

Astro-Wise Image Web-Services

Astro-Wise Workshop 2008

Serving images for surveys

Use case: large survey being processed on remote compute and storage facilities with Astro-WISE

Requirement for image-services:

Easy access to and handling of from web-browser:

- individual images
- image-data lineages (e.g. calibrations) as stored in the database
- image-data sets (e.g. RGB images)
- cut-out images from individual sources or from series in Sourcelists, Associatelist

AWE-Image-data web-services

Mode of operation:

- Single AWE-Image-server is connected to multiple data-servers storing FITS-images
- Image-Operations via <http://imageview.astro-wise.org/> on demand :
 - Web-browser-view of entire images,
 - cut-out sub-images as single, or series in HTML-table
- Access from multiple interfaces

Image-processing operations

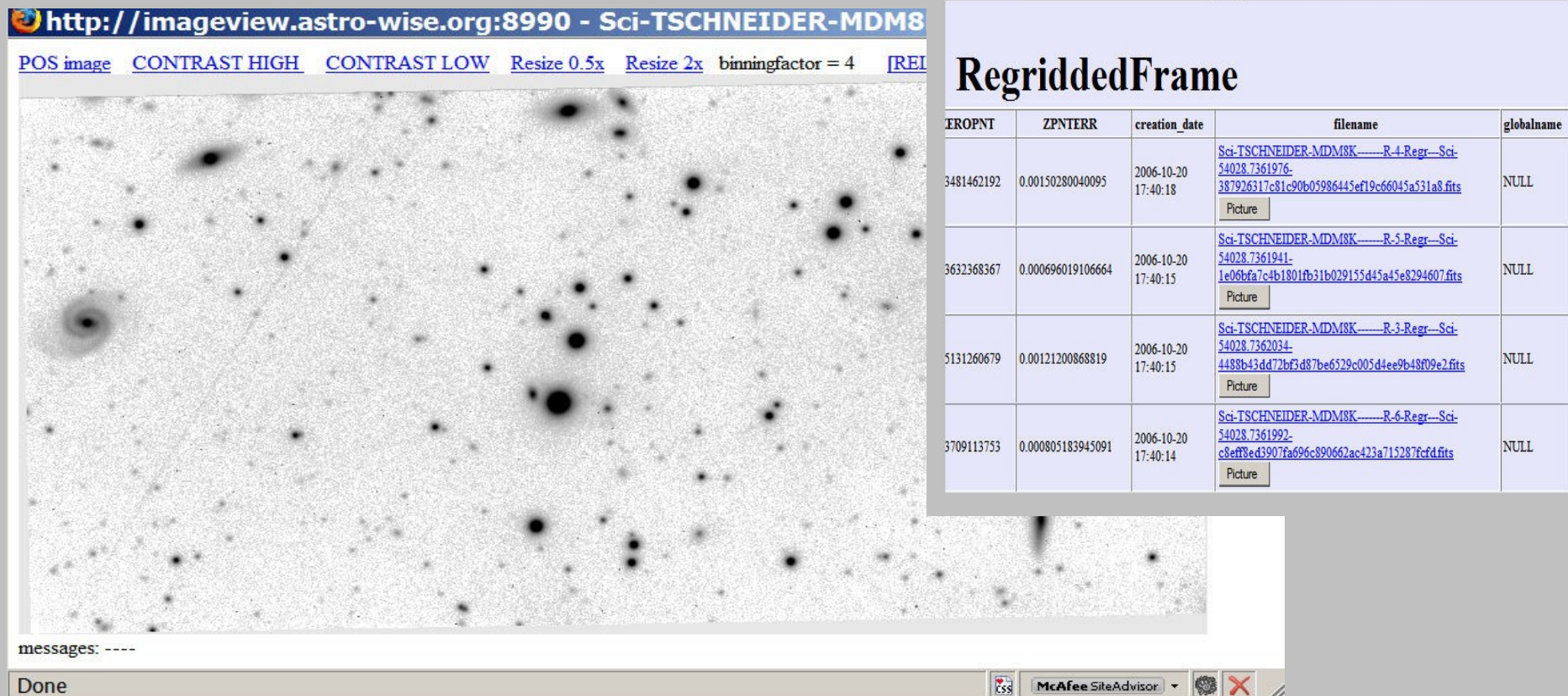
External programs are used for image-processing:

- Producing sub-images [cut-outs] (imcopy/pyFits)
- Conversion of fits-format to tif-format (stiff)
- Conversion of tif to png and jpg for web-viewing (convert)
- Compression and combination of sub-images (zip)
- Add data to fitsheader: (pyFits)

Viewing whole images

access tables in database via web-interface at <http://dbview.astro-wise.org/>

Call an image from a button in the table for on-demand processing:



The screenshot shows a web browser window with the address bar displaying <http://imageview.astro-wise.org:8990> and the page title "Sci-TSCHNEIDER-MDM8". The browser interface includes navigation links: "POS image", "CONTRAST HIGH", "CONTRAST LOW", "Resize 0.5x", "Resize 2x", "binningfactor = 4", and "[REI".

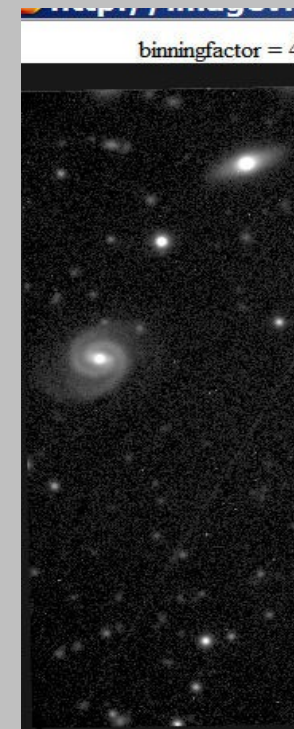
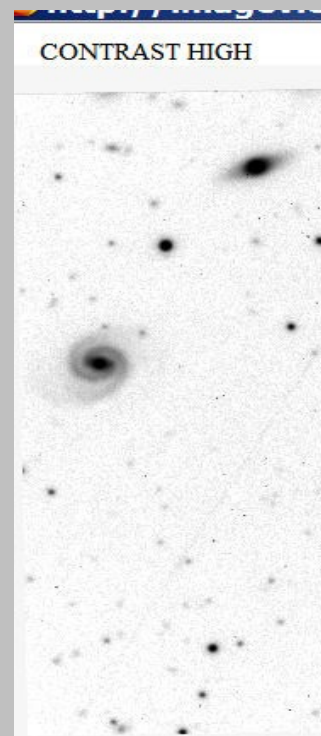
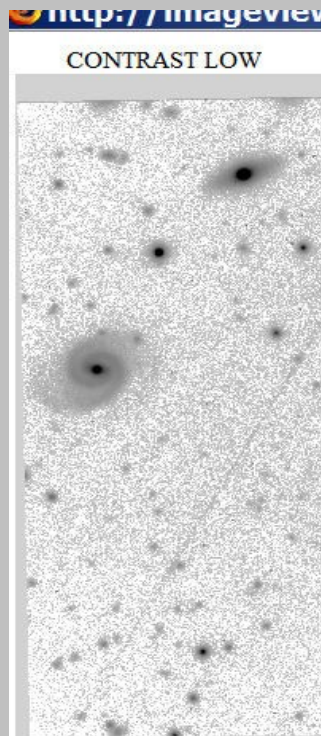
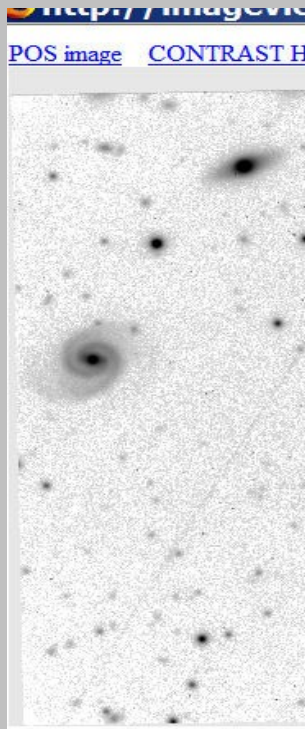
The main content area is split into two parts. On the left is a large, grainy astronomical image showing a field of stars. On the right is a table titled "RegriddedFrame".

EROPNT	ZPNTErr	creation_date	filename	globalname
3481462192	0.00150280040095	2006-10-20 17:40:18	Sci-TSCHNEIDER-MDM8K-----R-4-Regr--Sci-54028.7361976-387926317c81c90605986445ef19c66045a531a8.fits Picture	NULL
3632368367	0.000696019106664	2006-10-20 17:40:15	Sci-TSCHNEIDER-MDM8K-----R-5-Regr--Sci-54028.7361941-1e06bfa7c4b1801fb31b029155d45a45e8294607.fits Picture	NULL
5131260679	0.00121200868819	2006-10-20 17:40:15	Sci-TSCHNEIDER-MDM8K-----R-3-Regr--Sci-54028.7362034-4488b43dd72bf3d87be6529c005d4ee9b48f09e2.fits Picture	NULL
3709113753	0.000805183945091	2006-10-20 17:40:14	Sci-TSCHNEIDER-MDM8K-----R-6-Regr--Sci-54028.7361992-c8eff8ed5907fa696c890662ac423a715287fcfd.fits Picture	NULL

At the bottom of the browser window, there is a status bar with the text "messages: ----" and "Done". The taskbar at the very bottom shows the McAfee SiteAdvisor icon and other system icons.

Tweak the image

Change contrast or invert color



Find main-image and related images in object-view mode

Follow the dependency-tree in objectview

```

Main-Object : CoaddedRegriddedFrame
|- astrom.CRVAL2      | 9.5237674
|- astrom.CRVAL1     | 187.37622
|- NAXIS1            | 27003
|- NAXIS2            | 11754
|- OBJECT            | P3 Ha 300s;P3 Ha 600s
|- ZEROPNT           | 0.0
|- ZPNTERR           | 0.0
|- ccds              | (, [])
|- creation_date     | 2006-07-31 18:06:50
|- filename           | Sci-PHERAUDEAU-WFC-----197---Coadd---Sci-53947.7489918.fits Picture

|- globalname        | NULL
|- is_valid           | 1
|- process_status    | 1
|- psf_radii_per_ccd | ((, ), [])
|- psf_radius         | 1.225652
|- quality_flags     | 0
|----->
| \['regridded\_frames1'\]
| +astrom             [level : 2]
| +filter             [level : 2]
| +grid_target        [level : 2]
| +instrument         [level : 2]
| +observing_block   [level : 2]
| +process_params     [level : 2]
| +swarpconf          [level : 2]
| +weight             [level : 2]

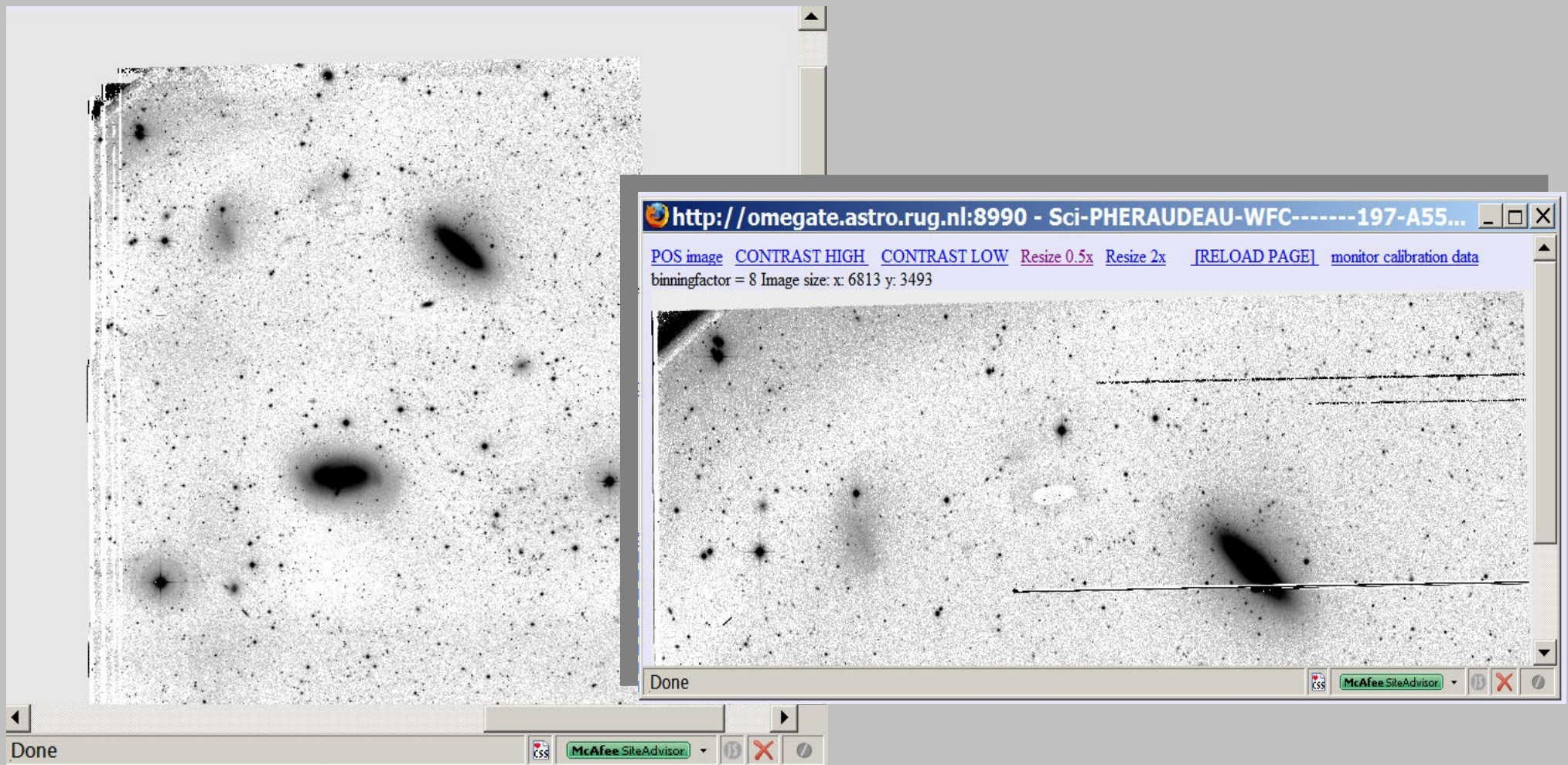
```

regridded_frames1

DATE_OBS	FLXSCALE	NAXIS1	NAXIS2	OBJECT	ZEROPNT	ZPNTERR	creation_date	filename
2006-02-20 03:41:07	6.38038779082e-13	6813	3493	P3 Ha 600s	30.4878823117	0.2	2006-07-18 15:25:13	Sci-PHERAUDEAU-WFC-----197-A5530-3-Regr---Sci-53934.6421374.fits Picture
2006-02-21 01:39:59	6.42092088955e-13	6840	3506	P3 Ha 600s	30.4810067022	0.2	2006-07-18 15:23:57	Sci-PHERAUDEAU-WFC-----197-A5382-1-7-Regr---Sci-53934.6412786.f Picture
2006-02-21 01:53:15	6.41068393667e-13	6839	3506	P3 Ha 600s	30.4827390861	0.2	2006-07-18 15:24:54	Sci-PHERAUDEAU-WFC-----197-A5382-1-7-Regr---Sci-53934.6419495.f Picture
2006-02-20 03:41:07	6.38038779082e-13	3401	6806	P3 Ha 600s	30.4878823117	0.2	2006-07-18 15:20:55	Sci-PHERAUDEAU-WFC-----197-A5383-17-7-Regr---Sci-53934.6392441 Picture

Inspect frames in dependency-tree

- Part of large (27003x11754) coadded frame in background;
Complete regridded frame (6813x3493) in foreground



Cut-out-services

- Access for webservices via separate servers: dbviewer, RGB-image-server, dependency-cut-out-server.
- Principle: generate sub-image on-demand, if not already present
- Visualize as JPG/PNG-image by web-browser
- Large cut-outs: view RGB-images
- Small cutouts: view individual sources

RGB image-, Dependency-cut-out servers interact with image-server

Separate web-interfaces At <http://process.test.astro-wise.org/RgbMaker> ,
<http://process.test.astro-wise.org/DependencyCutout>

Pseudo Color Service

TEST VERSION

This services makes pseudo color (RGB) images. First select the type of the input frames, then give three filenames to use as R(red), G(green) and B(blue) component. Or use the grid_target selector to select the input frames.

View RGB images generated by other users [here](#) !

Which type of frames to use :

RegriddedFrame
 CoaddedRegriddedFrame

Give the three filenames to use for the red, green and blue component :

Red filename
 Green filename
 Blue filename

Grid Targets

TEST VERSION

This service makes cutouts of sources. The cutouts can be from the image pipeline : RawScienceFrame, ReducedScienceFrame, BiasFrame, ColdPixelMap, MasterFlatFrame, FringeFrame, HotPixelMap, IlluminationCorrection.

Previous runs of the Dependency Cutout service can be found [here](#).

The sources can originate from a single SourceList, or from a AssociateList. Please specify whether to use a SourceList or AssociateList below.

SourceList		AssociateList	
SLID	<input type="text" value="0"/>	ALID	<input type="text" value="0"/>
SID(s)	<input type="text" value="1:6"/>	AID(s)	<input type="text" value="1:6"/>

The sources are identified by the SID(s) or AID(s), these can be specified by single numbers and/or ranges.

input	SID or AID
1:6	1,2,3,4,5,6
1,2,5	1,2,5
1:5,20,31:34	1,2,3,4,5,20,31,32,33,34

Select which cutouts to generate :

RawScienceFrame
 ReducedScienceFrame
 RegriddedFrame
 CoaddedRegriddedFrame
 BiasFrame
 ColdPixelMap
 FringeFrame
 HotPixelMap
 IlluminationCorrection
 MasterFlatFrame

animated GIF of the image pipeline cutouts

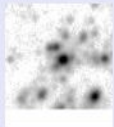
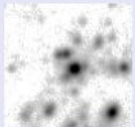
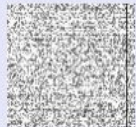

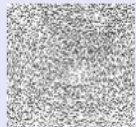


Output from RGB-cutout-server

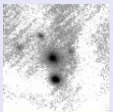
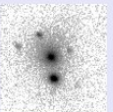
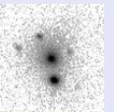
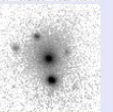






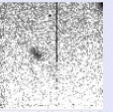
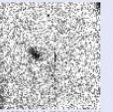

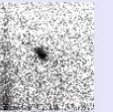


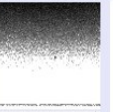


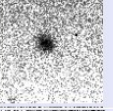
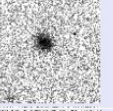
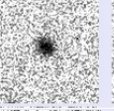
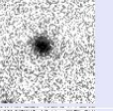
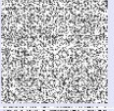




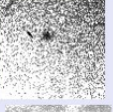
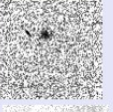
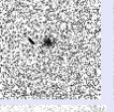
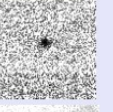




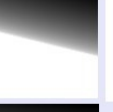
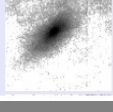
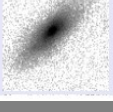
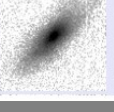




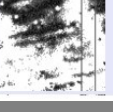


Images are combined into a jpg-picture



Links in SourceLists-4

Alternate Links-1: To dependency-server showing cut-outs from related images

RawFrame	ReducedFrame	BiasFrame	ColdPixelMap	MasterFlatFrame	FringeFrame	HotPixelMap	IlluminationCorrection
					None		

	RawFrame	ReducedFrame	RegriddedFrame	CoaddedRegriddedFrame	BiasFrame	ColdPixelMap	MasterFlatFrame	FringeFrame	HotPixelMap	IlluminationCorrection
SLID=4147 SID=0 RA=11.3289 DEC=-29.3984 X=1765 Y=84										
SLID=136151 SID=27 RA=9.5151 DEC=-28.9031 X=883 Y=45								None		
SLID=136151 SID=29 RA=9.6949 DEC=-28.9023 X=538 Y=126								None		
SLID=136151 SID=28 RA=9.8784 DEC=-28.9041 X=247 Y=96								None		
SLID=4147 SID=40 RA=11.4650 DEC=-29.3785 X=284 Y=187										

Interfacing cutout-services from tables in dbviewer

- Access image-server by HTML-links from database-tables at <http://dbview.astro-wise.org>
- SourceLists , AssociateList tables show links if fits-image is available
- on demand by controls from these tables:
 - fixed-sized cutouts
 - dependent cut-out-series

Links in SourceLists-1

Table has links and buttons to image-server if fitsfile is present

[uplink SourceList-data to Aladin sky-atlas applet](#)

[help image-cut-out-services](#)

SID	RA [deg]	DEC [deg]	A [pixel]	A_WCS	
0 ..	13.6063604196	-37.6601662225	4.44166946411	0.000293658376904	3.06
1 ..	13.6468255848	-37.6616893904	4.03187084198	0.000266564777121	1.84
2 ..	13.6469305149	-37.6621471054	1.66453170776	0.000110049542855	1.38
3 ..	13.6039116347	-37.6621415396	3.32534909248	0.000219853507588	2.49
4 ..	13.608024721	-37.6620095815	2.44054865837	0.000161355448654	1.96
5 ..	13.6420631477	-37.6619099154	1.18083047867	7.80699192546e-05	0.74
6 ..	13.6207022462	-37.6621371376	1.30694258213	8.64077446749e-05	1.13
7 ..	13.6095559049	-37.6622443485	1.96451294422	0.000129882624606	1.53
8 ..	13.6058286195	-37.6623191805	1.31185388565	8.67324561113e-05	1.30
9 ..	13.6064856265	-37.6625897325	2.00433850288	0.000132515662699	0.75

suppress image-server window, RELOAD table to view [Make cut-out-images](#)

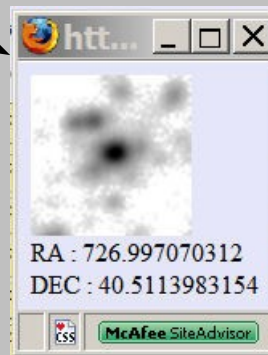
Links in SourceLists-2

- Cut-outs appear in image-server-interface, allowing free-floating popup enlargements
- Cut-outs may be shown in Sourcelist-table after reloading

click image to magnify [\[DIRECTORY VIEW \]](#)

Sci-WVRIEND-WFI-----#842-ccd52-Red---Sci-54489.457331

SLID=253461 SID=0 PIX_X=726.997070312 PIX_Y=40.5113983154	
SLID=253461 SID=1 PIX_X=242.07989502 PIX_Y=17.3874855042	
SLID=253461 SID=2 PIX_X=240.832199097 PIX_Y=10.4589500427	
SLID=253461 SID=3 PIX_X=756.372741699 PIX_Y=10.6099834442	
SLID=253461 SID=4 PIX_X=707.079345703 PIX_Y=12.6111803055	
SLID=253461 SID=5 PIX_X=299.158081055 PIX_Y=14.0685310364	
SLID=253461 SID=6 PIX_X=555.153015137 PIX_Y=10.6786851883	
SLID=253461 SID=7 PIX_X=688.733154297 PIX_Y=9.05853843689	
SLID=253461 SID=8 PIX_X=733.40222168 PIX_Y=7.92320966721	
SLID=253461 SID=9 PIX_X=725.532653809 PIX_Y=3.82867646217	



[uplink SourceList-data to Aladin sky-atlas applet](#)

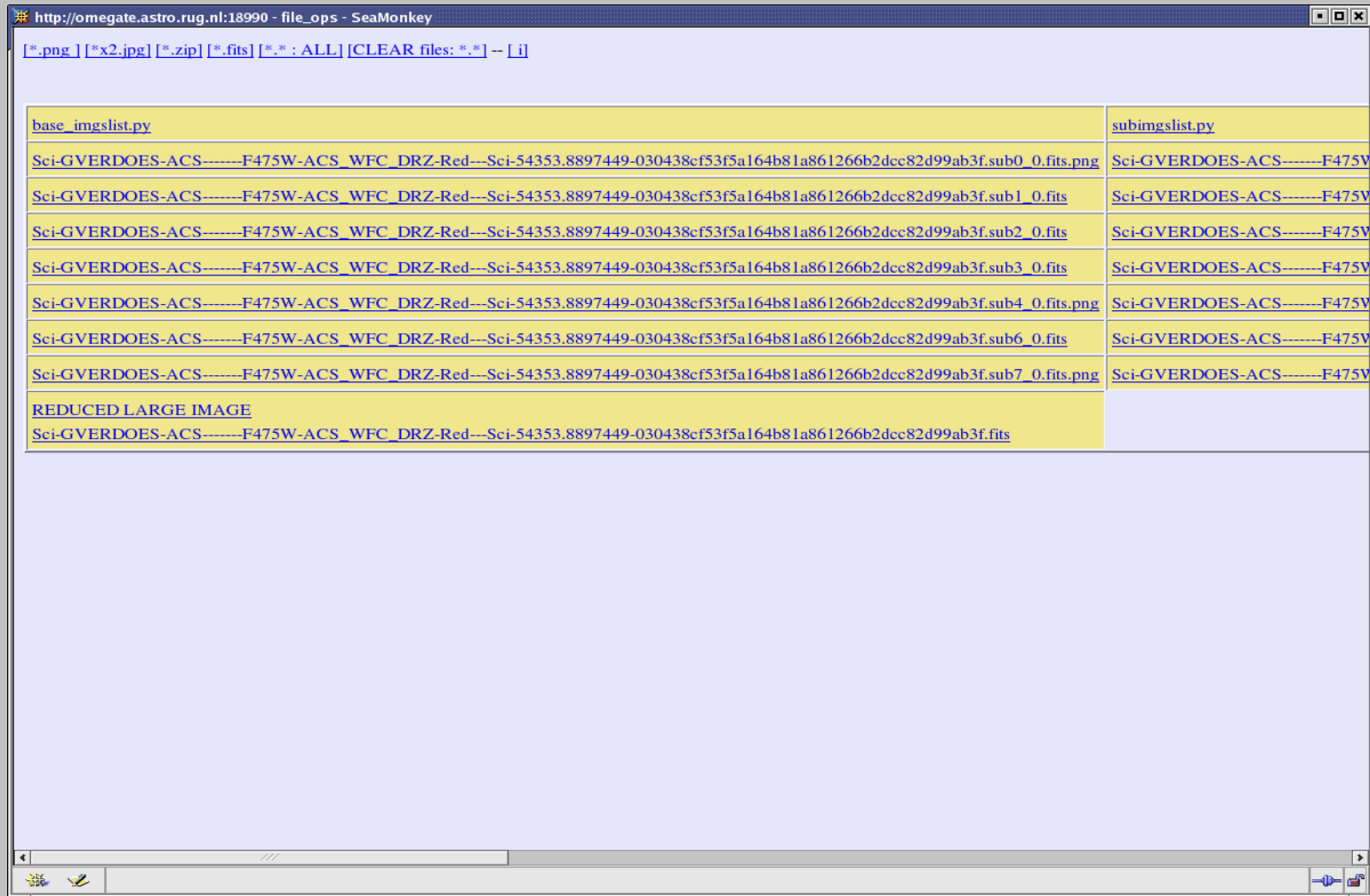
[help image-cut-out-services](#)

SID	RA [deg]	DEC [deg]	A [pixel]	A_WCS	
0 ..	13.6063604196	-37.6601662225	4.44166946411	0.000293658376904	3.0
1 ..	13.6468255848	-37.6616893904	4.03187084198	0.000266564777121	1.8
2 ..	13.6469305149	-37.6621471054	1.66453170776	0.000110049542855	1.3
3 ..	13.6039116347	-37.6621415396	3.32534909248	0.000219853507588	2.4
4 ..	13.608024721	-37.6620095815	2.44054865837	0.000161355448654	1.9
5 ..	13.6420631477	-37.6619099154	1.18083047867	7.80699192546e-05	0.7
6 ..	13.6207022462	-37.6621371376	1.30694258213	8.64077446749e-05	1.1
7 ..	13.6095559049	-37.6622443485	1.96451294422	0.000129882624606	1.5
8 ..	13.6058286195	-37.6623191805	1.31185388565	8.67324561113e-05	1.3
9 ..	13.6064856265	-37.6625897325	2.00433850288	0.000132515662699	0.7

suppress image-server window, RELOAD table to view [Make cut-out-images](#)

Links in SourceLists-3

Access-menu to cut-outs-directory for inspection and download



The screenshot shows a web browser window with the address bar displaying "http://omegate.astro.rug.nl:18990 - file_ops - SeaMonkey". The browser's status bar at the bottom shows the SeaMonkey logo and navigation buttons. The main content area displays a directory listing with the following items:

- [base_imgslst.py](#)
- [Sci-GVERDOES-ACS-----F475W-ACS_WFC_DRZ-Red---Sci-54353.8897449-030438cf53f5a164b81a861266b2dcc82d99ab3f.sub0_0.fits.png](#)
- [Sci-GVERDOES-ACS-----F475W-ACS_WFC_DRZ-Red---Sci-54353.8897449-030438cf53f5a164b81a861266b2dcc82d99ab3f.sub1_0.fits](#)
- [Sci-GVERDOES-ACS-----F475W-ACS_WFC_DRZ-Red---Sci-54353.8897449-030438cf53f5a164b81a861266b2dcc82d99ab3f.sub2_0.fits](#)
- [Sci-GVERDOES-ACS-----F475W-ACS_WFC_DRZ-Red---Sci-54353.8897449-030438cf53f5a164b81a861266b2dcc82d99ab3f.sub3_0.fits](#)
- [Sci-GVERDOES-ACS-----F475W-ACS_WFC_DRZ-Red---Sci-54353.8897449-030438cf53f5a164b81a861266b2dcc82d99ab3f.sub4_0.fits.png](#)
- [Sci-GVERDOES-ACS-----F475W-ACS_WFC_DRZ-Red---Sci-54353.8897449-030438cf53f5a164b81a861266b2dcc82d99ab3f.sub6_0.fits](#)
- [Sci-GVERDOES-ACS-----F475W-ACS_WFC_DRZ-Red---Sci-54353.8897449-030438cf53f5a164b81a861266b2dcc82d99ab3f.sub7_0.fits.png](#)
- [REDUCED LARGE IMAGE](#)
- [Sci-GVERDOES-ACS-----F475W-ACS_WFC_DRZ-Red---Sci-54353.8897449-030438cf53f5a164b81a861266b2dcc82d99ab3f.fits](#)
- [subimgslst.py](#)

At the top of the listing, there are several filter options: [\[* .png\]](#), [\[*x2.jpg\]](#), [\[* .zip\]](#), [\[* .fits\]](#), [\[*.* : ALL\]](#), and [\[CLEAR files: *.*\] -- \[i\]](#).

Links in SourceLists-5


- Alternate links-2: Export source-locations to Aladin sky-atlas to view location and distribution of cut-outs
- Communicate with VO-programs using Aladin's built-in "Plastic" -protocol

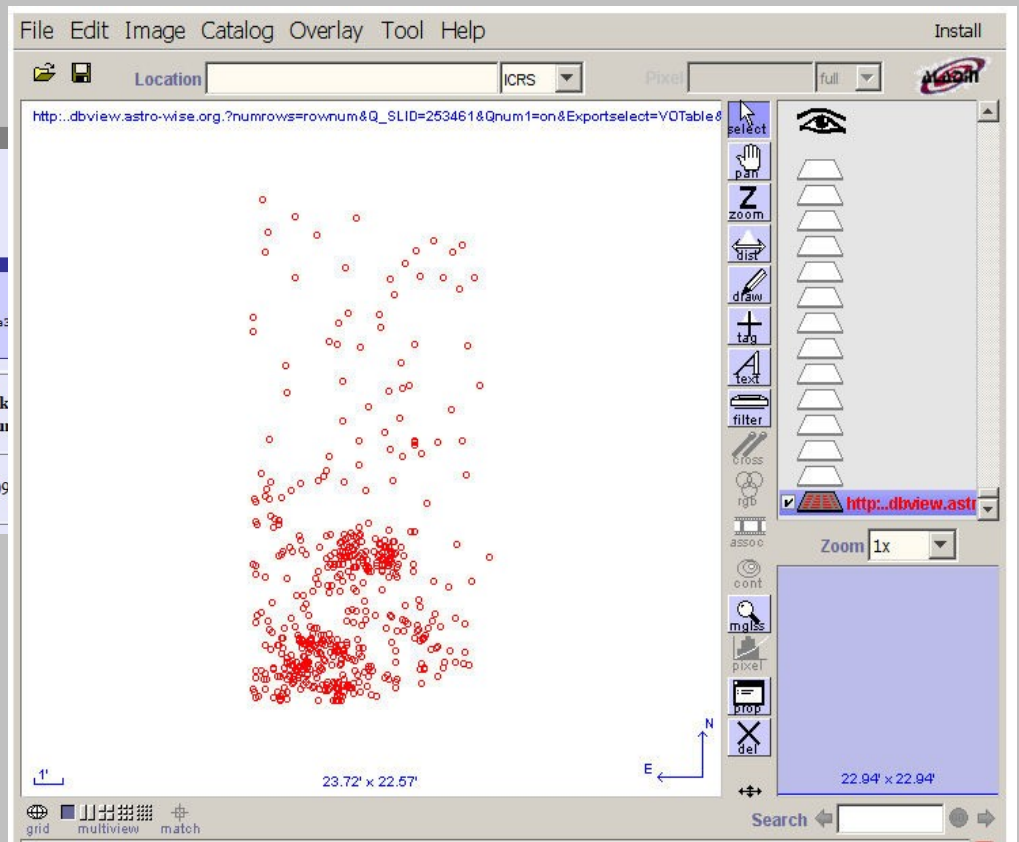
Total number of rows selected : 515 from project-context : ALL

[uplink SourceList-data to Aladin sky-atlas applet](#)

[help image-cut-out-services](#)

Export to Aladin-sky-atlas
1- Click link to load present table-data to Aladin-sky-atlas (without row-number-restriction)
2- to access the fits-image via Aladin LOAD, SERVER SELECTOR and FILE menu:
load cut-out or whole image from local directory or get whole image from
<http://ds.astro.rug.astro-wise.org/8000/Sci-WVR/END-WF1-----%23042-ccd52-Red---Sci-54489.4573311-6390ab97a>
NB images: memory-restrictions of Aladin as browser-applet may limit the workable size.
NB tables: use Aladin v.4 communication-button to interact with other VO applications [radio-dish pictogram]

SID	RA [deg]	DEC [deg]	A [pixel]	A_WCS	B [pixel]	B_WCS	Back [cou
 Q...	13.6063604196	-37.6601662225	4.44166946411	0.000293658376904	3.0658416748	0.000202696333872	182.3809



File Edit Image Catalog Overlay Tool Help

Location [] ICRS [] Pixel [] full []

http://ds.astro-wise.org/?numrows=rownum&Q_SLID=253461&Qnum1=on&Exportsselect=VOTable8

select
pan
zoom
list
draw
tag
text
filter
cross
rgb
assoc
oont
mgls
pixel
stop
del

Zoom 1x

23.72' x 22.67'

22.94' x 22.94'

Search []

Links in AssociateLists-1

Get cutout-images from associated source-lists (ALID=97961): compare related sets by AID

AID	SID	SLID	RA [deg]	Dec [deg]	RawFrame	ReducedFrame	RegriddedFrame	CoaddedRegriddedFrame	BiasFrame	ColdPixelMap	MasterFlatFrame	FringeFrame	HotPixelMap	
250	174 ..	194341	170.952095587	-21.5770332494			None	None				None		
250	143 ..	193811	170.951986509	-21.5770332494										
250	156 ..	192221	170.952077816	-21.5771916627										
250	166 ..	193711	170.952072766	-21.5772253825										
250	144 ..	193881	170.95205411	-21.5772148101										
250	155 ..	193491	170.952027883	-21.5771774606										
250	157 ..	193141	170.952050525	-21.5771693714										
250	164 ..	192131	170.952055577	-21.5771975744										
250	153 ..	194201	170.952074249	-21.577194506										

U-WFI-----#844-ccd53-Red---Sci-54360.6625883-eb4d4e51ece695437bbe608ac696530df0462da8.sub174_0.fits.SLID:174 etc

891 PIX_Y=1817.45849609

062 PIX_Y=1593.44543457

941 PIX_Y=1554.34838867

391 PIX_Y=1732.6875

082 PIX_Y=1377.75280762

996 PIX_Y=1855.76293945

938 PIX_Y=1644.74597168

734 PIX_Y=1683.15441895

684 PIX_Y=1679.91601562

215 PIX_Y=1907.70739746

RA : 1889.61962891
DEC : 1817.45849609

RA : 893.602539062
DEC : 1593.44543457











Links in AssociateLists-2

More examples of related series (marked by AID)

different epochs (ALID 3306)

AID	SID	SLID	RA [deg]	DEC [deg]	A
0	 4868 ..	20463	201.38334928	-43.1696512075	2.7
0	 5476 ..	20496	201.383378567	-43.1696431829	2.4
0	 5207 ..	20286	201.383372468	-43.1696435266	2.7
0	 4772 ..	20253	201.383362373	-43.1696454142	2.2
0	 5112 ..	20352	201.38337013	-43.1696348793	2.4
0	 2802 ..	20234	201.383404329	-43.1696296584	3.8
0	 7509 ..	20422	201.383406254	-43.1696273291	2.5
0	 5213 ..	20533	201.383378018	-43.1696330713	2.7
0	 4606 ..	20320	201.383368484	-43.1696535446	2.5
0	 5271 ..	20587	201.38341795	-43.1696349251	2.3

different filters (ALID 64471)

AID	SID	SLID	RA [deg]	DEC [deg]	A
0	 26 ..	135801	10.5160903384	-28.9063052094	1.93
0	 26 ..	135591	10.851568552	-28.9025545112	2.57
0	 1 ..	135611	11.0233793185	-28.9073823568	4.76
1	 1 ..	135801	10.6902055414	-28.9062582895	2.47
1	 2 ..	135611	10.941408324	-28.9110374686	6.48
1	 1 ..	135591	10.6902517643	-28.9062926261	4.05
2	 23 ..	135801	10.6646641242	-28.9071070595	3.65
2	 35 ..	135591	10.9298555855	-28.8998316828	0.95
2	 3 ..	135611	10.9610869014	-28.9126911772	5.32
3	 40 ..	135801	10.8284716796	-28.9045897778	2.95

options

Options for more control:

- log/ speed issues:
 - select cutout-operation by py-fits (data-servers) or imcopy (image-server)
 - show speed of operations of individual steps
 - access log of image-operations
- Setting size and format: use image-client from python- or AWE- prompt instead of browser (see previous workshop).

Next steps: customizing interfaces

Individual tables can be fitted with alternative links, for instance:

- GalfitModel: Links to models
- SourceList: Multiple links to tables, pictures, graphical interfaces

Conclusion

- Image-services for ASTRO-WISE are provided from multiple interfaces
- viewing fits-files in web-browser-compatible format allows working with large images
- Image-services accessed from web-interfaced database-tables and -trees enable efficient support for large surveys