

## **SOLAR WIND DENSITY INFLUENCE ON THE EFFICIENCY OF RING CURRENT RESPONSE TO A GIVEN SOLAR WIND ELECTRIC FIELD**

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Solar wind density has been claimed to have a strong effect on Earth's inner magnetosphere. Elevated solar wind density usually exists during intervals of enhanced magnetospheric activity, which complicates the analysis required to make this conclusion. In contrast, statistical studies have consistently shown that the independent correlation between solar wind density and inner magnetosphere activity (via a proxy, such as the Dst index) is small. These two seemingly contradictory results are resolved by showing that the solar wind density affects the solar wind electric field geoefficiency in a way that is not captured by the standard correlation or epoch averaging approach. The solar wind density influence is quantified using systematic statistical approaches that differ from the standard correlation treatment, including (a) data--derived impulse response functions and (b) the relationship between the integrated response of  $D_{st}$  to the integrated value of  $vB_s$  during geomagnetic storm intervals. We also show that (1) it is the solar wind density, not pressure that is the mediating factor and (2) the geoefficiency does not seem to depend on pre--conditioning by elevated solar wind density prior to the start of a geomagnetic storm.

Ring Current, Solar wind density, geoefficiency

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