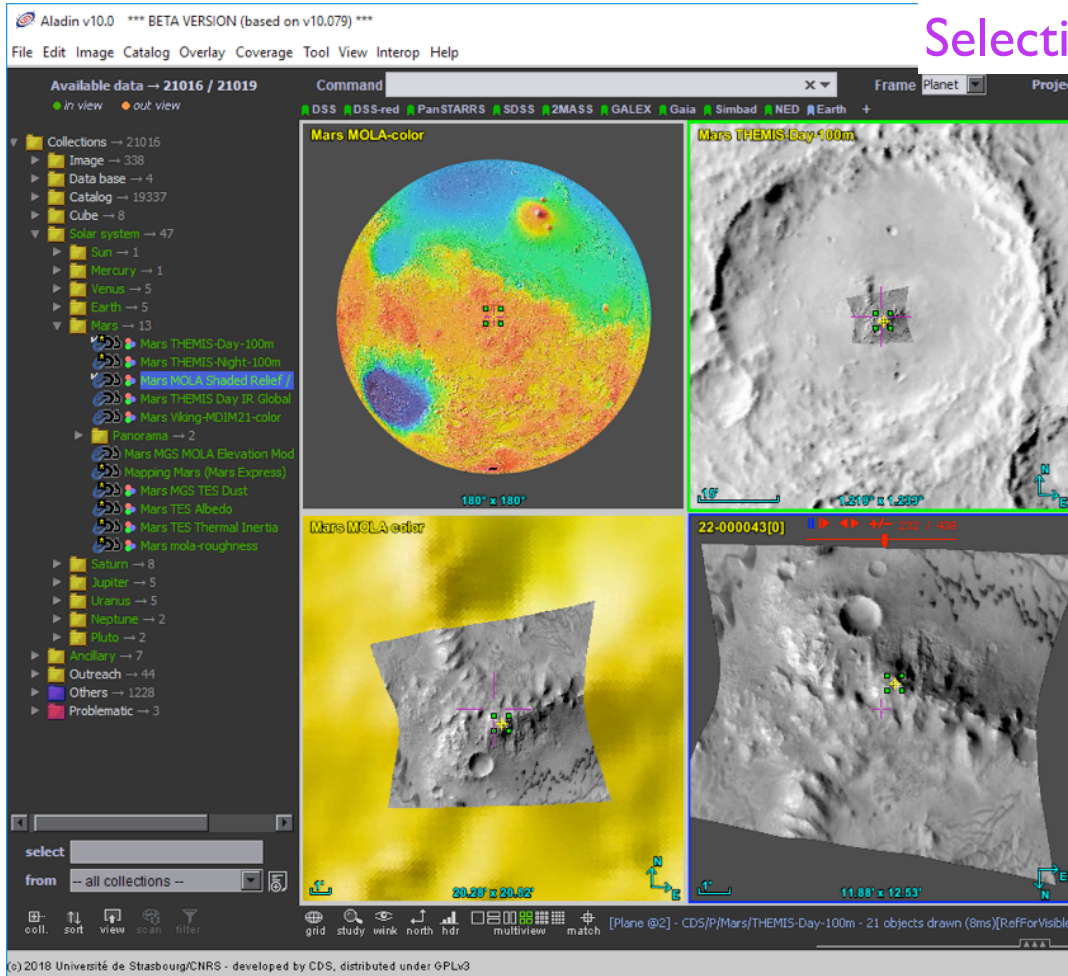
Virtis/Rosetta coverage, scale = 5

Updated VESPA tool

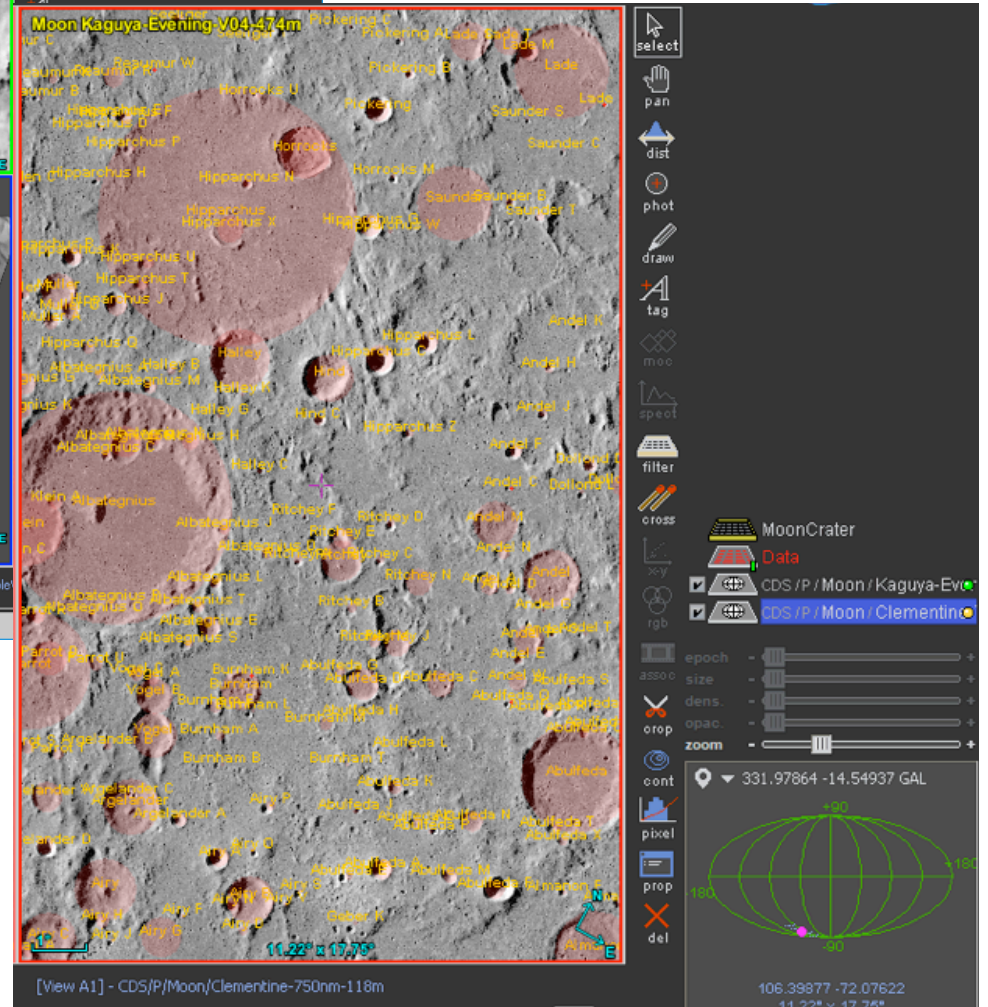
Aladin (CDS/CNRS):

Georeferenced images + objects superpositions

Selection in complex footprints



Lunar crater catalogue on Kaguya HiPS

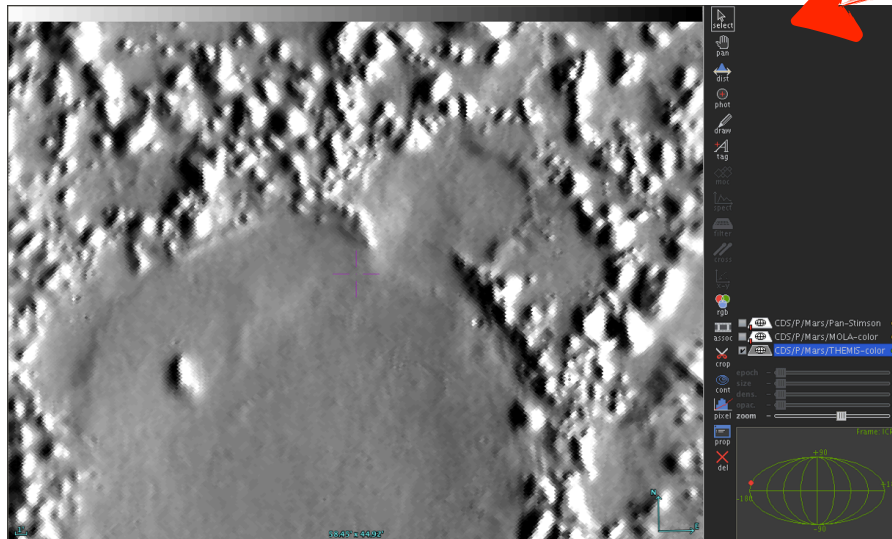
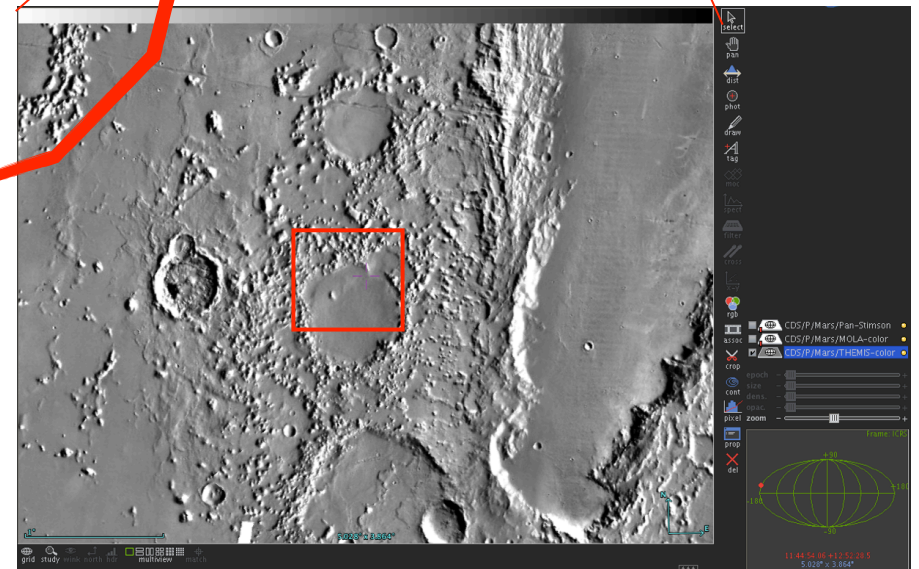
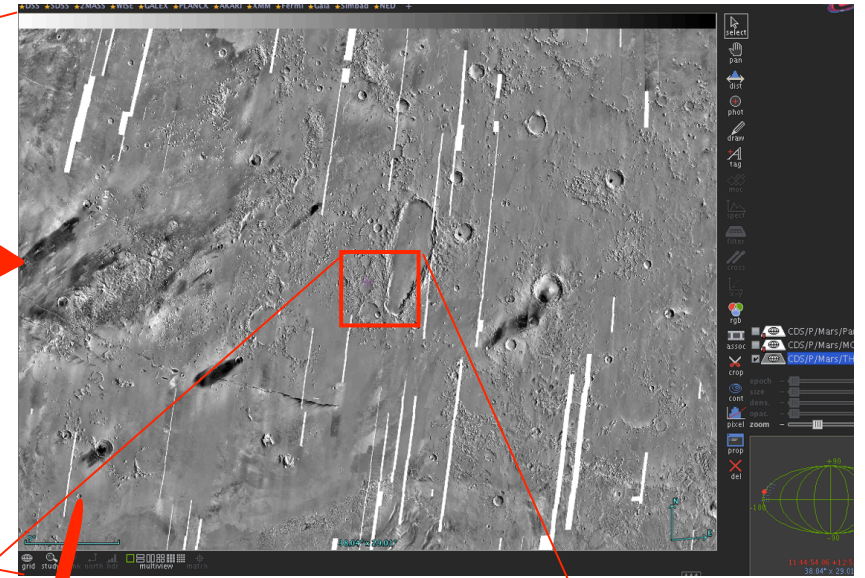
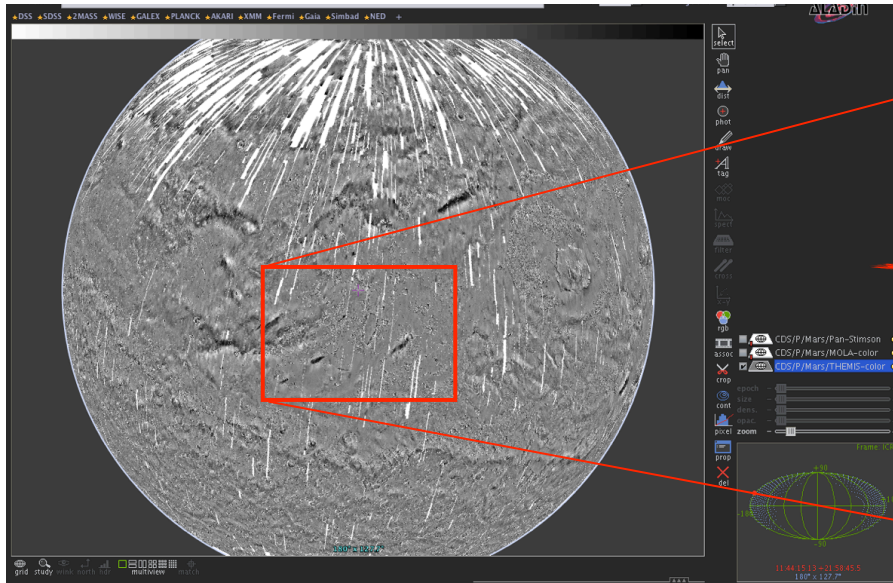


CRISM cubes on MOLA HiPS

Relies on IAU planetary coordinate frames (fits' WCS)

New VESPA functions

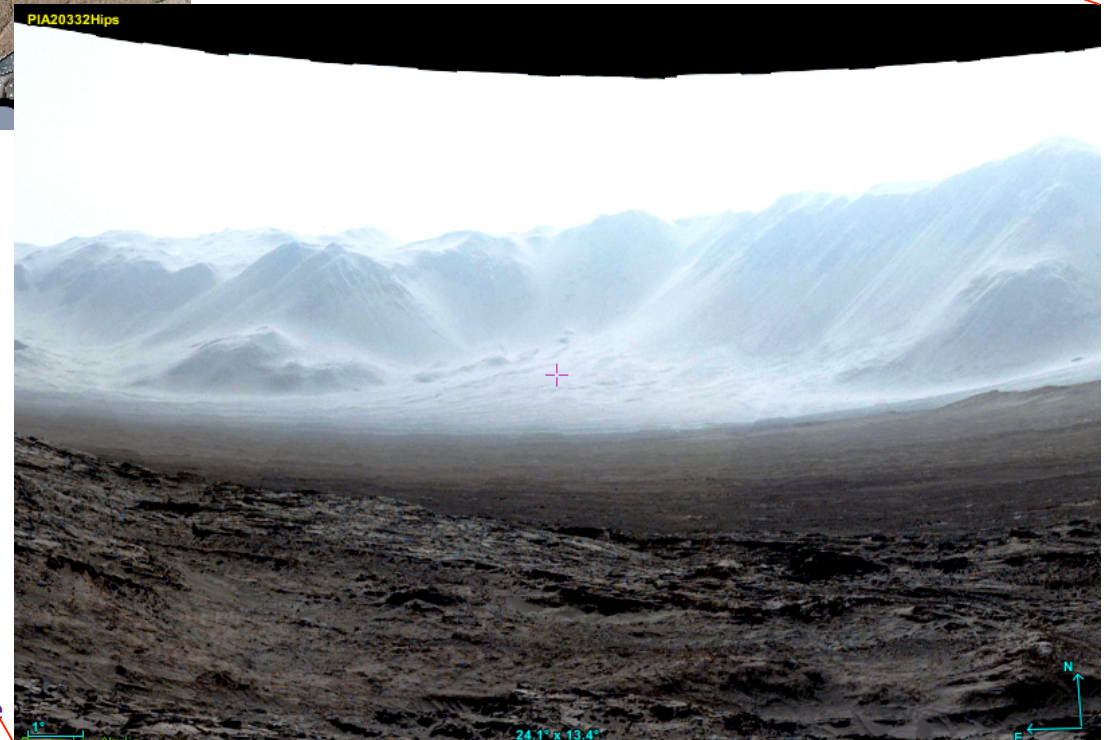
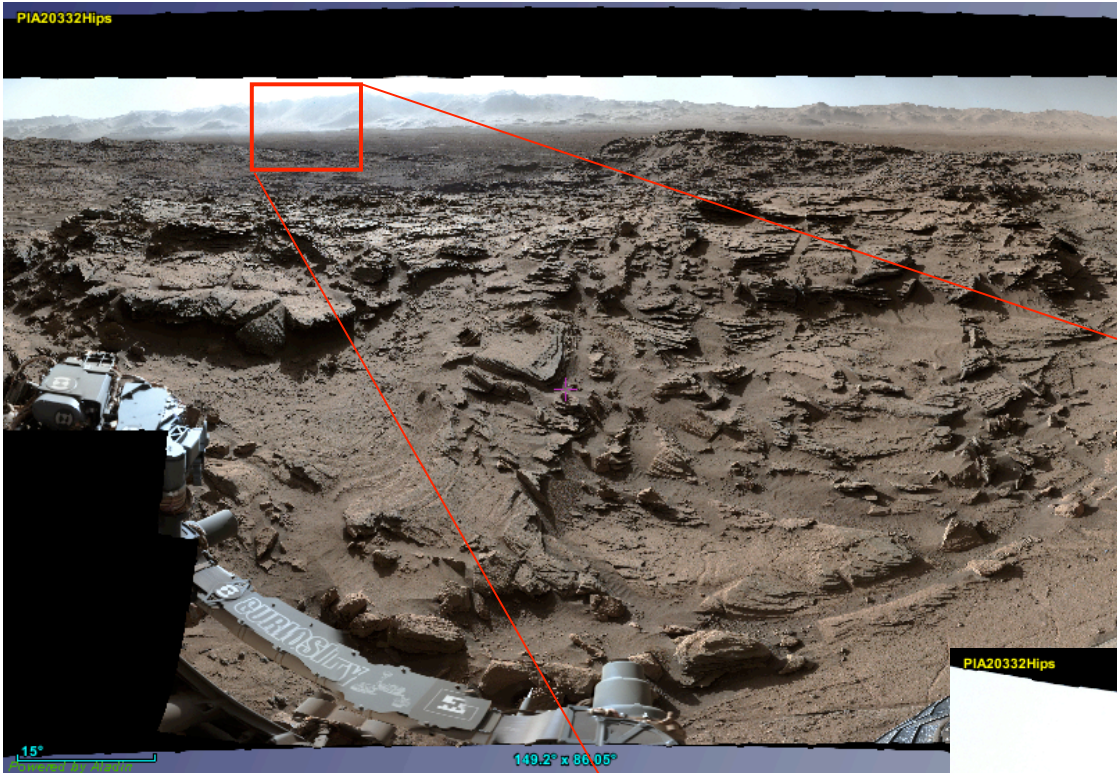
Multiresolution maps (HiPS) in Aladin



Currently 45 planetary HiPS available
(from USGS maps)

New VESPA functions

Multiresolution in Aladin: panoramic images

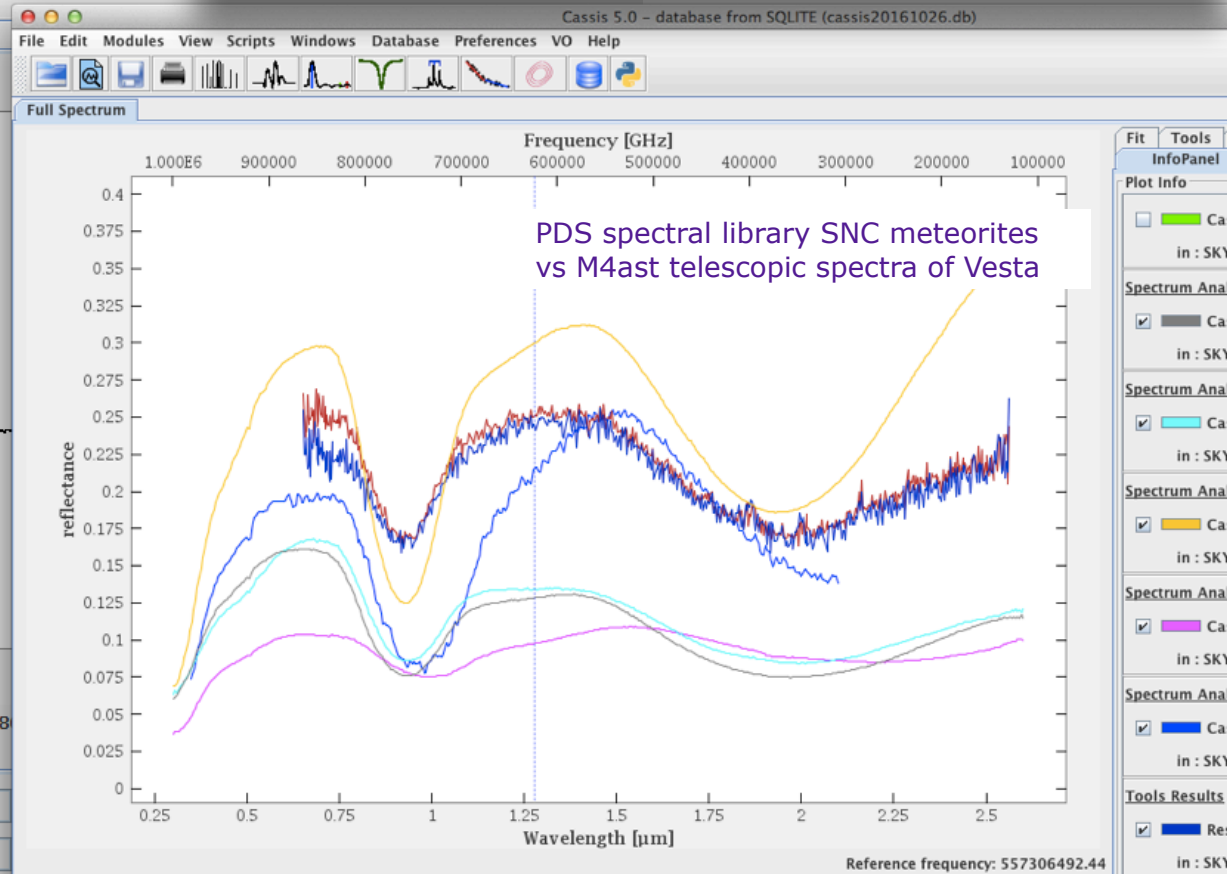
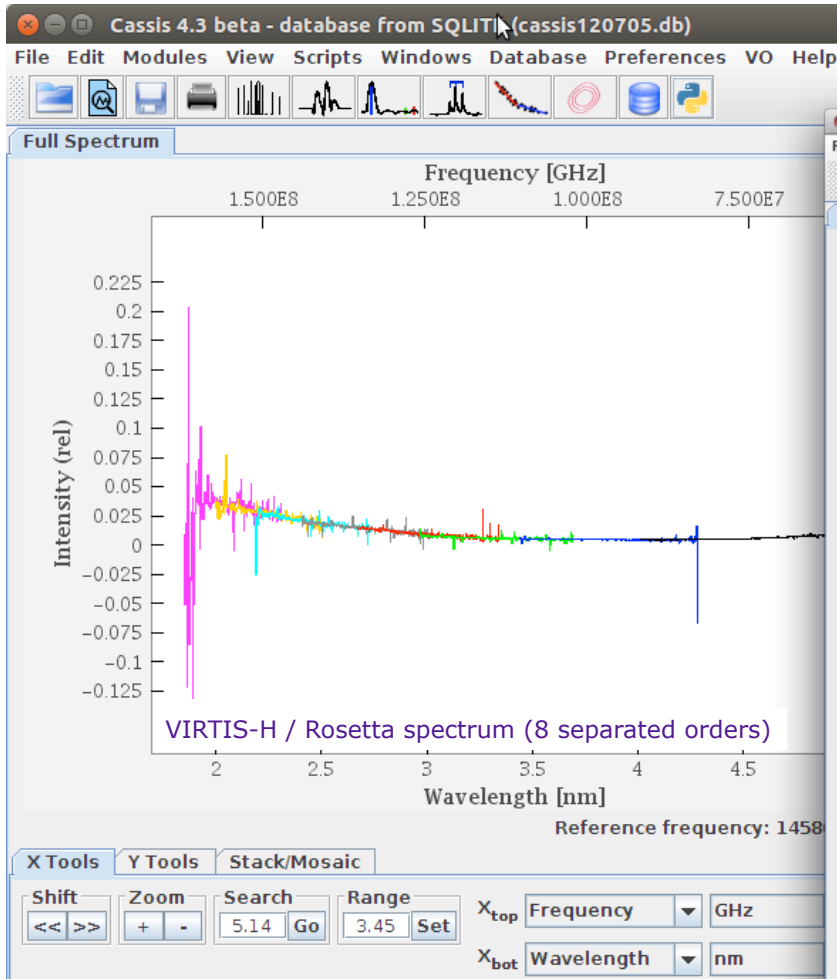
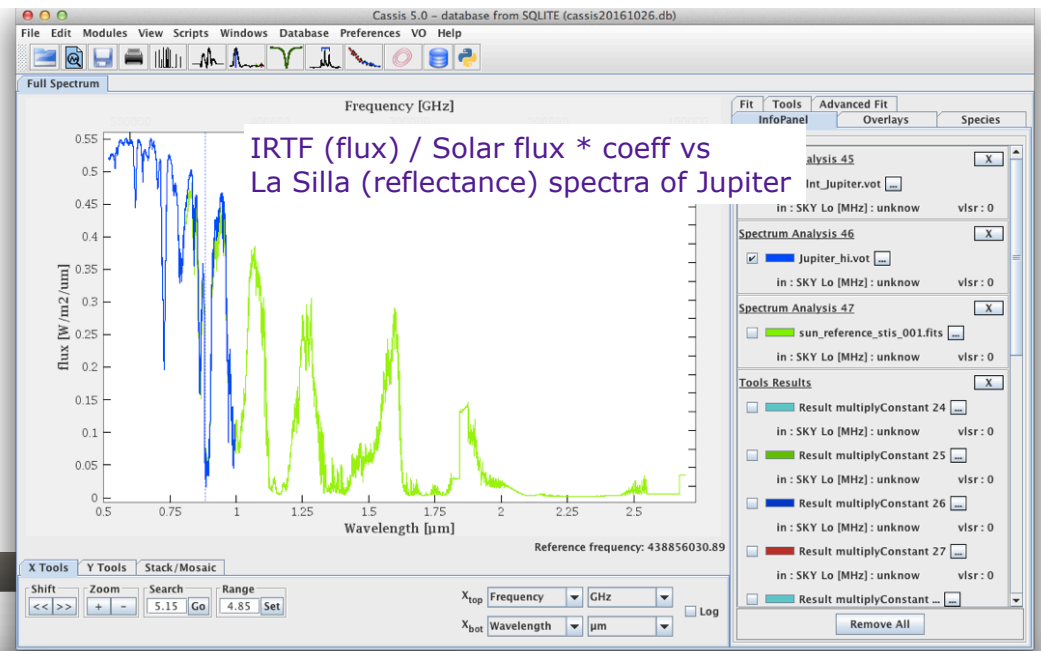


HiPS computed from a Curiosity MASTCAM panorama from JPL web site

Updated VESPA tool

CASSIS v5 (IRAP/CNRS)

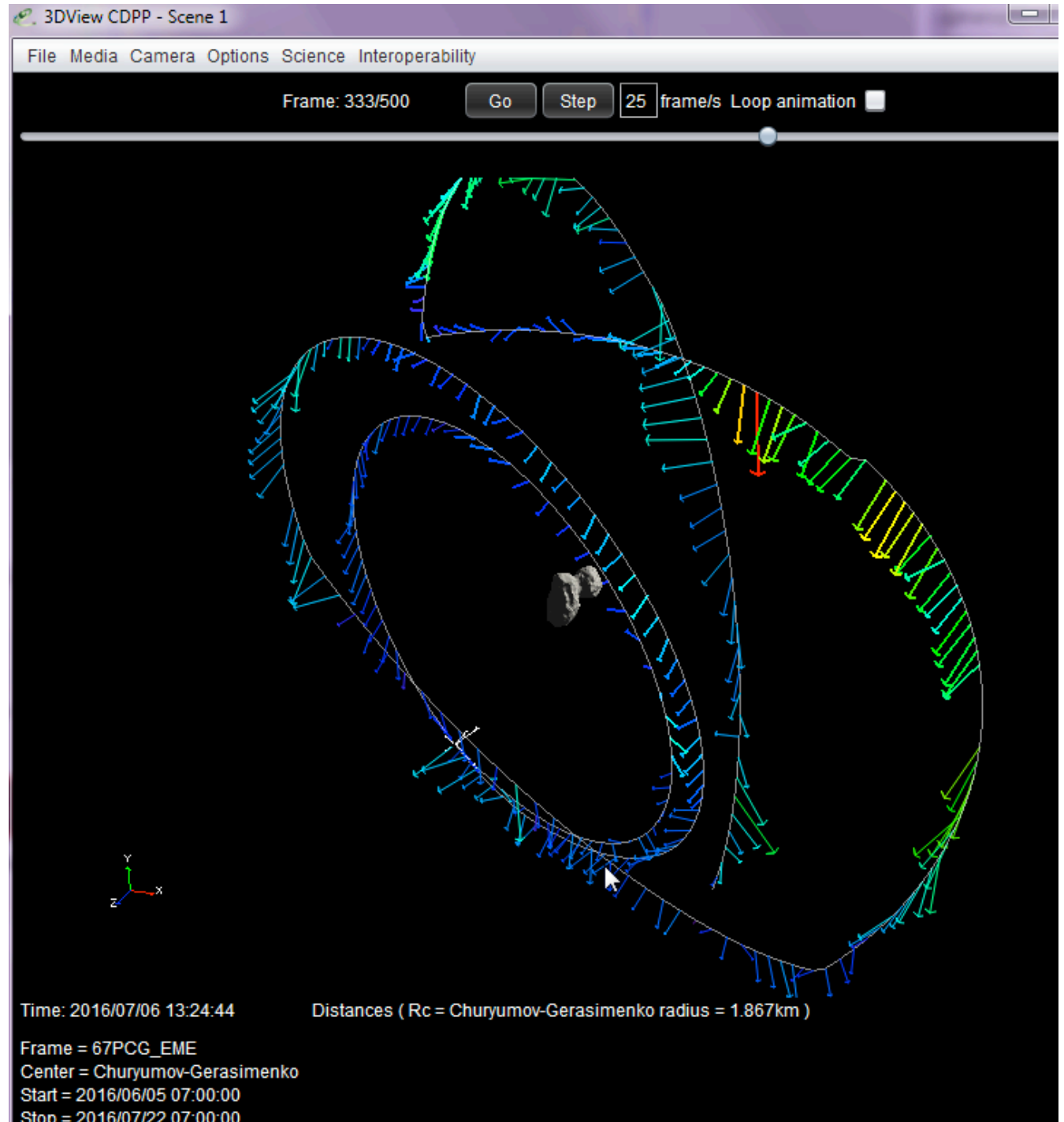
- Auto converts spectral axis & flux
- Support data in flux & various types of reflectance (scaling)
- Now supports multi-order spectra



Favorite VESPA tools

3Dview (CNES/IRAP):

- added Spice kernels from all space missions
- Added image projection capacities

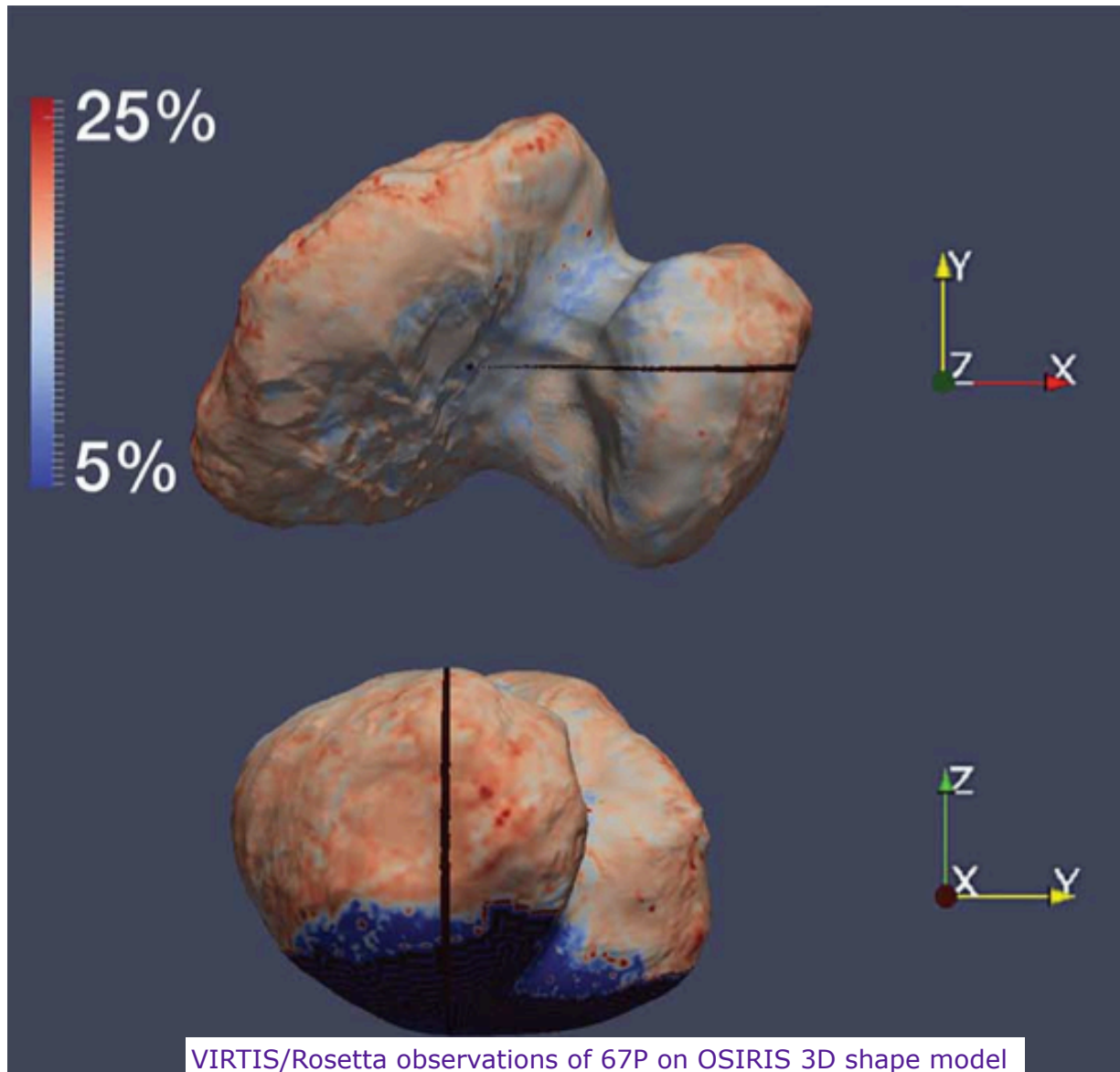


Updated VESPA tools

MATISSE (ASI):

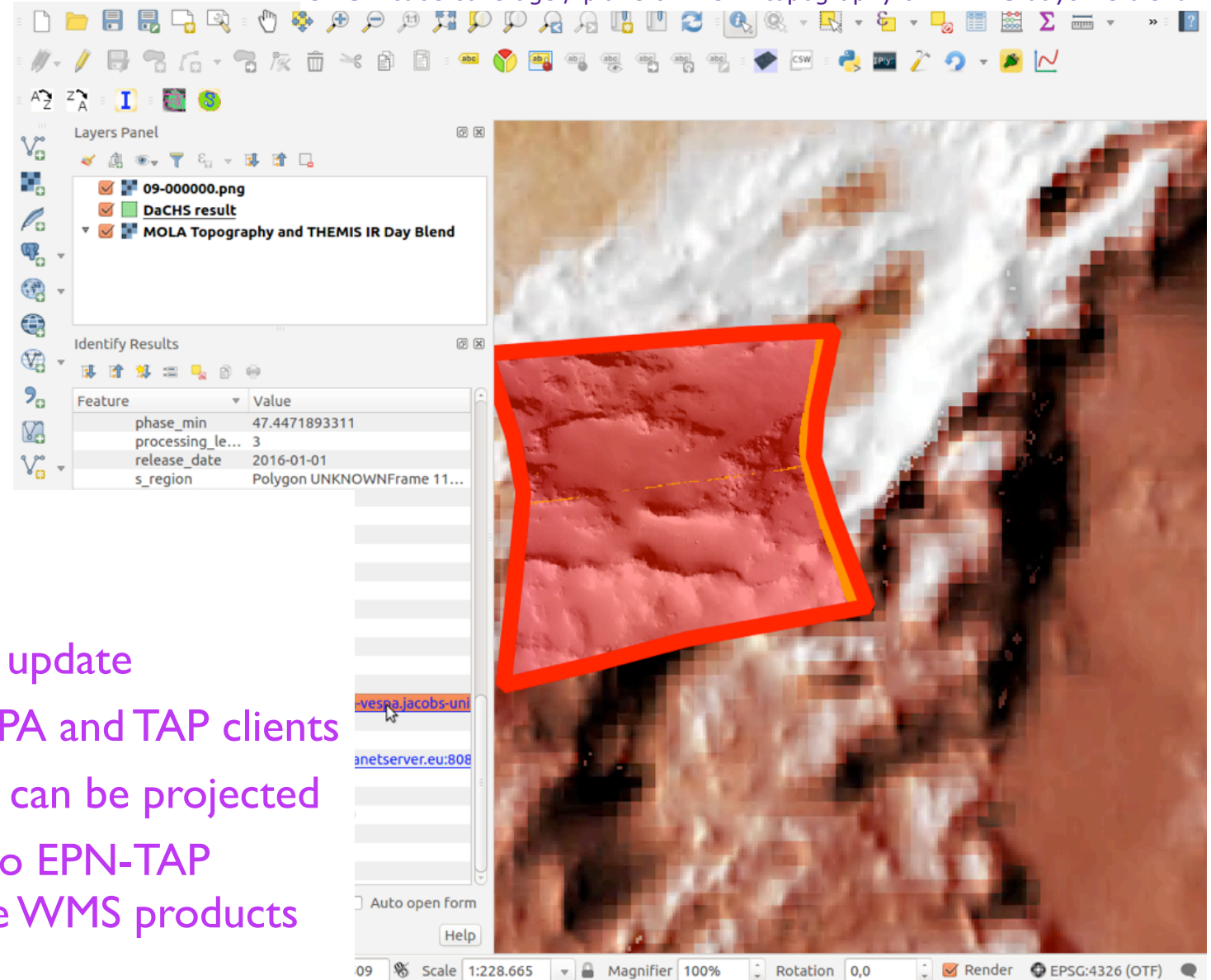
mapping on 3D shape models

SAMP connection added



New VESPA tools: VO-GIS connection

CRISM cube coverage / plane on MOLA topography & THEMIS daytime blend



QGIS (open source):

SAMP plug-in installed

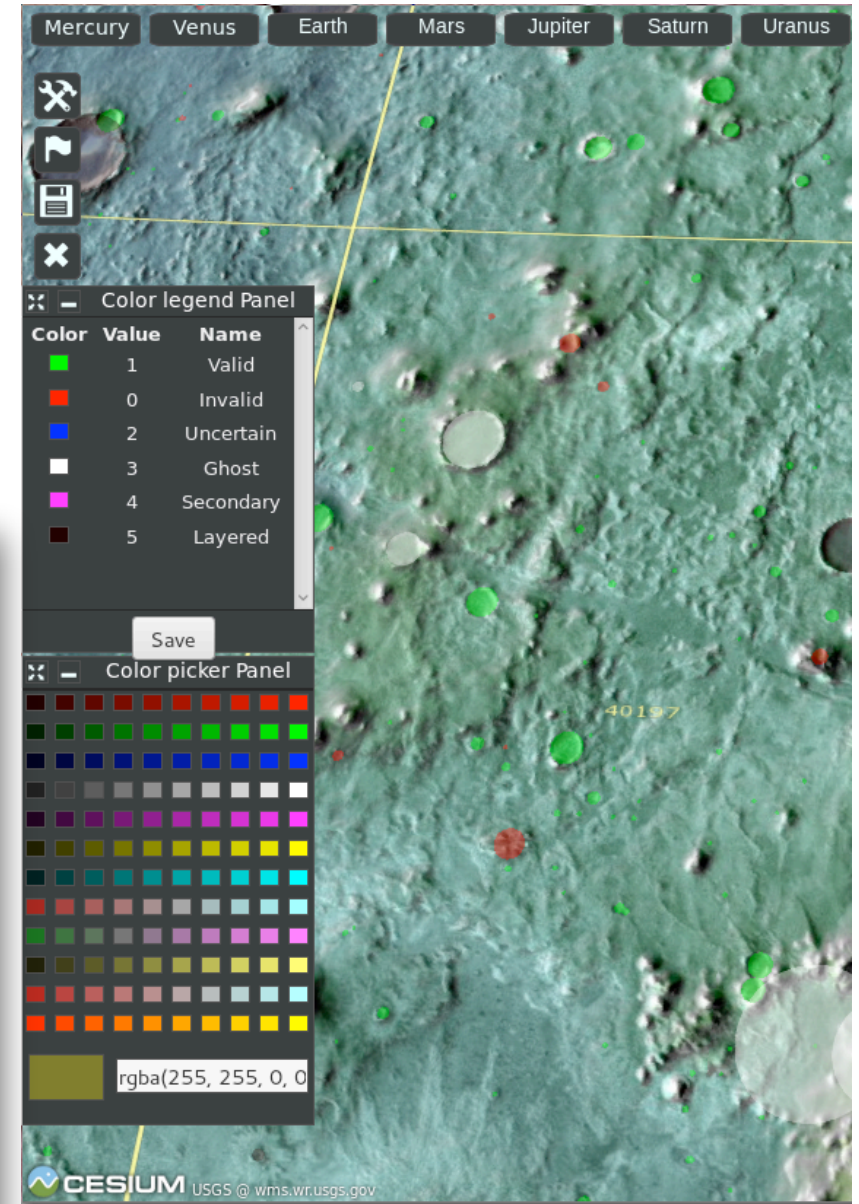
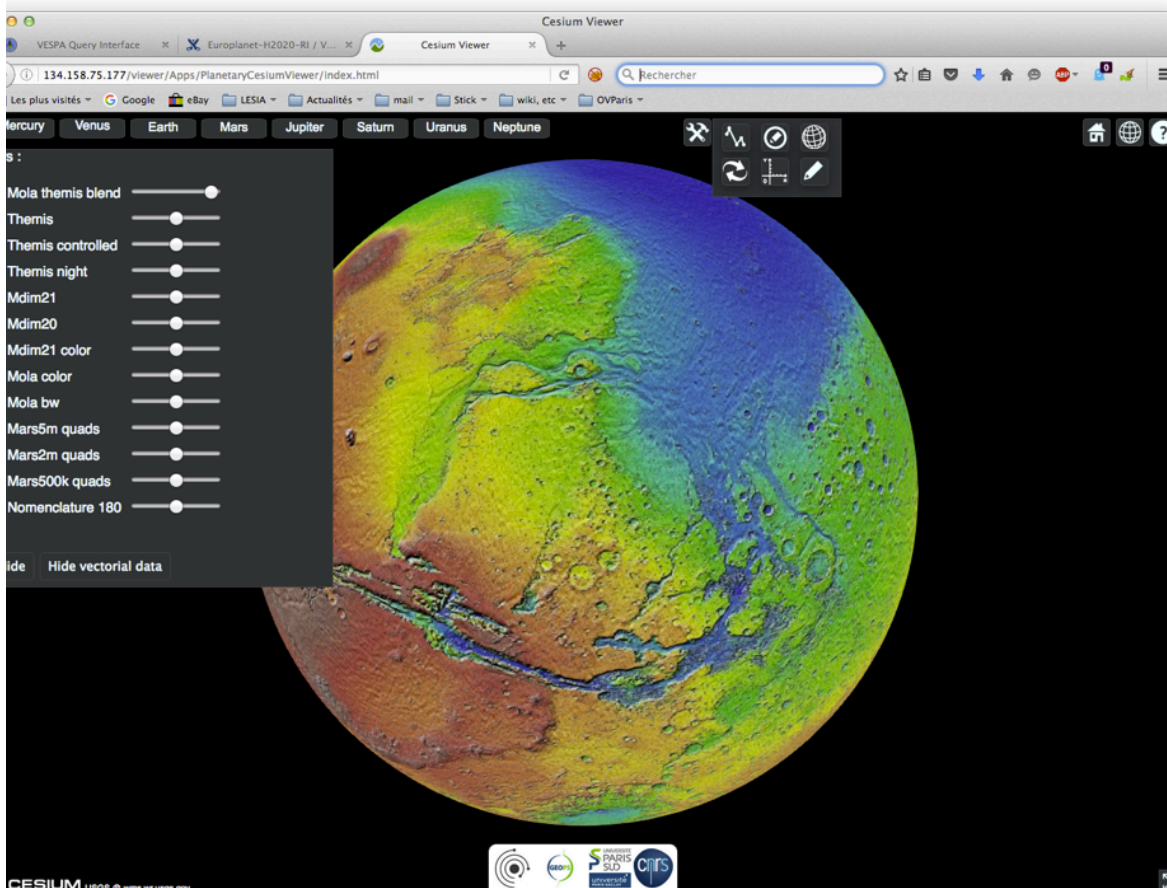
GEOfits format / GDAL update

- receives data from VESPA and TAP clients
- georeferenced fits files can be projected
- Provides visualization to EPN-TAP services which distribute WMS products

New VESPA tool

Planetary Cesium Viewer (GEOPS/CNRS)

- Quick multiresolution 3D visu
- Supports elliptic shapes
- Annotation/validation tool
- SAMP implementation



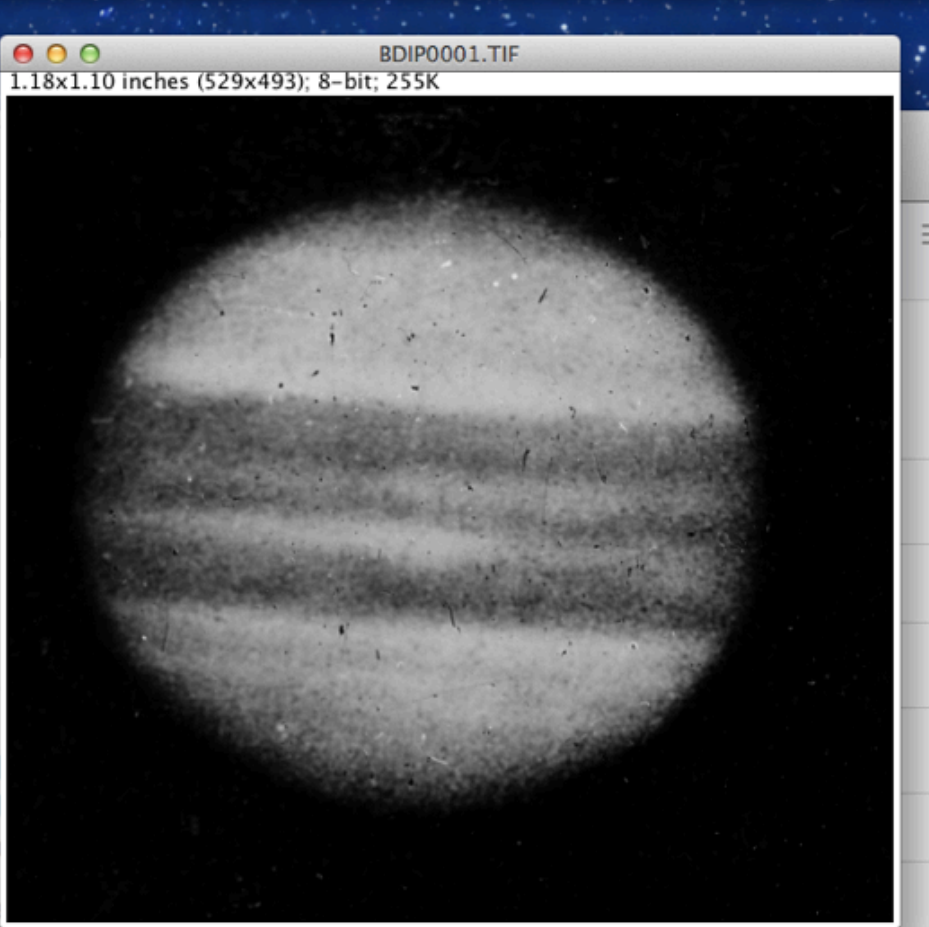
Robbins Mars craters database in PCV

New tools in VESPA

ImageJ (open source):

- SAMP connection installed
- Provides support for unusual data types (TIFF...), format conversion, and image processing functions in the VO

Historical image of Jupiter from BDIP (tiff format) in ImageJ



ImageJ interface showing the historical image of Jupiter from BDIP (tiff format). The window title is "BDIP0001.TIF" and the dimensions are "1.18x1.10 inches (529x493); 8-bit; 255K". The image shows a grayscale view of Jupiter with its characteristic bands and the Great Red Spot.

Below the image, the VESPA Query Interface displays the results in service BDIP. The interface includes a search bar, navigation buttons, and a table of results.

Results in service **BDIP**

Show entries

Column visibility

Select All in current page

granule_uid	dataproduct_type	target_name	time_min (d)	time_max (d)	url
BDIP0001_tif	image	Jupiter	1890-05-01T00:00:00	1890-05-01T00:00:00	http://vespa.obs.jpl.nasa.gov/planetary/data/display/?resource_id=ivo://ivo://vespa/obs/BDIP0001_tif
bdip0001	image	Jupiter	1890-05-01T00:00:00	1890-05-01T00:00:00	http://vespa.obs.jpl.nasa.gov/planetary/data/display/?resource_id=ivo://ivo://vespa/obs/bdip0001
bdip0004	image	Jupiter	1890-07-09T09:02:59.998	1890-07-09T09:02:59.998	http://vespa.obs.jpl.nasa.gov/planetary/data/display/?resource_id=ivo://ivo://vespa/obs/bdip0004
BDIP0004_tif	image	Jupiter	1890-07-09T09:02:59.998	1890-07-09T09:02:59.998	http://vespa.obs.jpl.nasa.gov/planetary/data/display/?resource_id=ivo://ivo://vespa/obs/BDIP0004_tif
BDIP0002_tif	image	Jupiter	1890-07-09T09:04:59.999	1890-07-09T09:04:59.999	http://vespa.obs.jpl.nasa.gov/planetary/data/display/?resource_id=ivo://ivo://vespa/obs/BDIP0002_tif
bdip0002	image	Jupiter	1890-07-09T09:04:59.999	1890-07-09T09:04:59.999	http://vespa.obs.jpl.nasa.gov/planetary/data/display/?resource_id=ivo://ivo://vespa/obs/bdip0002

Saturn in March 2012