

MAPPING GROUND LEVEL GEOMAGNETIC PERTURBATIONS AS A FUNCTION OF SOLAR WIND/IMF CONDITIONS

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Prior methods for predicting geomagnetic perturbations based on real-time solar wind/interplanetary magnetic field (IMF) measurements have usually been based on simulation or empirical calculations of the ionospheric electric fields and currents, from which the level of geomagnetic perturbations at ground level are calculated. A primary source of error in these calculations are uncertainties in the level of ionospheric conductances as well as the effects of induced currents underground.

Creation of a new empirical model specifically for geomagnetic predictions has recently started. Rather than using ionospheric field and currents, the new model is based entirely on global measurements of the ground level geomagnetic perturbations, along with the simultaneous measurements of the IMF; therefore it will be able to more accurately predict geomagnetic fluctuations for similar IMF conditions, as intervening calculations and uncertainties are eliminated.

Initial tests of the techniques have produced maps of the Northward, Eastward, and Vertical perturbations for several levels of IMF magnitude and clock angle orientations. When mapped in corrected geomagnetic latitude and local time, the patterns that are seen are very consistent, and have relatively little scatter. Thus, it is expected that the final model will work very well for geomagnetic predictions based on measurements of the upstream IMF.

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