Swift Observation of GRB 061217

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1 Introduction

BAT triggered on GRB 061217 at 03:40:08.21 UT (Trigger 251634) (Barthelmy , *et al.*, *GCN Circ.* 5926). This was a 0.256 sec rate-trigger on a short hard burst with $T_{90} = 0.212$ *sec*. Swift slewed to this burst immediately and XRT began follow-up observations at $T+67$ *sec*. At the moment of slew, UVOT was in safe mode. Our best position is the XRT location RA($J2000$) = $160.4096deg$ ($10h41m38.3$), Dec($J2000$) = $-21.1264deg$ ($-21d07'35.16$") with an error of 4.7 arcsec (90% confidence).

2 BAT Observation and Analysis

Using the data set from $T-10$ to $T+57$ *sec*, further analysis of BAT GRB 061217 has been performed by Swift team (Parsons, *et al.*, *GCN Circ.* 5930). The BAT ground-calculated position is RA($J2000$) = $160.418deg$ ($10h41m40.4s$), Dec($J2000$) = $-21.148deg$ ($-21d08'52.0$") $\pm$ 2.1 *arcmin*, (radius, systematic and statistical, 90% containment). The partial coding was 86% (the off-axis angle was 40 *deg*).

The masked-weighted light curves (Fig.1) starts at trigger time $T-0.356$ *sec* with a single rapid rise, and returns to background at about $T+0.644$ *sec*. $T_{90}(15-350keV)$ is 0.212 ± 0.041 *sec* (estimated error including systematics). There is no evidence for pre-trigger or post-trigger activity in the extended interval of $T-120$ to $T+180$ *sec*. The spectral lag for this burst is -7 ± 9 *msec* ($25-50$ *keV* to $100-350$ *keV*) using 8-msec binning. This is consistent with zero lag for short hard bursts (Barthelmy *et al.GCN Circ.* 5931).

The time-averaged spectrum from $T-0.1$ to $T+0.3$ *sec* is best fitted by a simple power law model. This fit gives a photon index of 0.96 ± 0.28, ($\chi^2 = 50.2$ for 57 d.o.f.). For this model the total fluence in the $15-150$ *keV* band is $(4.6 \pm 0.8) \times 10^{-8} ergs/cm^2$ and the 1-sec peak flux measured from $T-0.40$ *sec* in the $15-150$ *keV* band is 1.3 ± 0.2 $ph/cm^2/sec$. All the quoted errors are at the 90% confidence level.

3 XRT Observations and Analysis

Using the first 4 orbits XRT data from GRB 061217 (~ 7.3 *ksec* in Photon Counting mode), the refined XRT position is RA($J2000$) = $160.4096deg$ ($10h41m38.3$), Dec($J2000$) = $-21.1264deg$ ($-21d07'35.16$")$\pm$ 4.7 *arcsec* (90% confidence, using the updated teldef file as described by Burrows *et al.*, *GCN Circ.* 5750) (P.A. Evans, *et al.*, *GCN Circ.* 5932).

We found that data are affected by hot pixels and bright Earth contamination. Thus for this analysis we have ignored all data below 0.5 keV, which minimizes these problems. The X-ray afterglow is faint, and had an initial count rate of 0.04 ct/sec. It follows a power-law decay, with a slope of $0.64^{+0.69}_{-0.61}$.

The summed Photon Counting mode spectrum has very few counts, and was fitted using Cash statistics. We have modelled the spectrum with a Galactic absorption $nH = 4.51 \times 10^{20}$ cm^{-2} and a power law. The photon index is poorly constrained, but lies within the range of -0.402 to 4.698 (90% confidence). We also tried adding an additional absorber, to model any extragalactic absorption, however

this was very poorly constrained, with $nH = 0 - 4 \times 10^{22}\ cm^{-2}$.

4 UVOT Observation and Analysis

At the time of trigger, UVOT was in safe mode - caused by a backward time jump in ICU. It began observing the field of GRB 061217 later at 05:02:06.9 UT about 4917 sec after the BAT trigger (Batholmy, *et al.*, *GCN Circ.* 5926). No new source was detected within the XRT error circle in the White (100 *sec*) and V (200 *sec*) finding exposures, or in the co-added images in any filter down to 3-sigma magnitude (M. de Pasquale *et al.*, *GCN Circ.* 5934). Upper limits are summarized in Table 1. These upper limits are not corrected for Galactic extinction $E(B-V) = 0.045$.

We also note that the afterglow detected by XRT lies about 10 arcsec from a bright $V_{mag} \sim 17.6$ galaxy reported by the Supercosmos Sky Survey. This galaxy belongs to a cluster whose other components are visible within ~ 1 arcmin of the XRT position.

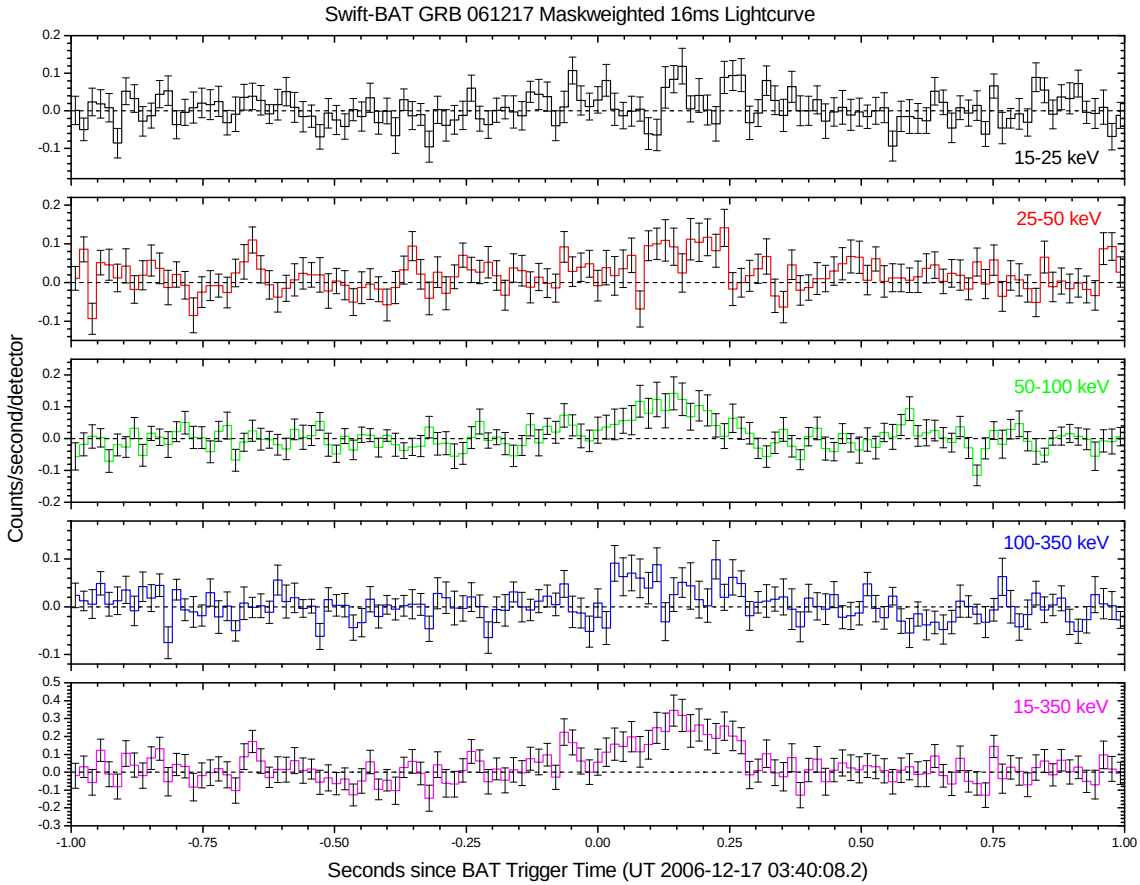

Figure 1: BAT Light curve. The mask-weighted light curve in the 4 individual plus total energy bands. The units are counts/sec/illuminated-detector (note illum-det = $0.16cm^2$) and T_0 is 03:40:08.21 UT.

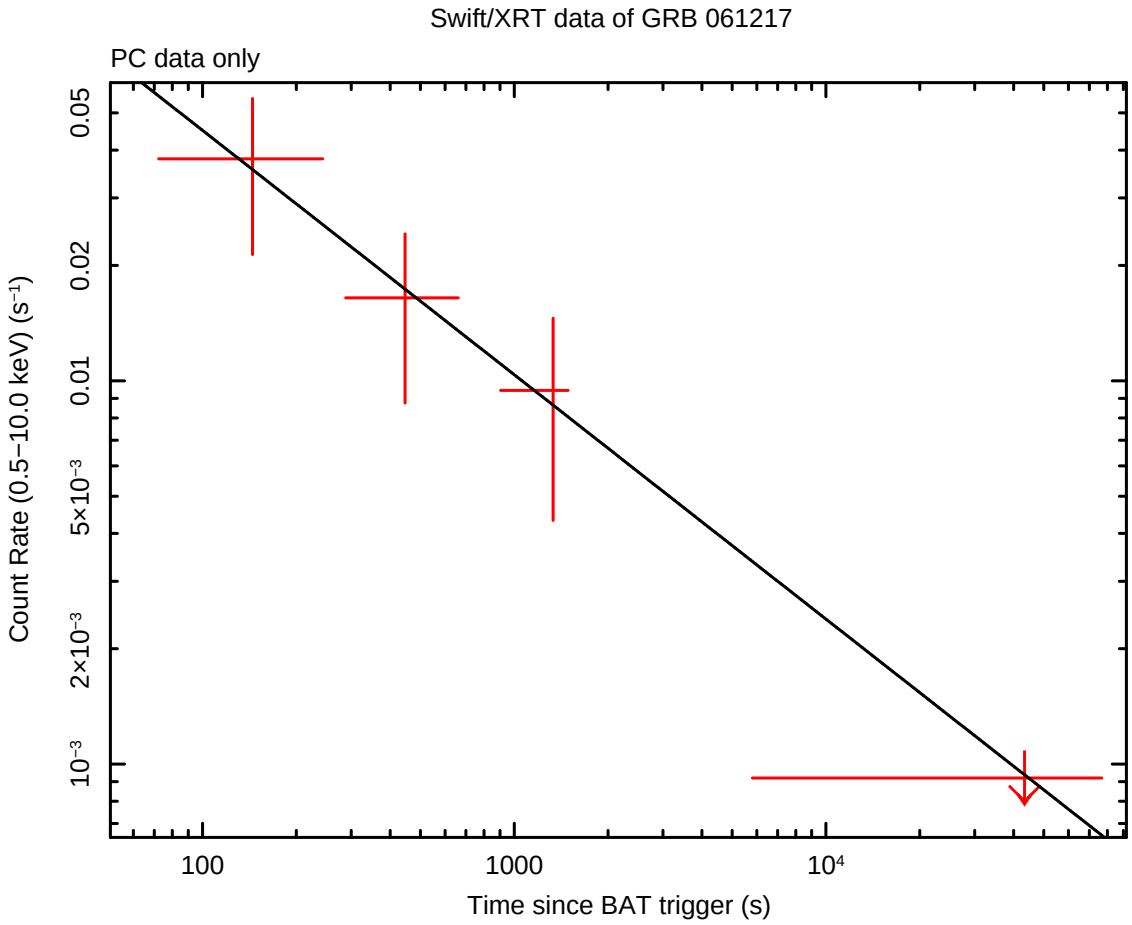

Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band in Photon Counting (PC) mode. The approximate conversion is 1 count/sec = $\sim 5. \times 10^{-11}$ $ergs/cm^2/sec$.

Filter	Start	Stop	Exposure	3-Sigma UL
White (finding)	4917	5017	100	19.2
V (finding)	5024	5223	200	19.2
White	4917	11602	1343	20.6
V	5024	17392	1278	20.3
B	5842	7474	393	20.2
U	5637	7269	342	19.8
UVW1	5433	7065	393	19.7
UVM2	5228	17725	717	20.4
UVW2	6252	13325	997	20.6

Table 1: Magnitude limits from UVOT observations