XRISM X-Ray Imaging and Spectroscopy Mission

Current Status of XRISM/Xtend Transient Search

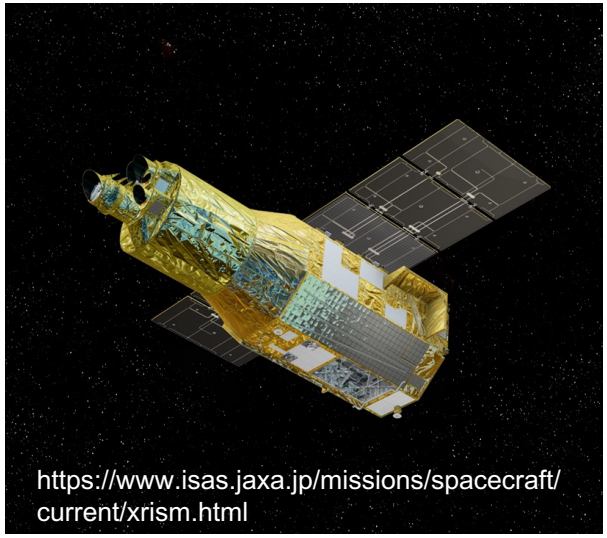
~ part of the XRISM science operations ~

Marina Yoshimoto (Ehime University)
on behalf of XTS team

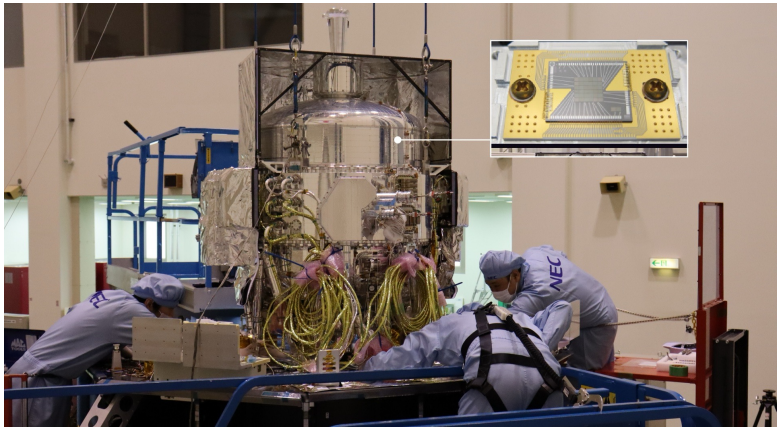
18 th IACHEC meeting, Pelham Germany, 20-23 April 2026

X-ray Imaging and Spectroscopy Mission (XRISM)

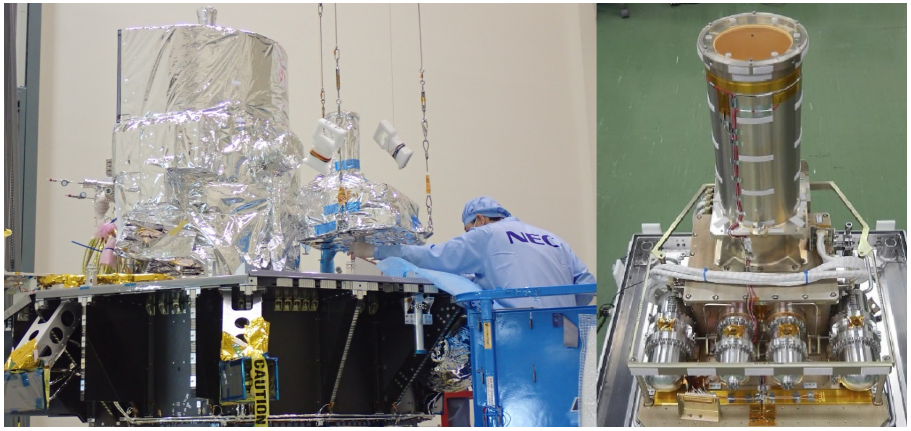
- launched: 2023/9/7 am 8:42:11 (JST)
- altitude: ~530 km
- orbital period: ~96 min
- category: **pointing satellite**
- instruments: Resolve (X-ray microcalorimeter)
  Xtend (X-ray CCD camera)


https://www.isas.jaxa.jp/missions/spacecraft/current/xrism.html

https://www.xrism.jaxa.jp/technology/



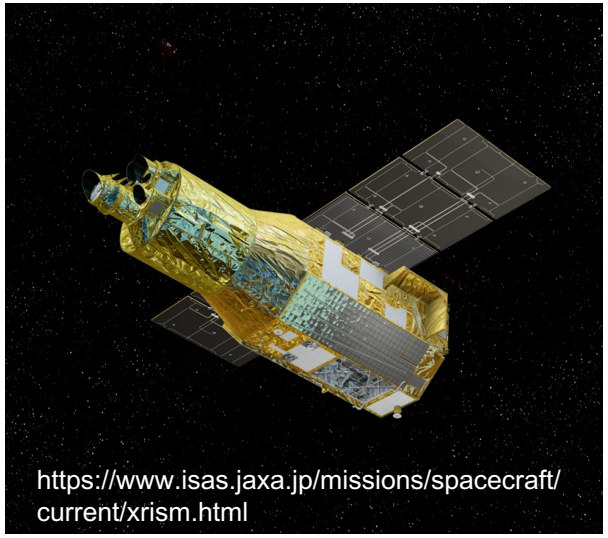
Resolve (2 − 12 keV)

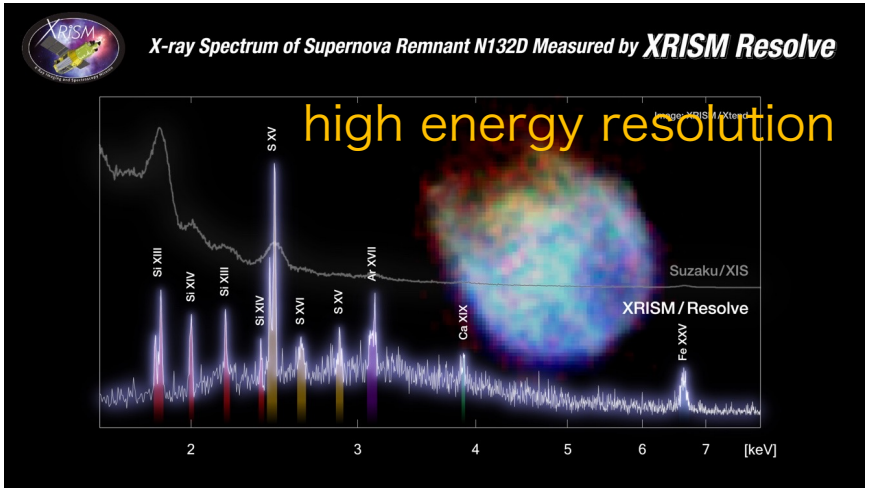


Xtend (0.4 − 13 keV)

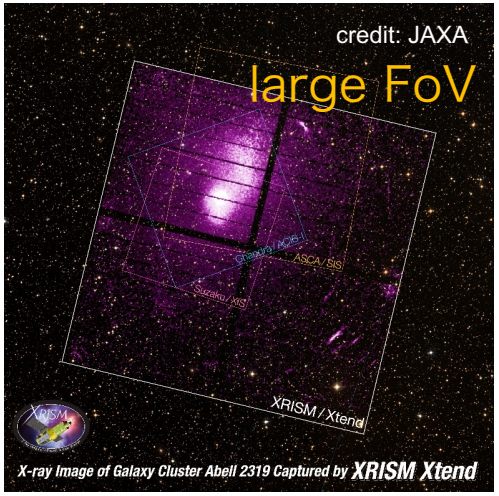
X-ray Imaging and Spectroscopy Mission (XRISM)

- launched: 2023/9/7 am 8:42:11 (JST)
- altitude: ~530 km
- orbital period: ~96 min
- category: **pointing satellite**
- instruments: Resolve (X-ray microcalorimeter)
  Xtend (X-ray CCD camera)



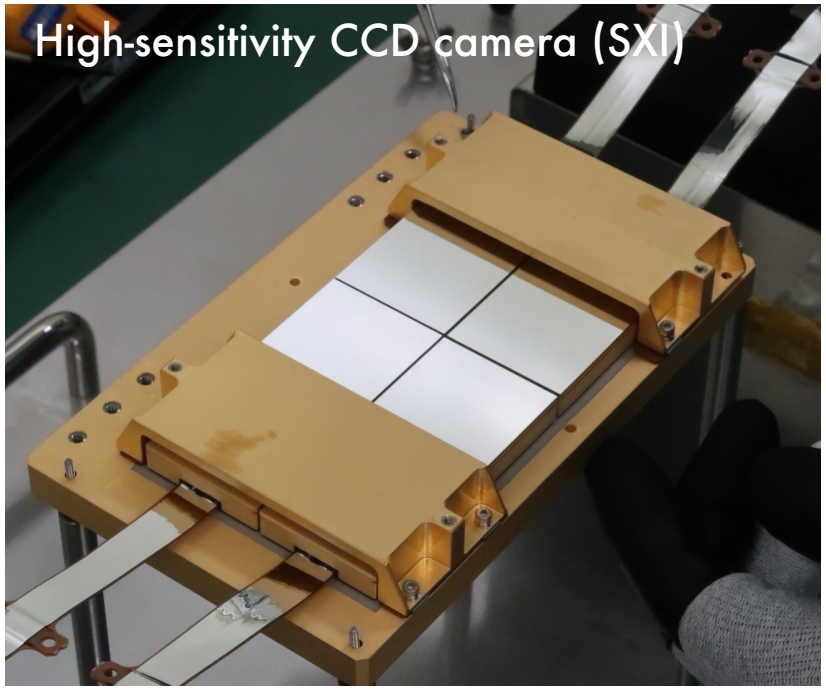


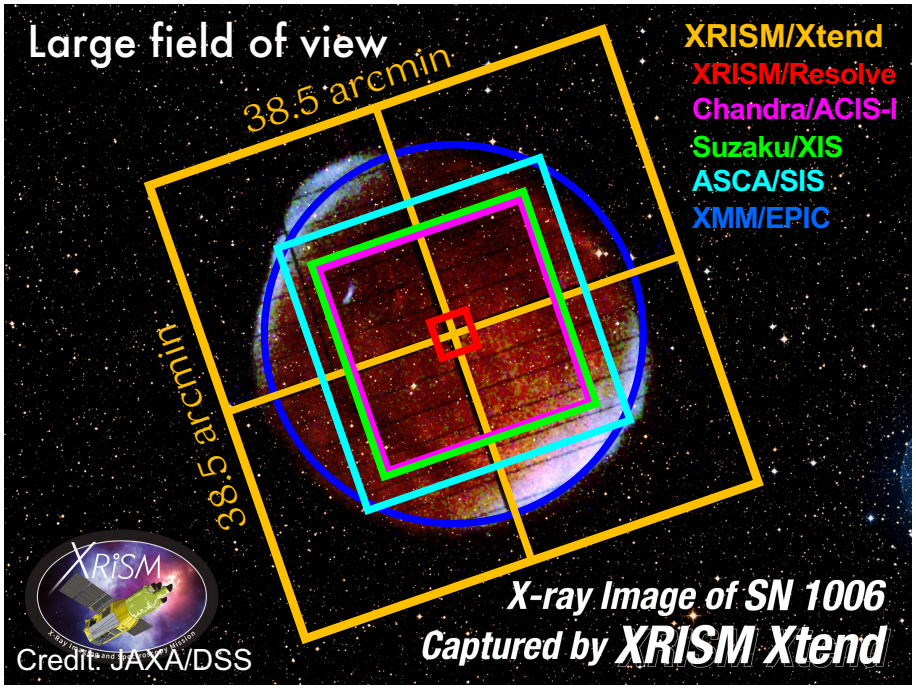
Resolve (2 − 12 keV)



Xtend (0.4 − 13 keV)

XRISM/Xtend Transient Search (XTS)





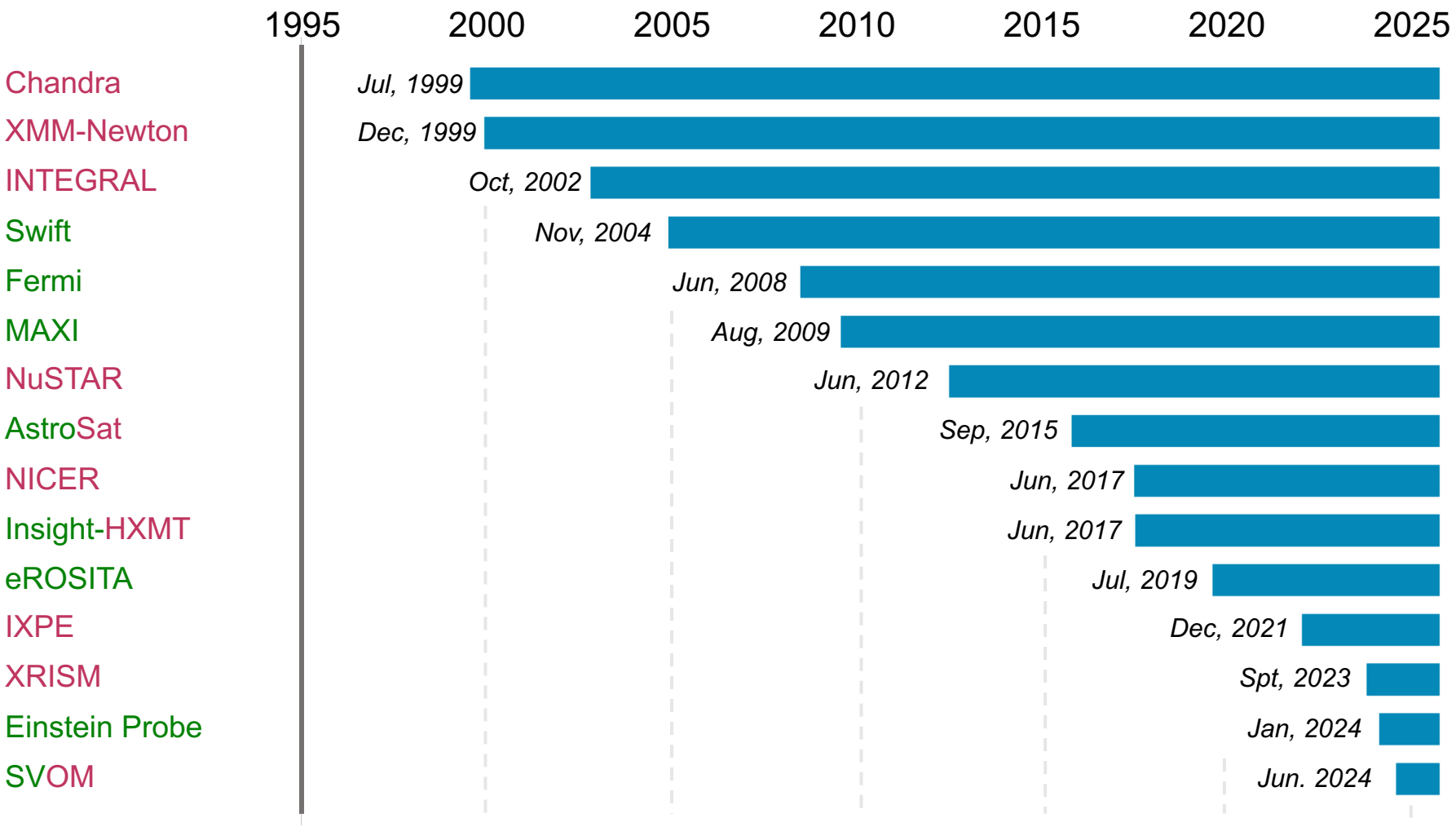
- is a science activity to
  - ① search for X-ray transients in the Xtend FoV of 38.5^2 arcmin^2 during a pointing observation
    (except for target sources in the Resolve FoV of 3^2 arcmin^2)
  - ② rapidly ($\lesssim$ 3 days) report on the detected transients via the Astronomer's Telegram (ATel)

  ☆ **unique to use a pointing instrument rather than a survey instrument for transients**
- systematic operation began since March 2024, and we currently have ~40 members

Time-domain astronomy with XRISM/Xtend!

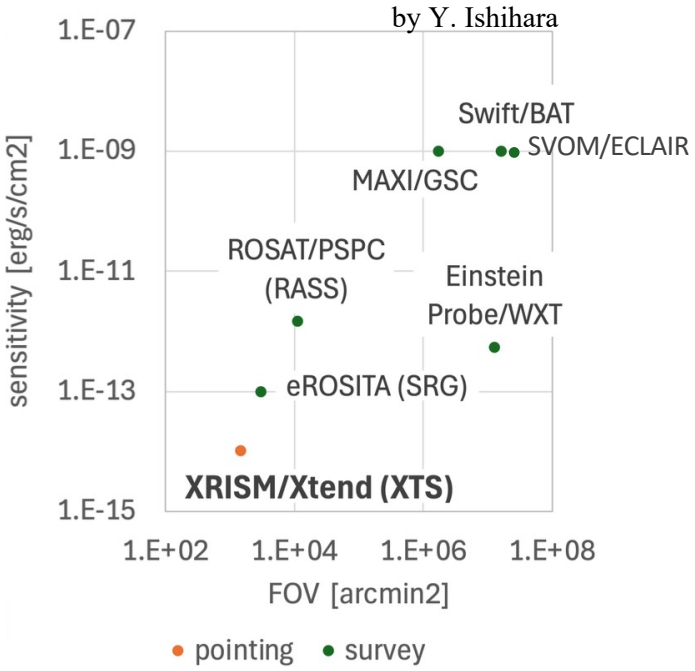
Active X-ray instruments

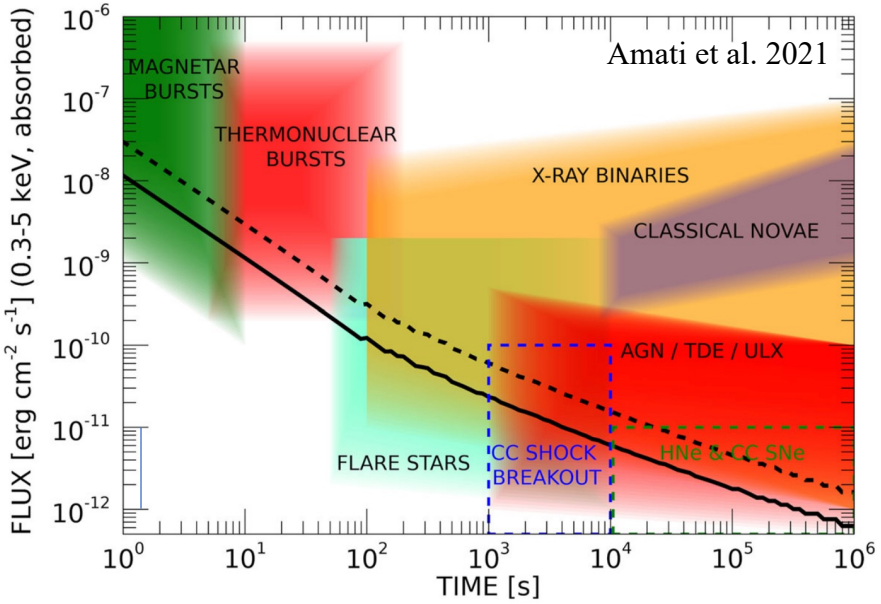
※ energy ~10 keV, except for CubeSat



About half pointing instruments and half survey instruments

XRISM/Xtend Transient Search (XTS)

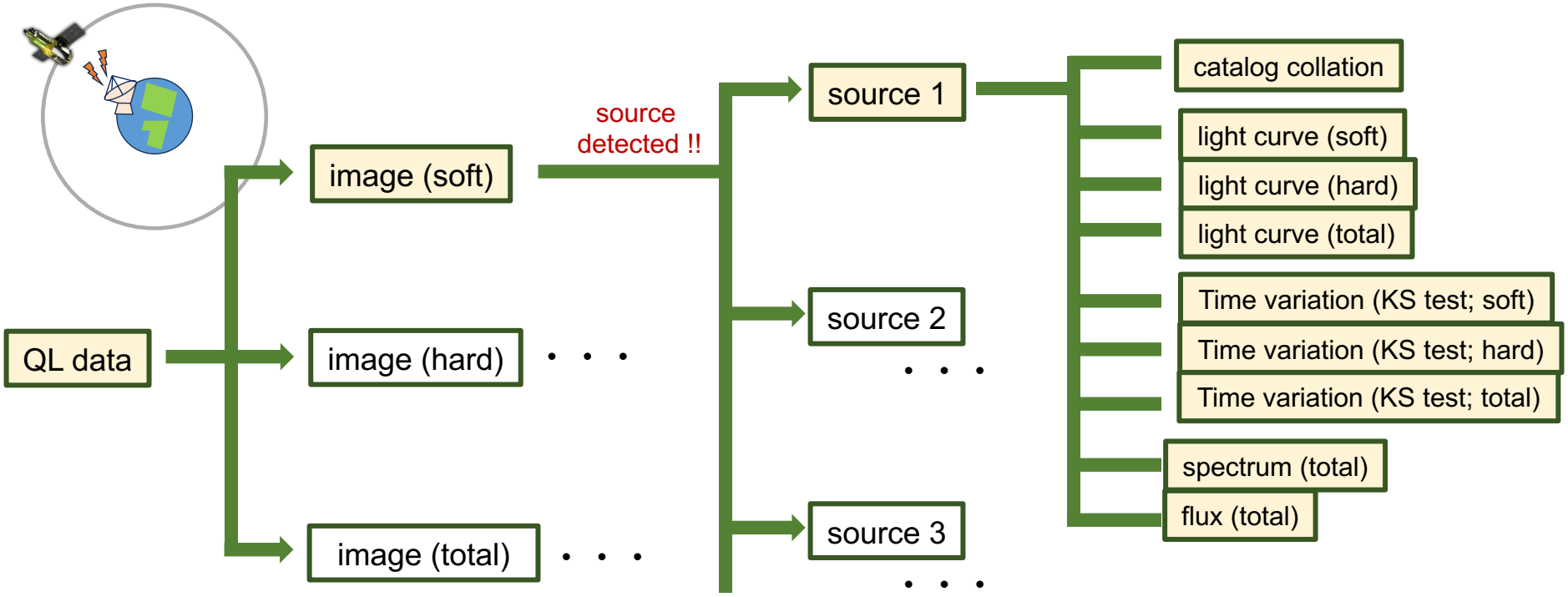




- Benefits from using the pointing instrument Xtend
  - long exposure time of observation & large mirror = high sensitivity
    - ⇨ detect faint transients (Xtend > 10^{-14} erg cm^{-2} s^{-1} with 50 ks exp.)
    - ⇨ observe a long trend of transients
  - one of the largest FoV among pointing instruments
    - ⇨ detect new faint sources

- Scientific targets
  - all transients
    - stellar flares, outbursts of binaries, tidal disruptions of AGNs, ... etc.

XTS process



- The system searches for sources automatically once a day after data downlink, with a PI permission
  - Extract images in three energy bands
    - soft band (0.4−2 keV), hard band (2-10 keV), total band (0.4-10 keV)
  - Perform wavelet search on each image
  - Extract light curves and spectra, do catalog matching, flux calculations, and time variation check

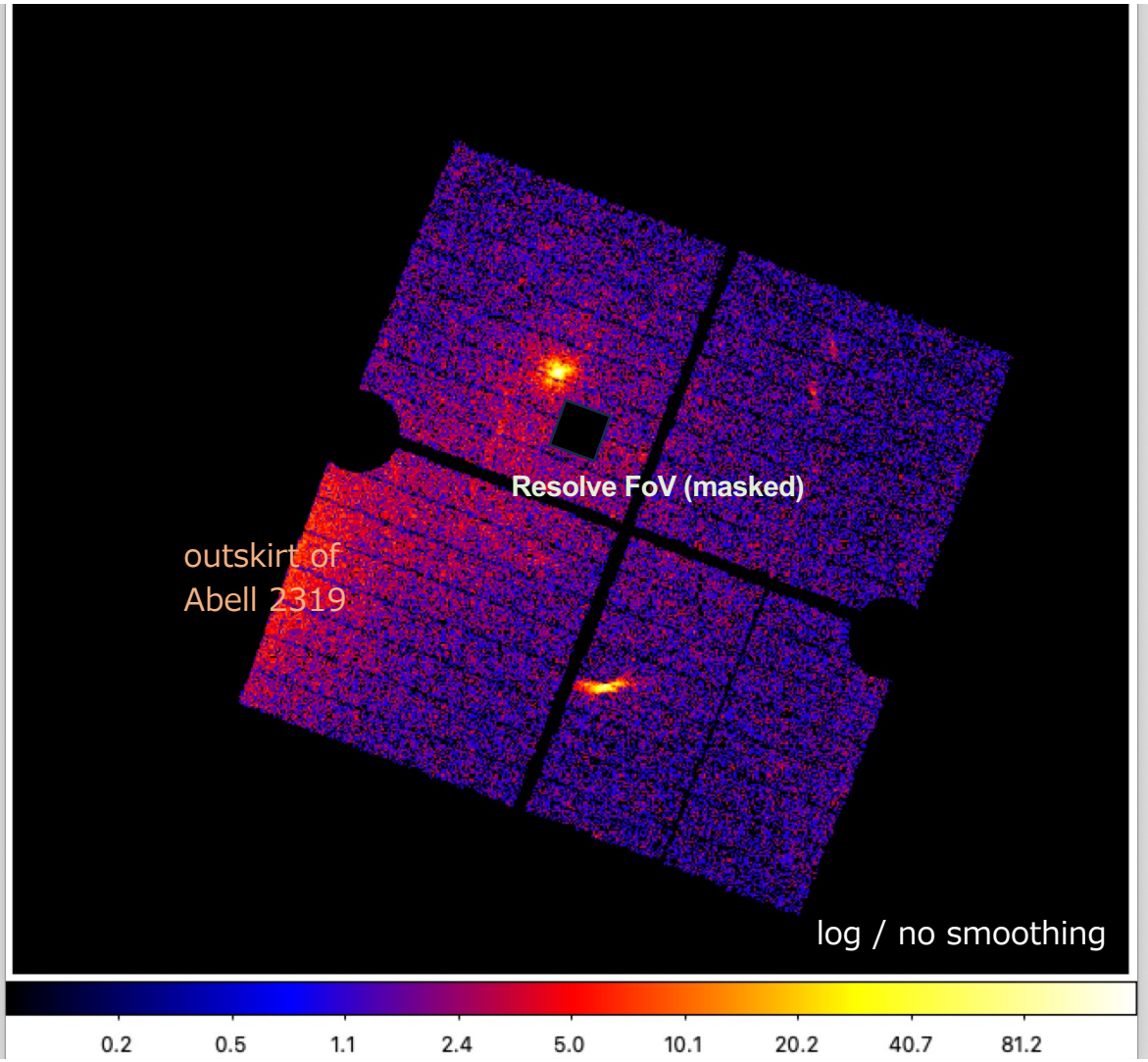
- XTS members confirm the products for transients and decide whether to report via the ATel
  - ◎ **flare or outburst**
  - ◎ **flux has increased by one order of magnitude compared to catalog fluxes from the past**

Initial Operation

- example

Abell 2319 Blank Sky

- exposure: 50 ks
- full window mode
- energy range: 0.4 – 10 keV



Initial Operation

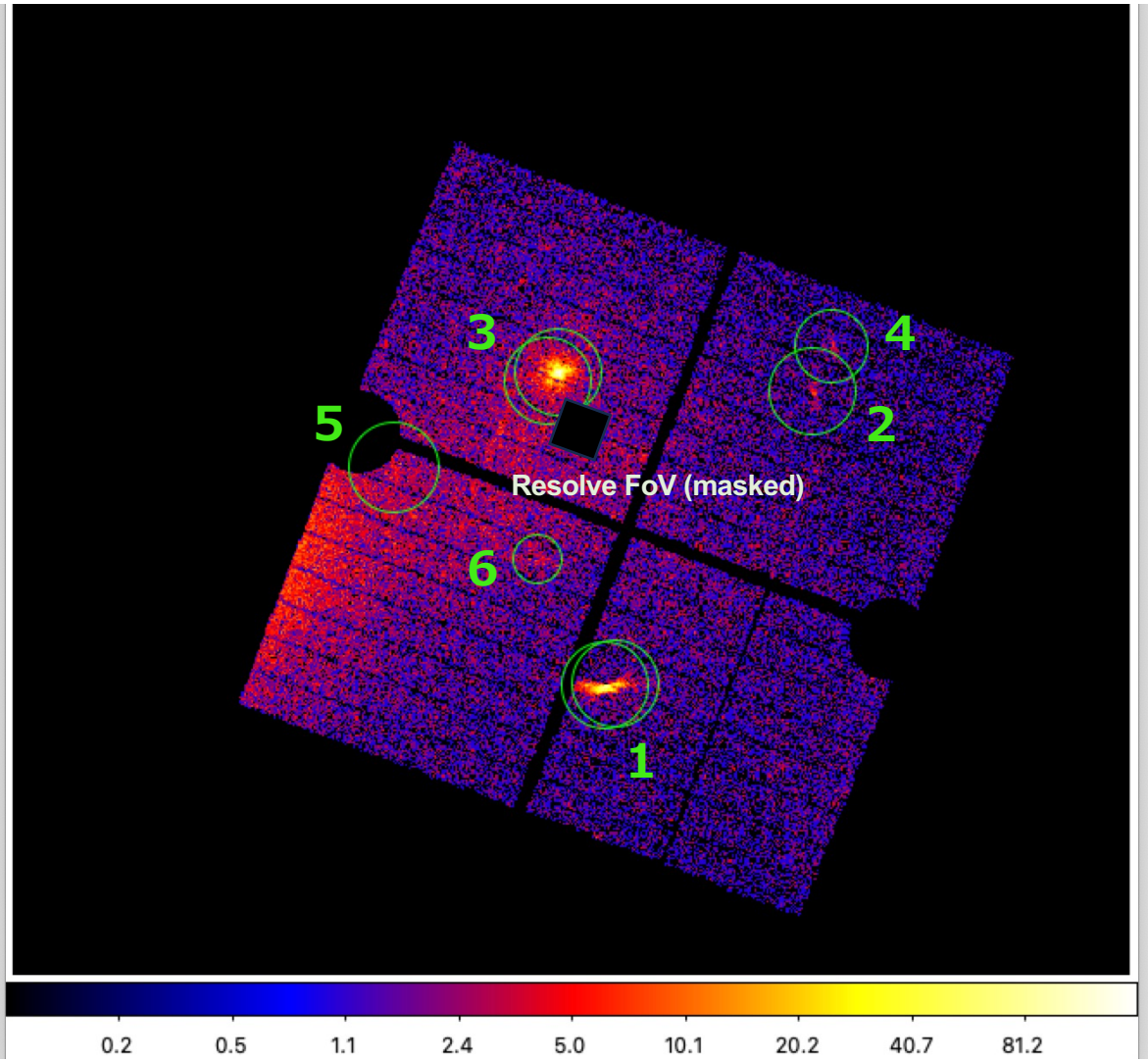
- example

Abell 2319 Blank Sky

- exposure: 50 ks
- full window mode
- energy range: 0.4 − 10 keV

■ Results

- **Detection of 6 sources (8 regions)**
- corresponding object in the 4XMM, 2SXPS, or 2RXS catalog



Initial Operation

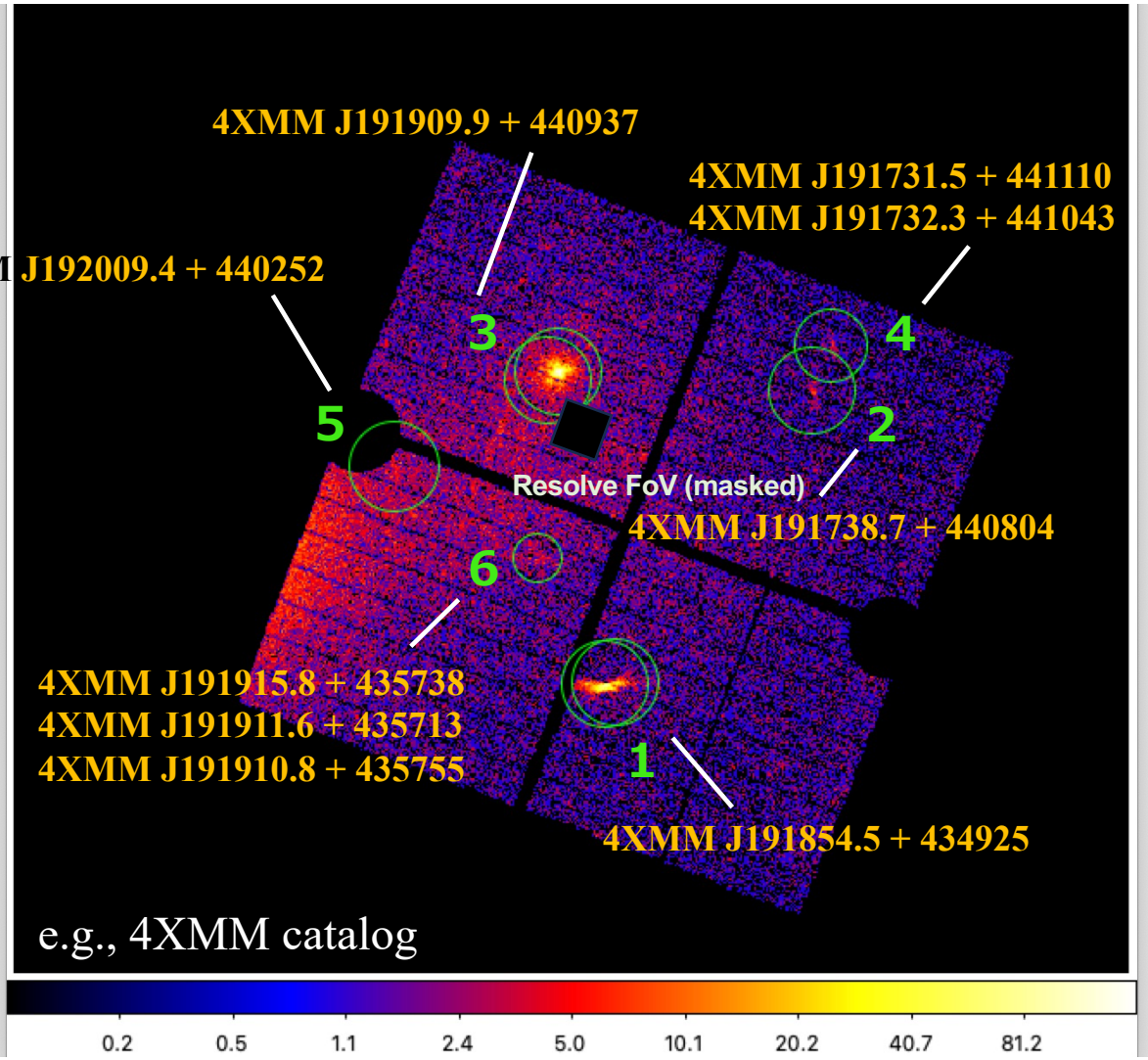
- example

Abell 2319 Blank Sky

- exposure: 50 ks
- full window mode
- energy range: 0.4 − 10 keV

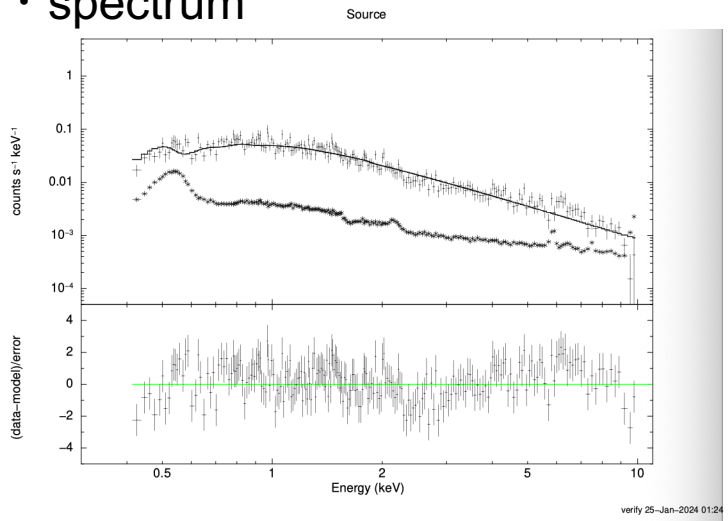
■ Results

- **Detection of 6 sources (8 regions)**
- corresponding object in the 4XMM, 2SXPS, or 2RXS catalog

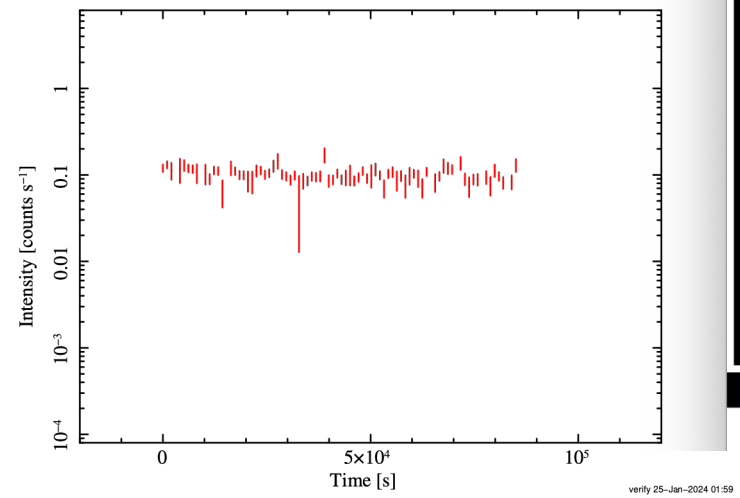


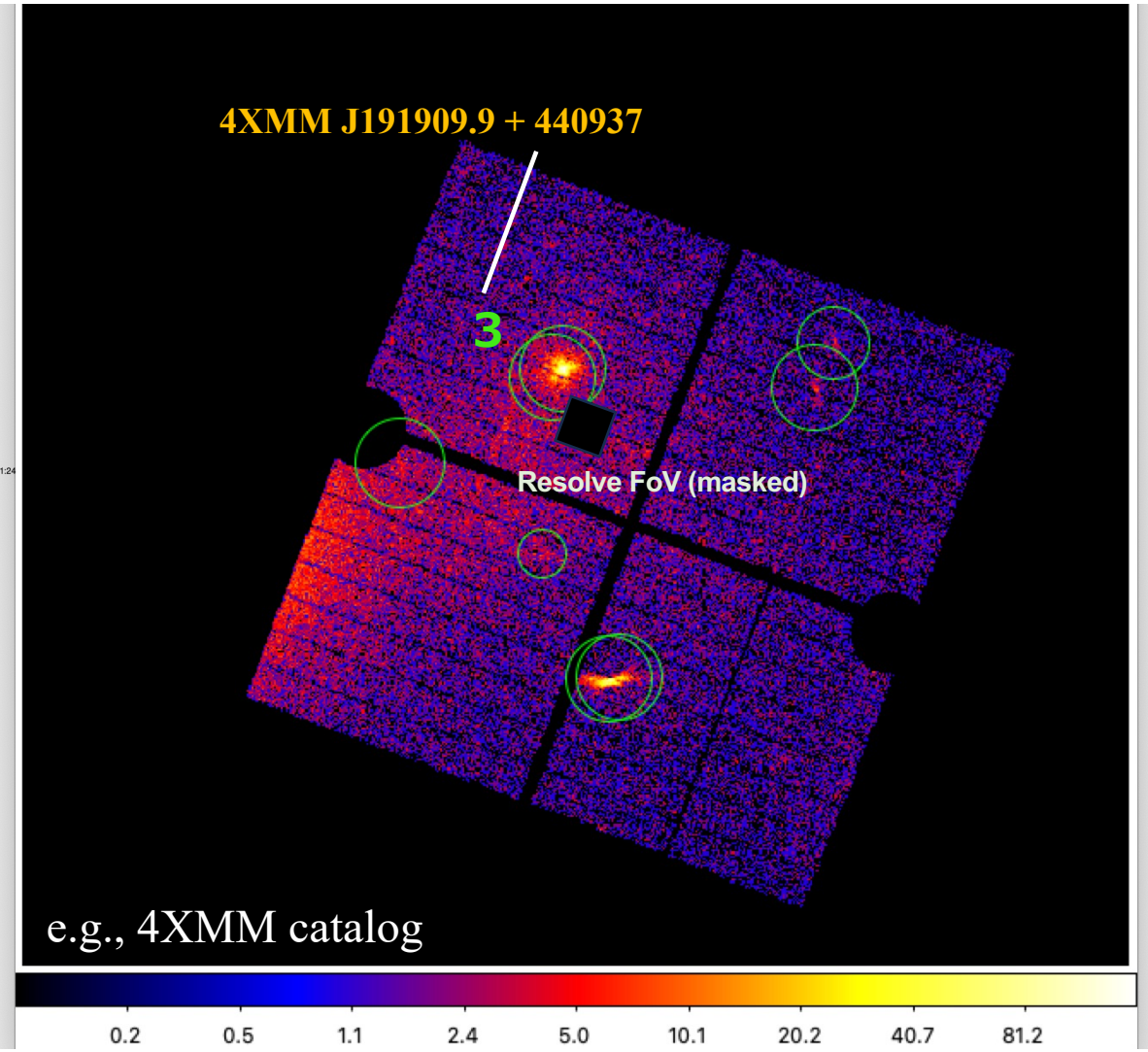
Initial Operation

- spectrum



- light curve

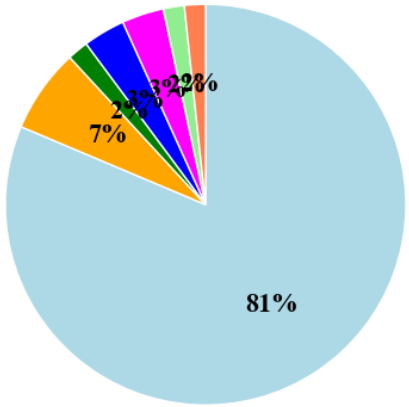




XTS results

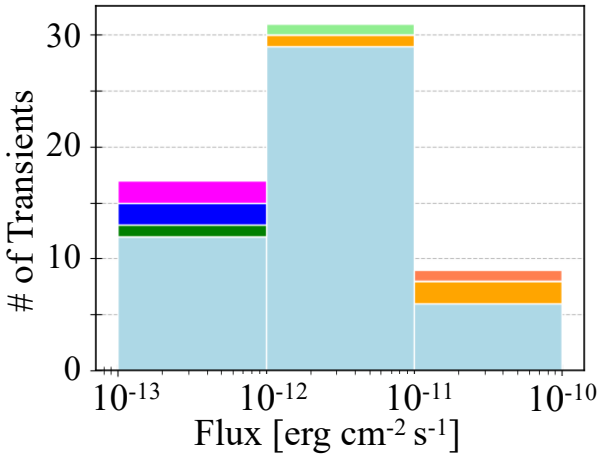
from 15 Mar 2024 to 16 Apr 2026

➢ Type



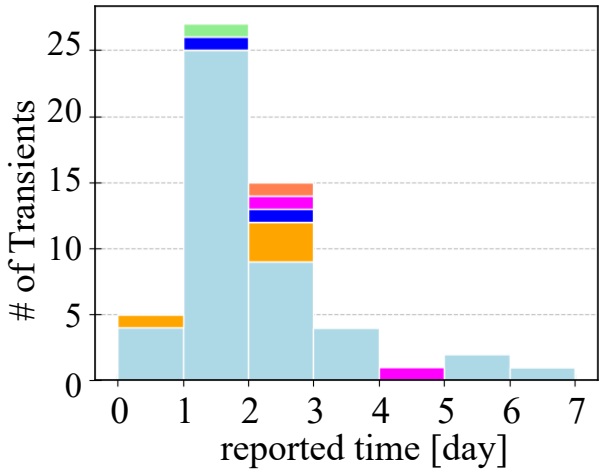
➢ Flux (0.4 − 10 keV)

※ except for an upper limit



➢ Reported time

※ except for follow-up obs.



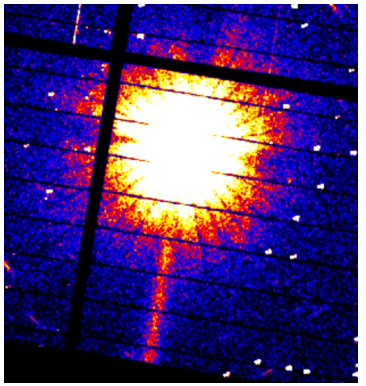
stellar or YSO flare　outburst　supernova (ToO)　AGN　unknown
GRB candidate　state transition

- We have reported 59 transients via 58 ATels
  - stellar or YSO flares were 81%
- peak flux > 10^{-13} erg cm^{-2} s^{-1} (0.4−10 keV)
  - 3 order of magnitude lower than MAXI detection
- The fastest reported time from transient start was 15 hours, generally within 3 days

XTS ATel list

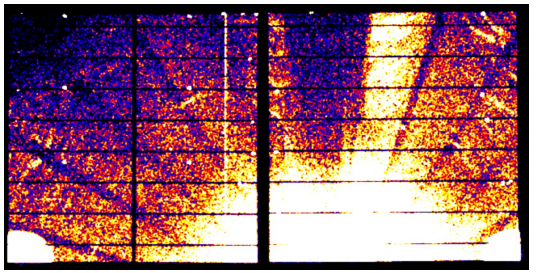
Lessons Learned

- utilizing the pointing satellite XRISM for transient search



① transient rate depends on pointing FoV

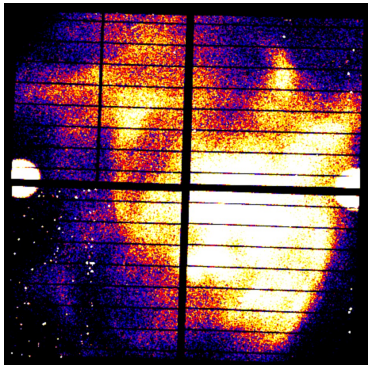
② using onboard attitude (for QL data)
- less accuracy results in a blurred image
  ⇨ should check a DET image



③ pseudo sources

out of time events, flickering pixels, stray light, and diffuse emission

⇨ should check an image



※ PL data

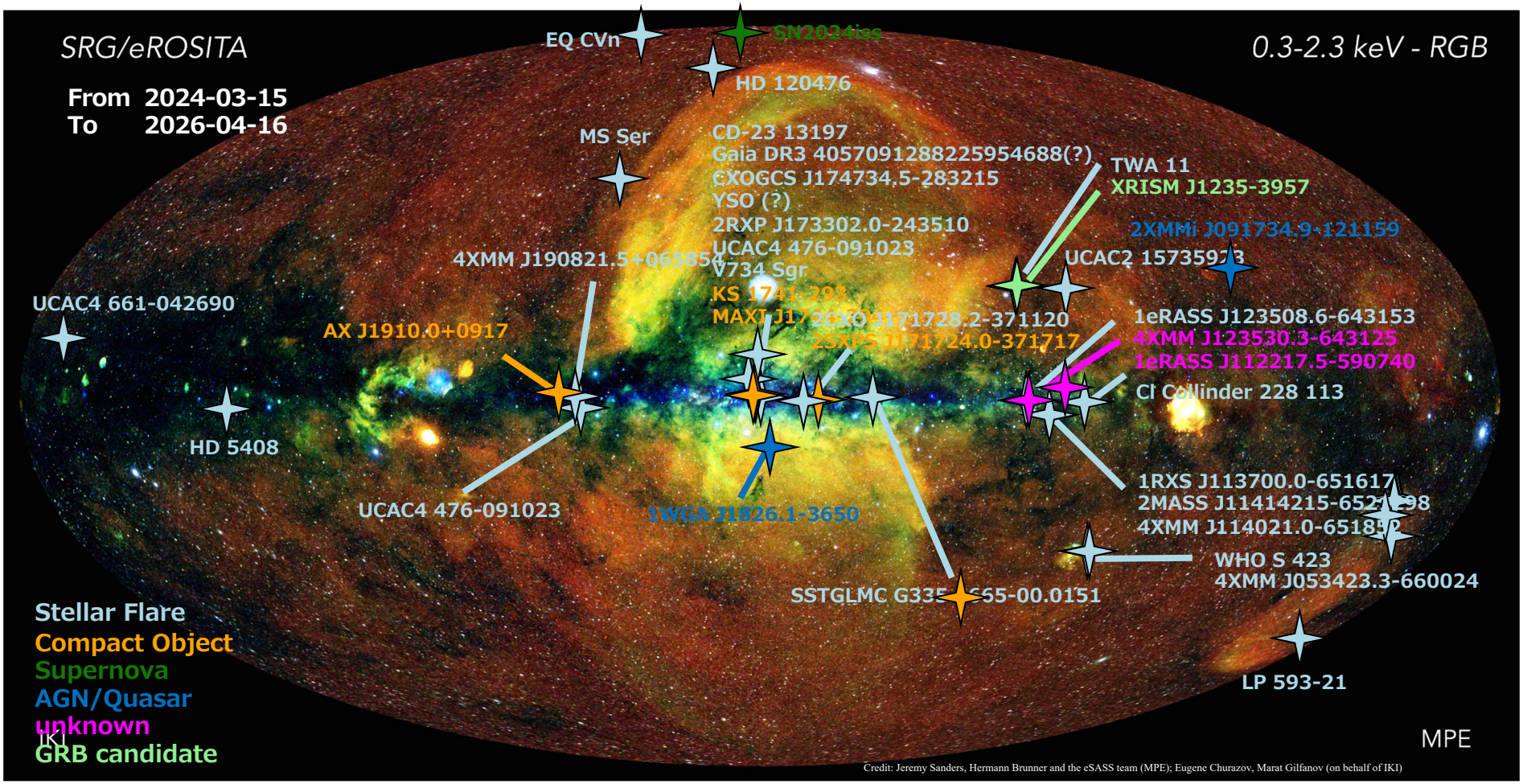
④ arf generation costs too much time

⇨ introduce arf library

(off axis angle: 1arcmin step, region radius: 12 arcsec step)

XTS sources

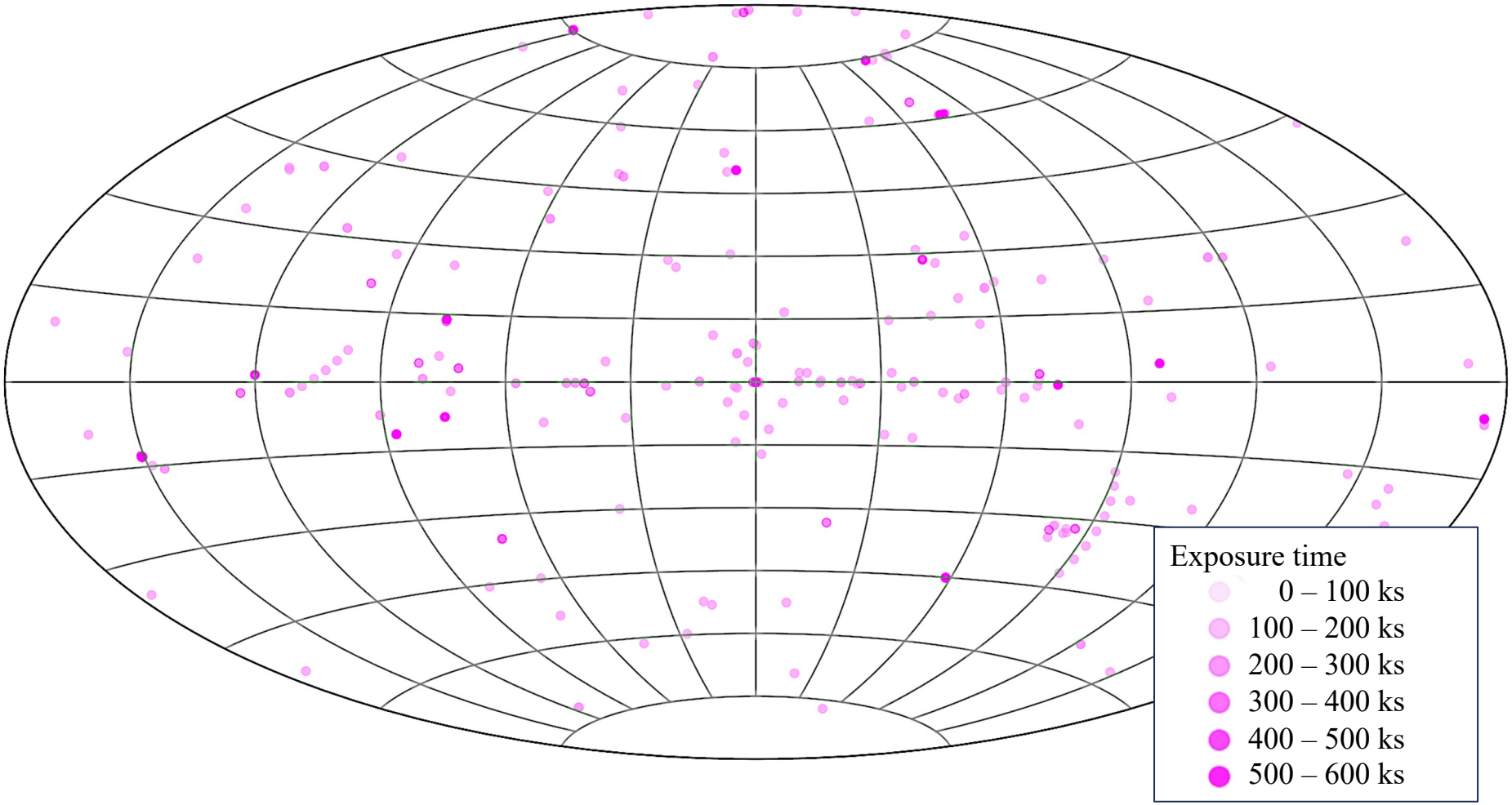
as of 16 Apr 2026



XRISM pointing FoV

as of 16 Apr 2026, by Y. Ishihara

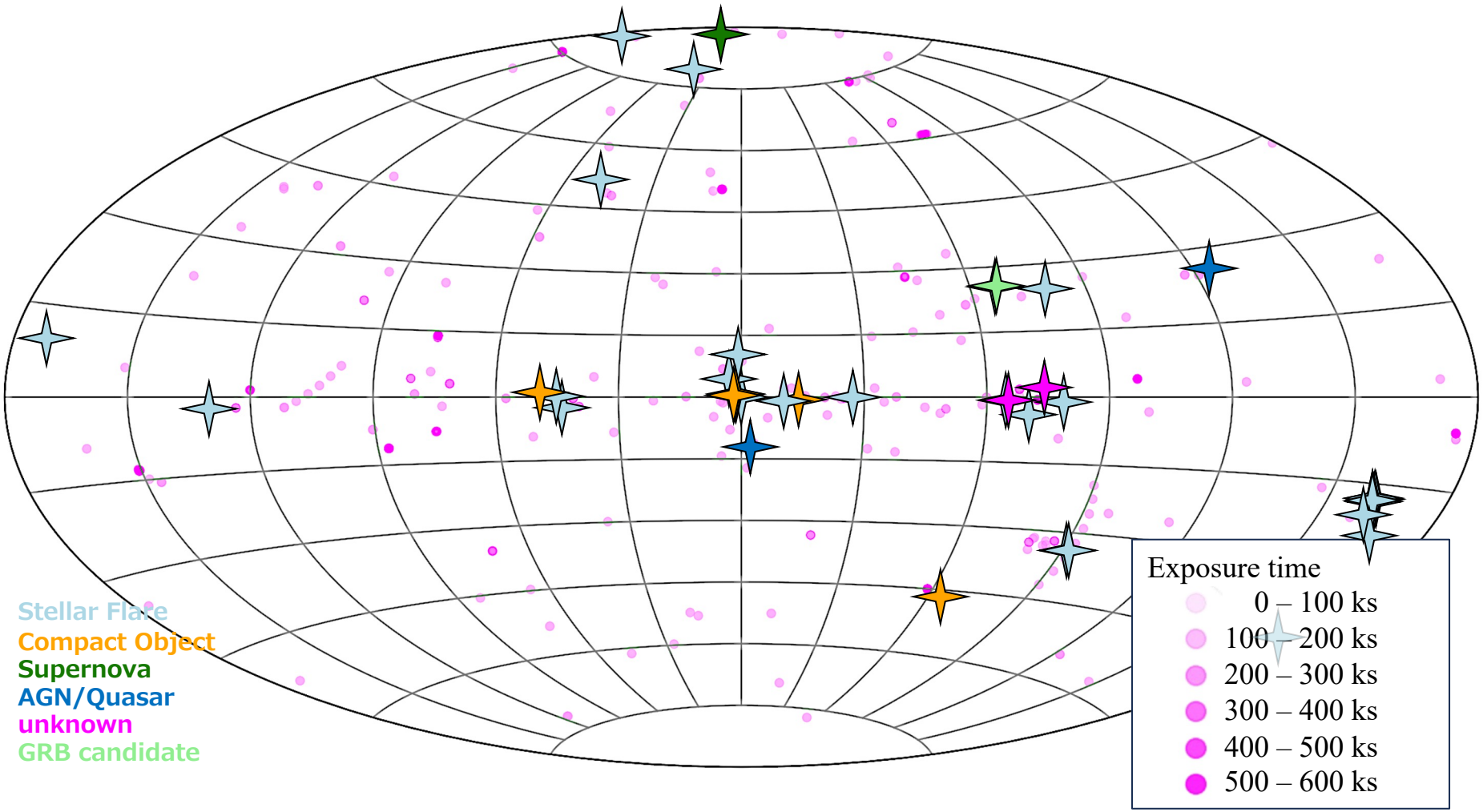
XTS results depend on pointing FoV of Xtend.



XRISM pointing FoV

as of 16 Apr 2026, by Y. Ishihara

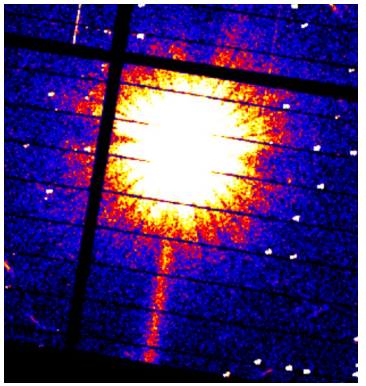
XTS results depend on pointing FoV of Xtend.



Many transients have been detected within our galaxy.

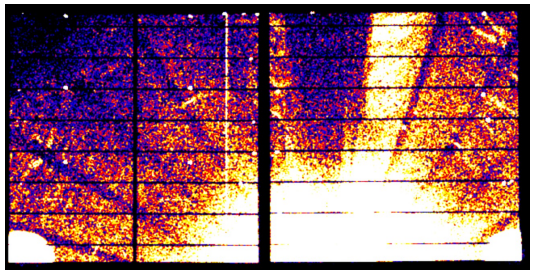
Lessons Learned

- utilizing the pointing satellite XRISM for transient search



① transient rate depends on pointing FoV

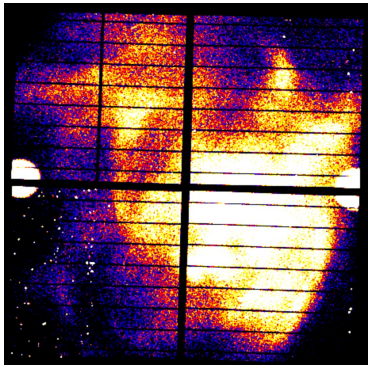
② using onboard attitude (for QL data)
- less accuracy results in a blurred image
  ⇨ should check a DET image



③ pseudo sources

out of time events, flickering pixels, stray light, and diffuse emission

⇨ should check an image



※ PL data

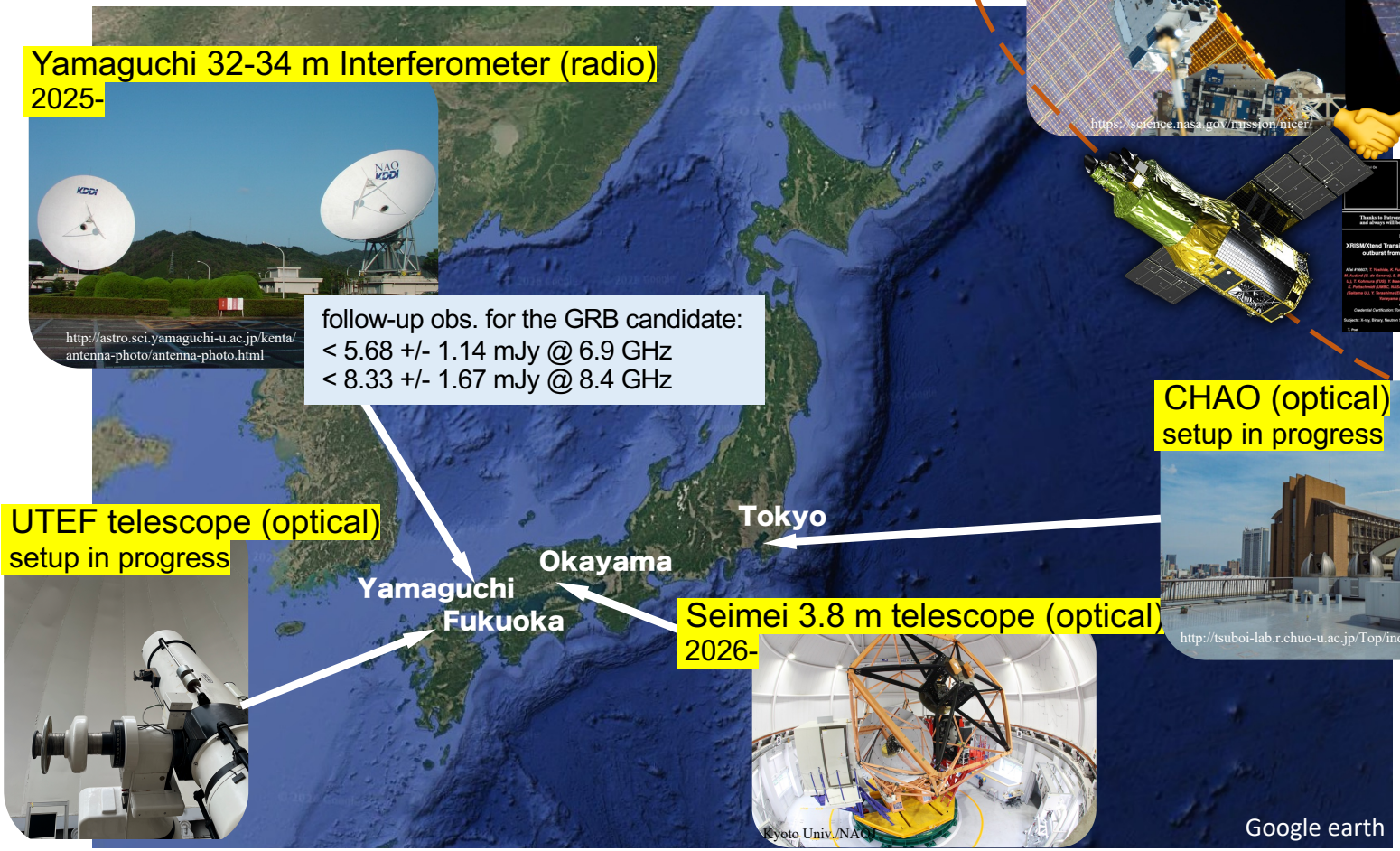
④ arf generation costs too much time

⇨ introduce arf library

(off axis angle: 1arcmin step, region radius: 12 arcsec step)

Follow-up observation network

- establishing the “Japan XTS network”



- Japanese network only covers northern sky
- International collaborations are welcome!

Summary

- XRISM/Xtend Transient Search (XTS)
  - is a science activity to
    ① search for X-ray transients in the Xtend FoV during a pointing observation
    ② rapidly ($\lesssim$ 2 days) report on the detected transients via ATel
  - have reported 59 transients since March 2024
  - has learned lessons of transient search using a pointing satellite over two years of operation
  - establishing follow-up observation network