XMM-Newton
EPIC TTD Meeting

Preparation for next eclipse season

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Facts / lessons learned from previous eclipses

1) the eclipses will occur before perigee in the period 19-03-2001 / 24-04-2001

2) the shortest time between "end of eclipse" and Perigee time is about 22 minutes; in most of the other cases it is around 30-31 min except at the beginning where it is longer (up to 1 h for the first eclipse).

3) the manual procedures used during the last eclipse season for the activation of the EPIC instruments worked very well; conversion of these manual procedures into automated procedures implies a major effort and a considerable risk and it is dependent on System changes (e.g. implementation of RCR-461 at the SOC, relaxation of the constraint on max number of parameters in an ED at the MOC). The EPIC activation will therefore be left unchanged (i.e. manual operations)

4) the OM and RGS's activation can be "easily" converted into an automated procedure; during the next eclipse season OM & RGS's will therefore be activated via automatic timeline.

Targets

1) Minimize the thermal excursions on the instruments by optimizing the OFF/ON sequence/strategy (see below)

2) Increase further the overall efficiency: start instrument operations (Observation window) at perigee + 4.5 h

Advantages will be:

- execute EPIC calibration exposures as well at the beginning of REV
- save science time for RGS

3) Minimize the preparation activity (DB/IFOP); basically almost all DB items already exist and are fully debugged (only a few to be defined)

4) Relax criticality of RCR-461 at the SOC

Principles

1) The post perigee window arrangement in the timeline will be as follows: Perigee + 40 min: AOS TC Perth, start of AOS_CHK window (duration = 30 min) Perigee + 1 h 10 min: start of SOPS window for RWL biasing (duration = 50 min) Perigee + 2 h: start of SOPS window for preparation of next eclipse (TT command load etc.); duration = 70 min Perigee + 3 h 10 min: start of Instrument ACTIVATION window

2) The EPIC can be switched on still before perigee; this will be always possible under VILSPA coverage. takes 5 minutes. This activity takes 5 minutes and it will be manually executed (one single ED)

3) The EPIC instruments will be manually activated in the period Perigee + 40 min and Perigee + 3h in parallel with other activities; tentatively this will be done in the following periods:

   - activation of MOS-1 & MOS-2 still under VILSPA coverage (one ED per instrument of a duration of 35 min; the two instruments can be activated in parallel via two MSTACK)

   - activation of EPIC-PN during the SOPS window for preparation for next eclipse (under Perth); one single ED of a duration of 40 min

4) It will be no problem to execute the first slew in parallel (all or partially) with the automated activation activities of OM and RGS;

Base-line for instrument re-activation

- T0 - 30 min: End of Eclipse
- T0 - 20 min: Manual switch of EPIC's & thermal control activation (ED EE0011); will be executed under VILSPA coverage
- T0 - 15 min: Start activation of EPIC-MOS1/2 (ED's EE0110, KE0110); duration = 35 min
- T0: Perigee pass
- T0 + 30 min: LOS VILSPA
- T0 + 40 min: AOS TC Perth
- T0 + 2 h: activation of EPIC-PN (ED FE0110) in parallel with MOC activities (SOPS window)
- T0 + 3 h 10 min: Start of ACTIVATION window in the timeline: automatic activation of RGS-1/2 and OM
- T0 + 4h 35 min: End of Activation / Start of Observation window in the Timeline

Strategy to minimise thermal excursions (1)

- T0 - 4h: end of observation window
- T0 - 3.5h: 3 TTC's for safe-standby of EPIC, p-n TTC deleted if everything is nominal, so that EPCH- EPEA stay on.
- T0 - 2h: one TTC for EPIC p-n to safe standby (EPEA-EPCH OFF, no htr); this TTC will be let to execute.
- T0 - 1.6/1h: Eclipse start. ECLIPSE signal switch EPICs off, all eltr htr OFF and turn on CCD substitution heater (branch A only)
- T0 - 1.6/1h: Eclipse start + 5 min: OM heater reconfig: Nom OFF / Red ON; 2 TTC's
- T0 - 1.0/0.5h: Eclipse End
- T0 - 20 min: Switch on EPIC's + thermal control (EPEA-EPCH OFF, no htr) + RGS electronic Htr on
- T0 - 15 min: Start of EPIC-MOS reconfiguration (EPEA-EPCH on within 10 minutes)
- T0 + 1h: Two TTC for EPIC CCD htr A+B on, TTCs deleted before if EPIC Switch-on successful
- T0 + 2h: Start of EPIC-PN Quad-CCD's ON

Strategy to minimise thermal excursions (2)

Advantages of above strategy are:

1) RAE-RFC are OFF without htr for max 1h in eclipse + 1.25h during activation. This is less than the usual 8h of RGS in SETUP during normal perigee.

2) The EPEA-EPCH are off without eltr htr for ~ 2.5h with more than 3h to stabilize before the start of the closed cal.

3) The p-n CCD's are left without thermal control with a single substitution heater for max 2.5h. This should limit the CCD temperature excursion to only a few degrees as there will be no earth shine while we are in eclipse. Even if we miss the EPIC switch-on before perigee, the second substitution htr will go on after max 2.8h from the beginning of the eclipse; by that time (or soon after depending of the S/C attitude) we will also get the earth shine and albedo on the radiators.