Swift Observations of GRB 130627B

S. R. Oates (UCL-MSSL), M. Stamatikos (OSU), P. Evans (U. Leicester), S. Campana (INAF-OAB), N. P. M. Kuin (UCL-MSSL), S. D. Barthelmy (GSFC), D. N. Burrows (PSU), M. H. Siegel (PSU) & N. Gehrels report for the Swift team

1. Introduction

At 12:00:50 UT, the Swift Burst Alert Telescope (BAT) triggered and located GRB 130627B (trigger=559139) (Oates *et al*. GCN Circ. 14936). Due to an Earth limb constraint Swift could not immediately slew to the burst, but began XRT and UVOT observations ~48 min after the trigger. At the time of the trigger, the initial BAT position was 107° from the Sun (5.7 hours East) and 113° from the 78%-illuminated Moon. **Table 1** contains the best reported positions from Swift.

No observatories other than Swift reported observations of this GRB.

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 Stamatikos *et al*. (GCN Circ. 14952), the BAT ground-calculated position is RA, Dec = 181.914, -55.706 deg which is RA(J2000) = $12^h07^m39.3^s$ Dec(J2000) = -55°42'20.3" with an uncertainty of 1.8 arcmin, (radius, sys+stat, 90% containment). The partial coding was 95%.

The mask-weighted light curve shows a single peak starting at ~T-6 s, peaking at ~T+2 s, and ending at ~T+22 s. T_{90} (15 - 350 keV) is 28.6 ± 5.8 s (estimated error including systematics).

The time-averaged spectrum from T-10.5 to T+26.0 s is best fit by a power law with an exponential cutoff. This fit gives a photon index 0.13 ± 1.03, and E_{peak} of 47.6 ± 8.7 keV (χ^2 56.72 for 56 d.o.f.). For this model the total fluence in the 15-150 keV band is 6.1 ± 0.8 x 10^{-07} erg cm^{-2} and the 1-s peak flux measured from T+1.82 s in the 15-150 keV band is 0.8 ± 0.2 ph cm^{-2} s^{-1}. This fluence is larger than that of 25% of the long GRBs in the Second BAT GRB Catalog (Sakamoto *et al*. 2011). A fit to a simple power law gives a photon index of 1.79 ± 0.16 (χ^2 68.34 for 57 d.o.f.). 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/559139/BA/.

3. XRT Observations and Analysis

A faint candidate X-ray source was initially reported by Evans & Oates (GCN Circ. 14947) and was later confirmed as the X-ray afterglow by Evans & Oates (GCN Circ. 14966). We analysed 11 ks of XRT data for GRB 130627B, from 3.7 ks to 414.7 ks after the BAT trigger. The data are entirely in Photon Counting (PC) mode. The XRT position for this burst was given by Evans & Oates (GCN. Circ 14947). Due to the faintness of the X-ray light curve we are unable to provide a decay index.

A spectrum formed from the first 4.4ks PC mode data can be fitted with an absorbed power-law with a photon spectral index of 1.1 (+0.8, -0.6). The best-fitting absorption column is 0.0 (+3.0 -0.0) x 10^{21} cm^{-2}, which is consistent with the Galactic value of 1.9 x 10^{21} cm^{-2} (Kalberla *et al*. 2005). The counts to observed (unabsorbed) 0.3-10 keV flux conversion factor deduced from this spectrum is 8 x 10^{-11} (9 x 10^{-11}) erg cm^{-2} $count^{-1}$.

A summary of the PC-mode spectrum is thus:
Total column: 0.0 (+3.0, -0.0) x 10^{21} cm^{-2}
Galactic foreground: 1.9 x 10^{21} cm^{-2}
Photon index: 1.1 (+0.8, -0.6)

The results of the XRT team automatic analysis are available at
http://www.swift.ac.uk/xrt_products/00559139.

4. UVOT Observations and Analysis

The Swift/UVOT began settled observations of the field of GRB 130627B 3755 s after the BAT trigger (Oates *et al.*, GCN Circ. 14936 & 14939 and Kuin & Oates GCN Circ. 14950). **Table 2** 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 0.40 mag. in the direction of the GRB (Schlegel *et al.* 1998).

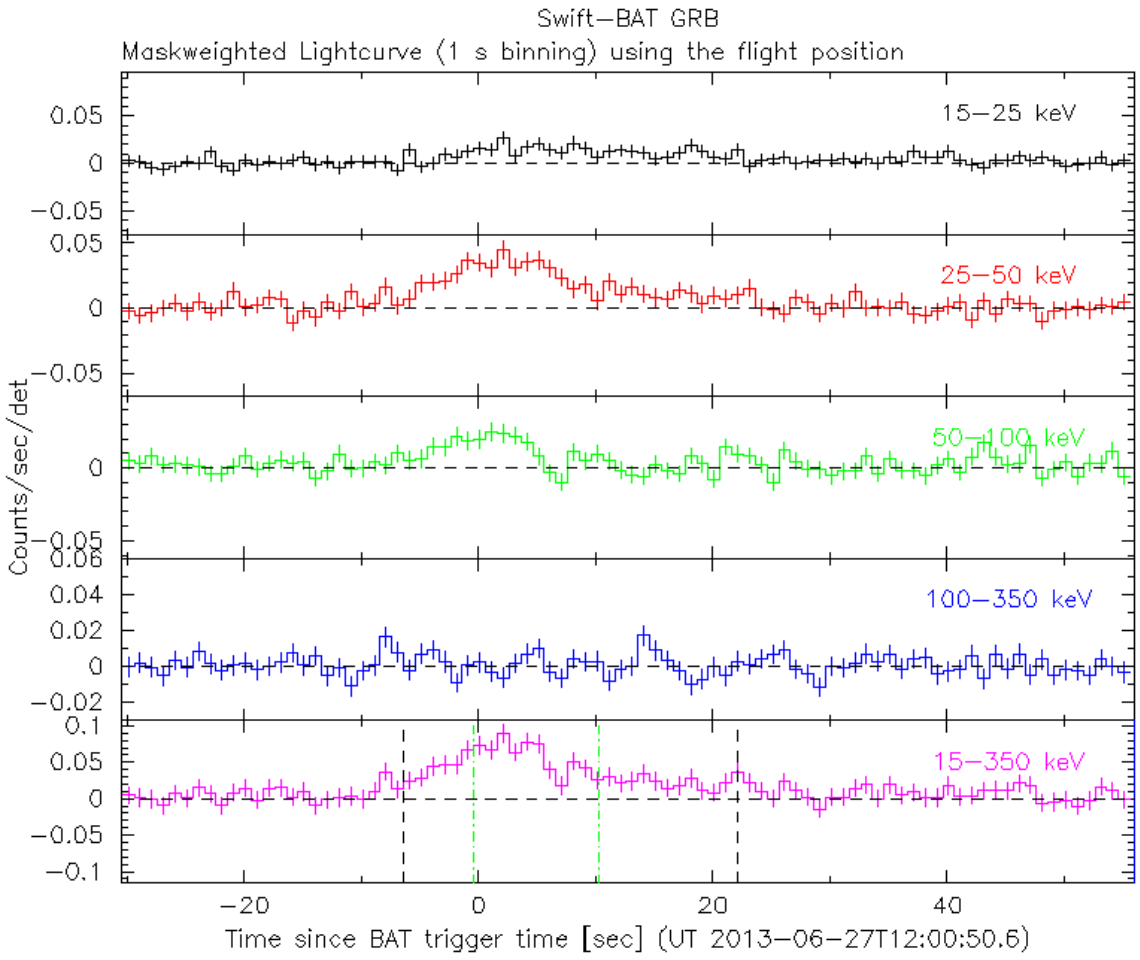

Figure 1. The BAT mask-weighted light curve in the four individual and total energy bands. The units are counts s^{-1} illuminated-detector^{-1}.

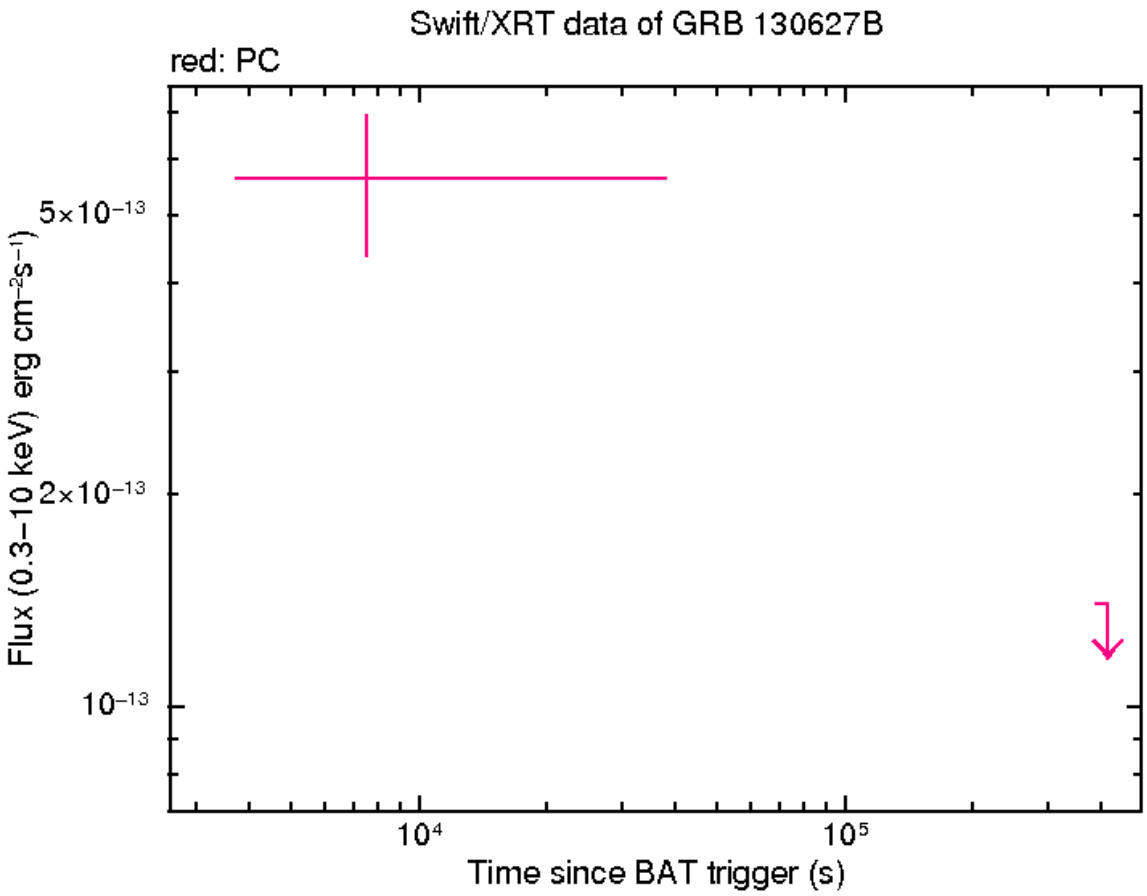

Figure 2. The XRT light curve.

RA (2000)	Dec (2000)	Error	Note	Reference
$12^h07^m39.14^s$	-55°42'02.9"	4.2"	XRT	Evans and Oates GCN Circ. 14947
$12^h07^m39.3^s$	-55°42'20.3"	1.8'	BAT-refined	Stamatikos *et al*. GCN Circ. 14952

Table 1. Positions from the Swift instruments.

Filter	T_{start}(s)	T_{stop}(s)	Exp(s)	Mag
$white_{FC}$	3755	3905	147	>20.3
white	3755	5137	344	>20.9
v	3911	5474	320	>19.5
b	4733	4932	197	>20.1
u	4526	4726	197	>19.7
w1	4321	11240	757	>20.3
m2	4116	10664	1082	>20.4
w2	5143	5343	197	>19.7

Table 2. UVOT observations reported by Kuin and Oates (GCN Circ. 14950). 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.

Sept 23, 2013