Analysis of a Mid-infrared solar flare driven by thermal conduction

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Abstract:

We present the analysis of the SOL20190515 event, a C2 class flare observed at 30 THz (10 μm) by the ground-based telescope AR30T, in operation at the Estación de Altura Carlos C. Cesco in the Observatorio astronómico Félix Aguilar, San Juan-Argentina. The increase of the emission in the mid-IR continuum during flares evidence the association with heating and ionization of the chromosphere. We perform a multi-wavelength analysis by combining the continuum mid-IR data from AR30T with ultraviolet images and magnetograms from SDO, Hα images from HASTA, microwaves spectra from EOVSA and soft X-ray data from GOES. We investigate the temporal and spatial evolution of the flare to understand the energy transport mechanisms in this weak event and propose a flare scenario. The mid-IR and ultraviolet images show a clear, impulsive response from the chromospheric plasma. However, EOVSA microwave data suggest the absence of a significant number of accelerated electrons during the flare. Therefore, we consider thermal conduction as the main energy transport process in the event. Our study also remarks the relevance of the mid-IR observations in general and of the AR30T telescope to understand the dynamics of the chromosphere during flares.

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