IRIS-9, Göttingen, 25-29 June 2018

Poster

4. Eruptions in the solar atmosphere

Chromospheric Condensation and Quasi-periodic Pulsations in a Circular-ribbon Flare

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We report our multiwavelength observations of the C3.1 circular-ribbon flare SOL2015-10-16T10:20 in active region (AR) 12434. The flare consisted of a circular flare ribbon (CFR), an inner flare ribbon (IFR) inside, and a pair of short parallel flare ribbons (PFRs). During the impulsive phase of the flare, "two-step" raster observations of *IRIS* with a cadence of 6 s and an exposure time of 2 s show plasma downflow at the CFR in the Si IV λ1402.77 line ($\log T \approx 4.8$), suggesting chromospheric condensation. The downflow speeds first increased rapidly from a few km s^{-1} to the peak values of 45−52 km s^{-1}, before decreasing gradually to the initial levels. The decay timescales of condensation were 3−4 minutes, indicating ongoing magnetic reconnection. Interestingly, the downflow speeds are positively correlated with logarithm of the Si IV line intensity and time derivative of the *GOES* soft X-ray (SXR) flux in 1−8 Å. The radio dynamic spectra are characterized by a type III radio burst associated with the flare, which implies that the chromospheric condensation was most probably driven by nonthermal electrons. Using an analytical expression and the peak Doppler velocity, we derived the lower limit of energy flux of the precipitating electrons, i.e., 0.65×10^{10} erg cm^{-2} s^{-1}. The Si IV line intensity and SXR derivative show quasi-periodic pulsations with periods of 32−42 s, which are likely caused by intermittent null-point magnetic reconnections modulated by the fast wave propagating along the fan surface loops at a phase speed of 950−1250 km s^{-1}. Periodic accelerations and precipitations of the electrons result in periodic heating observed in the Si IV line and SXR.