Japan Geoscience Union Meeting 2014
(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

MIS28-P01 会場:3 階ポスター会場 時間:5 月 1 日 18:15-19:30

日本における地磁気誘導電流測定データの解析
Analysis of geomagnetically induced current measured in Japan

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地磁気嵐に伴う地磁気誘導電流により送電網に障害が発生する可能性があることが知られている。地理緯度に比べて、地磁気緯度の低い日本では、その影響は、小さいと考えられている。しかし、日本と同じくらいの地理緯度の南アフリカ共和国で、2003 年 10 月の大きな地磁気嵐の際に、地磁気誘導電流の影響によりトランスが焼損した事例が報告されている。2005 年から 2007 年にかけて北海道電力の協力を得て女満別の変電所のトランスで地磁気誘導電流の測定を行った。このデータと気象庁女満別観測所の地電流測定による電場データとの比較を行った。その比較結果を基に電場の観測データを使って過去の大きな地磁気嵐に伴う地磁気誘導電流の評価を行った。その結果について報告を行う。

キーワード: 地磁気誘導電流, 地磁気嵐, 地電流, 電力網, 宇宙天気
Keywords: Geomagnetically Induced Current, geomagnetic storm, earth current, power grids, space weather

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(28 April - 02 May 2014 at Pacifico YOKOHAMA, Kanagawa, Japan)

MIS28-P02 会場:3 階ポスター会場 時間:5 月 1 日 18:15-19:30

グローバル MHD シミュレーションを用いた太陽風動圧の大きな急上昇に対する磁気圏応答
Global MHD simulation of the magnetospheric response to large and sudden enhancement of the solar wind dynamic pressure

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A large and sudden enhancement of the dynamic pressure in the solar wind generates a geomagnetic sudden commencement (SC). The magnetic field variation of SC at auroral latitudes shows a bipolar change which consists of preliminary impulse (PI) and main impulse (MI). Fujita et al. [2003a, 2003b] reproduced the PI/MI magnetic field variation using a magnetosphere-ionosphere coupling simulation and clarified the fundamental mechanisms. Interestingly, Araki et al. [1997] reported an anomalously large-amplitude SC of more than 200 nT with an unusually spiky waveform at low latitude, which occurred when the magnetopause was pushed inside geostationary orbit. Such a super SC is the target of this study. We investigate the large-amplitude SC at auroral latitudes when a large solar wind dynamic pressure impinges on the magnetosphere using a newly developed magnetosphere-ionosphere coupling simulation which has advanced robustness. We simulate two SC events of dynamic pressure enhancement of 16 times larger than the standard value, caused by the density enhancement and velocity enhancement, respectively. As an initial result of the comparison with the SC events, it is found that magnetic field variation of PI/MI is larger and sharper in the case of velocity rise than the case of density rise. It is therefore suggested that high-speed solar wind may be needed to create large and sharp SC. It is also found that a magnetic field variation similar to so-called Psc appears after PI/MI only in the case of velocity rise. When the high-speed solar wind impinges on magnetosphere, vortices are repeatedly formed at the equatorial magnetopause, probably due to the K-H instability. It seems that the high pressure of the vortices play an essential role as a current generator to drive the field-aligned currents and the magnetic field oscillation. In this presentation, we discuss the mechanisms of super SC in more detail, combining the other interesting simulation results.