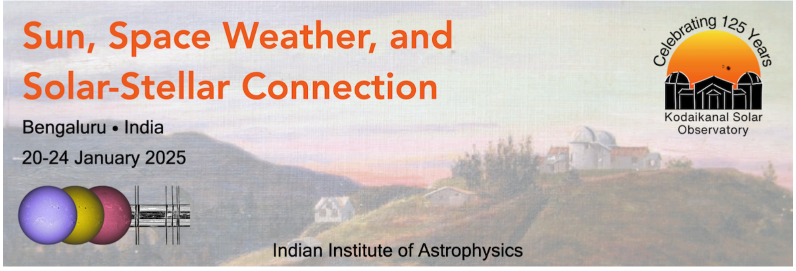

Contribution ID: **49** Type: **Poster**

Exploring propagation of small-scale flare heat flux in the lower and upper atmosphere of solar active region

During the solar flares, whole solar atmosphere gets heated; however, the energy deposition process in the lower solar atmosphere is still unclear. In this paper, we present spectroscopic and imaging observations of a small-scale transient of life-time ≈2-min and subsequent formation of a hot transient loop of life-time ≈4-min in a solar active region. The event is classified as an A-class flare by GOES. We utilize multi-wavelength observations recorded by the Interface Region Imaging Spectrograph (IRIS) Slit-Jaw Imager (SJI) and Solar Dynamic Observatory (SDO). Differential emission measure (DEM) analysis shows that the transient attained a more than 10 MK temperature. The observed transient shows hot plasma moving upward, forming a small-scale transient loop with a similar temperature. Using the IRIS density-sensitive O IV line pair, we obtained the average electron number density of $10^{11.25}$ cm^{-3} at the foot-point of the transient. IRIS transition region lines such as O IV and Si IV show a redshift of 10-15 km s^{-1}, whereas neutral lines such as C I and S I show a redshift of about 5 km s^{-1}. These Doppler shifts suggest a down-flowing plasma in the lower atmosphere, which decelerates in the deeper layers of the lower atmosphere. HMI magnetogram shows that the transient occurred beneath the mixed polarity region and provides evidence of flux emergence of both polarity fields which powers the transient. The observed transient shows enhancement in intensities in all the passbands of the AIA, IRIS, and HMI continuum which are sensitive to different temperatures and follow very clean temperature-dependent time delays in both the lower and upper atmosphere. Enhancement recorded in HMI photospheric visible continuum emission is very much unexpected for such a small energetic A-class flare; such enhancements are generally reported only for giant flares. These enhancements in intensities in the lower atmosphere result from efficient heating either due to the electron beams, or back-warming effects, or damping of downward propagating Alfv\'en waves.

Contribution Type

Theme

Energetic Phenomena

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