



Image Credit: Alex Cherney

Implementing an SIA1 service for CASDA

James Dempsey | 20 Oct 2022

Australia's National Science Agency





CASDA Cutout Service - Query

- Provide cutouts from curated survey datasets
- User only needs position
- Initial dataset – Rapid ASKAP Continuum Survey (RACS) Low DR 1 (Hale et al 2021)

A screenshot of the CASDA Cutout Service web interface. The form is titled "CASDA Cutout Service" and has a "Clear form" button and a "Generate cutout" button. The form fields are: "Position:" with a radio button selected for "Single"; "Object name:" with a text input containing "GUM25" and a "Resolve" button; "Right ascension:" with a text input containing "09:02:21.300"; "Declination:" with a text input containing "-48:41:54.996"; "Survey:" with two checked checkboxes: "Rapid ASKAP Continuum Survey (RACS)" and "RACS-low DR1"; and "Cutout Radius (arcmin):" with a text input containing "10".

CASDA Cutout Service

Clear form Generate cutout

Position: Single

Object name: Resolve

Right ascension:

Declination:

Survey: Rapid ASKAP Continuum Survey (RACS) RACS-low DR1

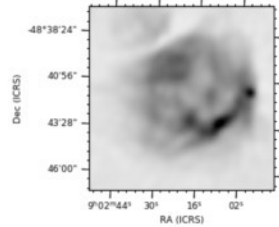
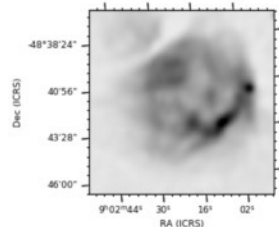
Cutout Radius (arcmin):

CASDA Cutout Service - Results

CASDA Cutout Service Results

RACS-low DR1 3

Show entries Options ▾

Title	Size	Distance (deg)	RA (J2000)	Dec (J2000)	Preview
Cutout from RACS-DR1_0913-50A.fits	225.09 KB	2.356	135.588750	-48.698610	
Cutout from RACS-DR1_0836-50A.fits	225.09 KB	4.3637	135.588750	-48.698610	

- Show cutouts from any overlapping images
- Preview generated on demand
- Immediate download



Implementation

- SIA1 – Query

- Survey – obscure query for images
- Base URL includes custom survey parameter
- A few iterations to understand parameters and meaning of output fields

- SIA1 – Retrieval

- Keep survey images online
- Produce cutouts and previews on demand
- Uses a sync endpoint so would not be suitable for large cubes



Motivation - why SIA1?

- Already run SIA2/Datalink/SODA service – well used
- Needed a survey-oriented not image-oriented service
- Guide users to best data for science use
- Supports UI but can be used elsewhere
- Other clients with SIA1 support not keen on using SIA2 service





Comparison of interactions

SIA1

1. GET query (with cutout spec)
2. For each matching image
 1. Read URL of preview row and GET
 2. Read URL of FITS cutout row and GET

SIA2

1. GET query (with cutout spec)
2. For each matching image
 1. GET datalink
 2. Find cutout preview service row and descriptor
 3. Build SODA cutout preview URL and GET
 4. Find FITS cutout service row and descriptor
 5. Build SODA FITS cutout URL and GET

See <https://github.com/ivoa-std/SIA/issues/6>



Speed hump 1

Rounding (in Postgres)

- `ROUND(distance, 4)` => "No function matches the given name and argument types. You might need to add explicit type casts."
- Postgres doesn't implement round for doubles
- Possibly an issue for VOLTT - could have this mapped to
 - `round(CAST(distance as numeric), 4)`
- Fell back to PostgreSQL specific
 - `to_char(distance, 'FM990.9999')`



Speed hump 2

Creating array values using concatenation

- `ceiling(109.2) || ' ' || ceiling(51.123) => "Unable to interpret query"`
- Fell back to PostgreSQL specific
 - `ceil(109.2) || ' ' || ceil(51.123) => '110 52'`
- Is there a better way to do this in ADQL?





Speed hump 3

Support for SQL VALUES syntax

- <https://www.postgresql.org/docs/current/queries-values.html>
- `SELECT * FROM (VALUES ('fits', 'image/fits'), ('png', 'image/png')) AS t (format, content_type)`
- Instead created a new table in our TAP service to support the formats





Thank you

CSIRO Information Management & Technology

James Dempsey
Senior Developer

+61 2 6214 2913

James.dempsey@csiro.au

casda.csiro.au



What about SIA2

- Could have
 - Add SURVEY custom keyword
 - Add cutout and cutout preview to datalink
 - Either:
 - Calculate SODA query for cutout/preview in interface layer; or
 - Include cutout spec in access URL to datalink, precalculate URLs for cutout/preview in datalink result
- Provide same data to UI