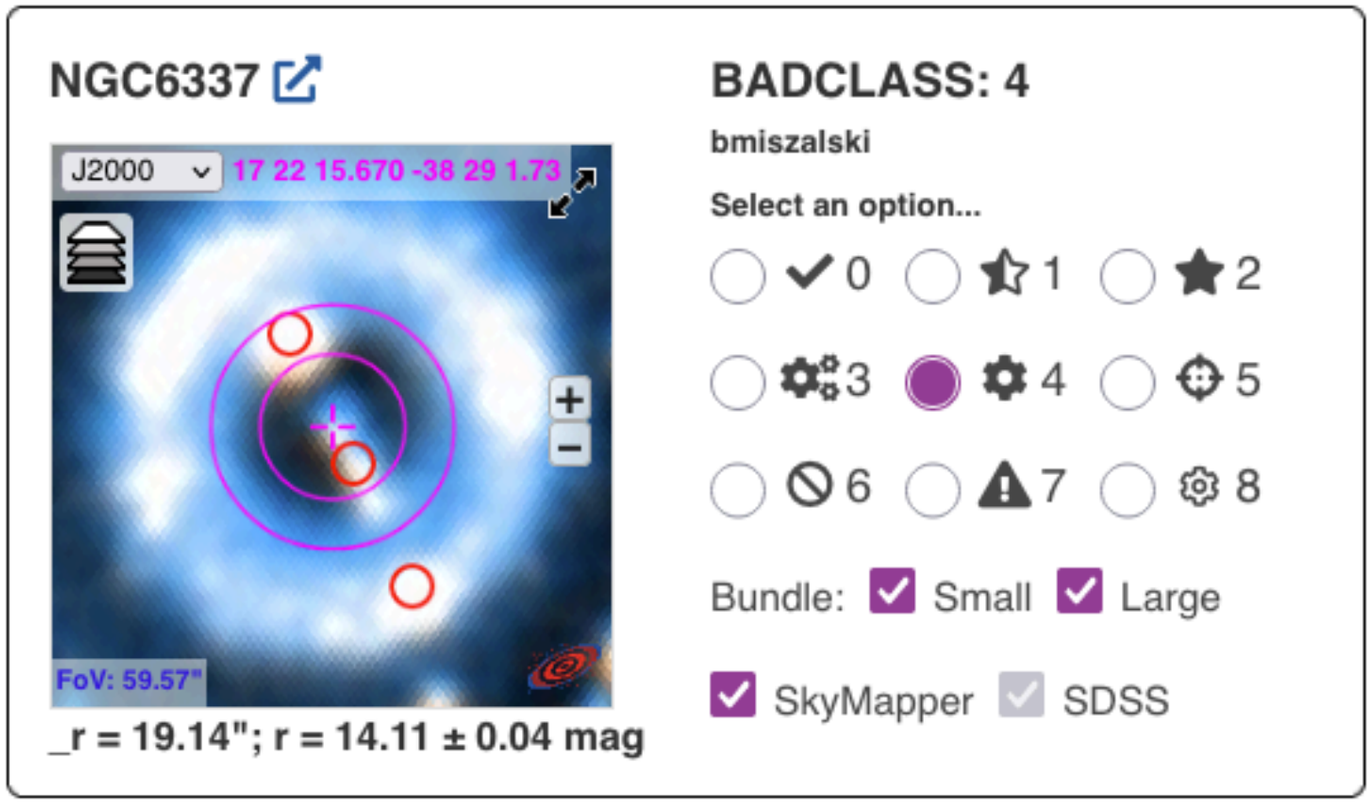
Data Central support for Hector



HECTOR Galaxy Survey

Hector observation log webapp

Dr Brent Miszalski

brent.miszalski@mq.edu.au

data central

AAO

MACQUARIE University

Overview

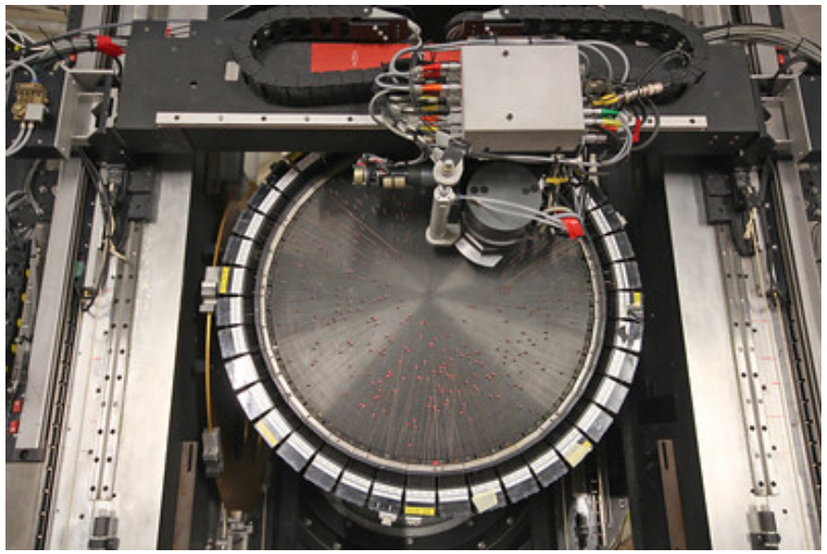
- 2dFdr automation: Pipeline as A Web Service (PAWS)
- Target Selection Application
- Observing Log Application (Kate Sheng, Data Central)
- Upgraded TAP Service

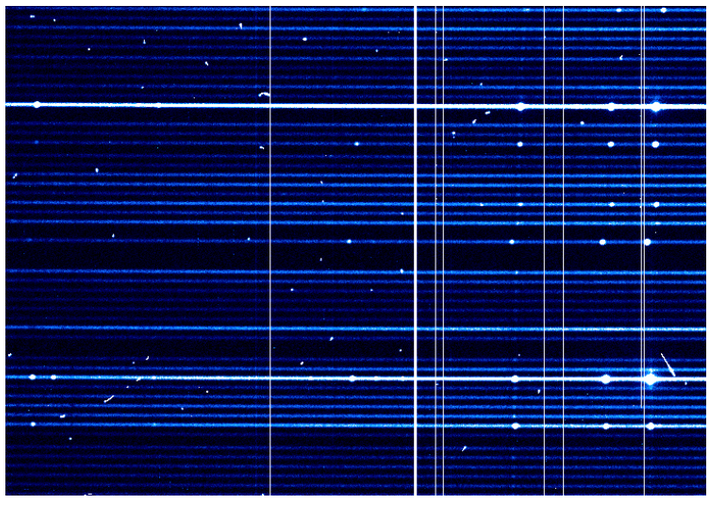
Other topics covered in recent Data Central workshop:

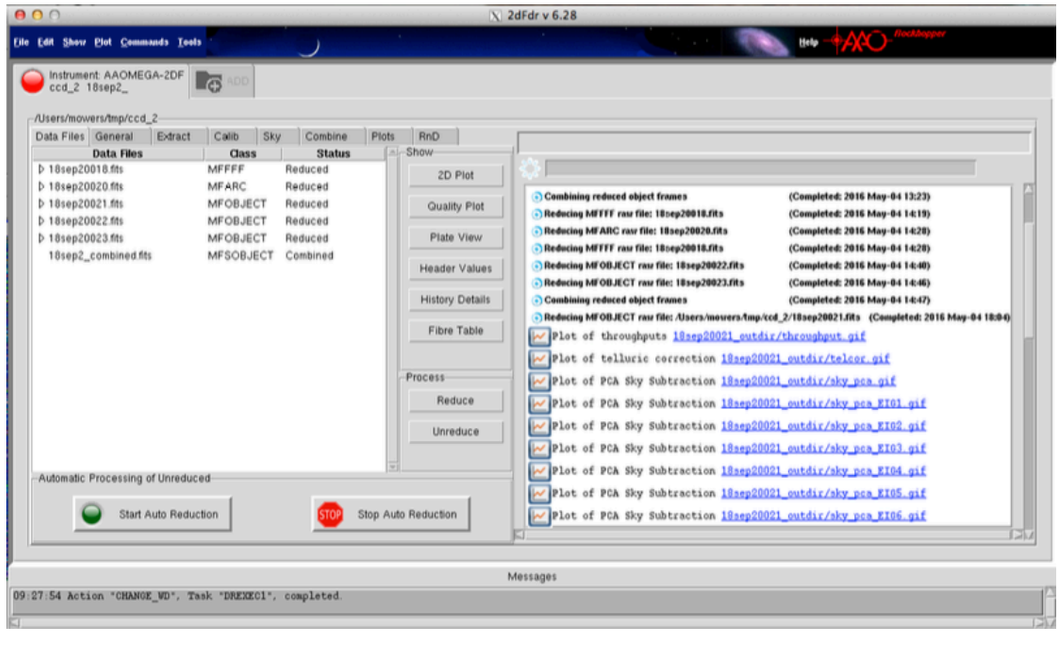
https://docs.datacentral.org.au/blog/odc-workshop-2022-program/

Part I: Pipeline as A Web Service (PAWS)

2dF data reduction



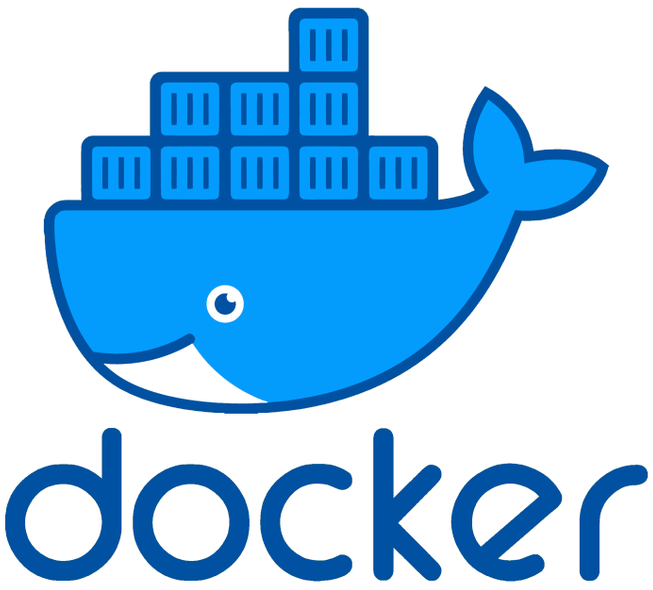




- Data reduction traditionally involves 2 steps:
  - Copy data during observing run or download from AAT archive
  - Reduce data with 2dFdr software
- This approach can be problematic:
  - Difficulties installing 2dFdr (unusual dependencies)
  - Downloading and organising large numbers of observations
  - Scripting possible via command line (aaorun) commands, but these do not scale well for multiprocessing usage. Multiple concurrent 2dFdr processes can crash for obscure reasons.
- We offer On Demand reductions for 2dF-AAOmega data:
  - No need to download data
  - No need to install 2dFdr

2dFdr Pipeline as A Web Service (PAWS)

- 2dFdr installed inside Docker image.
- Run 2dFdr commands off Docker container using Python web service, docker-py and celery (asynchronous task manager).
- **Robust:** Problematic 2dFdr commands that fail are automatically restarted by celery.
- **Fast:** e.g. reduce 960 science exposures in 48 minutes.



- **Current status:** 2dF+AAOmega reductions (beta). Proprietary data reduction supported.
- **Future plans:** Support other 2dF modes (Hermes, KOALA, etc). Adapt PAWS system to ESO pipelines (e.g. FORS, UVES, X-shooter, etc).
- **Possible Future Plans:**
  - Reduce archived 2dF observations and make available via SSA service
  - Live reductions of spectra as they are taken off the telescope.
  - Quick staging of reduced spectra (e.g. transient follow-up).

Workflow Overview

- Users do not have to select calibrations (ARC, FLAT, BIAS, DARK)
- Nearby calibrations queried: Use pandas to gather all info from AAT archive (indexed by date)
- Select calibrations closest in time to science observations
- Data grouped according to 2dF plate, grating, camera setup (camang+gratang), field (night + configure .fld name)
- Some basic 2dFdr parameters may be specified
- May still be bugs - please help test if you can at beta.datacentral.org.au

2dFdr PAWS Screenshots

New AAT archive query results

Request reductions with 2dFdr PAWS!

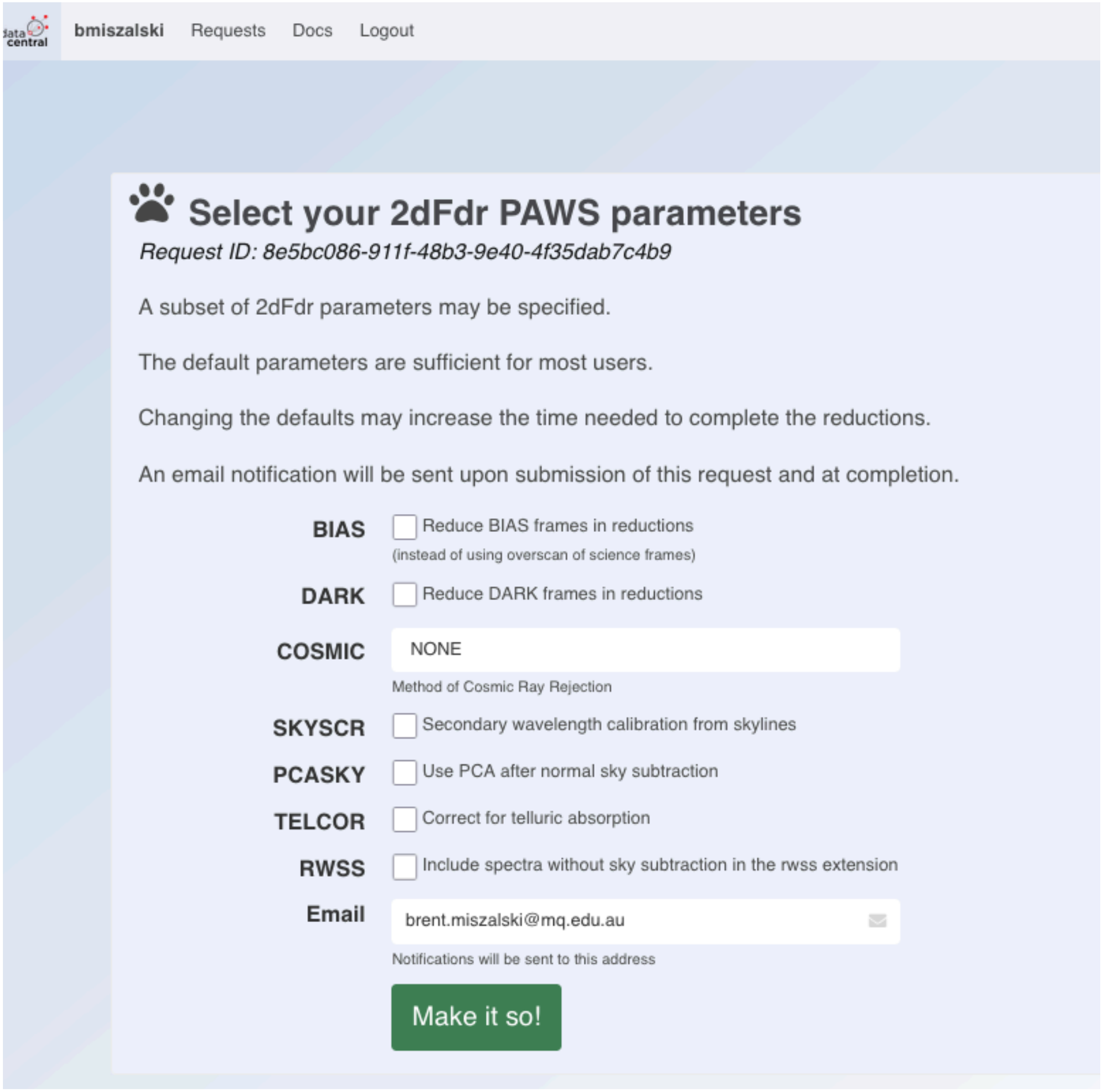
1/60 selected.

Download Files | Reduce With 2dFdr PAWS

COLUMNS FILTERS DENSITY EXPORT

fibre_table	ndf_class	targets	OBJECT	EXPOSED	obs_date
VIEW	MFFFF	VIEW	Fibre Flat Field - Quartz_20_2	4	2008-05-29
VIEW	MFARC	VIEW	ARC - FeAr_1 FeAr_2 CuAr_1 CuAr_2 CuHe_1 CuNe_1	30	2008-05-29
VIEW	MFOBJECT	VIEW	S18 MISZALSKI	1800	2008-05-29

2dFdr Parameters



Once reductions are requested, user redirected to this page

Custom reduction task manager developed for 2dFdr PAWS

Email notification

Data Central: 2dfdr PAWS reductions Inbox ×

noreply@datacentral.org.au Tue, 5 Apr, 10:19 (3 days ago)

to me

Dear Brent Miszalski,

The 2dFdr Pipeline As a Web Service (PAWS) has started to reduce your data.

You may check the status of the reductions here.

Another email will be sent to you upon completion.

Best regards,

Data Central and 2dFdr PAWS 🐾

Data Central, AAO North Ryde, Sydney, Australia

data central

Sent:

✦**At job start**

✦**At job completion**

noreply@datacentral.org.au Tue, 5 Apr, 10:23 (3 days ago)

to me

Dear Brent Miszalski,

The 2dFdr Pipeline As a Web Service (PAWS) has successfully reduced your data.

You may download the data products from here.

Best regards,

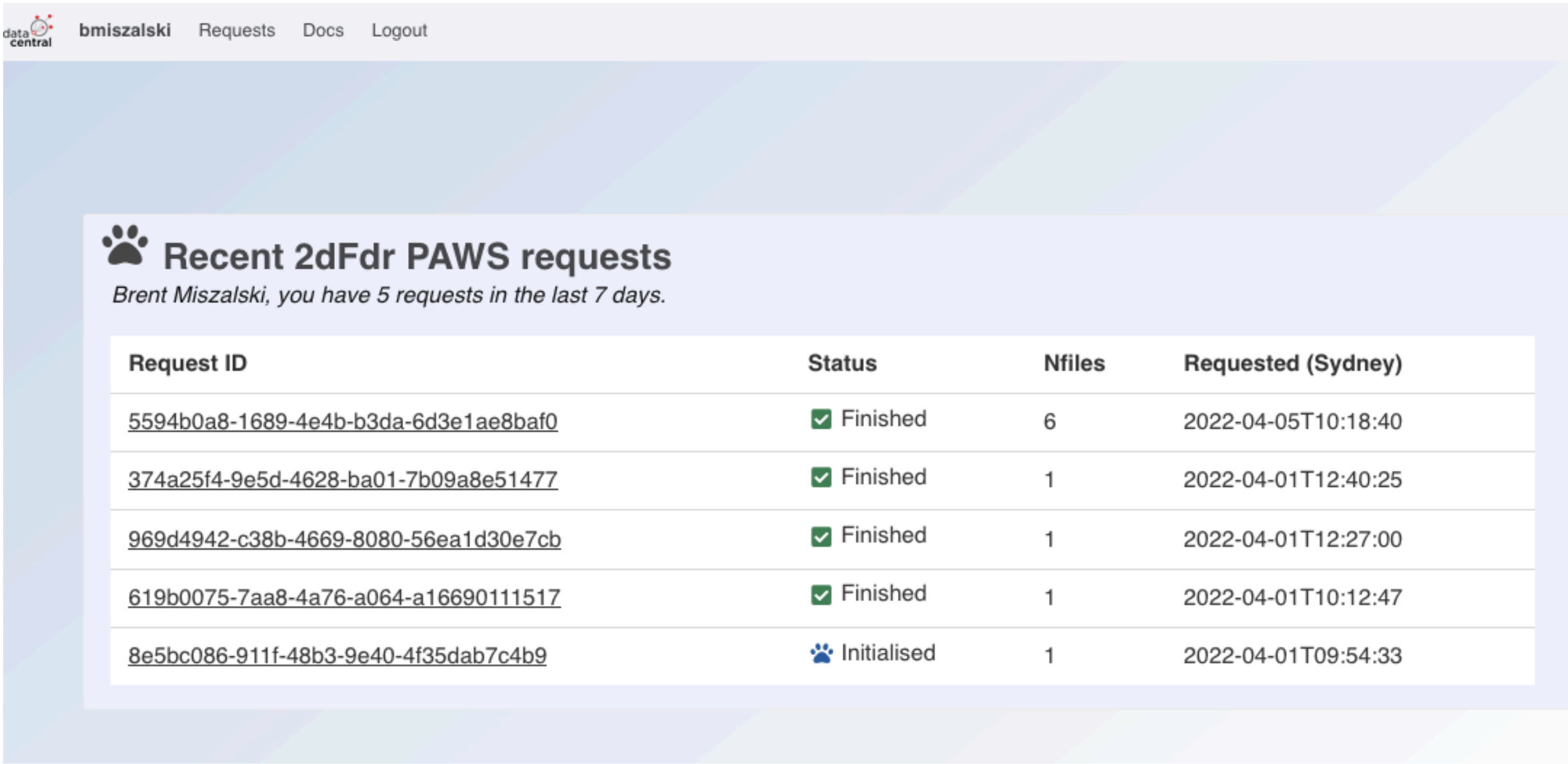
Data Central and 2dFdr PAWS 🐾

Data Central, AAO North Ryde, Sydney, Australia

data central

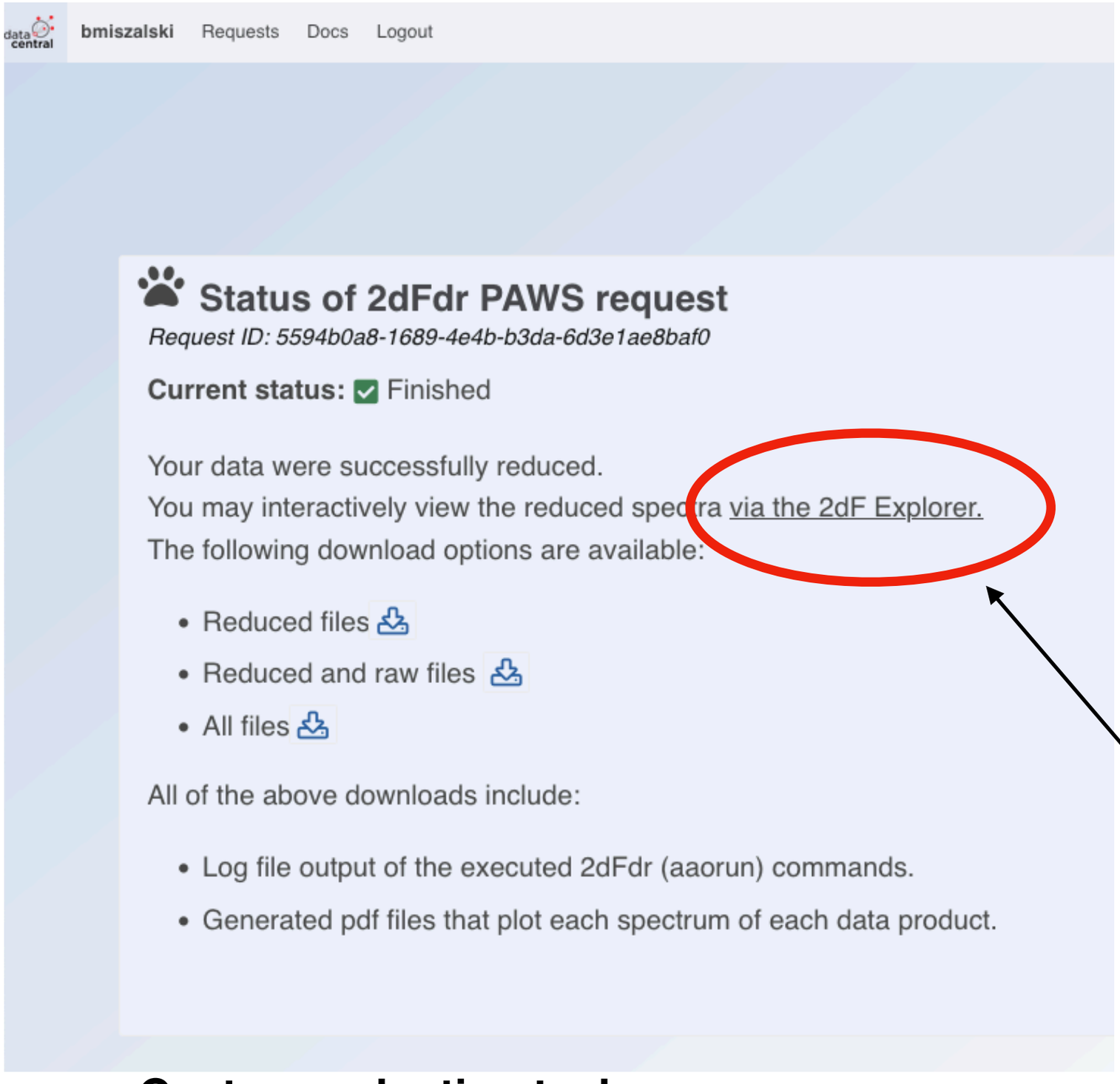
Users can keep track of the status of their 2dFdr requests

List of reduction jobs



Custom reduction task manager developed for 2dFdr PAWS

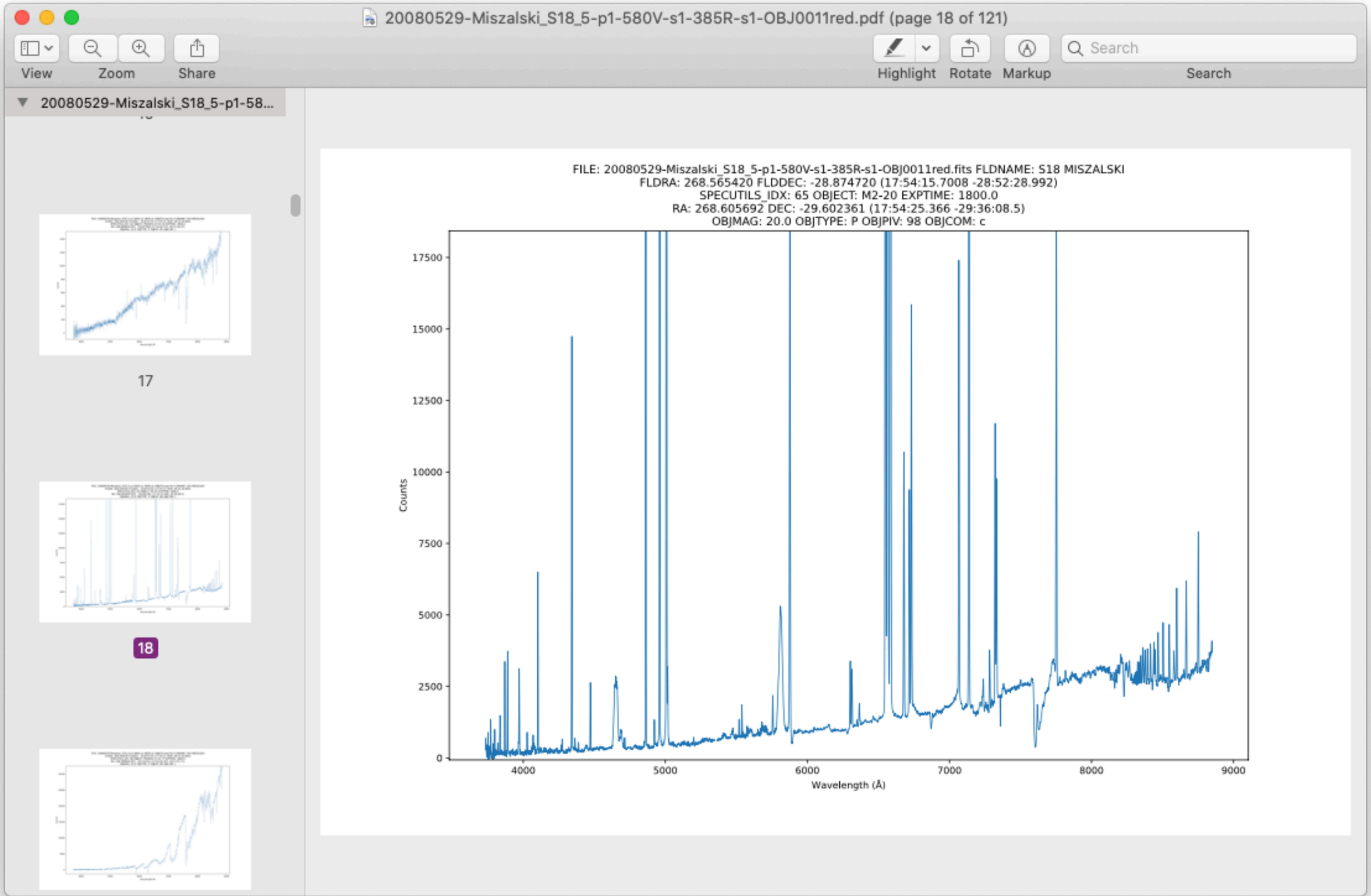
Status page of request



Custom reduction task manager developed for 2dFdr PAWS

- Users can download their data
  - Reduced files only
  - Reduced and raw files
  - Everything
- Log files and plots of spectra are included
- Users may also explore the data products interactively

Generated PDFs of all reduced spectra



2dF Explorer

data central **bmiszalski** Requests Docs Logout

Explore 2dFdr data products

Request ID: 5594b0a8-1689-4e4b-b3da-6d3e1ae8baf0

Select a data product to explore

- ✓ 1/385R/s1/20080529-Miszalski_S18_5-p1/OBJ0011red.fits
- 1/385R/s1/20080529-Miszalski_S18_5-p1/OBJ0012red.fits
- 1/385R/s1/20080529-Miszalski_S18_5-p1/OBJ0013red.fits
- 1/385R/s1/20080529-Miszalski_S18_5-p1/combined_red.fits
- 1/580V/s1/20080529-Miszalski_S18_5-p1/OBJ0011red.fits
- 1/580V/s1/20080529-Miszalski_S18_5-p1/OBJ0012red.fits
- 1/580V/s1/20080529-Miszalski_S18_5-p1/OBJ0013red.fits
- 1/580V/s1/20080529-Miszalski_S18_5-p1/combined_red.fits
- 1/spliced/20080529-Miszalski_S18_5-p1-580V-s1-385R-s1-OBJ0011red.fits
- 1/spliced/20080529-Miszalski_S18_5-p1-580V-s1-385R-s1-OBJ0012red.fits
- 1/spliced/20080529-Miszalski_S18_5-p1-580V-s1-385R-s1-OBJ0013red.fits
- 1/spliced/20080529-Miszalski_S18_5-p1-580V-s1-385R-s1-combined_red.fits

Summary

Field: S18 MISZALSKI (17:54:15.7008 -28:52:28.992) **Exp:** 1800s

Target: Click a target in Aladin lite to view its spectrum below

Users can select which data products they want to explore

2dF field position displayed in Aladin Lite

2dF Explorer

data central | **bmiszalski** | Requests | Docs | Logout

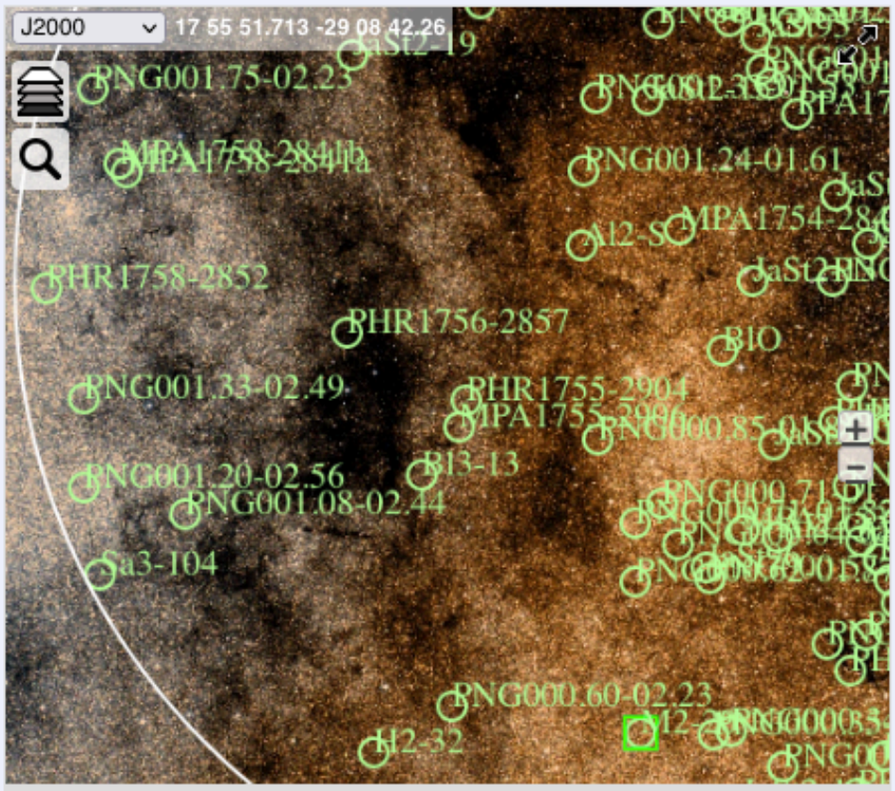
Explore 2dFdr data products

Request ID: 5594b0a8-1689-4e4b-b3da-6d3e1ae8baf0

Select a data product to explore

1/spliced/20080529-Miszalski_S18_5-p1-580V-s1-385R-s1-combined_re

Show Labels

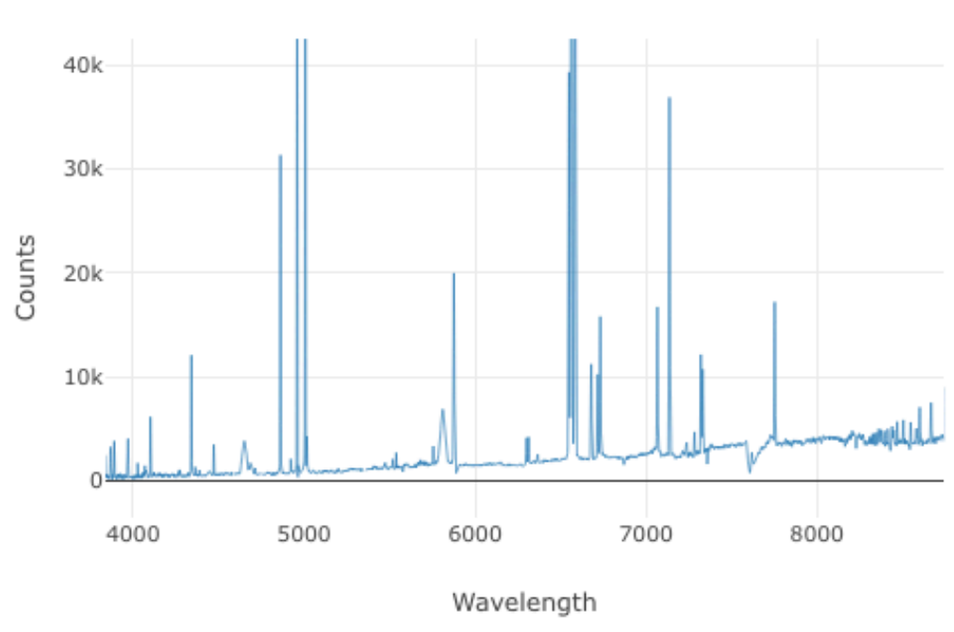


name	ra	dec	coordi…	idx	mag	comment
M2-20	268.60…	-29.60…	17:54:…	65	20	c

Interactive display of spectra with plotly.js (zoom, screenshot, etc)

Summary

Field: S18 MISZALSKI (17:54:15.7008 -28:52:28.992) **Exp:** 2100s
Target: M2-20 (17:54:25.366 -29:36:08.5) **DAS:**
Magnitude: 20 **Comment:** c



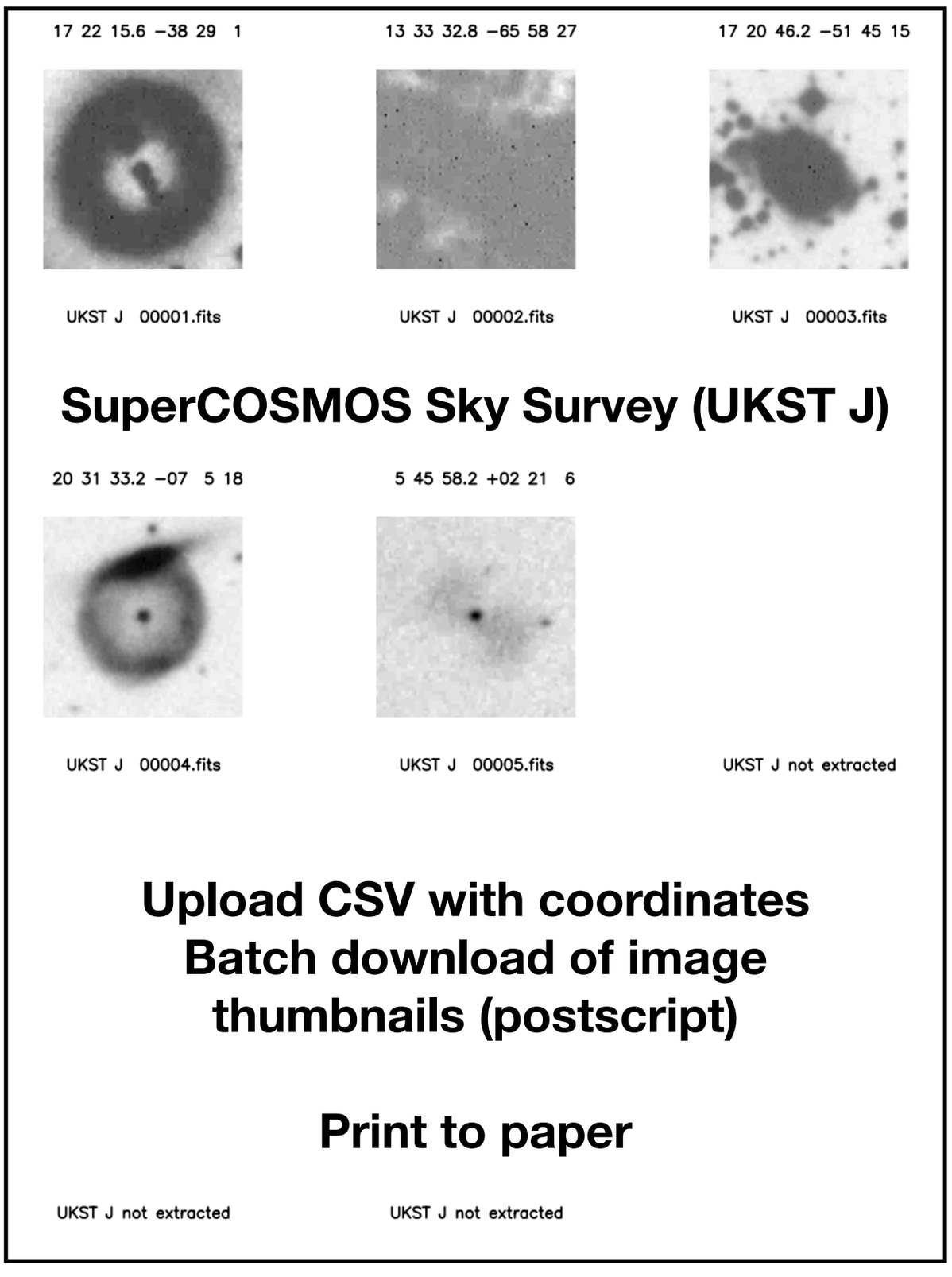
Users can click on individual fibre positions to LOAD the observed spectra

Summary

- Currently available for 2dF-AAOmega data only
- Possible to adapt to other instruments (e.g. Hector)
    - Requires additional funding and resource planning
    - Not a quick job. Additional coding and testing necessary.
- Current limitations:
    - Accessed via AAT archive (alternative: API access necessary to reduce large data volumes e.g. reduce an observing run’s worth of data in one go)
    - Proprietary data access strictly tied to LENS proposals (alternative: API Token)
    - Single 2dFdr version (alternative: multiple versions available, e.g. regression testing data reduction algorithms)

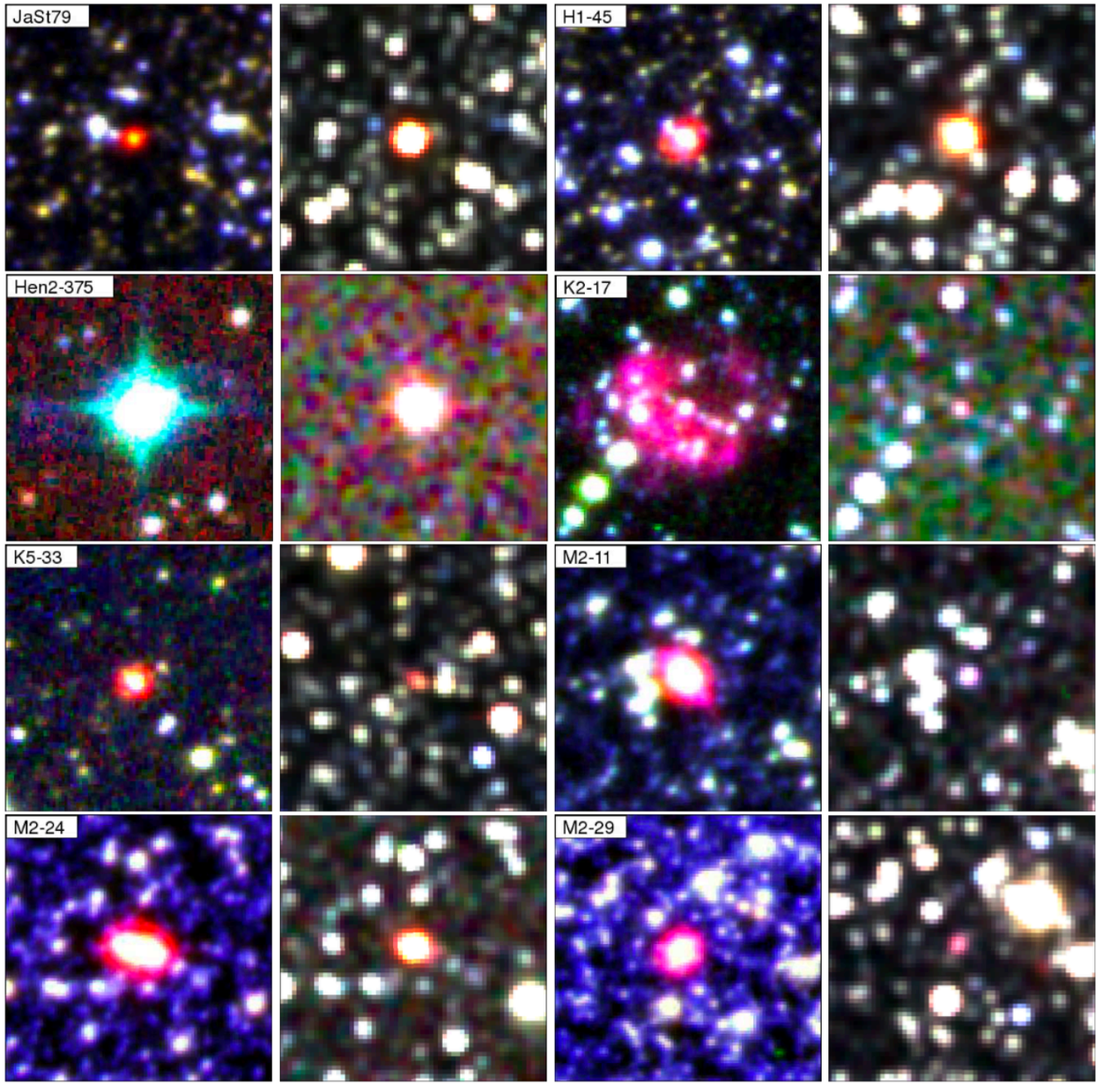
Part II: Target Selection Application

Traditional approach



SHS Halpha, SR
SSS Bj

2MASS J, H, Ks



Scripts to download data and create colour-composite thumbnails (Miszalski+2013, MNRAS, 432, 3186)

A static web page, PDF or a simple web application

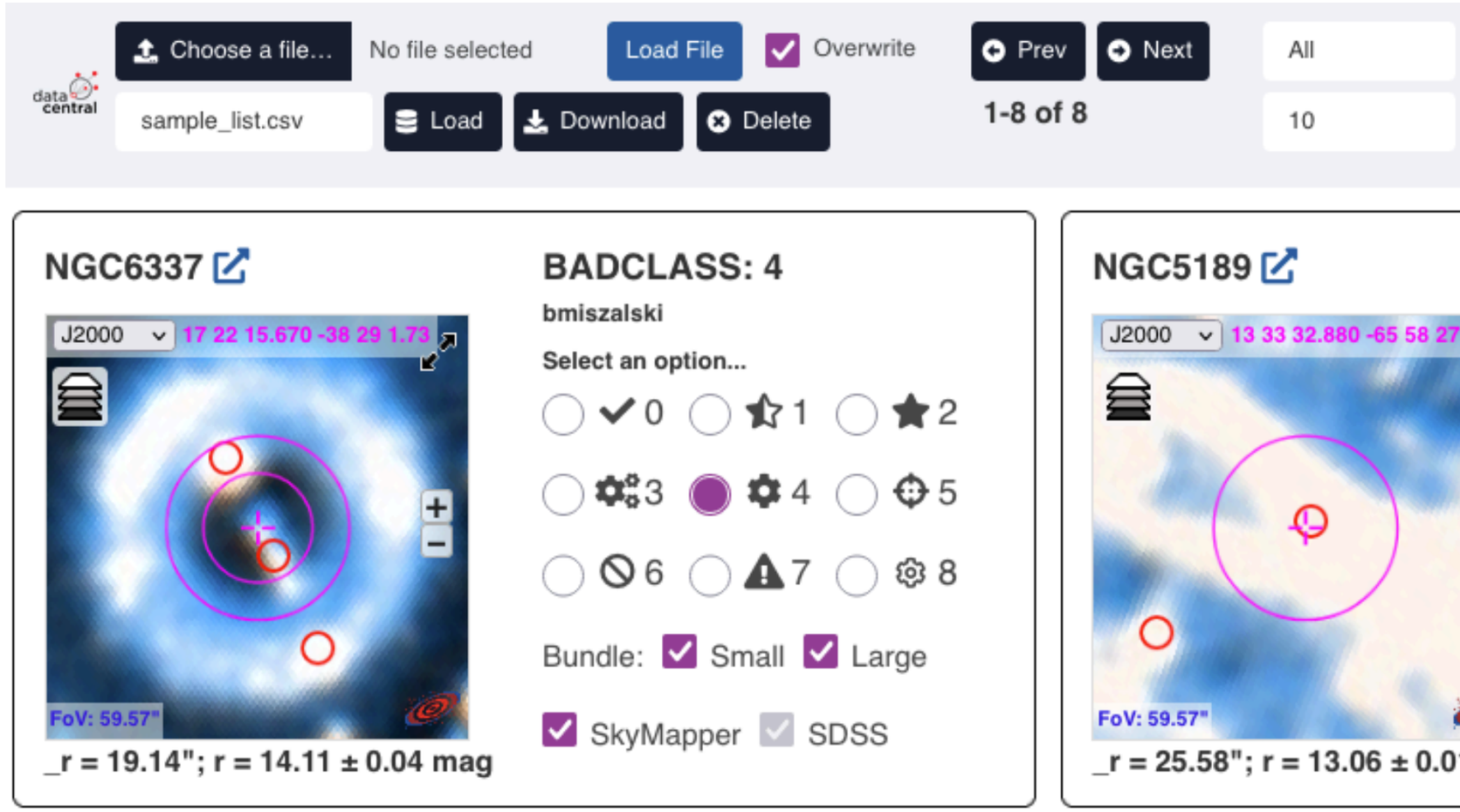
Overview

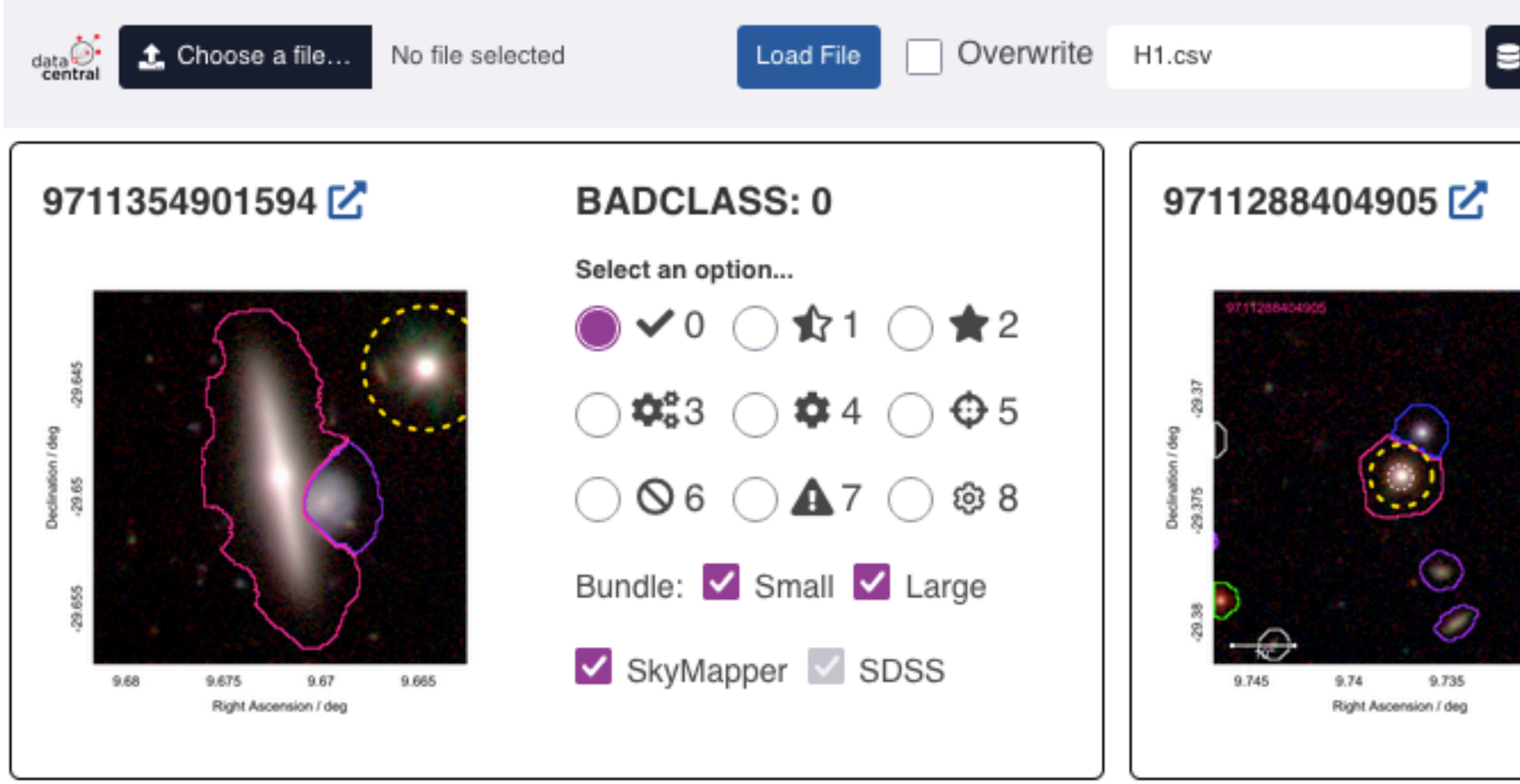
- **Target lists:** Import CSV into MongoDB database. User can classify targets and export results.

- **Aladin Lite:** Images and catalogues (**loaded asynchronously**) per target. Display instrument footprints.

- **Static images:** Can be displayed instead of Aladin Lite.

- **Filter catalogues:** Radius and magnitude cuts using pandas. Mouseover to view.





Controls

Choose CSV file

Load selected file

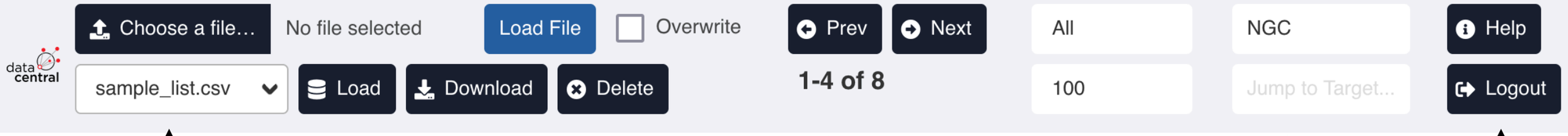
Overwrite file if already in DB

Classification filter (All, Unclassified, > 0, 1, 2, 3, 4, 5, 6, 7, 8)

Page Navigation

Target name filter

Online help (modal)



List of CSV files available in MongoDB database

Load file from database

Download CSV of selected database (includes user classifications)

Delete selected database

Target numbers displayed (Range of N Total)

Targets per page (1, 2, 3, 4, 5, 10, 15, 20, 30, 50, 100, 200)

Jump to target (resume at target of interest)

Logout (Data Central CAS server)

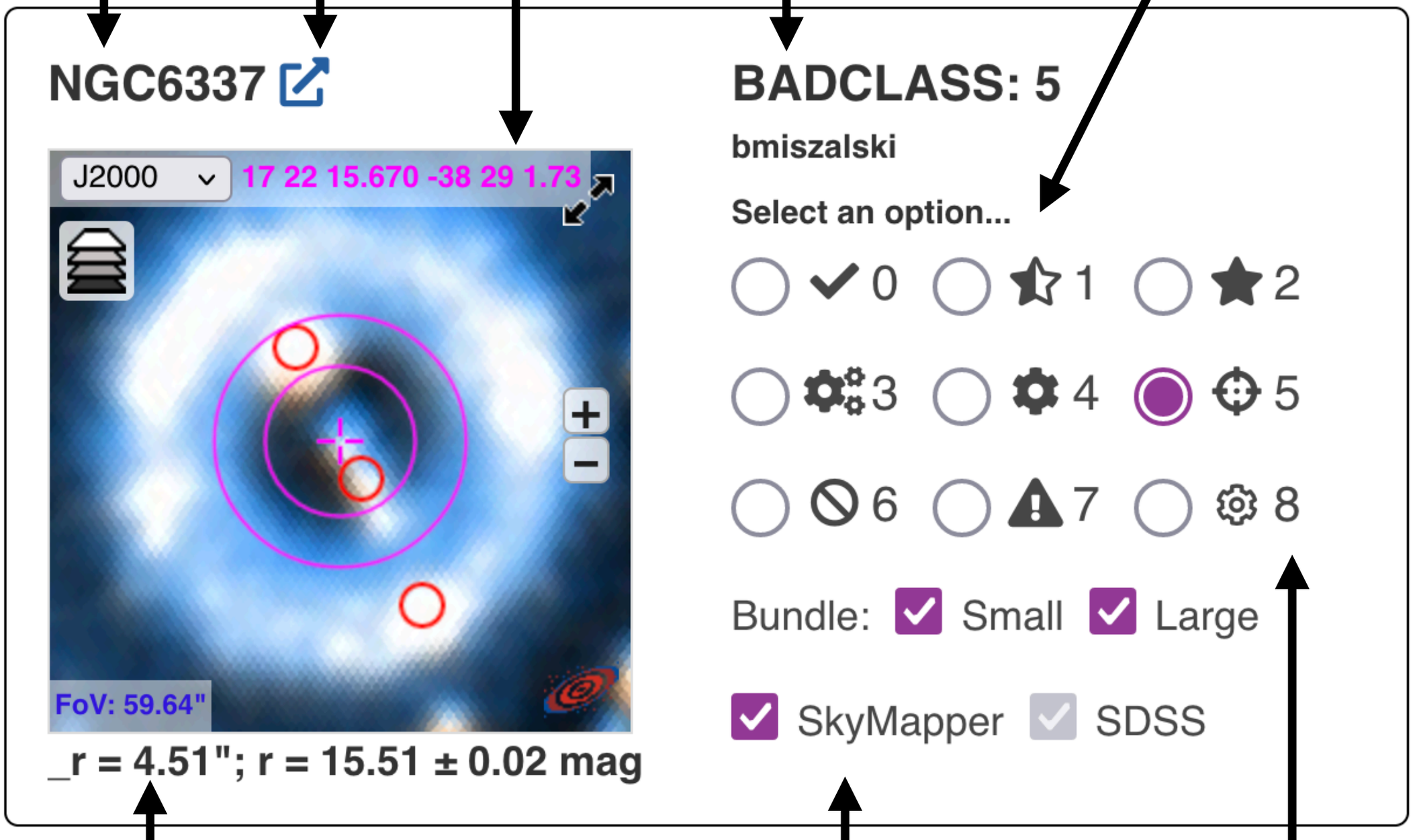
Link to target page (shareable URL)

Target name

Aladin Lite

Current classification and username of classifier

Label to remind user of class meaning (e.g. 4 - Large Galaxy)

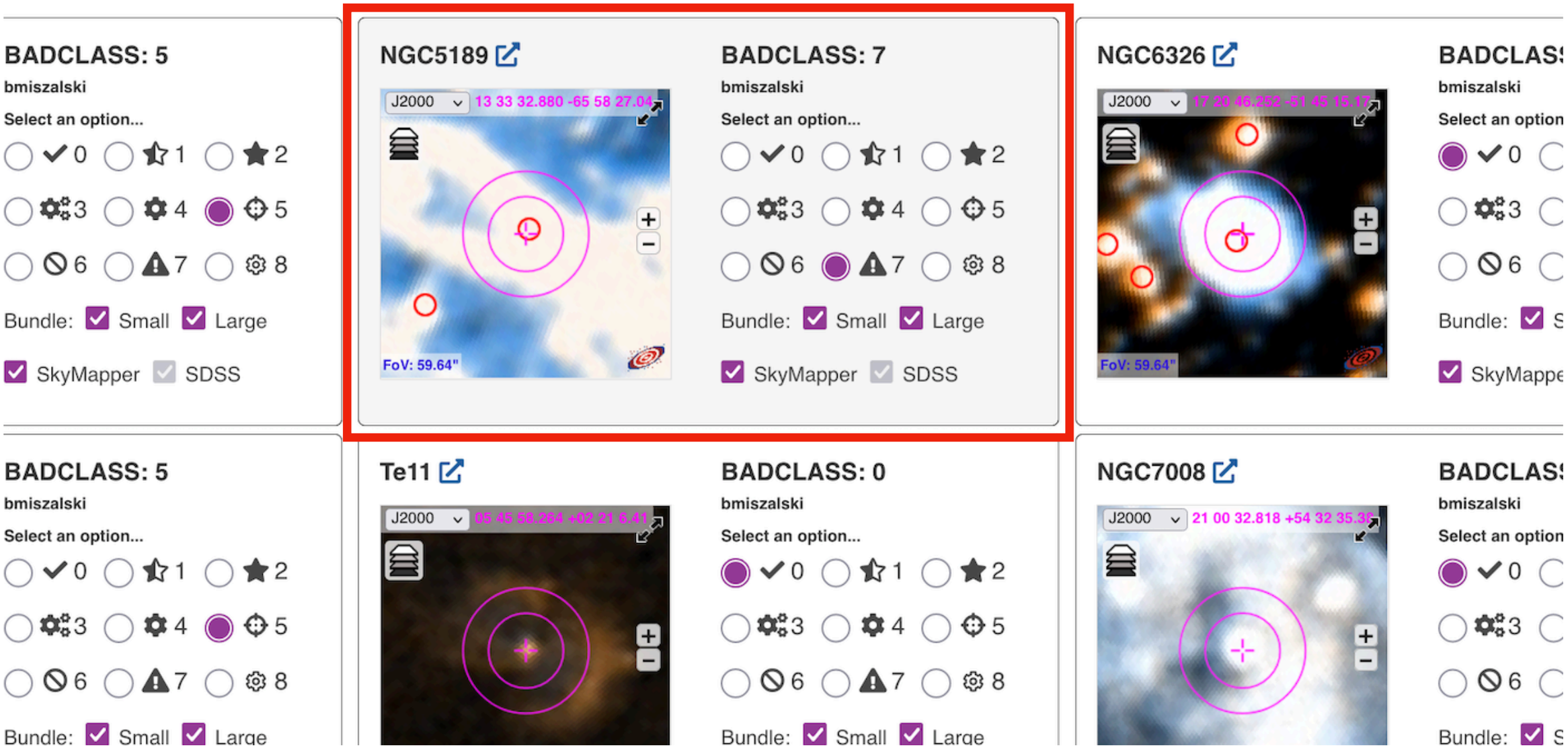


Label to display radial distance (arcsec) and magnitude of catalogued targets (updated on mouseover of target)

Toggle on/off Instrument footprints and loaded catalogues

Radio buttons to classify target

Navigation



- **Mouseover target of interest:** Active target (background shading)
- **Use 0-8 keys:** classification of active target
- **Use Left/Right keys:** Navigate to Prev/Next page of targets.
- **Number of targets per page:** 1 for keyboard only operation, or up to many per page…

Up to a few hundred per page

Targets fill page and adjust when window resized

Choose a file... pne.csv | Load File | Overwrite | Prev | Next | All | Filter Target... | Help

pne.csv | Load | Download | Delete | 101-200 of 200 | 100 | Jump to Target... | Logout

004.1-03.8 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.2-03.2 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.2-04.3 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.2-05.9 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.3+01.8 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.3-02.6 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.6+06.0 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.7-11.8 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.8+02.0 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.8-05.0 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.8-22.7 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.9+04.9 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

004.9-04.9 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

005.0+03.0 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

005.0+04.4 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

005.0-03.9 | BADCLASS: 0 | default | Select an option... 0 1 2 3 4 5 6 7 8 | Bundle: Small Large | SkyMapper SDSS

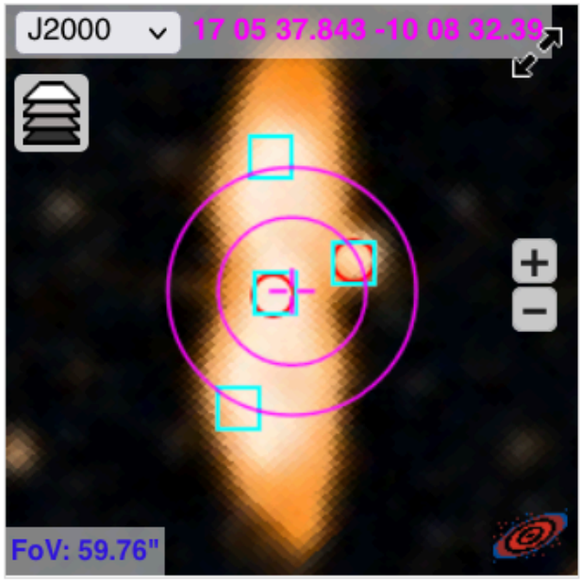
Jump to target

Enter target name
=> Navigate to its position
(resume classification from last target of interest)

Choose a file… | No file selected | Load File | Overwrite | Prev | Next | All | Filter Target... | Help

data central | pne.csv | Load | Download | Delete | 188-200 of 200 | 100 | 010.8+18.0 | Logout

010.8+18.0



BADCLASS: 0

default

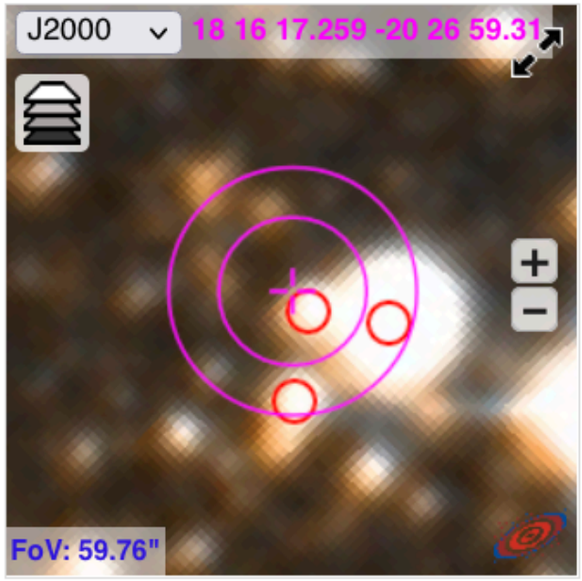
Select an option...

0 1 2
3 4 5
6 7 8

Bundle: Small Large

SkyMapper SDSS

010.8-01.8



BADCLASS: 0

default

Select an option...

0 1
3 4
6 7

Bundle: Small

SkyMapper

011.0+06.2

BADCLASS: 0

default

Select an option...

0 1 2
3 4 5
6 7 8

011.0-05.1

BADCLASS: 0

default

Select an option...

0 1
3 4
6 7

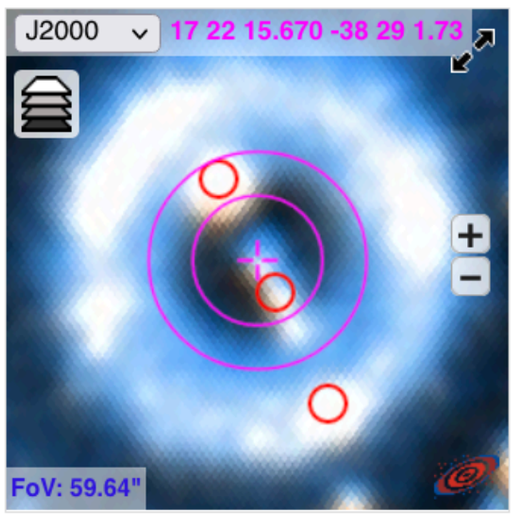
Filtering on target name

Uses pandas.Series.str.contains
(can also support regex, if needed)

Choose a file… | No file selected | Load File | Overwrite | Prev | Next | All | NGC | Help

data central | sample_list.csv | Load | Download | Delete | 1-4 of 8 | 100 | Jump to Target... | Logout

NGC6337



BADCLASS: 4

bmiszalski

Select an option...

○ ✔ 0 ○ ★ 1 ○ ★ 2

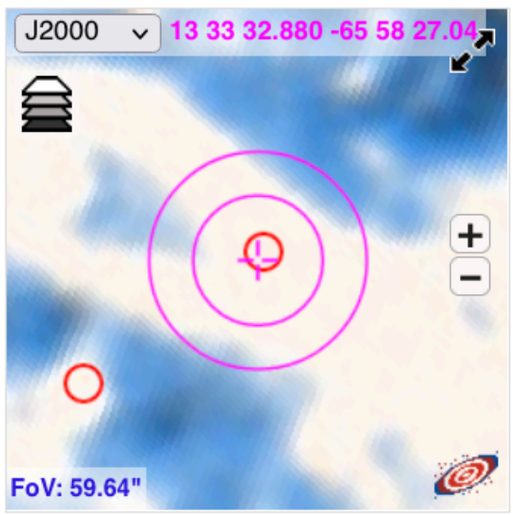
○ 3 ● 4 ○ 5

○ 6 ○ 7 ○ 8

Bundle: ☑ Small ☑ Large

☑ SkyMapper ☑ SDSS

NGC5189



BADCLASS: 7

bmiszalski

Select an option...

○ ✔ 0 ○ ★ 1 ○ ★ 2

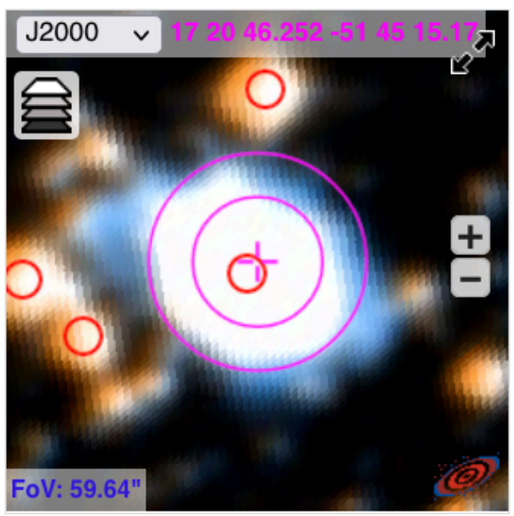
○ 3 ○ 4 ○ 5

○ 6 ● 7 ○ 8

Bundle: ☑ Small ☑ Large

☑ SkyMapper ☑ SDSS

NGC6326



BADCLASS: 0

bmiszalski

Select an option...

● ✔ 0 ○ ★ 1 ○ ★ 2

○ 3 ○ 4 ○ 5

○ 6 ○ 7 ○ 8

Bundle: ☑ Small ☑ Large

☑ SkyMapper ☑ SDSS

NGC7008

BADCLASS: 0

bmiszalski

Select an option...

● ✔ 0 ○ ★ 1 ○ ★ 2

○ 3 ○ 4 ○ 5

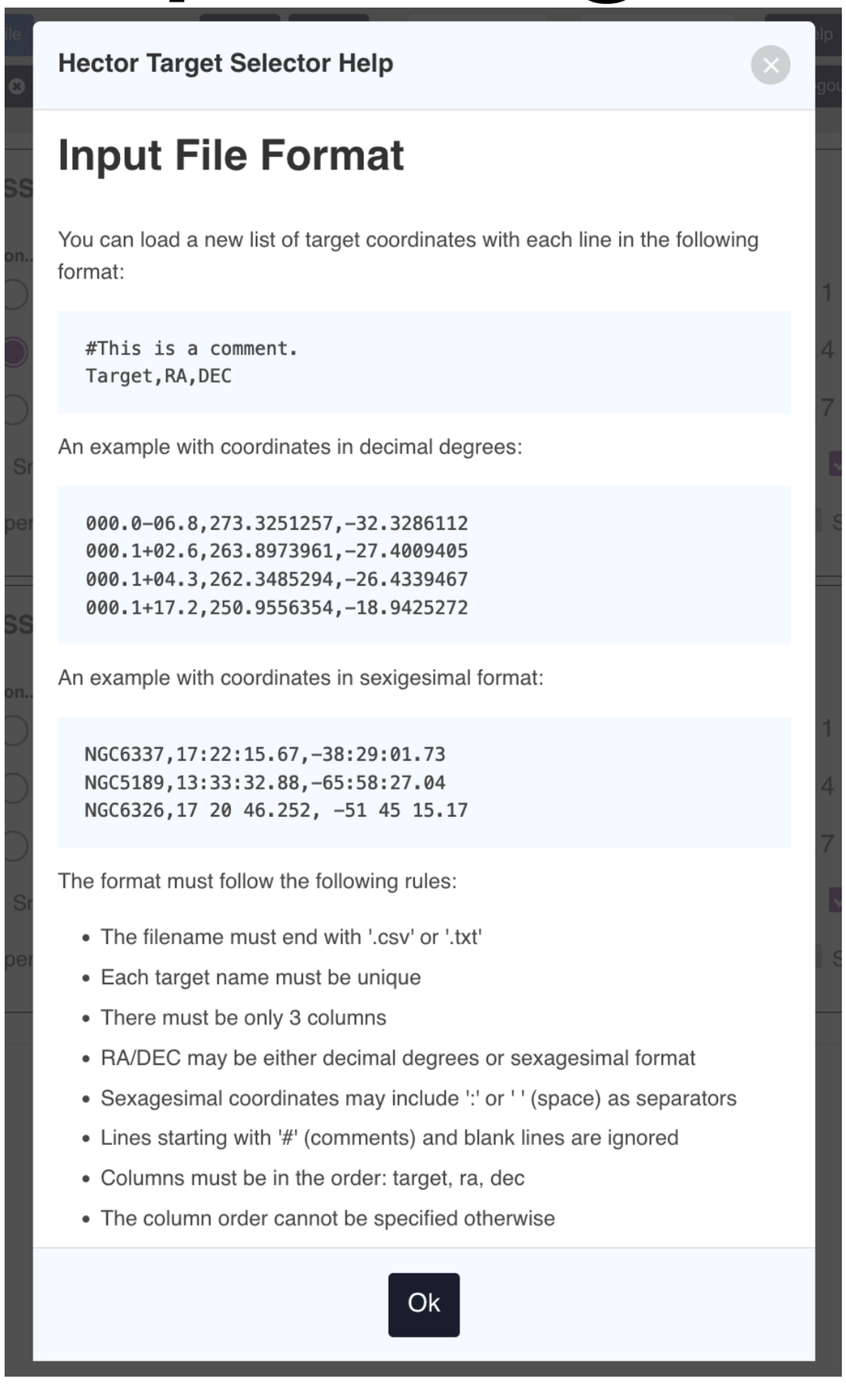
○ 6 ○ 7 ○ 8

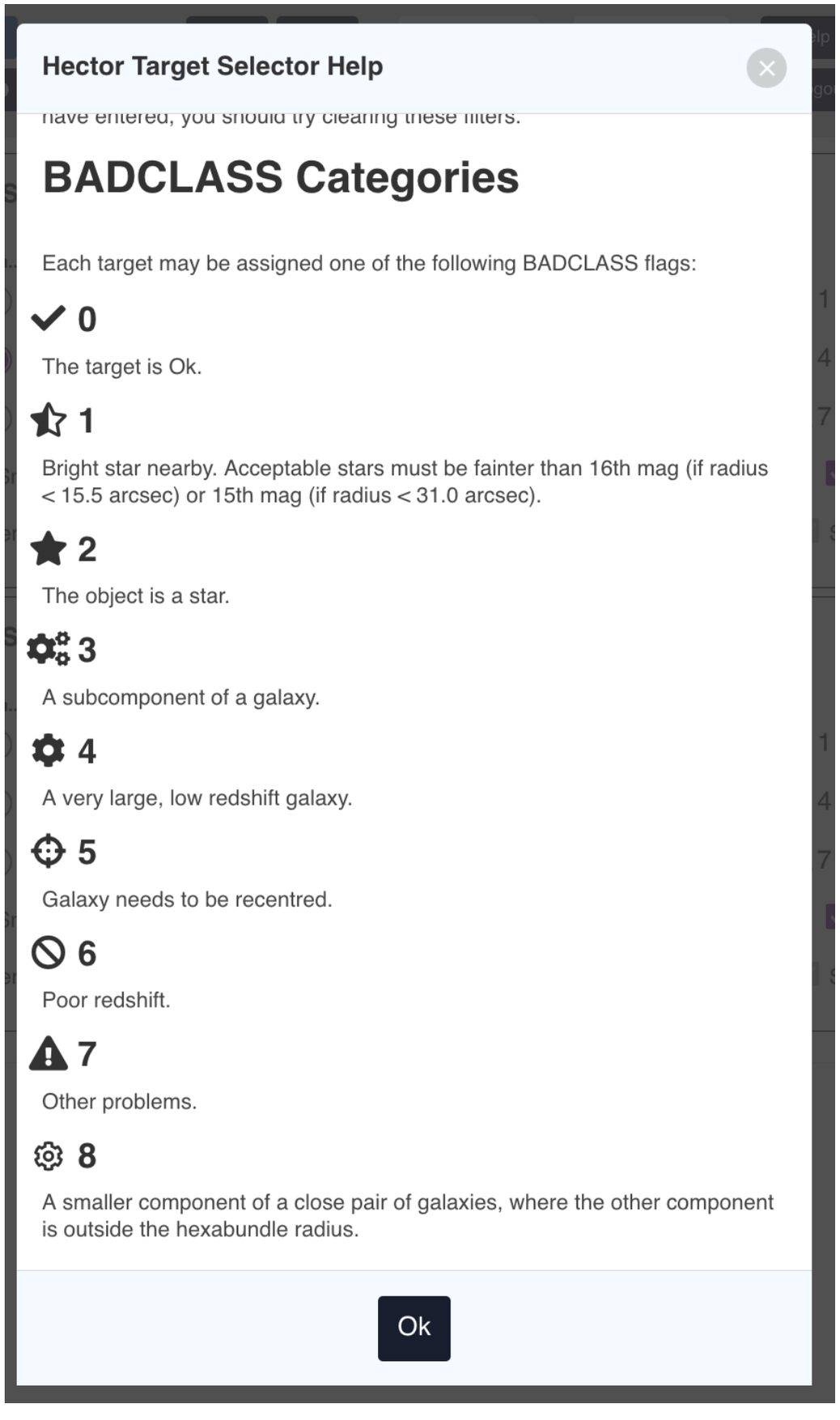
Bundle: ☑ Small ☑ Large

☑ SkyMapper ☑ SDSS

Help dialog

Provides answers to common questions
Reminds users of classification scheme





Part III: Observing Log Application

Kate Sheng
kate.sheng@mq.edu.au

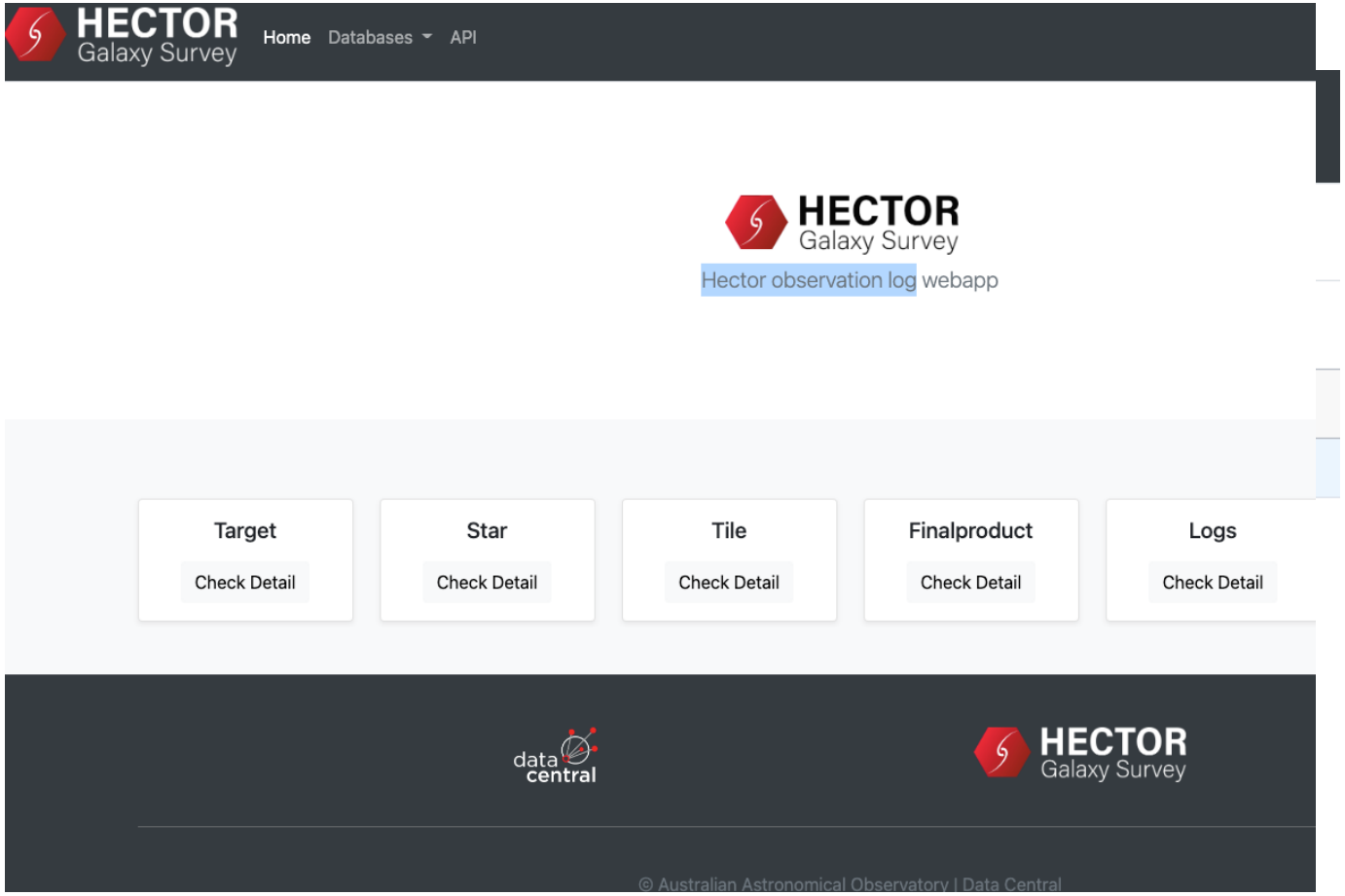
HECTOR
Galaxy Survey

Hector observation log webapp

https://obslog.datacentral.org.au/

data central

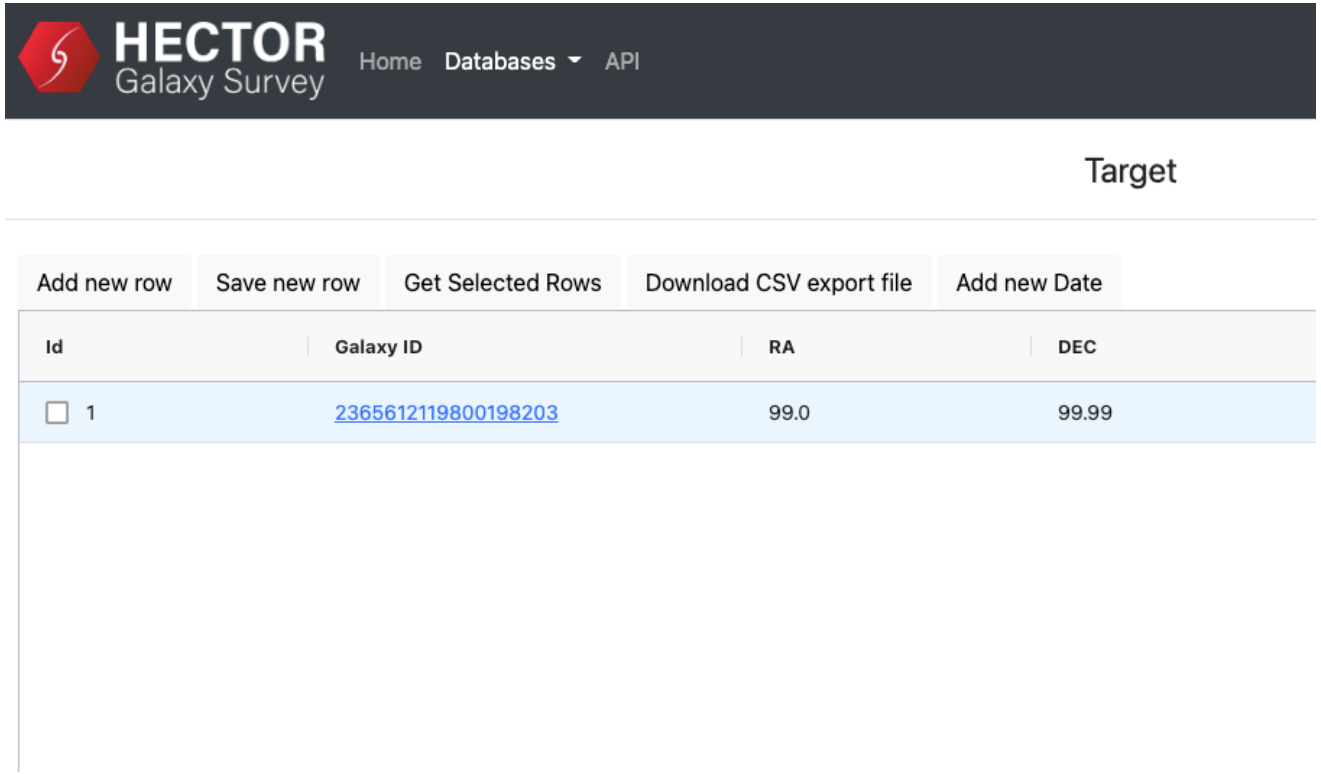
Webapp



- Record observation logs
- Query logs and runs and get related Targets, Stars, Tiles and etc

data central

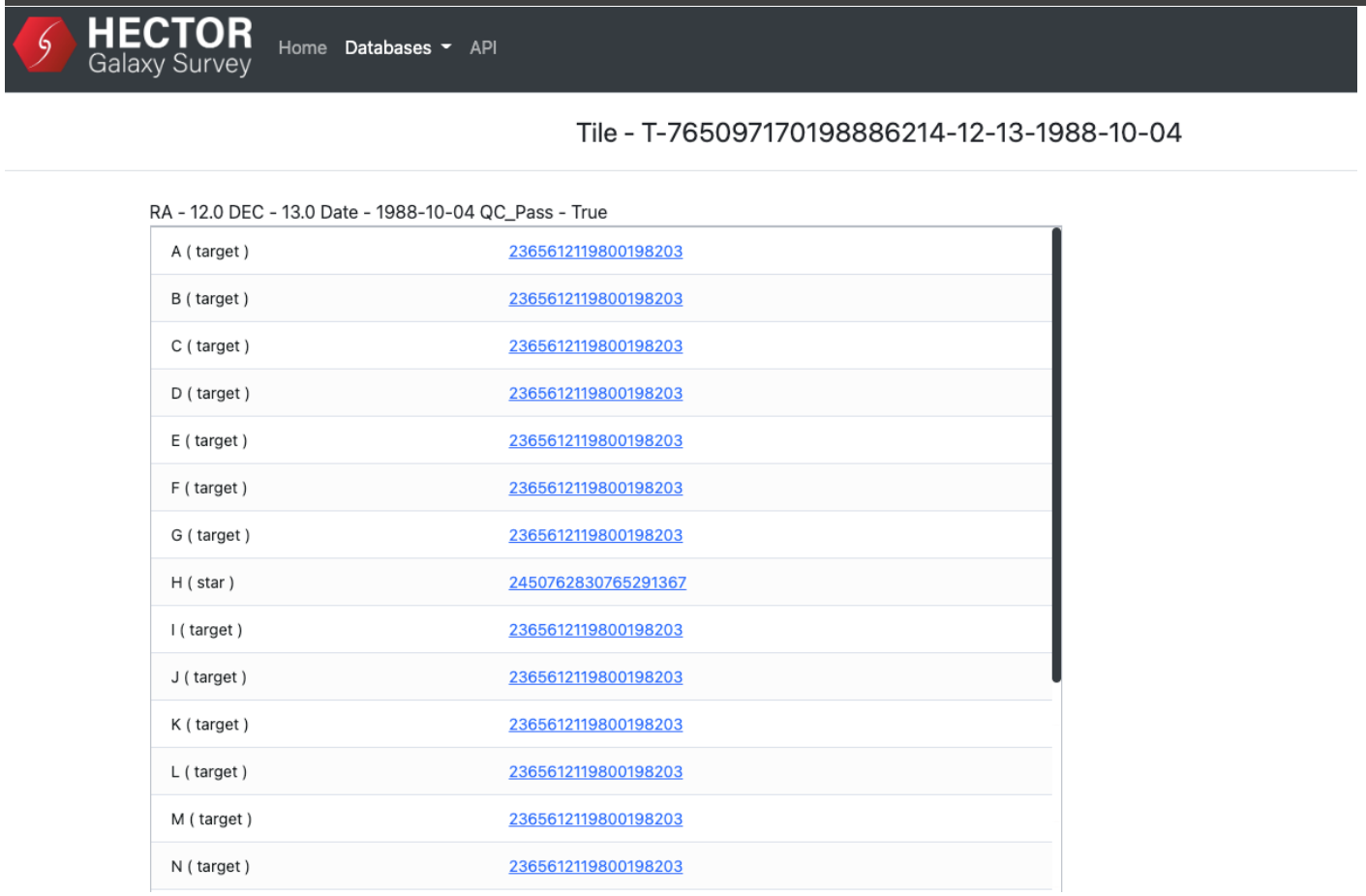
Record



- Can record:
  - Target
  - Star
  - Tile
  - Observation logs and runs

data central

Query



- Query logs and runs and get related Targets, Stars, Tiles

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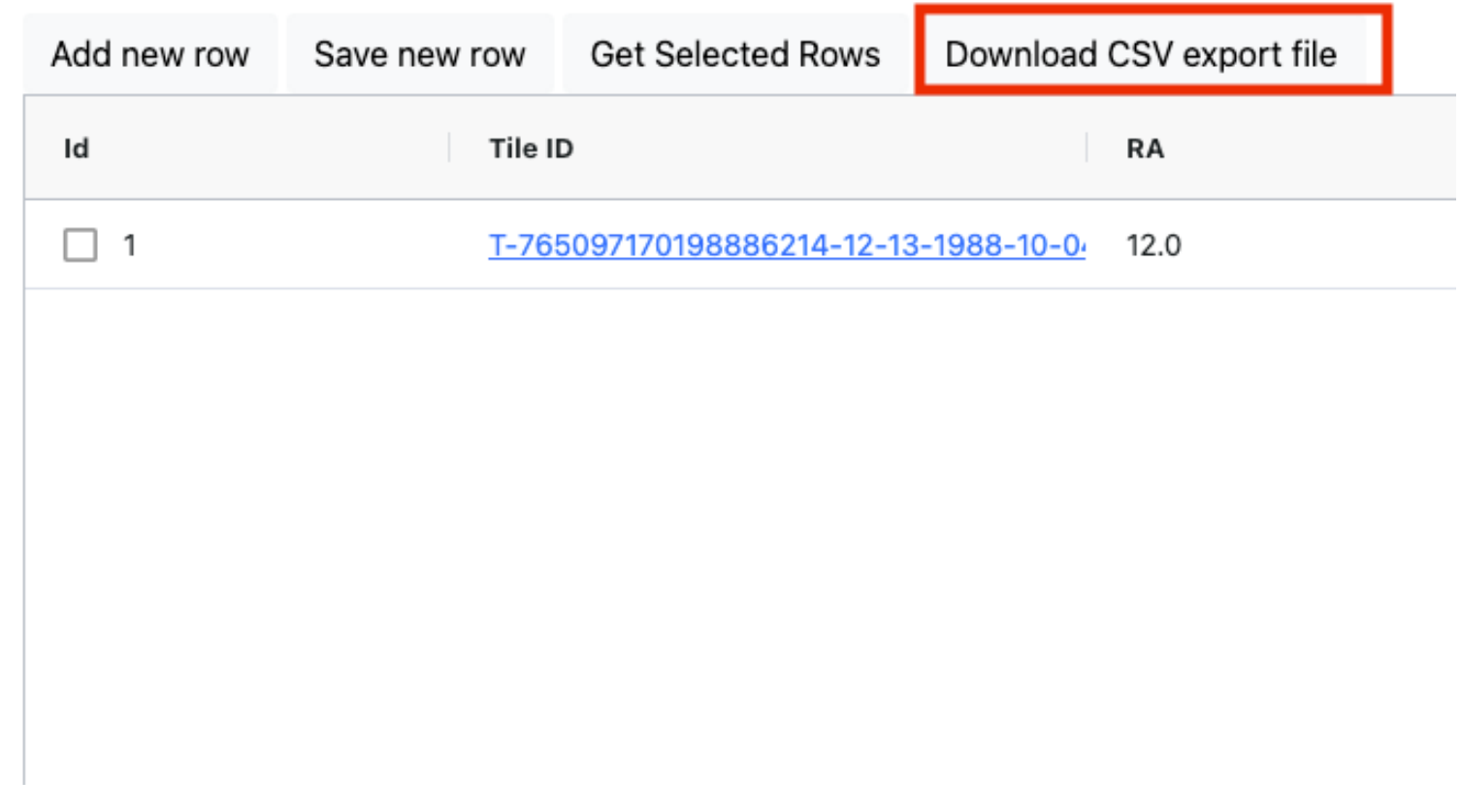
Download



- Export csv file

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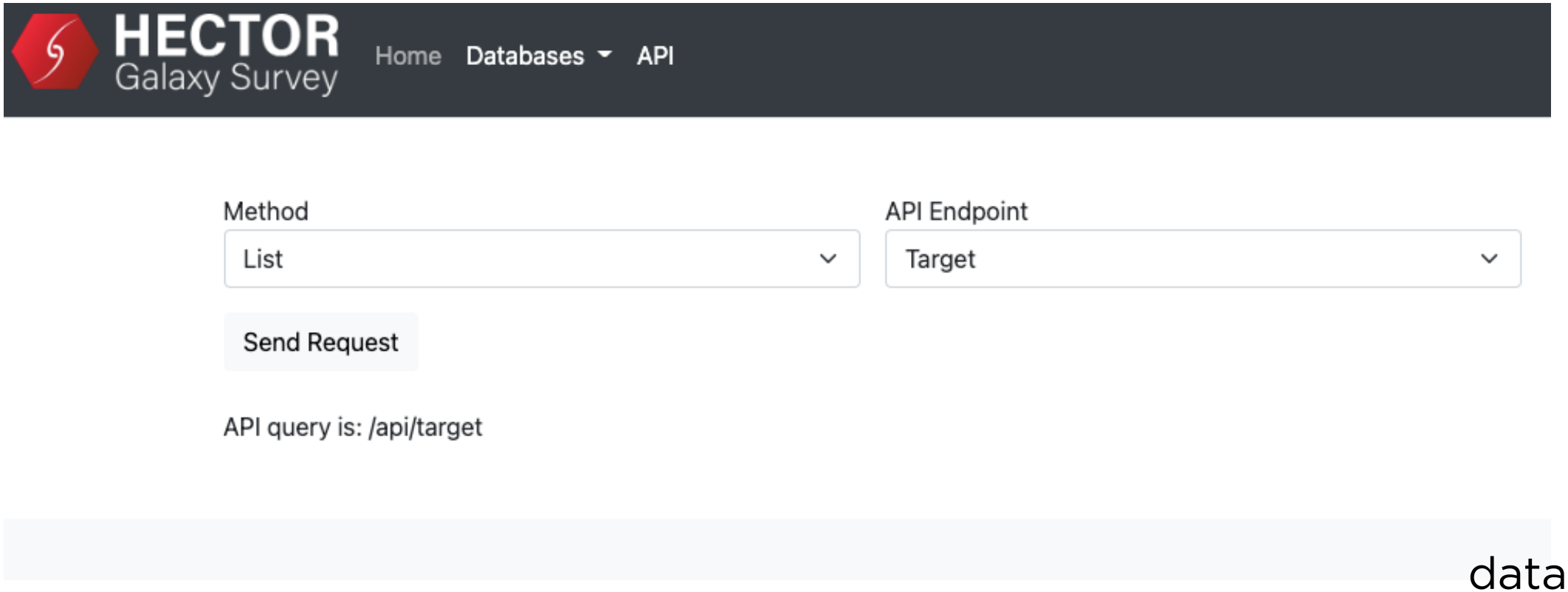
API

- Query from API endpoint



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Part IV: Upgraded TAP Service

Upgraded TAP Service

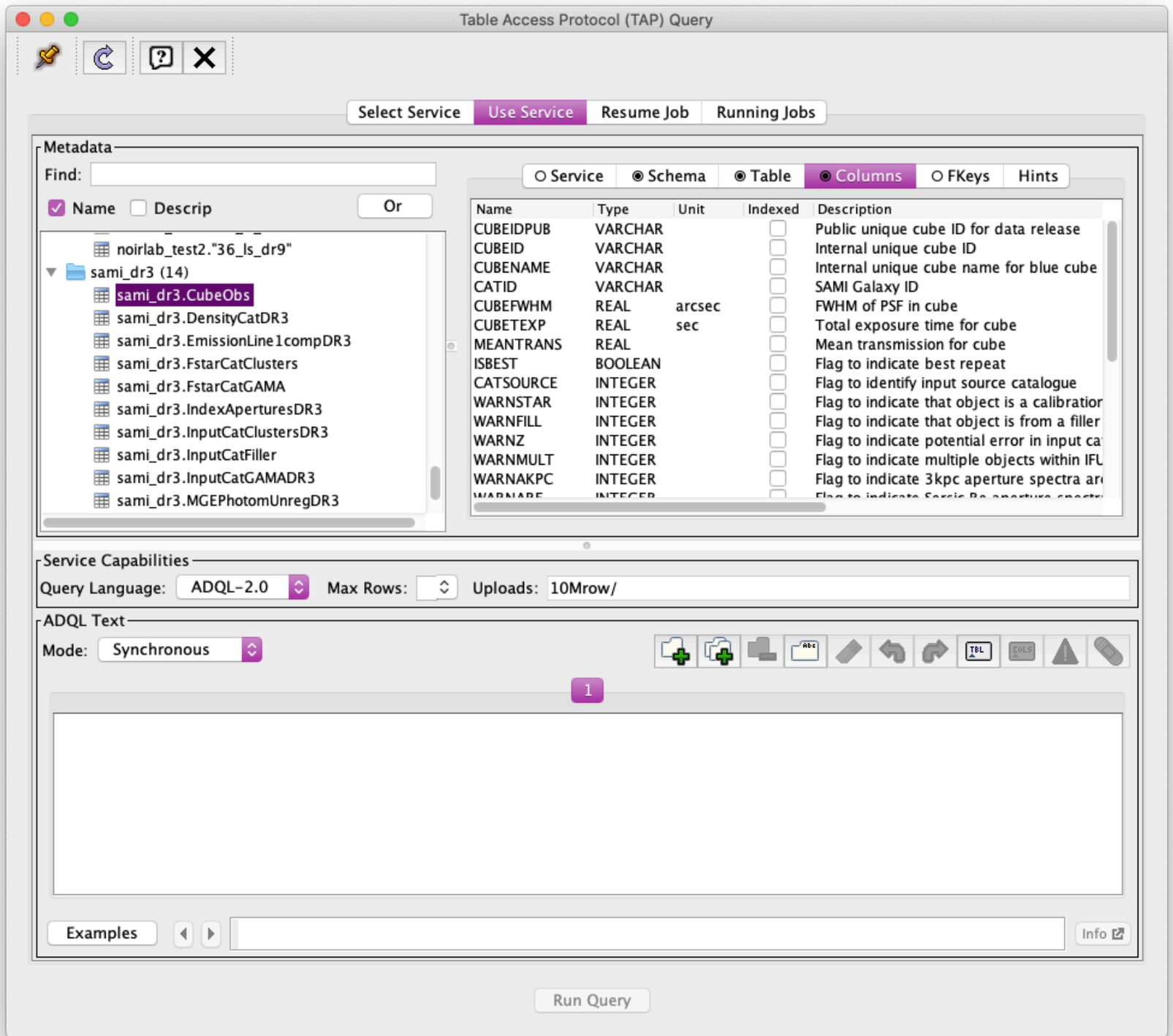
- Details: see https://docs.datacentral.org.au/reference/services/tap-service/

- Tap service: https://datacentral.org.au/vo/dev-tap

- Supports table uploads for joins/cross-match

- SAMI DR3 ingested. **What catalogues do you want to see?**

- Can turn votables or Data Central catalogue metadata into TAP tables.



Questions?

Need help accessing a particular dataset or service?

Please get in touch!