

# **IDOC space mission data distribution services**

**Institut d'Astrophysique Spatiale – Orsay**

K. Dassas on behalf of the IDOC team

## Outlines

- Context
- IDOC data interfaces
- Tools behind
- Conclusion

## Environment



UMR (CNRS and Paris-Sud University) - Orsay France

OSUPS = IAS + GEOPS = Science of Universe Observatory Paris-Sud

Staff : 150 members

IDOC staff : 9 permanent members + 6 contractants

### Scientific Teams :

- Solar and Planetary systems
- Interstellar Matter and Cosmology
- Stellar and Solar Physics
- Astrochemistry and Origins

### Context :

- Space Mission
  - International Consortia
  - « Astronomical » budget
  - Long terms engagements
  - Time constraints
- Paris – Saclay ( P2IO, SPU )

## IDOC Integrated Data and Operation Center

IDOC technical head: [gilles.poulleau@ias.u-psud.fr](mailto:gilles.poulleau@ias.u-psud.fr)

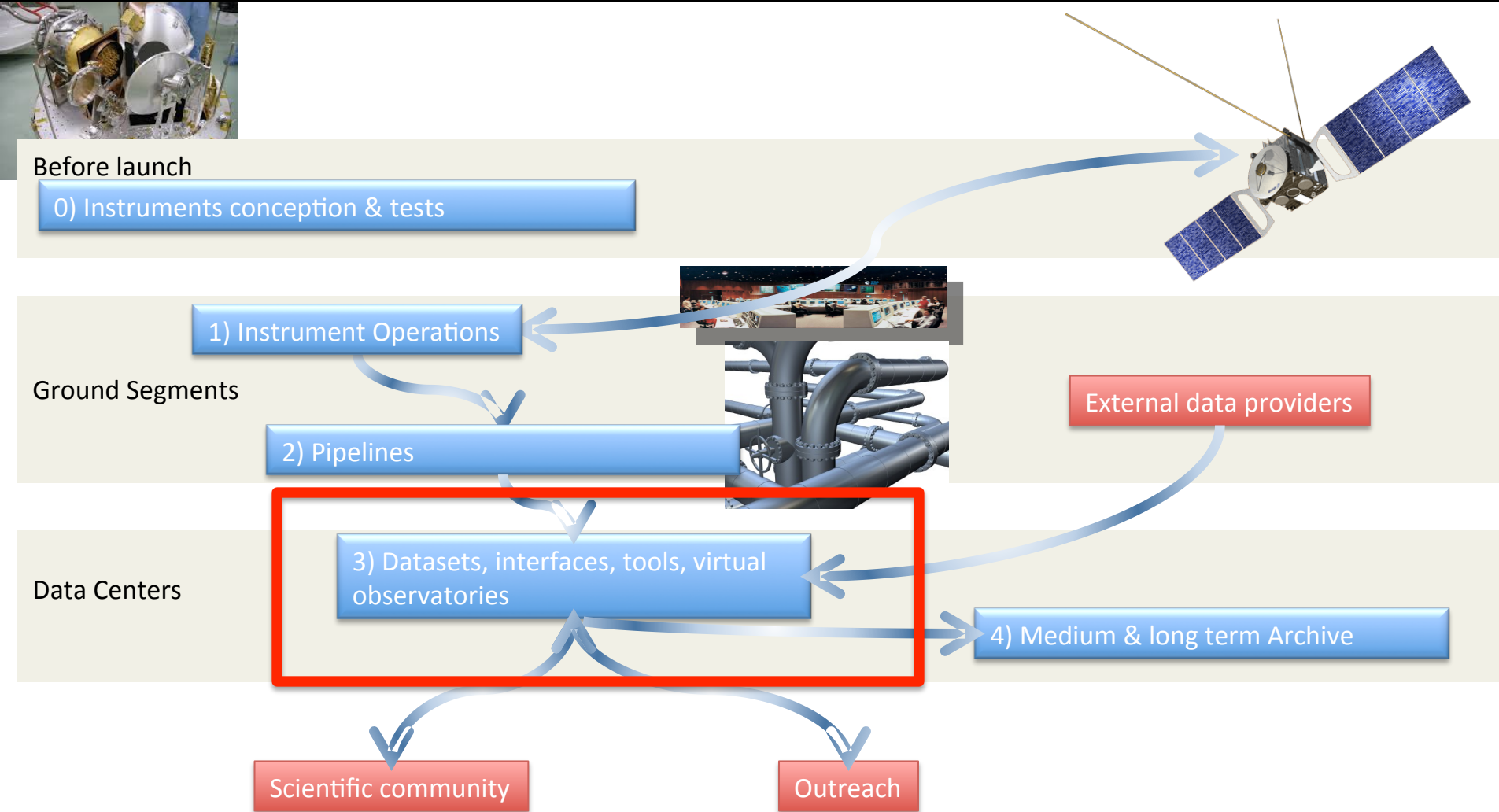
IDOC scientific head: [marian.douspis@ias.u-psud.fr](mailto:marian.douspis@ias.u-psud.fr)

<https://idoc.ias.u-psud.fr>

### Partners :

- Others laboratories French or foreign
- Space agencies : CNES, ESA, NASA, JAXA, CSSAR, FKA,...
- Industry (IT or Space)
- Airbus, Leonardo-Finemeccanica,Thales-Alenia...

## IDOC in the different space mission phases



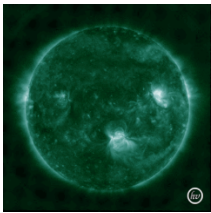
## Space Missions

IDOC Activity fields	Futures Mission	On-going	Past
Before flight			
0) Instrument design & tests	Euclid 0/2,		Rosetta 0/1/2,
Ground Segment			
1) Instrument Operations	JWST 2/3/4,	Mars-express 0/1/2/3/4,	CoRot 2/3/4,
2) Pipelines	Plato 2/3/4,	SoHo 0/1/2/3/4,	Planck 0/1/2/3,
Dataset Management			
3) Dataset interfaces, access and tools	Juice 0/1/2/3,	Stereo 3/4,	Herchel 3/4,
4) Medium and long term archive	Bepi-Colombo 0,	SDO 3/4,	Trace 3/4,
	Solar Orbiter 0/1/2/3/4	Fripon 1/2	Coronas 3/4,
			Picard 3/4,
			Iras 2/3/4



## **Galaxy, INterstellar matter and Cosmology (GINCO)**

<https://idoc.ias.u-psud.fr/ginco>



## **Multi Experiment Data & Operation Center (MEDOC)**

National Center for Space Solar Physics Data

<https://idoc.ias.u-psud.fr/MEDOC>



## **Planetary Operation & Data Center (IPOD) new name : PSUP**

<https://idoc.ias.u-psud.fr/ipod>



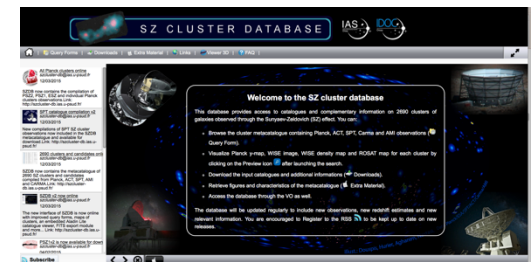
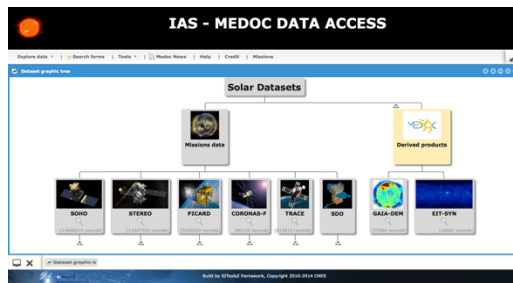
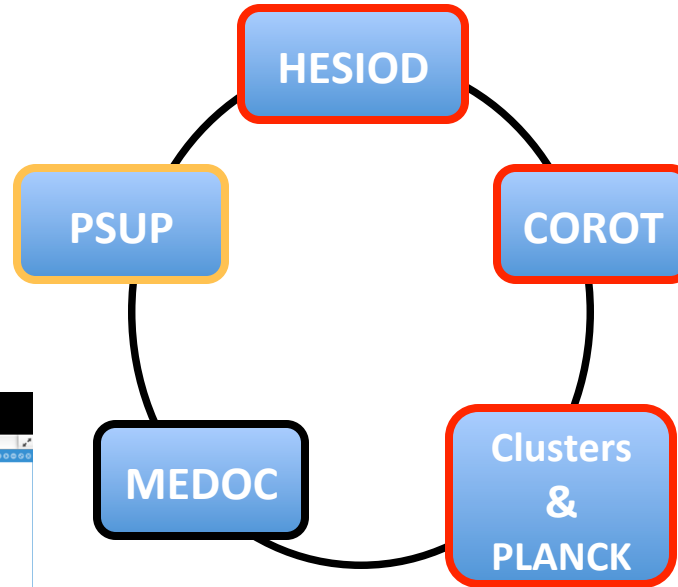
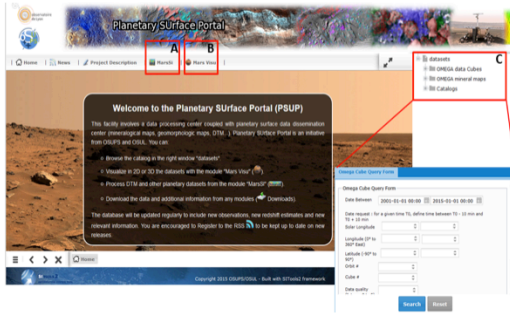
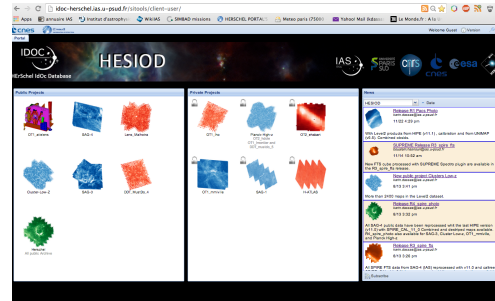
## **Stellar System Data (D2S)**

<https://idoc.ias.u-psud.fr/D2S>

# IDOC Data Interfaces

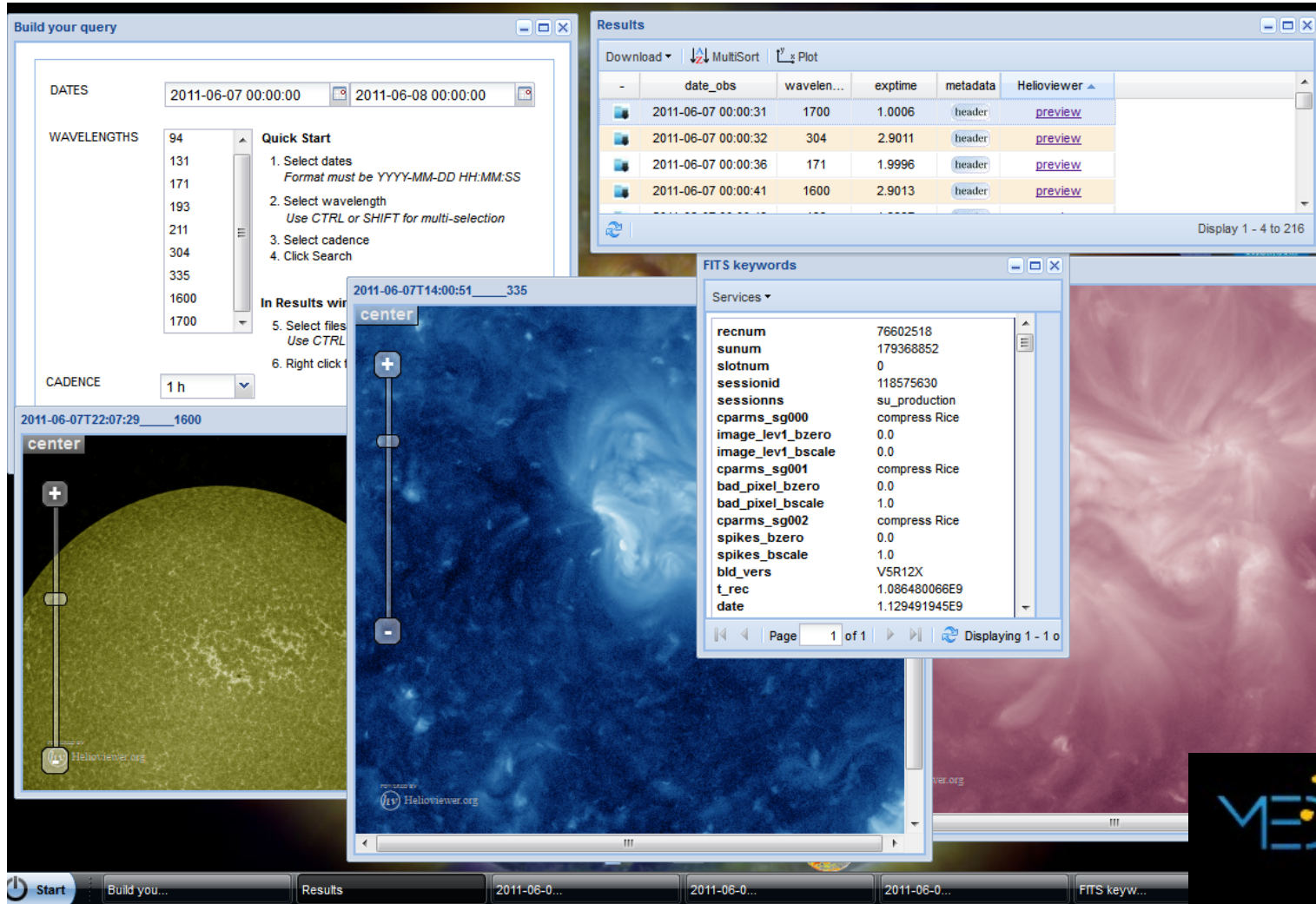
# Data Access and Visualization

<https://github.com/SITools2/SITools2-core/projects>





# Data Access and Vizualisation : <http://medoc-sdo.ias.u-psud.fr>



**Build your query**

DATES: 2011-06-07 00:00:00 to 2011-06-08 00:00:00

WAVELENGTHS: 94, 131, 171, 193, 211, 304, 335, 1600, 1700

Quick Start

1. Select dates  
Format must be YYYY-MM-DD HH:MM:SS
2. Select wavelength  
Use CTRL or SHIFT for multi-selection
3. Select cadence
4. Click Search

In Results window

5. Select files  
Use CTRL
6. Right click

CADENCE: 1 h

2011-06-07T22:07:29 1600

**center**

**Results**

	date_obs	wavelen...	exptime	metadata	Helioviewer
	2011-06-07 00:00:31	1700	1.0006	header	<a href="#">preview</a>
	2011-06-07 00:00:32	304	2.9011	header	<a href="#">preview</a>
	2011-06-07 00:00:36	171	1.9996	header	<a href="#">preview</a>
	2011-06-07 00:00:41	1600	2.9013	header	<a href="#">preview</a>

Display 1 - 4 to 216

**FITS keywords**

```

recnum      76602518
sunum       179368852
slotnum     0
sessionid   118575630
sessionns   su_production
cparams_sg000 compress Rice
image_lev1_bzero 0.0
image_lev1_bscale 0.0
cparams_sg001 compress Rice
bad_pixel_bzero 0.0
bad_pixel_bscale 1.0
cparams_sg002 compress Rice
spikes_bzero 0.0
spikes_bscale 1.0
bld_vers    V5R12X
t_rec       1.086480066E9
date        1.129491945E9
    
```

Page 1 of 1 | Displaying 1 - 1 of 1

Start | Build you... | Results | 2011-06-0... | 2011-06-0... | 2011-06-0... | FITS keyw...



# PSUP 1/3

**Planetary Surface Portal**

Home | News | Project Description | MarsSi | Mars Visu

**A** **B** **C**

### Welcome to the Planetary Surface Portal (PSUP)

This facility involves a data processing center coupled with planetary surface data dissemination center (mineralogical maps, geomorphologic maps, DTM...). Planetary Surface Portal is an initiative from OSUPS and OSUL. You can:

- o Browse the catalog in the right window "datasets"
- o Visualize in 2D or 3D the datasets with the module "Mars Visu" (🌐)
- o Process DTM and other planetary datasets from the module "MarsSI" (📄).
- o Download the data and additional information from any modules (📁 Downloads).

The database will be updated regularly to include new observations, new redshift estimates and new relevant information. You are encouraged to Register to the RSS (📡) to be kept up to date on new releases.

**datasets**

- OMEGA data Cubes
- OMEGA mineral maps
- Catalogs

**Omega Cube Query Form**

Omega Cube Query Form

Date Between: 2001-01-01 00:00 | 2015-01-01 00:00

Date request : for a given time T0, define time between T0 - 10 min and T0 + 10 min

Solar Longitude: [ ] [ ]

Longitude (0° to 360° East): [ ] [ ]

Latitude (-90° to 90°): [ ] [ ]

Orbit #: [ ]

Cube #: [ ]

Data quality: [ ]

Search | Reset

## PSUP 2/3

The screenshot displays the 'Planetary SURface Portal' web application. At the top, there is a navigation bar with links for Home, News, Project Description, MarsSI, and Mars Visu. Below this is a search bar containing 'Olympus Mons'. The main content area features a 3D globe of Mars with a color-coded thermal inertia map overlaid. A left-hand sidebar contains a 'Catalogs' section with several filterable categories, including 'Central peaks hydrated phases between Isidis and Hellas', 'Landing sites', 'Hydrated mineral sites', and 'Valles Marineris low Calcium-Pyroxene'. Below the filters are expandable sections for 'Background Layers', 'Mineral Layers', 'MarsSI Data', and 'Other'. At the bottom right of the globe, there is a legend for 'Mean thermal inertia (J/m<sup>2</sup>/K/s<sup>1/2</sup>)' with a color scale from 0 to 600. The footer of the application includes navigation icons, a 'Home' button, and a copyright notice: 'Copyright 2015 OSUPS/OSUL - Built with SITools2 framework'.

## PSUP 2/3 WMS, WCS, and WFS

Getting georeferenced Images :  
**WMS** requests to the IDOC Mapserver



Background Viking

<http://idoc-wmsmars.ias.u-psud.fr/wmsmap?WIDTH=1500&HEIGHT=750&STYLES=&FORMAT=image/png&TRANSPARENT=false&SERVICE=WMS&REQUEST=GetMap&VERSION=1.1.1&SRS=EPSG:4326&BBOX=0,-90,180,90&LAYERS=Viking>



ALBEDO Layer

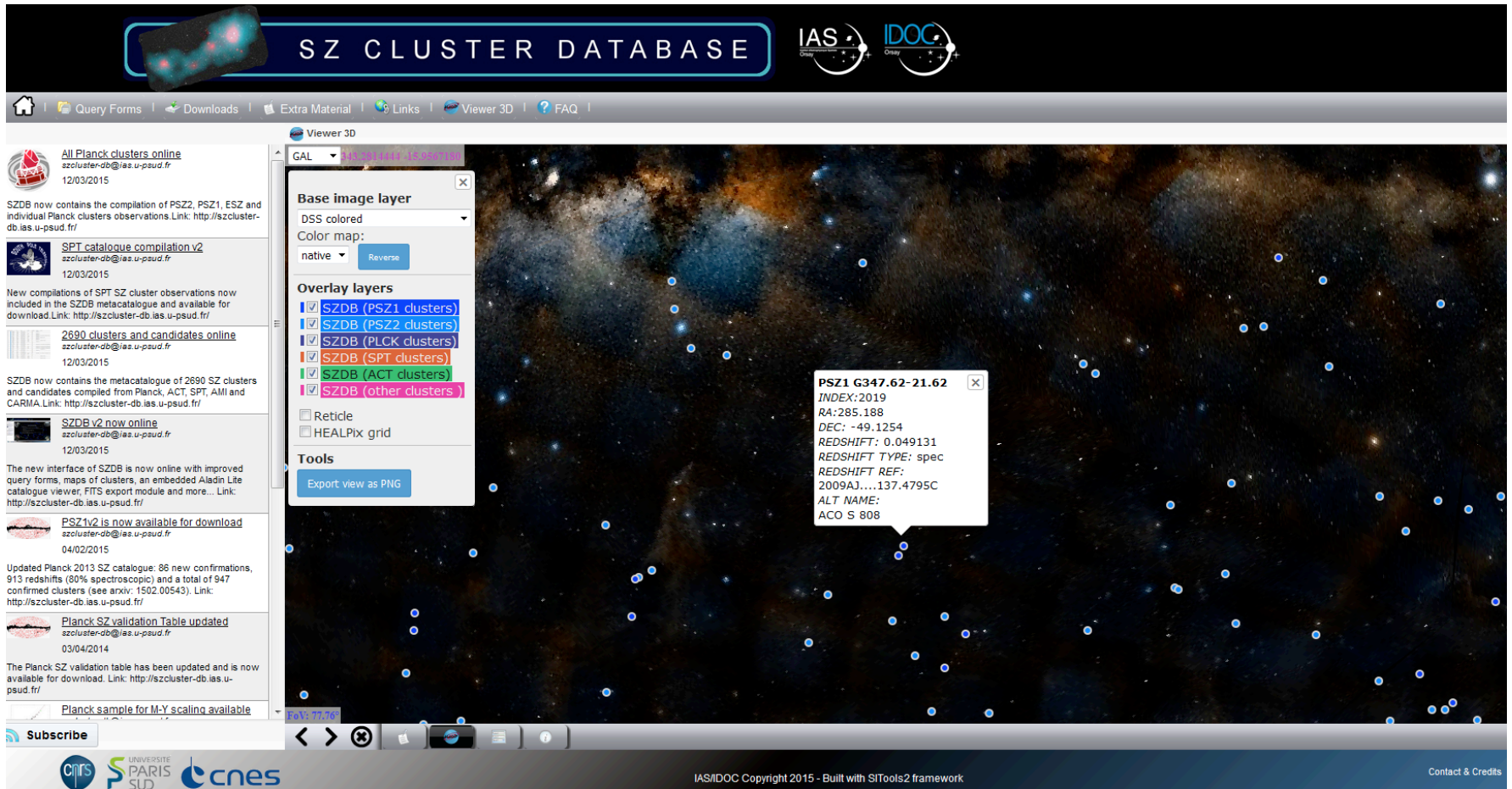
[http://idoc-wmsmars.ias.u-psud.fr/wmsmap?WIDTH=1500&HEIGHT=750&STYLES=&FORMAT=image/png&TRANSPARENT=false&SERVICE=WMS&REQUEST=GetMap&VERSION=1.1.1&SRS=EPSG:4326&BBOX=0,-45,180,45&LAYERS=OMEGA\\_solar\\_albedo](http://idoc-wmsmars.ias.u-psud.fr/wmsmap?WIDTH=1500&HEIGHT=750&STYLES=&FORMAT=image/png&TRANSPARENT=false&SERVICE=WMS&REQUEST=GetMap&VERSION=1.1.1&SRS=EPSG:4326&BBOX=0,-45,180,45&LAYERS=OMEGA_solar_albedo)

Getting coverage :  
**WCS** requests to the IDOC Mapserver

Getting Footprints and metadata (geojson):  
**WFS** requests to the MArSI Geoserver



# Planck – SZ cluster database



**SZ CLUSTER DATABASE**

IAS | IDOC

Home | Query Forms | Downloads | Extra Material | Links | Viewer 3D | FAQ

Viewer 3D

GAL: **Planck - PSZ1**

**Base image layer**

DSS colored  
Color map: native

**Overlay layers**

- SZDB (PSZ1 clusters)
- SZDB (PSZ2 clusters)
- SZDB (PLCK clusters)
- SZDB (SPT clusters)
- SZDB (ACT clusters)
- SZDB (other clusters)

Reticle  
 HEALPix grid

**Tools**

**PSZ1 G347.62-21.62**

INDEX: 2019  
RA: 285.188  
DEC: -49.1254  
REDSHIFT: 0.049131  
REDSHIFT TYPE: spec  
REDSHIFT REF: 2009AJ....137.4795C  
ALT NAME:  
ACO S 808

Subscribe

UNIVERSITE PARIS SUD | CNRS | CNES

IAS/IDOC Copyright 2015 - Built with SITools2 framework

Contact & Credits

# Planck – SZ cluster database

Home
Query Forms
Downloads
Extra Material
Links
Viewer 3D
FAQ

**All Planck clusters online**  
szcluster-db@ias.u-psud.fr  
12/03/2015

SZDB now contains the compilation of PSZ2, PSZ1, ESZ and individual Planck clusters observations. Link: <http://szcluster-db.ias.u-psud.fr/>

**SPT catalogue compilation v2**  
szcluster-db@ias.u-psud.fr  
12/03/2015

New compilations of SPT SZ cluster observations now included in the SZDB metacatalogue and available for download. Link: <http://szcluster-db.ias.u-psud.fr/>

**2690 clusters and candidates online**  
szcluster-db@ias.u-psud.fr  
12/03/2015

SZDB now contains the metacatalogue of 2690 SZ clusters and candidates compiled from Planck, ACT, SPT, AMI and CARMA. Link: <http://szcluster-db.ias.u-psud.fr/>

**SZDB v2 now online**  
szcluster-db@ias.u-psud.fr  
12/03/2015

The new interface of SZDB is now online with improved query forms, maps of clusters, an embedded Aladin Lite catalogue viewer, FITS export module and more... Link: <http://szcluster-db.ias.u-psud.fr/>

[Subscribe](#)

Preview

**PSZ2 G062.94+43.69**

Index	1840
RA	247.156
DEC	39.5602
Redshift	0.0299
Redshift type	spec
Redshift ref.	2011A&A...534A.109P
Alt. Name	RXC J1628.6+3932 ACO 2199 RMJ162838.2+393304.5 PSZ1 G062.94+43.69
VO Link	

◀ ▶ 🔍 📄 🌐 📄 ⓘ 📄

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Contact & Credits

21/10/2016

IVOA meeting Trieste 2016

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# Herschel – HESIOD <http://idoc-herschel.ias.u-psud.fr/>

cnes 
Welcome Guest [Version](#) [Login](#)

## HESIOD

### Public Projects

#### Main Public Project

**Herschel**  
All public  
Archive

#### Other Public Projects

OT1\_atielsens

Cluster-Low-Z

Lens\_Maihotra

SAG-3

SAG-4

DDT\_MustDo\_4

### Private Projects

OT2\_ehabart

OT1\_lho

OT1\_mmmville

SAG-1

H-ATLAS

Planck-High-z  
OT2\_hdoie

### News

**HESIOD** ▼ Date

**Release R6 PACS SPECTRO**  
*christophe.cossou@ias.u-psud.fr*  
6/24 3:21 pm

pac\_cal\_72\_0\_hipe\_v14.0.1 Level 2 products available. For each type of data file, here are the products it represents and a short description: Cube [HPS3DRR\_HPS3DBI\_Spectroscopy 3d cube context RebinnedCube [HPS3DRR\_HPS3DBI\_Spectroscopy rebinned 3d cube context ProjectedCube [HPS3DRR, H...

**Release R3 PACS Photo**  
*christophe.cossou@ias.u-psud.fr*  
5/3 9:24 am

With Level 2 products from HIPE (v14.0), calibration PACS\_CAL\_72\_ and UNIMAP (now directly included in HIPE).

**Release R7 spire photo**  
*christophe.cossou@ias.u-psud.fr*  
5/3 9:20 am

All SAG-4 public data have been reprocessed with the last HIPE version (v14.0) with SPIRE\_CAL\_14\_2 Combined and extended map available. R7 spire\_photo also available for SAG-3\_clusters\_lowz, DDT\_mustdo\_4, KEG1\_cwis001, OT1\_mmmville, OT2\_hdoie, DDT\_mustdo\_4, GT1\_baltieri, lens\_maihotra, OT1\_lm...

**Release FTS R6 spire fts**  
*karin.dassas@ias.u-psud.fr*  
4/25 3:34 pm

All SPIRE FTS data from SAG-4 (IAS and LAM) and OT1\_atielsens reprocessed with hipe v14 and calfree SPIRE\_CAL\_14\_2 Naive nearest and gridding cube projections available. Supreme Data are also available for all ineses products.

**PACS Photometer PSF available**  
*karin.dassas@ias.u-psud.fr*  
3/29 8:21 pm

[Subscribe](#)

# Herschel - HESIOD

The screenshot displays the HESIOD web interface. On the left, a table lists data levels for various instruments. The 'Spire 2.5' level is highlighted. A 'preview' window shows a grayscale image of a galaxy with a red 3D visualization overlaid. Below the preview, a table shows data for two rows, with the first row highlighted.

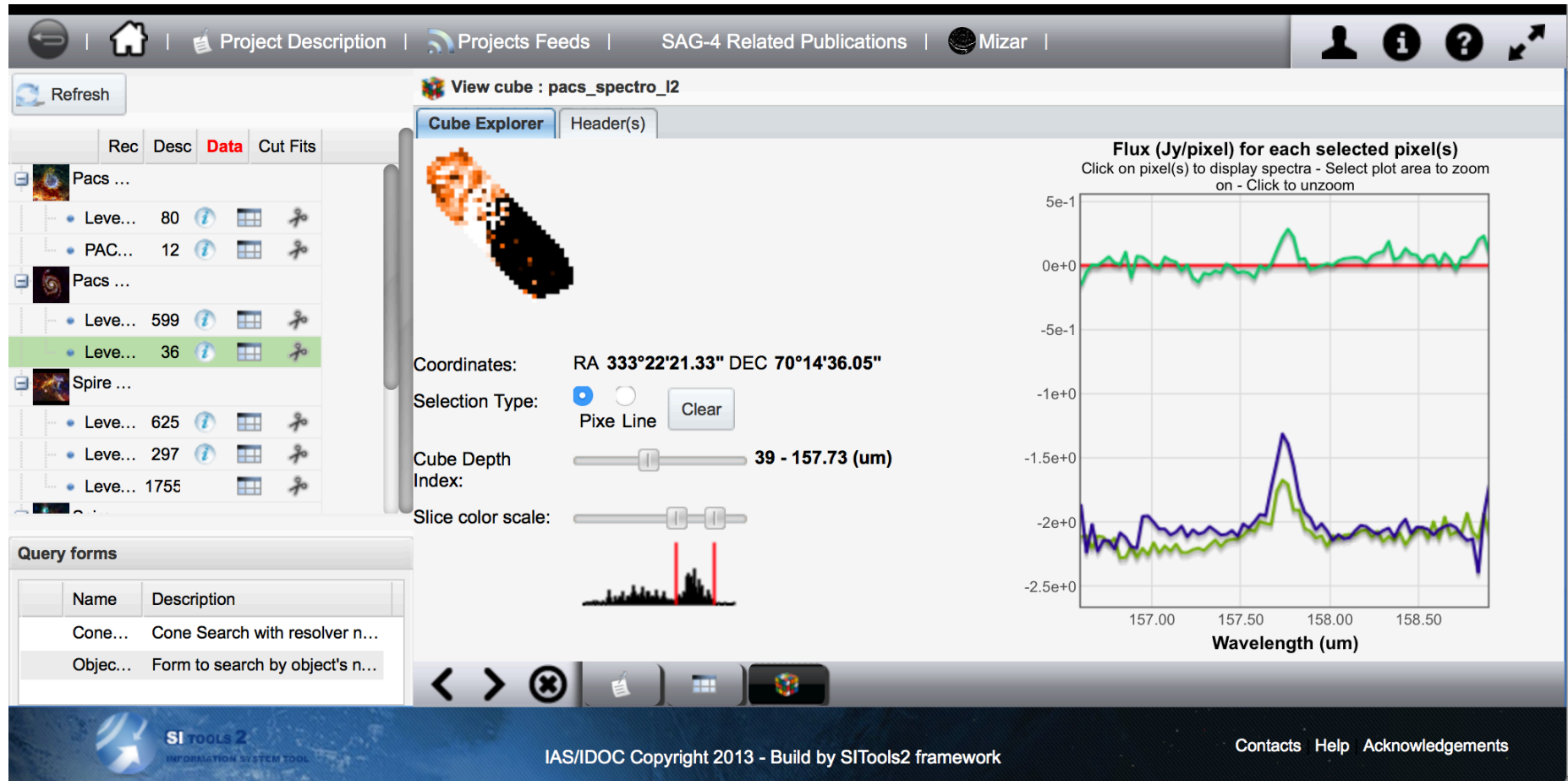
Instrument	Level	Rec	Desc	Data	Cut Fits
Pacs Photometer	Level 1	72			
	Level 2	82			
Pacs Spectrometer	Level 1	599			
	Level 2	28			
Spire Photometer	Level 1	86			
	Level 2	426			
Spire 2.5	Level 2.5	284			
	Level 1	2466			
Spire FTS	Level 1	2466			
	Level 2	666			
Previous Releases					

8.84	Header	S3	SAG-3	HIPE	500.0	11.0.2934	R4_spire_p
46.6	Header	S3	SAG-3	HIPE	250.0	11.0.2934	R4_spire_p



## Herschel – HESIOD – Cube Explorer



The interface displays a spectral cube view of a source. The main panel shows a 2D spectral cube with a color scale from red to black. A zoomed-in plot on the right shows the flux in Jy/pixel versus wavelength in micrometers (um). The plot features a prominent emission line at approximately 177.5 um, with a flux of about -1.5 Jy/pixel. The y-axis ranges from -2.5e+0 to 5e-1, and the x-axis ranges from 157.00 to 158.50 um.

Coordinates: RA 333°22'21.33" DEC 70°14'36.05"

Selection Type:  Pixe Line  Clear

Cube Depth Index:  39 - 157.73 (um)

Slice color scale:

Flux (Jy/pixel) for each selected pixel(s)  
Click on pixel(s) to display spectra - Select plot area to zoom on - Click to unzoom

Wavelength (um)

Query forms

Name	Description
Cone...	Cone Search with resolver n...
Objec...	Form to search by object's n...

SI TOOLS 2 INFORMATION SYSTEM TOOL

IAS/IDOC Copyright 2013 - Build by SITools2 framework

Contacts Help Acknowledgements

To be improved : data size management, genericity, robustness...

# Herschel - HESIOD

**Background layer**

- HIPS Herschel
- HESIOD VO
- Dataset Herschel**
  - Spire\_photo\_I25  
Opacity: 100%
  - Spire Catalog
- Other
- Coordinate systems

**Images**

- Spire\_photo\_I25
- Orion\_B-S-1\_ExtEmGainsApplied\_destri...

**Overlapped observations:**

- OrionB-S-1 PLW map
- OrionB-S-1 PMW map
- OrionB-S-1 PSW map**
- OrionB-S-1 PLW map
- OrionB-S-1 PMW map
- OrionB-S-1 PSW map
- OrionB-S-1 PLW map

<i>description:</i>	PSW map
<i>buildversion:</i>	12.0.2603
<i>program:</i>	SAG-3
<i>identifier:</i>	Orion_B-S-1_E...
<i>ra:</i>	86.05235
<i>object:</i>	OrionB-S-1
<i>filesize:</i>	2.019312E8
<i>dec:</i>	-1.7549866

**Metadata**

<i>description:</i>	PSW map
<i>buildversion:</i>	12.0.2603
<i>program:</i>	SAG-3
<i>identifier:</i>	Orion_B-S-1_ExtE...
<i>ra:</i>	86.05235
<i>object:</i>	OrionB-S-1
<i>filesize:</i>	2.019312E8
<i>dec:</i>	-1.7549866

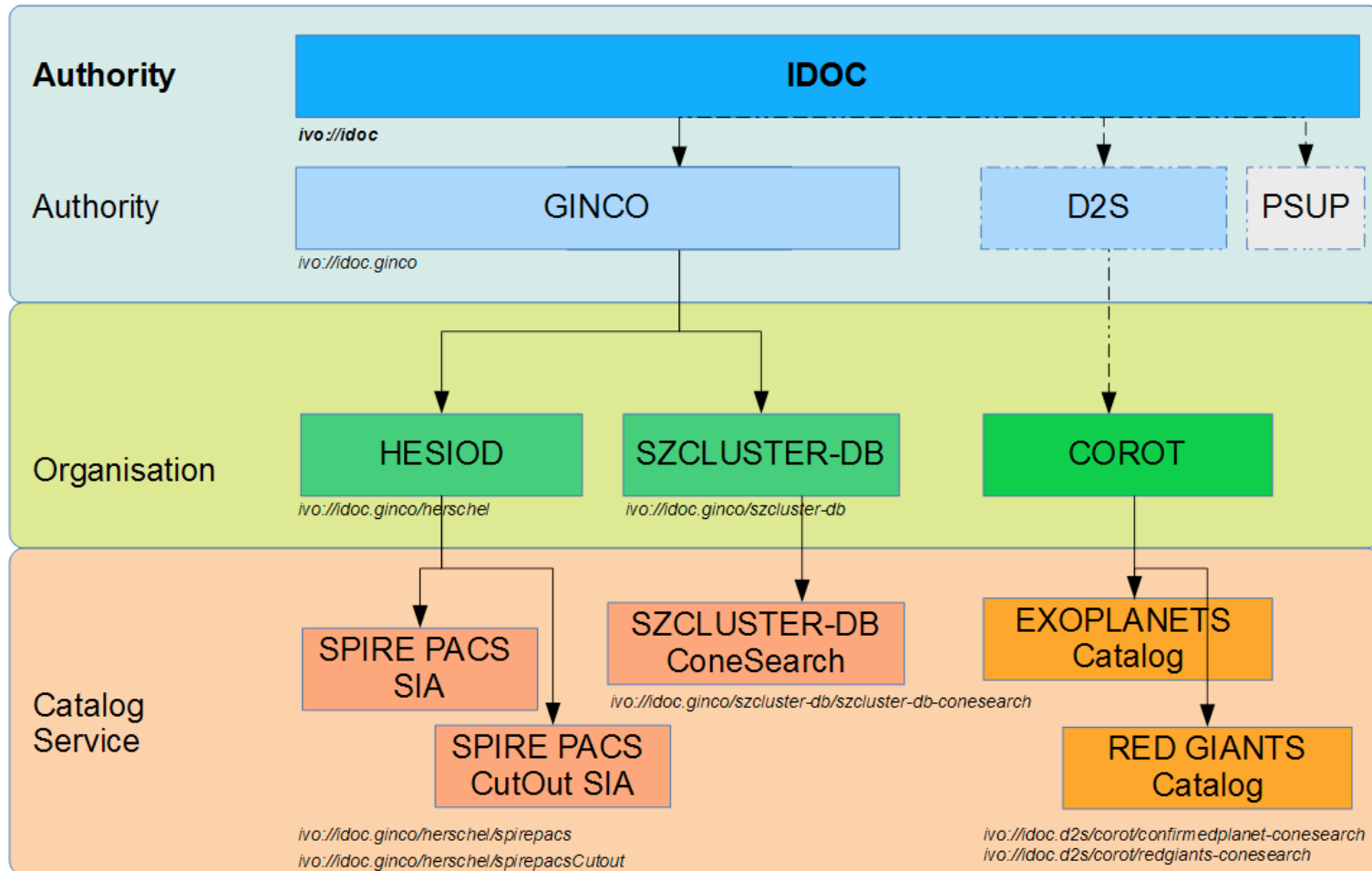
5h 37m 15.34s x +1° 42' 54.12"

DSS background from IAS  
The most brightest stars coming from CDS VizieR catalogue  
HIPS Herschel from IAS  
Hips Spire Planck Fields background from IAS

## IDOC VO registered services summary

### IDOC Virtual Observatory (euro-vo)

IVOA identifier



# MAGYC : Multi wAvelength GalXY Clusters

Job Manager Results

### Job launcher

Search a given region of the sky for Galaxy Clusters in optical galaxy surveys.  
Coordinate system is decimal Equatorial (J2000 ICRS).

Supported surveys :  
SDSS DR12

Right Ascension  
RA (degrees)

Declination  
DEC (degrees)

Search radius  
RADIUS (arcminutes)

OR

Upload a list of coordinates   
Choose File no file selected

OCA

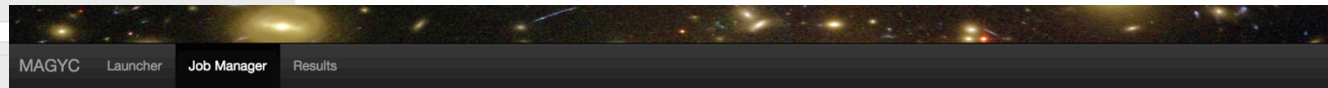
C.Benoist, C.Ordenovic, E.Slezak

IAS

M.Douspis, A.Beelen, H. Balans, F. Lefebvre

CDS

T.Boch, P.Fernique, A.Schaaff



## Jobs Manager

Refresh  Do not refresh

Search:

RA	DEC	RADIUS	Survey	Type	Created	Started	Elapsed	Remove	Phase	Action
197.87	-1.33	5	SDSS	wazp	20/10/2016 18:36:24	20/10/2016 18:36:24	4m 23s	Remove	Download	Results
197.87	-1.33	5	SDSS	dummy	20/10/2016 18:36:11	20/10/2016 18:36:11	15s	Remove	Download	N/A
197.87	-1.33	5	SDSS	hproj	20/10/2016 18:36:11	20/10/2016 18:36:12	31s	Remove	Download	Preview
197.87	-1.33	5	SDSS	catalogs	20/10/2016 18:36:08	20/10/2016 18:36:08	16s	Remove	Download	Properties
197.87	-1.33	5	SDSS	images	20/10/2016 18:36:08	20/10/2016 18:36:08	1m 28s	Remove	Download	Preview
247.15	39.5602	5	SDSS	wazp	20/10/2016 15:26:05	20/10/2016 15:26:06	4m 27s	Remove	Download	Results
247.15	39.5602	5	SDSS	hproj	20/10/2016 15:25:56	20/10/2016 15:25:56	36s	Remove	Download	Preview
247.15	39.5602	5	SDSS	dummy	20/10/2016 15:25:54	n/a	n/a	Remove	PENDING	

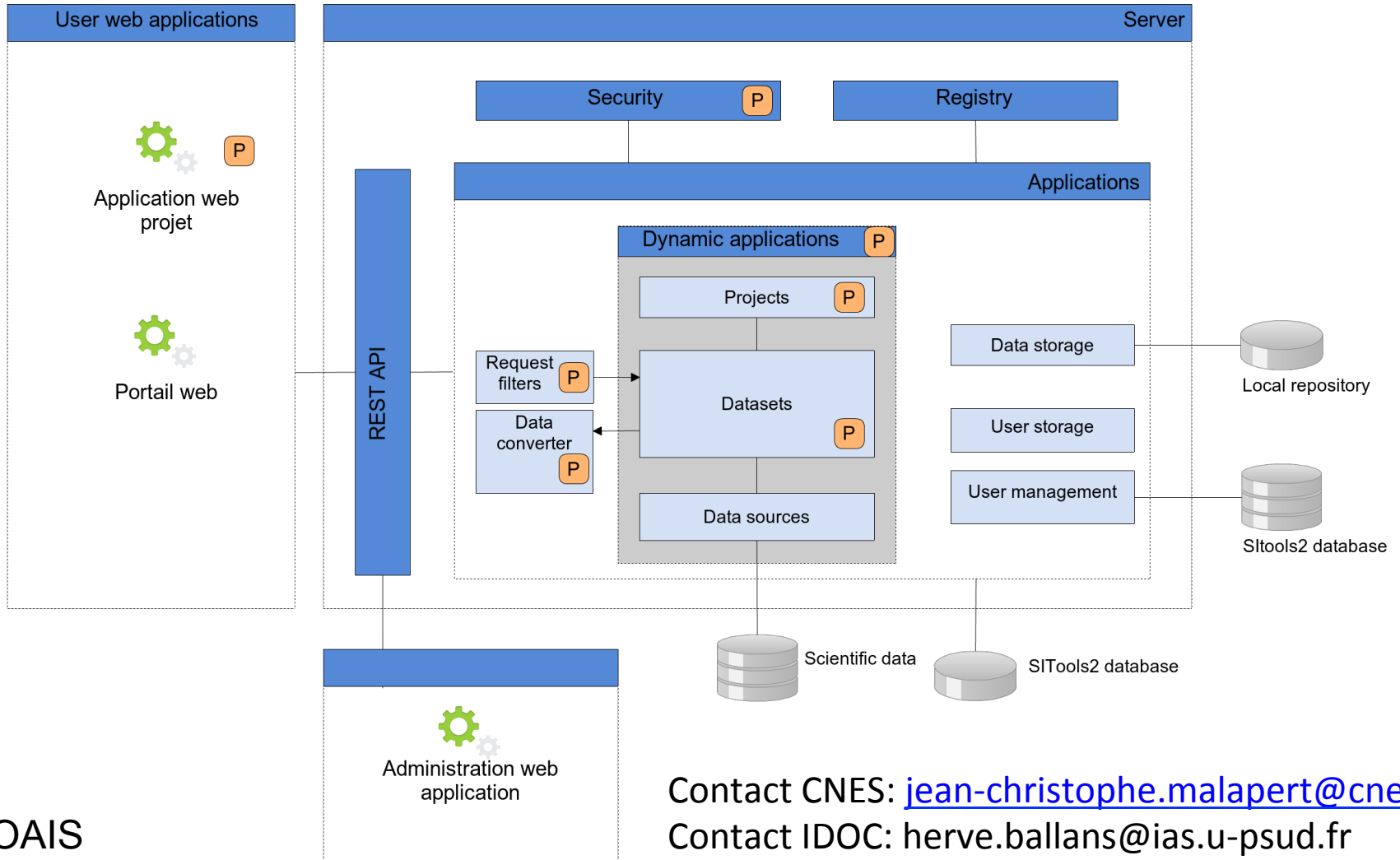
2 UWS servers  
(Library Gregory Mantelet CDS  
UWS 1.0)

SkyView, SkyServer  
Aladin Lite

Wazp at OCA  
Hproj at IAS

# Tools behind

## SItools 2



OAIS

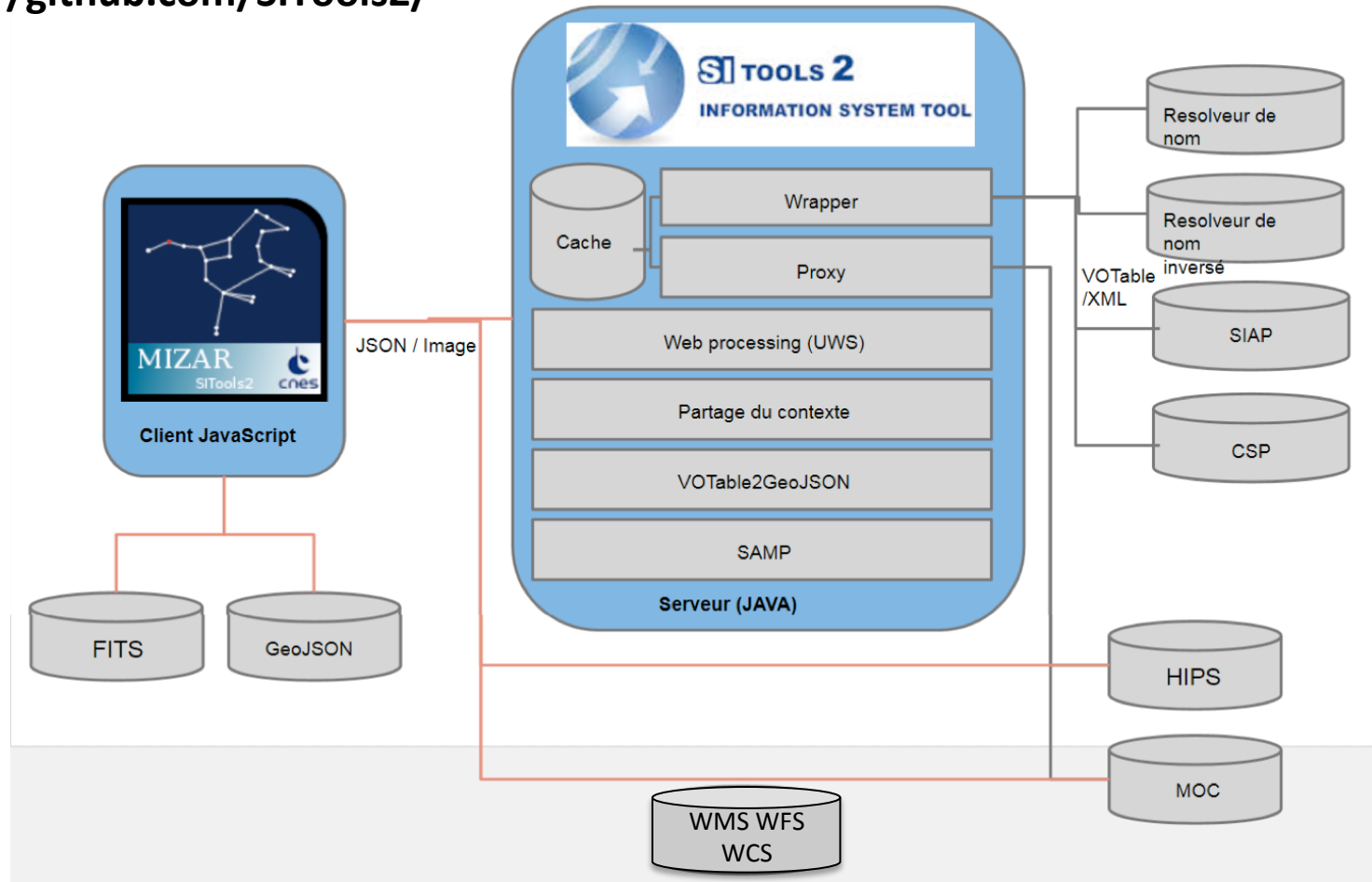
Contact CNES: [jean-christophe.malapert@cnes.fr](mailto:jean-christophe.malapert@cnes.fr)

Contact IDOC: [herve.ballans@ias.u-psud.fr](mailto:herve.ballans@ias.u-psud.fr)

<https://github.com/SITools2/>

## SItools 2

<https://github.com/SITools2/>



## Coming next : Regard

### Needs

OAIS main  
functions

OAIS data  
preservation

Software  
multitenancy

Interoperability :  
OGC & IVOA

Modular OAIS  
functions  
& adaptable

Scalability

SSO

Development kit

### Solutions

Microservice  
architecture

Each microservice  
Is adaptable :  
plugins

REST API

ElasticSearch

### Targets

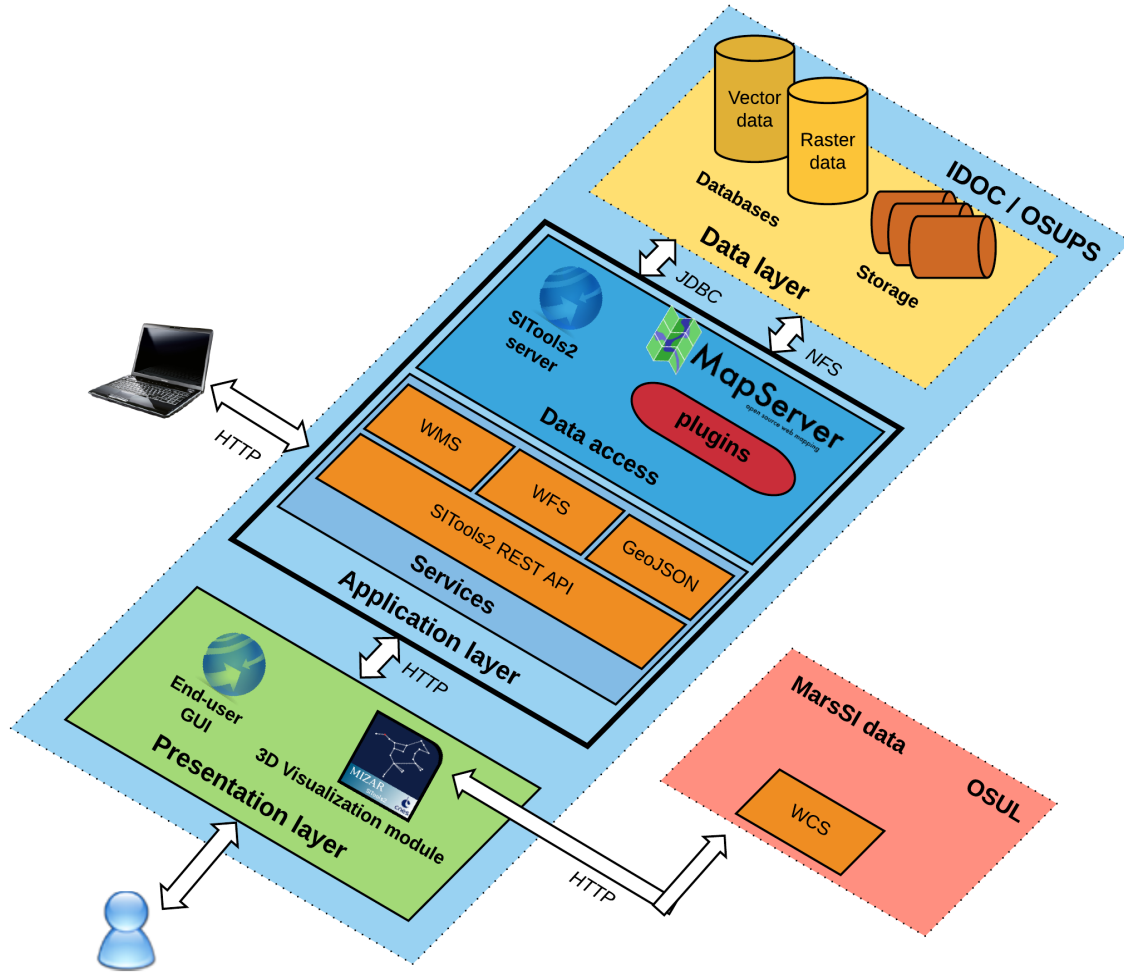
About 20 projects in different fields : astronomy, solar system, oceanography, ISS experiences, ...



## Conclusion

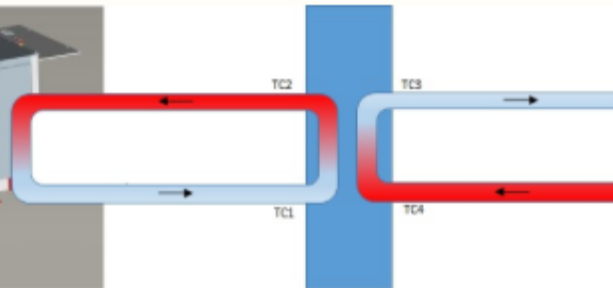
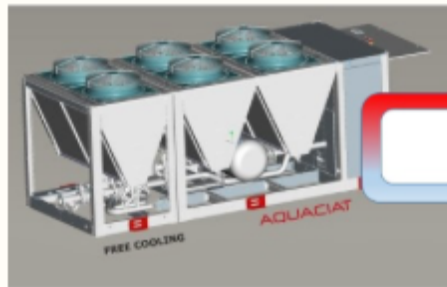
- Plan to publish new data into the VO (for current and next missions)
- TAP and EPN-TAP for the planetary portal
- UWS
- PROV
- New interfaces with Regard (end 2017)

Thank you for your attention !



## Labex P2IO « Vallée » computer room

- Shared by 8 laboratories (LAL, IPN, CSNSM...)
- Project realization : 2013
- Joint developments of competencies networks
- Governance documents
- Phase II (x2) already started : goal 2017
- 500 physical servers, 8000 cores, 5 PO of data.

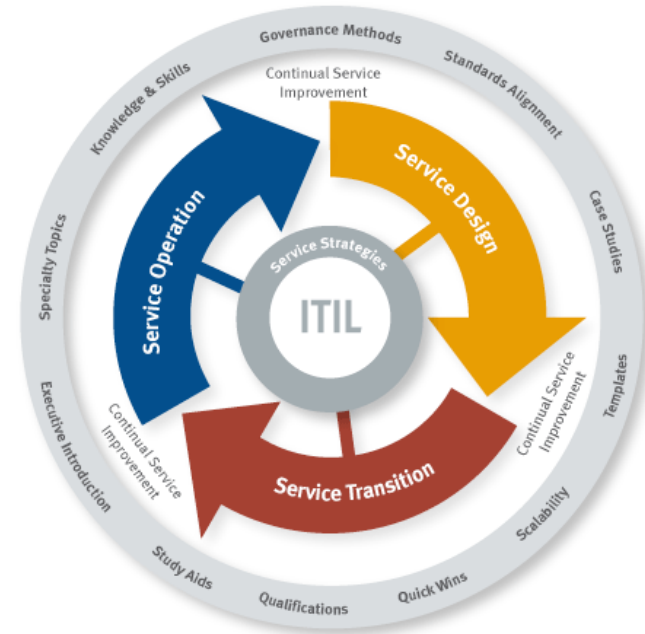


Budget : 1<sup>st</sup> phase 1M€  
2 more planned phases  
ROI : 3 years

Computer room  
sharing (green IT)

## Formalization

- OAIS : Open Archival Information System
- ITIL : Information Technology Infrastructure Library ( « best practices » )
- Label DSA : Data Seal of Approval



21/10/2016



IVOA meeting Trieste 2016



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