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We investigate the formation and evolution of mesoscale structures that result from the interaction of a coronal mass ejection (CME) with the heliospheric current sheet embedded in a stream interaction region. These structures dynamically form in our simulation of the 2014 September 10 event, performed with the Alfv ?en Wave Solar Atmosphere Model (AWSoM). With AWSoM, we first produce the background solar wind condition using synoptic magnetograms. The CME is initiated from the originating active region with a Gibson-Low magnetic flux rope defined to match the observed event. With the use of high-resolution grids, we capture magnetic reconnection at the heliospheric current sheet and within/at the front boundary of ICMEs leading to the formation of mesoscale flux ropes containing sufficiently strong magnetic fields (~30 nT) to be geoeffictive. We follow these flux ropes to 1 AU where they arrive with diameters ranging from 2-4 solar radii entrained with dense plasma of nearly 100 particles per cubic centimeter. We replicate PUNCH observations of the system with a synthetic Thomson-scattered white light images of the CME emphasizing the requirements for capturing mesoscale solar wind structures in detail.
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