



Astronomy on the web

SKY SURVEYS AND PORTALS

Survey Alphabet Soup

- 2MASS: 2 micron All Sky Survey
- CSS: Catalina Sky Survey; 1.6 m, 48" Schmidt; 50 cm Schmidt
 - Includes Palomar-Quest: produced 'The Big Picture' of Virgo
- DSS: digital sky survey; from Palomar plates
- DSS2: digital sky survey2; Palomar 48" Schmidt + UK Schmidt Southern telescope
- FIRST: VLA 20 cm survey
- IRAS: Infrared astronomical satellite
- Galex: Galaxy Evolution Explorer
- LSST: Large Synoptic Survey Telescope
- NEAT: Near Earth Asteroid Tracker; 48" Schmidt
- Pan-STARRS: Panoramic Survey Telescope and Rapid Response System
- SDSS: Sloan Digital Sky Survey; 2.5 m telescope
- WISE: Wide-field Infrared Survey Explorer; 40 cm scope

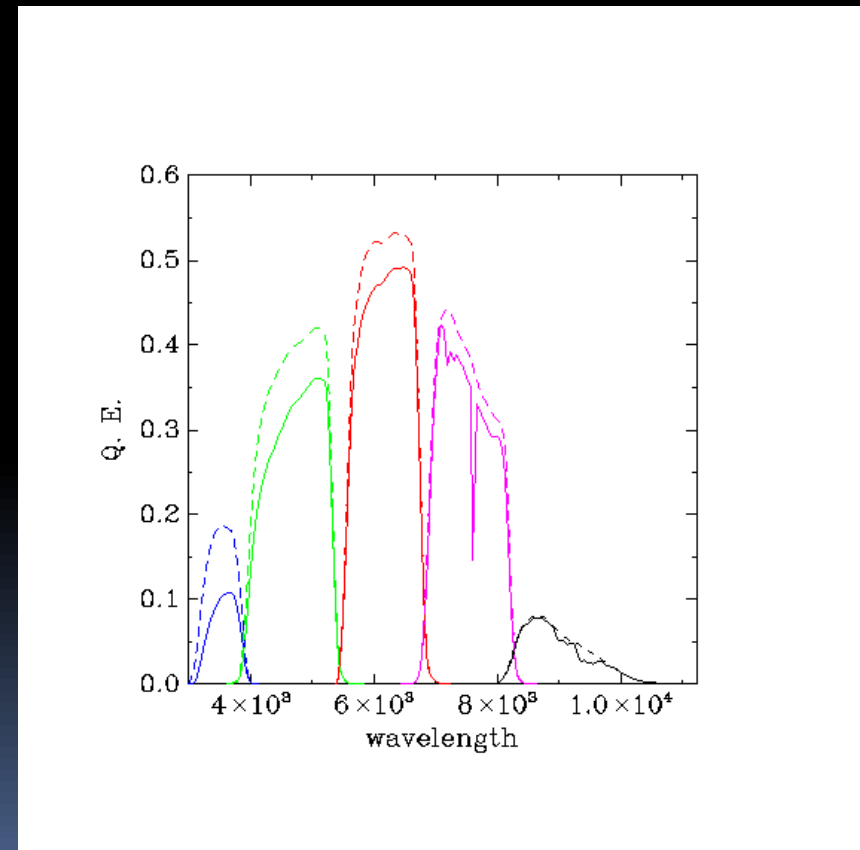
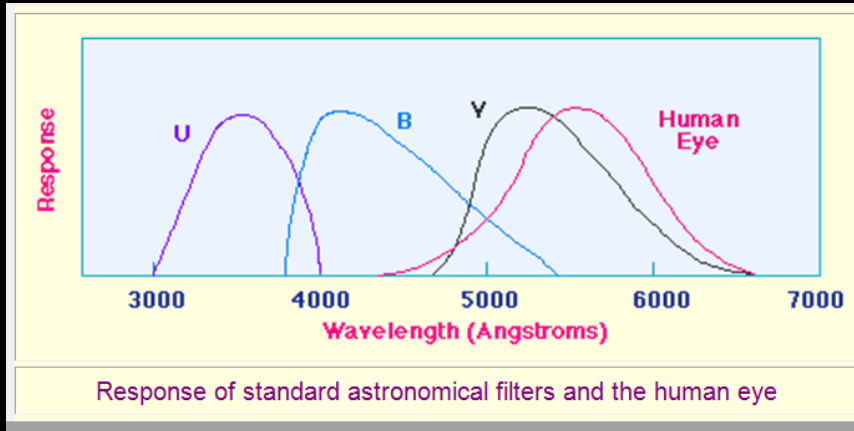
Goals: Fine Deep Wide Fast

- Fine: 1" (arc second) or less
 - SDSS: 1"
 - Pan-STARRS: 0.3"
- Deep: Magnitude 22 or more
 - SDSS: 22
 - Pan-STARRS: same (29 with co-adding)
- Wide: All sky (visible from observatory)
 - SDSS: 9500 sq degrees (out of 30000)
 - Pan-STARRS: All sky north of -30 degrees
- Fast: Survey and repeat
 - SDSS: one pass over surveyed area
 - Pan-STARRS: one pass every 7 days

Palomar Plates to Petabytes

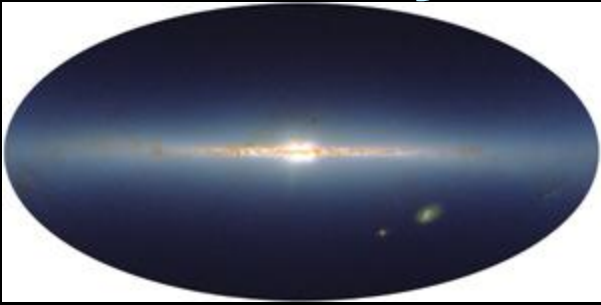
Epoch	Survey	Resolution	Notes
1945-55	Palomar Plates	2"	Red/Blue
1983	IRAS	2'	12/25/60/100 microns (IR)
1984-99	DSS2	<2"	Red/Blue/NearIR
1997-98	NEAT	1.5"	V(usual); 30% of sky
1997-2002	2MASS	1"	1.25/1.65/2.17 microns (K/H/J)
2003-08	SDSS	1"	g/r/i/z/u
2007	Galex	5"	0.135/0.28 microns (UV)
1994-2009	FIRST	5"	20 cm (radio)
2002-	CSS	1"	g/r/i/z (not yet public...)
2010	WISE	6"	3.4/4.6/12/22 microns; public 2011
2009-13	Pan-STARRS	0.3"	g/r/i/z/y (public 2013)
2016	LSST	?	g/r/i/z/y

Filters 101

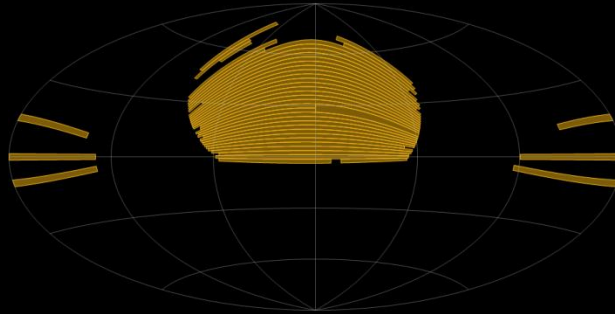


Sloan Filters u/g/r/i/z
= 3590/4810/6230/9060 angstroms

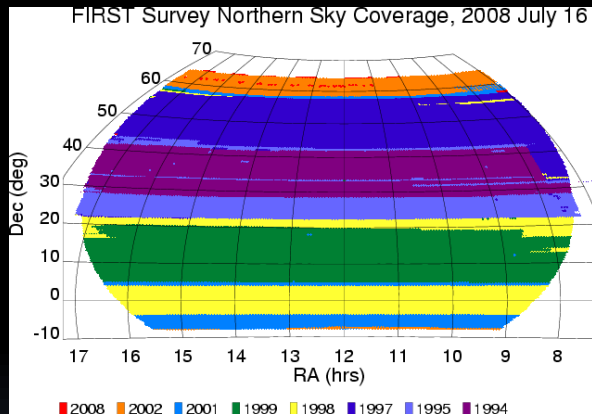
Survey Coverage



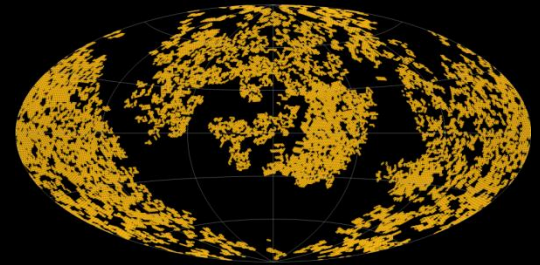
2MASS



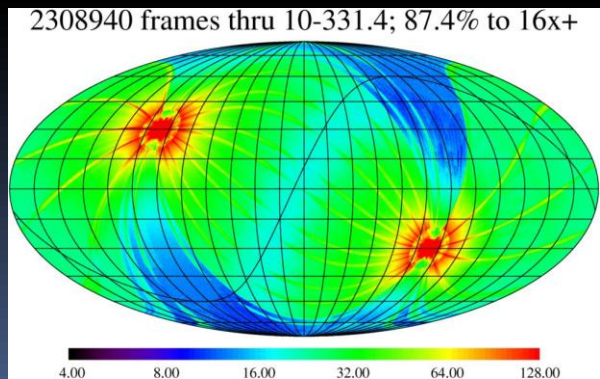
SDSS



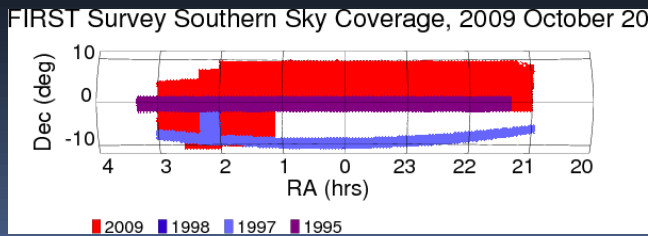
FIRST-North



Galex



WISE



FIRST-South

Survey Web Sites

- FIRST: <http://sundog.stsci.edu/index.html>
- IRAS: <http://irsa.ipac.caltech.edu/IRASdocs/iras.html>
- 2MASS: <http://www.ipac.caltech.edu/2mass/>
- Galex: <http://www.galex.caltech.edu/>
- DSS: <http://archive.stsci.edu/dss/>
- SDSS: <http://www.sdss.org/>
- NEAT: <http://neat.jpl.nasa.gov/>
- CSS: <http://www.lpl.arizona.edu/css/>
- Pan-STARRS: <http://pan-starrs.ifa.hawaii.edu/public/>
- WISE: <http://wise.ssl.berkeley.edu/>

Sky Portals: Visualizing Astro Data

- NVO: the place to search for images
- Skyview: grand-daddy portal
- Aladin: professional tool
- Google Sky: mobile + desktop planetarium
- WWT World Wide Telescope: planetarium ++
- Astronomy Lookup: <http://www.strudel.org.uk/lookUP>
- More...
 - SkyMorph (NEAT image access)
 - SkyAlert (for real time astro event alerts)
 - Sky Map (WikiSky)
 - SDSS Search (for SDSS images)
 - FIRST Cutout (for FIRST images)

Get to Know NVO

- NVO – National Virtual Observatory
 - Data standard for sharing astro data (VOtable)
 - Data registration and search scheme
 - 12,000+ resources (who's who of surveys/data)
 - Can search for images/spectra of an object
- Web site: <http://www.us-vo.org/>
 - Survey footprints: <http://voservices.net/footprint/>
 - Search for object images/spectra: DataScope

NVO DataScope



Hosted by:
HEASARC
NASA/GSFC

Search a position for all known information

Use DataScope to find everything that's known about a given target or region of the sky. DataScope will query hundreds of VO-enabled data resources and organize the results for your viewing.

Position:

Use a target name (e.g., 3c273) or position (e.g., 10 10 10.1, 20 20 20.2)

Size: (in degrees, max is 2)

Run query:

Skip cache?

Do not add to list of recent queries?

Positions may be entered in decimal (dd.f, sdd.f) or sexagesimal (hh mm ss.f, dd mm ss.f) notation or as targets recognized by NED or SIMBAD.

The **Size** should be entered in decimal degrees.


Use the **Skip cache** flag to ensure that you get the latest results from all services.

By default the last few queries anyone has made are shown at the bottom of the page but there is a checkbox to keep your query from being recorded on this list.



Some recent queries:

[NGC 7209 \(0.25\)](#)
[193.4431500,3.4971300 \(0.00125\)](#)


NVO DataScope Response



Virtual Astronomical
Observatory

NVO Portal: DataScope Response



Hosted by:
HEASARC
NASA/GSFC

VAO Home

New Query

Help

Contact Us

Data found(390)
No data (5387)
Errors(29)
Waiting(0)
100% complete

Position:M82 Resources/hits: 5806/78580 Cache age:0.186 hours

Summary
Resources
Data Table
No Data
Still Processing
Errors
Help

Matching Resources These resources had data in the specified region.
Click on the

checkbox to select the data for download or analysis.
name to view the catalog data and select files.
? to see the metadata for the resource.

When the number after the name is given as *nn/mm* you have selected *nn* of the *mm* files indexed in that resource. Click on the resource name to select files within such resources.

Download selected resources from the Summary tab.

<input type="checkbox"/> Major Multiwavelength Services					
		<input type="checkbox"/> NED(images) (0/54) ?		<input type="checkbox"/> Simbad (738) ?	
<input type="checkbox"/> Images (Data in one or more FITS files)					
<input type="checkbox"/> Multi	<input type="checkbox"/> CADC (0/1414) ?	<input type="checkbox"/> CADC/CFHT (0/145) ?	<input type="checkbox"/> CADC/HST (0/1221) ?	<input type="checkbox"/> MAST Scrapbook (0/72) ?	<input type="checkbox"/> MAST-Scrapbook (0/39) ?
<input type="checkbox"/> Optical	<input type="checkbox"/> HST Previews (0/465) ?	<input type="checkbox"/> HST.APPP (0/4) ?	<input type="checkbox"/> HST.M82 (0/8) ?	<input type="checkbox"/> HST.angst (0/6) ?	<input type="checkbox"/> NOAO (0/1) ?
<input type="checkbox"/> Radio	<input type="checkbox"/> GB6 (0/1) ?				
<input type="checkbox"/> Infrared	<input type="checkbox"/> 2MASS ASKY AT (0/24) ?	<input type="checkbox"/> 2MASS QL (0/24) ?	<input type="checkbox"/> ISSA (0/8) ?	<input type="checkbox"/> LGA (0/3) ?	
<input type="checkbox"/> UV	<input type="checkbox"/> GALEX (0/2) ?	<input type="checkbox"/> GALEX_Atlas (0/2) ?	<input type="checkbox"/> UIT (0/12) ?		
<input type="checkbox"/> X-ray	<input type="checkbox"/> Chandra (0/40) ?	<input type="checkbox"/> RASS (0/1) ?	<input type="checkbox"/> ROSAT SIA (0/160) ?		

Response lists 390 matches!

SkyView

- <http://skyview.gsfc.nasa.gov/cgi-bin/titlepage.pl>
- Grand-daddy Sky Image Access
- Many astro data sources
- Hints:
 - Use Query form to get images by object name or RA/Dec coordinates
 - Save pictures in JPEG or FITS format

SkyView Query

Coordinates or Source:

(e.g. "Eta Carinae", "10 45 3.6, -59 41 4.2", or "161.265, -59.685" [omit the quotes])

Surveys: Select at least one survey

SkyView Surveys

Gamma Ray:	Hard X-ray:	X-ray:	Diffuse X-ray:	UV:
EGRET (3D)	BAT Flux 14-195	RASS-Cnt Soft	RASS Background 1	GALEX Near UV
EGRET <100 MeV	BAT Flux 14-24	RASS-Cnt Hard	RASS Background 2	GALEX Far UV
EGRET >100 MeV	BAT Flux 24-50	RASS-Cnt Broad	RASS Background 3	ROSAT WFC F1
COMPTEL	BAT Flux 50-100	PSPC 2.0 Deg-Counts	RASS Background 4	ROSAT WFC F2
	BAT Flux 100-195	PSPC 2.0 Deg-Expos	RASS Background 5	EUVE 83 A
	BAT Sig 14-195	PSPC 2.0 Deg-Inten	RASS Background 6	EUVE 171 A
	BAT Sig 14-24	PSPC 1.0 Deg-Inten	RASS Background 7	EUVE 405 A

Optical/DSS:	Optical:	Infrared:	Infrared CMB:	Radio:
DSS	Mellinger Red	2MASS-J	WMAP ILC	VLA FIRST (1.4 Ghz)
DSS1 Blue	Mellinger Green	2MASS-H	WMAP Ka	NVSS
DSS1 Red	Mellinger Blue	2MASS-K	WMAP K	WENSS
DSS2 Red	NEAT	IRIS 12	WMAP Q	SUMSS 843 Mhz
DSS2 Blue	SDSSg	IRIS 25	WMAP V	VLSS
DSS2 IR	SDSSi	IRIS 60	WMAP W	0408MHz
	SDSSr	IRIS 100	COBE DIRBE/AAM	1420Mhz (Bonn)

Common Options (coordinate system, projection, image size)

Coordinates: J2000 Special Coordinates (e.g. J2100, B1975)

Projection:


Image size (pixels):

Image Size (degrees):

[Use 4-byte floating point values for FITS file](#)


Initiate request:

Resulting SkyView Preview

 **SkyView**
The Internet's Virtual Telescope
[Home](#) [Query Form](#) [Help](#)

SkyView Images

DSS2 Red: 2nd Digitized Sky Survey (Red)



Download [FITS](#) or [quick look jpeg](#) image. [\[What is this?\]](#)

Google Sky

- <http://www.google.com/sky/>
- View: Sky, Moon, Mars, Planets
- Data: SDSS, WMAP, GALEX, Chandra, Hubble, IRAS
- SDSS shown by default, with optional overlays (and opacity control)
- Hubble overlays SDSS; no way to turn off
- Hints:
 - Mouse: click+drag to pan; nav buttons to zoom; double click to center
 - Search by object name or RA/Dec coordinates
 - Thumbnails provide interesting images/overlays (Galex; Chandra)

Google Sky M82

Sky | [Moon](#) | [Mars](#)

[See sky in Google Earth](#) | [Help](#) | [About Google Sky](#)



M82
- 1 Results for M82 -
[Cigar Galaxy](#)

Search

English (US)

[Link to this page](#)

[Print](#)



[Infrared](#) [Microwave](#) [Historical](#)

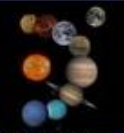


POWERED BY
Google

9h 57m 37.0s

69° 39' 15.2"

Image Credit: DSS Consortium, SDSS, NASA/ESA - [Terms of Use](#)



Solar System



Constellations



Hubble
Showcase



Backyard
Astronomy



Chandra X-
Ray
Showcase



GALEX
Ultraviolet
Showcase



Spitzer
Infrared
Showcase

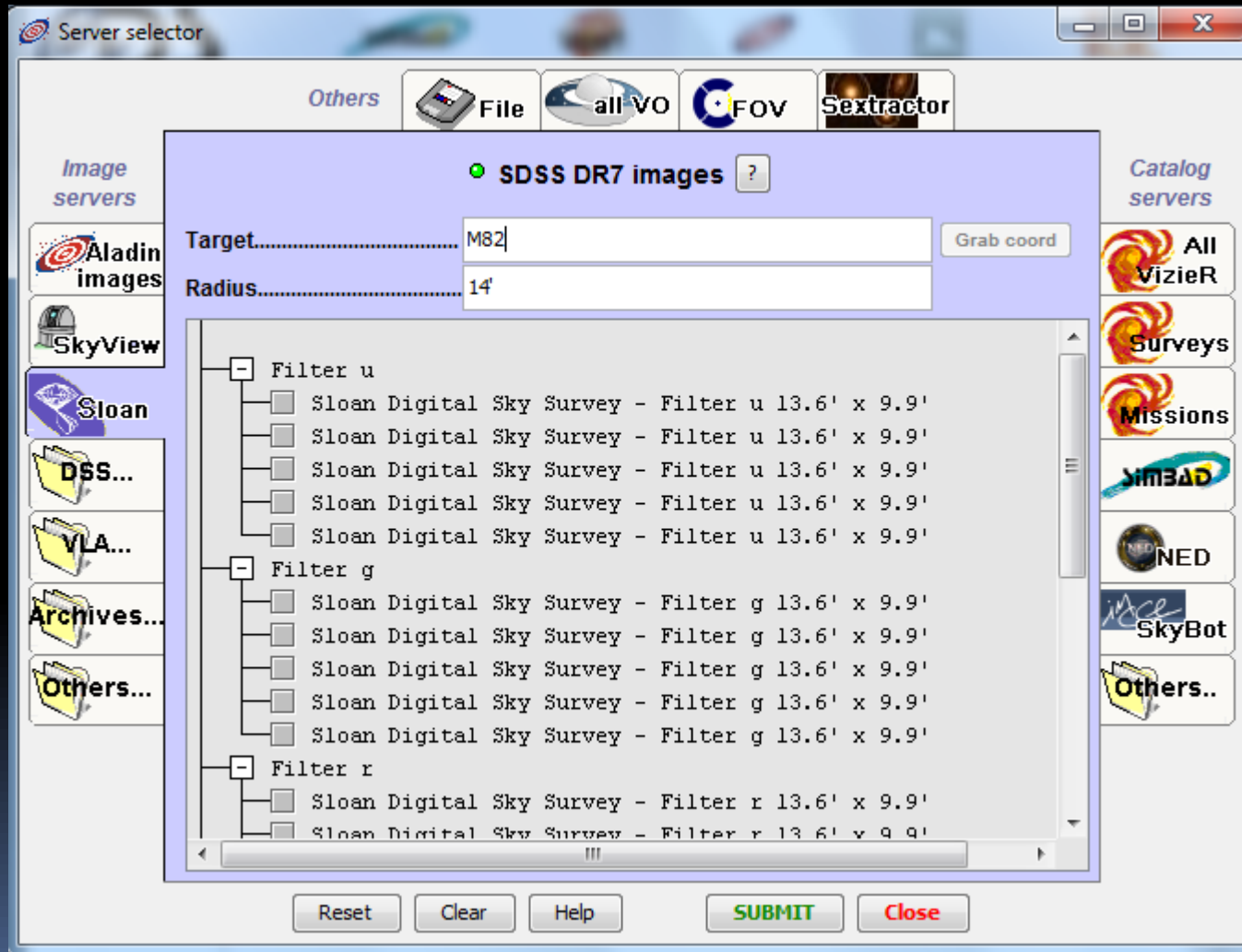


Earth & Sky
Podcasts

Aladin

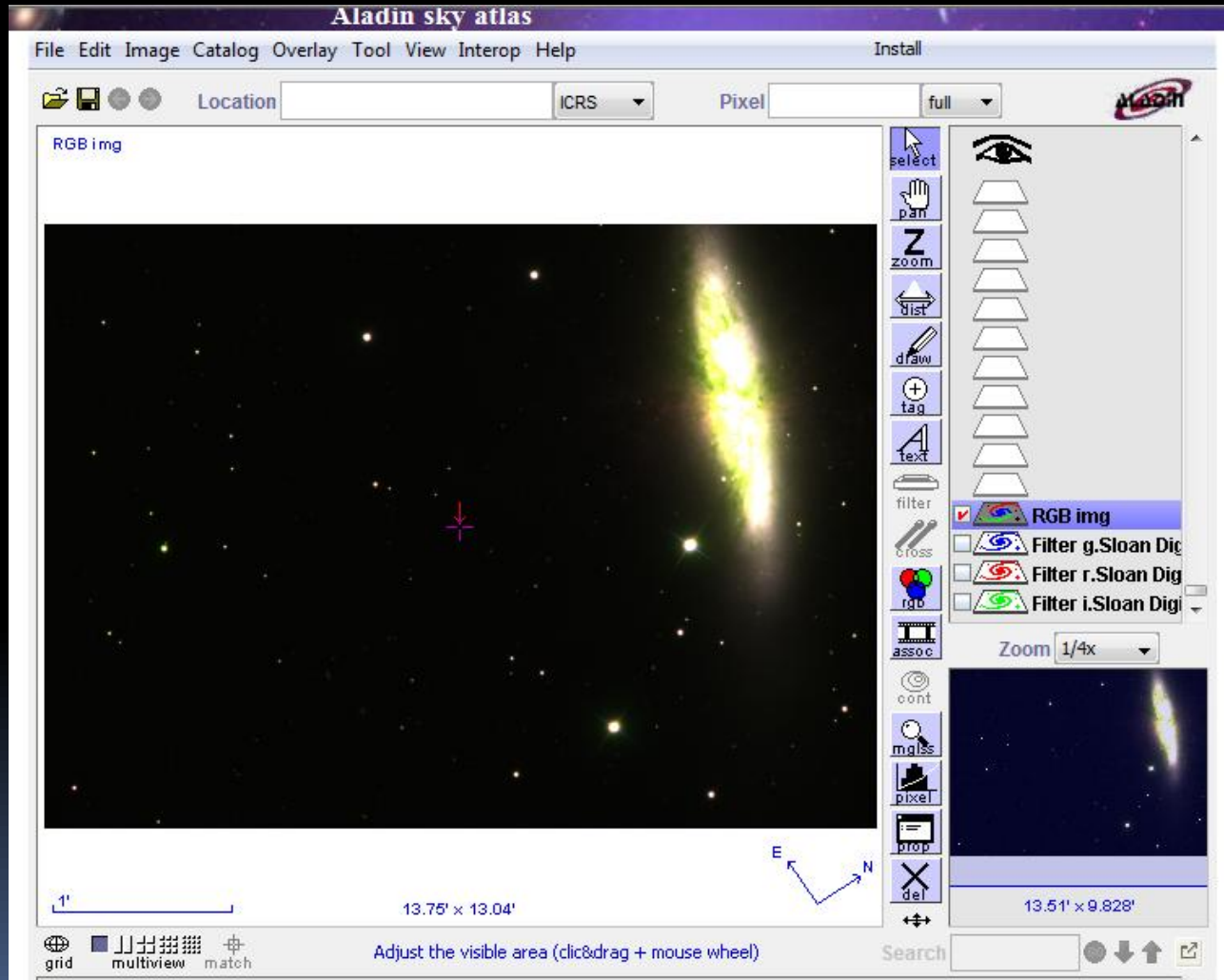
- <http://aladin.u-strasbg.fr/aladin.gml>
- Data: Many; SDSS unstitched, DSS, IRAS, Skyview, NVO...
- Professional astronomer tool: worth it
- Hints:
 - Java App: runs on Apple too!
 - File->Open to start; select database and object/coord
 - Many Ops: blink, difference, overlay data ref's, rgb merge, mosaic
 - Scriptable
 - Tools: S-extractor
 - Export/import JPEG/FITS

Aladin File Open



Aladin RGB View

View



Pane Stack

Zoom Overview

WWT

- <http://www.worldwidetelescope.org/Home.aspx>
- Portal on steroids: sky, planets, moon, even telescope control
- Data: DSS, SDSS, Hiparcos, 2MASS, FIRST, GALEX, ROSAT, Hubble,...
- Hints:
 - Change view with collections, 'look at', 'imagery'
 - Navigate: drag to pan; mouse wheel zoom; double click for finder ('close' at bottom)
 - Search: by object name or RA/Dec
 - Bottom shows objects 'in the area'
 - Tours are animations by pros and amateurs

WWT M82 from SDSS

Collection

The screenshot displays the WWT interface with the following elements:

- Navigation Bar:** Includes buttons for 'Explore', 'Guided Tours', 'Search', 'View', and 'Settings'. An 'Install Windows Client' button is on the right.
- Collections:** A row of thumbnails for various surveys: Hydrogen Alpha Full, SDSS: Sloan Digital Sky Survey, Tycho (Synthetic), USNOB: US Naval, GALEX 4 Near-UV, GALEX 4 Far-UV, GALEX (Ultraviolet), and RASS: ROSAT All Sky.
- Main View:** A large central window showing the M82 galaxy with a color gradient from blue to red.
- Control Panel:** Located at the bottom, it includes:
 - Look At:** A dropdown menu set to 'Sky'.
 - Imagery:** A dropdown menu set to 'SDSS: Sloan Digital Sky Survey'.
 - Info:** An information icon.
 - Image Crossfade:** A slider control.
 - Alternate Images:** A row of five thumbnails for different views of M82: 'Ursa Major', 'M82;M 82;Messier', 'Messier 82;Chandra', 'Messier 82;Happy', and 'Messier 82;M82;N'. A green arrow points from the 'Fader' label to the 'Image Crossfade' slider.
 - Navigation:** Left and right arrow buttons with '1 of 2' in between.
 - Sky Coord:** A globe icon and text showing 'RA : 09h55m28s' and 'Dec : 69:41:44'.
 - Constellation:** A map of the Ursa Major constellation with a yellow outline and the text 'Ursa Major 00:16:49'.

Fader

Alternate images

Sky coord

Constellation

Astronomy Lookup

- <http://www.strudel.org.uk/lookUP/>
- Mash-up by Stuart R. Lowe
- Look up Astronomical objects by name
- Get quick links to various astronomical views, photos, blog posts, and papers
- Hints:
 - Enter the object name of interest: galaxy, planet, comet, ...
 - Click 'search'
 - Follow the links...

Astronomy Lookup

Astronomy LookUP | an astronomical name resolver - Windows Internet Explorer

http://www.strudel.org.uk/lookUP/?name=M82

Norton Safe Search Search Cards & Log-ins

Astronomy LookUP | an astronomical name resol...

lookUP

Astronomical object name:

M82 (RA 09:55:52.2, Dec +69:40:48 FK5 J2000) Irregular Galaxy

View maps of the area around M82:


- [Radio via Chromoscope \(408 MHz\)](#)
- [Microwave via Chromoscope \(Planck\)](#)
- [Infrared via Wikisky \(IRAS\)](#)
- [Optical via Wikisky \(DSS\)](#)
- [Optical via Google Sky \(DSS\)](#)
- [UV via Wikisky \(GALEX\)](#)
- [X-ray via Wikisky \(RASS\)](#)
- [Gamma ray via Chromoscope \(Fermi\)](#)
- [Photo via Wikisky \(AstroPhoto\)](#)

[30×30° finder chart](#) from [Your Sky](#).
[10×10' finder chart](#) from the Minnesota Automated Plate Scanner Catalog (if available).

[View in Microsoft's World Wide Telescope](#) (requires Silverlight).

[flickr](#) images of [M82 by astrotag](#) (what's that?) or [within Astrophotography](#).

DSS image from [Wikisky](#)



Done

Internet | Protected Mode: On 100%

More Sky Portals

- SkyMorph (NEAT image access)
 - <http://skyview.gsfc.nasa.gov/skymorph/obs.html>
- SkyAlert (for real time astro event alerts)
 - <http://www.skyalert.org/>
- Sky Map (WikiSky)
 - <http://sky-map.org/>
- SDSS Search (for SDSS images)
 - <http://cas.sdss.org/dr7/en/tools/explore/>
- FIRST Cutout (for FIRST images)
 - <http://third.ucllnl.org/cgi-bin/firstcutout>