

地磁気から再現する誘導電流の周期依存性

菊池 崇 [1]; 海老原 祐輔 [2]; 橋本 久美子 [3]; 亘 慎一 [4]
[1] 名大 ISEE 研; [2] 京大生存圏; [3] 吉備国大; [4] 情報通信研究機構

Period dependence of reproducibility of the geomagnetically induced currents

Takashi Kikuchi[1]; Yusuke Ebihara[2]; Kumiko Hashimoto[3]; Shinichi Watari[4]
[1] ISEE, Nagoya Univ.; [2] RISH, Kyoto Univ.; [3] KIU; [4] NICT

The GIC has been evaluated from the magnetic field using the Faraday's law, i.e., dB/dt [Viljanen GRL1997; Carter et al., JGR2016]. On the other hand, Watari et al. [SW2009], analyzing the GIC and magnetometer data in Hokkaido, showed that the GIC is not correlated with the $dB_{x,y,z}/dt$, but well correlated with B_y . The results indicate that the Ampere's law relating the electric current and magnetic field should be included to reproduce the GIC. In this paper, we first made correlation analyses between the GIC and B_y with short ($<1h$) and long ($>several\ hours$) periods, to examine if the GIC- B_y correlation is valid for any space weather disturbances. We found that the correlation is good for short period ($cc > 0.8$) but poor for long periods ($cc < 0.3$). To reproduce the long period GIC from the B_y , we calculated the electric field induced by B_y in the conducting Earth. Assuming the Earth be a uniform conductor, we obtained the induced electric field with better correlations ($cc > 0.9$ for $T > several\ hours$). Our technique is based on the convolution of the step response of the uniform conductor and dB_y/dt . The period dependence of the GIC may be due to inhomogeneous structures of the electric conductivity of the Earth, which remains one of important issues for prediction of the GIC.