ISGRI NPHS modification

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NPHS rational

- Module trigger rate (unvetoed) is governed by charge particle triggers (protons, electrons). Gamma-ray triggers (CXB + internal + sources) are an order of magnitude smaller.

- Noisy-pixel trigger rate is dominated by detector noise

- Noisy pixels can be detected using a comparison of the pixel and module trigger-rate

NPHS implementation

- Module trigger-rate ~ 800 s^{-1}
- Quiet pixel trigger-rate~ 0.4 s-1
- Competition between the module counter and the pixel counters: who reaches its maximum value (respectively MCM and PCM) first ?
- With MCM = 10000* the maximum is reached after ~12 s
- With PCM = 200^{*+}, a quiet pixel reaches its maximum after ~ 500 s
- If a pixel reaches PCM before the module reaches MCM (in less than 12 s) the pixel counts ~ 40 times the average and so is clearly noisy

**value found during the commissioning phase with little adjustment*

$^+$ *constrained by the proton induced preamplifier saturation (~100 re-triggers)*

Effect of background evolution

- Module trigger rate is now around 1600 s^{-1}
- MCM = 10 000 is now reached after ~6 s
- If a pixel reaches PCM before the module (in less than 6 s), it is twice more noisy than the pixels that were close to the limit at the beginning of the mission.
- To keep constant the sensitivity of the NPHS, the MCM should be proportional to the ISGRI trigger rate → MCM = 20 000 for a module trigger rate of ~ 1600 s^{-1}

Revolutions

black 617
blue 618
light blue 619
green 620
yellow crab 665
orange crab 666

50% longer

NPHS: effect of the change of MCM
(10 000 → 20 000)
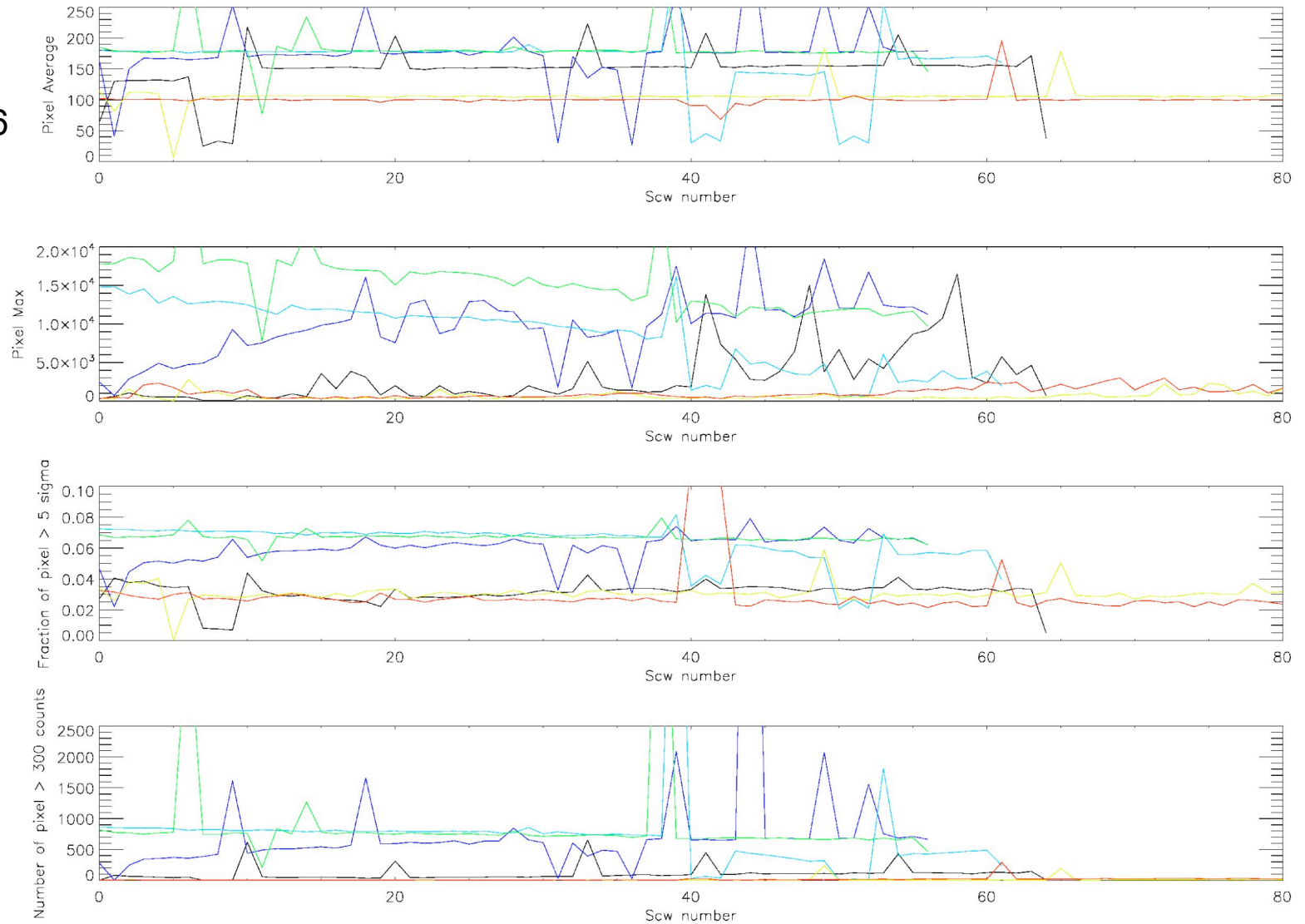
MCM = 20 000

- Since the trigger rate is not expected to decrease rapidly, MCM should be set to 20 000 permanently
- This means a change of the database