Imaging coronal magnetic-field reconnection in a solar flare

Below are some technical details of the data analyses.

1. The RHESSI images were reconstructed using the front segments of detectors 4 through 9 and the MEM-NJIT image reconstruction algorithm\textsuperscript{30}. The RHESSI spectra were made using data from the front segment of detector 3.

2. The temperature responses of the AIA channels span wide temperature ranges, but peak at different temperatures\textsuperscript{22}. The temperature-response function of AIA 171 Å (Fe IX) peaks at 0.6 MK, AIA 193 Å (Fe XII, XXIV) at 1.6 and 20.0 MK, AIA 211 Å (Fe XIV) at 2.0 MK, AIA 304 Å (He II) at 0.05 MK, AIA 131 Å (Fe VIII, XXI) at 0.4 and 10.0 MK, AIA 94 Å (Fe XVIII) at 6.3 MK, AIA 1600 Å (C IV +continuum) at 0.1 MK\textsuperscript{22}.

3. The filtered images used in this study were obtained from the original images by subtracting smoothed images (with a smoothing window of 5×5 pixels) to highlight the loops and other features.

4. The flare ribbons observed in the AIA 1600 Å images are plotted only for pixels with intensity greater than 300 DN s\textsuperscript{-1} pixel\textsuperscript{-1}.

5. The flow velocity vectors in Fig. 4 were derived using the Fourier Local Correlation Tracking (FLCT\textsuperscript{26}) method with a pair of AIA images taken 24 s apart at each wavelength. A smoothed image (with a smoothing window of 5×5 pixels) taken 24 s earlier was subtracted as background from the pair of images to better track the motion of coronal loops.

Fig. 1. Flare loops and ribbons observed by SDO/AIA and RHESSI. This figure shows how the footpoint regions (A, B, C, and D) are defined. The images are rotated clockwise by 114° to orient the solar limb (black line) in the horizontal direction. (a) The AIA image was obtained from the 131 Å video at 04:25 UT. The red contours show 5, 10, 20, 40, 60, and 90 percent of the maximum in the RHESSI 4-10 keV X-ray image integrated over the period from 04:22 to 04:26 UT. They show the EUV and X-ray emission from the hot flare loops. (b) AIA 1600 Å image and RHESSI 10-20 keV contours showing emission from the flare ribbons and corresponding X-ray footpoint regions.

Fig. 2. Inflow and outflow motions in time-distance plots made from the original AIA images. (a) These stack plots show (from the top) the time history of the intensity along curve C1 (Curves C1 and C2 are shown in the second image of Fig. 1c) in the original AIA images
at 171, 193, 211, and 304 Å. The white arrow indicates the signature of piled-up loops. (b) Same as supplementary Fig. 2a but for curve C2 at 131 Å.

**Movie M1.** Inflow loops observed by SDO/AIA at 171, 193 and 304 Å on August 17, 2011. The top row shows the original images obtained by AIA. The bottom row shows filtered images of the top row to better indicate the loops. These filtered images are obtained by subtracting a smoothed image from the original image.

**Movie M2.** SDO/AIA observations of the newly formed hot loops at 131 Å on August 17, 2011. The left image is taken by AIA. The image on the right shows a filtered image.

**Movie M3.** Combined images showing the reconnection process observed at AIA 171, 193, and 131 Å on August 17, 2011. The left image shows plasma with different temperatures in red (171 Å), green (193 Å) and blue (131 Å). The image on the right shows the running ratio difference images from the same three channels relative to the images taken two minutes earlier. Only positive changes (brightenings) are shown for clarity.

**Movie M4.** SDO/AIA and RHESSI observations of the energy release on August 17, 2011. The red contours (10, 20, 40, 60, and 90 percent of the maximum) indicate emission at 4-10 keV; the blue contours show emission at 10-20 keV.

**Movie M5.** A close look at the reconnection region indicated in Fig. 1. The first three images show the region at AIA 171, 193 and 131 Å. The fourth and fifth images show base difference images (relative to the image taken around 04:00:00 UT) and running difference images from the same three channels together, displayed in different colors (red, green and blue, respectively). These combined images show how cool loops come together horizontally and then disappear, and how hot loops form and then separate vertically.