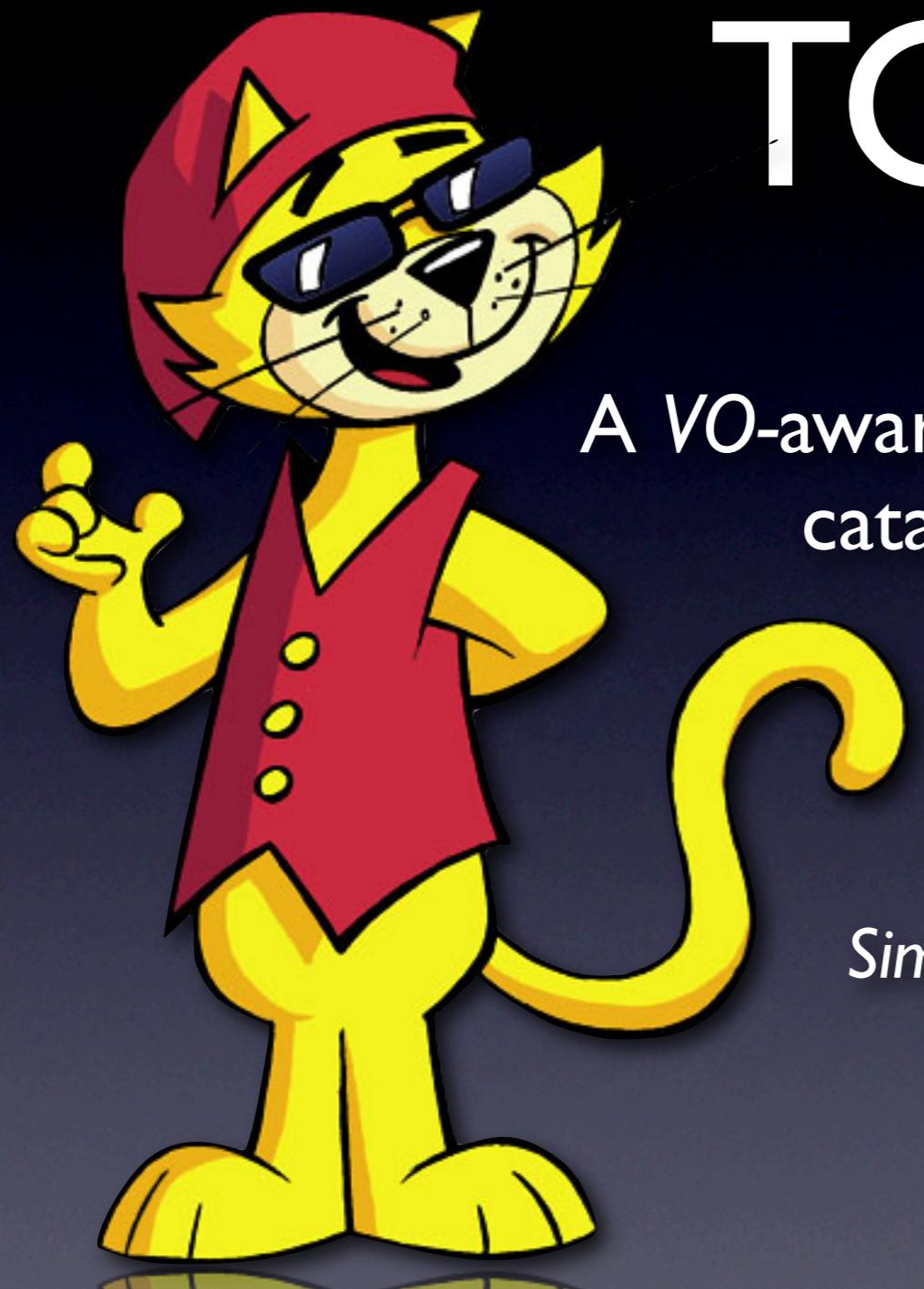


TOPCAT

A VO-aware tool for working with
catalogues and tables

Simon Murphy (RSAA / ANU)





TOPCAT



- Tools for Operations on
Catalogues And Tables
 - ‘Does *what you want with tables*’
- Written by Mark Taylor,
Bristol University
- Free Java application
- Actively developed

www.starlink.ac.uk/topcat

Why TOPCAT?



- Understands most table data formats (VOTable, ASCII, CSV, FITS, SQL, HTML, LaTeX)
- Handles large data sets (millions of rows with hundreds of columns)
- Fast and easy plotting
- Interaction with SQL databases and the VO

Why TOPCAT?

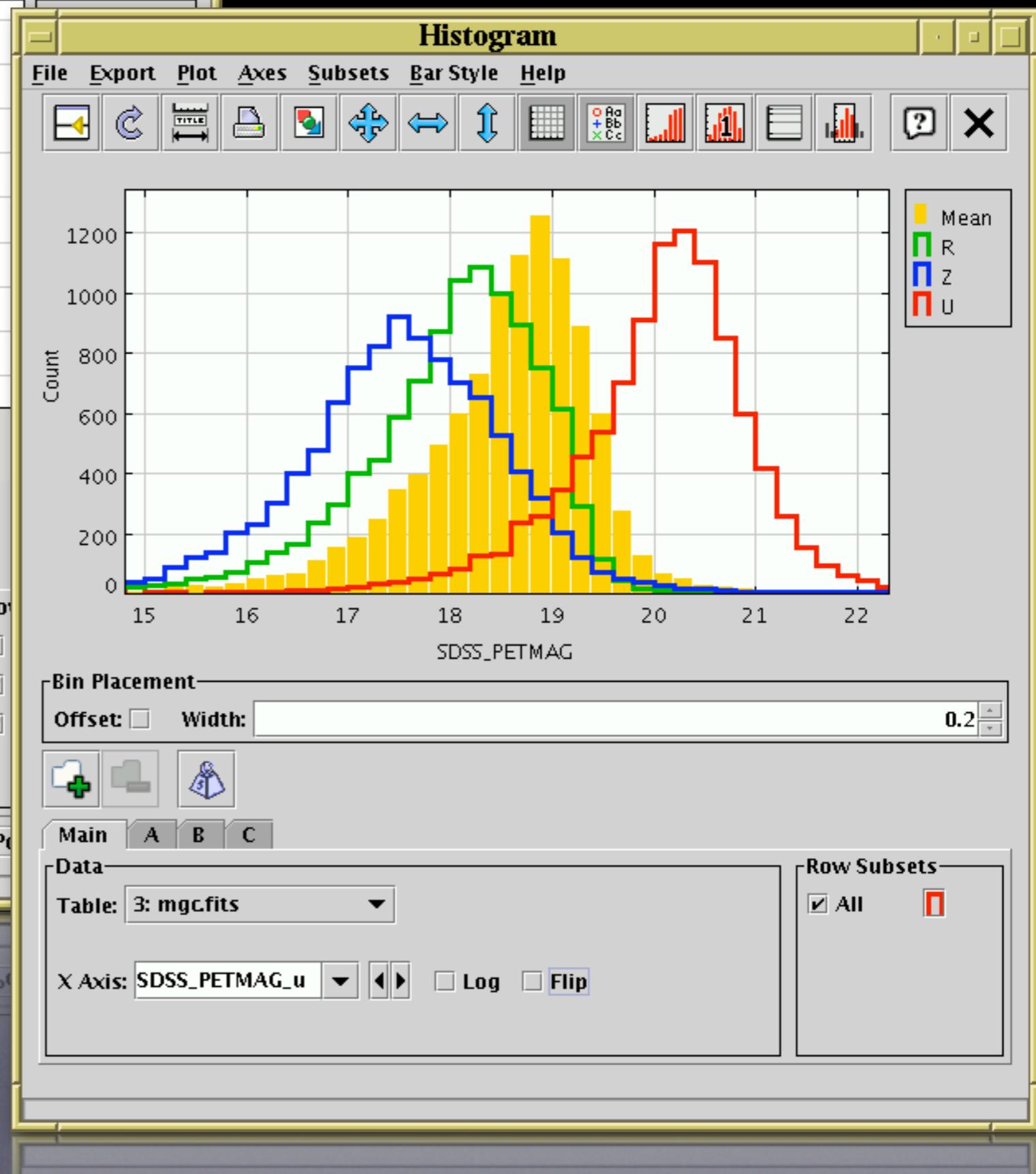
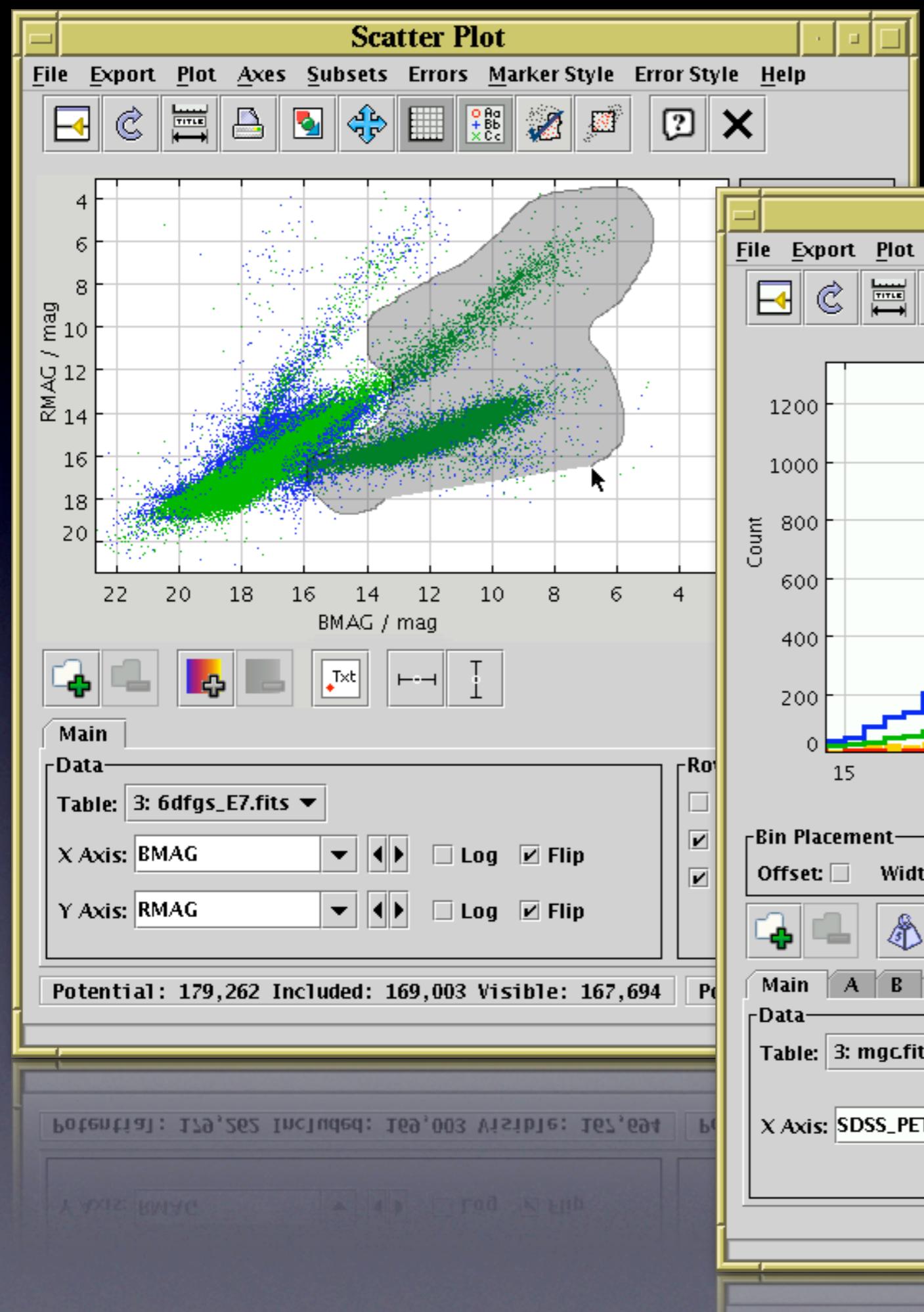


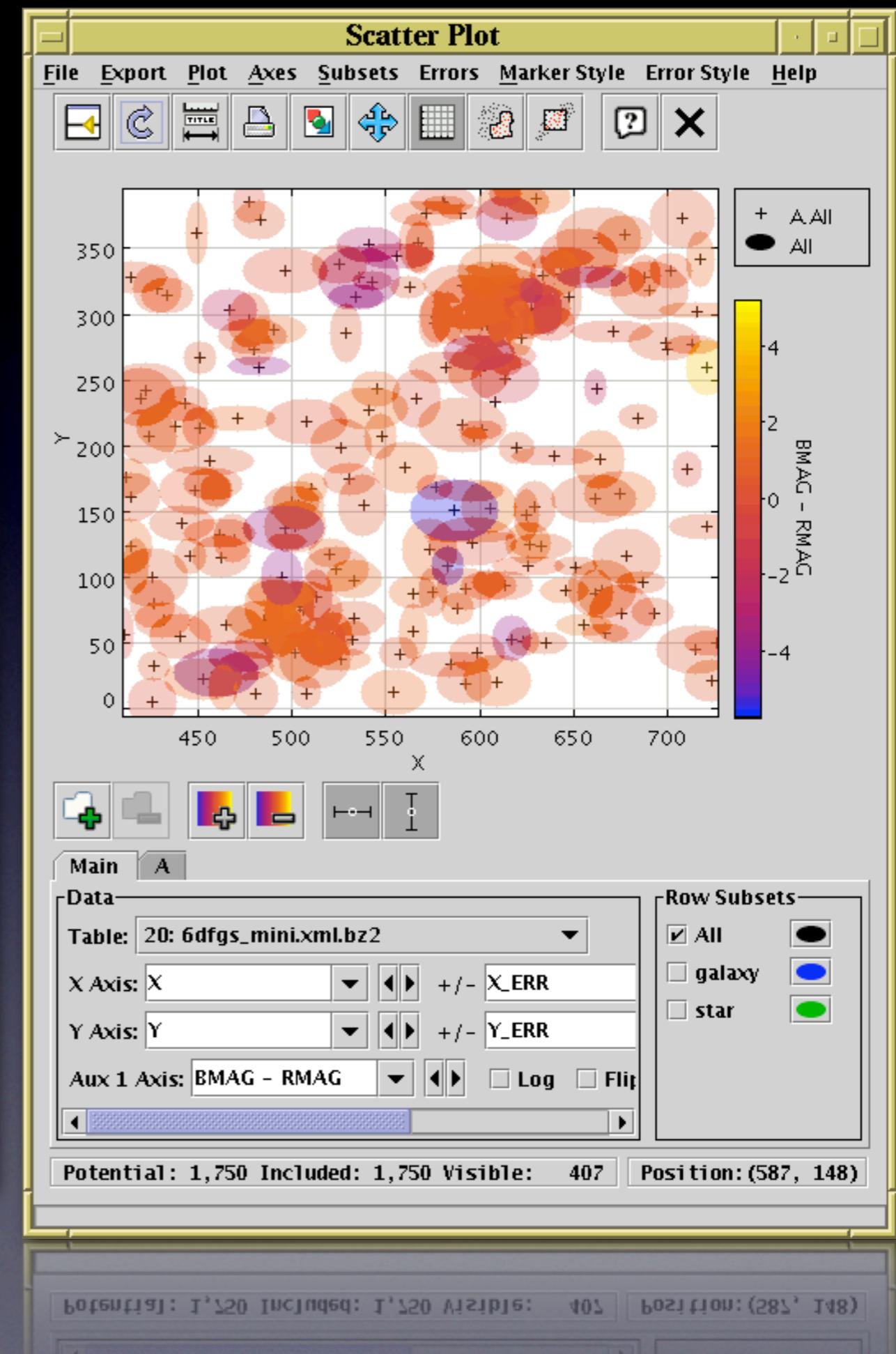
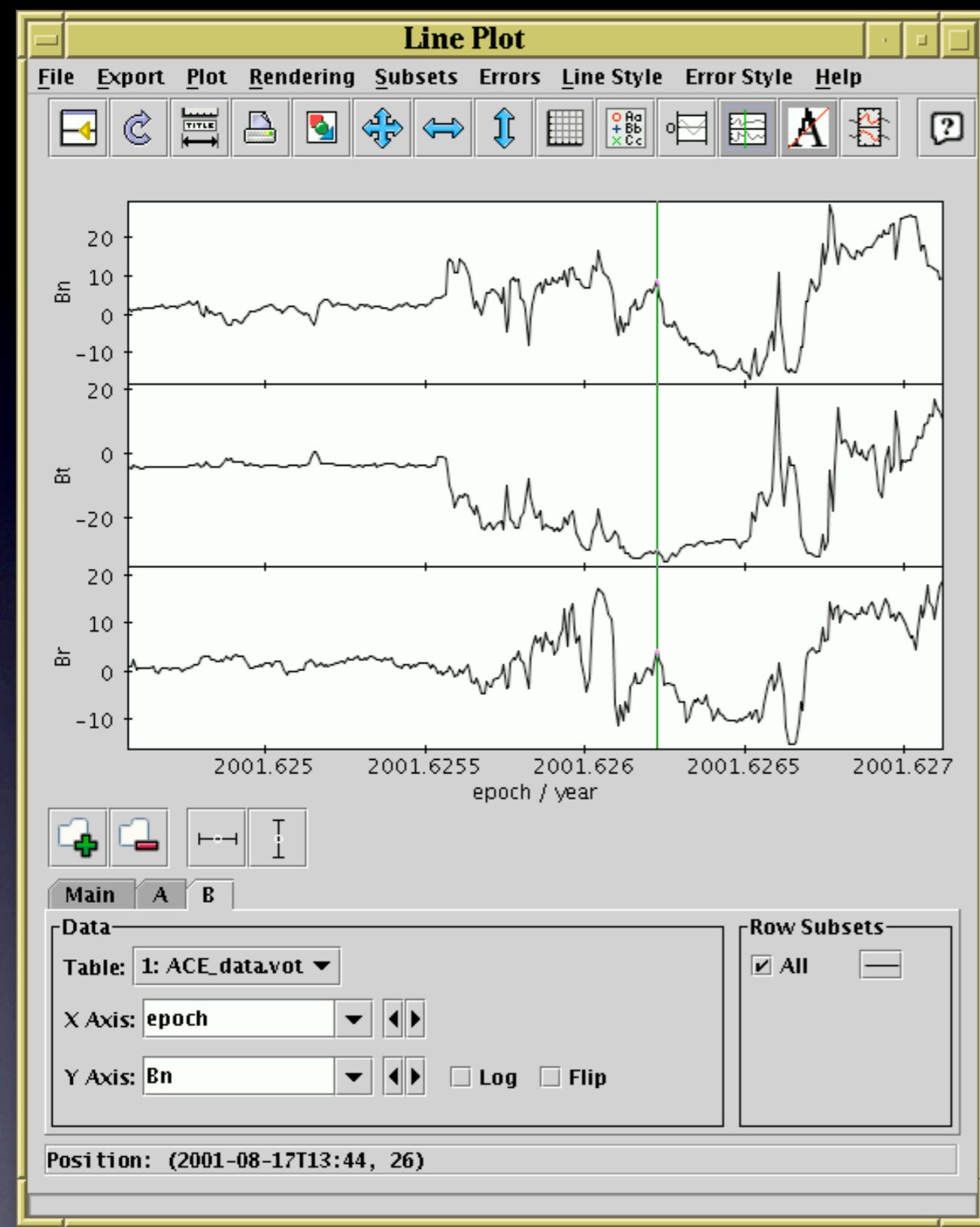
- Great for exploring your data, understanding correlations etc.
- Cross match tables based on position, exact values, cartesian match etc.
- Easily search the VO for additional data
- Talks to other VO apps

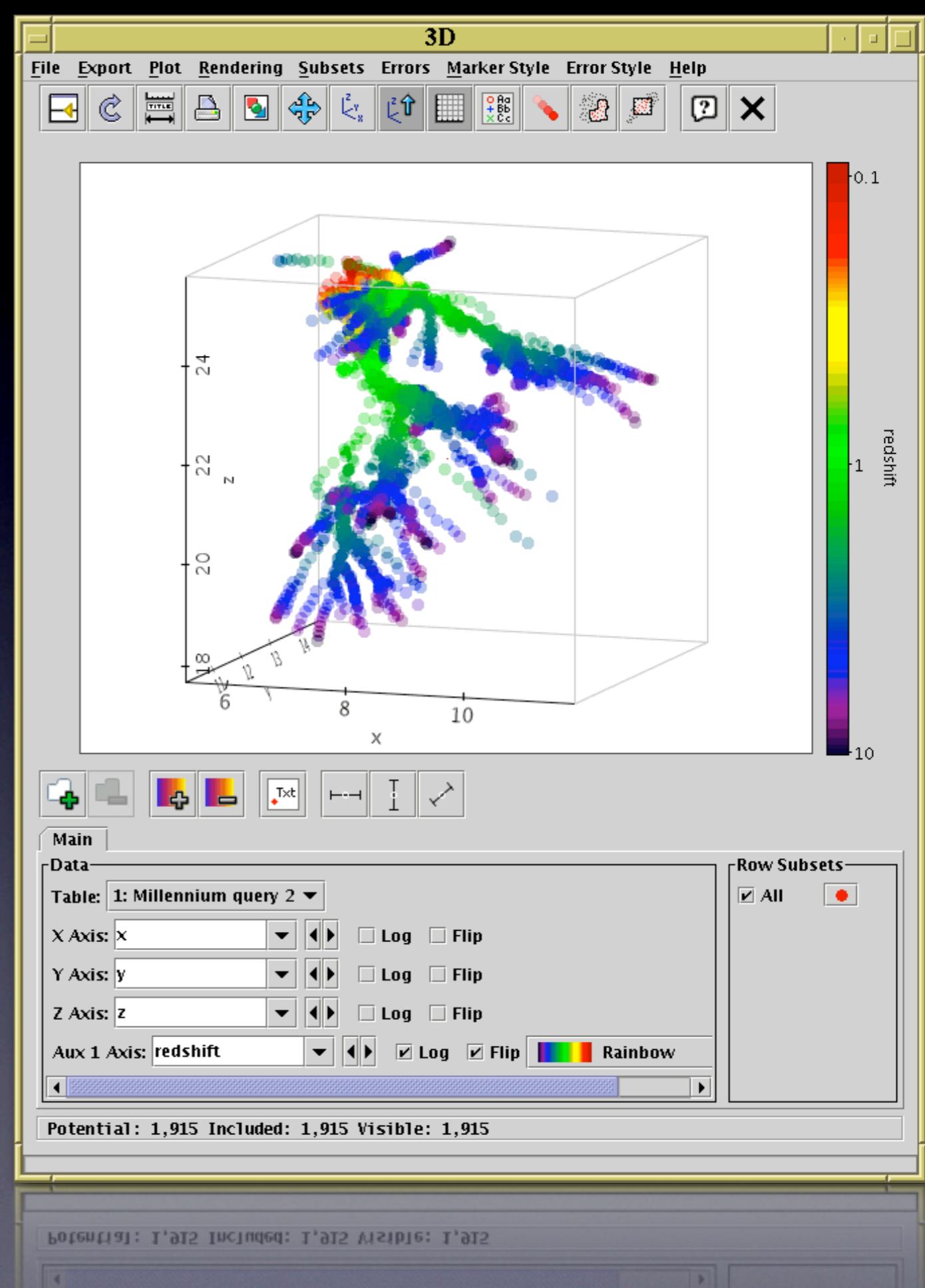
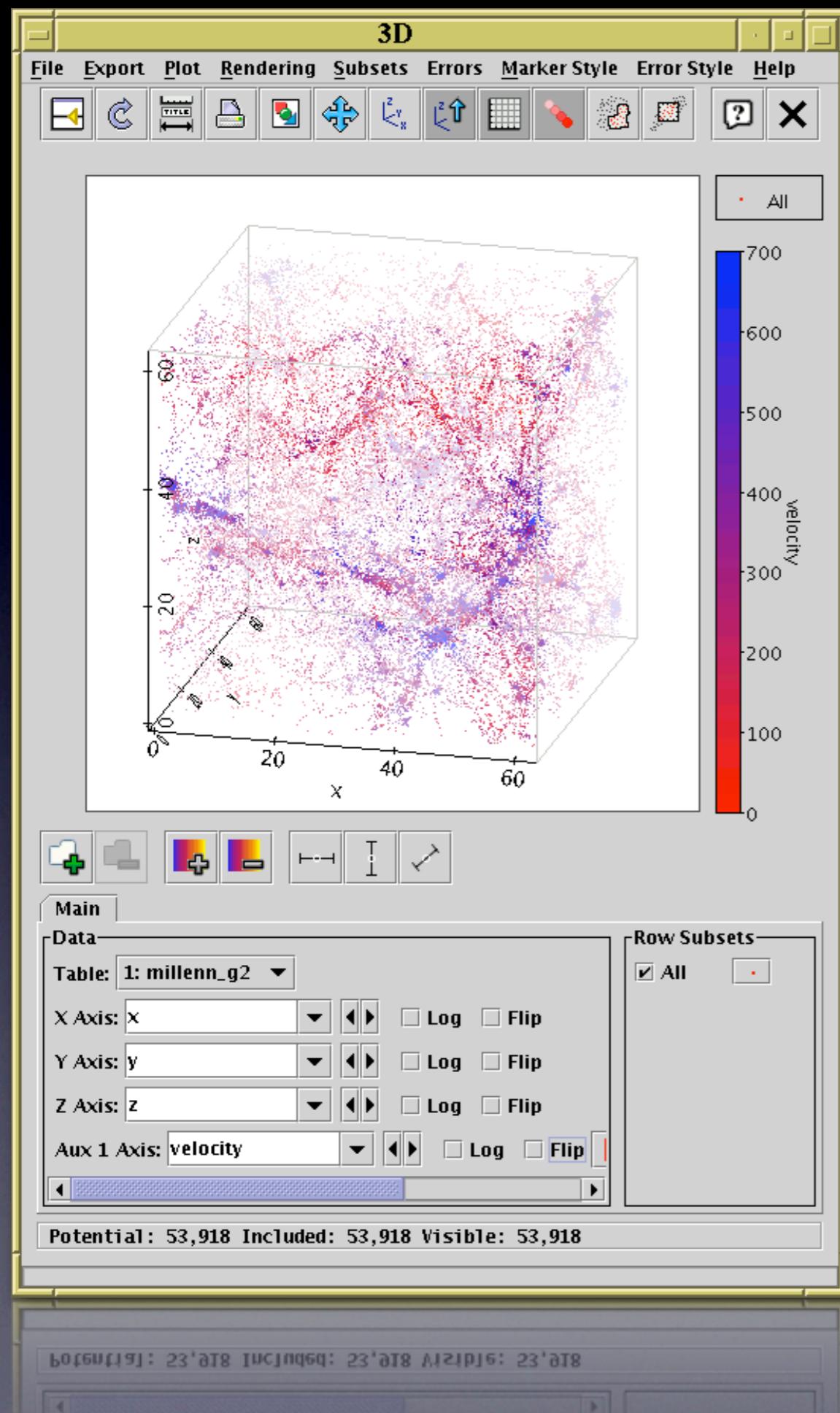
Plotting

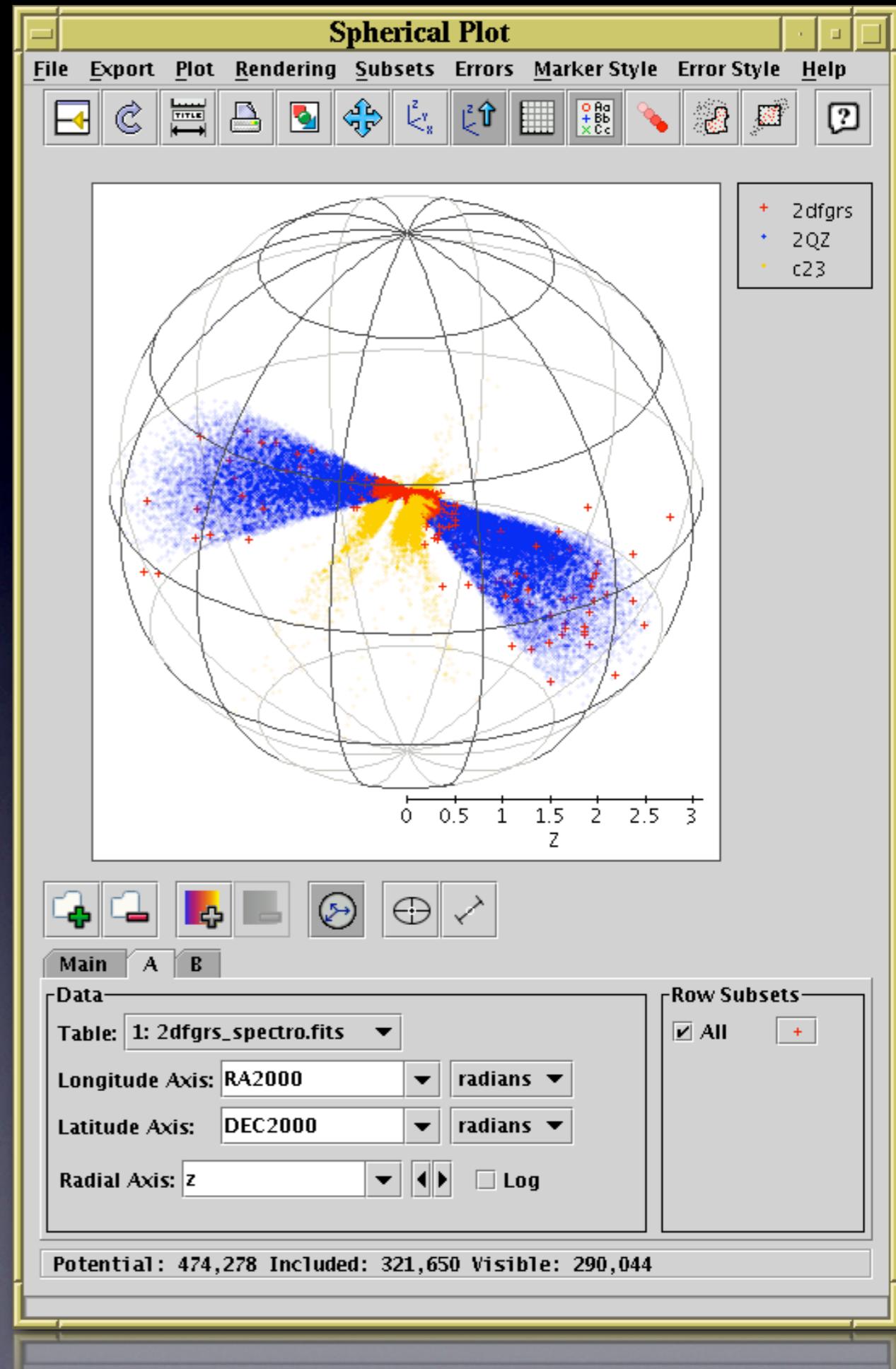
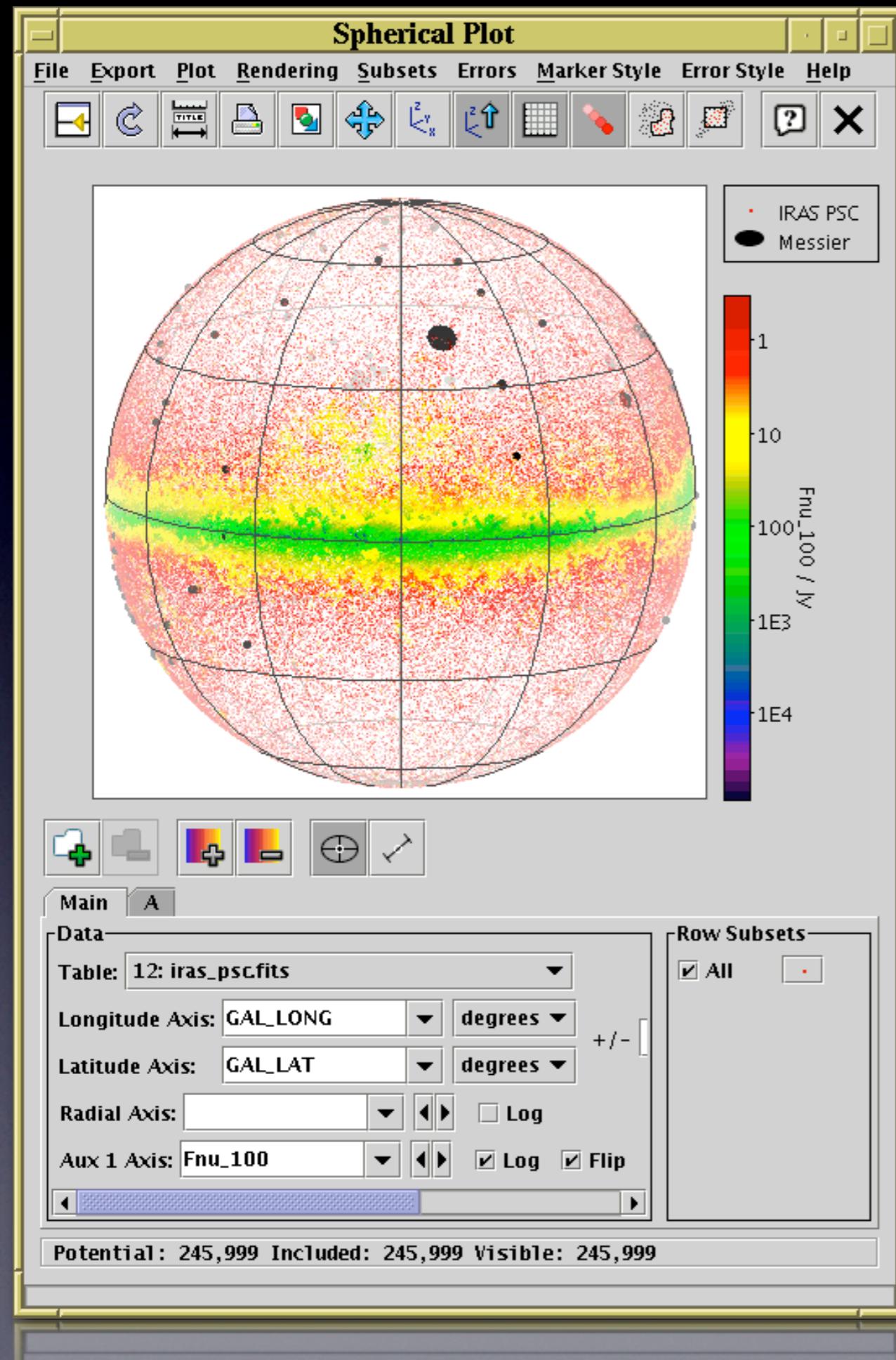
- Quickly create data-rich plots
- Visualise your data in multiple dimensions/parameter spaces
- Examine objects in multiple plots
- Transparency, auxiliary axes
- Export as .eps, image formats





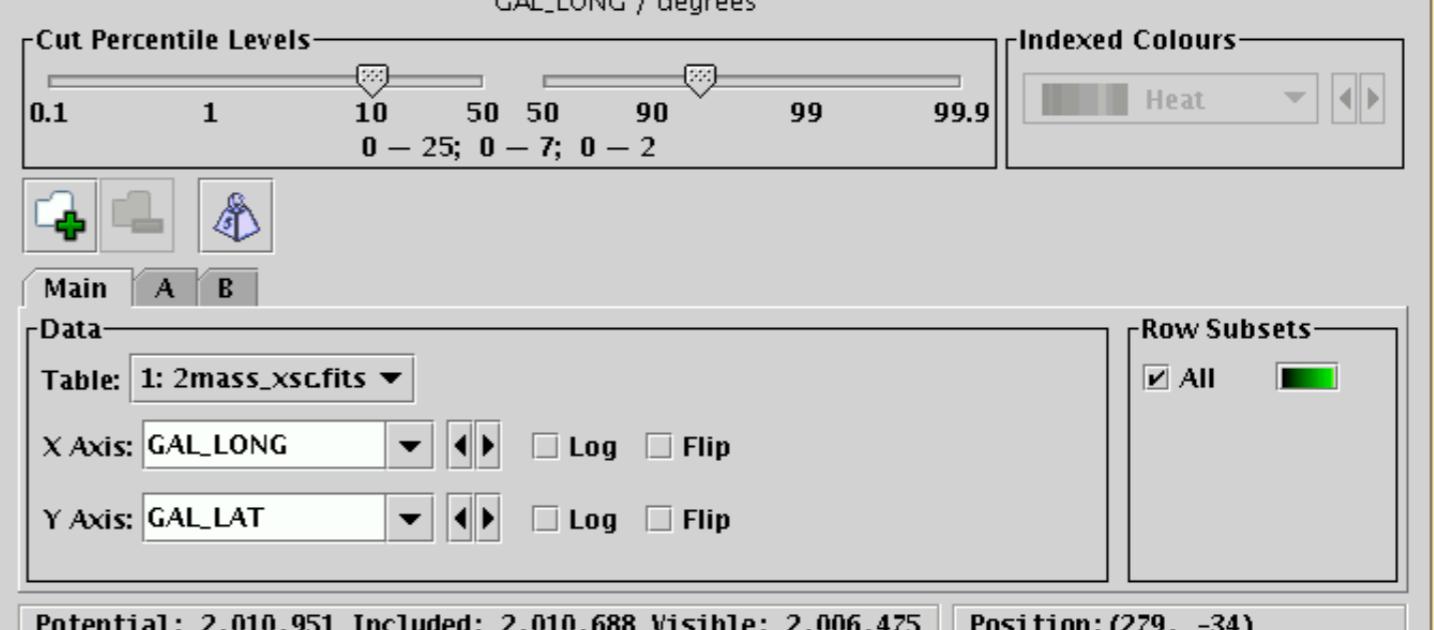
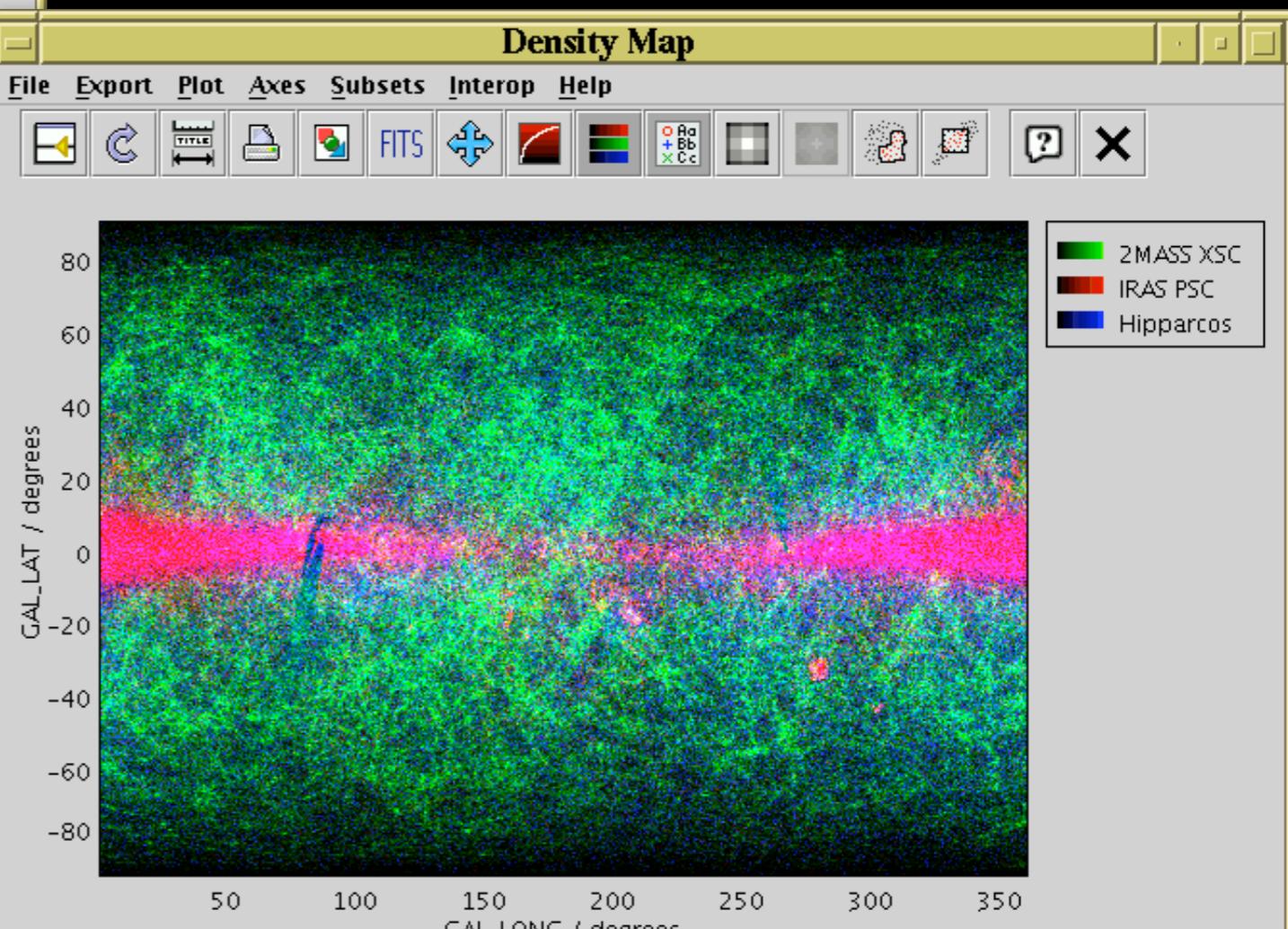
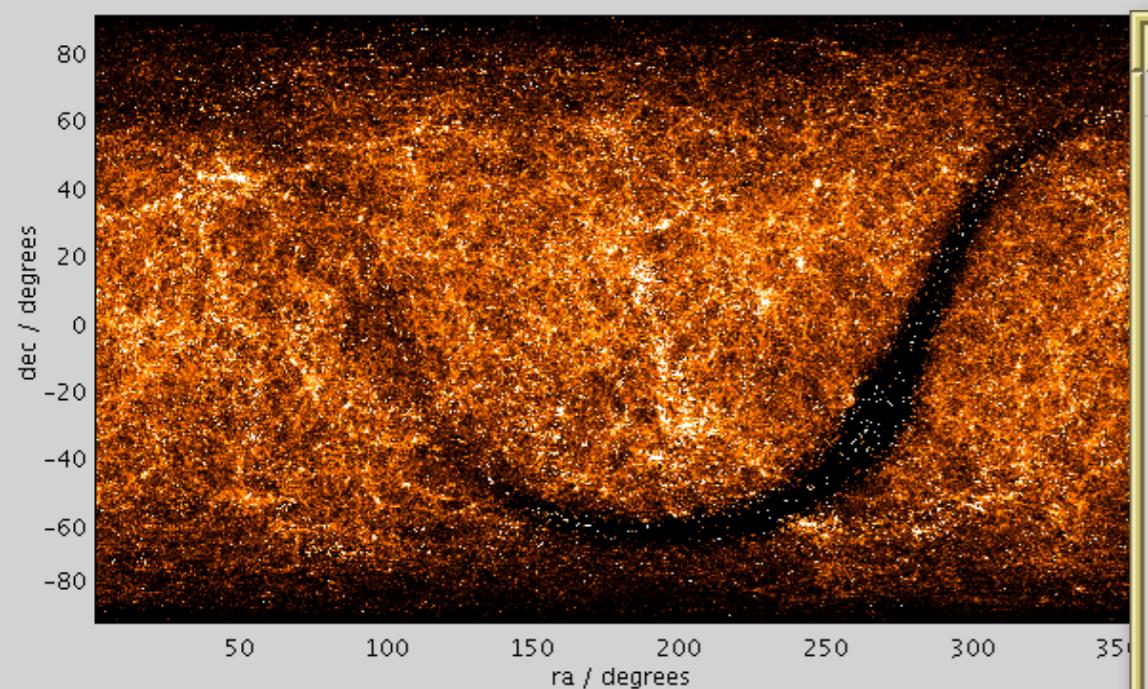






Density Map

File Export Plot Axes Subsets Interop Help



Other features

- Row subsets

TOPCAT(1): Row Subsets

File Subsets Display Interop Help

Row Subsets for 1: 6dfgs_E7.fits

ID	Name	Size	Fraction	Expression	Col \$ID
_1	All	179262	100%		
_2	galaxy	142369	79%		\$12
_3	star	26634	15%		\$13
_4	blue	10203	6%	BMAG - RMAG < -2.5	
_5	every_10	17926	10%	\$0 % 10 == 0	
_6	blue_gal	2501	1%	galaxy && blue	

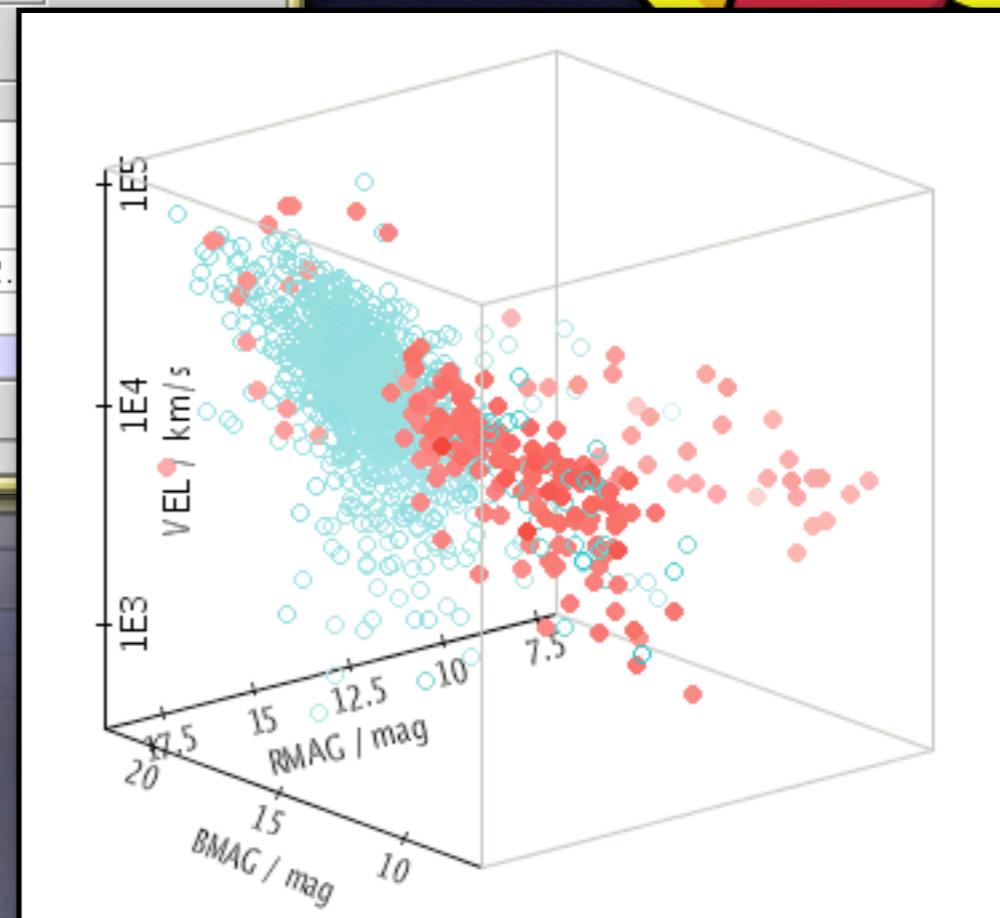
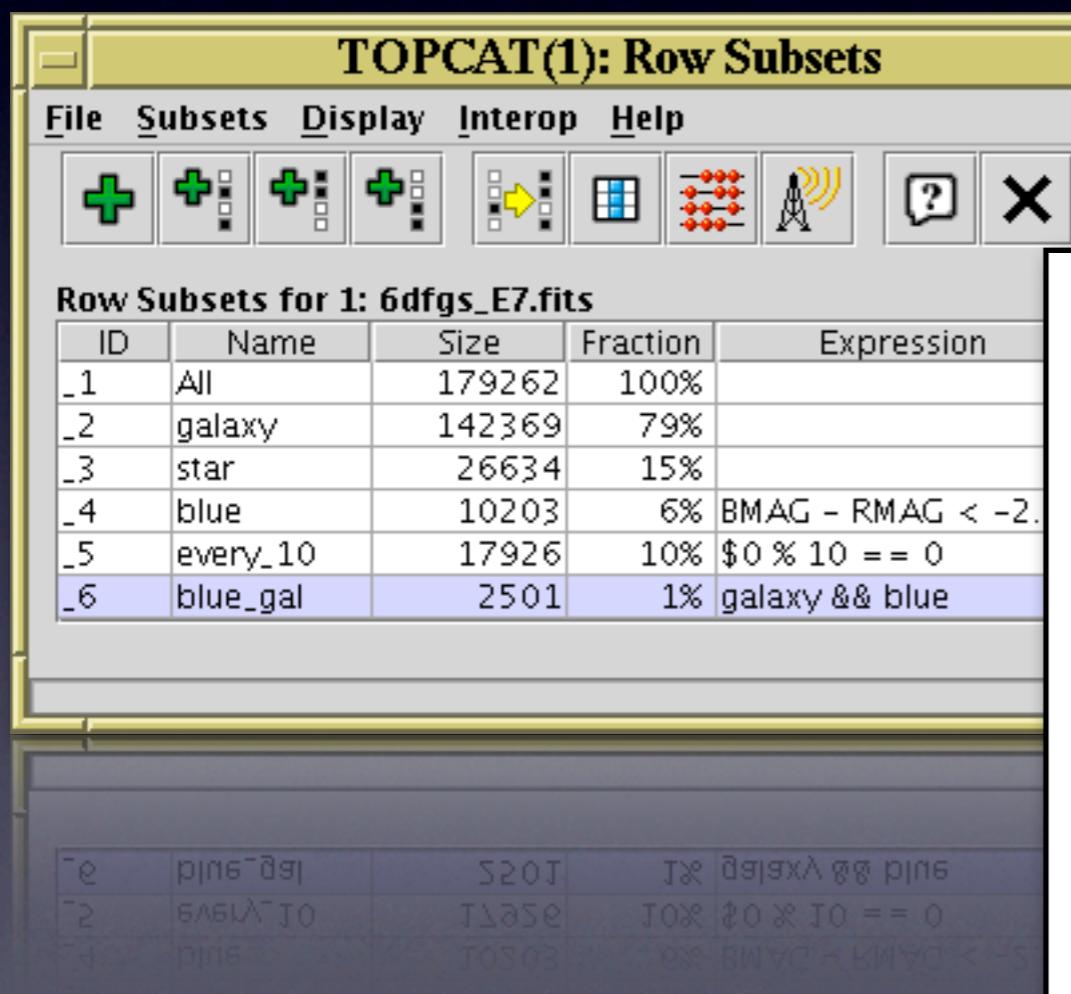
Subsets for 1: 6dfgs_E7.fits

ID	Name	Size	Fraction	Expression	Col \$ID
_1	All	179262	100%		
_2	galaxy	142369	79%		\$12
_3	star	26634	15%		\$13
_4	blue	10203	6%	BMAG - RMAG < -2.5	
_5	every_10	17926	10%	\$0 % 10 == 0	
_6	blue_gal	2501	1%	galaxy && blue	

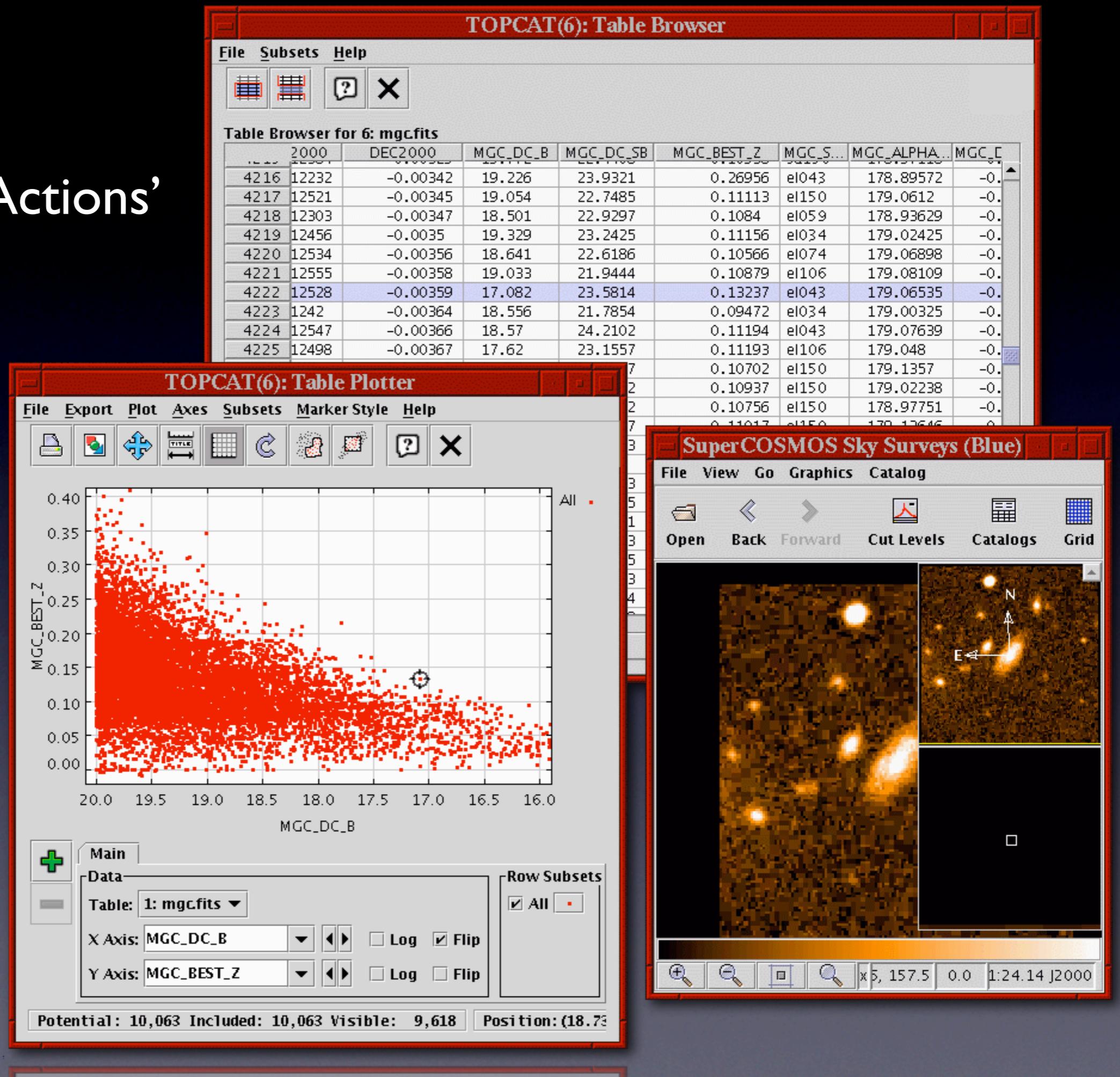


Other features

- Row subsets



'Activation Actions'



Cone Searches

Cone Search

Columns

Available Cone Search Services

Registry: <http://registry.astrogrid.org/astrogrid-registry/services/Registry>

Keywords: SDSS QSO

shortName	title	published
DR3QSO	DR3QSO: SDSS Quasar Catalog (Release 3) (LEDAS)	LEDAS, University
AGNSDSSXMM	SDSS/XMM-Newton AGN Spectral Properties Catalog	NASA/GSFC HEASARC
J/A+A/434/475	Redshifts for X-ray selected AGNs (Kitsionas+, 2005)	CDS
J/A+A/478/701	Color excess of SDSS quasars with DLA systems (Vladilo...)	CDS
J/AJ/121/2308	Sloan Digital Sky Survey quasar photometry (Richards+,...)	CDS
J/AJ/121/31	High-redshift quasars in SDSS (Fan+, 2001)	CDS
J/AJ/122/503	SDSS u*g*r*i*z* photometry and redshift of QSOs (And...)	CDS
J/AJ/123/567	SDSS quasar catalog (Schneider+, 2002)	CDS
J/AJ/125/1711	Broad Absorption Line Quasars from SDSS (Reichard+, ...)	CDS
J/AJ/126/2125	SDSS candidate type II quasars (Zakamska+ 2003)	CDS

AccessURL

Cone Search Parameters

Object Name:

RA: degrees
Dec: degrees
Radius: arcmin

SQL access

Open JDBC table

Protocol: Host: Database name:
SQL query:
User name: Password:

Metadata

- Metadata = Data about the data
- One of the many strands of the VO philosophy
- Semantics are essential in the era of ‘big-astronomy’
 - Which coordinates to use?
 - What type of magnitude?
 - Units?
 - Data types?



TOPCAT(1): Table Parameters

File **Parameters** **Display** **Help**



Table Parameters for 1: 6dfgs_mini.xml.bz2

Name	Value	Units	UCD	Description
Name	6dfgs_E7_subset			Table name
URL	jar:file:/data/andromeda1/starjava/java/li...			URL of original table
Column Count	17			Number of columns
Row Count	875			Number of rows
Description	6dFGS master config file (version E7 March...			
Original Source	http://www-wfau.roe.ac.uk/6dFGS/6dfgs_...			URL of data file used to
Credits	Column explanations provided by Mike Re...			
Conversion	Converted from 6dfgs_E7.fld.gz by Mark T...			
RESOLUTION	15	arcsec	stat.error;pos.eq.ra	Nominal positional error

Name: Description

Class: String

Shape:

Units:

Description:

UCD:

Value: 6dFGS master config file (version E7 March 2008) These data are taken from the 6dF Galaxy survey see astro-ph/0505068. Kindly provided by the 6dFGS team. These data are for EXAMPLE PURPOSES ONLY, intended for testing TOPCAT's properties. For science

TOPCAT(3): Table columns

File **Columns** **Display** **Help**



Table columns for 3: 2mass_xsc.fits

-	Visible	Name	\$ID	Class	Units	
3	<input checked="" type="checkbox"/>	designation	\$3	String		
4	<input checked="" type="checkbox"/>	ra	\$4	Double	degrees	J2000.0 Right Ascension based on ICRF2
5	<input checked="" type="checkbox"/>	dec	\$5	Double	degrees	J2000.0 Declination based on ICRF2
6	<input checked="" type="checkbox"/>	r_k20fe	\$6	Double	arcsec	20mag/sq." isophotal K fiducial radius
7	<input checked="" type="checkbox"/>	j_m_k20fe	\$7	Double	mag	J magnitude
8	<input type="checkbox"/>	j_msig_k20fe	\$8	Double	mag	J 1-sigma uncertainty
9	<input type="checkbox"/>	j_flg_k20fe	\$9	Integer		J confusion flag (0=no other objects)
10	<input checked="" type="checkbox"/>	h_m_k20fe	\$10	Double	mag	H magnitude
11	<input type="checkbox"/>	h_msig_k20fe	\$11	Double	mag	H 1-sigma uncertainty
12	<input type="checkbox"/>	h_flg_k20fe	\$12	Integer		H confusion flag (0=no other objects)
13	<input checked="" type="checkbox"/>	k_m_k20fe	\$13	Double	mag	K magnitude

Tutorial

- TOPCAT excels at letting you quickly explore your data
- As a example let us take a look at the distribution of young T Tauri stars in Chamaeleon

<http://www.mso.anu.edu.au/~murphysj/topcat/>



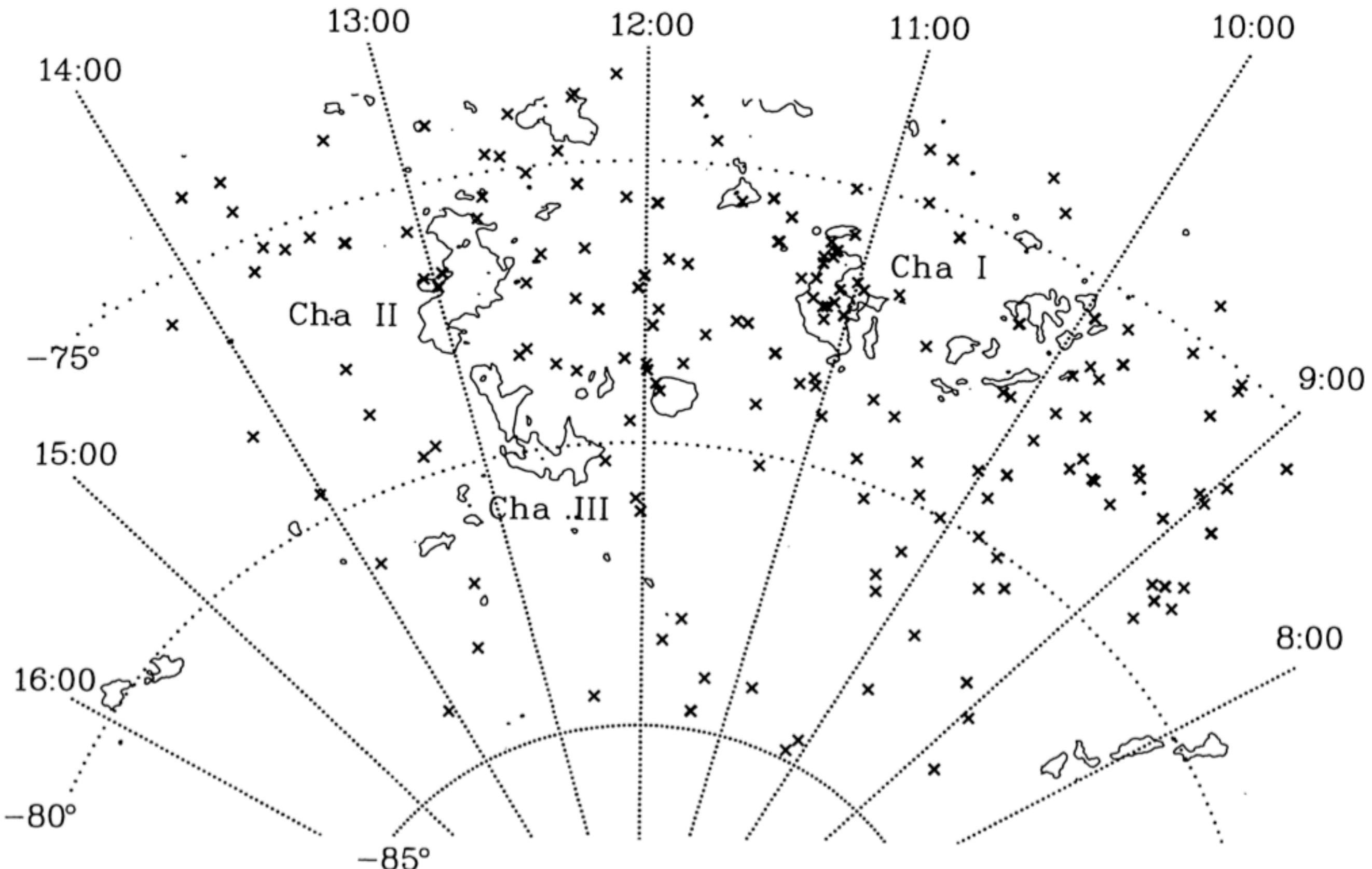


Fig. 1. Spatial distribution of ROSAT all-sky survey X-ray sources in the Chamaeleon cloud complex. The $100 \mu\text{m}$ IRAS contour maps are overplotted. The three main dark clouds are also indicated

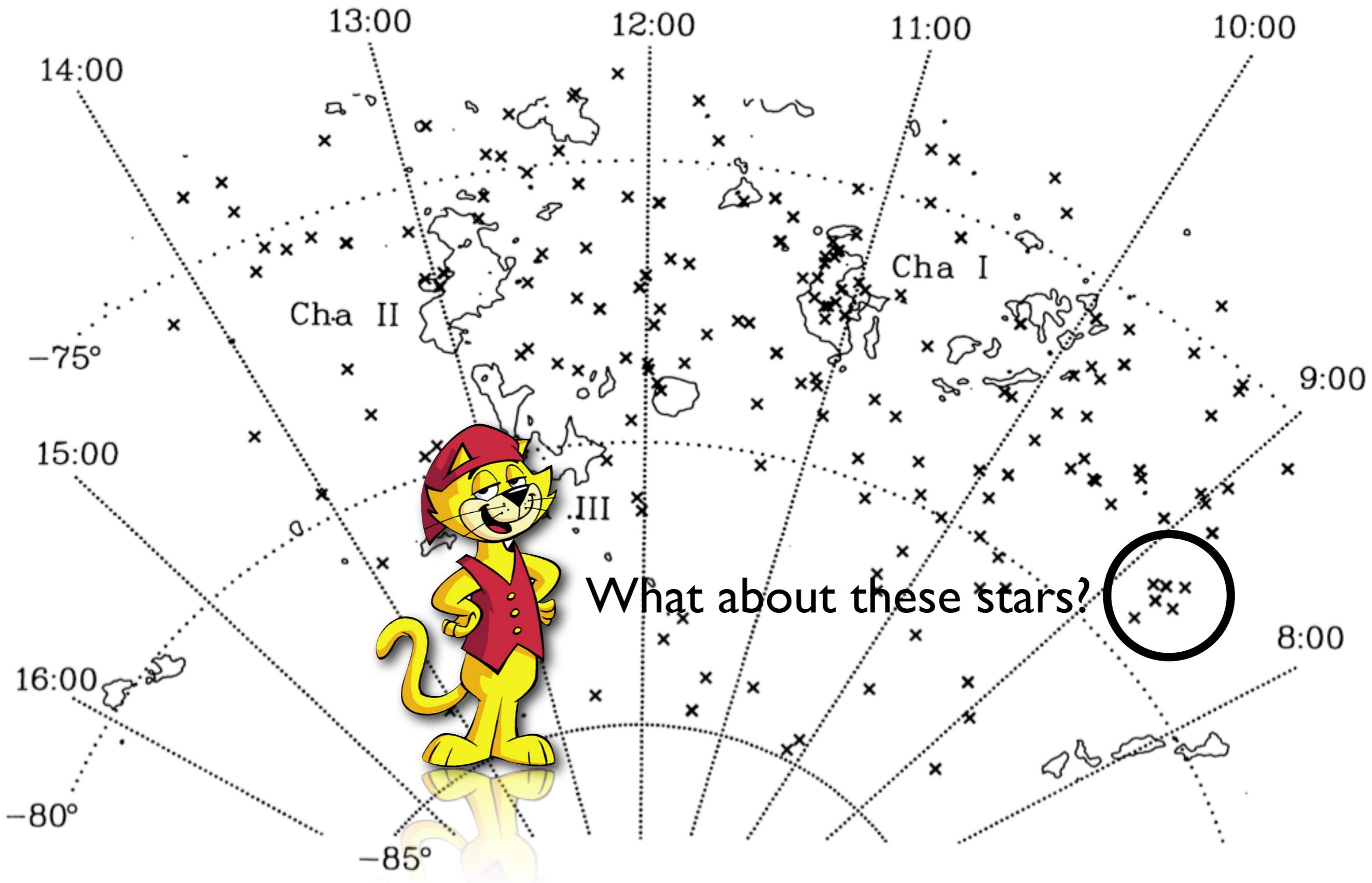


Fig. 1. Spatial distribution of ROSAT all-sky survey X-ray sources in the Chamaeleon cloud complex. The 100 μ IRAS contour maps are overplotted. The three main dark clouds are also indicated