



# **ASTERICS - H2020 - 653477**

# An introduction to the CDS services and tools

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Jenny G. Sorce updated with a new template for ASTERICS with the new CDS portal, new plots

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# Contents

1	Introduction	3
2	Goal of this tutorial	3
3	Search for information on NGC4039 in the CDS Portal3.1SIMBAD - Identifiers, Basic Measurements and links to the Bibliography3.2Aladin - Images3.3VizieR - Catalogs	<b>3</b> 4 5 6
4	Search for data on NGC4039 in Aladin	7
5	Compare the coverage of Sky Surveys and select interacting galaxies that have SDSS and GALEX data	9
6	Collect information on a sample of galaxies using Aladin [Optional]	12

# 1 Introduction

The CDS harbors three major programs, accessible through the CDS portal:

**SIMBAD**: The astronomical database SIMBAD contains more than 8 million objects. For each object it provides basic measurements (type, coordinates, proper motion, radial velocity, spectral type, distance, magnitude), cross-correlations and bibliography.



- **vizieR**: The vizieR catalog service provides access to about 15,000 catalogs, being the most complete library of published astronomical data tables available online.
- Aladin: The interactive sky atlas Aladin allows to visualize astronomical images and to superimpose entries from different catalogs and databases. It allows to visualize SIMBAD and VizieR information and distributed archives and databases as well as to upload own tables or images. There are two versions of Aladin: Aladin desktop and Aladin lite which runs in the browser.

Besides these tools, the CDS has been providing a cross-match service (X-match) since November 2011.

### 2 Goal of this tutorial

This tutorial shows how to use the CDS tools to gather information on specific astronomical objects. We will:

- Search for information on NGC4039 in the CDS portal
- Search for data on NGC4039 in Aladin
- Compare the coverage of Sky Surveys and select interacting galaxies that have SDSS and GALEX data

#### 3 Search for information on NGC4039 in the CDS Portal

Open the CDS Portal http://cdsportal.u-strasbg.fr/ and make a query for 'NGC4039'. The result provides an overview of the information and data available for this object in the 3 CDS services: SIMBAD, Aladin and VizieR:



Figure 1: Query for NGC4039 in the CDS Portal

#### 3.1 SIMBAD - Identifiers, Basic Measurements and links to the Bibliography

NGC4039 Q	🔸 💠 Object (Sir	nbad)	♦ Object (NED)
J2000 3 position : 12 01 53.801 -18 53 6.00	Main ID NGC 4039 Object type Galaxy in Pair of Galaxies Morphological type Sc S More info in Simbad	Magnitudes B: 11.08 R: 9.77	Main ID NGC 4039 Object type Galaxy Morphological type SA(s)m pecLINERSbrst More info in NED C

Figure 2: Result of the query for NGC4039 in the CDS Portal

• Click on **More info in Simbad** to see the full SIMBAD information on this object in a new tab.

	NGC 4039										
other query modes :	Identifier query	Coordinate query	Criteria query	Reference query	Basic query	Script submission	TAP	Output options	Help		
Query : NGC	Query : NGC 4039         C.D.S SIMBAD4 rel 1.5.10 - 2016.12.19CET10:43:26										
Available data	: Basic dat	a • Identifier	rs • Plot	& images •	Bibliogr	raphy • Meas	suremer	nts • Exter	nal archi	ves • Notes • Annotations	
Basic data :										$\Sigma_{(0)}$	
NGC 403	<b>9</b> Gal	axy in Pai	ir of Ga	alaxies							
Other object ty		•			IG (Ref	,VV), PaG (RE	(95), Ra	d (WISH)			
ICRS coord. (e	:p=J2000) :					[ ] D 2003A&				SIMBAD query around with radius 2 arcmin	
FK5 coord. (ep	=J2000 eq	= <i>2000) :</i> 12 0	1 53.8 -1	8 53 06 [ ]							
FK4 coord. (ep	=B1950 eq	= <b>1950) :</b> 11 5	9 20.0 -1	8 36 24 [ ]						Interactive AladinLite view	
Gal coord. (ep			9689 +42.		0.00547	4 [0.000030]	(	641 00 79 7	01		
Radial velocity	/ Redshift /			V.C0L		4 [0.000030]	/ Cz 1	541.00 [9.0	0]	*	
Morphological t	Morphological type: Sc D 2004ApJ602231C									10 Mar 10	
	Angular size (arcmin): 3.1 1.6 50 (-) p 2007ApJS1731856										
Fluxes (2): B 11.08 [0.21] D 2007ApJS1731856 R 9.77 [~] D 1989ESOLV.C0L											
						-				FoV: 3.09'	

Figure 3: Result of the query for NGC4039 in SIMBAD.

- Note the list of **Other object types**. These types are drawn for the literature and are stored in SIMBAD using a hierarchical classification scheme. The full list of Object Types can be found here: http://simbad.u-strasbg.fr/simbad/sim-display?data=otypes. The main Object Type of NGC4039 is **Galaxy in Pairs of Galaxies (GiP)**.
- Use the **siblings** button siblings to identify the name of the other galaxy in this interacting pair. Sorting by the number of references can help bring out the most important ones. What is the separation in arcseconds of these two galaxies?
- Use the **References** section to find the earliest listed reference in the literature to this object.

References (1086 between 1850 and 2017) Simbad bibliographic survey began in 1950 for stars (at least bright stars) and in 1983 for all other objects (outside the solar system). Sim Follow new references on this object	sort references         display         reference summary         from:         1850         to:         \$currentYear
Sort reference summaries by : (not exhaustive, explanation here)         Date       Title Abstract Keyword       In table       Score	

Figure 4: References section

• Return to the CDS portal.

#### 3.2 Aladin - Images



Figure 5: Result of the query for NGC4039 in the CDS Portal

- A DSS (Digitize Sky Survey) image of NGC4039 is shown.
- Note that you can zoom on the image by scrolling your mouse.
- Other images can be displayed by selecting them in the left column.
- Restricted searches on wavelength and resolution are possible by ticking/unticking the boxes in that same column.

#### 3.3 VizieR - Catalogs

02 VizieR Catalogs within	radiu	IS 0.20°			⊞ 0	
Wavelength	۲	Popularity 🤤 Q Search: Title	N	Vission		
Infrared 37		📩 The USNO-B1.0 Catalog (Monet+ 2003) 🚯	ROSAT	10		
Gamma-ray 1 X-ray 37		🜟 UCAC4 Catalogue (Zacharias+, 2012) 👔	XMM Hipparcos	6		
UV 5		The NOMAD Catalog (Zacharias+ 2005)	HST	5		
Optical 116 Radio 30		The Guide Star Catalog, Version 2.3.2 (GSC2.3) (STScI, 2006) (1)	Swift	3		
6 Rows # 20 40 60 80 10	0		⊘13 Rows ∨7 More	# 2 4	6 8 1	
Astronomy keywords	۲	★ Gaia DR1 (Gaia Collaboration, 2016) (gaia) 🚯	Associated data			
Search 10 20 30 4	0	📩 Gaia DR1 (Gaia Collaboration, 2016) (tgas) 🚯	image spectrum	3		
Positional_Data 46		📩 Gaia DR1 (Gaia Collaboration, 2016) (tgasptyc) 🕦	timeSerie	2		
Galaxies 42 SuperNovae 28		🜟 The HST Guide Star Catalog, Version 1.2 (Lasker+ 1996) 👔	0	# 1 2	3 4	
Proper_Motions 27		★ Carlsberg Meridian Catalog 15 (CMC15) (CMC, 2011) (cmc15) (1	-	Journal		
Photometry 27			Q Search A&A	10	20 3	
Stars 18		★ AllWISE Data Release (Cutri+ 2013) (allwise) 🜖	AdA	30		
otometry:wide 18	0	🜟 The DENIS database (DENIS Consortium, 2005) (denis) 🕦	ApJ	24		
#rows		AAVSO Photometric All Sky Survey (APASS) DR9 (Henden+, 2016) (apass9)	MNRAS	19		
		6	@1 Rows ~16 More	# 10	20 3	
60		📩 UCAC2 Catalogue (Zacharias+ 2004) 🚯	Sky	y fraction		
40		★ Teff and metallicities for Tycho-2 stars (Ammons+, 2006) (tycall) 🚯	150			
20		★ Teff and metallicities for Tycho-2 stars (Ammons+, 2006) (tycdwarf) (1)	100			
# 50 93 59		★ WISE All-Sky Data Release (Cutri+ 2012) (wise) f	50			

Figure 6: Result of the query for NGC4039 in the CDS Portal

- The list of catalogs is sorted by **Popularity** but can also be sorted by number of rows (**#rows**), **sky fraction** or **year**.
- Note that restrictions and filtering can be applied by clicking on the left or right columns according to your wills.
- Selecting a catalog, it is then possible to visualize it (either quickly or in VizieR), to plot it and/or to send it to the Aladin tool.

```
눚 The USNO-B1.0 Catalog (Monet+ 2003) 🚯 🎟 Quickview 🔊 🖓 🖉 Plot 👘
```

Figure 7: Selection of a VizieR Catalog on the CDS Portal.

• Actually the Antennae is listed in the Arp Atlas of Peculiar Galaxies, make a search for 'Arp' into the **Search** box.

Popularity	🖸 ja 🔍 Arp	8
	🛧 Atlas of Peculiar Galaxies (Arp 1966) (table2	2) 🚹
	🛧 Arp's Peculiar Galaxies (Webb 1996) (arplist	) 🚹
	🛧 Arp's Peculiar Galaxies (Webb 1996) (arpord	) 🚹

Figure 8: Looking for 'Arp' in the VizieR catalogs.

• Note that there are two catalogs for Webb 1996. Select the **arplist** table by clicking on it and then on This sends to the VizieR detailed query page.

- Make a first query on this table by clicking on **submit**. Examine the output as html. Go back to the previous page
- Modify the query preferences to add extra coordinate columns in J2000 decimal degrees and to obtain the whole catalog:

- Remove the restriction on searching only around 'NGC4039' by clicking on the **Clear** button below **Target Name (resolved by Sesame) or Position** at the top of the page.

- In **Preferences** on the left side of the page, add extra coordinate columns in decimal degrees by ticking **J2000** and **decimal** boxes.

- Change the maximum (**max**) number of rows to **unlimited** and tick **All columns** to get the whole catalog.



Figure 9: **Preferences** panel.

- Submit again.

- When satisfied, click on **Save in CDSportal**, then click on the **Save** button. The file is now saved in your personal user space on the CDS portal.
- Click on **Go to MyData** and download a copy in **VOTable** format on your desktop. This file will be used later in the tutorial.

Filename 🗢	Nb. rows <sup>\$</sup>	Size ᅌ	Comment 💠	Metadata	Upload date	Download 🚣
vizier_VII_192_arplist_20161220	592	176.5 KB	Your comment	Set metadat	20/12/2016 at 15:43:44	VOTable csv tsv fits

Figure 10: Personal User Space on the CDS Portal.

#### 4 Search for data on NGC4039 in Aladin

Open Aladin with at least 1GB memory allocated to the save virtual machine. To do so use the following command line: ' java -Xmx1024m -jar Aladin.jar '

Open the SERVER SELECTOR window via **File**  $\rightarrow$  **Open** or by clicking the **File** icon  $\checkmark$  at the top left corner of the Aladin window. The SERVER SELECTOR provides access to **Images servers** on the left, **Catalog servers** on the right and to a range of services including **all VO** at the top.

		Serv	er selector			
	Others	🔊 File 🥌	all VO	tch	Tools	]
Image servers		Aladin image	ge server 🕜			Catalog
	Step 1	Specify a target/	radius and pres	s SUBMIT		
Aladin images	Target (ICRS, nam	e) NGC4039		Gra	b coord	
mayes.						
SkyView	Search cone	0 arcmin				Survey
	>>> Step 2: load	one or several im	ages	Hierarchical v	iew	
UKIDSS	SURVEY	COLOR	SIZE	OBS ID	RES	Mission
	2MASS	K(IR K)	8.6' x 17.1'			
Sloan	2MASS	H(IR H)	8.6' x 17.1'	9903205_HI06902	21 1.1	MINBAD
	2MASS	J(IR J)	8.6' x 17.1'	9903205_JI06902	21 1.1	-
DSS	SERC	I-DSS2(0.807um)	13.0' x 13.0'	\$572	1.1	
Nº NO	AAO	R-DSS2(0.64um)	13.0' x 13.0'	572	1.1	MED
VLA	SERC	J-DSS1(0.468um)	14.2' x 14.2'	572	1.7	SkyBo
7	SERC	J-DSS1(0.468um)	1.7° x 1.7°	572-LOW	6.8'	экуво
rchives	SERC	I-DSS2(0.807um)	6.5° x 6.5°	572-PLATE	24.:	Gaia
1	AAO	R-DSS2(0.64um)	6.5° x 6.5°	572-PLATE	24.:	Calla
Others	SERC	J-DSS1(0.468um)	6.7° x 6.7°	643-PLATE	27.:	Others.
J.	IRAS-IRIS	25MU(25.0um)	12.5° x 12.5°	I144B2H0	1.5	S.
	C	Default format: 🧕	JPEG OFIT:	S		
	Reset	Clear	SUBMIT	Close	0	

Figure 11: SERVER SELECTOR of the Aladin tool, Aladin images has been selected for a query on NGC4039

- Insert in the **Target** box, 'NGC4039' in the **Aladin images** tab of the **Image server** and click on **submit**.
- Select a 13'x13' DSS image from the list and load it (tick the box and **submit** again). Note that it loads as a plane into the stack on the right panel of the Aladin window.
- Make a contour map of the image using the **cont** button **cont** next to the stack. Increase the number of contours to better represent the image.
- Overlay a SIMBAD plane showing only the galaxies by selecting the *isolatered the catalog servers* in the SERVER SELECTOR and choosing **Galaxy** as the **Display filter**.
- Change the color of the SIMBAD plane using the button **Properties**
- Using the **select** tool key, select some of the SIMBAD points and note that these are displayed as a table below the image. Note that this window can be detached with the icon .
- Select **2MASS J, H and K** bands images from the **Aladin images** tab in the SERVER SELEC-TOR window and construct a color image with the **rgb** tool **S**.
- Select an image from the Hubble Press Release images:
   File → Load Astronomical Image → Others → Hubble Press Release Images
  - or via the **Others** in the **Image servers** in the SERVER SELECTOR window.
- Compare the images in a number of different ways:
   Multiview: View → Create one view per image, or via the multiview icon at the bottom left of the Aladin image window
  - Align and scale all images by using the **match** icon below the image window match
  - Transparency overlays: return to single view mode. Change the transparency of planes in the

stack with the opacity sliders below each plane 4. Note that you can move the location of the planes in the stack.

• Search the VO for data on NGC4039:

- Use the **All VO** tab fin the SERVER SELECTOR to search for more images, catalogs and spectra.

- Make a general query for data from all the VO services accessible via Aladin by clicking on **Submit**. When a number of results have returned, click on **Stop**.

- Expand some of the nodes of the tree. Note how the Field of View from some series is displayed over the images in the Aladin image window.



Figure 12: Results of all the above mentioned steps.

- To make a restricted search use the **Detailed List**. To do so, first **unselect all**, then choose the series you want to query (note that the **Filter** text box can be used to search the list), e.g.: 'Hubble Legacy Archive', 'Skyview Virtual Observatory', 'Chandra X-Ray Observatory Data Archive'.

- **Submit** (bottom of the SERVER LIST) to load selected images.

- Display the images in **multiview** mode and note that you can align all the images to the same orientation and scale using the **match** icon.

• Now delete all the planes in your stack before continuing. This is not mandatory but it will free some useful memory space and allow you to proceed more easily with the next steps.

# 5 Compare the coverage of Sky Surveys and select interacting galaxies that have SDSS and GALEX data

- Browse the available surveys by clicking the **HiPS** (Hierarchical Progressive Survey, see http://aladin.u-strasbg.fr/hips/ for more information) tab in the SERVER SELECTOR window.
- Select the SDSS 9 colored (Image  $\rightarrow$  Optical  $\rightarrow$  SDSS) and GALEX All Sky Imaging Survey colored (Image  $\rightarrow$  UV  $\rightarrow$  GALEX) surveys and submit.

	Server selector	
ſ	Others File File Watch OV Tools	
Image servers	° Progressive surveys (HiPS) 🕜	Catalog servers
Aladin images	Target (ICRS, name)     Grab coord       Radius     14'	
SkyView	The Image	
UKIDSS	<ul> <li>Gamma-ray</li> <li>X</li> <li>UV</li> </ul>	Missions
DSS	Optical     DSS	
	<ul> <li>SDSS</li> <li>SDSS9 colored (CDS alternative) Sloan Digital Sky Survey</li> </ul>	SkyBot
Archives	<ul> <li>SDSS9 colored <u>SLOAN Digitized Sky Survey - Healpixed E</u></li> <li>SDSS9 u <u>SLOAN Digitized Sky Survey - Healpixed by CDS</u></li> <li>SDSS9 g <u>SLOAN Digitized Sky Survey - Healpixed by CDS</u></li> </ul>	Gaia
Others	SDSS9 g SLOAN Digitized Sky Survey – Healpixed by CDS SDSS9 i SLOAN Digitized Sky Survey – Healpixed by CDS	Others
	Default format: • Preview (jpg png) Full pixel dynamic (fits)	
	Reset Clear SUBMIT Close ?	

Figure 13: Selecting the SDSS 9 colored survey

- Turn on the coordinate grid  $\frac{\text{Grid}}{\text{grid}}$ , zoom out and use the **pan** tool  $\frac{1}{\text{pan}}$  to explore the whole sky.
- Go into **multiview** mode and match the views so that they can be panned and zoomed together.
- Load the coverage map (MOC Multi-Order Coverage map) of both the SDSS and GALEX surveys from the **properties** panel for each plane and click on **Coverage**. Zoom onto the edges of the surveys and note the way the MOC represents the coverage of the surveys.

	Properties					
Properties of	the plane "SDSS9 colored (CDS alternative)"					
PlaneID:	SS9 colored (CDS alternative)					
Description:	SDSS9 color (g, r, i CDS color composition) (more)					
Acknowledgment:	Sloan Digital Sky Survey					
IVOID:	ivo://CDS/P/SDSS9/color-alt					
HiPS creator	CDS					
Release date	2016-05-29T00:46Z					
Format:	HiPS See properties					
Url:	http://alasky.u-strasbg.fr/SDSS/DR9/color-alt					
HiPS properties						
Best pixel resolution						
HEALPix NSide:	524288 (2^19)					
Coord.sys.:	ICRS					
Tile format	PNG color					
Tile width:	512 pix (2^9)					
Coverage						
Space	36.2 % of sky Coverage					
Original data						
Provenance	SLOAN – http://www.sdss.org					
Copyright	<u>Sloan Digital Sky Survey</u>					
Used projection						
.projection center	01 30 00.00 +24 37 27.5					
.method	SINUS \$					
.frame	Default \$					
Apply Bookmark Close						

Figure 14: Displaying the coverage map

• Calculate the intersection of the coverage maps of the SDSS and GALEX surveys using in the menu the item Coverage → Logical operations.

	MOC operations Specify one or two MOC planes, choose a MOC operation and press the CREATE button to generate the resulting MOC.
Plane	GALEX Allsky Imaging Survey (AIS) colored MOC - "12 01 53.80 -18 53
Plane	SDSS9 colored MOC - "12 01 53.80 -18 53 06.0"
Plane	none
Plane	none
Plane	none
OUn	ion <ul> <li>Intersection</li> <li>Subtraction</li> <li>Difference</li> <li>Complementary</li> </ul>
	CREATE Reset Close (?)

Figure 15: Building the intersection of the coverage maps

• Load the full Webb 1996 Arp catalog that you saved earlier. You can do this in one of the two ways:

- file  $\rightarrow$  load

- drag and drop on the images

Alternatively you can download again the catalog via the VizieR interface in the **Catalogue Servers** in Aladin.

• Filter the catalog to select only the sources that fall within the SDSS+GALEX MOC: Coverage → Filter a table by MOC: 425 sources are selected.

	Filtering by MOC
press the CREATE	OC and one or several catalog button to generate a new catalogue inside (resp. outside) the MOC.
MOC plane	Int GALEX Allsky Imaging Survey
Catalog plane	vizier_VII_192_arplist_20161220.v
Catalog plane	none
Catalog plane	none
Catalog plane	none
۲	inside 🔵 outside
CREATE	Reset Close ?

Figure 16: Filtering a catalog by a MOC

• Visualize the brightest (<9 mag) galaxies of the selected sources by extracting small images from the SDSS survey:

- Select the brightest galaxies using the **filter** tool **grid** filter: select the **Show brightest stars** predefined filter and edit it with the **Advanced mode** to select object with magnitude below 9. Note that the column is automatically identified with the Unified Content Descriptor ' phot.mag\* '.

- Make sure that only MOC filtered catalog is active in the stack (or other sources may also be filtered). An easy way to ensure that is to delete every catalog not useful anymore.

- Click on **Apply** and then **Export** to create a new plane consisting only of sources selected by the filter. There are 7 sources with magnitudes below 9.

lter allows you to cu	istomize and constrain the display of catalogue planes in A
operties of the filter	Filter3
	Beginner mode Advanced mode
Choose a predefined	d filter
Predefined filters	<b>\$</b>
Or enter your own fi	ilter definition
eg: \${Bmag}<10 {dra	aw red square)
Pick: Columns D	UCDs D Actions D Maths Units D
\$	[phot.mag*]<9 { draw }
Help	
Examples	
L	Save filter Load filter
Export Create	a new plane with all filtered sources
Show rainbow col	

Figure 17: Filtering a catalog by magnitude

• Make thumbnails of the selected brightest sources: Tools  $\rightarrow$  Thumbnail view generator



Figure 18: Thumbnails

## 6 Collect information on a sample of galaxies using Aladin [Optional]

Use an Aladin script to obtain DSS and SDSS image with HST, Chandra, ESO observation log overlays for each of the selected bright galaxies.

- Copy the script Arp\_script.ajs from the url http://cds.unistra.fr/tutorials/CDS-tutorial/Arp\_script.ajs to your computer. The content of the script is shown in Figure 19
- Create a folder called 'Arp' and edit the script Arp\_script.ajs to insert a path in order to save the output files, e.g. ~/Desktop/Arp.
- Open the Aladin macro controller and load the script:
  - Tools  $\rightarrow$  Macro Controller then File  $\rightarrow$  Load script
  - or cut and paste the script into the top panel of the MACROS window.

- Select all the sources in the bright galaxy catalog:
  - Right click on the plane and Select all objects in the selected planes
  - In the MACROS window: File  $\rightarrow$  Use selected plane sources as params.

- Note how the catalog columns are shown as parameters which can be referred to as \$1, \$2, etc within the script.

- Click on the first row of the parameters table and execute the script for this row: **Exec current params**.
- Optional: add an SDSS image: remove the '#' to enable download of a SDSS g-band image for each source. Note that this results in an **Could not find any data corresponding to your request** message for objects not covered by SDSS.
- Inspect the output in the Aladin window and also the files written in the Arp folder.
- Execute the script for all sources: **Exec all from current**.
- Note that the saved stack files can simply be dragged and dropped into Aladin for inspection.

Macros	
Type or load a macro script	
<i>#AJS</i> <i>#</i> reset	#AJS #
grid on	reset
# DSS image: "ARP-\$2_DSS" = get DSS.STScI(POSS2UKSTU_Red,15,15) \$3	grid on
# SDSS image: # 'ARP-52_SDSS' = get SDSS(keyword=Filter g) \$3 # SIMBAD plane # 'ARP-52_Simbad' = get Simbad \$3 5'	<pre># DSS image: "ARP-\$2_DSS" = get DSS.STScI(POSS2UKSTU_Red,15,15) \$3</pre>
# Observation Logs viz_logHST=get vizierlogHST) \$3 viz_logESO=get vizierlogESO) \$3 viz_logESnadra=get vizierlogEChadra) \$3	<pre># SDSS image: # "ARP-\$2_SDSS" = get SDSS(keyword=Filter g) \$3</pre>
sync pause 1 # Write results to files	# SIMBAD plane # "ARP-\$2_Simbad" = get Simbad \$3 5'
# export B/hst/hstlog /Users/angm/Desktop/Arp/Arp-\$2_H\$T.xml	# Observation Logs
Type or load a list of parameters	viz logHST=get vizier(logHST) \$3
Add column Clear	<pre>viz_logESO=get vizier(logESO) \$3 viz_logChandra=get vizier(logChandra) \$3</pre>
\$1 \$2 \$3 \$4 1 26 14:03:12.70 +54:2 Filter.src	Viz_iogenandra_get Vizier(iogenandra) \$5
1         20         14/03/12/10/454/2 rHtter.str           2         85         13/29/52/30/474/2 rHtter.str           3         116         12/43/39/60 +11/3 Filter.str           4         152         12/30/49/40 +12/2 filter.str           5         134         12/29/46/40 +07.5 Filter.str           6         16         11/20/14/90 +12/5 Filter.str	sync pause 1
7 37 02:42:40.70 -00:0 Filter.src	# Write results to files
Script execution Exec. current params Exec. all Exec. all from current Stop	<pre># write results to Tiles # export B/hst/hstlog /Users/angm/Desktop/Arp/Arp-\$2_HST.xml save /Users/angm/Desktop/Arp/Arp-\$2_chart.png backup /Users/angm/Desktop/Arp/Arp-\$2_stack.aj #adapt ^^^^^^ to your own path</pre>

Figure 19: MACROS window & Arp\_script.ajs