

Upper atmospheric researches using metadata database and data analysis software developed by the IUGONET project

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The Earth's upper atmosphere consists of the mesosphere, thermosphere, ionosphere, plasmasphere and magnetosphere. The different atmospheric regions are closely coupled by the exchange of materials and transport of momenta and energies through complicated physical processes. Especially, the chemical reaction and dynamics in the ionosphere-thermosphere-mesosphere (MTI) region are caused by both external and internal factors (e.g., ultraviolet radiation and solar wind from the sun, cosmic ray, atmospheric gravity and tidal waves). Therefore, in order to investigate the mechanism of the long-term variations in the upper atmosphere, multidisciplinary researches are required with the integrated analysis of various types of ground-based observation data obtained at different locations and altitudes. However, since the observation data or databases generally have been maintained and made available to the community by each organization that conducted the observations, most of the researchers in different disciplines could not easily access and analysis their data or databases due to the lack of information on the data description. To solve this problem, the Inter-university Upper atmosphere Global Observation NETwork (IUGONET) project is started in 2009 as an inter-university program by the National Institute of Polar Research (NIPR), Tohoku University, Nagoya University, Kyoto University, and Kyushu University. The main task of this project is to build a database of metadata (data of data such as observation period, type of instrument, location of data, and so on) for the long-term ground-based observations of the upper atmosphere and to develop the integrated data analysis software called UDAS on the basis of the THEMIS Data Analysis Software (TDAS) written in IDL. With the progress of the IUGONET project, we can freely access and download the long-term observation data of the neutral wind in the lower thermosphere and mesosphere (MLT) region obtained from the MF and meteor wind radars over Indonesia using the IUGONET metadata database and UDAS. These observation data for the period from October 28, 1992 to present are available in the RISH database, Kyoto University (<http://database.rish.kyoto-u.ac.jp/arch/iugonet/index-idr.html>) now. The data format is text or netCDF and png or gif for numerical data and height-time plots of the neutral wind, respectively. The IUGONET project also performs scientific researches on the long-term variation of the upper atmosphere using our metadata database and UDAS in order to evaluate the performance of our products since this year. In this talk, we introduce an overview of the IUGONET project and scientific researches on the long-term trends in geomagnetic solar quiet daily (Sq) variation and the neutral wind in the MLT region over the Asian sector.

Keywords: Solar radiation, Geomagnetic solar quiet daily variation, Ionospheric conductivity, Thermosphere-mesosphere, IUGONET, Analysis software