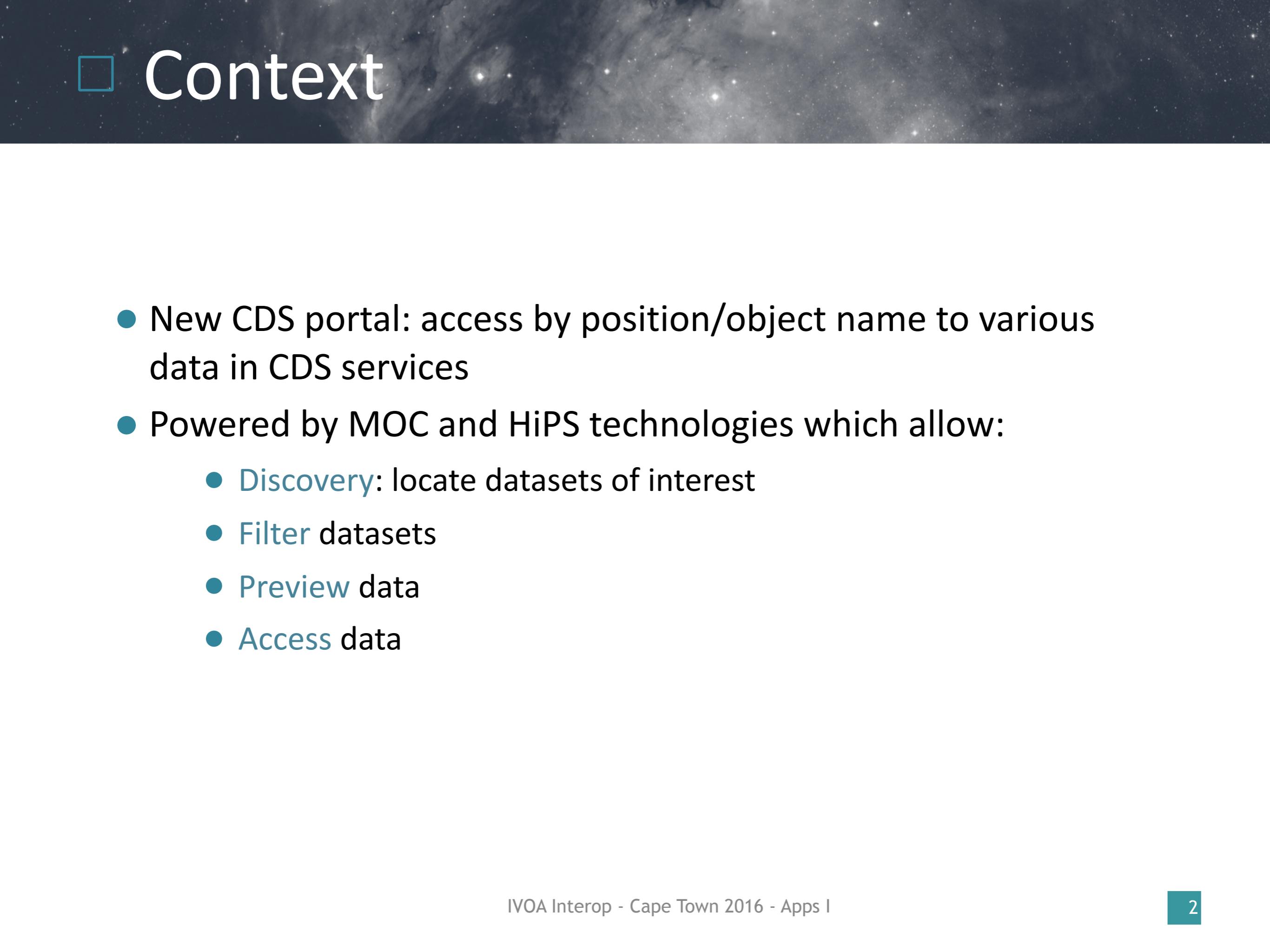


# The new CDS Portal, powered by HiPS and MOC

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& the CDS Team



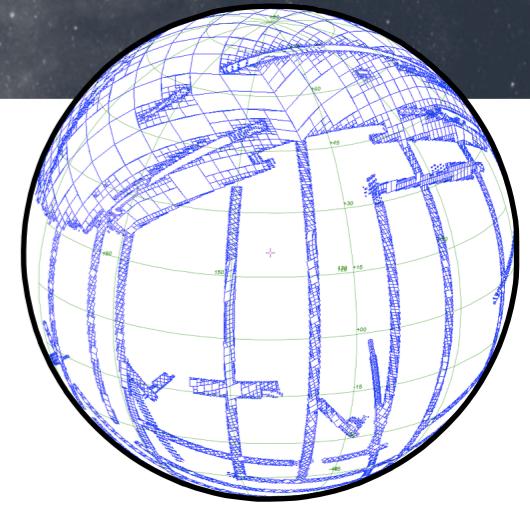
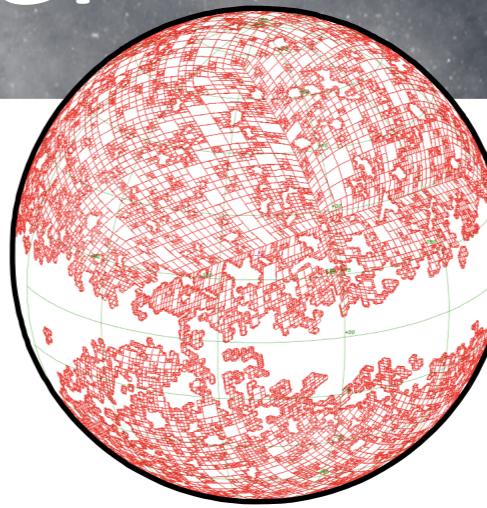


# □ Context

- New CDS portal: access by position/object name to various data in CDS services
- Powered by MOC and HiPS technologies which allow:
  - [Discovery](#): locate datasets of interest
  - [Filter](#) datasets
  - [Preview](#) data
  - [Access](#) data

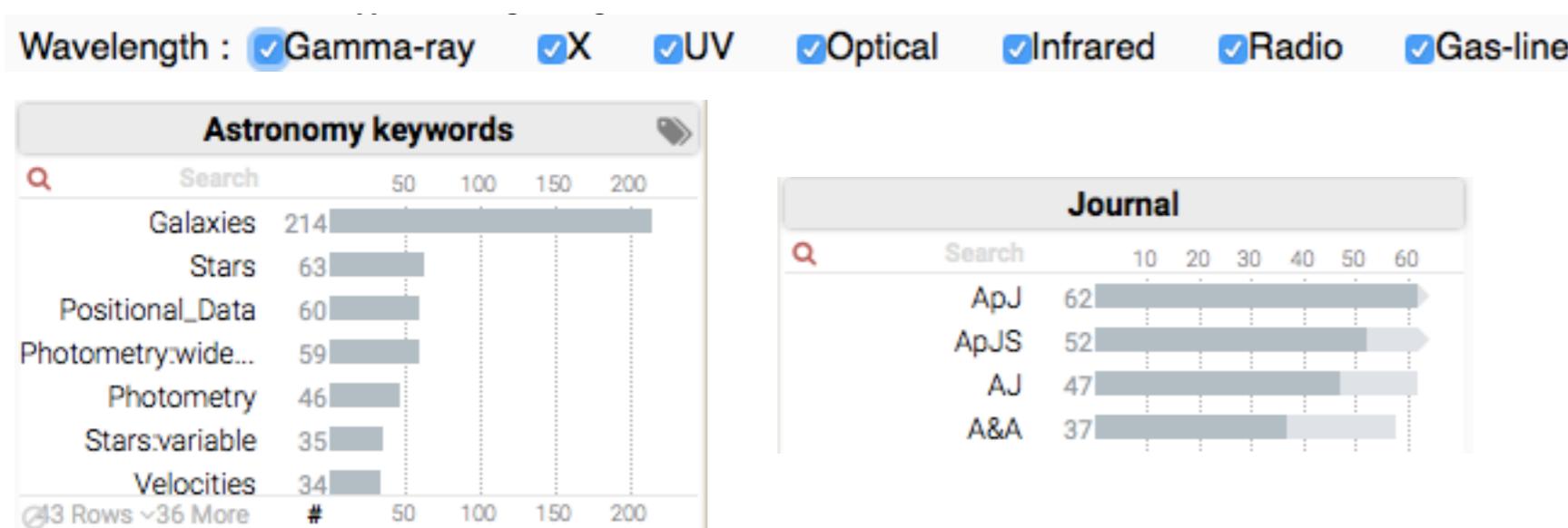
# □ MOC and MOCSERVER

- MOC
  - IVOA standard to describe a dataset coverage
  - allows for fast comparison of coverages
  - based on HEALPix tessellation
- MOCSERVER
  - collection of 15,000 MOCs for:
    - all image HiPS published by CDS & partners (ESAC, JAXA, IRAP, etc)
    - all VizieR tables with positions (1.7 arcmin resolution)
    - Simbad
  - queriable by cone, polygon, MOC
  - give me resources available in this region



# □ MOCServer

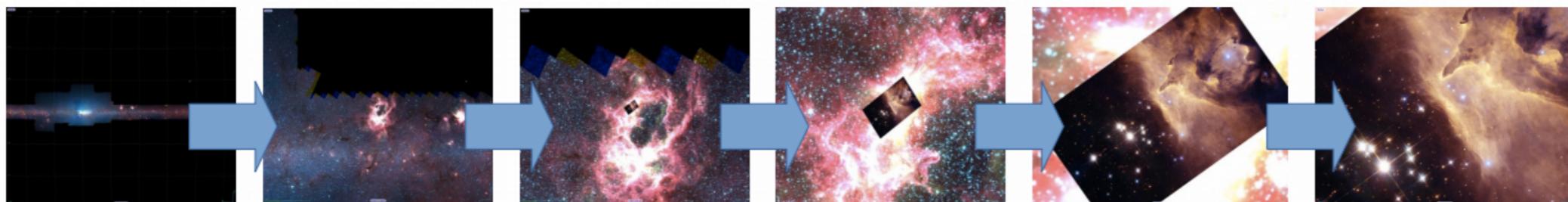
- spatial indexation
  - which data collections are available in this sky region?
    - eg: image HiPS in a 5 degrees cone around M31  
[alasky.unistra.fr/MocServer/query?  
RA=10.68&DEC=41.273&SR=1&dataproduct\\_type=image&get=record](http://alasky.unistra.fr/MocServer/query?RA=10.68&DEC=41.273&SR=1&dataproduct_type=image&get=record)
    - fast: spatial query <100ms
    - metadata provider



## □ HiPS and Aladin Lite

- HiPS: Hierarchical Progressive Surveys

- Multi-resolution data structure

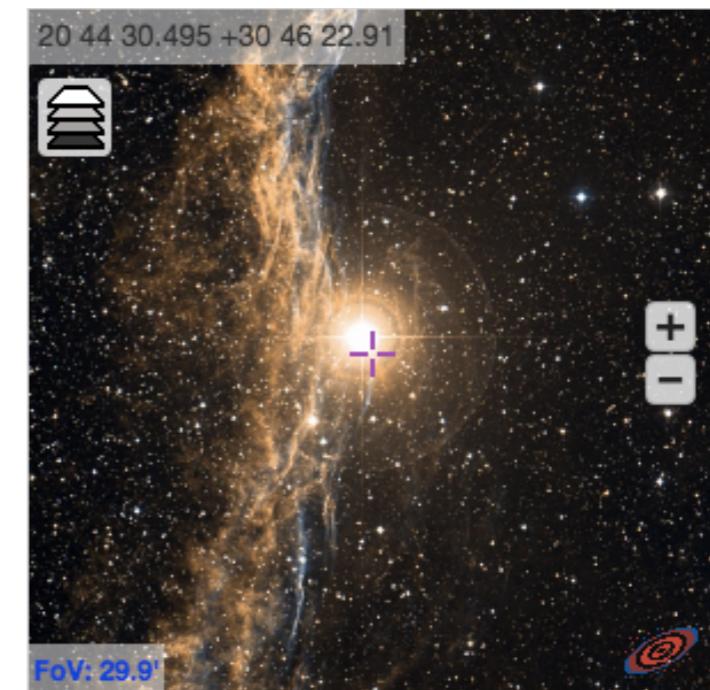


- IVOA note at <http://www.ivoa.net/documents/Notes/HiPS/>

- Aladin Lite: HiPS visualizer

- Easy to embed
  - Controllable through a JS API

Preview  
Access to data





# Portal demonstration

**Target:** M33

J2000 position: 01 33 50.904 +30 39 35.79

**Images**

193 HIPS images available around 01 33 50.904 +30 39 35.79 :

Wavelength : Gamma-ray X UV Optical Infrared Radio Gas-line

Show : All HIPS Most popular

**Filter:**  title continuous update

	title	wavelength	Sky fraction
and F342W			0.02 %
HST-V includes the following filters: F555W, F547W, F569W and F550W			0.02 %
HST-I includes the following filters: F814W, F791W, F785LP and F775W			0.03 %
HLA-wideV includes the following filters: F606W and F600LP			0.05 %
HST-wideV includes the following filters: F606W and F600LP			0.06 %
HLA-I includes the following filters: F814W, F791W, F785LP and F775W			0.07 %
SCUBA 450um emission maps	Radio	0.31 %	0.82 %
SCUBA 850um emission maps	Radio	0.9 %	
SCUBA 850um emission maps - extended dataset	Radio	0.99 %	
SCUBA2 450um observations	Radio	1.75 %	
SCUBA2 850um observations	Radio	1.8 %	
XMM-Newton stacked EPIC images			5.06 %
Arches PN Colored			5.31 %
X-ray images on band 0.5-1Kev			6.69 %
X-ray images on band 1-2Kev			6.69 %

Showing 193 entries

**Catalogues**

**450 Vizier Catalogs**

**Wavelength**

	Infrared	Gamma-ray	X-ray	UV	Optical	Radio
#	96	1	73	20	277	64
Rows	6 Rows					
#	50	100	150	200	250	

**Astronomy keywords**

	Search	Galaxies	Stars	Positional_Data	Photometry-wide...	Photometry	Stars-variable	Velocities
#	214	63	60	59	46	35	34	36
Rows	~36 More							
#	50	100	150	200				

**popularity**  Search title

Rank	Name	Size	Description	Actions
19.23M	AllWISE Data Release (Cutri+ 2013) (allwise)	19.23M		
1.925M	The USNO-B1.0 Catalog (Monet+ 2003)	1.925M		
1.193M	VizieR META catalogue (METAobj)	1.193M		
1.193M	VizieR META catalogue (ReadMeObj)	1.193M		
1.018M	WISE All-Sky Data Release (Cutri+ 2012) (wise)	1.018M		
1.014M	UCAC4 Catalogue (Zacharias+, 2012)	1.014M		
705.9k	NOMAD Catalog (Zacharias+ 2005)	705.9k		
643.6k	The Guide Star Catalog, Version 2.3.2 (GSC2.3) (STScI, 2006)	643.6k		
311.3k	The HST Guide Star Catalog, Version 1.2 (Lasker+ 1996)	311.3k		
254.7k	UCAC2 Catalogue (Zacharias+ 2004)	254.7k		
214.3k	Carlsberg Meridian Catalog 15 (CMC15) (CMC, 2011) (cmc15)	214.3k		
174.3k	XPM Catalog of positions and proper motions (Fedorov+ 2011) (xpm)	174.3k		
174.1k	The Initial Gai Source List (IGSL) (Smart, 2013) (igsl3)	174.1k		
171.6k	The USNO-A2.0 Catalogue (Monet+ 1998)	171.6k		
170.6k	The PPMXL Catalog (Roeser+ 2010)	170.6k		

**Mission**

Search	ROSAT	XMM	IRAS	Einstein
#	17	10	8	8
Rows	~18 More			
#	5	10	15	

**Associated data**

timeSerie	image	spectrum	
19	11	10	
Rows	~33 More		
#	5	10	15

**Journal**

Search	ApJ	ApJS	AJ	A&A
#	71	64	62	58
Rows	~33 More			
#	20	40	60	

**Sky fraction**

#	419	2	4	4	21	
Rows	~33 More					
#	0%	20%	40%	60%	80%	100%

**Year**

# □ Modular components

- Each component is independent
- Has no knowledge of other components
- Interactions between components through a message bus
  - SAMP-like, but within the web page
  - *postal.js* pub/sub library

```
postal.subscribe({
    topic: "table.load.votable",
    callback: function(data, envelope) {
        self.aladin.addCatalog(A.catalogFromURL(data.url,
{name: data.name, onClick: 'showTable'}));
    }
});
```

```
postal.publish({
    topic: "table.load.votable",
    data: {url: 'http://.../table.vot', name: 'myTable' }
});
```

## □ Other libraries used

- **keshif.js**

Javascript library for easy exploration, facets-filtering of datasets

<http://keshif.me/>

- **votable.js**

Javascript library to parse VOTable

Developed at CDS

<https://github.com/aschaaff/votable.js>

## □ Extension to VO portal

- IVOA-registered resources can describe their associated MOC

```
<coverage>
<footprint ivo-id="ivo://mocivod">
    http://alasky.u-strasbg.fr/footprints/cats/vizier/I/221?
    product=MOC&amp;nside=512</footprint>
    <waveband>Optical</waveband>
</coverage>
```
- currently only some of the CDS resources have a MOC attached to the coverage in the VO registry
  - VizieR catalogues
- MOCServer could ingest non-CDS IVOA resources exposing their MOC
- Granularity of resources in the registry?

## □ Perspectives and conclusion

- HiPS, MOCServer and Aladin Lite allow for creation of a data portal in the browser
  - easy to develop (HTTP queries, JSON response)
  - interactive and fast
- This approach extendable to integrate other VO resources
  - MOC not limited to HiPS, can describe the spatial coverage of any dataset
- New CDS Portal in production this summer



# Links

- MOC and MOCSERVER
  - MOC IVOA standard: [ivoa.net/documents/MOC/](http://ivoa.net/documents/MOC/)
  - Query the MOCSERVER: [alasky.unistra.fr/MocServer/query](http://alasky.unistra.fr/MocServer/query)
- HiPS
  - introduction: [aladin.u-strasbg.fr/hips/](http://aladin.u-strasbg.fr/hips/)
  - current IVOA note:
- Aladin Lite
  - General doc: [aladin.u-strasbg.fr/AladinLite/doc/](http://aladin.u-strasbg.fr/AladinLite/doc/)
  - API doc
    - [aladin.u-strasbg.fr/AladinLite/doc/API/](http://aladin.u-strasbg.fr/AladinLite/doc/API/)
    - examples: [aladin.u-strasbg.fr/AladinLite/doc/API/examples/](http://aladin.u-strasbg.fr/AladinLite/doc/API/examples/)
  - *Build a sky chart* tutorial: [tiny.cc/AL-tutorial](http://tiny.cc/AL-tutorial)
- postal.js: [github.com/postaljs/postal.js](https://github.com/postaljs/postal.js)