Coronal mass ejections (CMEs) and solar flares are the main drivers of weather in space. Understanding how these events occur and what conditions might lead to eruptive events is of crucial importance for up to date and reliable space weather forecasting.

In this talk we will present a numerical magnetohydrodynamic (MHD) data-inspired model suitable for the simulation of the CME initiation and their early evolution. Starting from a potential magnetic field extrapolation of the active region (AR) NOAA 9415, we solve the full set of ideal MHD equations in a non-zero plasma-β environment. As a consequence of the applied twisting motions, a force-free magnetic field configuration is obtained, which has the same chirality as the investigated AR. We investigate the response of the solar corona when photospheric motions resembling the ones observed for AR 9415 are applied at the inner boundary.

In the second part of the talk, the effect of the overlying field in the CME deflection will be discussed. The results of an axisymmetric MHD simulation will be used to perform a model-driven interpretation of the filament eruption that occurred on 2009 September 21.