

## 中緯度地磁気誘導電流GICの予測

## Prediction of the midlatitude geomagnetically induced currents

\*菊池 崇<sup>1,2</sup>、海老原 祐輔<sup>2</sup>、橋本 久美子<sup>3</sup>、田中 高史<sup>4</sup>、亘 慎一<sup>5</sup>

\*Takashi Kikuchi<sup>1,2</sup>, Yusuke Ebihara<sup>2</sup>, Kumiko Hashimoto<sup>3</sup>, Takashi Tanaka<sup>4</sup>, Shinichi Watari<sup>5</sup>

1. 名古屋大学宇宙地球環境研究所、2. 京都大学生存圏研究所、3. 吉備国際大学、4. 九州大学、5. 情報通信研究機構

1. Institute for Space-Earth Environmental Research, Nagoya University, 2. Research Institute for Sustainable Humanosphere, 3. Kibi International University, 4. Kyushu University, 5. National Institute of Communications and Technology

Morphologically, the midlatitude GICs are well correlated with the y-component magnetic field ( $B_y$ ) on both the day and nightsides, while those are poorly correlated with the  $B_x$  [Watari et al., 2009]. The GIC is found to be a current induced by the  $B_y$  propagating into the ground as a diffusion mode. The daytime GIC is also found to be well correlated with the equatorial electrojet (EEJ), suggesting that the  $B_y$  is transmitted from high latitudes by the TM0 mode waves in the Earth-ionosphere waveguide [Kikuchi and Araki, 1979]. The TM0 mode waves take a major role in transmitting electromagnetic energy consumed in the GIC at low latitude, while the TE mode with the  $B_x$  is an evanescent mode not contributing to the transport of energy [Kikuchi and Araki, 1979]. The  $B_y$  can be predicted by predicting the ionospheric Pedersen currents and field-aligned currents (FACs). The midlatitude daytime Pedersen currents complete a circuit between the polar and equatorial ionosphere [Kikuchi et al., 1996], which are driven by magnetospheric dynamos created by the magnetospheric compression [Fujita et al., 2003] and southward IMF [Tanaka, 1995]. The FACs on the night are the substorm R1 FACs driven by the near-Earth tail and lobe mantle dynamos [Tanaka et al., 2010; Ebihara and Tanaka, 2015]. We now propose a prediction scheme of the midlatitude GIC, where the global MHD simulation with the potential solver provides the ionospheric Pedersen currents on the dayside and the substorm FACs on the nightside and the solution of the diffusion equation for the  $B_y$  provides the GIC.

キーワード：地磁気誘導電流、中緯度地面電流、グローバル電離圏電流、磁気圏電離圏沿磁力線電流、電離圏地面伝送線

Keywords: Geomagnetically induced current, Mid latitude ground surface current, Global ionospheric current, Magnetosphere-ionosphere field-aligned current, Ionosphere-ground transmission line