

Data usage trend in the IUGONET service

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Inter-university Upper atmosphere Global Observation NETwork (IUGONET) is a community to promote an integrated data analysis for a research of solar-terrestrial physics. The IUGONET participants consist of ROIS, NIRP, Nagoya University, Kyoto University, Tohoku University, Kyushu University, NICT, NAOJ, JMA, and Kanazawa University. So far, IUGONET has held several research meetings, science schools, and analysis workshops every year, and has provided three products: web-based data service (database) named as IUGONET Type-A, analysis software (UDAS) based on SPEDAS and IDL, and universal framework (IUWAF) to enable other promoters to significantly enhance data activities.

IUGONET Type-A has 1,217 datasets covering a wide region from sun to surface (e.g., imager data (sun, aurora, and airglow), geomagnetic field data, atmospheric and ionospheric radar data, radiosonde data and so on). The contents of each dataset include data information, various quick-look images (QLs), and a procedure to make the QL plot with UDAS/SPEDAS. IUGONET Type-A also implements an interactive analysis tool named as UDAS web. These services are a very useful and quick way for researchers to easily conduct advanced researches such as correlation between different kinds of observation data, spectral and trend analyses.

At present, IUGONET Type-A has been used by about 1,600 users all over the world per month. The ratio is 83.62% from Japan, and 16.38% from foreign countries, especially, Indonesia, Malaysia, India, Nigeria where the IUGONET team have held science schools and analysis workshops in collaboration with international programs (e.g., VarSITI, WDS, ISELLI and so on) every year. Interestingly, that access log from September 2016 to August 2017 shows a clear difference of usage between Japanese and other country users. About 77.8% of Japanese users tend to look at specific data while about 66.1% of foreign users tend to survey several different data. In spite of the different usage between both users, the foreign users have also published scientific papers with the IUGONET products as well as Japanese researchers.

From these results, we can consider that the two different approaches are very important for promotion of integrated studies on a coupling process of solar-terrestrial system. A specific field research at a higher level is required to deal with specific data in detail while an interdisciplinary research is necessary to handle several data with an extensive knowledge and experience. However, since it takes long time for researchers to conduct both the researches, we will start a new project in ROIS in order to succeed in universal activities of IUGONET with an aid of data-driven technology. (e.g., machine readable routines, engine for correlation, and recommendation for researchers [FY2018-2019], promotions [FY2020-], and extensions to a fusion of various research fields and enhanced collaboration with many universities in Japan [FY2021-]). It is expected that these new style 'support and service' makes comprehensive data analyses much easier, provides a place for public and international discussion without a difference of current status of data usage, and leads to new scientific findings among researchers in many fields.

Keywords: solar-terrestrial physics, database, data science, data use, international collaboration