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Global MHD simulations of ejections of magnetic flux ropes

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Magnetic flux ropes ejections are considered a progenitor of Coronal Mass Ejections (CMEs) and their occurrence usually follows a long lasting equilibrium in the solar corona. Magnetic flux ropes form in the solar corona due to the evolution the coronal magnetic field driven by photospheric motions and flux emergence events and when magnetic flux ropes become unstable their ejection may turn into a CME releasing plasma and magnetic flux into the interplanetary space. Although state of the art simulations can explain flux rope ejections, to perform these studies from realistic configurations merged into the global corona is key to shed light on still standing questions: what is the impact of a flux rope ejection on the global configuration of the corona? Can a single ejection accelerate or trigger ejections in different locations?
However the size of the full coronal domain and the different time scales involved pose considerable challenges. To this end we couple the Global Non-Linear Force-Free Field (GNLFFF) model applied to observed magnetograms to 3D MHD simulations of the global corona. The GNLFFF is tailored to describe the slow magnetic evolution of the corona that leads to a flux rope formation, while the MPI-AMRVAC software is a numerical MHD model that keeps a general approach and can effectively model a fast flux rope ejection.
We will present our model and how its potential in the Space Weather forecast context and some preliminary results.

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