Swift Observations of GRB 100905A

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1. INTRODUCTION

At 15:08:14 UT the Swift Burst Alert Telescope (BAT) triggered on GRB 100905A (trigger 433442). Swift slewed immediately to the burst and found an uncatalogued X-ray source (Marshall *et al*. GCN Circ. 11214). The best Swift position of this burst is the XRT enhanced position (Evans *et al*. GCN Circ. 11219) of RA (J2000) = 02h 06m 12.06s and Dec (J200) = +14d 55' 45.9" with an uncertainty of 1.6".

No optical afterglow was detected with UVOT, and no afterglow was reported from ground-based observatories.

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 (Barthelmy *et al*. GCN Circ. 11218) is RA (J2000) = 02h 06m 10.0s and Dec (J2000) = 14° 55' 08" with an uncertainty of 1.7' (90% containment radius including both statistical and systematic errors).

The mask-weighted light curve (Figure 1) shows a single peak starting at ~T-1.7 sec, peaking at ~T+0.5 sec, and ending at ~T+3 sec. T_{90} (15-350 keV) is 3.4 ± 0.5 sec (estimated error including systematics).

The time-averaged spectrum from T-1.6 to T+2.1 sec is best fit by a simple power-law model. The power law index is 1.09 ± 0.19. The fluence in the 15-150 keV band is 1.7 ± 0.2 x 10^{-7} erg cm^{-2}. The 1-sec peak photon flux measured from T+0.03 sec in the 15-150 keV band is 0.6 ± 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 100905A about 78 sec after the BAT trigger. About 71 sec of data starting about 300 sec after the trigger were taken in Windowed Timing (WT) mode, and the remainder were taken in Photon Counting (PC) mode. The best XRT position is reported in Section 1. The light curve shows some initial flaring activity, with the flares peaking at around 290, 320 and 400 s after the trigger. The flares peak an order of magnitude brighter than the underlying emission, which can be modeled with a single power-law with a decay index of α=0.86 ± 0.06.

A spectrum formed from the 71 seconds of WT mode data can be fitted with an absorbed power-law with a photon spectral index of 3.0 ± 0.3. The best-fitting absorption column is 1.9 (+0.6, -0.5) x 10^{21} cm^{-2}, in excess of the Galactic value of 5.4 x 10^{20} cm^{-2} (Kalberla *et al*. 2005). The spectrum of the PC mode data from 149 s to 13.6 ks after the trigger has a photon index of 1.97 (+0.12, -0.18) and a best-fitting absorption column of 8.4 (+4.1, -2.8) x 10^{20} cm^{-2}. The counts to observed (unabsorbed) 0.3-10 keV flux conversion factor deduced from this spectrum is 3.9 x 10^{-11} (4.8 x 10^{-11}) erg cm^{-2} $count^{-1}$.

4. UVOT OBSERVATIONS AND ANALYSIS

The Swift/UVOT observed the field of GRB 100905A starting 77 sec after the BAT trigger with the *white* finding chart (Siegel *et al*. GCN Circ. 11237). No afterglow was detected. The preliminary 3-σ upper limits using the UVOT photometric system (Poole *et al*. 2008, MNRAS, 383, 627) are given in Table 1. No correction has been made for the large expected extinction in the Milky Way (Schlegel *et al*. 1998).

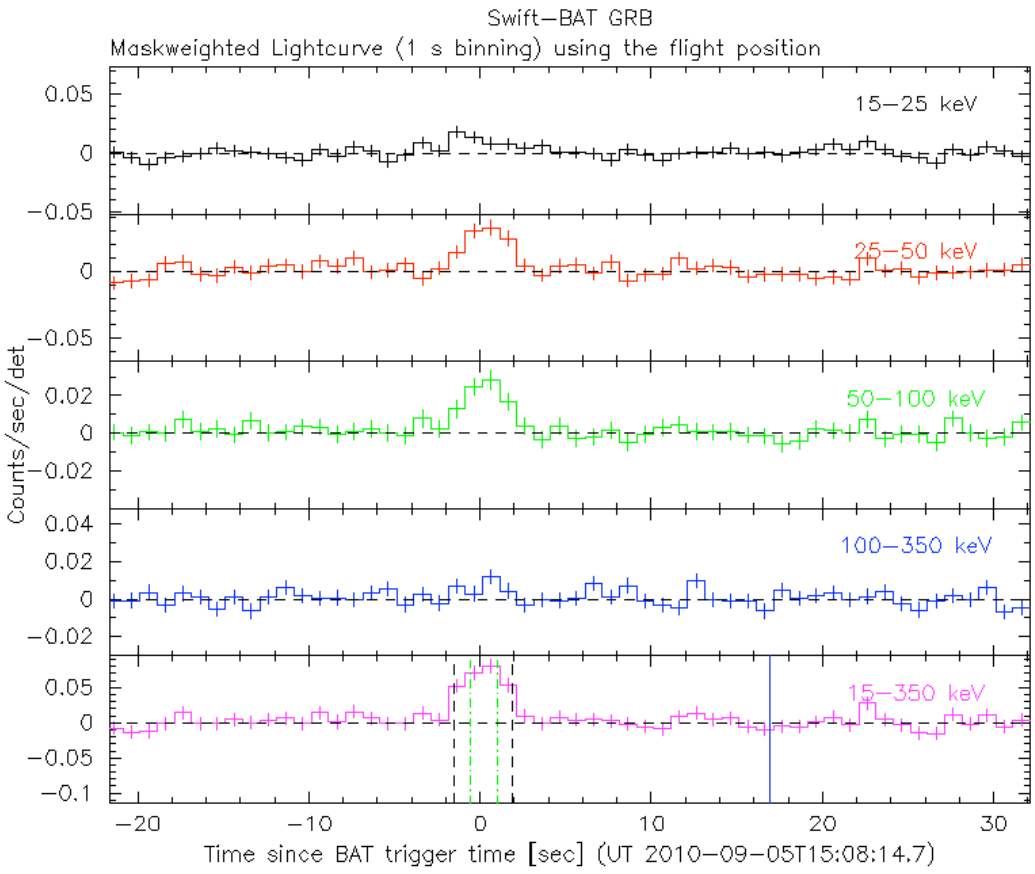

Figure 1: The BAT light curve in multiple energy bands.

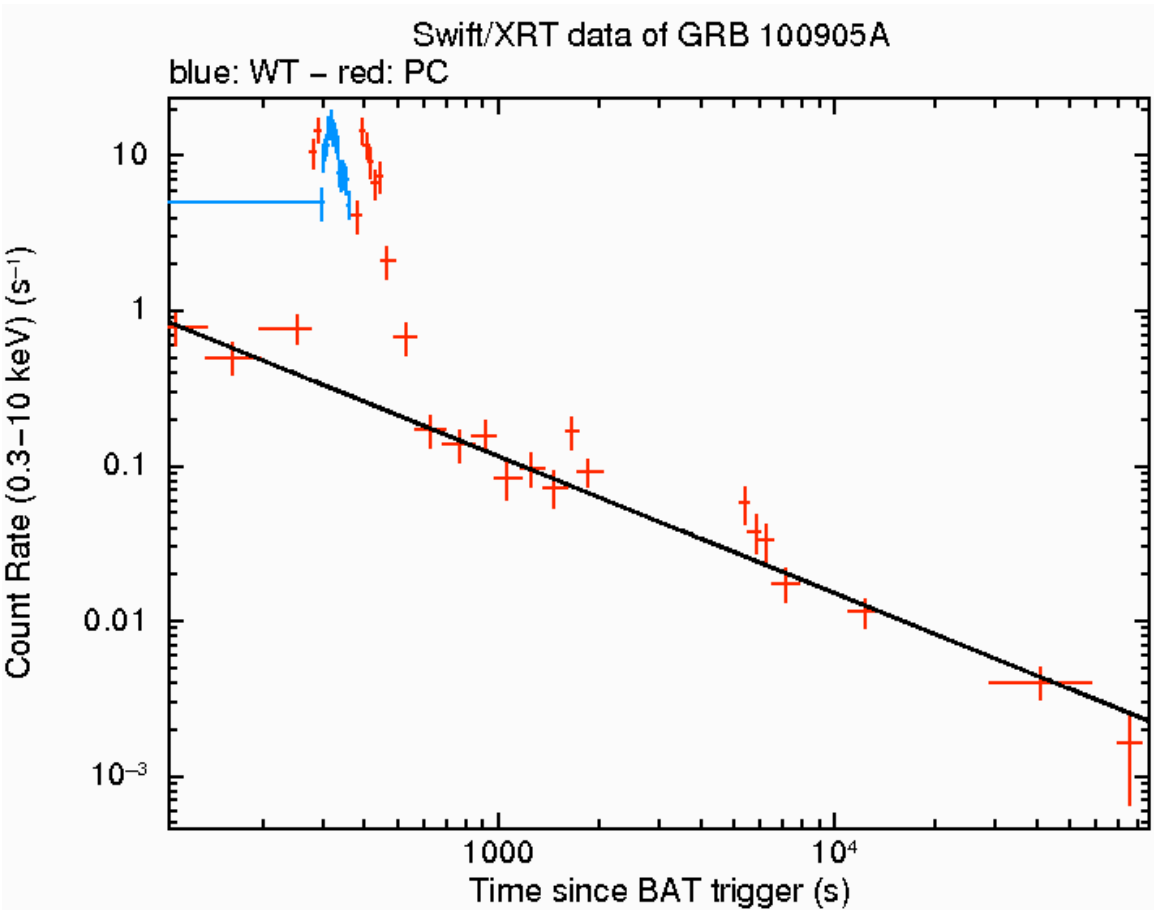

Figure 2: The XRT light curve.

Filter	T_{start}	T_{stop}	Exposure	Magnitude
	(seconds)	(seconds)	(seconds)	
white (FC)	78	228	147	>20.77
white	78	2055	450	>21.29
v	619	1933	155	>19.01
b	545	2031	155	>19.81
u (FC)	290	540	245	>20.08
u	290	2006	381	>20.17
uvw1	668	1982	155	>19.53
uvm2	5654	7290	393	>20.19
uvw2	5245	12865	1278	>21.26

Table 1: UVOT Observations for the 7 filters. Finding Chart (FC) observations are listed separately. 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 large expected extinction in the Milky Way (Schlegel *et al*. 1998).