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Thermospheric response to interplanetary coronal mass ejections

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We present a statistical analysis on the response of the Earth's thermosphere to the impact of interplanetary coronal mass ejections (ICMEs). Drag measurements from the GRACE satellite during the time range 2003 – 2010 are analyzed. Observed density enhancements in the Earth's thermosphere could be associated to 20 ICMEs. For a sample of ICMEs consisting of a magnetic cloud structure, we obtain characteristic parameters by applying the force-free, constant-alpha flux rope model of interplanetary magnetic clouds. From this we derive θ and ϕ, angles determining the axis orientation of the fitted cylinder, B_0 the magnetic field strength in the center of the cloud from the fit, as well as helicity and sonic Mach number. We relate these quantities to the drag and Dst measurements.