The relations between the solar source of Coronal Mass Ejections (CME) and their effects in the terrestrial environment are far from being understood quantitatively, let it be for the physical mechanisms (solar-terrestrial physics) or for the effects on living bodies and technological systems (space weather). Are successively involved the formation mechanism of solar flares and CMEs, the propagation within the solar wind, the interaction with the Earth’s magnetosphere and the coupling between the magnetosphere, the ionosphere and the neutral atmosphere.

Studying the physical processes in, and between the various regions on the path from the Sun to the Earth is one among the objectives of the French National Solar-Terrestrial Physics program. We only focus here on the earthward part of the domain, by looking at the interactions between CMEs and the magnetosphere, as seen on convection maps and polar cap potential values derived from SuperDARN radar data.

The polar cap potential, obtained from the APL database for the northern hemisphere radars, shows a noticeable response to the arrival of the CME only in a very limited number of cases (about 10% of the database). For halo CMEs propagating backwards from the Sun or on the eastward limb of the Sun, the lack of terrestrial effect is quite normal. In addition, halo CMEs with a negative acceleration seem also to lack of effectiveness. Moreover, the direction of \( B \) and the orientation of \( B_z \) plays the major role in defining the geoeffectiveness of a halo CME.