



A simple model of Forbush decreases caused by sheathless magnetic clouds

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A simple model has been derived that qualitatively describes short-term galactic cosmic ray (CR) decreases, i.e. Forbush decreases (FDs) caused by magnetic clouds (MCs) that drive no sheath region. The model is based on the interaction of the MC and CRs where the time profile of the CRs during the passage of the MC can be represented by the radial profile of trapped particles within a cylindrical 2D region, when a constant magnetic field is switched on. The model predicts that the number of CRs will decrease towards the center of the MC. The profile and its amplitude depend on the magnetic field strength and spatial extent of the MC. Although the model is based on basic electrodynamics only, it has the potential to forecast the amplitude as function of particle energy, and MC radius and magnetic field strength. We test the model on a sample of events using in situ magnetic cloud measurements from ACE and WIND satellites as well as CR measurements by EPHIN detector onboard SOHO satellite. This work has been supported in part by Croatian Science Foundation under the project 6212 „Solar and Stellar Variability“ and by MZOS/DAAD bilateral project CORAMOD.