

Study on the upper atmosphere by the IUGONET project

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Upper atmosphere is characterized by the following properties: (1) It is necessary to consider both vertical couplings between the multiple spheres such as the magnetosphere, ionosphere, and neutral atmosphere, and global horizontal circulation. (2) There are many kinds of physical quantities to be measured. (3) The long-term data analysis is required. The IUGONET (Inter-university Upper atmosphere Global Observation NETwork) project was established in FY2009 as a six-year research project to investigate the mechanism of the long-term variation in the upper atmosphere. We have developed metadata database for cross-searching various kinds of ground-based observational data of the upper atmosphere obtained by the IUGONET members (i.e., National Institute of Polar Research, Tohoku University, Nagoya University, Kyoto University, and Kyushu University) and analysis software for visualizing and analyzing these data. More than 10 million metadata have been registered to our metadata database and can be used for the cross-search. We adopted SPASE (Space Physics Archive Search and Extract) metadata model as a basis of the IUGONET metadata format, which is used for describing the elements of the space and solar physics, so it is easy to add the satellite data to our database in the future. The IUGONET data analysis software is based on SPEDAS (Space Environment Data Analysis Software). The SPEDAS is a set of routines written in IDL (Interactive Data Language) to visualize and analyze data obtained by many satellites, e.g., ACE, WIND, GOES, THEMIS, and Van Allen Probes, and various ground-based observational data. A plug-in software for SPEDAS developed by the IUGONET enables users to deal with the upper atmosphere data provided by the IUGONET members on the SPEDAS. In the presentation, we will introduce some research results from the IUGONET project and discuss the issues in data analysis of the upper atmosphere.

Keywords: IUGONET, upper atmosphere, metadata database, data analysis software, long-term data, interdisciplinary study