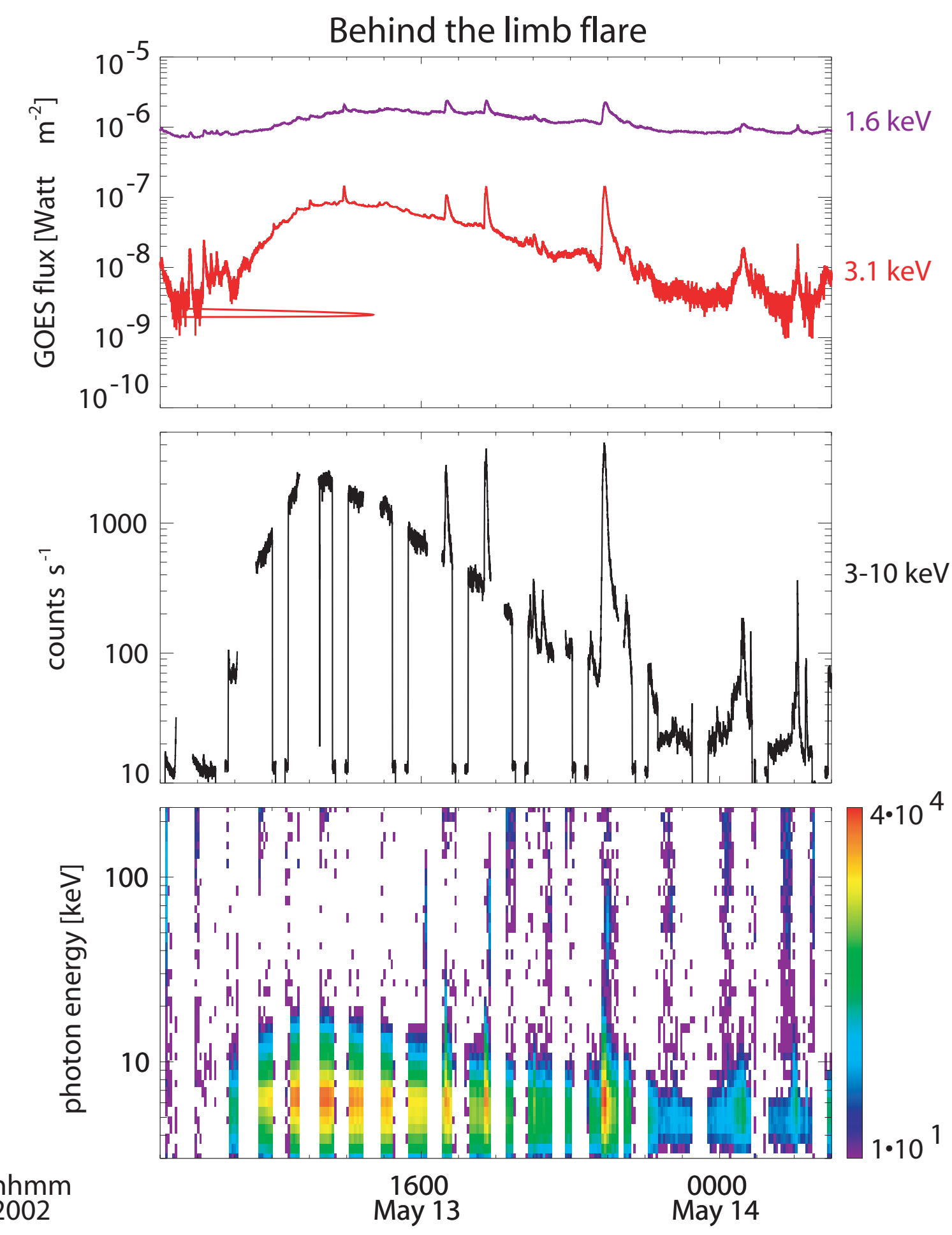


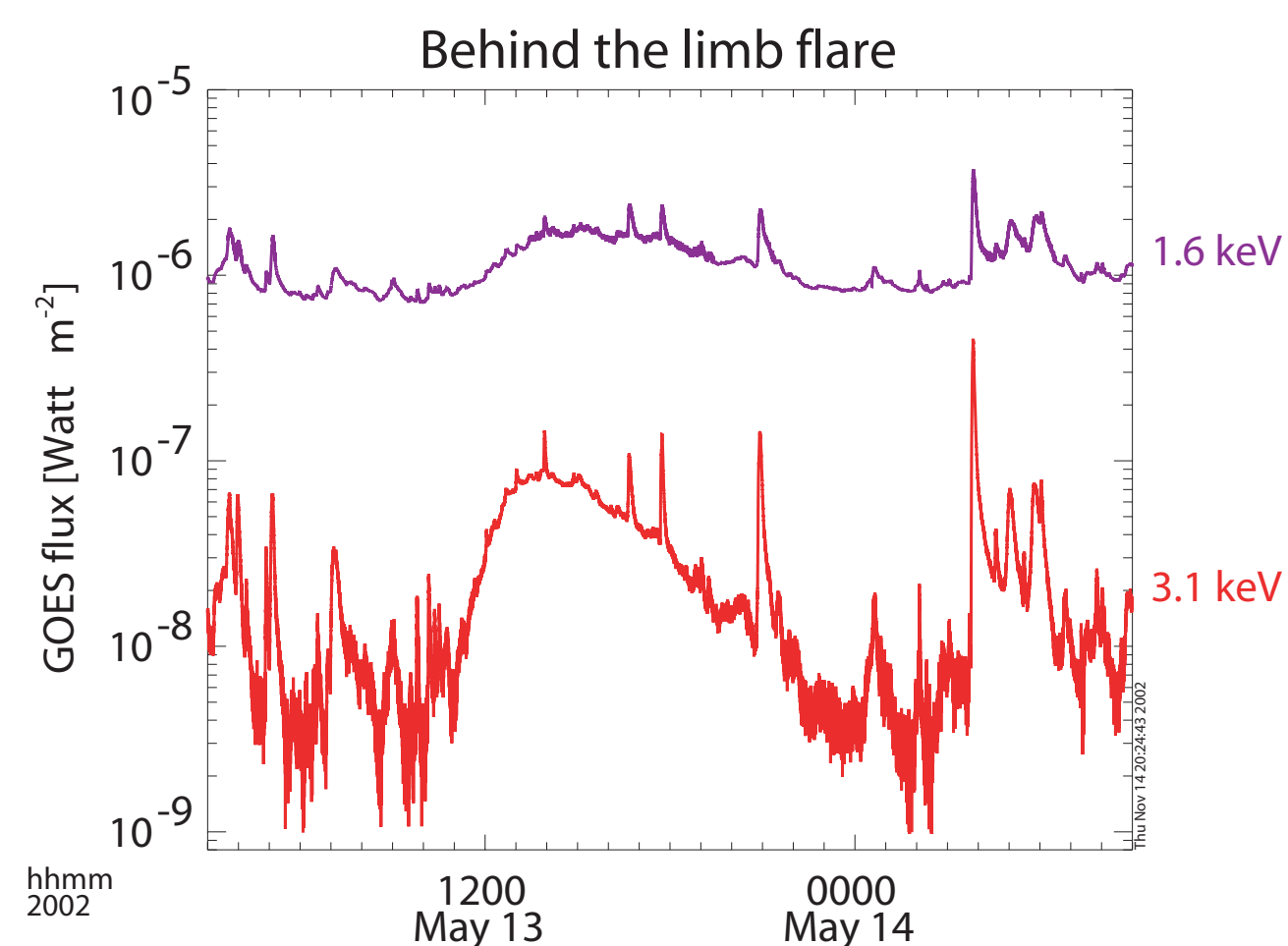
SH52A-0480

RHESSI Observations of an Occulted Hard X-ray Flare

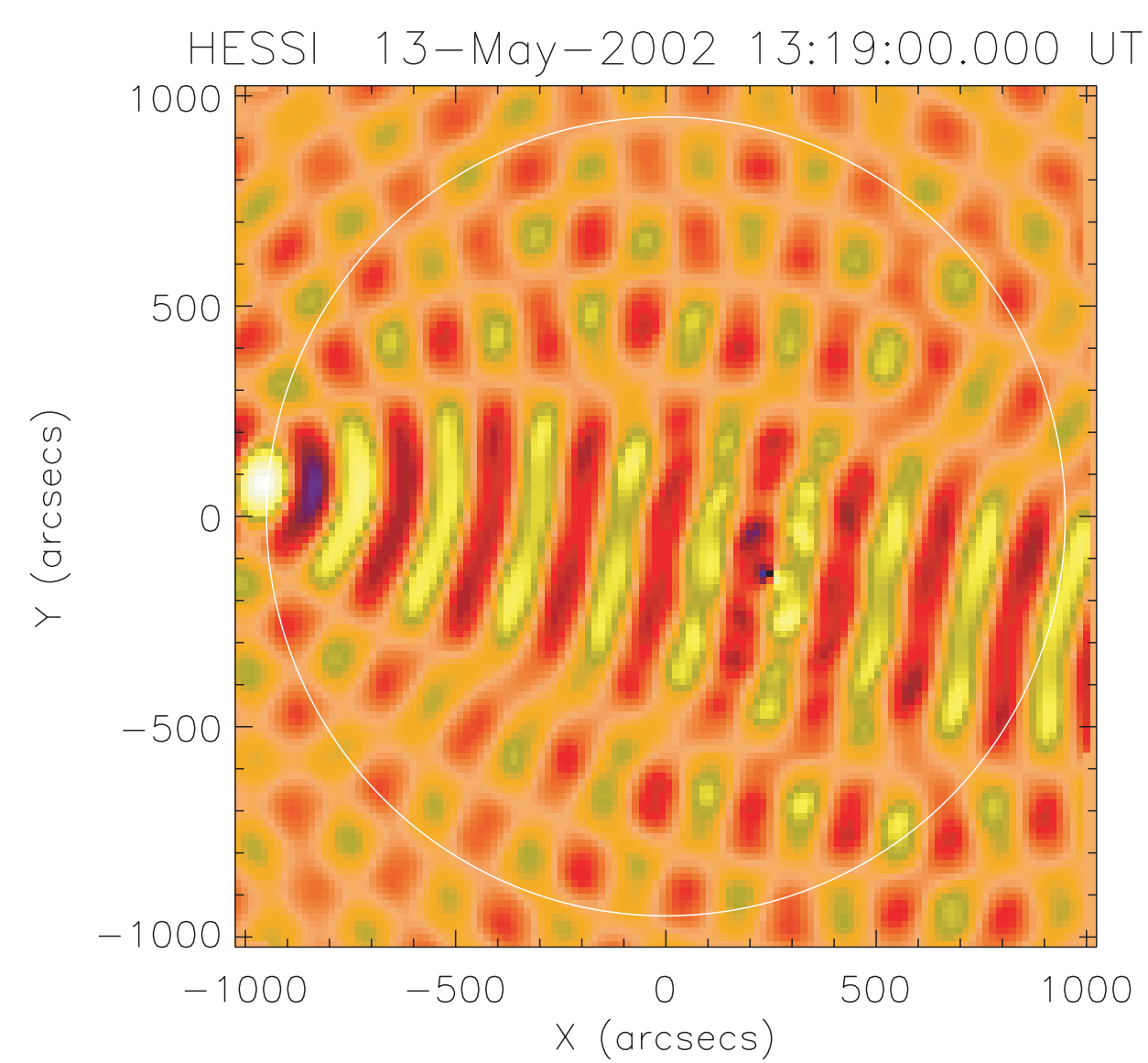
Paula Balciunaite¹, Steven Christe^{1,2}, Säm Krucker¹, R. P. Lin^{1,2}



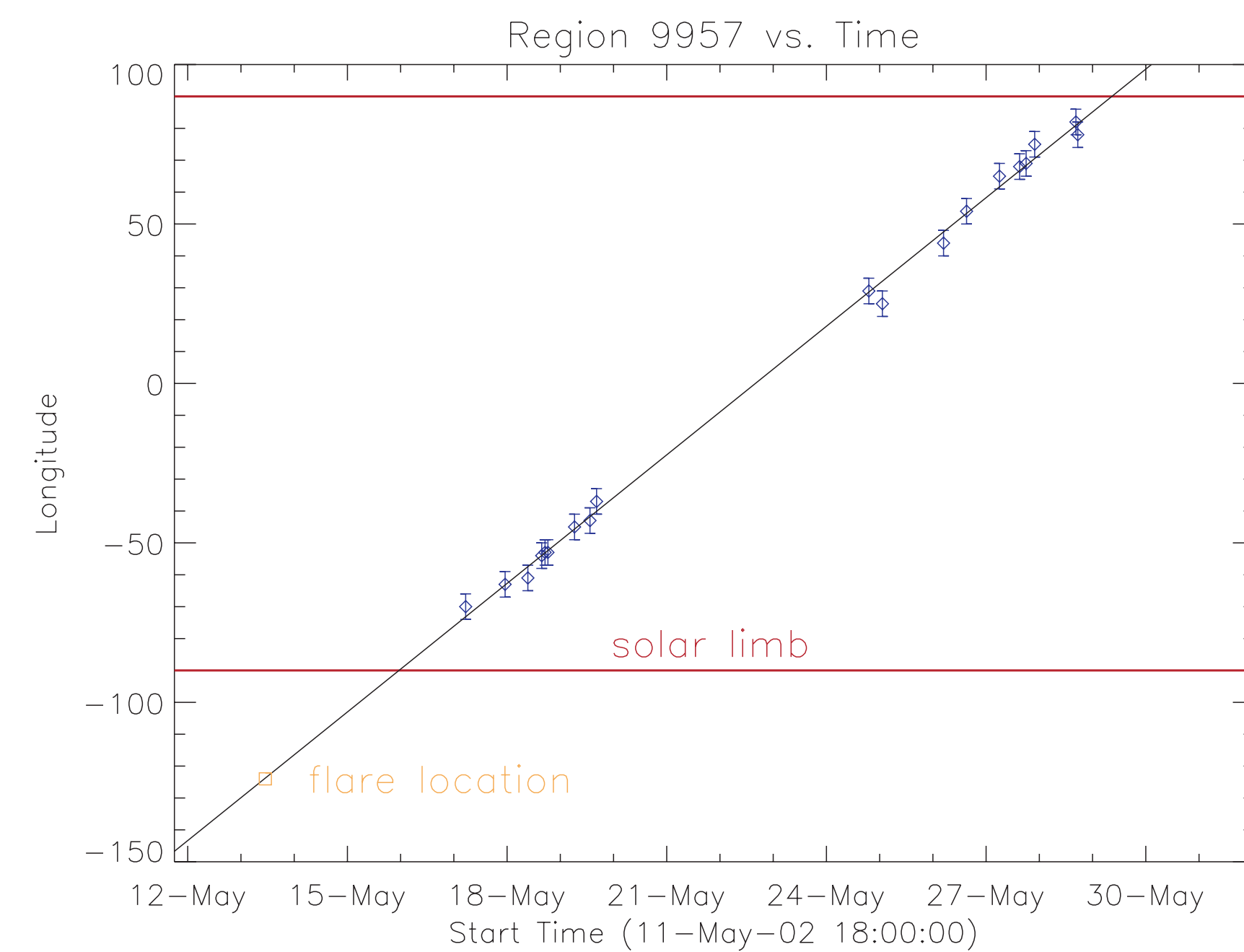
On May 13, 2002, RHESSI observed a slow-rise, long-duration flare in the lower energy channels (3-15 keV). The total duration of the event was 10 hours (~ 9 RHESSI orbits). Shown below is the GOES plot, the RHESSI uncalibrated counts between 3-10 keV, and the RHESSI count spectrogram with night-time, background subtracted.



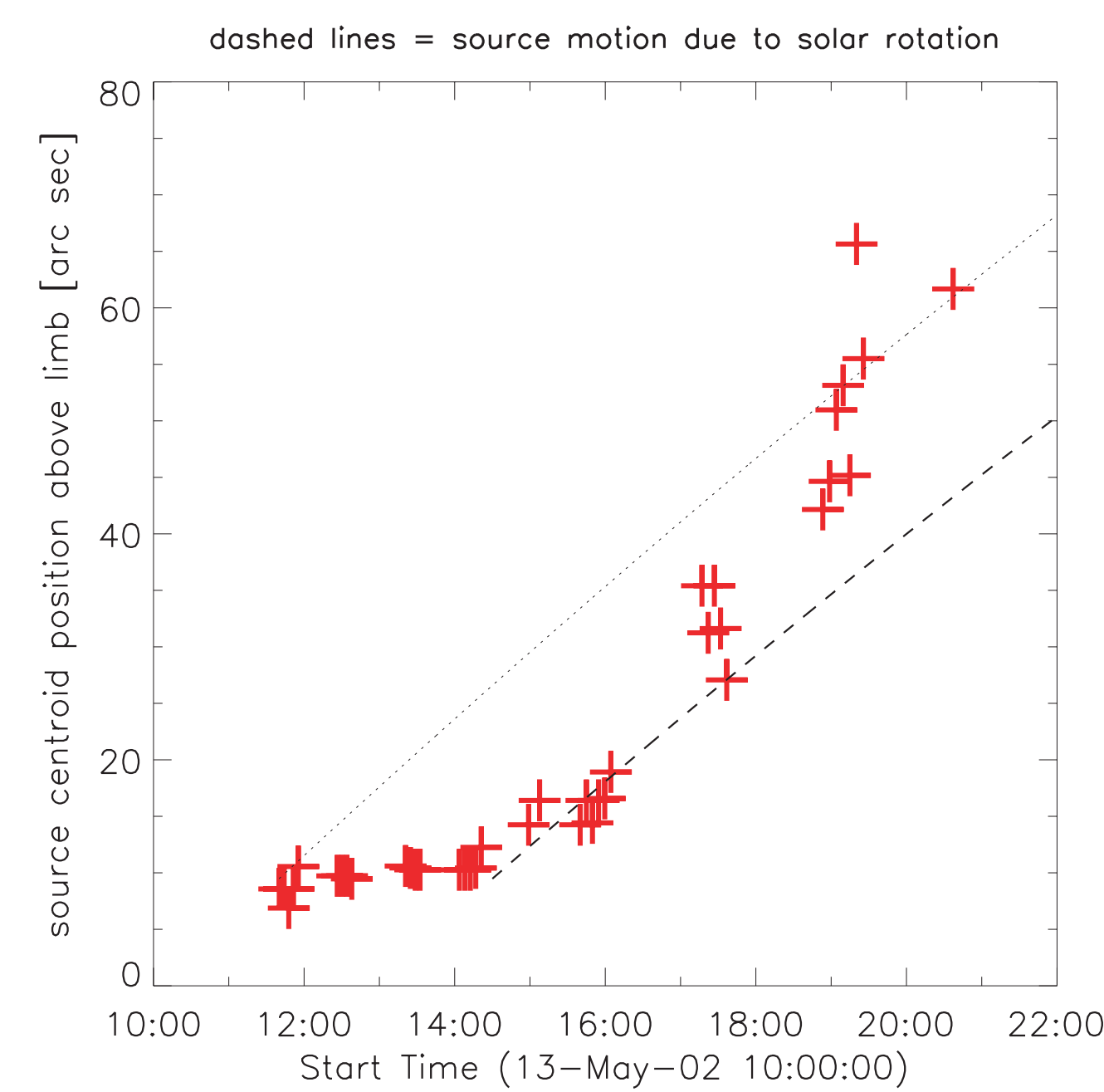
This 2 day GOES plot shows the unusually long duration of the flare, its slow rise and slow decay, and the lack of an impulsive phase.



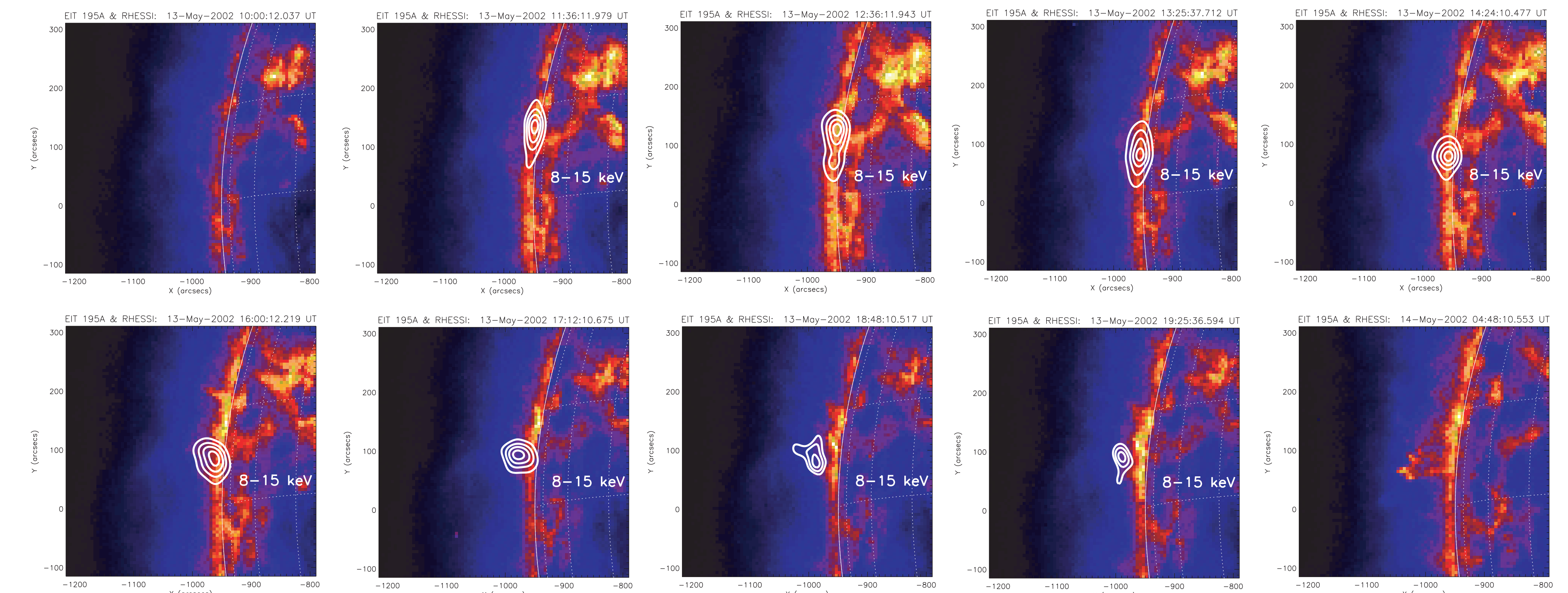
Reconstructing the RHESSI full disk image (using GeD 8, at the 8-15 keV energy channel) revealed that the flare brightening occurred on the east limb of the sun.



Magnetograms did not show an active region emerging from the east limb until ~3 days later. The position of the active region was extrapolated to 34 degrees behind the east limb by tracking the most probable originating active region (NOAA Active Region 9957), as the above plot shows. The height of the source is therefore inferred to be 0.20 solar radii above the east limb.

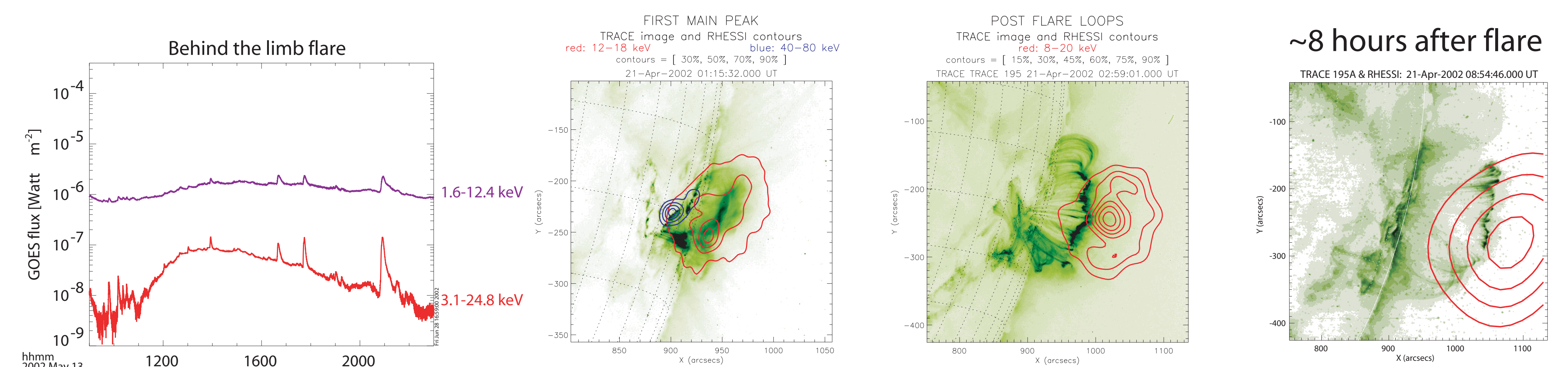


The hard X-ray (8-15 keV) source centroid position as a function of time initially shows a constant position just above the solar limb for approximately 2 hours. Then the source appears to rise above the limb, in a manner that could not be due solely to solar rotation. The radial velocity of the source is ~2 km/s. The estimate of the source motion due to solar rotation is a linear approximation.

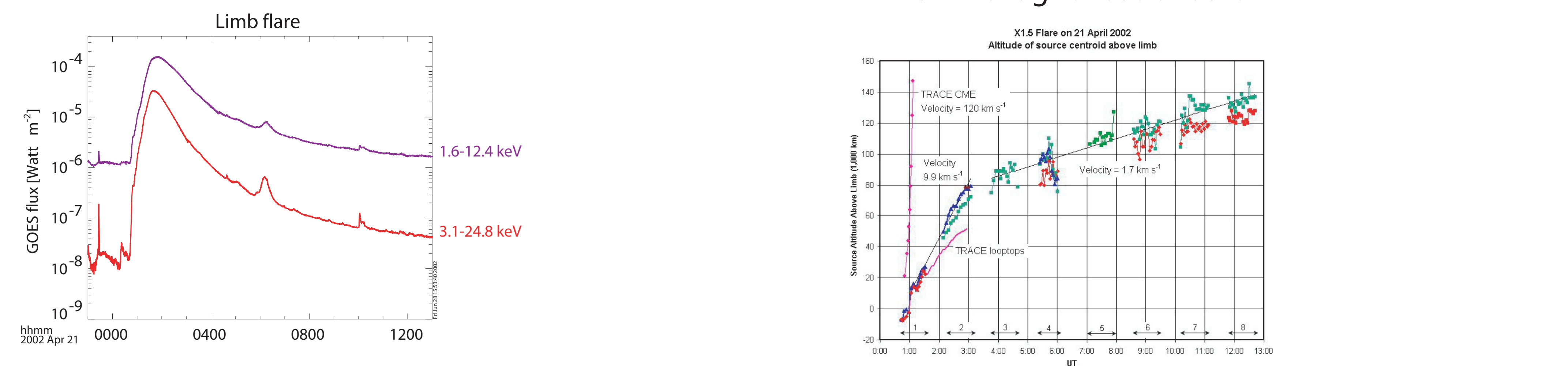


The above series of images shows RHESSI intensity contours superimposed on EIT (SOHO Extreme Ultraviolet Imaging Telescope) maps over the duration of the event (1 image per hour). While the RHESSI shows hard X-ray emission throughout the flare, EIT does not see emission until much later (~19 hours after the start of the event).

Comparison with limb flare on April 21, 2002



From Gallagher et al. 2002:



2 GOES plots: A comparison with an X1.5 flare observed on April 21, 2002 shows a substantial difference in the size of the two flares and the lack of an initial impulsive phase for the May 13 flare. This difference can be explained if the X-ray source directly associated with the May 13 flare and the initial impulsive phase was occulted from view (that is, the flare occurred behind the limb), and as the active region rotated into view, the impulsive phase was over and the rest of the flare could be observed. TRACE maps: TRACE images the solar corona and the transition region at high angular and temporal resolutions. Shown are RHESSI intensity contours superimposed on a TRACE image of the April 21 flare. They indicate that the April 21 flare occurred on the solar limb - if the flare was 34 degrees behind the limb, the highest RHESSI intensity contours would not be shown here. Source centroid plot for the April 21 flare shows the source rising for the first 3 hours and then slowly leveling off probably because of solar rotation.