

M29a Transition region down flows in the impulsive phase of flares

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Strong down flows in the transition region have been found during the impulsive phase of 4 flares. The flares occurred during coordinated observations between the Coronal Diagnostic Spectrometer (CDS) on board SOHO and the Domeless Solar Telescope (DST) in Hida Observatory in July and August, 2002. A narrow field of view (16×240 arcsec) was set for SOHO/CDS to achieve a high time cadence of 42 sec, and lines of He I ($\log T_e = 4.55$), O V (5.35), and Mg IX (6.00) were selected to study the dynamics in a wide temperature range. $H\alpha$ filter images were simultaneously obtained with the DST.

We mainly observed active regions in this campaign and caught several flare kernels within the narrow SOHO/CDS field of view. The SOHO/CDS spectra were analysed for 4 flares ranging from GOES B-class to M-class. Strong relative Doppler velocities of 20-80 km/s were detected in the O V line in the impulsive phase of the flares, which indicate down flows in the transition region in excess of the normal transition region red-shift. The analysis of He I spectra and $H\alpha$ wavelength scanned images indicated down flows of about 10 km/s at the same time, which agrees with previous papers on the red asymmetry in chromospheric lines. Our study shows that down flows in the transition region may be a common characteristic of the flare impulsive phase, regardless of the flare size. These results provide a clue for the understanding of chromospheric evaporation and flare precursors.