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The relationship between the solar flares, EIT waves and radio-bursts?

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We have analysed solar activity using simultaneous observation of Solar Dynamics Observatory (SDO), Solar Terrestrial Relations Observatory (STEREO), Parker Solar Probe (PSP), and GOES missions. We studied the M4.4 class solar flare that occurred around 13:00 on 29th November 2020 in the active region (AR 12790) and the related CME. The flare is observed at the solar limb by the SDO and close to the disk center by STEREO. We analysed data from SDO-AIA, STEREO-EUVI to determine the potential source of the type II and III radio bursts observed by PSP. To this aim, we studied the flare brightness and topology evolutions and the CME velocity propagation. Using the PSP-RFS data and a model of the heliospheric density, we estimated the electron density, the height where the type II and III bursts are created and, electron velocity related to these bursts. The new PSP data allows us to investigate the radio-emission unprecedentedly close to the Sun with improved sensitivity. Moreover, we analysed the EIT (EUV) wave observed by STEREO-SECCHI, producing a widespread of solar energetic particles in the heliosphere. Based on the above measurements, we built the comprehensive image of the solar eruption. First, the SDO&STEREO observations showed a flare and associated EIT wave. The type III radio-burst is associated with electrons beams that are accelerated by magnetic field reconnection during the flare. Then, the CME is propagated. The type II radio-burst is related to propagation of a MHD wave in the corona resulting from CME propagation.

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