The Survey Science Centre report to the XMM-Newton Users Group

Natalie Webb

Topics

- SSC activities

- 4XMM (DR10 & DR10s)

- XMM2ATHENA

- Classifying 4XMM and citizen science

- Future catalogues and products

- Summary

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SSC Activities

- Regular teleconferences with 8 SSC points of contact

- Continued SAS task development + support

- Continued data products screening

- Ongoing source identification activities

- Enhancement of catalogue servers

- Updating XMM-SSC webpages

- Continued input into SAS and pipeline development via monthly SAS-CCB and SASWG meetings

- Outreach projects

- Release of 4XMM (DR10 & DR10s, 10th December 2020)

- Increased funding through H2020 programme XMM2ATHENA

XMM2ATHENA

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4XMM-DR10

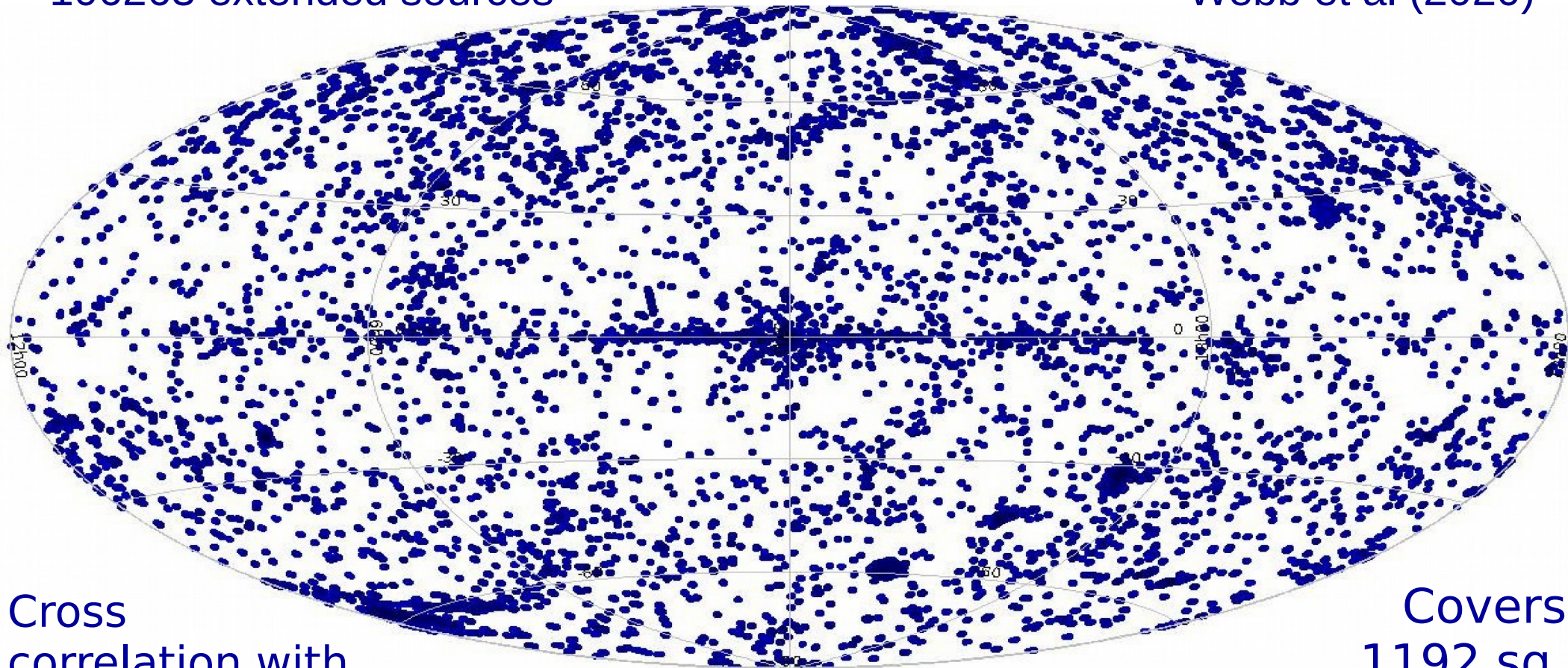3 February 2000 – 14 December 2019   Released : 10th December 2020
849991 detections, 575158 unique sources - detected up to 74 times
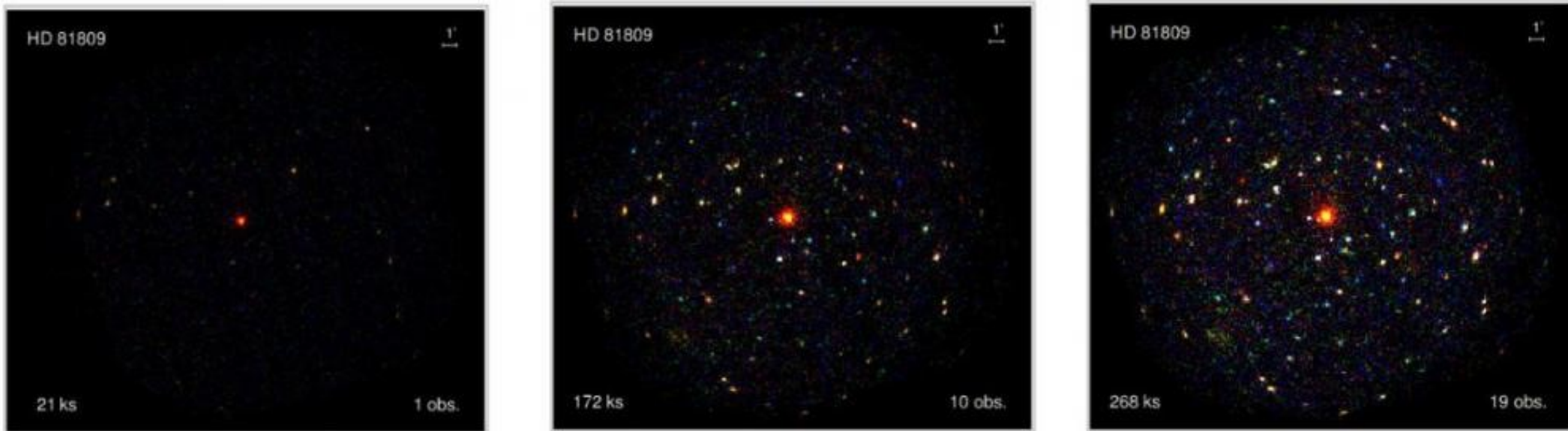303023 (36%) sources with spectra and lightcurves
106263 extended sources   Webb et al (2020)

Cross
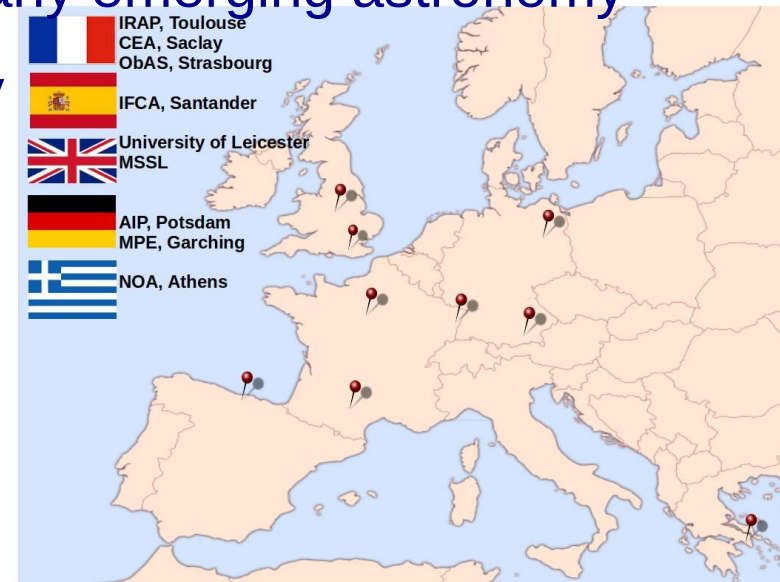correlation with
222 catalogues

Covers
1192 sq.
deg of sky

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4XMM-DR10s

- 1396 stacks
- 7803 observations
- 335 812 sources
- ~20% new sources with respect to 4XMM-DR10

Traulsen et al. 2020

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XMM2ATHENA

- XMM-Newton observing the X-ray, UV and optical sky for 20 yrs

- Astronomy has evolved, rarely look at individual sources, but populations

- No longer content to use a single wavelength, but multi-wavelength and multi-messenger information help us understand the X-ray sources

- Moving into an era of time domain astronomy

- This means operating our observatories differently

- New software + methods needed to accompany emerging astronomy

- To then be used by the next generation X-ray observatory, Athena

- XMM2ATHENA benefits from the XMM-Newton SSC, key members of the Athena Science ground segment + members of the X-ray community

IRAP, Toulouse
CEA, Saclay
ObAS, Strasbourg

IFCA, Santander

University of Leicester
MSSL

AIP, Potsdam
MPE, Garching

NOA, Athens

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XMM2ATHENA

Complimentary skills will allow us to develop+test new methods/software :

 - to follow the X-ray transient sky in quasi-real time

 - to identify multi-wavelength/messenger counterparts of X-ray sources

 - to determine their nature using advanced machine learning methods

 - to probe the faintest sources using innovative stacking and detection

Provide added value products to the XMM-Newton archives

Newly detected/identified sources will enhance our preparation of the X-ray sky that will be observed with Athena

Employ post-docs to whom we can pass on our skills and expertise

XMM2ATHENA

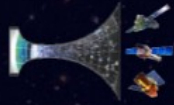## Work packages

http://xmm-ssc.irap.omp.eu/xmm2athena/

1. Administration

2. Multi-wavelength/multi-messenger counterpart

3. Sensitivity estimator

4. Enhanced stacked catalogue

5. Variability

6. Spectra

7. Optical/UV classification

8. X-ray source classification

9. Science Validation

10. Communication

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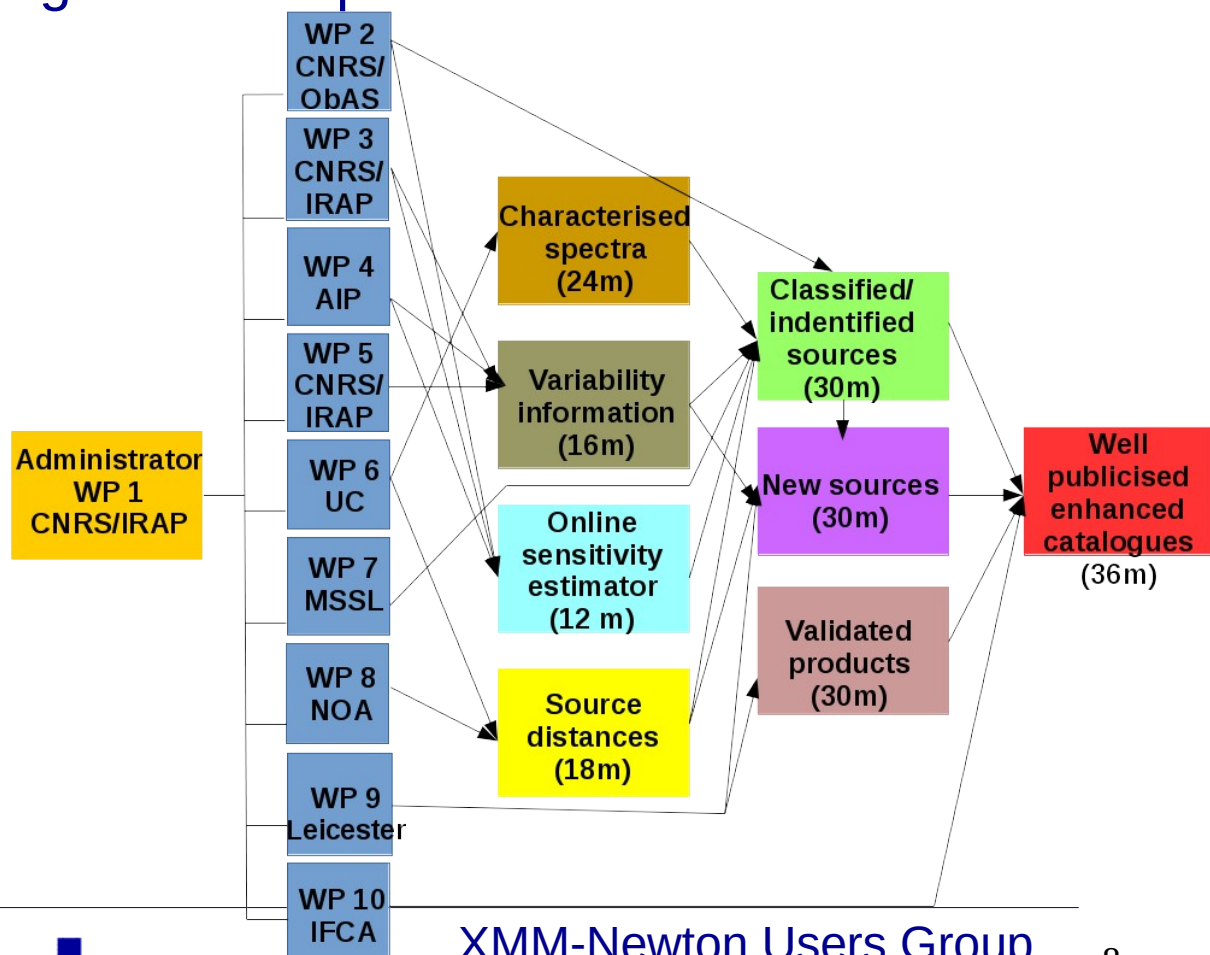
Citizen science

Welcome to **CLAXSON!**

(**Cl**assification of **X**-ray **So**urces for **N**ovices)

For astronomers | About us | The project | Tutorial | Contact | Log in | Sign up

CLAXSON is a platform designed to identify new objects observed in the X-ray sky with the European Space Agency X-ray telescope XMM-Newton. Be the first to find new supermassive black holes, stars, galaxies and other exotic objects in observations taken over the last 20 years, and help astronomers unravel the mysteries of the X-ray sky.

Begin!   **Presentation**

Aim: use identified sample for AI
Teaches about objects
Teaches to identify sources
Uses wisdom of crowds
Many users
http://xmm-ssc.irap.omp.eu/claxson/index.php?

Original image credit: NASA/JPL-Caltech

--- Ranking of level 2 users ---

Rank	User	Number of classifications	Since 1 week	Success rate
1	algol	13124	160	92.7
2	KrystianBykowski	12003	1284	83.9
3	dani.gi	4466	0	86.5
4	SimonLeKlaxon	4417	136	91.9
5	Tsuki Eeen no	4032	0	64.6
6	chrostek	2309	0	78.9
7	Baldrick	2121	21	84.4

Transient alerts

Plan to provide transient alerts to the community, when the PI is in agreement

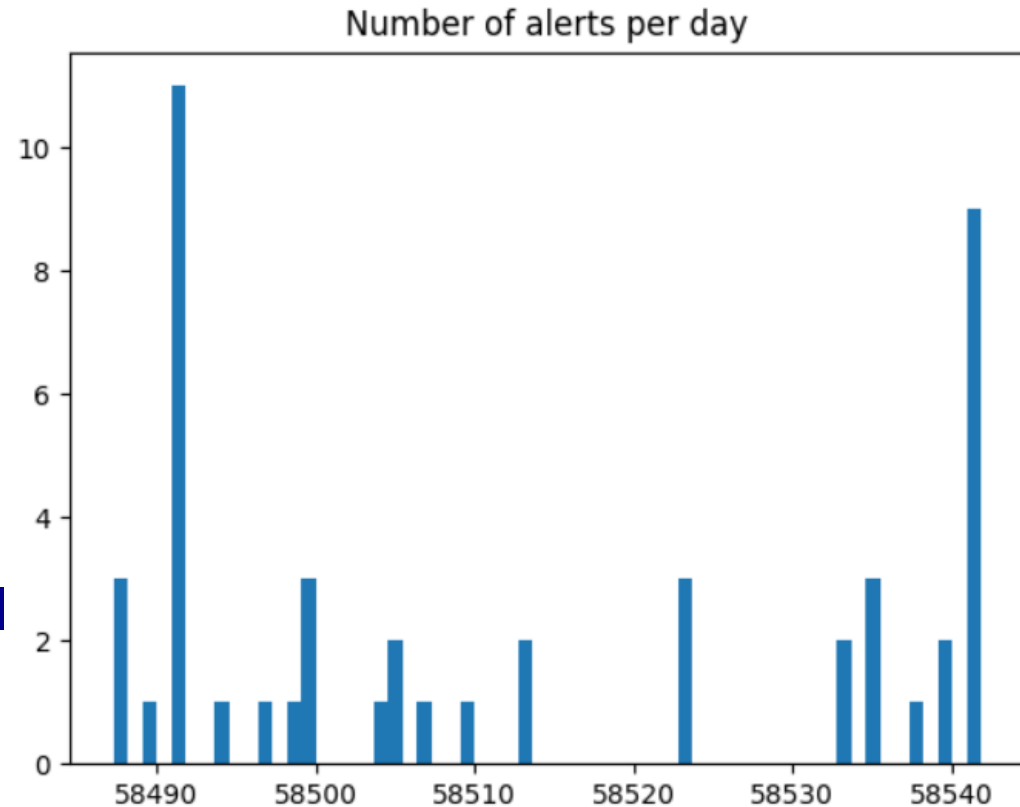Developed task to be inserted into the pipeline

Uses >20 yrs of XMM-Newton data + Swift & Chandra data + upper limits

Exploits also the OM data

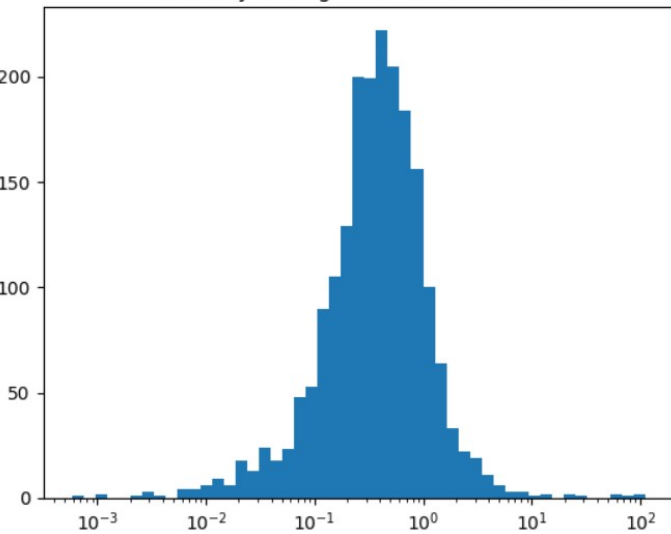Test on two months of DR10 data to determine alert rate

Chosen (example) variability of factor 3 (data bars 90%)

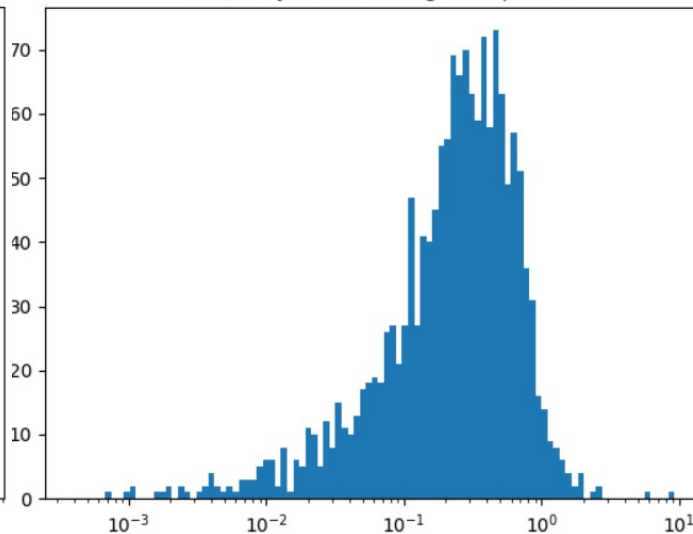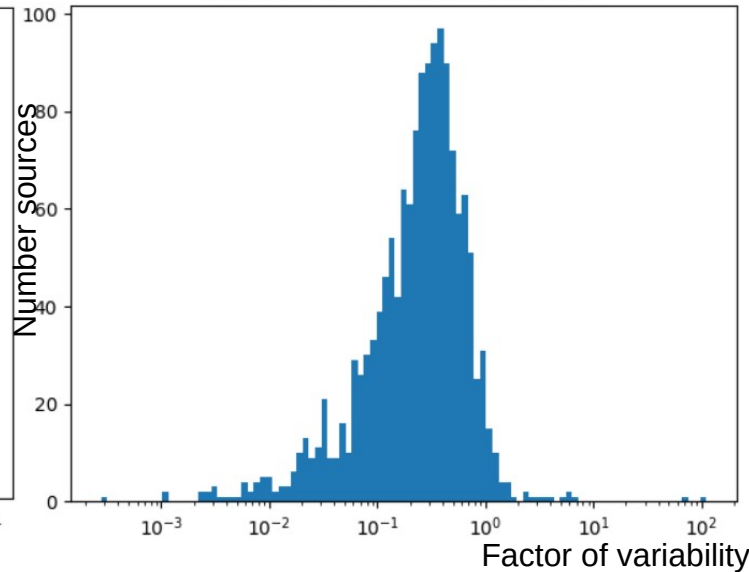Consider sources rising, falling, general variable + short term variability

Number of alerts per day

Transient alerts

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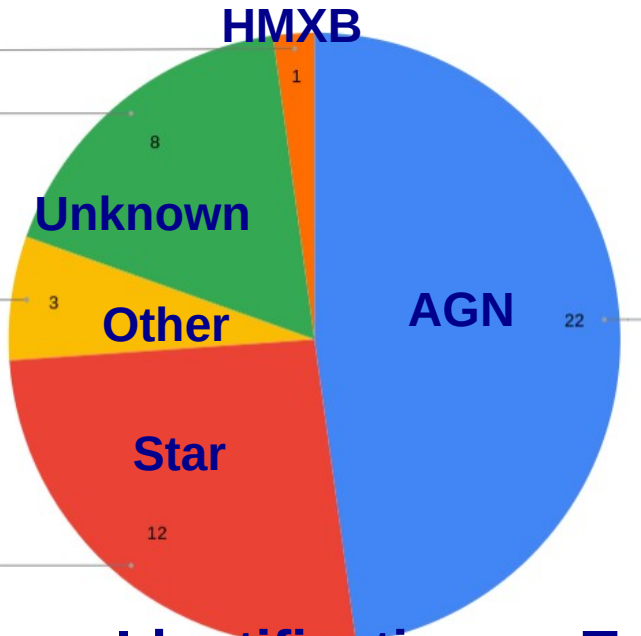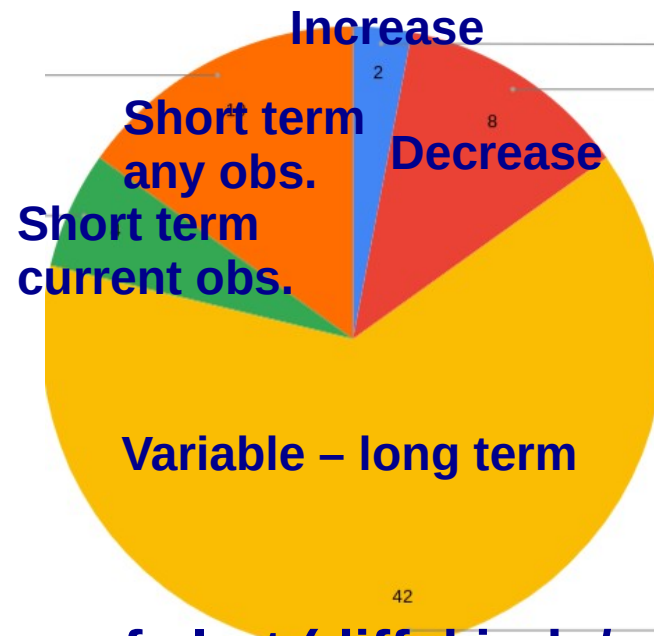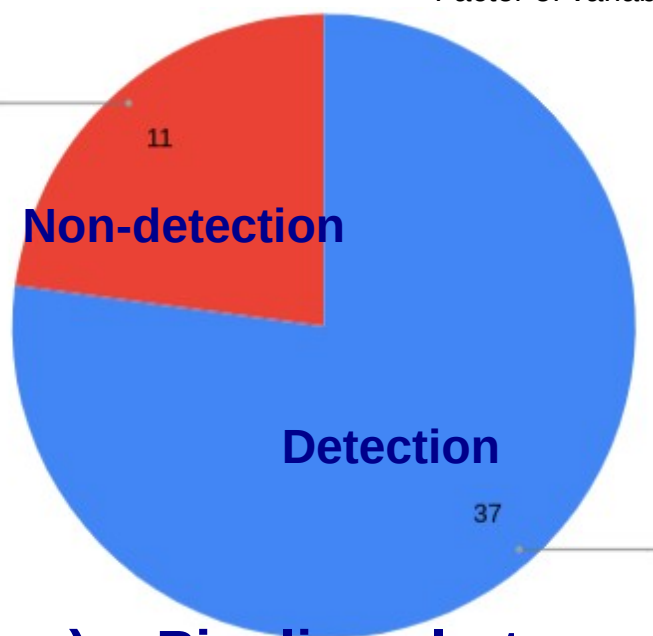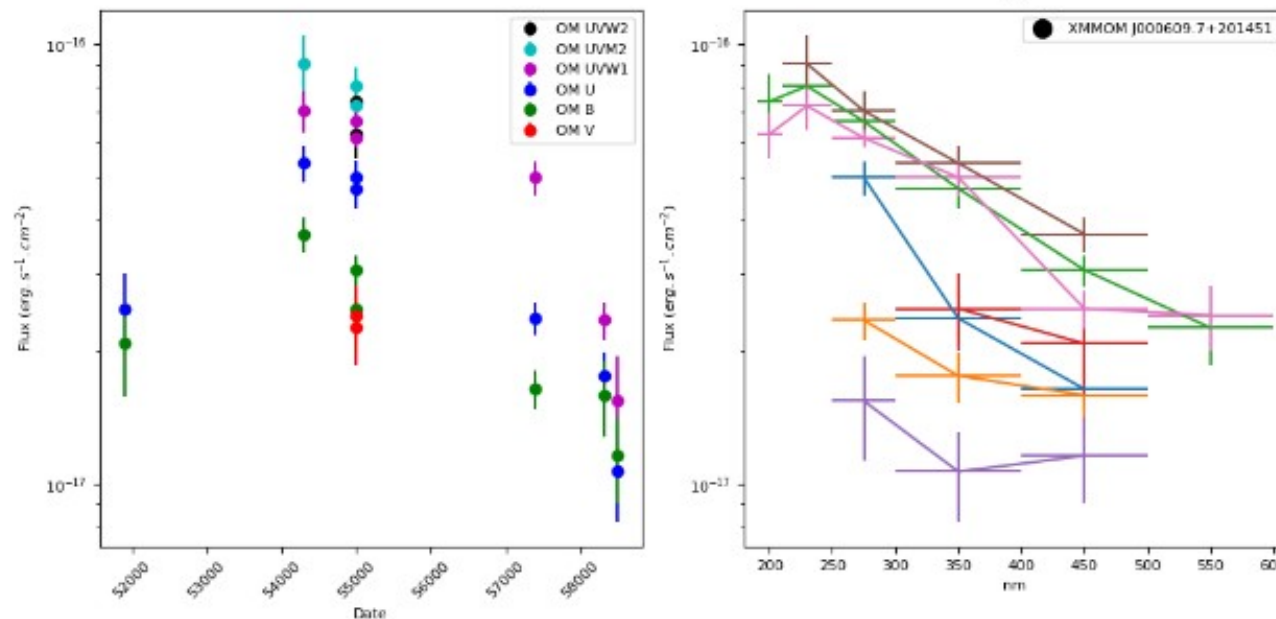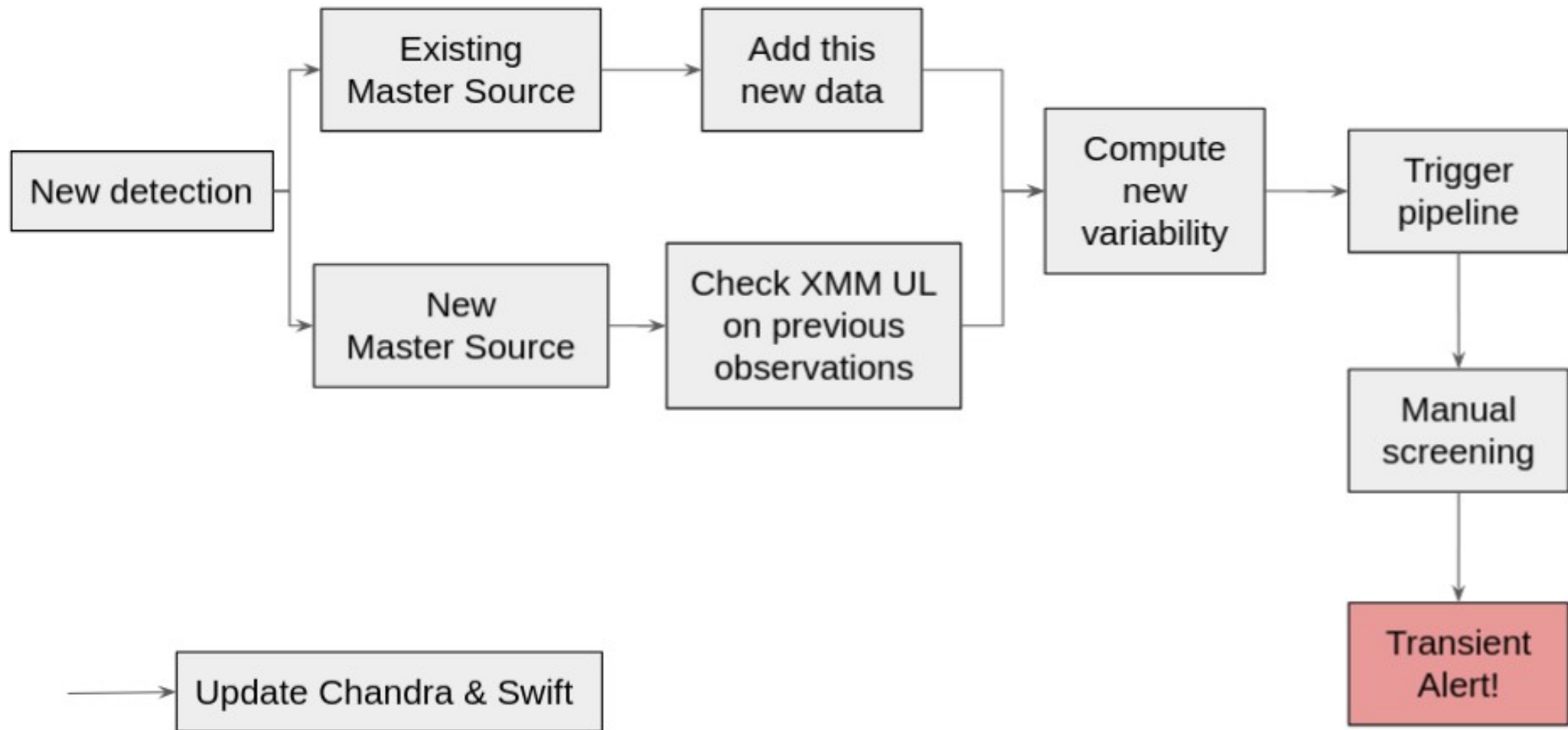
Transient alerts
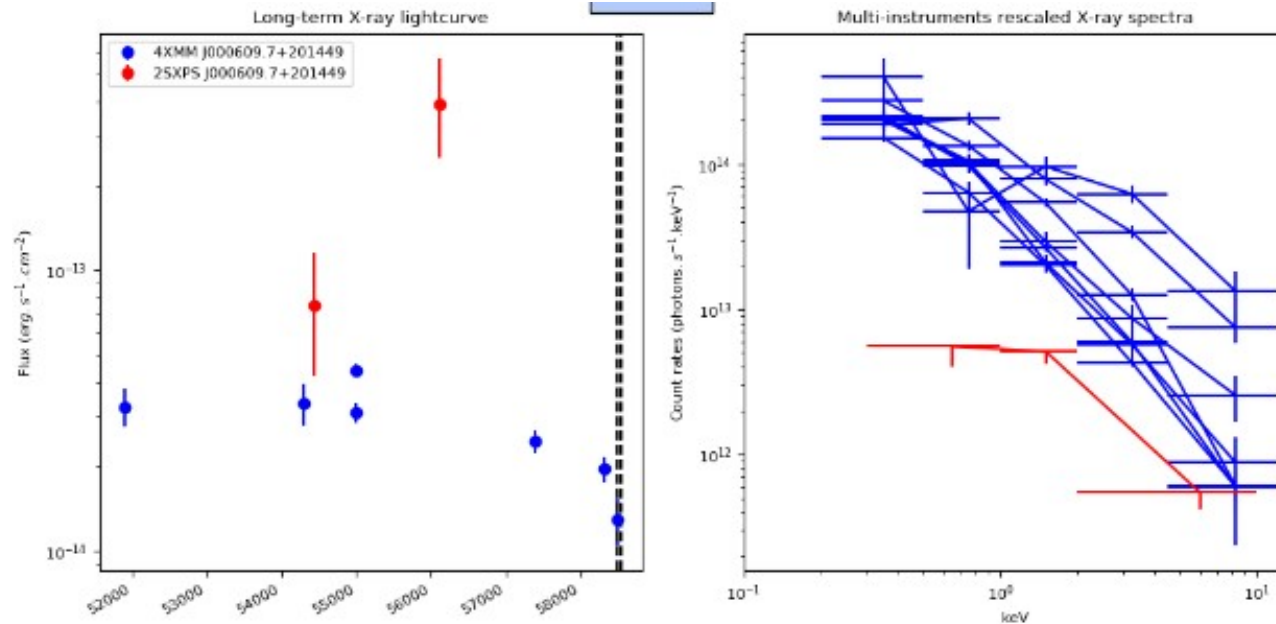
X-ray

OM

Flow diagram of pipeline task

Upcoming products

- 4XMM-DR11 and 4XMM-DR11s planned for this Summer
- Updates to the FLIX upper limit server
- Identification + classification of OM sources
- Counterparts to X-ray sources and multi-messenger events
- Improved source detection in the stacked catalogue
- Photometric redshifts
- Classified sources
- Fits to spectra, incl. sources with just 5 flux bands
- Physically motivated (type/z) spectral fits for best spectra
- New outreach material
- Enhanced catalogue (5XMM) with all the above information

Summary

- Continued SAS task development + support

- Continued data products screening

- Ongoing source identification activities

- Enhanced catalogue servers helping to disseminate data products

- 4XMM-DR10(s) released at the end of 2020

- Yearly incremental updates of 4XMM + 4XMMs expected

- Enhanced manpower & new products coming with XMM2ATHENA

- 5XMM expected for ~2025

- Continue to provide XMM-Newton legacy products

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Not even the COVID-19 can stop us!

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