



Magnetospheric response to solar wind dynamic pressure

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Polar Cap (PC) index values are derived from polar magnetic variations calibrated on a statistical basis such that the polar cap index approximate values in units of mV/m of the interplanetary "merging" (or "geo-effective") electric field conveyed by the solar wind. We have examined the possible influence from solar wind density variations and see little or no effects from this parameter over a wide range of values. We have also examined the basis for some of the previously published analyses, which attribute large variations in the polar cap indices to solar wind dynamic pressure variations, and have found inaccuracies in the data analysis that cast doubt on the results. Our main conclusion is that the PC index values respond little to solar wind density variations except for short-lasting variations at the arrival of solar wind shock fronts, which cause global sudden impulses (SI) or storm sudden commencements (SSC). Even in these events, which have been studied extensively in the past, it is unclear whether the geomagnetic effects are related to the solar wind density variations as such or to other properties of the shock front like steep gradients in the solar wind velocity as well as in the magnetic field components.