Evolution and magnetic topology of the M 1.0 flare of October 22, 2002

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Abstract. In this paper we analyse an M1.0 confined flare observed mainly during its gradual phase. We used the data taken during a coordinated observational campaign between ground based instruments (THEMIS and VTT) and space observatories (SoHO/CDS and MDI, TRACE and RHESSI). We use these multi–wavelength observations to study the morphology and evolution of the flare, to analyse its gradual phase and to understand the role of various heating mechanisms. During the flare, RHESSI observed emission only within 3 – 25 keV spectral range. The RHESSI spectra indicate that the emission of the flare was mainly of thermal origin with a small non–thermal component observed between 10 and 20 keV. The temperature of plasma obtained from the fitting of the RHESSI X–ray spectra was between 8.5 and 14 MK. The lower temperature limit is typical for a plasma contained in post flare loops observed in X–rays. Higher temperatures were observed during a secondary peak of emission corresponding to a small impulsive event. The SoHO/CDS observations performed in EUV Fe XIX line also confirm the presence of a hot plasma at temperatures similar to those obtained from RHESSI spectra. Besides, the EUV structures were located at the same place as RHESSI X–ray emission. The magnetic topology analysis of the AR coming from a linear force–free field extrapolation explains the observed features of the gradual phase of the flare i.e. the asymmetry of the ribbons and their fast propagation. The combination of the multi–wavelength observations with the magnetic model further suggests that the onset of the flare would be due to the reconnection of an emerging flux in a sheared magnetic configuration.

Key words. Sun: flares – Sun: X-rays – Sun: magnetic fields