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

Natalie Webb

Topics

- SSC and XMM2ATHENA activities
- 4XMM (DR11 & DR11s)
- Selected activities in detail
- XMM-Newton and ecology!
- Future catalogues and products
- Summary

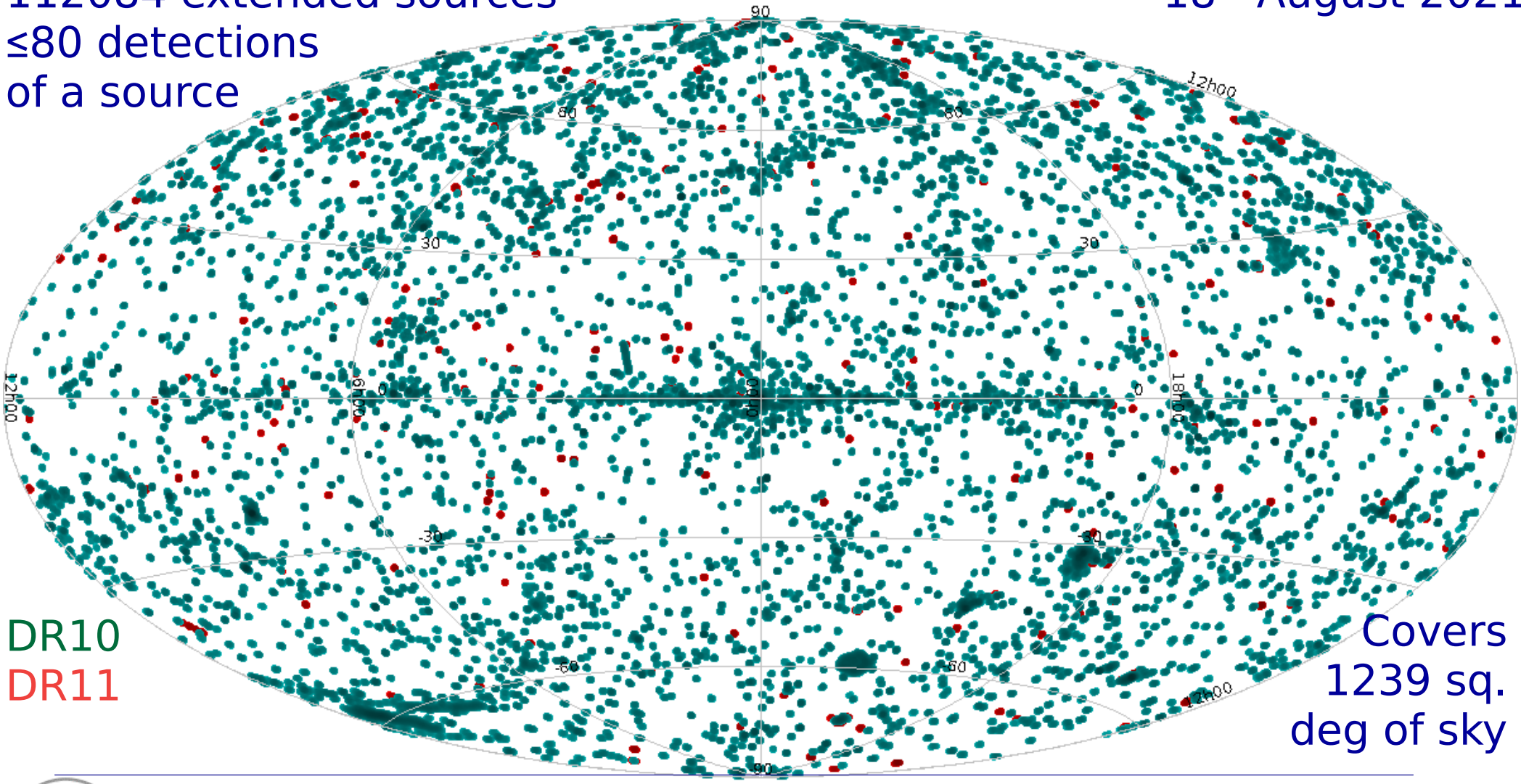
SSC/XMM2ATHENA Activities

- Regular teleconferences with 8 SSC & XMM2ATHENA points of contact
- Continued SAS task development + support
- Continued data products screening
- Ongoing source identification activities (machine learning, ...)
- Enhancement of catalogue servers
- New version of the FLIX sensitivity estimator, including latest 4XMM data
- Updating XMM-SSC and XMM2ATHENA webpages
- Continued input into SAS and pipeline development via monthly SAS-CCB and SASWG meetings
- Fitting of all spectra & identifying long and short term variability
- Systematic exploitation of OM data (with X-ray sources)
- New stacking methodology to detect fainter sources
- Outreach projects
- Release of 4XMM-DR11 & 4XMM-DR11s, 18th August 2021

4XMM-DR11

DR11: 895415 detections (+45424), 602543 unique sources (+27385)
319292 (36%) sources with spectra and lightcurves
112084 extended sources
≤80 detections
of a source

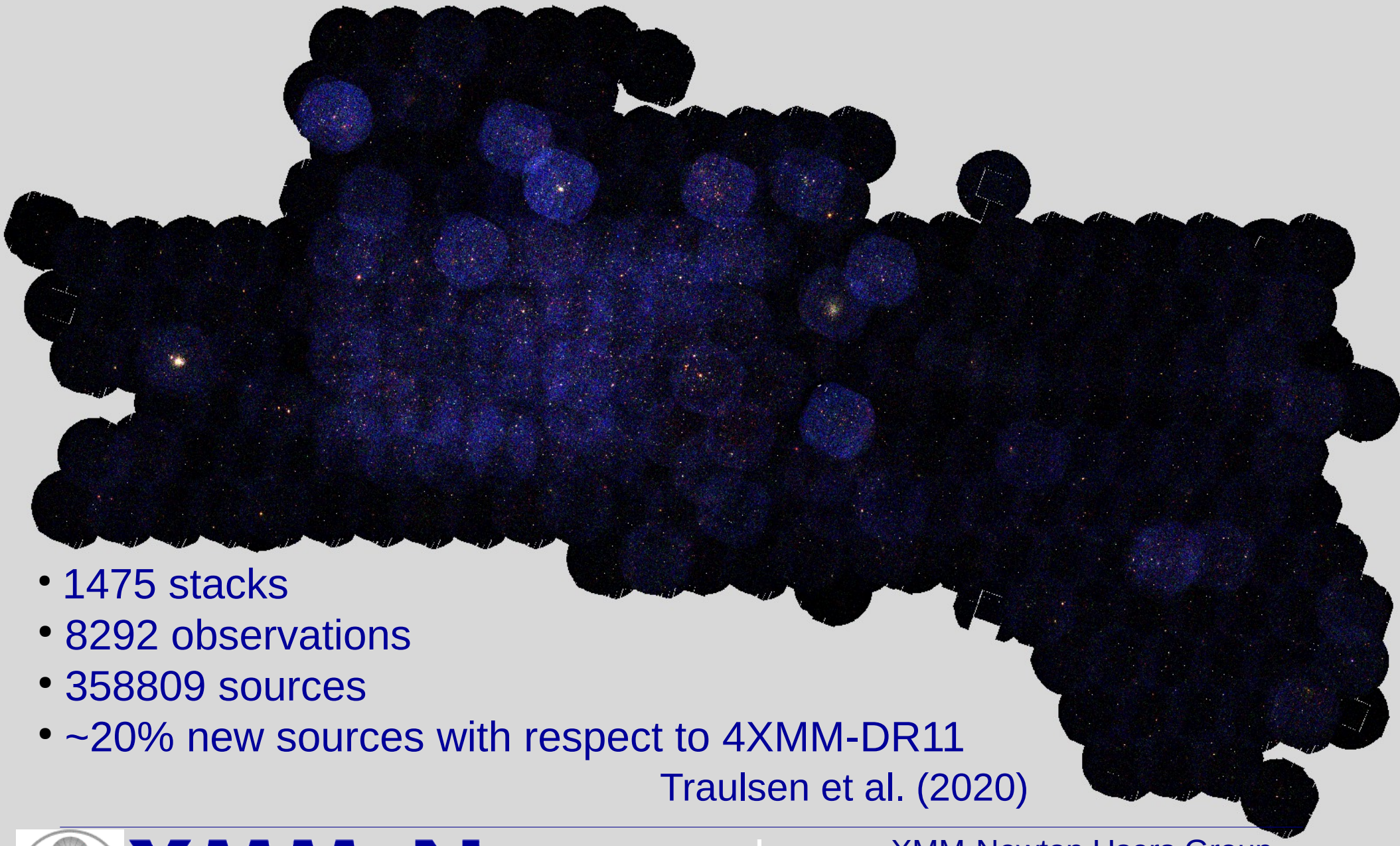
Release:
18th August 2021



DR10
DR11

Covers
1239 sq.
deg of sky

4XMM-DR11s



- 1475 stacks
- 8292 observations
- 358809 sources
- ~20% new sources with respect to 4XMM-DR11

Traulsen et al. (2020)

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n°101004168

Flix – sensitivity estimator

XMM2ATHENA

XMM-NEWTON SURVEY SCIENCE CENTRE

FLIX

Sensitivity Estimator

Enter coordinates to estimate upper limit | CALCULATE

Supported coordinates format: 12h34m56.2s -08d24m20.6s
12:34:56.2 -08:24:20.6
12.345 -13.678

HOME | WEB SERVICES | DOCS | LINKS

NEWS

12 Apr 2022 — Release of a beta version of FLIX sensitivity estimator

WEB

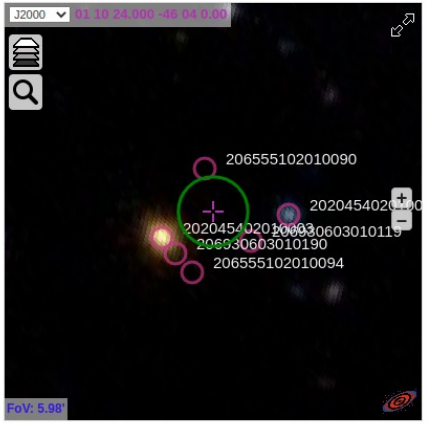
This websit… upper limit … the XMM-N… based on 4… XMM-Newt…

http://flix.irap.omp.eu/

FLIX SENSITIVITY ESTIMATOR

01:10:24 -46:04:00 | CALCULATE | Settings

HOME | WEB SERVICES | DOCS | LINKS | ABOUT



Query coordinates: 01h10m24s -46d04m00s

Detection maximum likelihood threshold: 10

Radius of circle for flux estimation: 30"

Nearest sources in XMM catalogue:
206555102010090 (37.04")
206930603010119 (41.5")
206930603010190 (48.9")
202045402010003 (49.47")
206555102010094 (55.27")
202045402010010 (65.77")

Observations of this field at different epochs

Download full results as: FITS

Obsid	Date Obs	Axis Offset (arcmin)	Instrument	Filter	Exposure (sec)	Upper Limit - band 8 (erg/cm2/s)	Encircled Flux - band 8 (erg/cm2/s)	
0204540201	2004-11-23	8.59	M1	Thin1	11520	2.517e-14	1.308e-14 ± 1.290e-14	
			M2	Thin1	12916	2.250e-14	1.340e-14 ± 1.117e-14	More bands
			PN	Thin1	9561	1.336e-14	2.790e-14 ± 6.921e-15	
0560180901	2008-11-28	2.5	M1	Thin1	49660	9.692e-15	2.584e-14 ± 5.509e-15	
			M2	Thin1	47935	9.865e-15	2.643e-14 ± 5.590e-15	More bands
			PN	Thin1	136	nan	nan ± nan	

XMM-New… SURVEY SCIENCE CENTRE

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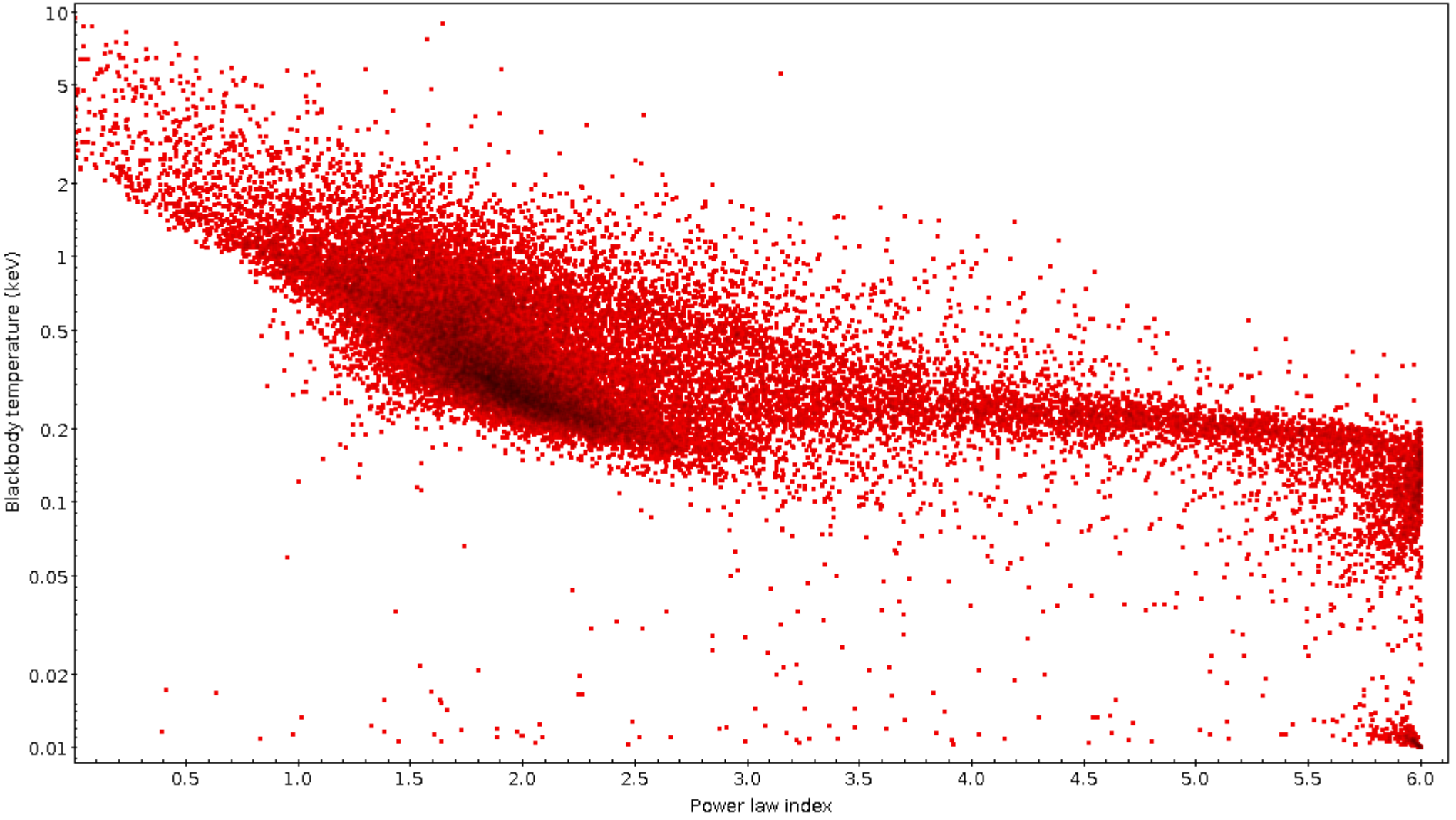
Spectral fitting

XMM2ATHENA

Fitting all X-ray spectra with different models



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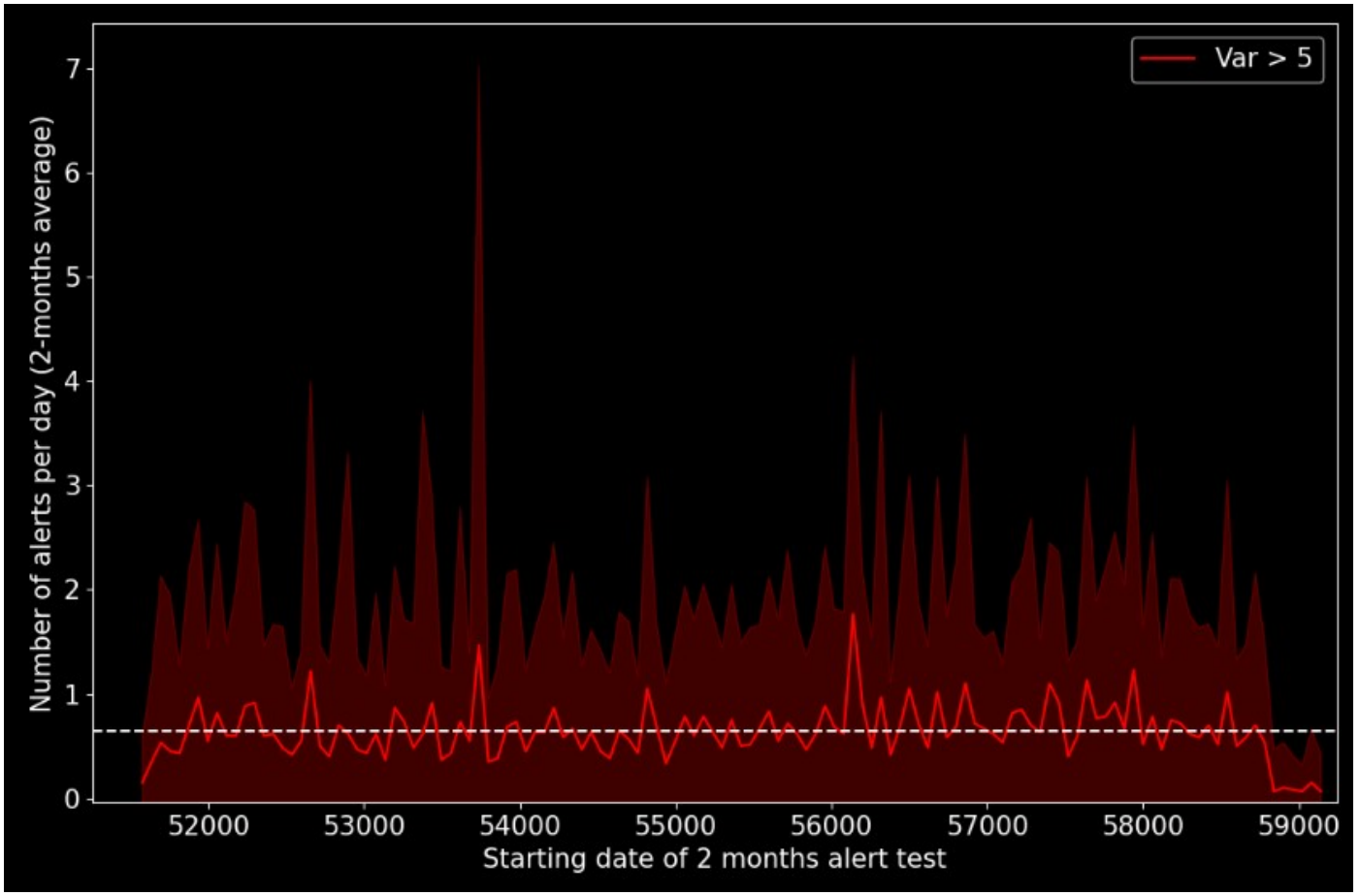
Transients

XMM2ATHENA

Long term transients : ~0.7 / day



Short term transients

~1000 new sources

~7000 extra variable sources (during observation) compared to DR11

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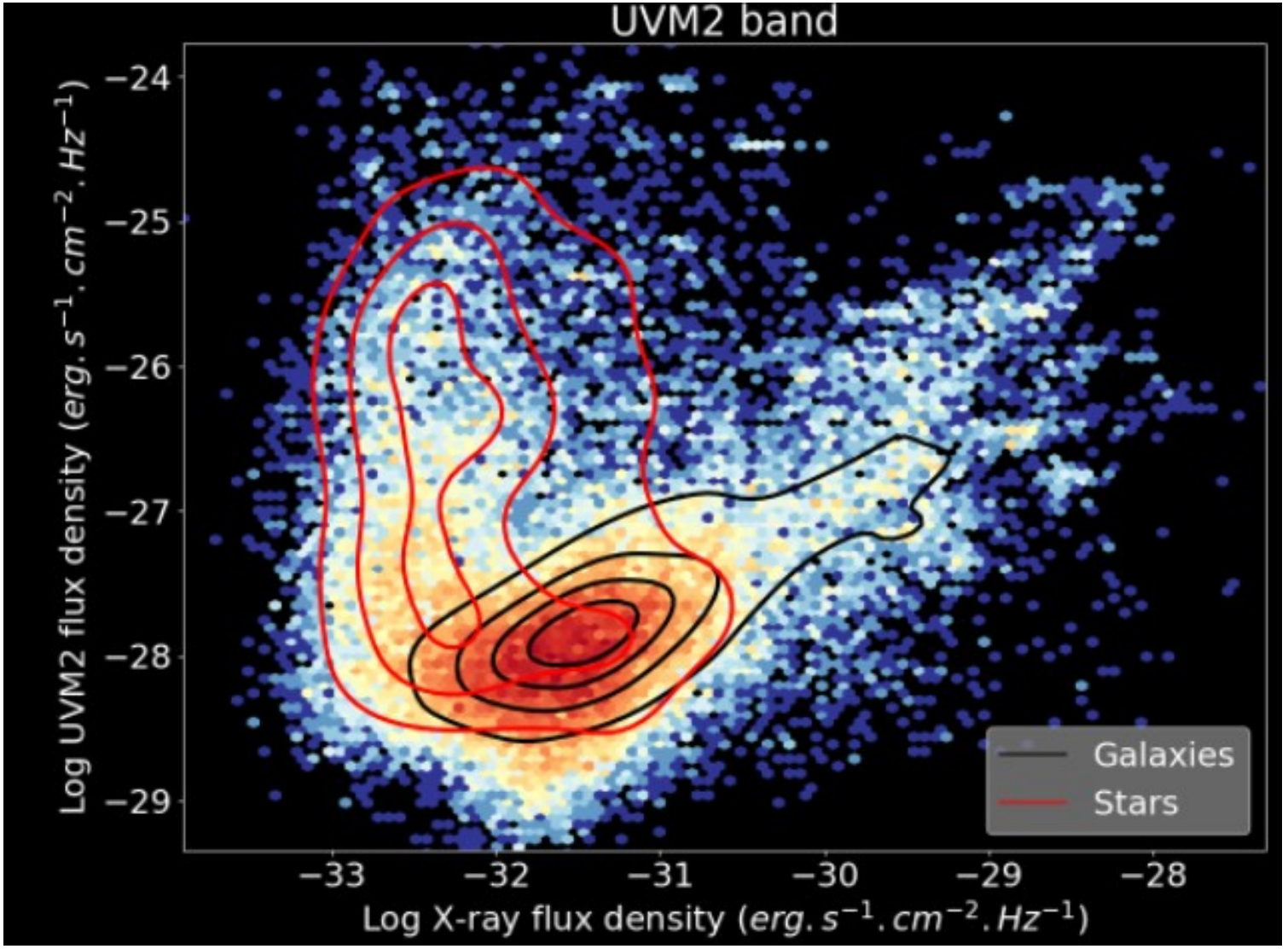
Exploiting OM data

XMM2ATHENA



- Systematic study of all OM data
- Source identification
- Combined EPIC and OM data
- Population studies
- Time domain studies
- SED studies

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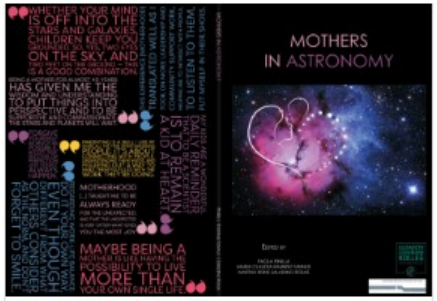
Outreach

XMM2ATHENA



Mothers in Astronomy

The Mothers In Astronomy 2022 book is an initiative of Dr Paola Pinilla (MPIA and MSSL/UCL) and Dr Maria Claudia Ramirez-Tannus (MPIA). Its aim is to: Amplify the voices of mothers in astronomy. Raise awareness of the challenges they face. Highlight the positive impact of motherhood on their careers. Create collective empowerment by inspiring and...

Read more »

Black Hole Week: May 2-6

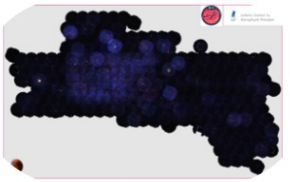
BlackHoles are possibly the most intriguing objects in the Universe. What do you know about them? There are many questions, doubts, around these objects and during the week of May 2 – 6 our scientists will answer crucial questions about black holes for this #BlackHoleWeek! Like @athena.xray.observatory @AthenaXIFU @AHEAD2020 & @XMM2Athena to get all the...

Read more »

Hosting a high school class: half day on high energy at IRAP

On Monday 4 April, IRAP welcomed a high school class from the Lycée Toulouse Lautrec for an afternoon of high energy themes, including space programmes such as XMM2ATHENA, X-IFU and ATHENA. On the menu, the high school students were able to attend a conference for the general public given by Natalie WEBB as well as...

Read more »



Scientific Images

Consortium Images

Outreach Images

Artistic Images

Posters

For Kids

Kahoots

Erwan Quintin at the Astrophysics apéro-conferences with the association Universciel

Initially created in 2012, the association

Hugo TRANIN on April 12 at the Astrophysics aperitif-conference with the

8 March 2022 International Women´s Day: " Gender equality today for a

Upcoming products

- 4XMM-DR12 and 4XMM-DR12s about to be delivered
- Updates to the FLIX upper limit server
- Identification + classification of OM/EPIC sources
- Muti-wavelength/messenger counterparts to X-ray sources
- Improved source detection in the stacked catalogue
- Photometric redshifts
- 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

XMM-Newton and ecology

Estimate of the carbon footprint of astronomical research infrastructures

2022, Nature Astronomy, Volume 6, p. 503-513

Jürgen Knödlseder[1], Sylvie Brau-Nogué[1], Mickael Coriat[1], Philippe Garnier[1], Annie Hughes[1], Pierrick Martin[1] & Luigi Tibaldo[1]

worldwide active astronomical research infrastructures currently have a carbon footprint of 20.3±3.3 $MtCO_2$ equivalent (CO_2e) and an annual emission of 1,169±249 $ktCO_2e\ yr^{-1}$ corresponding to a footprint of 36.6±14.0 tCO_2e per year per astronomer. Compared with contributions from other aspects of astronomy research activity, our results suggest that research infrastructures make the single largest contribution to the carbon footprint of an as-

Findings include :

- Operations are ~1-2 % of carbon footprint of typical space based mission
- More comprehensive exploitation of data limits carbon footprint

=> **Longevity of XMM-Newton coupled with intense archive exploitation reduces impact of X-ray astronomy in Europe** ☺

Note : average carbon footprint / European / year : ~8 tCO_2

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Summary

- Continued SAS task development + support
- Continued data products screening
- Ongoing source identification activities
- Enhanced catalogue servers helping to disseminate data products
- 4XMM-DR11(s) released in August 2021
- Flix sensitivity estimator on line
- Systematic spectral fitting
- Many new short and long-term transients
- Systematic exploitation of OM data with EPIC data
- Yearly incremental updates of 4XMM + 4XMMs expected
- Many more new products with XMM2ATHENA
- 5XMM expected for ~2025
- Continue to provide XMM-Newton legacy products

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From strength to strength!