<table>
<thead>
<tr>
<th>Title</th>
<th>Inter-university Upper atmosphere Global Observation NETwork (IUGONET)</th>
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<tbody>
<tr>
<td>Author(s)</td>
<td>HAYASHI, Hiroo; KOYAMA, Yukinobu; HORI, Tomoaki; TANAKA, Yoshimasa; KAGITANI, Masato; SHINBORI, Atsuki; ABE, Shuji; KOUNO, Takahisa; YOSHIDA, Daiki; UENO, Satoru; KANEDA, Naoki; YONEDA, Mizuki; IUGONET project team</td>
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<td><a href="http://hdl.handle.net/2433/142532">http://hdl.handle.net/2433/142532</a></td>
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Inter-university Upper atmosphere Global Observation NETwork (IUGONET)

The IUGONET project aims at building “e-infrastructure” for researchers to effectively find, get, and analyze various kinds of upper atmospheric data spread over universities and institutes.

- To distribute ground-based observational data accumulated over 50 years since IGY (both digital and analogue data)
- To promote analyses of multi-disciplinary data, which will lead to comprehensive studies of mechanisms of long-term variations in the upper atmosphere

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**
Various observation parameters (wind, geomagnetism, aurora, sunspot etc.) taken by various techniques in various time periods at various locations and altitudes

Such observational data not necessarily well used in scientific researches so far

→ What’s the problem?
PROBLEM: Various kind, huge amount of data spread over institutes and universities

SOLUTION: Create a metadata database for cross-search of these distributed data

Promote new types of upper atmospheric research by analysis of multi-disciplinary data

Create a metadata database of upper atmospheric data for cross-search

Finally to other Earth and planetary science fields ...
Design of metadata format

- Many metadata formats available in Earth and planetary sciences!
  - Dublin Core
  - ISO 19115 / 19139
  - GCMD DIF
  - FGDC CSDGM
  - IPY Metadata Profile
  - ISTP Standards
  - SPASE
  - ...

- IUGONET adopted **SPASE** as our base format
  - originally developed to describe research resources regarding heliospheric and magnetospheric satellite observations
  - closely related to STP and upper atmospheric researches (**easy to use as a base format**)  
  - new metadata elements & words appendable (**customizable according to our data**)  
  - widely-used in existing Virtual Observatories (**possible to exchange metadata**)  
  
  ![SPASE](http://www.spase-group.org)
IUGONET uses **DSpace** as the metadata DB platform.

- Free software, widely used by digital repositories in many universities over the world.
- Including fundamental functions to register, search, provide, and harvest metadata written in the IUGONET metadata format.
Metadata DB system – search form

- **Keyword search**: radar
- **Time range search**
- **Spatial coverage search**
Datasets that match input keyword(s) are listed!

**The common time fitacf CDF data of SuperDARN King Salmon HF radar distributed by ERG-SC**

**NumericalData**
Common mode data obtained by SuperDARN King Salmon HF radar. Data files are distributed in the CDF format through the ERG-SC repository.

- **Start Date**: 2006-12-02T00:00:00
- **Relative Stop Date**: 180 days ago (-P180D)

**Repository**: spase://IUGONET/Repository/STEL/ERG-SC

**Instrument**: spase://IUGONET/Instrument/STEL/SuperDARN/HOK

**Standard observation data of the troposphere and lower stratosphere taken by the MU radar (NetCDF format)**

**NumericalData**
The 10-minute average observation data in the NetCDF (Network Common Data Form) format taken by the MU radar at Shigaraki in the Shiga prefecture, Japan (34.85N, 136.10E, 385m MSL), which has been operated in the standard observation mode of the troposphere and stratosphere. The observation data are stored in the NetCDF files of each day. The file name is (year)(month)(day).nc. The NetCDF data include range, height, time, three components of wind velocity, radial Doppler velocity, echo power, spectral width and noise level for each beam number and so on. The azimuth and zenith angles of beam 1, 2, 3, 4 and 5 are (0, 0), (0, 10), (90, 10), (180, 10) and (270, 10), respectively, in unit of degree. The value of 1.0e+10 means missing data.

- **Start Date**: 1986-03-16T15:05:00
- **Relative Stop Date**: 14 days ago (-P14D)

**Repository**: spase://IUGONET/Repository/RISH/RISHDB

**Instrument**: spase://IUGONET/Instrument/RISH/misc/SGK/MUradar

**Field-aligned irregularity (FAI) observation data of the ionosphere taken by the EAR (NetCDF format)**

**NumericalData**
The field-aligned irregularity (FAI) observation data in the NetCDF (Network Common Data Form) format taken by the equatorial atmosphere radar (EAR) at Kototabang, Indonesia (0.20S, 100.32E, 865m MSL). This FAI observation mode covers a wide altitude range from 80 to 500 km in the ionosphere (D-region (below 90 km), E-region (90-150 km), and F-region (above 150 km)). The observation data are stored in the NetCDF files of each day and observation parameter. The file name is (year)(month)(day).(observation parameter).nc. The NetCDF data include range, height, time, radial Doppler velocity, echo power, spectral width and noise level for each beam number and so on. Details of the observation parameter are described in the EAR-FAI homepage (http://www.rish.kyoto-u.ac.jp/ear/data-fai/index.html). The value of 1.0e+10 means missing data.
Description:
The 10-minute average observation data in the NetCDF (Network Common Data Form) format taken by the equatorial atmosphere radar (EAR) at Kototabang, Indonesia (0.203S, 100.320E, 865m MSL), which has been operated in the standard observation mode of the troposphere and stratosphere. The observation data are stored in the NetCDF files of each day. The file name is (year)(month)(day).nc. The NetCDF data include range, height, time, three components of wind velocity, radial Doppler velocity, echo power, spectral width and noise level for each beam number and so on. The azimuth and zenith angles of beam 1, 2, 3, 4 and 5 are (0, 0), (0, 10), (90, 10), (180, 10) and (270, 10), respectively, in unit of degree. The value of 1.0e+10 means missing data.

Acknowledgement:
If you acquire EAR data, we ask that you acknowledge us in your use of the data. This may be done by including text such as EAR data provided by Research Institute for Sustainable Humanosphere of Kyoto University.

Release Date:
2011-05-06T00:00:00

Contact Person ID:
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2: spase://IUGONET/Person/Noriko.Hashiguchi
3: spase://IUGONET/Person/RISH.Metadata.Management.Group

Contact Role:
0: PrincipalInvestigator
1: GeneralContact
2: DataProducer
3: MetadataContact

Access Information Repository ID:
spase://IUGONET/Repository/RISH/RISHDB

Access Information URL:
http://www.rish.kyoto-u.ac.jp/ear/data/index.html

Access Information Availability:
Online

Access Information Access Rights:
Open

Access Information Format:
NetCDF
IUGONET data analysis software (UDAS) = IDL + TDAS

➢ To help users easily download, visualize, and analyze various data provided from us

Able to make stacked plots of time series to compare various kind of data

Easy to handle data even for those who are not familiar with the data by using GUI

THEMIS Data Analysis Software suite – a set of IDL libraries
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<tbody>
<tr>
<td>Installation &amp; stable operation</td>
<td>Install system</td>
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<td>Construct the integrated research environment (video and/or web conference system, etc.)</td>
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<td>Extension to other disciplines</td>
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<td>Wrap up the project and discuss further extension of the system to other discipline</td>
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<td>Metadata DB system</td>
<td></td>
<td>Make prototype</td>
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<td>Design and build the IUGONET metadata DB system on the basis of DSpace</td>
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<tr>
<td>Development</td>
<td></td>
<td>Develop regular system</td>
<td>Release product to public</td>
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<td>Conduct regular operation of the metadata DB and customize it as needed</td>
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<tr>
<td>Stable operation</td>
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<tr>
<td>Design of metadata format</td>
<td>Release ver.1 format</td>
<td>Prepare documents</td>
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<td>Update format as needed</td>
<td>Formulate the IUGONET common metadata format and keep updating it if necessary</td>
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<tr>
<td>Creation of metadata</td>
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<td>Open metadata thru metadata DB</td>
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<td>Create metadata in the designated format and register them in the metadata DB system</td>
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<tr>
<td>Survey &amp; Specification of analysis software</td>
<td>Specification</td>
<td>Prepare documents</td>
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<td>Design an integrated analysis software to download, visualize, and analyze data provided from the IUGONET institutions</td>
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<tr>
<td>Programming</td>
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<td>Release product to public</td>
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<td>Target relatively old, undatabased items</td>
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<tr>
<td>Rearrangement of observational DBs</td>
<td>Rearrange DBs corresponding to metadata &amp; software development</td>
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<td></td>
<td></td>
<td>Rearrange existing observational DBs and newly compile DBs of undatabased items</td>
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<tr>
<td>Scientific researches</td>
<td></td>
<td></td>
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<td></td>
<td>Conduct scientific researches with the IUGONET products</td>
<td></td>
<td>Do interdisciplinary researches using various data from the IUGONET institutions</td>
</tr>
<tr>
<td>Management of project website</td>
<td>Build project homepage</td>
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<td>Provide project information to the public through the website</td>
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</table>
Release of IUGONET products

The IUGONET metadata database and analysis software have just been beta-released!

http://search.iugonet.org/iugonet

We welcome your feedback
The IUGONET project (http://www.iugonet.org) builds metadata database and analysis software to promote effective use of upper atmospheric data taken by various ground-based observations.

The IUGONET products have been beta-released!

Metadata database: http://search.iugonet.org/iugonet/

The IUGONET project plans to expand this system to other types of data (satellite & simulation) and to other countries. We also would like to collaborate with other disciplines to build more comprehensive system.