

データアーカイブを用いた(多波長)天文学

(例A) すばるHSCによる遠方銀河/クエーサー探査

(Akiyama et al. 2018, He et al. 2018)

(例B) あかり赤外線点源カタログによるULIRGs/HyLIRGs探査

(Chen et al. 2019a, 2019b)

で ✓何を用了？ ➤何があると良い？
をユーザーの立場からまとめてみる。

秋山 正幸
(東北大学)

(例A) すばるHSCによる銀河/クエーサー探査

1) 候補天体をリストアップする

- ✓ HSC-SSPのSQLデータベースから候補となる天体のリストをダウンロードする。
- 参照できそうなパラメータは他にもいくつかあるが、定義がはっきりしない。それぞれのパラメータを求めている source code が(簡単に)見れると論文に記述できる。

前回の古澤さん
スライドより

The screenshot shows a web-based Query Interface. At the top, it says "name: catalog-job 2016-05-31". The main area is divided into three panels:

- Query Interface:** Contains a SQL query:

```
2 -- with i band Kron magnitudes smaller than 25.5, and  
3 -- the range RA J2000 between 34.0 and 36.0 degrees  
4 -- and -4.5 degrees.  
5  
6 -- WARNING:  
7 -- --> Remove 'LIMIT 10' for your query  
8 -- --> Edit the schema name 's15b_udeep' for your  
9  
10 SELECT id, ra2000, decl2000,  
11 imag_kron, imag_kron_err,  
12 ymag_kron, ymag_kron_err,  
13 imag_kron - ymag_kron AS i_y  
14 FROM s15b_udeep.photoobj_mosaic_deepcoadd_merged  
15 WHERE ra2000 BETWEEN 34.0 AND 36.0  
16 AND decl2000 BETWEEN - 5.0 AND - 4.5  
17 AND imag_kron < 25.5  
18 LIMIT 10  
19 ;
```
- List of tables:** Shows a tree view of tables including 'DR Early', 'DR1', 'Release - S15B', 'UDEEP - s15b_udeep', 'DEEP - s15b_deep', 'WIDE - s15b_wide', and 'meta'.
- Schema browser:** Shows the schema for 'mosaic_measlist_deepcoadd' with columns: pos, name, type, constraint, description, format, unit. It lists various fields like 'skytile_id', 'tract', 'rerun', 'mos_rerun', 'patch', 'patch_num', 'pointing', 'filter01', 'id', 'parent', 'ra2000', 'decl2000', 'hpx_idc', 'cx', 'cy'.

Below the query interface, there are options for output format: 'include SQL in CSV', 'syntax check before enqueueing', 'csv', 'csv.gz', 'sqlite3', 'fits'. There is also an 'estimate query time' button.

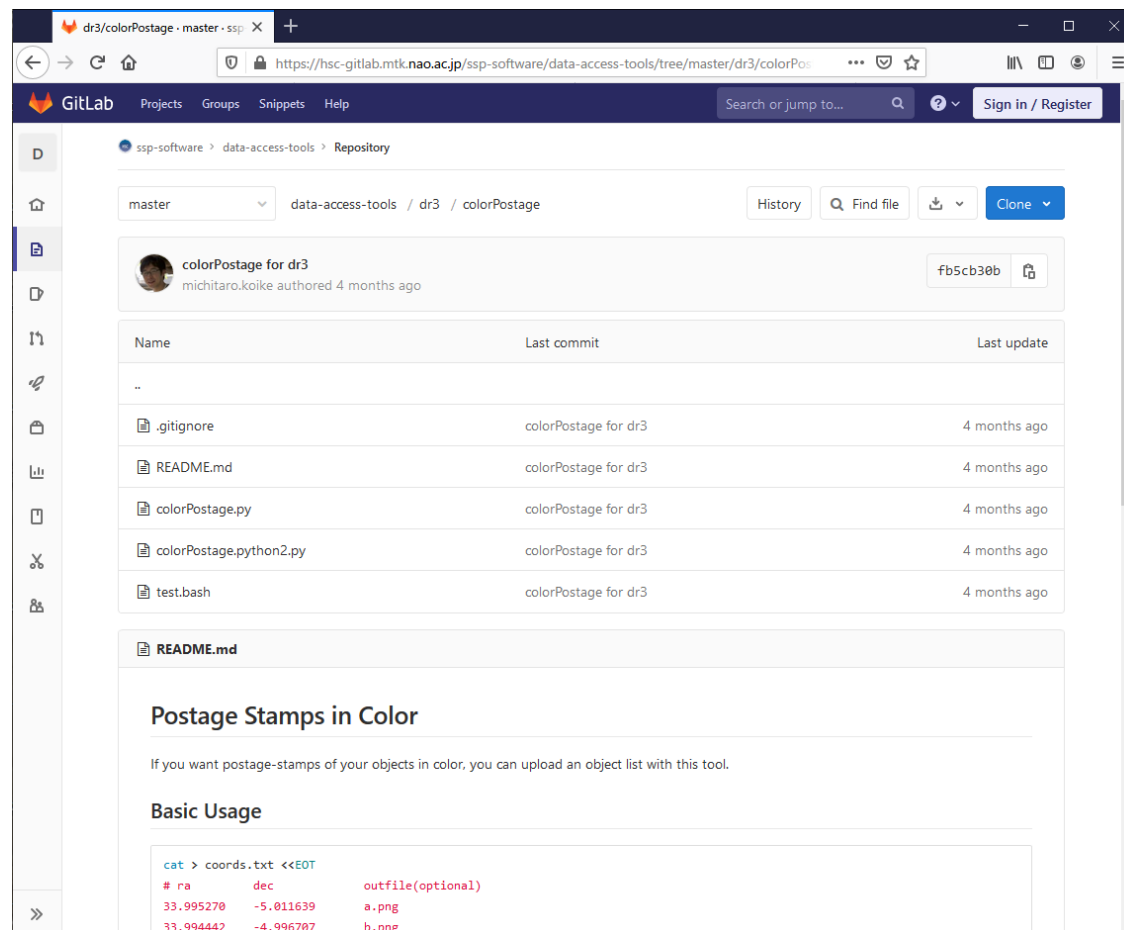
At the bottom, a table of results is shown with columns: Objectid, Coordinates, Magnitude stuff. The table has 10 rows of data with columns: id, ra2000, decl2000, imag_kron, imag_kron_err, ymag_kron, ymag_kron_err, i_y.

| id | ra2000 | decl2000 | imag_kron | imag_kron_err | ymag_kron | ymag_kron_err | i_y |
|-------------------|------------------|-------------------|------------------|---------------------|------------------|---------------------|-------------------|
| 37484571888986404 | 35.057607259963 | -4.93732873437365 | 25.118035214154 | 0.114107063765164 | 499.99 | | -474.873964785846 |
| 37484571888981864 | 35.0078396962661 | -4.99930759079772 | 24.7384120063062 | 0.157894468090058 | 499.99 | | -475.251587993694 |
| 37484571888981830 | 35.0170633972484 | -4.99999974304848 | 25.2428014368963 | 0.048677325305955 | 24.7206126105315 | 0.119918698842417 | 0.522188828164801 |
| 37484571888981836 | 34.8821309197278 | -4.99930786149459 | 22.8655471968143 | 0.0224779610352464 | 21.8832518610747 | 0.0314281419314268 | 0.9822953357396 |
| 37484571888981841 | 34.9514394247036 | -4.99962360937544 | 23.8826282949199 | 0.0659761864315893 | 499.99 | | -476.10737170508 |
| 37484571888981843 | 35.044904992429 | -4.99958864819437 | 23.1103459522296 | 0.0156855050275436 | 22.3297109090374 | 0.0298954794412492 | 0.780635043192202 |
| 37484571888981845 | 34.9356921325154 | -4.99962119090221 | 23.9156879556918 | 0.115395611427154 | 499.99 | | -476.074312044308 |
| 37484571888981846 | 34.9951690997466 | -4.9994484942167 | 21.050207876937 | 0.00343046684949933 | 20.8541957046687 | 0.00829000469868113 | 0.3960121722683 |
| 37484571888981848 | 34.9989217892049 | -4.99874914731603 | 21.5619537823084 | 0.00596309869913547 | 21.1934332122157 | 0.0154515778470028 | 0.368520570092699 |
| 37484571888981957 | 35.0304967192095 | -4.99918406737899 | 20.8919295021014 | 0.00658339033071192 | 20.0156954024041 | 0.0049567490400015 | 0.966523109632899 |

(例A) すばるHSCによる銀河/クエーサー探査

2-1) 選ばれた天体の画像を試みる

- ✓ 候補天体の FITS 画像を切り出してダウンロードする。(hsc-gitlab の python code (下のページ)を参考にして画像データサーバーにアクセスして切り出す。)



The screenshot shows a web browser displaying a GitLab repository page for 'colorPostage'. The browser address bar shows the URL: <https://hsc-gitlab.mtk.nao.ac.jp/ssp-software/data-access-tools/tree/master/dr3/colorPostage>. The repository is located at 'ssp-software > data-access-tools > Repository'. The current branch is 'master'. The repository contains several files, all committed by 'colorPostage for dr3' (michitaro.koike) 4 months ago:

| Name | Last commit | Last update |
|--------------------------------------|----------------------|--------------|
| .. | | |
| <code>.gitignore</code> | colorPostage for dr3 | 4 months ago |
| <code>README.md</code> | colorPostage for dr3 | 4 months ago |
| <code>colorPostage.py</code> | colorPostage for dr3 | 4 months ago |
| <code>colorPostage.python2.py</code> | colorPostage for dr3 | 4 months ago |
| <code>test.bash</code> | colorPostage for dr3 | 4 months ago |

The `README.md` file is expanded, showing the following content:

Postage Stamps in Color

If you want postage-stamps of your objects in color, you can upload an object list with this tool.

Basic Usage

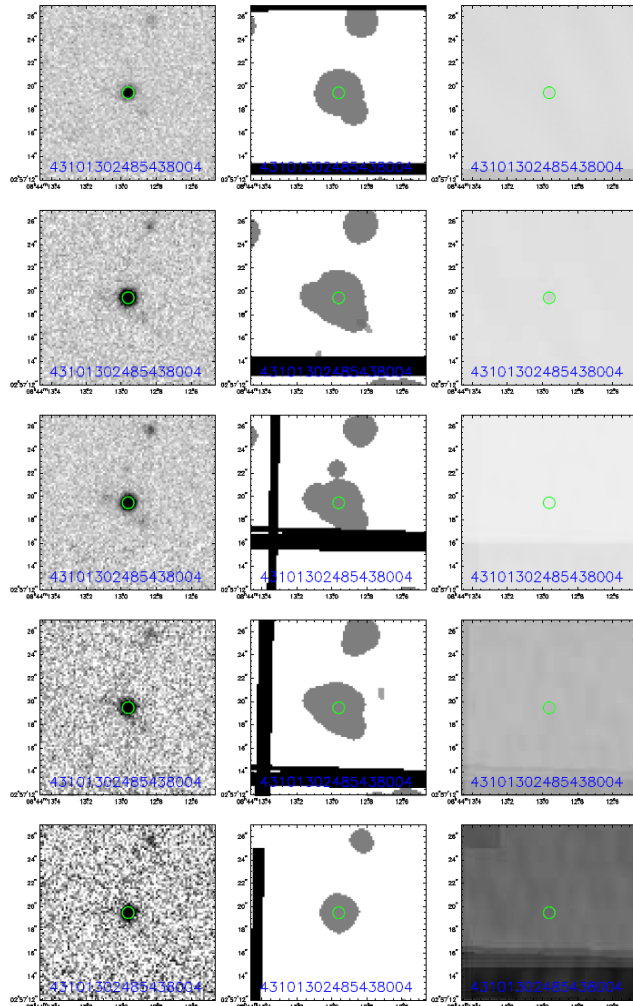
```
cat > coords.txt <<EOT
# ra      dec      outfile(optional)
33.995270 -5.011639  a.png
33.994442 -4.996707  b.png
<<EOT
```

(例A) すばるHSCによる銀河/クエーサー探査

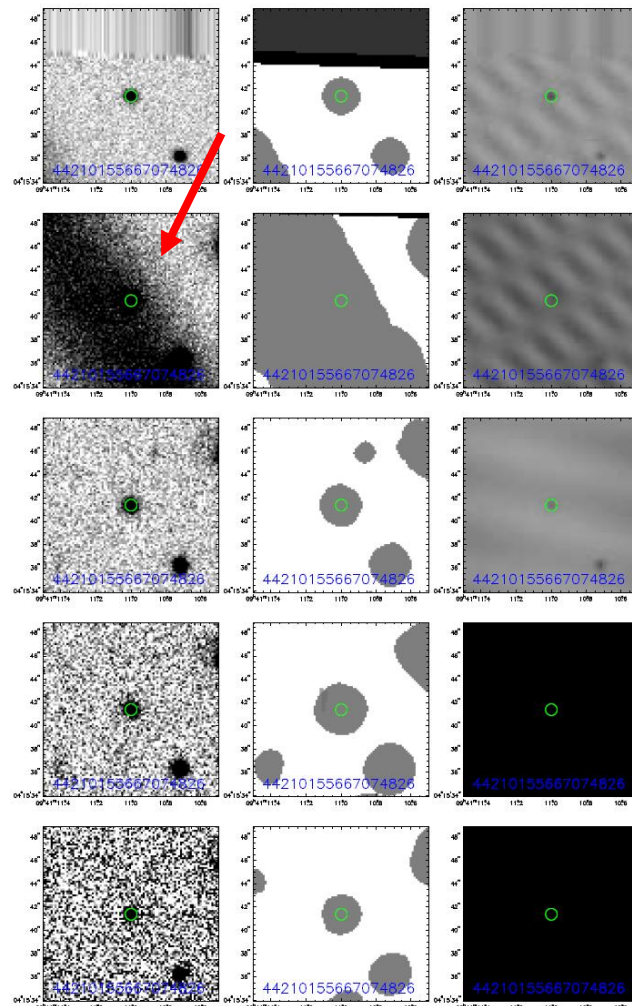
2-2) 選ばれた天体の画像をしてみる

- ✓ 5-band の Science / Mask / Variance 画像をプロットする。

候補天体の5バンド画像



候補天体の5バンド画像：
r-band にゴースト？ゴミ候補



(例A) すばるHSCによる銀河/クエーサー探査

2-0) 選ばれた天体の画像をしてみる

- サイエンスアイデアを確認するためには、まずは画像を簡単にチェックできると嬉しい。

The screenshot displays the SDSS Image List web interface. The browser address bar shows the URL: `skyserversdss.org/dr16/en/tools/chart/list.aspx`. The page title is "obj list page 1".

On the left side, there is a sidebar with the following sections:

- DR16**: Home | Help | Chart | Navi | Explore | Use query to fill form
- Parameters**: scale: 0.4 "/pix, opt: [empty]
- Get Image**: [button]
- Drawing options**: Grid, Label, Photometric objects, Objects with spectra, Invert Image
- Advanced options**: APOGEE Spectra, SDSS Outlines, SDSS Bounding Boxes, SDSS Fields, SDSS Masks, SDSS Plates
- Powered by SciServer**

The main content area shows a grid of 25 galaxy images, each with its name and coordinates. The coordinates are listed in two columns: name and ra. The names and coordinates are as follows:

| name | ra |
|--------------------------------------|------------|
| 274-51913-230 J103915.59-003918 | 159.815 -0 |
| 275-51910-275 J104412.23+000907.1 | 161.051 0 |
| 275-51910-525 J104657.36+005334.7 | 161.739 0 |
| 276-51909-19 J111222.08-001518 | 164.090 -0 |
| 278-51900-112 J110821.84-001257.5 | |
| 278-51900-225 J110827.38+001456.3 | |
| 278-51900-430 J111549.43+005136 | |
| 279-51900-39 J111352.79+000014.4 | |
| 279-51984-466 J111753.28-000025.2 | |
| 279-51984-520 J111753.28-000025.2 | |
| 281-51614-230 J112426.16-002537.2 | |
| 282-51658-167 J113535.51-003505.9 | |
| 285-51930-309 J115537.91-004615.5 | |
| 286-51999-359 J120105.03+000650.3 | |
| 288-52000-173 J121920.87-001431.1 | |
| 349-51699-582 J170208.88+641221.6 | |
| 353-51703-328 J170256.87+603346.8 | |
| 353-51703-365 J170437.67+603506 | |
| 355-51786-167 J171556.15-571416.7 | |
| 355-51788-563 J172029.03+584749.1 | |
| 358-51818-349 J172343.2+570025.1 | |
| 387-51791-72 J000258.56+000831.1 | |
| 389-51795-481 J001529.76+003823.9 | |
| 390-51900-196 J002043.91-002623.9 | |
| 390-51900-464 J002143.68+001745.5 | |

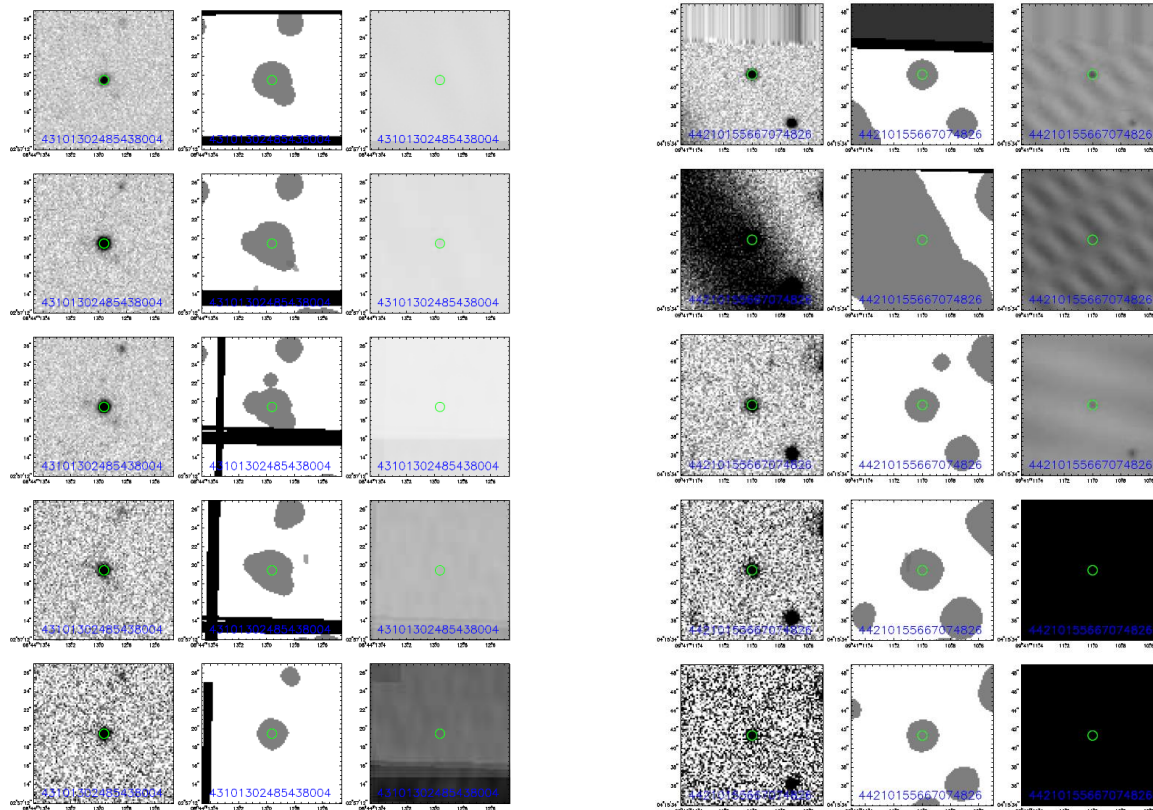
At the bottom of the page, the URL is: `skyserversdss.org/dr16/en/tools/chart/navi.aspx?ra=161.739&dec=0.893&scale=0.2&width=120&height=120&opt=`

SDSS Image List を使うと座標リストに対して簡単に画像を確認できる。

(例A) すばるHSCによる銀河/クエーサー探査

3) 選ばれた天体にフラッグ付け

- ✓ Mask / Variance の情報を用いて機械的な基準を設けて天体の候補天体のフラッグ付け。
- ◆ 10,000天体の画像切り出しには12時間かかっている。
- 探査面積の計算のためにランダム天体についても同様のフラッグ付けを行う。必要な画像取得には1週間以上かかりそう。高速な画像切り出しが必要。



(例A) すばるHSCによる銀河/クエーサー探査 4-2) 中規模アーカイブの分光データを調べる

- ✓ VIMOS VLT Deep Survey などのカタログデータとクロスマッチして分光情報を調べる。
- ◆ データの均質性に疑問がある。
- 定型のヘッダー情報とともに各グループで解析されたデータがまとめて公開されていると良い。

VVDSプロジェクトの
データ公開ページ (LAM)

ESO Catalogue Facility
ESO の大規模観測で得られたデータを
処理したものをまとめて公開

The screenshot shows the VVDS Database interface. It features a navigation bar with 'Home', 'Data search', and 'Retrieve Catalogues'. Below this, there are tabs for 'Spectroscopy', 'Photometry', 'Wget download', and 'Data description'. The main content area is titled 'Download complete datasets' and is divided into two sections: 'GALAXIES' and 'SPECTRA'. The 'GALAXIES' section has sub-tabs for 'Light', 'Full', '1D', '1DSky', and '2D'. The 'SPECTRA' section has sub-tabs for '1D', '1DSky', and '2D'. A table lists various surveys and datasets with their respective object counts and download icons.

| SURVEY | DATASET | CATALOGUE | GALAXIES | | | SPECTRA | | |
|------------|---------------|-----------|-----------|-----------|----|---------|----|--|
| | | | Light | Full | 1D | 1DSky | 2D | |
| WIDE | WVDS-F1003+01 | 6229 obj | AS CII VO | AS CII VO | 1D | 1DSky | 2D | |
| | WVDS-F1400+05 | 7358 obj | AS CII VO | AS CII VO | 1D | 1DSky | 2D | |
| | WVDS-F2217+00 | 13291 obj | AS CII VO | AS CII VO | 1D | 1DSky | 2D | |
| DEEP | WVDS-F0226-04 | 11368 obj | AS CII VO | AS CII VO | 1D | 1DSky | 2D | |
| | WVDS-CDFS | 1585 obj | AS CII VO | AS CII VO | 1D | 1DSky | 2D | |
| ULTRA DEEP | WVDS-F0226-04 | 1125 obj | AS CII VO | AS CII VO | 1D | 1DSky | 2D | |

The screenshot shows the ESO Catalogue Facility website. It features a navigation bar with 'Public', 'Science', 'User Portal', and 'Intranet'. Below this, there is a search bar and a list of data products. The main content area is titled 'Find catalogues by' and shows a search result for '53 catalogues found (out of 53)'. The results are displayed in a table with columns for 'PROGRAMME', 'TITLE', 'INSTRUMENT', 'FILTER SET', 'VERSION', 'PUBLICATION DATE', 'INFO', and 'REQUEST'. The table lists various surveys and datasets, including UltraVISTA, GCAV, GAIAESO, LEGA-C, PESSTO, KIDS, VANDELS, and VIDEO.

| PROGRAMME | TITLE (click on title for querying) | INSTRUMENT | FILTER SET | VERSION | PUBLICATION DATE | INFO | REQUEST |
|------------|--|--------------|-----------------------------|---------|------------------|------|---------|
| UltraVISTA | COSMOS2015 catalogue: photometric redshifts and stellar masses (Laigle et al. 2016) | VIRCAM | Y,J,H,Ks | 1 | 2016-12-20 | (i) | (r) |
| UltraVISTA | Deep/Ultra-Deep Near-IR Survey of the COSMOS Field (Ultra-VISTA) | VIRCAM | Y,J,H,Ks,NB118 | 3 | 2019-03-11 | (i) | (r) |
| GCAV | GCAV catalogue for RXCJ1514.9-1523 cluster | VIRCAM | Y,J,Ks | 1 | 2018-12-20 | (i) | (r) |
| GCAV | GCAV catalogue for RXCJ2129.6+0005 cluster | VIRCAM | Y,J,Ks | 1 | 2018-12-20 | (i) | (r) |
| GAIAESO | Gaia-ESO spectroscopic survey | GIRAFFE,UVES | | 2 | 2016-12-05 | (i) | (r) |
| LEGA-C | Large Early Galaxy Census Spectroscopic Survey | VIMOS | | 2 | 2018-06-21 | (i) | (r) |
| PESSTO | PESSTO Multi-epoch Photometry | MULTI | | 2 | 2017-08-25 | (i) | (r) |
| PESSTO | PESSTO Public ESO Spectroscopic Survey of Transient Objects | EFOSC | | 2 | 2017-08-25 | (i) | (r) |
| KIDS | The Kilo-Degree Survey 9-band ugrIZYJHKs source catalogue | OMEGACAM | u_SDSS_g_SDSS_r_SDSS_i_SDSS | 3 | 2019-02-28 | (i) | (r) |
| KIDS | The Kilo-Degree Survey: Weak lensing shear measurements | OMEGACAM | u_SDSS_g_SDSS_r_SDSS_i_SDSS | 1 | 2017-01-03 | (i) | (r) |
| VANDELS | VANDELS High-Redshift Galaxy Evolution: Spectroscopic and Photometric Redshifts in the CANDELS UDS and CDFS Fields | VIMOS | | 3 | 2019-11-11 | (i) | (r) |
| VIDEO | VISTA Deep Extragalactic Observations Survey | VIRCAM | Z,Y,J,H,Ks | 2 | 2016-09-09 | (i) | (r) |

(例A) すばるHSCによる銀河/クエーサー探査

5-1) アークタイプのX線データを調べる

- ✓ 各論文にあるリストをダウンロードしてクロスマッチ。
- ✓ Vizierや各プロジェクトのウェブページを活用する。
- 各プロジェクトのウェブからのダウンロードは将来にわたっての再現性に懸念が残る。

Vizier

The screenshot shows the Vizier web interface with a list of catalogues. The interface includes a search bar, a 'Reset All' button, and a 'Show table details' button. The list of catalogues includes:

- II/340 XMM-OM Serendipitous Source Survey Catalogue (XMM-SUSS2.1) (Page+ 2014)
- II/356 XMM-OM Serendipitous Source Survey Catalogue (XMM-SUSS4.1) (Page+ 2019) [XMM-OM-SUSS4.1.fits]
- IX/50 XMM-Newton Serendipitous Source Catalogue 3XMM-DR6 (XMM-SSC, 2016) Detailed description and explanations are available in the public pages of the 3XMM-DR6 Catalogue
- IX/54 XMM-Newton Serendipitous Source Catalogue 3XMM-DR7 (XMM-SSC, 2017) Detailed description and explanations are available in the public pages of the 3XMM-DR7 Catalogue
- IX/55 XMM-Newton Serendipitous Source Catalogue 3XMM-DR8 (XMM-SSC, 2018) Detailed description and explanations are available in the public pages of the 3XMM-DR8 Catalogue
- IX/56 3XMM-DR7s serendipitous source catalogue from stacks (Traulsen+, 2019)
- B/xmm XMM-Newton Observation Log (XMM-Newton Science Operation Center, 2012)
- IX/37 XMM-Newton Serendipitous Source Catalogue (1XMM) (XMM-SSC, 2003) This catalogue is obsolete by IX/39
- IX/39 The XMM-Newton 2nd Serendipitous Source Catalogue (2XMM) (XMM-SSC, 2007) This catalogue is obsolete by IX/40
- IX/40 The XMM-Newton 2nd Incremental Source Catalogue (2XMMi) (XMM-SSC, 2008) This catalogue is obsolete by IX/41
- IX/41 XMM-Newton Serendipitous Source Catalogue 2XMMi-DR3 (XMM-SSC, 2010) This catalogue is obsolete by IX/44
- IX/44 XMM-Newton Serendipitous Source Catalogue 3XMM-DR4 (XMM-SSC,

3XMM (Serendip. Survey Catalog)

The screenshot shows the 3XMM-DR8 web page with the 3XMM-DR8 logo. The page includes the following text:

3XMM-DR8

The 3XMM-DR8 catalogue contains source detections drawn from 10242 XMM-Newton EPIC observations, 0.2 keV to 12 keV. These observations were made between 2000 February 3 and 2017 November 30 and by 2017 December 31, but not all public observations are included in this catalogue (see below for more info).

Should you use the catalogue for your research and publish the results, please use the acknowledgement below for 3XMM (Rosen, Webb, Watson et al., 2016, A&A, 590, 1).

This research has made use of data obtained from the 3XMM XMM-Newton serendipitous source catalogue and the XMM-Newton Survey Science Centre selected by ESA.

As well as the fits and csv formats of the catalogue distributed below, the following Web-based user interface for the catalogue (and give access to all or selected associated data products):

- XSA at ESA's XMM-Newton SOC
- XCAT-DB at the SSC institute, Observatoire Astronomique, Strasbourg
- Browse at HEASARC NASA GSFC
- The IRAP catalogue server
- LEDAS at the SSC institute, University of Leicester

The SSC Catalogue Home Page (this page), XSA, and HEASARC allow download of the catalogue file in (binary) products will be available shortly through LEDAS, but are already available in the IRAP catalogue server.

The cross-correlation products of potential counterparts at other wavelengths for 3XMM-DR8 are provided at the catalogue server.

The following table gives an overview of the statistics of the catalogue in comparison with the 3XMM-DR7 catalogue:

| | 3XMM-DR8 |
|------------------------|----------|
| Number of observations | 10242 |

(例B)あかり赤外線点源カタログによるULIRGs/HyLIRGs探査

1) あかりカタログとSDSS/WISE撮像カタログの クロスマッチで対応天体を特定する

- ✓ それぞれのカタログをダウンロードしてクロスマッチする。
- 画像を見て確認したい。SDSS/IRSA のインターフェースは画像の min/max 調整などが出来なくて不便。

AKARI FIS BSC のページ

SDSS Postage stamp IRSA WISE Postage stamp

AKARI-FIS Bright Source Catalogues Ver.2 (Release April 2016)

Update History

- 2018/03/30: Release note updated. Colour-correction information added.
- 2018/03/27: Typo in ReadMe.txt corrected.
- 2018/03/23: Typo in release note corrected.
- 2018/02/06: In the release note, the number of sources for FISBSCV1 is corrected.
- 2016/09/20: Column number for f_S65 (and preceding 000) in ReadMe.txt are corrected.
- 2016/06/28: Numbers of objects in this page and ReadMe.txt are corrected.
- 2016/04/26: Data and documents are prepared.

The AKARI/FIS Bright Source Catalogue Version 2.0 provides the positions and fluxes in the four far-infrared wavelengths centred at 65, 140, and 160 micron (see filter characteristics in the "Note (1)" section below).

The catalogue consists with two parts: the *main catalogue* and the *supplemental catalogue*. The main catalogue contains 501,444 sources with high detection reliability, i.e., detected by at least two wavelength bands or in four or more scans in one wavelength band. The supplemental catalogue which includes 416,612 sources which are confirmed at one of four wavelength bands. The detection limit of the both catalogues in the most sensitive band, WIDE-S band (90 micron), is about 0.5 Jy.

The main catalogue should be sufficient and is recommended for most of the scientific analysis. The supplemental catalogue may be useful to obtain AKARI fluxes of known objects which are not included in the main catalogue. Note that version 1.0 of this catalogue corresponds to the sum of the main + supplemental catalogue.

The users of the catalogue are requested to read the documents carefully before critical discussions of the data. At this moment, as the documents are not yet ready, please feel free to contact Helpdesk (iris_help@iris.as.jaxa.jp) for any questions and comments.

In particular, users are strongly recommended to refer to FQUALxxx(f_Sxxx) flags. Sources with FQUAL(f_Sxxx) = 3 are the most reliable dataset.

Please acknowledge the usage of the AKARI data (details at [Guidelines for publication related to AKARI](#))

Documents

- [ReadMe.txt](#)
CDS style ReadMe document.

DR16

| name | r | ra | dec |
|---------------|---------|----|-----|
| 274-51913-230 | 159.815 | -0 | |
| 275-51910-275 | 161.051 | 0 | |
| 275-51910-525 | 161.739 | 0 | |
| 276-51909-19 | 164.090 | -0 | |

IRSA: WISE

Position

General

- [Position](#)
- [Solar System Object/Orbit](#)

Advanced

Single Object | Multi-Obj

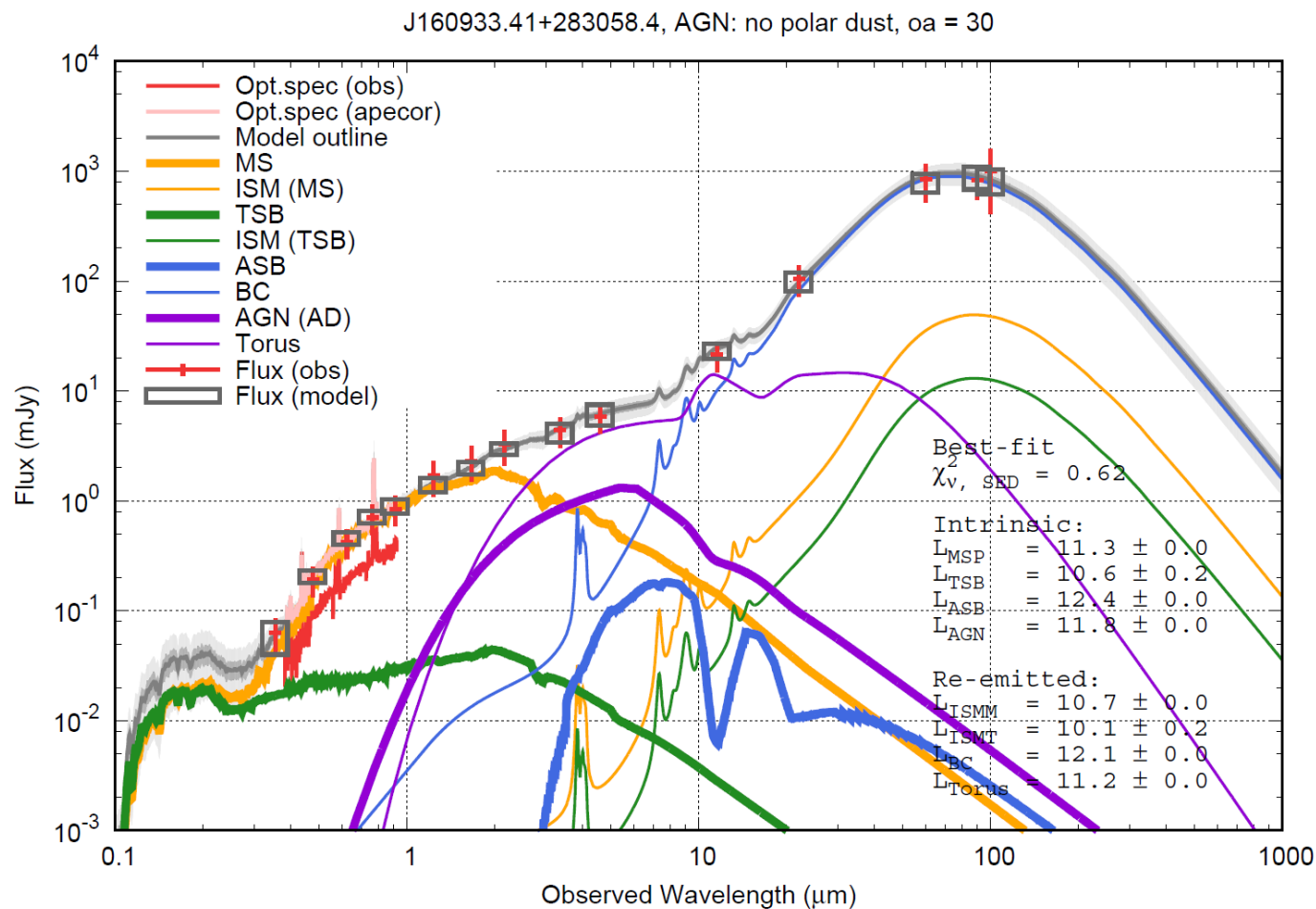
Name or Position:

Examples: 'm81' 'ngc 1068' '10h 17m 10s +41d 12m 10s'

(例B)あかり赤外線点源カタログによるULIRGs/HyLIRGs探査

2) 測光データと分光データを合わせてSED解析する

- ✓ 広い波長範囲および測光・分光データでコンシステントな較正(をするための情報: flux conversion, PSF, fiber-loss, etc.)が必要。



(例B)あかり赤外線点源カタログによるULIRGs/HyLIRGs探査

3) 電波全天探査のカタログを用いて電波での特性を調べる

- ✓ 遠赤外線銀河とFIRSTカタログをマッチさせて電波特性を調べる。
- 電波画像を見てマッチングを確認。電波ローブの片側とマッチしているような場合は除く。

FIRST image cutouts

Extract FIRST Image Cutouts
Hosted by the [LLNL Institute for Geophysics & Planetary Physics](#)

RA and Dec: 10 50 07.270 +30 40 37.52 Equinox: J2000
Image Size: 4.5 arcmin
Image Type: GIF FITS Image FITS File
Maximum Intensity for Scaling: 10 mJy
Extract the Cutout Reset Form Help

SDSS Postage stamp のようにリスト入力だと便利だが。。。

FIRST
Richard L. White, rlw@stsci.edu
Sun Mar 29 19:55:00 2020

Data Release 16 | SDSS skyserver.sdss.org/dr16/en/tools/chart/list.aspx

obj list page 1

| | | | | |
|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|--------------------------------------|
| 274-51913-230 J103915.59-003918 | 275-51910-275 J104412.23+000907.1 | 275-51910-525 J104857.36+005334.7 | 278-51909-19 J105621.6-005320.4 | 278-51900-39 J111352.79+000014.4 |
| 278-51900-112 J111222.08-001518 | 278-51900-225 J110821.84-001257.5 | 278-51900-430 J110827.36+001456.3 | 279-51984-456 J111549.43+005136 | 279-51984-520 J111753.28-000025.2 |
| 281-51614-230 J112426.16-002537.2 | 282-51658-167 J113535.51-003505.9 | 285-51930-309 J115537.91-004615.5 | 286-51999-359 J120105.03+000650.3 | 288-52000-173 J121920.87-001431.1 |

Parameters
scale: 0.47 pix
opt:
Get Image

Drawing options
 Grid
 Label
 Photometric objects

SciServer
Not logged in Login Help

撮像データベースへの期待

- 点源カタログ
 - 各パラメータを求める際のコード(リファレンス/コメント付き)がわかると良い。論文でそのまま引用できる。
- Image viewer
 - 座標リストを受け付け、一覧表示できると良い。スケール変更して暗い天体やノイズレベルを見るなど自由にできると良い。
- 一次処理済み画像データ
 - 各PIからの公開ではなくて天文台として統一したアーカイブがあると良い。
 - ただし、データが巨大化すると(ex. HSC-SSP Wide-layer)ダウンロードは不可能。
- Postage stamp 画像の取得
 - FITS 形式で手元で画像処理を行う。
 - Variance / Mask / Nframe の画像は必須。
 - PSFの情報をどう与えるか？
- 画像データに対して検出シミュレーション
 - 多数の postage stamp 画像の取得が必要。

分光データベースへの期待

- 分光データカタログ
- Spectrum viewer
- 較正処理済み 1次元スペクトル
 - フラックス較正済み
 - FITS 形式で画像処理可能
 - Variance / Mask / Nframe の画像も付随
- データの質チェックのためには1次処理済みの2次元データへのアクセスは重要。
 - 特に>8m望遠鏡でターゲットにするような暗い天体の弱い信号の信頼性を確認するためには2次元で確認する必要もありそう(PFSのようなファイバー分光器のデータであっても)。
- 統一的な処理済みスペクトルデータベースが中規模程度の観測に対してもあると良い。HST High Level Science Products や ESO Catalog Facility のような形式は良いのでは？

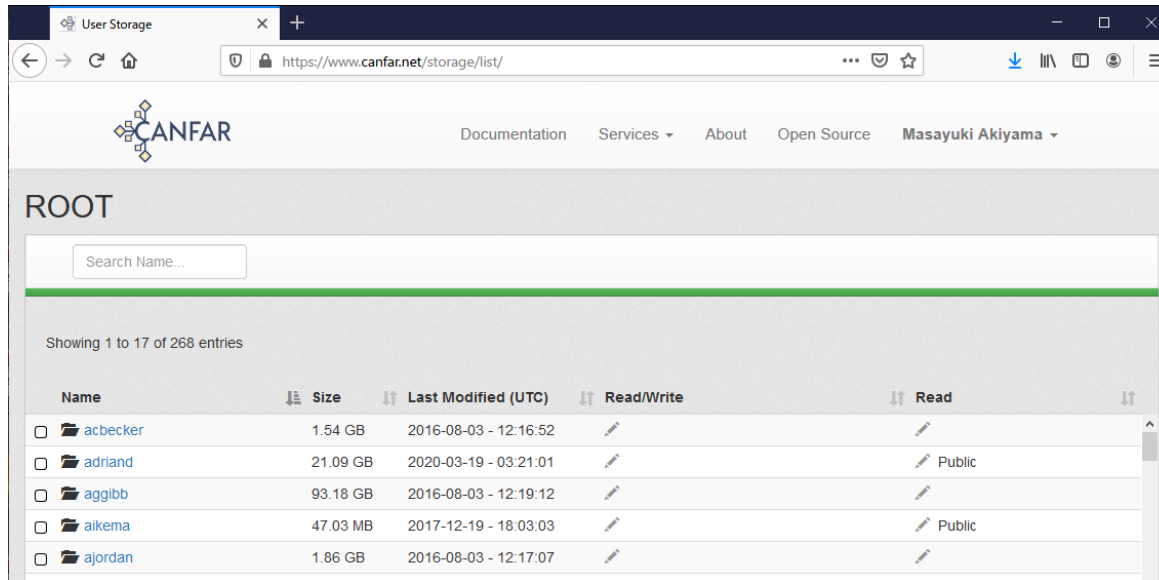
まとめ (1)

- 今回紹介したような研究では、それぞれの生データの解析に戻ってやり直したいということはまれ。
 - 各装置のパイプラインや較正データは詳細化、各プロジェクトのデータは巨大化、していて、自前でパイプラインを最適化するのは強い必要性がなければコストに見あわない。
- 1次処理済みデータの一部を「切り出して」、2次解析を行うためのインターフェースが重要。
 - 多数の天体の postage stamp に対して独自の処理(検出シミュレーションを含め)を行う。
 - スペクトルデータに対して独自のフィッティングを行う。またその不定性評価をモンテカルロシミュレーションで行う。

まとめ (2)

- 個別のPI観測についてもそれぞれで解析されたデータをアーカイブする必要性はあるのではないか？
 - ESO catalog facility / HST High Level Science product や CANFAR(CADAC) のような各 PI で処理済みデータがある一定の品質保証の元で交換するインターフェースは有効ではないか？
- 論文出版にあたって再現性も求められる。論文誌の中でカタログの扱いを充実させる必要がある：ApJはなかなか良いが(個別にtex用に作られたテーブルを統一的なテキストフォーマットに勝手に変換してくれる)、PASJは？

CANFARのページ：それぞれが自分の公開したいデータを置いてありデータのアクセス権は各自で設定できる。



The screenshot shows a web browser window with the URL <https://www.canfar.net/storage/list/>. The page displays the CANFAR logo and navigation links: Documentation, Services, About, Open Source, and Masayuki Akiyama. Below the navigation is a search bar labeled "Search Name...". The main content area shows "Showing 1 to 17 of 268 entries" and a table of user directories.

| Name | Size | Last Modified (UTC) | Read/Write | Read |
|-----------------------------------|----------|-----------------------|--------------------------|---------------------------------|
| <input type="checkbox"/> acbecker | 1.54 GB | 2016-08-03 - 12:16:52 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> adriand | 21.09 GB | 2020-03-19 - 03:21:01 | <input type="checkbox"/> | <input type="checkbox"/> Public |
| <input type="checkbox"/> aggibb | 93.18 GB | 2016-08-03 - 12:19:12 | <input type="checkbox"/> | <input type="checkbox"/> |
| <input type="checkbox"/> aikema | 47.03 MB | 2017-12-19 - 18:03:03 | <input type="checkbox"/> | <input type="checkbox"/> Public |
| <input type="checkbox"/> ajordan | 1.86 GB | 2016-08-03 - 12:17:07 | <input type="checkbox"/> | <input type="checkbox"/> |