

## IUGONET project and its products for multidisciplinary study on upper atmospheric physics

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In order to investigate the mechanism of long-term variations in the upper atmosphere, it is crucially important to make cross-cutting studies with various kinds of data observed between Sun and Earth region. Thus, it is needed to combine databases which maintained by each institute and to accelerate to make data-sharing network in the STP community. The IUGONET (Inter-university Upper atmosphere Global Observation NETwork) project was established in 2009 as a six-year research project supported from the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan. It consists of the five Japanese universities and institutes (NIPR, Tohoku University, Nagoya University, Kyoto University, and Kyushu University, that have been leading ground-based observations of the upper atmosphere for decades), and collaborates with many domestic (for example, the National Institute of Information and Communications Technology (NICT), the National Astronomical Observatory of Japan (NAOJ), and the Kakioka magnetometer observatory, Japan Meteorological Agency) and overseas institutes/projects (for example, ESPAS in EU). One of our products in the IUGONET data management framework is developing systems for searching metadata of these observational data, and the metadata database (MDB). In the STP community, there are various kinds of archived data observed by many instruments, for example radars, magnetometers, photometers, radio telescopes, helioscopes, and so on. The IUGONET MDB is based on DSpace as a metadata registering system, which is mainly used in literature management. It also adopts an extension of the SPASE data model as a metadata format, which is widely used in the upper atmospheric community in USA. As a result, this system can deal with all kind of data belonging to IUGONET institutes, including cosmic ray, meteorological information observed by automatic weather station, etc. The system can also get flexibility to other type of data including the satellites and the numerical simulation which are used in the STP community. It is one of our challenges to apply the IUGONET system to many kinds of data in other communities. This MDB system is in operation since 2011 with over 10 million metadata. Other challenge of the IUGONET is developing software which can use for scientific research and publication. The iUgonet Data Analysis Software (UDAS) is a plug-in software of Themis Data Analysis Software (TDAS), which is upgraded to Space Physics Environment Data Analysis System (SPEDAS). The UDAS provides many routines for loading the ground-based observational data from various types of instruments, and performing scientific data analysis. This platform made it easier for STP community to analyze a various kind of data in a unified way. The IUGONET project will be closed at the end of fiscal year 2014. In this presentation, we will introduce the achievements and problems of our six-year project and discuss futures for global data sharing and research.

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