HiPS – Hierarchical Progressive Survey

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Asterics

What's the plan ?

1)Recap on HiPS

2)State of the art

3)The HiPS Network

4)Progress towards an IVOA standard

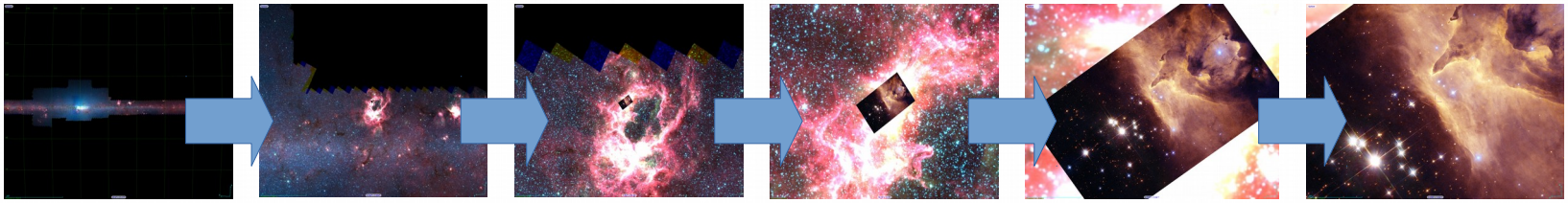
5)Next steps

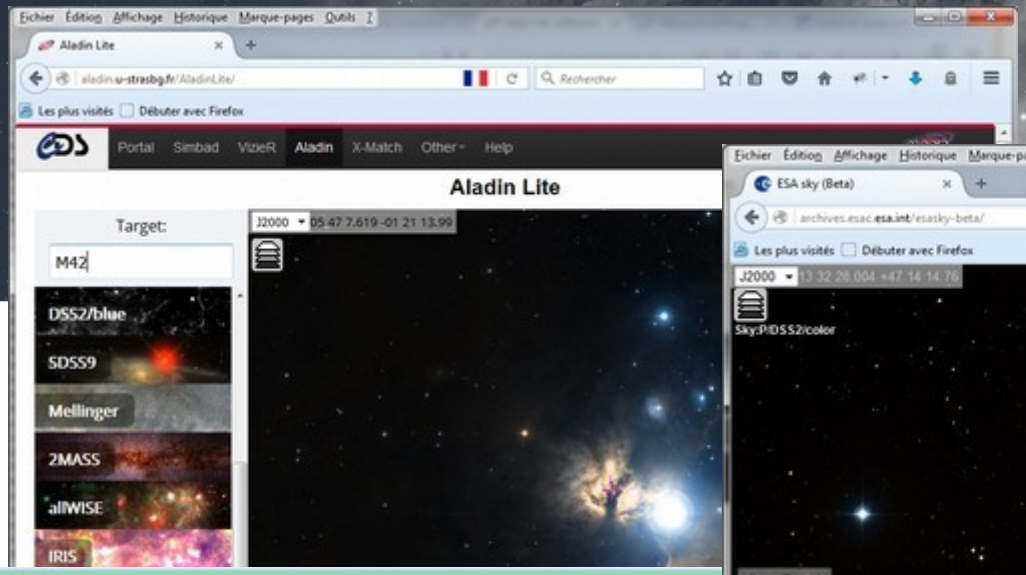
HiPS – What is it ?

Hierachical Progressive Survey

"*The more you zoom in on a particular area,the more details show up*"

- Multi-resolution HEALPix data structure
  for Images, Catalogues, 3-dimensional data cubes, ...
- Conserves scientific data properties alongside visualisation considerations
- No databases or servers, just HTTP

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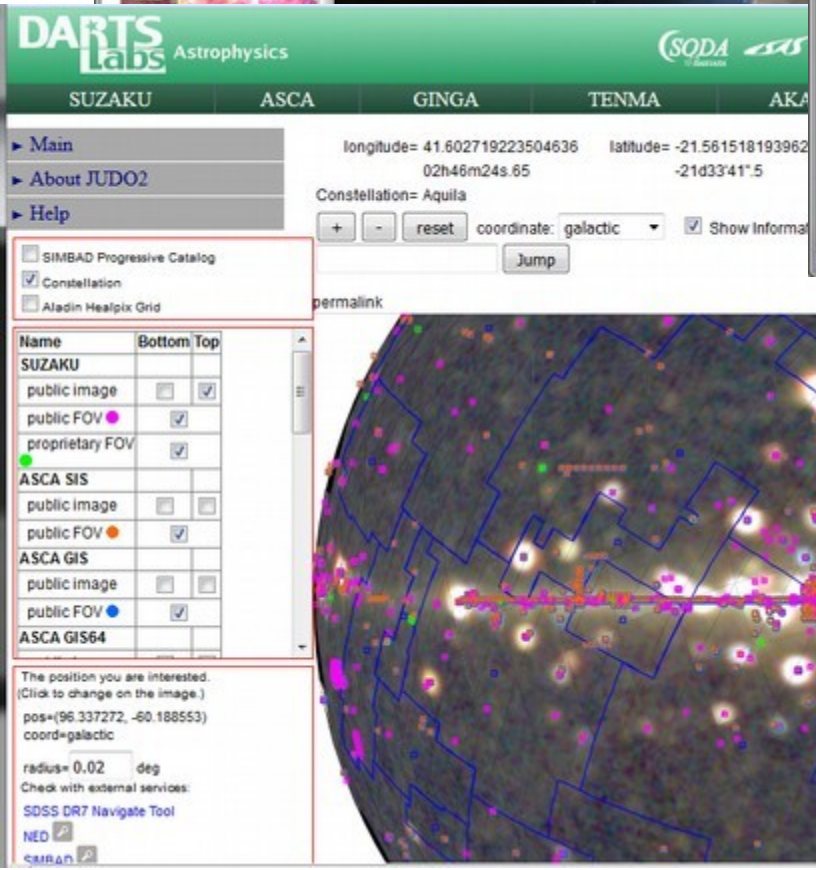
Portal
Simbad
VizieR
Aladin
X-Match
Other
Help
Target:
M42
DSS2/blue
SDSS9
Mellinger
2MASS
allWISE
IRIS


ESA sky (Beta)
Upload target list
Data Panel
ESA Observations
ESA Catalogues
Close data panel


DARTS Labs
Astrophysics
SUZAKU
ASCA
GINGA
TENMA
Main
About JUDO2
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SIMBAD Progressive Catalog
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The position you are interested.
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SDSS DR7 Navigate Tool
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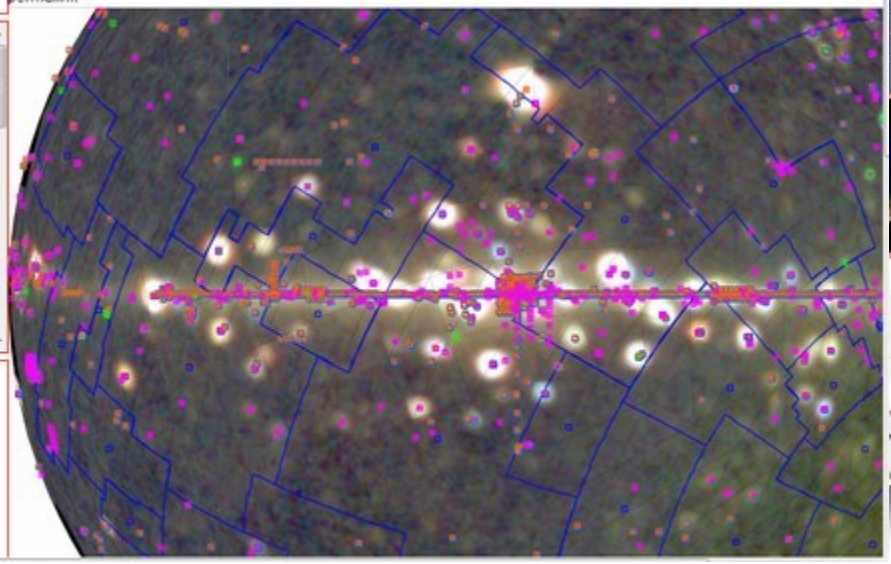
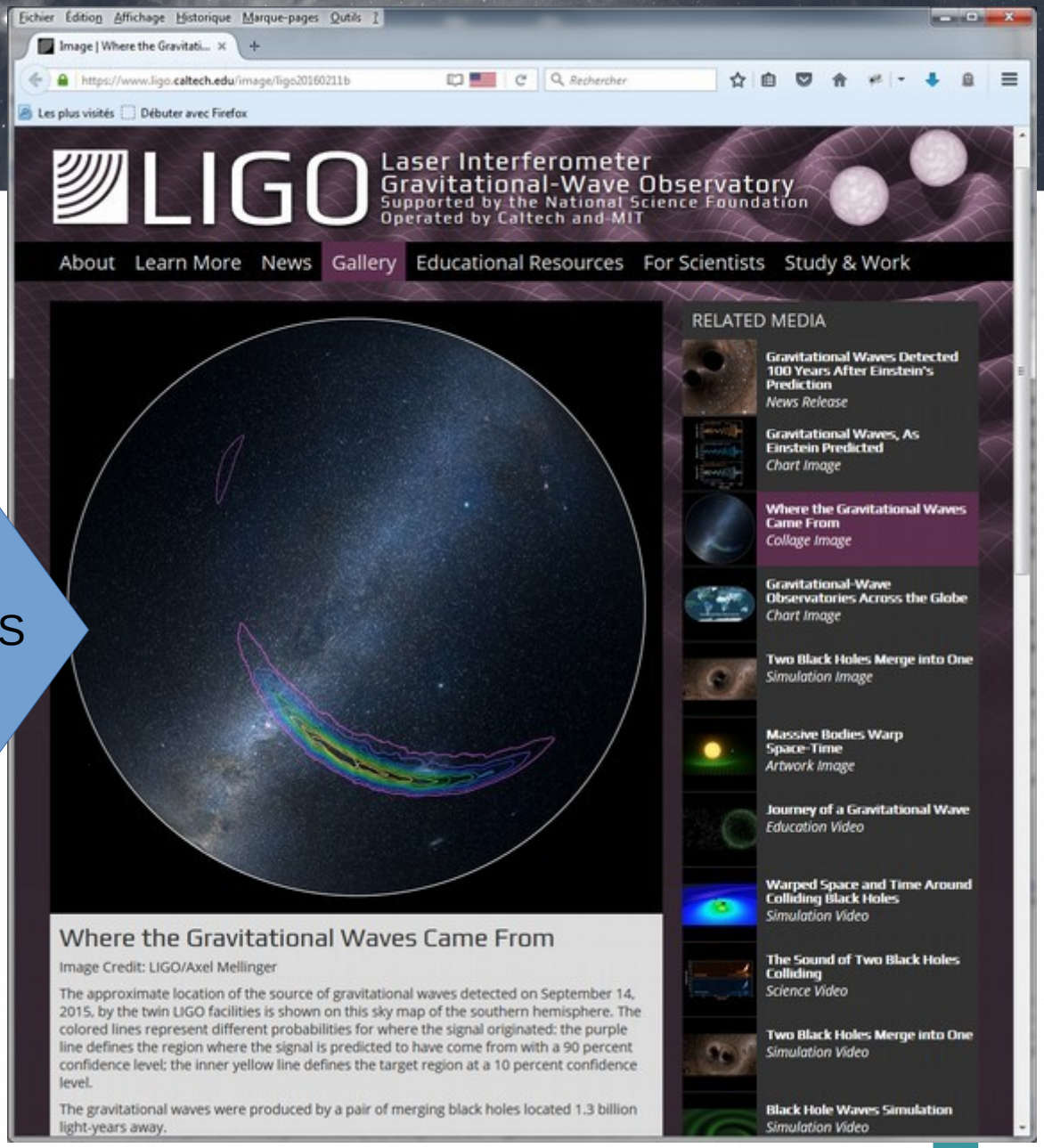



[View 82] - GALEX colored

HiPS also at the forefront of the science

Yes ! it is a HiPS



State of art (March 2016)

- 300+ HiPS for 85TB data (CDS 92%, CADC 5%, ESAC 2%)
- 300 000+ HiPS tiles requested / day (+40% in 1 year)
- More a more HiPS clients :

→ Aladin Desktop (CDS), Aladin Lite (CDS), MIZAR (CNES)
+ in dev: STScI portal (NASA), openWWT (Microsoft), proto (China), …

+ Aladin Lite implementation: ESAsky (ESAC), JUDO2 (JAXA), SkyWatch, ...
+ Aladin Lite web page inclusion: Simbad, VizieR, GLIMPSE360, CADE, ADS allsky, CASSIS, Akari-Viewer, VistaOrion, AstroDEEP, CDS portal v2…
+ Aladin Desktop usage “diversion”: Arches walker

State of art (March 2016)

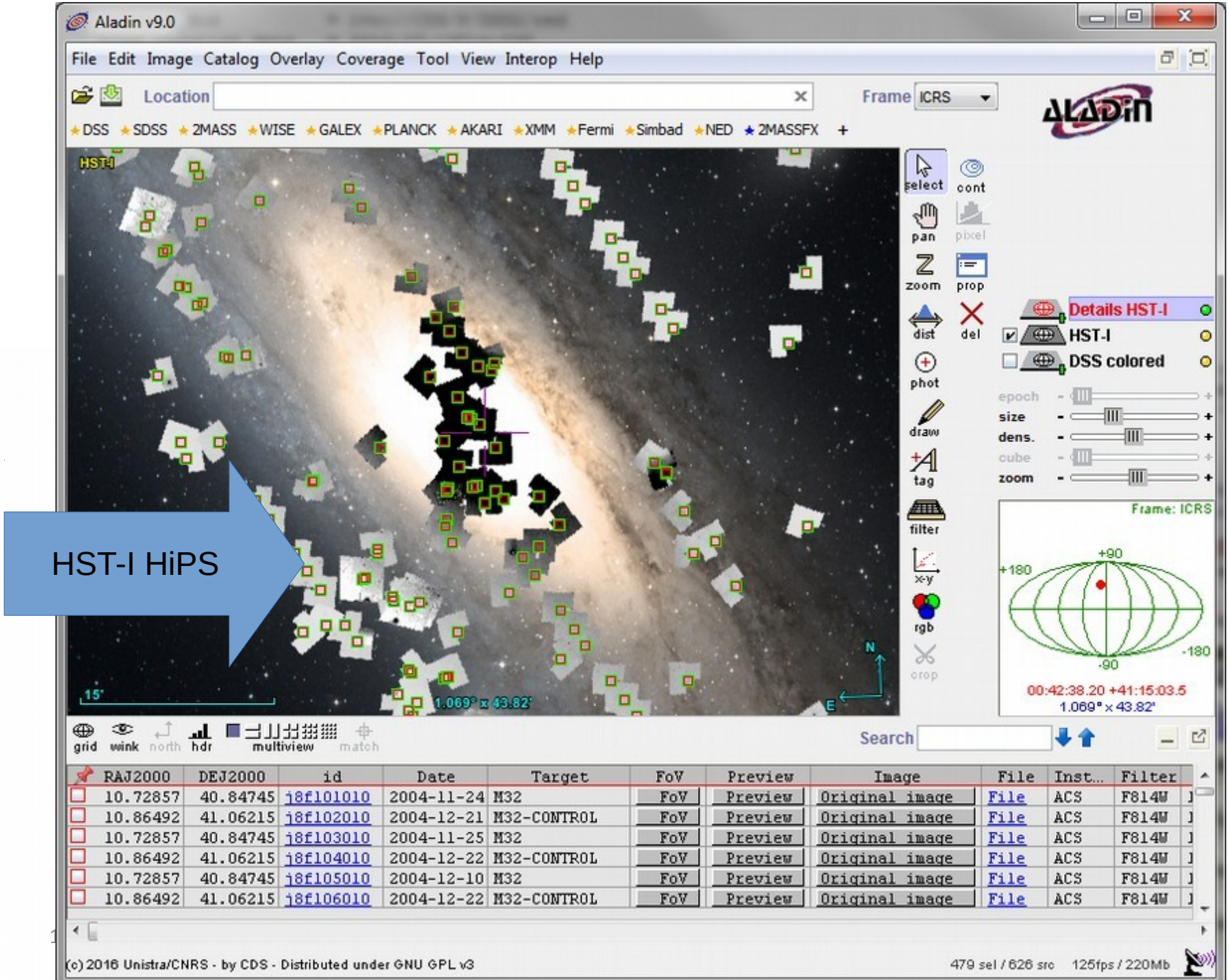
- 12+ HiPS servers

  → CDS, SSC-XMM, IAS, IRAP/CADE, IPAC, ADS, ESAC, JAXA, AMIGA, Spanish-VO, Vista-Orion, TGSSADR...

- 2 HiPS generators
  - Images & cubes: Aladin/Hipsgen (perf: 10h/1Tpix),
  - Catalogs: Hipsgen-cat
- 1 paper → 2015A&A...578A.114F
- More docs → http://aladin.unistra.fr/hips
  ("*Make your HiPS in 10 steps*", *Aladin Lite examples*, ...)

HiPS in action

- HST & HLA : 48 HiPS
  built by D.Durand/CADC – released in Feb 2016
  - grouped by "usual filters": B, CO, H, H2O, Halpha, HBeta, I, J, NII, OII, OIII, Palpha, Palpha_c, R, SDSSg, SDSSr, SDSSz, SIII, U, UV, V, Y, wideUV, wideV (rather than wavelength ranges).
  - Provided both in preview tiles & in full dynamic tiles
  - Incorporate "progenitor links" facility: for accessing associated original images directly
  - Use "-live" HiPS extension: allow incremental updates


Aladin v9.0
File Edit Image Catalog Overlay Coverage Tool View Interop Help
Location
Frame ICRS
DSS SDSS 2MASS WISE GALEX PLANCK AKARI XMM Fermi Simbad NED 2MASSFX
HST-I
select cont pan pixel zoom prop dist del phot draw tag filter x-y rgb crop
Details HST-I
HST-I
DSS colored
epoch size dens. cube zoom
Frame: ICRS
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1.069° x 43.82'
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RAJ2000 DEJ2000 id Date Target FoV Preview Image File Inst... Filter
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10.86492 41.06215 j8f106010 2004-12-22 M32-CONTROL FoV Preview Original image File ACS F814W
(c) 2016 Unistra/CNRS - by CDS - Distributed under GNU GPL v3
479 sel / 626 src 125fps / 220Mb

HST-I HiPS

The 4 HiPS principles (in an ideal world)

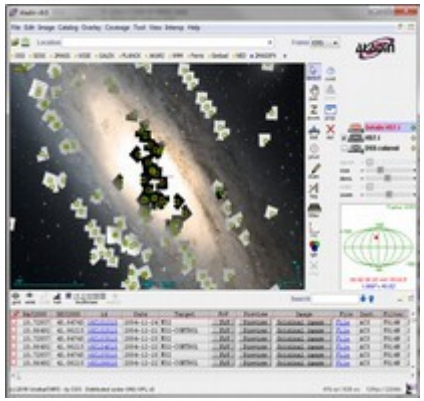
- Universality: Anybody should be able to generate HiPS (authors, projects, missions, archives, data centers...)
- Quality: HiPS should be generated by the data providers themselves (they know their data). Otherwise, archives or data centers do the job.
- Efficiency: HiPS should be distributed by several sites and mirrored/synchronized as much as possible (big data is here – think petabytes !)
- Simplicity: user point of view: just “click & play” !

How to build the HiPS network

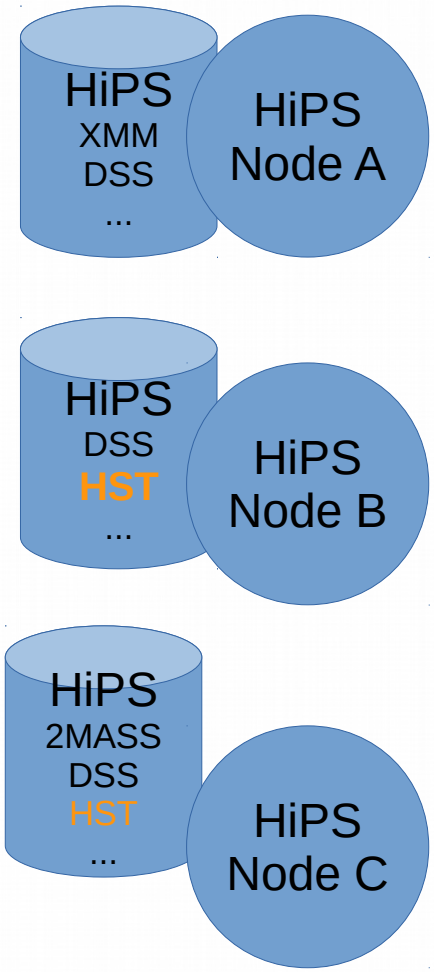
- HiPS registry = a “registry” providing the list of HiPS servers
- HiPS node = a HTTP server distributing HiPS + one HiPS list
- HiPS list = list of the HiPS (with associated meta-data a la ObsCore) distributed by each HiPS server

HiPS network

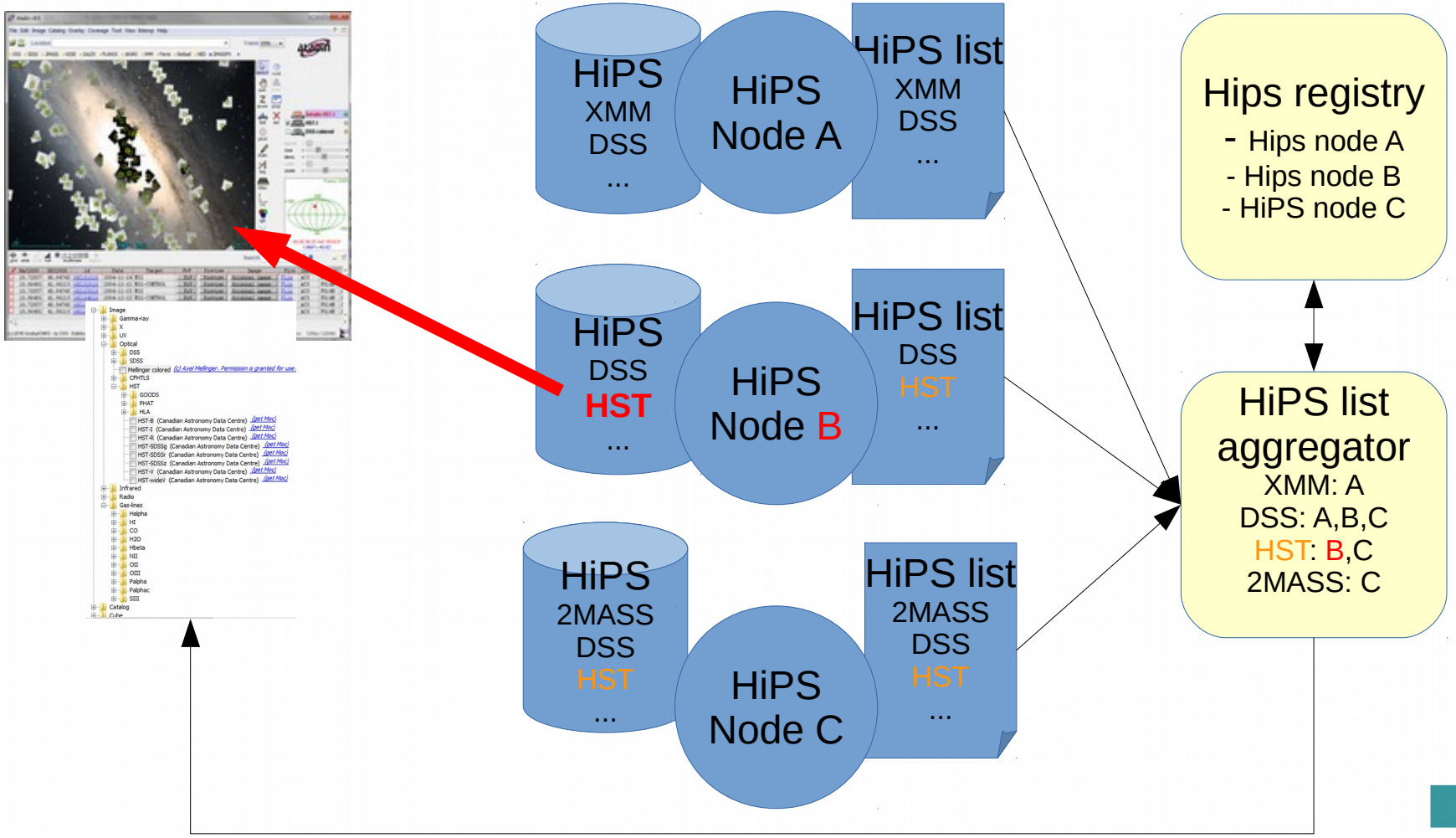
HiPS client



HiPS servers

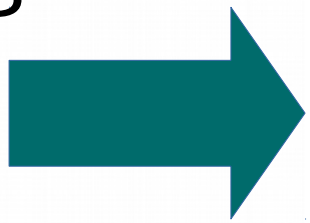


HiPS network



HiPS metadata

Properties file provided with each HiPS



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obs_title               = DSS2 optical HEALPix survey, color (R=red[~0.6um]/G
obs_description         = Color composition generated by CDS. This HiPS surve
obs_copyright           = Digitized Sky Survey - STScI/NASA, Colored & Healpi
obs_copyright_url       = http://archive.stsci.edu/dss/acknowledging.html
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hips_release_date       = 2015-05-11T08:45Z
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dataproduct_subtype     = color
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moc_access_url          = http://alasky.u-strasbg.fr/DSS/DSSColor
hips_service_url        =
hips_status             = public master clonable
hips_rgb_red            =                                    Linear]
hips_rgb_blue           = DSS2-blue-XJ-S [4286.0 12122.5 19959.0 Linear]
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hips_pixel_scale        = 2.236E-4
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obs_initial_fov         = 0.11451621372724685
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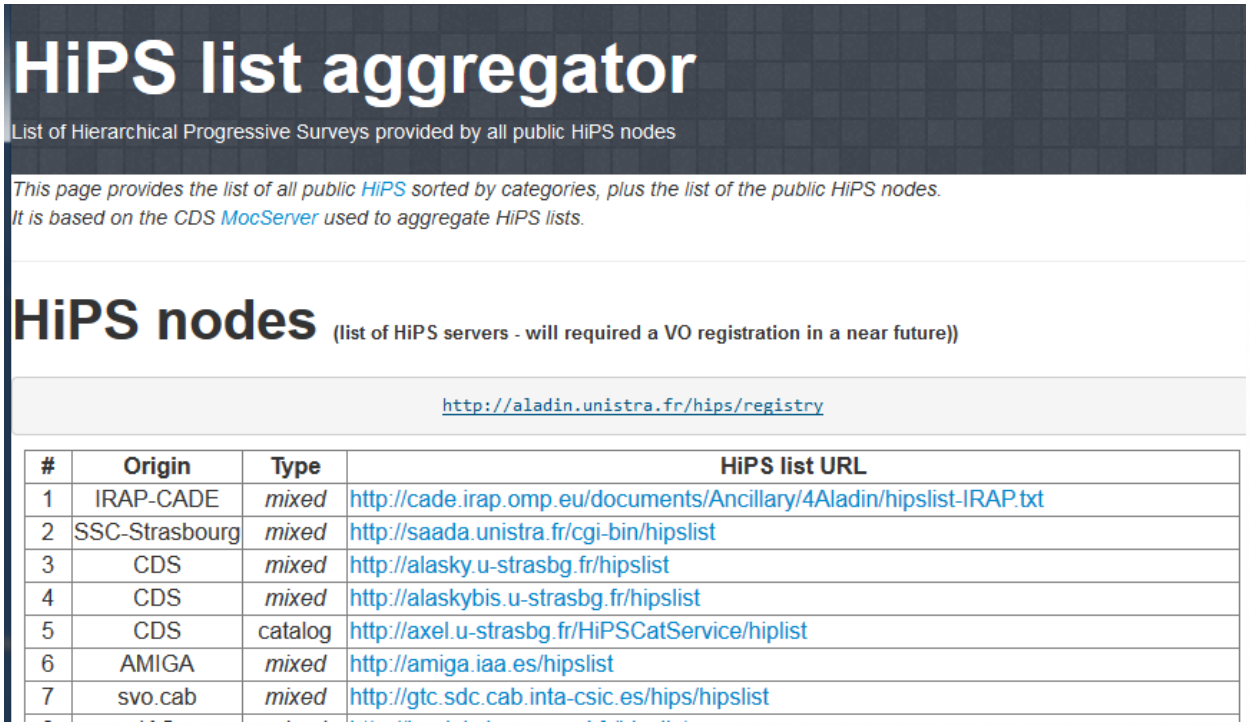
CDS MocServer: an example of HiPS list aggregator

→ http://alasky.unistra.fr/MocServer/query

→ http://aladin.unistra.fr/hips/list



HiPS list aggregator

List of Hierarchical Progressive Surveys provided by all public HiPS nodes

This page provides the list of all public HiPS sorted by categories, plus the list of the public HiPS nodes.
It is based on the CDS MocServer used to aggregate HiPS lists.

HiPS nodes (list of HiPS servers - will required a VO registration in a near future))

http://aladin.unistra.fr/hips/registry

#	Origin	Type	HiPS list URL
1	IRAP-CADE	*mixed*	http://cade.irap.omp.eu/documents/Ancillary/4Aladin/hipslist-IRAP.txt
2	SSC-Strasbourg	*mixed*	http://saada.unistra.fr/cgi-bin/hipslist
3	CDS	*mixed*	http://alasky.u-strasbg.fr/hipslist
4	CDS	*mixed*	http://alaskybis.u-strasbg.fr/hipslist
5	CDS	catalog	http://axel.u-strasbg.fr/HiPSCatService/hiplist
6	AMIGA	*mixed*	http://amiga.iaa.es/hipslist
7	svo.cab	*mixed*	http://gtc.sdc.cab.inta-csic.es/hips/hipslist

IVOA HiPS standardization

7 months

- IVOA note (oct 2015) → http://www.ivoa.net/documents/Notes/HiPS/
- IVOA Sydney decision (nov 2015) :

  IVOA endorsement of the HiPS technology (in Apps Working group)
- Discussion (in progress)
- Identication & VO registration → agreement
- HiPS standards (protocols+metadata) → WD in progress..
- IVOA WD in progress (Cape Town ready ?)

  Authors aff.: CDS, CADC, SSC, ESAC, ALMA, NASA

IVOA HiPS roadmap constraints

- HiPS is already being used

  → The HiPS IVOA standardization process must be seen more like an evolution of an existing standard, rather than a new thing from scratch.

- HiPS actors are not necessary IVOA people, nor computer specialists

  → HiPS must stay as simple as possible, easily usable by any data providers (data centers, archives but also astronomers/authors)

Pleasure of standardization

- Difficulties:
  - IVOA public debates → not so motivating for HiPS actors
  - Heavy constraint on IVOID usage → obligation of an “a priori” VO registry declaration + syntax evolution by the introduction of “?” blocking char for undeclared resource
  - NO IVOA support of mirror sites
- Good news: we (partially) circumvented these issues

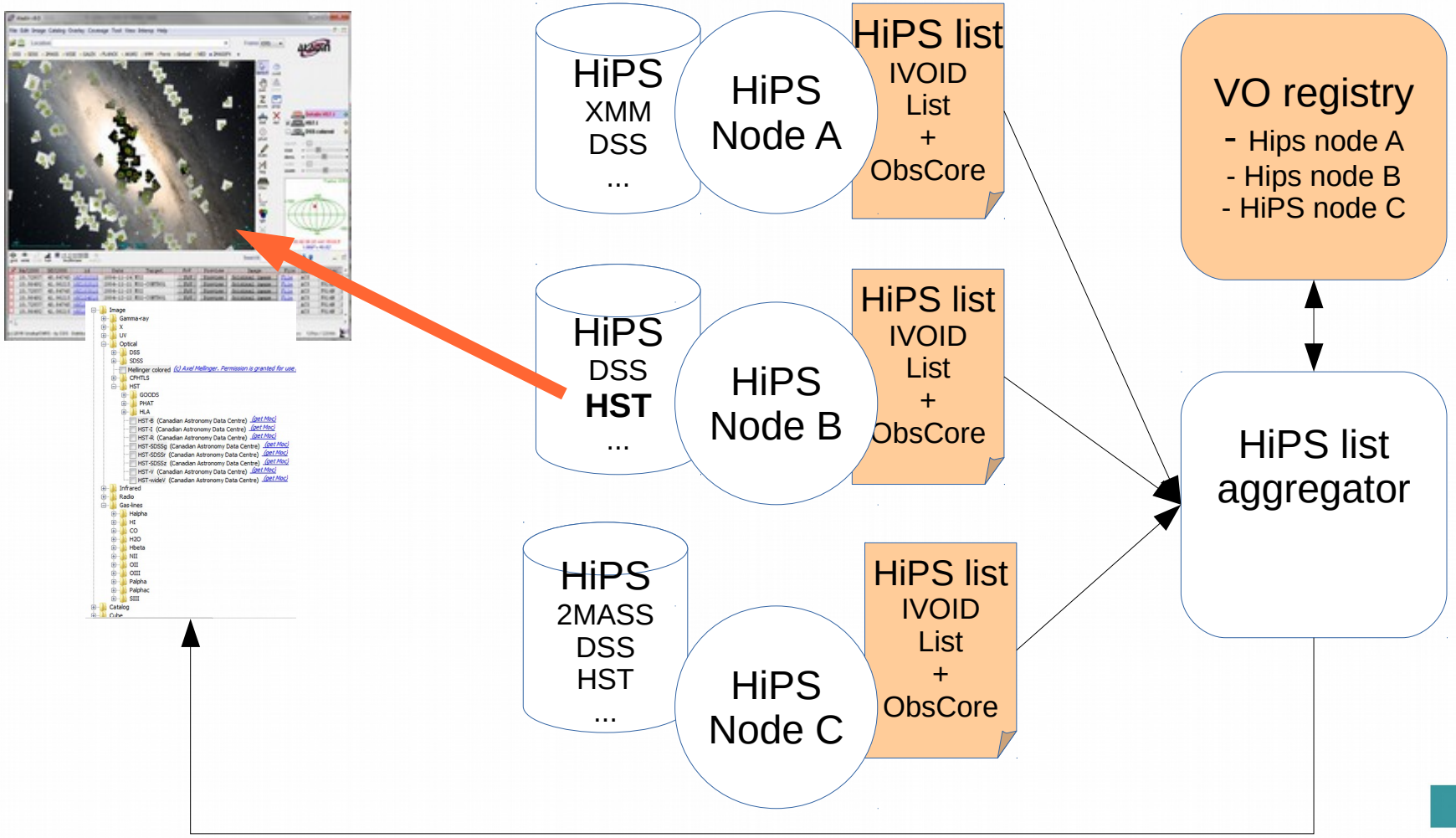
→ HiPS network should not be delayed too longer

→ The impacts should be small

IVOA agreement !

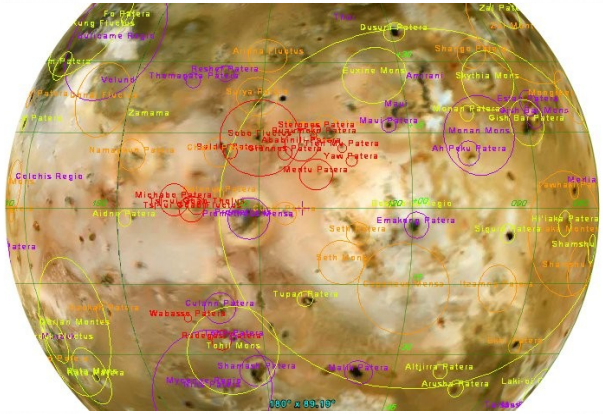
1) *The IVOA HiPS standard will recommend to use a valid IVOID identifier for any generated HiPS, for instance ivo://authority_id?obs_id (ex: ivo://CDS?P/DSS2/color) with the constraint to declare ASAP the authority_id in the VO registry if it is not yet the case;*
2) *This identifier will be stored in the HiPS properties file under the creator_did keyword;*
3) *Independently, any HiPS provider can - if they want - declare in the VO registry:*
   - *As Publisher: their HiPS server(s) = HTTP service which publishes several HiPS : must provide their HiPS list [required for VO visibility]*
   - *As Creator: each individual HiPS [optional, still in discussion]*

HiPS network in IVOA



Next steps

- Pursue the HiPS Network deployment
- Notably the HiPS catalogs (~15 000 HiPS)
- Start the VO registry declarations



- Finalize the IVOA WD
- Study a statistics report protocol
- HiPS extension to planetary data (EuroPlanet project)

Thanks !
Questions ?