

RGS CALIBRATION STATUS

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XMM-NEWTON SCIENCE OPERATIONS CENTRE

ON BEHALF OF THE SRON AND ESAC RGS TEAMS

Outline



Instrument Status

Operations

Offsets

CTE

Bad Surface

Calibration

New CCFs

Wavelength Scale

Contamination

Effective Area

Instrument Status

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Operations



- ✓ RGS operations are running smoothly
- ✓ No changes in operational configuration
- ✓ No anomalies

Instrument Status

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Wavelength Scale

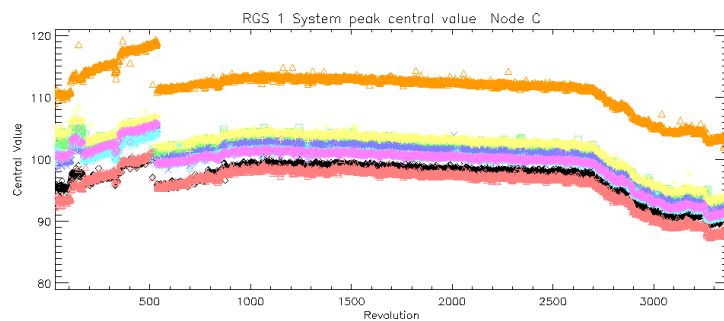
Contamination

Effective Area

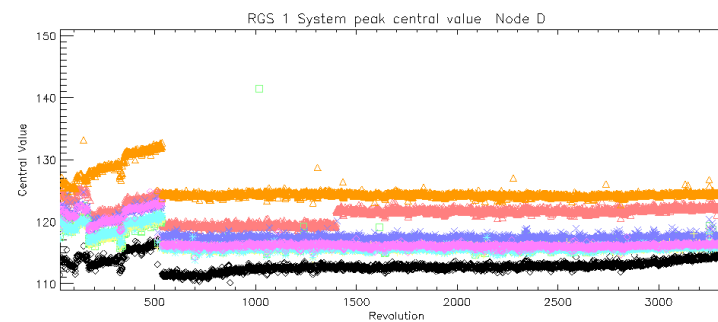
Offsets



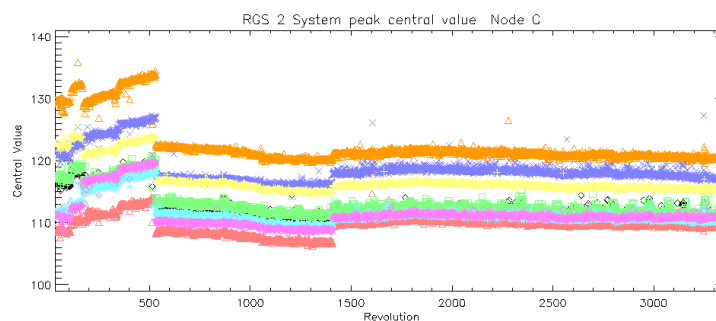
RGS1 node C



RGS1 node D



RGS2



Instrument Status

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CTE

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Calibration

New CCFs

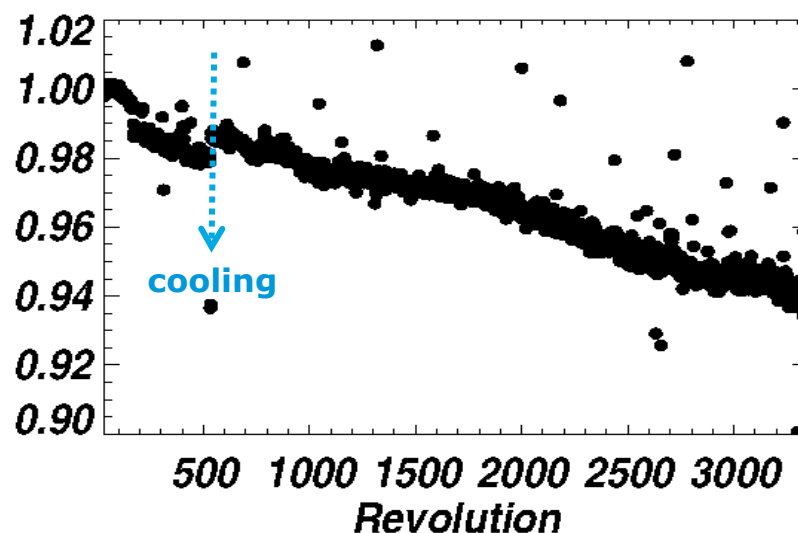
Wavelength Scale

Contamination

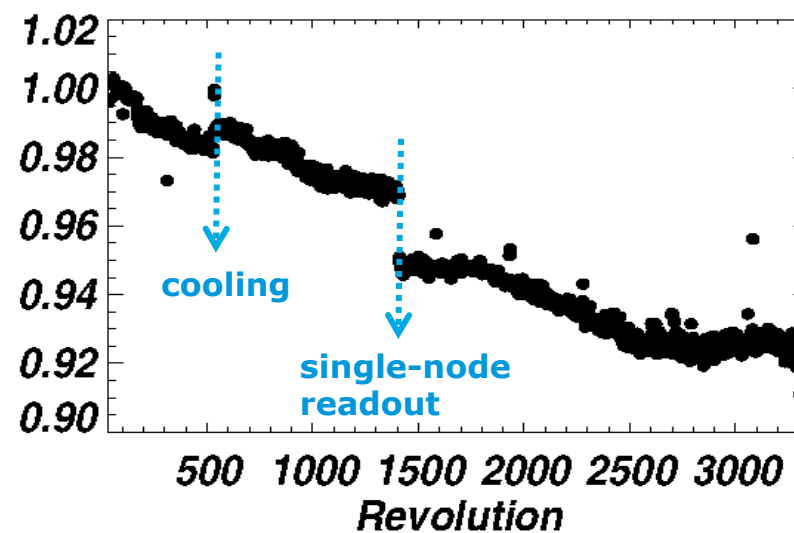
Effective Area

Relative Charge Transfer Efficiency

RGS 1



RGS 2



C. de Vries

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Wavelength Scale

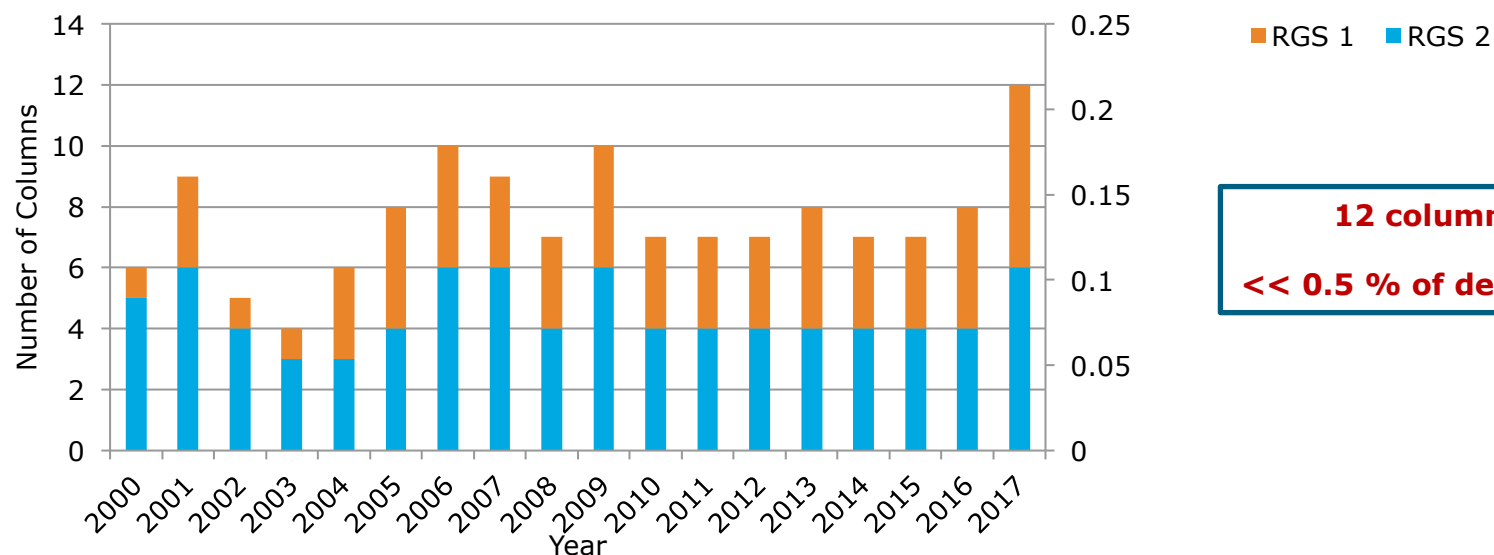
Contamination

Effective Area

Bad Surface



Columns found hot in > 95% of the observations



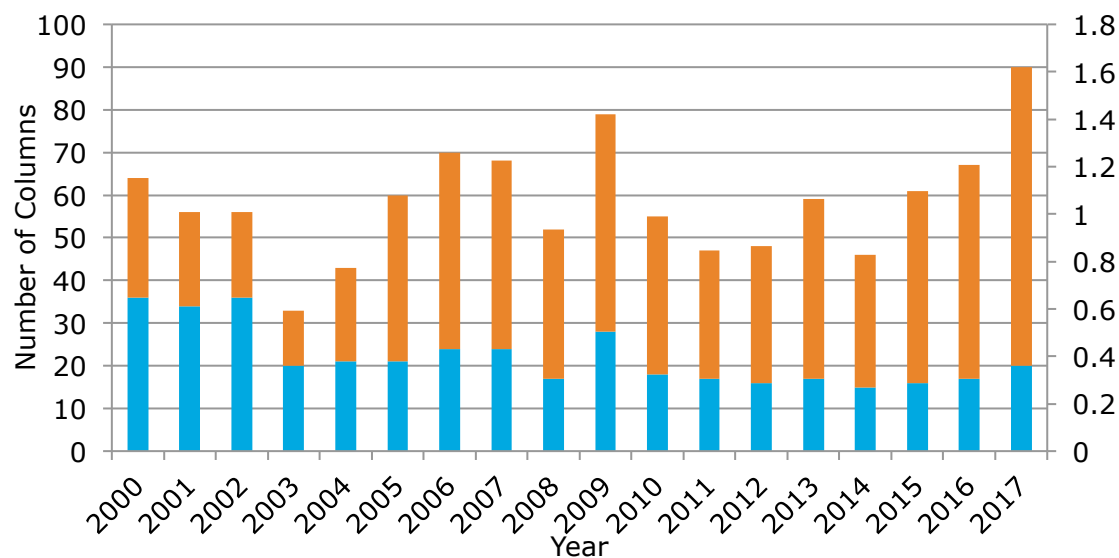
12 columns (6+6)
<< 0.5 % of detector surface

XMM-SOC-CAL-TN-0217
 C.Gabriel

Bad Surface

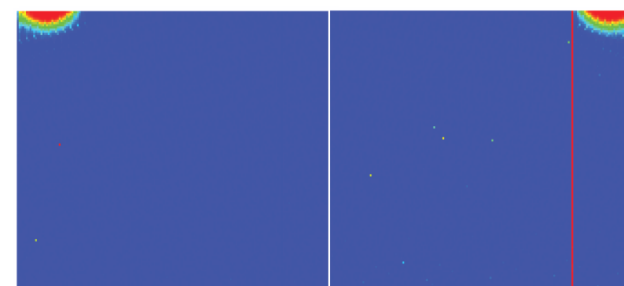


Columns found hot in > 25% of the observations



■ RGS 1 ■ RGS 2

< 2% of detector surface



XMM-SOC-CAL-TN-0217
C. Gabriel

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European Space Agency

Instrument Status

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CTE

Bad Surface

Calibration

New CCFs

Wavelength Scale

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Effective Area

Calibration files released since last Meeting



CCF	Release Note	Purpose	Date
RGS[12]_EFFAREACORR_0012	349	Extrapolation of the correction to the RGS Effective Area beyond revolution 2816	June 2017
RGS1_HKPARMINT_0016 RGS2_HKPARMINT_0015	350	Increase in the RGA Temperature limits in revolutions 3249 and 3250	September 2017

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Wavelength Scale

Contamination

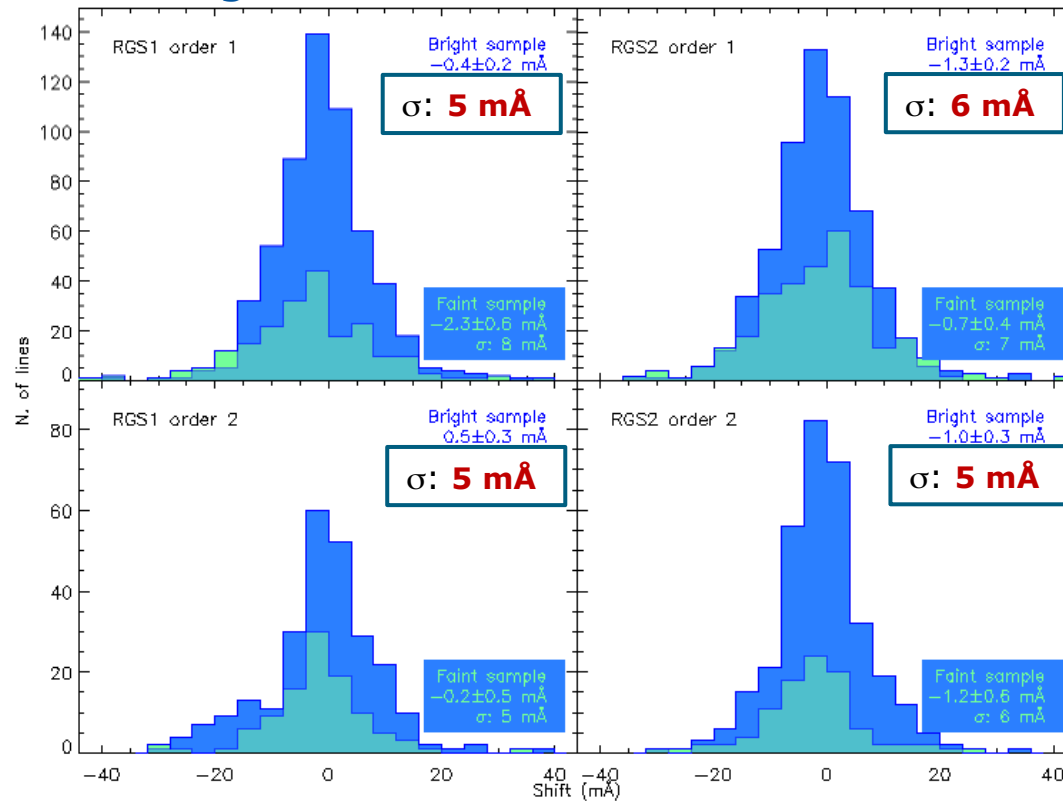
Effective Area

Wavelength Scale



AB Dor, HR 1099,
Capella and Procyon

Fainter emission line stars



- ✓ Heliocentric and Sun angle corrections applied
- ✓ Most recent XMM variable boresight (#28)
- ✓ No trend with time

Instrument Status

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Calibration

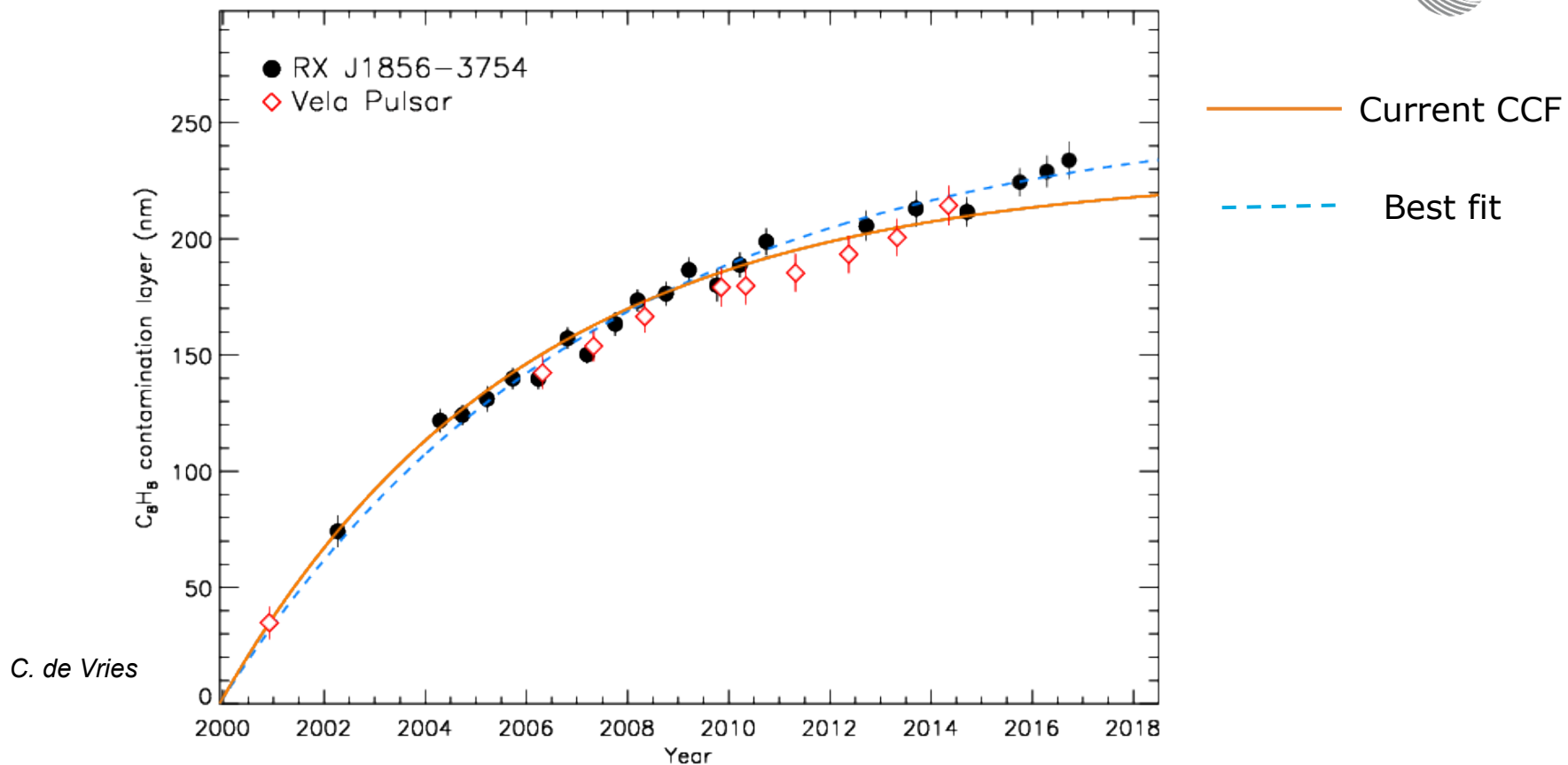
New CCFs

Wavelength Scale

Contamination

Effective Area

Contamination



C. de Vries

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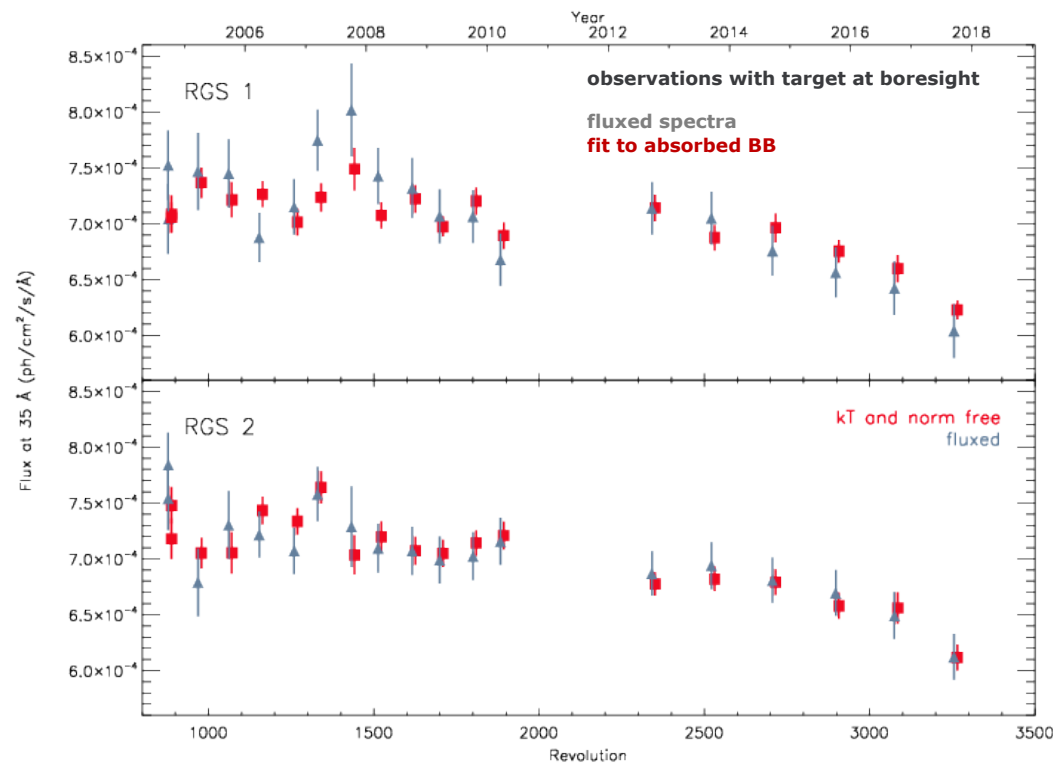
New CCFs

Wavelength Scale

Contamination

Effective Area

Effective area: Flux changes in RXJ1856-3754

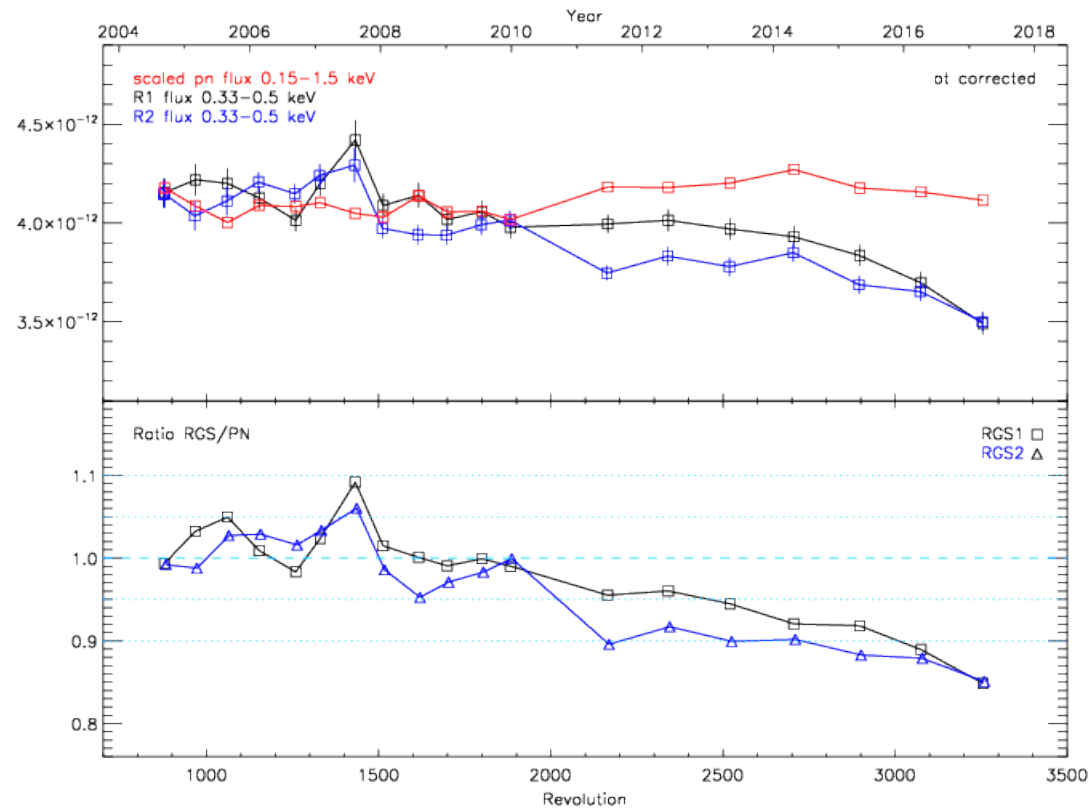


Decrease in the flux of the
Isolated Neutron Star
RXJ1856-3754

=> Current model underestimates
the contamination



Effective area: RXJ1856-3754 RGS vs. EPIC-pn



EPIC-pn flux 0.15-1.5 keV :
constant within 2% (F. Haberl, priv. comm.)

RGS1 [RGS2] flux 0.33-0.5 keV,
from fluxed spectra

Effective Area



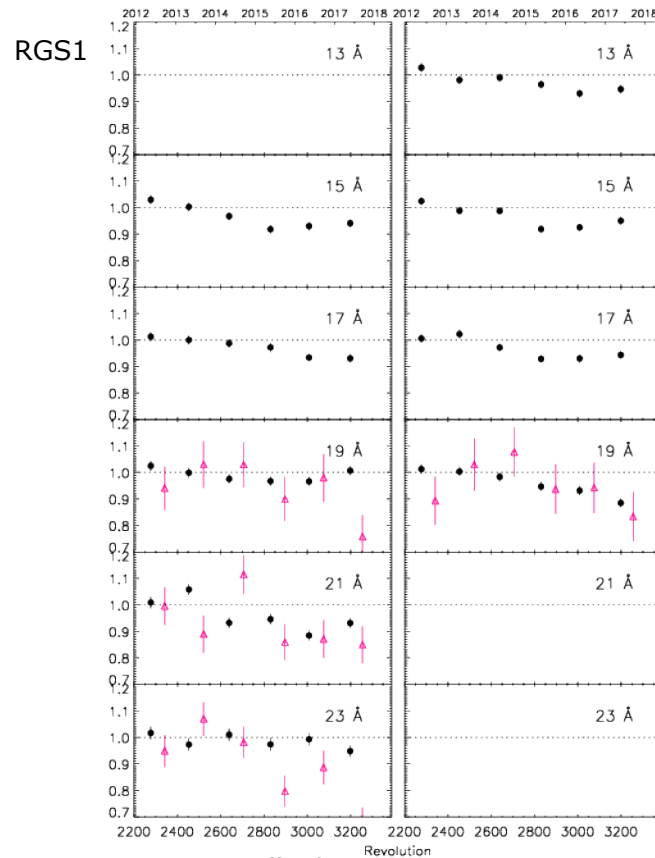
The flux of the ISN RXJ1856 has decreased in the last years

- The source is not variable
- The observed changes cannot be explained with (only) an increase in the thickness of the C_8H_8 contamination layer

Work in progress to confirm the change in effective area and quantify it

- Detailed analysis of selected targets: RXJ1856, Vela Pulsar, compact SNRs (1ES0102, N132D)
- Comparison with EPIC-pn data for BL Lacs (aka "Rectification Factors")
- Comparison with Chandra/LETG
- Evaluation of instrumental factors (detectors, optics...)

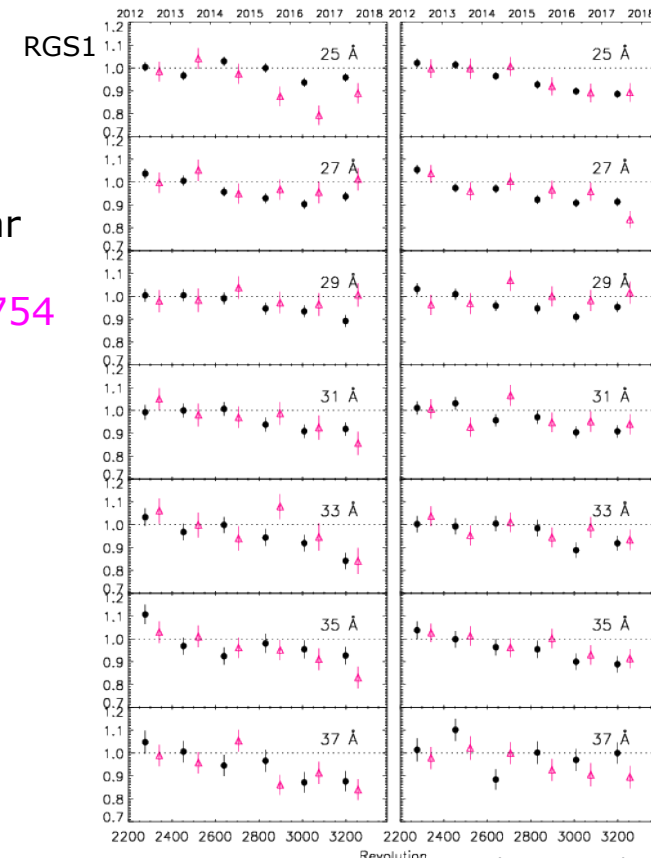
Preliminary results: Flux changes in the Vela Pulsar



RGS2

Vela Pulsar

RXJ1856-3754



RGS2

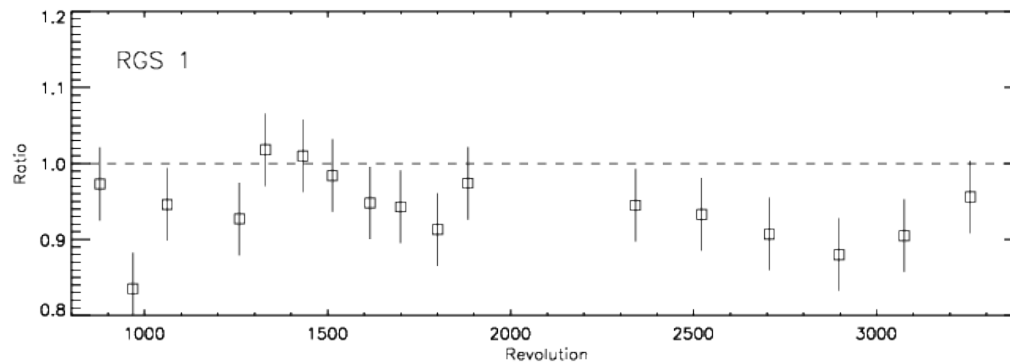
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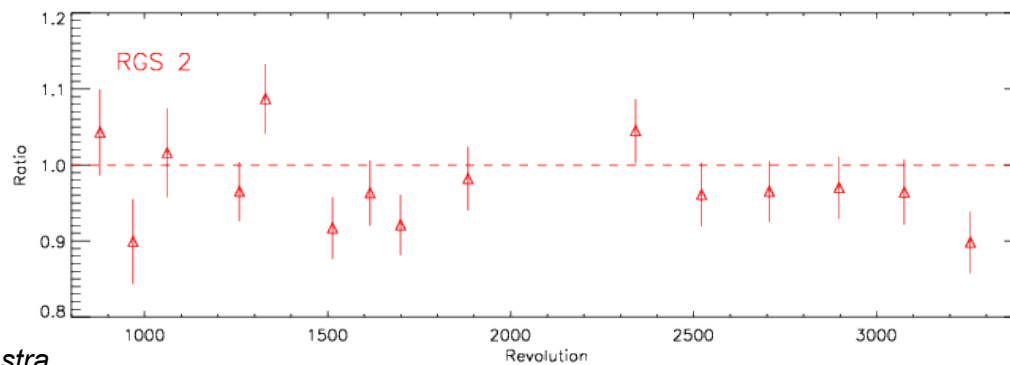


European Space Agency

Preliminary results: RXJ1856-3754, comparison with LETG

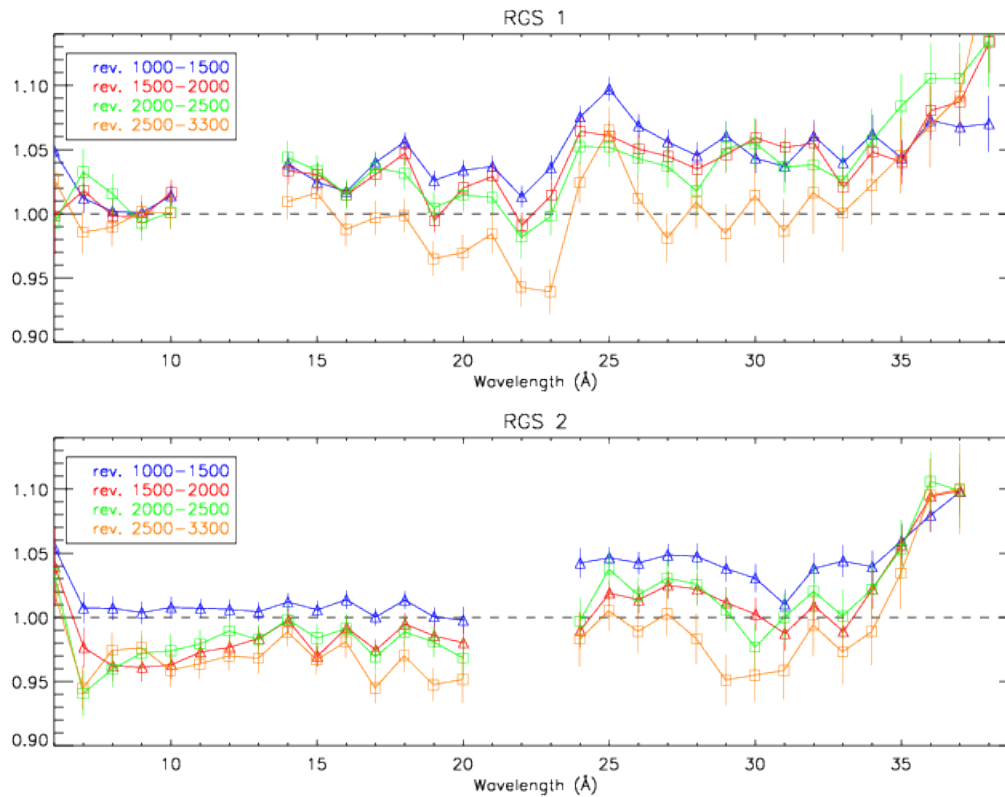


Flux ratio at 27Å
with respect to
Chandra LETG model



J. Kaastra

Preliminary results: Time-dependent rectification factors



Flux Ratio RGS / EPIC-pn
for a sample of BL Lacs

Summary and Conclusions



- ✓ RGS operations are running smoothly
- ✓ Instruments do not show any unexpected degradation
- ✓ Wavelength scale is stable. Accuracy is $\approx 5 \text{ mÅ}$
- ✓ There are indications of a decrease in Effective Area; the reason is not understood yet
- ✓ Work in progress to quantify this effect and determine its origin