

# バーチャル天文台を利用した 天文学研究の成果と 今後の期待 ~ JVO use cases ~

白崎、小宮、大石、水本  
(国立天文台)

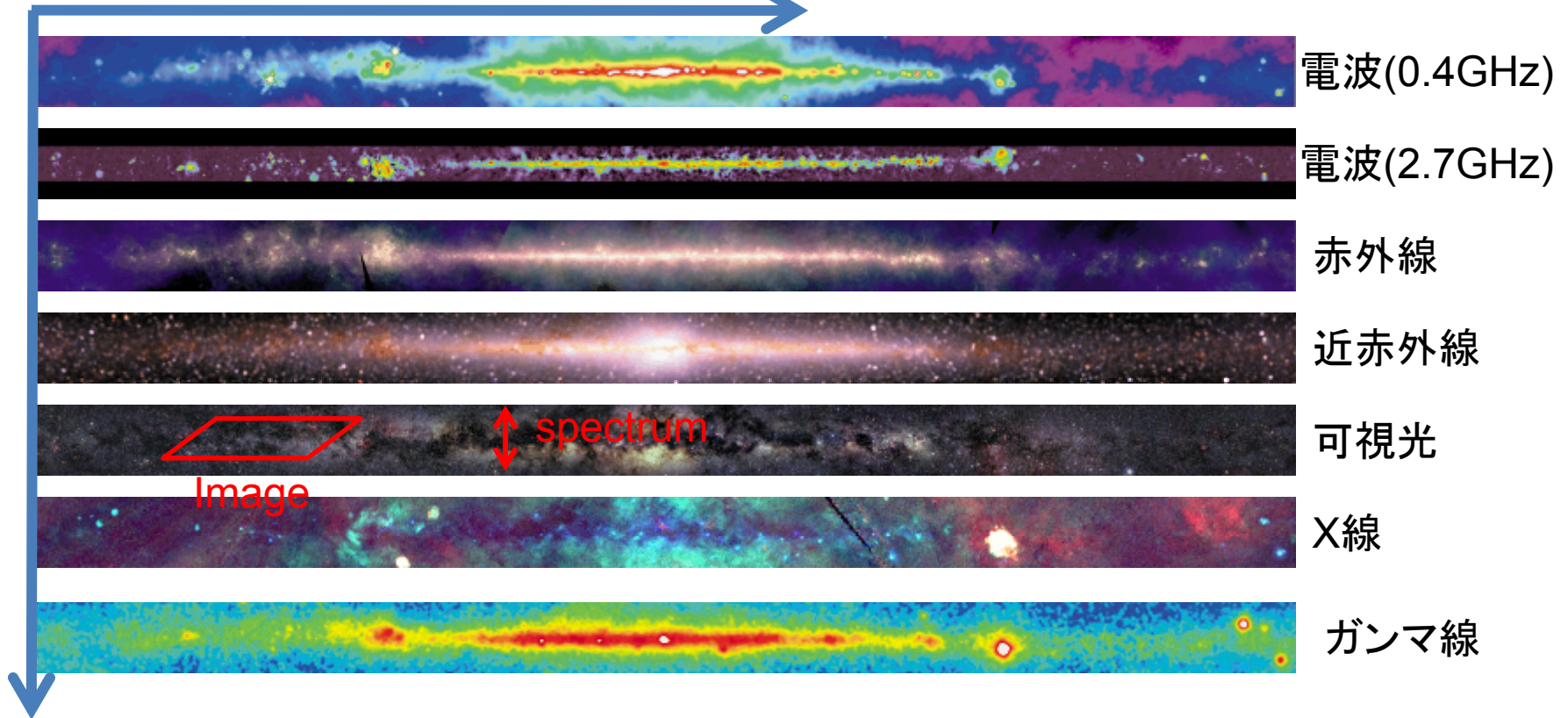
Data science workshop  
2009/08/19 札幌

# 天文 data

位置(赤径・赤緯)

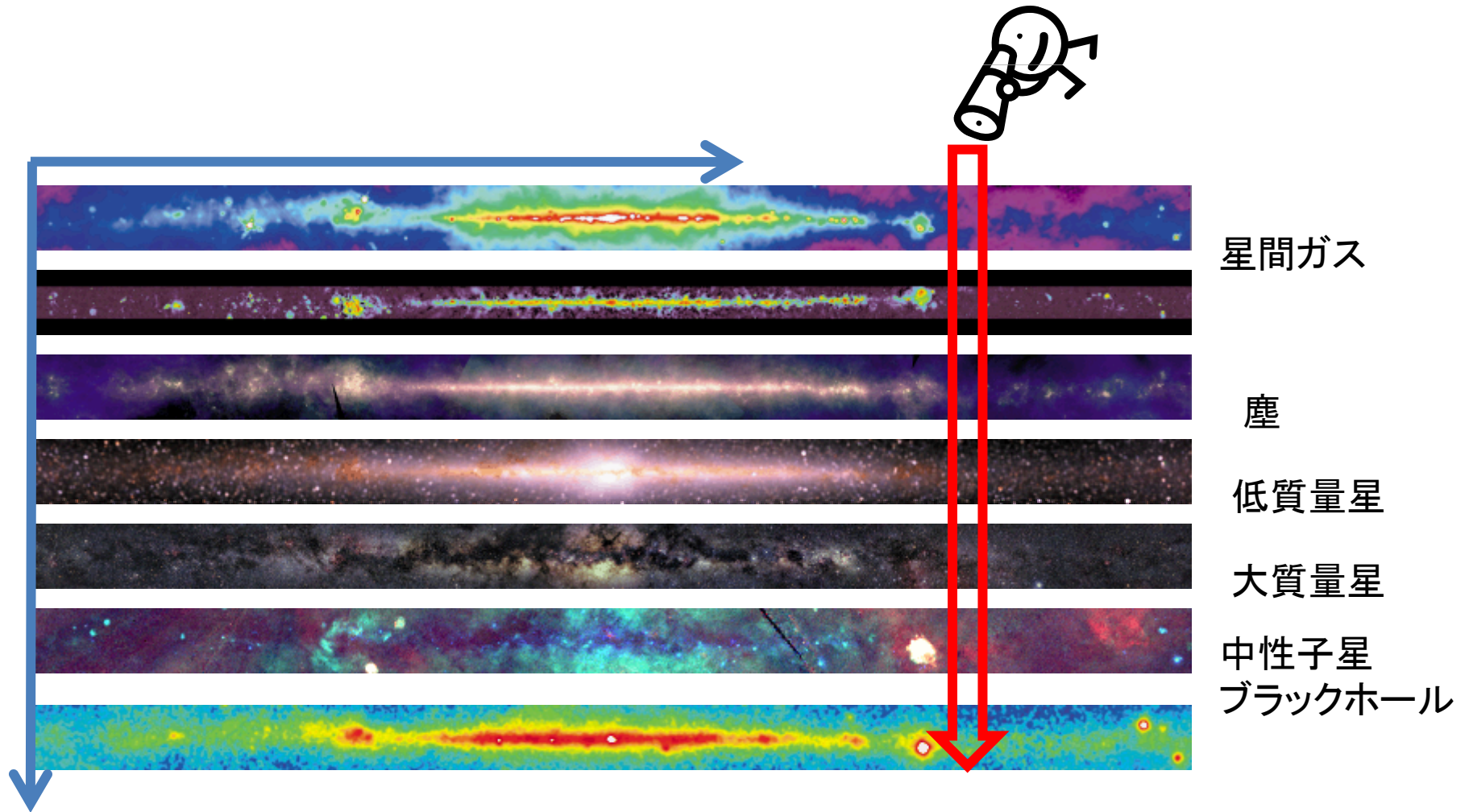


周波数



日時、観測装置

# Use case





⇒ Location: Top Page > Search > Parallel Search


## Parallel search on multiple services [Help\(J\)](#)

**Coordinates or Object Name**

J2000 (FK5)

Samples:

天体名  
⇒座標  
その座標の  
周囲0degの  
データを検索

 If you have any questions or requests on JVO, please contact us at:  
**help\_desk@jvo.nao.ac.jp**

=> Location: Top Page > Search > Search Status

## Search Status

Restart Polling Force Status Update

completed !

Status	Elapsed Time	Progress
success	762.805 sec	searching=18 finished=3684 waiting=0

Service Name	Data Type	Table Name	# of result	result
Einstein Catalog HRI ESTEC Sources	catalog		1	Result
ROSAT All-Sky Bright Source Catalogue (1RXS) (Voges+ 1999) - 1RXS Correlation to ROSATP3, ROSATWGA, ROSATHRI	catalog		4	Result
The XMM-Newton 2nd Serendipitous Source Catalogue (2XMM) (XMM-SSC, 2007) - The 2XMM catalog, "slim" version -- see also the #W{xcatDB}{http://amwdb.u-strasbg.fr/2xmm/}{2XMM Public SSC Interface at Strasbourg}	catalog		5	Result
The USNO-B1.0 Catalog (Monet+ 2003) - The Whole-Sky USNO-B1.0 Catalog of 1,045,913,669 sources	catalog		7	Result
Galaxy Evolution Explorer	image		5	Result
Hubble Space Telescope Press Release Image Archive	image		2	Result
Sloan Digital Sky Survey DR5 - Images	image		15	Result
USNO-SA2.0	catalog		2	Result
Master X-Ray Catalog	catalog		65	Result

JVO VOTable Viewer - Mozilla Firefox

ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)

http://jvo.nao.ac.jp/portal/viewer.do?action=votableViewer&path=%2Fwork%2Fp

よく見るページ Firefox を使いこなそう 最新ニュース

Search Status x JVO VOTable Viewer x JVO VOTable Viewer x JVO VOTable Viewer x JVO VOTable Viewer x

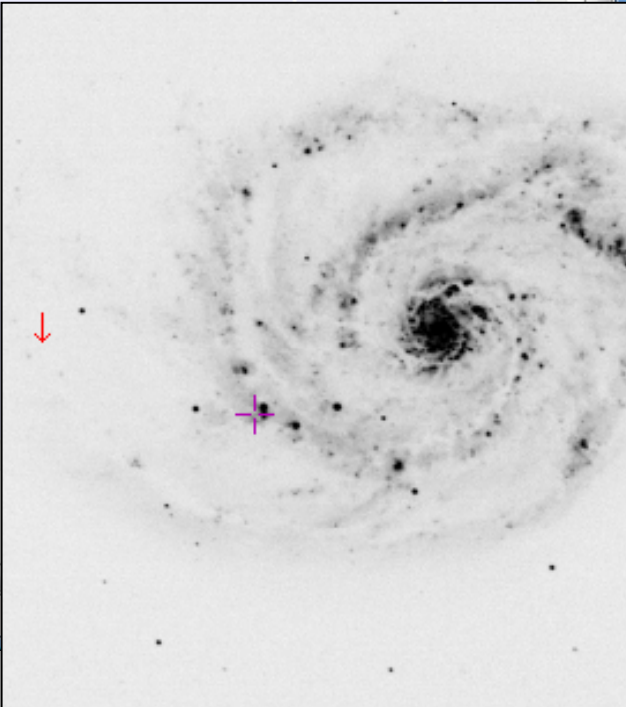
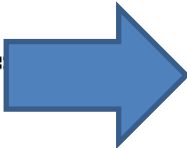
Save/Download Filter Metadata Graphic Add Column Appearance

Total 15 records page: 1

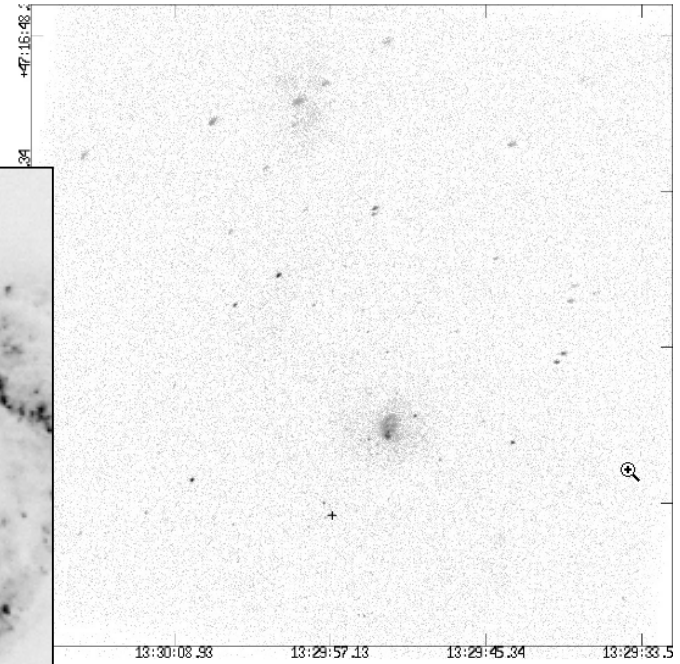
Alias Name			C0	C1	C2	C3	C4	C5	C6	C7	C9
group ID	check	download	TITLE	WIDTH	HEIGHT	SIZE	RA	DEC	SCALE	FORMAT	EQUINC
0	<input type="checkbox"/>	Download	Sloan Digital Sky Survey - Filter u	2048	1489	3049472	202.471041839196	47.3352948181777	{0.000110035211267606}	image/fits	J2000
1	<input type="checkbox"/>	Download	Sloan Digital Sky Survey - Filter g	2048	1489	3049472	202.470053619886	47.3			
2	<input type="checkbox"/>	Download	Sloan Digital Sky Survey - Filter r	2048	1489	3049472	202.472125395373	47.3353838935941			

Message

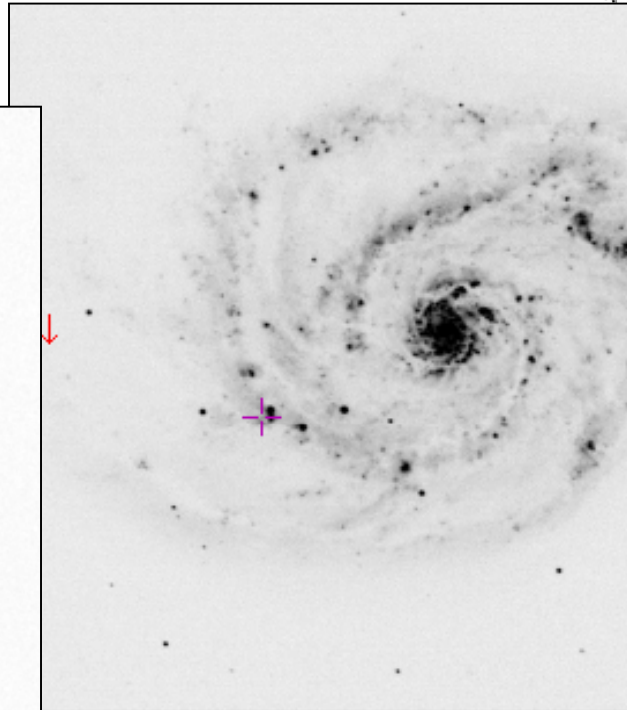
完了



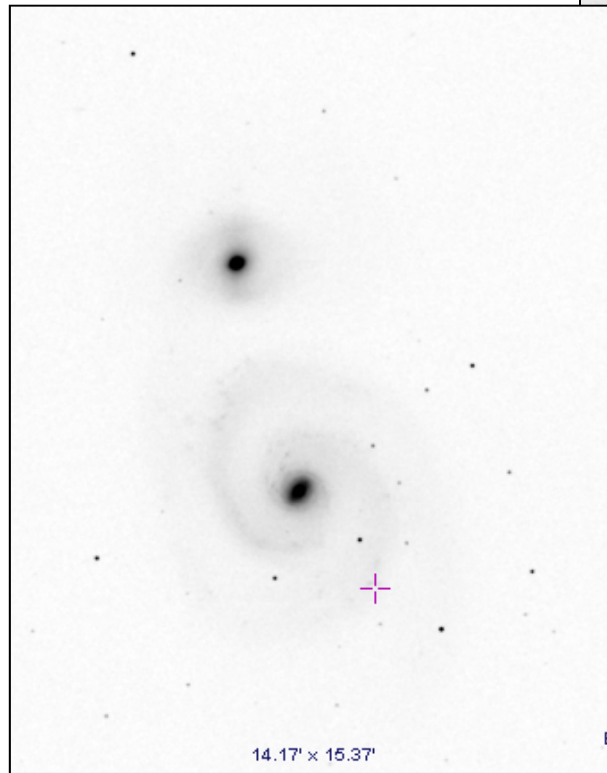
X線(Chandra)

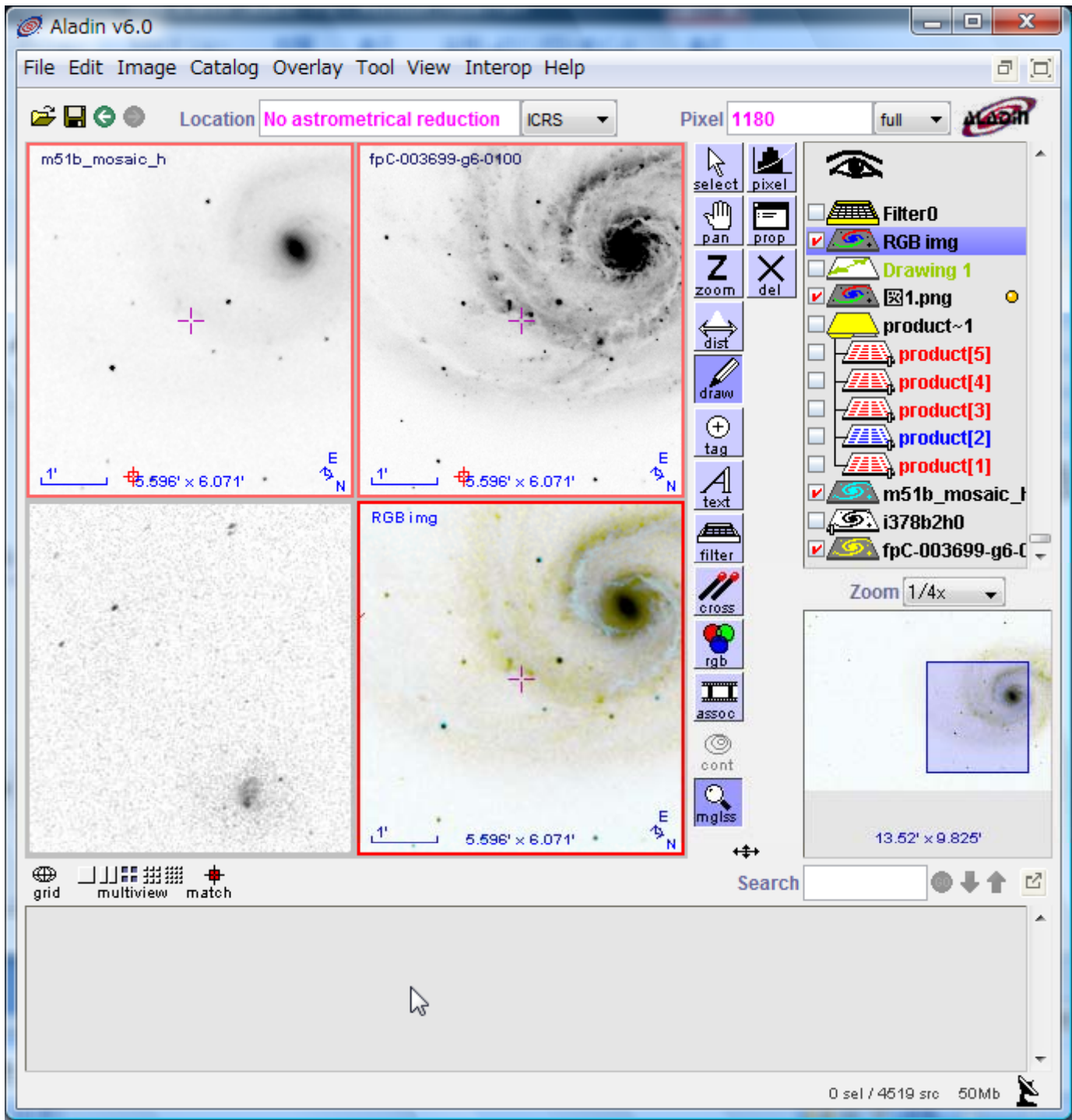


可視光(SDSS)



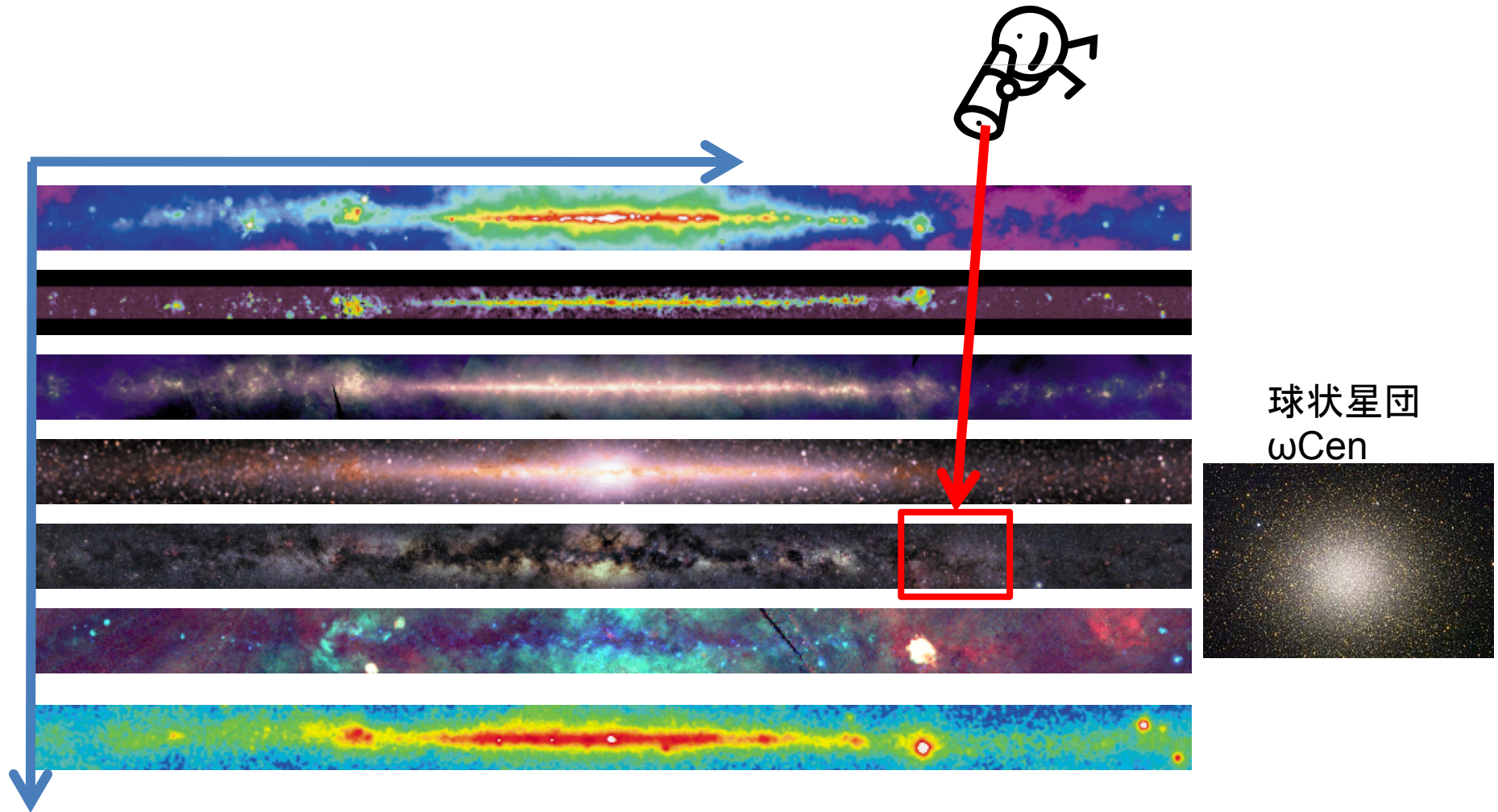
赤外(IRAS)







# Use case



### News

- Suprime-Cam mosaic image updated. (ver.0.2.6, 2009-06-24)
- IVOA Newsletter Vol.2 (2009-05-27)
- SDS Survey Quick Viewer is available. (2009-03-05)
- IRSF Survey Quick Viewer is available. (2009-03-05)
- SED plot functionality was updated. (2009-02-22)
- Multi-region search is available. (2009-02-22)

### Registration

- Read "about registration".

### Your account information

## Service Contents Help(J)

### Data Search

- Quick Search
- Search on a single VO Service
- Parallel search on multiple VO Services
- Xmatch Search
- JVOQL Search

### Subaru

- Suprime-Cam
- HDS

### Surveys

- Subaru Deep Survey
- IRSF Survey

### Service Search

- Keyword Search
- Category Search
- Advanced Search

### Astronomical Tools

- Source Extractor
- HyperZ

### Workflow

- Workflow Editor (Script)
- Workflow Editor
- Workflow Monitor

### Admin

Single Service Search - Mozilla Firefox  
 ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)  
 http://jvo.nao.ac.jp/portal/search/single.do

Single Serv VO Service Search Result - Mozilla Firefox  
 ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)  
 http://jvo.nao.ac.jp/portal/search/request.do  
 JVO JAPANESE VIRTUAL OBSERVATORY  
 => Location: Top

Data s  
 Execute Query  
 1. Service [L]  
 Service is no  
 Search servi  
 Select fro  
 Keyword S  
 Category S  
 Specify

ID	More Info	Description	Source	URL	URL	URL
87	<input type="radio"/>	Photometric evolution of star clusters models (Kruijssen+, 2008) - *Fitting values for a, b and c for the luminous fractional cluster mass decrease due to stellar evolution.	VizieR	URL	URL	FR
88	<input type="radio"/>	Photometric evolution of star clusters models (Kruijssen+, 2008) - Summary of models	VizieR	URL	URL	FR
89	<input type="radio"/>	JHKs surface brightness of Galactic globular . (Cohen+, 2007) - Parameters of the King profile fits for Galactic globular clusters	VizieR	URL	URL	FR
90	<input type="radio"/>	X-ray sources toward NGC 2808 (Servillat+, 2008) - Detected Chandra sources in the direction of NGC 2808	VizieR	URL	URL	FR
91	<input type="radio"/>	Absolute magnitude of Globular Cluster (Di Criscienzo+, 2006) - Globular Clusters in the Milky Way	VizieR	URL	URL	FR
92	<input type="radio"/>	Identification and coordinates in NGC 5272 (Evstigneeva+ 1994) - Coordinates of variables in M3 (Tables 1-6 of the paper)	VizieR	URL	URL	FR
93	<input type="radio"/>	Velocities and CMT photometry in globular M92 (Drukier+, 2007) - Data for cluster members	VizieR	URL	URL	FR
94	<input type="radio"/>	Velocities and CMT photometry in globular M92 (Drukier+, 2007) - Data for non-members	VizieR	URL	URL	FR
95	<input type="radio"/>	Velocities and CMT photometry in globular M92 (Drukier+, 2007) - Observing Log for M92	VizieR	URL	URL	FR
96	<input checked="" type="radio"/>	UBV(RI)cHalpha photometry in omega Cen (Bellini+, 2009) - Astrometric and photometric parameters for 359391 objects (table6 of the paper)	VizieR	URL	URL	FR
97	<input type="radio"/>	UBV(RI)cHalpha photometry in omega Cen (Bellini+, 2009) - Membership probability for the Kaluzny et al. (2004, Cat. <J/A+A/424/1101>) variable star catalog	VizieR	URL	URL	FR
98	<input type="radio"/>	2dF study of globular clusters in NGC 5128 (Beasley+, 2008) - Spectroscopic results of the study of globular clusters in NGC 5128 (tables 2, 3 and 4 of paper)	VizieR	URL	URL	FR
99	<input type="radio"/>	2dF study of globular clusters in NGC 5128 (Beasley+, 2008) - Lick indices and	VizieR	URL	URL	FR

x 検索: omega  
 完了

x 検索: omega  
 ↓ 次を検索(N) ↑ 前を検索(P) ☞ すべて強調表示(A) ☐ 大文字/小文字を区別(C)  
 完了

**JVO** Top | Search | VO Services | Subaru | Analysis | Workflow | JVO Space[Logout]  
 JAPANESE VIRTUAL OBSERVATORY p00 ver.090715 News | FAQ(J) | Help(J) | Bugs(J) Yutaka Komiya  
 => Location: Top Page > Search > Single Service

### Data search on a single service Help(J)

UBV(RI)cHalpha photometry in omega Cen (Bellini+, 2009) – Astrometric and photometric parameters for 359391 objects (table6 of the paper)

Execute Query Check SQL

1. Service 2. Table 3. Region 4. Criteria

Method to specify center coordinates:  Single  Multiple  VOTable  Local File

Object Name  Convert to Coordinate

Center Coord Samples:

Search Radius

Max # of concurrent queries

JVO VOTable Viewer - Mozilla Firefox

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http://jvo.nao.ac.jp/portal/viewer.do

Single Service Search x JVO VOTable Viewer x

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⇒ Location: Top Page > VOTable Viewer

Save/Download Filter Metadata Graphic

Total 50000 records page: 1

nload	_R	_RAJ2000	_DEJ2000
	sort	sort	sort
0.283447	201.80208	-47.75025	
0.277746	201.76372	-47.75027	
0.282936	201.79937	-47.75025	
0.275307	201.64188	-47.75016	
0.278472	201.61164	-47.75013	
0.278793	201.60922	-47.75012	
0.300158	201.50628	-47.74993	
0.274026	201.72153	-47.75013	
0.273759	201.71494	-47.75016	
0.276388	201.62903	-47.75006	
nload	_R	_RAJ2000	_DEJ2000
0.339351	201.99001	-47.74996	
0.321434	201.94261	-47.74999	
0.282011	201.79481	-47.75009	

JVO VOTable Viewer - Mozilla Firefox

ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)

http://jvo.nao.ac.jp/portal/viewer.do

Single Service Search x JVO VOTable Viewer x

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⇒ Location: Top Page > VOTable Viewer

Save/Download Filter Metadata Graphic Add Column Appearance

**Columns** specify column names which you want to displace. ex. col1, col2, col3 ...

**Condition** c15>80| specify selection condition of the records.

**Region** RA: Dec: Radius: deg specify selection region of the records.

**Order** specify the names of columns used to order the records.

ALL  DISTINCT

Update Clear

table update completed

0.278793	201.60922	-47.75012	6	201.609219	-47.750121	-1.55	1.6	20.856	20.202	19.66	19.263	57			
0.300158	201.50628	-47.74993	7	201.506294	-47.749911	6.71	21.84	19.905	19.095	18.552	18.136	0			
0.274026	201.72153	-47.75013	8	201.721527	-47.750125	1.23	7.76	20.844	20.116	19.692	19.347	62			
0.273759	201.71494	-47.75016	9	201.714951	-47.750153	5.27	2.33	20.354	19.696	19.261	18.909	70			
0.276388	201.62903	-47.75006	10	201.629034	-47.750053	4.24	7.46	19.275	18.694	18.31	17.953	0			
nload	_R	_RAJ2000	_DEJ2000	SEQ	RAJ2000	DEJ2000	PMRA	PMDE	UMAG	BMAG	VMAG	RCMAG	ICMAG	HA	MM
0.339351	201.99001	-47.74996	11	201.990031	-47.749954	11.91	2.8	21.197	20.246		19.408			62	
0.321434	201.94261	-47.74999	12	201.942606	-47.749989	-2.58	5	19.089	18.485	18.107	17.767			52	
0.282011	201.79481	-47.75009	13	201.79482	-47.750087	5.19	8.32	19.258	18.725	18.331	17.979			35	

完了

# 色等級図

Plot XY expr. Axis Filter Histogram Setting Misc

XY Plot mode:

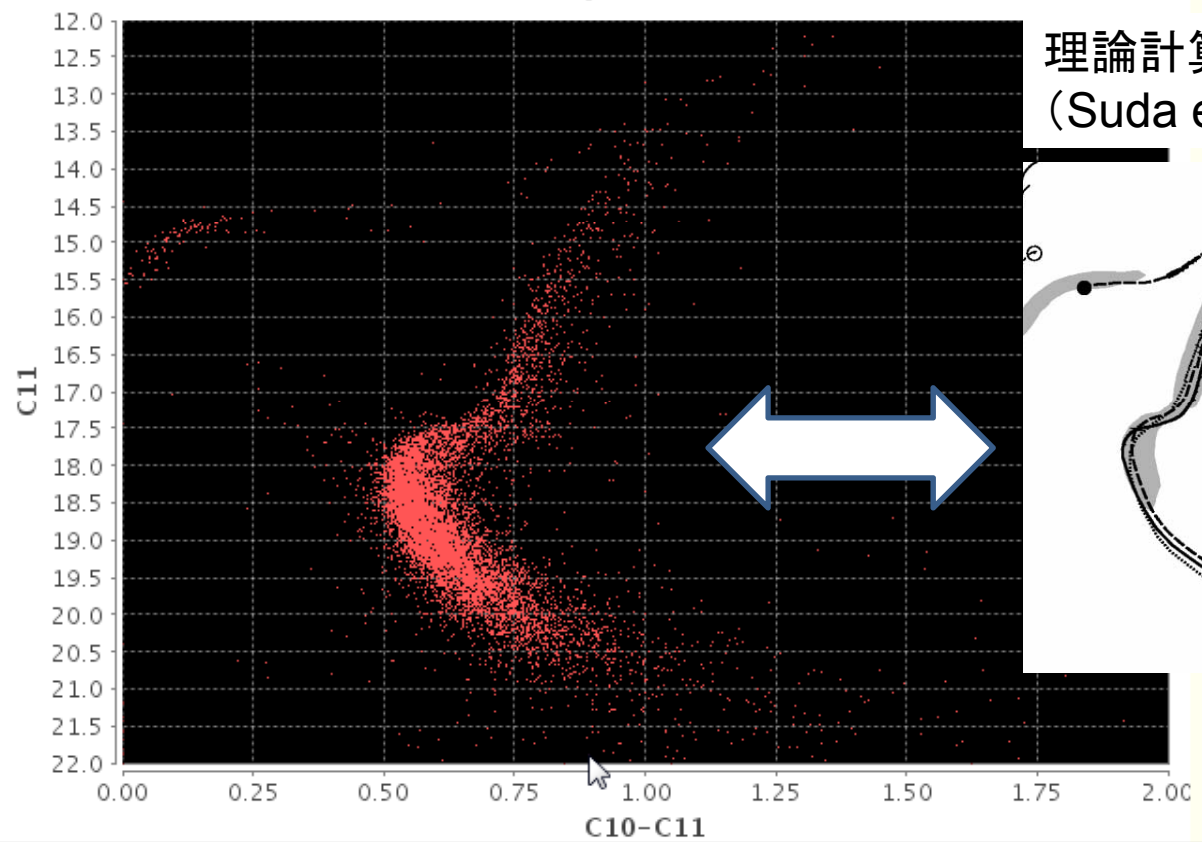
- Marker
- Line
- Line & Marker
- Dot

Histogram:

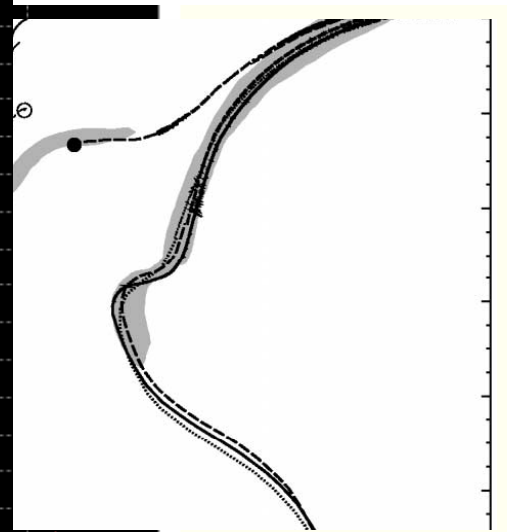
- Histogram

Plot

### XY plot



理論計算  
(Suda et al. 2007)



# JVOSpace

JVO VOTable Viewer - Mozilla Firefox  
ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)  
http://jvo.nao.ac.jp/portal/viewer.do  
よく見るページ Firefox を使いこなそう 最新ニュース  
Single Service Search JVO VOTable Viewer

**JVO** JAPANESE VIRTUAL OBSERVATORY  
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=> Location: Top Page > VOTable Viewer

JVO Space Viewer - Mozilla Firefox  
Save/Download Filter Metadata  
Save Result Download Save As  
ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)  
http://jvo.nao.ac.jp/portal/jvospace.do  
よく見るページ Firefox を使いこなそう 最新ニュース  
JVO Space Viewer

Alias Name	oo		
group ID	check	download	_R
0	<input type="checkbox"/>		0.283447
1	<input type="checkbox"/>		0.277746
2	<input type="checkbox"/>		0.282936
3	<input type="checkbox"/>		0.275307
4	<input type="checkbox"/>		0.278472
5	<input type="checkbox"/>		0.278793
6	<input type="checkbox"/>		0.300158
7	<input type="checkbox"/>		0.274026
8	<input type="checkbox"/>		0.273759
9	<input type="checkbox"/>		0.276388
group ID	check	download	_R
10	<input type="checkbox"/>		0.339351
11	<input type="checkbox"/>		0.321434

検索: omega  
完了

**JVO** JAPANESE VIRTUAL OBSERVATORY  
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=> Location: Top Page > JVOSpace Viewer

## JVOSpace Viewer

Partitions: /tmp | /work | /user

Current Directory: /user/

Operations Contents

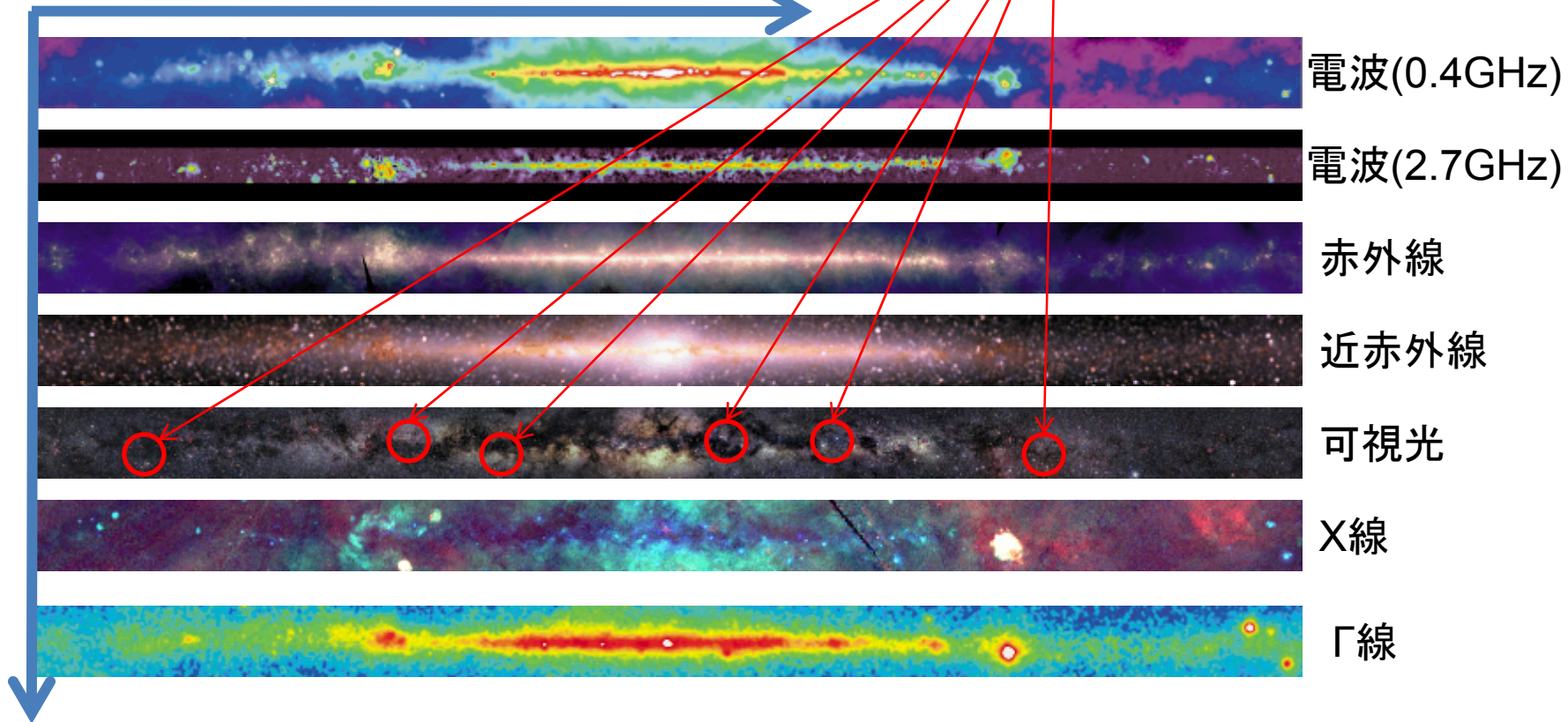
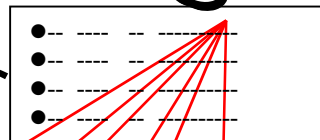
- Filter:  Update
- memorize Do It
- Select all  Unselect all

[parentdir]		
<input type="checkbox"/> - komiya/	4096	2008-07-24T15:12:28 JST
<input type="checkbox"/> - omegaCen/	4096	2008-07-24T15:38:22 JST
<input type="checkbox"/> - sagaEMP.xml	71795	2008-07-27T13:47:27 JST
<input type="checkbox"/> - sagaEMPvo.dat	47367	2008-07-27T13:46:34 JST
<input type="checkbox"/> - sagaall.dat	155871	2008-07-27T13:41:17 JST
<input type="checkbox"/> - testHDF.xml	751480	2008-06-11T10:55:14 JST
<input type="checkbox"/> - user	10081	2008-07-27T13:21:37 JST

# Use Case



リスト





## Data search on a single service [Help\(J\)](#)

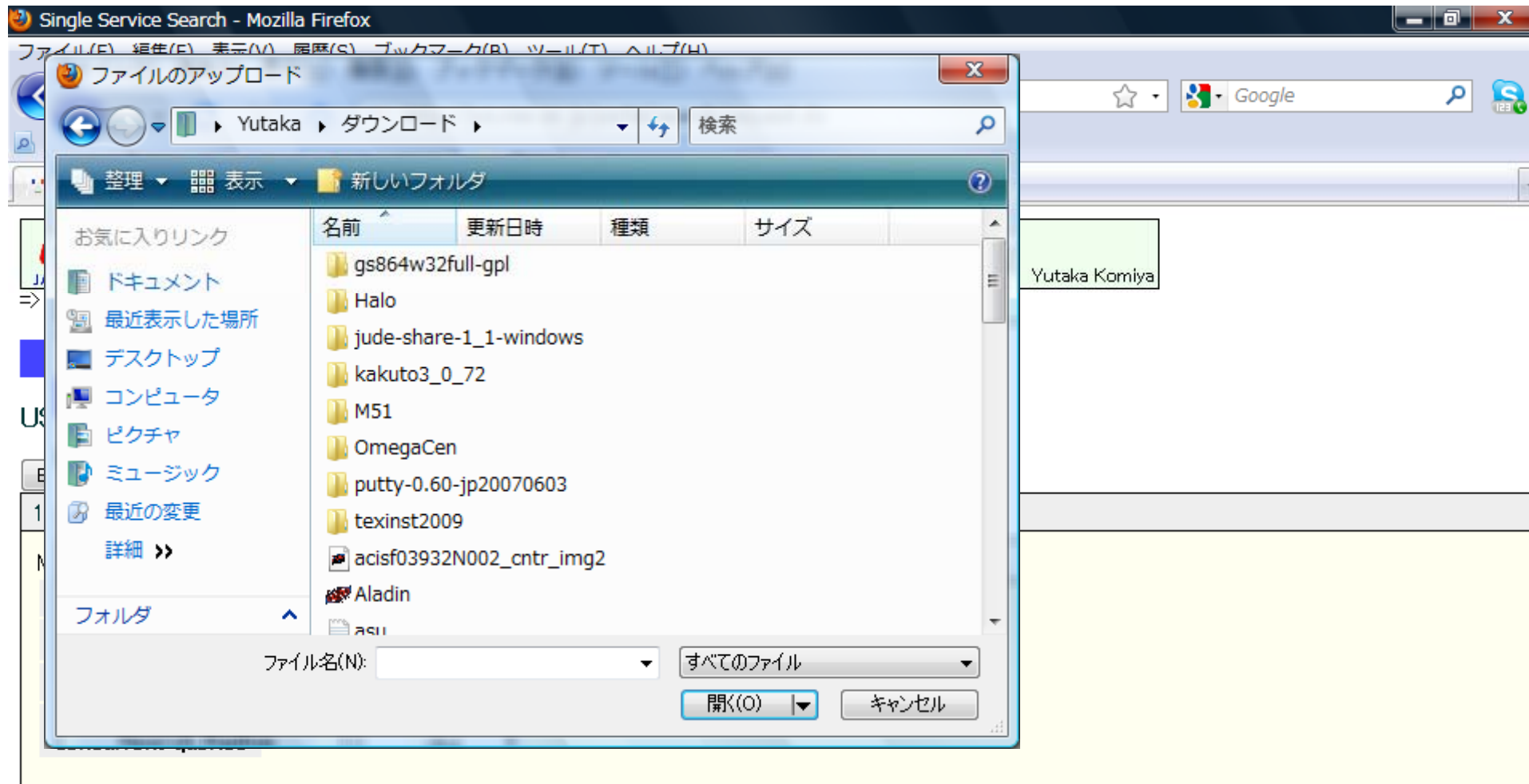
USNO-A2.0

Execute Query   Check SQL

1. Service	2. Table	3. Region	4. Criteria
------------	----------	-----------	-------------

Selected service is: **USNO-A2.0**  
The service identifier is: **ivo://nvo.nao.edu/usno-a2.0**  
Search service

Select from All	<input type="button" value="Do It"/>
Keyword Search <input type="text"/>	<input type="button" value="Do It"/>
Category Search <input type="text"/>	<input type="button" value="Do It"/>
Specify ID <input type="text" value="ivo://nvo.nao.edu/usno-a2.0"/>	<input type="button" value="Do It"/>



JVO VOTable Viewer - Mozilla Firefox

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http://jvo.nao.ac.jp/portal/viewer.do

よく見るページ Firefox を使いこなそう 最新ニュース

Search Status Search Status Single Service... JVO VOTa... x JVO VOTable ... Single Service... JVO VOTable ...

**JVO** Top | Search | VO Services | Subaru | Analysis | Workflow | JVO Space[Logout]  
 JAPANESE VIRTUAL OBSERVATORY p00 ver.090715 News | FAQ(J) | Help(J) | Bugs(J) Yutaka Komiya

=> Location: Top Page > VOTable Viewer

Save/Download Filter Metadata Graphics **Add Column** Appearance

Total 1134 records page: 1 go << < > >>

Alias Name			O0	O1	O2	O3	O4	O5	O6	O7	O8
group	ID	check download	T.NAME <input type="button" value="sort"/>	T.RA2000 <input type="button" value="sort"/>	T.DE2000 <input type="button" value="sort"/>	T.V <input type="button" value="sort"/>	T.FE_H <input type="button" value="sort"/>	T.B_V <input type="button" value="sort"/>	T.T_EFF <input type="button" value="sort"/>	T.LOG_G <input type="button" value="sort"/>	T.URL <input type="button" value="sort"/>
0		<input type="checkbox"/>	HD122563	14 02 31.8460	+09 41 09.944	6.18	-2.59	0.85	4650	1.24	Link
1		<input type="checkbox"/>	BD+03 740	05 01 16.6219	+04 06 37.021	9.8	-2.65	0.36	6266	4.04	Link
2		<input type="checkbox"/>	CS29497-034	00 41 39.819	-26 18 54.48	12.221	-2.9	1.1	4800	1.8	Link
3		<input type="checkbox"/>	HD88609	10 14 28.9837	+53 33 39.351	8.64	-3.07	0.93	4550	1.1	Link
4		<input type="checkbox"/>	LP625-44	16 43 14.038	-01 55 30.50	11.85	-2.7	0.69	5500	2.5	Link
5		<input type="checkbox"/>	CS31082-001	01 29 31.20	-16 00 48.0	11.674	-2.9	0.772	4825	1.5	Link
6		<input type="checkbox"/>	CD-24 17504	23 07 20.25	-23 52 35.9	12.124	-3.21	0.39	6338	4.32	Link
7		<input type="checkbox"/>	BD-18 5550	19 58 49.7374	-18 12 11.144	9.35	-3.03	0.599	4600	0.95	Link
8		<input type="checkbox"/>	BS16929-005	13 03 29.40	+33 51 06.0	13.61	-3.17	0.62	5250	2.8	Link
9		<input type="checkbox"/>	CS22886-042	22 20 25.8	-10 23 20	13.275	-2.61	0.831	4800	1.6	Link
group	ID	check download	T.NAME	T.RA2000	T.DE2000	T.V	T.FE_H	T.B_V	T.T_EFF	T.LOG_G	T.URL
10		<input type="checkbox"/>	CS22960-053	22 16 17.00	-43 54 21.0	14.95	-3.14	0.76	5200	2.1	Link
11		<input type="checkbox"/>	CS30325-028	15 05 19.8	+06 17 05	12.868	-2.74	0.76	4900	1.8	Link
12		<input type="checkbox"/>	CS30325-094	14 54 39.27	+04 21 38.0	12.317	-3.17	0.7	5050	2.1	Link

javascript:settab('box', 'head', 10, 1)

JVO VOTable Viewer - Mozilla Firefox

ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)

http://jvo.nao.ac.jp/portal/viewer.do?action=votableViewer&path=%2Fuser%2F... Google

よく見るページ Firefox を使いこなそう 最新ニュース

Search Status Search Status Single Service... JVO VOTable ... JVO VOTa... x Single Service... JVO VOTable ...

**JVO** Top | Search | VO Services | Subaru | Analysis | Workflow | JVO Space[Logout]  
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⇒ Location: Top Page > VOTable Viewer

Save/Download Filter Metadata Graphic Add Column Appearance

### Add a column of another catalog

- Service identifier or VOTable path  e.g. ivo://jvo/twomass (2MASS catalog service)
  - Search a VO data service  Keyword  Category
  - Search a file in the JVOSpace
  - Select from memorized VOTable at the JVOSpace
  - Select from memorized VO services
- Table name:  e.g. psc (2MASS point source catalog)
  - Select from a list
- Column names to be added (comma separated): \*  e.g. ra,dec,j\_m-h\_m,h\_m-k\_m (2MASS coordinate and color)
  - Select from a list
- Condition:
  - Proximity of Coordinates :  arcsec
  - Coordinate columns of **this** Table (alias name)
    - RA =  DEC =
  - Coordinate columns of the table **to be added** (table column name or VOTable field name)
    - RA =  DEC =
  - Other condition (not implemented yet)

完了

JVO VOTable Viewer - Mozilla Firefox

ファイル(E) 編集(E) 表示(V) 履歴(S) ブックマーク(B) ツール(I) ヘルプ(H)

http://jvo.nao.ac.jp/portal/viewer.do

JVO JAPANESE VIRTUAL OBSERVATORY p00 ver.090715 News | FAQ(J) | Help(J) | Bugs(J) Yutaka Komiya

⇒ Location: Top Page > VOTable Viewer

Save/Download Filter Metadata Graphic Add Column Appearance

Total 1134 records page: 1

Alias Name	C0	C1	C2	C3	C4	C5	C6	C7	C8
group ID check download	T.NAME	T.RA2000	T.DE2000	T.V	T.FE_H	T.B_V	T.T_EFF	T.LOG_G	T.URL
	sort	sort	sort	sort	sort	sort	sort	sort	sort
0	HD122563	14 02 31.8460	+09 41 09.944	6.18	-2.59	0.85	4650	1.24	Link
1	BD+03 740	05 01 16.6219	+04 06 37.021	9.8	-2.65	0.36	6266	4.04	Link
2	CS29497-034	00 41 39.819	-26 18 54.48	12.221	-2.9	1.1	4800	1.8	Link
3	HD88609	10 14 28.9837	+53 33 39.351	8.64	-3.07	0.93	4550	1.1	Link
4	LP625-44	16 43 14.038	-01 55 30.50	11.85	-2.7	0.69	5500	2.5	Link
5	CS31082-001	01 29 31.20	-16 00 48.0	11.674	-2.9	0.772	4825	1.5	Link
6	CD-24 17504	23 07 20.25	-23 52 35.9	12.124	-3.21	0.39	6338	4.32	Link
7	BD-18 5550	19 58 49.7374	-18 12 11.144	9.35	-3.03	0.599	4600	0.95	Link
8	BS16929-005	13 03 29.40	+33 51 06.0	13.61	-3.17	0.62	5250	2.8	Link
9	CS22886-042	22 20 25.8	-10 23 20	13.275	-2.61	0.831	4800	1.6	Link
group ID check download	T.NAME	T.RA2000	T.DE2000	T.V	T.FE_H	T.B_V	T.T_EFF	T.LOG_G	T.URL
10	CS22960-053	22 16 17.00	-43 54 21.0	14.95	-3.14	0.76	5200	2.1	Link
11	CS30325-028	15 05 19.8	+06 17 05	12.868	-2.74	0.76	4900	1.8	Link
12	CS30325-094	14 54 39.27	+04 21 38.0	12.317	-3.17	0.7	5050	2.1	Link

javascript:settab('box', 'head', 10, 1)

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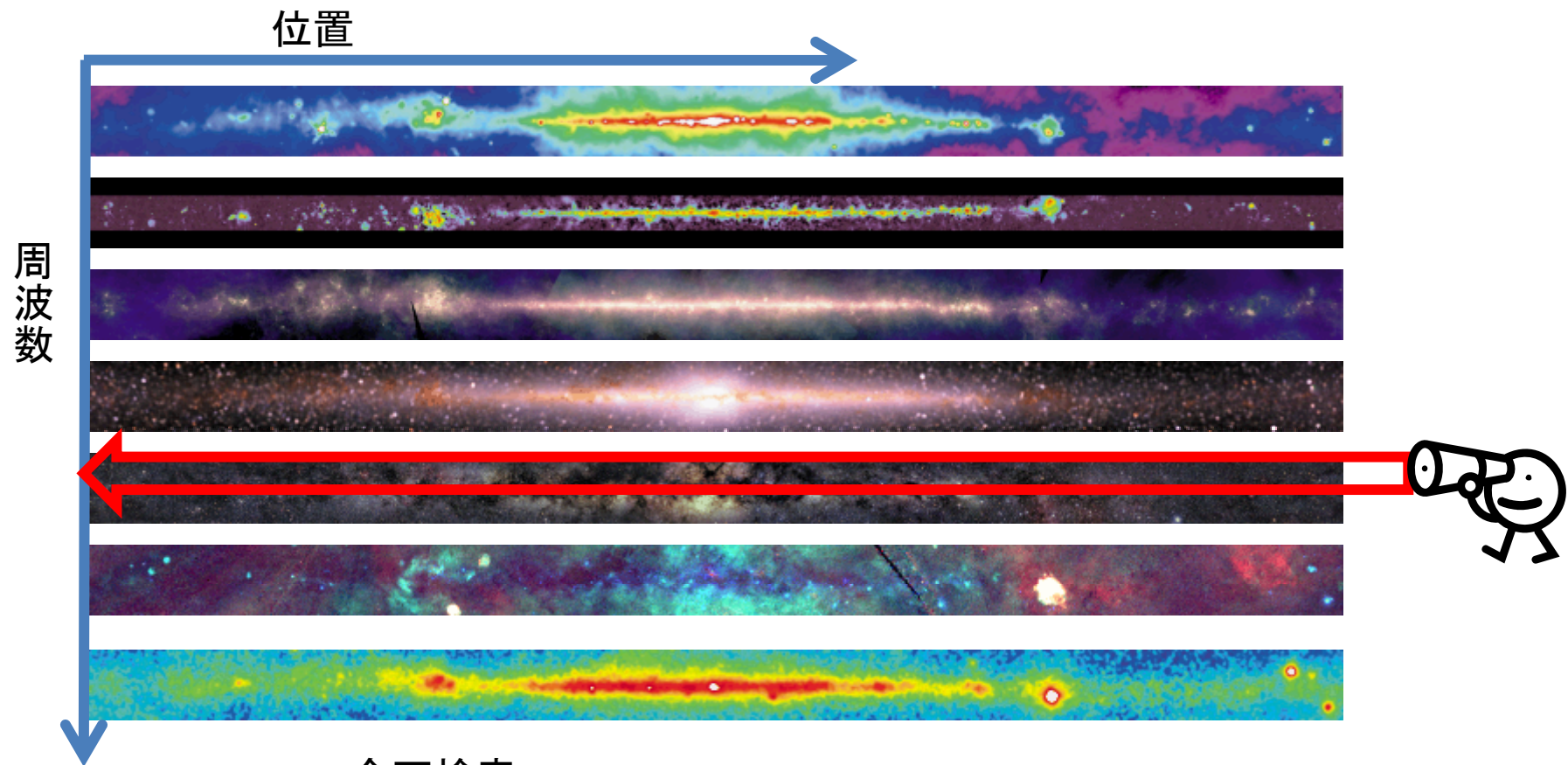
http://jvo.nao.ac.jp/portal/viewer.do

C6	C7	C8	C9	C10	C11	C12						
E_RADEG	E_DEDEG	UCMAG	NO	EPOCH	PMRA	PMDE						
sort	sort	sort	sort	sort	sort	sort						
46	32	15.56	3	1999.352	27.6	-33						
23	29	15.86	2	1999.354	1.1	4.9						
76	136	16.11	2	1999.355	-12.9	-19						
23	32	14.5	4	1999.354	-12.6	18.1						
8	19	13.83	5	1999.356	42.4	-3.1						
65	15	15.85	2	1999.352	-8	12.1						
26	24	15.05	2	1999.352	-27.4	-7						
29	49	14.76	3	1999.353	4.8	-14.8						
55	49	16.28	2	1999.351	-35.7	-10.2						
44	15	14.07	4	1999.356	25.5	-68.7						
_R	_RAJ2000	_DEJ2000	UCAG	RA(ICRS)	DE(ICRS)	E_RADEG	E_DEDEG	UCMAG	NO	EPOCH	PMRA	PMDE
151212	255.582561	-27.73699	21817942	255.5825627	-27.736992	12	9	11.73	6	1999.356	-9.4	11.5
149229	255.58316	-27.727082	21817946	255.5831536	-27.7270756	38	10	16.44	2	1999.352	33.9	-32.9
16354	255.588371	-27.631574	21817958	255.588378	-27.6315631	8	33	14.54	4	1999.355	-32.3	-62.7

Message

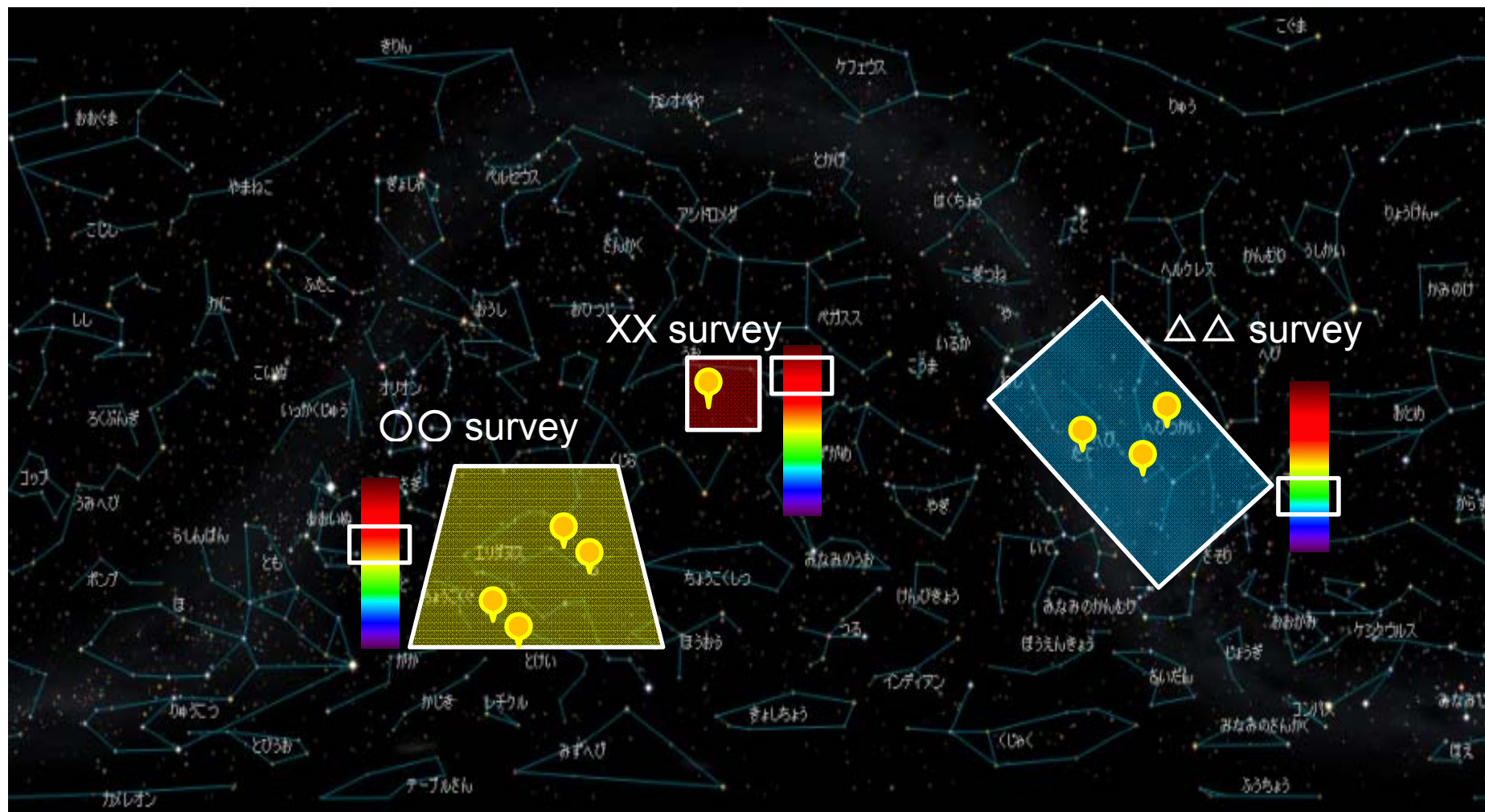
完了

# Use case



全天検索 :  
大量データへのアクセス⇒並列化を検討

# 天球上表示



# In the near future

- 安定性向上
- 天球上からのデータ探索
- 並列化/全天検索
- JVOSpace の拡充
  - JVOSpace内の検索
  - JVOSpace上での解析
- 

乞うご期待！