

SIAP2 et HiPS2FITS prototype CDS

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Donner accès à des images standard FITS ou JPEG à l'époque HiPS ?

Motivation pour la distribution d'images classiques:

- Accès direct à des images non rééchantillonnées (données d'origine) pour cas scientifiques particuliers
- Comparaison avec des images d'autres serveurs (même WCS)
- CDS : héritage de fonctionnalités pour les clients non HiPS
 - Vignettes JPEG pour portail CDS (remplace Aladin preview.)
 - usage local pour XMM ACDS : pipe line d'identification croisée (fait avec le serveur Aladin classique auparavant)
- Etc...

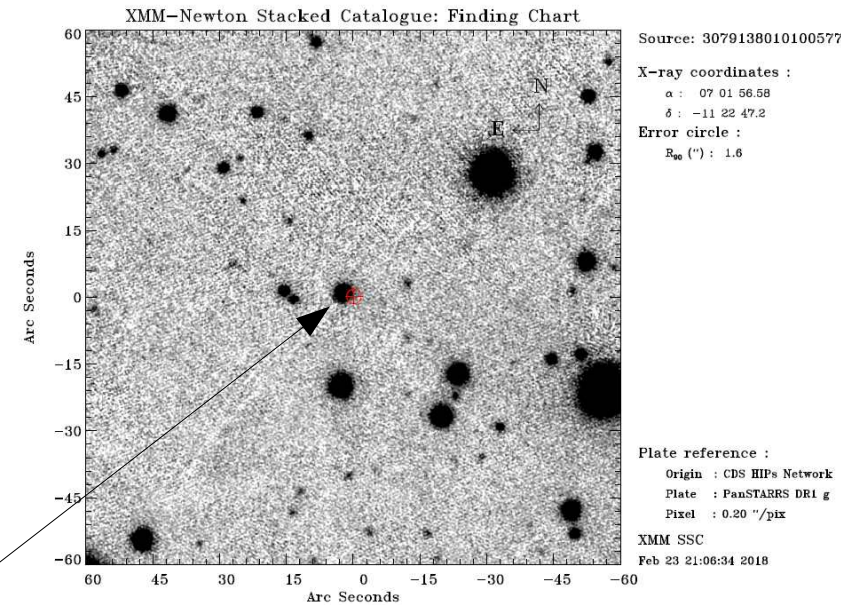
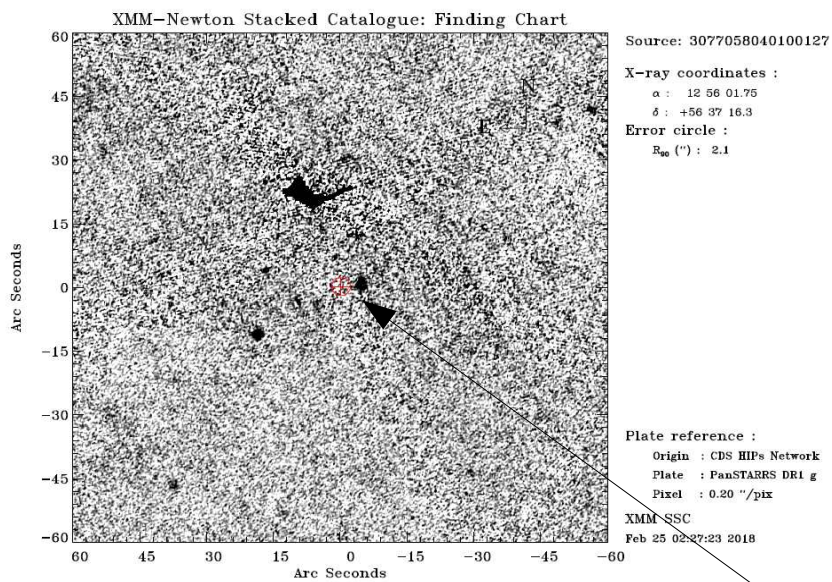


Comment donner accès à ces images standards ?

- solution classique: créer un serveur image avec images d'origine (compatible VO : ObsTAP, SIAP2.0, SIAP1.0)
 - CDS : images associées à VizieR, serveur Aladin classique, etc..
 - Pas facile d'étendre à de nouvelles collections d'images et à la génération d'images virtuelles
- Solutions basée sur HiPS : créer des images à la volée en reprojétant les pixels HiPS sur une grille de pixels 2D
 - opérationnel en version java et version python !!!



HiPStoFITS pour XMM ACDS réutilise le code AladinJava



XMM source

Cartes de champ Pan-Starrs pour le Catalogue XMM compilé
(3XMMdr7s catalogue, Iris Traulsen et al. A&A)



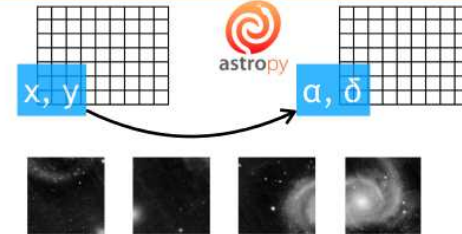
HIPSTOFITS in python

Algorithm

```
CSPIX1 = 1000.0
CSPIX2 = 500.0
CDELT1 = -9.18
reference point
CDELT2 = 0.18
reference point
CUNIT1 = 'deg'
value
CUNIT2 = 'deg'
value
CTYPE1 = 'GLON-MOL'
projection
CTYPE2 = 'GLAT-MOL'
projection
```

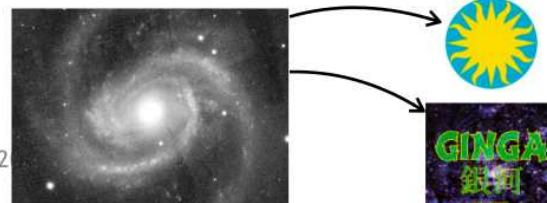
WCS, hips

1. For each (x, y) pixel: compute α, δ
(using **Astropy** WCS)
2. Retrieve tiles covered by the cutout
—> quite fast as most HiPS are available or mirrored at CDS
3. For each (α, δ): retrieve respective contribution
from 4 nearest HEALPix cells
(using **cdshealpix** (Rust-based) Python library)
4. Actual bilinear interpolation computation,
accelerated by **Numba** decorators
5. Return FITS image cutout



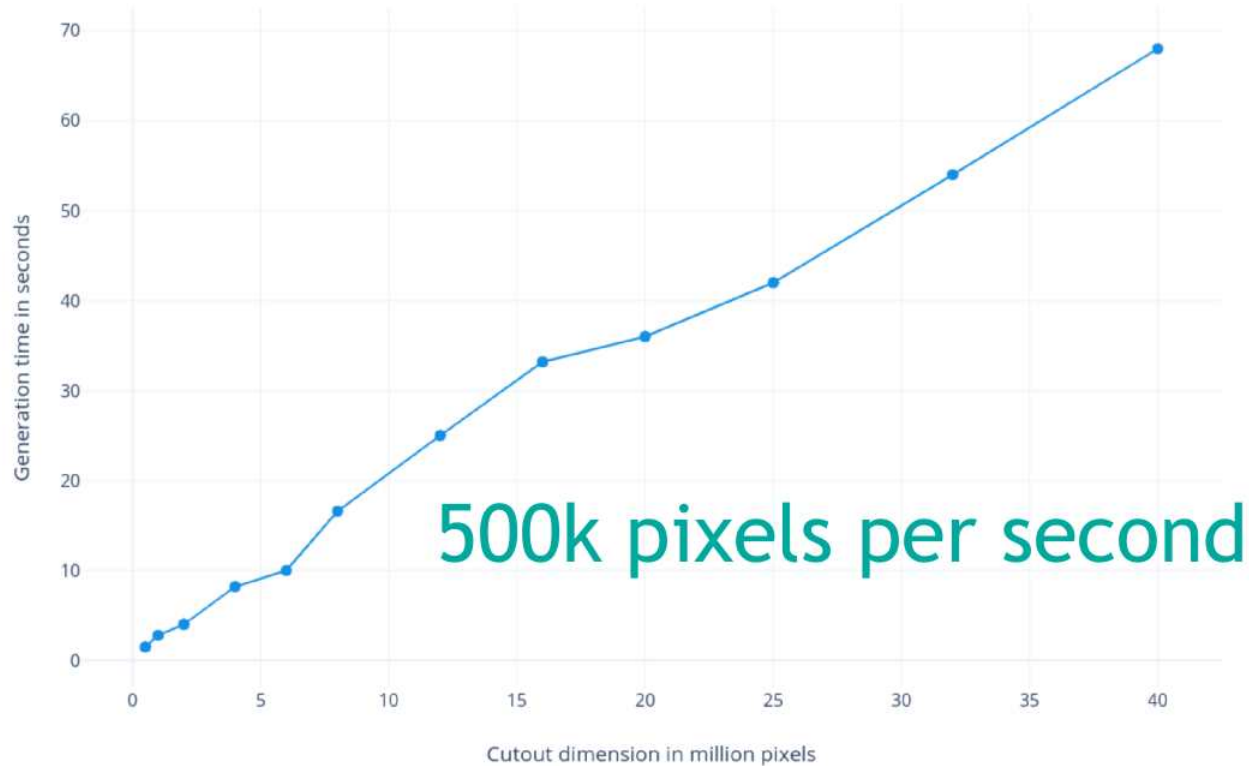
$$\text{value} = w1*va11 + w2*va12 + w3*va13 + w4*va14$$

FITS cutout



HiPSTOFITS in python

□ Performances



HiPS2FITS et SIAP2 « virtuel »

- Problème de la découverte:
 - > rapidement confus pour les surveys non disponibles partout
 - (« error : No data » ou « image vide »)
 - Utiliser un service semblable à SIAP2 (même paramètres) pour découvrir les images « générables » par HiPS2FITS
 - Pas compatible SIAP2.0 (images d'archives) --> SIAP2.1
 - Surcouche au MOCserver du CDS (pas de service TAP)



Interface du proto SIAP2 HiPStoFITS CDS

The screenshot displays the Aladin v11 astronomical software interface. The main window shows a star field with a bright star highlighted by a blue circle and crosshairs. The interface includes a menu bar (File, Edit, Image, Catalog, Overlay, Coverage, Tool, View, Interop, Help), a command line, and a toolbar with various icons for navigation and analysis. A 'Server selector' dialog box is open in the foreground, titled 'HIPS2FITS CDS SIAV2 virtual data prototype'. The dialog contains the following fields:

- Target (ICRS, name): 05 41 12.96268 -02 15 18.6480
- Radius: 8.09'
- wl interval (m):
- Epoch interval (MJD):
- Polarisation states:
- Image format: application/fits
- collection:
- facility:
- instrument:

The dialog also features a 'SUBMIT' button and a 'Close' button. The background image is a color composite of the star field, labeled 'DSS2 color'. The bottom right corner shows a small inset map of the sky with a red circle indicating the current field's location, labeled 'SAO 70467'.



Liste des images générables par le proto SIAP2 HiPS2FITS CDS

The screenshot displays the ALADIN web interface. The main window shows a star field with a nebula, overlaid with a grid and a search box. The interface includes a menu bar (File, Edit, Image, Catalog, Overlay, Coverage, Tool, View, Interop, Help), a command line, and a toolbar with various tools like select, pan, dist, phot, draw, tag, moc, filter, cross, crop, cont, pixel, prop, and del. The bottom panel shows a table of available data collections.

access_url	dataprod...	calib_le...	obs_collection	obs_id	obs_publisher_id	access...
http://cds.uva.es	image		1 The Two Micron All Sky Survey - H band (2MASS H)	CDS/P/2MASS/H # 85_30401116666667 -2.2551799999999997 0.1348333333333333	1wo://CDS/P/2M...	image/
http://cds.uva.es	image		1 The Two Micron All Sky Survey - J band (2MASS J)	CDS/P/2MASS/J # 85_30401116666667 -2.2551799999999997 0.1348333333333333	1wo://CDS/P/2M...	image/
http://cds.uva.es	image		1 The Two Micron All Sky Survey - K band (2MASS K)	CDS/P/2MASS/K # 85_30401116666667 -2.2551799999999997 0.1348333333333333	1wo://CDS/P/2M...	image/
http://cds.uva.es	image		1 AKARI FIS N160	CDS/P/AKARI/FIS/N160 # 85_30401116666667 -2.2551799999999997 0.1348333333333333	1wo://CDS/P/AK...	image/
http://cds.uva.es	image		1 AKARI FIS N60	CDS/P/AKARI/FIS/N60 # 85_30401116666667 -2.2551799999999997 0.1348333333333333	1wo://CDS/P/AK...	image/
http://cds.uva.es	image		1 AKARI FIS W1deL	CDS/P/AKARI/FIS/W1deL # 85_30401116666667 -2.2551799999999997 0.1348333333333333	1wo://CDS/P/AK...	image/
http://cds.uva.es	image		1 AKARI FIS W1deS	CDS/P/AKARI/FIS/W1deS # 85_30401116666667 -2.2551799999999997 0.1348333333333333	1wo://CDS/P/AK...	image/
http://cds.uva.es	image		1 CO composite survey	CDS/P/CO # 85_30401116666667 -2.2551799999999997 0.1348333333333333	1wo://CDS/P/CO...	image/



Image 2MASS générée par HiPS2FITS CDS

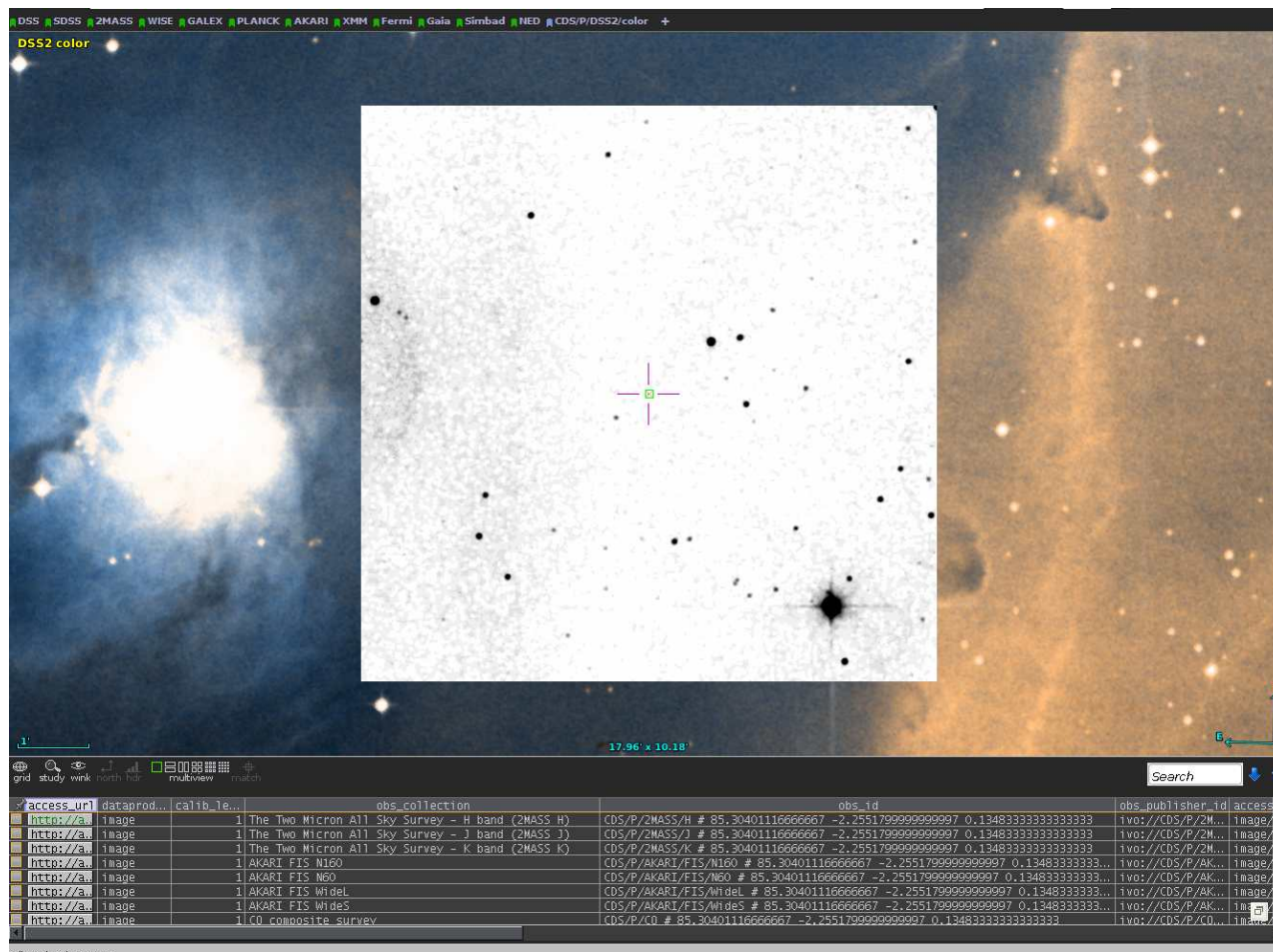
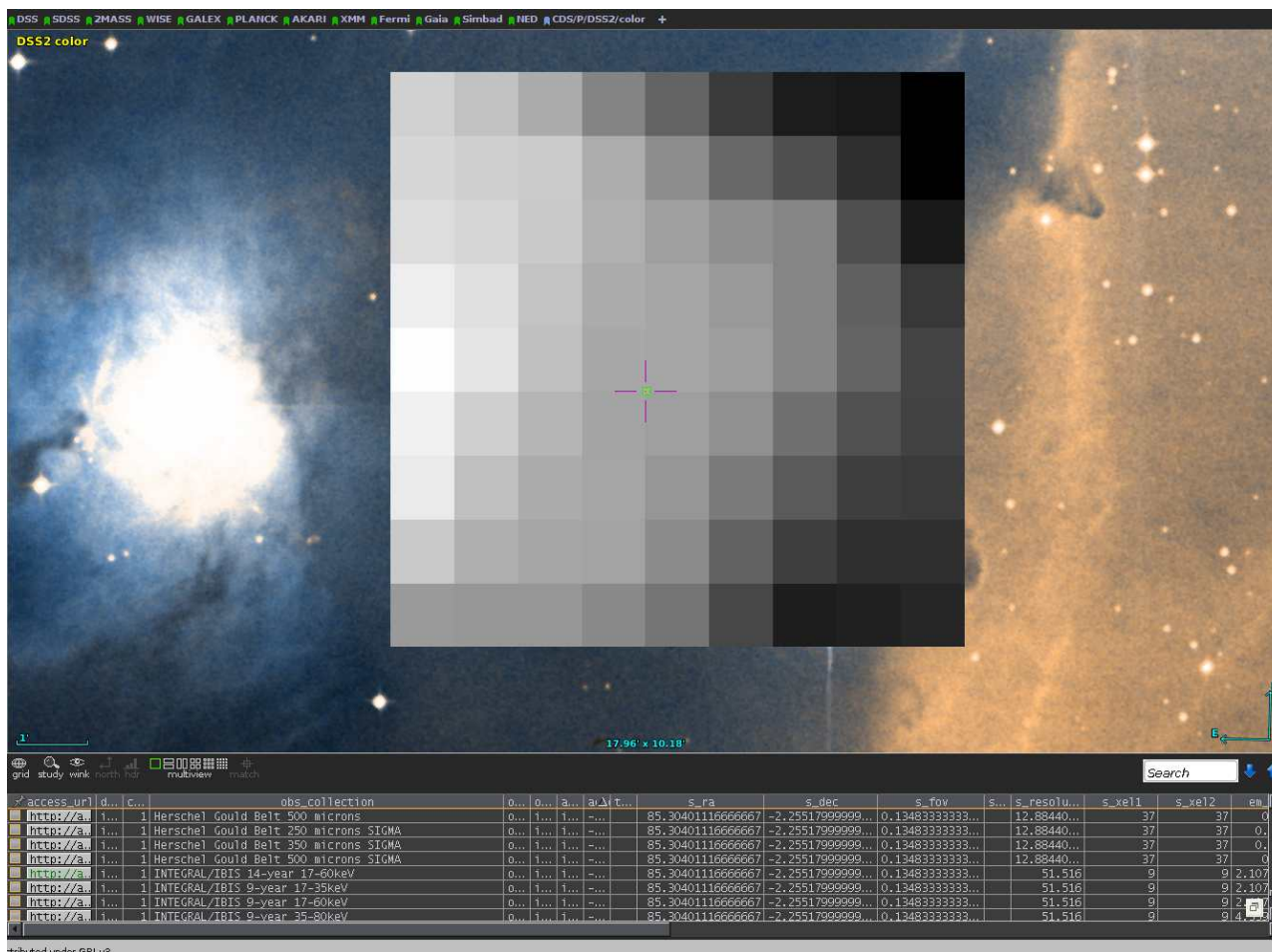


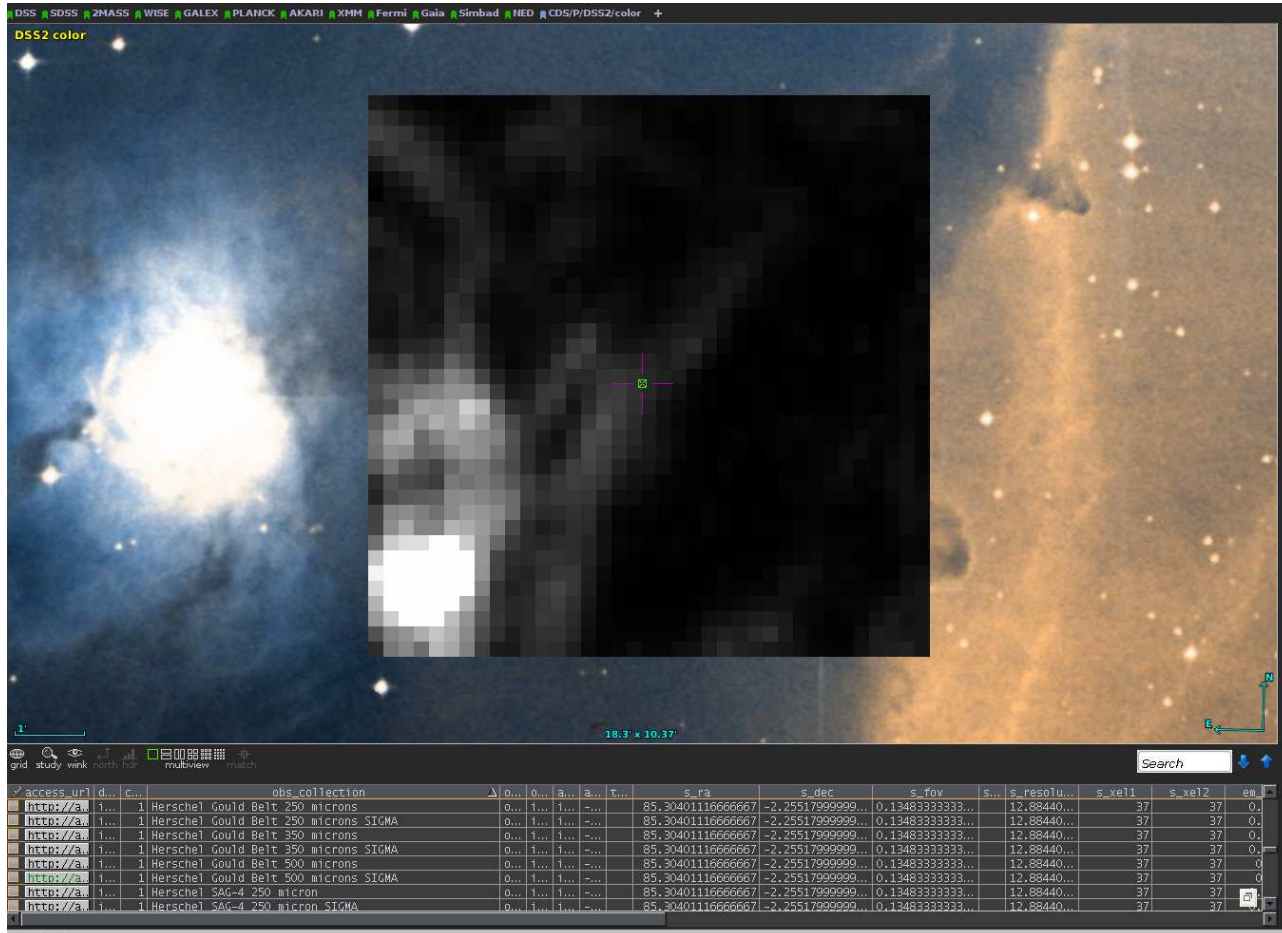
Image INTEGRAL générée par HiPS2FITS CDS



distributed under GPLv3



Image Herschel générée par HiPS2FITS CDS



Proto SIAP2 pour images associées VizieR

- Les catalogues de VizieR ont des données associées.
 - Accessibles par des liens depuis les catalogues
 - Un service ObsTAP a aussi été développé pour les accéder « directement »
 - Surcouche SIAP2.0 (Obscore1.1) sur ce service ->Un « vrai » SIAP2.0



Proto SIAP2 CDS pour données associées VizierR taille d'image 1

Aladin v10.0 *** BETA VERSION (based on v10.073) ***

Command: 05:40:54.29 -02:28:00.2

Frame: CRS Projection: Aitoff

Available data:
• in view • out view

- Collections → 24499
 - Image → 405
 - Data base → 59
 - Catalog → 22848
 - Cube → 16
 - Ancillary → 14
 - Outreach → 43
 - Others → 1112
 - Problematic → 2

Server selector:
Others File V... Vols... VizierR HIPS

VizieR associated data CDS SIAV2 interface

Target (ICRS, name): 05 41 40.97812 -02 12 24.6830

Radius: 35.38'

wl interval (m):

Epoch interval (MJD):

Polarisation states:

Image format: application/fits

collection:

facility:

instrument:

Reset Clear SUBMIT Close

obs.url	dataproduct	calib.le...	obs.collection	obs.id	obs.publ.	access.f.	access.p.	target.n...	S Pa	S dec	
http://c...	image	-1	"J/A+A/560/A73"	"ch3oh1-1.fit"	*ivo://C...	image/fits	1056960	"HORSEH...	85, 22619...	-2, 46673...	0, 1
http://c...	image	-1	"J/A+A/560/A73"	"ch3oh2-1.fit"	*ivo://C...	image/fits	1056960	"HORSEH...	85, 22619...	-2, 46673...	0, 1
http://c...	image	-1	"J/A+A/560/A73"	"h2co-1.fit"	*ivo://C...	image/fits	175680	"HORSEH...	85, 22585...	-2, 46448...	0, 1
http://c...	image	-1	"J/A+A/560/A73"	"ch3oh1-s.fit"	*ivo://C...	image/fits	43200	"HORSEH...	85, 22924...	-2, 45702...	0, 1
http://c...	image	-1	"J/A+A/560/A73"	"ch3oh2-s.fit"	*ivo://C...	image/fits	43200	"HORSEH...	85, 22924...	-2, 45702...	0, 1
http://c...	image	-1	"J/A+A/560/A73"	"h2co-s.fit"	*ivo://C...	image/fits	43200	"HORSEH...	85, 22924...	-2, 45702...	0, 1
http://c...	image	-1	"ApJ/802/60"	"apj508569f3_Fits#2"	*ivo://C...	image/fits	35022240	"Flame"	85, 45100...	-1, 91204...	0, 1
http://c...	image	-1	"ApJ/802/60"	"apj508569f5_Fits#2"	*ivo://C...	image/fits	35022240	"Flame"	85, 45100...	-1, 91204...	0, 1

VizieR-CDS SIAV2 Search

10 sel / 10 src 86fps / 801Mb

Proto SIAP2 CDS pour données associées VizierR taille d'image 2

Aladin v10.0 *** BETA VERSION (based on v10.073) ***

Command: 05:40:55.02 -02:27:25.3

Frame: CRS Projection: Aitoff

Available data:
• in view • out view
Collections → 24499
Image → 405
Data base → 59
Catalog → 22848
Cube → 16
Ancillary → 14
Outreach → 43
Others → 1112
Problematic → 2

Server selector:
Others File V... Vols... VizieR HIPS

VizieR associated data CDS SIAV2 interface
Target (ICRS, name): 05 41 40.97812 -02 12 24.6830
Radius: 35.38'
wl interval (m):
Epoch interval (MJD):
Polarisation states:
Image format: application/fits
collection:
facility:
instrument:

access_url	dataproduct	calib_level	obs_collection	obs_id	obs_publ.	access_f...	access_e...	target_n...	S_ra	S_dec
http://...	image	-1	"A+A/560/A73"	"ch30h1-1.fit"	"ivo://C...	image/fits	1056960	"HORSEHE...	85.22619...	-2.46673...
http://...	image	-1	"A+A/560/A73"	"ch30h2-1.fit"	"ivo://C...	image/fits	1056960	"HORSEHE...	85.22619...	-2.46673...
http://...	image	-1	"A+A/560/A73"	"h2co-1.fit"	"ivo://C...	image/fits	175680	"HORSEHE...	85.22585...	-2.46448...
http://...	image	-1	"A+A/560/A73"	"ch30h1-s.fit"	"ivo://C...	image/fits	43200	"HORSEHE...	85.22924...	-2.45702...
http://...	image	-1	"A+A/560/A73"	"ch30h2-s.fit"	"ivo://C...	image/fits	43200	"HORSEHE...	85.22924...	-2.45702...
http://...	image	-1	"A+A/560/A73"	"h2co-s.fit"	"ivo://C...	image/fits	43200	"HORSEHE...	85.22924...	-2.45702...
http://...	image	-1	"ApJ/802/60"	"ap1508569f3.fits#2"	"ivo://C...	image/fits	35922240	"Flare"	85.45100...	-1.91204...

VizieR-CDS SIAV2

Search

obs_collection (3 items)

Proto SIAP2 CDS pour données associées VizieR images chargées

Aladin v10.0

File Edit Image Catalog Overlay Coverage Tool View Interop Help

Command: 05:41:48.24 -01:54:43.4

Frame: CRS Projection: Aitoff

Available data

- in view
- out view
- Collections → 24499
 - Image → 405
 - Gamma-ray → 23
 - X-ray → 27
 - UV → 27
 - Optical → 100
 - HST → 28
 - Skymapper → 7
 - SDSS → 7
 - CFHTLS → 12
 - Swift → 6
 - MAMA → 3
 - DECaPS → 2
 - DES → 6
 - PanSTARRS → 7
 - HSC → 4
 - DSS → 4
 - DSS2 Blue (X+)
 - DSS2 colored
 - DSS2 Red (F+R)
 - DSS2 NIR (M+IS)
 - DECaLS → 4
 - Mellinger color
 - IPHAS → 3
 - J-PLUS-DR1 (July;)
 - MINU-PAS-PDR201
 - BASS → 2
 - DES DR1 LineA colc
 - GTC Public Archive
 - Infrared → 124
 - Radio → 61
 - Gas-lines → 43
 - Data base → 59
 - Catalog → 22848
 - Cube → 16
 - Ancillary → 14
 - Outreach → 43
 - Others → 1112
 - Problematic → 2

DSS2 color

VizieR-CDS SIAP2

- Field: access_format
- Value: image/fits
- UCD: meta.code.mime
- Utype: Access_format

8.923° x 4.73°

access_url	dataobj...	calib...	obs_collection	obs_id	obs_publ...	access_f...	access_o...	target_n...	S_ra	S_dec	S_fov	S_region	S_resolu...	S_xell	S_reli...
http://cdsarc.u-	image	-1	J/A+A/560/A73	ch3oh2-1_fit	*ivo://C...	image/fits	1056960	"HORSEHE...	85.22619...	-2.46673...	0.069552...	Fov	0	-32768	-321
http://cdsarc.u-	image	-1	J/A+A/560/A73	h2co-1_fit	*ivo://C...	image/fits	175680	"HORSEHE...	85.22585...	-2.46448...	0.027766...	Fov	0	-32768	-321
http://cdsarc.u-	image	-1	J/A+A/560/A73	ch3oh1-s_fit	*ivo://C...	image/fits	43200	"HORSEHE...	85.22924...	-2.45702...	0.111110...	Fov	0	-32768	-321
http://cdsarc.u-	image	-1	J/A+A/560/A73	ch3oh2-s_fit	*ivo://C...	image/fits	43200	"HORSEHE...	85.22924...	-2.45702...	0.111110...	Fov	0	-32768	-321
http://cdsarc.u-	image	-1	J/A+A/560/A73	h2co-s_fit	*ivo://C...	image/fits	43200	"HORSEHE...	85.22924...	-2.45702...	0.111110...	Fov	0	-32768	-321
http://cdsarc.u-	image	-1	J/ApJ/602/600	apj5085693_fits#2	*ivo://C...	image/fits	3902240	"Flare"	85.45100...	-1.91204...	0.370284...	Fov	3.699263...	-32768	-321
http://cdsarc.u-	image	-1	J/ApJ/602/600	apj5085695_fits#2	*ivo://C...	image/fits	3902240	"Flare"	85.45100...	-1.91204...	0.370284...	Fov	3.699263...	-32768	-321
http://cdsarc.u-	image	-1	JApS/175/277	scuba E 207d2-1644 B...	*ivo://C...	image/fits	2079260	"Flare"	85.61563...	-2.50166...	1.198222...	Fov	8.485281...	-32768	-321

Search

10 sel / 10 src 2 views 48fps / 567Mb

Et la suite ?

- CDS :
 - Ouvrir ces services et arrêter le service Aladin classique
 - Etendre à des paramètres non SIA comme le choix de la projection
- IVOA :
 - Proposer cette évolution pour SIAP2.1
 - Retrouver les fonctionnalités de SIAP1 « Mosaic »
 - SODA 1.0 ne fait que du cutout mais a des paramètres compatibles avec SIA2.0
 - Réutiliser les paramètres de SIAP2.1 pour un SODA 1.1
 - Génération d'images virtuelles autres que de purs cutouts

