

Transition-Region/Coronal Signatures of Penumbral Microjets: Hi-C, SDO/AIA and Hinode (SOT/FG) Observations

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Penumbra microjets are bright, transient features seen in the chromosphere of sunspot penumbrae. Katsuoka et al. (2007) noted their ubiquity and characterized them using the Ca II H-line filter on Hinode's Solar Optical Telescope (SOT). The jets are 1000--4000 km in length, 300--400 km in width, and last less than one minute. It was proposed that these penumbral microjets could contribute to the transition-region and coronal heating above sunspots. We examine whether these microjets appear in the transition-region (TR) and/or corona or produce brightenings there.

The chosen sunspot is one observed by Hi-C on July 11, 2012 at $\sim -145''$, $-300''$. First, we identify penumbral microjets with the SOT's Ca II H-line filter. We then examine the sunspot in the same field of view and at the same time (from $\sim 18:50:00$ UT to $20:00:00$ UT) in other wavelengths. We use the High Resolution Coronal Imager Telescope (Hi-C) at 193\AA and the 1600\AA , 304\AA , 171\AA , 193\AA , and 94\AA passbands of the Atmospheric Imaging Assembly (AIA) on board the Solar Dynamics Observatory (SDO). We find many Ca II jets and examine whether they have any discernible signature in the other passbands, but find none, except for a few exceptionally strong jets that have longer lifetimes and bigger sizes and occur at only a few locations in the penumbra. We conclude that the normal (smaller) microjets are not heated to transition-region/coronal temperatures, but the larger jets are.