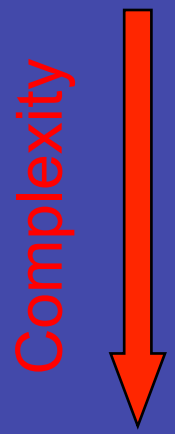
Optical / Infrared Databases and Catalogs

ASTR 288C: Lecture 2

Astronomical Databases

Database is a collection of structured data stored electronically, with an interface enabling the data to be searched.

Most public astronomical data available on the Web



Observations

Images

Spectra

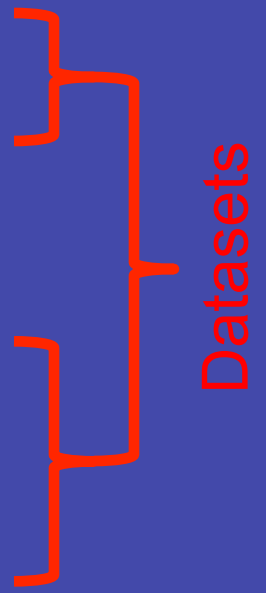
Catalogs

Journals (usually require subscription)

Astronomical Databases

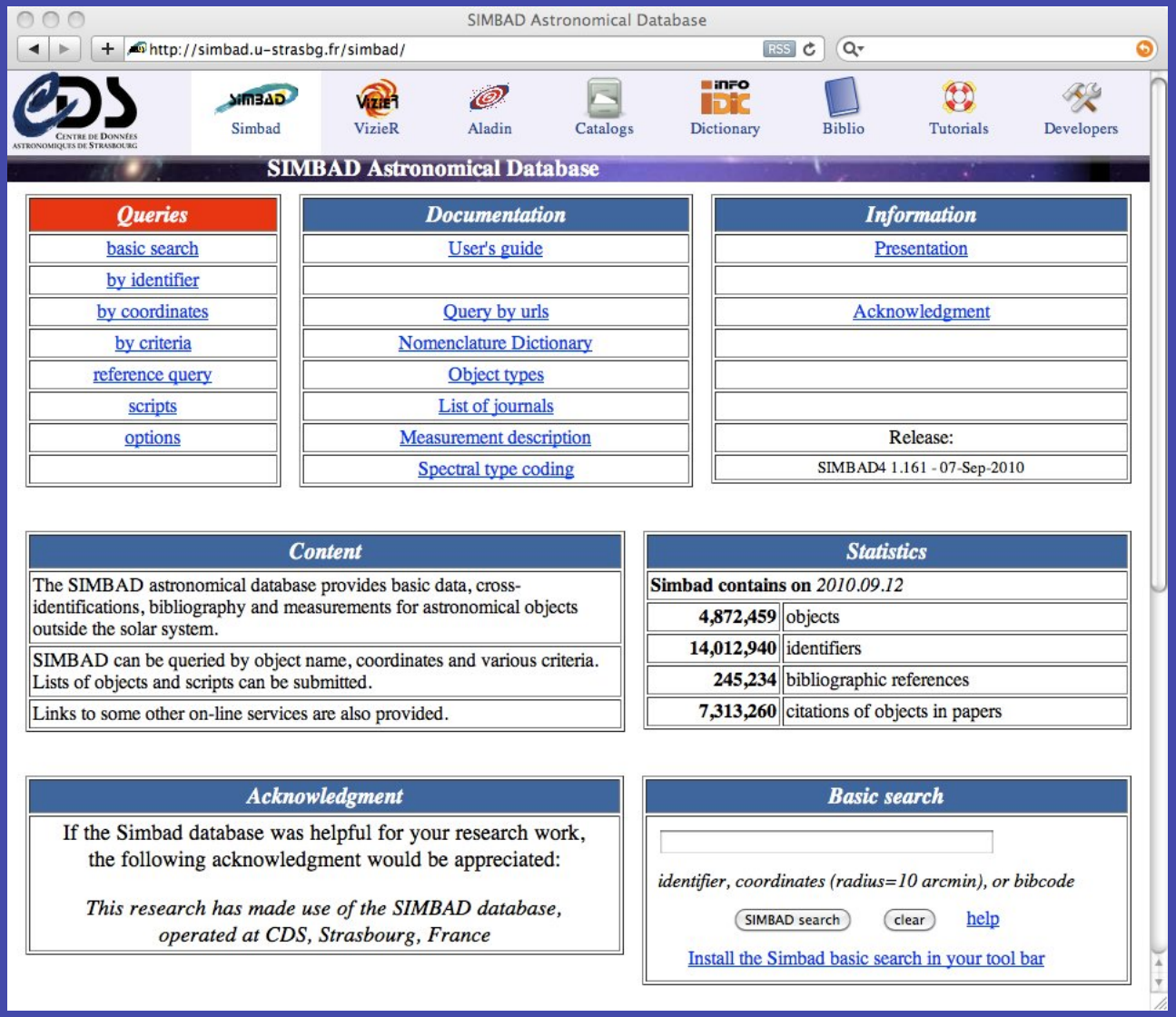
Some popular optical and infrared databases/interfaces:

- SIMBAD
- NED (deferred to Lecture 3)
- STScI DSS (optical)
  - POSS1 "B","R"
  - POSS2 / UKSTU "B","R","I"
- Gator (infrared)
  - 2MASS 1.2 – 2.2 μm (J,H,K)
  - Spitzer 3.6 – 160 μm
  - IRAS 12 – 100 μm
- ADS (deferred to Lecture 7)



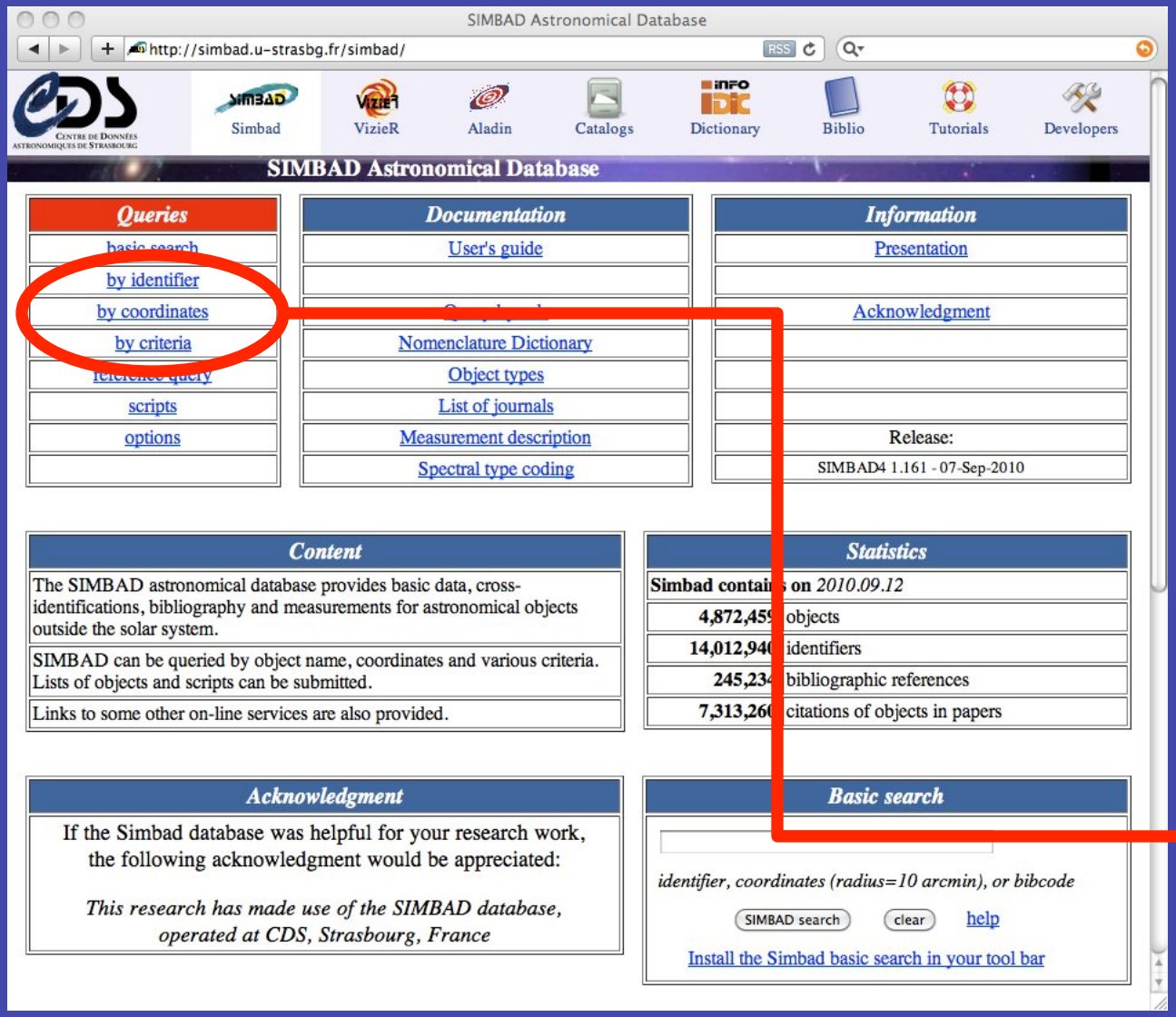
SIMBAD

http://simbad.u-strasbg.fr/simbad/



SIMBAD

http://simbad.u-strasbg.fr/simbad/



Search by:

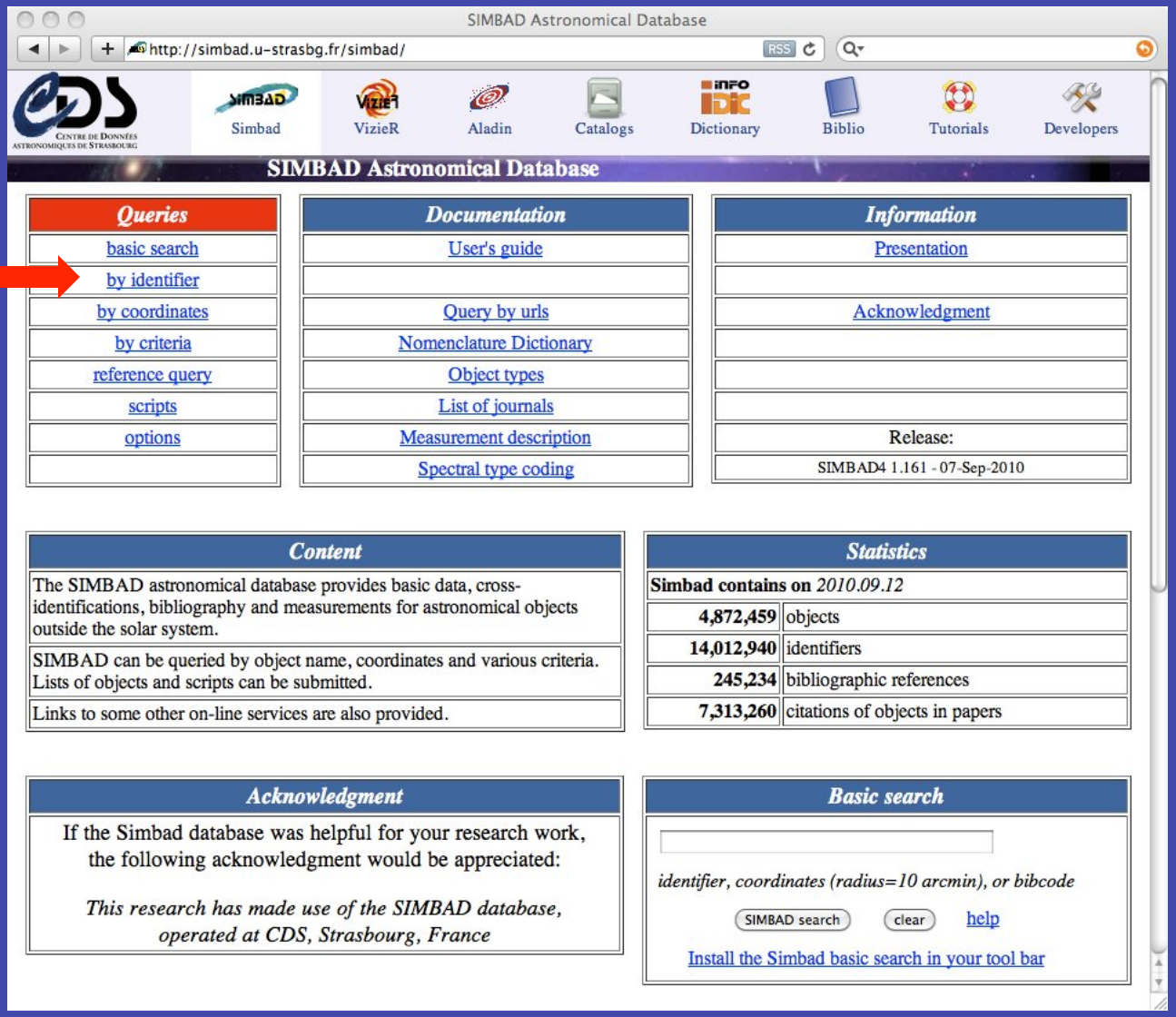
Identifier

Coordinates

Criteria

SIMBAD

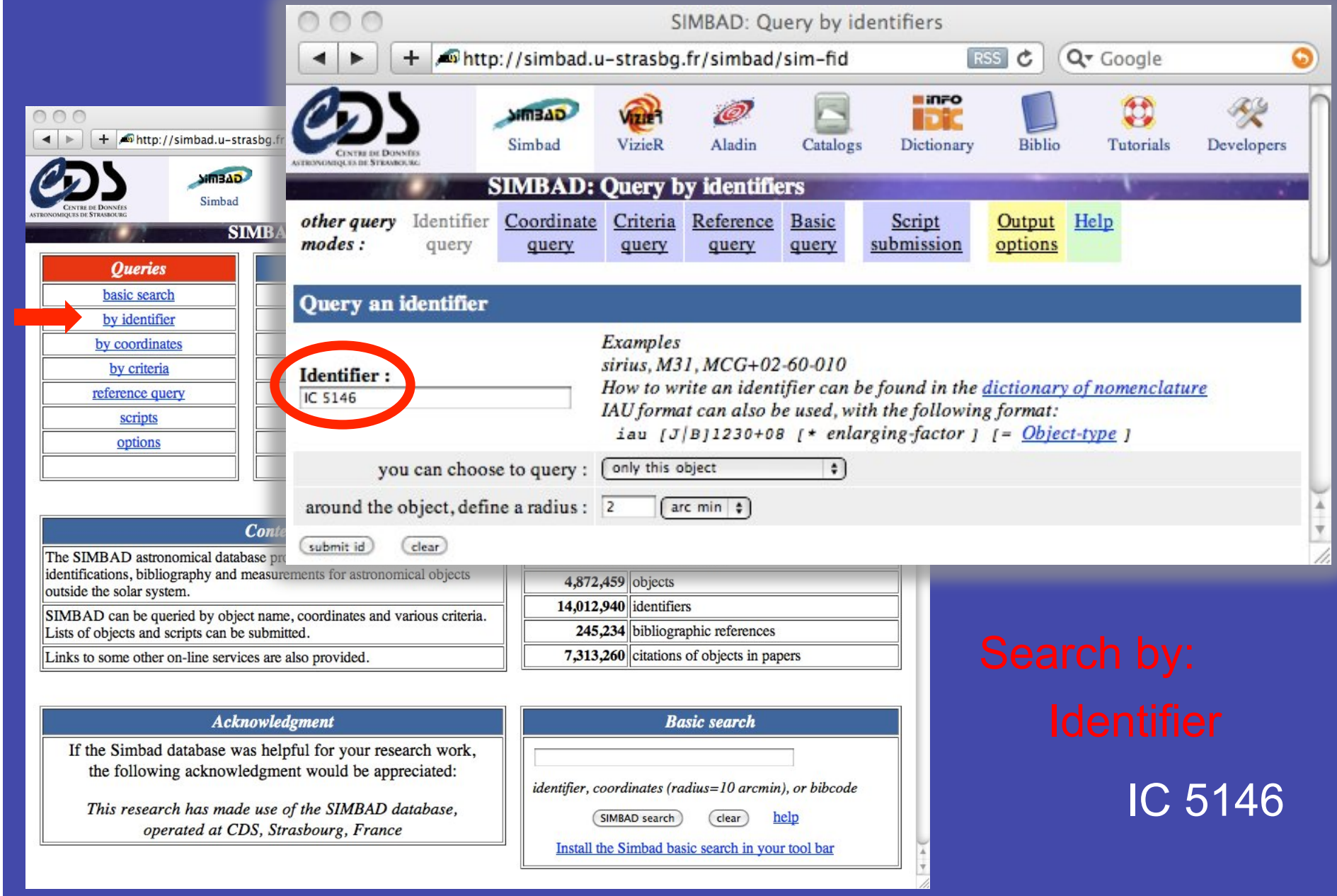
http://simbad.u-strasbg.fr/simbad/



Search by:

Identifier

SIMBAD

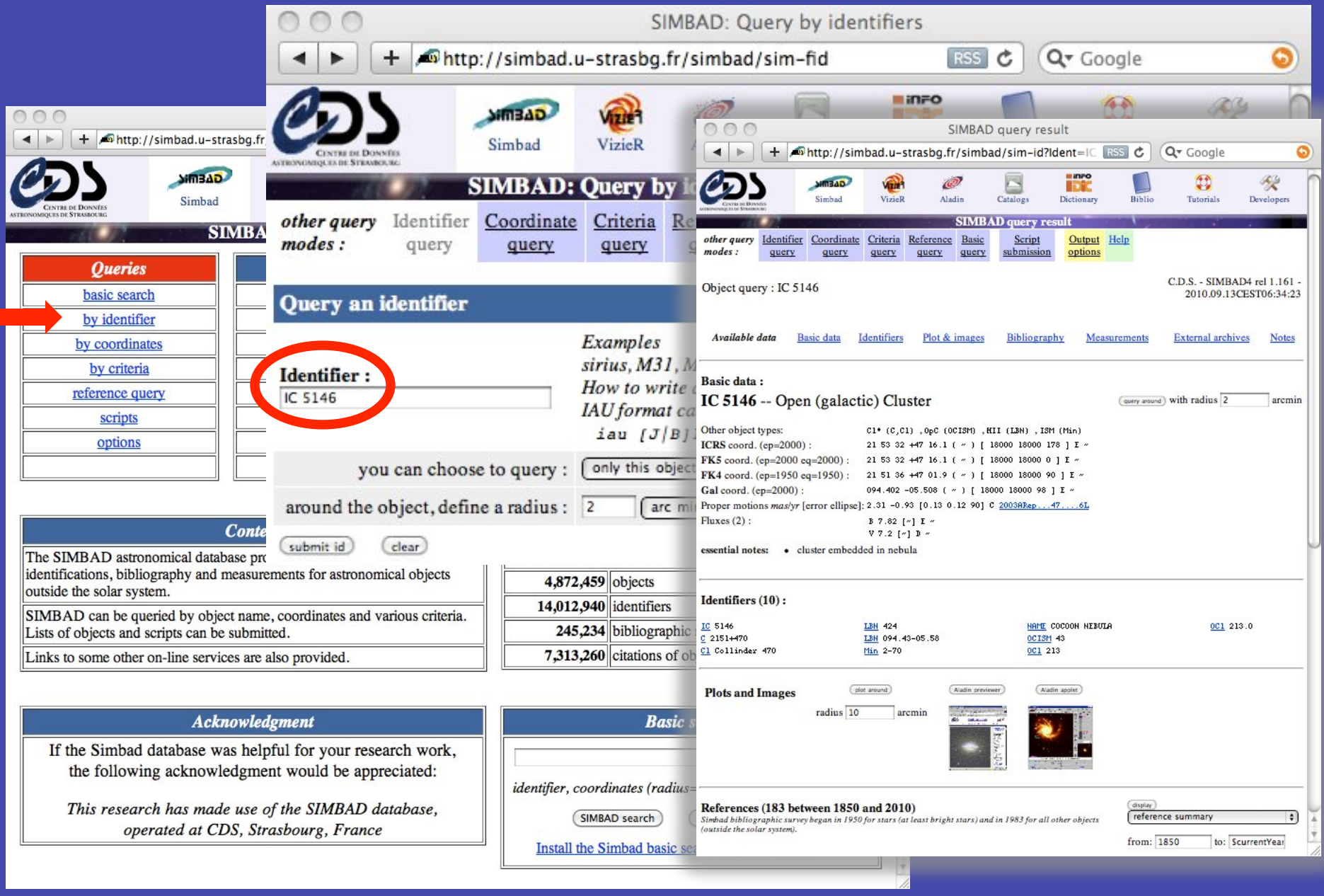


Search by:

Identifier

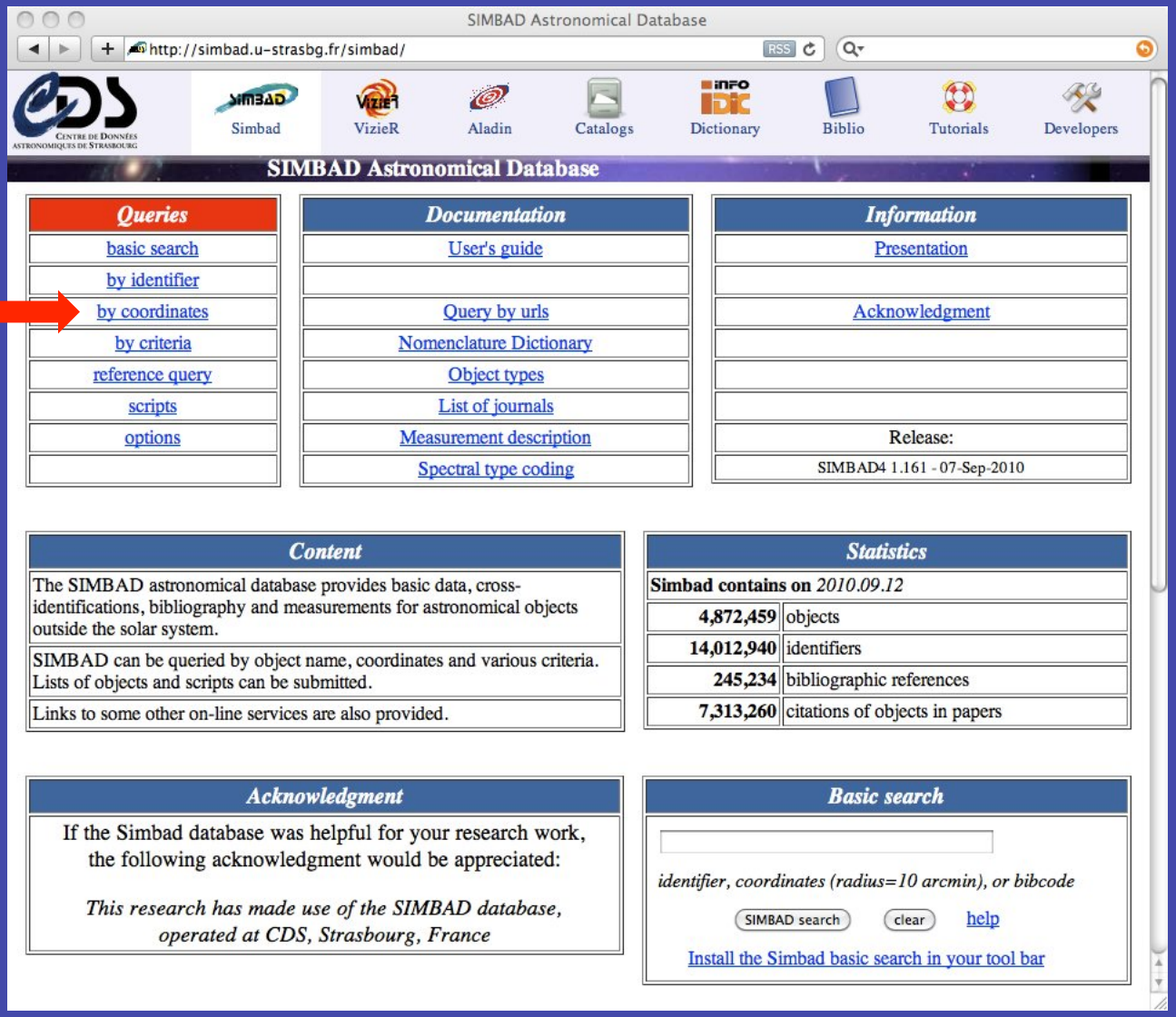
IC 5146

SIMBAD


SIMBAD: Query by identifiers
http://simbad.u-strasbg.fr/simbad/sim-fid
Simbad
VizieR
SIMBAD: Query by
other query modes :
Identifier query
Coordinate query
Criteria query
Queries
basic search
by identifier
by coordinates
by criteria
reference query
scripts
options
Query an identifier
Identifier :
IC 5146
Examples
sirius, M31,
How to write
IAU format
you can choose to query :
around the object, define a radius :
submit id
clear
The SIMBAD astronomical database pro
identifications, bibliography and measurements for astronomical objects outside the solar system.
SIMBAD can be queried by object name, coordinates and various criteria. Lists of objects and scripts can be submitted.
Links to some other on-line services are also provided.
4,872,459 objects
14,012,940 identifiers
245,234 bibliographic
7,313,260 citations of ob
Acknowledgment
If the Simbad database was helpful for your research work, the following acknowledgment would be appreciated:
This research has made use of the SIMBAD database, operated at CDS, Strasbourg, France
SIMBAD search
Install the Simbad basic
SIMBAD query result
http://simbad.u-strasbg.fr/simbad/sim-id?Ident=IC
Aladin
Catalogs
Dictionary
Biblio
Tutorials
Developers
other query modes :
Identifier query
Coordinate query
Criteria query
Reference query
Basic query
Script submission
Output options
Help
Object query : IC 5146
C.D.S. - SIMBAD4 rel 1.161 - 2010.09.13CEST06:34:23
Available data
Basic data
Identifiers
Plot & images
Bibliography
Measurements
External archives
Notes
Basic data :
IC 5146 -- Open (galactic) Cluster
query around
with radius 2
arcmin
Other object types:
ICRS coord. (ep=2000) :
FK5 coord. (ep=2000 eq=2000) :
FK4 coord. (ep=1950 eq=1950) :
Gal coord. (ep=2000) :
Proper motions mas/yr [error ellipse]:
Fluxes (2) :
essential notes: • cluster embedded in nebula
Identifiers (10) :
IC 5146
C 2151+470
Cl Collinder 470
LBN 424
LBN 094.43-05.58
Min 2-70
NAME COCOON NEBULA
OCISM 43
OCl 213
OCl 213.0
Plots and Images
plot around
Aladin previewer
Aladin applet
radius 10 arcmin
References (183 between 1850 and 2010)
Simbad bibliographic survey began in 1950 for stars (at least bright stars) and in 1983 for all other objects (outside the solar system).
display
reference summary
from: 1850 to: 2010

SIMBAD

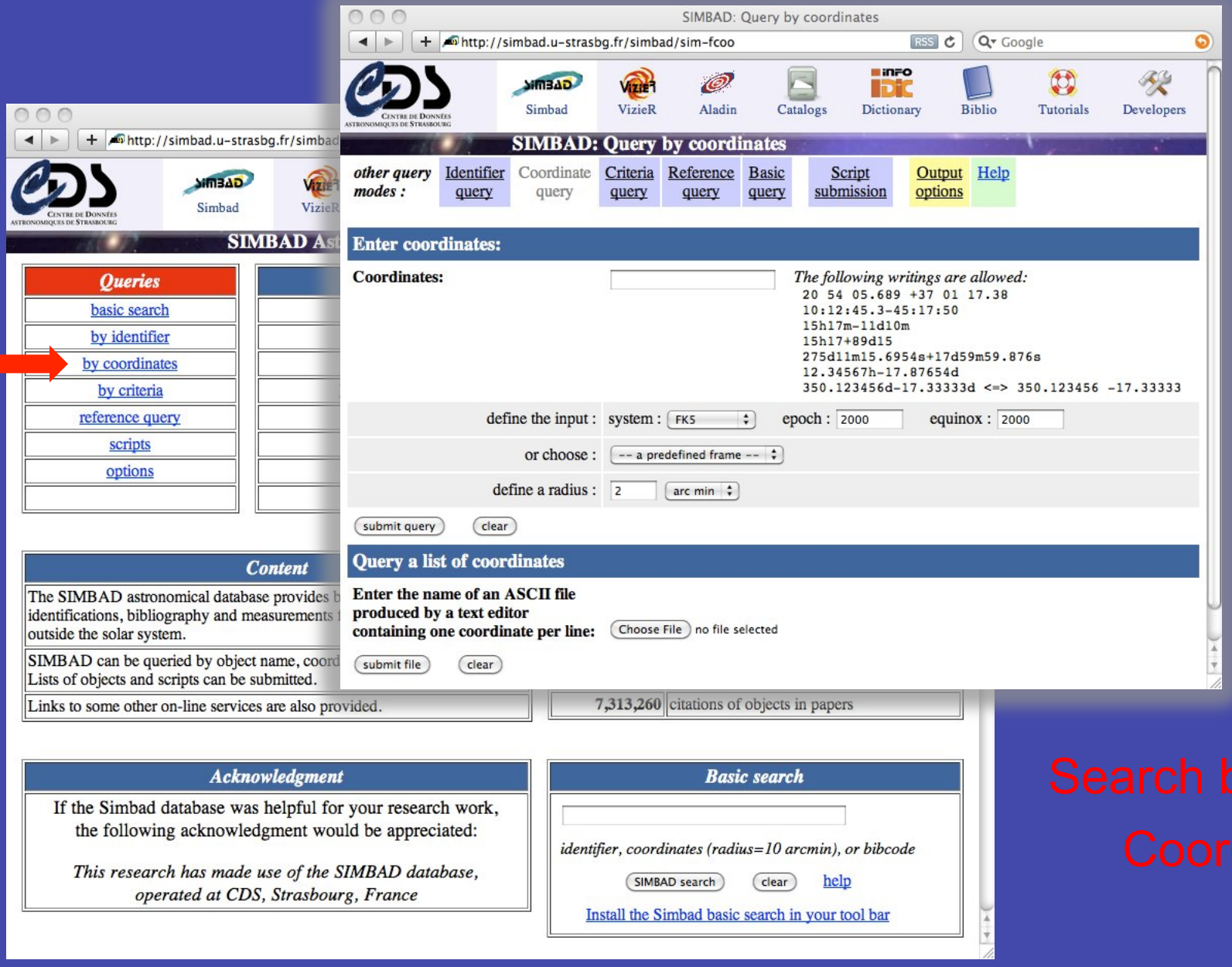
http://simbad.u-strasbg.fr/simbad/



Search by:

Coordinates

SIMBAD

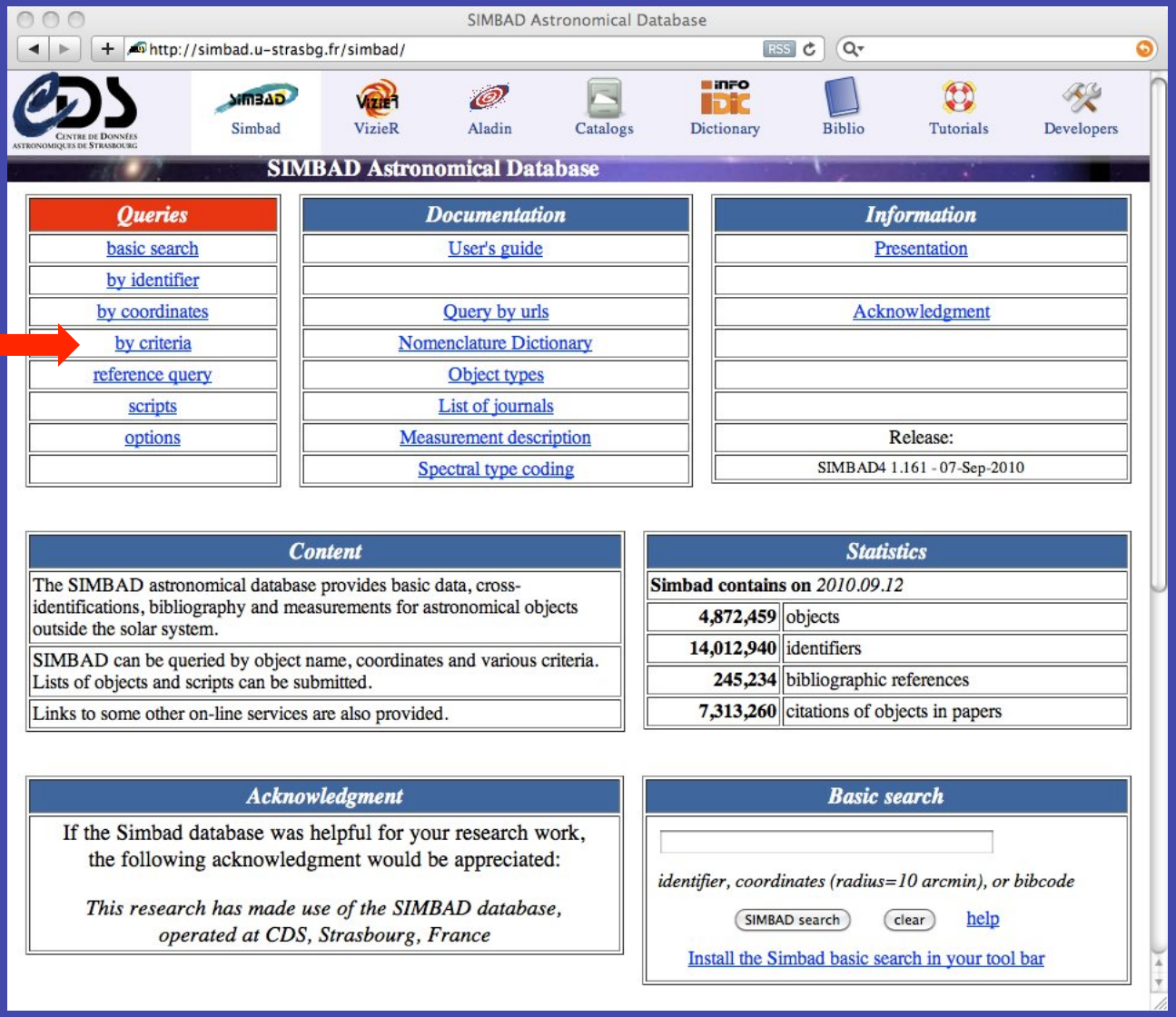


Search by:

Coordinates

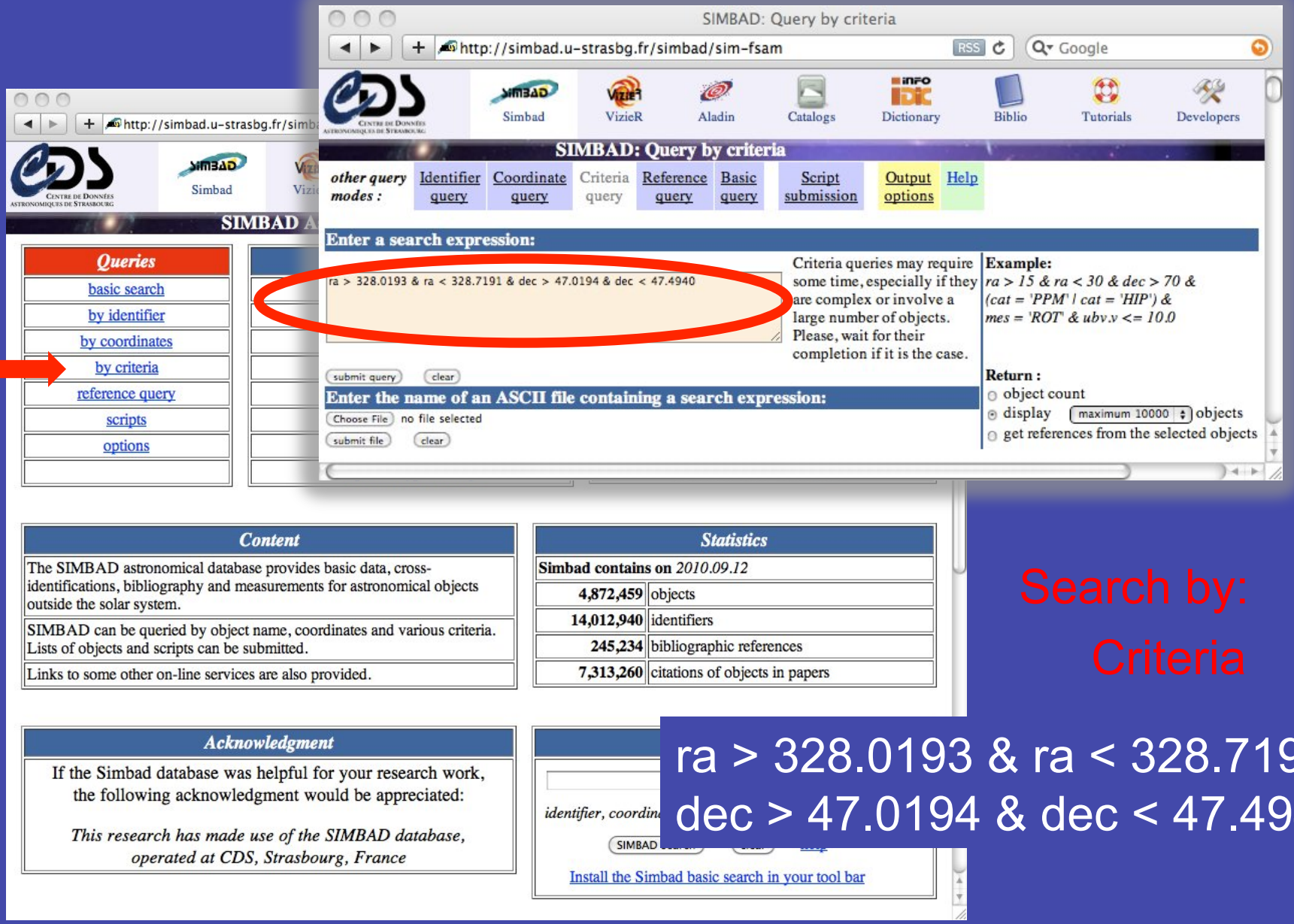
SIMBAD

http://simbad.u-strasbg.fr/simbad/



Search by:
Criteria

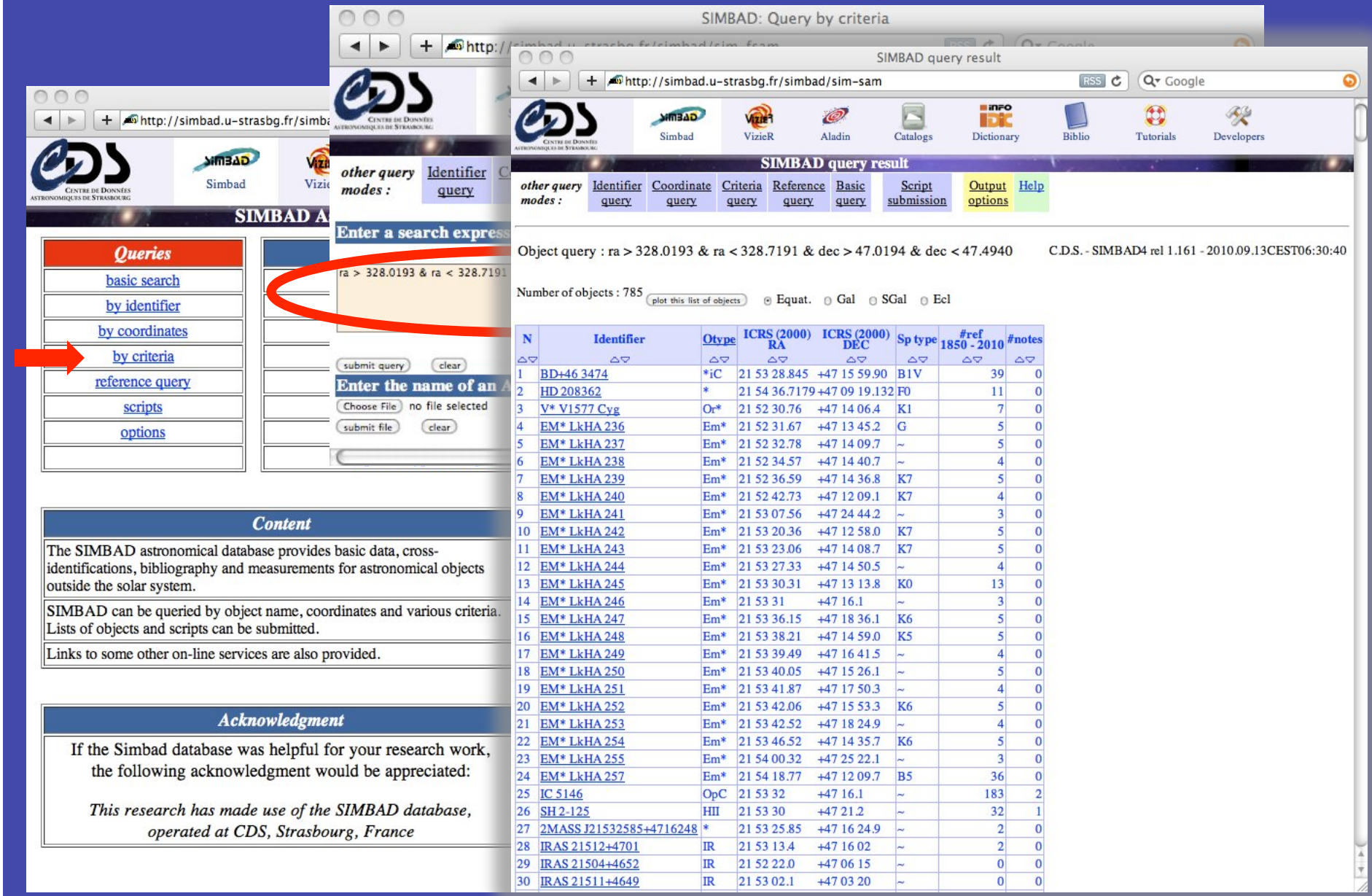
SIMBAD



Search by:
Criteria

ra > 328.0193 & ra < 328.7191 &
dec > 47.0194 & dec < 47.4940

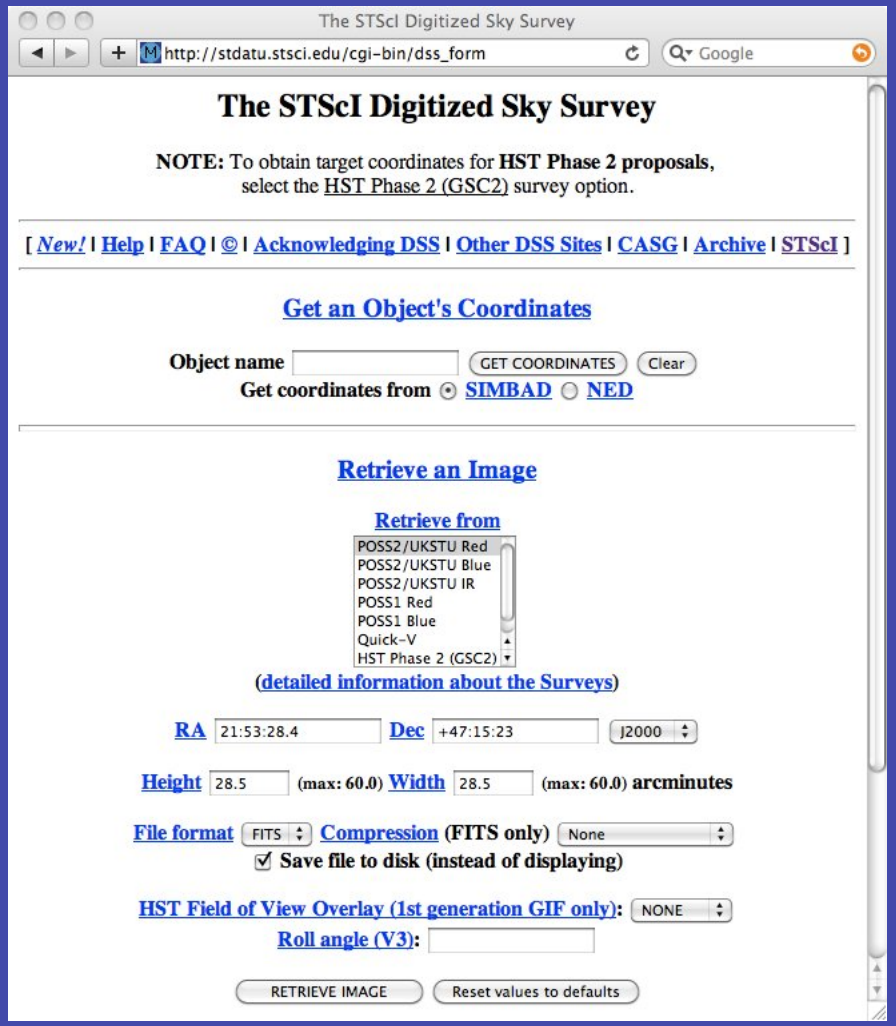
SIMBAD



N	Identifier	Otype	ICRS (2000) RA	ICRS (2000) DEC	Sp type	#ref 1850 - 2010	#notes
1	BD+46 3474	*iC	21 53 28.845	+47 15 59.90	B1V	39	0
2	HD 208362	*	21 54 36.7179	+47 09 19.132	F0	11	0
3	V* V1577 Cyg	Or*	21 52 30.76	+47 14 06.4	K1	7	0
4	EM* LkHA 236	Em*	21 52 31.67	+47 13 45.2	G	5	0
5	EM* LkHA 237	Em*	21 52 32.78	+47 14 09.7	~	5	0
6	EM* LkHA 238	Em*	21 52 34.57	+47 14 40.7	~	4	0
7	EM* LkHA 239	Em*	21 52 36.59	+47 14 36.8	K7	5	0
8	EM* LkHA 240	Em*	21 52 42.73	+47 12 09.1	K7	4	0
9	EM* LkHA 241	Em*	21 53 07.56	+47 24 44.2	~	3	0
10	EM* LkHA 242	Em*	21 53 20.36	+47 12 58.0	K7	5	0
11	EM* LkHA 243	Em*	21 53 23.06	+47 14 08.7	K7	5	0
12	EM* LkHA 244	Em*	21 53 27.33	+47 14 50.5	~	4	0
13	EM* LkHA 245	Em*	21 53 30.31	+47 13 13.8	K0	13	0
14	EM* LkHA 246	Em*	21 53 31	+47 16.1	~	3	0
15	EM* LkHA 247	Em*	21 53 36.15	+47 18 36.1	K6	5	0
16	EM* LkHA 248	Em*	21 53 38.21	+47 14 59.0	K5	5	0
17	EM* LkHA 249	Em*	21 53 39.49	+47 16 41.5	~	4	0
18	EM* LkHA 250	Em*	21 53 40.05	+47 15 26.1	~	5	0
19	EM* LkHA 251	Em*	21 53 41.87	+47 17 50.3	~	4	0
20	EM* LkHA 252	Em*	21 53 42.06	+47 15 53.3	K6	5	0
21	EM* LkHA 253	Em*	21 53 42.52	+47 18 24.9	~	4	0
22	EM* LkHA 254	Em*	21 53 46.52	+47 14 35.7	K6	5	0
23	EM* LkHA 255	Em*	21 54 00.32	+47 25 22.1	~	3	0
24	EM* LkHA 257	Em*	21 54 18.77	+47 12 09.7	B5	36	0
25	IC 5146	OpC	21 53 32	+47 16.1	~	183	2
26	SH 2-125	HII	21 53 30	+47 21.2	~	32	1
27	2MASS J21532585+4716248	*	21 53 25.85	+47 16 24.9	~	2	0
28	IRAS 21512+4701	IR	21 53 13.4	+47 16 02	~	2	0
29	IRAS 21504+4652	IR	21 52 22.0	+47 06 15	~	0	0
30	IRAS 21511+4649	IR	21 53 02.1	+47 03 20	~	0	0

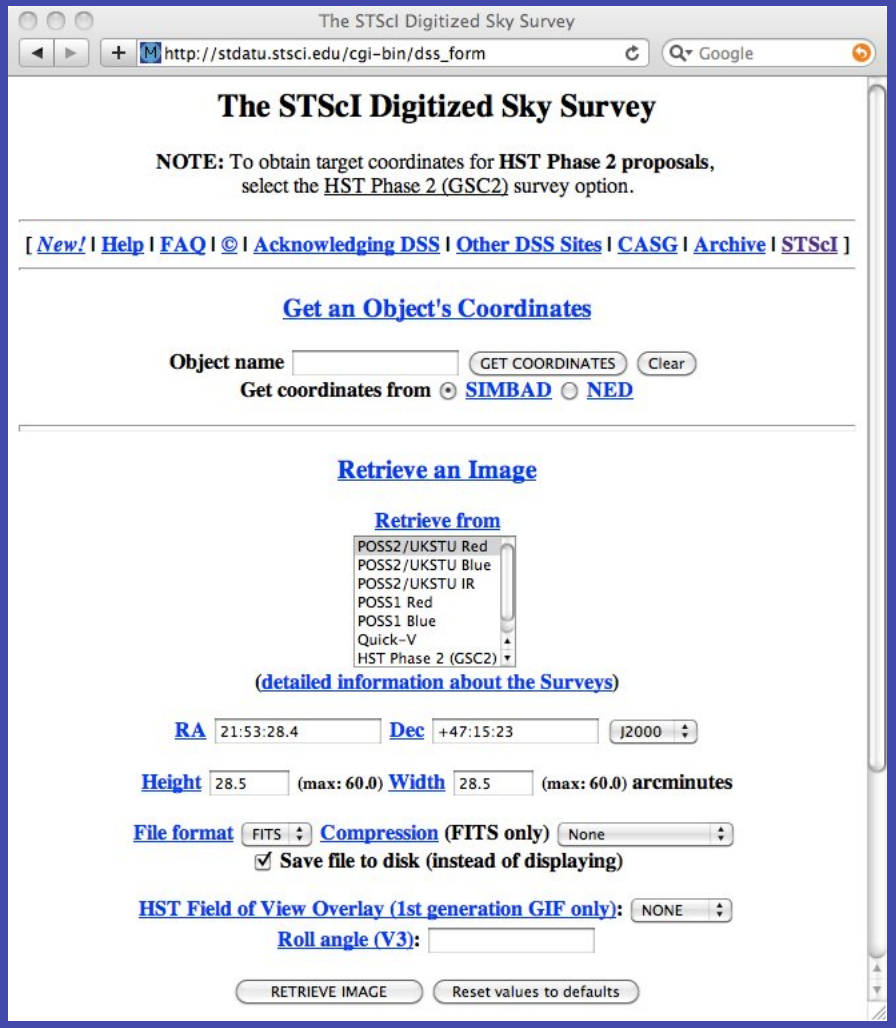
STScI DSS

http://stdatu.stsci.edu/cgi-bin/dss_form

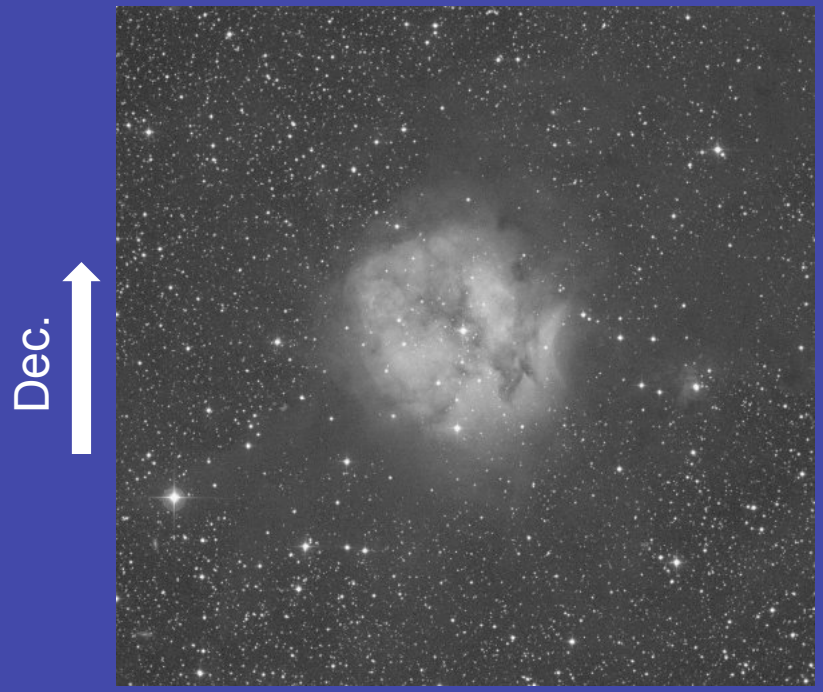


STScI DSS

http://stdatu.stsci.edu/cgi-bin/dss_form



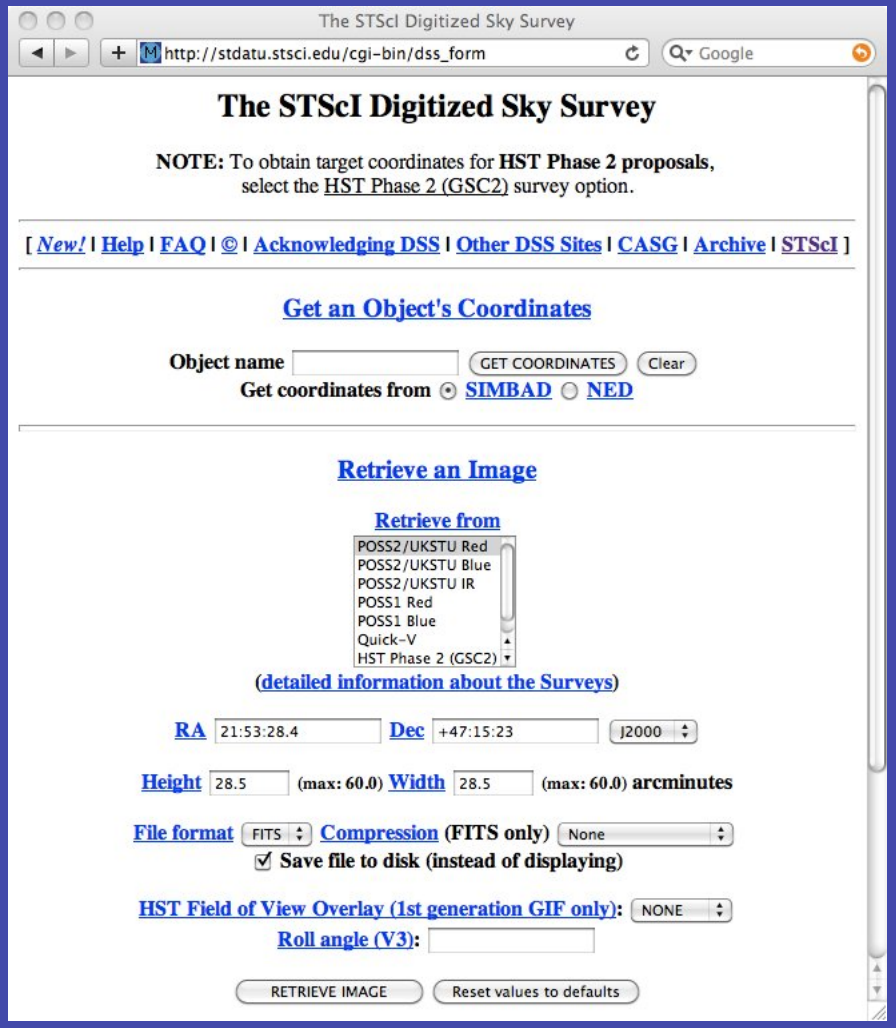
IC 5146: POSS2 “Red”



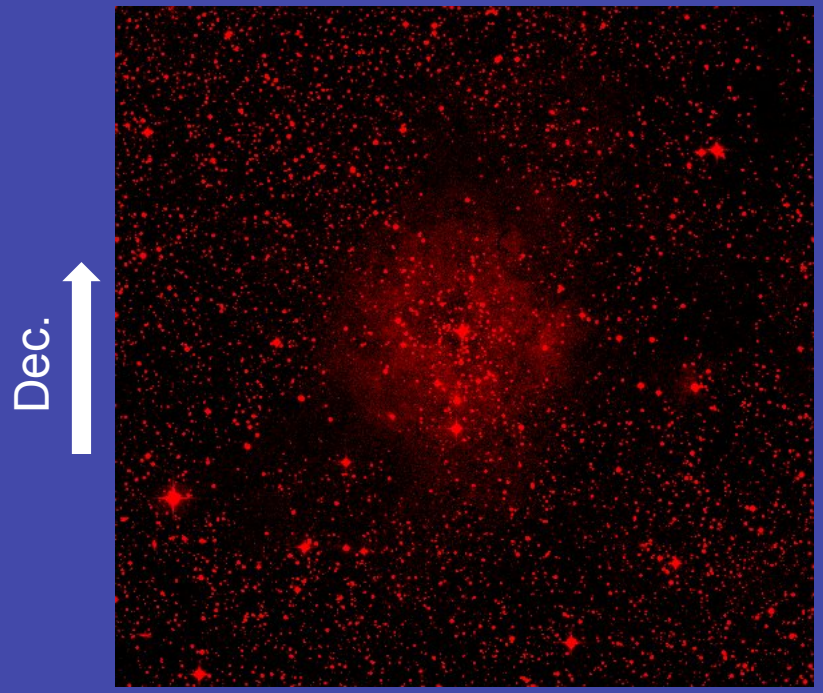
28.5’ x 28.5’
field centered on
21h 53m 28.4s +47° 15’ 23” (J2000)

STScI DSS

http://stdatu.stsci.edu/cgi-bin/dss_form



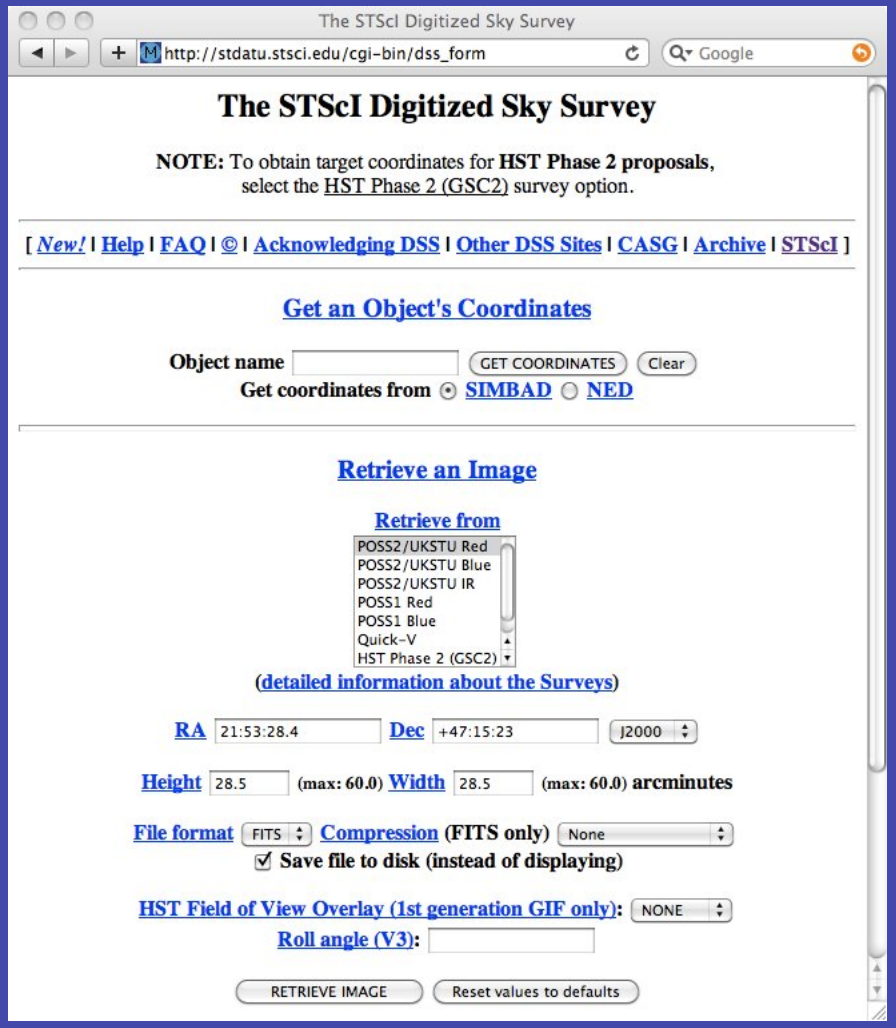
IC 5146: POSS2 “Red”



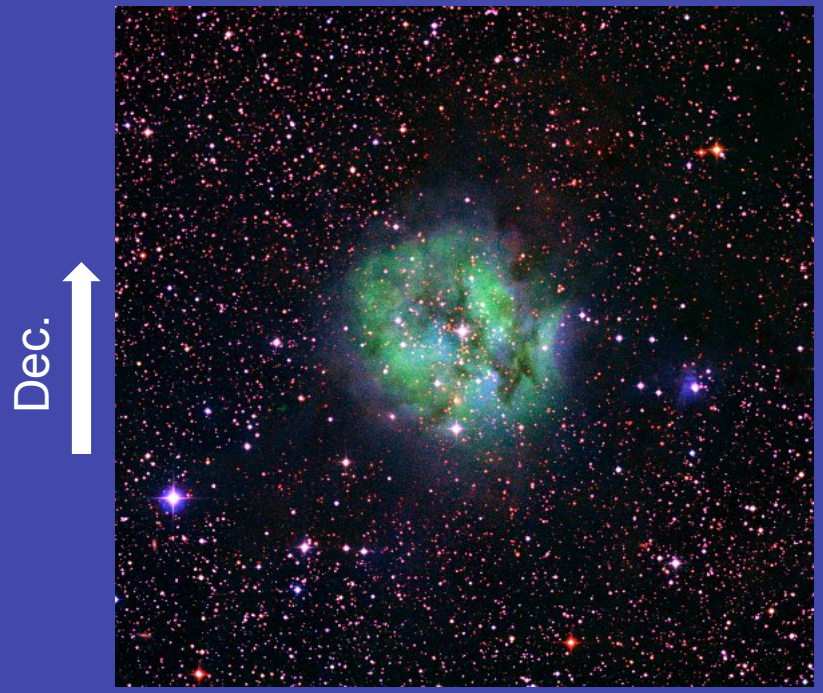
28.5’ x 28.5’
field centered on
21h 53m 28.4s +47° 15’ 23” (J2000)

STScI DSS

http://stdatu.stsci.edu/cgi-bin/dss_form



IC 5146: POSS2 BRI



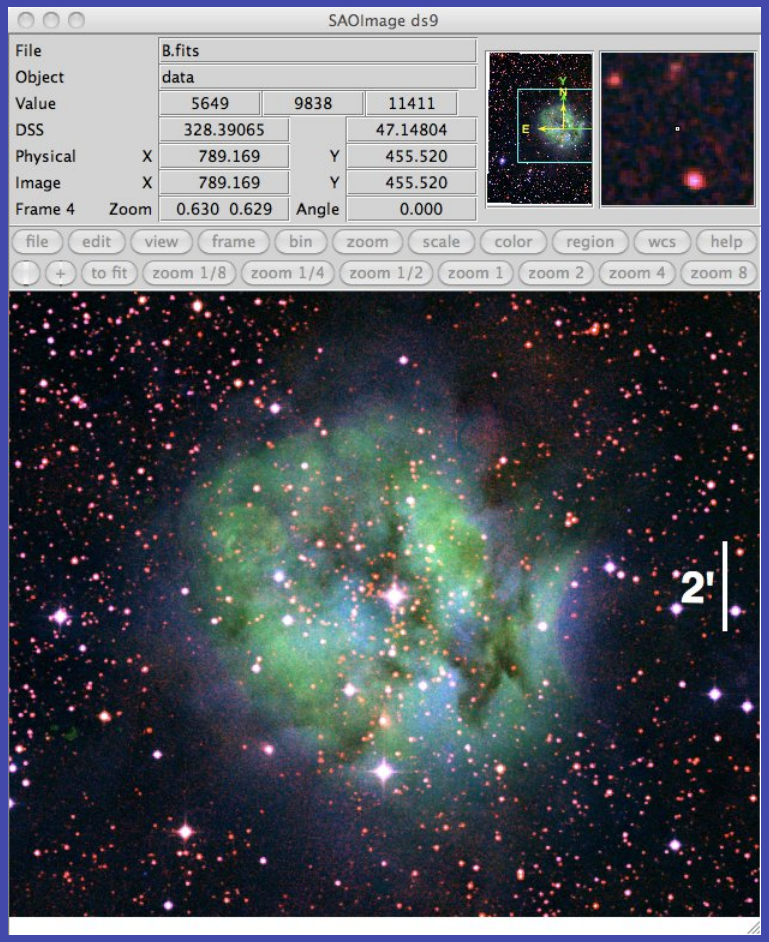
28.5’ x 28.5’
field centered on
21h 53m 28.4s +47° 15’ 23” (J2000)

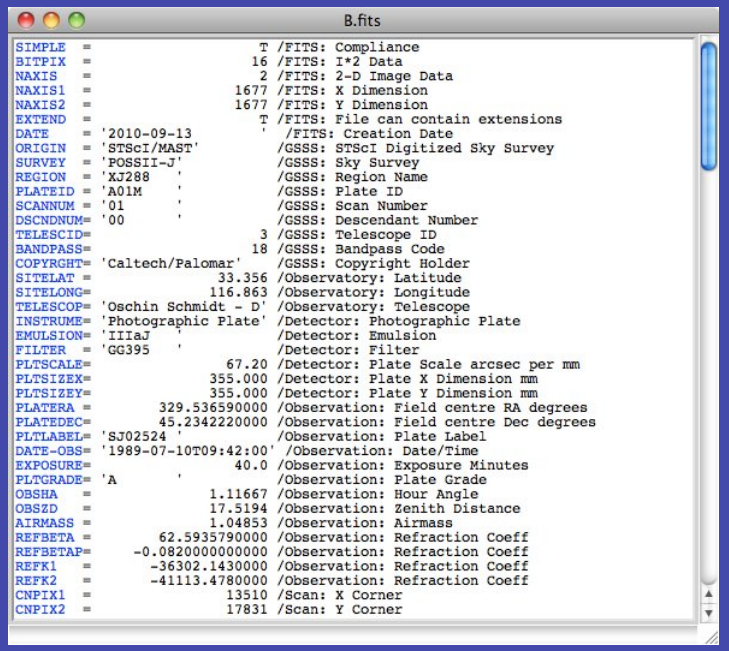
Astronomical Image Format: FITS Files and ds9

http://hea-www.harvard.edu/RD/ds9

FITS = Flexible Image Transport System

SAOImage ds9 is a common viewer





Image

The Data!

Pixels

Header

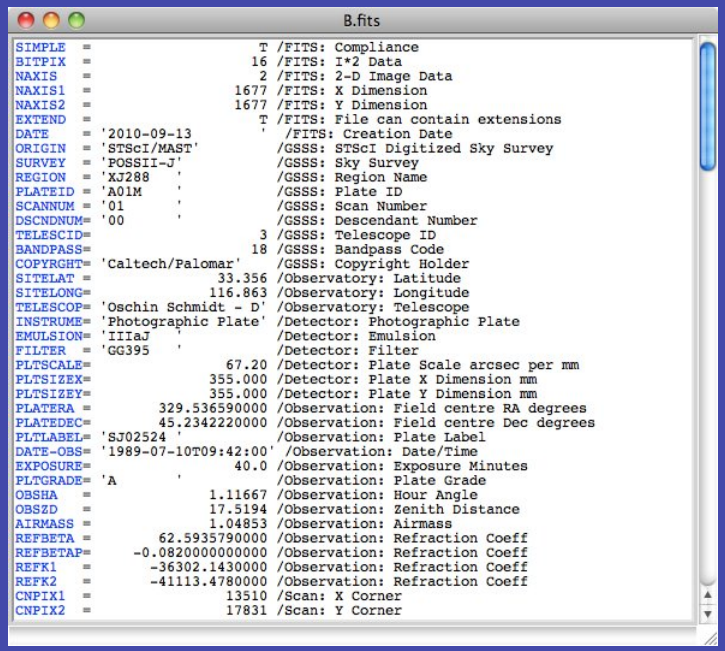
"Metadata"

Astrometry

Filter, etc.

Astronomical Image Format: FITS Files and ds9

Header



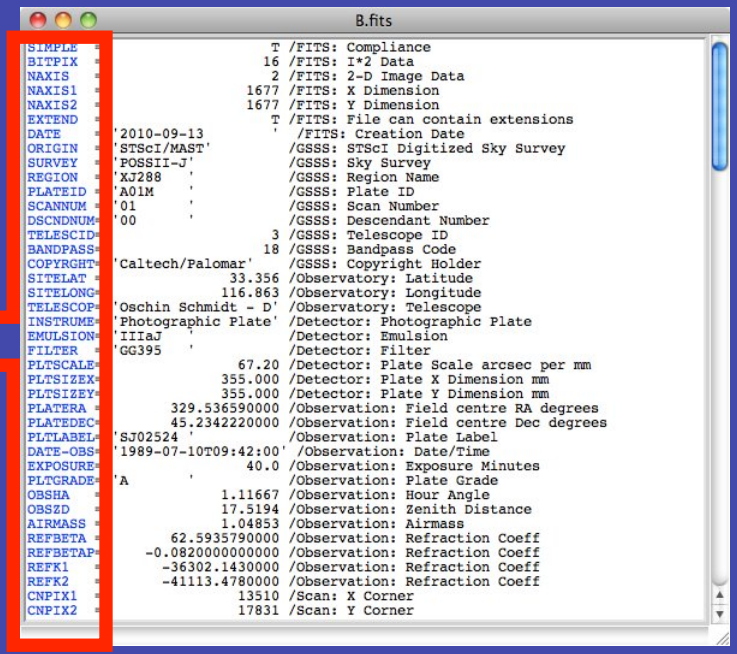
Astronomical Image Format: FITS Files and ds9

Header

FILTER

Keywords

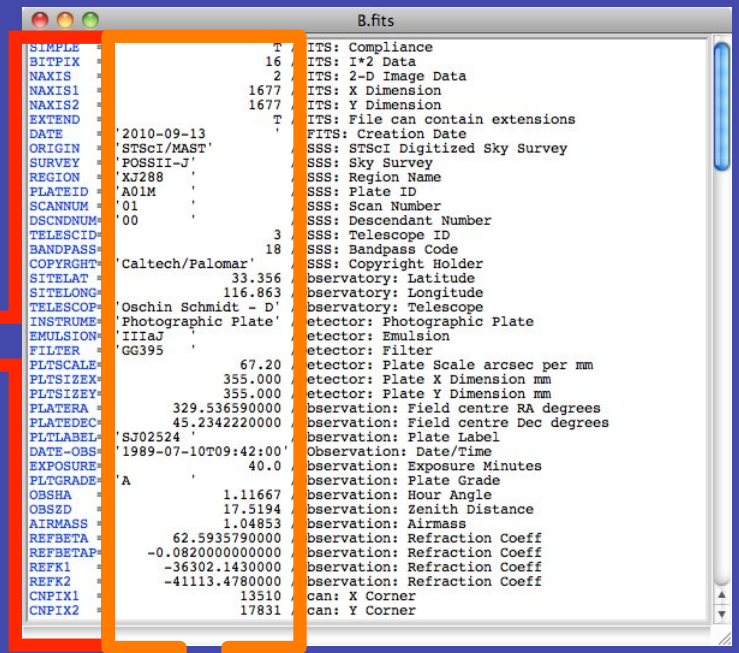
Each limited to 8 characters



Astronomical Image Format: FITS Files and ds9

Header

FILTER ‘GG395 ’



Keywords

Each limited to 8 characters

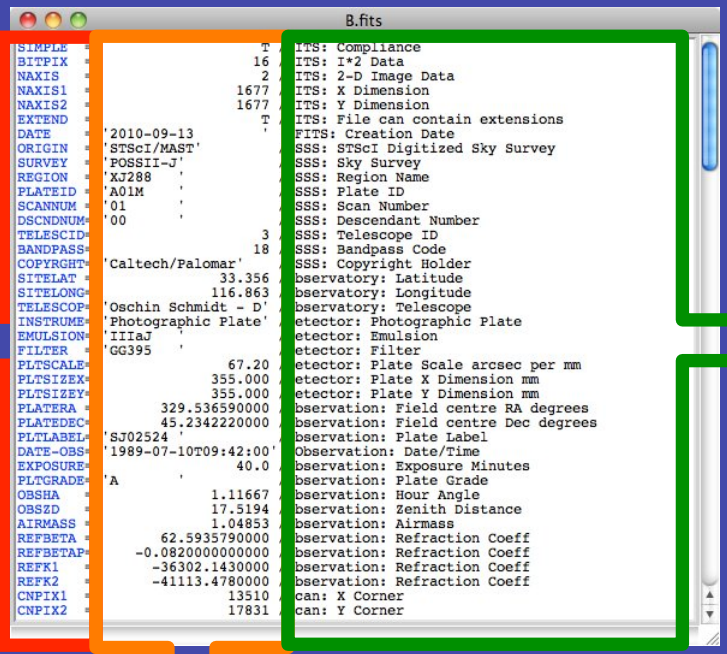
Keyword Values

Unlimited number of characters

Astronomical Image Format: FITS Files and ds9

Header

FILTER ‘GG395 ’ Detector: Filter



Keywords

Each limited to 8 characters

Keyword Comments

Unlimited number of characters

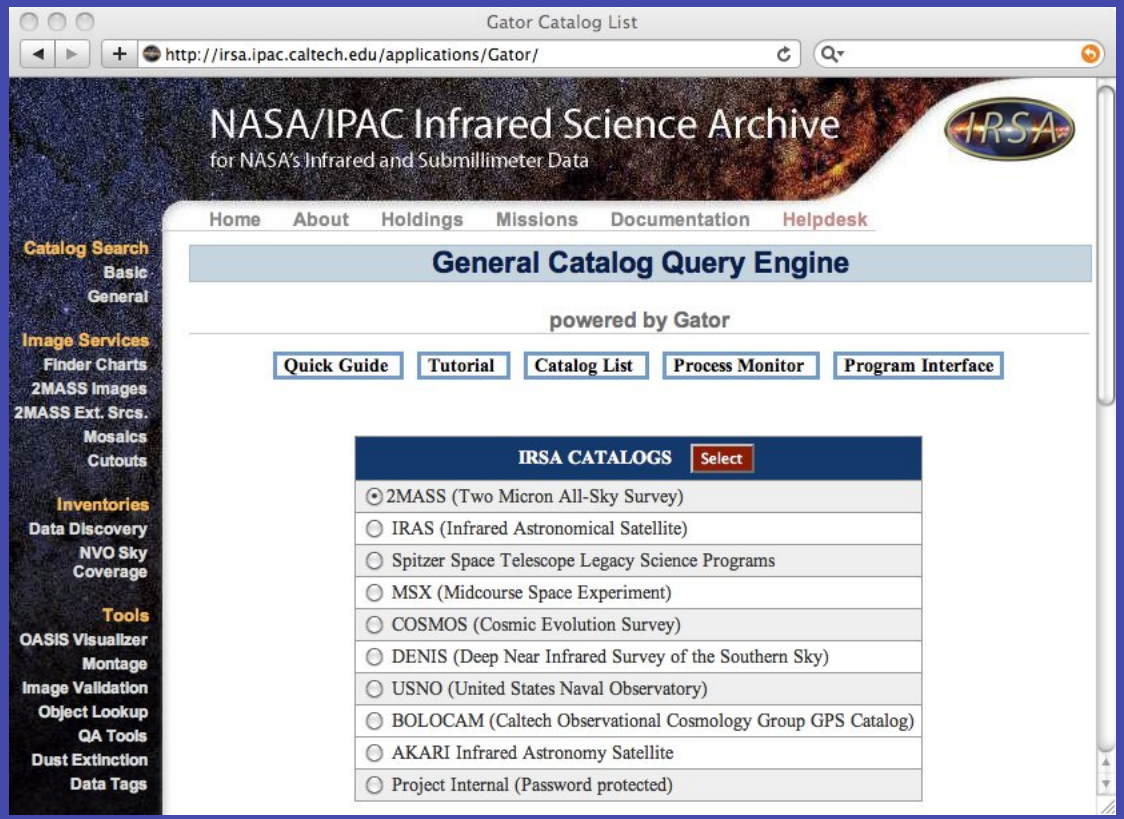
Keyword Values

Unlimited number of characters

Gator

http://irsa.ipac.caltech.edu/applications/Gator

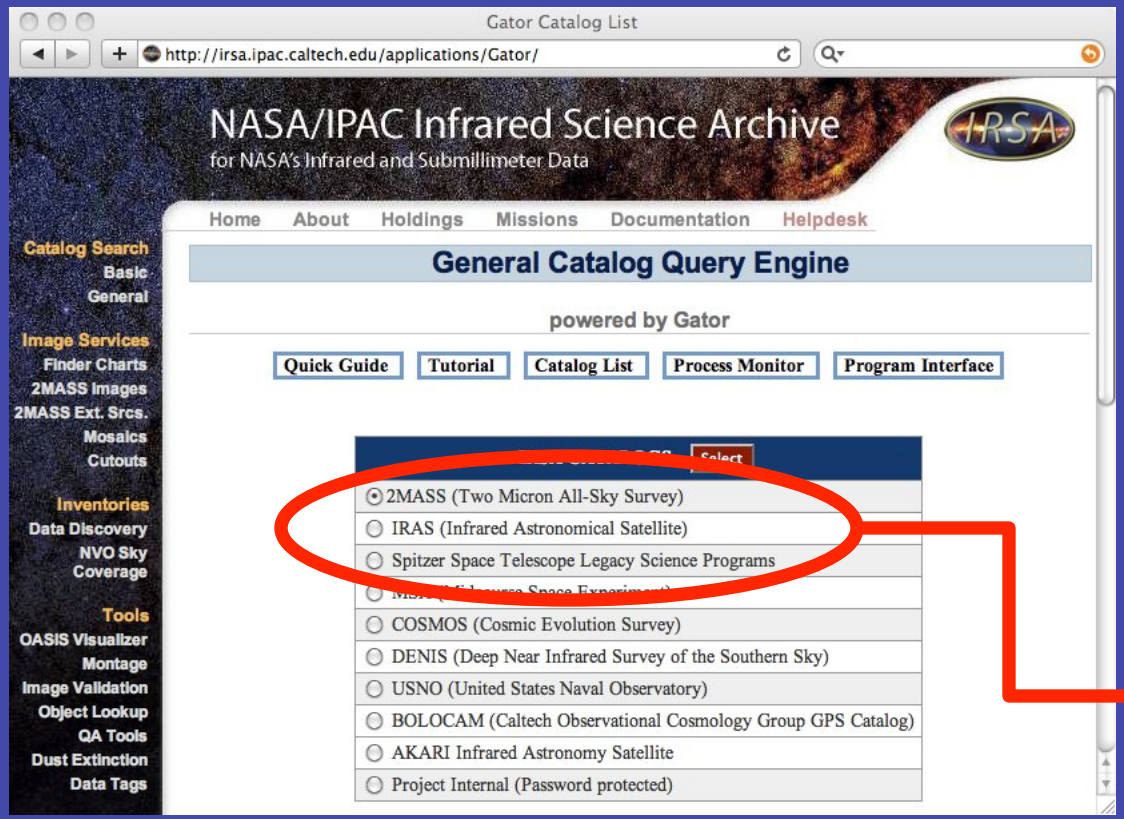
NASA/IPAC's Catalog Search Engine for Infrared Data



Gator

http://irsa.ipac.caltech.edu/applications/Gator

NASA/IPAC's Catalog Search Engine for Infrared Data



2MASS (1.2 – 2.2 μm)

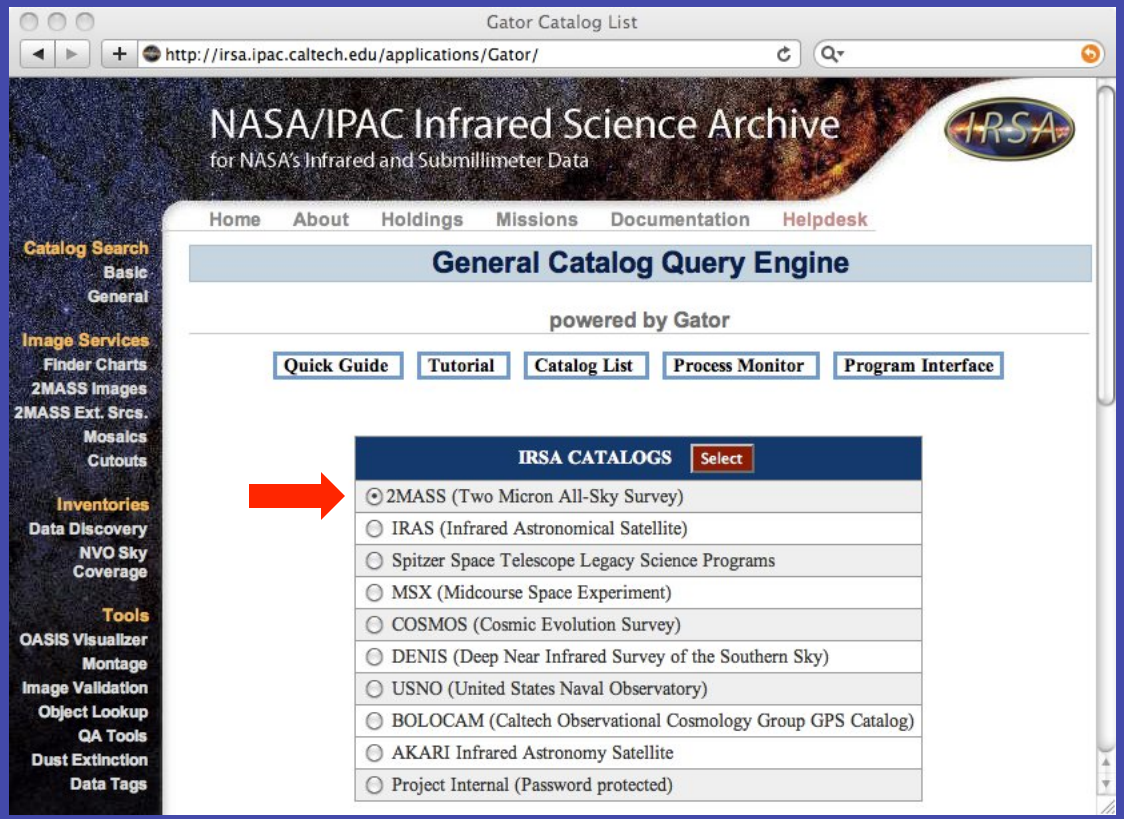
Spitzer (3.6 – 160 μm)

IRAS (12 – 100 μm)

Gator

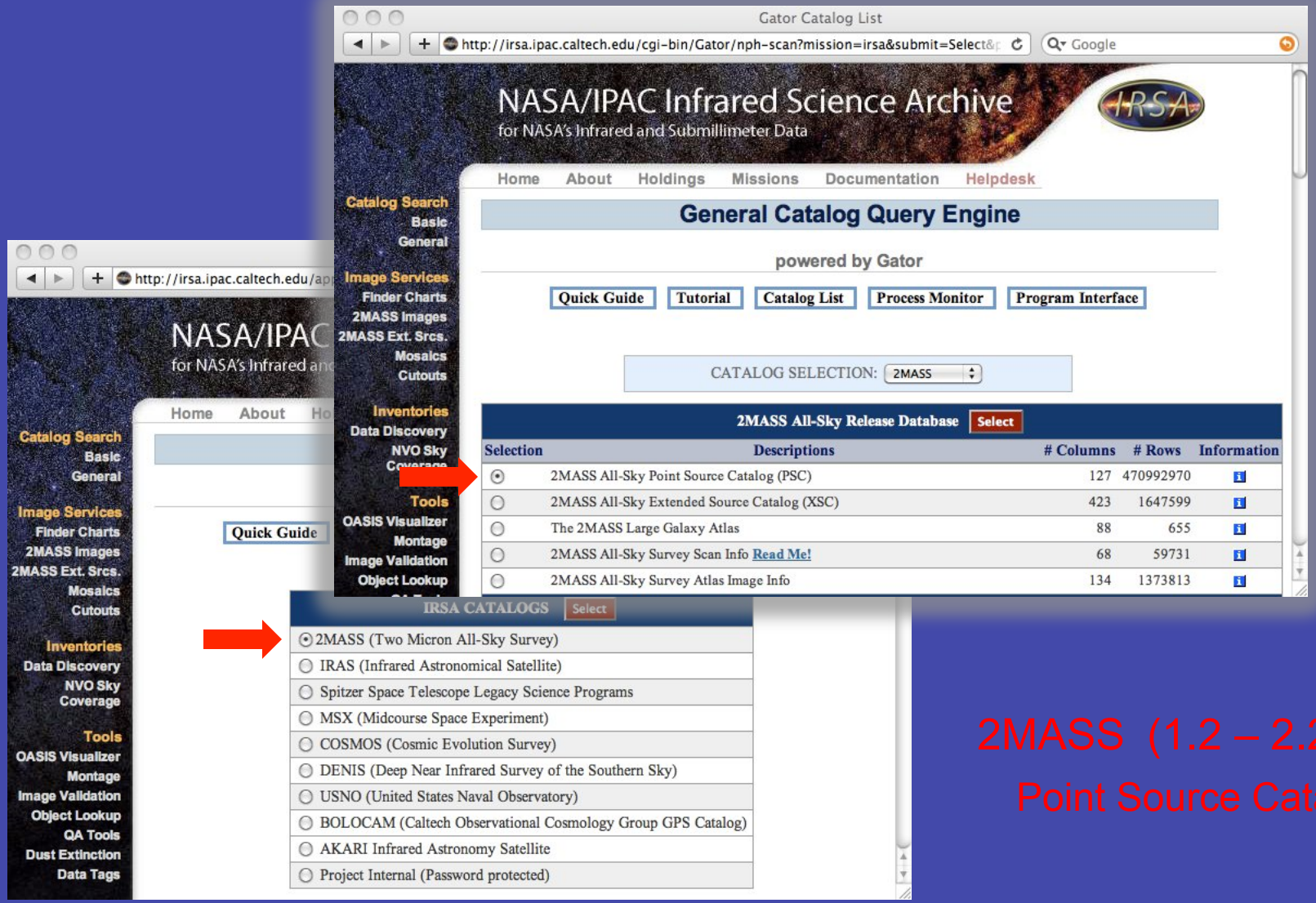
http://irsa.ipac.caltech.edu/applications/Gator

NASA/IPAC's Catalog Search Engine for Infrared Data



2MASS (1.2 – 2.2 μm)

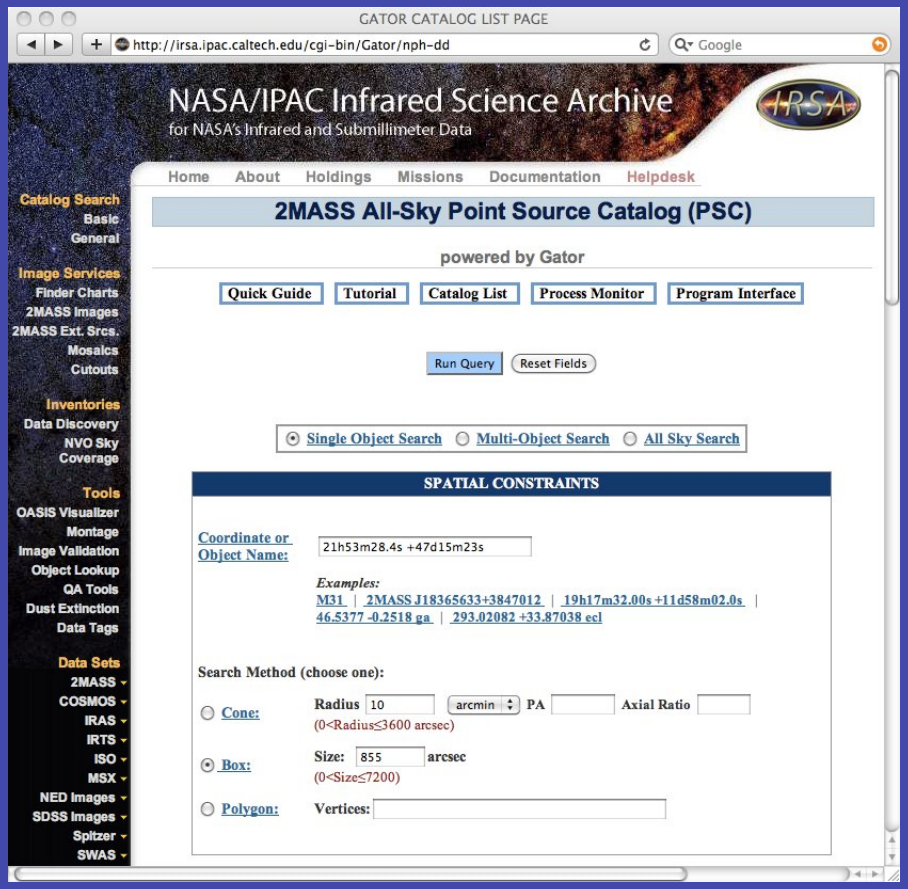
Gator

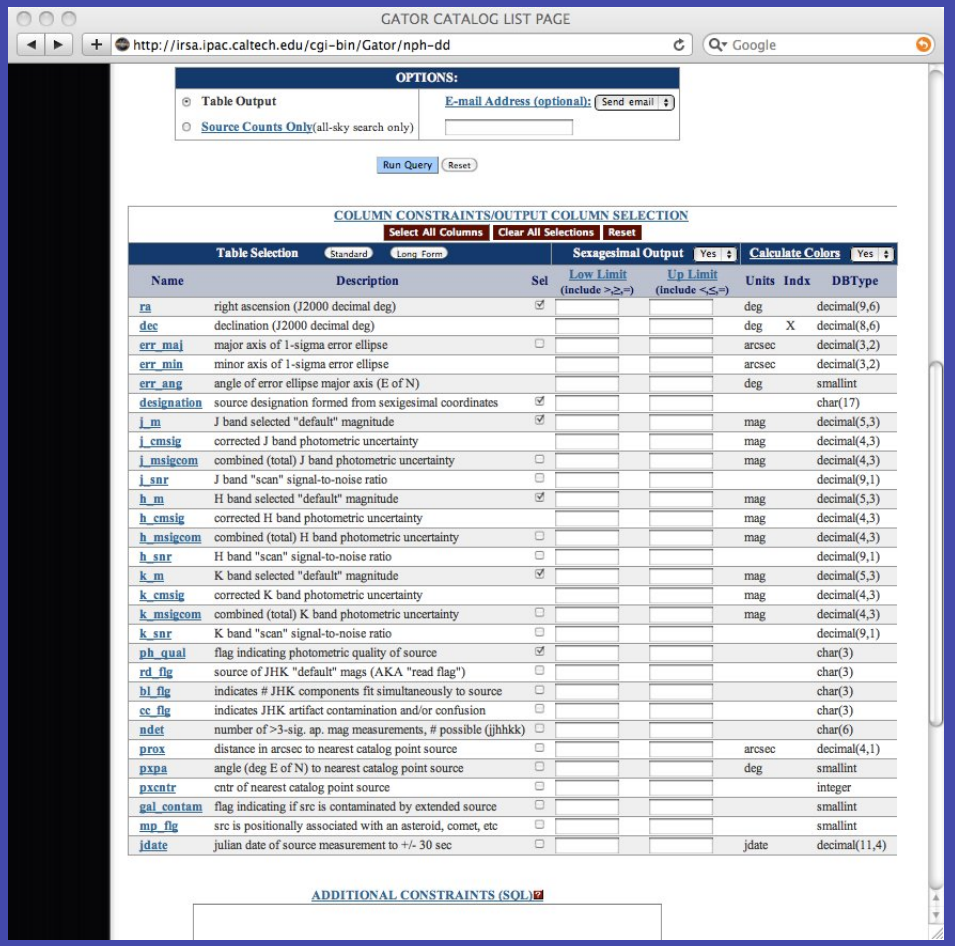


2MASS (1.2 – 2.2 μm)

Point Source Catalog (PSC)

Gator





2MASS (1.2 – 2.2 μm)

Point Source Catalog (PSC)

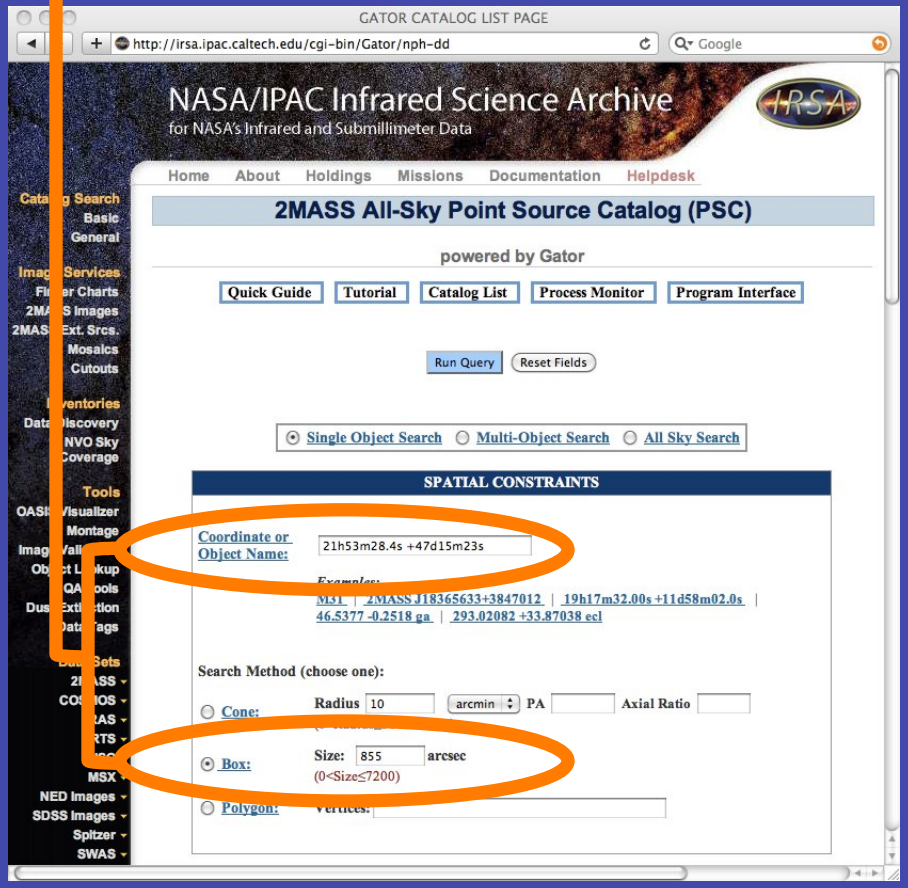
Gator

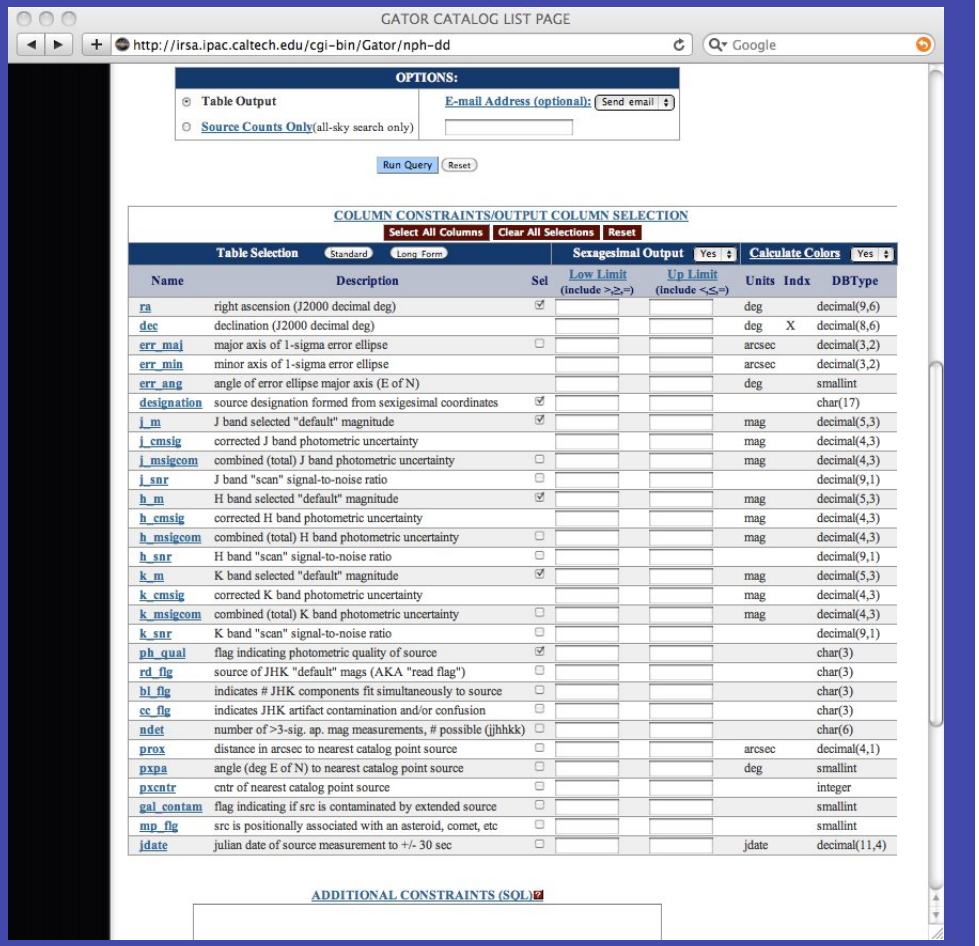
Coordinates

21h53m28.4s +47d15m23s

Box Size

855 arcsec





2MASS (1.2 – 2.2 μm)

Point Source Catalog (PSC)

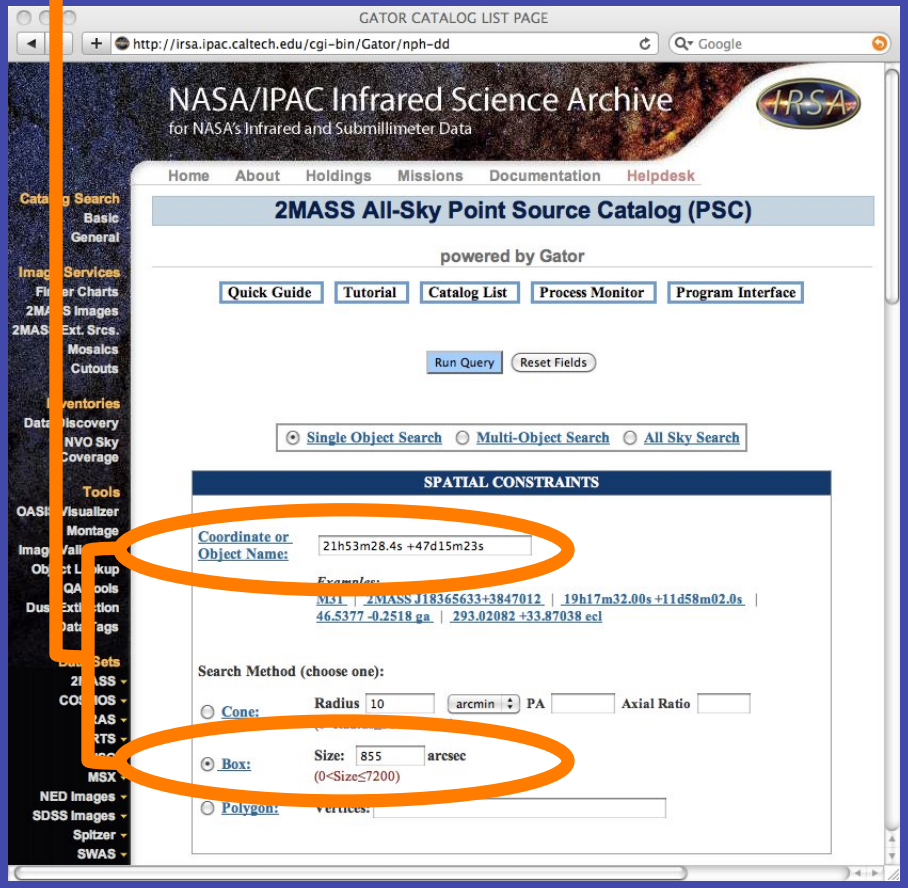
Gator

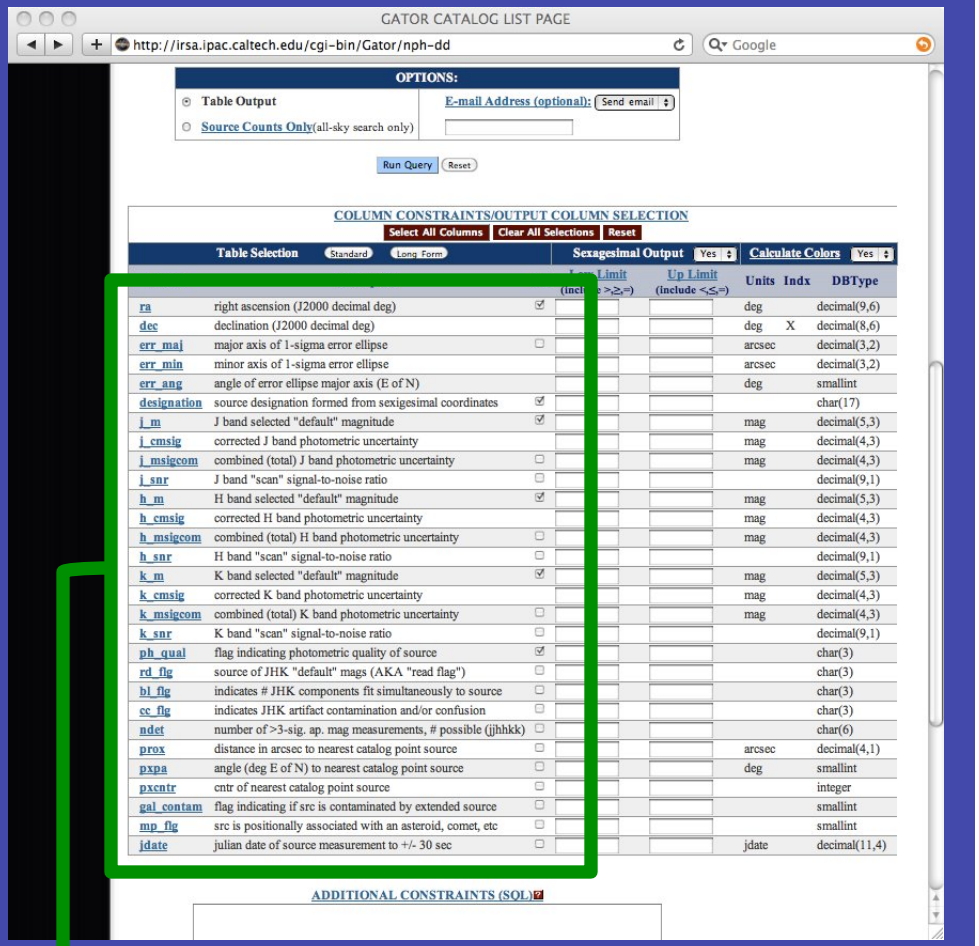
Coordinates

21h53m28.4s +47d15m23s

Box Size

855 arcsec



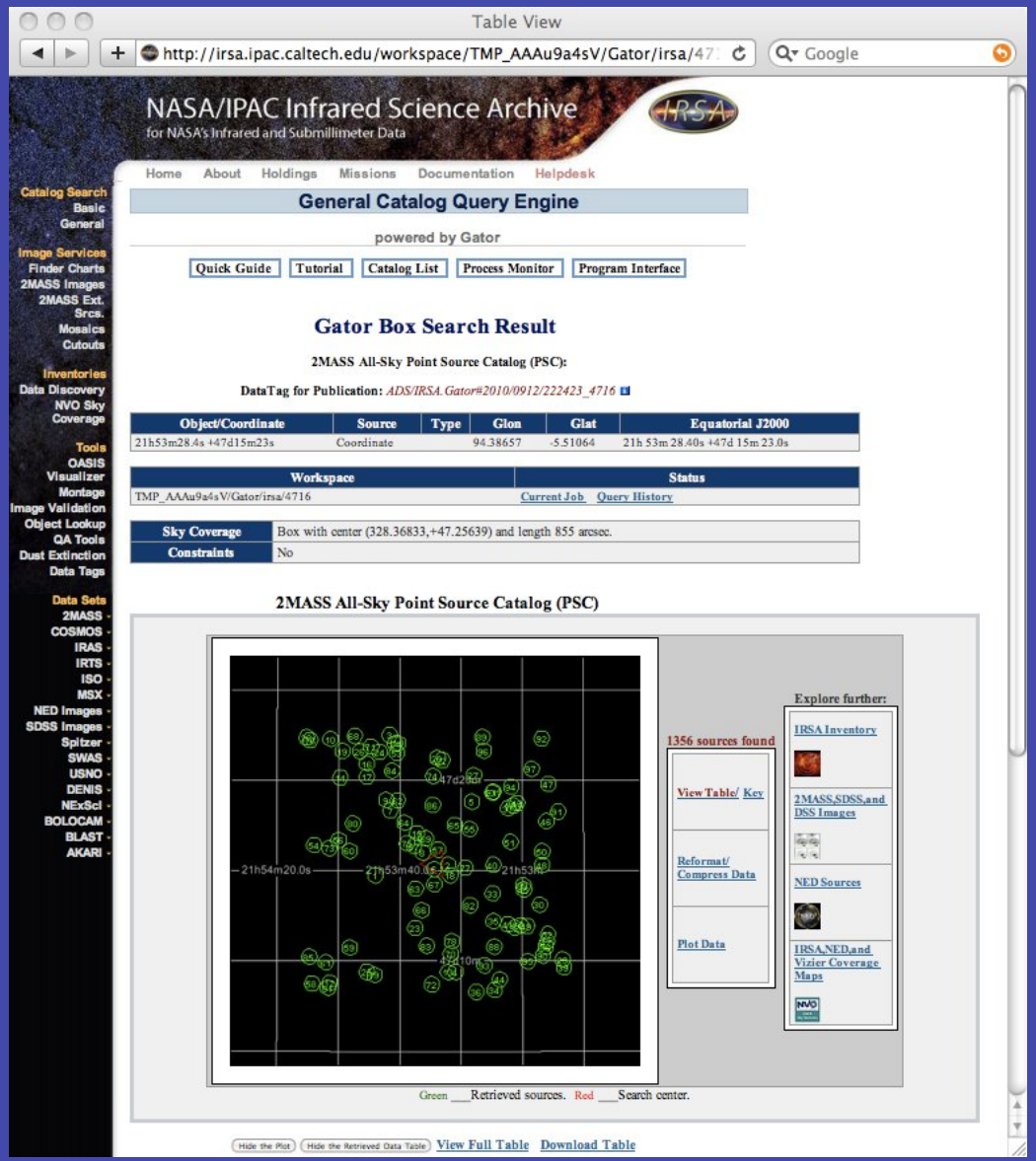


2MASS (1.2 – 2.2 μm)

Point Source Catalog (PSC)

Catalog Output Selections

Gator



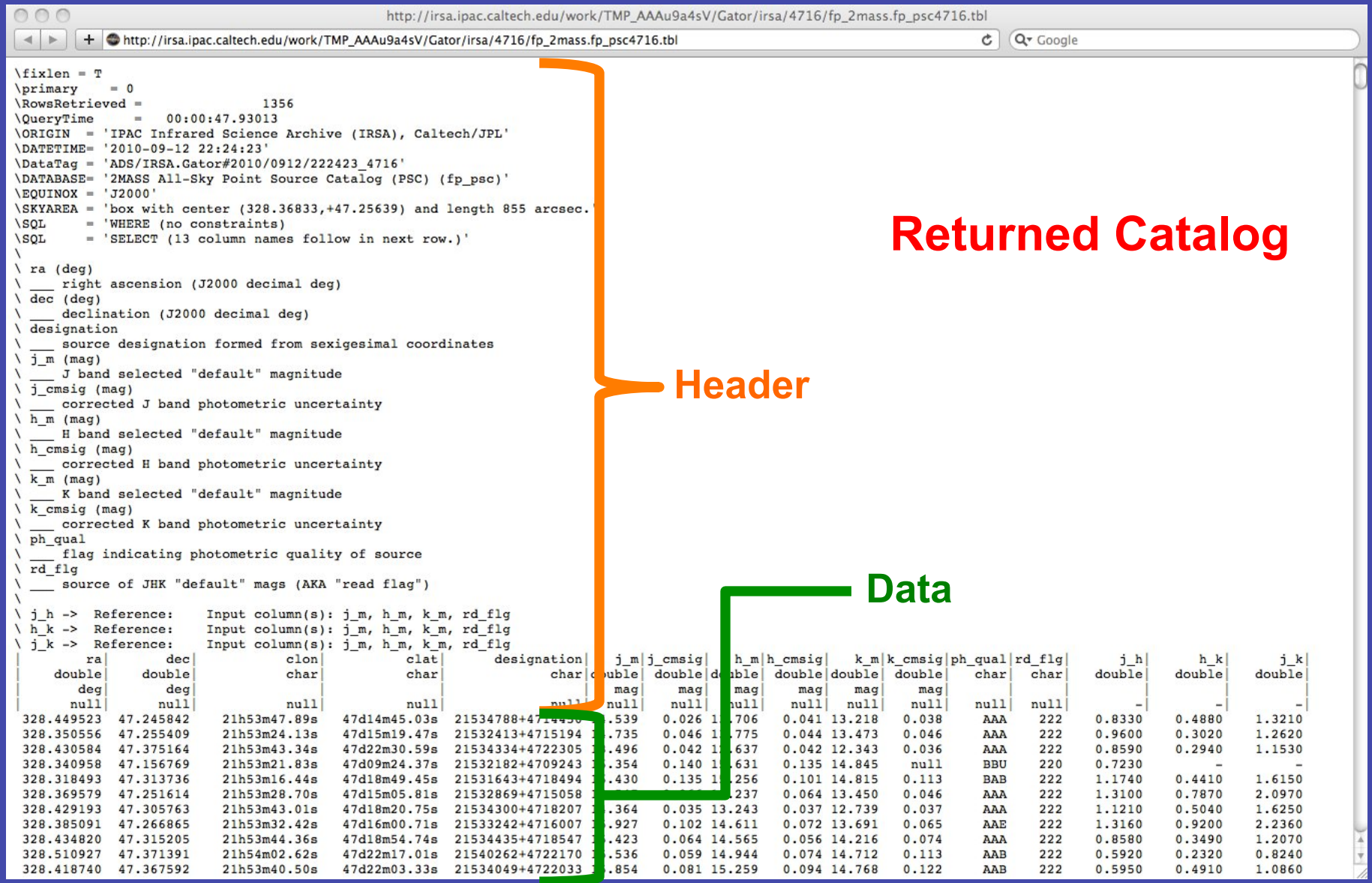
Quick View of Results

Figure showing distribution of first 100 sources in returned catalog

2MASS (1.2 – 2.2 μm)

Point Source Catalog (PSC)

Gator

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\DATETIME= '2010-09-12 22:24:23'
\DataTag = 'ADS/IRSA.Gator#2010/0912/222423_4716'
\DATABASE= '2MASS All-Sky Point Source Catalog (PSC) (fp_psc)'
\EQUINOX = 'J2000'
\SKYAREA = 'box with center (328.36833,+47.25639) and length 855 arcsec.'
\SQL     = 'WHERE (no constraints)
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\
\ ra (deg)
\ ___ right ascension (J2000 decimal deg)
\ dec (deg)
\ ___ declination (J2000 decimal deg)
\ designation
\ ___ source designation formed from sexigesimal coordinates
\ j_m (mag)
\ ___ J band selected "default" magnitude
\ j_cmsig (mag)
\ ___ corrected J band photometric uncertainty
\ h_m (mag)
\ ___ H band selected "default" magnitude
\ h_cmsig (mag)
\ ___ corrected H band photometric uncertainty
\ k_m (mag)
\ ___ K band selected "default" magnitude
\ k_cmsig (mag)
\ ___ corrected K band photometric uncertainty
\ ph_qual
\ ___ flag indicating photometric quality of source
\ rd_flg
\ ___ source of JHK "default" mags (AKA "read flag")
\
\ j_h ->  Reference:    Input column(s): j_m, h_m, k_m, rd_flg
\ h_k ->  Reference:    Input column(s): j_m, h_m, k_m, rd_flg
\ j_k ->  Reference:    Input column(s): j_m, h_m, k_m, rd_flg
|        ra|       dec|           clon|           clat|       designation|   j_m|j_cmsig|   h_m|h_cmsig|   k_m|k_cmsig|ph_qual|rd_flg|      j_h|      h_k|      j_k|
|    double|    double|           char|           char|             char|double|  double|double|  double|double|  double|   char|   char|   double|   double|   double|
|       deg|       deg|               |               |                 |   mag|     mag|   mag|     mag|   mag|     mag|       |       |         |         |         |
|      null|      null|           null|           null|             null|  null|    null|  null|    null|  null|    null|   null|   null|        -|        -|        -|
 328.449523  47.245842    21h53m47.89s   47d14m45.03s  21534788+4714450  14.539   0.026  13.706   0.041  13.218   0.038     AAA    222   0.8330   0.4880   1.3210
 328.350556  47.255409    21h53m24.13s   47d15m19.47s  21532413+4715194  14.735   0.046  13.775   0.044  13.473   0.046     AAA    222   0.9600   0.3020   1.2620
 328.430584  47.375164    21h53m43.34s   47d22m30.59s  21534334+4722305  14.496   0.042  13.637   0.042  12.343   0.036     AAA    222   0.8590   0.2940   1.1530
 328.340958  47.156769    21h53m21.83s   47d09m24.37s  21532182+4709243  14.354   0.140  14.631   0.135  14.845     null    BBU    220   0.7230        -        -
 328.318493  47.313736    21h53m16.44s   47d18m49.45s  21531643+4718494  14.430   0.135  13.256   0.101  14.815   0.113     BAB    222   1.1740   0.4410   1.6150
 328.369579  47.251614    21h53m28.70s   47d15m05.81s  21532869+4715058  14.[illegible]  13.237   0.064  13.450   0.046     AAA    222   1.3100   0.7870   2.0970
 328.429193  47.305763    21h53m43.01s   47d18m20.75s  21534300+4718207  14.364   0.035  13.243   0.037  12.739   0.037     AAA    222   1.1210   0.5040   1.6250
 328.385091  47.266865    21h53m32.42s   47d16m00.71s  21533242+4716007  14.927   0.102  14.611   0.072  13.691   0.065     AAE    222   1.3160   0.9200   2.2360
 328.434820  47.315205    21h53m44.36s   47d18m54.74s  21534435+4718547  14.423   0.064  14.565   0.056  14.216   0.074     AAA    222   0.8580   0.3490   1.2070
 328.510927  47.371391    21h54m02.62s   47d22m17.01s  21540262+4722170  14.536   0.059  14.944   0.074  14.712   0.113     AAB    222   0.5920   0.2320   0.8240
 328.418740  47.367592    21h53m40.50s   47d22m03.33s  21534049+4722033  14.854   0.081  15.259   0.094  14.768   0.122     AAB    222   0.5950   0.4910   1.0860
```