



IBIS Survey Status

A J Bird, on behalf of IBIS Survey Team

Internal INTEGRAL workshop

ESTEC

18-21 Jan 2005

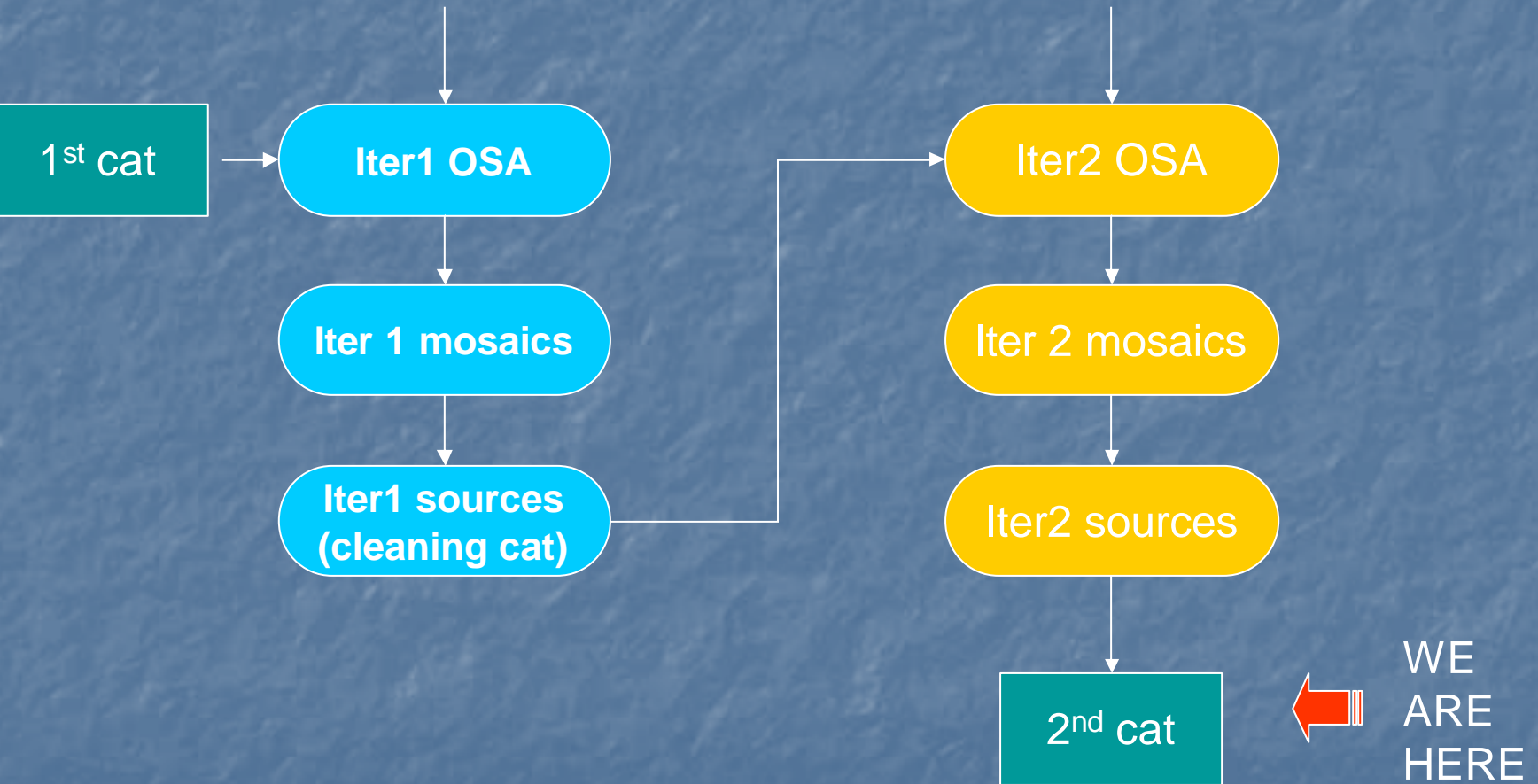
Survey activities

- Analysis and follow-up of sources in first IBIS/ISGRI catalog
 - 123 sources
 - 28 'unidentified' sources
 - Preparation of second catalog
 - technical improvements
 - source list preparation
-

1st catalog unidentified sources

- Of the 28 unidentified sources in 1st catalog:
 - 5 have been observed with XMM
 - another 2 have scheduled XMM observations
 - 12 more have been proposed for XMM
 - At least 3 optical follow-ups have been carried out, more proposed
- Sources allocated within survey team for further study – nearing completion

The search for sources



New data – new challenges...

- Since the last survey images, covering rev 46 – 120, there has been a lot happening to increase the dataset:
 - CP data up to rev 210
 - Public data up to rev 96
- This leads to new technical problems
 - Really need all-sky maps now
 - A lot of guest observer data is in staring mode or taken in 'bad weather'

Technical improvements

since first catalog

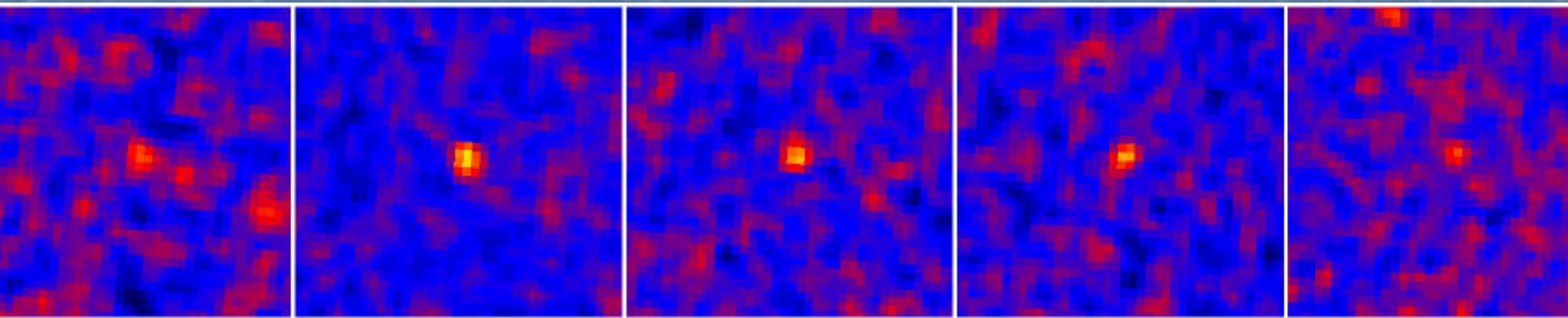
- Change to 'latest' versions of OSA
- New cleaning catalog
- Better filtering at scw level (using image rms)
- Use of polar maps for all-sky work
- Removal of staring data
- Searching on multiple time-scales

Searching on different timescales

- We now need to search at:
 - scw level
 - for fast transients visible in just a few scw
 - revolution level
 - for weaker, more persistent sources
 - revolution group level
 - groups of fairly constant pointings (eg GCDEs)
 - 2-year mosaic level
 - for the truly persistent sources

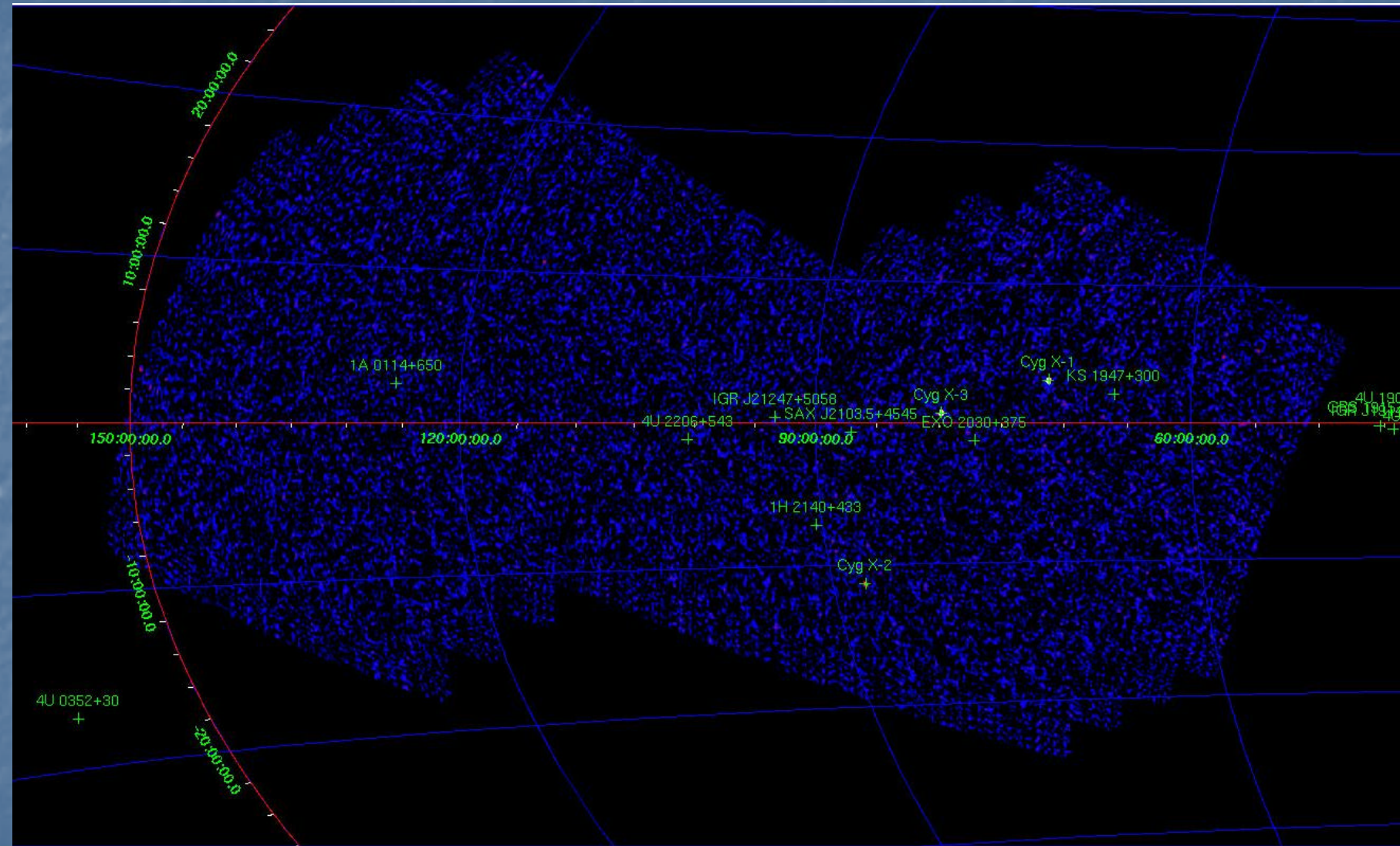
Transient searching

- Search every science window for excesses above 6 sigma, and generate list of:
 - positions
 - number of appearances
 - possible catalog IDs



- Most entries come from:
 - Bright sources
 - Image artefacts (bright source in corner of FOV)
 - Incorrectly removed ghosts
- Each possible 'transient' needs to be checked by hand.

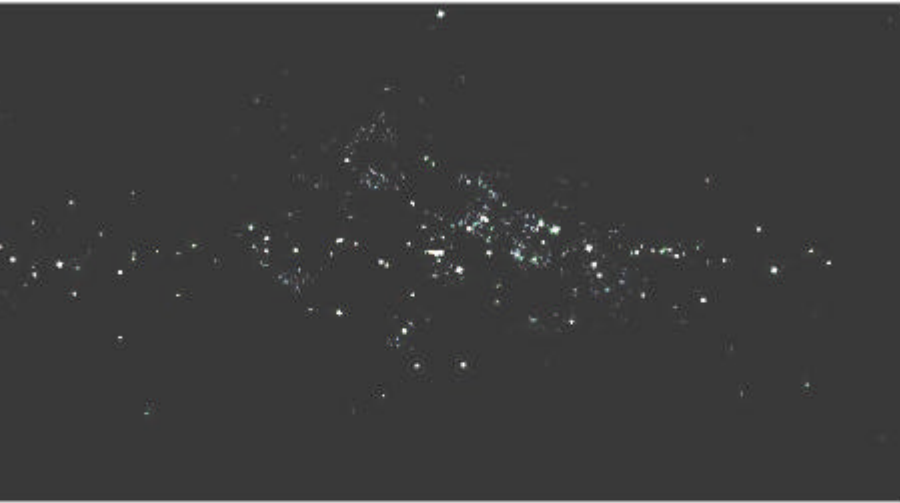
Revolution by revolution



Occasionally find sources not seen either at scw or mosaic level this way...

Revolution group mosaics

GCDE – Mar 2003

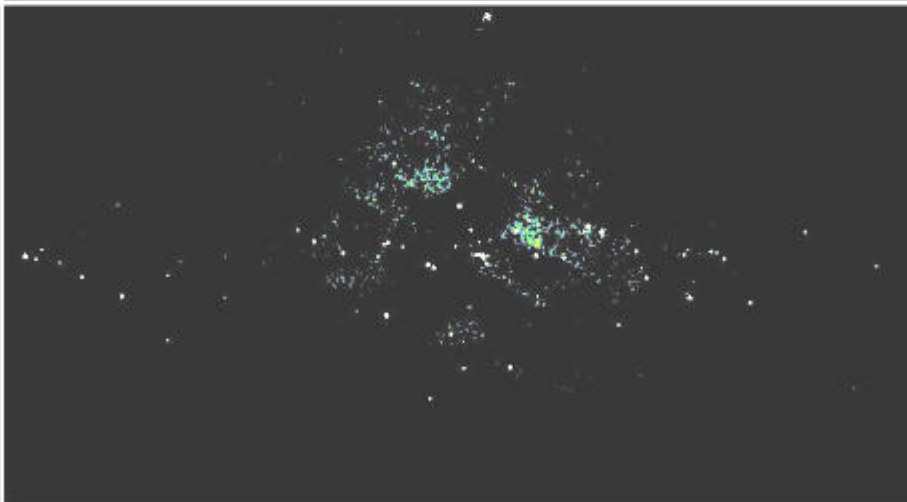


GCDE – Aug 2003

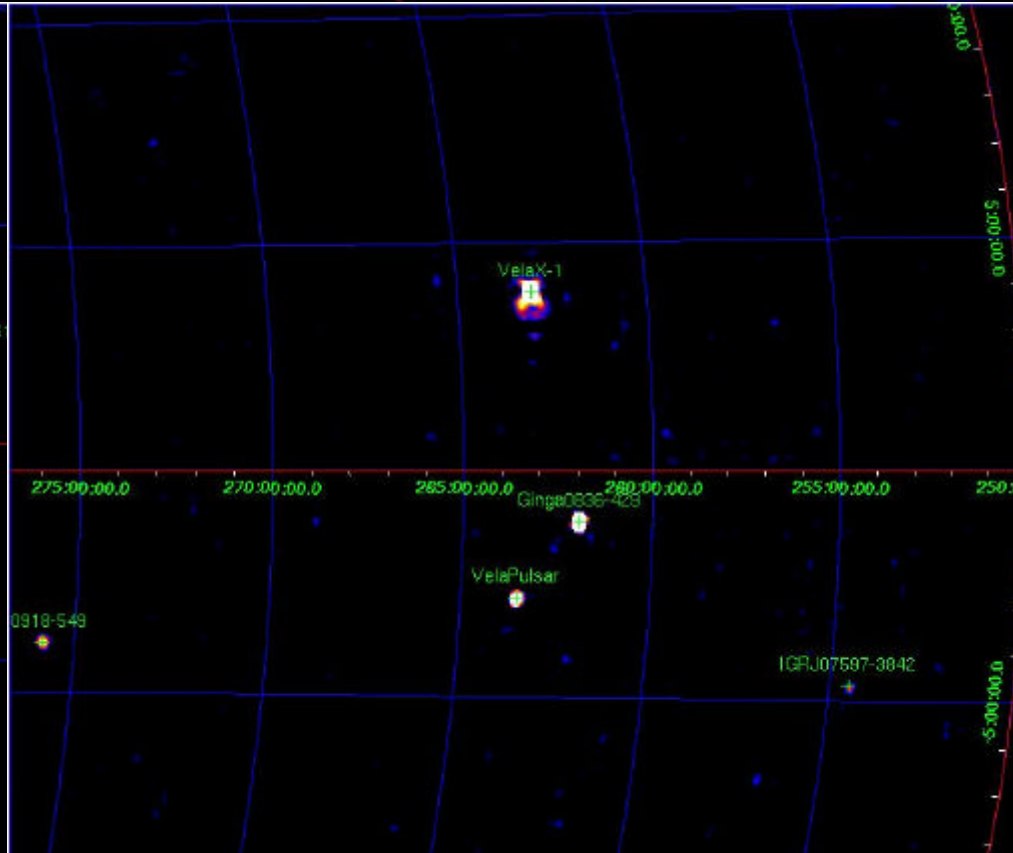
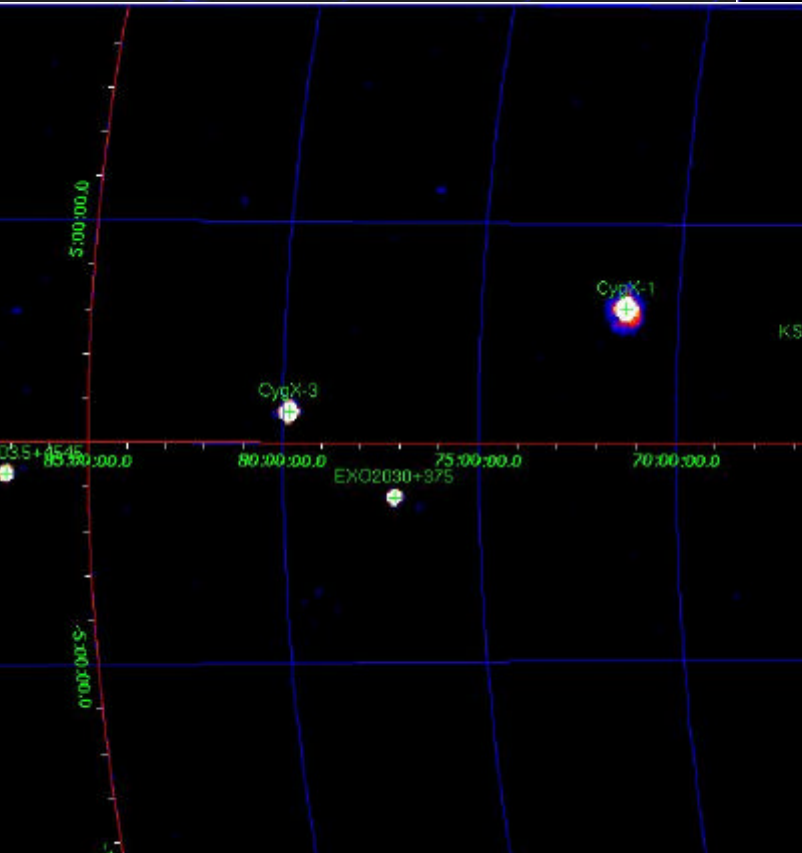
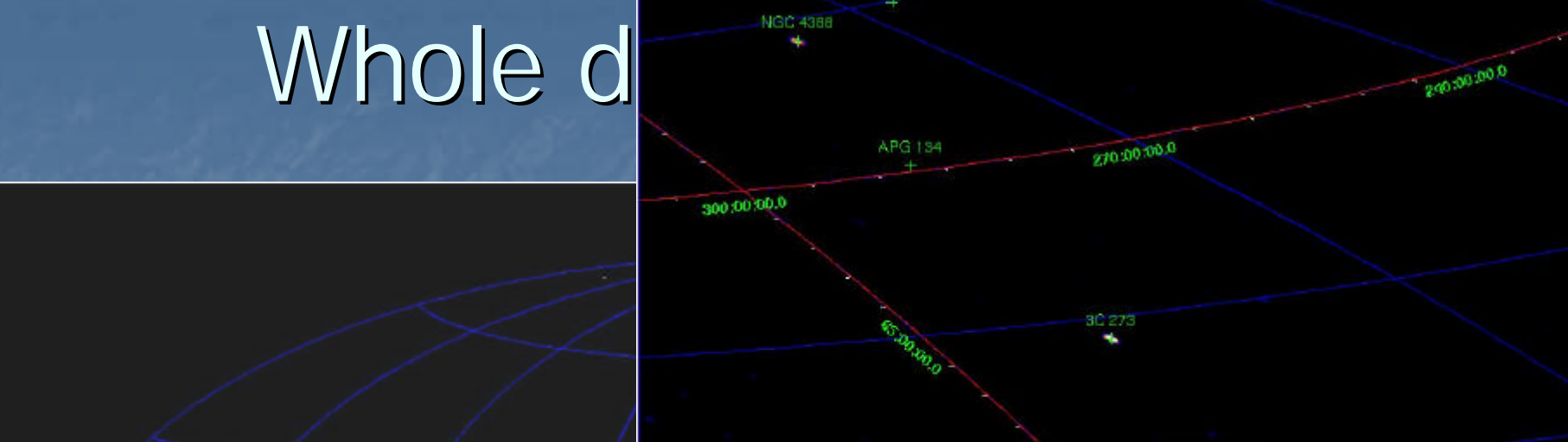


GCDE – Sep/Oct 2003

GCDE – Mar 2004



Whole d



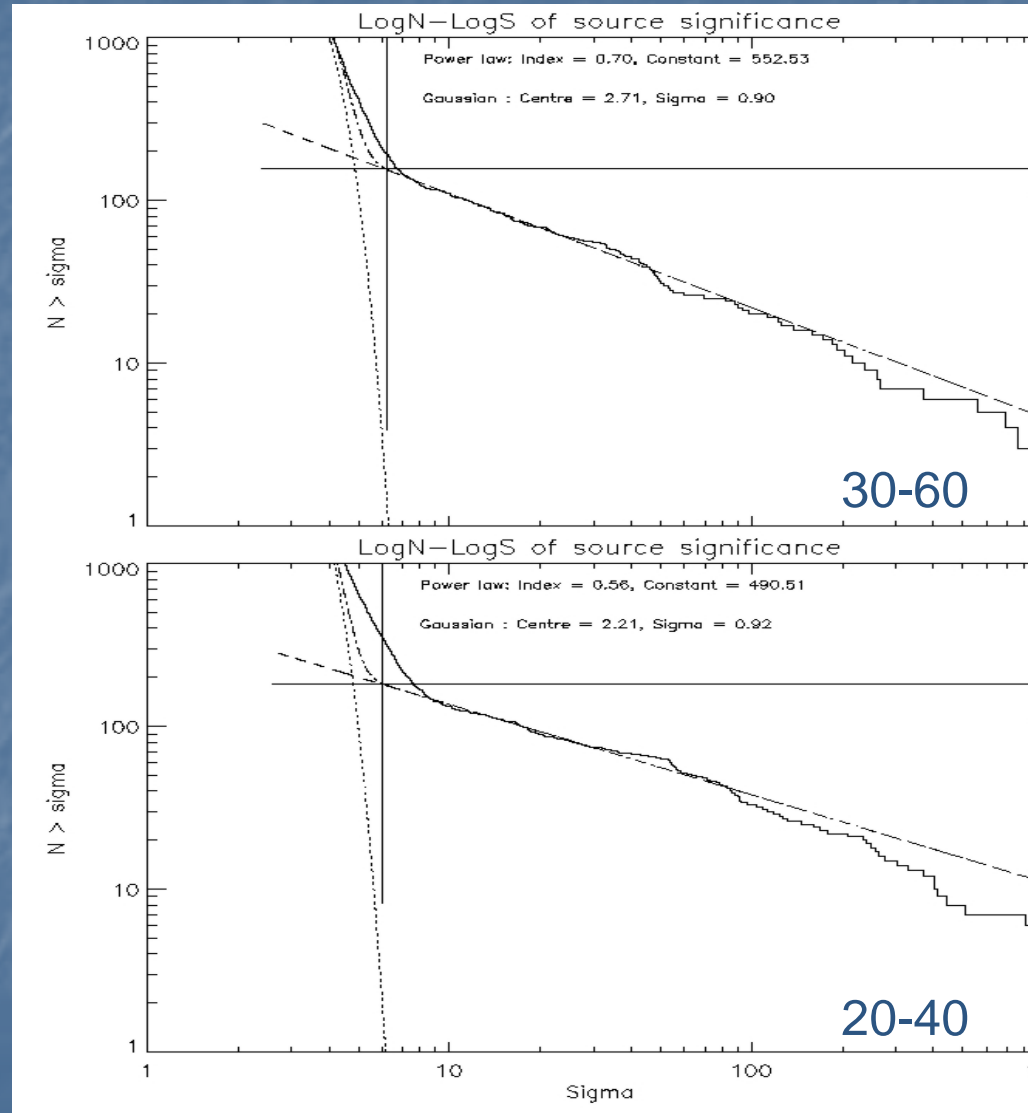
Map quality and cuts

■ Individual bands:

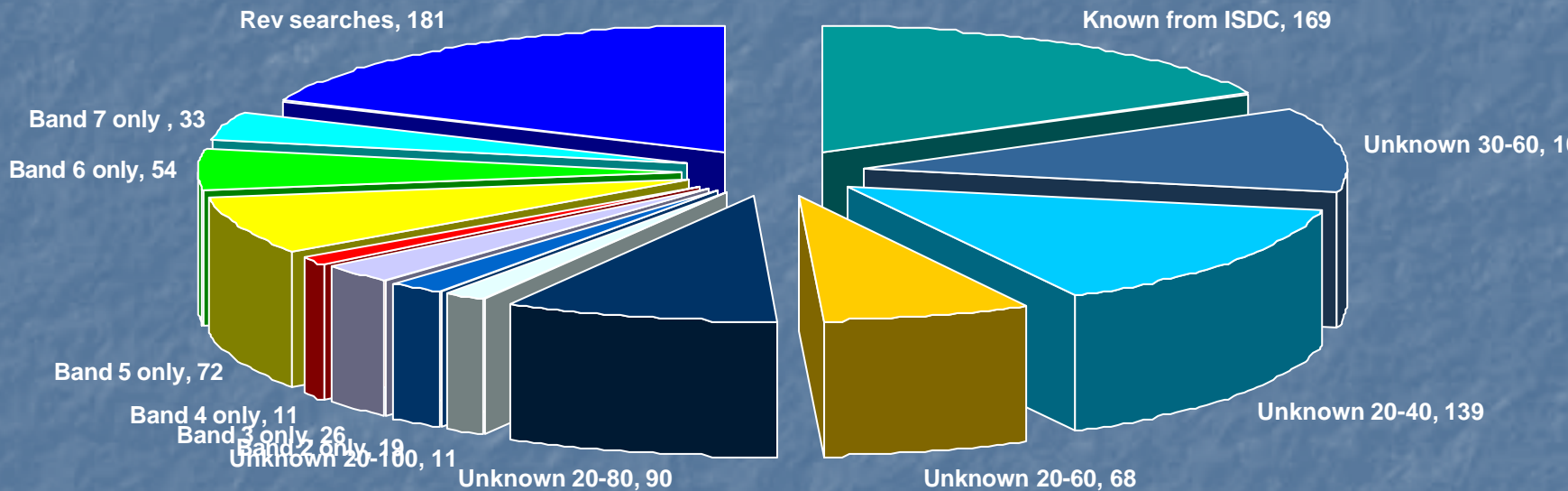
- 15-20 ... 18.3 (!)
- 20-30 ... 5.9
- 30-40 ... 5.1
- 40-60 ... 5.4
- 60-80 ... 5.6
- 80-100 ... 6.0
- 100-150 ... 6.0
- 150-300 ... 7.6 (?)

■ Search bands:

- 20-40 ... 6.1
- 30-60 ... 5.9
- 20-100 ... 7.1



The initial source list



981 excesses in total !

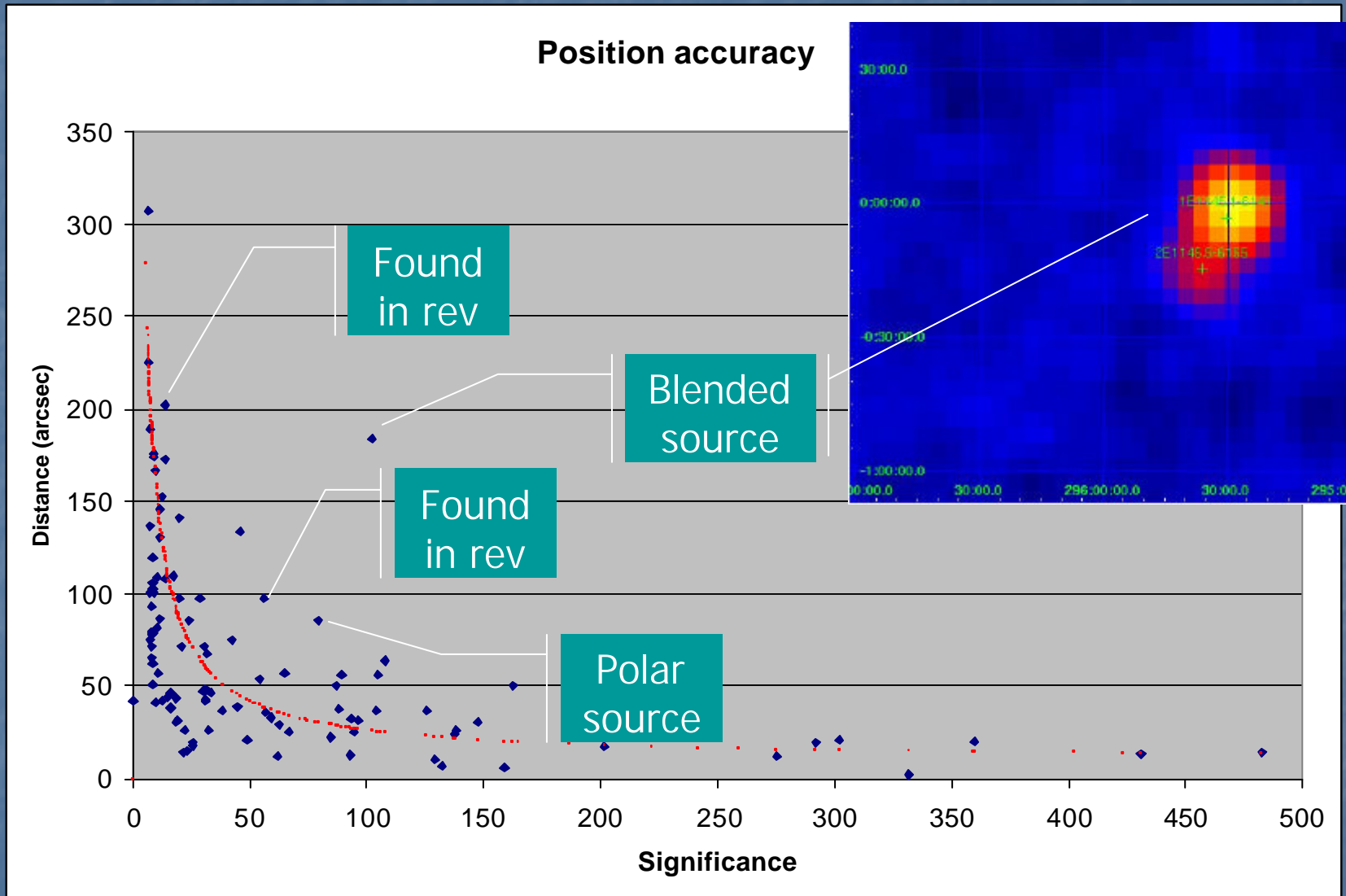
Comparison to last time

- If we applied the same search and selection as last time (1st catalog):
 - 300 excesses (~700 last time)
 - 169 known sources (~95 last time)
- The map quality is much improved
- Exposure of the whole sky is better
- We are pushing down into the noise to extract sources from the best parts of the map (but it costs time!)

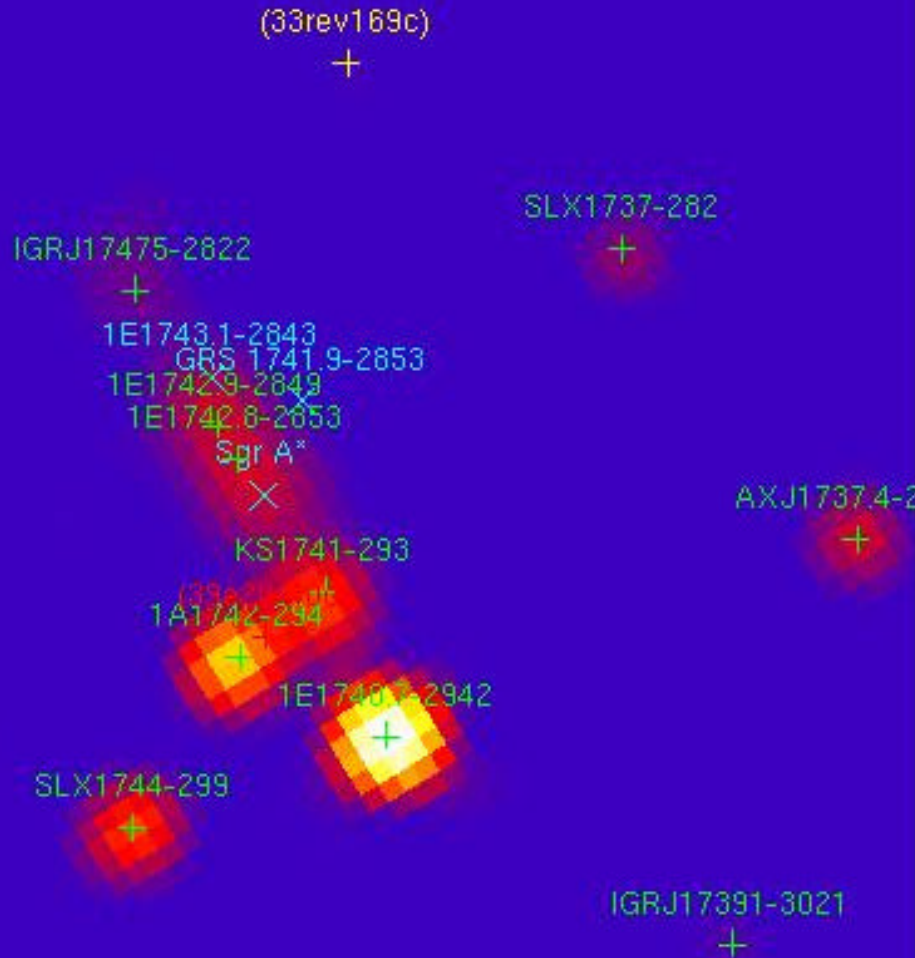
The 'real' numbers

- The 981 excesses are mostly false!
- Main task is to filter this down to the real sources:
 - Cross-check against 2 other ISGRI maps
 - Cross-check against ROSAT bright sources
 - Check spectra & light curves
 - Check against realistic sensitivity

Source positions



Deblending the GC



Overall mosaic

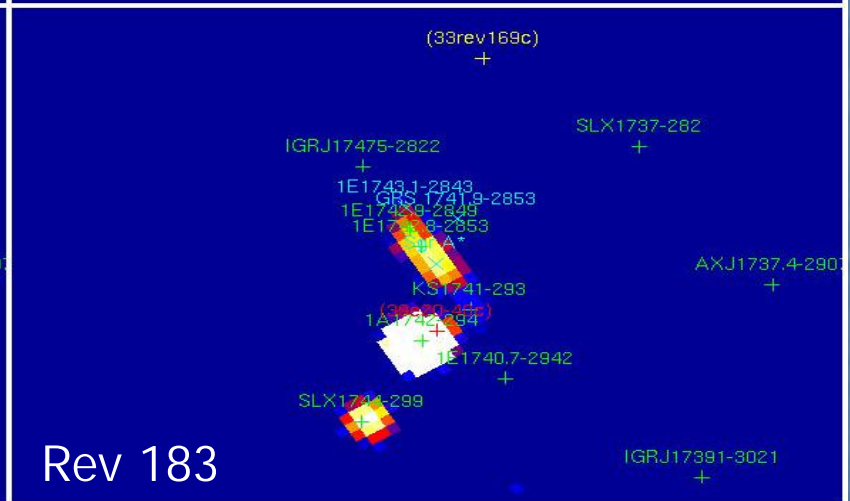
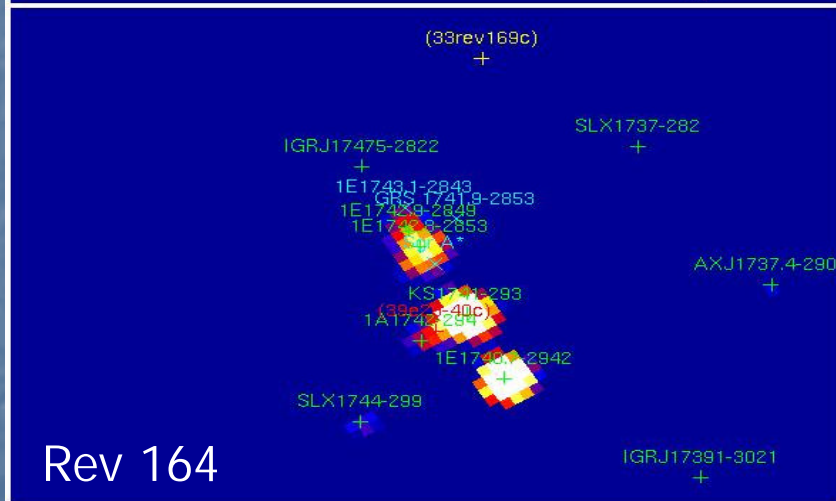
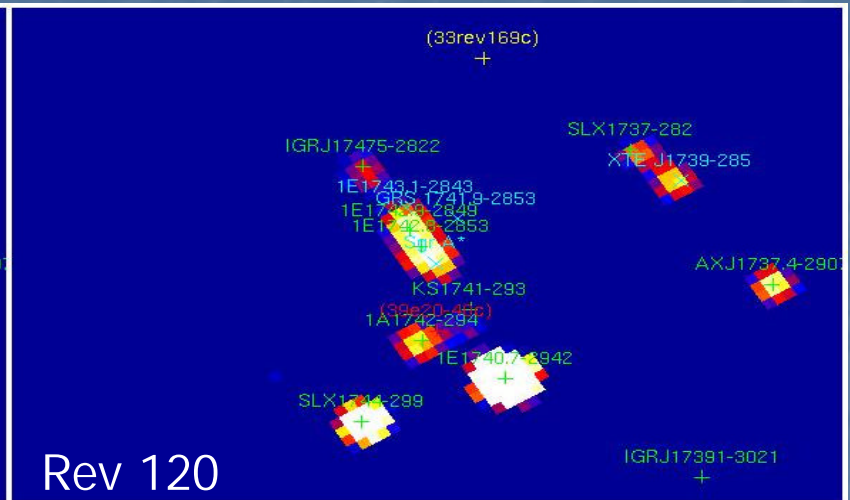
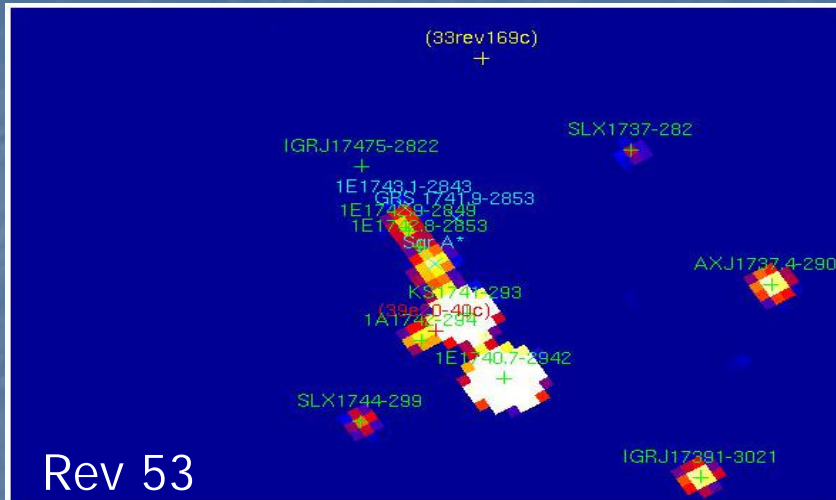
20-40 keV

Central region is
badly blended

Some sources are
shifted and/or
completely spurious

Impossible to
unambiguously
identify in central
region

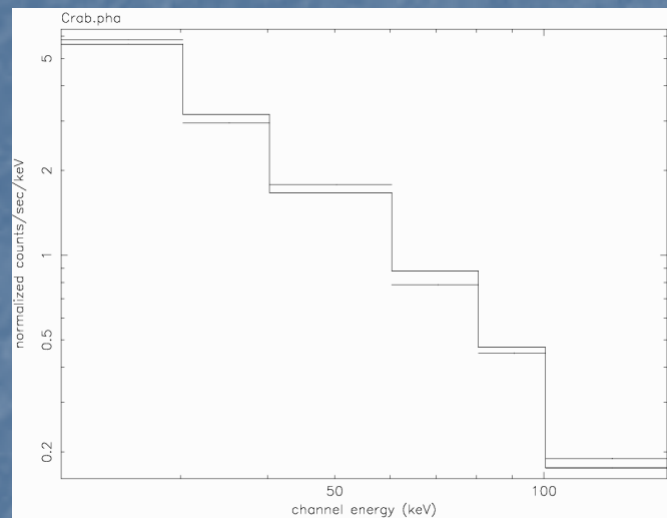
Deblending the GC



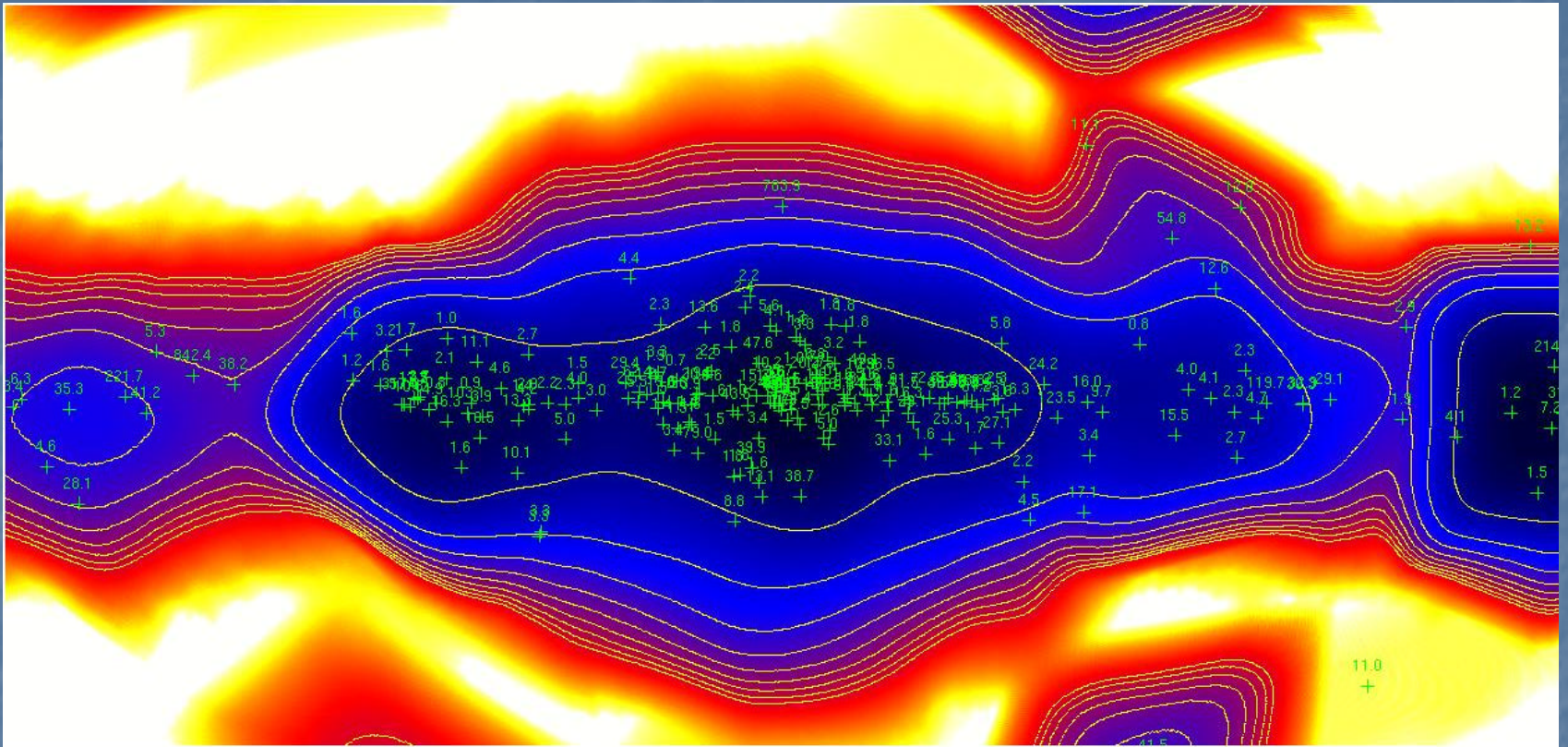
Variability can be the key to separating, identifying and locating in crowded regions.

Spectral extraction

- Fluxes extracted from 10 narrow band mosaics
- These are 2-year time-averaged spectra
- Differences to OSA4 spectral extraction need to be understood
- Can spectra be used for source / structure differentiation?
 - 10 'structures' – look like faint sources
 - 10 'empty points' – look very different



Survey sensitivity

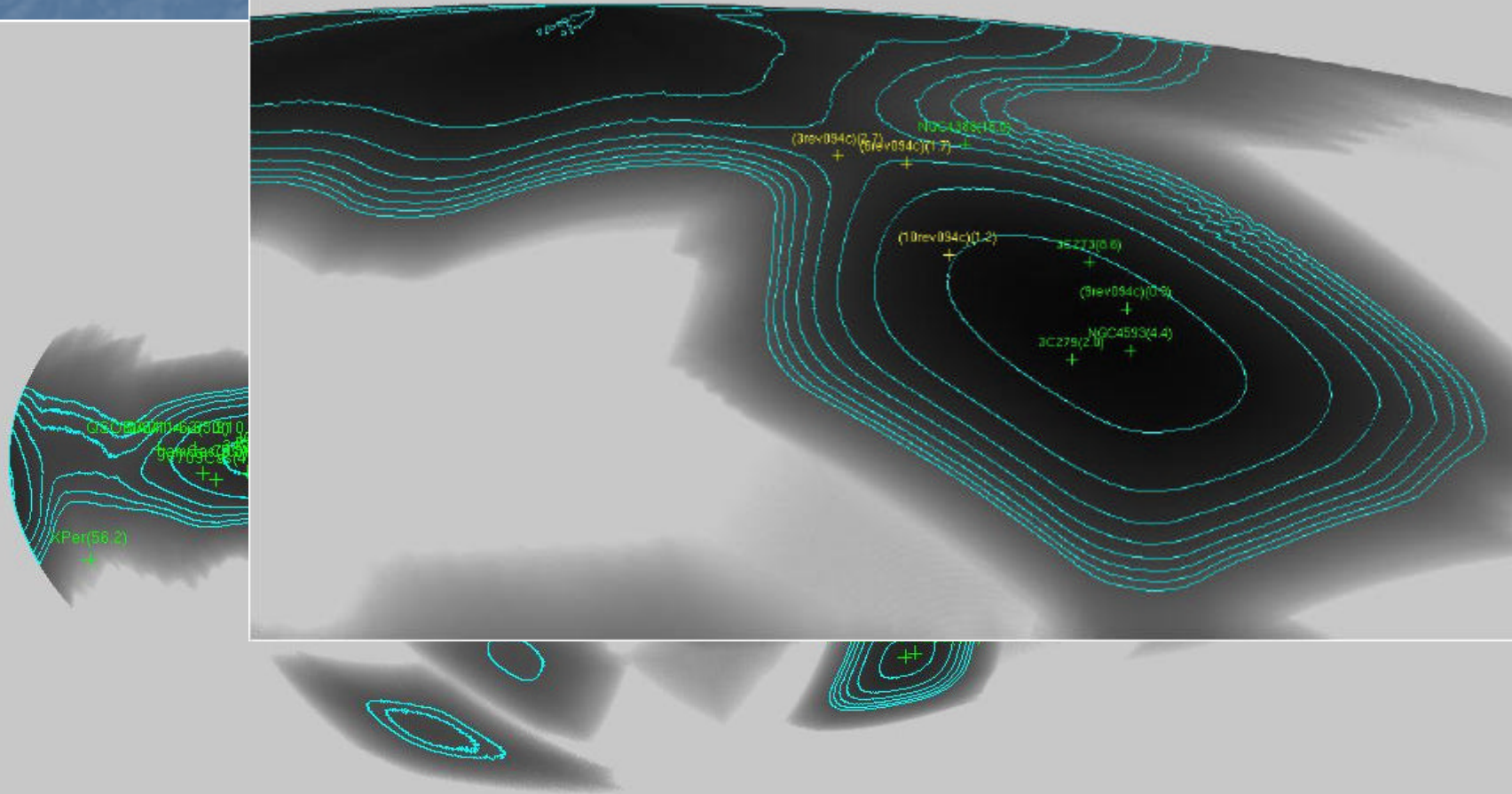


Source distribution follows sensitivity/exposure contours very strongly

Observed minimum fluxes match well with values calculated from exposure map.

A few 'dubious' sources break this rule – this is a way to identify/purge non-sources

Survey Sensitivity



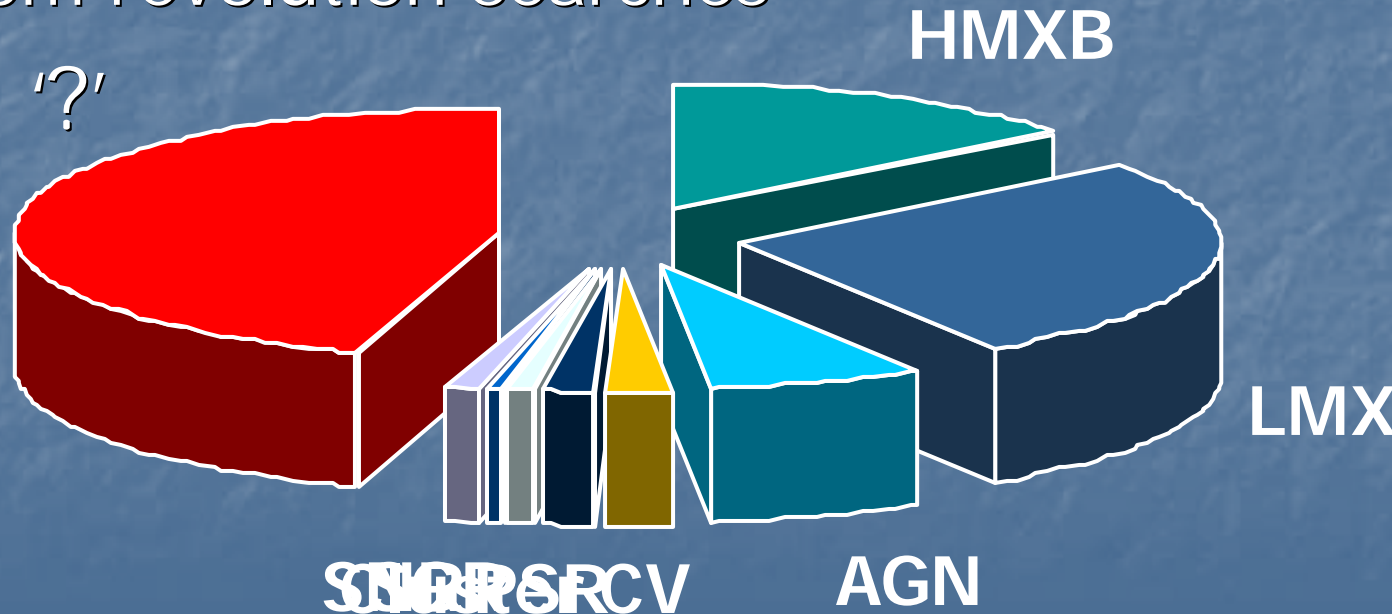
1mCrab sensitivity contours

Current catalog stats

- 229 entries
 - ~200 from broad-band whole-archive maps
 - ~10 from narrow-band maps
 - ~15 from revolution searches

- 31 rated '?'

Other



Still to do...

- Check auxiliary maps
 - polar map results
 - Revolution group (GCDE) searches
- Standard data product generation
 - Source list
 - Spectra
 - Light curves