



VESPA-Cloud

**Virtual European Solar and Planetary Access
Europlanet-20204-RI**

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

Main Query Portal: <http://vespa.obspm.fr>

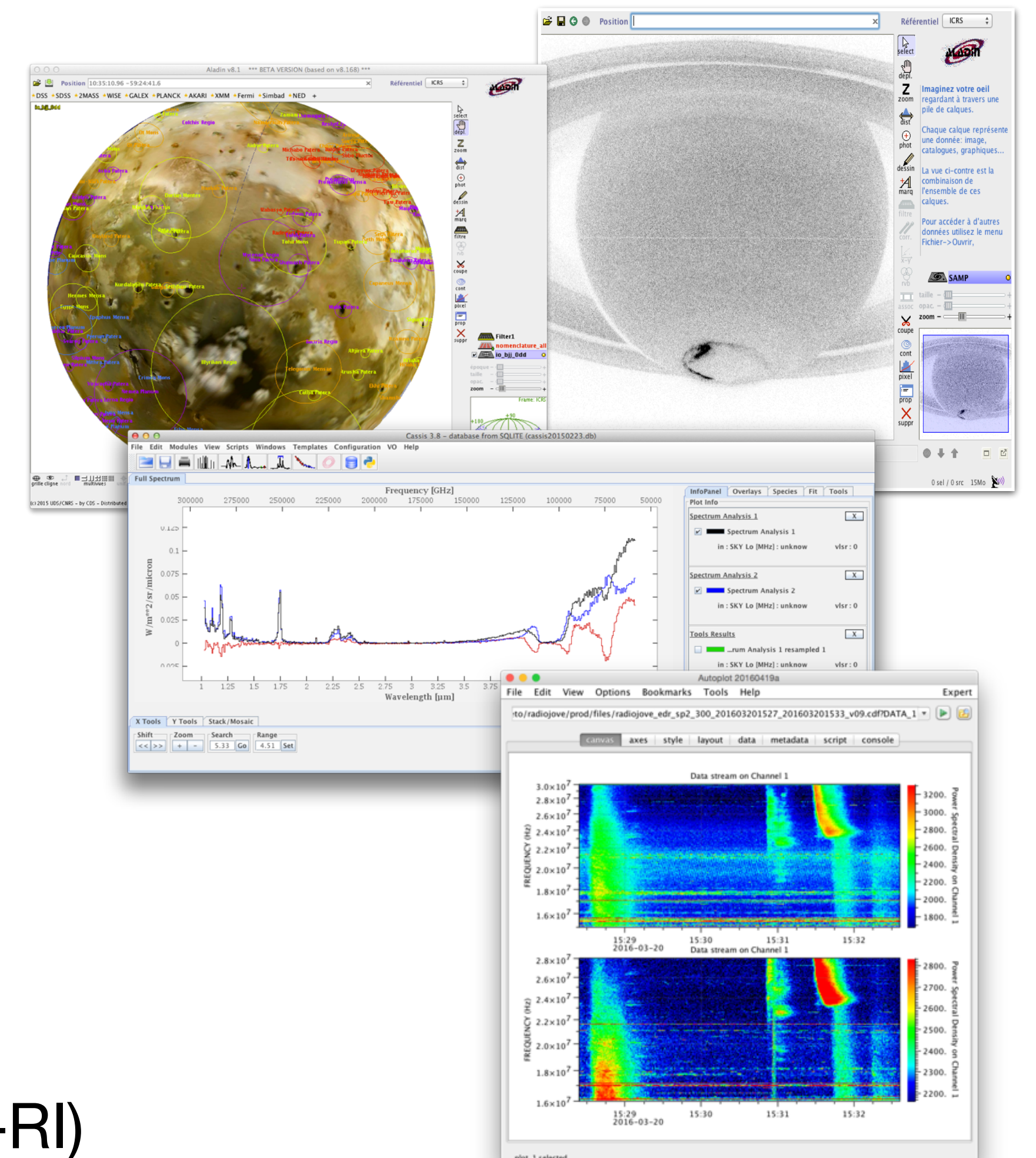
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A distributed Virtual Observatory for Solar System Sciences

- Data discovery oriented:
sharing metadata for science data products
using relational databases and a standard metadata dictionary = source, observer, location, spectral range, time range, physical parameter, product type...
- Distributed virtual research environment using:
 - *Astronomy* interoperability framework (IVOA) and the tools developed by this community
 - Other interoperability standards from *heliophysics*, *planetary sciences* archives, and associated tools...
 - Community recommended data formats
- New 4-year contract started in Feb. 2020 (Europlanet-2024-RI)





- Strengths:
 - **Distributed:** No central single point failure, services are distributed among data providers
 - **Homogeneity:** all data providers use the metadata dictionary, and almost all use same data sharing framework, many running examples, tutorials...
 - **Sustainability:** Relying on larger groups interoperability layers and tools
- Weakness:
 - **No data replication:** Small data providers can't maintain server on the long term. If single server fails (or team stops operating), the hosted metadata is unreachable.



- **VESPA status:**
started in 2015

~20 data providers
(including the ESA /
Planetary Science
Archive)

~50 services online,

~20 million data
products searchable
and accessible.

Data services connected via EPN-TAP / field

Open
Open in test
In development
Being studied
• New/updated in 2020

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)
- - SBNAF - (from H2020 prog., Konkoly Obs)
- 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)
- Meteor_showers predictions (IMCCE)

Solid spectroscopy

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

Surfaces

- CRISM WCS service (MRO, Jacobs U)
- Mars craters (Jacobs U, + update by GEOPS)
- USGS planetary maps, WMS (Jacobs U)
- M3 WMS service (Chandrayaan-1, Jacobs U)
- HRSC nadir images, WMS (MEx, Frei Univ)
- OMEGA cubes and maps (MEx, IAS)
- VIMS/Cassini w/geometry, satellites (LPG)
- MarsSI GIS (Lyon)

Magnetospheres / radio

- APIS (HST/Cassini, LESIA)
- NDA (Jupiter radio Nançay, LESIA)
- AMDA (CDPP / IRAP)
- MAG data (VEx, IWF Graz)
- - MASER & related services (LESIA)
- RadioJove (LESIA & US amateur network)
- Iitate HF data of Jupiter (Tohoku Univ, Jap)
- UTR-2 Juno ground support (Kharkiv)
- MDISC (modeling, UCL)
- Cluster & Themis data (IAP, Prague)
- IMPEx models (from FP7 prog, 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 (from FP7 prog, 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)
- - VizieR catalogues in Planetary Science (CDS)
- DARTS (JAXA - currently via PDAP)



- **VESPA-Cloud:** Propose data-provider-ready (configurable and maintained) VESPA distribution service (using DaCHS, Data Centre Helper Suite)
- **VESPA-Cloud use case**
 - New VESPA data providers will be able to:
 - order a service running the DaCHS framework installed (PaaS)
 - configure the service for their science application (with git repository for versioning)
 - let the VESPA team administrate the server (maintenance, updates, package management)
 - update the science content and the metadata
 - The VM hosting the service has a static public DNS and public web http interfaces (IVOA APIs).
 - The service is registered in the IVOA Registry, and is reachable by any IVOA tools.
 - The services can be used (open access) by scientists within their science workflows.

The banner features a dark blue space background with various celestial bodies: a comet, Earth, Jupiter with a hand cursor pointing at it, Saturn, and a blue planet. The text 'VESPA-Cloud' is in large white font, and 'Virtual European Solar and Planetary Access' is in smaller white font below it.

VESPA-Cloud

Virtual European Solar and Planetary Access

- EOSC-Hub EAP Project
 - **Compute capabilities (EGI Cloud compute):** 20 VM instances linux based (split evenly across 2 sites),
Each VM: 2 CPU, 4GB RAM, 20 GB disk, 1 fixed DNS name, ports open: 22, 80, 8080, 5 remote ssh-key access per VM
 - **Storage capabilities:** 3x2 TB of storage accessible from every VM:
2TB of EUDAT B2SAFE (iRODS), 2 x 2TB of Object Storage (2TB of Swift/other at each supporting site)
 - **AAI services:**
 - *eduTEAMS* as community AAI for user group management and integration with DaCHS application
 - Accessing to cloud via EGI Check-in
 - **Infrastructure:**
 - EOSC Monitoring using a custom nagios probe
 - EGI DNS as a Service to provide persistent DNS names
 - VO in EGI AppDB to manage replication of VM templates across sites
 - EUDAT B2FIND for discovery
 - Integration of service into the EOSC Marketplace
 - INDIGO PaaS: evaluating if appropriate for VESPA-Cloud
 - Zenodo: exploring potential integration with DaCHS



VESPA-Cloud

Virtual European Solar and Planetary Access

Q1

1. Having **access to the VM** at the sites
2. Validating **access to storage** from VMs:
iRODS and Object Storage
3. Being able to **manually deploy the full stack** on a VM:
deployment of containers from git-managed repository

Q2

4. **Automate VM deployment and management** (cloud-init) + puppet or equivalent
5. Allow the **VESPA Hub teams to deploy services** by themselves:
Observatoire de Paris (Paris, France), INAF/OATS (Trieste, Italy), Heidelberg Univ. (Heidelberg, Germany)
6. Test **harvesting of metadata by B2FIND** (DaCHS exposing OAI-PMH endpoint)
7. Configure **eduTEAMS Community AAI** Service

Q3

8. **Document service deployment for data providers** external to VESPA community

9. Having a **VM template in appdb** to have VM available at all sites
10. Having access to **group management in eduTEAMS** Community AAI:
implement OAuth and group authorization in DaCHS

Q4

11. **Document the process** required to deploy the service following an EOSC order, providing their SSH keys
12. **Onboard the service** to have it recorded and orderable in the EOSC marketplace
13. **Study technical follow up**
 - Doing computing on demand on batch resources using UWS
 - Study how to deploy an ElasticSearch solution in EOSC
 - Explore integration with Zenodo
 - Explore usage of INDIGO PaaS
14. **Explore sustainability** options after EOSC-hub
 - Discuss economic models allowing to provide the services
 - Prepare agreements to continue to operate the services deployed during the EAP



- First achievements:
 - eduTEAMS-VESPA Kick-Off (Apr. 15th 2020).
 - AAI framework: *perun*
 - first actions: register on eduTEAMS (done), create VO, invite users/admins and setup roles, first groups, manage access in VESPA-Hub gitlab servers.
 - VO: vo.europlanet-vespa.eu at EGI (merge or re-use with eduTEAMS?) (access to be fixed)
 - Two prototype topologies already available at INFN-Catania. Used for early prototype in 2019 (thanks to Björn Backeberg). Still available. No VM instance configured at this time.
 - Services created: B2ACCESS, B2FIND, B2SAFE, EGI Cloud Compute, EGI Online Storage (access to be fixed)