

Dynamic evolution of EUV loops

Yin Zhang, Baolin Tan



National Astronomic Observatories, Chinese Academic of Science (email:zhangyin@bao.ac.cn)

Abstract: Observations of the solar corona with Yohkoh, SOHO and TRACE have revealed that individual coronal loop of active regions have their own temperatures from 1 to 5 MK. The cool (1-2 MK) EUV loops can be identified clearly by 171 A observations. We investigate the dynamic evolution of well-observed cool loops which appeared in an ephemeral active region NOAA 10385 on 25 Dec, 2011, by using Solar Dynamics Observatory (SDO)/Atmospheric Imaging Assembly (AIA) multiwavelength images. The photospheric properties of their foot-points are also discussed in detail by using SDO/Helioseismic and Magnetic Imager (HMI) magnetic and velocity field.

1. Motivation

Investigate the dynamic evolution of footpoints of EUV loop and the long-term evolution of the loop as a whole, and discuss the possible heating mechanism of EUV loop.

3. Observational results

2. Data analyze

Line of sight magnetic filed: HMI Doppler velocity: HMI Horizontal velocity: DAVE method Temperature: AIA multi-wavelength observations



Third row: temperature; Fourth row: Doppler velocity; Fifth: horizontal velocity. White boxes indicate both foot points and white line in first AIA filtergram shows position of the loop top. This figure shows that there are no permanent motions in both foot points. While the temporal evolution of magnetic field and temperature are shown in right figure.

Possible wave information was identified by wavelet analyzing at two slices that indicated by white line in 171 filtergram and a comparable quiet region. The figure shows no obviously information resulting from oscillation of loop.

4. Summary

(1)The EUV loop was relative stable during the period from 04:00 UT to 08:40 UT.

(2) The degree of mixed polarity in both foot points is 0, which means that both are single polarity during the evolution. (3) Both footpoints do not show obvious motions (no shear, no twist, and no other motions).

(4) The loop top was heated and kept on high temperature as 1.4 MK, while both foot points continue to experience heating and cooling.

The observational results suggest that it is difficult to explain the heating of the EUV loop by magnetic reconnection mechanism or wave heating mechanism. And the magnetic gradient pumping (MGP) mechanism (Tan, 2014) will be a possible candidate. It deserves further discussions.