

# eROSITA NRTA

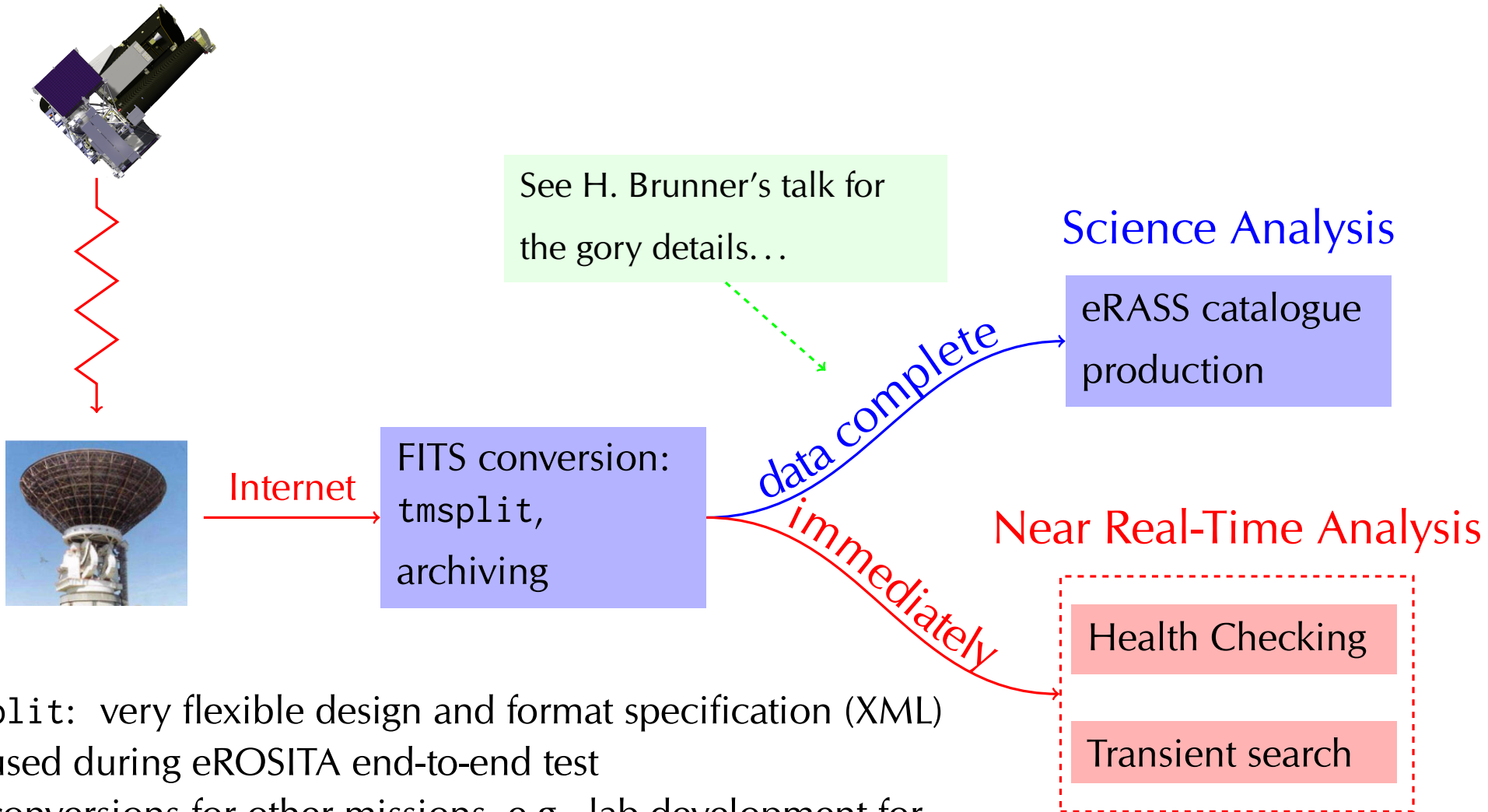
Jörn Wilms, Ingo Kreykenbohm, Arne Rau, Philipp Weber,  
Sebastian Falkner, for the NRTA and TDA teams



ERLANGEN CENTRE  
FOR ASTROPARTICLE  
PHYSICS



# The NRTA

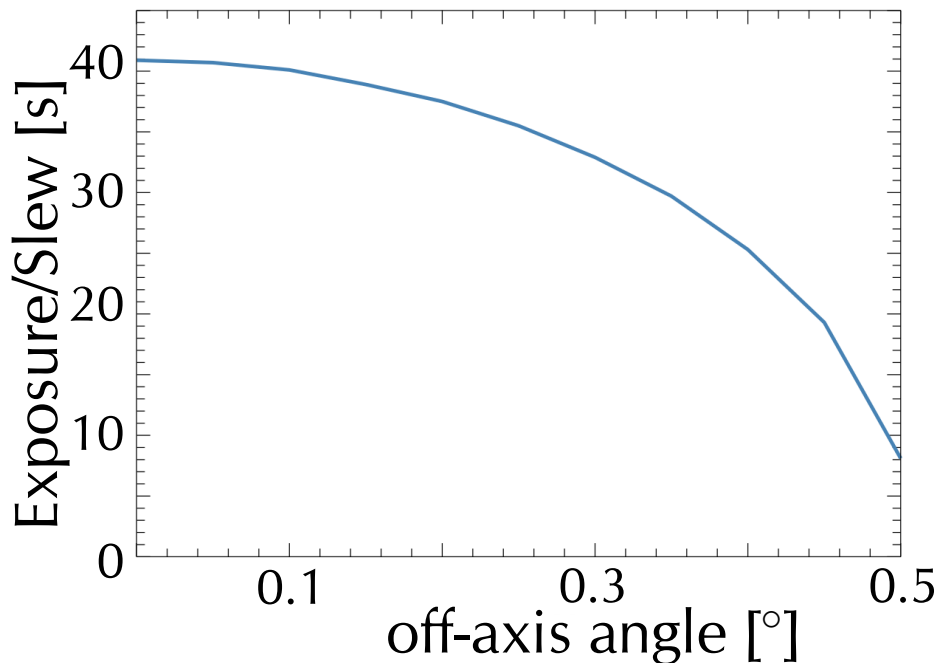
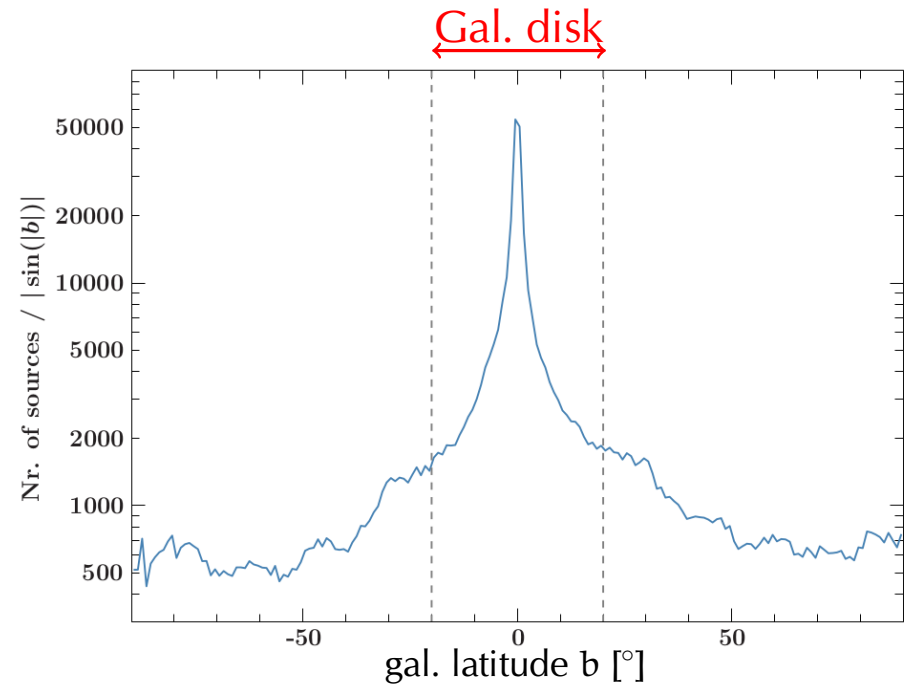
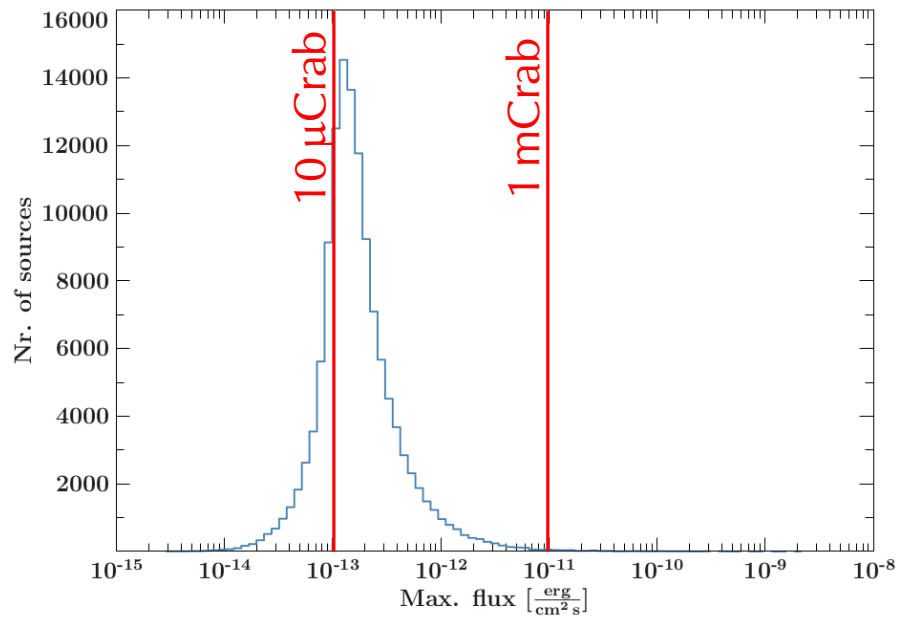


tmsplit: very flexible design and format specification (XML)

- used during eROSITA end-to-end test
- conversions for other missions, e.g., lab development for Jem-EUSO balloon
- have also converted various other mission formats

⇒ prepared for last minute changes, add ons

# Science NRTA



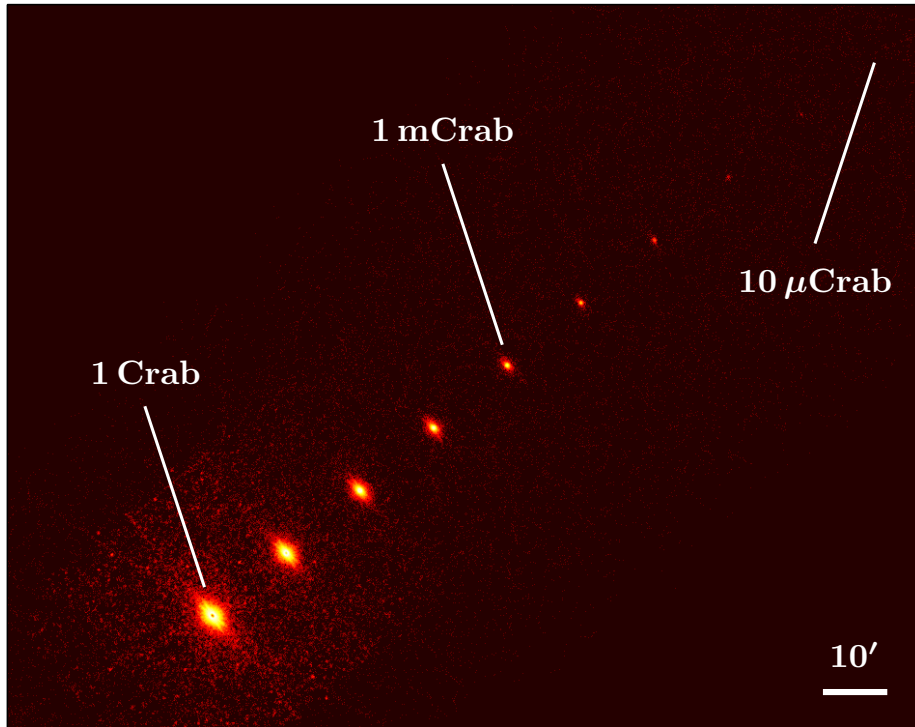
## RASS:

- many field sources above  $\sim 10 \mu\text{Crab}$
- Concentration on gal. plane

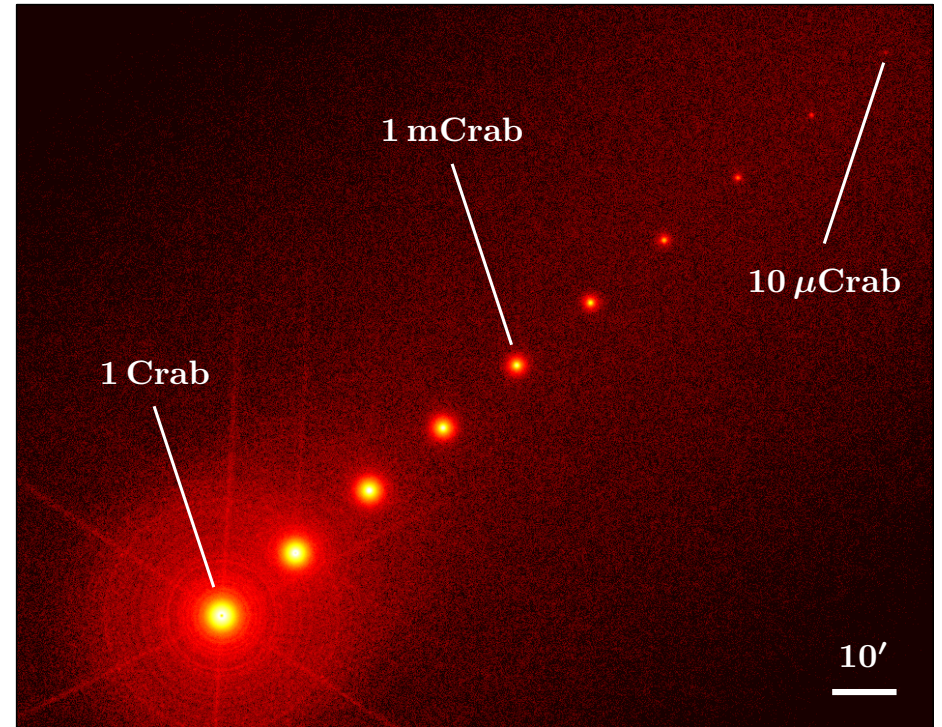
## eRASS:

- Typical exposures: 25–40 s
- Multiple visits on a single day

# Science NRTA



Single scan sensitivity (T. Dauser)



One eRASS scan sensitivity (T. Dauser)

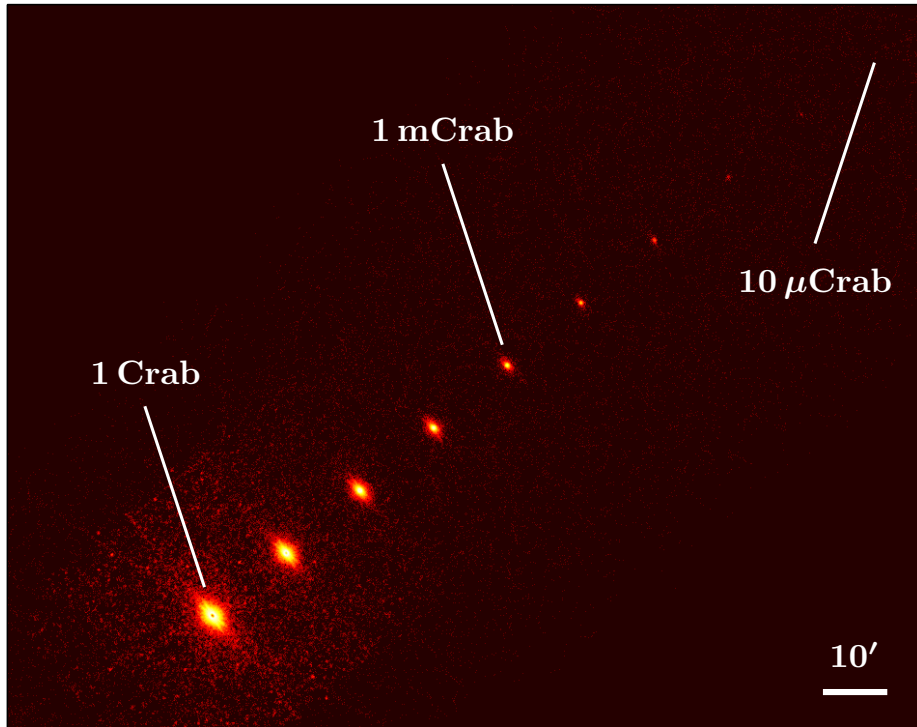
Sensitivity during individual scans:  $\mathcal{O}(0.1 \text{ mCrab})$

⇒ better than MAXI,

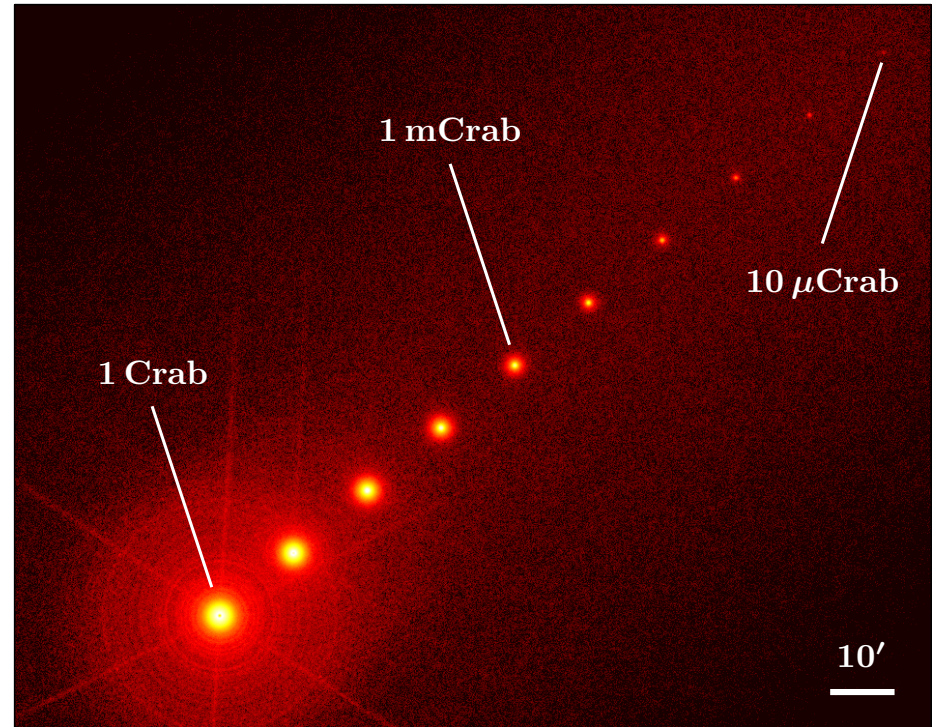
⇒ comparable to RXTE-PCA slews

1 Crab: 2–10 keV:  $2.05 \times 10^{-8} \text{ erg cm}^{-2} \text{ s}^{-1}$  (3.2 ph); 0.3–2 keV:  $1.01 \times 10^{-8} \text{ erg cm}^{-2} \text{ s}^{-1}$  (5.5 ph)

# Science NRTA



Single scan sensitivity

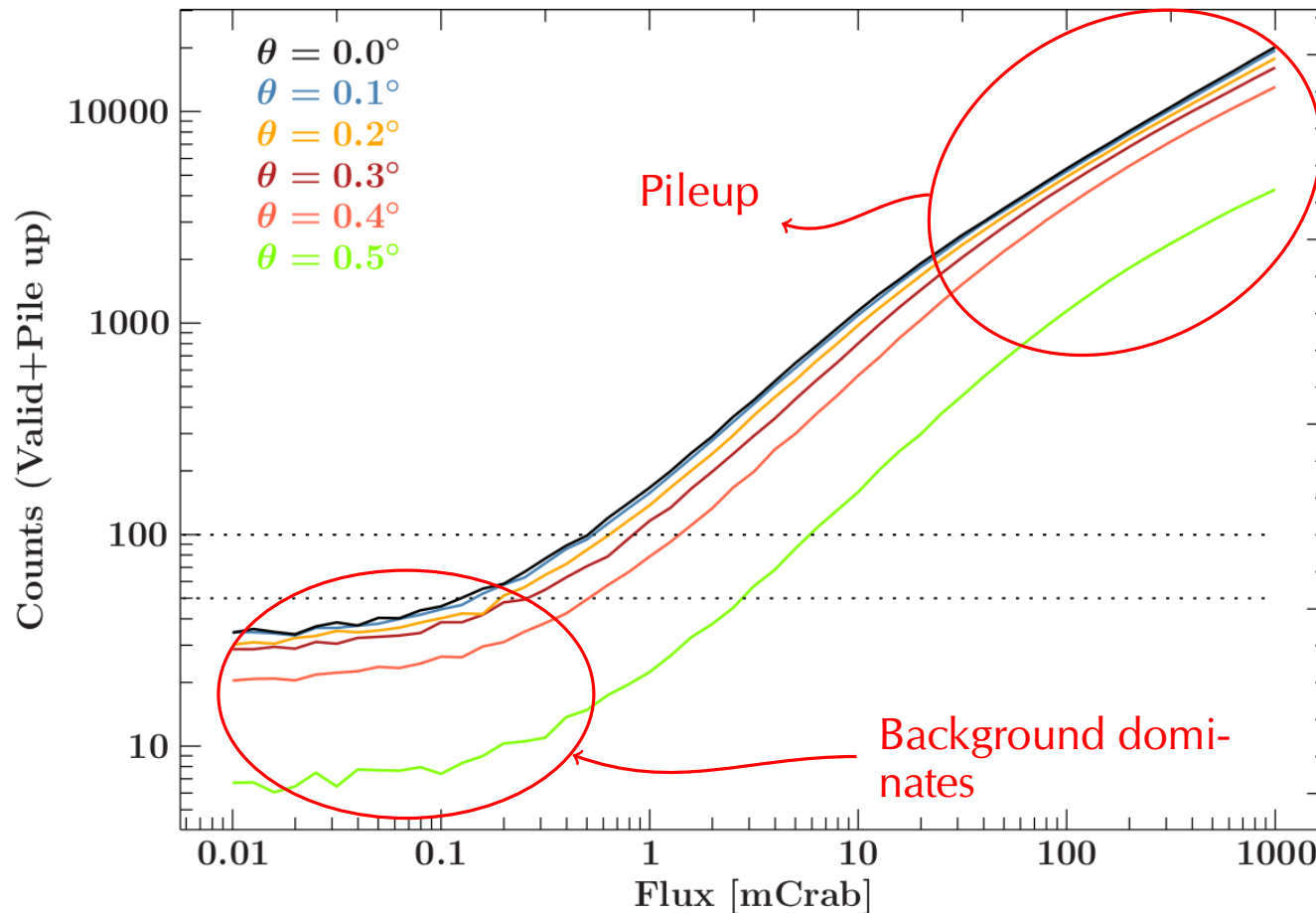


One eRASS scan sensitivity

## Variability:

- ⇒ Variability between individual scans (one “ero-day” to the next)
- ⇒ Variability on 0.5 yr scales
- ⇒ Variability during survey phase

# Science NRTA



Counts per single (!) telescope and per single visit as function of flux (T. Hain, MSc thesis)

Bright sources ( $>0.1$  mCrab) will allow **spectroscopy** and **variability analysis** in a single slew

# NRTA Detection

Calibration / PV Phase	eRASS1	eRASS2	eRASS3
Manual source vetting.			
Distribution of man. vetted alerts to interested eROSITA_DE members (e.g., TDA working group, external collaborators) via mailing list and/or internal web page.			
Public announcement of exceptional transients via Astronomer's Telegrams, GCNs.			
		Distribution of semi-automatically generated alerts to interested eROSITA_DE members (e.g., TDA working group, external collaborators) via VOEvent or similar.	
		Public web page for high significance alerts. Public block-announcement of new events via Astronomer's Telegram.	
		Distribution of semi-automatically generated alerts to the public via VOEvent or similar.	
		Public web page for semi-automatically generated alerts.	

## Strategy for variability detection during survey phase:

1. Directly after downlink: **Near Real-Time Data Analysis (NRTA)**
2. NRTA triggers on **potentially interesting sources**  
*See next slides for examples*
3. eSASS run on fields containing interesting sources
4. Initial fast analysis by **scientist on duty** in collaboration w/scientists to be **named by working groups**  
Need more volunteers for this job
5. If phenomenon interesting: ATEL, special email lists, papers,...

## Example Criteria for “Interesting Sources”

Criteria for “interesting sources”:

- *must* be quantitative
- trigger criteria can be matched against following:
  - source **is/is not in a well specified catalogue**
  - source is at a given **position**  
i.e., always extract fields around list of sources
  - count rate range (“cps above”, “cps below”), in E-band or total eROSITA
  - bright sources: **Bayesian block trigger**
  - unknown sources: **type from machine learning**
  - hardness in a given **hardness band** (expect ~4 HR values)
  - **eSASS ML likelihood**
  - **relative change in count rate wrt previous eRO-Day (or later: eSASS)**

Need “trigger criteria” from all WGs.

Note: It is the job of all WGs to ensure that the science in their remit can be done. BUT: just because you formulated a trigger criterion *does not* mean that you get to do the science! – that’s up to the WGs to decide!



## Example Criteria for “Interesting Sources”

### High Mass X-ray Binaries in the LMC and SMC:

Sources with  $\geq 0.1$  counts  $s^{-1}$  ( $\sum$  all 7 cameras) *and*

- LMC: circle with radius  $4.5^\circ$  centred on  $\alpha_{J2000.0} = 05 : 22 : 15$ ,  $\delta_{J2000.0} = -68 : 04 : 30$
- SMC: circle with radius  $2.5^\circ$  centred on  $\alpha_{J2000.0} = 01 : 07 : 00$ ,  $\delta_{J2000.0} = -73 : 18 : 00$
- Bridge:  $01 : 30 : 00 \leq \alpha_{J2000.0} < 05 : 30 : 00$  and  $-75^\circ < \delta_{J2000.0} < -72^\circ$

# Example Criteria for “Interesting Sources”

## Ultraluminous X-ray Sources

### Known ULX:

- extract all sources with  $EP8LMax > 10^{39} \text{ erg s}^{-1}$  in Earnshaw et al. (2019),  
*and*
- $Flag F_{eROSITA} > 3 \times SF1uxEP9$  or
- $Flag F_{eROSITA} < SF1uxEP9/3$   
SF1uxEP9: average 3XMM-Flux

# Example Criteria for “Interesting Sources”

## Ultraluminous X-ray Sources

### Known ULX:

- extract all sources with  $EP8LMax > 10^{39} \text{ erg s}^{-1}$  in Earnshaw et al. (2019),  
*and*
- Flag  $F_{eROSITA} > 3 \times SF1uxEP9$  *or*
- Flag  $F_{eROSITA} < SF1uxEP9/3$   
SF1uxEP9: average 3XMM-Flux

### New ULX:

- Source w/ $10^{39} \text{ erg s}^{-1}$  (equiv. eROSITA cps) within  $D_{25}$  ellipse of Galaxy in Catalog of Neighboring Galaxies (Karachentsev et al.) *or* HECATE catalogue (Zezas et al., to be submitted)

## Example Criteria for “Interesting Sources”

### Brightening X-ray Binaries in other galaxies

- extract all sources with  $EP8LMax < 10^{39} \text{ erg s}^{-1}$  in Earnshaw et al. (2019) binary catalogue, *and*
- Flag  $F_{eROSITA} > 10 \times SF1uxEP9$

## Example Criteria for “Interesting Sources”

### Brightening X-ray Binaries in other galaxies

- extract all sources with  $EP8LMax < 10^{39} \text{ erg s}^{-1}$  in Earnshaw et al. (2019) binary catalogue, *and*
- Flag  $F_{eROSITA} > 10 \times SF1uxEP9$

### Blazar Flares

- measure fluxes  $\forall$  blazars  $> 0.01 \text{ mCrab}$  in the Frascati catalogue *and*
- trigger if fluxes are  $3 \times$  above average flux

## Example Criteria for “Interesting Sources”

### Brightening X-ray Binaries in other galaxies

- extract all sources with  $EP8LMax < 10^{39} \text{ erg s}^{-1}$  in Earnshaw et al. (2019) binary catalogue, *and*
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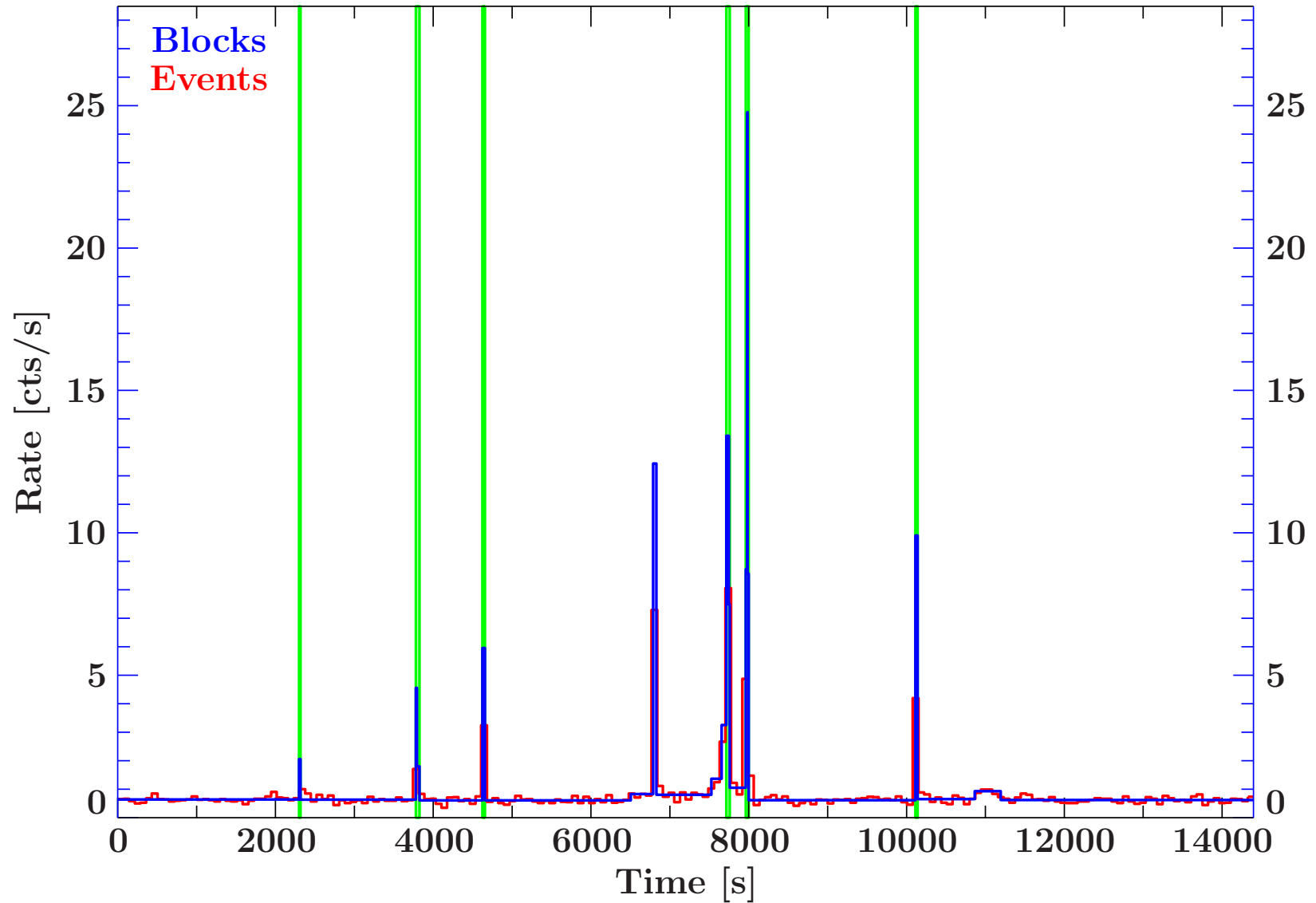
### Blazar Flares

- measure fluxes  $\forall$  blazars  $> 0.01 \text{ mCrab}$  in the Frascati catalogue *and*
- trigger if fluxes are  $3 \times$  above average flux

### Bright X-ray Sources

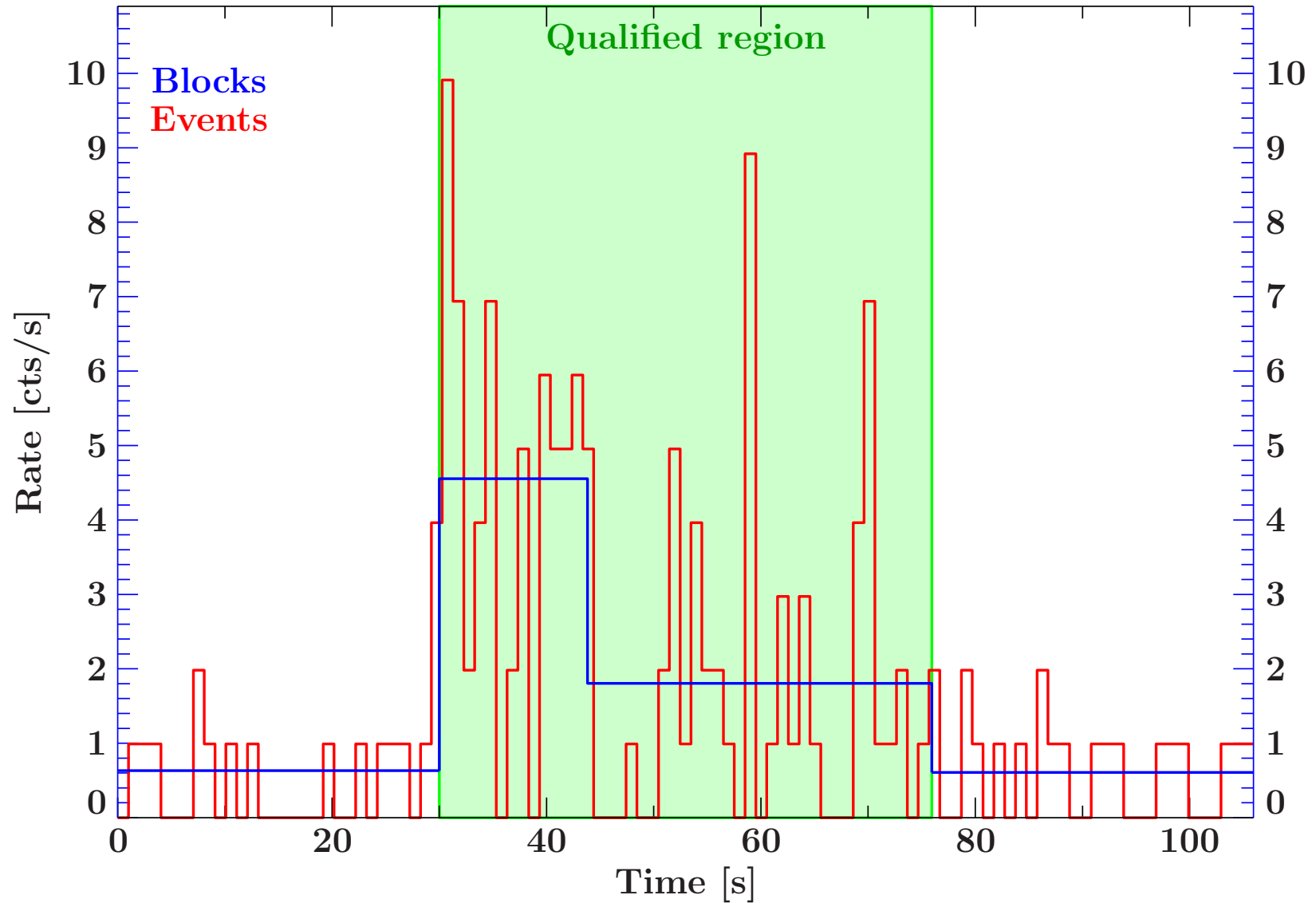
- **known sources**: Extract at all positions of 4U-catalogue sources or transients from RXTE-ASM, Swift-BAT, MAXI
- **unknown sources**: Extract wherever Bayesian Block Analysis yields significant excess count rate

# Bright Transients



Fast identification of bright transients w/Bayesian blocks (P. Weber)  
(*really* bright ones: single scatterings)

# Bright Transients



Fast identification of bright transients w/Bayesian blocks (P. Weber)  
(*really* bright ones: single scatterings)



# NRTA Science Interface

Work Area 4  
Work Area 5

<input type="checkbox"/>	Unknown Source	Ger	101.2	6.2	18:10:5...	-29:11:5...	Joern Wilms
<input type="checkbox"/>	Unknown Source	Ger	9.7	1.7	18:06:5...	-29:23:1...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	6.0	0.5	18:08:0...	-29:24:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	528.0	35.3	18:10:4...	-26:09:0...	Not assigned
<input checked="" type="checkbox"/>	Unknown Source	Ger	4.1	2.2	18:10:4...	-26:11:0...	Matthew Middl...
<input type="checkbox"/>	Unknown Source	Ger	1675.7	33.6	18:06:5...	-24:35:3...	Matthew Middl...
<input type="checkbox"/>	Unknown Source	Ger	1317.6	34.2	18:06:3...	-22:15:1...	Adam Malyali

**Discussion**

Date	Author	Summary
2019-01-24	falkner	Simple Test
2019-01-24	arau	Proton Flare
2019-01-24	kreyken	Background event
2019-01-24	schwope	Complex Test of the ECAP Wifi functionality
2019-01-24	schwope	Awesome
2019-01-24	schwope	Awesome
2019-01-24	kreyken	Background event

Alert ID: 00010-t234-00003  
Source: [Unidentified \(NRTA J180600.9-292435\)](#)  
Configuration: t234 Coordinates: HMS  
Time: 10.48216 eroDay Duration: 32.22 s

Products Matthew Middleton Discussion

TStart: 10 OR Select Preset  
TStop: 11 eroDay

MJD: 58542.5689  
eroday: 41992.1634  
last eroday: 41992.1634



Source alerts

# NRTA Science Interface

Work Area 4

Work Area 5

<input type="checkbox"/>	Unknown Source	Ger	101.2	6.2	18:10:5...	-29:11:5...	Joern Wilms
<input type="checkbox"/>	Unknown Source	Ger	9.7	1.7	18:06:5...	-29:23:1...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	6.0	0.5	18:08:0...	-29:24:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	528.0	35.3			
<input checked="" type="checkbox"/>	Unknown Source	Ger	4.1	2.2			
<input type="checkbox"/>	Unknown Source	Ger	1675.7	33.6			
<input checked="" type="checkbox"/>	Unknown Sou...	Ger	1317.6	34.2			

**Discussion**

Date	Author	Summary
2019-01-25	amalyali	New source
2019-01-25	amalyali	Correction to previous c

Alert ID: 00010-t234-00010  
Source: [Unidentified \(NRTA J180600.5-221510\)](#)  
Configuration: t234  
Time: 10.50116  
Products: Adam Malyali

TStart: 10 OR Select Preset  
TStop: 11  
eroDay

MJD: 58542.5700  
eroday: 41992.1703  
last eroday: 41992.1703

**Discussion of scientific alert 00010-t234-00010**

Current Alert Status: **open**

Alert is marked as regular

**Comments**

Author: amalyali   
Date: 2019-01-25   
Time (UTC): 10:32  
No attachments

Author: amalyali   
Date: 2019-01-25   
Time (UTC): 10:37  
No attachments

Discussion of alerts

# NRTA Science Interface

The screenshot displays the NRTA Science Interface. At the top, there is a table with columns for checkboxes, source names, countries, and numerical values. Below this is a 'Discussion' table with columns for Date, Author, and Summary. A dialog box titled 'Add comment to scientific alert' is open, showing fields for Source, Alert-ID, Templates, Title, and Comment. The dialog also includes an Attachments section and buttons for Cancel, Submit, and Add Comment.

Source	Country	Value 1	Value 2	Time 1	Time 2	Author
Unknown Source	Ger	101.2	6.2	18:10:5...	-29:11:5...	Joern Wilms
Unknown Source	Ger	9.7	1.7	18:06:5...	-29:23:1...	Not assigned
Unknown Source	Ger	6.0	0.5	18:08:0...	-29:24:4...	Not assigned
Unknown Source	Ger	528.0	35.3			
Unknown Source	Ger	4.1	2.2			
Unknown Source	Ger	1675.7	33.6			
Unknown Sou...	Ger	1317.6	34.2			

Date	Author	Summary
2019-01-25	amalyali	New source
2019-01-25	amalyali	Correction to previous c

Alert ID: 00010-t234-00010  
Source: [Unidentified \(NRTA J180600.5-221510\)](#)  
Configuration: t234  
Time: 10.50116  
Products: Adam Malyali

TStart: 10 OR Select Preset  
TStop: 11  
eroDay

MJD: 58542.5712  
eroday: 41992.1773  
last eroday: 41992.1773

**...can add comments**

# NRTA Science Interface

Work Area 4

Work Area 5

<input type="checkbox"/>	Unknown Source	Ger	118.9	0.3	17:58:0...	+50:24:...	Ingo Kreykenb...
<input type="checkbox"/>	Unknown Source	Ger	30998.9	463.4	18:01:0...	-25:04:4...	Not assigned
<input checked="" type="checkbox"/>	Unknown Sou...	Ger	29080.2	363.0	18:01:1...	-25:44:2...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	82.2	1.1	18:02:1...	-24:52:0...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	41.7	0.7	18:03:2...	-25:15:5...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	48097.1	505.2	18:01:3...	-20:31:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	39544.0	256.2	18:02:3...	-20:17:1...	Not assigned

**Discussion**

Date	Author	Summary
No discussion present		

Alert ID: 00002-t234-00004

Source: [Unidentified \(NRTA J180100.2-254429\)](#)

Configuration:  Coordinates:

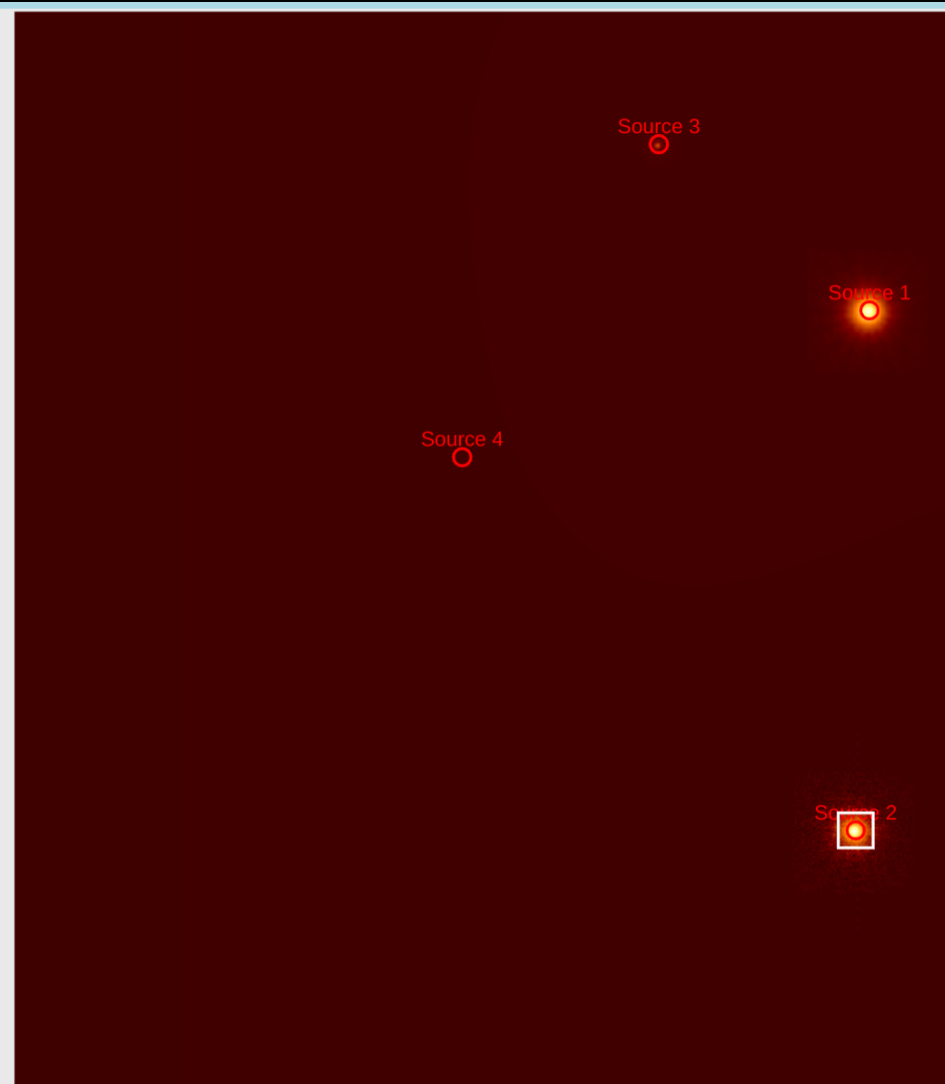
Time: 2.49256  Duration: 108.25 s

Products  Discussion

TStart:   OR

TStop:

MJD: 58542.5724  
eroday: 41992.1843  
last eroday: 41992.1843



inspect sky image (ds9 like)

# NRTA Science Interface

Work Area 4

Work Area 5

<input type="checkbox"/>	Unknown Source	Ger	118.9	0.3	17:58:0...	+50:24:...	Ingo Kreykenb...
<input type="checkbox"/>	Unknown Source	Ger	30998.9	463.4	18:01:0...	-25:04:4...	Not assigned
<input checked="" type="checkbox"/>	Unknown Sou...	Ger	29080.2	363.0	18:01:1...	-25:44:2...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	82.2	1.1	18:02:1...	-24:52:0...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	41.7	0.7	18:03:2...	-25:15:5...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	48097.1	505.2	18:01:3...	-20:31:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	39544.0	256.2	18:02:3...	-20:17:1...	Not assigned

**Discussion**

Date	Author	Summary
No discussion present		

Alert ID: 00002-t234-00004

Source: [Unidentified \(NRTA J180100.2-254429\)](#)

Configuration:  Coordinates:

Time: 2.49256  Duration: 108.25 s

Products  Discussion

TStart:   OR

TStop:

MJD: 58542.5724  
eroday: 41992.1843  
last eroday: 41992.1843

value(0) physical(778.966, 1019.644) FK5(18:02:08.504, -25:01:46.99)

Source 3

Source 1

Source 4

Source 2

...contrast changed

# NRTA Science Interface

Work Area 4

Work Area 5

<input type="checkbox"/>	Unknown Source	Ger	118.9	0.3	17:58:0...	+50:24:...	Ingo Kreykenb...	
<input type="checkbox"/>	Unknown Source	Ger	30998.9	463.4	18:01:0...	-25:04:4...	Not assigned	value(0) physical(248.458, 1284.051) FK5(18:04:44.348, -24:44:06.46)
<input checked="" type="checkbox"/>	Unknown Sou...	Ger						
<input type="checkbox"/>	Unknown Source	Ger						
<input type="checkbox"/>	Unknown Source	Ger						
<input type="checkbox"/>	Unknown Source	Ger						
<input type="checkbox"/>	Unknown Source	Ger						

Discussion

Date Author

No discussion present

Alert ID: 00002-t234

Source: [Unidentified](#)

Configuration: t234

Time: 2.49256

Products

TStart: 2

TStop: 3

MJD: 58542.5736

eroday: 41992.1915

last eroday: 41992.1915

Aladin Sky Browser

VizieR: Select catalog

J2000 18 01 37.192 -25 05 50.23

Source 3

Source 1

Source 4

Source 2

FoV: 1.17°

display eSASS detected  
src in Aladin w/eROSITA  
sources

# NRTA Science Interface

Work Area 4

Work Area 5

<input type="checkbox"/>	Unknown Source	Ger	118.9	0.3	17:58:0...	+50:24:...	Ingo Kreykenb...	
<input type="checkbox"/>	Unknown Source	Ger	30998.9	463.4	18:01:0...	-25:04:4...	Not assigned	value(0) physical(248.458, 1284.051) FK5(18:04:44.348, -24:44:06.46)
<input checked="" type="checkbox"/>	Unknown Sou...	Ger						
<input type="checkbox"/>	Unknown Source	Ger						
<input type="checkbox"/>	Unknown Source	Ger						
<input type="checkbox"/>	Unknown Source	Ger						
<input type="checkbox"/>	Unknown Source	Ger						

Discussion

Date	Author
No discussion present	

Alert ID: 00002-t234

Source: [Unidentified](#)

Configuration: t234

Time: 2.49256

Products

TStart: 2

TStop: 3

MJD: 58542.5736

eroday: 41992.1915

last eroday: 41992.1915

Aladin Sky Browser

VizieR: Select Catalog

J2000 18 01 56.234 -25 42 32.02

Source 3

Source 1

Source 4

Source 2

Ximg	2RXS	Cts	e_Cts	RAJ2000	DEJ2000	HR1	e_HR1	HR2	
Ximg	2RXS	J180326.2-251554	20.58	5.408932	270.85956	-25.26526	1.000	0.207	0.741

display eSASS detected src in Aladin  
known source info

# NRTA Science Interface

Work Area 4

<input type="checkbox"/>	Unknown Source	Ger	118.9	0.3	17:58:0...	+50:24:...	Ingo Kreykenb...	value(0) physical(170.492, 1319.644) FK5(18:05:07.194, -24:41:42.79)
<input type="checkbox"/>	Unknown Source	Ger	30998.9	463.4	18:01:0...	-25:04:4...	Not assigned	

Work Area 5

<input checked="" type="checkbox"/>	Unknown Sou...	Ger						
<input type="checkbox"/>	Unknown Source	Ger						
<input type="checkbox"/>	Unknown Source	Ger						
<input type="checkbox"/>	Unknown Source	Ger						
<input type="checkbox"/>	Unknown Source	Ger						

Discussion

Date	Author
No discussion present	

Alert ID: 00002-t234

Source: [Unidentified](#)

Configuration: t234

Time: 2.49256

Products

TStart: 2

TStop: 3

MJD: 58542.5759

eroday: 41992.2055

last eroday: 41992.2055

Aladin Sky Browser

VizieR: Select Catalog

J2000 18 01 48.045 -25 17 45.41

Base image layer: SPITZER color

Overlay layers:

- INTEGRAL/IBIS 9year
- Fermi 3FGL
- Swift 7year
- Second RASS
- Found sources

Tools:

- Reticle
- HEALPix grid

Source 3

Source 1

Source 4

Source 2

Ximg	2RXS	Cts	e_Cts	RAJ2000	DEJ2000	HR1	e_HR1	HR2	
Ximg	2RXS	J180326.2-251554	20.58	5.408932	270.85956	-25.26526	1.000	0.207	0.741

change base image and add other source catalogues (will also match w/all earlier X-ray missions)



# NRTA Science Interface

Unknown Source Ger 118.9 0.3 17:58:0... +50:24:... Ingo Kreykenb...

value(0) physical(817.667, 413.500) FK5(18:01:56.855, -25:42:11.39)

Work Area 4

Work Area 5

Aladin Sky Browser

VizieR: Select Catalog

J2000 18 02 43 369 -25 25 43 84

FoV: 1.44°

MJD: 58542.5782

eroday: 41992.2194

last eroday: 41992.2194

J180501.6-2435157

J180501.6-240444

J180501.6-241556

J180501.6-244435

overlay Aladin sources onto eROSITA image

# NRTA Science Interface

Work Area 4

Work Area 5

<input type="checkbox"/>	Unknown Source	Ger	118.9	0.3	17:58:0...	+50:24:...	Ingo Kreykenb...
<input type="checkbox"/>	Unknown Source	Ger	30998.9	463.4	18:01:0...	-25:04:4...	Not assigned
<input checked="" type="checkbox"/>	Unknown Sou...	Ger	29080.2	363.0	18:01:1...	-25:44:2...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	82.2	1.1	18:02:1...	-24:52:0...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	41.7	0.7	18:03:2...	-25:15:5...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	48097.1	505.2	18:01:3...	-20:31:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	39544.0	256.2	18:02:3...	-20:17:1...	Not assigned

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No discussion present		

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Source: [Unidentified \(NRTA J180100.2-254429\)](#)

Configuration:  Coordinates:

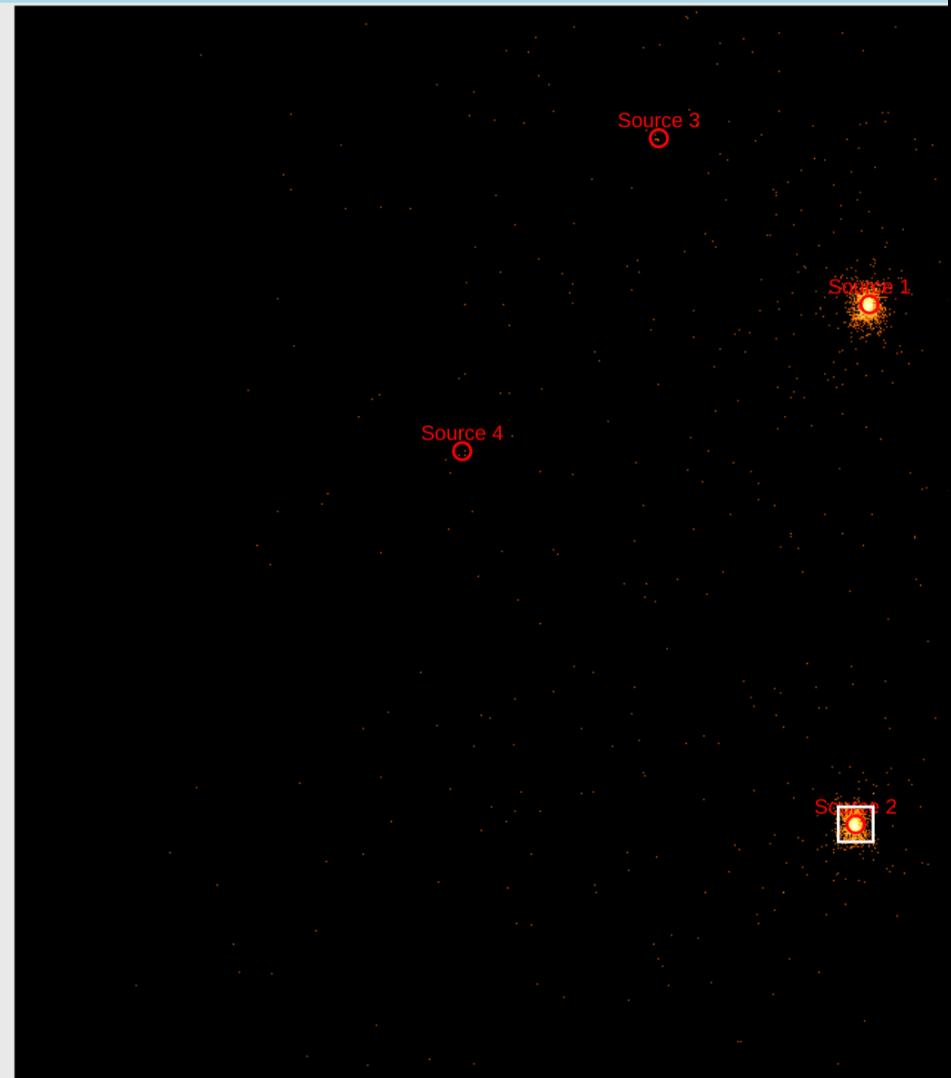
Time: 2.49256  Duration: 108.25 s

Products:  Discussion

TStart:   OR

TStop:

MJD: 58542.5794  
eroday: 41992.2264  
last eroday: 41992.2264



back to eROSITA only

# NRTA Science Interface

Work Area 4

Work Area 5

<input type="checkbox"/>	Unknown Source	Ger	118.9	0.3	17:58:0...	+50:24:...	Ingo Kreykenb...	270.301996428...	-25.741567976...	0.528282	0	0	4.51043329148...	-1.360
<input type="checkbox"/>	Unknown Source	Ger	30998.9	463.4	18:01:0...	-25:04:4...	Not assigned	270.581725863...	-24.867298221...	3.19037	0	0	5.39567958301...	-1.148
<input checked="" type="checkbox"/>	Unknown Sou...	Ger	29080.2	363.0	18:01:1...	-25:44:2...	Not assigned	270.858935346...	-25.266282282...	3.45109	0	0	5.17202410734...	-1.562
<input type="checkbox"/>	Unknown Source	Ger	82.2	1.1	18:02:1...	-24:52:0...	Not assigned							
<input type="checkbox"/>	Unknown Source	Ger	41.7	0.7	18:03:2...	-25:15:5...	Not assigned							
<input type="checkbox"/>	Unknown Source	Ger	48097.1	505.2	18:01:3...	-20:31:4...	Not assigned							
<input type="checkbox"/>	Unknown Source	Ger	39544.0	256.2	18:02:3...	-20:17:1...	Not assigned							

**Discussion**

Date	Author	Summary
No discussion present		

Alert ID: 00002-t234-00004

Source: [Unidentified \(NRTA J180100.2-254429\)](#)

Configuration:  Coordinates:

Time: 2.49256  Duration: 108.25 s

Products  Discussion

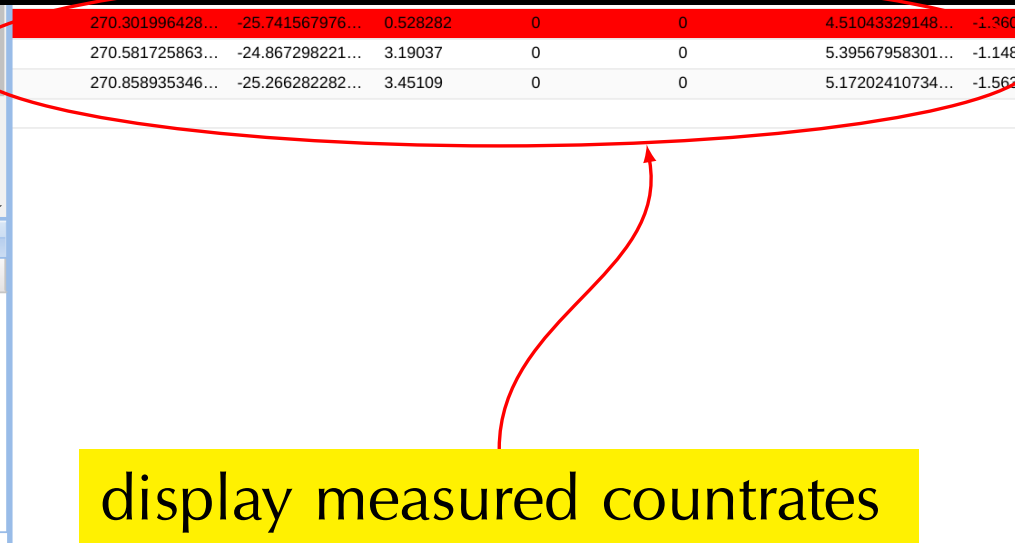
TStart:  OR

TStop:

MJD: 58542.5794

eroday: 41992.2264

last eroday: 41992.2264



display measured countrates

# NRTA Science Interface

Work Area 4  
Work Area 5

<input type="checkbox"/>	Unknown Source	Ger	118.9	0.3	17:58:0...	+50:24:...	Ingo Kreykenb...
<input checked="" type="checkbox"/>	Unknown Sou...	Ger	30998.9	463.4	18:01:0...	-25:04:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	29080.2	363.0	18:01:1...	-25:44:2...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	82.2	1.1	18:02:1...	-24:52:0...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	41.7	0.7	18:03:2...	-25:15:5...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	48097.1	505.2	18:01:3...	-20:31:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	39544.0	256.2	18:02:3...	-20:17:1...	Not assigned

**Discussion**

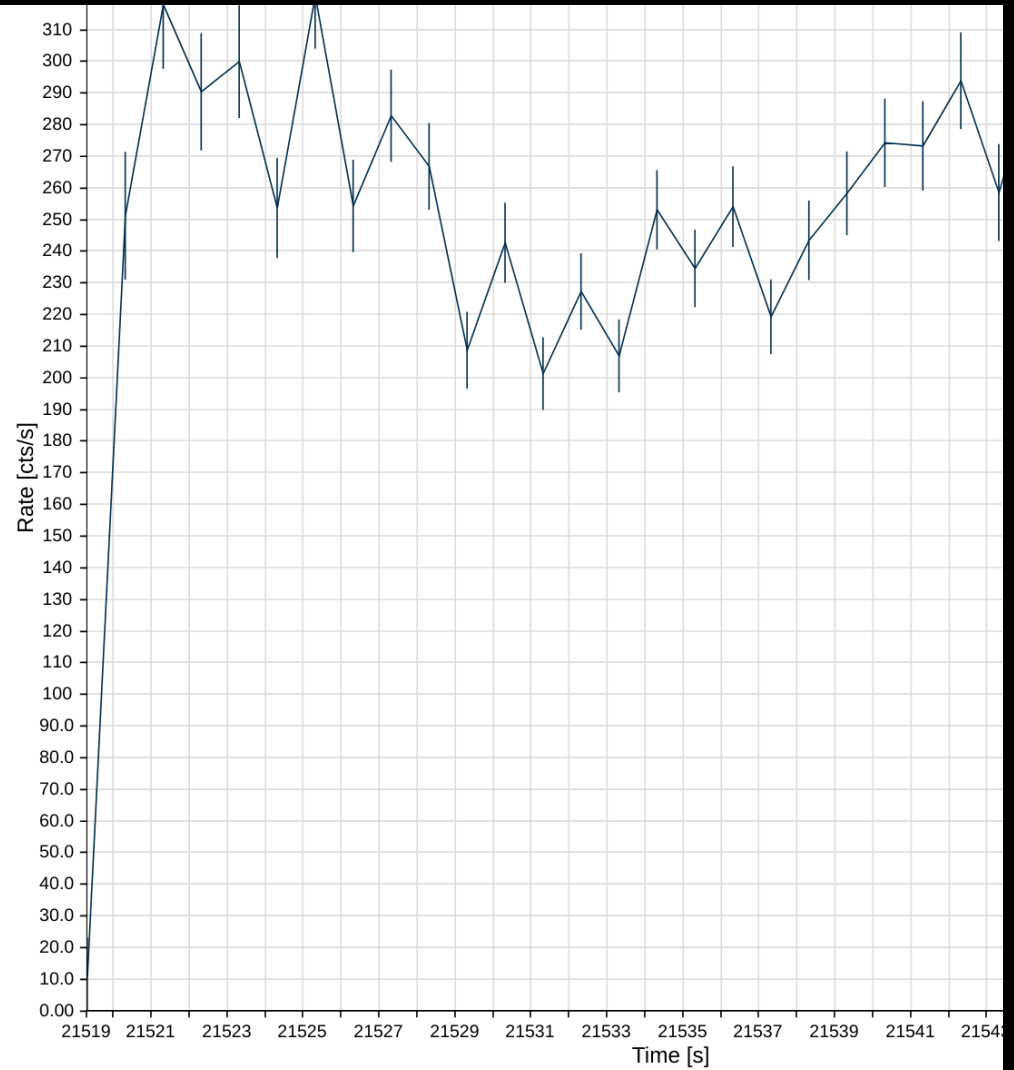
Date	Author	Summary
No discussion present		

Alert ID: 00002-t234-00003  
Source: [Unidentified \(NRTA J180100.1-250443\)](#)  
Configuration: t234 Coordinates: HMS  
Time: 2.49256 eroDay Duration: 108.25 s

Products: Not assigned Discussion

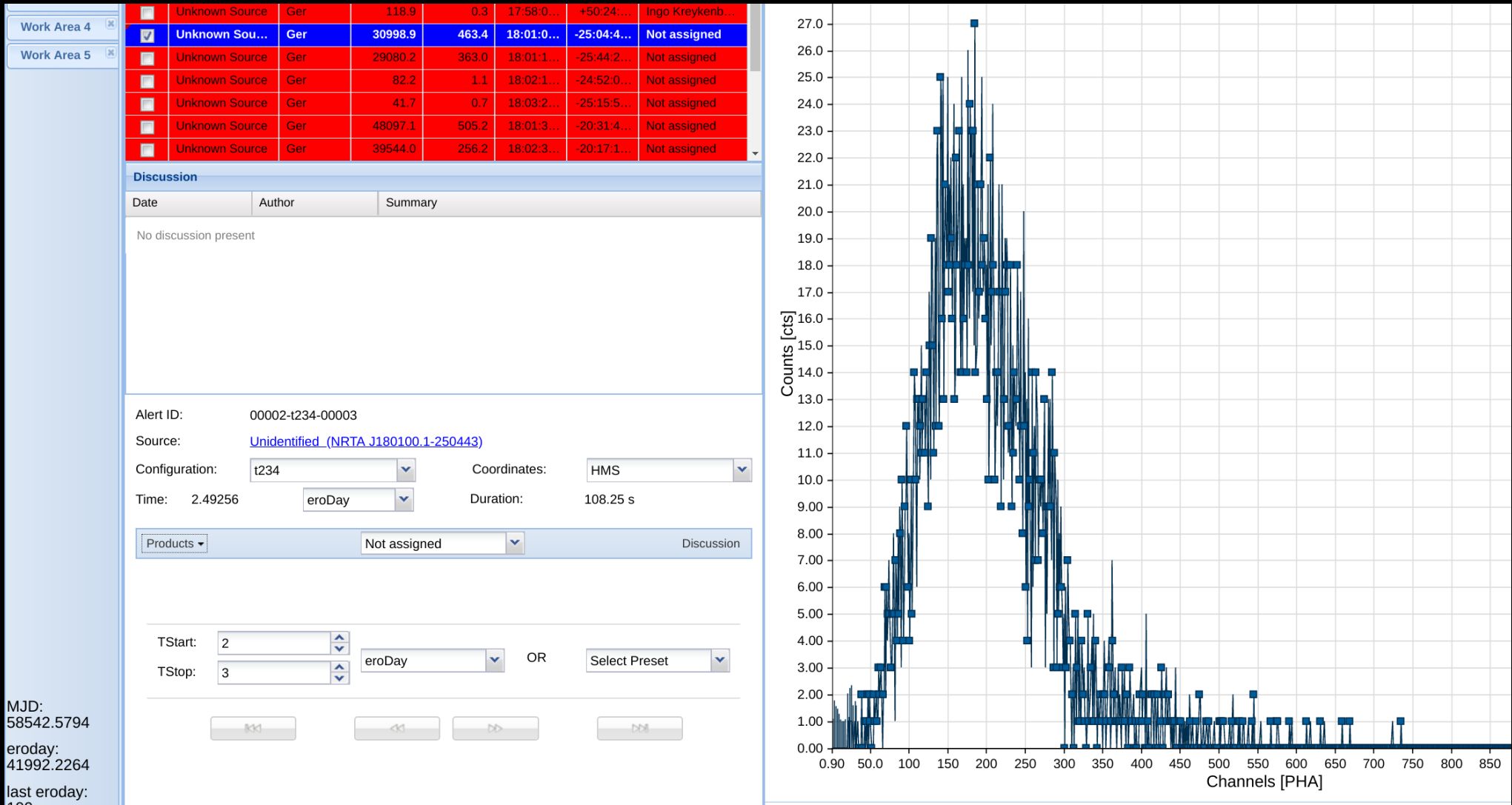
TStart: 2 OR Select Preset  
TStop: 3 eroDay

MJD: 58542.5794  
eroday: 41992.2264  
last eroday: 41992.2264



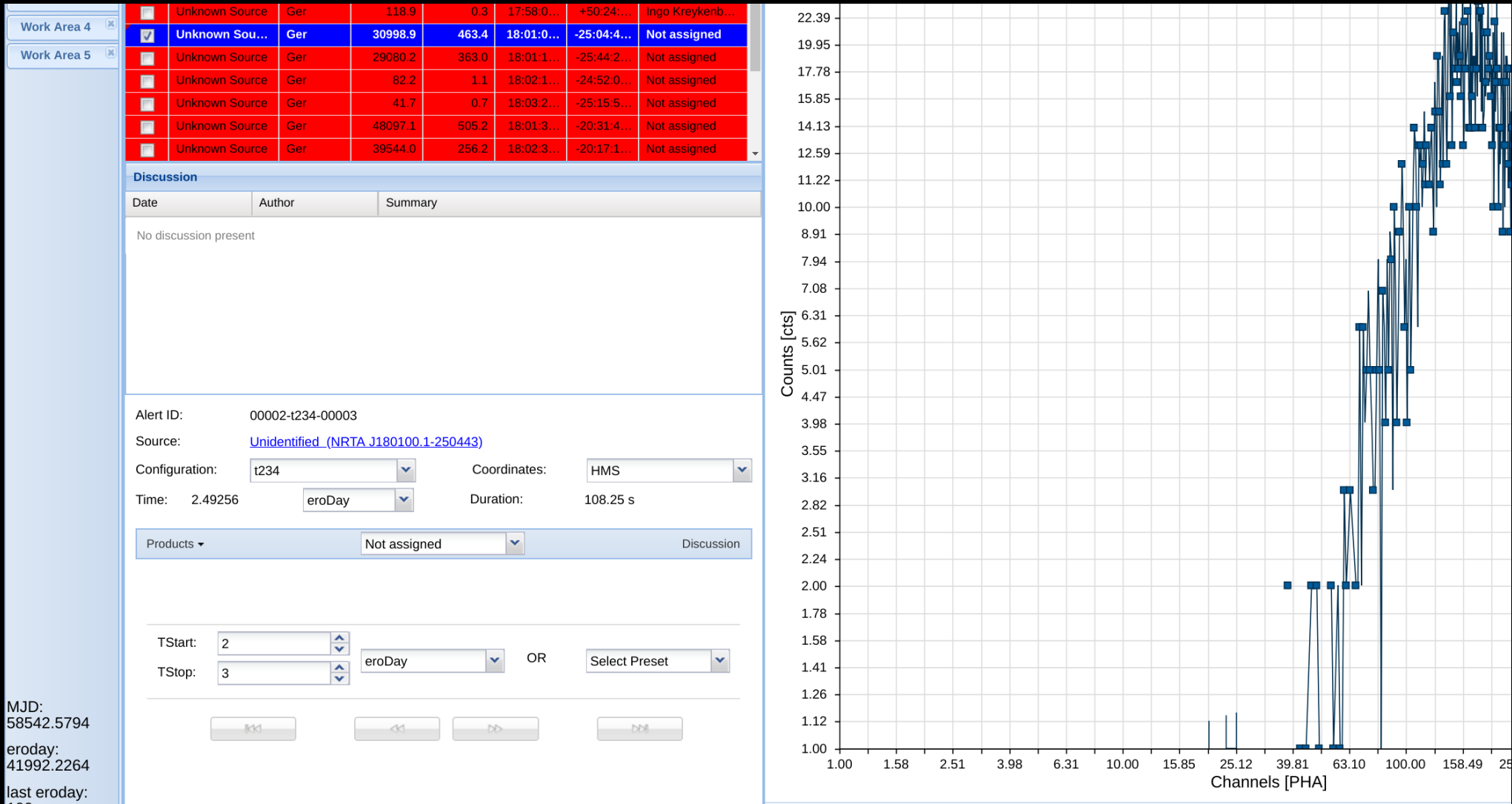
plot source lightcurve

# NRTA Science Interface



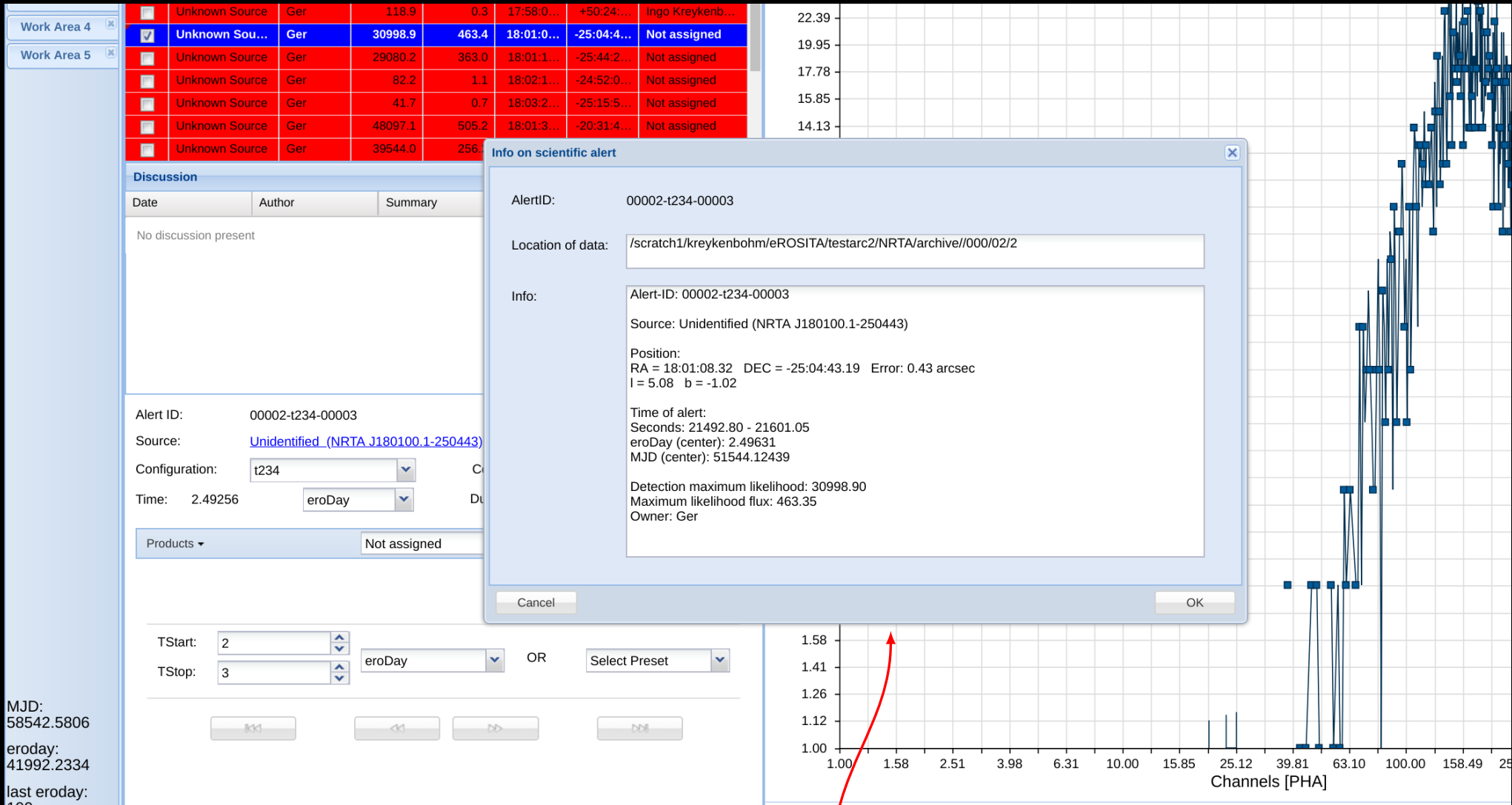
plot source spectrum in detector space

# NRTA Science Interface



plot source spectrum in detector space  
(log-log) [will provide fits to standard  
spectral models]

# NRTA Science Interface



display further alert information (summary text), can also be other informative text from other NRTA modules ("bots")

# NRTA Science Interface

Work Area 4  
Work Area 5

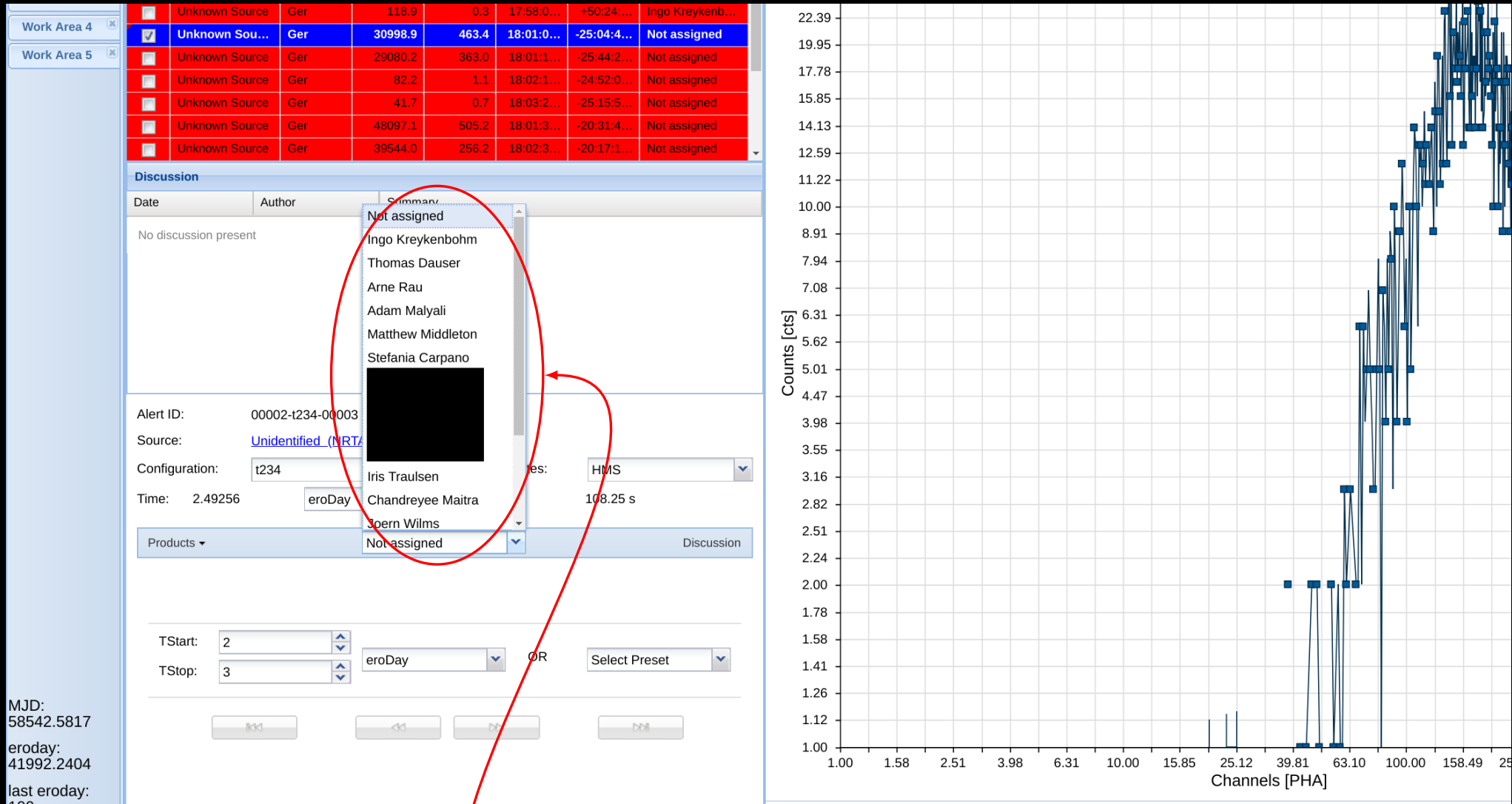
- 02
  - 0
  - 2
    - bkg
    - boxlist.fits
    - boxlist\_bkg.fits
    - catalog.fits
    - cheese
    - detmask
    - evt
    - expmap
    - img
    - products
    - srcmaps
    - THISISAVEERYLONGNAMEFORCATPREP\_mlist.fits
  - 3
  - 4
  - 5
- 03
- 04
- 05
- 06
- 07
- 08
- 09
- 10
- 11
- 12
- 13
- 14
- 15
- 16
- 17
- 18
- 19
- 20
- 21

MJD:  
58542.5817  
eroday:  
41992.2404  
last eroday:  
41992.2404

can browse all products  
from eSASS run



# NRTA Science Interface



Alerts can be assigned to scientist for further inspection

# NRTA Science Interface

The screenshot displays the NRTA Science Interface. At the top, there is a table of alerts with columns for selection, source, country, and various numerical and time-based data. Below the table is a 'Discussion' section with a table of entries. A configuration panel is overlaid on the interface, providing options for selection, closing alerts, blacklisting sources, and communication methods. The panel includes buttons for 'All', 'Invert', 'None', 'Close Alert', 'Close Checked', 'Hide closed', 'Discussion', 'Hide Blacklisted', 'Discussion', 'Contact by', 'Email', 'Telegram', 'Dock', 'Undock', and 'Close'. The interface also shows 'Work Area 4' and 'Work Area 5' on the left side.

<input checked="" type="checkbox"/>	Unknown Sou...	Ger	32.4	0.6	18:08:4...	-26:00:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	78.0	3.9	18:08:2...	-23:09:1...	Ingo Kreykenb...
<input type="checkbox"/>	Unknown Source	Ger	1349.9	17.0	18:08:4...	-20:24:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	419.0	19.6	18:09:5...	-19:43:5...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	820.5	23.7	18:10:2...	-19:04:1...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	2019.9	20.5	18:07:2...	+19:42:...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	1948.3	18.3	18:05:4...	+21:26:...	Not assigned

Date	Author	Summary
2019-02-01	kreyken	Background event

Alert ID: 00011-t234-00003  
Source: [Unidentified \(NRTA\)](#)  
Configuration: t234  
Time: 11.4913 eroDay

Products ▾

TStart: 11  
TStop: 12

MJD: 58542.5833  
eroday: 41992.2498  
last eroday: 41992.2498

Alerts can be blacklisted, hidden,...

# NRTA Science Interface

The screenshot displays the NRTA Science Interface. At the top, there are two work area tabs: 'Work Area 4' and 'Work Area 5'. Below them is a table with columns for source, country, and various numerical and time-based data. A 'Discussion' section follows, showing a table with columns for Date, Author, and Summary. Below the discussion is a detailed view of an alert with fields for Alert ID, Source, Configuration, Time, and Duration. A 'Products' dropdown is set to 'Not assigned'. At the bottom, there are time selection controls for TStart and TStop, along with a 'Select Preset' dropdown and navigation buttons.

Source	Country	Value 1	Value 2	Time 1	Time 2	Assignment
Unknown Source	Ger	32.4	0.6	18:08:4...	-26:00:4...	Not assigned
Unknown Source	Ger	78.0	3.9	18:08:2...	-23:09:1...	Ingo Kreykenb...
Unknown Source	Ger	1349.9	17.0	18:08:4...	-20:24:4...	Not assigned
Unknown Source	Ger	419.0	19.6	18:09:5...	-19:43:5...	Not assigned
Unknown Source	Ger	820.5	23.7	18:10:2...	-19:04:1...	Not assigned
Unknown Source	Ger	2019.9	20.5	18:07:2...	+19:42:...	Not assigned
Unknown Source	Ger	1948.3	18.3	18:05:4...	+21:26:...	Not assigned

Discussion

Date	Author	Summary
2019-02-01	kreyken	Background event

Alert ID: 00011-t234-00003  
Source: [Unidentified \(NRTA J180800.7-260042\)](#)  
Configuration: t234  
Time: 11.4913  
Duration: 3

Products: Not assigned

TStart: 11  
TStop: 12  
eroDay  
OR  
Select Preset

MJD: 58542.6470  
eroday: 41992.6322  
last eroday: 41992.6322

Contact other users

Alert-ID: 00011-t234-00003

Recipients: Ingo Kreykenbohm(@IngoKreykenbohm)

Contacts: Ingo Kreykenbohm(@IngoKreykenbohm)

Text: This is a test

Buttons: Cancel, Paste Alertinfo, Send Telegram

Trigger info can be emailed to known users

# NRTA Science Interface

The screenshot displays the NRTA Science Interface. At the top, there are two work area tabs: 'Work Area 4' and 'Work Area 5'. Below them is a table with columns for source, country, and various numerical and time-based data. A 'Discussion' section follows, containing a table with columns for Date, Author, and Summary. Below the discussion is an 'Alert ID' section with fields for Source, Configuration, Time, and Duration. A 'Products' dropdown is set to 'Not assigned'. At the bottom, there are 'TStart' and 'TStop' fields with a 'Select Preset' dropdown and navigation buttons.

Source	Country	Value 1	Value 2	Time 1	Time 2	Assignment
Unknown Sou...	Ger	32.4	0.6	18:08:4...	-26:00:4...	Not assigned
Unknown Source	Ger	78.0	3.9	18:08:2...	-23:09:1...	Ingo Kreykenb...
Unknown Source	Ger	1349.9	17.0	18:08:4...	-20:24:4...	Not assigned
Unknown Source	Ger	419.0	19.6	18:09:5...	-19:43:5...	Not assigned
Unknown Source	Ger	820.5	23.7	18:10:2...	-19:04:1...	Not assigned
Unknown Source	Ger	2019.9	20.5	18:07:2...	+19:42:...	Not assigned
Unknown Source	Ger	1948.3	18.3	18:05:4...	+21:26:...	Not assigned

Date	Author	Summary
2019-02-01	kreyken	Background event

Alert ID: 00011-t234-00003  
Source: [Unidentified \(NRTA J180800.7-260042\)](#)  
Configuration: t234  
Time: 11.4913  
Duration: 3

Products: Not assigned

TStart: 11  
TStop: 12  
eroDay  
OR  
Select Preset

MJD: 58542.6482  
eroday: 41992.6392  
last eroday: 41992.6392

### Contact other users

Alert-ID: 00011-t234-00003

Recipients:

- Thomas Dauser
- Arne Rau
- Matthew Middleton

Contacts: Matthew Middleton

Subject: Weird source

Text: What do you think of this alert?

Attachments: no new

Buttons: Cancel, Paste Alertinfo, Send Email, select File, Upload

Trigger info can be emailed to known users

# NRTA Science Interface

Work Area 4

Work Area 5

<input checked="" type="checkbox"/>	Unknown Sou...	Ger	32.4	0.6	18:08:4...	-26:00:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	78.0	3.9	18:08:2...	-23:09:1...	Ingo Kreyken...
<input type="checkbox"/>	Unknown Source	Ger	1349.9	17.0	18:08:4...	-20:24:4...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	419.0	19.6	18:09:5...	-19:43:5...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	820.5	23.7	18:10:2...	-19:04:1...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	2019.9	20.5	18:07:2...	+19:42:...	Not assigned
<input type="checkbox"/>	Unknown Source	Ger	1948.3	18.3	18:05:4...	+21:26:...	Not assigned

**Discussion**

Date	Author	Summary
2019-02-01	kreyken	Background event

Alert ID: 00011-t234-00003

Source: [Unidentified \(NRTA J180800.7-260042\)](#)

Configuration: t234 Coordinate: ...

Time: 11.4913 eroDay Duration: ...

Products: Not assigned Discussion

TStart: 11 OR Select Preset

TStop: 12

MJD: 58542.6482

eroday: 41992.6392

last eroday: 41992.6392

Review source Unidentified (NRTA J180800.7-260042)

Current Status: **active**

Reasons / Discussion

No reviews present for this source

Discussion on alert can be accessed

# NRTA Science Interface

Work Area 4	<input checked="" type="checkbox"/>	Unknown Sour...	Ger	107.1	4.1	18:09:5...	-19:43:5...	Not assigned
Work Area 5	<input checked="" type="checkbox"/>	Unknown Sour...	Ger	540.2	5.2	18:07:2...	+19:42:...	Not assigned
	<input type="checkbox"/>	Unknown Source	Ger	1575.4	19.9	18:05:4...	+21:26:...	Not assigned
	<input type="checkbox"/>	Unknown Source	Ger	693.7	24.4	18:08:1...	+29:41:...	Not assigned
	<input type="checkbox"/>	Unknown Source	Ger	34.3	0.6	18:06:5...	+29:31:...	Not assigned

**Discussion**

Date	Author	Summary
No discussion present		

Alert ID: 00012-t234-00003  
Source: [Unidentified \(NRTA J180700.4+194213\)](#)  
Configuration: t234 Coordinates:   
Time: 12.61867 eroDay Duration: 3

Products: Not assigned

TStart: 12 OR Select Preset  
TStop: 13 eroDay

MJD: 58542.6494  
eroday: 41992.6462  
last eroday: 41992.6462

**Close scientific alert**

Source: Unidentified (NRTA J181000.9-291200)  
Unidentified (NRTA J180900.8-194354)  
Unidentified (NRTA J180700.4+194213)

Alert-ID: 00012-t234-00001  
00012-t234-00002  
00012-t234-00003

Templates: empty

Title: Enter title or one line summary

Comment: Provide comment/reason

Attachments: no new select File Upload

Cancel Submit

Alerts from same source can be merged

# Summary

## Science:

- There is a large number of sources to follow
- Survey science: end stages of stellar evolution, stellar flares, AGN events,...
- Timing: Sampling not ideal, but eROSITA will probably be one of only a few monitors  $<10$  keV available in 2020ff.
- $\sim 1-2$  transients per day to follow up

## Software:

- NRTA interface allows initial studies of triggered sources
- Many tools in backend finalized
- Input on triggers, interface from potential users urgently needed  
 $\implies$  please communicate trigger criteria & science projects to the TDA WG!
- Interested scientists: please come the TDA WG sessions for further information.