



Visibility data discovery and access prototype based on ObsTAP + DataLink

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Our GOAL

- Demonstrate how we can use existing Standards to expose visibility data in the VO and highlight what is missing by :
- Try to expose a small collection of visibility data observations (measurement sets) in an ObsTAP service
- Solve the Observation / dataset issue
 - Visibility data observations are generally gathering several datasets
- Provide additional information useful for data selection by adding « ad hoc » columns in ObsCore table and various information via DataLink
- *Initiate a discussion on how we can standardize this additional information*



Small MS collection

- Various measurement sets provided by Katharina Lutz and Yelena Stein (post docs at CDS) and Alan Loh (Nançay)
 - 7 ATCA MS
 - Single and multi-fields : 1-2 Ghz, 4-5 Hhz, 6-7Ghz, 40-50 Ghz bands
 - 2 EVLA MS
 - Single and multi_fields 1-2 Ghz band
 - 1 LOFAR MS
 - 50-60 Mhz band
 - 1 NENUFAR MS
 - 50-60 Mhz band



Processed Metadata : listobs output

- For each measurement set we extract metadata using the casa listobs command
- Algorithm to split measurement sets into several datasets and extract ObsCore metadata for them developed by one of us (A.Egner) as an internship.

```

=====
MeasurementSet Name: /home/klutz/Interns/Anais_Radio-Data-Archive/Measurement_Sets/HI_data_narrow_channels.ms  MS Version 2
=====
Observer: TB,KL      Project: C2705
Observation: ATCA
Data records: 18900      Total elapsed time = 3229.86 seconds
Observed from 10-Sep-2015/02:13:20.0 to 10-Sep-2015/03:07:09.9 (UTC)

ObservationID = 0      ArrayID = 0
Date      Timerange (UTC)      Scan      FlId      FieldName      nRows      SpwIds      Average Interval(s)      ScanIntent
10-Sep-2015/02:13:20.0 - 02:53:29.9      0      0      eso208-g026      14460      [0,1,2,3]      [9.86, 9.86, 9.86, 9.86]
      02:54:10.0 - 02:59:09.9      1      1      0823-500      1800      [0,1,2,3]      [9.86, 9.86, 9.86, 9.86]
      02:59:50.0 - 03:07:09.9      2      0      eso208-g026      2640      [0,1,2,3]      [9.86, 9.86, 9.86, 9.86]
(nRows = Total number of rows per scan)

Fields: 2
ID      Code Name      RA      Decl      Epoch      SrcId      nRows
0      eso208-g026      07:35:21.099994 -50.02.34.99996 J2000      0      17100
1      0823-500      08:25:26.868994 -50.10.38.49003 J2000      1      1800

Spectral Windows: (4 unique spectral windows and 1 unique polarization setups)
SpwID      Name      #Chans      Frame      Ch0(MHz)      ChanWid(kHz)      TotBW(kHz)      CtrFreq(MHz)      Corrs
0      2049      TOPO      3124.000      -1000.000      2049000.0      2100.0000      XX XY YX YY
1      17409      TOPO      1410.500      -0.488      8500.5      1406.2500      XX XY YX YY
2      2049      TOPO      3124.000      -1000.000      2049000.0      2100.0000      XX XY YX YY
3      17409      TOPO      1410.500      -0.488      8500.5      1406.2500      XX XY YX YY

Sources: 2
ID      Name      SpwId      RestFreq(MHz)      SysVel(km/s)
0      eso208-g026      any      1420.40575      0
1      0823-500      any      1420.40575      0

Antennas: 6:
ID      Name      Station      Diam.      Long.      Lat.      Offset from array center (m)      ITRF Geocentric coordinates (m)
      East      North      Elevation      x      y      z
0      CA01      ANT1      22.0 m      +149.33.56.6      -30.08.43.7      1499.9977      0.7721      -1.6135 -4751674.967380 2791612.460760 -3200482.268996
1      CA02      ANT2      22.0 m      +149.33.50.3      -30.08.43.7      1331.6239      0.6974      -1.7741 -4751589.523380 2791757.543760 -3200482.252996
2      CA03      ANT3      22.0 m      +149.33.48.0      -30.08.43.7      1270.4069      0.6539      -1.8330 -4751558.449380 2791810.287760 -3200482.260996
3      CA04      ANT4      22.0 m      +149.33.32.6      -30.08.43.7      857.1470      0.4463      -2.2224 -4751348.704380 2792166.364760 -3200482.244996
4      CA05      ANT5      22.0 m      +149.33.28.0      -30.08.43.7      734.6957      0.3678      -2.3296 -4751286.549380 2792271.868760 -3200482.258996
5      CA06      ANT6      22.0 m      +149.31.08.2      -30.08.43.8      -2999.9964      -0.8846      -4.6136 -4749390.961380 2795489.734760 -3200482.194996

```



A few hints on the choice we made

- A dataset is defined as a **subset** of **contiguous or overlapping SpectralWindows** of **same Channel Width** for a given **Field**
- `obs_id`, `facility_name`, `instrument_name` built or extracted from generic measurement set information (Observer, project, Observation name, etc..)

```
Observer: TB,KL      Project: C2705
Observation: ATCA
Data records: 18900      Total elapsed time = 3229.86 seconds
Observed from 10-Sep-2015/02:13:20.0 to 10-Sep-2015/03:07:09.9 (UTC)
```



A few hints on the choice we made

- target_name , s_ra, s_dec, obs_publisher_did extracted from the field table for each datasets we create :

```
Fields: 2
-----
ID      Code Name          RA              Decl             Epoch           SrcId           nRows
0       eso208-g026  07:35:21.099994 -50.02.34.99996 J2000           0               17100
1       0823-500    08:25:26.868994 -50.10.38.49003 J2000           1               1800
```

- f_min, f_max, em_min, em_max, em_res_power, em_xel, pol_states, pol_xel, s_fov, s_region extracted from the SpectralW indow table

```
Spectral Windows: (4 unique spectral windows and 1 unique polarization setups)
SpwID  Name      #Chans  Frame  Ch0(MHz)  ChanWid(kHz)  TotBW(kHz)  CtrFreq(MHz)  Corrs
0       2049     TOPO    3124.000 -1000.000  2049000.0    2100.0000    XX XY YX YY
1       17409    TOPO    1410.500 -0.488     8500.5       1406.2500    XX XY YX YY
2       2049     TOPO    3124.000 -1000.000  2049000.0    2100.0000    XX XY YX YY
3       17409    TOPO    1410.500 -0.488     8500.5       1406.2500    XX XY YX YY
```

s_fov is estimated as $1.02 * (\text{central lambda} / \text{Antenna Diameter}) * (180 / \pi)$
(f_min, f_max non ObsCore columns)



A few hints on the choice we made

- `t_min`, `t_max`, `t_exptime` extracted from « scan table »

Date	Timerange (UTC)	Scan	FldId	FieldName	nRows	SpwIds	Average Interval(s)	ScanIntent
10-Sep-2015	02:13:20.0 - 02:53:29.9	0	0	eso208-g026	14460	[0,1,2,3]	[9.86, 9.86, 9.86, 9.86]	
	02:54:10.0 - 02:59:09.9	1	1	0823-500	1800	[0,1,2,3]	[9.86, 9.86, 9.86, 9.86]	
	02:59:50.0 - 03:07:09.9	2	0	eso208-g026	2640	[0,1,2,3]	[9.86, 9.86, 9.86, 9.86]	

(nRows = Total number of rows per scan)

- Antenna diameter from Antenna table (common value)
- Still unsolved :
 - `s_resolution`, `s_xel1`, `s_xel2`
 - `t_resolution`, `t_xel`
 - `obs_collection`



Visibility data ObsTAP CDS prototype

- A service with 374 different datasets from 11 observations
- `access_url` gives a DataLink response VOTable providing links to
 - Full listobs result file
 - MS zip file
 - Various plots (uv coverage, antennae, etc...)



Prototype queried via TOPCAT

« select * from ivoa.obscore where em_min > 1 »

The screenshot displays the TOPCAT software interface. The main window shows a metadata tree on the left with 'ivoa.obscore' selected. The central area contains a query editor with the text: `select * from ivoa.obscore where em_min > 1`. Below the query editor, a table browser window displays the results of the query. The table has 11 rows and 11 columns, with the following headers: `datapro...`, `calib_l...`, `obs_co...`, `obs_id`, `obs_publisher_did`, `access_url`, `access_format`, `target_name`, `s_dec`, `s_ra`, `s_fov`, `s_region`, and `t_min`. The status bar at the bottom indicates 'Total: 11 Visible: 11 Selected: 0'.

Table Browser for 1: TAP_1_ivoa.obscore

	datapro...	calib_l...	obs_co...	obs_id	obs_publisher_did	access_url	access_format	target_name	s_dec	s_ra	s_fov	s_region	t_min
1	visibility	1	TBD	LC2_034_LOFAR_unknown_1	ivo://CDS/tap/visibility#LC2_034_LOFAR_unknown_1_BEAM_0_1	https://aladin.u...	application/x...	BEAM_0	40,7339	299,8682	3,7655	CIRCLE ICRS 299.8682 40.73...	56866,43653
2	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_1	https://aladin.u...	application/x...	BEAM_0	90,	0,	15,7736	CIRCLE ICRS 0.0 90.0 7.8868	58927,01189
3	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_2	https://aladin.u...	application/x...	BEAM_0	90,	0,	15,5926	CIRCLE ICRS 0.0 90.0 7.7963	58927,01189
4	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_3	https://aladin.u...	application/x...	BEAM_0	90,	0,	15,4157	CIRCLE ICRS 0.0 90.0 7.70785	58927,01189
5	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_4	https://aladin.u...	application/x...	BEAM_0	90,	0,	15,1861	CIRCLE ICRS 0.0 90.0 7.59305	58927,01189
6	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_5	https://aladin.u...	application/x...	BEAM_0	90,	0,	15,0183	CIRCLE ICRS 0.0 90.0 7.50915	58927,01189
7	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_6	https://aladin.u...	application/x...	BEAM_0	90,	0,	14,8542	CIRCLE ICRS 0.0 90.0 7.4271	58927,01189
8	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_7	https://aladin.u...	application/x...	BEAM_0	90,	0,	14,6936	CIRCLE ICRS 0.0 90.0 7.3468	58927,01189
9	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_8	https://aladin.u...	application/x...	BEAM_0	90,	0,	14,5364	CIRCLE ICRS 0.0 90.0 7.2682	58927,01189
10	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_9	https://aladin.u...	application/x...	BEAM_0	90,	0,	14,3321	CIRCLE ICRS 0.0 90.0 7.16605	58927,01189
11	visibility	1	TBD	MSCreate_LOFAR_MSCreate_1	ivo://CDS/tap/visibility#MSCreate_LOFAR_MSCreate_1_BEAM_0_10	https://aladin.u...	application/x...	BEAM_0	90,	0,	14,1825	CIRCLE ICRS 0.0 90.0 7.09125	58927,01189

Total: 11 Visible: 11 Selected: 0

Prototype queried via TOPCAT

« select * from ivoa.obscore where obs_id like '%ATCA%' »

The image shows a screenshot of the TOPCAT software interface. The main window displays a query: `select * from ivoa.obscore where obs_id like '%ATCA%'`. Below the query, a table browser shows the results of the query, listing 17 rows of data. The table has columns for obs_id, obs_publisher_id, access_urls, target_name, s_dec, s_ra, s_fov, s_region, t_min, t_max, t_exptime, and t_resol.

Table Browser for 2: TAP_2_ivoa.obscore

	obs_id	obs_publisher_id	access...	acce...	access...	target_name	s_dec	s_ra	s_fov	s_region	t_min	t_max	t_exptime	t_resol
1	C2705_ATCA_TB.KL_1	ivo://CDS/tap/visibility#C2705_ATCA_TB.KL_1_eso208-g026_1	https...	appl...		eso208-g026	-50,0431	113,8379	0,3793	CIRCLE ICRS 113.8379 -50.0431 0.18965	57275,79572	57275,8331	2849,8	
2	C2705_ATCA_TB.KL_1	ivo://CDS/tap/visibility#C2705_ATCA_TB.KL_1_eso208-g026_2	https...	appl...		eso208-g026	-50,0431	113,8379	0,5663	CIRCLE ICRS 113.8379 -50.0431 0.28315	57275,79572	57275,8331	2849,8	
3	C2705_ATCA_TB.KL_1	ivo://CDS/tap/visibility#C2705_ATCA_TB.KL_1_0823-500_1	https...	appl...		0823-500	-50,1774	126,362	0,3793	CIRCLE ICRS 126.362 -50.1774 0.18965	57275,82407	57275,82755	299,9	
4	C2705_ATCA_TB.KL_1	ivo://CDS/tap/visibility#C2705_ATCA_TB.KL_1_0823-500_2	https...	appl...		0823-500	-50,1774	126,362	0,5663	CIRCLE ICRS 126.362 -50.1774 0.28315	57275,82407	57275,82755	299,9	
5	C2921_ATCA_Wang_1	ivo://CDS/tap/visibility#C2921_ATCA_Wang_1_ngc4930_1	https...	appl...		ngc4930	-41,4116	196,0219	0,3793	CIRCLE ICRS 196.0219 -41.4116 0.18965	57017,57542	57017,59428	1409,8	
6	C2921_ATCA_Wang_1	ivo://CDS/tap/visibility#C2921_ATCA_Wang_1_ngc4930_2	https...	appl...		ngc4930	-41,4116	196,0219	0,5706	CIRCLE ICRS 196.0219 -41.4116 0.2853	57017,57542	57017,59428	1409,8	
7	C2921_ATCA_Wang_1	ivo://CDS/tap/visibility#C2921_ATCA_Wang_1_1243-412_1	https...	appl...		1243-412	-41,4793	191,4902	0,3793	CIRCLE ICRS 191.4902 -41.4793 0.18965	57017,58178	57017,58386	179,9	
8	C2921_ATCA_Wang_1	ivo://CDS/tap/visibility#C2921_ATCA_Wang_1_1243-412_2	https...	appl...		1243-412	-41,4793	191,4902	0,5706	CIRCLE ICRS 191.4902 -41.4793 0.2853	57017,58178	57017,58386	179,9	
9	C3145_ATCA_sb.mv_1	ivo://CDS/tap/visibility#C3145_ATCA_sb.mv_1_b03_532_1	https...	appl...		b03_532	-32,2607	264,07	0,0184	CIRCLE ICRS 264.07 -32.2607 0.0092	58945,64653	58945,6466	5,9	
10	C3145_ATCA_sb.mv_1	ivo://CDS/tap/visibility#C3145_ATCA_sb.mv_1_b03_532_2	https...	appl...		b03_532	-32,2607	264,07	0,0189	CIRCLE ICRS 264.07 -32.2607 0.00945	58945,64653	58945,6466	5,9	
11	C3145_ATCA_sb.mv_1	ivo://CDS/tap/visibility#C3145_ATCA_sb.mv_1_b03_532_3	https...	appl...		b03_532	-32,2607	264,07	0,0187	CIRCLE ICRS 264.07 -32.2607 0.00935	58945,64653	58945,6466	5,9	
12	C3145_ATCA_sb.mv_1	ivo://CDS/tap/visibility#C3145_ATCA_sb.mv_1_b03_532_4	https...	appl...		b03_532	-32,2607	264,07	0,0186	CIRCLE ICRS 264.07 -32.2607 0.0093	58945,64653	58945,6466	5,9	
13	C3145_ATCA_sb.mv_1	ivo://CDS/tap/visibility#C3145_ATCA_sb.mv_1_b03_532_5	https...	appl...		b03_532	-32,2607	264,07	0,0185	CIRCLE ICRS 264.07 -32.2607 0.00925	58945,64653	58945,6466	5,9	
14	C3145_ATCA_sb.mv_1	ivo://CDS/tap/visibility#C3145_ATCA_sb.mv_1_b03_532_6	https...	appl...		b03_532	-32,2607	264,07	0,0185	CIRCLE ICRS 264.07 -32.2607 0.00925	58945,64653	58945,6466	5,9	
15	C3145_ATCA_sb.mv_1	ivo://CDS/tap/visibility#C3145_ATCA_sb.mv_1_b03_532_7	https...	appl...		b03_532	-32,2607	264,07	0,0183	CIRCLE ICRS 264.07 -32.2607 0.00915	58945,64653	58945,6466	5,9	
16	C3145_ATCA_sb.mv_1	ivo://CDS/tap/visibility#C3145_ATCA_sb.mv_1_b03_532_8	https...	appl...		b03_532	-32,2607	264,07	0,0181	CIRCLE ICRS 264.07 -32.2607 0.00905	58945,64653	58945,6466	5,9	
17	C3145_ATCA_sb.mv_1	ivo://CDS/tap/visibility#C3145_ATCA_sb.mv_1_b03_532_9	https...	appl...		b03_532	-32,2607	264,07	0,0164	CIRCLE ICRS 264.07 -32.2607 0.0082	58945,64653	58945,6466	5,9	

Prototype queried via TOPCAT

« select * from ivoa.obscure where t_min > 57200 and t_max < 57300 »
+ DataLink access to listobs result - 1

The screenshot displays the TOPCAT software interface with several windows open:

- Table Access Protocol (TAP) Query:** Shows metadata for 'TAP Service (26)' and 'ivoa (1)'. The 'ivoa.obscure' table is selected.
- TOPCAT(3): Activation Actions:** Shows a list of actions for 'TAP 3 ivoa.obscure'. The 'Load Table' action is selected.
- TOPCAT:** Shows the 'Table List' with 5 tables. The 'Current Table Properties' for 'C2705_ATCA_TB,KL_1.xml' are displayed, including label, location, name, rows (2), and columns (8).
- TOPCAT(5): Table Browser:** Shows a table with 2 rows and 10 columns. The first row is selected.
- TOPCAT(3): Table Browser:** Shows a table with 4 rows and 14 columns. The first row is selected.

The ADQL Text window contains the query: `select * from ivoa.obscure where t_min > 57200 and t_max < 57300`

The Table Browser for 5: C2705_ATCA_TB,KL_1.xml shows the following data:

Seq	Row	Status	Message
1	1	OK	Table loaded from https://aladin.u-strasbg.fr/dl/C2705_ATCA_TB,KL_1.xml

The Table Browser for 3: TAP_3 ivoa.obscure shows the following data:

ID	access_url	service...	error_...	seman...	description	content_type	content_le...
1	https://aladin.u-strasbg.fr/dl/listobs_ATCA_C2705_HI_data_narrow_channels.txt			#this	ListObs for Measurement set ATCA_C2705_HI...	text/html	3330
2	https://aladin.u-strasbg.fr/dl/ATCA_C2705_HI_data_narrow_channels.ms.zip			#this	Full retrieval of Measurement set ATCA_C2705...	application/zip	24900000

The Table Browser for 3: TAP_3 ivoa.obscure shows the following data:

access_url	access_format	target_name	t_min	t_max	t_exptime	em_max	em_min	em_res_power	em_xel	o_ucd	pol_sta
https://aladin.u-strasbg.fr/dl/C2705_ATCA_TB,KL_1.xml	application/x-votable+xml;content=datalink	eso208-g026	57275,79572	57275,8331	2849,8	0,27888	0,09596	2100,	2049	phot.flux;stat.Fourier	XX XY YX
https://aladin.u-strasbg.fr/dl/C2705_ATCA_TB,KL_1.xml	application/x-votable+xml;content=datalink	eso208-g026	57275,79572	57275,8331	2849,8	0,21383	0,21254	2,881660E6	36867	phot.flux;stat.Fourier	XX XY YX
https://aladin.u-strasbg.fr/dl/C2705_ATCA_TB,KL_1.xml	application/x-votable+xml;content=datalink	0823-500	57275,82407	57275,82755	299,9	0,27888	0,09596	2100,	2049	phot.flux;stat.Fourier	XX XY YX
https://aladin.u-strasbg.fr/dl/C2705_ATCA_TB,KL_1.xml	application/x-votable+xml;content=datalink	0823-500	57275,82407	57275,82755	299,9	0,21383	0,21254	2,881660E6	36867	phot.flux;stat.Fourier	XX XY YX

Prototype queried via TOPCAT

« select * from ivoa.obscure where t_min > 57200 and t_max < 57300 »
 + DataLink access to listobs result - 2

Table Access Protocol (TAP) Query

Window IAP Registry Edit Interop Help

TOPCAT(3): Table Browser

Window Rows Help

Select Select

Metadata

Find:

Table Browser for 3: TAP_3 ivoa.obscure

Name	access_url	access_format	target_name	t_min	t_max	t_exptime	em_max	em_min	em_res_power	em_xel	o_ucd
1	https://aladin.u-strasbg.fr/dl/C2705_ATCA_TB_KL_1.xml	application/x-votable+xml;content=datalink	eso208-g026	57275,79572	57275,8331	2849,8	0,27888	0,09596	2100,	2049	phot.flux:stat.F
2	https://aladin.u-strasbg.fr/dl/C2705_ATCA_TB_KL_1.xml	application/x-votable+xml;content=datalink	eso208-g026	57275,79572	57275,8331	2849,8	0,27888	0,21254	2,881660E6	36867	phot.flux:stat.F
3	https://aladin.u-strasbg.fr/dl/C2705_ATCA_TB_KL_1.xml	application/x-votable+xml;content=datalink	0823-500	57275,82407	57275,82755	299,9	0,27888	0,09596	2100,	2049	phot.flux:stat.F
4	https://aladin.u-strasbg.fr/dl/C2705_ATCA_TB_KL_1.xml	application/x-votable+xml;content=datalink	0823-500	57275,82407	57275,82755	299,9	0,27888	0,21254	2,881660E6	36867	phot.flux:stat.F

Total: 4 Visible: 4 Selected: 1

ivoa (1)

- ivoa.obscure
- provenance (20)
 - activity
 - activitydescriptio
 - agent

Service Capabilities

Query Language: ADQL-2.0 Max Rows: 1000000 (default)

ADQL Text

Mode: Synchronous

```
select * from ivoa.obscure where t_min > 57200 and t_max < 57300
```

TOPCAT(5): Table Browser

Window Rows Help

Table Browser for 5: C2705_ATCA_TB_KL_1.xml

ID	access_url	service..	error...	seman...	description	content_type	content_le...
1	https://aladin.u-strasbg.fr/dl/listobs_ATCA_C2705_HI_data_narrow_channels.txt			#this	ListObs for Measurement set ATCA_C2705_HI...	text/html	3330
2	https://aladin.u-strasbg.fr/dl/ATCA_C2705_HI_data_narrow_channels.ms.zip			#this	Full retrieval of Measurement set ATCA_C2705...	application/zip	249000000

Total: 2 Visible: 2 Selected: 1

Mozilla Firefox

mime type for zips - Recl x aladin.u-strasbg.fr/dl/listobs_

https://aladin.u-strasbg.fr/dl/listobs_ATCA_C2705_HI_data_narrow_channels.txt

MeasurementSet Name: /home/klutz/Interns/Anais_Radio-Data-Archive/Measurement_Sets/ATCA_C2705_HI_data_narrow_channels.ms MS Version 2

Observer: TB, KL Project: C2705

Observation: ATCA

Data records: 18900 Total elapsed time = 3229.86 seconds

Observed from 10-Sep-2015/02:13:20.0 to 10-Sep-2015/03:07:09.9 (UTC)

ObservationID = 0 ArrayID = 0

Date	Timerange (UTC)	Scan	FldId	FieldName	nRows	SpwIds	Average Interval(s)	ScanIntent
10-Sep-2015/02:13:20.0	02:53:29.9	0	0	eso208-g026	14460	[0,1,2,3]	[9.86, 9.86, 9.86, 9.86]	
	02:54:10.0	02:59:09.9	1	0823-500	1800	[0,1,2,3]	[9.86, 9.86, 9.86, 9.86]	
	02:59:50.0	03:07:09.9	2	eso208-g026	2640	[0,1,2,3]	[9.86, 9.86, 9.86, 9.86]	

(nRows = Total number of rows per scan)

Fields: 2

ID	Code Name	RA	Decl	Epoch	SrcId	nRows
0	eso208-g026	07:35:21.099994	-50.02.34.99996	J2000	0	17100
1	0823-500	08:25:26.868994	-50.10.38.49003	J2000	1	1800

Spectral Windows: (4 unique spectral windows and 1 unique polarization setups)

SpwID	Name	#Chans	Frame	Ch0(MHz)	ChanWid(kHz)	TotBW(kHz)	CtrFreq(MHz)	Corrs
0	2049	TOPO	3124.000	-1000.000	2049000.0	2100.0000	XX XY YX YY	
1	17409	TOPO	1410.500	-0.488	8500.5	1406.2500	XX XY YX YY	

Prototype queried via Aladin

Overall distribution of datasets

Aladin v10.0

Fichier Edition Image Catalogue Graphique Couverture Outil Vue Interop Aide

Données disponibles → 45 / 25018 Commande Référentiel **CRS** Projection **Aitoff**

DSS PanSTARRS SDSS 2MASS GALEX Gaia Simbad NED +

NVSS

Catalog of pointlike radiosources f...
 Catalog of double radiosources frc...
 AS → 4 / 734
 Ultra steep spectrum radio sources ca...
 List of WN (WENSS-NVSS) USS sourc...
 List of TN (TEXAS-NVSS) USS sourc...
 Pulsars Identified from the NRAO VLA...
 NVSS sources around pulsar positio...
 Pulsars > 5 mJy but not detected b...
 → 7 / 4298
 S-PASS & NVSS bright extragalactic ra...
 Variable 1.4GHz radio sources from NV...
 Observing times of NVSS sources (t...
 Observing Times of FIRST Sources (t...
 Variable sources (table3)
 FIRST-NVSS-SDSS AGN sample: catalo...
 Arecibo Methanol Maser Galactic Plan...
 IRAS, MSX, and NVSS counterparts f...
 New VLA Sky Survey (NVSS) Cat of IRA...
 → 4 / 1775
 NVGRC - Identify giant radio sources f...
 Delayed NVSS sources SEDs (Farpo...

Imaginez votre oeil regardant à travers une pile de calques (ci-dessous).
 Chaque calque représente une donnée: image, catalogues, graphiques...
 Le panneau central affiche la combinaison de l'ensemble de ces calques.
 Pour accéder à d'autres données utilisez l'arbre de découverte sur le panneau de gauche, ou glissez/déposez vos propres fichiers locaux.

select
 dépt
 dist
 phot
 dessin
 marq
 moc
 aspect
 filtre
 corr.
 x-y
 rvp
 as300
 coupe
 cont
 pile
 http://localhost
 CDS/IP/NVSS
 taille
 dens.
 opac.
 zoom

Sélecteur de serveurs

Autres File FoV... Tools...

localhost Mode: Generic
 Générez, vérifiez et exécutez votre requête.

Table: **ivoa.obscore** Set ra, dec

Select: All
 dataproduct_ty
 calib_level
 obs_collection
 obs_id

Constraints: Add new
 Max rows:

Target: 1 55 33.12996 -13 30 44.7733
 Rayon: 180° CIRCLE Add

Refresh query Check.. SYNC Async jobs>>

SELECT * FROM ivoa.obscore

Réinit. Effacer **CHERCHER** Fermer

id	obs_publ...	access_t...	access_e...	target_n...	s_dec	s_ra	s_fov	s_region	s_resolu...	s_xell	s_xb
te...	ivo://CD...	applicat...		BEAM_0	90.0	0.0	15.4157	FoV			
te...	ivo://CD...	applicat...		BEAM_0	90.0	0.0	15.1861	FoV			
te...	ivo://CD...	applicat...		BEAM_0	90.0	0.0	15.0183	FoV			
te...	ivo://CD...	applicat...		BEAM_0	90.0	0.0	14.8542	FoV			
te...	ivo://CD...	applicat...		BEAM_0	90.0	0.0	14.6936	FoV			
te...	ivo://CD...	applicat...		BEAM_0	90.0	0.0	14.5364	FoV			
te...	ivo://CD...	applicat...		BEAM_0	90.0	0.0	14.3321	FoV			
te...	ivo://CD...	applicat...		BEAM_0	90.0	0.0	14.1825	FoV			

360° x 180°

Chercher

00:00:00.00 +00:00:00.0
 360° x 180°

374 sel / 374 src 42fms / 838Mo

Prototype queried via Aladin EVLA MS field of view on top of NVSS

Aladin v10.0

Données disponibles → 45 / 25018
in view out view

Commande [x] Référentiel ICRS Projection Altoff

Aladin

Imaginez votre œil regardant à travers une pile de calques (ci-dessous).
Chaque calque représente une donnée: image, catalogues, graphiques...
Le panneau central affiche la combinaison de l'ensemble de ces calques.
Pour accéder à d'autres données utilisez l'arbre de découverte sur le panneau de gauche, ou glissez/déposez vos propres fichiers locaux.

Sélecteur de serveurs

localhost Mode: Generic
Générez, vérifiez et exécutez votre requête.

Table: ivoa.obscore Set ra, dec

Select: All
Constraints: Add new Max rows:

Target: 1 58 38.51659+43 57 39.1430
Rayon: 2.004° CIRCLE Add

Refresh query Check.. SYNC Async jobs>>

```
SELECT * FROM ivoa.obscore where facility_name = 'EVLA'
```

Réinit. Effacer **CHERCHER** Fermer

obs_publ...	access_f...	access_e...	target_n...	s_dec	s_ra	s_fov	s_region	s_resolu...	s_xel1	s_xe
ivo://CD...	applicat...		N4013	43.9466	179.6308	0.5097	FoV			
ivo://CD...	applicat...		N4013	43.9466	179.6308	0.3948	FoV			
ivo://CD...	applicat...		N4013	43.9466	179.6308	0.5097	FoV			
ivo://CD...	applicat...		N4013	43.9466	179.6308	0.3948	FoV			

1.768° x 56.6'

Chercher

s_region (2 items)

Prototype queried via Aladin ASCA MS with DataLinks

The screenshot displays the Aladin software interface. The main window shows a star field visualization with a central bright star and several smaller stars. The interface includes a menu bar at the top with options like 'Fichier', 'Edition', 'Image', 'Catalogue', 'Graphique', 'Couverture', 'Outil', 'Vue', 'Interop', and 'Aide'. Below the menu bar, there are several tabs and buttons, including 'Données disponibles → 45 / 25018', 'Commande', 'Référentiel ICRS', and 'Projection Aitoff'. A 'Sélecteur de serveurs' dialog box is open, showing a list of servers and a query window. The query window contains the following SQL query:

```
SELECT * FROM ivoa.obscure where obs_id = 'C885_ATCA_cbruens_1'
```

The query window also shows a list of columns: 'dataproducer_by', 'calib_level', 'obs_collection', 'obs_id', and 'obs_publisher'. The 'obs_id' column is highlighted in orange. Below the query window, there are buttons for 'Réinit.', 'Effacer', 'CHERCHER', and 'Fermer'. The main window also shows a list of collections on the left, including 'NVSS - The NRAO VLA Sky Survey'. The right side of the interface features a sidebar with various tools and a 'Bienvenue sur Aladin' message. The bottom of the interface shows a list of data links and a table of results.

Table of results:

dec	s_ra	s_fov
8.7127	294.8543	0.5771
8.7127	294.8543	0.5648
1.0765	43.1923	0.5771
1.0765	43.1923	0.5648
5.6099	15.7132	0.5771
5.6099	15.7132	0.5648

Additional text in the interface includes:

- access_url
- https://aladin.u-strasbg.fr/d1/C885_ATCA_cbruens_1
- https://aladin.u-strasbg.fr/d1/C885_ATCA_cbruens_1
- https://aladin.u-strasbg.fr/d1/C885_ATCA_cbruens_1
- https://aladin.u-strasbg.fr/d1/C885_ATCA_cbruens_1
- https://aladin.u-strasbg.fr/d1/C885_ATCA_cbruens_1
- https://aladin.u-strasbg.fr/d1/C885_ATCA_cbruens_1

Search results for 'Chercher':

- listOBS for Measurement set obs_source_calib_1410MHz_1384MHz (size 3330 byte)
- Full retrieval Measurement set obs_source_calib_1410MHz_1384MHz (size 249000000 byte)
- uv coverage map Measurement set obs_source_calib_1410MHz_1384MHz (size 26000 byte)
- Antennae plot Measurement set obs_source_calib_1410MHz_1384MHz (size 26000 byte)
- amplitude versus time plot Measurement set obs_source_calib_1410MHz_1384MHz (size 25500 byte)
- phase versus time plot Measurement set obs_source_calib_1410MHz_1384MHz (size 26000 byte)

Prototype queried via Aladin ASCA MS linked plots

The screenshot displays the Aladin software interface with the following components:

- Top Menu:** Fichier, Edition, Image, Catalogue, Graphique, Couverture, Outil, Vue, Interop, Aide.
- Commande:** A search bar with a dropdown menu.
- Données disponibles:** 45 / 25018. Includes a list of data sources: DSS, PanSTARRS, SDSS, 2MASS, GALEX, Gaia, Simbad, NED.
- Left Panel (Collections):** A tree view showing various astronomical collections, with 'NVSS - The NRAO VLA Sky Survey' selected.
- Top Right:** Référentiel (CRS), Projection (Aitoff).
- Four Main Plots:**
 - Amp vs. Time:** A plot showing amplitude over time with a prominent initial peak and subsequent smaller peaks.
 - Vwave vs. Uwave:** A circular plot showing the relationship between V-wave and U-wave amplitudes.
 - Antenna Positions for obs_source_calib_1410MHz_1384MHz.ms:** A scatter plot of antenna positions in the X-Y plane, with points labeled CA00 through CA05.
 - Phase vs. Time:** A plot showing phase in degrees over time, exhibiting a regular, periodic oscillation.
- Right Panel:** A toolbar with various interactive tools like select, repl, dist, phot, dessin, marq, mic, aspect, filtre, corr, etc.
- Bottom:** A status bar showing '[Plane @2] - http://localhost:8080/tap' and a search button labeled 'Chercher'.

Work coming next

- Add other MS (JIVE, LOFAR, ALMA???)
- Add other free metadata columns in ObsCore
 - uv characterisation, number of antennae,
- Add new descriptive metadata in DataLink
- Make an attempt of standardizing metadata
 - = Characterisation and Provenance extension
- Collaborations ?

