A Series of Streamer-Puff CMEs Driven by Solar Jets from the Active Region 12192

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Abstract

We investigate characteristics of solar coronal jets that originated from active region NOAA 12192 and produced coronal mass ejections (CMEs). This active region produced many non-jet major flare eruptions (X and M class) that made no CME. A multitude of jets occurred from the southeast edge of the active region, and in contrast to the major-flare eruptions in the core, six of these jets resulted in CMEs. Our jet observations are from multiple SDO/AIA EUV channels, and Hinode/XRT and CME observations are taken from SOHO/LASCO C2 coronograph. Each jet-driven CME was relatively slow-moving (~200 - 300 km s⁻¹) compared to most CMEs; had angular width (20° - 50°) comparable to that of the streamer base; and was of the “streamer-puff” variety, whereby a preexisting streamer was transiently inflated but not removed (blown out) by the passage of the CME. Much of the chromospheric-temperature plasma of the jets producing the CMEs escaped from the Sun, whereas relatively more of the chromospheric plasma in the non-CME-producing jets fell back to the solar surface. We also found that the CME-producing jets tended to be faster in speed and longer in duration than the non-CME-producing jets. We expect that the jets result from eruptions of minifilaments (Sterling et al. 2015). We further propose that the CMEs are driven by magnetic twist injected into streamer-base coronal loops when erupting-twisted-minifilament field reconnects with the ambient field at the foot of those loops.