

Recent activity and future perspective of IUGONET project based on international research collaboration

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In the Earth's upper atmosphere above about 60 km, including mesosphere, ionosphere, and magnetosphere, various phenomena are generated by energy input from the Sun (i.e., solar radiation and solar wind), atmospheric waves propagating from the lower atmosphere, and the interaction among multiple layers. Thus, comprehensive analysis of various kinds of satellite and ground-based observational data in the multiple regions is important to understand physical mechanism of the phenomena. Inter-university Upper atmosphere Global Observation Network (IUGONET) project has developed two useful tools to assist such a comprehensive analysis. One is a web service 'IUGONET Type-A' that helps researchers at each research step, i.e., cross-searching, knowing, visualizing, and analyzing data, and the other is an analysis software 'SPEDAS' developed based on Interactive Data Language (IDL), which enables to analyze various types of upper atmosphere data in an integrated fashion. Many recent research outcomes on the upper atmosphere were actually obtained by comprehensive data analysis with these tools.

The IUGONET project has been so far collaborating with many ground-based and satellite missions, such as THEMIS, PWING, and ERG, and is also expected to play an essential role in future projects. One of the large research projects is 'Study of coupling processes in the solar-terrestrial system' that was approved by the Master Plan 2011/2014/2017 of Science Council of Japan. In particular, we can contribute to data sharing and development of the visualization and analysis tools for effectively producing research outcomes. In addition, we will also contribute to the construction of observation networks in the Asia, Oceania, and African regions through the international research collaboration and the education of young researchers. In order to promote the collaborative researches and education, we regularly hold data analysis workshops in Asian and African countries (e.g., Indonesia, Malaysia, India, China, and Nigeria) as well as Japan. In these countries, however, MATLAB is more common for data analysis than IDL. Therefore, we are planning to develop the MATLAB routine library for loading the upper atmosphere data released by the IUGONET institutions. This new library will allow researchers in Asia and Africa to easily analyze the IUGONET data by themselves and enhance research collaborations with us.