EPIC source catalogues

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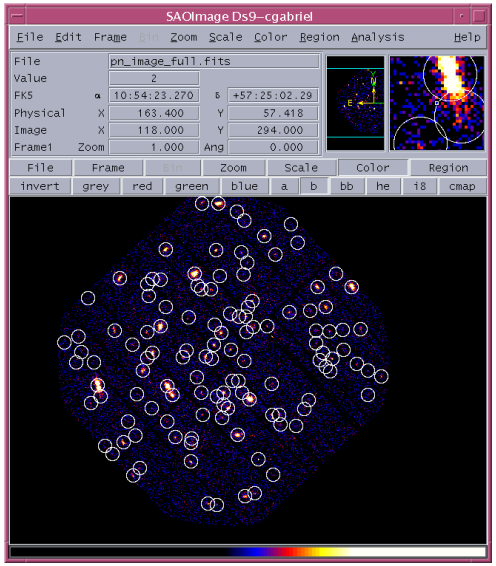
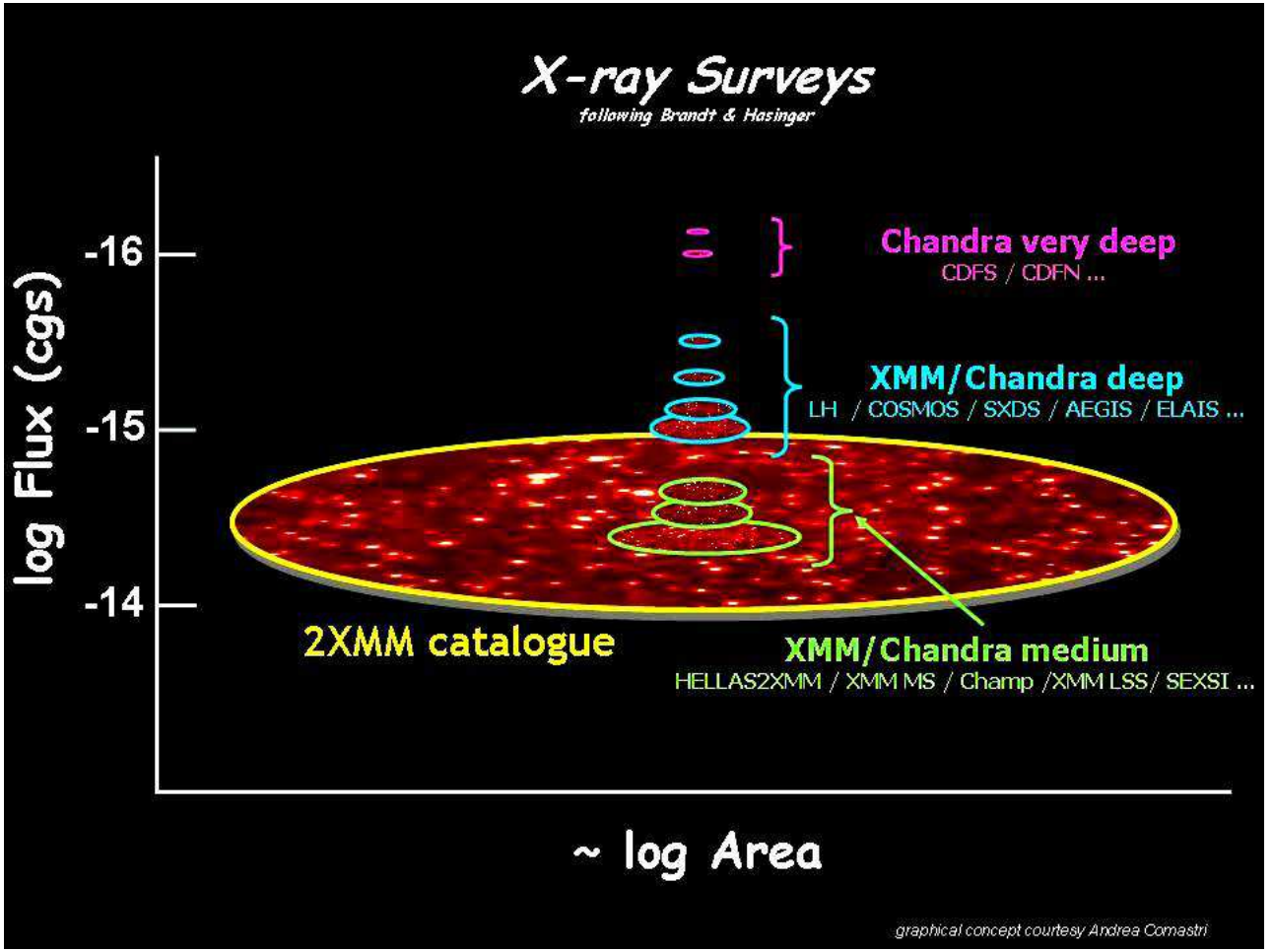
3XMM – serendipitous sources cat





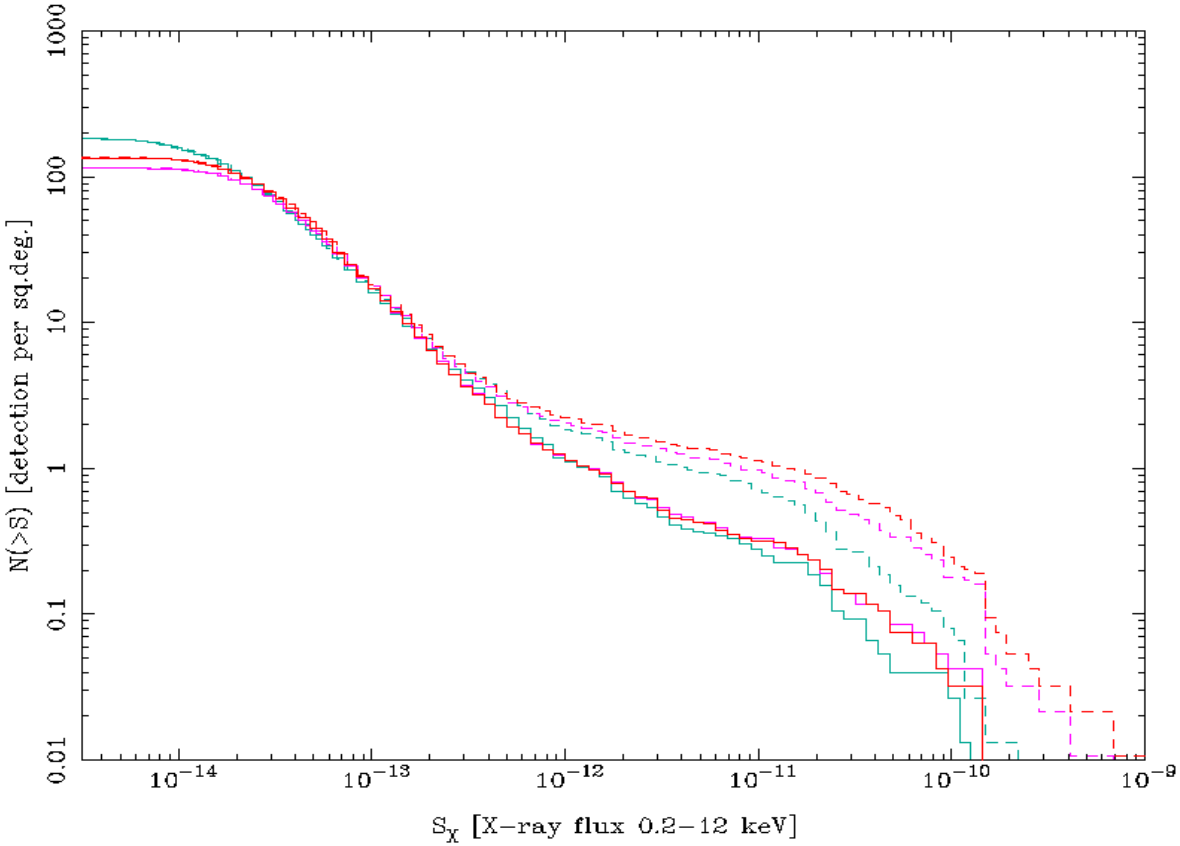
3XMM: Creation process

- Uniform pipeline processing of all public observations
- Combine detection of sources in all EPIC cameras simultaneously with ML method to maximise sensitivity
- Visual screening to remove obvious spurious sources
- Cross-correlation with standard catalogues (USNO, Rosat 2mass etc.)
- Merge all observations into one catalogue
- First released in August 2007 (increments every year(ish), currently DR4)
- Source-specific products (spectra, lightcurves) produced for brighter sources (>100 counts in combined image)

3XMM-DR4: statistics

- 7427 observations.
- ~531000 detections in total.
- ~373000 unique sources
- ~11000 X-ray sources probably extended
- ~median flux is $F_{2\text{-}12}=1.3\text{x}10^{-14}$ ergs s^{-1} cm^{-2}
- 20% have $F_{0.2\text{-}12}<1\text{x}10^{-14}$ ergs s^{-1} cm^{-2}
- Minimum flux ~$1.0\text{x}10^{-15}$ ergs s-1 cm-2
- Total area independently covered = 794 deg^2
- Astrometry generally good to ~1 arcsec
- 248000 sources have spectral products extracted

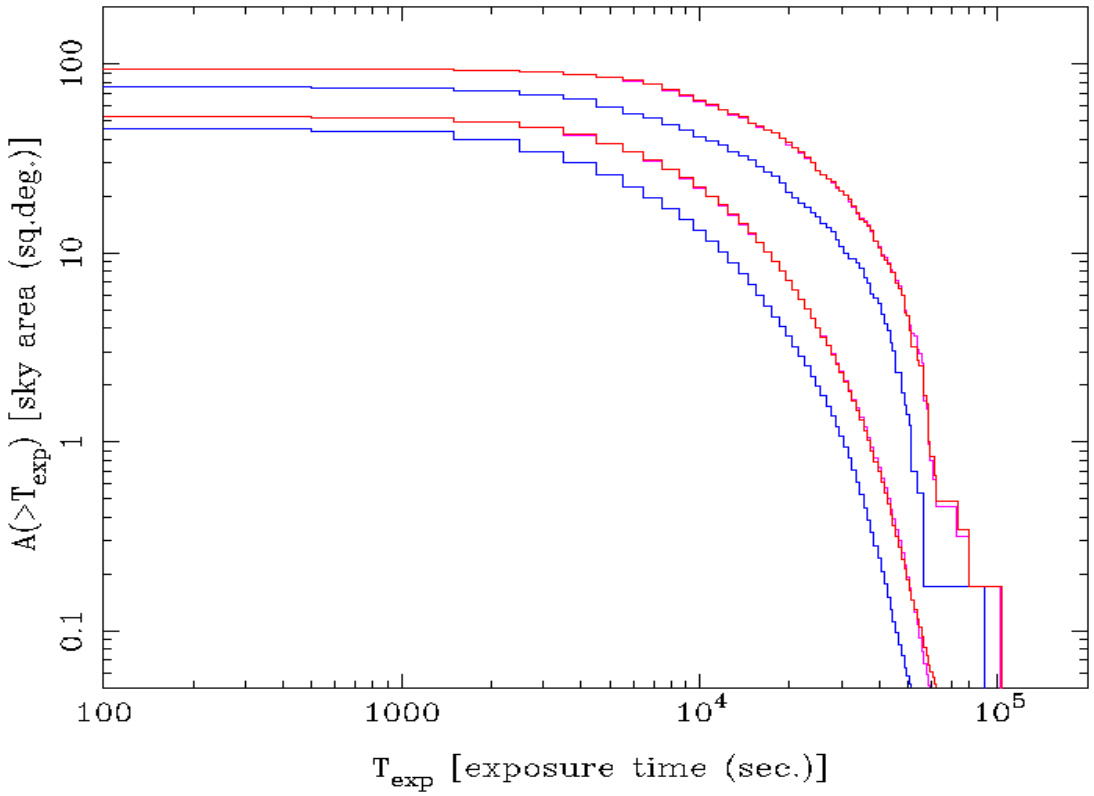
Source flux distribution



Log n - Log s curves for pn (red), Mos-1 (purple) and Mos-2 (grey).

Dashed curves include the observation targets.

Sky Area



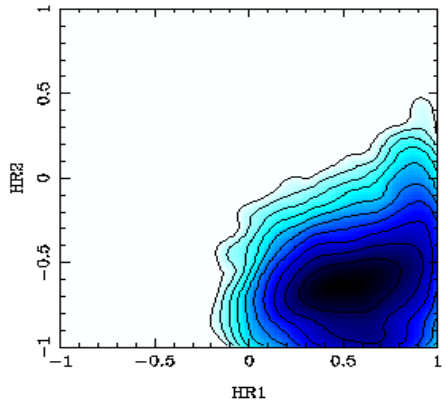
Area covered by catalogue: upper curves are the nominal values for MOS and EPIC-pn; lower curves correct for field overlaps and vignetting.

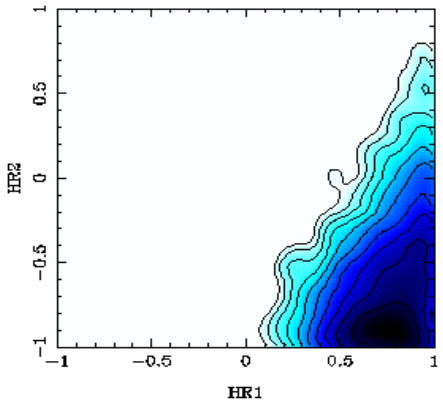
Important columns

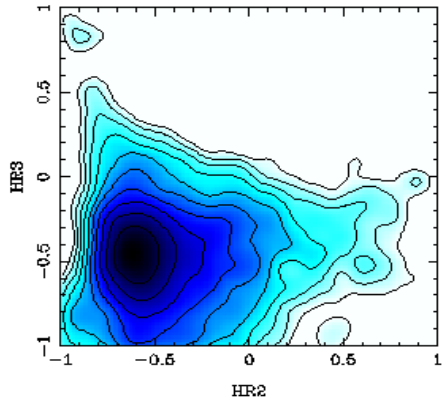
3XMM J010230+640102 - IAU source name
RA_CORR, DEC_CORR, LII,BII - standard coords.
EP_DET_ML - maximum likelihood for source
EP_FLUX, EP_FLUX_ERR - 0.2-12 keV flux
M1_n, M2_n, PN_n - count rate in band ‘n’ in each camera
CAT_NAME_1 - cross-correlation results

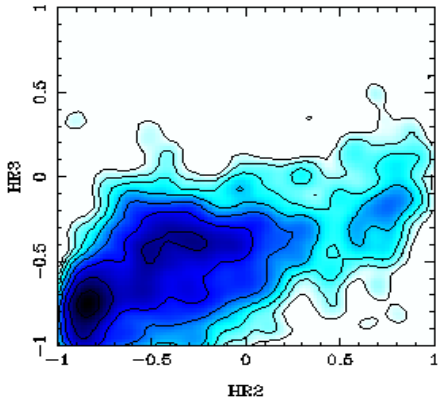
Band	**Energy (keV)**
1	0.2 – 0.5
2	0.5 – 1.0
3	1.0 – 2.0
4	2.0 – 4.5
5	4.5 – 12.0

Hardness ratios







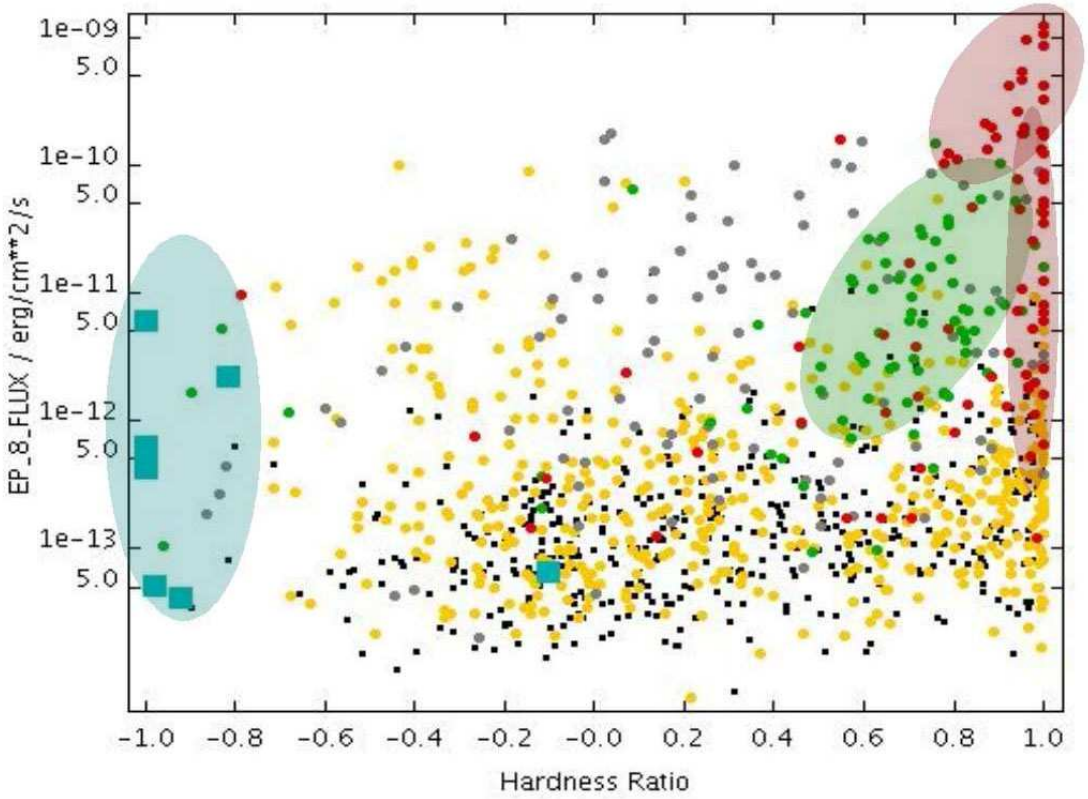


The bulk spectral properties of the EPIC_pn catalogue detections.

HR1 = (F2 - F1) / (F2 + F1)
HR2 = (F3 - F2) / (F3 + F2)
HR3 = (F4 - F3) / (F4 + F3)

Left panels are for high galactic latitude, right panels are for low galactic latitude.

Hardness ratios of variable sources in 3XMM



Gosling et al. 2008

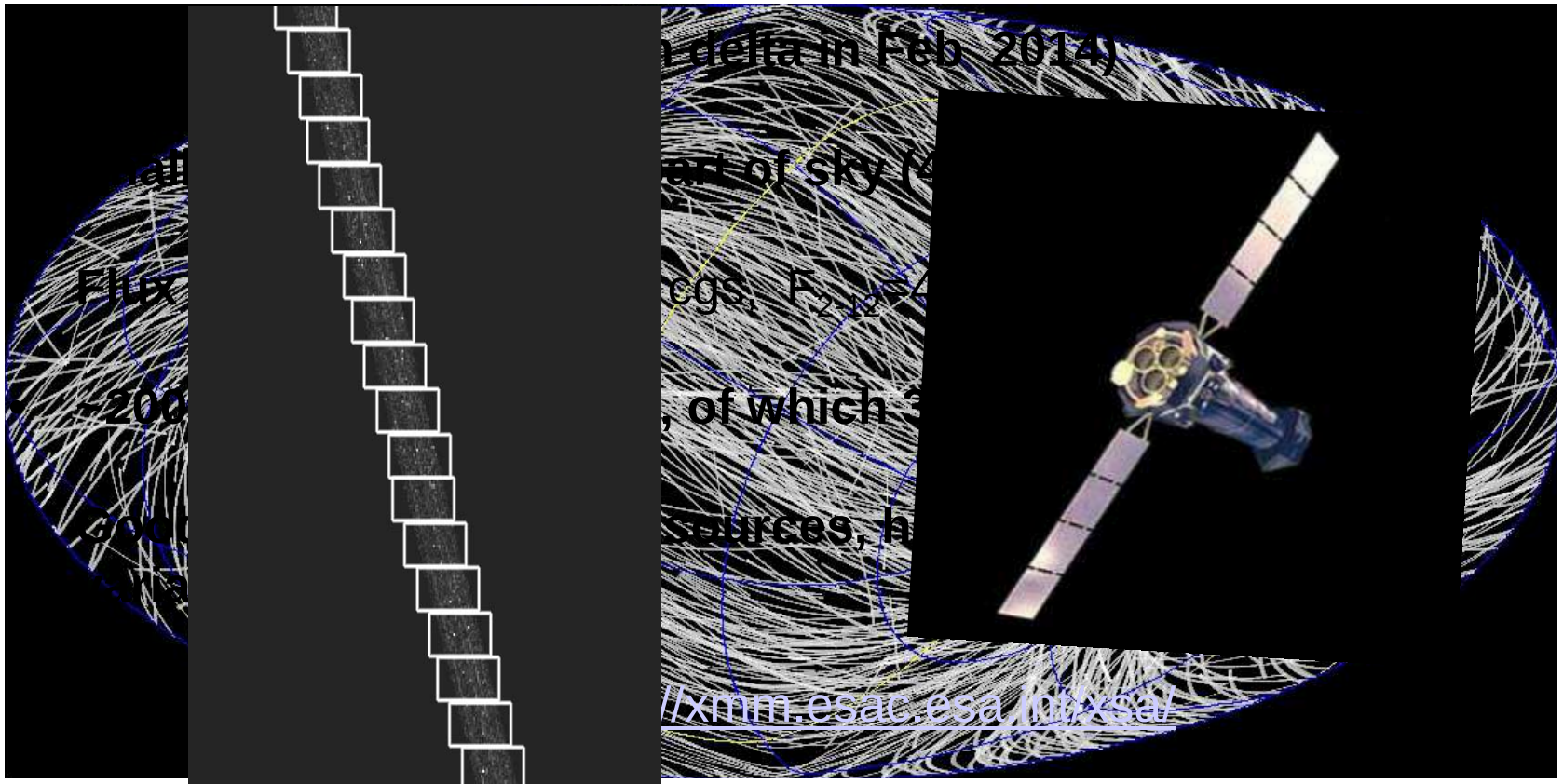
HR = (F2 - F1) / (F2 + F1)

F1 = 0.2 – 1 keV flux
F2 = 1 – 12 keV flux

EP_8_FLUX is 0.2-12 keV

Red = X-ray binaries
Green = CVs
Grey = AGN
Yellow = Stars
Turquoise = SSS

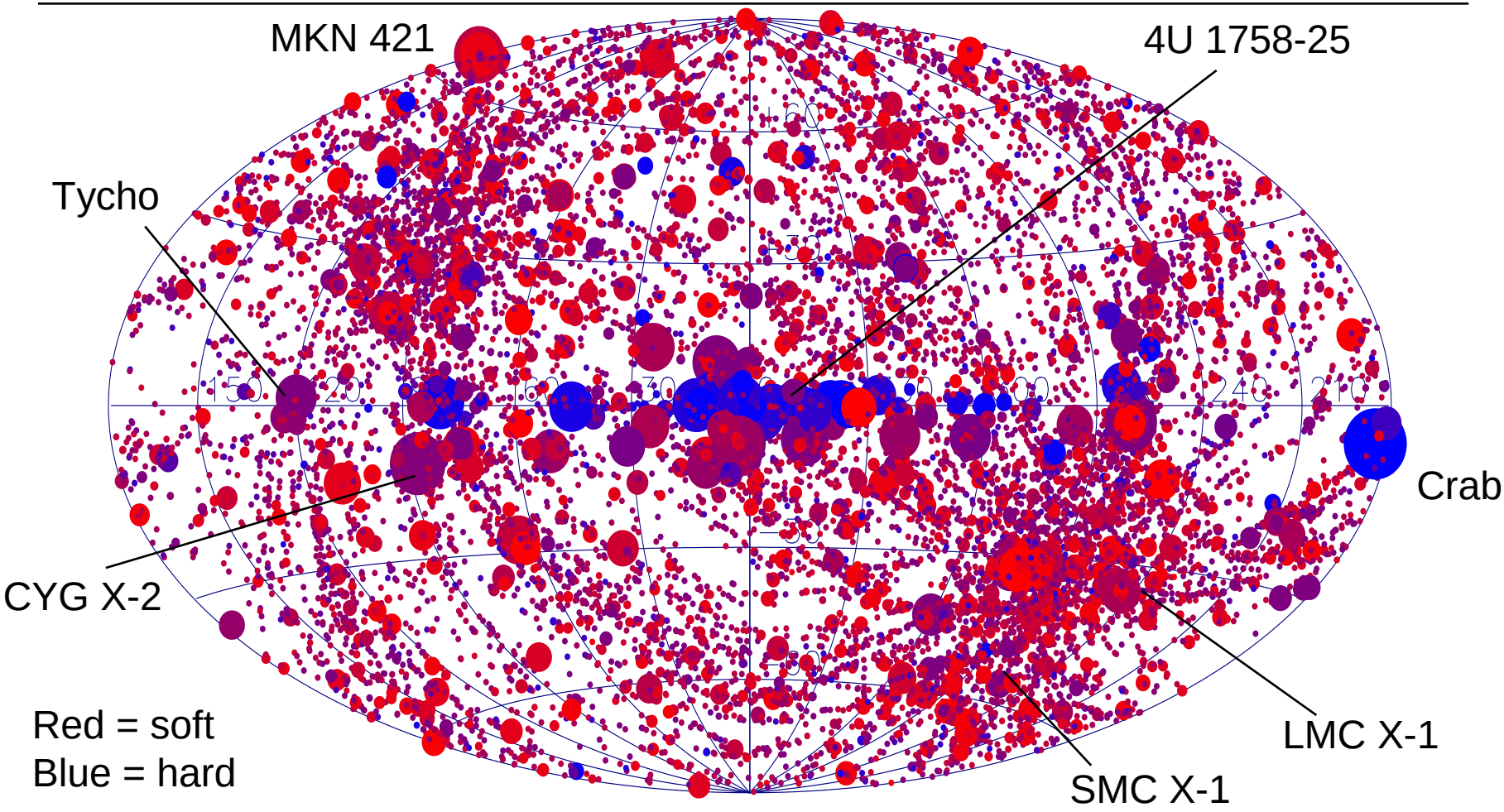
XMM slew survey: XMMSL1(Delta-6)



- **Archive contains images, exposure maps and event files**

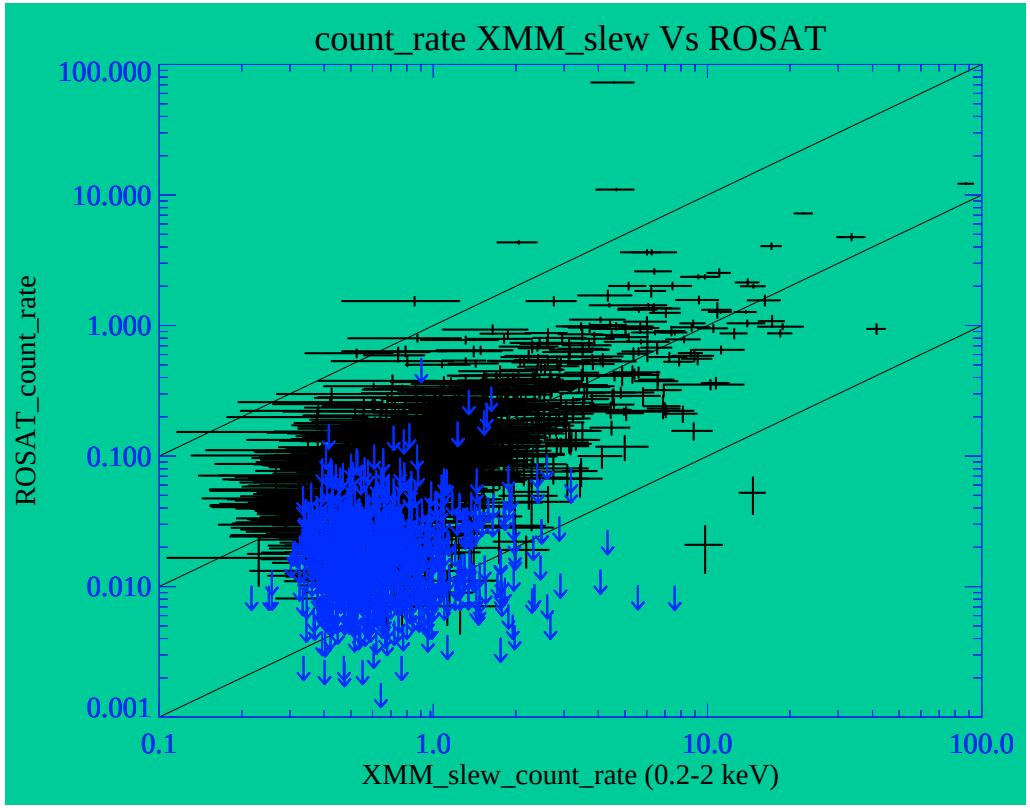
Slew paths in Galactic coordinates

Slew sources



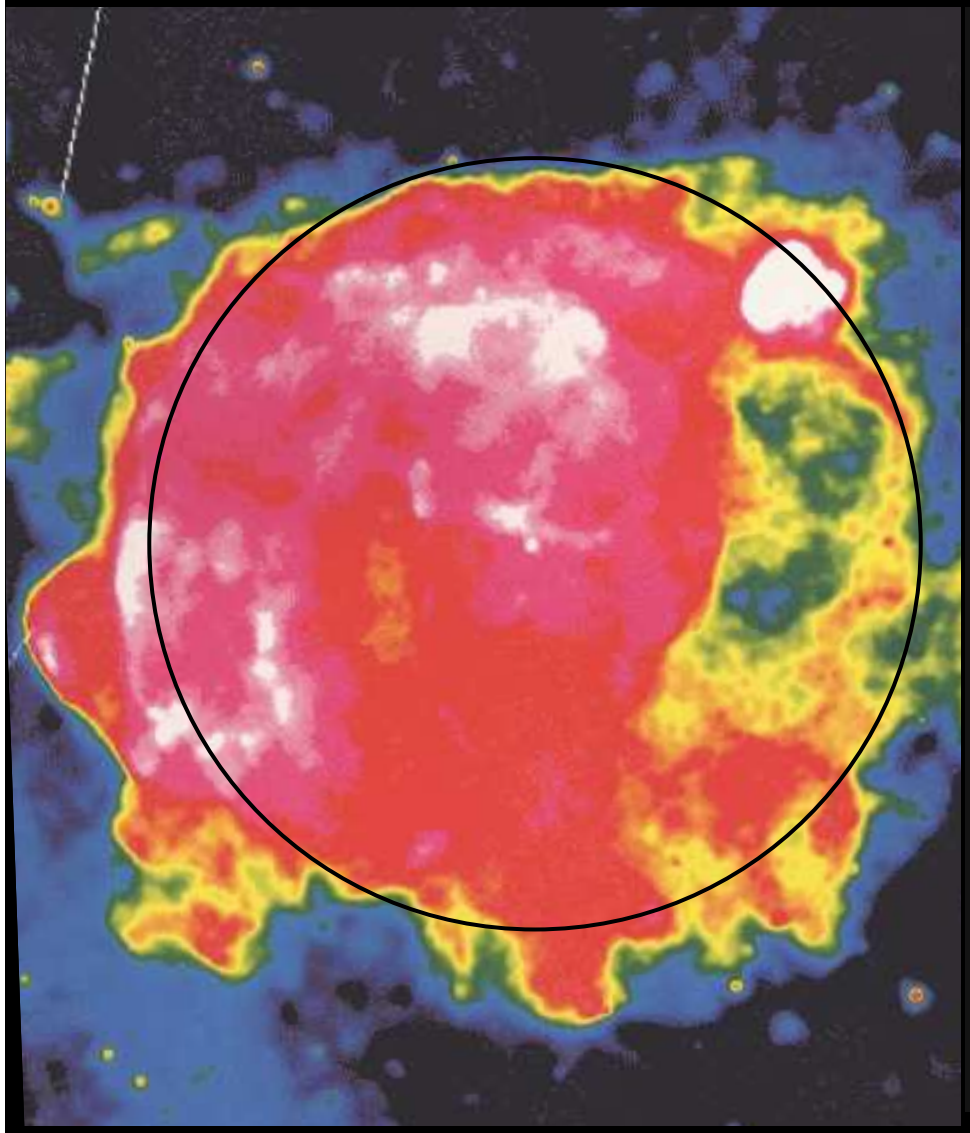
Correlations with ROSAT

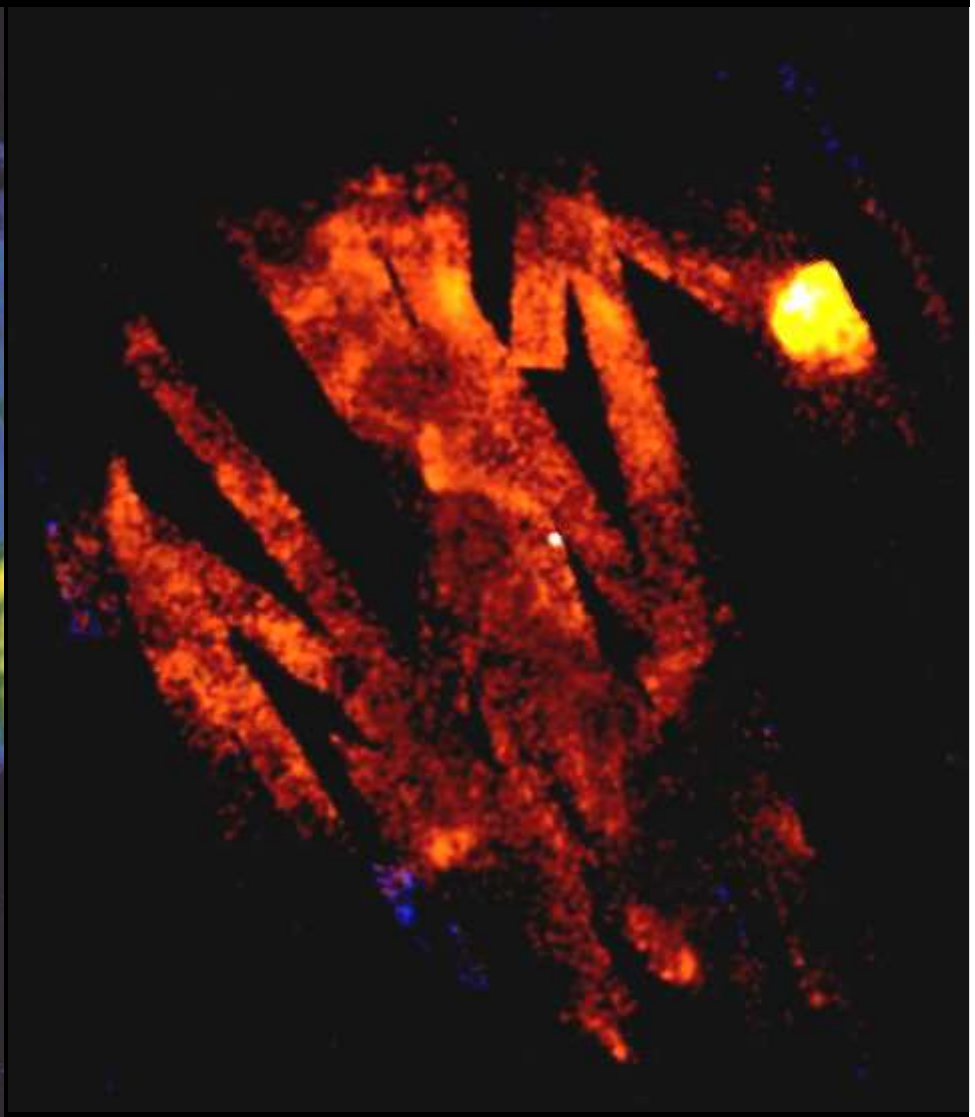
- 55% of sources correlate with ROSAT (non-extended, DET_ML>10)
- 1% show variability by > factor of ten (5% of AGN)



Mean rate : XMM-slew/ROSAT~7

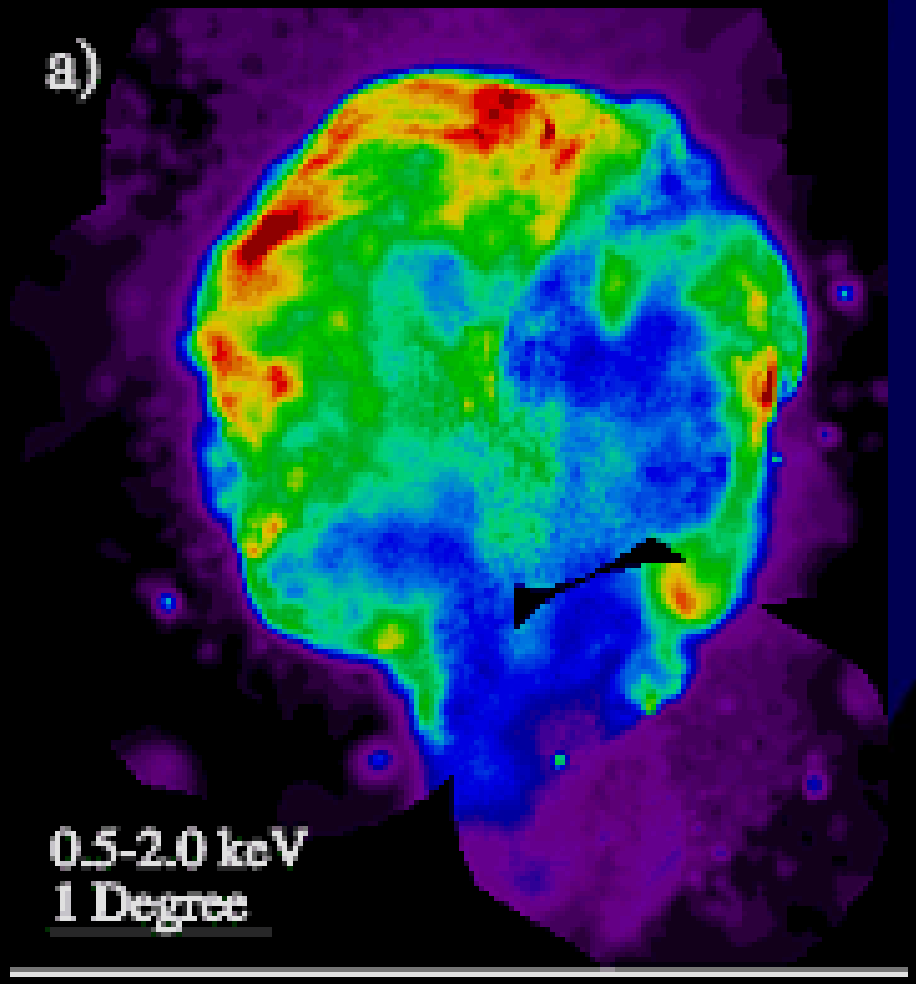
Vela Supernova Remnant



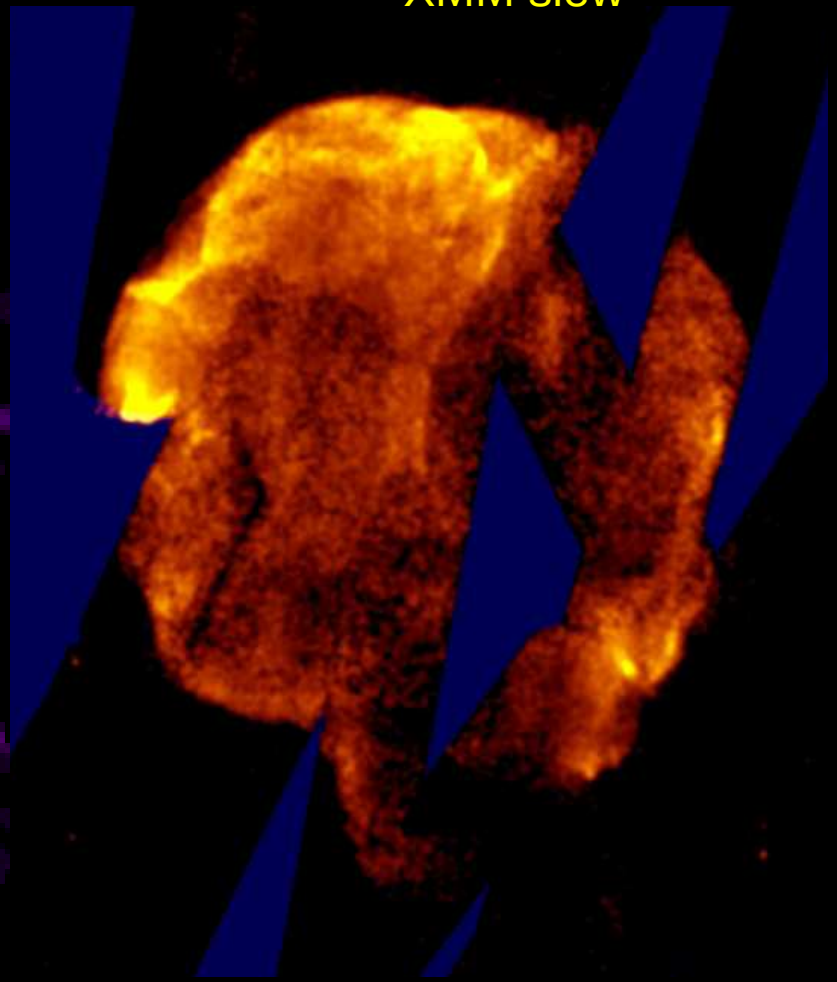


Cygnus Loop

ROSAT

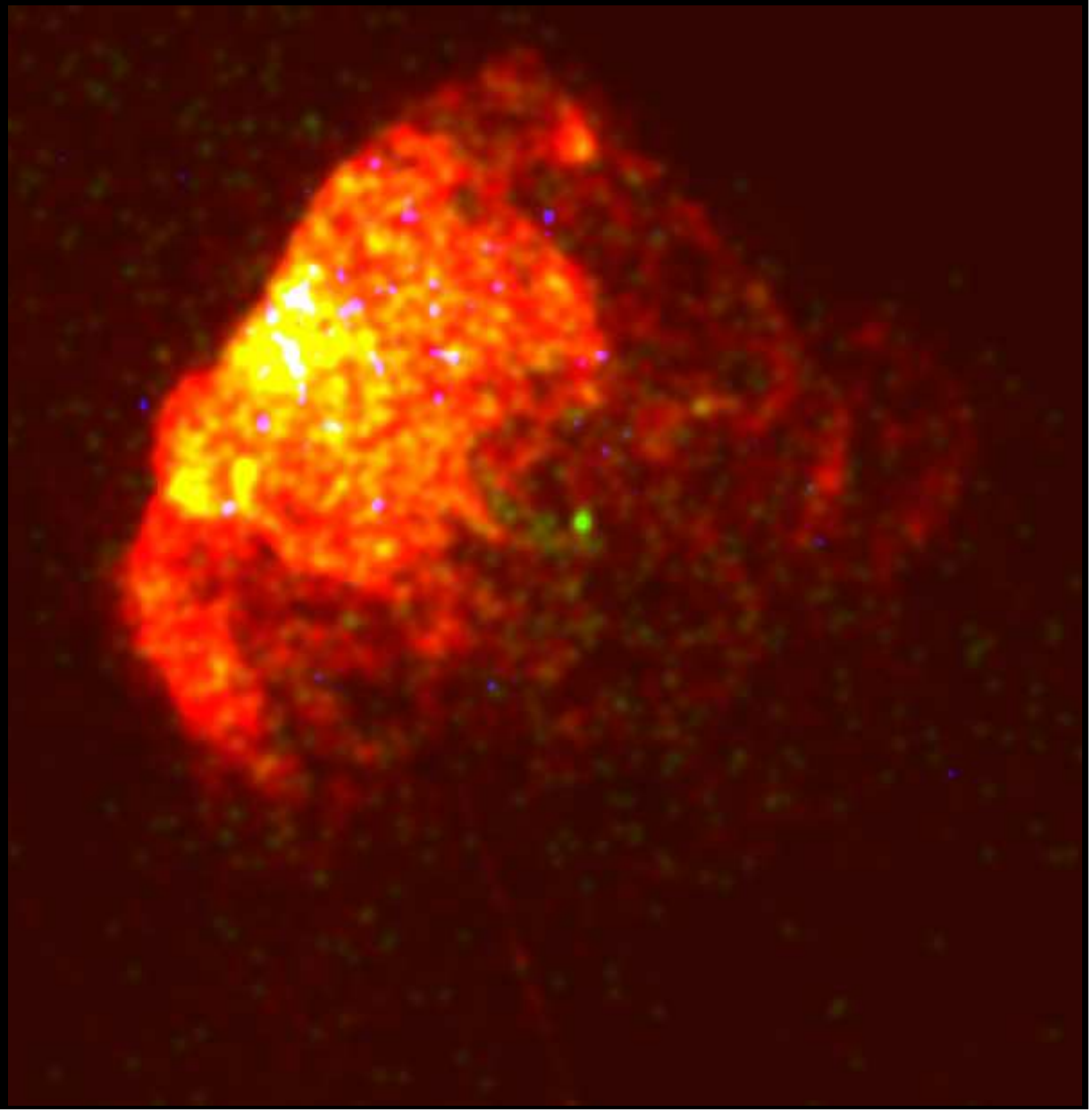


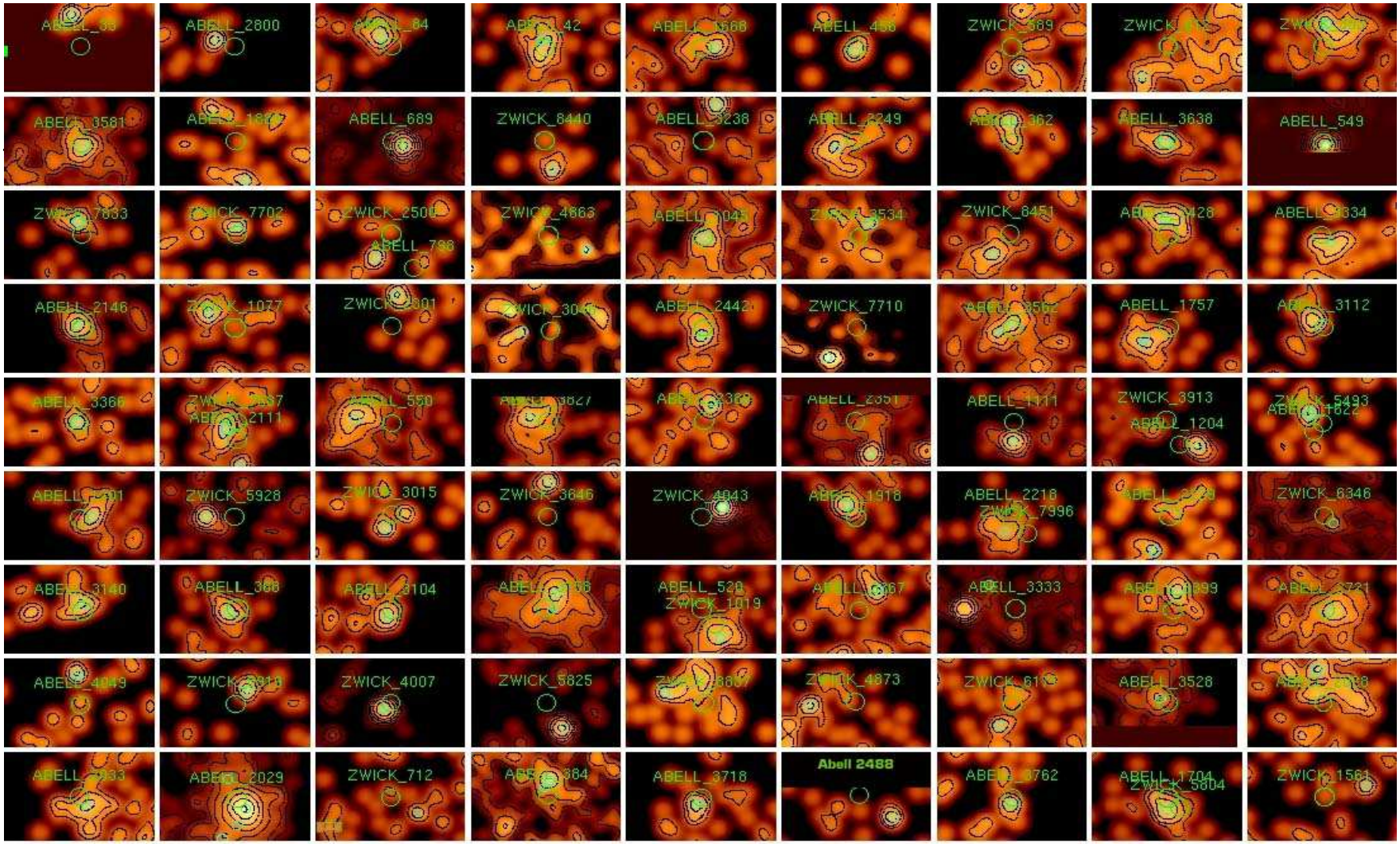
XMM slew



Analysing extended structures- Puppis SNR

XSA contains slew images, exposure maps and event files. Can perform spectral analysis of extended structures.





>200 clusters of galaxies detected

Summary

- **3XMM, XMMSL1 relatively unexplored at present.**
- **Data are public**
- **Slew survey catalogue currently covers 65% of sky. Addition of 4000 deg^2 per year.**
- **3XMM covers 2% of sky – 500k sources**

How to access the catalogue

- o Fits file from http://xmmssc-www.star.le.ac.uk/
- o The XSA http://xmm.esac.esa.int/xsa/
- o SCI-DB http://xcatdb.u-strasbg.fr/xcat-db/
- o User documentation: http://xmmssc-www.star.le.ac.uk/Catalogue/UserGuide_xmmcat.html
- o LEDAS http://ledas-www.star.le.ac.uk

Current ref: *Watson et al. 2009, A&A 493, 339-373 (2XMM)*
Saxton et al. 2008, A&A 480, 611 (XMM slew)