

Contribution of the IUGONET data analysis system to a study on coupling processes in the solar-terrestrial system

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Various kinds of disturbance phenomenon and long-term variation as seen in several observation parameters (electric and magnetic fields, temperature, mean wind etc.) in a wide area from space surrounding the Earth to the atmospheric layers are caused by energy input from solar radiation, solar wind, momenta and energies from the lower atmosphere via atmospheric waves, and chemical reaction. Such a disturbance phenomenon and long-term variation observed by various kinds of ground-based and satellite instruments are the result of such complicated processes. Then, in order to investigate the mechanisms of these phenomena in this region, researchers need to conduct comprehensive analyses with various kinds of long-term observation data that have been continued by means of a global network of radars, magnetometers, optical sensors, helioscopes, etc. The IUGONET (Inter-university Upper atmosphere Global Observation NETWORK) project initiated in 2009 aims at the establishment of a cross-reference system for various kinds of ground-based observation data obtained from different techniques. The IUGONET participants consist of five universities/institutes: the National Institute of Polar Research (NIPR), Tohoku University, Nagoya University, Kyoto University, and Kyushu University. We have developed metadata database (MDB) and IUGONET data analysis software (UDAS) of ground-based observation data managed by these IUGONET universities/institutes with an international collaboration in order to promote a study on coupling process in the Sun-Earth system. The MDB provides researchers in a wide range of disciplines with a seamless data environment to link databases spread across the IUGONET universities/institutes. In particular, UDAS will be of great help in conducting integrated analyses and visualization of various kinds of solar-terrestrial observation data to investigate the long-term variation in the upper atmosphere throughout the Sun-Earth system. Then, the IUGONET products will greatly contribute to a study on coupling process in the Sun-Earth system on the basis of integrated analysis of various kinds of long-term observation data covering a wide region from both the pole to the equator. In this talk, we introduce a brief overview of the IUGONET project, and an application of the IUGONET products to typical examples of upper atmospheric researches.

Keywords: Upper atmosphere, Long-term variation, Solar activity, Metadata search system, Data analysis tool, Coupling process in the Sun-Earth system