Swift Observations of GRB 130803A

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1. Introduction

At 10:02:52 UT, the Swift Burst Alert Telescope (BAT) triggered and located GRB 130803A (trigger=565263) (Page *et al.* GCN Circ. 15059). Swift slewed immediately to the burst. At the time of the trigger, the initial BAT position was 88° from the Sun (5.8 hours East) and 126° from the 11%-illuminated Moon. **Table 1** contains the best reported positions from Swift, and the latest XRT position can be viewed at http://www.swift.ac.uk/xrt_positions.

Table 2 is a summary of GCN Circulars about this GRB from observatories other than Swift.

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

2. BAT Observations and Analysis

As reported by Cummings *et al.* (GCN Circ. 15063), the BAT ground-calculated position is RA, Dec = 220.256, -2.499 deg which is RA(J2000) = $14^h41^m01.4^s$ Dec(J2000) = -02°29'58" with an uncertainty of 1.1 arcmin, (radius, sys+stat, 90% containment). The partial coding was 30%.

The mask-weighted light curve (**Figure 1**) shows two well-separated symmetrical peaks. The first, larger peak starts at about T_0-2 seconds and lasts until about T+8 seconds. The second peak, which was softer, starts about T_0+41 seconds and lasts until about T_0+48 seconds. T_{90} (15-350 keV) is 44 ± 2 s (estimated error including systematics).

The time-averaged spectrum from T-1.24 to T+45.76 s is best fit by a simple power-law model. The power law index of the time-averaged spectrum is 1.69 ± 0.14. The fluence in the 15-150 keV band is 1.5 ± 0.1 x 10^{-6} erg cm^{-2}. This fluence is larger than that of 52% of the long GRBs in the Second BAT GRB Catalog (Sakamoto *et al.* 2011). The 1-s peak photon flux measured from T+2.09 s in the 15-150 keV band is 5.1 ± 0.4 ph cm^{-2} s^{-1}. All the quoted errors are at the 90% confidence level.

The results of the batgrbproduct analysis are available at http://gcn.gsfc.nasa.gov/notices_s/565263/BA/.

3. XRT Observations and Analysis

Analysis of the initial XRT data was reported by Beardmore *et al.* (GCN Circ. 15068). We have analysed 12 ks of XRT data for GRB 130803A, from 75 s to 61.7 ks after the BAT trigger. The data comprise 7 s in Windowed Timing (WT) mode (taken while Swift was slewing), with the remainder in Photon Counting (PC) mode. The enhanced XRT position

for this burst was given by Osborne *et al.* (GCN. Circ 15062).

The late-time light curve (**Figure 2**) (from T0+3.9 ks) can be modelled with a power-law decay with a decay index of α=0.87 (+0.09, -0.08).

A spectrum formed from the PC mode data can be fitted with an absorbed power-law with a photon spectral index of 2.41 (+0.23, -0.22). The best-fitting absorption column is 8.8 (+1.5, -1.4) x 10^{21} cm^{-2}, in excess of the Galactic value of 4.2 x 10^{20} cm^{-2} (Kalberla *et al.* 2005). The counts to observed (unabsorbed) 0.3-10 keV flux conversion factor deduced from this spectrum is 4.4 x 10^{-11} (1.3 x 10^{-10}) erg cm^{-2} $count^{-1}$.

A summary of the PC-mode spectrum is thus:
Total column: 8.8 (+1.5, -1.4) x 10^{21} cm^{-2}
Galactic foreground: 4.2 x 10^{20} cm^{-2}
Excess significance: 10.0 σ
Photon index: 2.41 (+0.23, -0.22)

The results of the XRT team automatic analysis are available at http://www.swift.ac.uk/xrt_products/00565263.

4. UVOT Observations and Analysis

The Swift/UVOT began settled observations of the field of GRB 130803A 93 s after the BAT trigger (Marshall and Page GCN Circ. 15065). No optical afterglow consistent with the enhanced XRT position (Osborne *et al.* GCN Circ. 15062) is detected in the initial UVOT exposures. **Table 3** gives preliminary magnitudes using the UVOT photometric system (Breeveld *et al.* 2011, AIP Conf. Proc., 1358, 373). No correction has been made for the expected extinction in the Milky Way corresponding to a reddening of E_{B-V} of 0.05 mag. in the direction of the GRB (Schlegel *et al.* 1998).

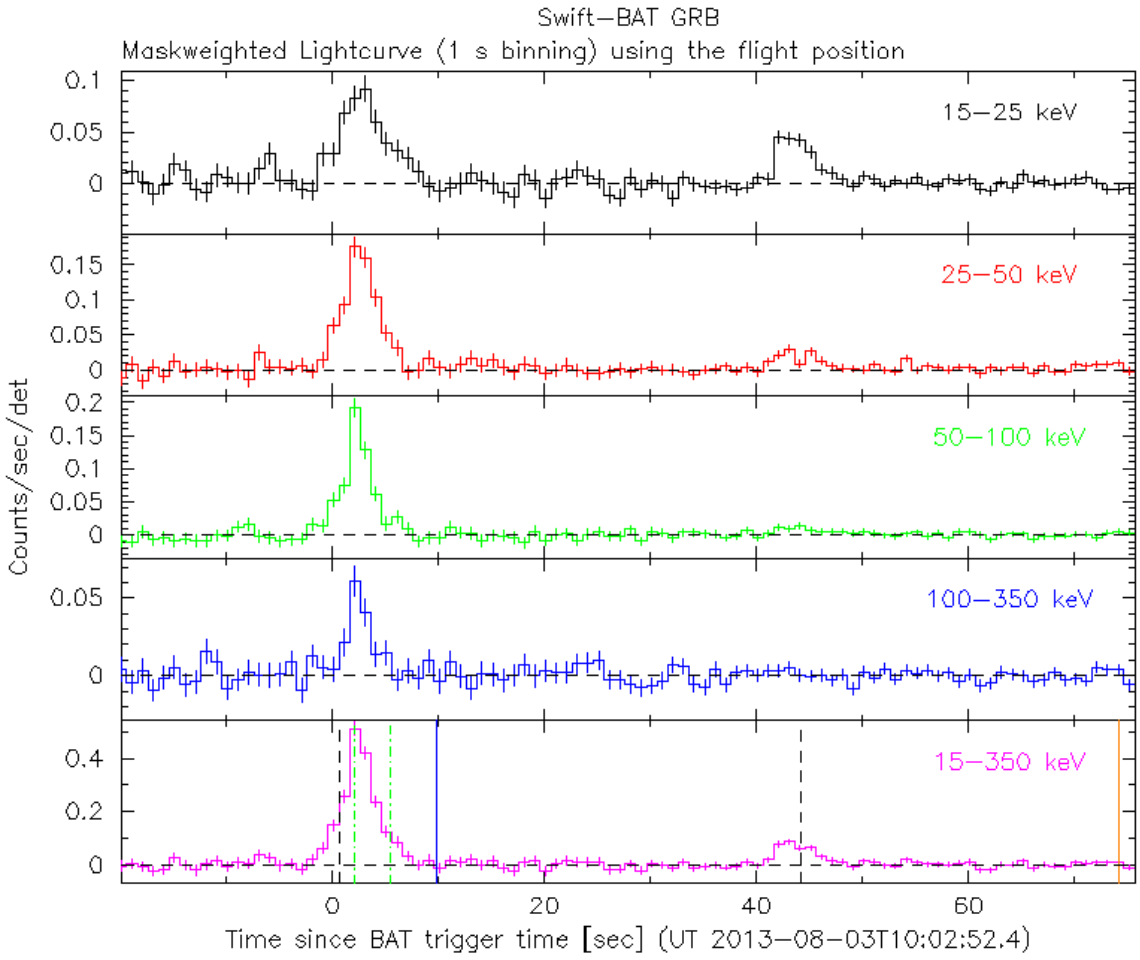

Figure 1. The BAT mask-weighted light curve in the four individual and total energy bands. The units are counts s^{-1} illuminated-detector^{-1}.

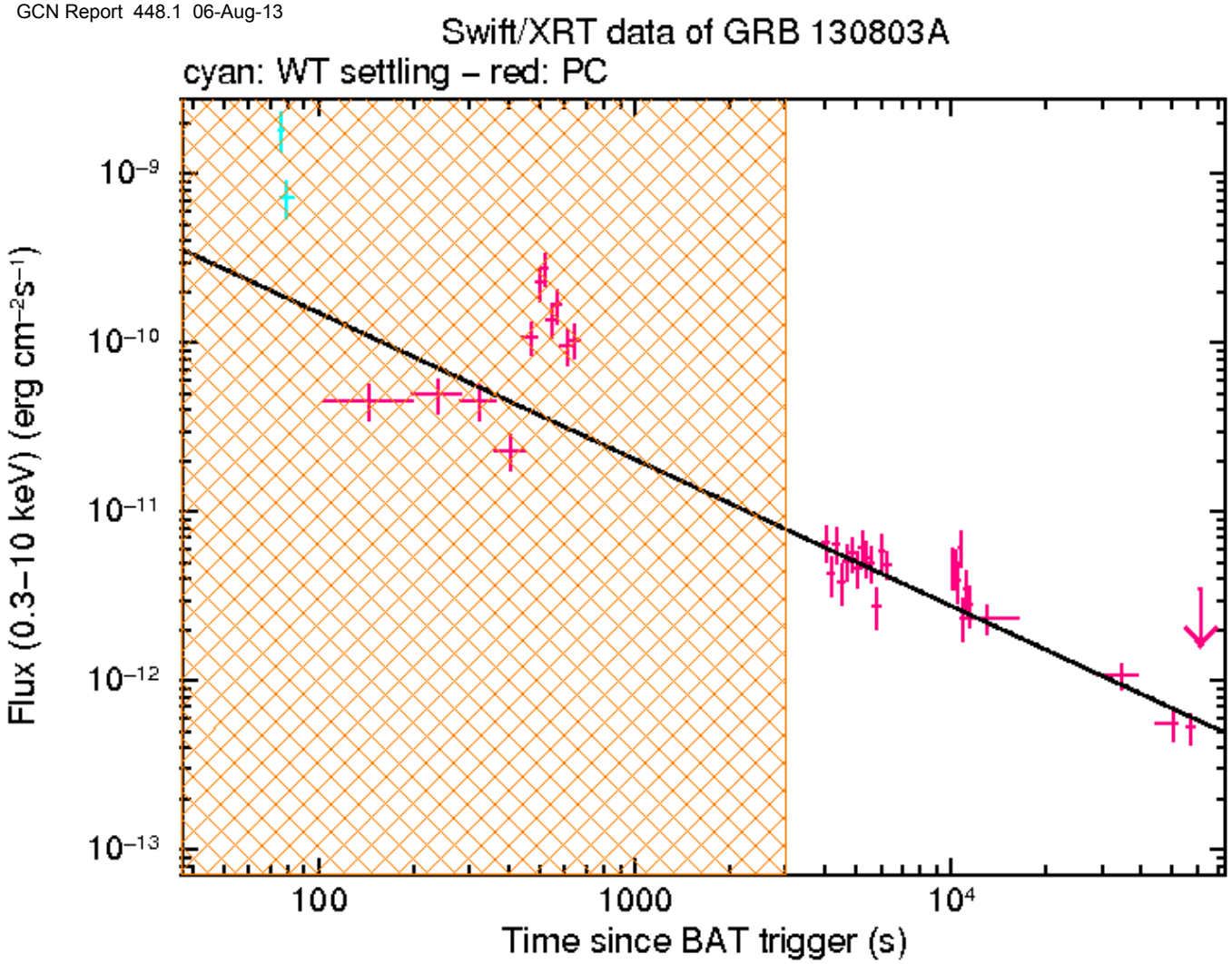

Figure 2. The XRT light curve. Data marked by the orange cross-hatching were not used in the fit.

RA (2000)	Dec (2000)	Error	Note	Reference
$14^h41^m00.65^s$	-02°29'31.2"	1.4"	XRT-final	UKSSDC
$14^h41^m00.66^s$	-02°29'31.0"	1.8"	XRT-enhanced	Osborne *et al.* GCN Circ. 15062
$14^h41^m01.4^s$	-02°29'58"	1.1'	BAT-refined	Cummings *et al.* GCN Circ. 15063

Table 1. Positions from the Swift instruments.

Band	Authors	GCN Circ.	Subject	Observatory	Notes
Optical	Melandri *et al.*	15061	Faulkes Telescope South Observations	FTS	
Optical	Varela *et al.*	15066	GROND detection of possible host	GROND	

Optical	Littlejohns *et al.*	15067	RATIR Optical and NIR Observations	RATIR	upper limits
Gamma-ray	Yu	15064	Fermi GBM observation	Fermi GBM	E_{peak} = 141.6 ± 12.2 keV

Table 2. Summary of GCN Circulars from other observatories sorted by band and then circular number.

Filter	**T_{start}(s)**	**T_{stop}(s)**	**Exp(s)**	**Mag**
$white_{FC}$	93	243	147	>21.0
u_{FC}	305	555	246	>20.3
white	93	6186	560	>21.7
v	636	11010	1142	>20.8
b	561	5981	413	>21.0
u	305	5776	639	>20.7
w1	3936	16308	788	>21.4
m2	5167	11916	1082	>21.2
w2	4757	6392	393	>20.9

Table 3. UVOT observations reported by Marshall and Page (GCN Circ. 15065). 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 extinction in the Milky Way.

August 5, 2013