Swift Observations of GRB 120807A

F. E. Marshall (NASA/GSFC), S. D. Barthelmy (NASA/GSFC), D. N. Burrows (PSU), O.M. Littlejohns (U. Leicester), M. H. Siegel (PSU), and N. Gehrels (NASA/GSFC) for the Swift Team

1. INTRODUCTION

At 07:09:37 UT the Swift Burst Alert Telescope (BAT) triggered on GRB 120807A (trigger 530267). Swift slewed immediately to the burst, and XRT found a decaying, uncatalogued X-ray source (Marshall *et al*. GCN Circ. 13602). The best Swift position for this burst is the enhanced XRT position (Beardmore *et al*. GCN Circ. 13603) of RA (J2000) = 16h 05m 02.44s and Dec (J200) = -47° 28' 47.0" with an uncertainty of 1.8" (radius, 90% confidence).

No optical afterglow was detected with UVOT (Siegel & Marshall GCN Circ. 13616) or reported from ground-based observatories (Klotz *et al*. GCN Circ. 13605, Wren *et al*. GCN Circ. 13607). Zheng & Akerlof reported (GCN Circ. 13608) an upper limit for Fermi/LAT.

Standard analysis products for this burst are available at http://gcn.gsfc.nasa.gov/swift_gnd_ana.html.

2) BAT OBSERVATION AND ANALYSIS

The BAT ground-calculated position (Cummings *et al*. GCN Circ. 13604) is RA (J2000) = 16h 05m 05.6s and Dec (J2000) =-47° 27' 16.3" with an uncertainty of 2.1' (90% containment radius including both statistical and systematic errors).

The mask-weighted light curves (Figure 1) show a single pulse starting at ~T-5 sec, peaking at ~T+2 sec, and ending at ~T+20 sec. T_{90} (15-350 keV) is 20.0 ± 5.8 sec (estimated error including systematics).

The time-averaged spectrum from T-0.24 to T+24.07 sec is best fit by a simple power-law model with a photon spectral index of 1.81 ± 0.30. The fluence in the 15-150 keV band is 2.9 ± 0.5 x 10^{-7} erg cm^{-2}. The 1-sec peak photon flux measured from T+0.65 sec in the 15-150 keV band is 0.9 ± 0.1 ph cm^{-2} sec^{-1}. All the quoted errors are at the 90% confidence level.

3. XRT OBSERVATIONS AND ANALYSIS

The XRT began observing GRB 120807A about 72 sec after the BAT trigger (Marshall et al. GCN Circ. 13602). There is 11.8 ks of XRT data from 56 s to 200 ks after the BAT trigger. The data comprise 8 s in Windowed Timing (WT) mode (taken while Swift was slewing), with the remainder in Photon Counting (PC) mode. The best XRT position is reported in Section 1. The light curve can be modeled as a power-law decay with a decay index of 1.27 (+0.16, -0.17).

The spectrum formed from the PC mode data up to 75.9 ks after the BAT trigger can be fitted with an absorbed power-law with a photon spectral index of 2.3 ± 0.3. The best-fitting absorption column is 1.04 (+0.25, -0.22) x 10^{22} cm^{-2}, in excess of the Galactic value of 4.9 x 10^{21} cm^{-2} (Kalberla *et al*. 2005). The counts to observed (unabsorbed) 0.3-10 keV flux conversion factor deduced for this spectrum is 4.8 x 10^{-11} (1.4 x 10^{-10}) erg cm^{-2} $count^{-1}$.

4. UVOT OBSERVATIONS AND ANALYSIS

UVOT began settled observations of GRB 120807A 75 sec after the BAT trigger. No optical afterglow was detected in the initial UVOT exposures (Siegel & Marshall GCN Circ. 13616). The preliminary 3-σ upper limits using the UVOT photometric system (Breeveld *et al*. 2011, AIP Conf. Proc., 1358, 373) are given in Table 1. No correction has been made for the expected extinction in the Milky Way corresponding to a reddening of E_{B-V} of 1.41 mag. in the direction of the GRB (Schlegel *et al*. 1998).

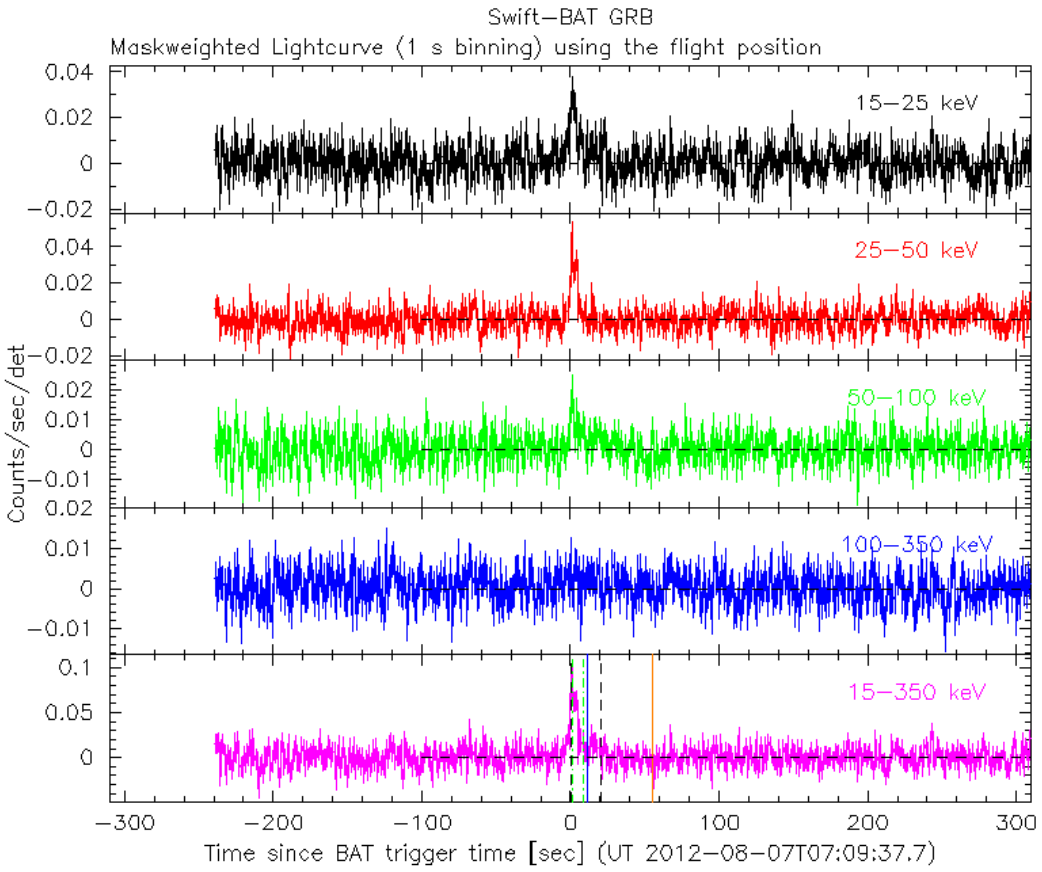

Figure 1: The BAT light curve in multiple energy bands.

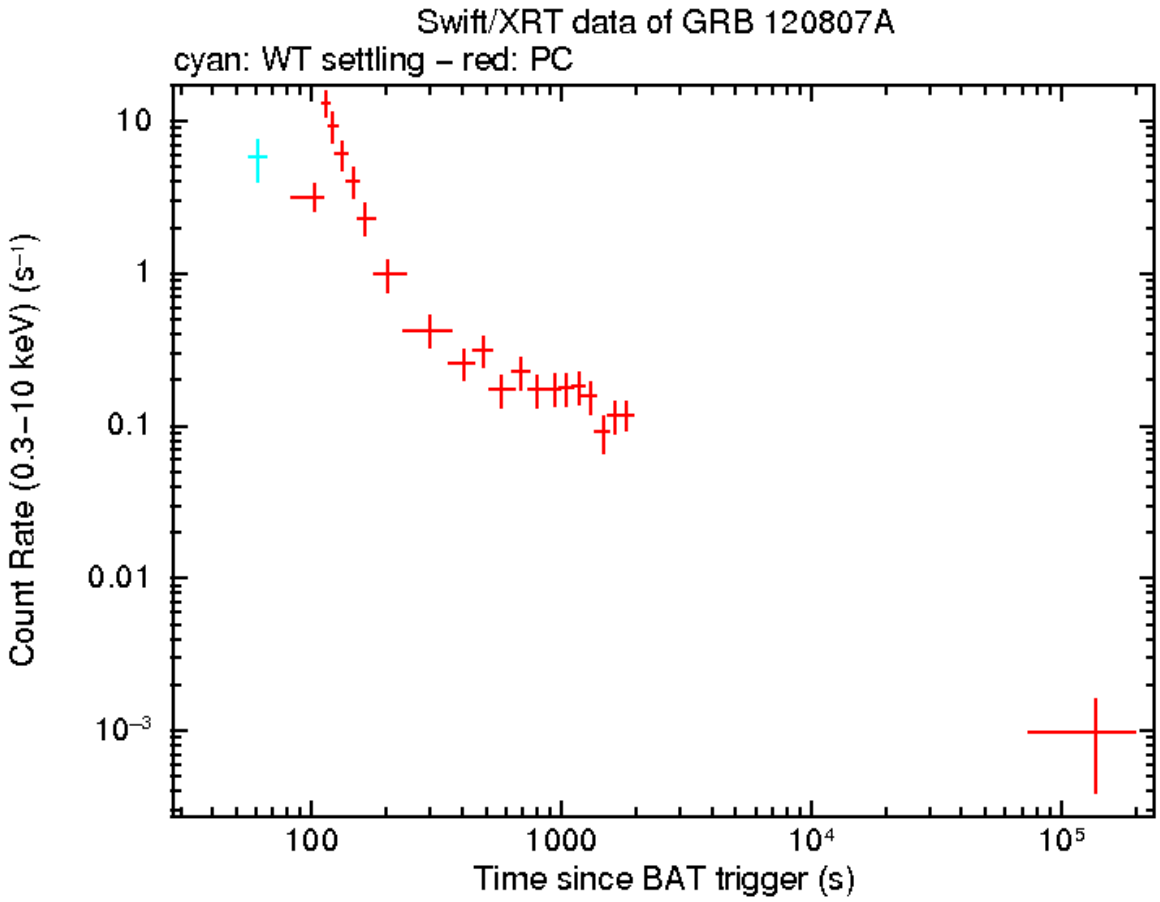

Figure 2: The XRT light curve.

Filter	T_{start}	T_{stop}	Exposure	Magnitude
	(seconds)	(seconds)	(seconds)	
white (FC)	75	225	147	>20.6
u (FC)	288	537	246	>20.4
white	75	1884	431	>21.8
v	618	1935	156	>19.6
b	543	1860	136	>20.4
u	288	1835	363	>20.7
uvw1	668	1810	136	>20.3
uvm2	1591	1611	19	>18.8
uvw2	593	1910	117	>19.9

Table 1: UVOT Observations. The start and stop times of the exposures are given in seconds since the BAT trigger. The preliminary 3-σ upper limits are given. No correction has been made for the expected extinction in the Milky Way (Schlegel *et al*. 1998).