esa

MEETING

Meeting date / *date de la réunion*	**02.05. 2006**	ref./*réf.*	XMM-SOC_EPIC_BG_WG-003	page/*page*	1 / 7

Meeting place / *lieu de la réunion*	**MPE Garching**	chairman / *président*	A. Read

Minutes' date / *dates de minute*: 08.05.2006

Participants

Andy Read (AMR): scientific chair, MOS (Leicester)
Wolfgang Pietsch (WNP), pn (MPE)
Michael Freyberg (MJF), pn (MPE)
Jenny Carter (JC), SAS development (Leicester)
Steve Snowden (SS), XMM US-Guest observers facility (Goddard)
Kip Kuntz (KK), XMM US-Guest observers facility (Goddard)
Silvano Molendi (SM) & student (Alberto Leccardi)
Marcus Kirsch (MK), ESA coordination (as of 2006) (ESAC)
Matthias Ehle (ME), ESA coordination (ESAC)

guests: Ulrich Briel, Steve Sembay, Gabriel Pratt (GP), Michael Bauer

This minutes plus related documents are all available on the web:
http://www.src.le.ac.uk/projects/xmm/technical/

Subject/*objet*	Minutes of meeting EPIC Background Working Group 3	copy/*copi*	Minutes by Matthias Ehle
		M. Turner, S. Sembay	
		L.. Metcalfe, N. Schartel	
		A. Parmar	

1.0 Action Items from last meetings (AMR)

AI_EPIC_BG_WG_02_01: MK to ask RGS if RGS BG light curve could help EPIC screening
OPEN: MK discussed with A. Pollock: currently no news but A. Pollock should be involved later (invite him for one of the next meeting)

AI_EPIC_BG_WG_02_02: MK to change "mission BG history" information link (different name) and introduce new link for Background analysis linking to page with EPIC, RGS, OM BG information - **DONE**

AI_EPIC_BG_WG_02_03: ME to test and transfer WNPs script of 01_11 to SOC thread
ONGOING, to be used/tested by SAS-WS participants;
Under Test: analysing a common data set (at MPE & ESAC)

AI_EPIC_BG_WG_02_04: MK to organize providing of merged closed data files for all cameras at the SOC, these files will be mirrored at Goddard, (20 Gig) , pn files to be provided by MJF, MOS files by SS
Partly DONE (disk space), some description TBD by MJF (amount of exp. time, bkg level, ObsId, Tstart, Tstop, etc),

AI_EPIC_BG_WG_02_05: MK to send SS information how to get CALCLOSED and CLOSED data and to include SS in the CALCLOSED and CLOSED mailing list
DONE but inconsistencies in ObsIds (less data than KK thinks…)
SS still to be included in automatic e-mail

AI_EPIC_BG_WG_02_06: MK to change wording for "Files that you do need for your data analysis" to Files that you may need for your data analysis", and separate link of Response from BG files – **Partly CLOSED**: re-wording still TBC

AI_EPIC_BG_WG_02_07: AMR to ask GP to provide double background subtraction tool to BGWG with the final idea to provide it as an extra tool on the Background page if possible.
CLOSED ⇒ see presentation by AMR (3.2)

AI_EPIC_BG_WG_02_08: MJF to get numbers for out-of-FOV contribution (i.e. single reflections)
CLOSED ⇒ see presentation by MJF (2.4)

AI_EPIC_BG_WG_02_09: all to provide presentations to AMR - **DONE**

AI_EPIC_BG_WG_02_10: all to provide proposal to AMR to link relevant papers to the BG component table – **ONGOING** (also see AI_EPIC_BG_WG_03_02)

AI_EPIC_BG_WG_02_11: ME to check with mission planning if criterion can be added for SWCX avoidance – **ONGOIN**G (offline between mission planning & SS)
An AO5 observation (100ks) in June should help to constrain model

AI_EPIC_BG_WG_02_12: JAC, MJF, WNP to check if OOE can be flagged on an event basis
CLOSED: MJF: For PSF (PANTER) not vital but YES, it can be done on a statistical basis (on event by event basis);

AI_EPIC_BG_WG_02_13: SS to provide task description of the Goddard BG tasks for BG page - **DONE**

AI_EPIC_BG_WG_01_01: SS to provide by October 2005 to SOC
- Proton screening tool
- Use of multiple light curves for screening
- BG tool
- Provide list of st. candles for BG analysis comparison with different tools

- Proton screening tool and multiple light curve prototype available, by end of December a SAS task version will be available for DT, aiming release for SAS 7.0 – **OVERDUE** (SAS task by B. Perry now in DT; there was a problem with Perl numerical recipes– TBC) – see new AI_EPIC_BG_WG_03_07
- BG tool prototype is available for testing within BGWG, will not make it into SAS 7.0 but a non SAS version will be made available by end of March 2006 - **CLOSED**
- list of BG candles is ongoing task - **ONGOING**

AI_EPIC_BG_WG_01_04: AMR to invite other BG experts to next meetings and to provide possibly scripts/tasks - **ONGOING**

AI_EPIC_BG_WG_01_05: MJF to provide link to processed pn closed event files for all modes to MK - **DONE**

AI_EPIC_BG_WG_01_12: MJF: Once any BG or Closed fits files had been obtained, the user can change their CCF_PATH etc. setup so that a new cifbuild would incorporate these extra files. This enables the BG/Closed events files (e.g. the ones used in SS's task) to be used in the SAS, without them having to be included in the CCF files. – **ONGOING** - Interface TBD (MJF & RS)

2 Progress Reports

2.1 XMM-ESAS (SS)

Chandra fits higher temperatures for clusters then XMM-Newton (e.g. Chandra 7.5 keV; XMM-Newton 6 keV); this effect is clearer for high T clusters.
XMM's broader PSF might have an effect for inner radii (but effect goes out to 3-4 arcmin);
At outer radii better agreement between Chandra & XMM (modification needed for arfgen?
Or a Chandra calibration effect? (in general it is hard to measure hot clusters with Chandra)

Future development plans: mosaicing (in about 6 months; as part of ESAS), pn ..

Only if quiescent particle background is removed, Temperature fits to clusters make sense (see Fig. in ESAS cookbook; SM: this holds true even in Perseus cluster);

2.2 Goddard background subtraction s/w (KK/SS):

MOS closed data: merged files for each CCD (sometimes two or even three states: soft below 1 keV differences) – will go into ESAS

Method: corner pixels in MOS measure particle background
Normally not enough counts ⇒ use entire public data (revs 25-1128)

- 34 % of MOS data is affected by flares (cf. with policies; give number?!)
- corner spectra templates characterized by: rate, hardness, PL index
- rate: drop at start, stable, increase after ~700, flat again
- hardness is temporally variable!, variation in PL index is statistical (⇒ now ignored)
- instrumental lines changes with location (Au); also the continuum

- correct spectrum to the FoV: MOS1 use CCD 2, 3, 6, 7, MOS2 use 3, 4, 7
- FWC data: ~1Ms, anomal: ~200ks ; not yet enough if you do annuli…
- Ignore Al, Kalpha lines
- Soon perl scripts only calling SAS tasks (B. Perry)

Anomalous states: different for different CCDs (not all at same time! Why?)
Always high rates & low hardness (MOS1-4, 1-5; MOS2-2, 2-5: detector noise – known! But reason unknown! SM: check patterns) check HK data? Currently ESAS does not know about this…
Other problem: MOS1-4: in some areas on the chip FWC data normal, in other areas anormal! (anonymous state (starts after ~rev 800) other chips do not show this, luckily)

- Modification to ESAS: detect chip state first, extract appropriate FWC data, augmentation careful to exclude data from the wrong state (not yet), for now MOS1-4 is caveat emptor

Soft proton flare characteristics:
Light-curve cleaning minimizes flares but… it does not guarantee that soft proton flares are all removed!

- must characterize the spectra: rate dependent hardness ⇒ can't be subtracted from object spectrum, must be fitted with bkg spectrum: problem: model (double exponential cannot be incorporated in XSPEC) ⇒ use broken powerlaw (almost as good; break energy stable (~3.2 keV), all other free parameter). Spatial distribution: MOS1-2 shows edge at low energies (CCD defect, also visible in X-rays!) ⇒ radial variations depending on energy (much flatter than X-ray profiles; independent on filter); spectrum becomes steeper with radius.

2.3 Blank Sky event lists and relates files (JAC/AMR)

ESAC web pages to be ready next week (MOS blank fields are already done). Should be finished end of next week! (before UG meeting)

Improved method for 'Ghosting': Filling source holes: copy events from outer ring, randomize DETX, DETY, add to event lists. Consider complicated situations (like edges, gaps).
Some sets needed to be split (limit to ftools & evselect ~2.1 GBytes).

Location dependence (script exists), rate dependence (high, medium, low – script in future)

Future Plans: Out of Time events handling & update of existing files (larger, cleaner etc); updates due to user response

2.4 Status of closed event files and out-of-FOV straylight (MJF)

Straylight: single reflections from parabola: shells too close
single reflections from hyperbola: typical
reflections from backside of mirror shell: - negligible
Out of window: even for EPIC pn LW mode: Out-of-Time (OoT) events
Out of time events (bad) source: EPIC-pn rows 1-12: OoT events
Optical photons

UHB 3.2.4, CCF? should take into account eff. area outside the Filed-of-View (FoV) (3 cm^2)

Close events files: description nearly ready (during cal. meeting) ESAC web pages to be ready next week if possible (MOS blank fields are ready),

2.5 Web Pages (AMR)

Changes planned for section on blank sky fields & closed data (now further comments/change requests from BGWG)

3 New Items

3.1 Background treatment in spectral analysis of low surface brightness sources (SM + Student)

Outer Regions (A1689): source ~ background intensities! ⇒ chi^2 statistics is no longer valid
Screening: hard & soft light curves + in FoV / out FoV ratio (paper by De Luca & Molendi 2004)

Simulations ⇒ best model:
bkg modelled (not subtracted!) & Cash statistics & joined probability distributions (of T: no Gaussians (rather asymmetric), not just multiplied but instead summed up – in reality: three EPIC cameras)
Bkg model **(above 2 keV)**: NXB continuum & NXB fluorescence emission lines & cosmic XRB
(**hot clusters, rather hard** ⇒ double bkg subtraction not necessary here)

Standard analysis does not give correct results here (T too low by 10-20 %); Normalisation off by a few percent.

All in shell scripts, calling SAS tasks – could become scripts for users… (evtl. perl?)

Paper is in preparation; procedure can go public afterwards (see AI_EPIC_BG_WG_03_10)

This method is only suited for hot clusters!

3.2 Double Subtraction (AMR)

(Method described in Arnaud et al. 2002, A&A 390, 27); Recipe & s/w provided by G. Pratt:

Lots of steps, tcsh script – calls IDL (for flare cleaning)

Very interactive; probably modelling better than subtracting… not recommended for normal users…

Summary:
- various languages used

- requires manual input
- tools are very much cluster science oriented
- not a well integrated tools, i.e. no full pipeline for extended source analysis
  ('very useful, but very very difficult…' - statement by M. Arnaud)

G. Pratt: plans to model bkg instead of subtracting…

4 Final session: - Summing up

4.1 AOB

SM: Arfgen for extended sources apparently has problems (TBC with RS); SPR raised?

4.2 Plans for next period

Extend SS/KK tools to pn.

4.3 Next meeting

- Mallorca, Wed. 25 October 2006 (before EPIC Cal/Ops)
- BGWG members should make hotel bookings as described for EPIC Cal/Ops meeting (cf. note from S. Sembay)

New Action Items resulting from this meeting:

AI_EPIC_BG_WG_03_00: on all: send presentations to AMR
AI_EPIC_BG_WG_03_01: on KK/SS: provide text & page related to MOS closed data sets (before UG meeting)
AI_EPIC_BG_WG_03_02: on AMR: to publish new background table (with links to papers)
On all: provide AMR with additional links & more papers
On MJF: to send SPIE paper to ME for inclusion into ESAC document system
AI_EPIC_BG_WG_03_03: on AMR/JAC: to explain on blank sky web page when to use filled and/or unfilled data sets (recommendations); make web & files public before UG meeting
AI_EPIC_BG_WG_03_04: on SM: send shell script for f_in / f_out test for flaring bkg to AMR
AI_EPIC_BG_WG_03_05: on AMR: to test if sky-recast tool is working correctly on specific data set (i.e a cluster)
AI_EPIC_BG_WG_03_06: on ME: on background page: make clear which are the old blank sky fields and that these only should be used if you know exactly what to do… (sort papers chronologically)
AI_EPIC_BG_WG_03_07: on ME: test soft proton screening s/w SAS tool (in dev. track?, TBC)
AI_EPIC_BG_WG_03_08: on MJF: UHB update section 3.2.4: outside FoV eff. Area (up to 80 arcmin) (before end of May to ME), link from bkg page
Update of CCF (currently not supported, calview, 15 arcmin, TBC)
AI_EPIC_BG_WG_03_09: on MJF: prepare web page describing and linking to closed pn data files (before UG meeting, if possible)
AI_EPIC_BG_WG_03_10: on SM: provide BGWG with script on bkg treatment in spectral analysis (after publication of related paper)
AI_EPIC_BG_WG_03_11: on AMR: check HK parameters for anomalous MOS FWC data

Possible future AI (with R. Saxton+student)?
Use SciSim to simulate cluster & bkg and test different analysis methods on it (also for Chandra simulator)