

Swift Observations of the INTEGRAL-detected GRB 080613A

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for the Swift Team:

1. INTRODUCTION

GRB 080613A is a long burst detected by the IBIS/ISGRI detector on INTEGRAL on 2007-08-06 at 09:35:21 UTC (Gotz et al., GCN Circ. #7871). The burst was approximately 25 seconds in duration. Imaging observations by Guidorzi et al. from Faulkes Telescope North (FTN) detected the optical afterglow counterpart ($R \sim 19$ mag; GCN Circ. #7872), and later non-detections by GROND, MITSuME, and Swift UVOT indicated that the counterpart was fading (Clemens, et al., GCN Circ. 7880; Yoshida et al., GCN Circ. 7886; and see below).

This report summarizes Swift observations of the afterglow. Our best Swift position is from the Swift XRT, which is:

RA(J2000) = 14h 13m 05.31s
Dec(J2000) = +05d 10' 21.2"

with an uncertainty of 5.2 arcsec (radius, 90% confidence). However, we note that the most precise position is likely to be that reported from FTN (GCN Circ. #7872). Swift XRT detected a rapidly fading X-ray counterpart. Swift observations are now complete.

2. BAT OBSERVATION AND ANALYSIS

There are no BAT results for this burst.

3. XRT OBSERVATION AND ANALYSIS

The Swift XRT began observing the GRB on June 13, 16:19 UT, 24.2 ks after the time of the INTEGRAL trigger (Guidorzi et al., GCN Circ. #7882). The data consist of about 10 ksec of exposure, observed in Photon Counting mode.

We detect a single X-ray source within the INTEGRAL error circle at the position RA, Dec = 213.27213, +5.17256 which is equivalent to:

RA (J2000): 14h 13m 05.31s
Dec (J2000): +05d 10' 21.2"

with an uncertainty of 5.2 arcsec (radius, 90% confidence). This position lies 4.9" from the optical afterglow found with the Faulkes Telescope North (Guidorzi et al., GCN Circ. 7872), and is therefore consistent with being the X-ray afterglow of GRB 080613A.

We confirm the source is fading in X-rays (Figure 1). The lightcurve can be fit with a power law with decay index $\alpha = 2.5 \pm 0.6$ (1 sigma).

We extracted a 0.3-10 keV spectrum from the first 3.6 ksec, using a 10-pixel radius circular region. Owing to the poor statistics, we used the Cash statistic for fitting. The spectrum can be fit by a power law, with an absorbing column density fixed to the Galactic value ($2.0 \times 10^{20} \text{ cm}^{-2}$) and a photon index of 1.3 ± 0.3 . The observed (unabsorbed) 0.3-10 keV flux is $1.50 (1.53) \times 10^{-12} \text{ erg cm}^{-2} \text{ s}^{-1}$.

4. UVOT OBSERVATION AND ANALYSIS

The Swift UVOT began settled observations of the counterpart 6.7 hours after the trigger (Hoversten & Holland, GCN Circ. 7881). No afterglow is detected at the position of the R-band detection by the FTN (Guidorzi, et al., GCN Circ. 7872). The 22.2 magnitude upper limit in the white band suggests the R~19 object seen by Guidorzi et al. 3.9 minutes after the trigger has faded, and was indeed the afterglow.

In Table 1, we report the 3 sigma upper limits for the counterpart in each filter. The values quoted in the table are in the UVOT photometric system (Poole et al. 2008, MNRAS, 383, 627). They are not corrected for the expected Galactic extinction, corresponding to a reddening of $E(B-V)=0.023$ mag in the direction of the burst (Schlegel et al. 1998).

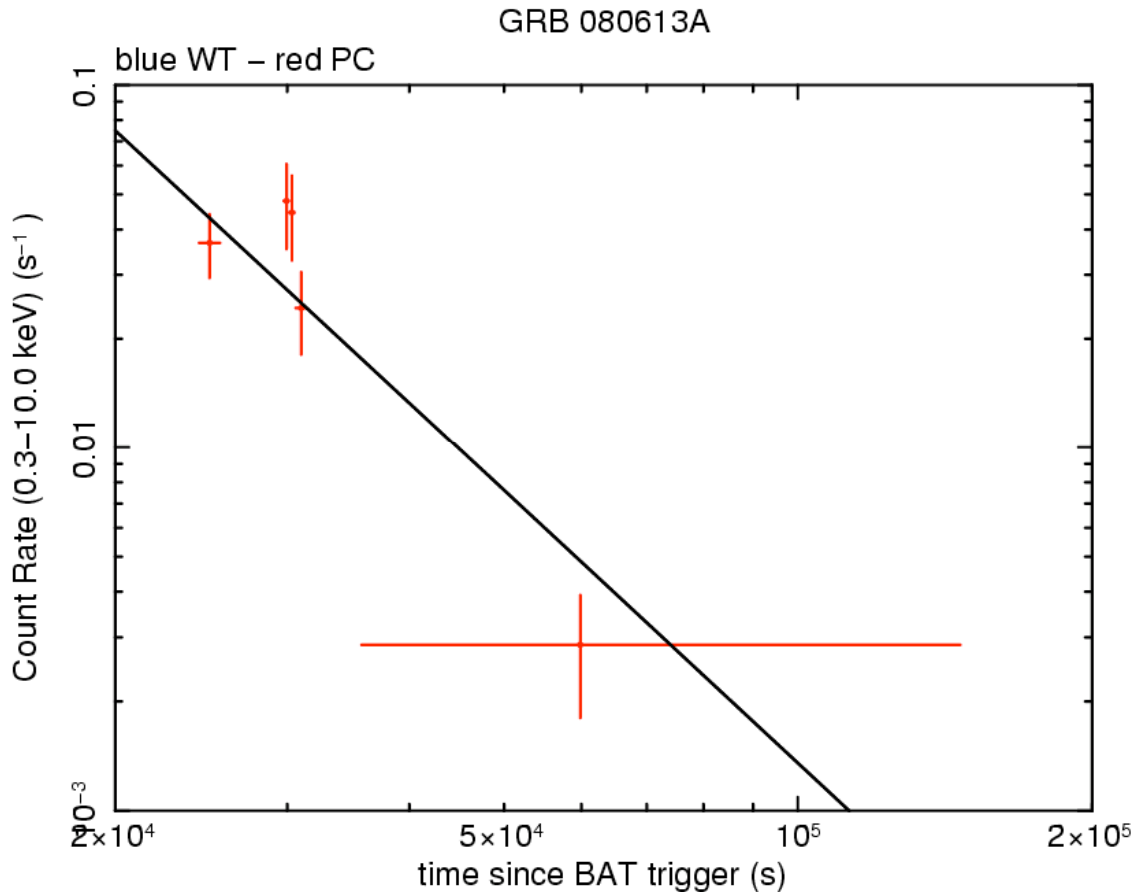


Fig. 1: Swift XRT lightcurve in count rate units, taken in Photon Counting (PC) mode. The solid black line indicates the best fit power law decay described in the text. The conversion factor from count rate to observed flux (0.3-10 keV) is $1 \text{ count s}^{-1} = 5.9 \times 10^{-11} \text{ erg cm}^{-2} \text{ s}^{-1}$.

Table 1: UVOT Upper Limits.

Filter	Time (s)	Expo(s)	Mag (3- σ UL)
WHITE	24725-25189	456	22.2
V	25195-25638	436	20.5
B	24257-24720	456	21.5
WHITE	24725-30924	999	22.65
V	25195-31420	917	20.96
B	24256-36185	1380	22.17
U	24206-35793	146	20.39
V	123061-145719	2126	21.39
B	129107-146639	1692	22.26
U	123289-146180	1861	21.99
UVW2	129434-146800	1009	21.80

(Times are given in seconds after the INTEGRAL IBAS trigger time.)