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A SUSPECTED RED VARIABLE IN THE ERROR BOX OF GRB 970111

GRB 970111 is a gamma-ray burst detected by the satellite BeppoSAX on January 11, 1997 (Costa et al. 1997). Soon after the event, we observed the field of GRB 970111 (Guarnieri et al. 1997) with the 1.5-meter telescope (+BFOSC) of the Bologna University and compared it to the Digitized Sky Survey (DSS). We noticed on the R frames the clear presence of a star (Figure 1) which was barely visible on the DSS (whose limiting magnitude is $R \sim 20.5$). The star is also practically invisible on the Palomar Sky Survey red plates and absent on the blue ones (limiting magnitude ~ 21 for both). From the DSS we deduced the coordinates of this object:

$$\alpha = 15^{\text{h}}28^{\text{m}}45^{\text{s}}; \delta = +19^{\circ}47'15'' \text{ (equinox 2000.0),}$$

with a conservative error of $\pm 5''$ for both values. The star is inside the GRB 970111 error box communicated by Hurley et al. (1997; see also Figure 1). No variable object within a circle of radius $10'$ and centered on these coordinates is mentioned in the SIMBAD database.

From 5 frames (3 in R band, 1 in B and 1 in V , respectively) collected between Jan. 15 and Jan. 31 1997, we determined the magnitudes of the star by means of the DAOPHOT II package (Stetson 1987) and the *ALLSTAR* procedure implemented in MIDAS. The entire log of observations, together with the Palomar data, is reported in Table 1.

Table 1. Available magnitudes and color indices for the variable

JD	B	V	R	$B - V$	$V - R$	Source
2433391.90	>21	—	~ 21	—	—	Palomar plates
2450463.68	—	—	19.90	—	—	1.5m+BFOSC
2450465.71	—	—	19.93	—	—	1.5m+BFOSC
2450479.65	>21	20.34	19.80	~ 1.2	0.54	1.5m+BFOSC

The calibration has then been performed with the use of the photometric standards in the field of PG 1047+003 (Landolt 1992). The star, on January 15 1997, was at $R = 19.90 \pm 0.05$, thus showing a variation of more than a magnitude with respect to the Palomar red plates (April 1950), while on January 17 the R magnitude was 19.93 ± 0.05 . On January 31 its magnitude in the R band was found to be 19.80 ± 0.05 . During the same night, its $V - R$ color index was 0.54. Unfortunately, the object was too faint to be visible in the B band, even with an exposure time of 50 minutes; we can however give an indicative $B - V$ color index of ~ 1.2 by comparing the $V - R$ of the star with those of field stars with known $B - V$ color indices. These colors suggest that this object is a mid-late K spectral type star, depending on the luminosity class (Lang 1992). All this seems to indicate that this suspected variable might be a long period red star.

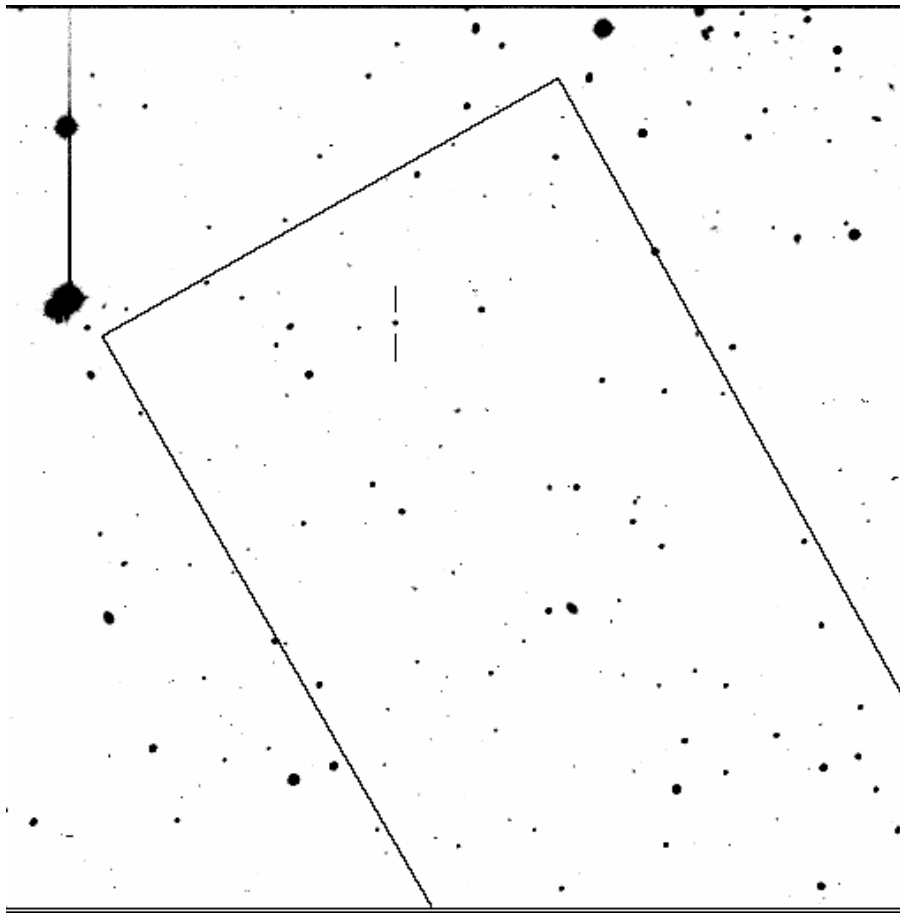


Figure 1. The field ($9' \times 9'$) of the suspected variable in the Johnson R band (exposure time: 20 minutes), observed on January 15, 1997. The star is indicated by the ticks. North is at top, east is to the left. The northern part of GRB 970111 error box by Hurley et al. (1997) is also reported

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