

# Swift Observations of GRB 110918A

*H. A. Krimm (CRESST/GSFC/USRA), V. Mangano (INAF-IASFPA)  
& M. H. Siegel (PSU), for the Swift Team*

## 1 Introduction

GRB 110918A was not a BAT trigger. It triggered Konus-WIND at 21:27:02.856 UT (Golenetskii, *et al.*, *GCN Circ.* 12362). The burst was reported as the most intense long GRB event in the history of Konus-Wind observations since November, 1994 (Figure 1). GRB110918A was also observed by INTEGRAL (SPI-ACS), Konus-Wind, Mars Odyssey (HEND), and MESSENGER (GRNS) at 21:26:57 UT. At the time of the burst, Swift was in the SAA and earth-occulted, and Fermi was Earth-occulted. Using the Interplanetary Network (IPN; Hurley, *et al.*, *GCN Circ.* 12357), a position was determined and Swift was able to observe and localize this burst. XRT began follow-up observations at  $T + 107.4$  *ksec*.

The best position is from an Isaac Newton Telescope observation (Tanvir, *et al.*, *GCN Circ.* 12365) at a location  $RA(J2000) = 32^{\circ}.539125$  (02h10m09.39s),  $Dec(J2000) = -27^{\circ}.105444$  (-27d06'19.6") with an error of 0.5 arcsec.

Using the GMOS-N spectrograph on Gemini-N, Mauna Kea on 20-Sep-2011 12:51 UT, Levan, *et al.*, (*GCN Circ.* 12368) determined a spectroscopic redshift of  $z = 0.982$ . This was later confirmed by Ugarte Postigo, *et al.*, (*GCN Circ.* 12375) with the 10.4m GTC telescope at Roque de los Muchachos Observatory (Spain), who reported  $z = 0.984 \pm 0.001$ .

## 2 XRT Observations and Analysis

Using the data from the first 2.5 ks of XRT observations of GRB 110918A (all in Photon Counting mode), the refined XRT position is  $RA(J2000) = 32^{\circ}.53860$  (02h10m9.27s),  $Dec(J2000) = -27^{\circ}.10610$  (-27d06'22.0")  $\pm 1.5$  *arcsec* (90% confidence, including boresight uncertainties).

The 0.3 – 10 *keV* light curve obtained over 48 days of observations (Fig.2) shows a continual steady decline with a slope of  $1.629 \pm 0.037$ . The second-to-last point dips below the decay extrapolation at  $4 \times 10^{-4}$  ct s<sup>-1</sup>, but the final point is again consistent with the extrapolation. Thus there is no clear evidence for a jet break.

The first segment of the X-ray lightcurve can be modeled with an absorbed power-law with spectral index of  $2.12 \pm 0.26$ . The  $N_H$  column density is in excess of galactic,  $1.5 \pm 0.7 \times 10^{21}$  cm<sup>-2</sup>. The galactic column density in this direction is  $1.7 \times 10^{20}$  cm<sup>-2</sup> (Kalberla *et al.* 2005). The average observed (unabsorbed) flux over 0.3 – 10 *keV* for this spectrum is  $8.3 \times 10^{-12}$  ( $1.2 \times 10^{-11}$ ) *ergs/cm<sup>2</sup>/sec*.

## 3 UVOT Observation and Analysis

The UVOT began observing the field of GRB 110918A 153272 s after the IPN Trigger. (Siegel *et al.*, *GCN Circ.* 12371). A source consistent with the XRT position was detected in the initial UVOT exposures. Observations are summarized in Figure 3 and early observations in Table 1.

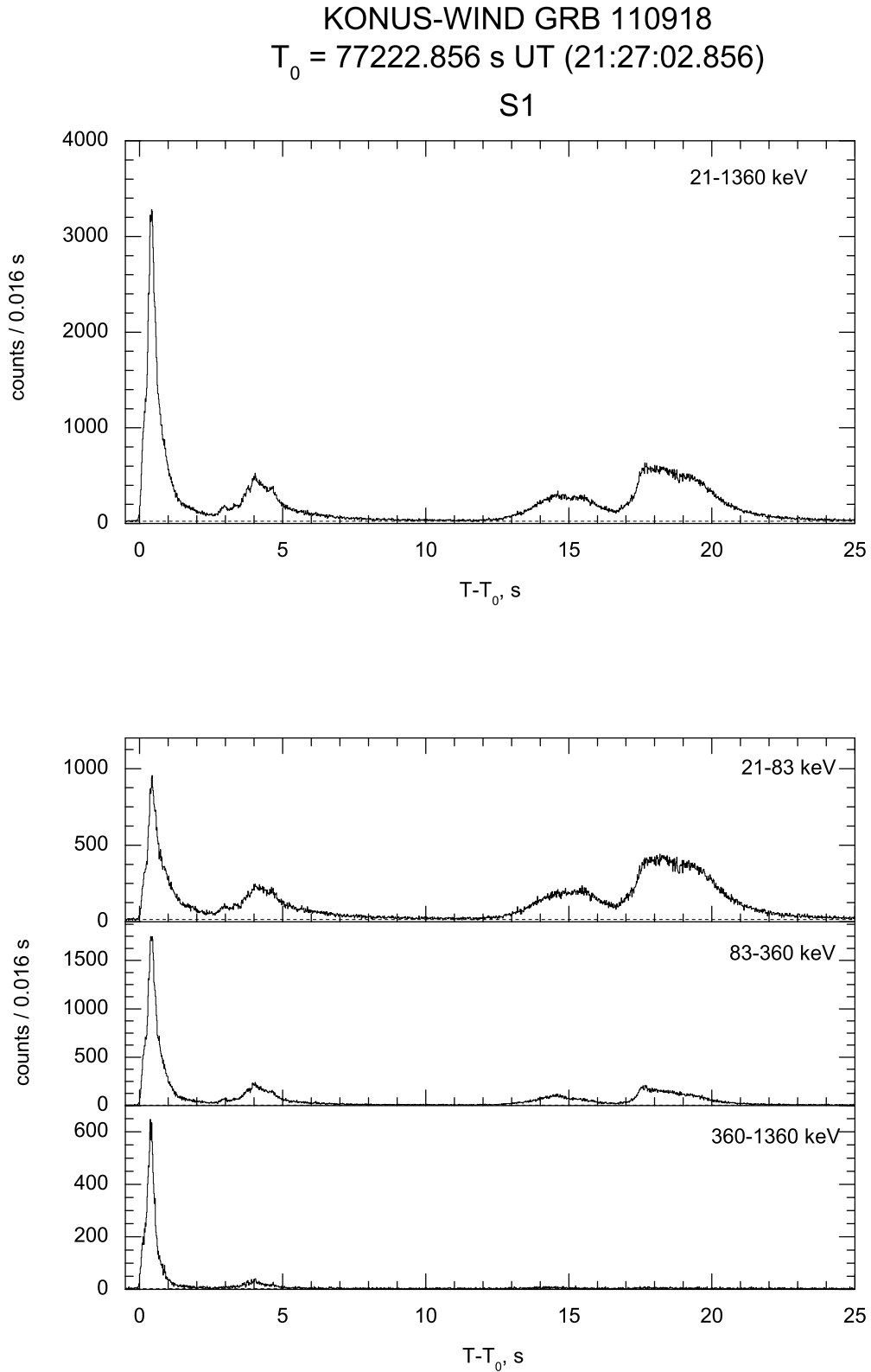


Figure 1: Konus-WIND Light curve in the full energy range (top) and in three energy bands (bottom) (from Golenetskii, *et al.*, *GCN Circ.* 12362)

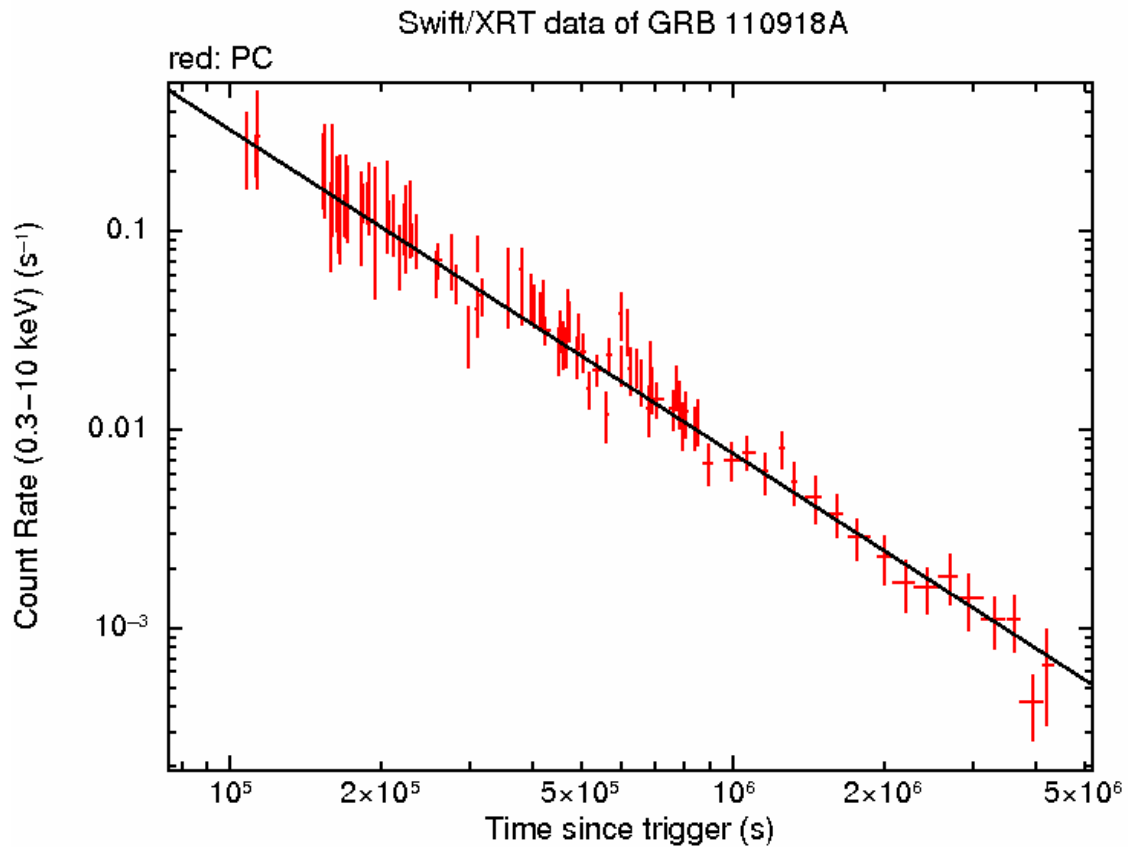


Figure 2: XRT Lightcurve. Counts/sec in the 0.3-10 keV band all in Photon Counting mode. The approximate conversion is  $1 \text{ count/sec} = \sim 2.9 \times 10^{-11} \text{ ergs/cm}^2/\text{sec}$ .

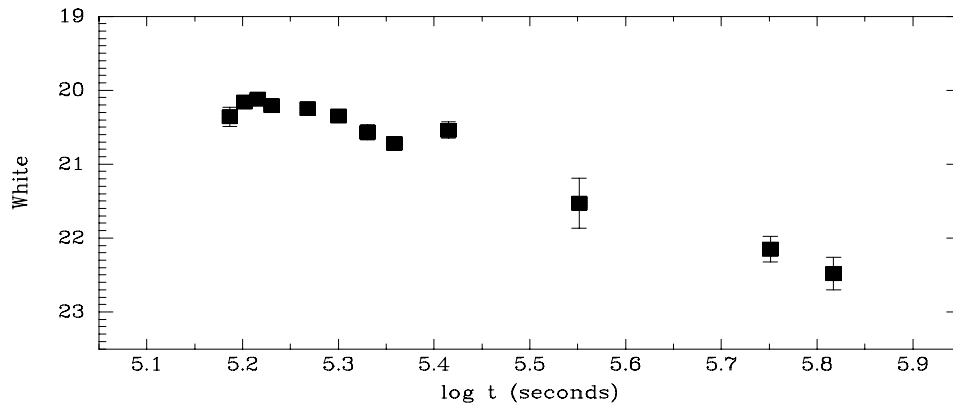


Figure 3: UVOT Lightcurve in the White filter. This shows a power law decay with index of approximately -1.15

Filter	Start	Stop	Exposure	Magnitude
white	153272	154107	791	$20.36 \pm 0.13$
white	158468	159889	1373	$20.16 \pm 0.08$
white	163169	165670	2419	$20.12 \pm 0.05$
white	168950	171166	2178	$20.21 \pm 0.06$

Table 1: Magnitudes from the initial UVOT observations. The magnitudes in the table are not corrected for the Galactic extinction due to the reddening of  $E(B-V) = 0.02$  in the direction of the burst (Schlegel et al. 1998).