Calibration of the *XMM-Newton* RGS after SASv7.0.0

European Space Astronomy Centre

Mallorca 26-27 October 2006

SRON Utrecht & XMM-SOC@ESAC

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Broad RGS themes

- Review of RGS with SAS v7.0.0 and its CCFs
- Schedule for new CCFs : 2007-01-31
- RGS pile-up
- The WHIM story
- Operational plans : single-node readout and “multiple-pointing”

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New RGS CCFs with SAS v7.0.0

- RGS QUANTUMEF
- RGS CTI
- RGS COOLPIX
- RGS EXAFS
- RGS ADUCONV

- RGS EFFAREACORR

- RGS background templates

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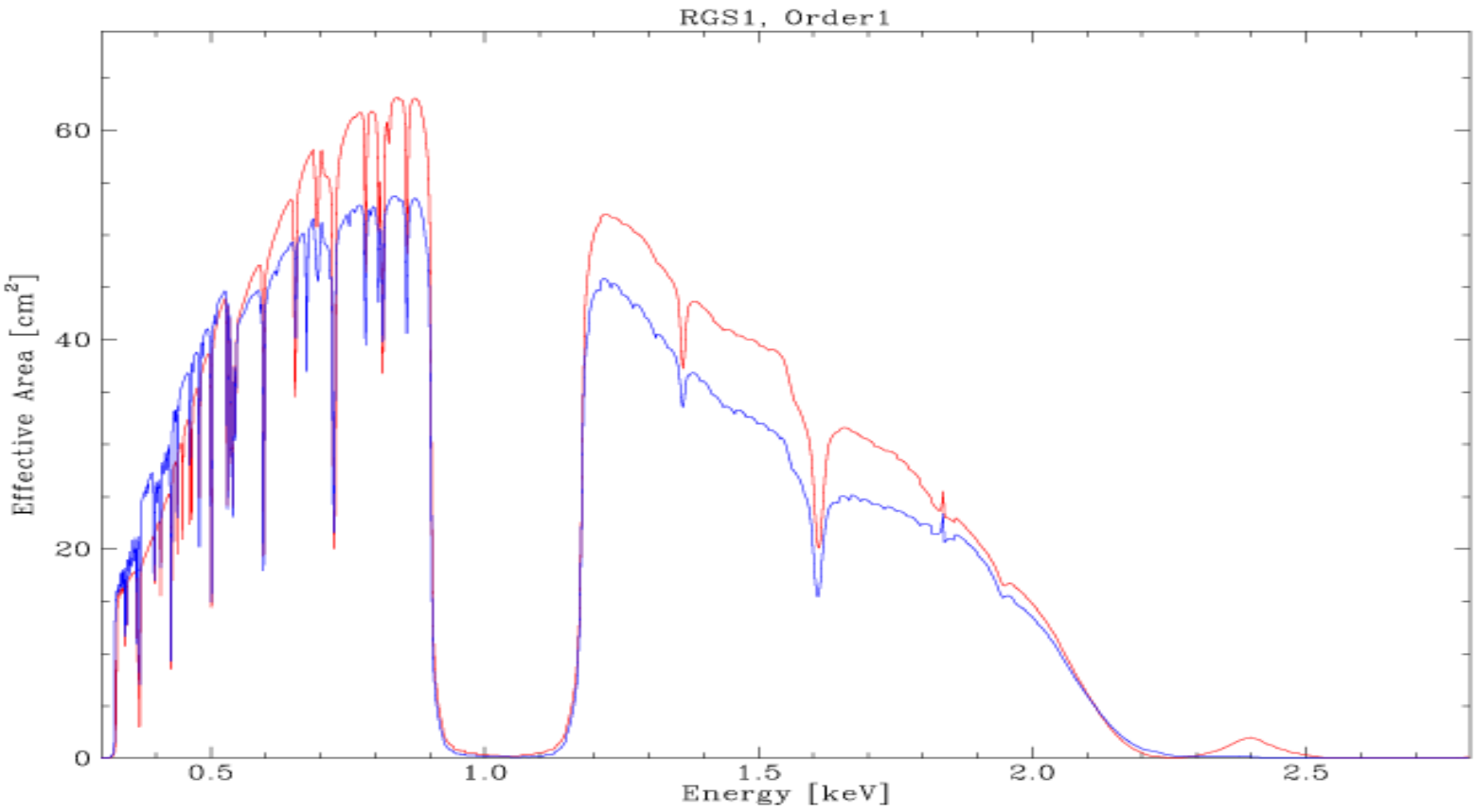
RGS EFFAREACORR with SAS v7.0.0



Randall Smith, GSFC

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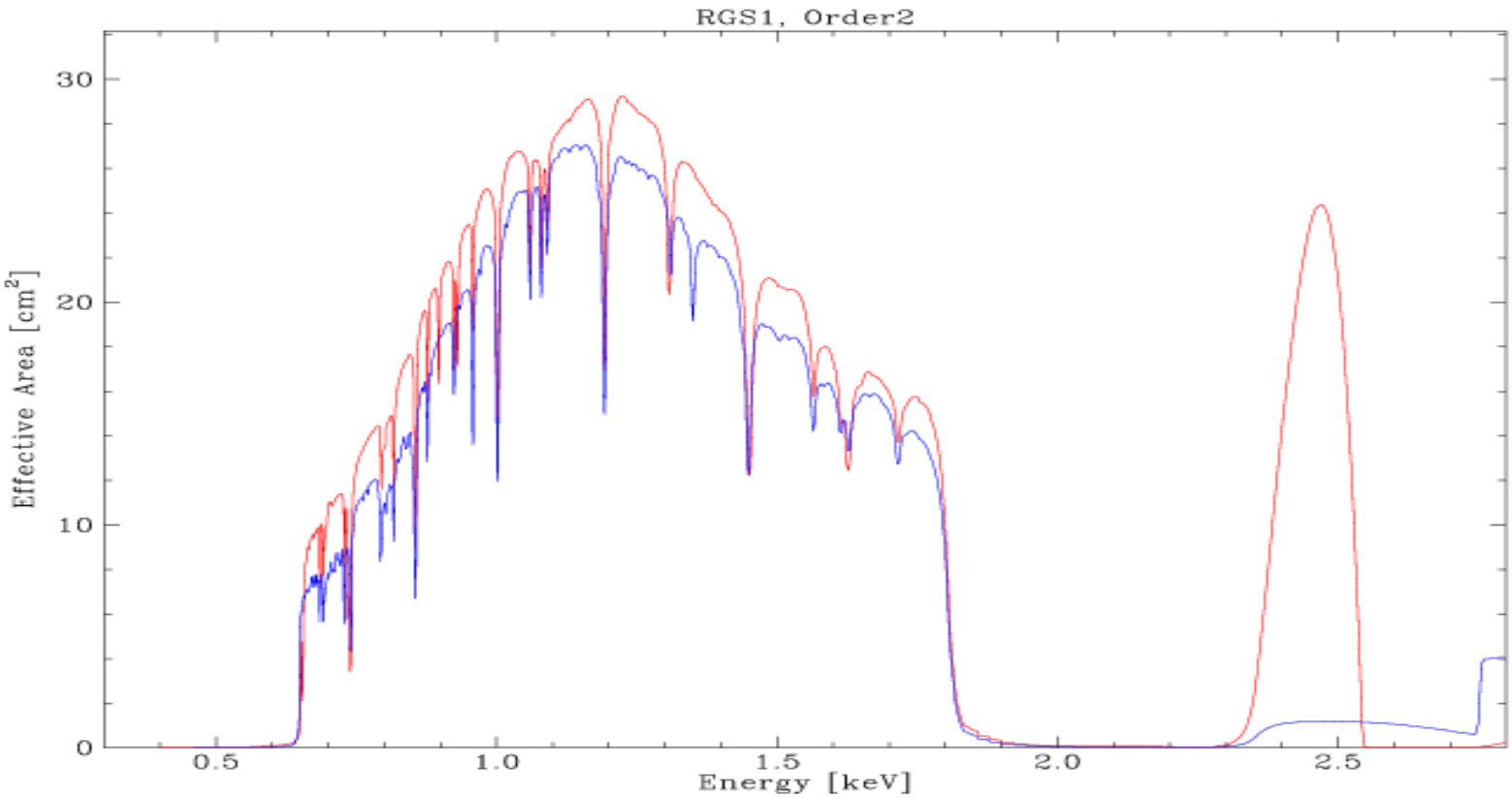
RGS EFFAREACORR with SAS v7.0.0



⇒ new fudged RGS%_EFFAREACORR_0004

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SASv7.0.0 release of RGS background templates

Why RGS1_TEMPLATEBCKGND_003.CCF & RGS2_TEMPLATEBCKGND_003.CCF

- consistent use of **rgsspectrum** v2.6
  - new **BACKSCAL** per channel**,** not per CCD node
  - new **QUALITY** per channel
    - ⇒ more low **BACKSCAL** values
    - ⇒ more 'bad' **QUALITY** channels

- XSPEC takes no account of background **QUALITY**
  - ⇒ outliers in the background-subtracted spectrum
  - ⇒ replace **BACKSCAL(QUALITY=1)** with node **median(BACKSCAL(QUALITY=0))**

- SAS v7.0.0 PI extraction regions ⇒ 90% & 95%

- 100% cross-dispersion
  - ⇒ 64 extensions such as X100_P095_1_8.00

Charo

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RGS with SAS v7.0.0

- How do you judge ?
- We have reached the stage for quantitative statistical tests
  - C-statistic
- RGS physical test harness
  - SNR 1ES0102-7219 is constant
  - HR1099 spectrum is bremsstrahlung continuum (and weak lines)
  - Procyon spectrum is lines (and weak continuum)
  - Crab

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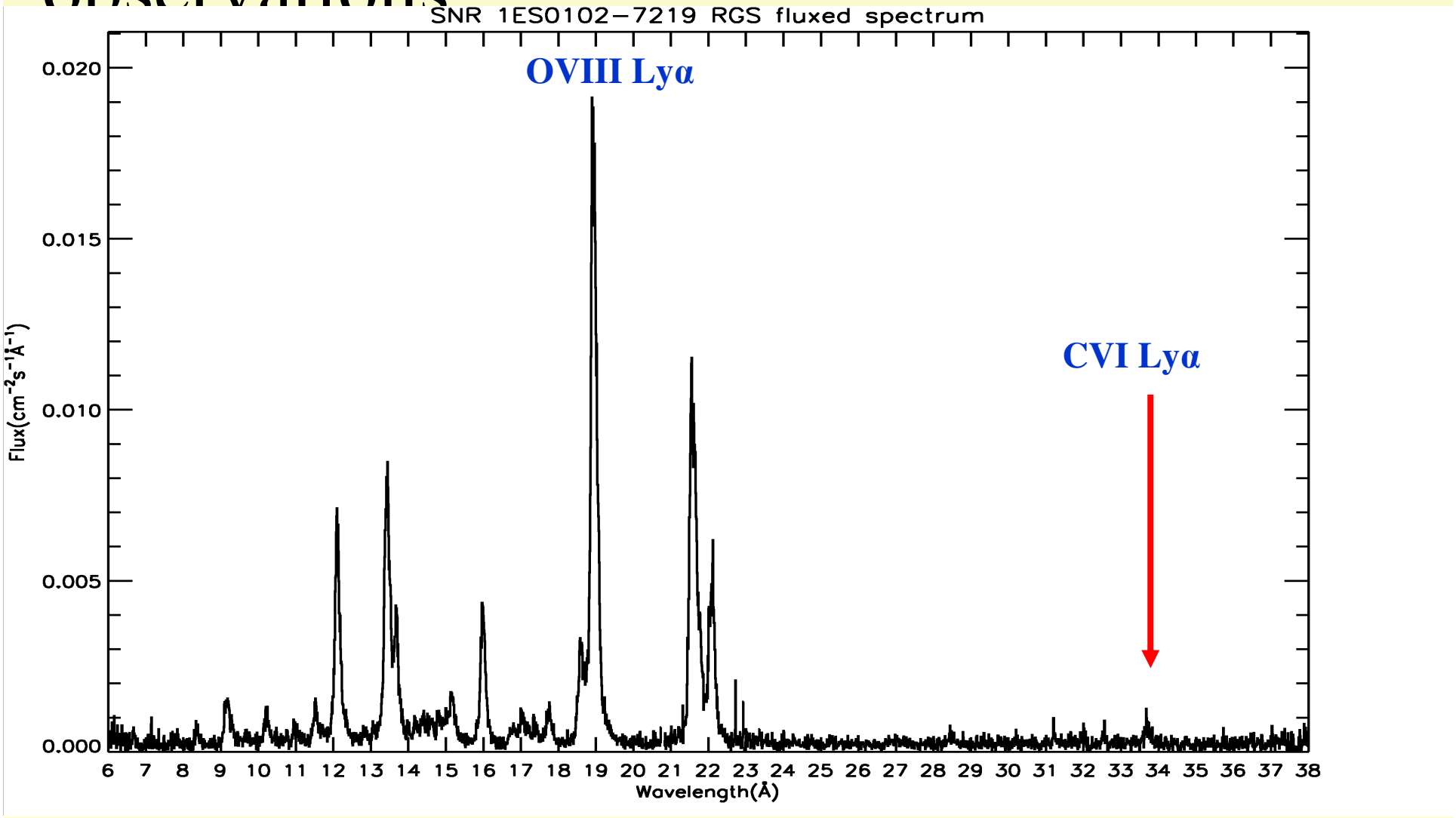
RGS A(t) from SNR observations



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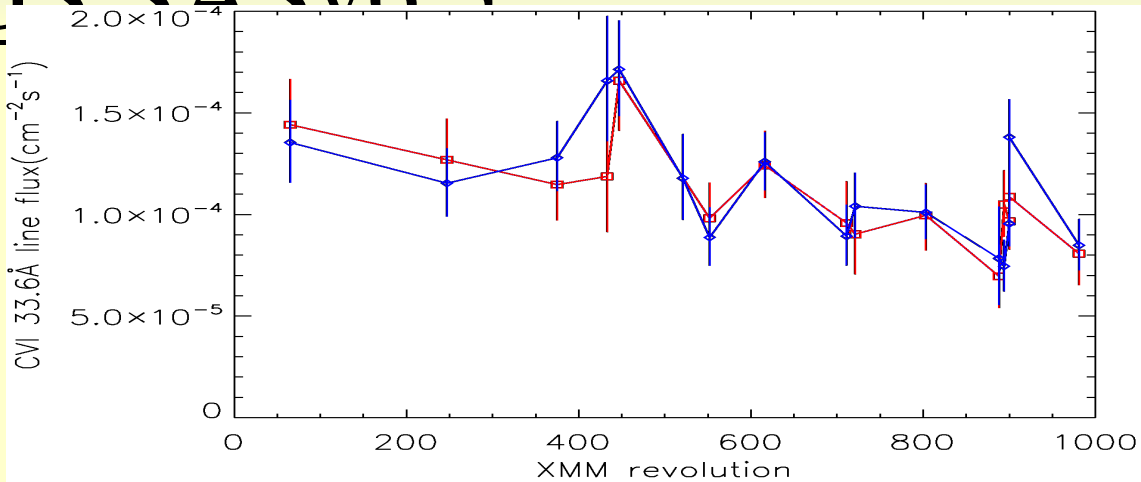
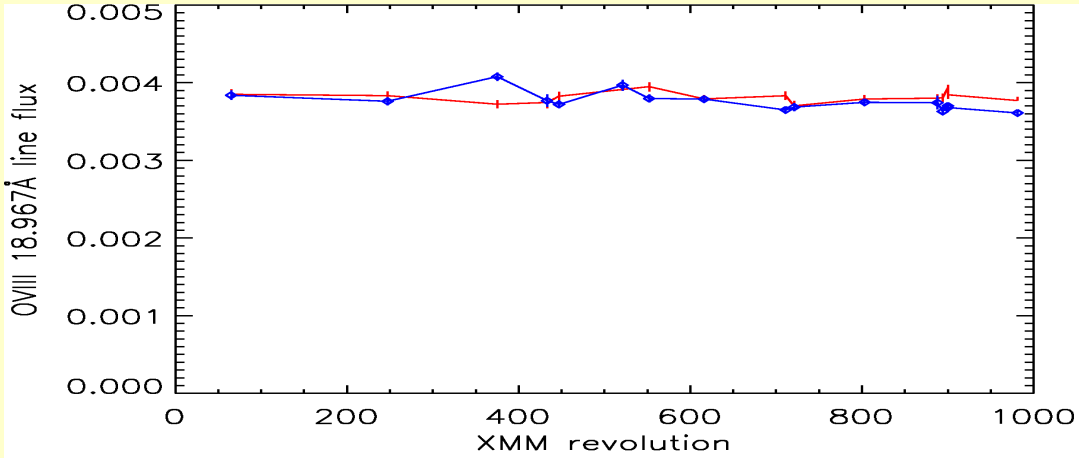
SNR 1ES0102-7219 with RGS SAS v6.5



CVI Lyα 33.734Å



OVIII Lyα 18.967Å

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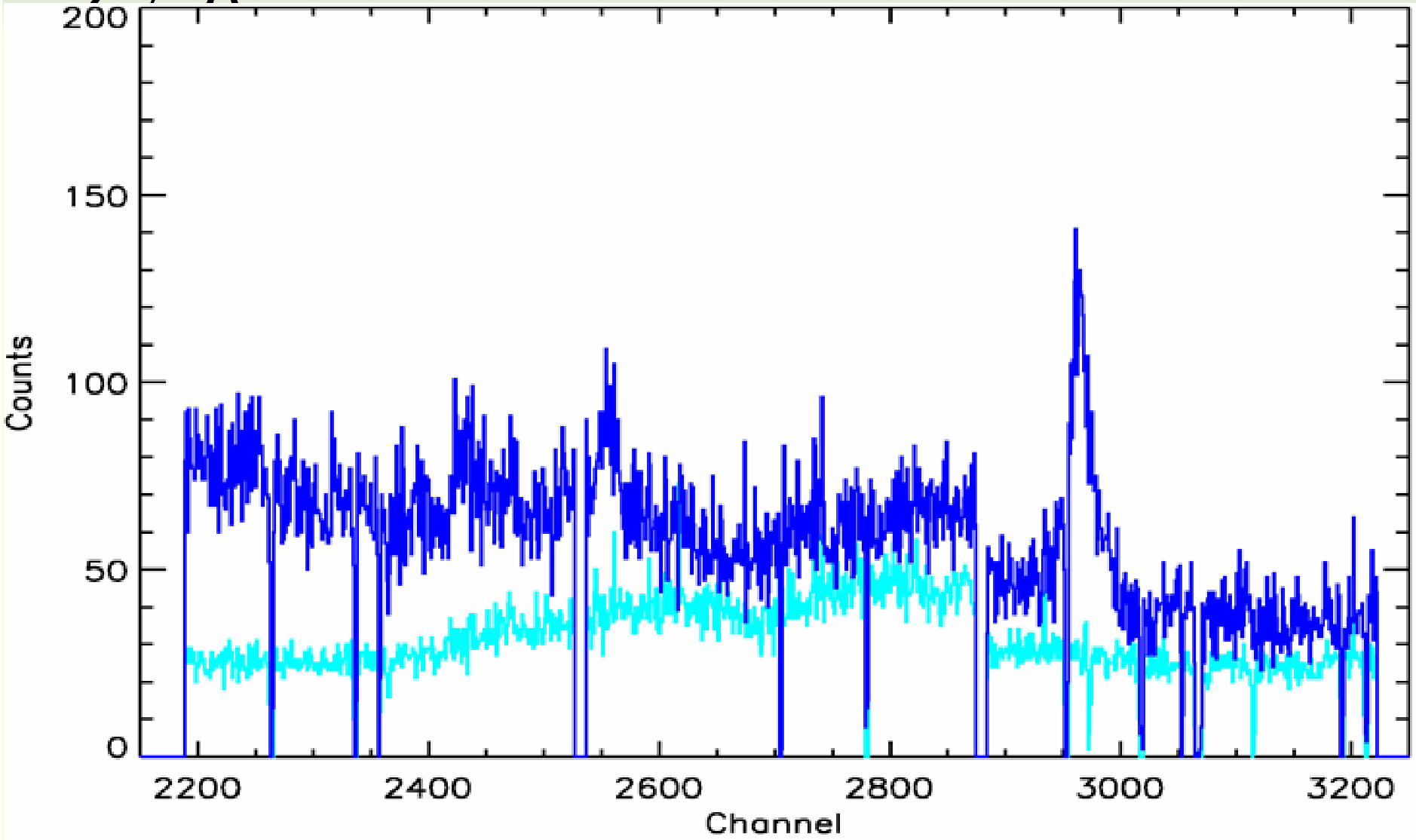
SNR 1ES0102-7219 in SAS



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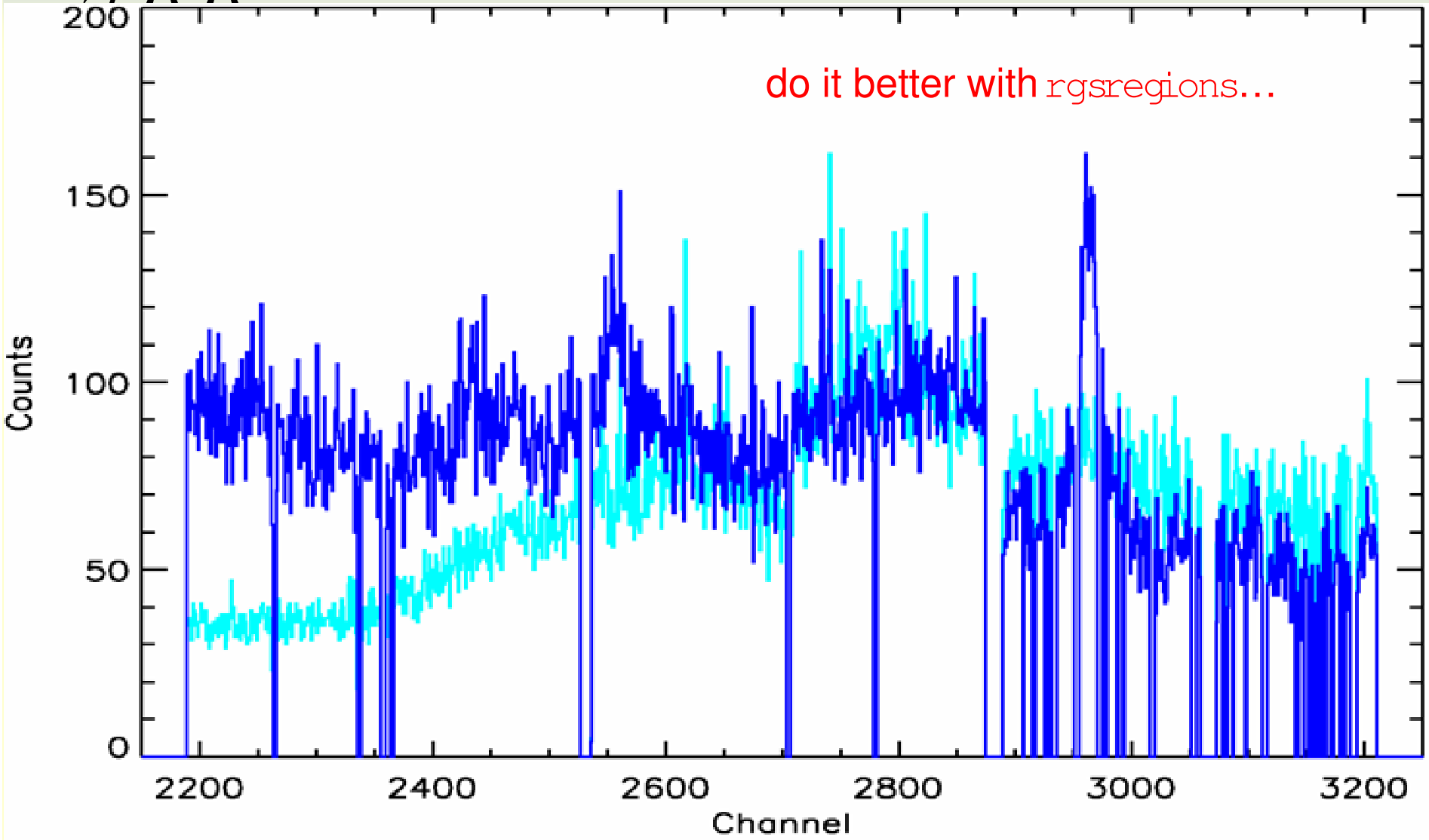
SNR 1ES0102-7219 in SAS



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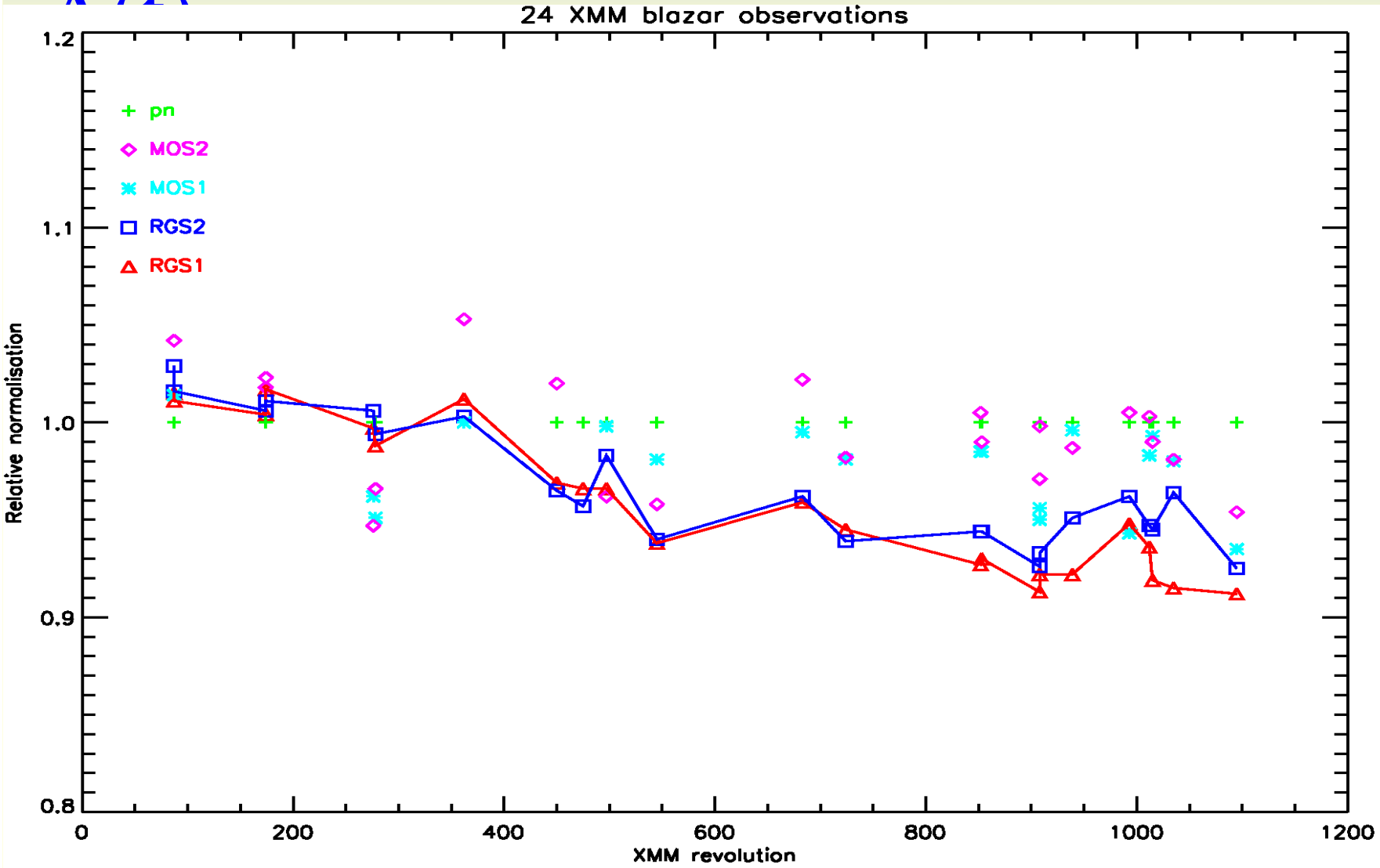
RGS vs EPIC statistics ⇒



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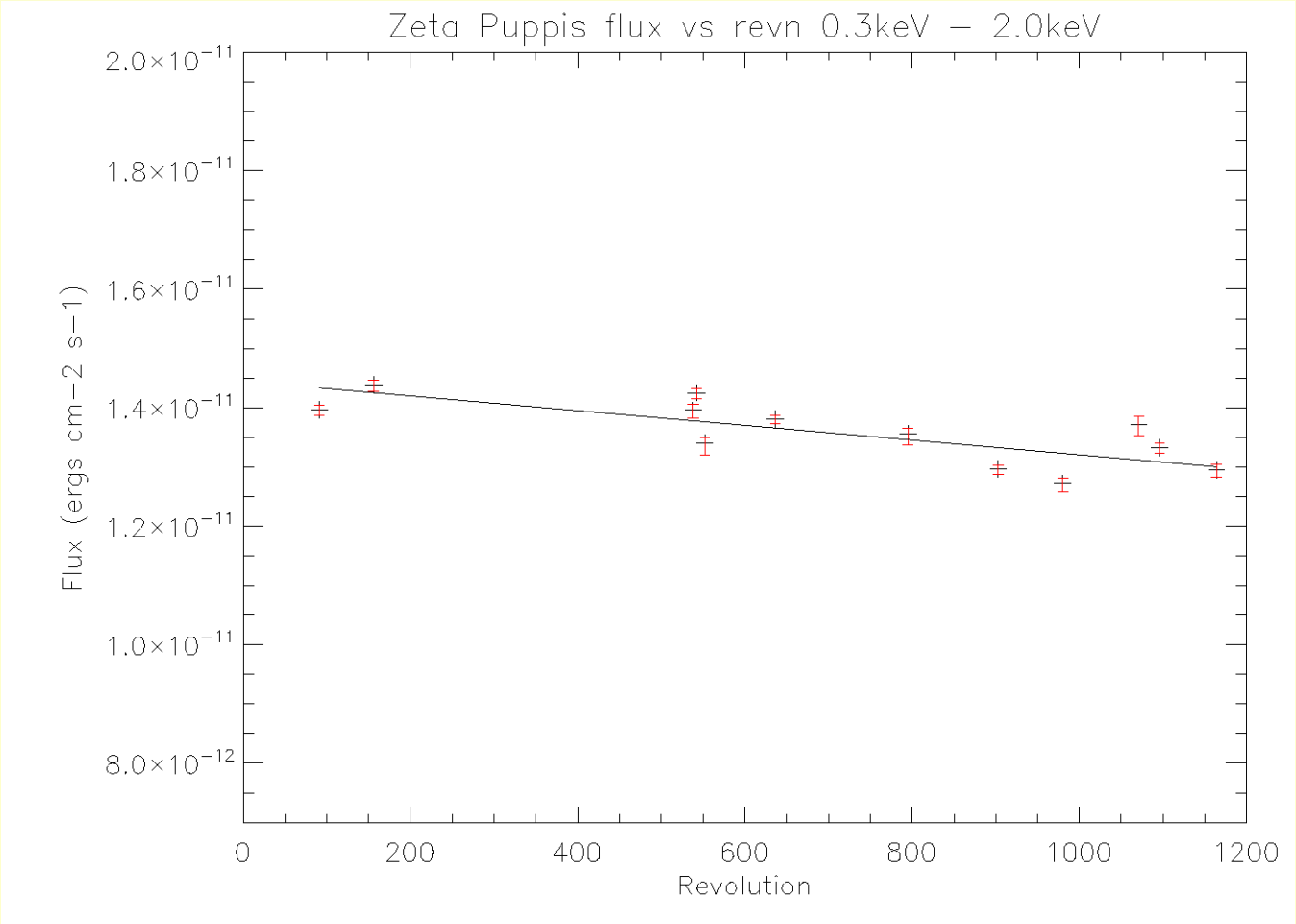
ζ Pup with SAS v7.0.0 ⇒ A(t)



Jenny Carter, Leicester

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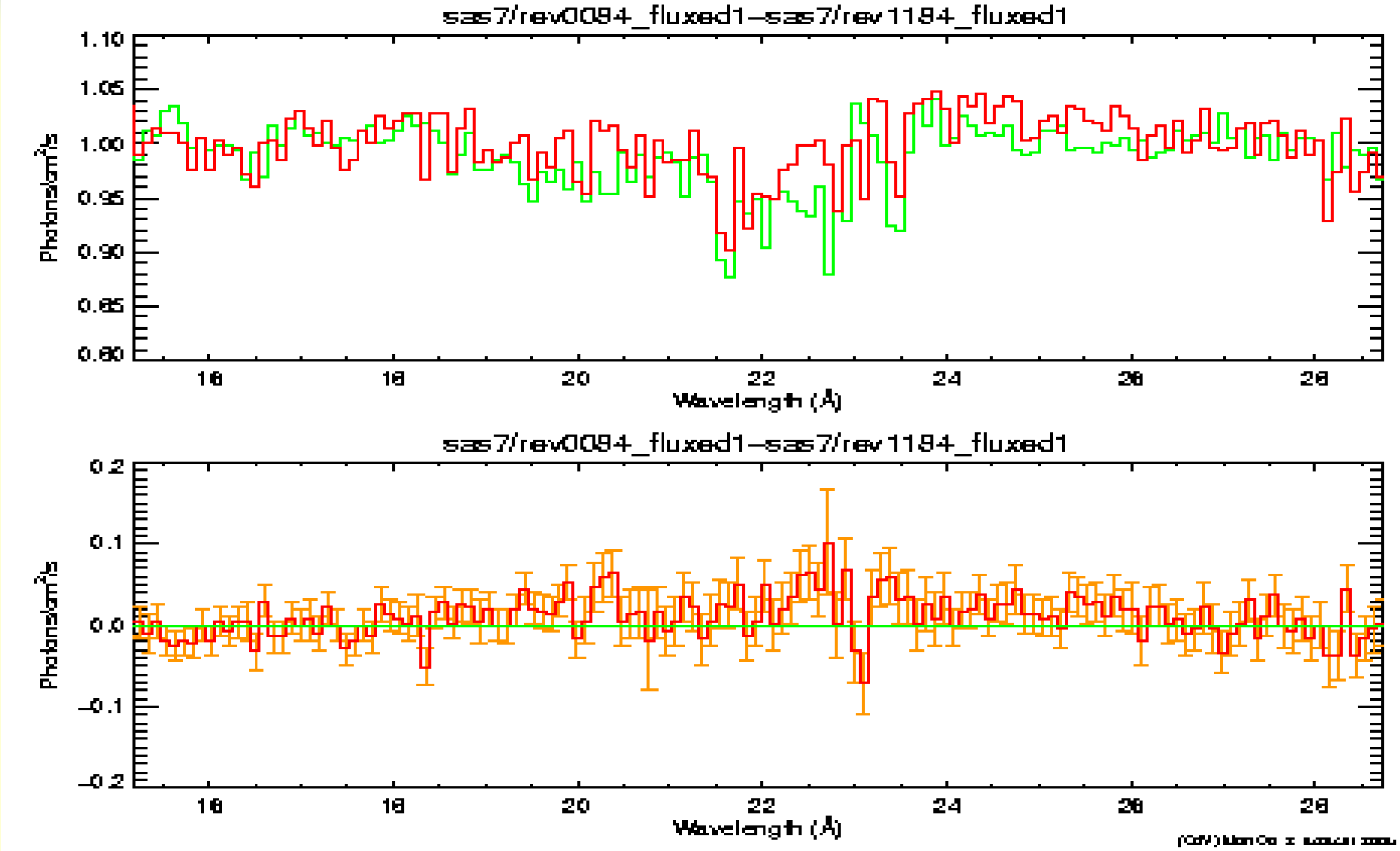
No change in O-absorption in Mkn421



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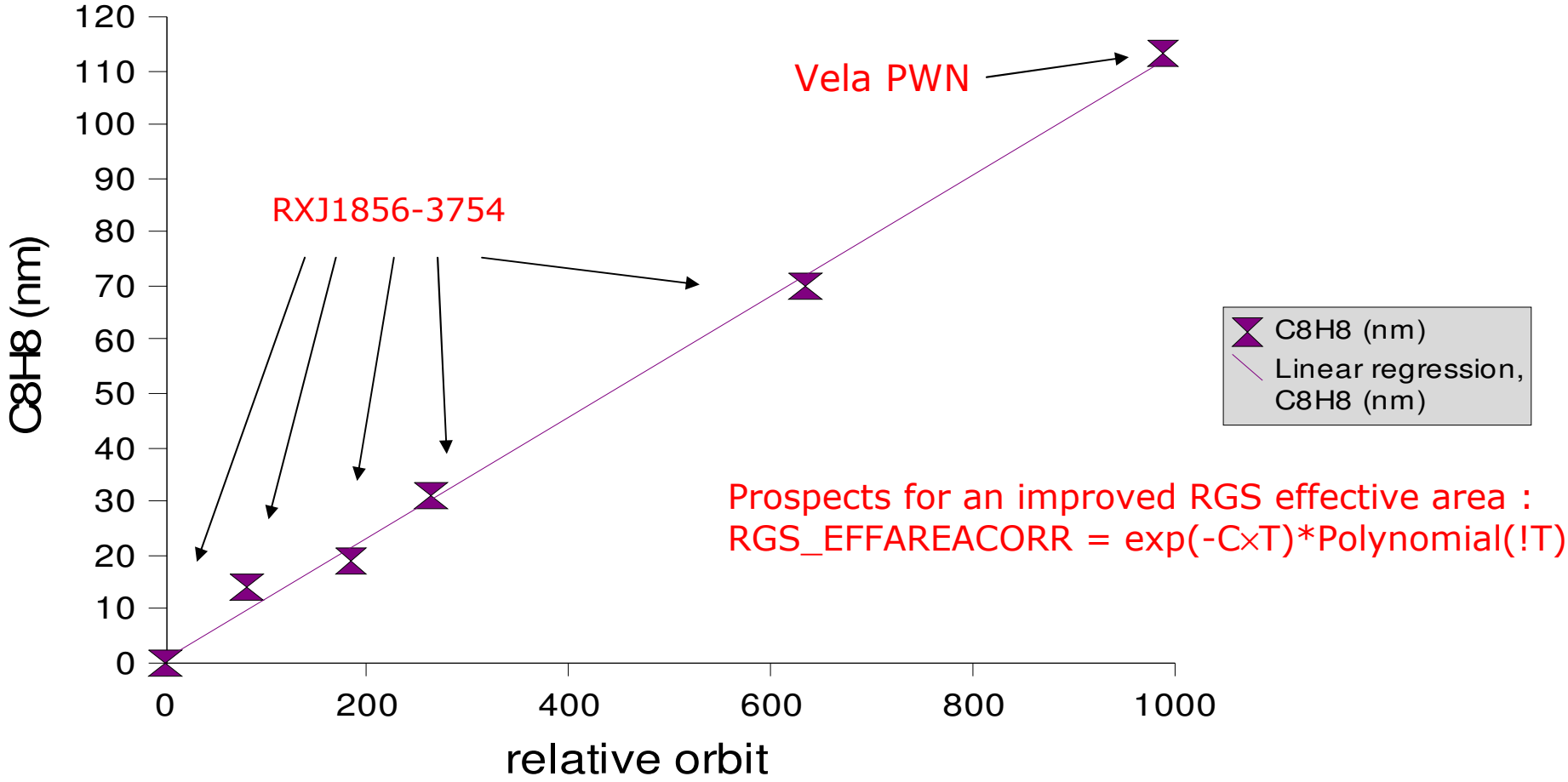
Contamination history



Prospects for an improved RGS effective area :
RGS_EFFAREACORR = exp(-C×T)*Polynomial(!T)

C-layer increase of about 20 nm/year

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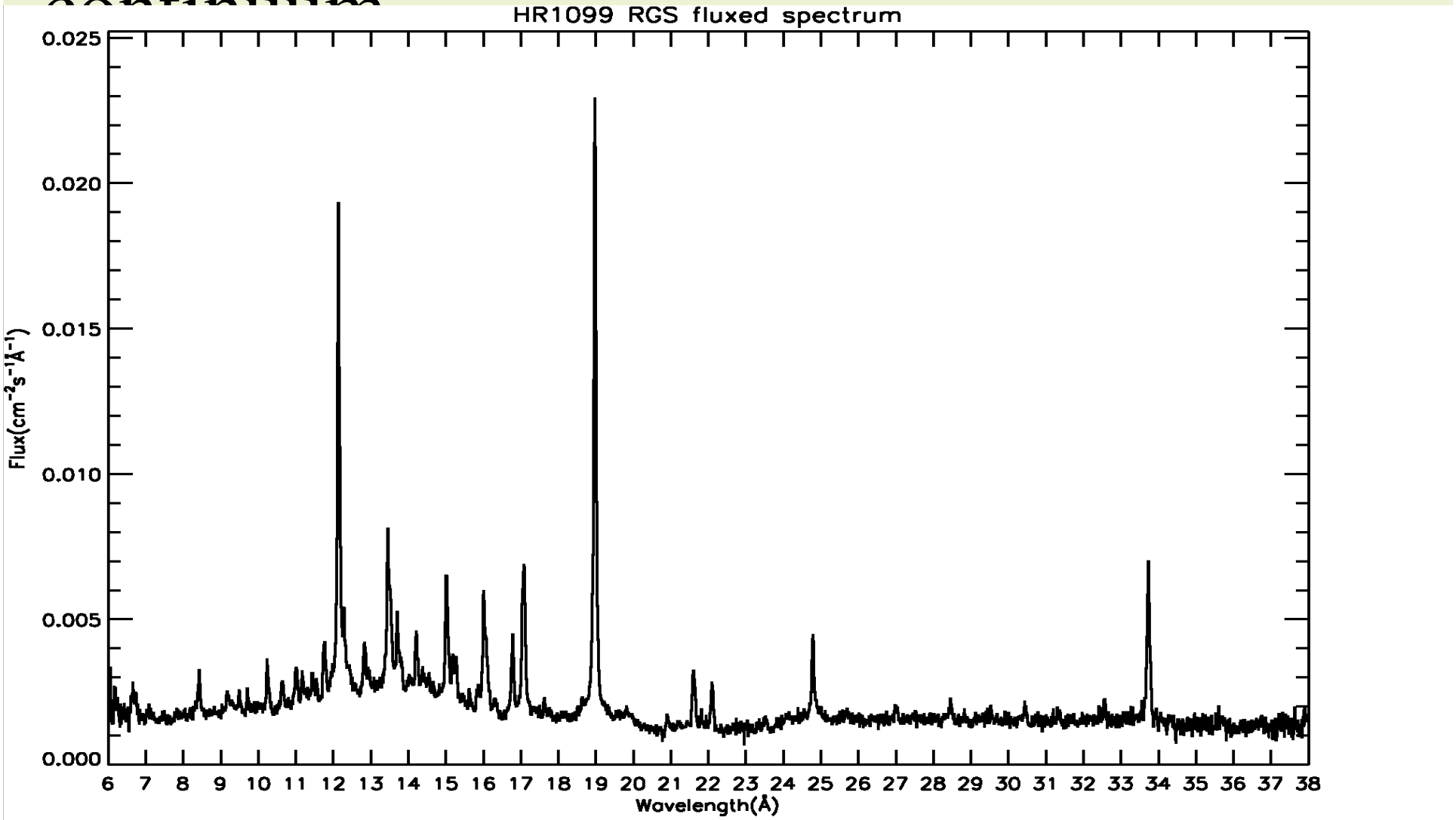
RGS A(λ) from HR1099 continuum



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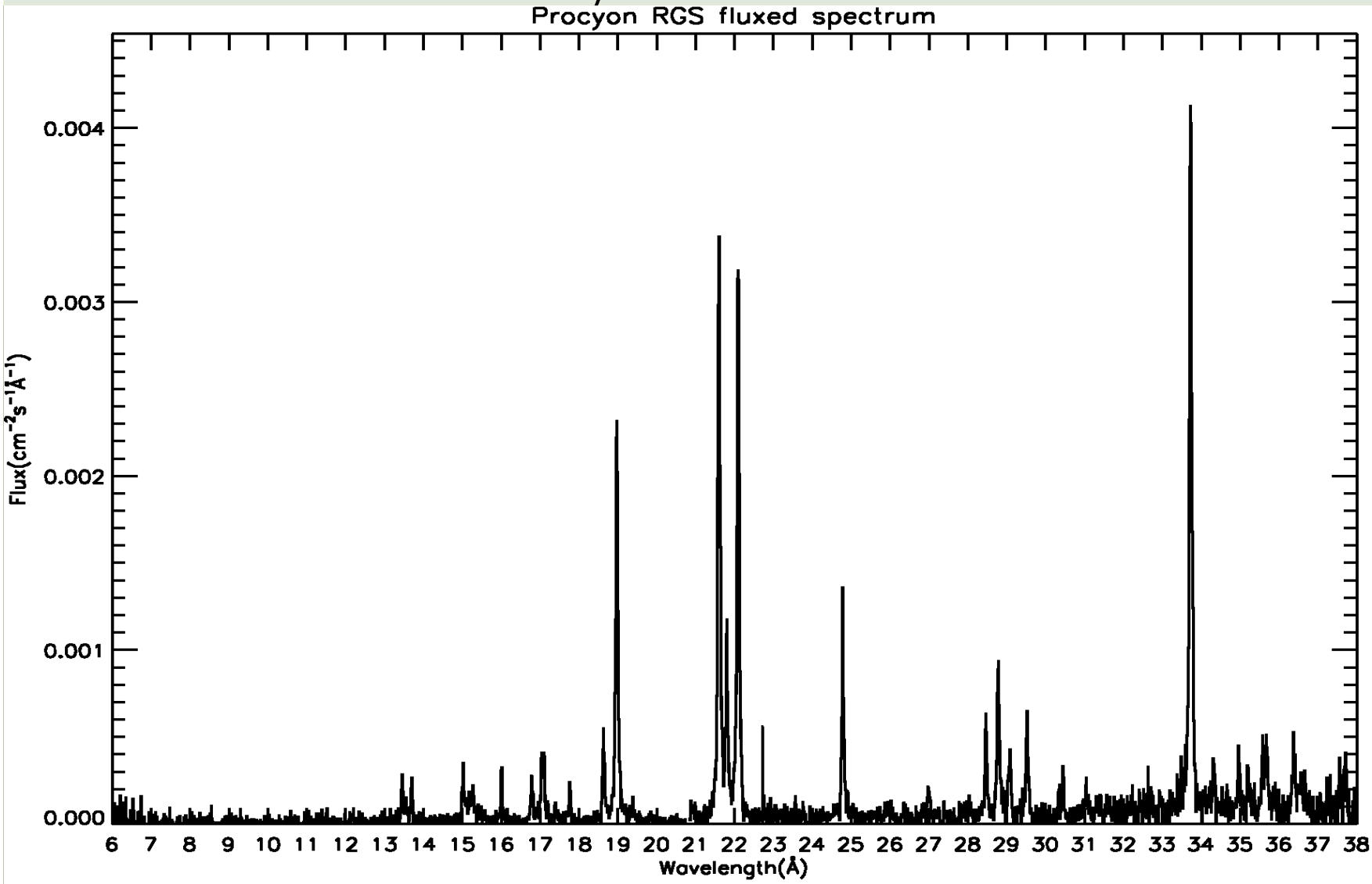
XCal from Procyon lines



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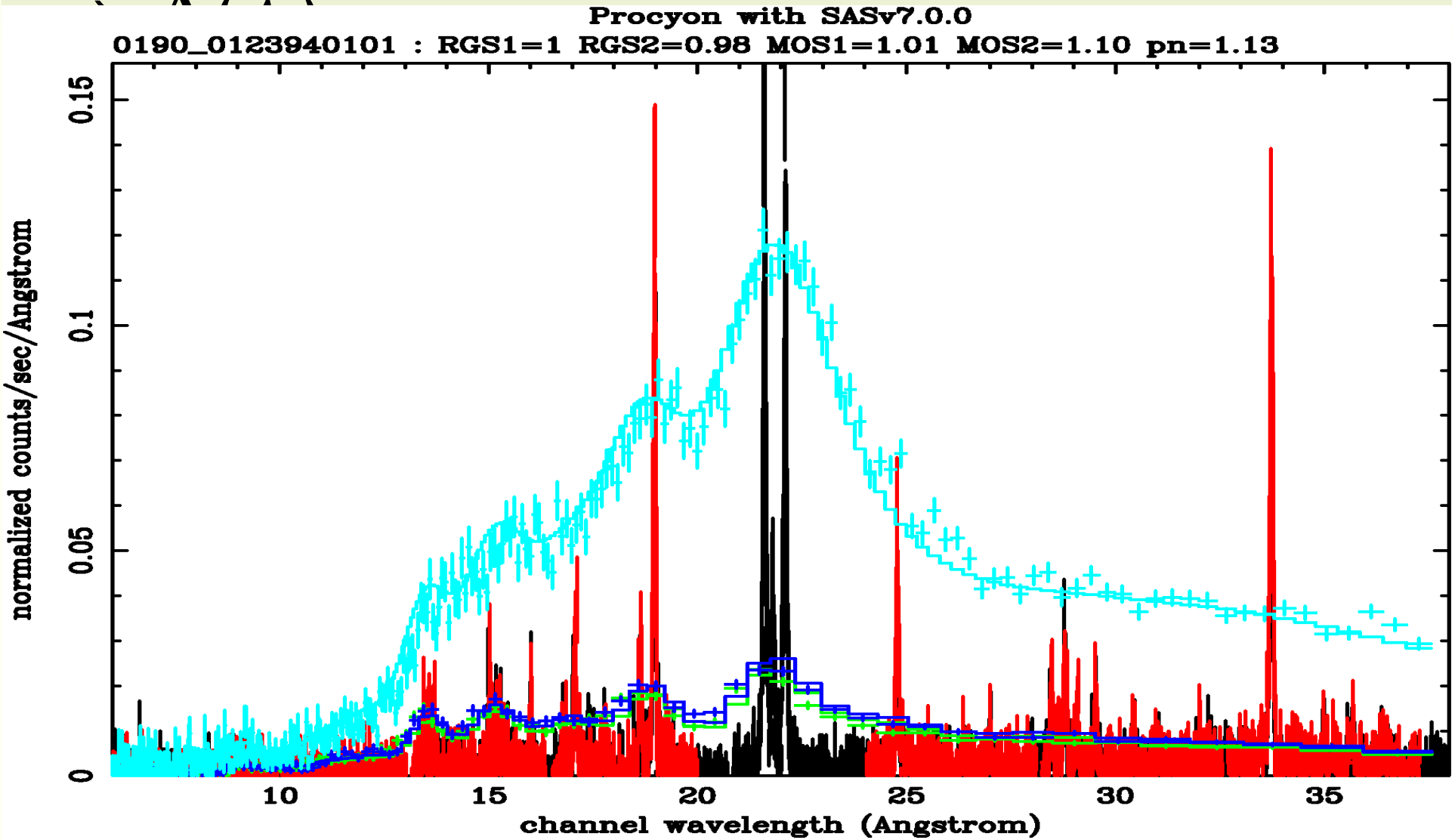
Procyon with SAS v7.0.0



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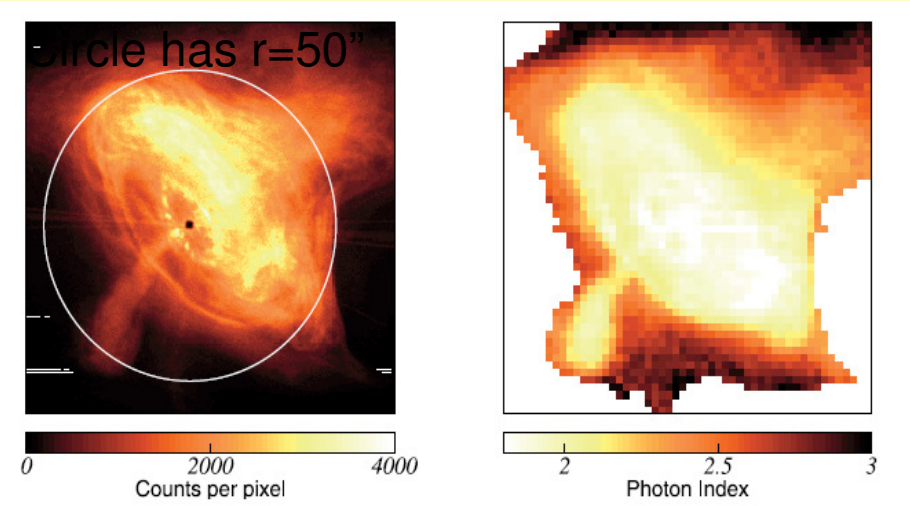
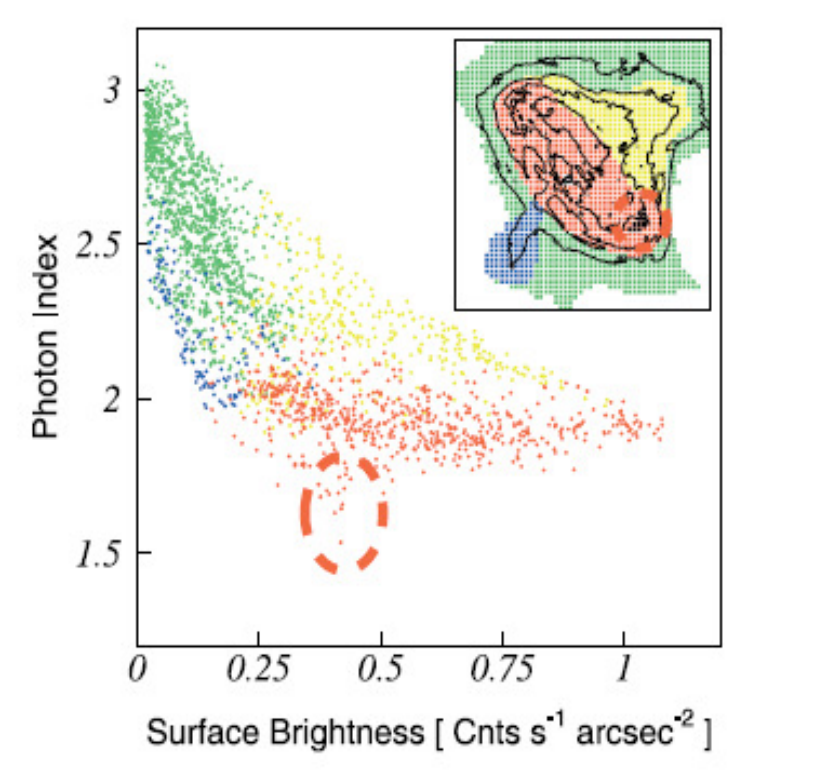
Spatial variations in the Crab





Mori et al., Chandra

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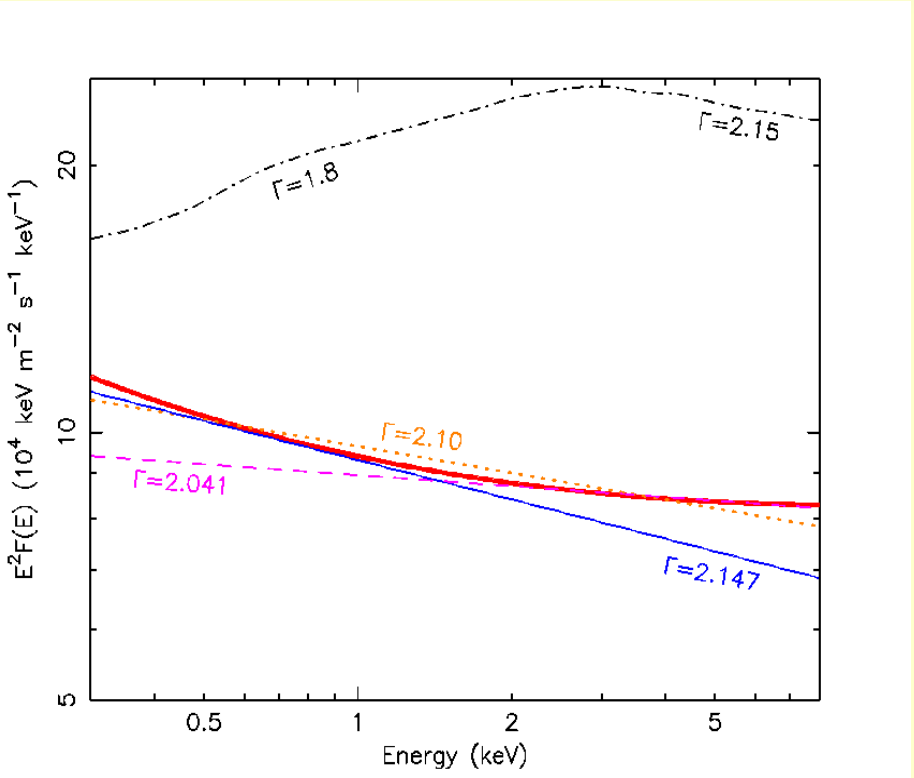
Curved Crab spectrum

- red : sum of individual Chandra spectra pixels
- purple: 2-8 keV range fit to red curve
- blue: Kuiper et al.
- orange: Mori's fit to total spectrum



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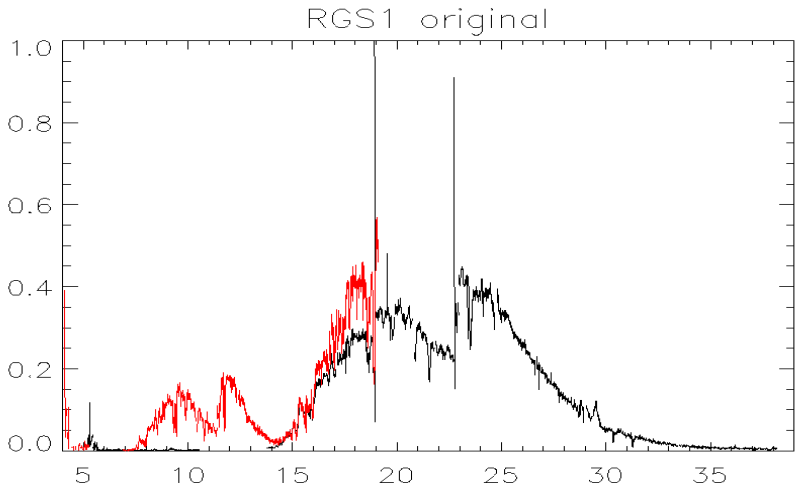
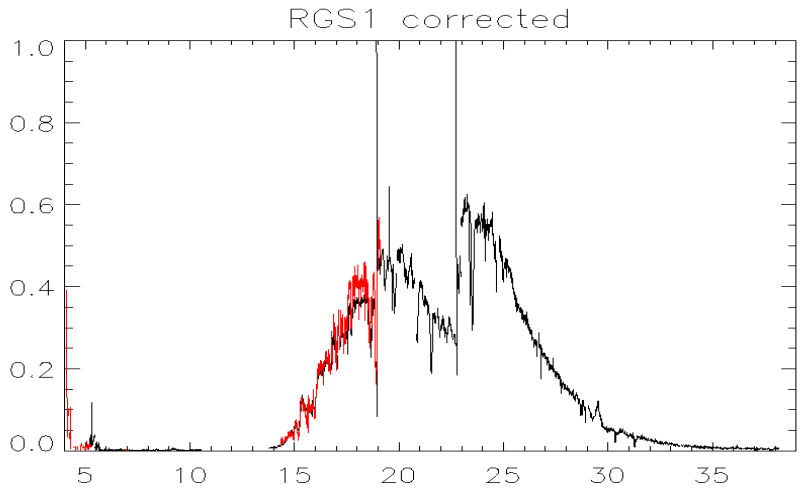
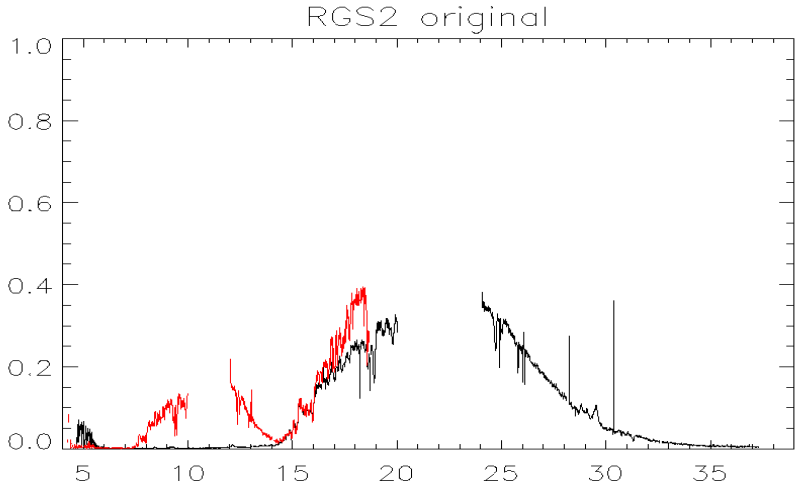
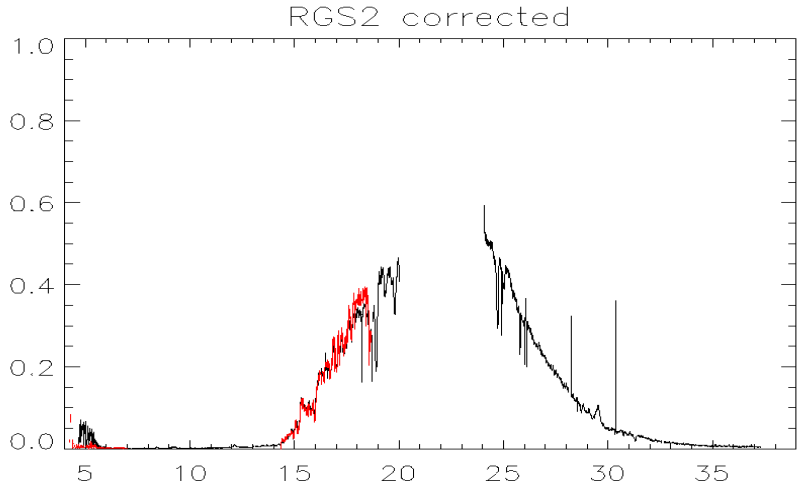
RS Oph RGS pile-up









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Miscellaneous

- The WHIM story
  - Everyone friends now
  - (RGS was right)
- Operational plans
  - single-node readout
    - a few remaining details
  - “multiple-pointing” for AO7
    - ⇒ implementation plan with 2006-12-31 deadline (Muñoz & Metcalfe)

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