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Solar wind - magnetosphere coupling efficiency during ejecta and sheath region driven intense geomagnetic storms

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The majority of the strongest magnetospheric disturbances are driven by interplanetary coronal mass ejections (ICMEs). An ICME event consists of two structures with distinct solar wind properties: the ejecta with typically smooth solar wind driving parameters and the turbulent sheath region ahead of the ejecta. Previous studies have shown that the magnetospheric response as measured by geomagnetic indices such as AL and Dst is typically different during ICMEs and sheath regions. Here we study the characteristics of the solar wind-magnetosphere coupling efficiency during ejecta and sheath regions. The data set comprises the time period between 1996-2014 and the solar wind data from the near-Earth spacecraft (Wind and ACE). In particular, we will investigate the effect of Alfven Mach number on the solar wind-magnetosphere coupling efficiency and saturation of the polar cap potential. In sheath regions the Alfven Mach number is typically higher and more variable than in the ejecta which leads to significant variations in energy supply into the magnetosphere.