



# BAT STATUS

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# HEALTH



- BAT is Fine.
- No degradation in performance
- Only a loss of detectors (see later).
- No consumables.
- Prediction is a long and productive life.



# Burst Rate

- 74 in 10.5 mo ( $\Rightarrow$  85/yr, whereas 95/yr previously)
- Reasons for the decrease in burst rate:
  - Loss of detectors:  $\sim 6\%$  in sensitivity (ie 4 lost bursts/yr)
  - Loss of time: 5% (ie 5 lost bursts/yr)
    - 67 slews/day early in mission
    - 90 slews/day now
- Buying back some of the loss with (this year):
  - Subthreshold: 3 ( $\Rightarrow$  5 per 12 mo)
  - Slew Survey: 2
  - Ground-Det: 2



# Number of Disabled Detectors

- Number: ~8000 (out of 32K, ie 25%)
- Number is composed of 4 components:
  - Sporadically noisy (which I periodically reclaim),
  - Permanently noisy (hard to tell what the growth rate is; but it is small),
  - Latch-ups & Block Comm problems (which get periodically reclaimed),
  - SAA-clobbered dets (which get periodically reclaimed).
- Long-term outlook is good: another ~10% in 5 more years.
- Possible mitigation:
  - Raise the threshold level.
  - Currently at 11-14 keV (channel dependant)
  - To somewhere around 15-18 keV
  - Eats into the 15-25 keV band for burst triggers and for the hard -ray survey.



# Hard X-ray Survey



- 58-Month processing nearly done (1 month)
  - Not an easy task
  - 3 months of processing (on 17 cpu's)
- See Jack Tueller's talk tomorrow.



# Hard X-ray Transient Monitor



- Operating since October 2006
- Hard x-ray equivalent of ASM
- 732 sources monitored (inc. LAT bright srcs, flare stars, blazars)
- ~30 web site visits per day

During the past year:

- 11 Atels reporting Monitor results
  - 8 known sources in outburst or low state
  - 2 new source discoveries (1 pulsar in LMC; 1 galactic BH)
  - Orbital period from monitor archive for IGR J19294+1816

Possible newest source Swift J1713.4-4219 discovered in Monitor  
Monday: RXTE ToO requested (in Swift sun constraint).

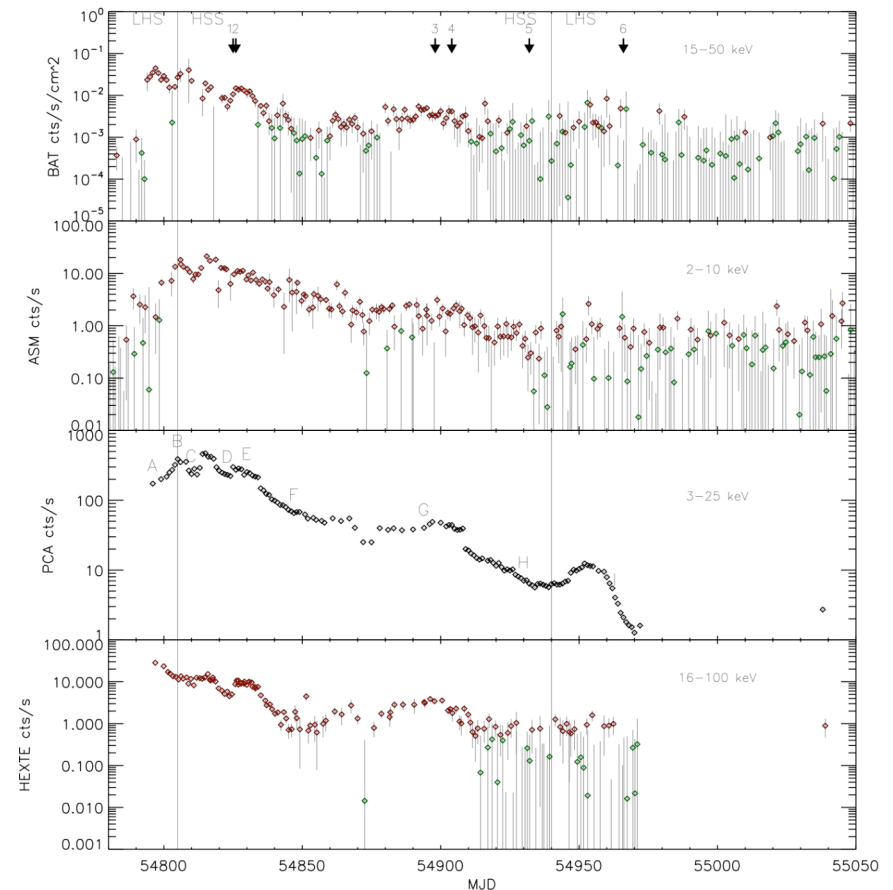
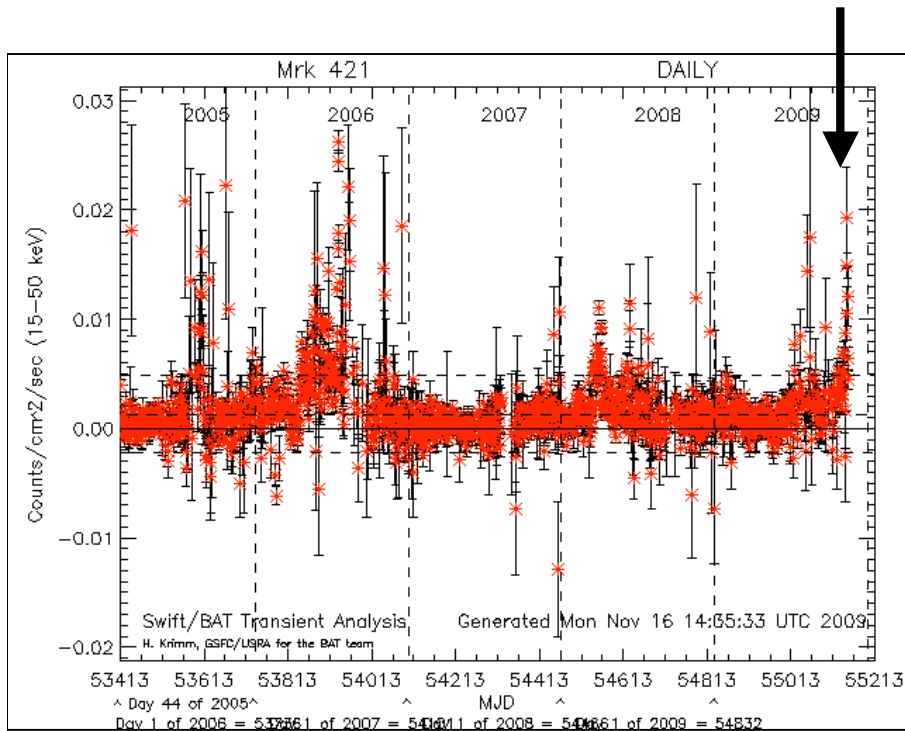


# Recent Monitor Results



Flare in Mrk 421 announced 11-Nov led to major multi-wavelength campaign (Swift, Chandra, Fermi, XMM, VLBA, optical, IR, TeV)

New black hole source  
Swift J1539.2-6227 obs.  
with Swift/RXTE for 6 mo.  
-- See poster Krimm T-3





# Subthreshold Triggers

- Lower the BAT threshold in the image domain; BAT executes a limited response; Observe for only that 1 orbit.
- 3 real GRBs out of 192 triggers in ~6 months.
- Tweaked to avoid the SAA entry/exit regions.
- Downside to Subthreshold operations:
  - Data volume to be downloaded (getting new Gnd Stations).
  - Disrupts Planned target and TOO target observations.
- Changed Merit Value to reduce the number of interruptions.
- On hold for the last 2 months.
- Will resume shortly:
  - Less event capture so less telemetry volume.
  - Lower Merit Value so no TOO interruptions.





# Merit Weights Changed



- Restructuring of the Merit Values of the various categories of targets.
- Motivation: less slewing to the “unwanted” known-source Transient triggers.
- This means less of the “wanted” target observations are interrupted.
  - Immediate TOO’s and the PPT TOO’s.
  - More important now that Swift is doing lots of TOO’s; especially the time-critical/coordinated TOO’s.



# BAT Slew Survey (1of2)



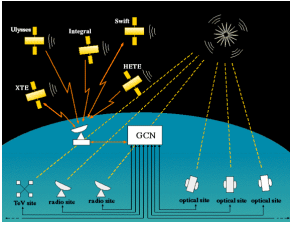
- Capture event-by-event data during the time when Swift is slewing.
- Harvard group (Copete & Grindlay) processes these events (with the 5 Hz ACS information) to make sky maps during the slew.
- Maps are scanned for sources (known & new).
- New sources are distributed to the world.



# BAT Slew Survey (2of2)



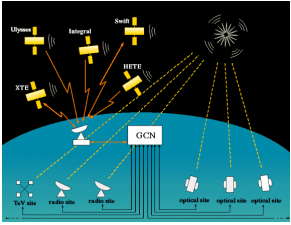
- 40-60% of the slews per day have event capture. (limited by telemetry downlink capacity)
- 2 min of capture per slew.
- 24,526 slews with capture; 23.7 days of exposure.
- 9 bursts detected (announcement delays 2-12 hrs).
  
- Future:
  - Added ground stations will increase the capture.
  - Goal is 100% capture.
  - New script to capture the entire slew (not just 2 min):
    - More sky coverage; more bursts; longer bursts.



# GCN Enhances Swift (1 of 2)



- Subthreshold
  - Swift to GCN to UL/Phile to GCN to world.
  - Immediate distribution, Importing from UL, Promotion, Delayed distribution.
- FakeGRB TOOs (on other mission GRBs)
  - Used to get the immediate responses of XRT and UVOT down TDRSS for faster identification the the counterpart.
  - Only to Swift Team members (for Operations).
- Regular TOO Notices blocked to world.



# GCN Enhances Swift (2of2)

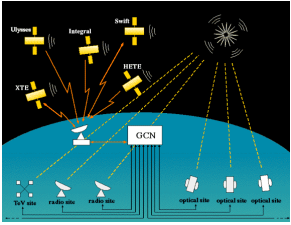


- Galaxy proximity matching
  - The 5600 NGC2000 galaxies that have a size.
  - Inside the galaxy, or burst error circle overlaps galaxy.
- Bright stars nearby
  - <6.5 mag within 12 arcmin.
- Special Functions Catalog:
  - Notifies the SFXT Team when any of the 23 SFXT sources trigger BAT.
  - Notifies the Flare Star team when any of the 21 Flare Stars trigger BAT.
  - Can Block specific sources to the world.



# Future Items

- Tiling-mode commands from BAT FOM Task
  - To cover LAT error circulars with multiple pointings.
  - 2x2, 7 in circle, and even larger, 19 in a circle.
- LLD Threshold increase (11-14 ==> 15-18 keV)
  - To get the “barely noisy” detector active again.
  - Affect the survey (most of the photons at low E)
- Event captures for PPT targets (automated).
- Fluence-based triggers (really long events)



# GRB Naming Change



- Only a minor change to the way GRBs are named.
- Even the first burst announced in a given day will be called the “A” burst.
  - Example: GRB 091120A.
  - Even before any “B” burst is announced.
  - Or even if no “B” burst is ever announced.
- This will prevent confusion in the Circulars and it will prevent mistakes.
- Tentative agreement from all the GRB-producing missions.
- We would like to start this new method on 01 Jan 2010.
- Would like to take this opportunity to get your inputs -- catch me in the “hallway”.