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3D Magnetic reconnection and energy release in solar flares and eruptions

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The three-dimensional magnetic reconnection geometries have recently been shown to be present in solar flares, providing explanations for various observed phenomena, including evolution of sigmoids, drift of the erupting flux rope legs, and the shape of solar flare arcades. We review the observational evidence for these processes and their consequences for space weather. Particular emphasis is paid to related energy release phenomena occurring on short timescales, including HXR and radio bursts, fast slippage of flare loops, intermittent heating of the solar flare atmosphere, and the possibility that the flaring atmosphere is strongly out of equilibrium.

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