

X5.4 flare on 7 March 2012: magnetic and velocity properties at the solar surface

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Solar flares abruptly release the free energy stored as a non-potential magnetic field in the corona and may be accompanied by eruptions of the coronal plasma. Formation of non-potential magnetic field and the mechanisms on triggering the onset of flares are still unclear; Especially, dynamical behaviors observed around polarity inversion lines producing major flares observationally. This presentation will discuss X5.4 flare on 7 March 2012 with emphasis on magnetic and velocity field properties at the solar surface. The coronal mass ejection launched at the same time as the X5.4 flare propagated through interplanetary space and caused a large geomagnetic storm on 9 March. One of remarkable properties to be discussed is a high-speed material flow existing along the polarity inversion line located between flare ribbons at the main energy release side. The high-speed material flow was observed in the horizontally oriented magnetic field formed nearly in parallel to the polarity inversion line and it existed at least from 6 hours before the onset of the flare and continued at least for several hours after the onset of the flare. Observations suggest that the observed material flow represents neither the emergence nor convergence of the magnetic flux. It may be rather considered as material flows working for increasing the magnetic shear along the polarity inversion line and for developing the magnetic structures favorable for the onset of the eruptive flare.

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