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MAGDAS 地磁気観測ネットワークを用いた中間圏-熱圏-電離圏結合過程の研究
Mesosphere-Thermosphere-Ionosphere coupling research by using MAGDAS network

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MAGnetic Data Acquisition System/Circum-pan Pacific Magnetometer Network (MAGDAS/CPMN: Yumoto et al, 1996, 2001, 2006, 2007) is a ground magnetometer network all over the world. It conducted by the Space Environment Research Center (SERC), Kyushu University. It mainly consists of three magnetometer chains, and a part of 210 degrees Magnetic Meridian chain and Magnetic Equator chain are locate in Asia region. In addition, we have three Frequency Modulated-Continuous Wave (FM-CW) radar along the 210 magnetic meridian includes Asia region. Long-term observational data can be used to clarify the Sun-Earth coupling system, including Mesosphere-Thermosphere-Ionosphere.

We calculate the equatorial electrojet index (EE-index) every day, and open it to public. The equatorial electrojet is caused by the ionospheric current flowing along the narrow channel (~3 degrees in latitudinal range) of the enhanced ionospheric conductivity, called Cowling conductivity. We developed the EE-index to quantify the scale of magnetic disturbances in the equatorial region using MAGDAS/CPMN data. The ionospheric equivalent current pattern using the MAGDAS data is also useful for the study MTI coupling. At high latitudes the ionospheric currents are joined with field-aligned currents from the solar wind region into the magnetosphere, and the electro-dynamics is dominated by the influences of solar wind-magnetosphere interaction processes. On the other hand, the ionospheric current at middle and low latitudes is generated by the ionospheric wind dynamo, which produces global current vortices on the dayside ionosphere. By using the MAGDAS ionospheric current pattern and empirical model, the global electromagnetic coupling processes at all latitudes can be clarified.

In this paper, we will introduce of the overview of MAGDAS project, and how data from MAGDAS can be used to research of Mesosphere-Thermosphere-Ionosphere coupling.

Keywords: magnetometer, FM-CW radar, network observation, equatorial electrojet, geomagnetic index