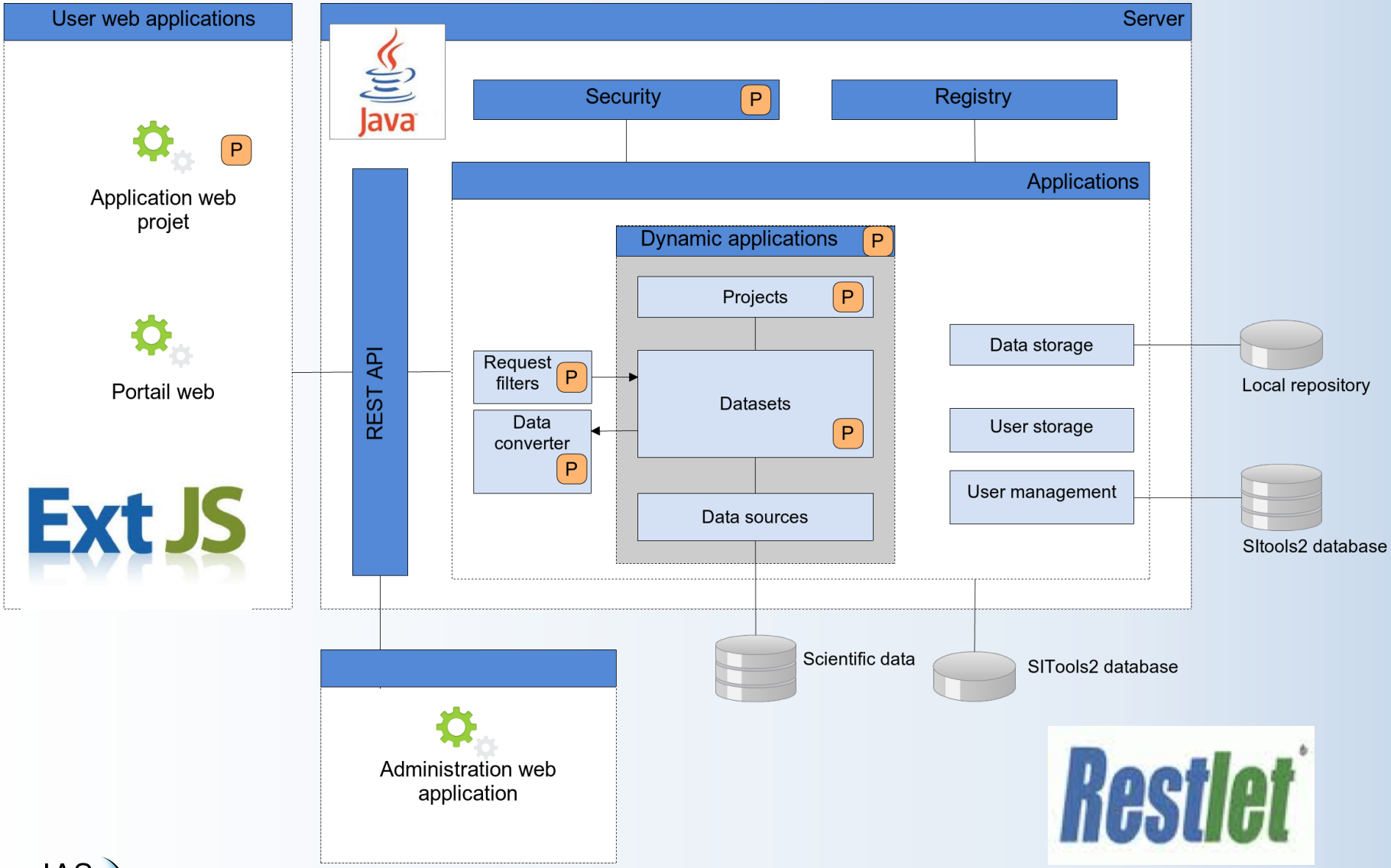
SITools2 as VO service provider: an example with Herschel at IDOC (Integrated Data and Operation Center)

SITools 2

- SITools2 is a CNES generic tool performed by a joint effort between CNES and scientific laboratories.
- It offers common services through an “easy-to-use” open source web platform.
- The aim of SITools is to provide a self-manageable data access layer deployed on already existing scientific laboratory databases.
- http://sitools2.sourceforge.net/
- https://github.com/SITools2
- Contact: jean-christophe.malapert@cnes.fr

SITools2 General Architecture



Herschel in a nutshell

- **Herschel** was the fourth cornerstone mission in the European Space Agency science programme. It has performed photometry and spectroscopy in the far infrared and submillimetre part of the spectrum, covering approximately the **55-672 µm** range.

- **Objectives**: the formation of stars and galaxies, and the interrelation between the two, the physics of the interstellar medium, astrochemistry, and solar system studies.

- Two cameras and two medium resolution spectrometers (**PACS** and **SPIR**E) and a very high resolution heterodyne spectrometer (HIFI)

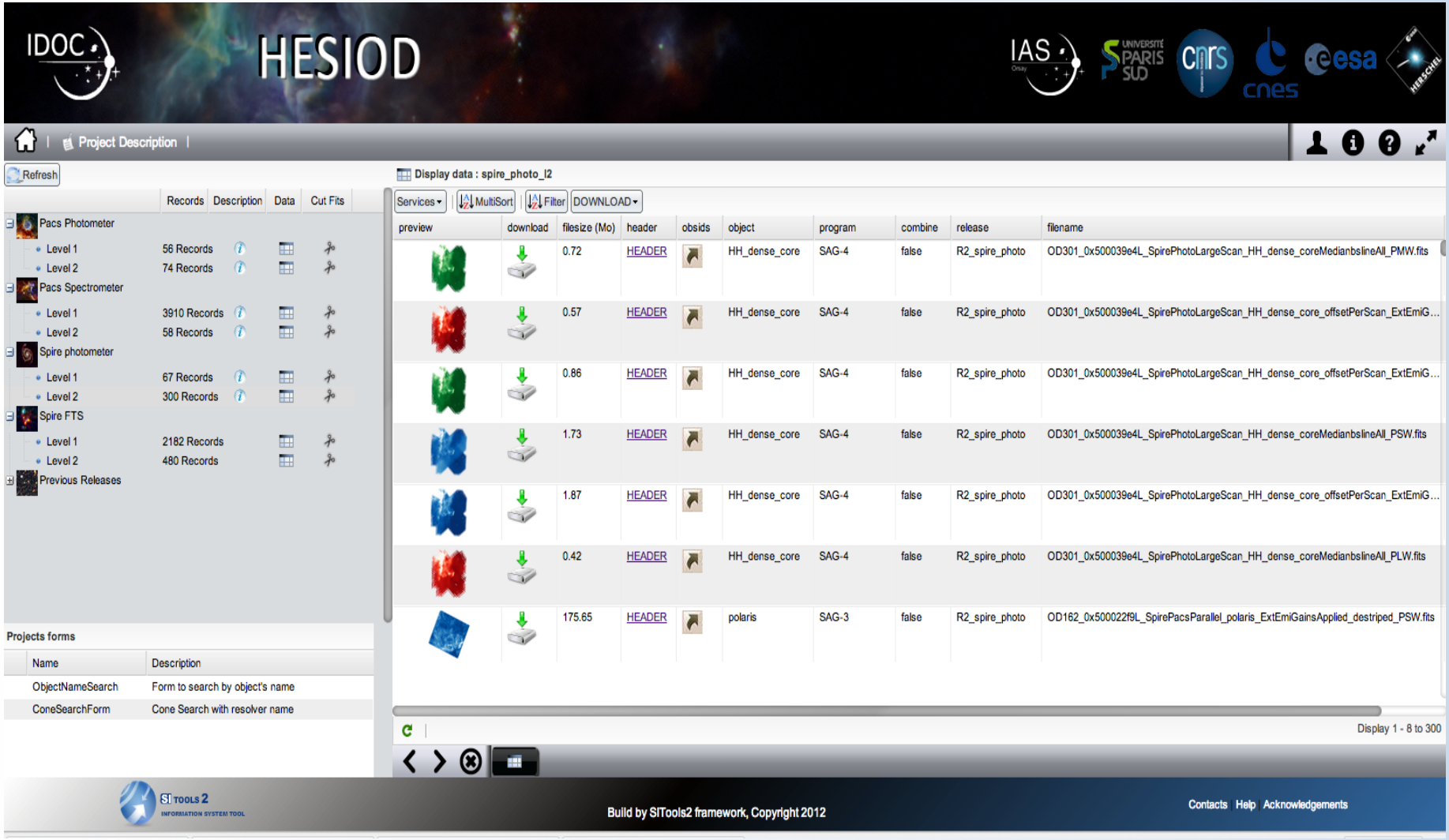
- It was launched in mai 2009, and run out of helium in april 2013.

HESIOD (HErSchel IdOc Database) Portal

IDOC = Integrated Data and Operation Center

http://idoc-herschel.ias.u-psud.fr/sitools/client-user/

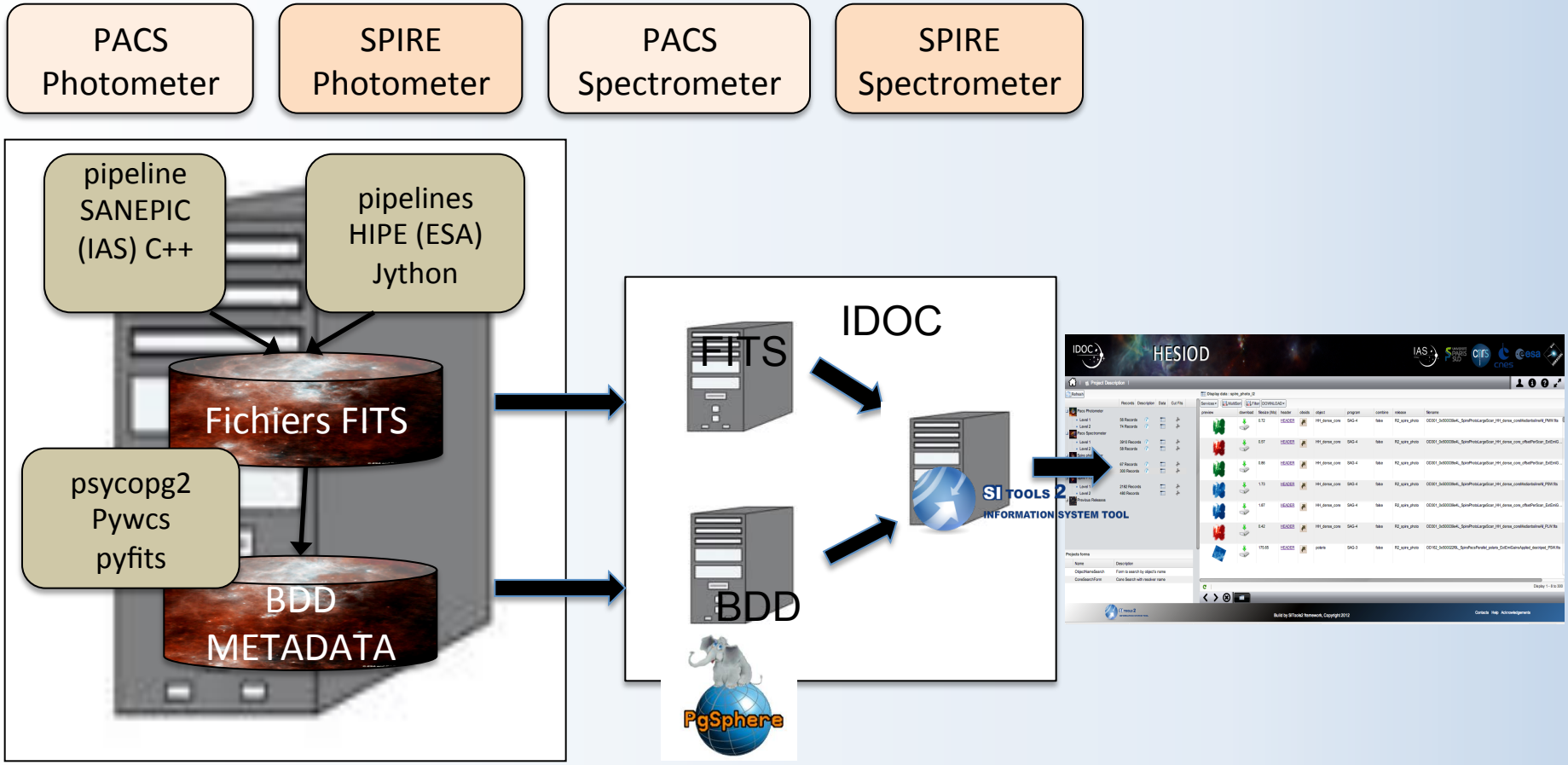
Interstellar medium guaranteed time key project (SAG-4) in HESIOD



Interstellar medium guaranteed time key project (SAG-4) from HESIOD in VO

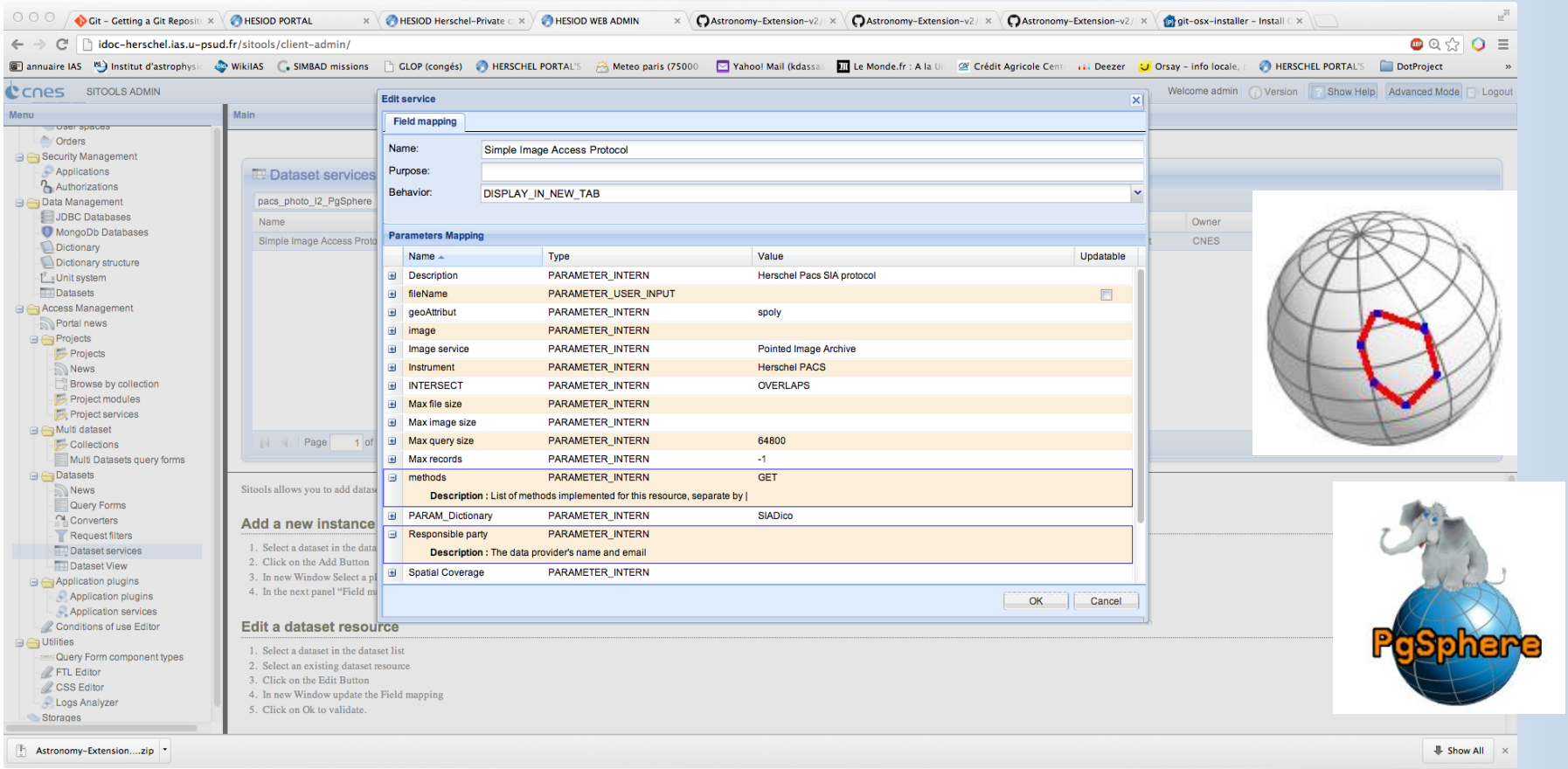
- Level 2 and L2.5 PACS (60 or 100 170) and SPIRE (250, 350, 500 micrometers) Public Maps
- Reprocessed at IAS with the latest ESA pipeline (last release only) and with home made pipeline (SANEPIC)

HESIOD General Architecture



SITools2 SIAP Module

http://idoc-herschel.ias.u-psud.fr/ds/pub/spirephotol2/services/sia?
http://voparis-validator.obspm.fr



SITools2 SIA Module – dataset columns

Edit dataset

Dataset information | Properties | Select tables | Select fields | **Fields setup** | Criteria | View Configuration

Create | Edit | Delete | Action

SQL definition	Table name	Table alias	Column alias	Format	Unit	Label	Width	Sortal
filesize	pacs_photo…		filesize			filesize	100	
release	pacs_photo…		release			release	100	
last	pacs_photo…		last			last	100	
spoly	pacs_photo…		spoly			spoly	100	
'http://idoc-herschel....			download			download	100	
'2'			naxes			naxes	100	
naxis1||' '||naxis2			naxis			naxis	100	
crpix1||' '||crpix2			crpix			crpix	100	
crval1||' '||crval2			crval			crval	100	
cdelt1||' '||cdelt2			scale			cdelt	100	
cdelt1||' '||crota2||' '||...			cdmatrix			cdmatrix	100	
'ICRS'			coordref			coordref	100	
'TAN'			projection			projection	100	
'image/fits'			format			format	100	
'Herschel PACS'			insid			insid	100	
'SAG-4'			observingpr…			observingpr…	100	

OK | Cancel

SITools2 SIA Module – dictionnary

SI TOOLS 2
INFORMATION SYSTEM TOOL

Dataset's semantic / dictionary mapping

SIADico | Default dictionary | Save | Delete

Dataset's columns

Column alias
z
filesize_bytes
filesize
release
last
spoly
download
naxes
naxis
crpix
crval
scale

Dictionary's concepts

Name	Description	ID	ucd	utype	ref	datatype	width	precision
Title	Short description of the image		VOX:Image_Title	Observ…	Acces…	char		
RA	ICRS right-ascension of the center of the image		POS_EQ_RA_MAIN			double		
DEC	ICRS declination of the center of the image		POS_EQ_DEC_MAIN			double		
NAXES	Number of image axes		VOX:Image_Naxes			int		
NAXIS	Array value giving the length in pixels of each ima…		VOX:Image_Naxis			int		
Scale	Array value giving the scale in degrees per pixel …		VOX:Image_Scale			double		
Format	MIME-type of the object associated with the imag…		VOX:Image_Format			char		
AccessRef	URL to be used to access or retrieve the image		VOX:Image_AccessReference			char		
InstID	Instrument or instruments used to make the obser…		INST_ID			char		
JulianDate	Mean modified Julian date of the observation		VOX:Image_MJDateObs			double		
CoordRefFrame	Coordinate system reference frame, selected fro…		VOX:STC_CoordRefFrame			char		

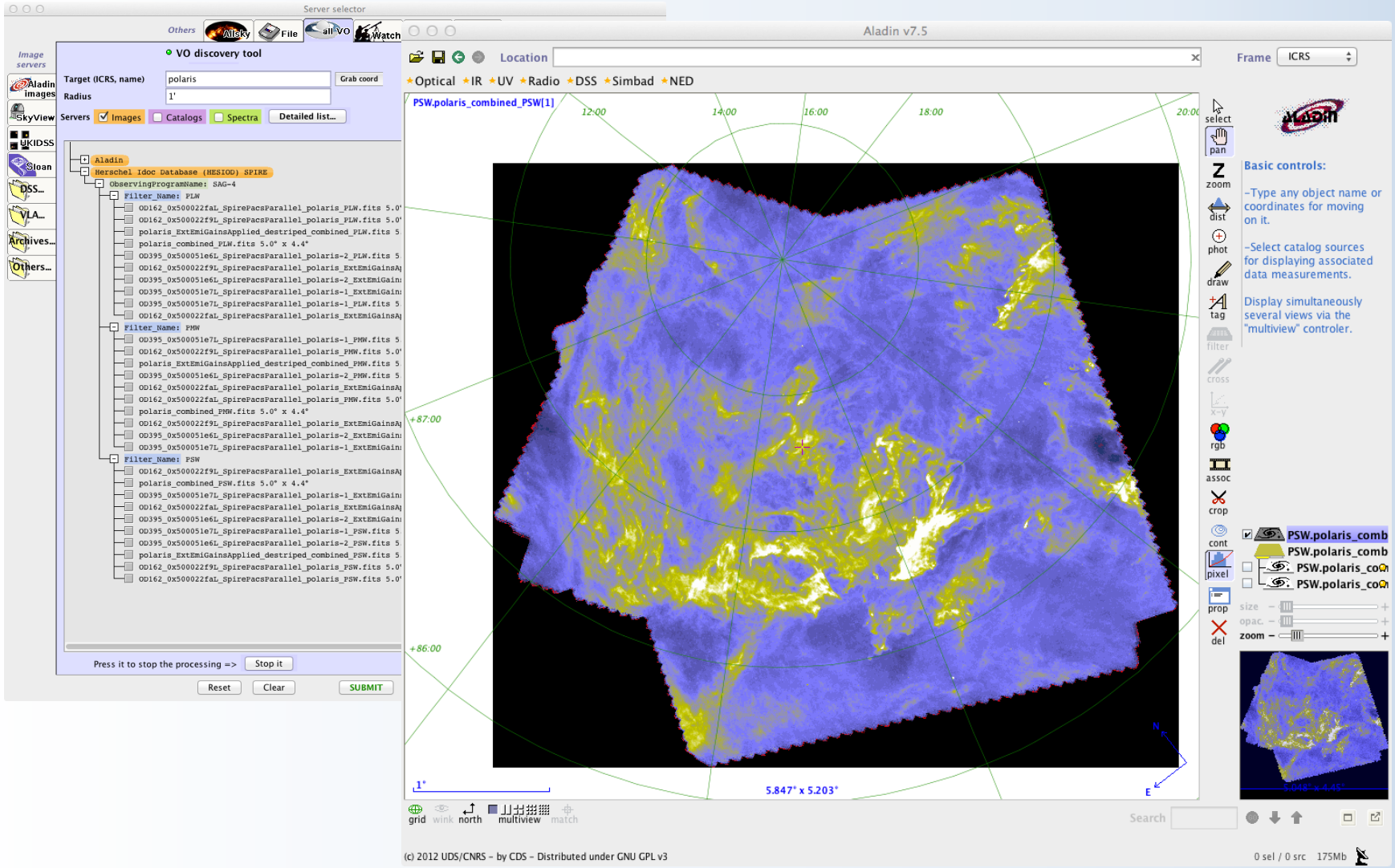
Mapping column/concept

Map | Unmap

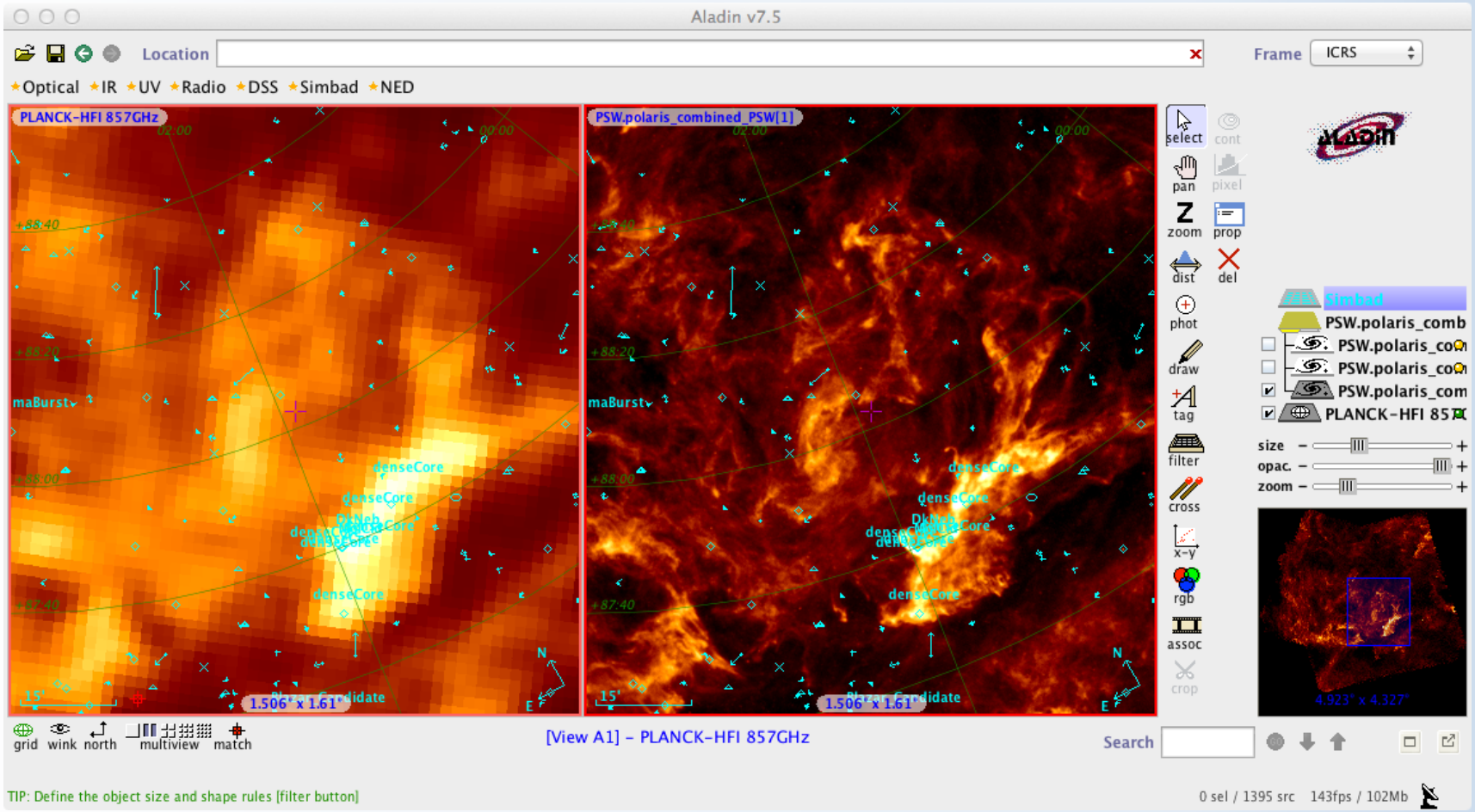
Name	Description	ID	ucd	utype	ref	datatype	width	precision	unit	type	xtype	arraysize
ImageFile…	Actual or estimated size of the encoded image in bytes (not pixels!)		VOX:Image_FileSize			int						
Column alias: format (1 Item)												
Format	MIME-type of the object associated with the image acref		VOX:Image_Format			char						*
Column alias: insid (1 Item)												
InstID	Instrument or instruments used to make the observation		INST_ID			char						*
Column alias: naxes (1 Item)												
NAXES	Number of image axes		VOX:Image_Naxes			int						
Column alias: naxis (1 Item)												
NAXIS	Array value giving the length in pixels of each image axis		VOX:Image_Naxis			int						*
Column alias: observingprogramname (1 Item)												

Save and Close | Close

HESIOD through Aladin



HESIOD through Aladin



VO Issues or questions

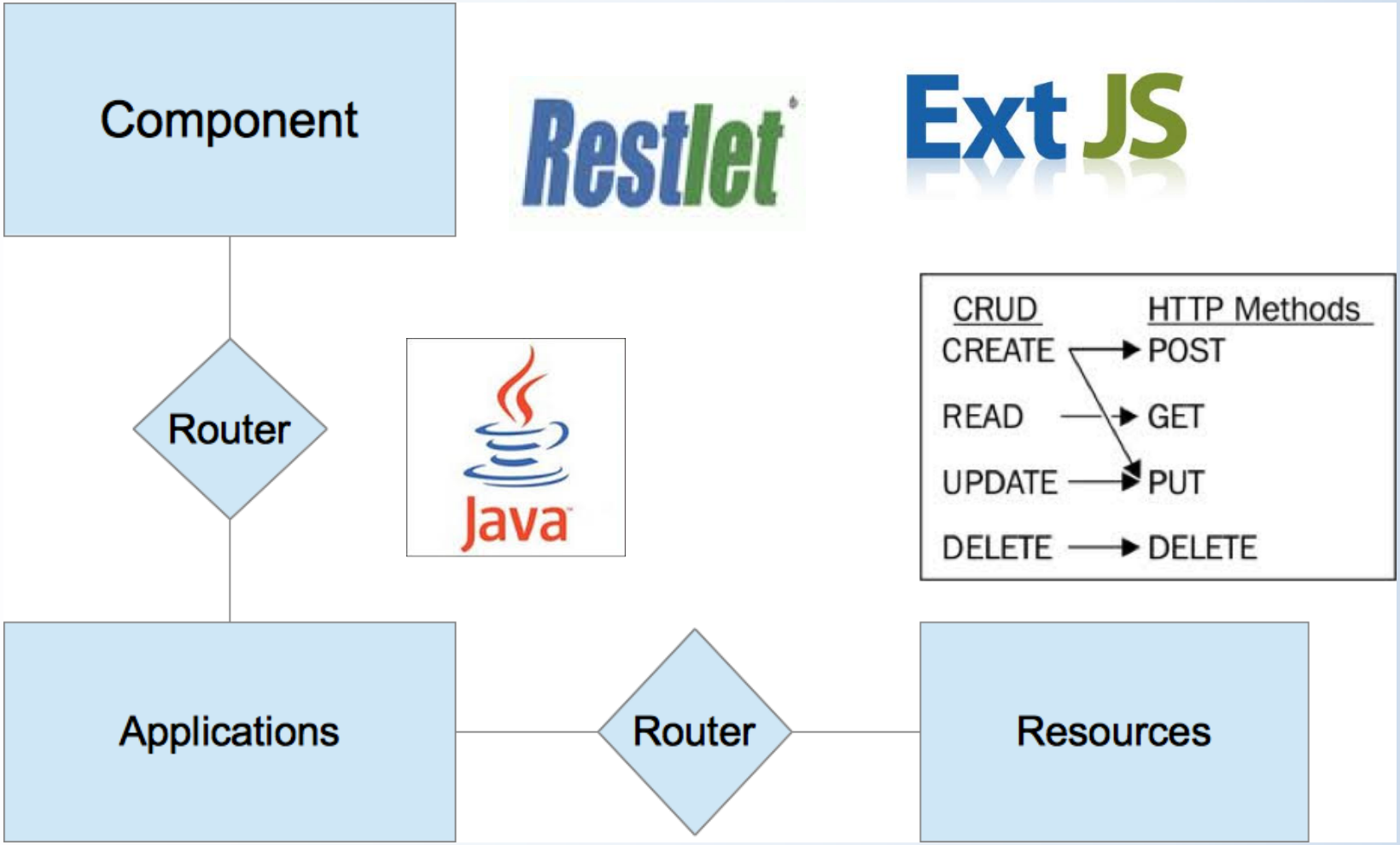
- Registration was not so straightforward
- Not always easy to know which fields to fill in to display information in Aladin (for instance sortorder in the votable)
- Communication between euroVO and VAO?

To be done

- Extension of SIAP to other HESIOD programs
- Cutfits
- SSAP (cubes?)
- Stats on Data usage (distinction from VO and from direct access)

ANNEXES

SITools2 General Architecture: REST



SITools2 SIA Module spoly

```
def calculateSpoly(filepath=""):
        hdulist=pyfits.open(filepath)
        try:
                Image = hdulist['Image']
                wcs = pywcs.WCS(Image.header)
                hdr1=hdulist[1].header
        except:
                try:
                        ###### for SCANAMORPHOS fits files
                        Image=hdulist['PrimaryImage']
                        PrimaryHeader=hdulist['Primary'].header
                        wcs = pywcs.WCS(PrimaryHeader)
                        hdr1=Image.header
                        print wcs
                        print hdr1
                except KeyError:
                        print "EE - No 'Image' extension in "+os.path.basename(inputImage)
                        return 2
        poly1=wcs.wcs_pix2sky([[0.5,0.5]],0)
        print poly1
        poly2=wcs.wcs_pix2sky([[0.5+hdr1['NAXIS1'],0.5]],0)
        print poly2
        poly3=wcs.wcs_pix2sky([[0.5+hdr1['NAXIS1'],0.5+hdr1['NAXIS2']]],0)
        print poly3
        poly4=wcs.wcs_pix2sky([[0.5,0.5+hdr1['NAXIS2']]],0)
        print poly4
         poly1="("+str(poly1[0,0])+"d,"+str(poly1[0,1])+"d)"
        poly2="("+str(poly2[0,0])+"d,"+str(poly2[0,1])+"d)"
        poly3="("+str(poly3[0,0])+"d,"+str(poly3[0,1])+"d)"
        poly4="("+str(poly4[0,0])+"d,"+str(poly4[0,1])+"d)"
        poly="{"+poly4+","+poly3+","+poly2+","+poly1+"}"
        #poly="("+poly1+","+poly3+")"
        return poly
```

SIA EuroVO registry

VO Integrated Data Operation Center [IDOC] [XML | EDIT | CLONE]

IVOA identifier: ivo://idoc [Authority]

This naming authority is the root of the naming of the resources from IDOC

Published by: IDOC on the 2013-01-25T09:21:30Z and last updated on the 2013-01-25T10:31:24Z

GINCO: Galaxy, INterstellar matter and Cosmology [GINCO] [XML | EDIT | CLONE]

IVOA identifier: ivo://idoc.ginco [Authority]

GINCO is a center for expertise for several space, balloon and ground mission. It has an important role in data processing, distribution and interpretation, for several astronomy missions at long wavelength. In this matter, GINCO : develops and maintains high level analysis pipelines develops and maintains data archives & access develops, maintains and distribute high level software for data analysis offers scientific expertise for mission using long wavelength detectors plays an important role in education and outreach to the general public

Published by: IDOC on the 2013-01-25T09:21:30Z and last updated on the 2013-01-25T14:21:11Z

HErSchel IdOc Database (HESIOD) [HESIOD] [XML | EDIT | CLONE]

IVOA identifier: ivo://idoc.ginco/herschel [Organisation]

HErSchel IdOc Database (HESIOD)

Published by: IDOC GINCO on the 2013-01-25T11:01:53Z and last updated on the 2013-03-29T10:57:43Z

SIA EuroVO registry

Herschel Idoc Database (HESIOD) SPIRE [HESIOD] [CHECK | XML | EDIT | CLONE]

IVOA identifier: ivo://idoc.ginco/herschel/spire [CatalogService] [SimpleImageAccess]

All data for the Herschel SPIRE guaranted time program on Interstellar Medium (SAG-4) and other public data processed at IDOC. All data have been reprocessed at IDOC using advanded reprocessing pipeline.

Published by: IDOC GINCO on the 2013-01-25T14:53:47Z and last updated on the 2013-04-03T07:23:07Z

Herschel Idoc Database (HESIOD) PACS [HESIOD] [CHECK | XML | EDIT | CLONE]

IVOA identifier: ivo://idoc.ginco/herschel/pacs [CatalogService] [SimpleImageAccess]

All data for the Herschel SPIRE guaranted time program on Interstellar Medium (SAG-4) and other public data processed at IDOC. All data have been reprocessed at IDOC using advanded reprocessing pipeline.

Published by: IDOC GINCO on the 2013-04-02T11:59:44Z and last updated on the 2013-04-03T07:23:39Z

http://idoc-herschel.ias.u-psud.fr/ds/pub/spirephotol2/services/sia?

Herschel Portal: what's new

- New processing (PACSMAN for spectro, scanamorphos for PACS Photo)
- VO compatible for Simple Image Access Protocol
- Log Stats on downloaded data
- New ergonomy
- Multidataset search

Herschel Portal: and always…

- Easy search and download
- CutFits available for Level2 Photometry
- Latest and Previous Releases available