EGU21-6760
https://doi.org/10.5194/egusphere-egu21-6760
EGU General Assembly 2021

Two classes of eruptive events during Solar Minimum

Prantika Bhowmik and Anthony Yeates
Durham University, Department of Mathematical Sciences, Durham, United Kingdom of Great Britain – England, Scotland, Wales (prantika.bhowmik@durham.ac.uk)

During Solar Minimum, the Sun is perceived to be quite inactive with barely any spots emerging on the solar surface. Consequently, we observe a drop in the number of highly energetic events such as solar flares and coronal mass ejections (CMEs), which are often associated with active regions on the photosphere. However, our magnetofrictional simulations during the minimum period suggest that the solar corona could still be significantly dynamic while evolving in response to the large-scale shearing velocities on the solar surface. The non-potential evolution of the corona leads to the accumulation of magnetic free energy and helicity, which is periodically lost through eruptive events. Our study shows that these events can be categorised into two distinct classes. One set of events are caused due to full-scale eruption of low-lying coronal flux ropes and could be associated with occasional filament erupting CMEs observed during Solar Minimum. The other set of events are not driven by destabilisation of low-lying structures but rather by eruption from overlying sheared arcades. These could be linked with streamer blowouts or stealth CMEs. The two classes differ considerably in the amount of magnetic flux and helicity shed through the outer coronal boundary. We additionally investigate how other measurables such as current, open magnetic flux, free energy, coronal holes area, and the horizontal component of the magnetic field on the outer model boundary vary during the two classes of event. This study demonstrates and emphasises the importance and necessity of understanding the dynamics of the coronal magnetic field during Solar Minimum.