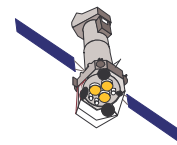


RGS/MOS-cooling

Results

February 03, 2003

L. Metcalfe



XMM-Newton

Science Operations & Data Systems Division
Research & Scientific Support Department

Page 1

CONTENT :

- * immediate results of cooling**
- * contamination**
- * open points**

RECOMMENDATIONS OF THE XMM NEWTON USERS GROUP re. COOLING

at UG Meeting of 16/17 September 2002

“The UG however encourages the Project to take all necessary steps to **make sure that the XMM data are of the best possible quality**, and at the same time strongly recommends that the Project take measures that **keep the impact on users** in terms of data delivery etc. **at a minimum.**”

“The Users Group feels that in order to make sure that the scientific capabilities of XMM-Newton can be maximally exploited **the MOS and RGS CCDs should be cooled** despite small remaining risks. Recommendations were formulated considering the expected scientific improvements as well as the delay in data delivery.”

Recommendation 2002-09-17/18: The Users Group appreciates the effort to maximise and to maintain the high performance of the instruments. Also, a steady data flow from XMM-Newton to the scientific community has now been achieved. **The impact of the cooling on the data delivery should thus be minimised.**

Action 2002-09-17/08: As far as data delivery is concerned, XMM-Newton SOC and XMM Newton SSC should evaluate the **possibility to deliver initially data with a preliminary calibration** and to reprocess such data after the cooled instruments are calibrated.

THE PLAN



COOLING

MOS Instrument Settings

Focal plane temperature: -120 deg C

Voltages: unchanged

RGS Instrument Settings

Focal plane temperature: -110 deg C

Voltages: some serial voltages adjusted

BAD PIXELS

MOS1 :

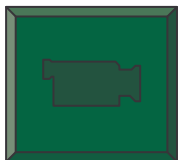
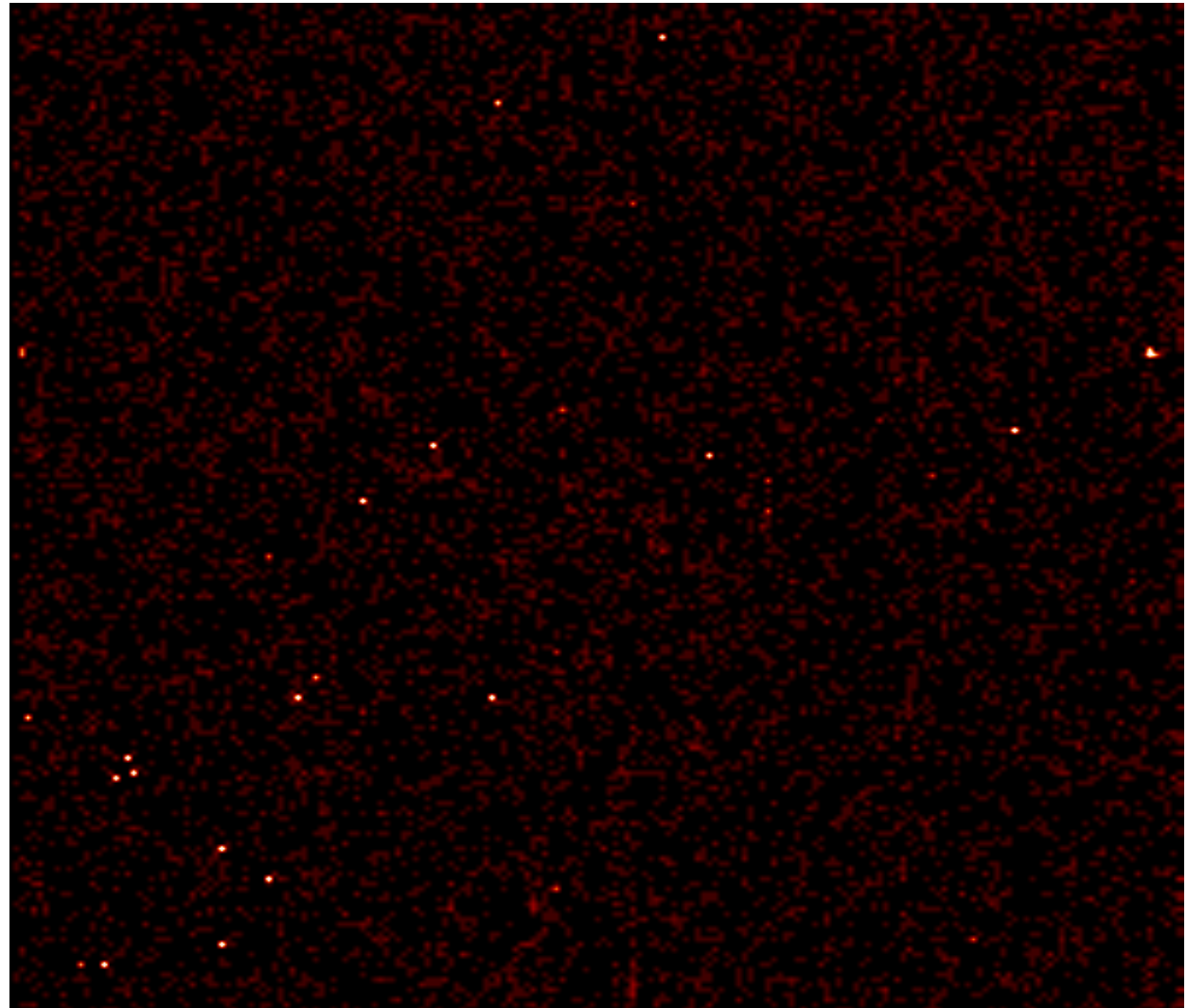
98 \Rightarrow 38

\Rightarrow -61 %

MOS2 :

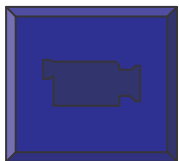
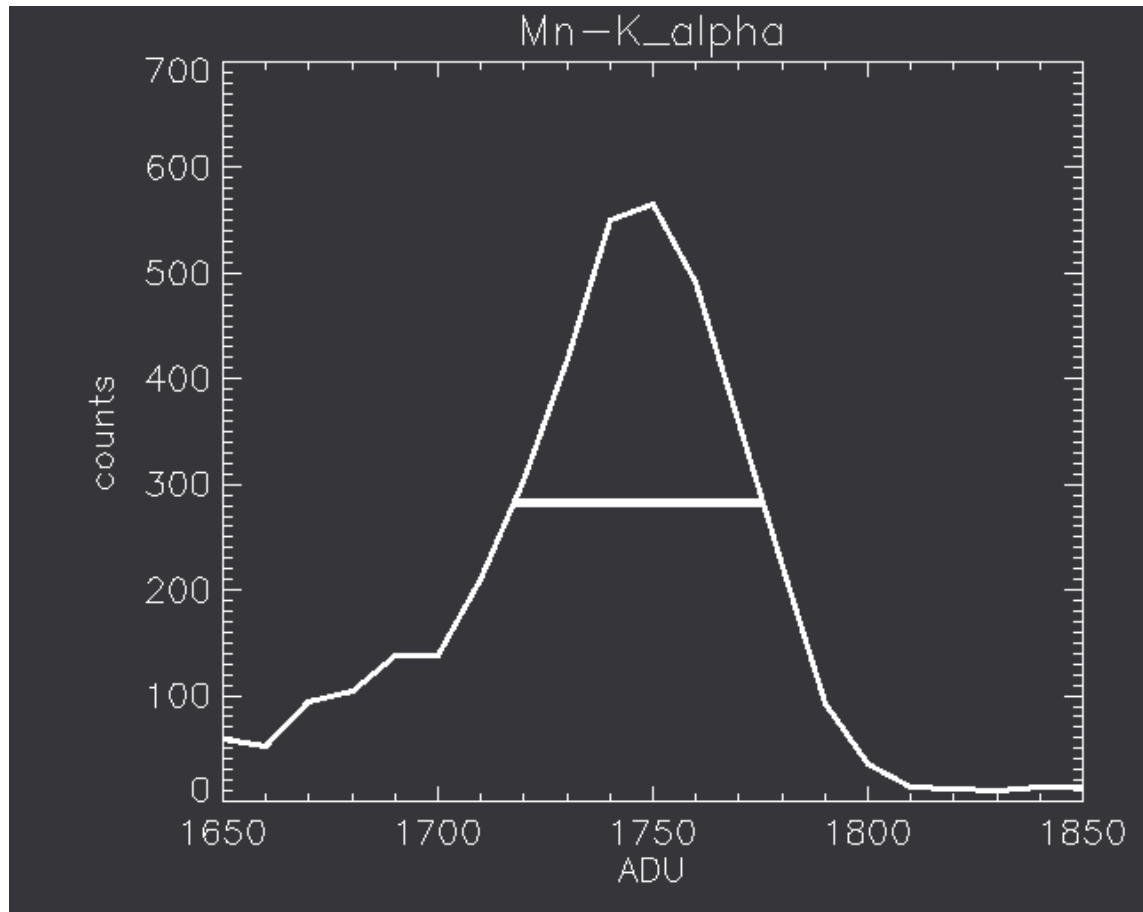
167 \Rightarrow 24

\Rightarrow -86 %



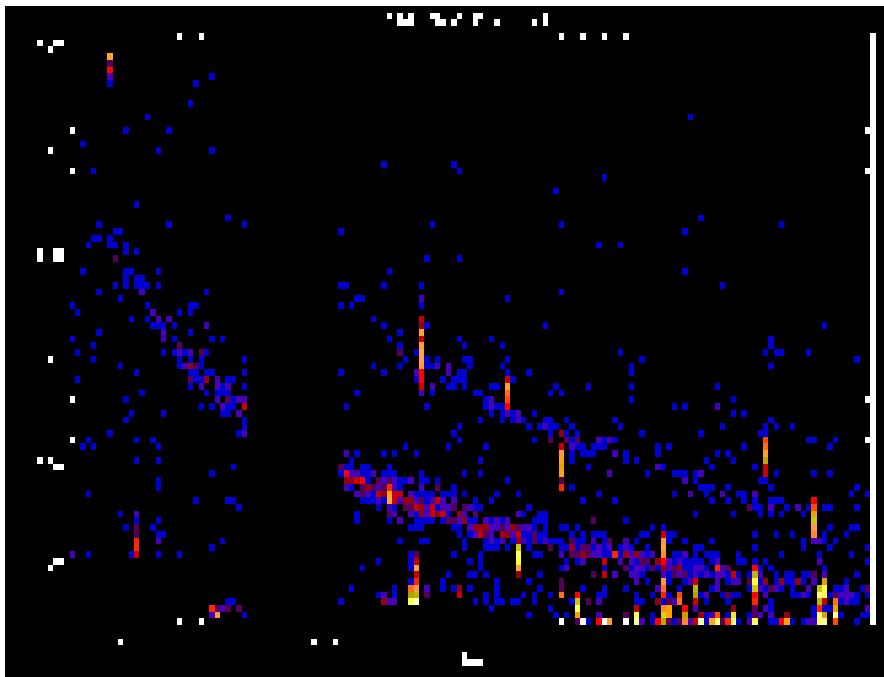
ENERGY RESOLUTION-1

FWHM of the Mn K line (@5.9 keV)
reduced from ~160eV to ~140eV.

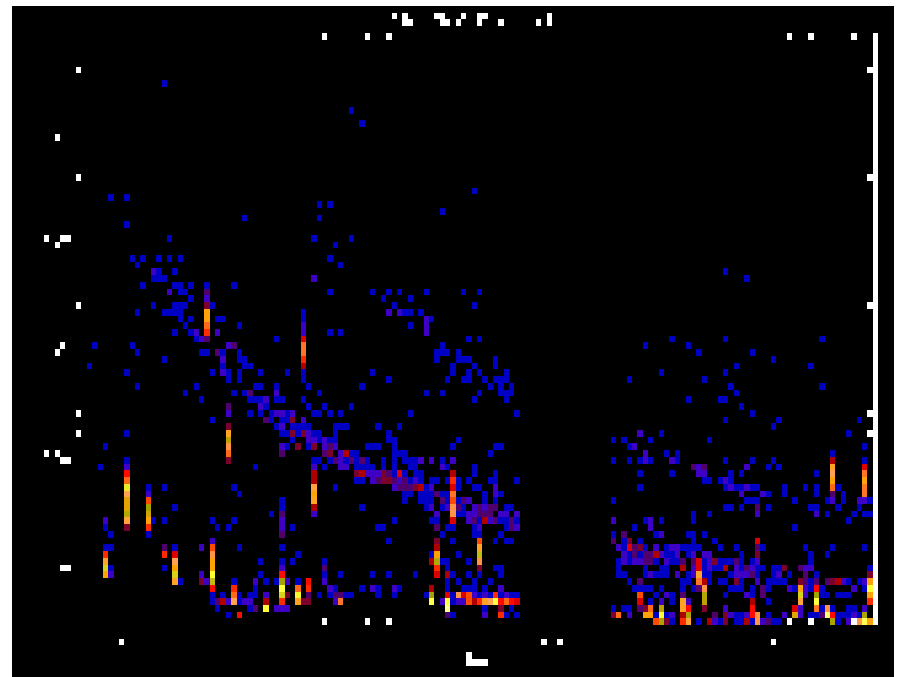
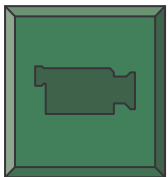


COOLING RGS

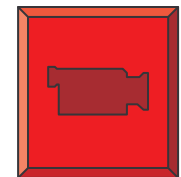
The RGS instruments' operational temperature was decreased in early November from -80°C to -110°C : Mkn421 was observed during the 9 hours necessary for decreasing the CCD temperature



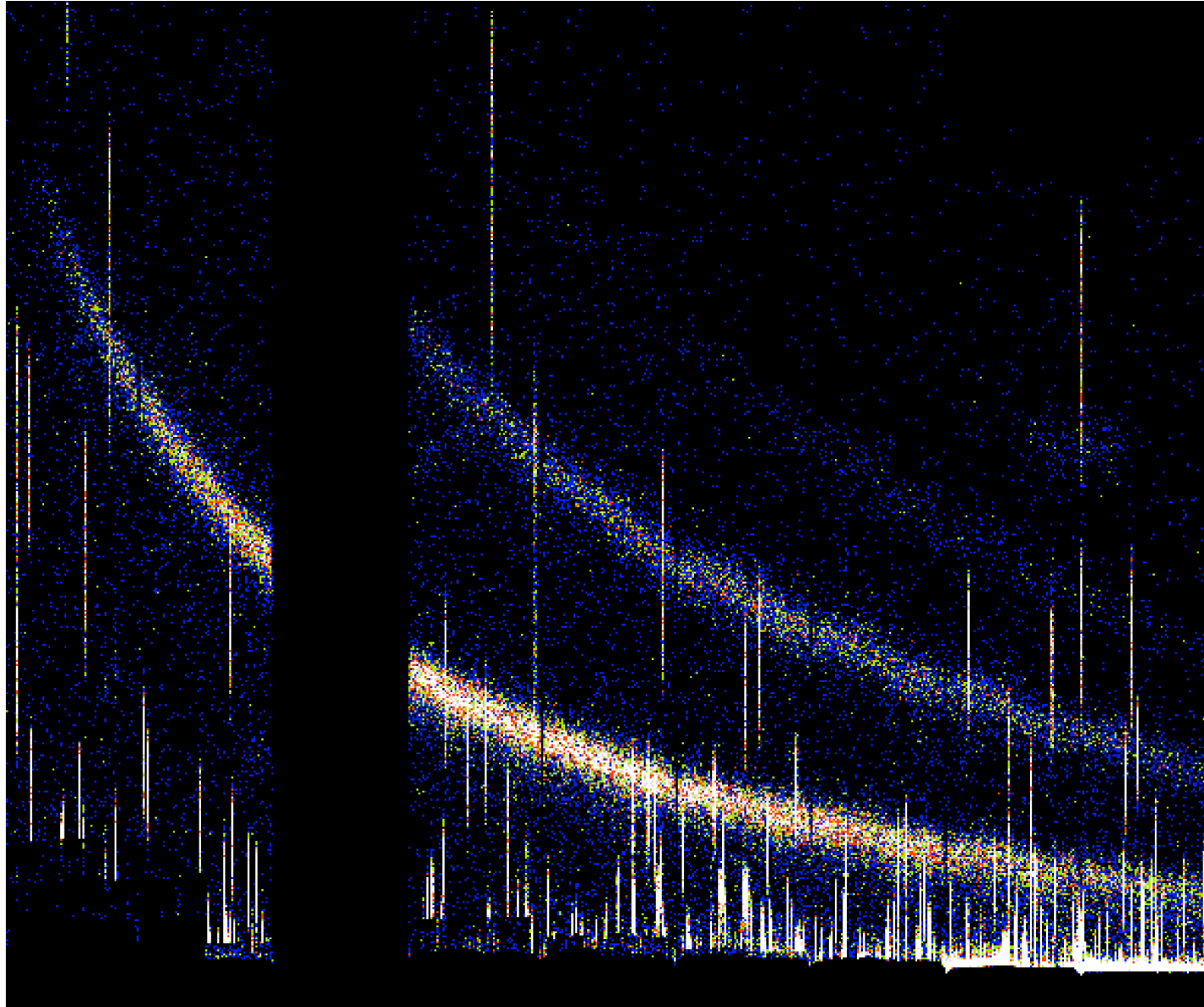
RGS1



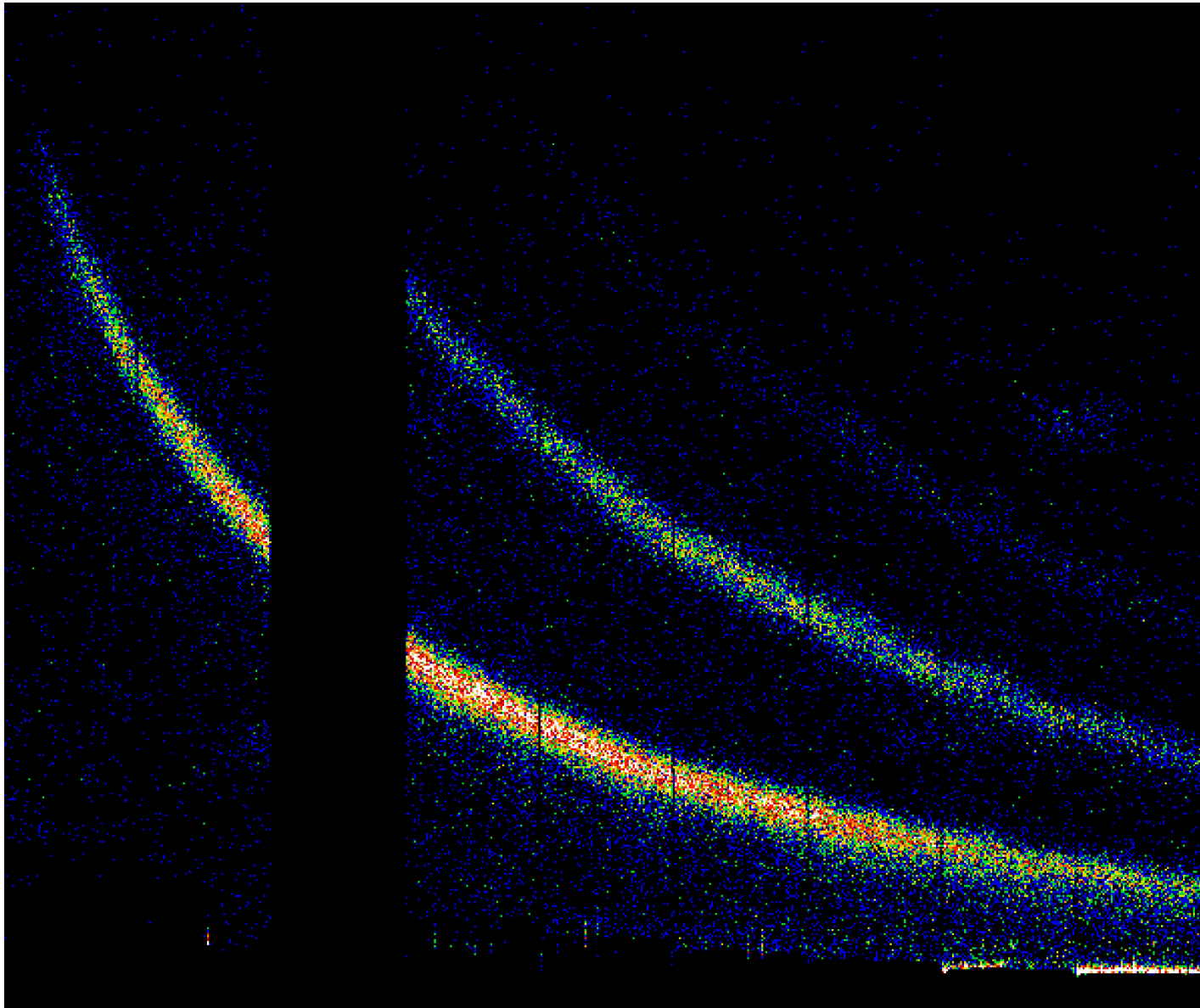
RGS2



RGS at its initial operating temperature of -80°C



RGS after cooling to -110°C



PERIGEE T EXCURSIONS MOS2

XMM M2T

Start Date & Time 2002-363 12:34:01

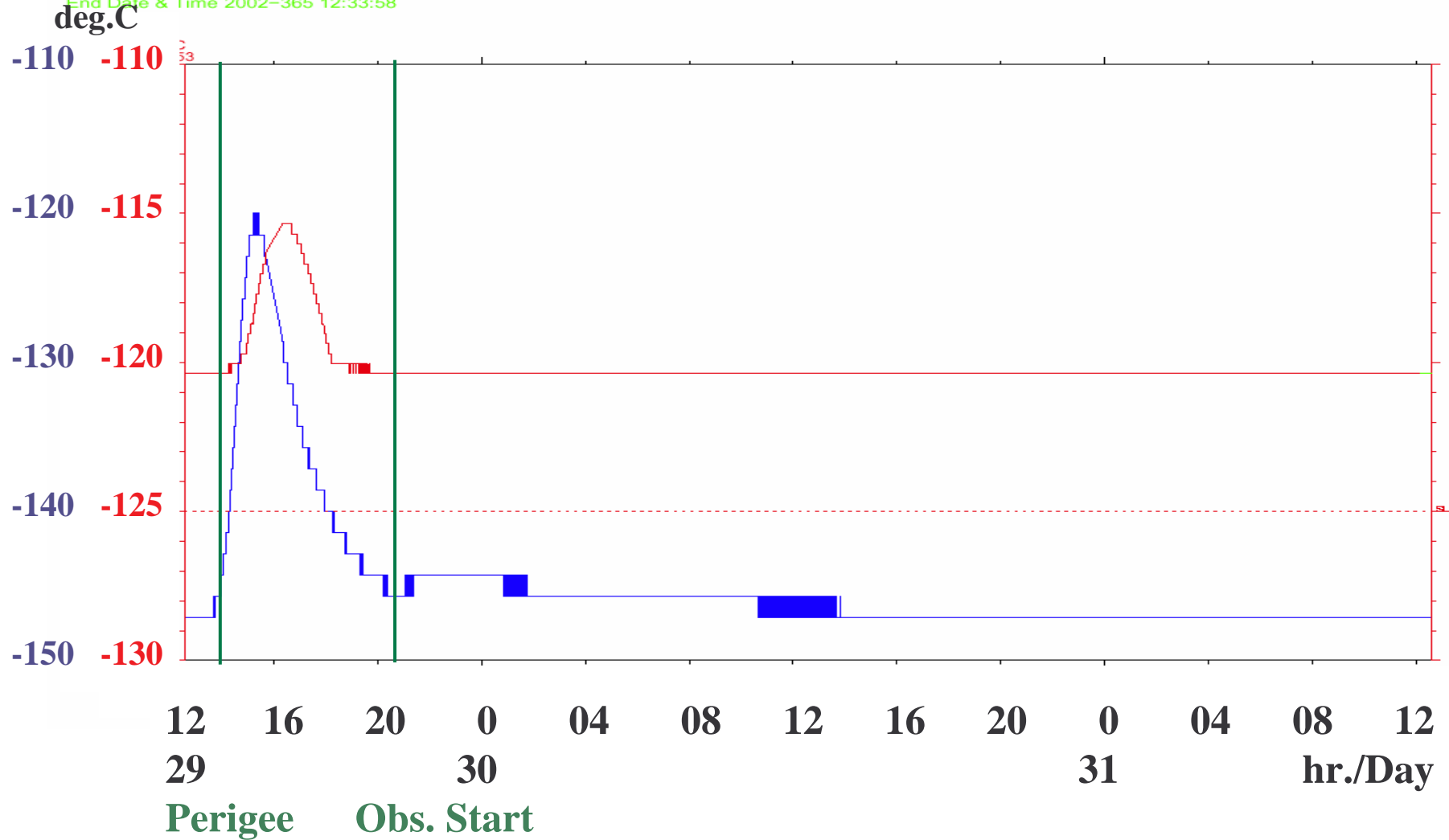
End Date & Time 2002-365 12:33:58

EPIC MOS2 TEMP

SPEVAL

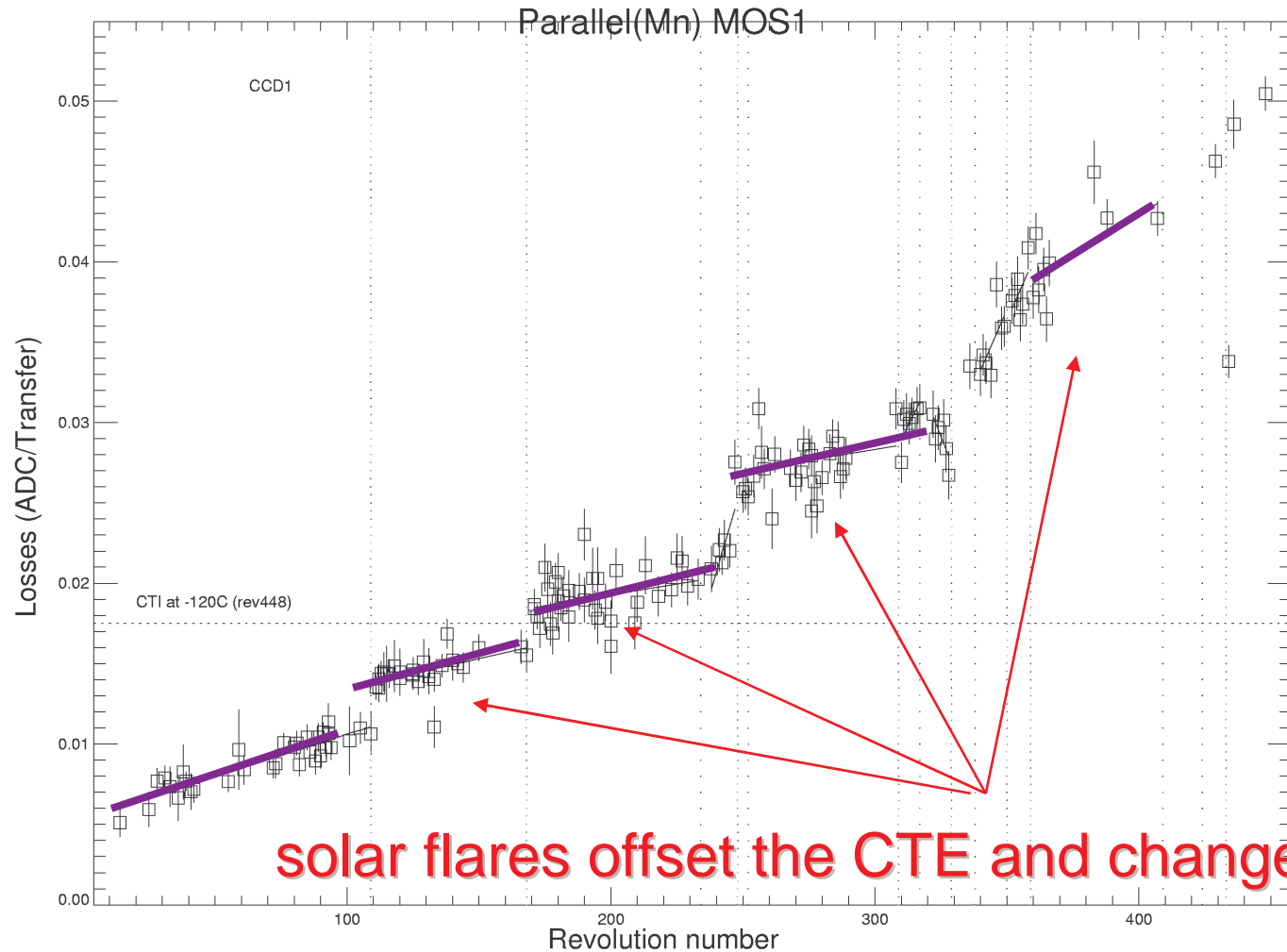
K1253 H FPLANNORRANTEM

T4003 TEMP EMCH2 P RAD



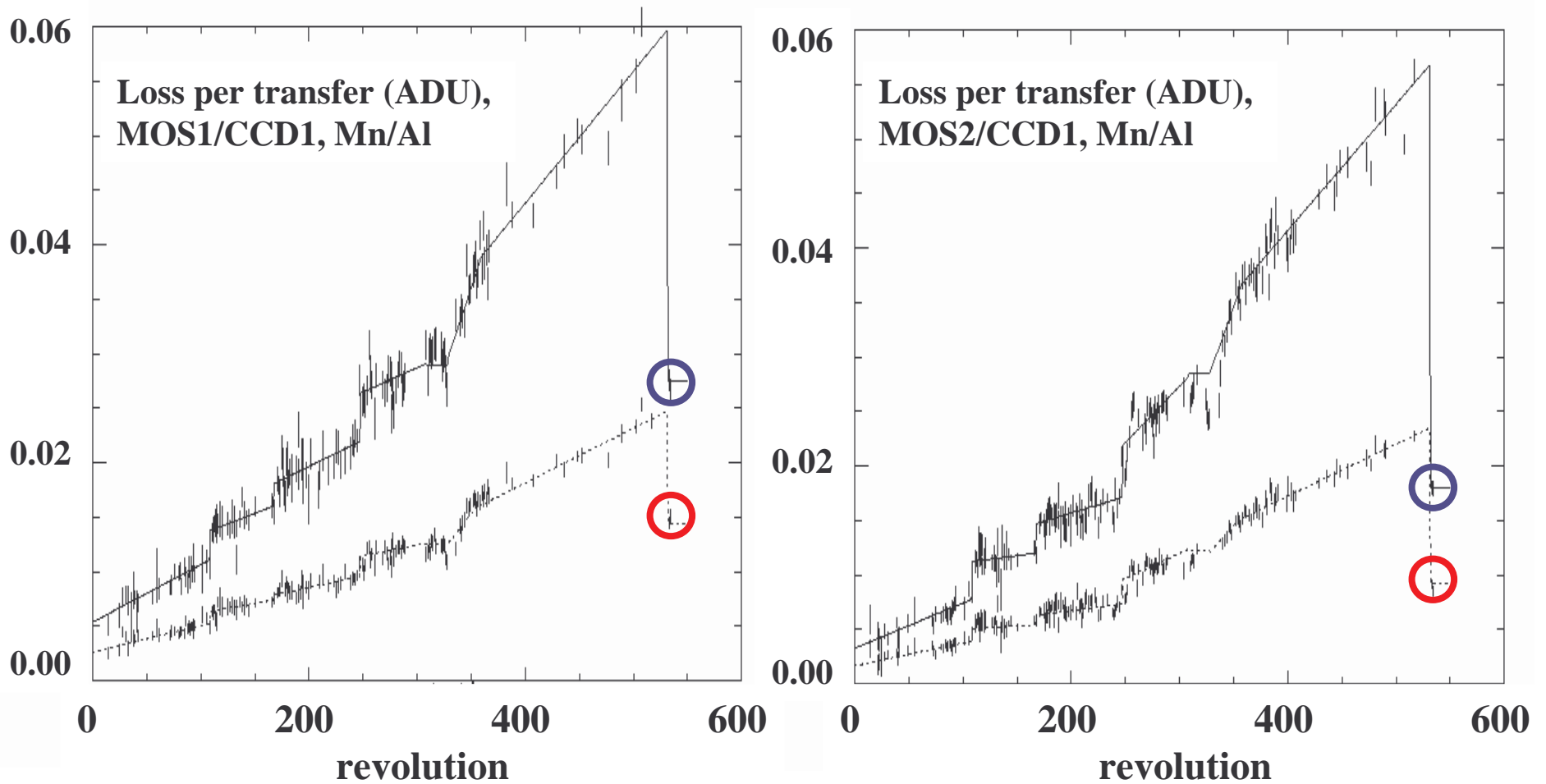
MOS CTE degradation

high energy radiation degrades CTE continuously

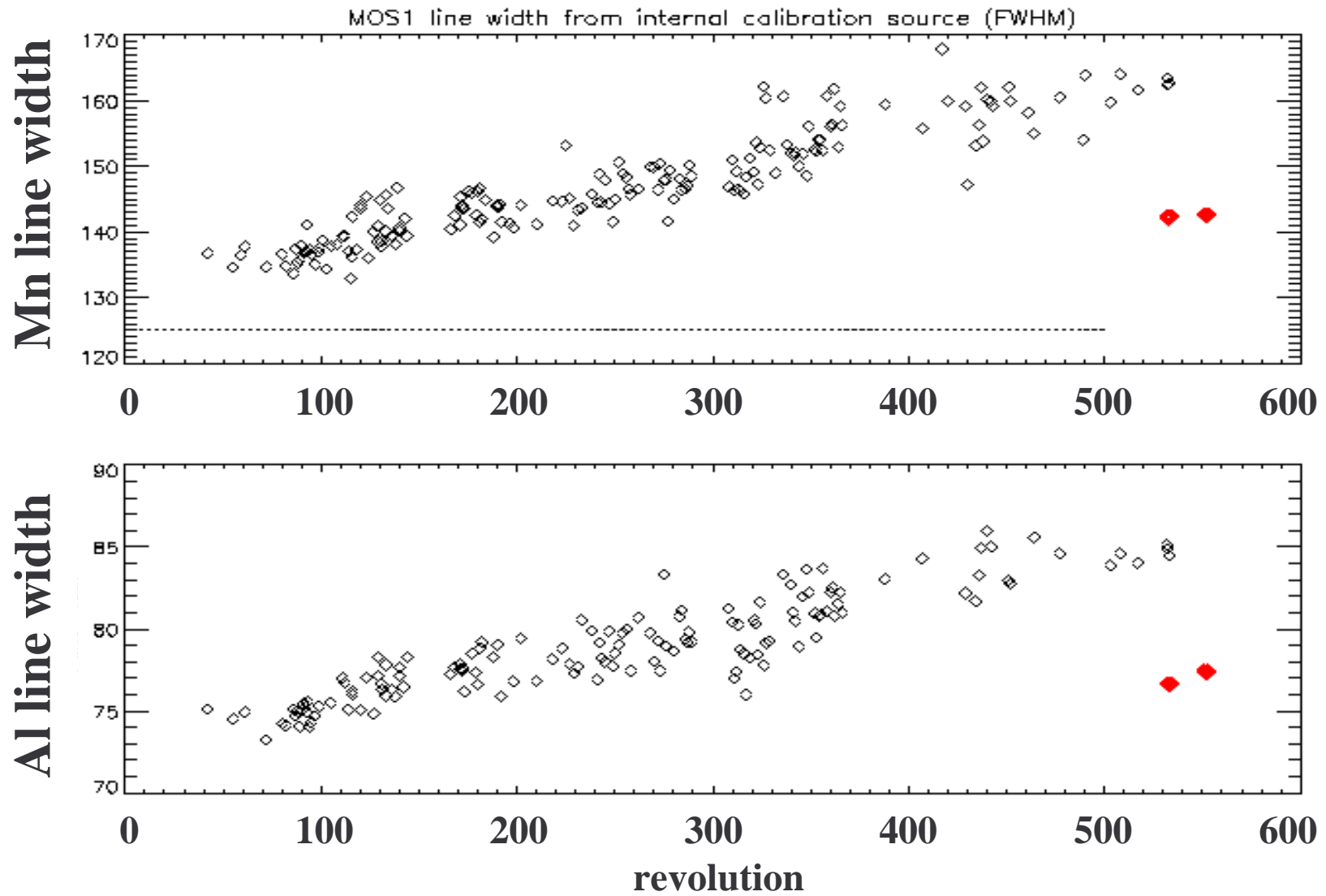


MOS CTI

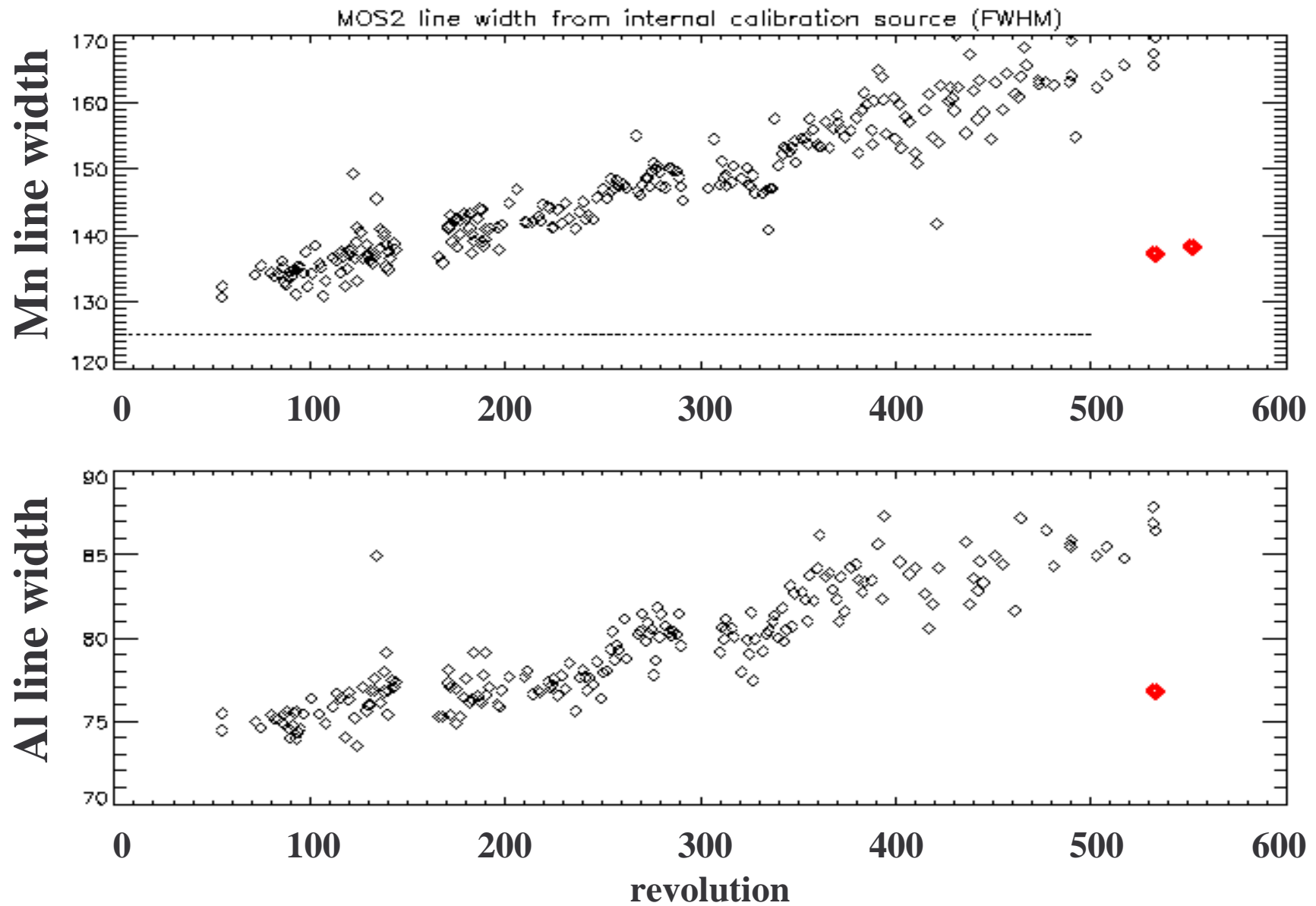
parallel CTI reduced by factor 2 to 3 depending on CCD



ENERGY RESOLUTION: MOS1

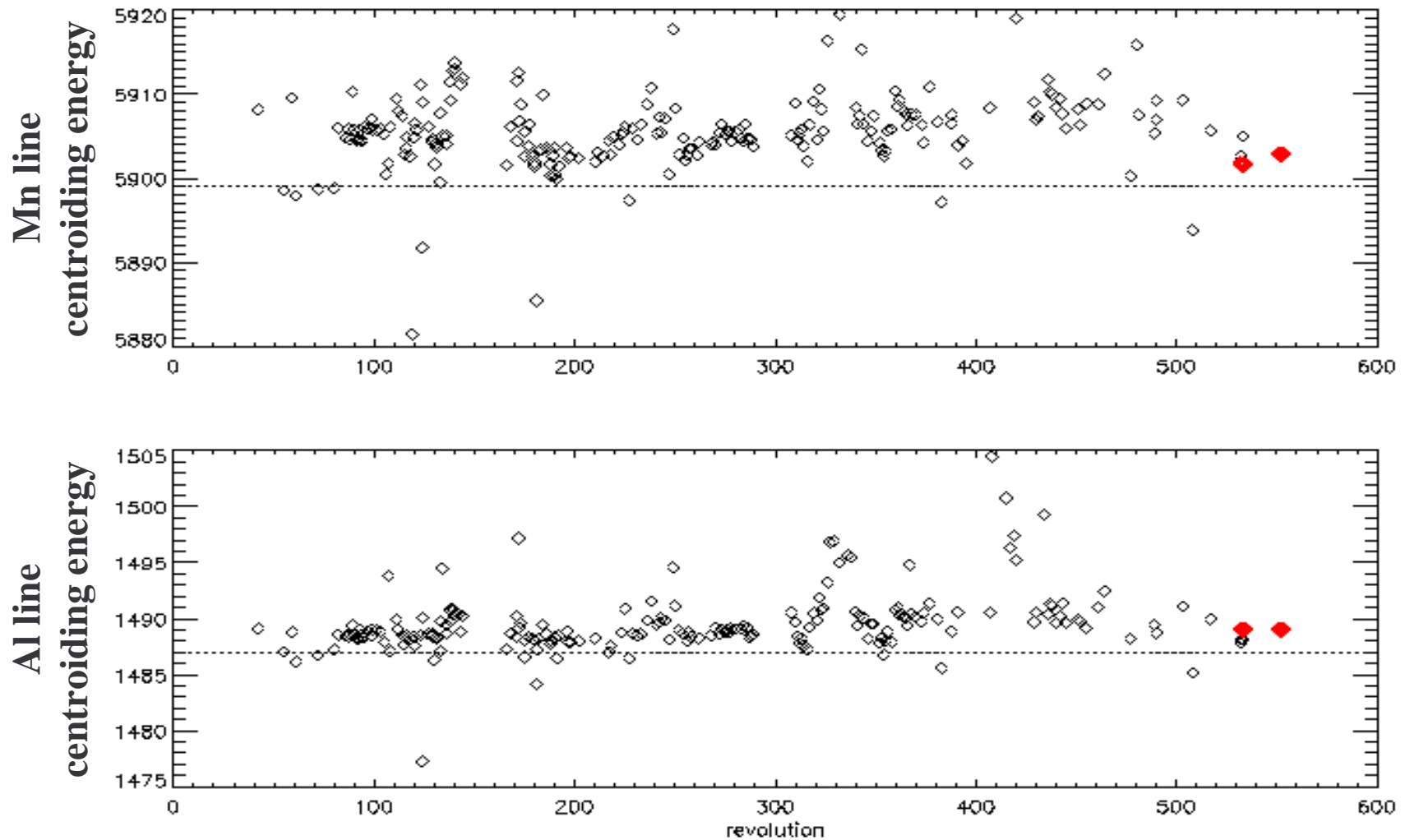


ENERGY RESOLUTION: MOS2



GAIN

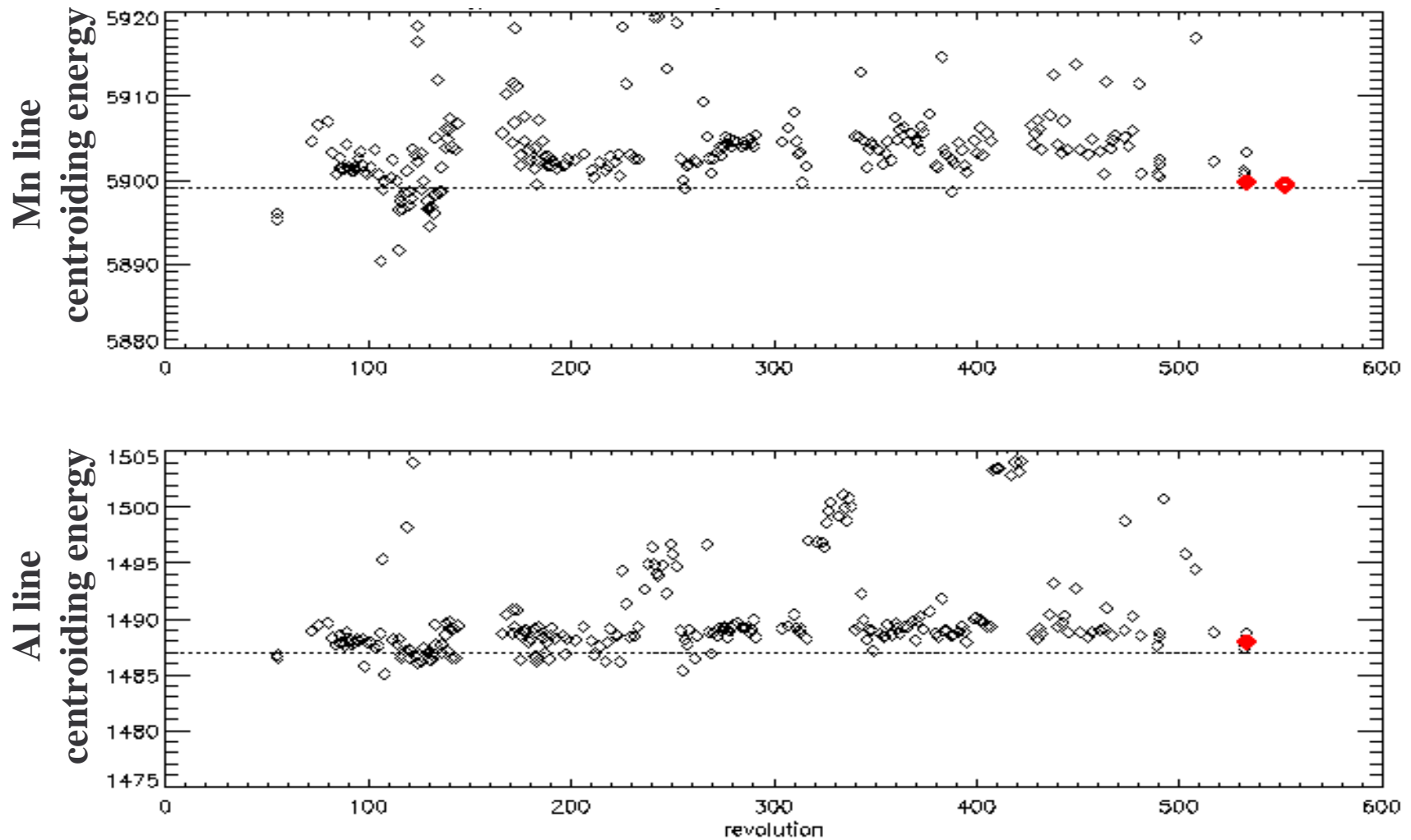
MOS1 energy scale monitoring with internal calibration source PAT1



RECONSTRUCTED LINE POSITION WITH SAS5.4_REL

GAIN

MOS2 energy scale monitoring with internal calibration source PAT1



RECONSTRUCTED LINE POSITION WITH SAS5.4_REL

contamination monitoring

zeta Pup

zeta Pup

N132D

R
G
S

Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug
-----	-----	-----	-----	-----	-----	-----	------	------	-----

N132D

M
O
S

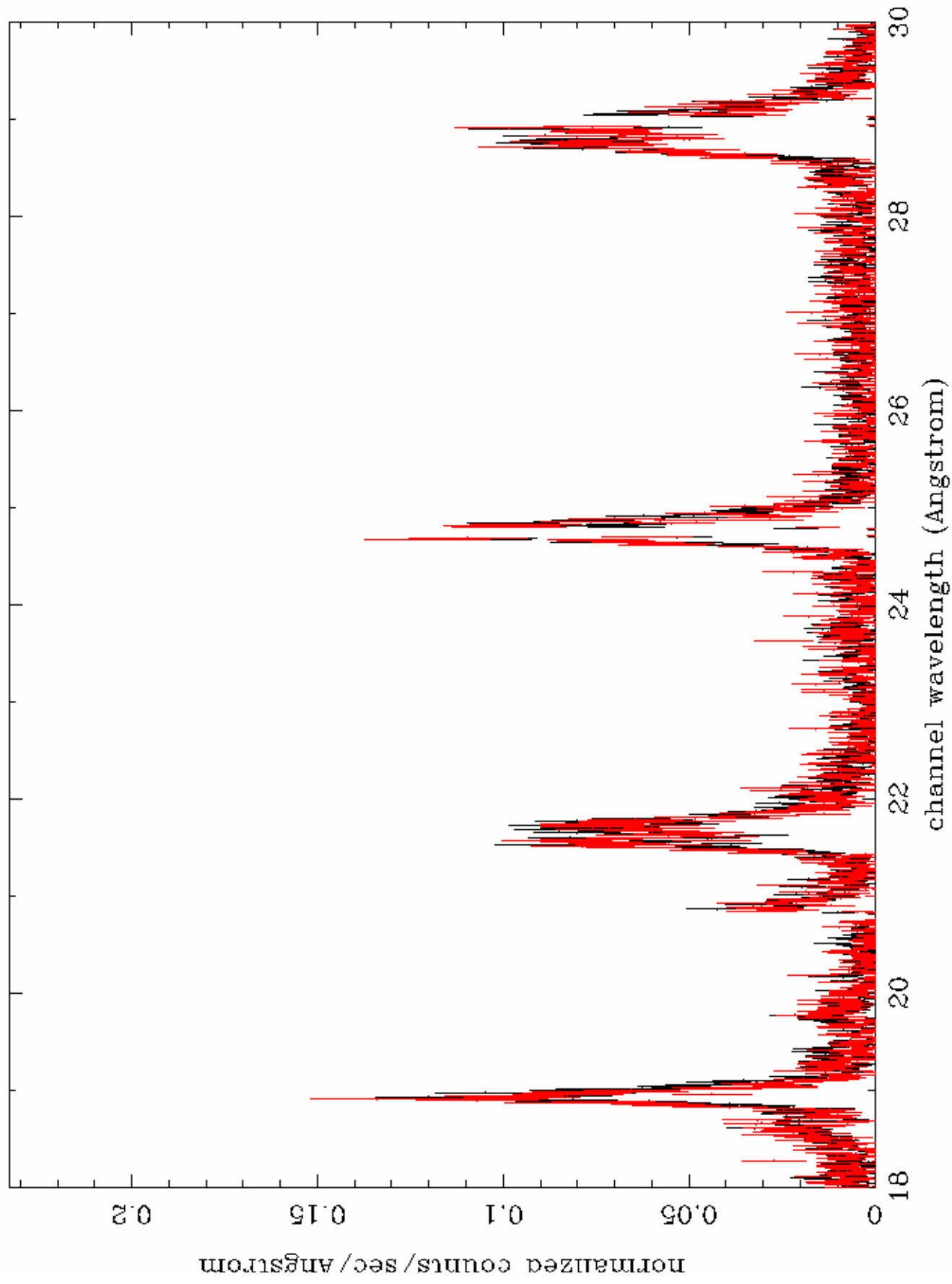
RBS1223

RXSJ160518.8+32

RBS1223

RXSJ160518.8+32

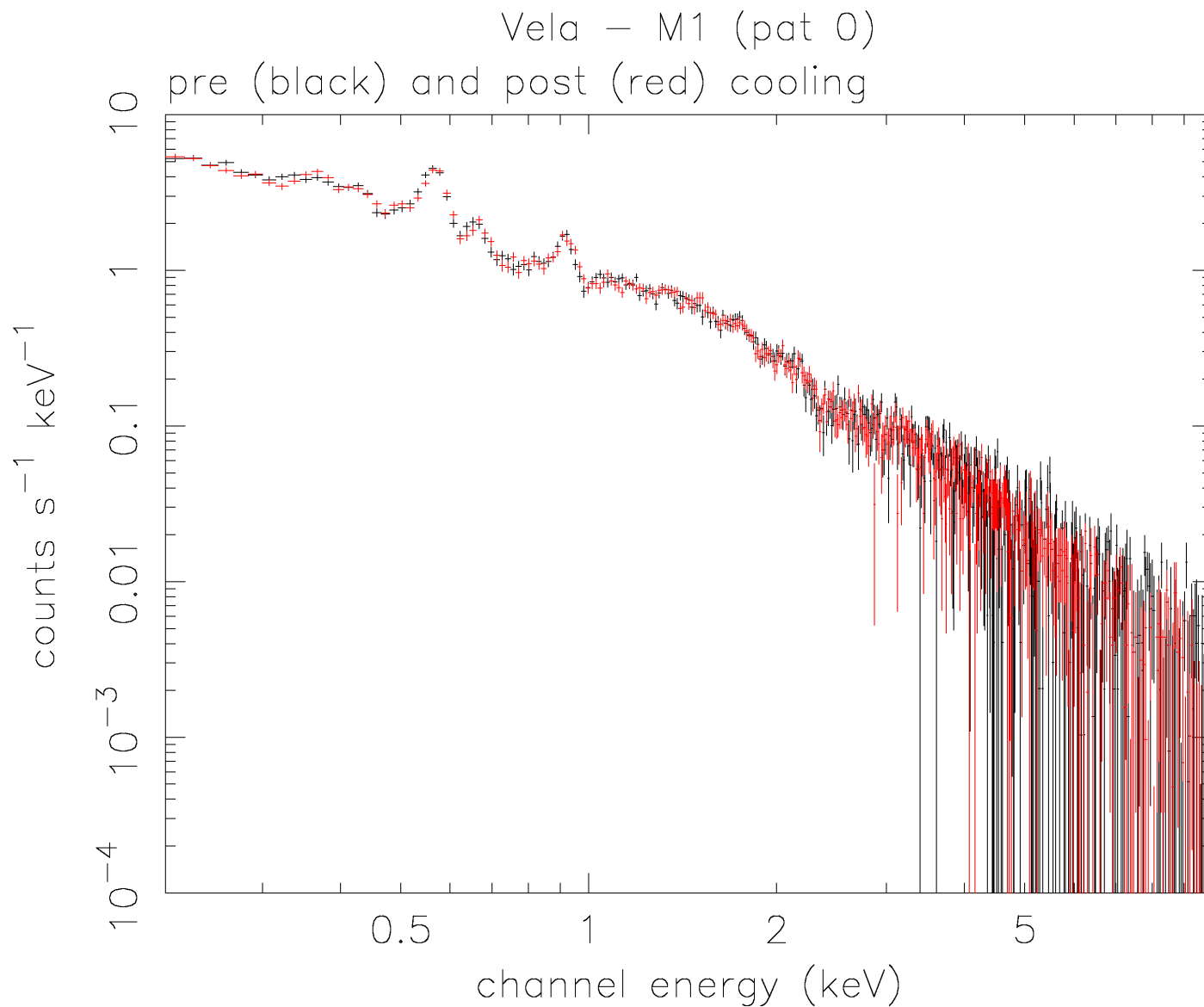
0091_0095810301 & 0552_0157161101
 ζ Puppis stellar contamination monitor



CCF Status

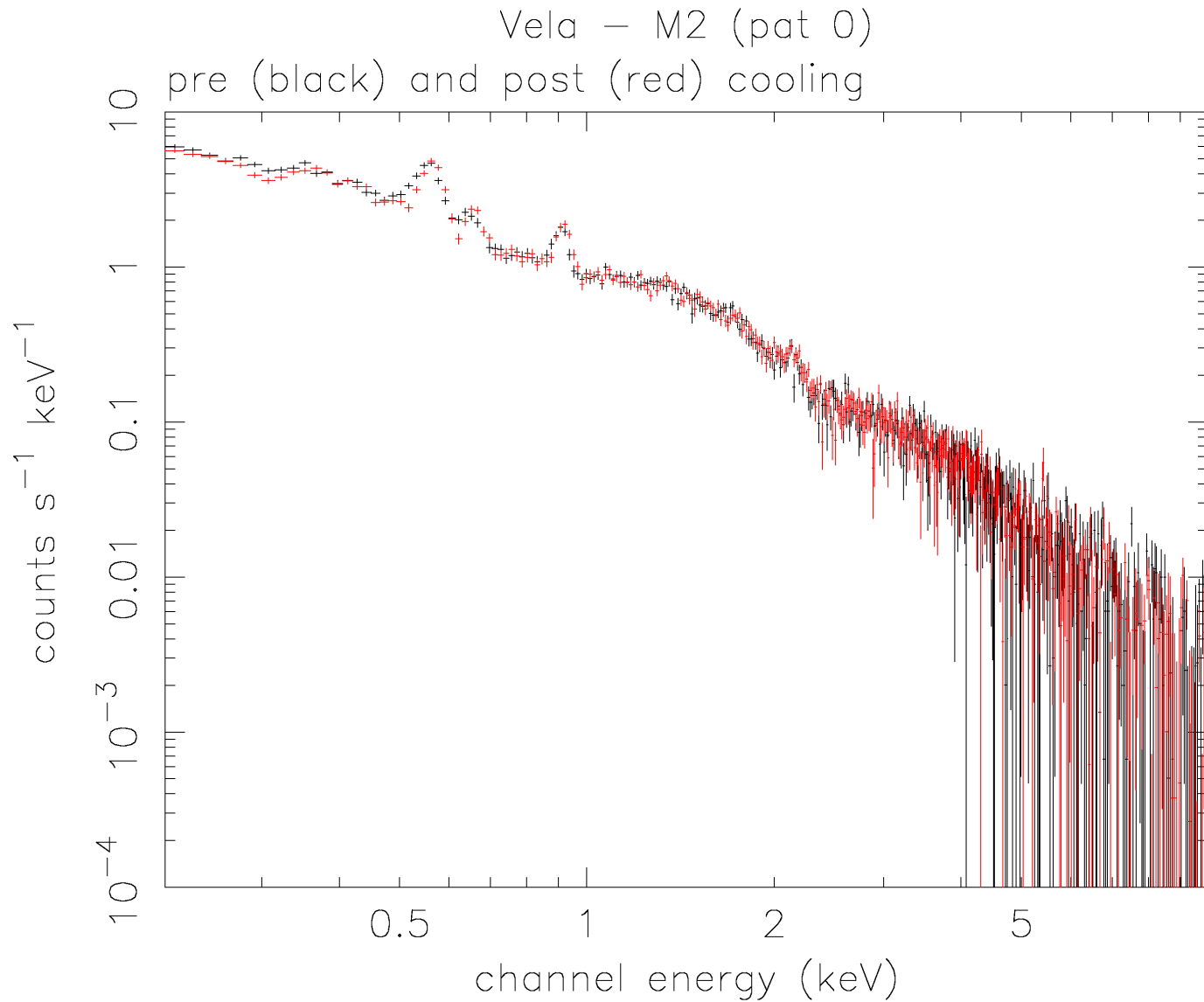
CCF	in work	DT	RN	CCR	RT	public	resp
EPN_CTI_0011	X	X	X	X	X	X	MK
EMOS_x_ADUCONV (12-18)	X	X	X	X	X	X	MK
EMOS_x_ADUCONV_0019	X	X	X	X	X	X	SS/MK
EMOS_x_CTI (7-15)	X	X	X	X	X	X	BA/MK
EMOS_x_BADPIX_0016	X	X	X	X	X	X	BA/MK
EMOS_x_HKPARMINT_0016	X	X	X	X	X	X	BA/MK
EMOS_x_QUANTUMEFF_0013	X	X	X	X	X	X	RS
EMOS_x_REDIST (13-19)	X	X	X	X	X	X	RS
EPN_QUANTUMEFF_0012	X	X	X	X	X	X	RS
related to cooling							

Vela SNR pre and post-M1



**no evidence
for a change
in QE due to
contamination
going from
Rev 533
(pre-cooling)
to Rev 534
(post-cooling)**

Vela SNR pre and post-M2



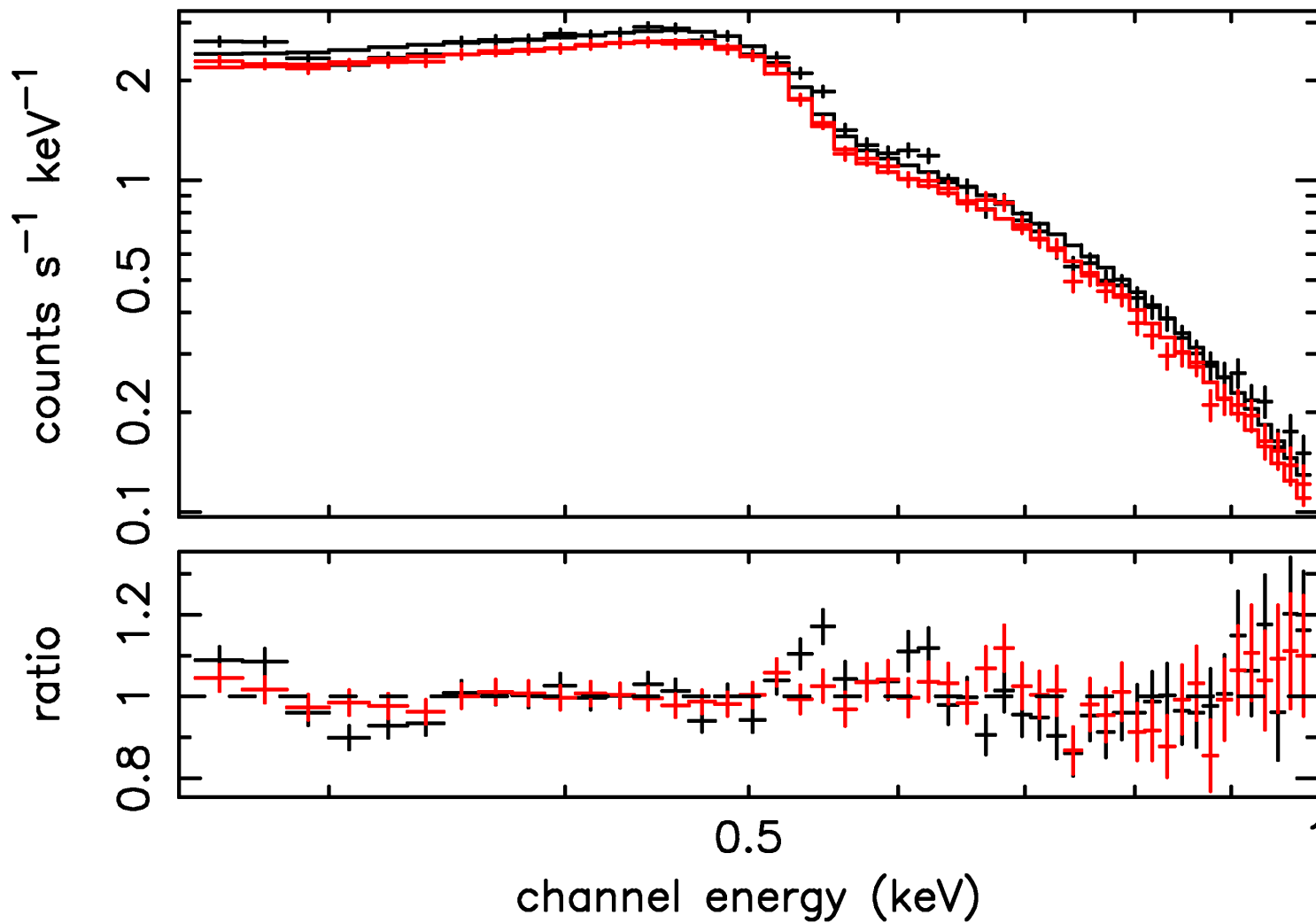
**no evidence
for a change
in QE due to
contamination
going from
Rev 533
(pre-cooling)
to Rev 534
(post-cooling)**

RXj 0720.4-3125-M1

RXJ 0720 – M1

black – pre-cooling; red – post-cooling

drop in flux
but spectral
shape is the
same

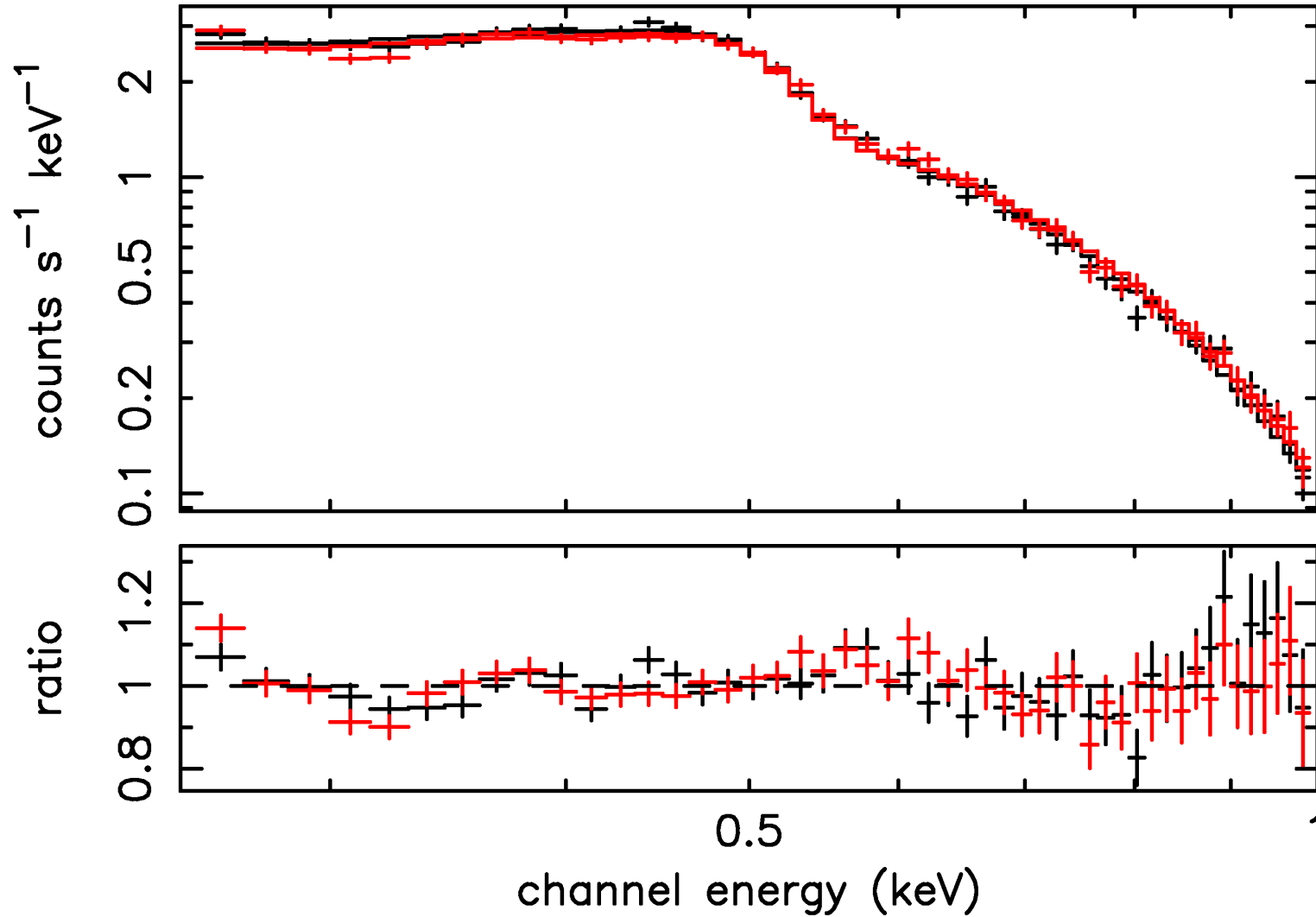


RXj 0720.4-3125-M2

RXJ 0720 – M2

black – pre-cooling; red – post-cooling

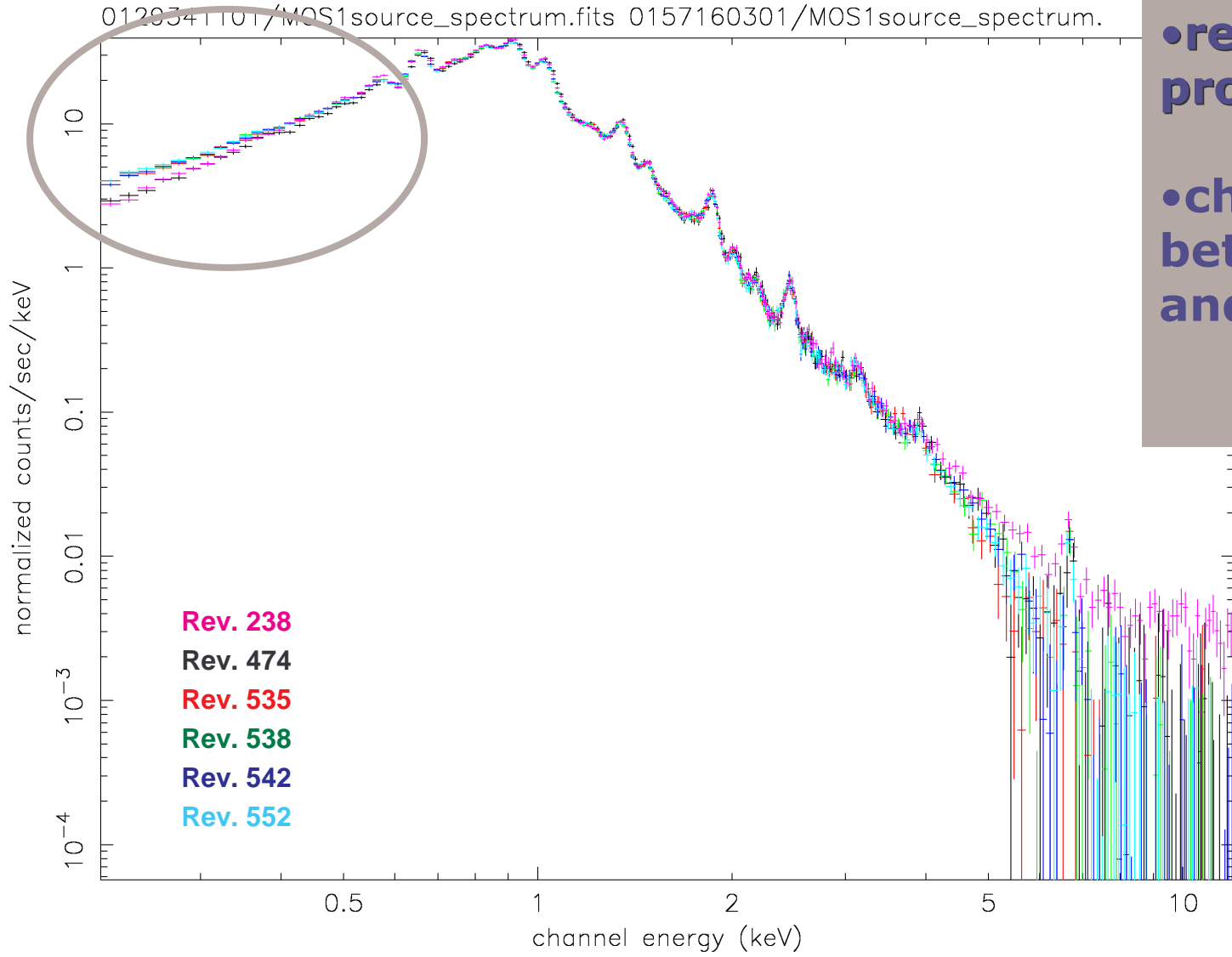
Entirely
consistent



N132D-M1

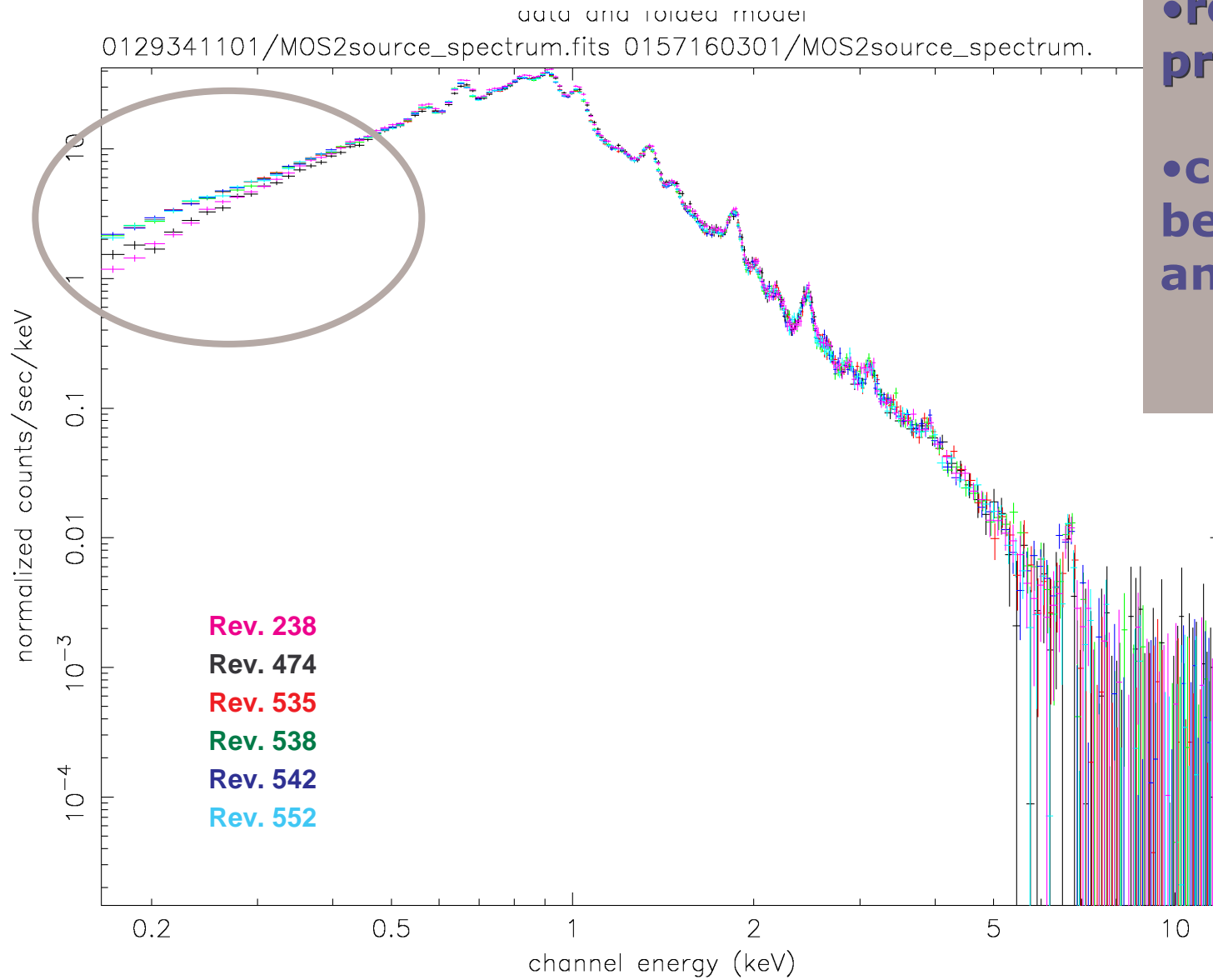
data and folded model

0129341101/MOS1source_spectrum.fits 0157160301/MOS1source_spectrum.



•redistribution problem?
•change between 474 and 535.

N132D-M2



•redistribution problem?

•change between 474 and 535.

OPEN POINTS (MOS)

MOS:

- . Updates to CCD temperature calibration curves received from the Instrument team on 15/01/03 were implemented in Database Release 4.1 on 22/01/03.
- . Rxj0720.4-3125 MOS1/MOS2 post-cooling differences to be further investigated and understood with a view to giving an account of the effect to the User Community asap.
- . MOS QE increase on N132D below 0.5 keV, reaching 30% at 0.2 keV, to be further investigated and understood with a view to giving an account of the effect to the User Community asap.
- . check zeta pup observations

OPEN POINTS (RGS)

RGS:

- . Derive 2nd.-order refinements for the calibration of ODFs from the Cool-A to Cool-C 4 week period.
- . Confirm stability of wavelength calibration post-cooling.
- . Future NRCOs are needed for Zeta Puppis and Mkn421 when they become visible in 2003 April and May (Cool-D !?)
- . update the 1 X 1 Hot stuff:
 - run the Spectroscopy 1 X 1 Storage section/Spect 1 X 1
 - diagnostic 1 X 1 required

ACTIONS (from cooling review)

AI Wrap-1: on the SOC (MK) to summarise current planning for **CALCLOSED** measurements with a view confirming PI agreement to the strategy at the EPIC/TTD/Calibration meeting.

AI Wrap-2 : on the SOC (MK) to specify any ongoing monitoring of CCD noise with a view to confirming a strategy with the PI at the upcoming EPIC TTD/Calibration Meeting.

AI Wrap-3 : on the SOC (MK) to specify current planning for bright-pixel monitoring with a view to confirming a strategy with the PI at the upcoming EPIC TTD/Calibration Meeting.

CONCLUSIONS

- . Very strong improvements in instrument performances seen
- . Product distribution stopped December 03
- . Pipeline restarted with full re-calibration December 19
- . Product distribution resumed January 16, 4 working days beyond planned target
- . Some calibration features to be understood.