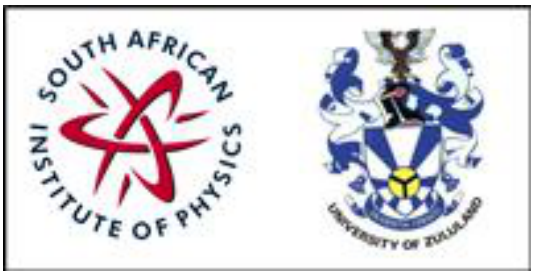

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Progress towards a GIC prediction framework

Tuesday, 9 July 2013 15:40 (20 minutes)

Abstract content
   (Max 300 words)

This paper presents work in progress towards extending the lead time for forecasting space weather related geomagnetically induced currents (GICs) in power lines. The earth's magnetic field is connected to, and perturbed by the continuous outflow of solar plasma (the solar wind). At times the disturbances to the geomagnetic field caused by the buffeting received from the solar wind is strong enough to induce currents in earth that are closed in terrestrial conductor networks like power distribution lines. When these currents flow to ground via the neutral connection of Y-connected power transformers, they may cause disturbances on the power system and permanent damage to the power transformers. Forecasting these events will enable power utilities to mitigate the impact on the power system. We discuss progress toward an integrated GIC prediction framework. The first part of the talk outlines the chain of events leading to induced currents and the second part will address the progress towards a working prediction model. The model is based on an empirically developed neural network (NN) based predictor of perturbations in the northern (X) and eastern (Y) components of the geomagnetic field that uses solar wind plasma and magnetic field measurements as input. Solar wind measurements are streamed from spacecraft located in the upstream solar wind, resulting in a lead time of about 1 hour - depending on the speed of the solar wind.
The Wang-Sheely-Arge (WSA) model is a magneto-hydrodynamic model that estimates solar wind plasma and magnetic field parameters from observations of the solar corona - up to days in advance of their arrival time at the bow shock. We investigate the feasibility of using WSA estimates of solar wind parameters with over 24 hours of lead time as input to the X, Y prediction model. If proved to be feasible, the model may significantly increase the mitigation time.

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