MAGDAS Project at SERC for Space and Lithosphere Weather

Kiyohumi Yumoto[1]; Yumoto Kiyohumi MAGDAS/CPMN Group[2]

[1] Space Environ. Res. Center, Kyushu Univ.; [2] -

http://www.serc.kyushu-u.ac.jp/

The Space Environment Research Center (SERC), Kyushu University is deploying the MAGnetic Data Acqusition System (MAGDAS) at 50 stations in the Circum-pan Pacific Magnetometer Network (CPMN) region, and several FM-CW radars along the 210-degree magnetic meridian. The MAGDAS project has the potential to contribute greatly to IHY/CAWSES by supporting ground-based magnetometer array for worldwide studies, and by demonstrating the beauty, importance, and relevance of space science to the world. 20 and 10 MAGDAS units were installed in collaborations with 30 organizations in the world, respectively, along the 210-degree magnetic meridian in 2005 and along the magnetic dip equator in 2006. In the year 2007, 10 MAGDAS units havebeen deployed in places such as Antarctica, South Africa, India, etc. The goal of MAGDAS is to become the most comprehensive ground-based monitoring system of the earth's magnetic field. It does not compete with space-based observation. Rather, this ground-based network complements observation from space. To properly study solar-terrestrial events, data from both are required.

MAGDAS/CPMN are roughly divided into two portions. MAGDAS-A system is a new magnetometer system installed at the CPMN stations, while MAGDAS-B is data acquisition and monitoring system installed at SERC. The new magnetometer system consists of 3-axial ring-core sensors, tilt-meters and thermometer in sensor unit, fluxgate-type magnetometer, data logging/transferring units, and power unit. The total weight of the MAGDAS-A is less than 15 kg. The H, D, Z and total (F) components can be measured in the resolution of 0.031nT/LSB. The noise level of the MAGDAS system is less than 0.2 nT rms. The data transferring unit transfers the 1-sec averaged data of H, D, Z, and F in real time from the overseas stations to the SERC, Japan, by using three possible ways: Internet, Telephone line or Satellite phone line.

This project intends to get the MAGDAS network fully operational and provide data for studies on space and lithosphere weather. By analyzing these new MAGDAS data, we can perform a real-time monitoring and modeling of the global 3-dimensional current system and the ambient plasma mass density for understanding the electromagnetic and plasma environment changes in geospace during helio-magnetospheric storms. In connection with this project, we propose a new ultra-low frequency (ULF) wave analysis method to study ULF anomalies associated with great earthquakes using MAGDAS magnetic data.

The MAGDAS II project is newly planned to construct a magnetometer chain along the 110-degree magnetic meridian from South Africa to Hungary in 2008-2009. By using the MAGDAS data from the 210-degree MM and the 110-degree MM stations, it will be possible to examine the local time asymmetry of magnetospheric disturbances.