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Analysis of magnetotelluric data from the South African magnetotelluric network

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Surface impedance data is required for estimating induced electric fields from measured geomagnetic data. Lack of surface impedance data was once cited as a limiting factor in modelling Geomagnetically Induced Currents in the Southern African region. For a very long period, the Southern African region has relied on the magnetic field recorded from its four magnetic observatories, which are Tsumeb (TSU), Keetmanshoop (KMH) (in Namibia), Haretbeeshoek (HBK) and Hermanus (HER) (in South Africa). Since the year 2012 several magnetotelluric (MT) stations were deployed in South Africa and Namibia to add on to the magnetic field data acquisition network. The main aim was to have simultaneous co-located measurements of the magnetic and electric field so that the surface impedance can be derived. The current study presents the components of the surface impedance derived from the data from different MT stations using the full tensor method. A comparison of the electric field calculated using the derived surface impedance and the electric field measured at the site using the MT station for selected solar active days was done. From the derived surface impedance, the difference in the surface impedance of coastal and non-coastal region is observed. The high confidence obtained when the measured and calculated electric field are compared shows that the full tensor method is a tool that can be used to produce reliable surface impedance maps that can be used in enhancing the GIC modelling in South Africa and the region at large.

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

No

Level for award (Hons, MSc, PhD, N/A)?

N/A

Main supervisor (name and email) and his / her institution

Prof. P. J. Cilliers
 pjcilliers@sansa.org.za
 SANSA Space Science

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

No

Primary author: Dr MATANDIROTYA, Electdom (University of zimbabwe)

Co-author: Prof. CILLIERS, Pierre J. (South African National Space Agency, Space Science Directorate)

Presenter: Dr MATANDIROTYA, Electdom (University of zimbabwe)

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