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Estimation of Arrival Time, Duration, and Intensity of Major Storms Caused by Earth Directed Halo Coronal Mass Ejections Using the WSA-Enlil Cone Model

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Abstract content
   (Max 300 words)

The objective of this study is to apply the recently developed Wang-Sheeley- Arge(WSA)-Enlil Cone model for using observations of coronal mass ejections (CMEs) on the sun to compute estimates of the arrival time, intensity, location and duration of impact of the solar wind at Earth. These information together with measured GIC data from the ESKOM network can be used as inputs to develop a neural network model to estimate geomagnetically induced currents in the South Africa power network resulting from CMEs.

A number of models have been developed to study the behavior of sun, solar wind, transient events, and the resulting storms when they are directed towards the Earth. The Wang- Sheeley-Arge Enlil(WSA-Enlil) Cone model is the current state of the art model which is a 3-D Magnetohydrodynamic (MHD) model used to simulate the solar wind from the Solar Corona out to the heliosphere.

In this paper the arrival time duration, and intensity of a selected number of solar storms associated with CMEs are studied. We considered storms resulting from Halo CMEs with Dst less than -200 nT. The data for Halo CMEs is collected from observations of the Large Angle Spectroscopic Coronagraph(LASCO) on board Solar and Heliosphere Observatory(SOHO) satellite(http://cdaw.gsfc.nasa.gov/CME_list/). From the detected Halo CMEs we considered only those which are geoeffective. To associate the CMEs with the observed storms, we used the Advanced Composition Explorer (ACE) satellite data.
Once we have chosen the dates of the storms, the simulation is done for each period and the nature of the individual storms is studied. The simulation output is then compared with satellite observations of the arrival times, duration, and intensity of solar storms.

Apply to be
 considered for a student
   award (Yes / No)?

Yes

Level for award
 (Hons, MSc,
   PhD)?

MSc

Main supervisor (name and email)
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**Would you like to
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Yes

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