Contamination on the EPIC MOS detectors

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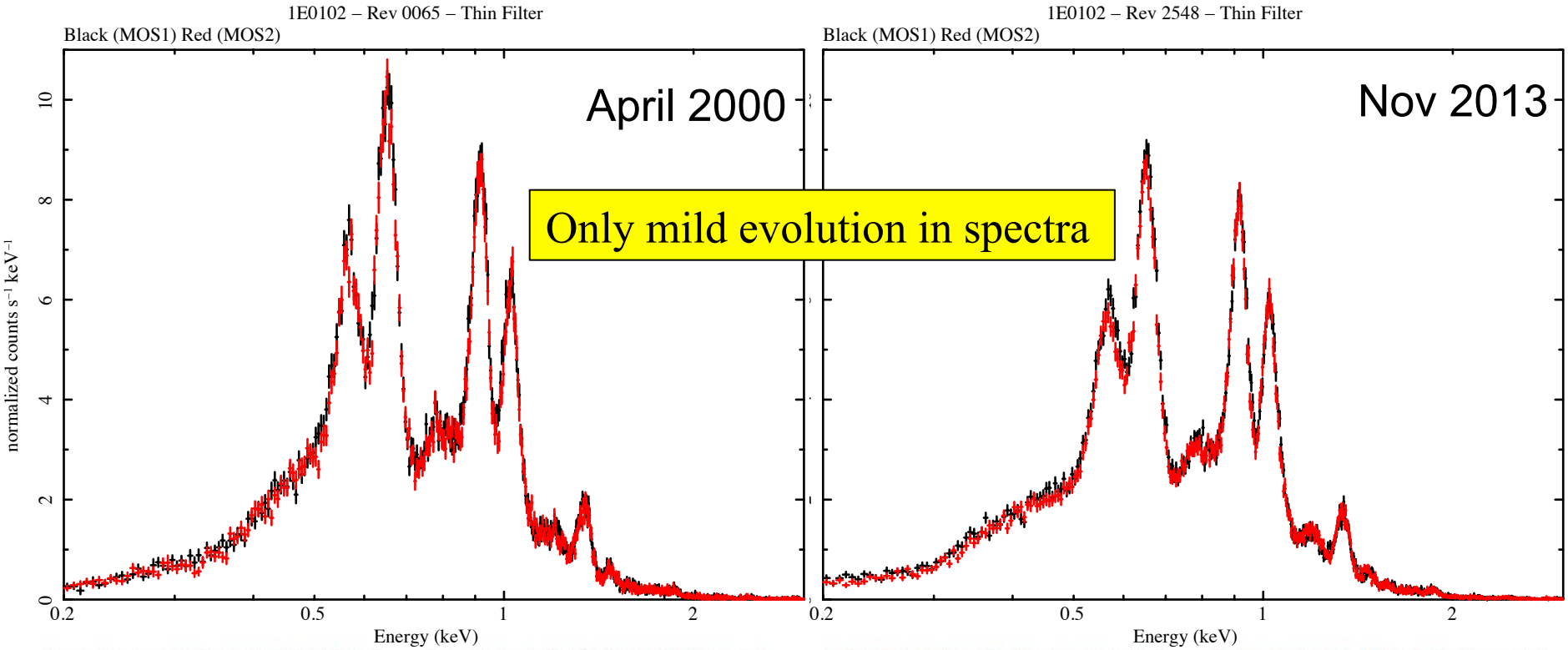

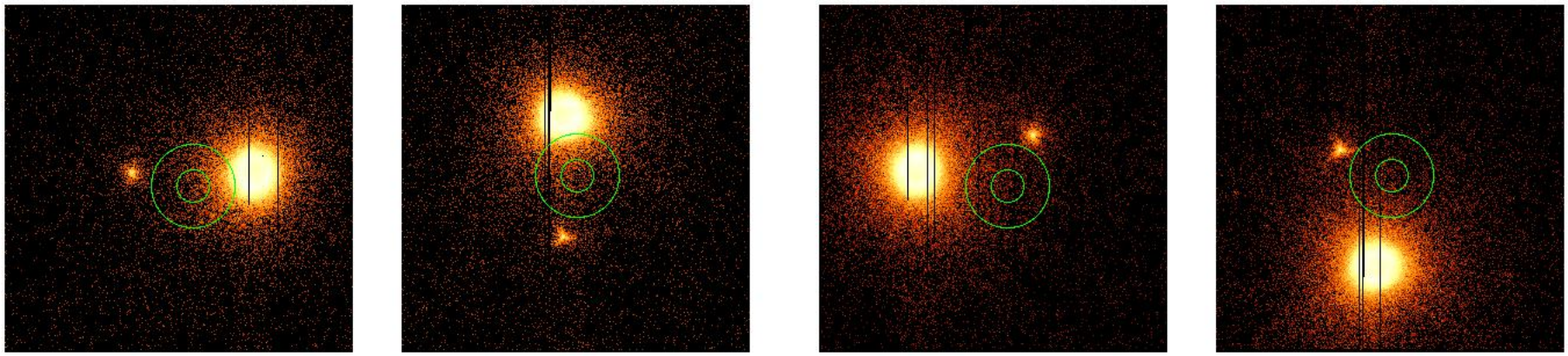

XMM EPIC MOS

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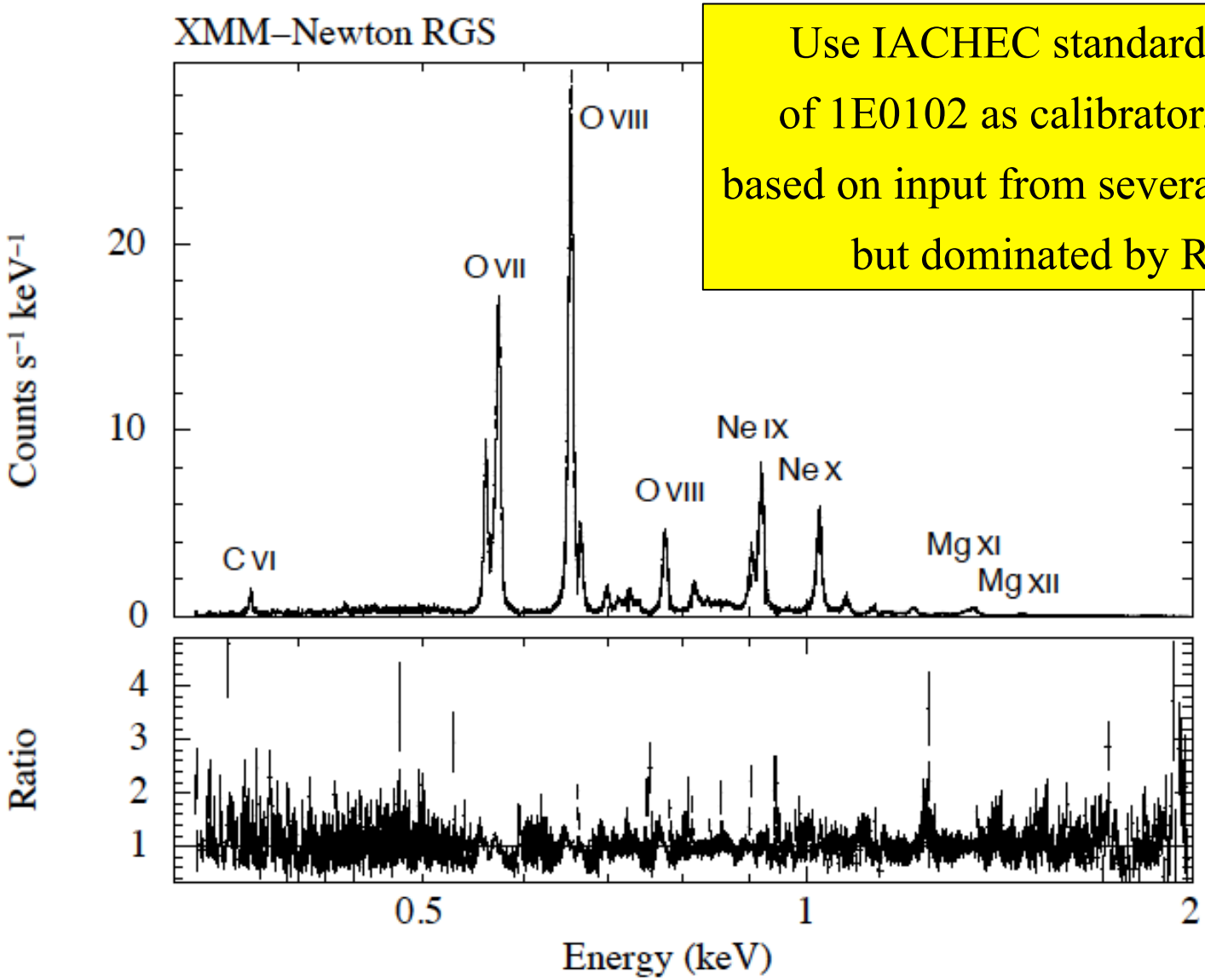
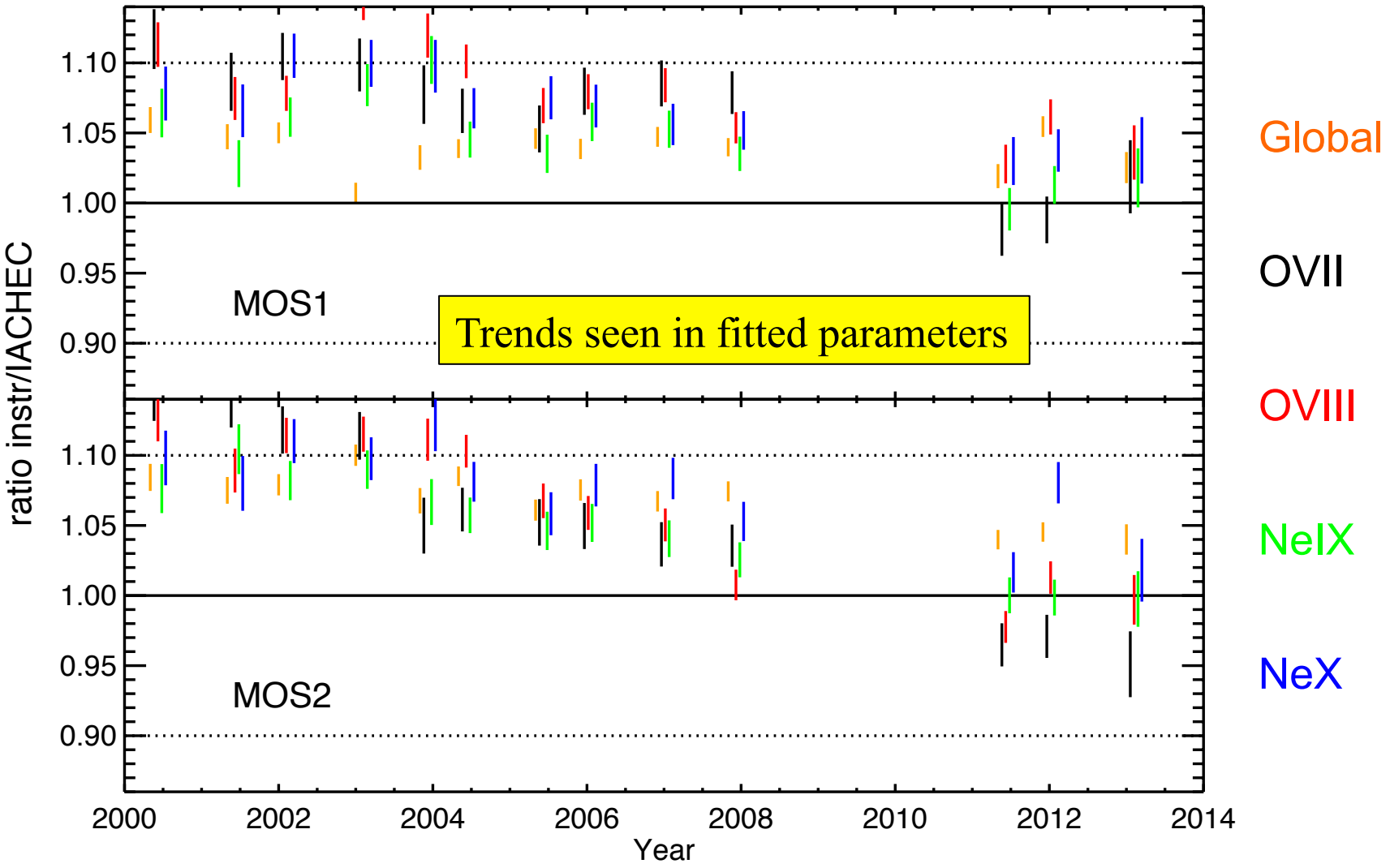


Use IACHEC standard model of 1E0102 as calibrator. Model based on input from several missions but dominated by RGS

IACHEC Standard Model: https://wikis.mit.edu/confluence/display/iachec/Therma+SNR

SAS 12.0.0 responses



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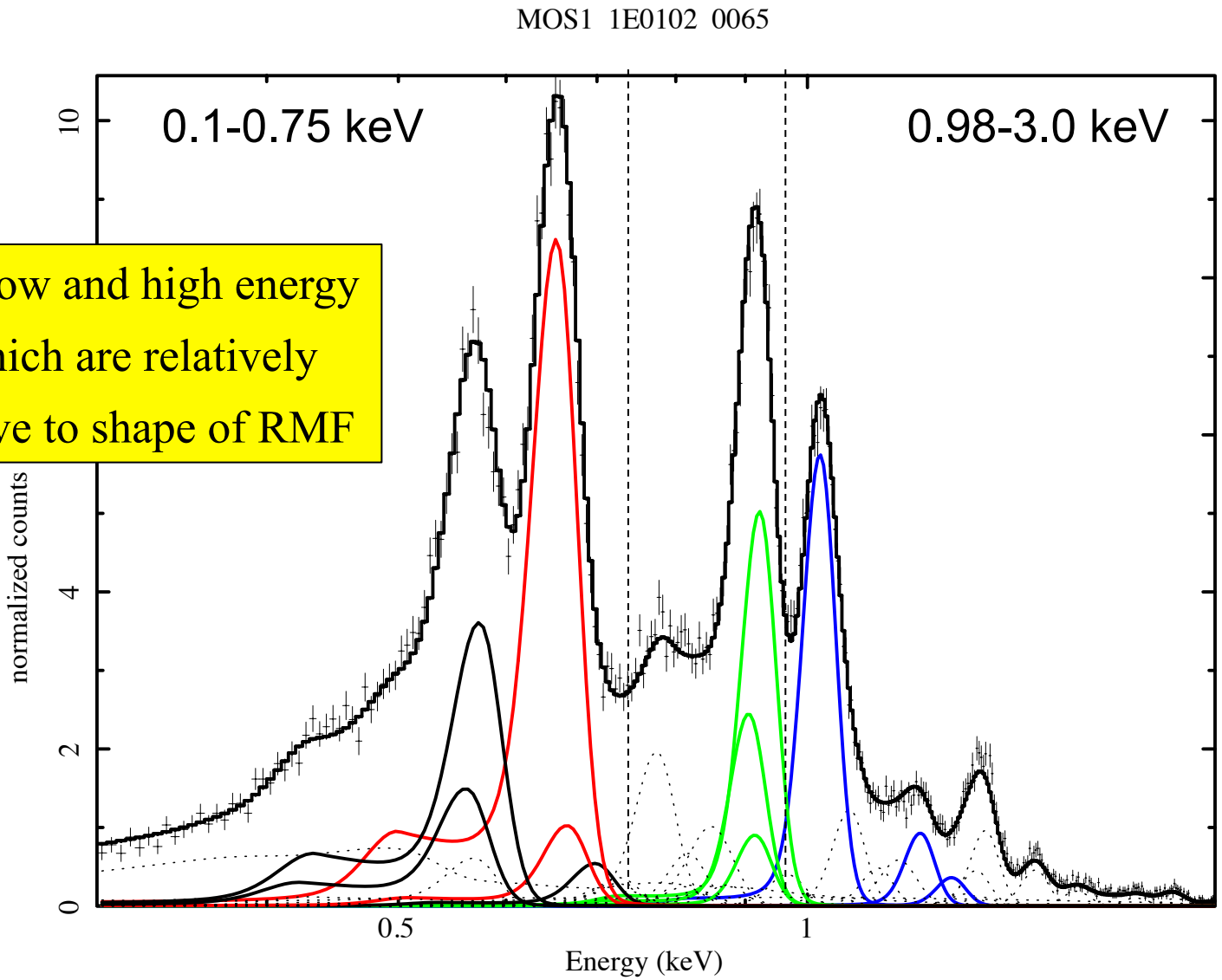
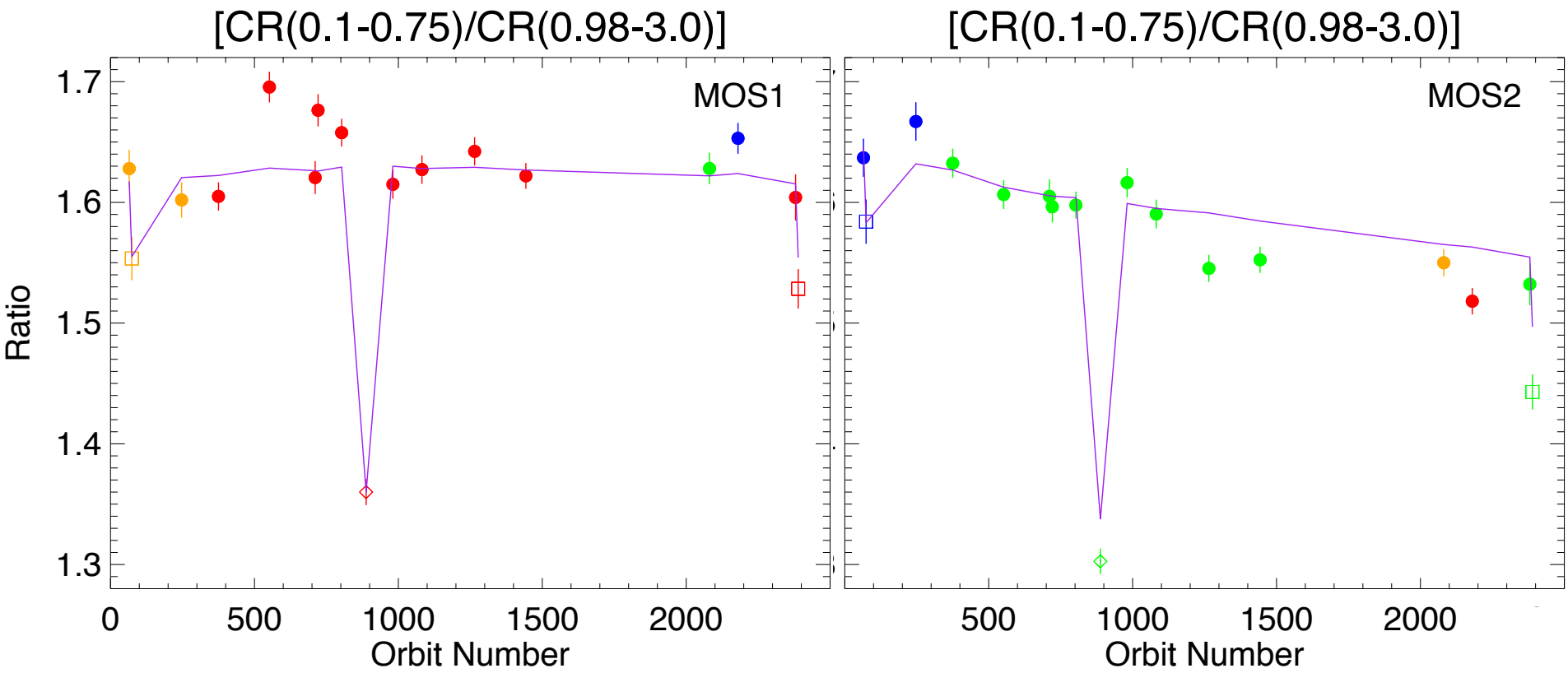
1E0102 spectrum and shape of RMF



Choose low and high energy bands which are relatively Insensitive to shape of RMF

Real change in softness ratio counts in MOS2



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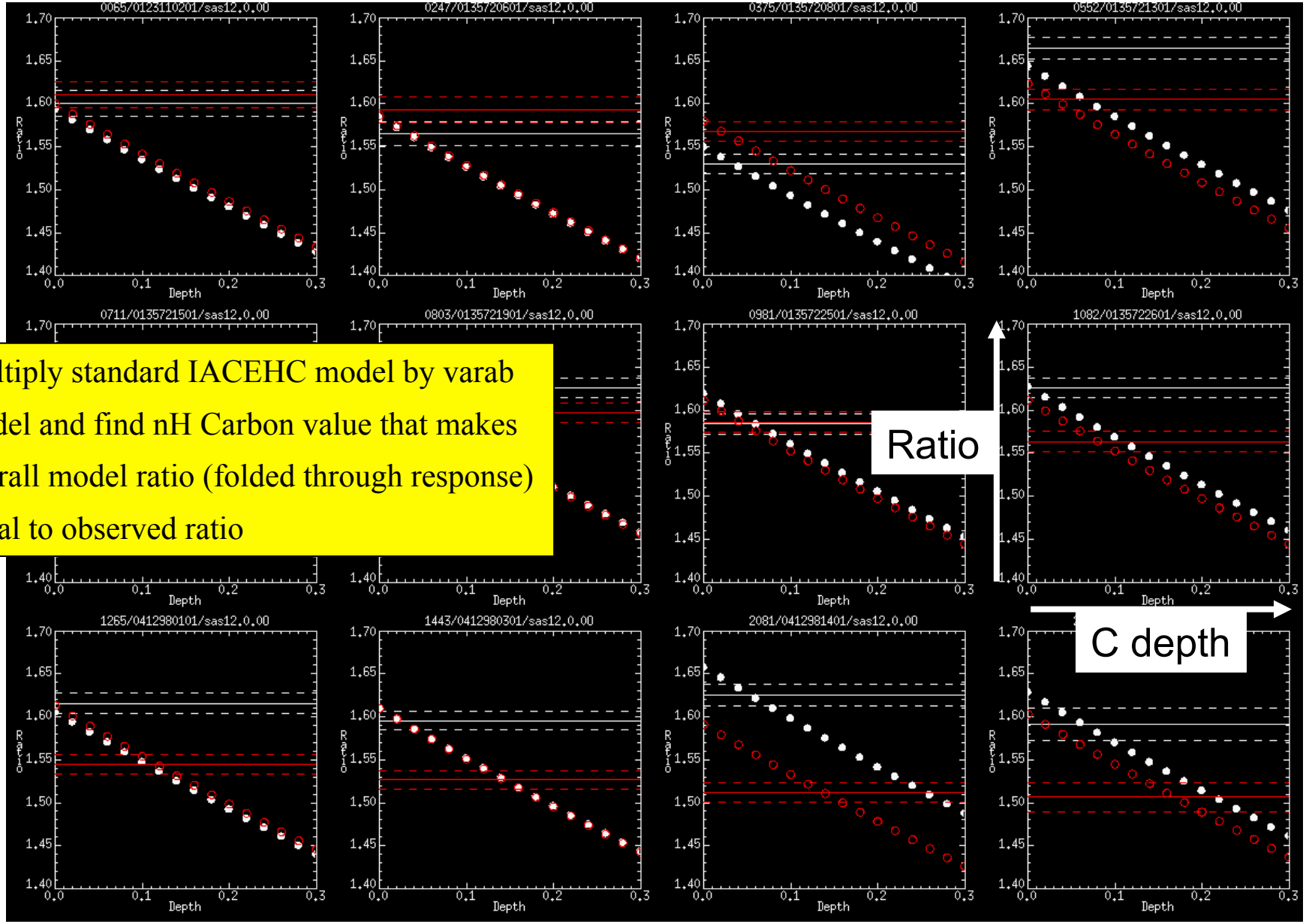
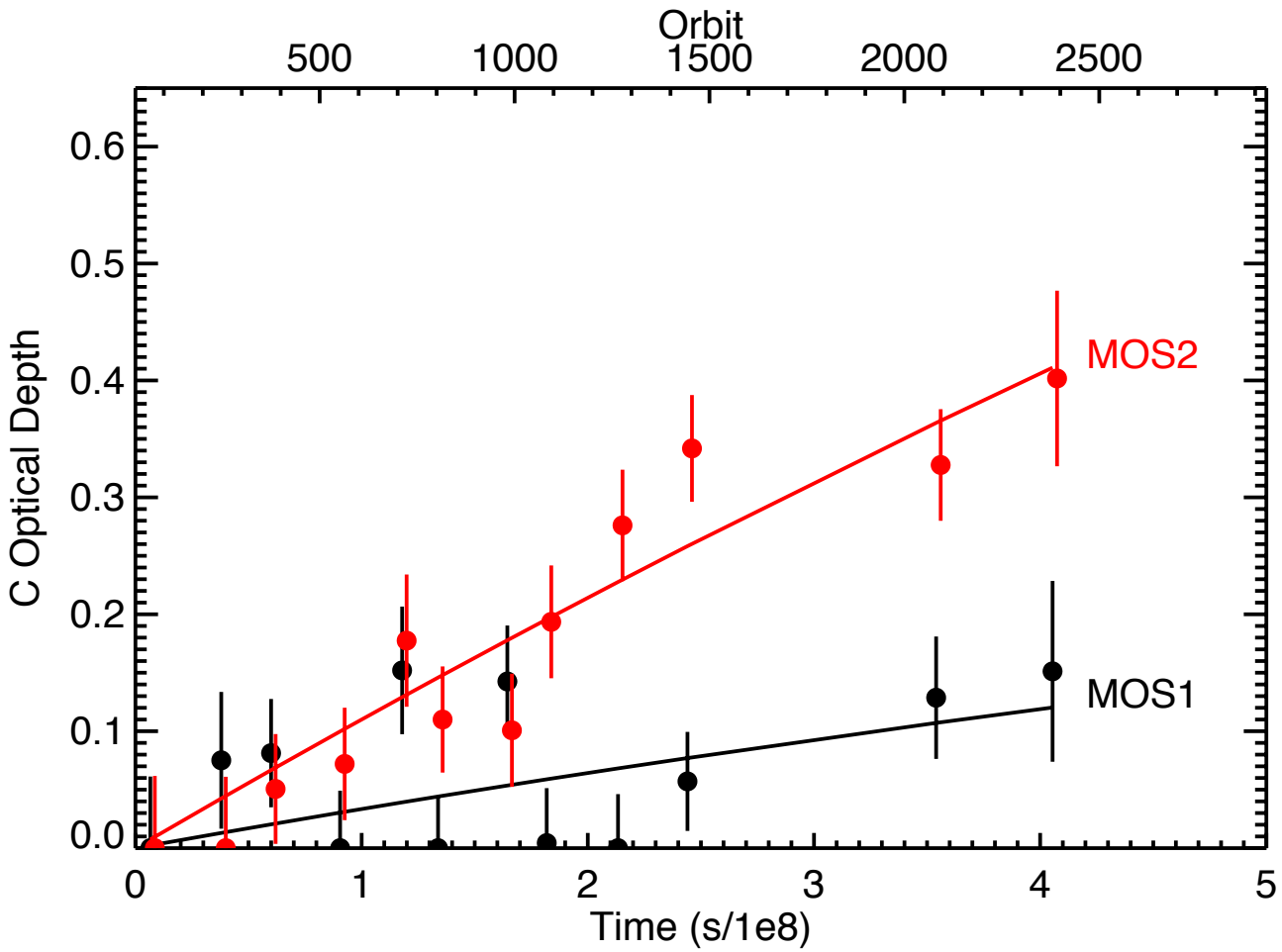


Multiply standard IACEHC model by varab model and find nH Carbon value that makes overall model ratio (folded through response) equal to observed ratio

Current carbon contamination model: looks linear but are exponential functions



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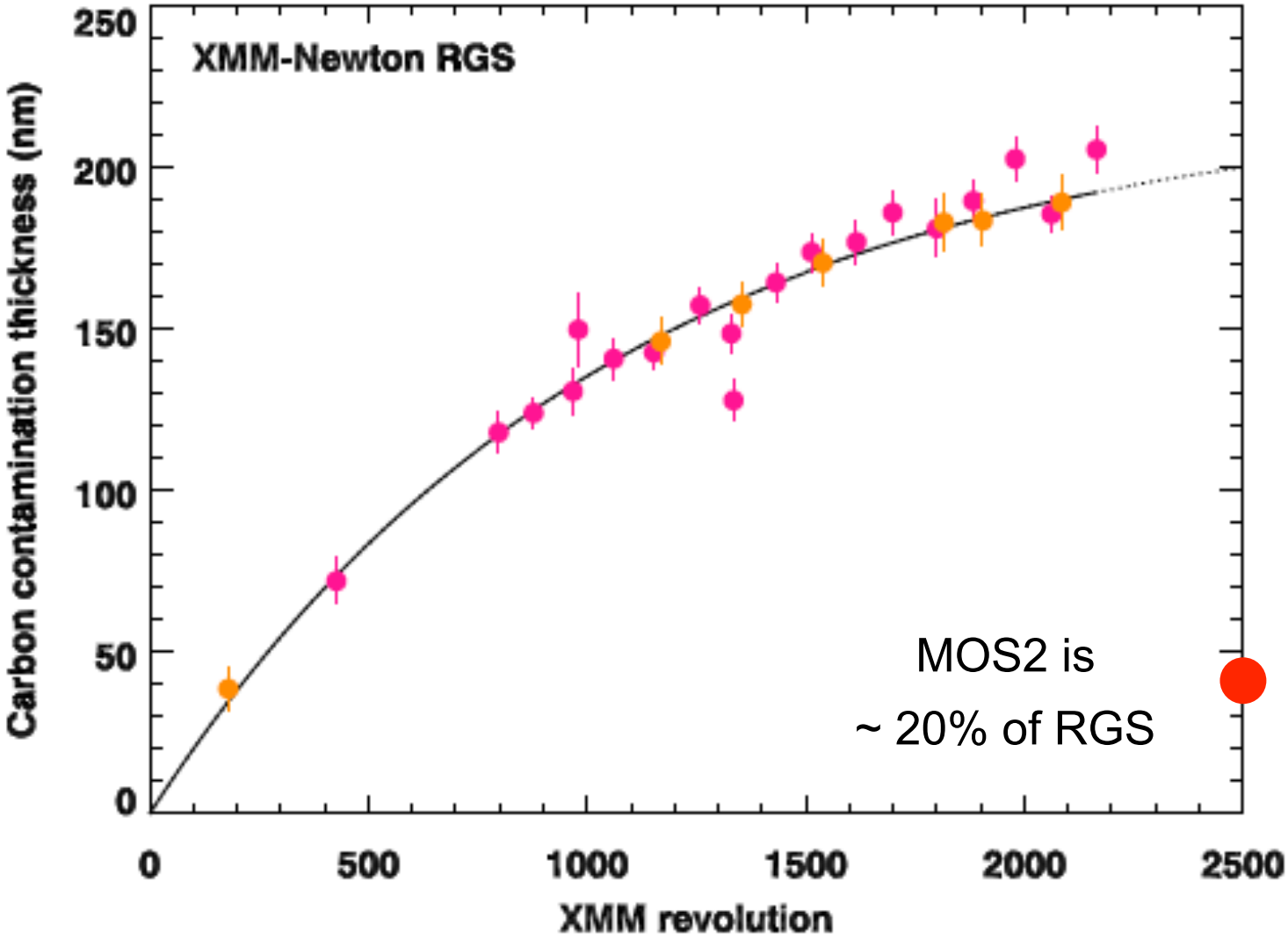
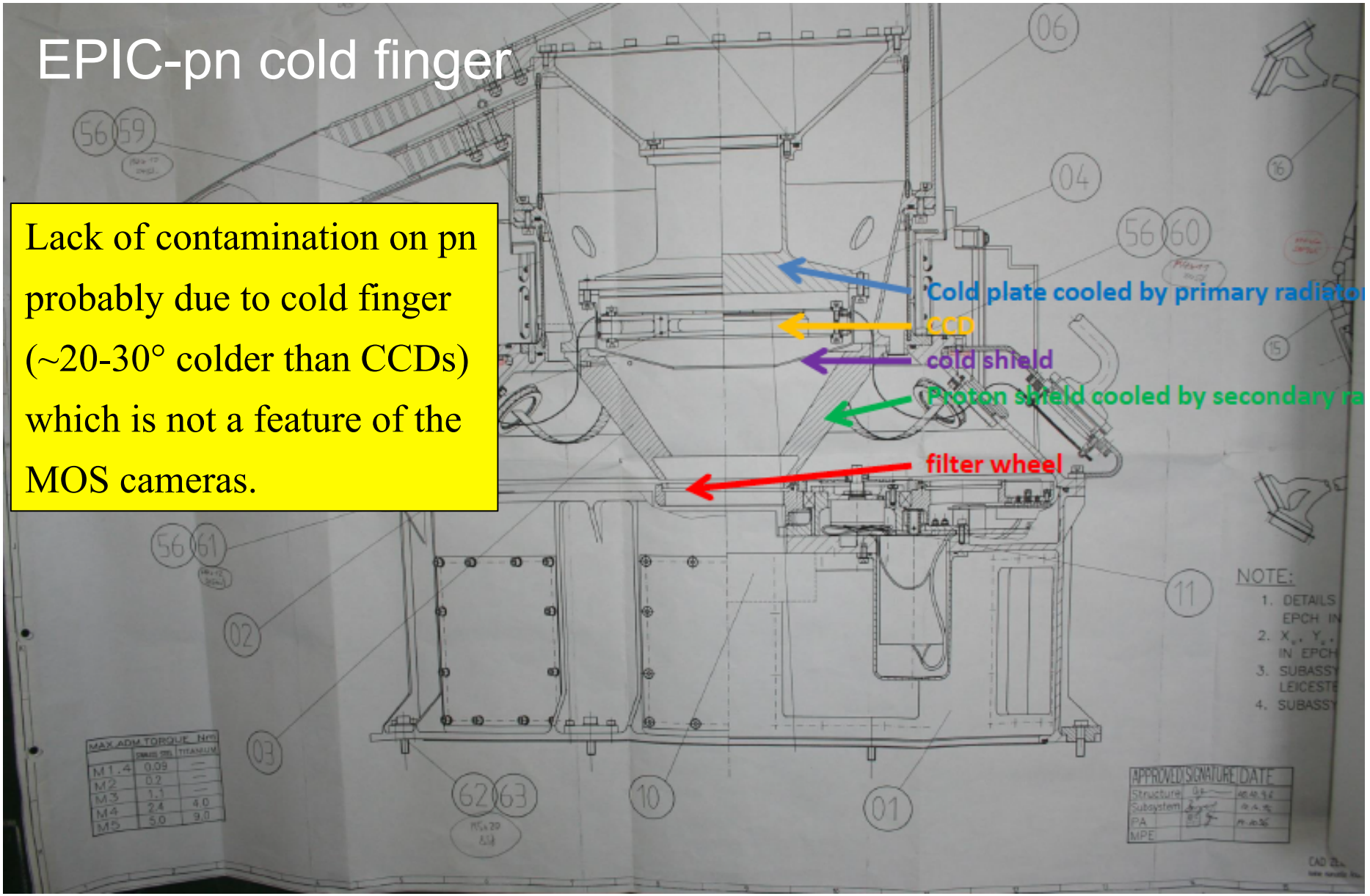
RGS C model (expressed as depth in nm)

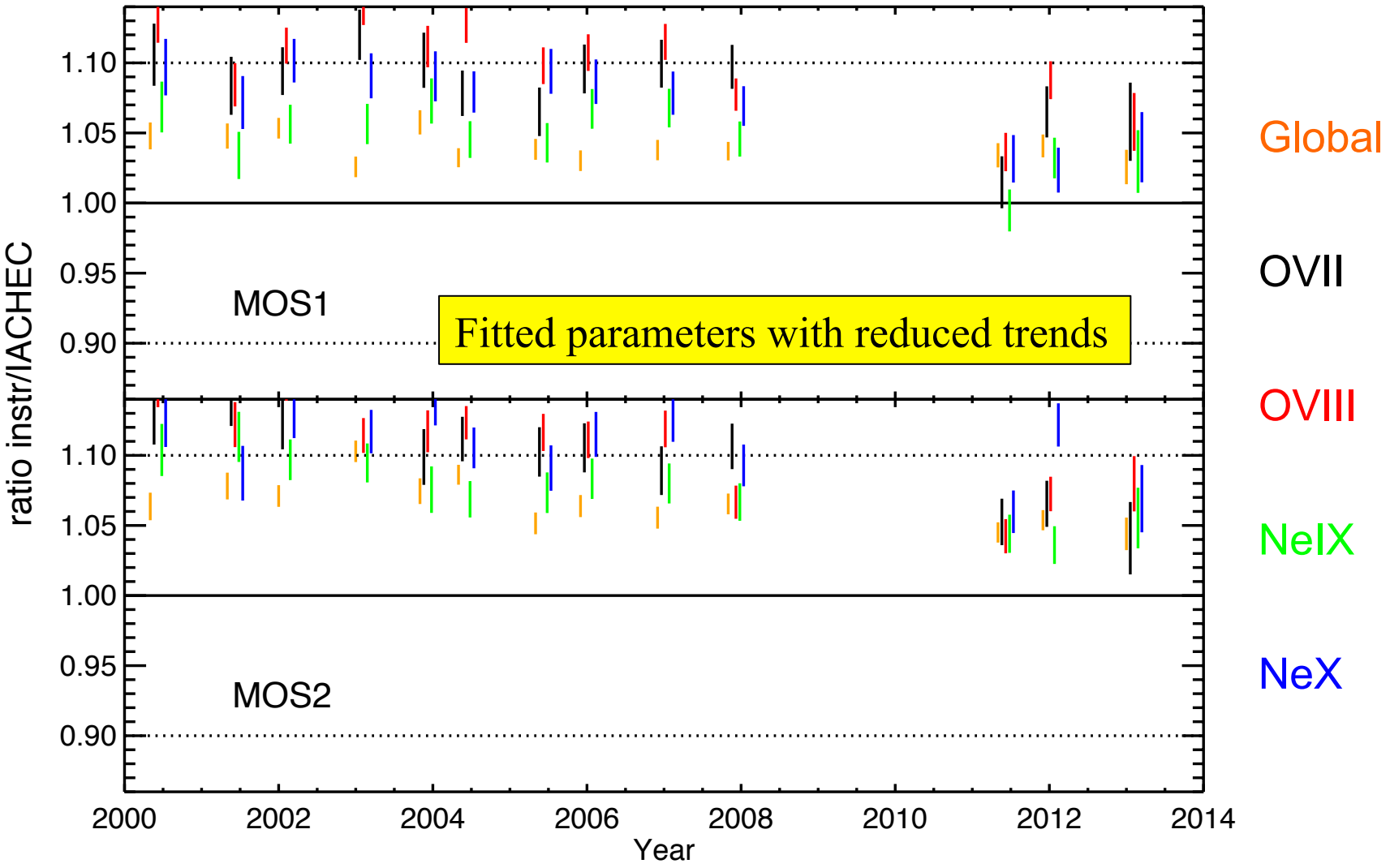


EPIC-pn cold finger

Lack of contamination on pn probably due to cold finger (~20-30° colder than CCDs) which is not a feature of the MOS cameras.



SAS 13.5.0 responses: new arf with contamination and new rmf



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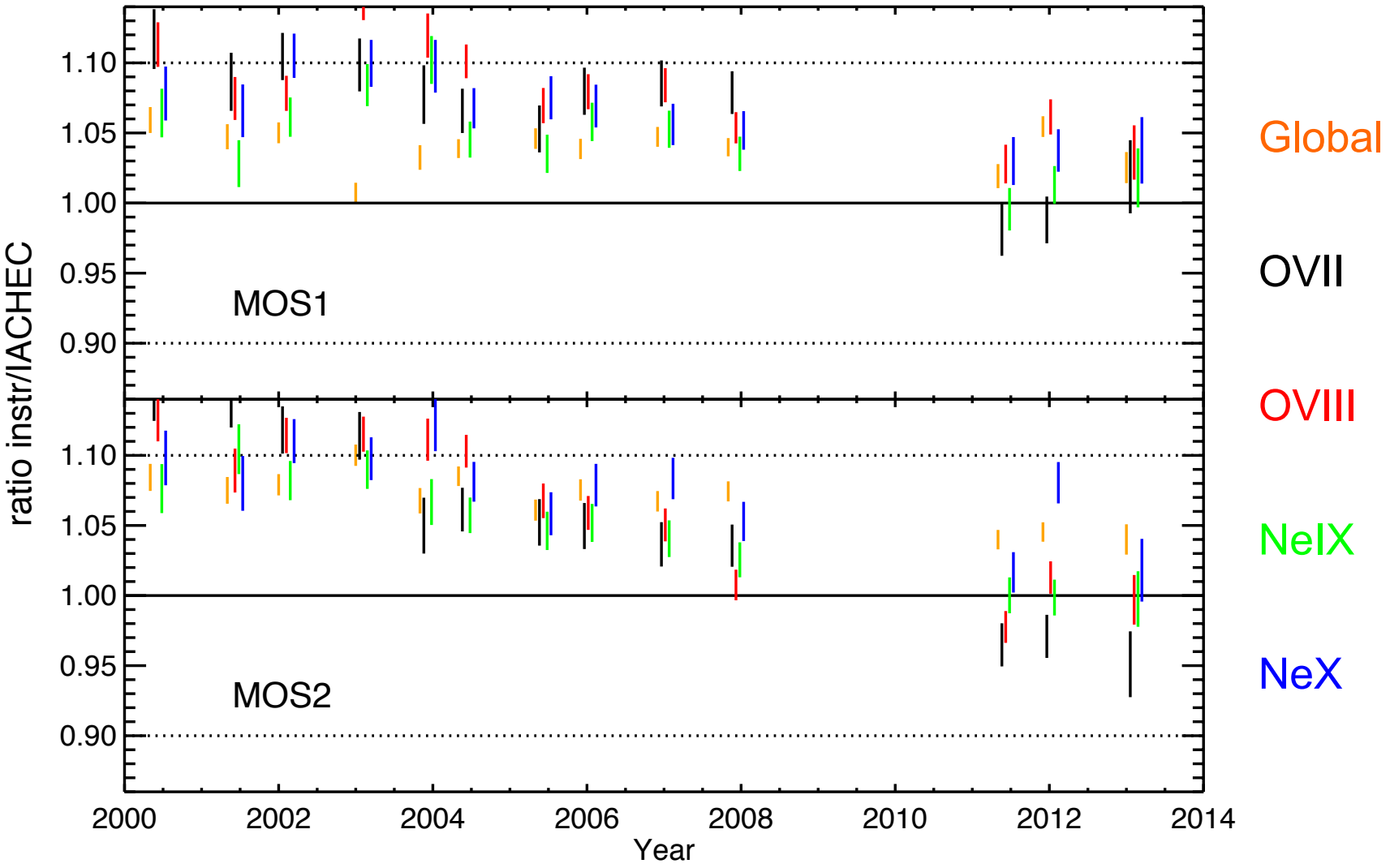
SAS 12.0.0 responses



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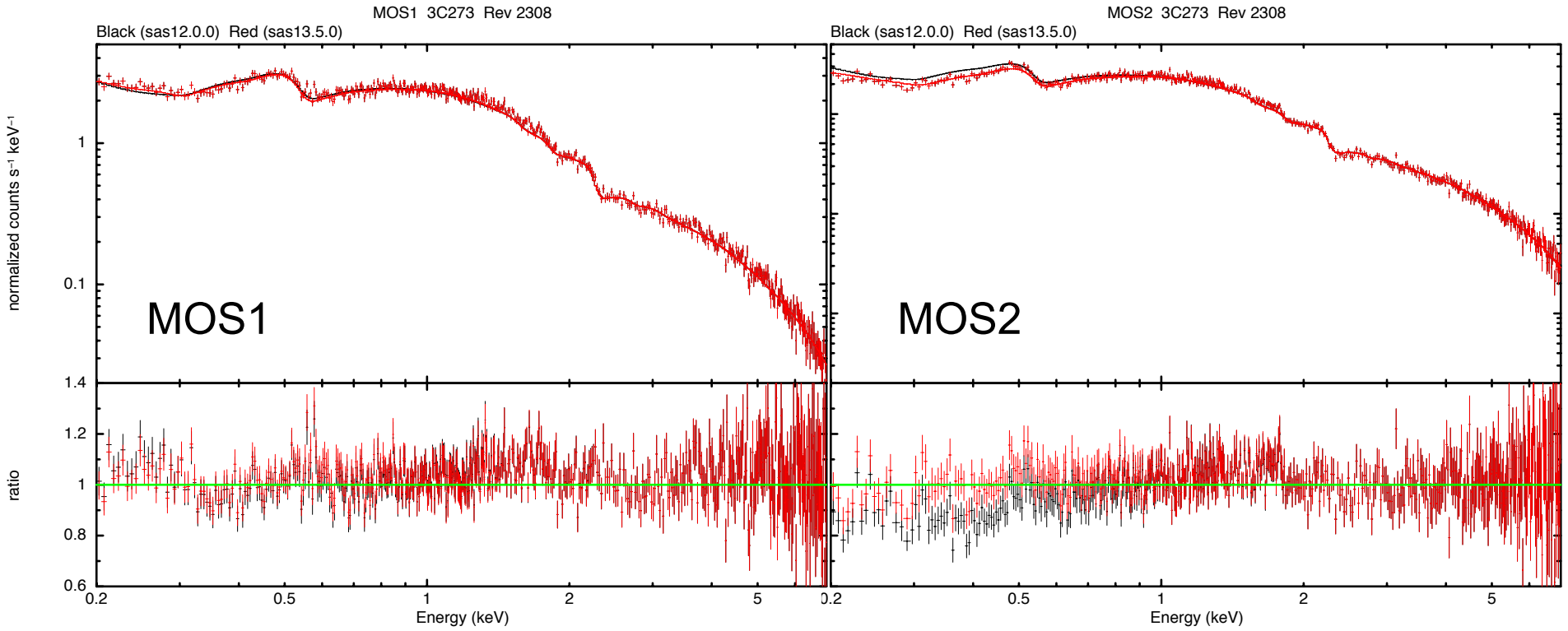
MOS v PN: fit model to pn then fold through MOS response

sas12.0.0 v sas13.5.0



Improves cross-cal with pn in continuum sources

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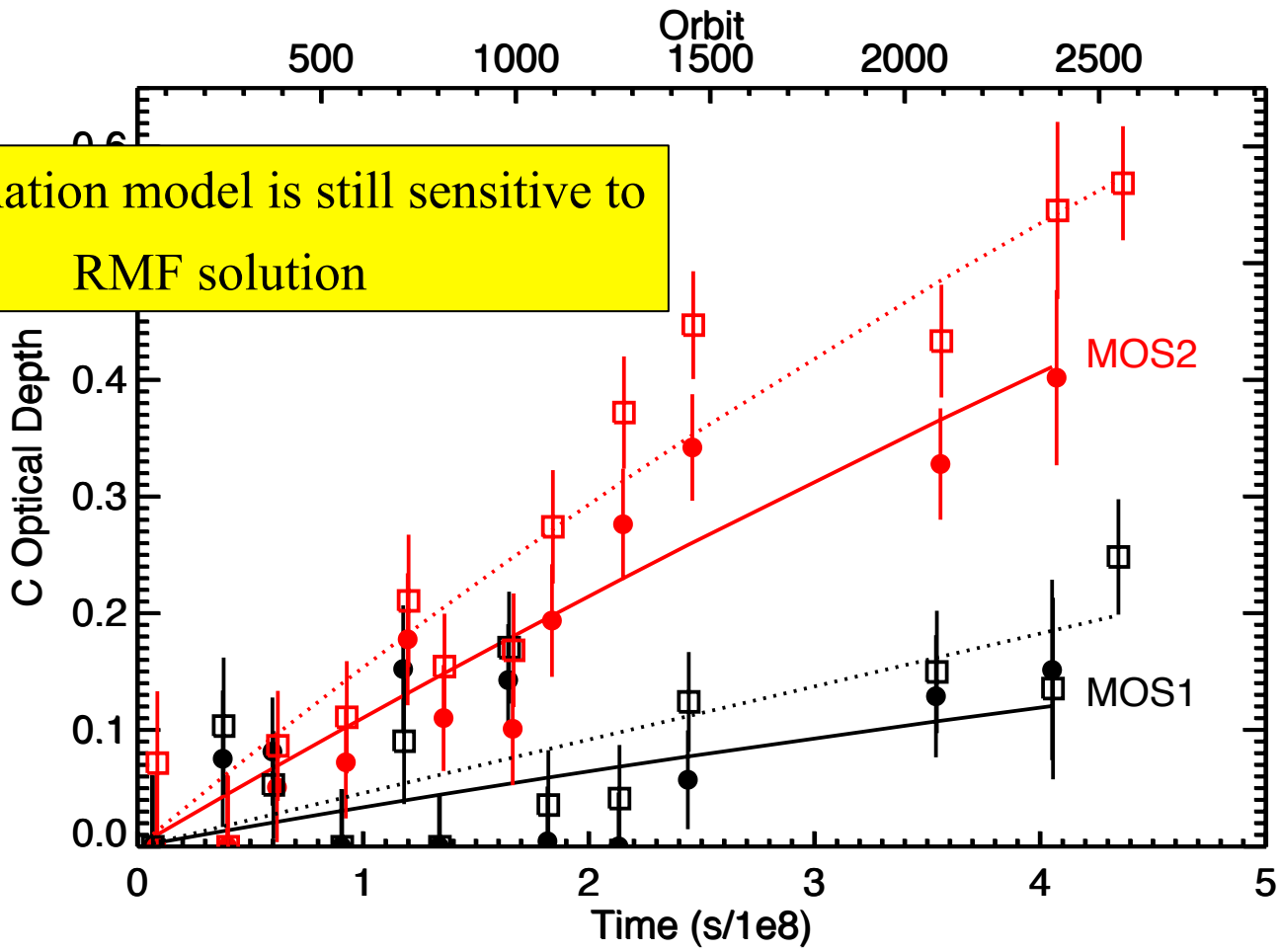
Recalculation of contaminant with sas13.5.0 rmf: plus latest observation

Contamination model is still sensitive to RMF solution



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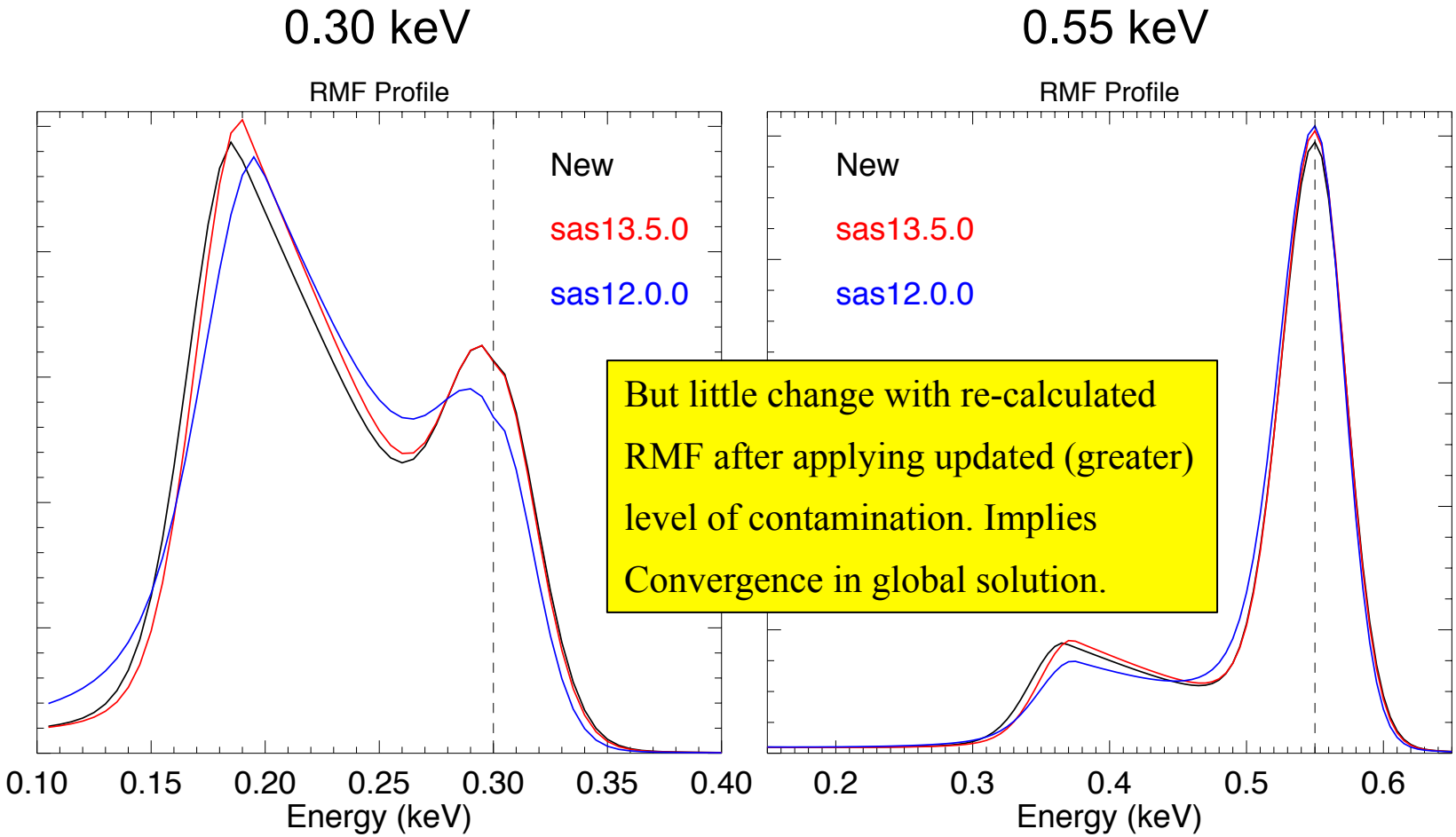
MOS2 outer region RMFs, epoch-2151-2450



But little change with re-calculated RMF after applying updated (greater) level of contamination. Implies Convergence in global solution.

Summary:

SAS13.5.0 contains carbon contamination plus new set of rmfs.

Helps detrend MOS2 1E0102 fits

Improves MOS2 v MOS1 & MOS2 v pn XCAL

“global iterative solution” vis-à-vis rmf solution shows convergence … true contamination level ~30% higher than SAS13.5.0 solution.