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

Author(s)
SHINBORI, Atsuki; KOYAMA, Yukinobu; NOSE, Masahito; HORI, Tomoaki; OTSUKA, Yuichi; HASHIGUCHI, Noriko O.; HAYASHI, Hiroo; TSUDA, Toshitaka; IUGONET project team

Citation (2012)

Issue Date 2012-05-22

URL http://hdl.handle.net/2433/156052

Right/ This is not the published version. Please cite only the published version. この論文は出版社版でありません。引用の際には出版社版をご確認ご利用ください。

Type Presentation

Textversion author Kyoto University
Upper atmospheric researches using metadata database and data analysis software developed by the IUGONET project

Atsuki Shinbori¹, Yukinobu Koyama³, Masahito Nose³, Tomoaki Hori², Yuichi Otsuka², Noriko O. Hashiguchi¹, Hiroo Hayashi¹, Toshitaka Tsuda¹, and IUGONET project team

¹RISH, Kyoto Univ.
²STEL, Nagoya Univ.
³WDC, Kyoto Univ.
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**
1. Introduction (IUGONET observation networks)

- **Svalbard**
  - IS radar (EISCAT) meteor radar aurora imager

- **Tromso**
  - IS radar (EISCAT) meteor radar MF radar

- **Iceland**
  - aurora imager x2 magnetometer x3 ELF/VLF receiver riometer

- **Equatorial Atmosphere Observatory**

- **SuperDARN Radar**
  - SuperDARN radar x2 MF radar aurora imagers magnetometer ELF/VLF receiver riometer

- **Syowa Station**
  - SuperDARN radar x2 MF radar aurora imagers magnetometer ELF/VLF receiver riometer

- **Hida Observatory**

- **SuperDARN Hokkaido HF radar**

- **Hidate and Onagawa Observatories**

- **Iitate Planetary Radio Telescope**

- **Magnetic Equator (IGRF2005, Height 100km)**

- **Flare Monitoring Telescope**

- **SuperDARN Radar**

- **Peru Ica University**
  - MST radar MF/meteor radar
  - MAGDAS magnetometer
  - FM – CW radar OMTI imager
  - WDC magnetometer
1. Introduction (Problems of data use)

Various observation parameters (wind, geomagnetic field, 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

⇒ PROBLEMS: databases dispersed, too little info, various data format, etc.

SOLUTIONS

1. Metadata database: to share info of data online and realize cross-search
2. Data analysis software: to help users quickly visualize and analyze data
We have already released the IUGONET metadata database and the integrated data analysis software!
3. Development of analysis software

3.1 Characteristics of the UDAS software

UDAS is a plug-in software of TDAS and includes the load procedures for observation data distributed by the IUGONET institutions.

- timespan, ‘yyyy-mm-dd’, 13, /day
- thm_load_○○○
- tplot, △△△

Automatic download of data files by http from data servers

Users can get and analyze various kinds of observation data without any concerns about data locations and formats.
3. Development of analysis software

3.2 Sample plot using the UDAS software

Geomagnetic field indices
- Global magnetometer network data
- EAR-FAI
- Meteor radar
- MU mesosphere
- LQ-7

Sample plot showing AE, Dst, and various meteor radar data.

Dates: 2011/3/7-16
4. Database of MF/MW radars in Indonesia

4.1 Webpage of MF/MW radar data in Indonesia

Access URL: http://database.rish.kyoto-u.ac.jp/arch/iugonet/index-idr.html

Information of the latest data

Jump to the detailed data use policy (English, Japanese).

Please read it carefully before you use the radar data.

If you click the observation station shown on the map, you can go to the download page of observation data at the selected station.
### 4. Database of MF/MW radars in Indonesia

#### 4.2 Category of MF and MW radar data in Indonesia

<table>
<thead>
<tr>
<th>Location</th>
<th>Type</th>
<th>Time Period</th>
<th>Formats</th>
<th>Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serpong MW radar</td>
<td>Numerical data</td>
<td>(1992/10-1999/08)</td>
<td>Wind data (1-day, 1-month files)</td>
<td>2 km, 60 min (-30-30 min)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Text, NetCDF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Resolution :</td>
<td>4 km, 240 min (-120-120 min)</td>
</tr>
<tr>
<td></td>
<td>Display data</td>
<td></td>
<td>GIF (1-day, 1-month, 1-year)</td>
<td></td>
</tr>
<tr>
<td>Kototabang MW radar</td>
<td>Numerical data</td>
<td>(2002/11-present)</td>
<td>Original: Text (1-day file)</td>
<td>2 km, 60 min (-30-30, 0-60 min)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wind data (1-day, 1-month files)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Text, NetCDF</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Resolution :</td>
<td>4 km, 60 min (-30-30, 0-60 min)</td>
</tr>
<tr>
<td></td>
<td>Display data</td>
<td></td>
<td>GIF (1-day, 1-month, 1-year)</td>
<td></td>
</tr>
<tr>
<td>Pameungpeuk MF radar</td>
<td>Numerical data</td>
<td>(2004/03-present)</td>
<td>Binary (1-day file)</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>NetCDF (1-day file)</td>
<td></td>
</tr>
<tr>
<td>Pontianak MF radar</td>
<td>Display data</td>
<td>(2010/02-2011/05)</td>
<td>PNG (1-day and 1-month files)</td>
<td></td>
</tr>
</tbody>
</table>
5. Example of upper atmospheric researches

- Global geomagnetic field variation and ionospheric disturbance dynamo during geomagnetic storms.

**Leader:** Dr. Hayashi (Kyoto Univ.)  
**Joint research program of NIPR**

**[Purpose of this study]**
To clarify the origin of global magnetic field variations during geomagnetic storms using solar wind and magnetic field observations.

In this case, eastward and westward equatorial electrojets are enhanced on the dayside and nightside, respectively, at the onset of geomagnetic storm.
5. Example of upper atmospheric researches

- Long-term variation of upper atmosphere as seen in the amplitude of solar quiet (Sq) daily variation.
  
  Leader: Dr. Shinbori (Kyoto Univ.) Joint research program of STEL

**[Purpose of this study]**
To clarify the origin of long-term variation of Sq amplitude from correlation analysis between geomagnetic field and wind in the MLT region.
5. Example of upper atmospheric researches

- Long-term variation of upper atmosphere as seen in the amplitude of solar quiet (Sq) daily variation.

Leader: Dr. Shinbori (Kyoto Univ.) Joint research program of STEL

The Sq amplitude tends to enhance when zonal wind is directed westward. This result suggests that the MLT wind contributes to ionospheric dynamo which produces ground magnetic field variations.
6. Summary

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

- UDAS is a plug-in software of TDAS and provides the load procedures for the various ground-based observational data distributed by each institution in the IUGONET project.

- We promote long-term variation of upper atmosphere using various kinds of observation data in order to evaluate a capability of our developed products.

- The IUGONET products have been released!

  Metadata database: [http://search.iugonet.org/iugonet/](http://search.iugonet.org/iugonet/)


We welcome your feedback