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<td>Author(s)</td>
<td>HAYASHI, Hiroo; HORI, Tomoaki; KOYAMA, Yukinobu; TANAKA, Yoshimasa; KAGITANI, Masato; KOUNO, Takahisa; YOSHIDA, Daiki; UENO, Satoru; KANEDA, Naoki; ABE, Shuji; MIYOSHI, Yoshizumi; OKADA, Masaki; NAKAMURA, Takuji; NOSE, Masahito; SHINBORI, Atsuki</td>
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Inter-university Upper atmosphere Global Observation NETwork (IUGONET) - Development of metadata database -

H. Hayashi¹, T. Hori⁵, Y. Koyama², Y. Tanaka⁶, M. Kagitani⁷, T. Kouno⁵, D. Yoshida², S. Uenoy³, N. Kaneda³, S. Abe⁴, Y. Miyoshi⁵, M. Okada⁶, T. Nakamura⁶, M. Nosé², and A. Shinbori¹

The IUGONET project - Objectives

Purposes of this 6-year (2009-2014) project are:

- to **develop a metadata database (DB) of the upper atmosphere (UA) data by ground-based observation accumulated over 50 years since IGY by Japanese institutes/universities**.
- to promote effective use of the observational data and comprehensive studies of the UA.
- to investigate mechanism of long-term variation in the UA

This project is supported by Special Educational Research Budget (Research Promotion), MEXT, Japan

Participating universities and research institutes

- Planetary Plasma and Atmospheric Research Center, Tohoku University
- National Institute of Polar Research
- Solar Terrestrial Environment Laboratory, Nagoya University
- Research Institute for Sustainable Humanosphere, Kyoto University
- World Data Center for Geomagnetism, Kyoto University
- Kwasan and Hida Observatories, Kyoto University
- Space Environment Research Center, Kyushu University
Project members

- **Tohoku Univ.**  
  T. Ono, N. Terada  
  M. Kagitani

- **National Institute of Polar Research**  
  N. Sato, T. Nakamura,  
  H. Miyaoka, M. Okada,  
  Y. Tomikawa  
  Y. Tanaka

- **Solar Terrestrial Environment Lab., Nagoya Univ.**  
  T. Ogino, Y. Miyoshi, Y. Otsuka  
  T. Hori, T. Kouno

- **World Data Center, Kyoto Univ.**  
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  Y. Koyama, D. Yoshida

- **Research Institute of Sustainable Humanosphere, Kyoto Univ.**  
  T. Tsuda  
  H. Hayashi (*), A. Shinbori

- **Kwasan and Hida Observatory, Kyoto Univ.**  
  K. Shibata  
  S. UeNo, N. Kaneda

- **SERC, Kyushu Univ.**  
  K. Yumoto  
  S. Abe

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Member of core development team  
(*) Lead of core development team
Iceland
aurora imager x2
magnetometer x3

Toromso
IS radar (EISCAT)
meteor radar
MF radar

Equatorial Atmospheric Radar (EAR)

SYOWA base
SuperDARN radar x2
MF radar
aurora imagers
magnetometer chain
ELF obs. (conjugate with Onagawa)

MU radar @Shigarakı

SuperDARN Hokkaido HF radar

SuperDARN radar

Svalbard: IS radar (EISCAT),
meteor radar, aurora imager

JPGU Meeting 2010 in Makuhari (May 26, 2010)
Problem with databases

A University
MLT radar data
DB
MLT radar data
experts

B University
Geomag. data
DB
Geomag. data
experts

C University
Solar data DB
Solar data
experts

Not impossible, but hard to reach the other disciplinary data!
Database access through metadata DB

- Obs. time & loc.
- Instrument type
- Location of data file
- Data format
- Contact
- … etc.

MLT radar data DB

Geomag. data DB

Solar data DB

Sharing MD among all MDB

Metadata DB

MLT radar data experts

Geomag. data experts

Solar data experts

Easy to obtain various kinds of UA data from research institutes/universities!

JPGU Meeting 2010 in Makuhari (May 26, 2010)
## Project Timeline

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<tbody>
<tr>
<td>Virtual information center (VIC) of UA studies</td>
<td>System installation</td>
<td>Normal operation</td>
<td>System update</td>
<td></td>
<td></td>
<td></td>
<td>Construct the integrated research environment (TV-conference system, ..)</td>
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<tr>
<td>Development of metadata DB system</td>
<td>Prototype system devel.</td>
<td>Regular system devel.</td>
<td>Open to public</td>
<td></td>
<td></td>
<td></td>
<td>Design and develop the metadata DB system</td>
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<tr>
<td>Design the Metadata format standards</td>
<td>Ver.1 format</td>
<td>Update &amp; document</td>
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<td></td>
<td></td>
<td></td>
<td>Release the format ver.1 and keep updating if necessary</td>
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<tr>
<td>Development of data analysis software</td>
<td>Specifications and basic design</td>
<td>Programming</td>
<td>Open to public</td>
<td></td>
<td></td>
<td></td>
<td>Develop and release analysis softwares for UA data</td>
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<tr>
<td>Maintenance &amp; extension of existing DBs of Observation data</td>
<td>Maintenance of obs. DBs &amp; exam. of non-digital dataset</td>
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<td>Incorporate non-DB’d data into the DBs</td>
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<td>Metadata generation</td>
<td>Collecting metadata from each obs. DB</td>
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<td></td>
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<td>Effort focused on old data from Y2012 on</td>
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<tr>
<td>Operation of metadata DB</td>
<td></td>
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<td></td>
<td>Generate metadata in the designated format and add to metadata DB</td>
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<tr>
<td>VIC extension to related fields</td>
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<td>Release the metadata DB for community</td>
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**JPGU Meeting 2010 in Makuhari (May 26, 2010)**
IUGONET metadata format = SPASE + modifications

(http://www.spase-group.org)

The SPASE data system is a model for scientific data systems. It is based on the latest web-based technologies and is designed to be a distributed data systems with a heterogeneous mix of platforms and systems.

These pages focus on the data model for the SPASE data system. The data model includes the structure of messages passed between systems; how to enrich data for interchange and archiving; and a data dictionary defining all terms and keywords used in the system. A full description of the data model is included under Documents.

Announcements:
SPASE face-to-face meeting (July 9-11, 2007) more...

Data Model Document
History of changes:
Current Version (2.0.0)
Released: 2009-04-29
Current Draft (2.0.1)
updated: 2009-07-30
All documents

Services
SMWG Registry Search
Naming Authority
Groups and Mailing Lists

Data Dictionary
Search
Tree
Explorer (New!)
XML Schema
XML Stylesheet
XML Templates
XML Models
Ontologies

News
SPASE in the literature

IUGONET’s modifications

- additional words to represent non-digital archives
- additional words to represent heliospheric coordinates
- new metadata elements to describe observation location & range

metadata format developed by international consortium to comprehensively describe research resources regarding heliospheric and magnetospheric satellite observations

- closely related to STP and upper atmosphere researches (easy to use as a base format)
- new metadata elements & words appendable (customizable according to our data)
- widely-used in VxOs (possible metadata exchange in the future)
Prototype of MDB system is being developed by an existing repository software (DSpace).

- able to register, search, collect, and provide metadata
- able to handle arbitrary metadata formats
- free, and widely used (e.g. digital academic repositories)
Development of analysis and quick-look software for our observation data has just started, in collaboration with the ERG Science Center.

The software will be produced with the THEMIS science Data Analysis (TDAS) IDL libraries and be functioned on the free IDL Virtual Machine.
The “IUGONET” project will develop a metadata DB to facilitate efficient use of the upper atmospheric data, and thereby to promote comprehensive, multi-disciplinary studies.

Current development status:
- Metadata DB system is being developed on the basis of DSpace.
- Metadata format has been determined - SPASE with some modifications.
- Analysis software started to be developed with TDAS IDL libraries.

The IUGONET metadata DB will surely contribute to the promotion of international interdisciplinary studies in the CAWSES-II Escience and informatics group.
● IUGONET homepage

http://www.iugonet.org/en

● JpGU exhibition booth

JPGU Meeting 2010 in Makuhari (May 26, 2010)