STILTS Graphics

Mark Taylor, Bristol University, UK

http://www.starlink.ac.uk/stilts/

STILTS is ...

STILTS is a powerful and mature package for all kinds of table manipulation, including crossmatching, row selections, data and metadata processing, format conversion and other things. Features include:

- Multi-format (FITS, VOTable, CSV, SQL, . . .)
- Efficient
- Scalable
- Fully documented
- Easy to install (Java)
- Open source

It is the command-line counterpart to the GUI table analysis application TOPCAT.

New Graphics Capabilities

As of Version 2 (October 2008), STILTS provides plotting commands as well. Currently available are:

- plot2d: 2-dimensional scatter plot
- plot3d: 3-dimensional scatter plot
- plothist: histogram

Plotting features shared with TOPCAT:

- Highly configurable styles
- Overplotting of multiple data sets
- Symmetric or asymmetric N-dimensional error bars/ellipses/cuboids/. . .
- Higher-dimensional visualisation using colours
- Variable transparency of markers
- Text labelling of points
- Choice of output formats (EPS, PNG, GIF, JPEG or to screen)

Plotting features only in STILTS:

- Unlimited data set size
- Better configurability of fonts, colours, axes, . . .

Coming Soon ...

In future releases the graphics capabilities will be extended:

- Spherical plots
- Stacked line plots
- Density plots
- More configurability options
- Improved programmatic callability from Java
- TOPCAT plot windows to output equivalent STILTS command text
- . . . your request here?

More Information

For downloads, documentation, examples etc, visit the website of STILTS or its companion packages TOPCAT (GUI table processing) or STIL (table I/O library underlying both). Alternatively, talk to me in person or by email: m.b.taylor@bristol.ac.uk
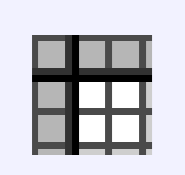
STILTS: STIL Tool Set
http://www.starlink.ac.uk/stilts/

TOPCAT: Tool for OPerations on Catalogues And Tables
http://www.starlink.ac.uk/topcat/

STIL: Starlink Tables Infrastructure Library
http://www.starlink.ac.uk/stil/

Use Cases

STILTS plotting commands are suitable anywhere that non-interactive plot generation is required.

Client-side

Running STILTS commands directly from the command line or from a script might be useful for:

- Repeatable plotting
- Generating similar plots for multiple datasets
- Producing figures for publication

The package could also be used as an embeddable high-level plotting library, allowing third-party applications (most conveniently Java ones) to produce plots from internal or external tabular data.

Server-side

By co-locating STILTS with server-held data or computation, plots can be generated on the fly and served to HTTP clients as an alternative to, or as well as, raw table data.

A new server or servlet mode of operation allows STILTS to serve graphics (or tables) directly to clients, driven by HTML forms or query URLs.

The example below shows a trial deployment at INAF giving previews of simulation data served from the Italian Theoretical Virtual Observatory database (thanks to Marco Molinari, INAF).
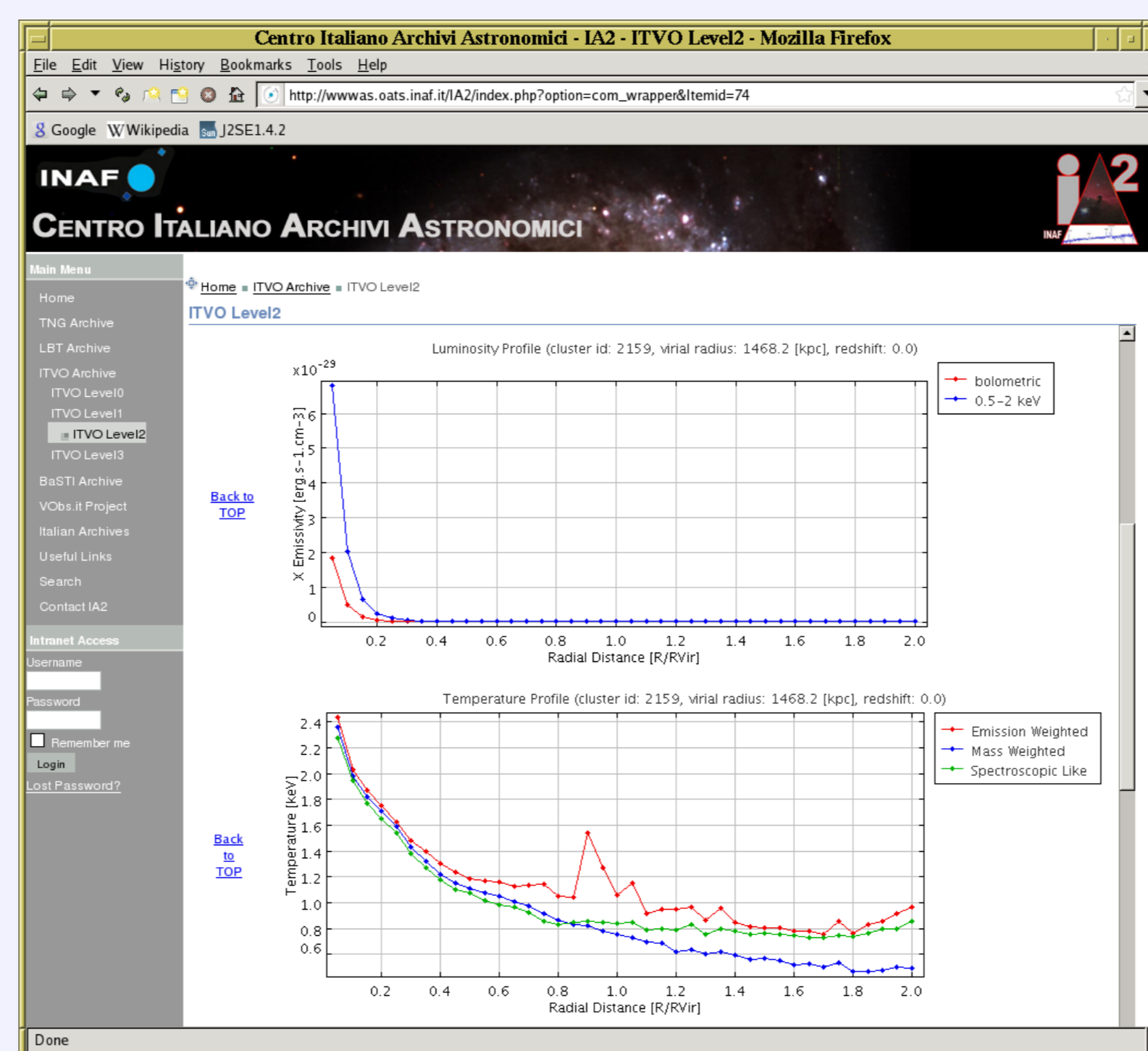
Thomas Boch (CDS) has also installed an experimental Simbad plotting service at http://cdsweb.u-strasbg.fr/~boch/simbad-plotter/.

I can advise if you would like to do something similar on your data servers.

Comparison With Other Packages

TOPCAT

STILTS can generate exactly the same plots as TOPCAT, but using an imperative rather than interactive interface. The two packages can be used in a complementary fashion working from the same or similar data, using TOPCAT to experiment rapidly with the kind of plot which is required, and STILTS for fine tuning, reproducible output or programmatic invocation.

Other Plotting Packages

STILTS graphics does a similar job to a number of other packages which provide programmatic plotting such as Gnuplot, IDL, PONGO, ... If those packages do what you want, fine! Reasons to use STILTS instead include:

- Direct use of STILTS-friendly formats (VOTable, FITS, SQL)
- Very large datasets
- Complementary use with TOPCAT
- Ease of installation, deployment and licensing
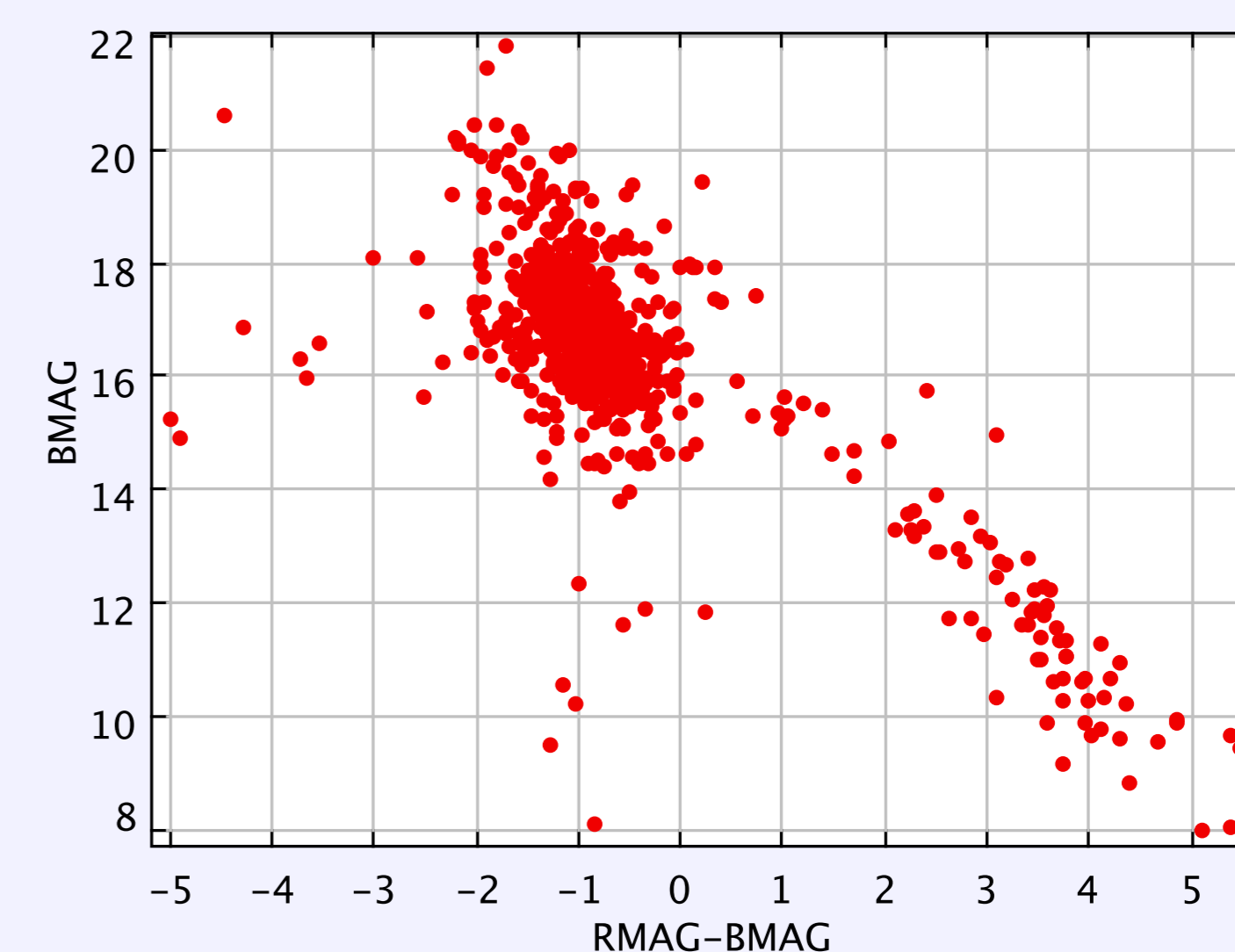

```
stilts plot2d
    in=cat.xml xdata=RMAG-BMAG ydata=BMAG
    out=color-mag.eps
```
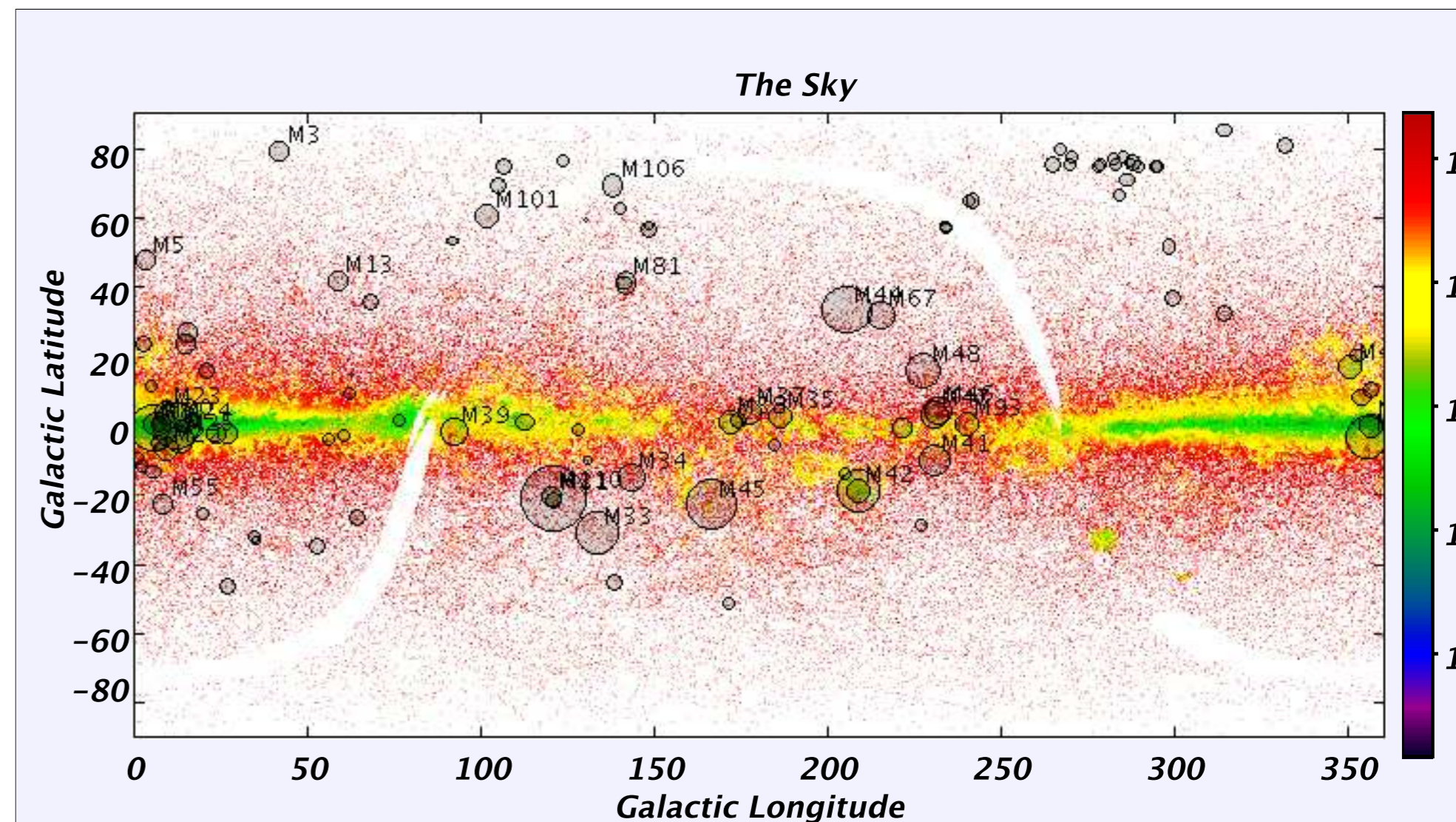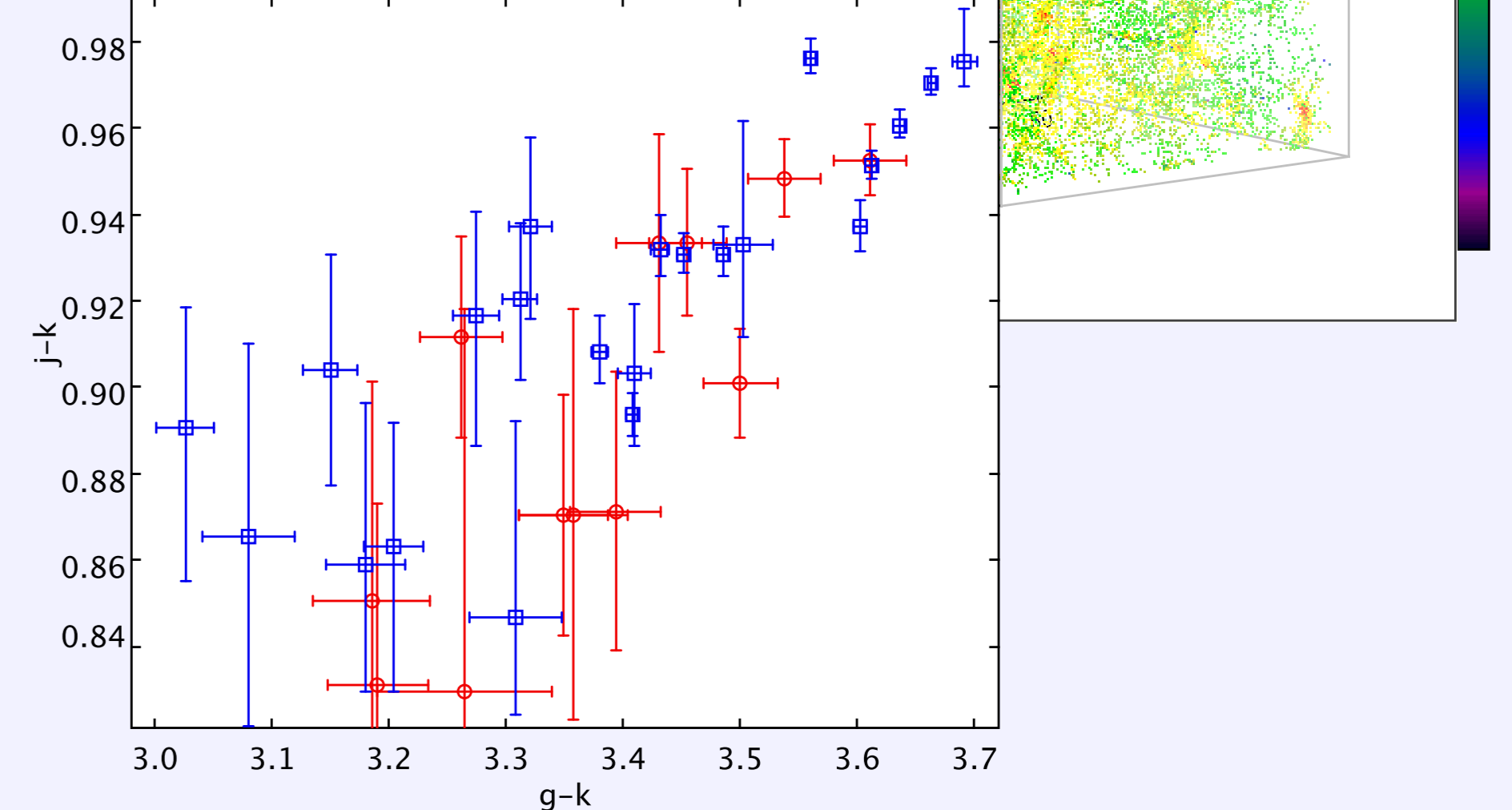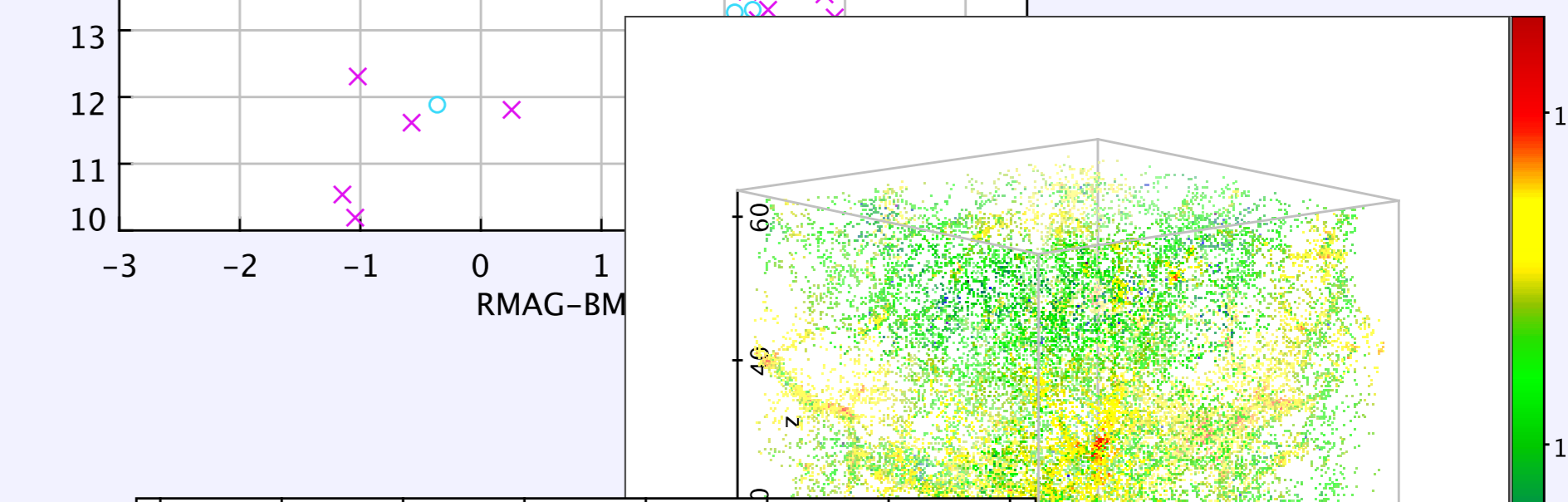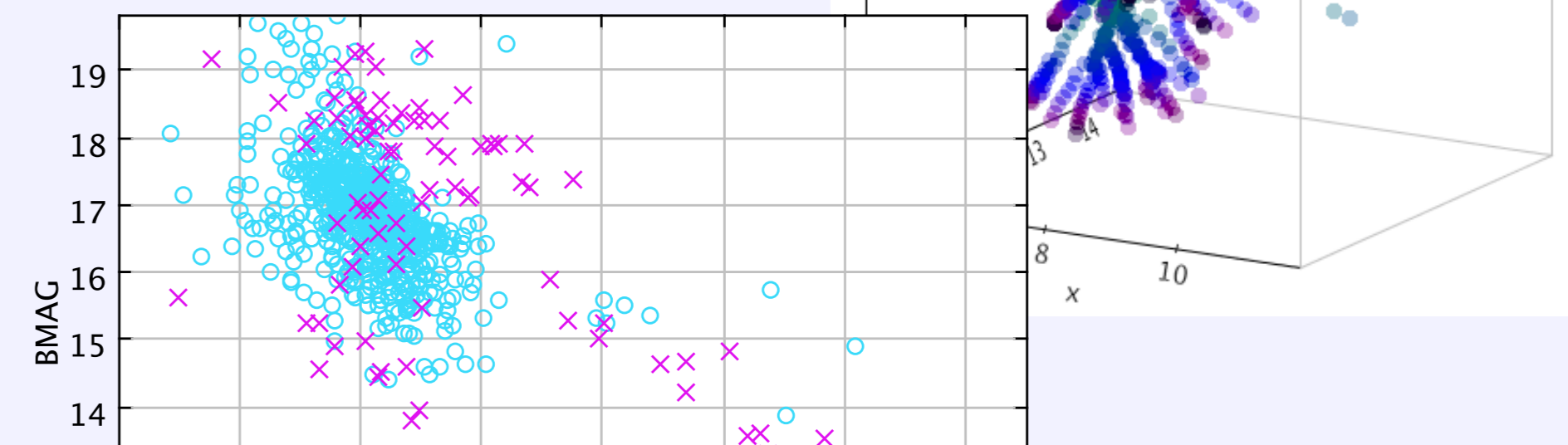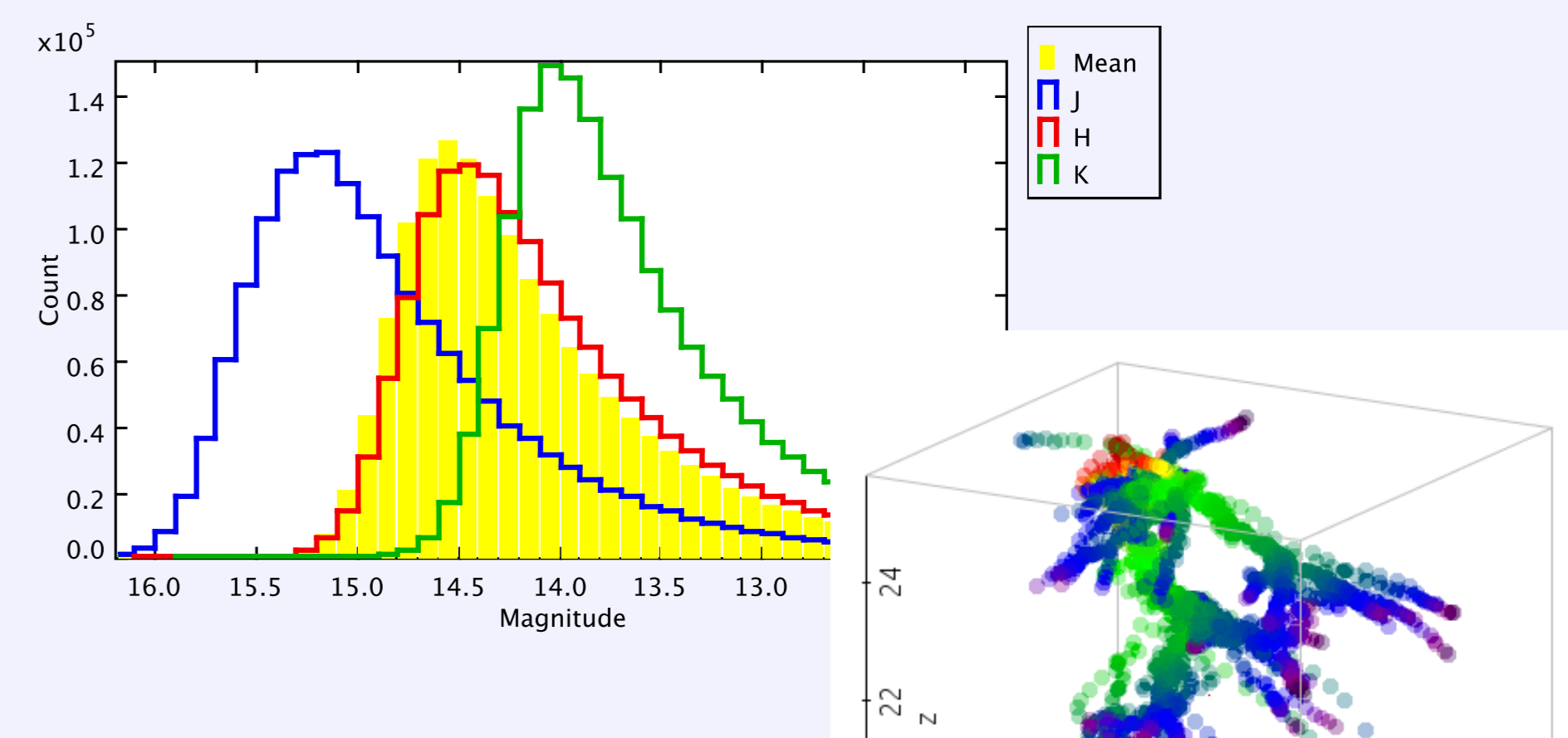


```
stilts plot2d
    in1=iras.psc.fits cmd1='addskycoords fk5 galactic RA DEC GLON GLAT' xdata1=GLON ydata1=GLAT
    auxdata1=FNU_100 auxlog=true auxflip=true size1=0 transparency1=3
    in2=messier.xml cmd2='addskycoords fk5 galactic RA DEC GLON GLAT' xdata2=GLON ydata2=GLAT
    txtlabel2=RADIUS>16?("M"+ID):"") cmd2='addcol SIZE sqrt(RADIUS/2)' xerror2=SIZE yerror2=SIZE
    subset2a=true hide2a=true colour2a=black errstyle2a=ellipse
    subset2b=true hide2b=true colour2b=black errstyle2b=filled_ellipse transparency2b=6
    xlabel='Galactic Longitude' ylabel='Galactic Latitude' title='The Sky' legend=false grid=false
    xlo=0 xhi=360 ylo=-90 yhi=+90 xpix=800 ypix=400 fontsize=16 fontstyle=bold-italic
    out=skyplot.eps
```