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1 *HST* observations, processing and analysis.

A log of our *HST* observations is shown in Table 1. The standard STScI pipeline was used to initially process the data. The images from each epoch were then aligned to within a small fraction of a pixel using the task TWEAKREG from the STSDAS package DRIZZLEPAC[30] and combined using ASTRODRIZZLE. The final drizzled pixel scales were 15 pixels per arcsec for the WFC3/IR F160W images and 30 pixels per arcsec for the ACS F606W images.

To obtain photometry we adopted a very similar procedure for both optical and nIR data: (1) the point spread function (psf) was modelled with DAOPHOT[31] using several bright unsaturated stars in the epoch 1 image; (2) this psf was fitted to the transient source in the nIR difference image, and also at the same location in the optical difference image; (3) we adopted the standard *HST* zero-points to convert these fluxes in counts per second to AB magnitudes; (4) photometric errors were estimated in the case of the nIR observations by placing many artificial stars of the same magnitude as the transient at locations of the difference image corresponding to regions of similar background as provided by the host galaxy, and measuring the scatter in their recovered photometry. In the case of the optical photometry, since there was no significant flux at the transient location, we fitted psfs (allowing negative normalisations), again to locations of the difference image in regions similar to the host galaxy, and the error distribution was determined from the measured scatter in the results. This finally provided the following photometry: $R_{606,\mathrm{AB}}$ >28.25 (2σ upper limit) and $H_{160,\mathrm{AB}} = 25.73 \pm 0.20$.

2 Summary of ground monitoring

The early and mid-time photometry of the SGRB 130603B field as plotted in Figure 2 of the letter, is shown in Table 2. Further ground photometry and an expanded discussion, including its implications for the afterglow, will appear in de Ugarte Postigo *et al.* (in prep.).

These data, which include the original discovery observations of the optical afterglow, serve to monitor its behaviour over the first ~ 36 hours and place limits at later times. All data were de-biased and flat-fielded following standard procedures. The field lies within the SDSS footprint and so photometric calibration for $griz$ observations is obtained directly from it. Near-IR calibration is taken from 2MASS, while we utilize our own calibration of the V-band.

To obtain photometric measurements of the afterglow in each band we performed image subtraction with the public ISIS code[32]. For clean subtractions we employed a later time image from each telescope as a template and subtract this from the earlier data (these were initially assumed afterglow free, but if an extrapolation of the power law decay suggested a low level of afterglow contamination, this was then reapplied as a small correction to the photometry of the subtracted image. These corrections were always less than 0.1 mag.). Photometric calibration of these subtracted images is obtained by the creation of an artificial star of known magnitude in the first image, with the errors estimated from the scatter in a large number of apertures (of radius approximately equal to the seeing) placed within the subtracted image. The placement of artificial stars close to the limiting magnitude within the image confirms that these can be recovered, and so the given limiting magnitudes are appropriate. However, we do note that the limiting magnitudes are based on the scatter in photometric apertures placed on the sky, not on the relatively bright regions of the host directly underlying the SGRB. Given that background errors are dominated by sky variance, this should not result in significant underestimate of errors: tests suggest an effect usually no more than 0.05 mag, so we conservatively add that extra error to all our magnitude uncertainties (in fact, we note that the scatter around the model fit did not suggest the original errors were underestimated, as mentioned below).

Afterglow spectral energy distribution Using this photometry we are able to construct a rather complete $grizJHK$ spectral energy distribution (SED) at a time ≈ 0.6 days post-burst. We do not attempt to model this physically, but simply fit the data with a spline to allow interpolation. This SED is assumed to hold for the afterglow at later times, and the significantly increased slope at 9 days is one way of quantifying the evidence for an additional kilonova component.

3 Light curve analysis

In order to assess the significance of the late-time nIR enhancement, we performed the following analysis:

1. We fitted the optical data shown in Figure 2 of the paper (i.e. the optical detections interpolated to the $R_{606,\mathrm{AB}}$ band using observed SED, and the *HST* epoch 1 F606W magnitude limit) with a smoothly broken power-law. The break time and smoothness were allowed

to vary, as was the pre-break slope. The parameter of primary interest is the post-break slope, and for this we found a value $\alpha = 2.68$ (where flux $F \propto t^{-\alpha}$). We note that this fit has $\chi^2/\mathrm{dof} = 5.1/7$, whereas if we had not added the estimate for an extra uncertainty due to image subtraction errors, the fit would have been essentially the same, but with $\chi^2/\mathrm{dof} = 8.9/7$. In either case, the error estimates seem to be reasonable.

On the low side the 95% confidence region goes to $\alpha = 2.18$, but on the high side it is not well constrained (i.e. steeper slopes become allowed by moving the break time later). We think it is unlikely that the late slope is much steeper than $\alpha \approx 2.7$, since that would not sit comfortably with the X-ray decay rate (see Figure 2 in the letter, and Ref. 33), although this makes no substantive difference to our conclusions. Note that if we just used imaging taken directly in an R-band (or r-band) filter, so avoiding significant interpolation, we still find a similar best fit slope $\alpha = 2.72$, and again the 95% confidence range only allows values as low as $\alpha = 2.18$.

2. We assumed the same light curve shape, including this late-time slope, applied to the H-band and hence determined the apparent magnitude of the excess nIR flux of $H_{160,\mathrm{AB}} = 25.77^{+0.26}_{-0.22}$ (1σ bounds). This value is not corrected for host dust extinction, but in the rest-frame J-band, this is unlikely to be more than 0.1–0.2 mag.

References

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UT date and start time	Exp (s)	Camera	Filter
2013-06-12 23:11:55	2216.000	ACS WFC	F606W
2013-06-13 02:36:24	2611.751	WFC3 IR	F160W
2013-07-03 05:33:02	2611.751	WFC3 IR	F160W
2013-07-03 07:09:12	2216.000	ACS WFC	F606W

Table 1: Log of *HST* observations obtained with the Advanced Camera for Surveys/Wide Field Channel (ACS/WFC) and the Wide Field Camera 3/Infrared (WFC3/IR). Note, the original *Swift* trigger occurred at 2013-06-03 15:49:14 UT.

MJD (start)	MJD (mid)	ΔT (days)	Telescope	band	exp. (s)	AB Mag
56446.902986	56446.902986	0.244	NOT/MOS	r	5 × 360	21.15 ± 0.02
56446.923576	56446.932922	0.274	WHT/ACAM	i	3 × 300	20.86 ± 0.06
56446.948825	56446.949172	0.290	GTC/OSIRIS	r	30	21.30 ± 0.02
56446.943541	56446.952887	0.294	WHT/ACAM	g	3 × 300	21.90 ± 0.06
56446.988045	56446.988596	0.329	FORS2	V	60	21.47 ± 0.02*
56446.978	56446.989	0.330	GMOS-S	g	8 × 180	22.09 ± 0.04
56447.000	56447.011	0.352	GMOS-S	r	8 × 180	21.52 ± 0.05
56447.022	56447.032	0.373	GMOS-S	i	8 × 180	21.18 ± 0.11
56447.254670	56447.258471	0.599	GMOS-N	z	5 × 100	21.86 ± 0.03
56447.256481	56447.261765	0.603	UKIRT	K	70 × 10	21.06 ± 0.11
56447.262775	56447.266563	0.607	GMOS-N	i	5 × 100	22.26 ± 0.03
56447.267535	56447.272743	0.614	UKIRT	J	70 × 10	21.48 ± 0.14
56447.270813	56447.274604	0.615	GMOS-N	r	5 × 100	22.75 ± 0.03
56447.278897	56447.282685	0.623	GMOS-N	g	5 × 100	23.39 ± 0.04
56448.262940	56448.273513	1.61	UKIRT	J	140 × 10	>22.5
56448.245230	56448.249620	1.59	GMOS-N	g	5 × 120	>25.7
56448.254521	56448.259011	1.60	GMOS-N	r	5 × 120	25.6 ± 0.3
56448.264818	56448.269194	1.61	GMOS-N	i	5 × 120	>24.7
56448.274065	56448.278411	1.62	GMOS-N	z	5 × 120	>23.9
56448.965463	56448.976436	2.32	HAWKI	J	22 × 60	>23.6
56449.914515	56449.918376	3.26	GTC	r	3 × 200	>25.1
56450.919727	56450.923053	4.26	GTC	r	3 × 200	>25.5
56453.950521	56453.961441	7.30	HAWKI	J	22 × 60	>23.5

Table 2: Photometric observations of the SGRB 130603B afterglow, taken from our observations, from de Ugarte Postigo *et al.*, and from Cucchiaria *et al.* 2013 (for Gemini-S; ref. 22). * Note that the V-band data is measured in a small (0.7 arcsec) aperture, but is not host subtracted. The errors given are statistical only and do not account for systematics between slightly different filter systems. The details of the subtraction also make small differences to the recovered flux, especially for sources sitting on moderately bright extended regions of their host galaxies. To account for this we estimate the additional variance on artificial stars inserted into the images to be ~ 0.05 mag.