

Solar Wind-Magnetosphere Coupling Efficiency and Polar Cap Potential Saturation

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As the solar wind reaches the vicinity of the Earth, it interacts with the Earth's magnetosphere and impacts the near-Earth space environment. The plasma and magnetic field properties of the solar wind plasma define the coupling and energy transfer between the solar wind and the magnetosphere. This presentation gives an overview what is meant by the solar wind-magnetosphere coupling efficiency, how it can be defined and what factors limit it. Especially the presentation focus on cross polar cap potential (CPCP) saturation, which is one of the key phenomenon decreasing the coupling.

Several models have been presented in the literature to explain the CPCP saturation but the reasons leading to saturation are still under debate. One of the controversial topic is the dependence of the CPCP on the upstream solar wind conditions. In this presentation, I go through theory, recent observations and results related to the coupling efficiency and saturation of the CPCP during different upstream solar wind conditions. The particular focus of the study was on the coupling efficiency dependence with upstream solar wind Alfvénic Mach number and dynamic pressure conditions.