Data-driven modelling of erupting solar active regions

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Fully understanding solar eruptions and their eventual consequences for the Earth requires a rigorous modelling approach due to the difficulty of directly measuring magnetic fields in the solar corona. Consequently, this study employs a time-dependent data-driven magnetofrictional model (TMFM) to simulate the coronal evolution of coronal mass ejections from multiple active regions. We processed HMI vector magnetograms with the Electric Field Inversion Toolkit to generate a time series of photospheric electric field maps which were used as the lower boundary to drive our TMFM simulations. Analysis was aided by computing maps of the squashing factor and twist, as well as by calculating coronal metrics such as the volume energy and helicity, and by comparison to AIA observations. Studying multiple events simultaneously permits comparative analysis and the evaluation of the model performance.