Hard X-ray images at the flare on 1992 August 17

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Abstract

Hard X-ray images of the flare of 2359UT, 17 August 1992 are presented. The images show more than three sources. The southern source shows nonthermal spectrum, while the other shows thick target X-rays from super hot thermal electrons with 85 million degrees.

Comment

Time profiles in four energy bands of the X-ray burst are shown in Figure 1. X-ray images are shown in Figure 2, in which photon energy and the time of snap shot are indicated in each panel. The panel number of each X-ray map is identical with the numeral shown in the top panel of Figure 1 indicating the time range of snapshot of the X-ray map. Precise comparison of these with the SXT and Radio maps is not yet made, but the two peaks at the Time (4) probably coincide with the sources (2) and (4) presented in the preceding papers by Takahashi and Enome. The X-ray maps, however, suggest that the sources (2) and (4) are foot points of a common coronal loop, so that the week central X-ray source, probably the source (3) in the Takahashi's paper, is the top of this loop. The X-ray spectra at the Time (4) are obtained from the three energy bands in the same way as mentioned in my previous comment on the burst of October 27. The source (2) shows thick target X-ray spectrum from the electrons flowing into the chromosphere with quasi- thermal distribution, $T_e \simeq 8.5 \times 10^7$ K and the number density is $3 \times 10^6 \mathrm{cm}^{-3}$. On the other

hand, the spectrum for the source (4) shows power law with the X-ray photon spectral index of 3.1, i.e., the index for electron energy is 4.6, and the electron number density above 15 Kev is $6 \times 10^6 \mathrm{cm}^{-3}$. The above result is consistent with the radio observation that the brightest source is located near the source (4) at about the Time (4).

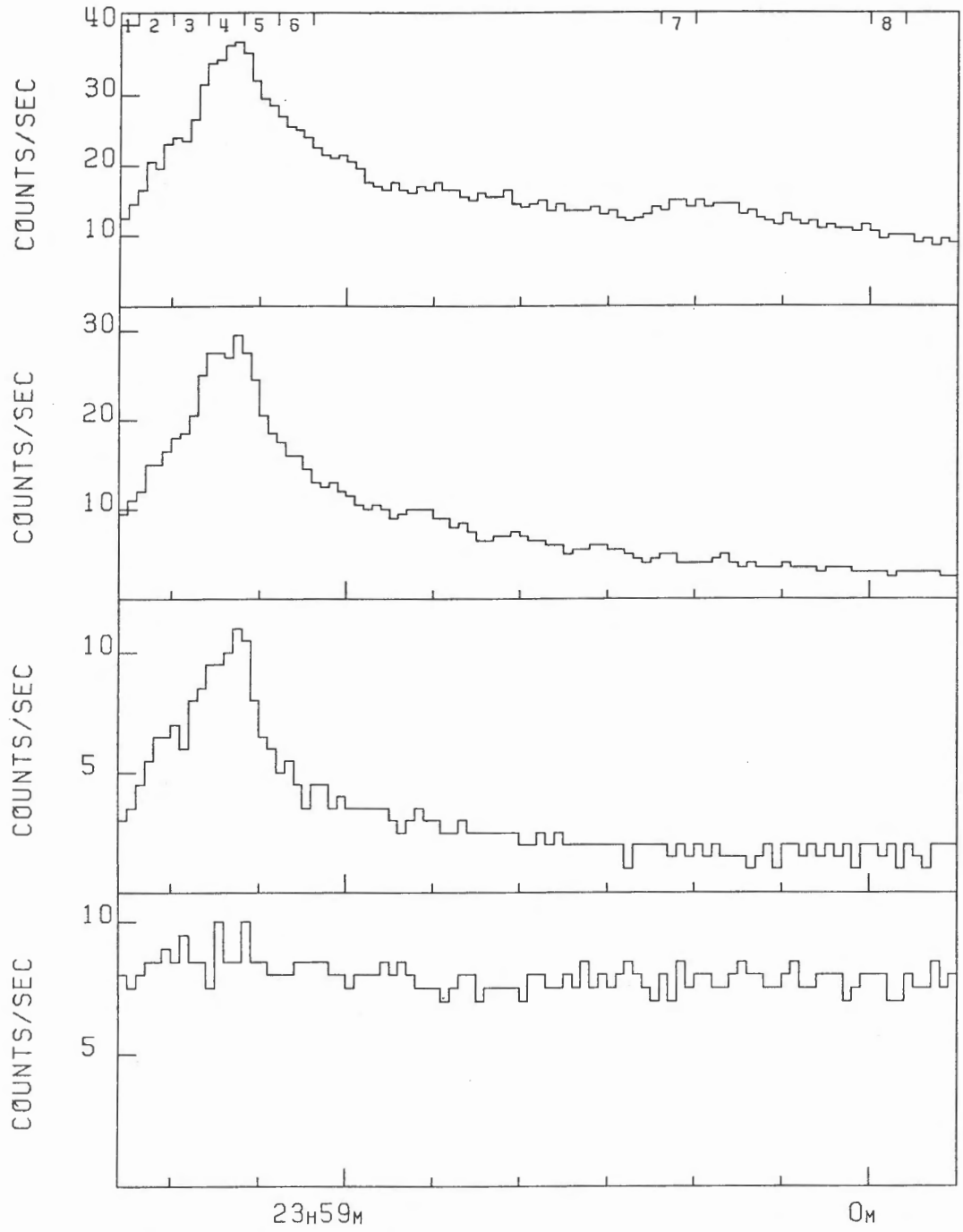

Fig.1. Time profiles of the X-ray burst on 1992 August 17 in four energy bands L, M1, M2, and H from top to bottom: L; 13.9-22.7 keV, M1; 22.7-32.7 keV, M2; 32.7-52.7 keV, H; 52.7-92.8 keV. Since the effective mean collecting area per each collimator is about 1 cm^2, the vertical scale is approximately X-ray flux ($c\,s^{-1}cm^{-2}$). The numerals marked on the curve in the top panel show the times of snapshots of X-ray maps shown in Figure 2.

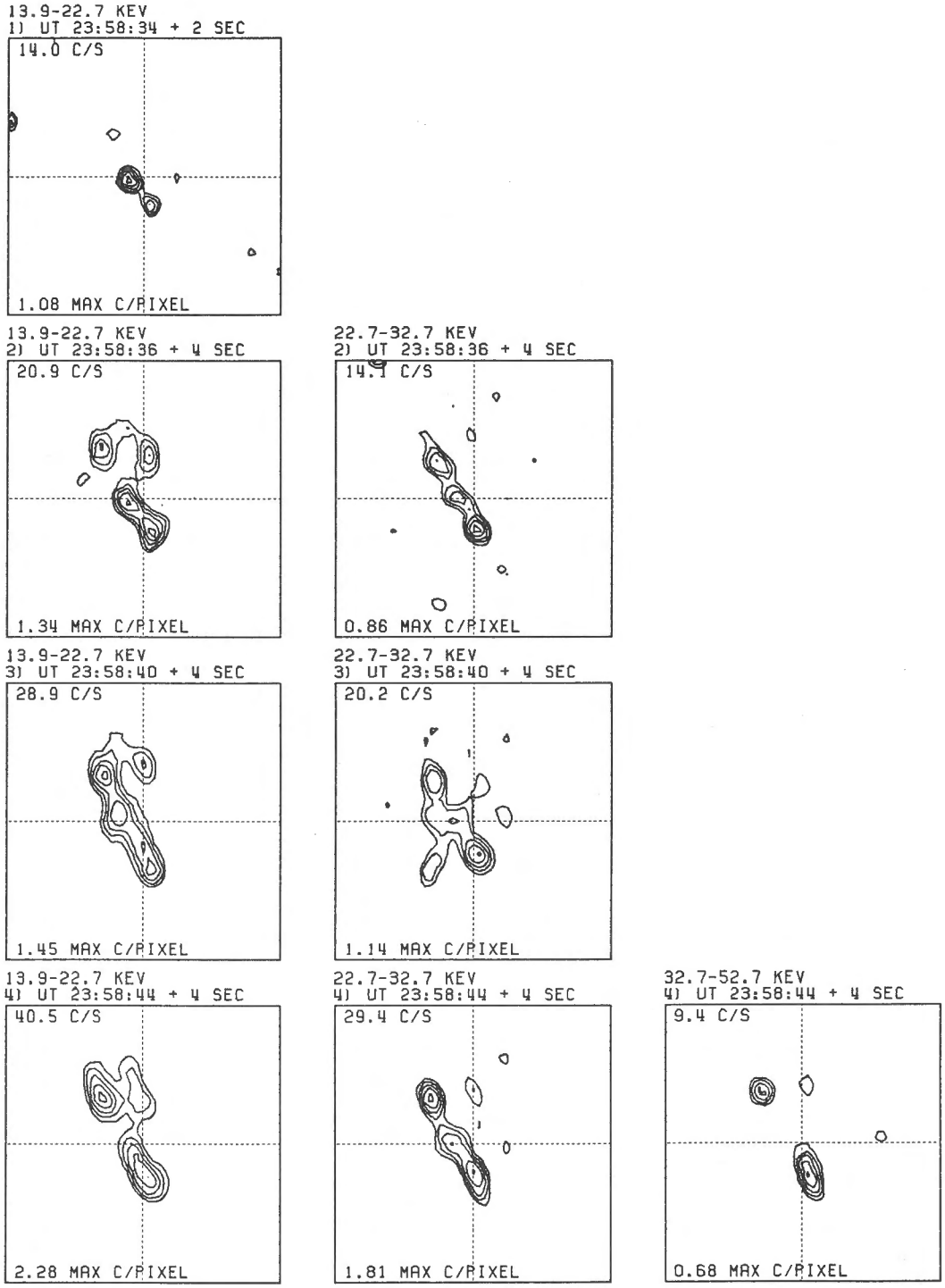

Fig.2a. X-ray contour maps of the burst. The photon energy, the starting time and integration time of the map are shown in each panel. The panel number is identical with the numeral shown in Figure 1 indicating the time of the snapshot. The minimum contour level is 0.1 times the peak brightness in each map and the contour steps are logarithmic with $\sqrt{3}$ steps. The map size is 126 arcsec square. The map center is 0.13 arcmin west and 3.05 arcmin north from the solar center. The solar north is upward (y-axis) in the maps. In each panel, X-ray count/sec and count/pixel in the brightest pixel are shown.

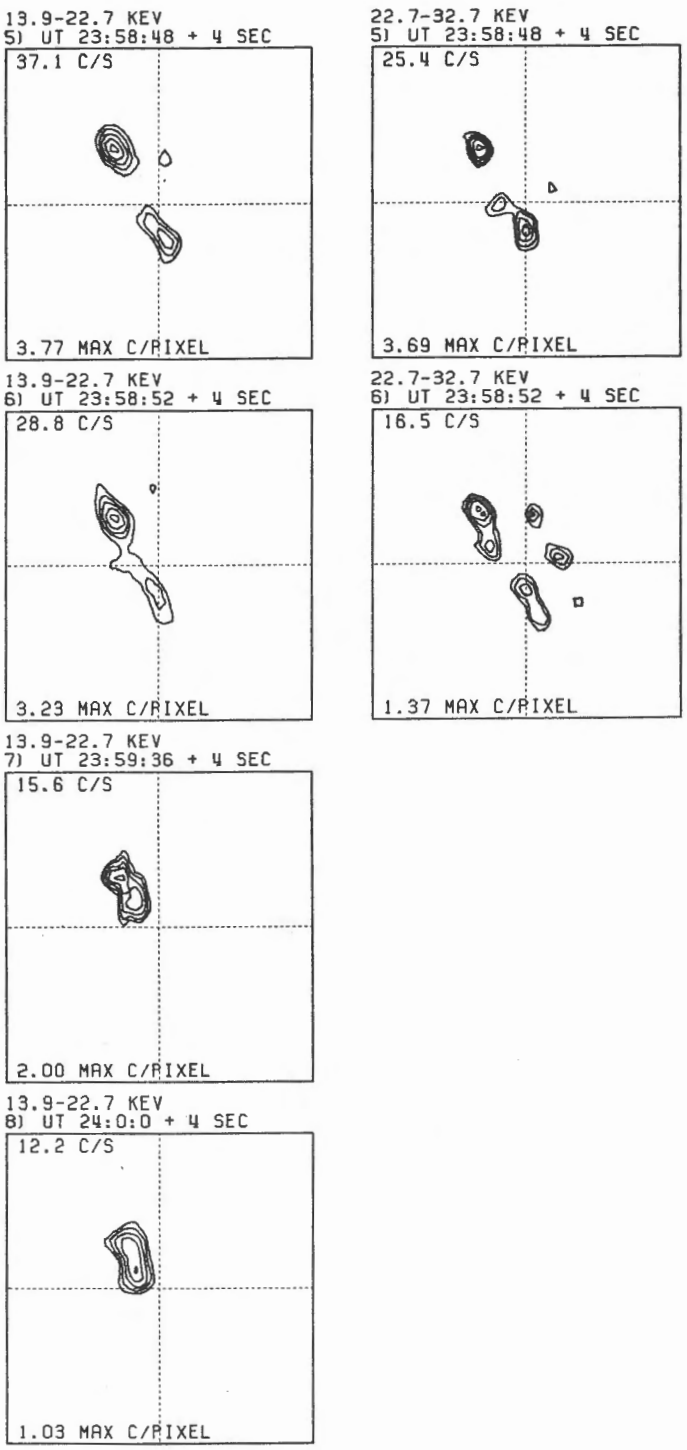

Fig.2b. Same as Figure 2a, but later time.