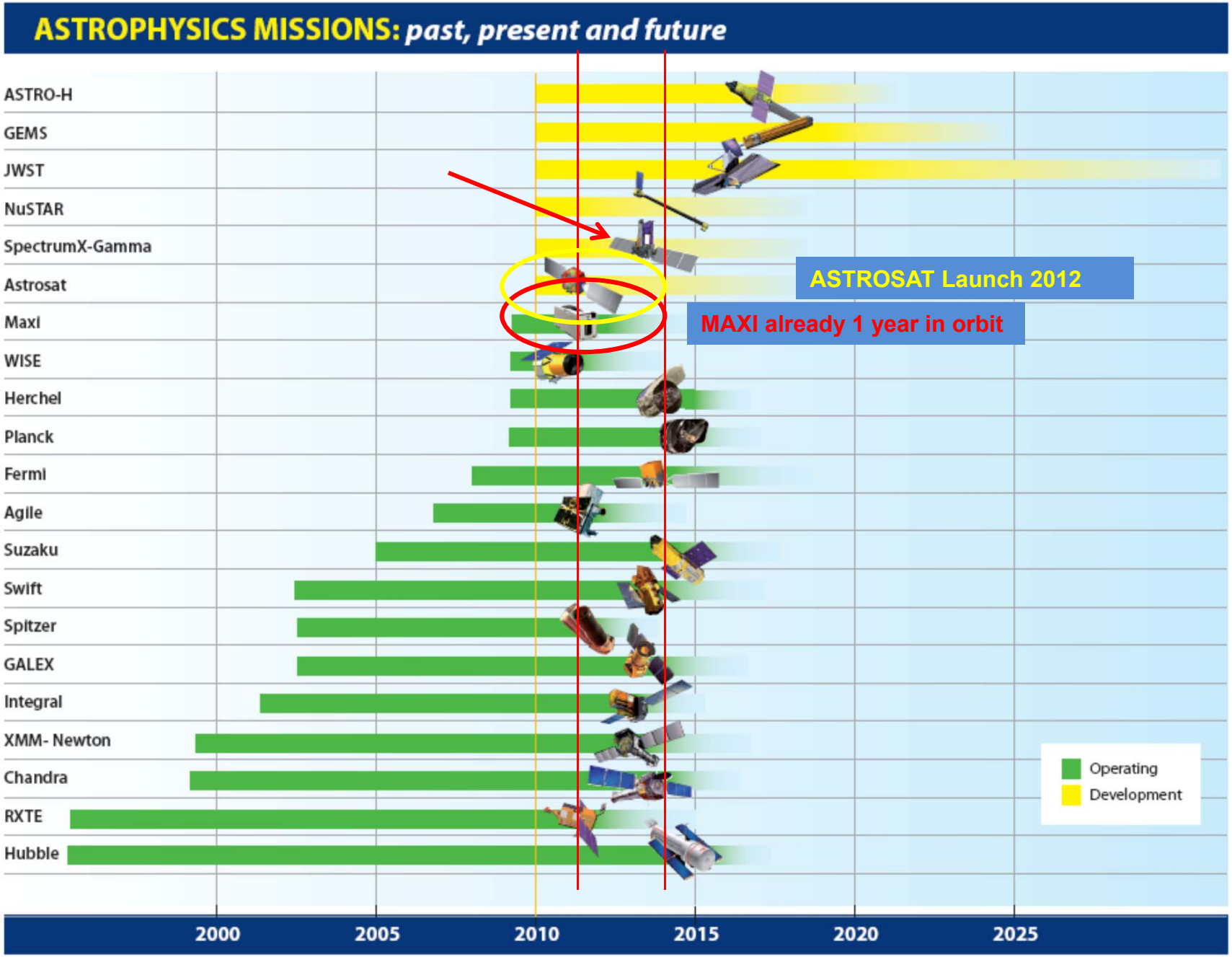

ASTROPHYSICS MISSIONS: past, present and future
ASTRO-H
GEMS
JWST
NuSTAR
SpectrumX-Gamma
Astrosat
Maxi
WISE
Herchel
Planck
Fermi
Agile
Suzaku
Swift
Spitzer
GALEX
Integral
XMM- Newton
Chandra
RXTE
Hubble
ASTROSAT Launch 2012
MAXI already 1 year in orbit
Operating
Development
2000
2005
2010
2015
2020
2025

MAXI HIGHLIGHT 1\13

1) Black Hole Transients
2) Neutron stars state transitions
3)Transient events: GRBS & short X-ray transients
4)Extragalactic survey

Revised estimate of MAXI sensitivity
from Ueda talk

Comparison with our pre-launch estimate (YU+ 2009)

- **Observation efficiency ~40%, due to the HV turn-off at high latitudes and the reduced number of cameras (12→8)**
- **Slight update of the non X-ray background rate . Below 10 keV it is consistent with previous missions (Sugizaki's talk)**

- **Expected 5σ sensitivity in the 2-10 keV (4-10 keV) band**

~1.3 (2.0) mCrab from *1 month* operation

~0.5 (0.8) mCrab from *7 months* operation

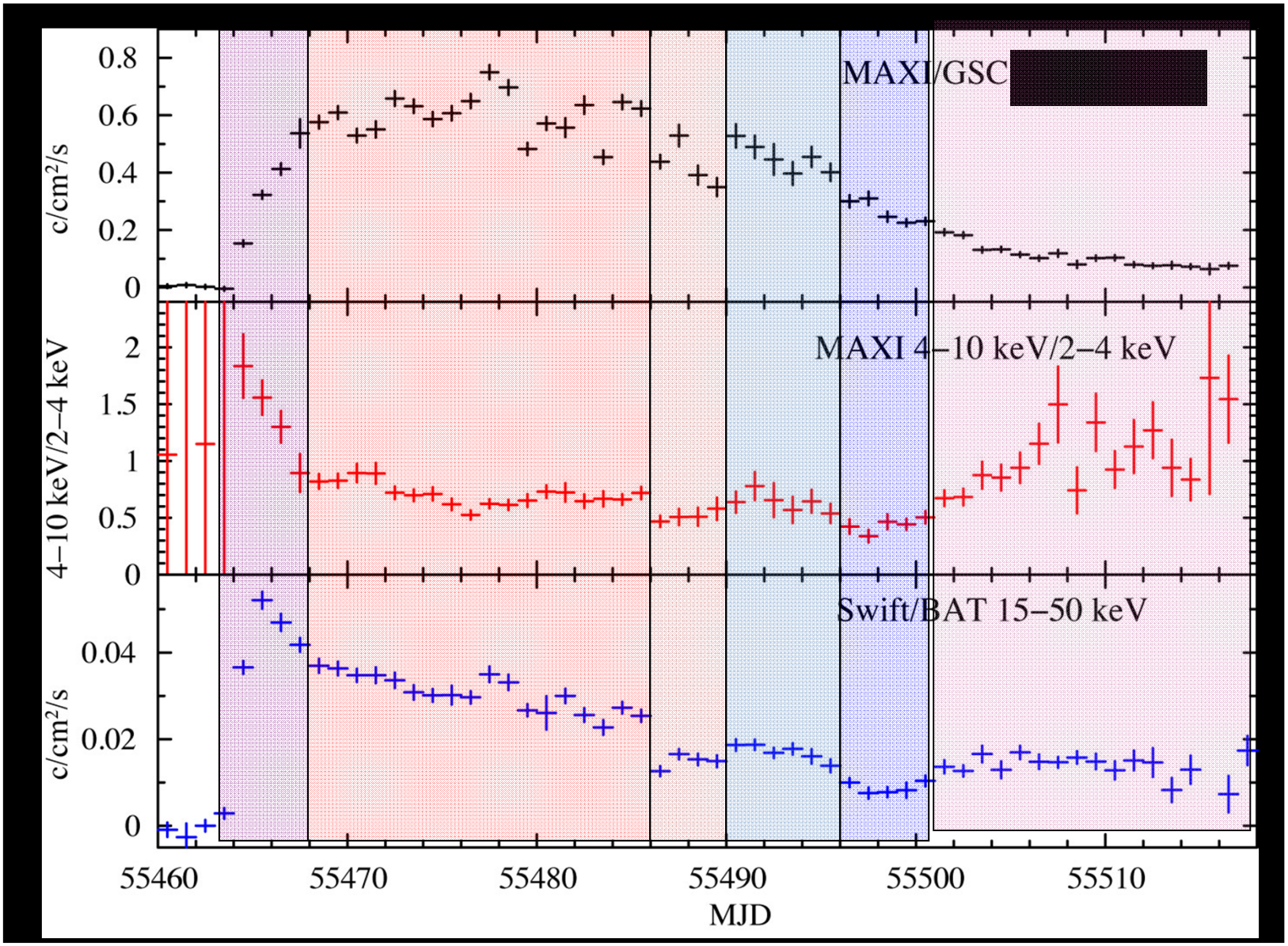
~0.2 (0.3) mCrab from *3 years* operation

cf. confusion limit (1 source per 10 beams) ~ 0.2 mCrab

MAXI Summary for BlacK Hole

- MAXI observed X-ray outbursts from H1743-322, 4U 1630-472, GX 339-4, XTE J1752-223, and MAXI J1659-152.
- MAXI also observed many state transitions including transitions in Swift J1753.5-0127 and Cyg X-1.
- Color-Intensity diagrams of these sources show two types of transitions to the soft (and intermediate) state.
  - Cyg X-1 and MAXI J1659-152 are stable in the intermediate (very high) state.
  - GX 339-4 and XTE J1752-223 are stable in the soft state.
- The magnetically supported disk model is favorable to the observed features of the intermediate state.
- The following futures are, however, still open questions.
  - luminosity dependence
  - Regularity
  - Environment(?) dependence (difference in initial magnetic force)

State Transitions in MAXI J1659-152

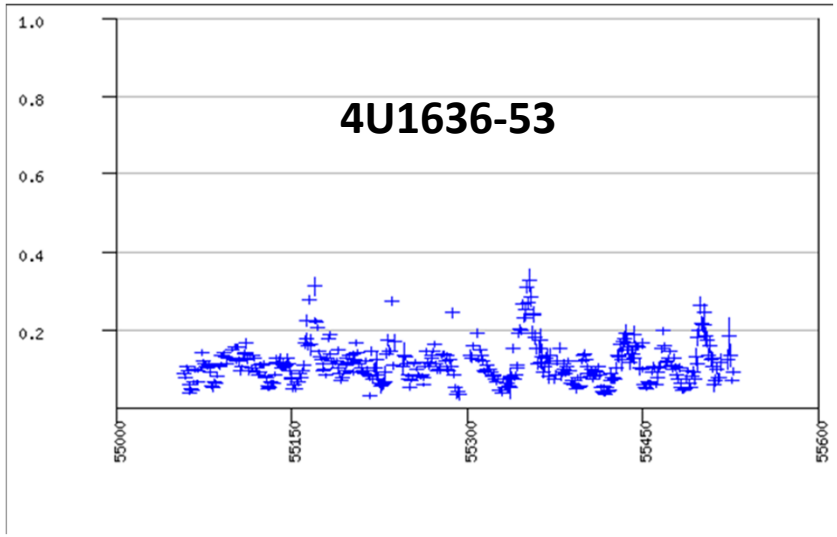


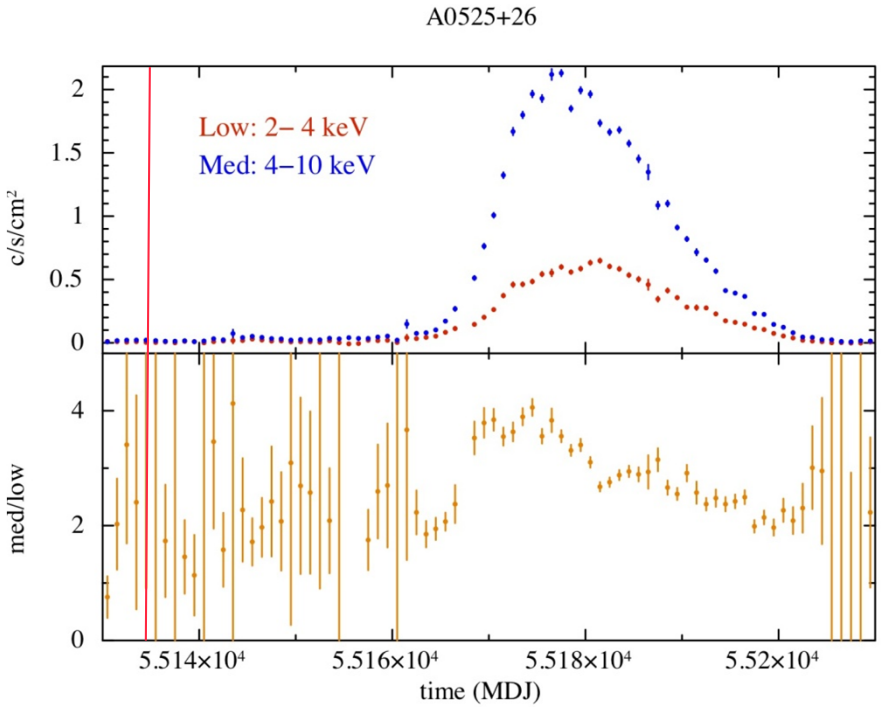
see RXTE results by Yamaoka+

MAXI Summary for Neutron Stars

- **MAXI observed X-ray bursts (see list) and flares from e.g. A0535+26 , 4U1323+619,4U2206+54**
- **MAXI also observed many state transitions including Cyg X-3 and Cir X-1 and many LMXBs**

84 x-ray bursts from 18 sources
And 30 from Rapid burster!



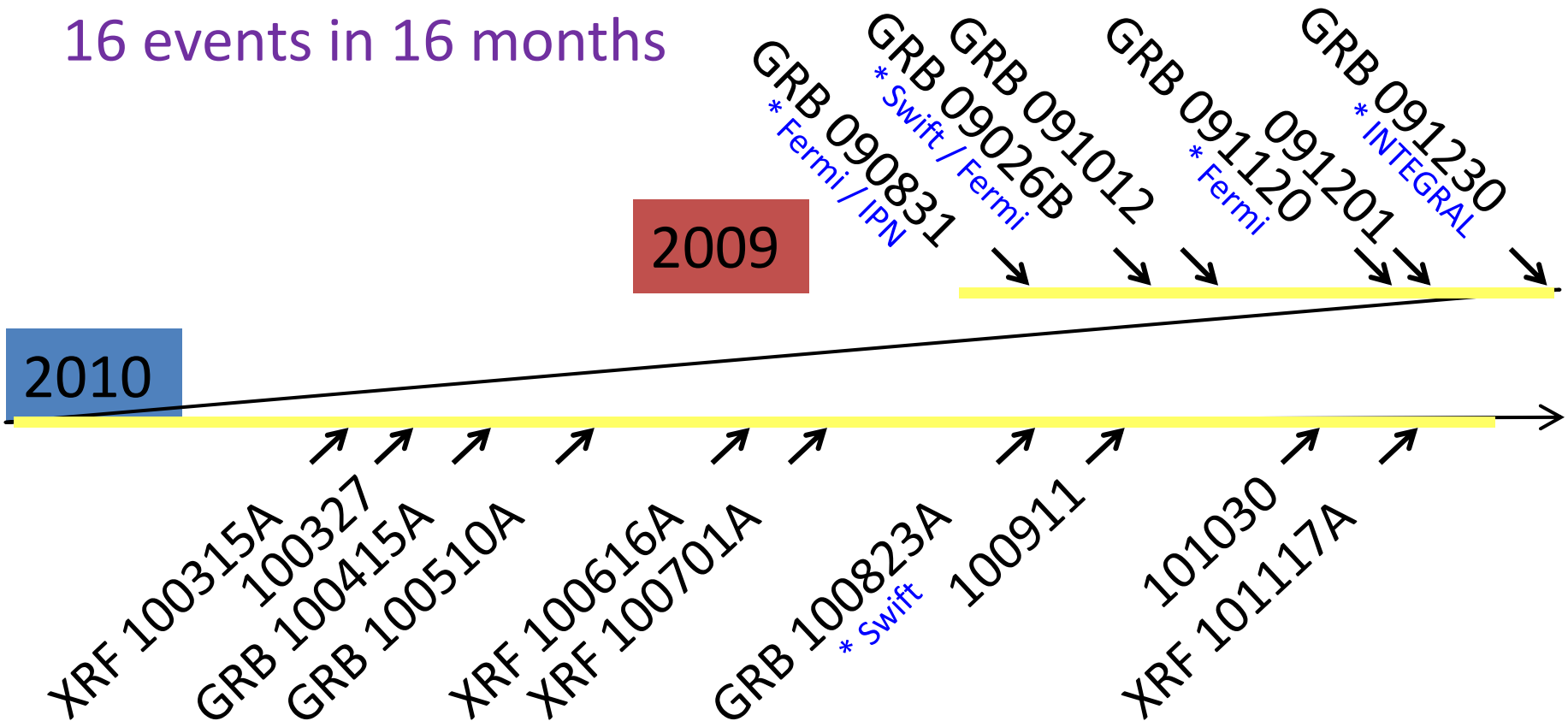


MAXI Summary on Burst
from Serino talk

- MAXI GSC detected **16** bursts in 16 months
- A study of flux and hardness distribution of MAXI bursts shows that GSC efficiently detect soft bursts (XRRs and XRFs)
- We can see good agreement in normalization with other instruments
- GRB 090926B has peculiar spectral shape and that may be a emission from photosphere of GRB fireball

MAXI bursts

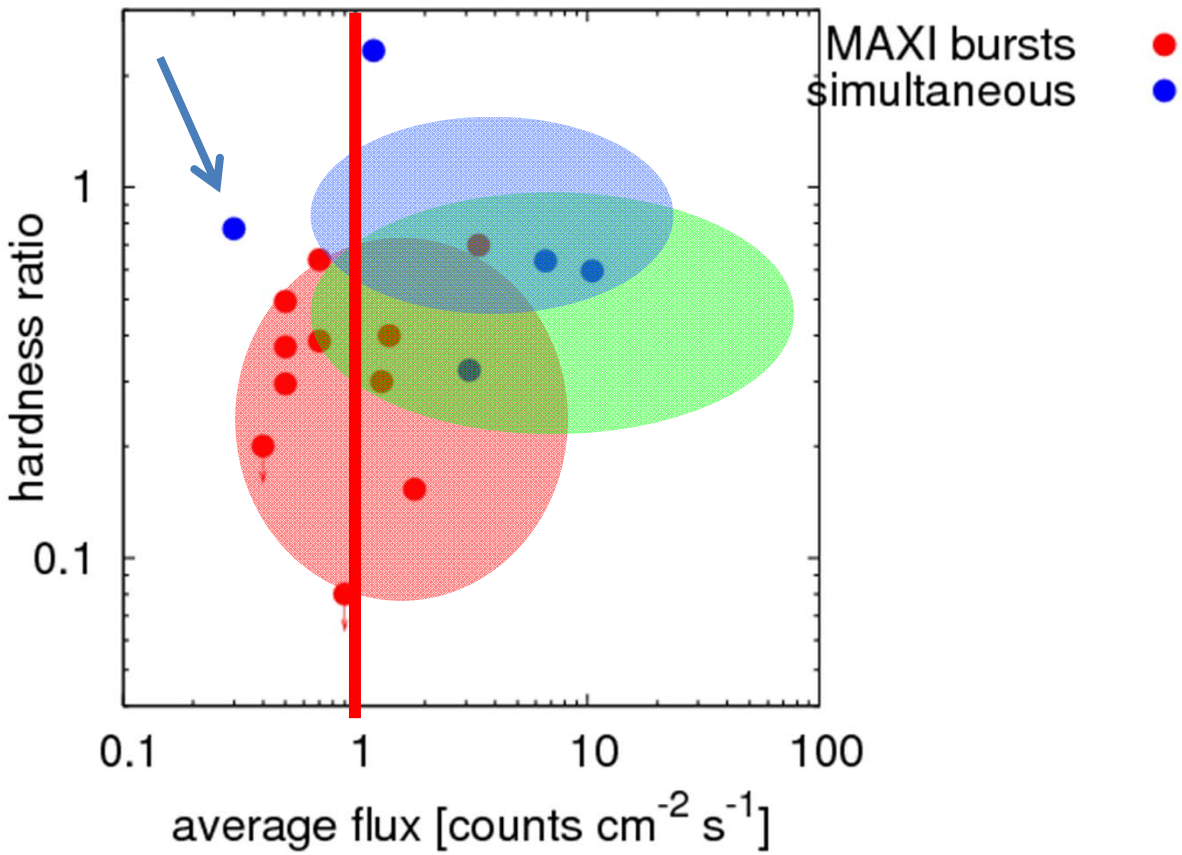
16 events in 16 months



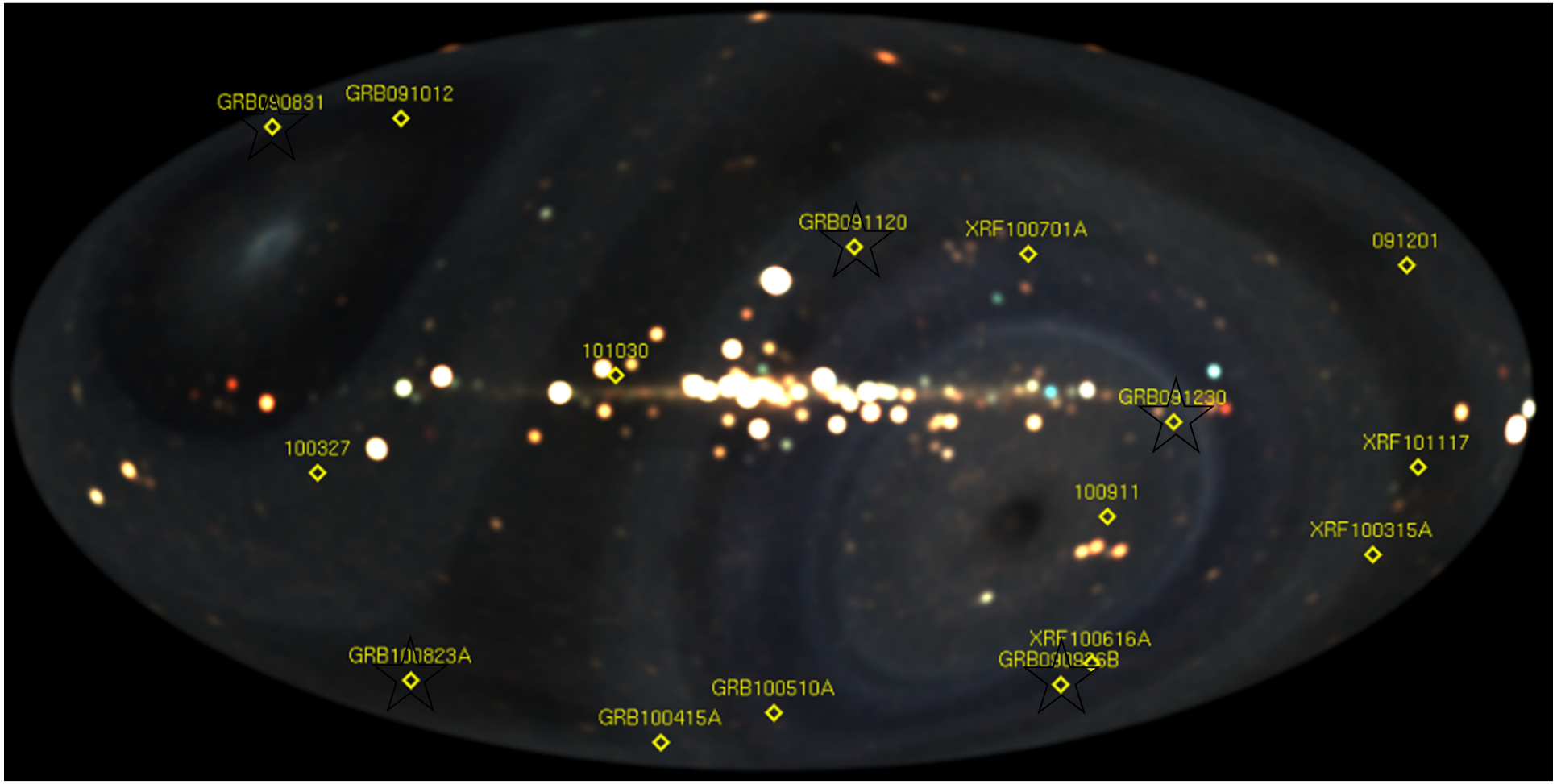
* 5 are simultaneously detected by other satellites

flux and hardness of MAXI bursts

- MAXI bursts and XRF/XRR/GRB classification
  - XRFs dominate!



MAXI bursts sky distribution



* 5 are simultaneously detected by other satellites

Event rate

- expected detection rate

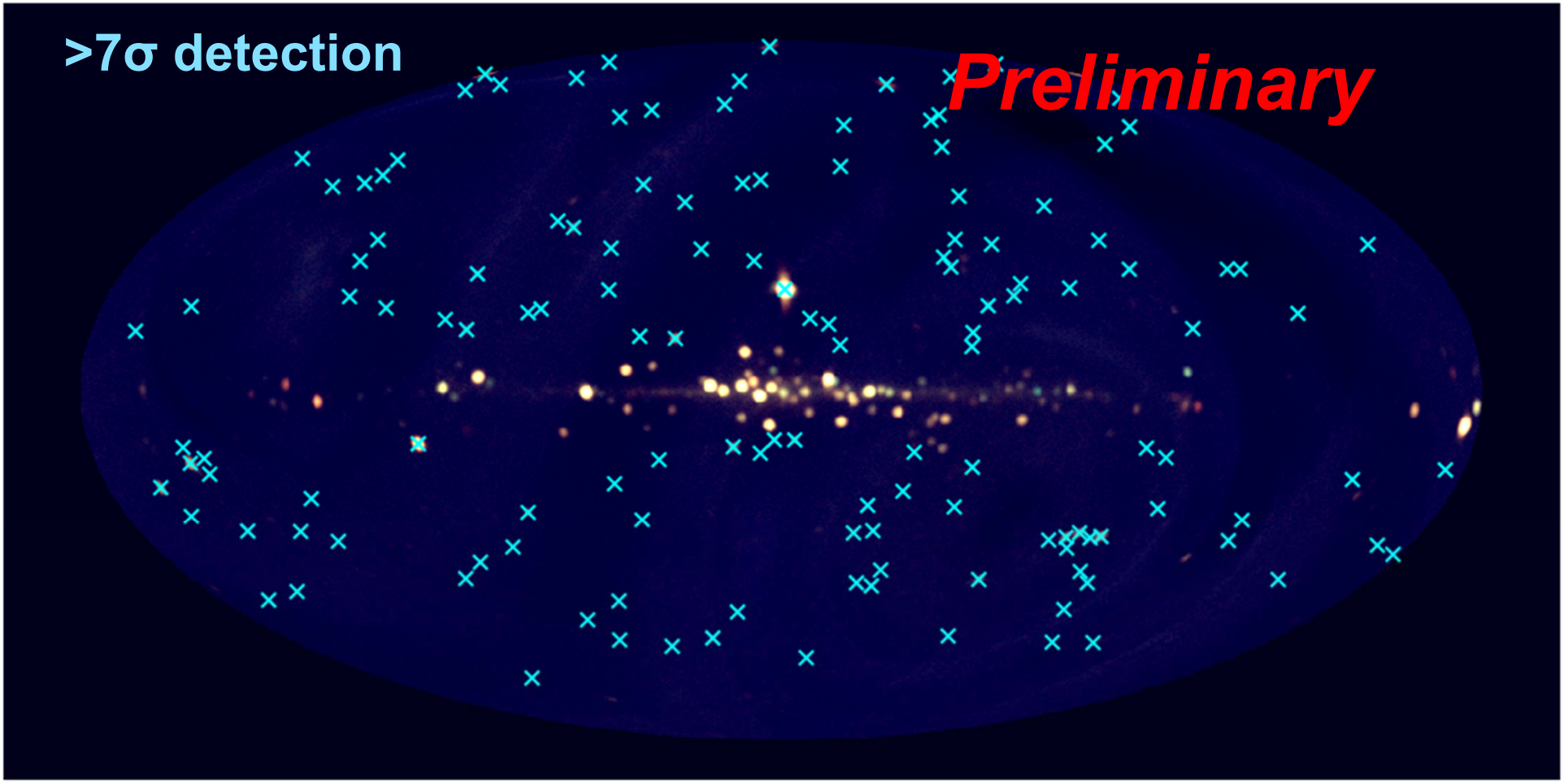
400	×	0.02	×	0.4	=	3.2 / yr
total number of bursts		instantaneous sky coverage of GSC		observation efficiency		

- actual detection rate **12 / yr !**
  - why??
- MAXI can detect soft events

MAXI Summary for AGNs

Results (|b|>10, 4-10 keV)

227 (136) sources above 5σ (7σ)



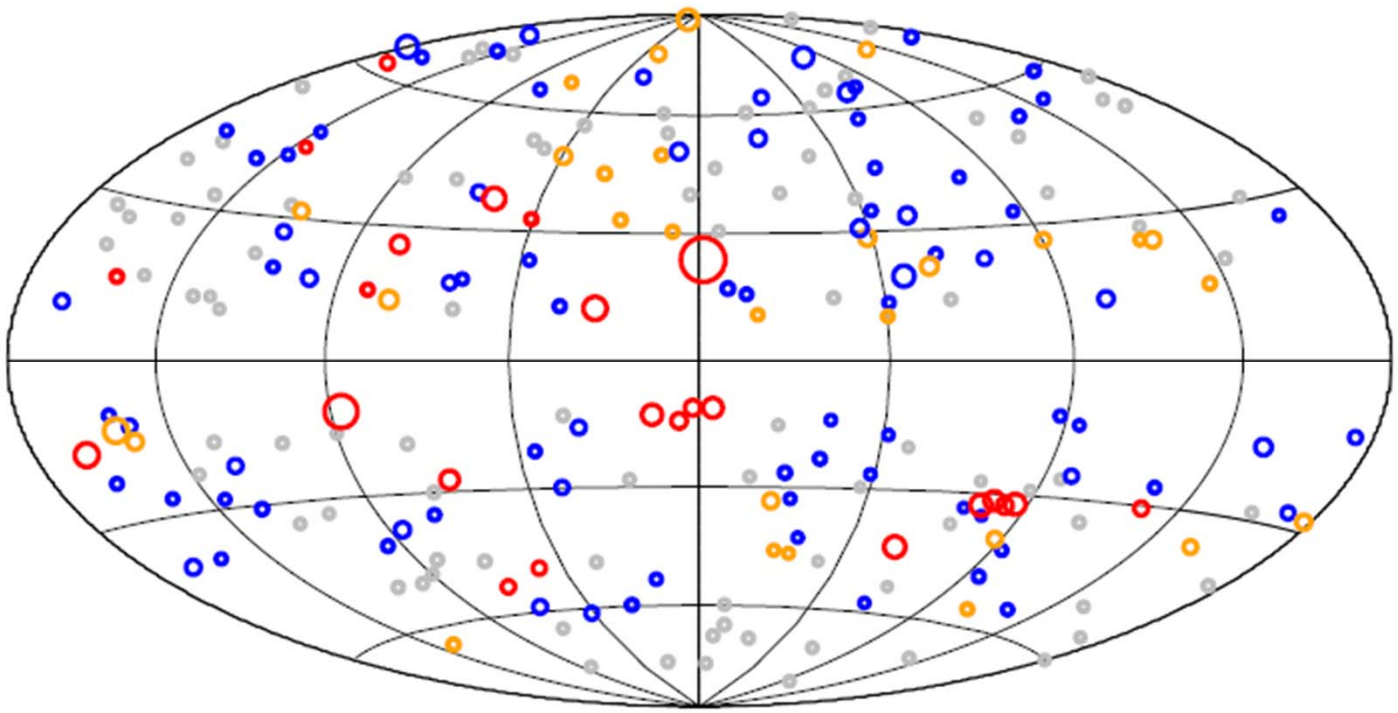
Cross Correlation with other Catalogs

MAXI total (>7σ)	136
Swift/BAT 58-months	69
Fermi/LAT 1 year	10
RASS (above 0.3 count/s)	75
at least one	95

Preliminary

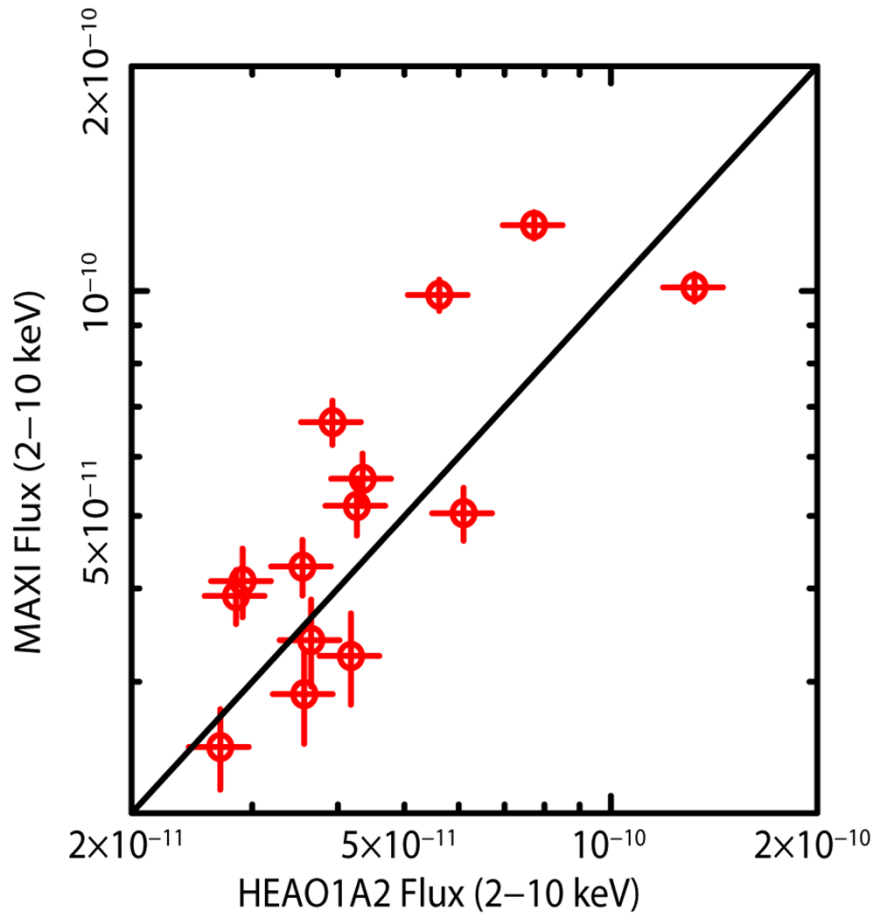
ID status

Galactic/MC objects (red)	23
Clusters of galaxies (orange)	29
AGN and unID (blue)	37+47



AGN: flux comparison with HEAO1

- **About half of the 31 AGNs in the HEAO1 A2 catalog (Piccinotti+ 1982) are *not* detected with MAXI above 7σ (with a better sensitivity than HEAO-1):**

  the list of "brightest AGNs" has changed dramatically from 30 years ago.

- **AGNs commonly detected with MAXI and HEAO1 show evidence for time variability in most cases**