

A04-P08

IUGONET TOOLS FOR INTERDISCIPLINARY STUDY ON UPPER ATMOSPHERE

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Geospace consists of various layers including mesosphere, thermosphere, ionosphere, plasmasphere and magnetosphere. In order to understand the Arctic geospace, it is essential to discuss these layers as a coupled system and not to regard them as separate regions. In addition to the vertical coupling processes between these layers, the meridional coupling in the region that covers the equatorial, low, middle, and high latitudes plays an important role in the changes of the Arctic geospace. Since the geospace is characterized by the coexistence of both ionized plasma and neutral gas and also by the drastic changes in the physical quantities across the layers, it is necessary to comprehensively analyze various types of physical quantities observed in the multiple layers.

In this presentation we introduce useful tools for such interdisciplinary study, which were developed by the IUGONET (Inter-university Upper atmosphere Global Observation NETwork) project. The IUGONET is an inter-university project by five Japanese institutes and universities (Tohoku University, Nagoya University, Kyoto University, Kyushu University, and the National Institute of Polar Research) that have been developing a worldwide ground-based observation network of the upper atmosphere, Sun and planets. The main tools developed by the IUGONET are metadata database and data analysis software.

The IUGONET metadata database (IUGONET-MDB) enables cross-searching of data distributed across the member institutes/universities of IUGONET. It is possible for users to search data by specifying keywords, the date and time, or location in geographic coordinates (or heliographic coordinates for solar data). The metadata of various ground-based observational data have already been registered not only by the members of IUGONET but also by a few other Japanese institutes, such as the National Institute of Information and Communications Technology (NICT), the Solar Observatory of National Astronomical Observatory of Japan (NAOJ), and the Kakioka magnetometer observatory, Japan Meteorological Agency. We also consider including data from the satellites and the numerical simulation in the future. The iUgonet Data Analysis Software (UDAS) is a plug-in software of Space Physics Environment Data Analysis System (SPEDAS), which is an integrated analysis platform for visualizing and analyzing the ground-based and satellite observation data. The UDAS allows users to analyze the ground-based observational data from various types of instruments on the SPEDAS, for example, solar telescope, solar radio telescope, ionosphere and atmosphere radars, imagers, and magnetometers. We believe that these tools should be useful for the geospace studies in the Arctic region.