IUGONET

Metadata DB for Upper Atmosphere

超高層大気長期変動の全球地上ネットワーク観測・研究

Inter-university Upper atmosphere Global Observation NETwork

JpGU International Symposium 2011, Chiba, 26 May 2011
- U-04 Global Data System for Earth and Planetary Sciences -

U004-12

Inter-university Upper atmosphere Global Observation NETwork (IUGONET)

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The IUGONET project - Objectives

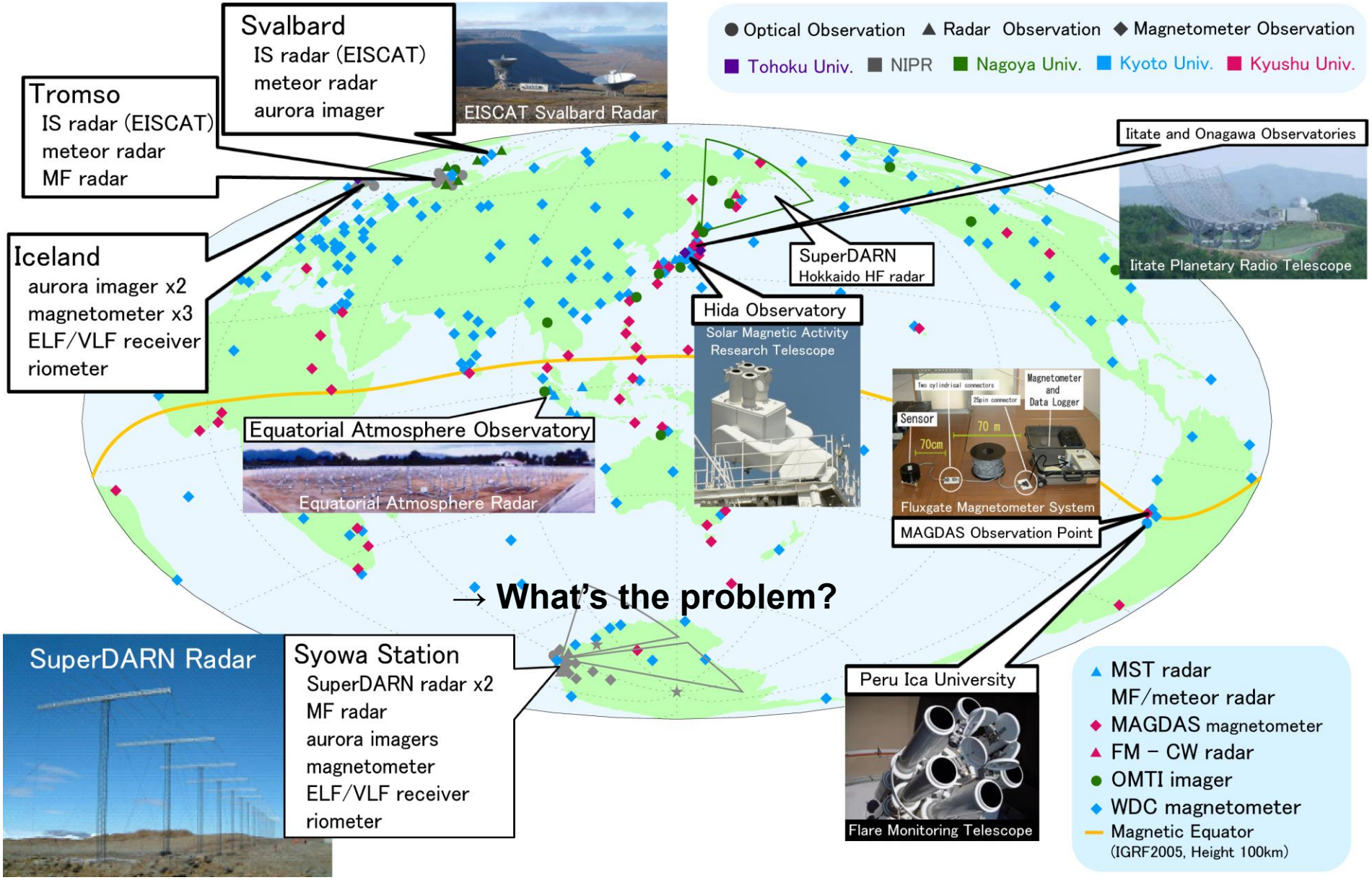
The IUGONET project aims at building "e-infrastructure" for researchers to effectively find, get, and analyze various kinds of upper atmospheric data spread over universities and institutes.

- *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**

Observations by IUGONET institutions



Project Schematic

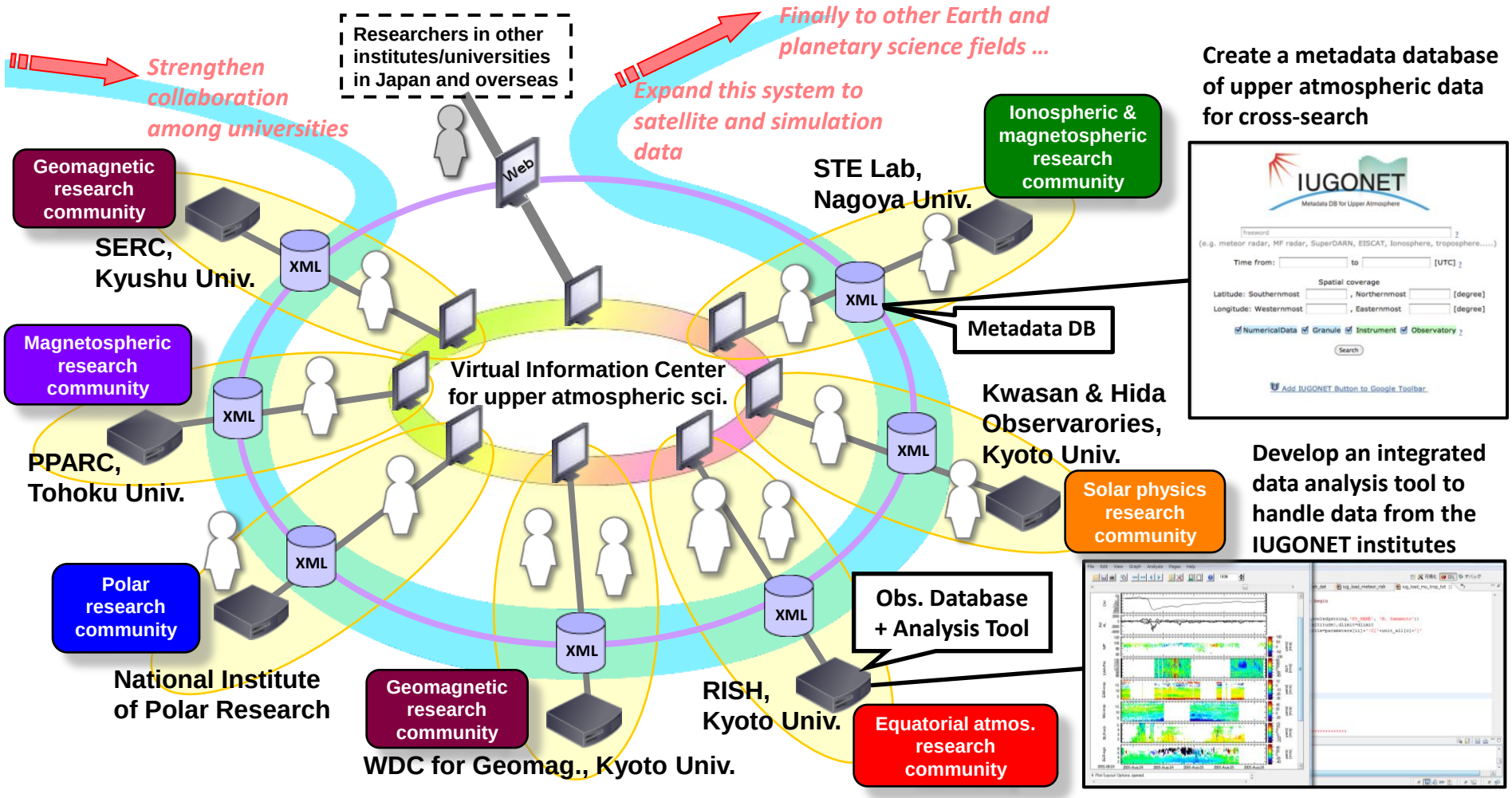
PROBLEM: Various kind, huge amount of data spread over institutes and universities

→

SOLUTION: Create a <u>metadata database</u> for cross-search of these distributed data

→

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



Design of metadata format

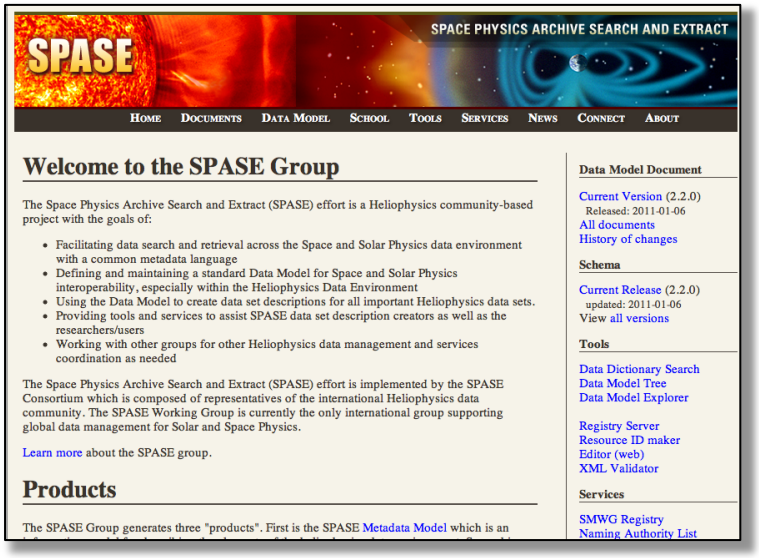
- **Many metadata formats available in Earth and planetary sciences !**

  - Dublin Core
  - ISO 19115 / 19139
  - GCMD DIF
  - FGDC CSDGM
  - IPY Metadata Profile
  - ISTP Standards
  - SPASE
  - …

- **IUGONET adopted SPASE**

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)**



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

Creation of metadata

- **The IUGONET common metadata format used**

available at http://www.iugonet.org/mdformat.html


```
<?xml version="1.0" encoding="UTF-8"?>
<spase lang="en" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xmlns="http://www.iugonet.org/data/schema"
xsi:schemaLocation="http://www.iugonet.org/data/schema
   http://www.iugonet.org/data/schema/iugonet.xsd ">
  <Version>1.0.0</Version>
 <NumericalData>

<ResourceID>spase://IUGONET/NumericalData/STEL/SuperDARN/HOK/HFra
dar/sd_hok_common_ergsccdf</ResourceID>
   <ResourceHeader>
     <ResourceName>SuperDARN Hokkaido HF radar, common mode data
distributed by
 ERG-SC</ResourceName>
     <ReleaseDate>2009-04-01T00:00:00</ReleaseDate>
     <ExpirationDate>2199-12-31T23:59:59</ExpirationDate>
     <Description>Common mode data generated by SuperDARN Hokkaido HF
radar. Data
. Data files are distributed in the CDF format through ERG-SC</Description>
 … ...
 … ...
</NumericalData>
```


EXAMPLE: metadata of dataset

- **Metadata file written in XML format** ➢ metadata exchange in future
- **Metadata of each data file, instrument, observatory, and person also created**

Development of metadata DB system

- **IUGONET adopted DSpace as our 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.**

registered

XML

```
<?xml version="1.0" encoding="UTF-8"?>
<spase lang="en" xmlns:xsi="http://www.w3.org/2001/XMLSchema-
instance" xmlns="http://www.iugonet.org/data/schema"
xsi:schemaLocation="http://www.iugonet.org/data/schema
   http://www.iugonet.org/data/schema/iugonet.xsd ">
  <Version>1.0.0</Version>
 <NumericalData>

<ResourceID>spase://IUGONET/NumericalData/STEL/SuperDARN/
HOK/HFradar/sd_hok_common_ergsccdf</ResourceID>
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      <Description>Common mode data generated by SuperDARN
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. Data files are distributed in the CDF format through ERG-
SC</Description>
 … …
 … …
</NumericalData>
```
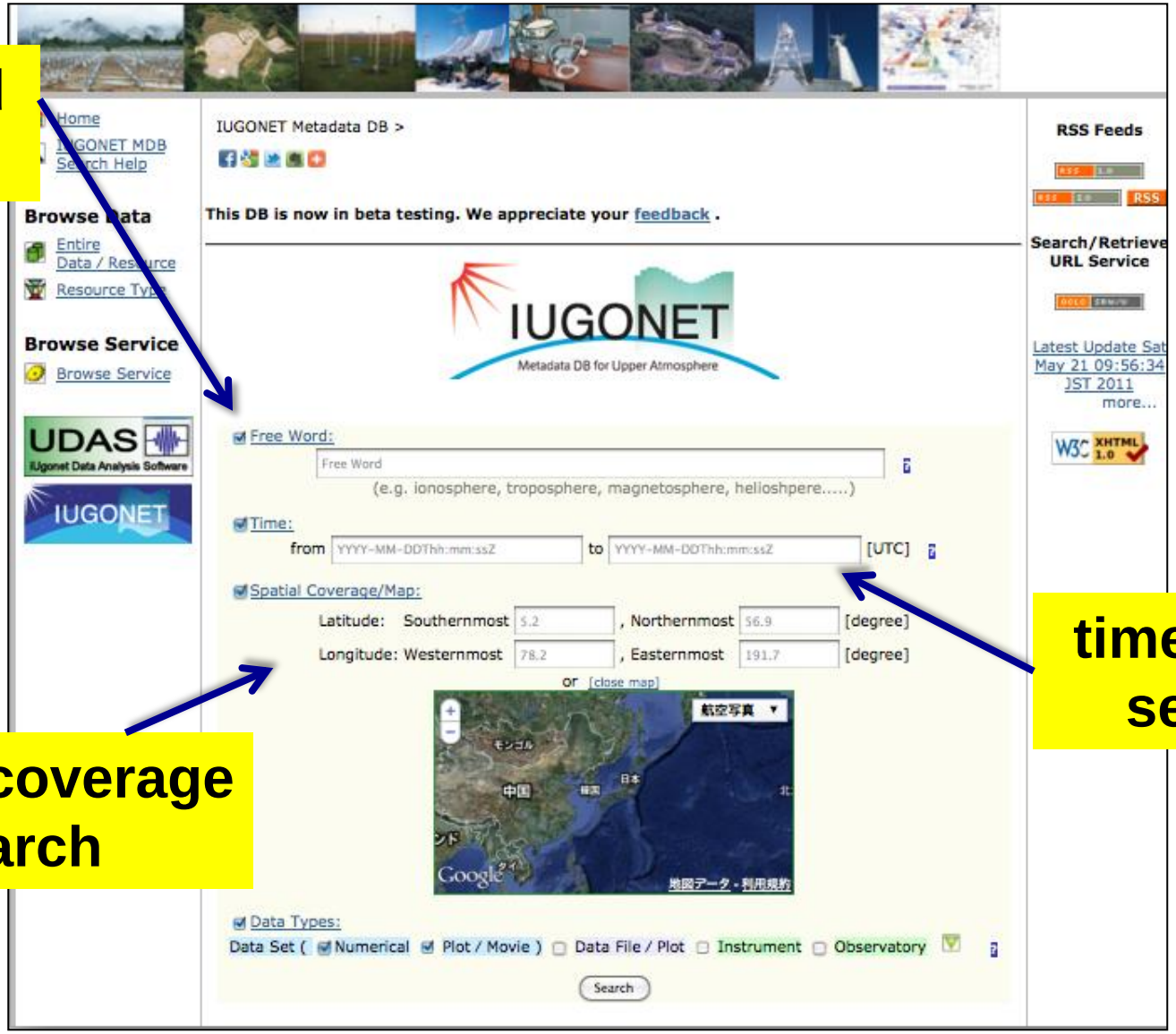

Metadata DB system – search form



keyword search

spatial coverage search

time range search

Metadata DB system – detailed metadata

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 aquire 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.

ReleaseDate:

2011-05-06T00:00:00

Contact PersonID:

0: spase://IUGONET/Person/Hiroyuki.Hashiguchi
1: spase://IUGONET/Person/EAR.Management.Group
2: spase://IUGONET/Person/Noriko.Hashiguchi
3: spase://IUGONET/Person/RISH.Metadata.Management.Group

Contact Role:

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

AccessInformation RepositoryID:

spase://IUGONET/Repository/RISH/RISHDB

AccessInformation AccessURL URL:

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

AccessInformation Availability:

Online

AccessInformation AccessRights:

Open

AccessInformation Format:

NetCDF

Description of data

Acknowledgment
(Data use policy)

Jump to metadata of "person"
(e-mail address, etc.)

Information of data access

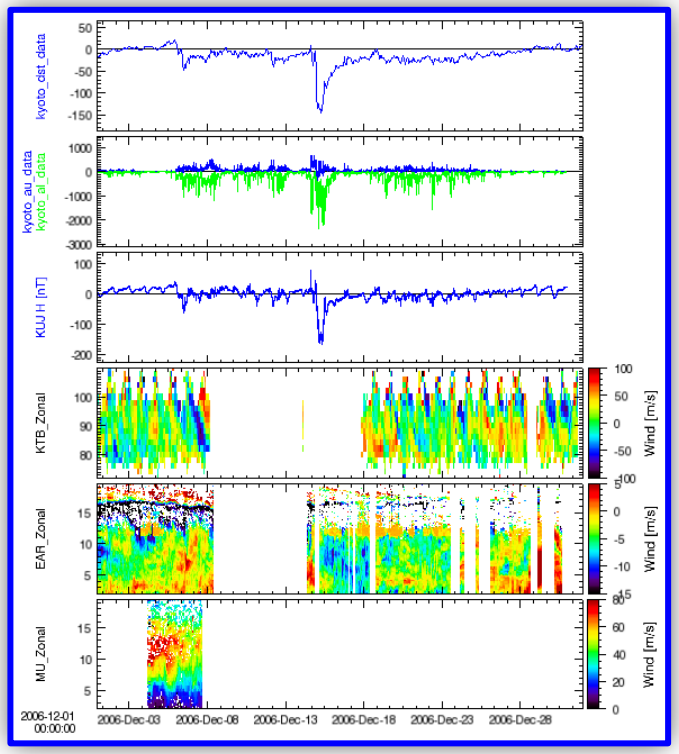
Development of analysis software

IUGONET data analysis software (UDAS) = IDL + TDAS

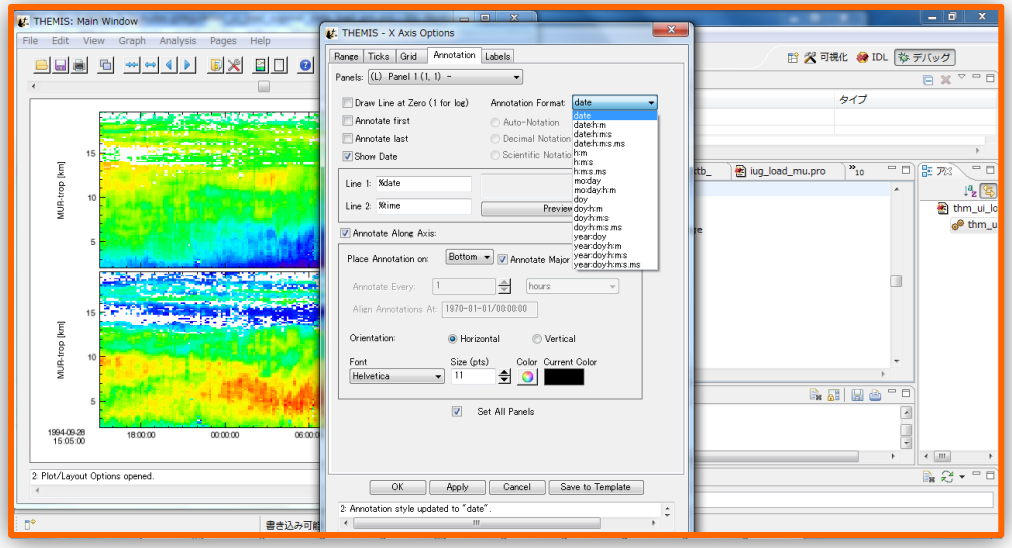
- enable users to easily download, visualize, and analyze various kind of data

THEMIS Data Analysis Software suite – a set of IDL libraries

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

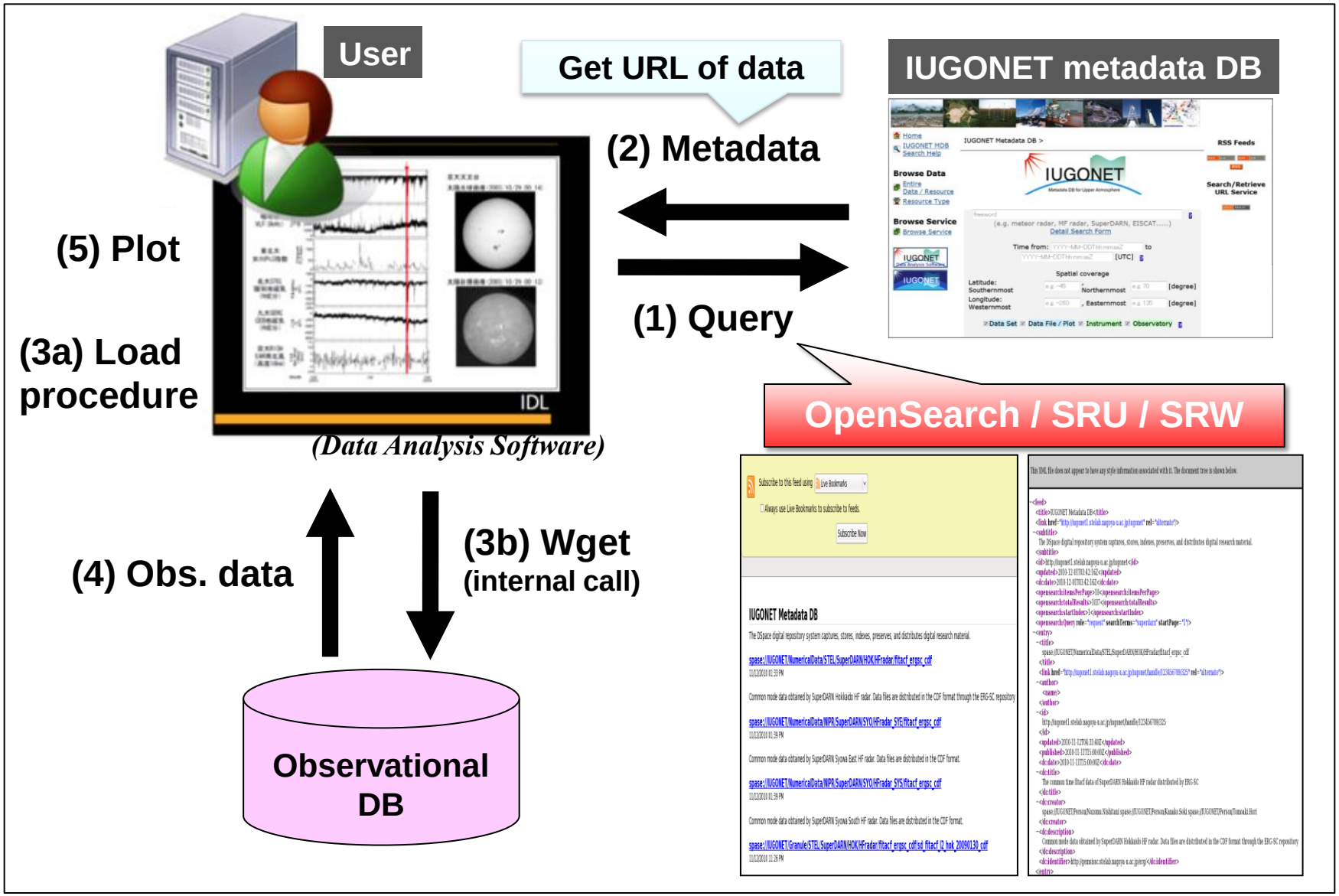


Easy to handle data even for those who are not familiar with the data by using GUI



Use of metadata DB by analysis software

Planning to use metadata DB from analysis software to get some info (e.g. URL)



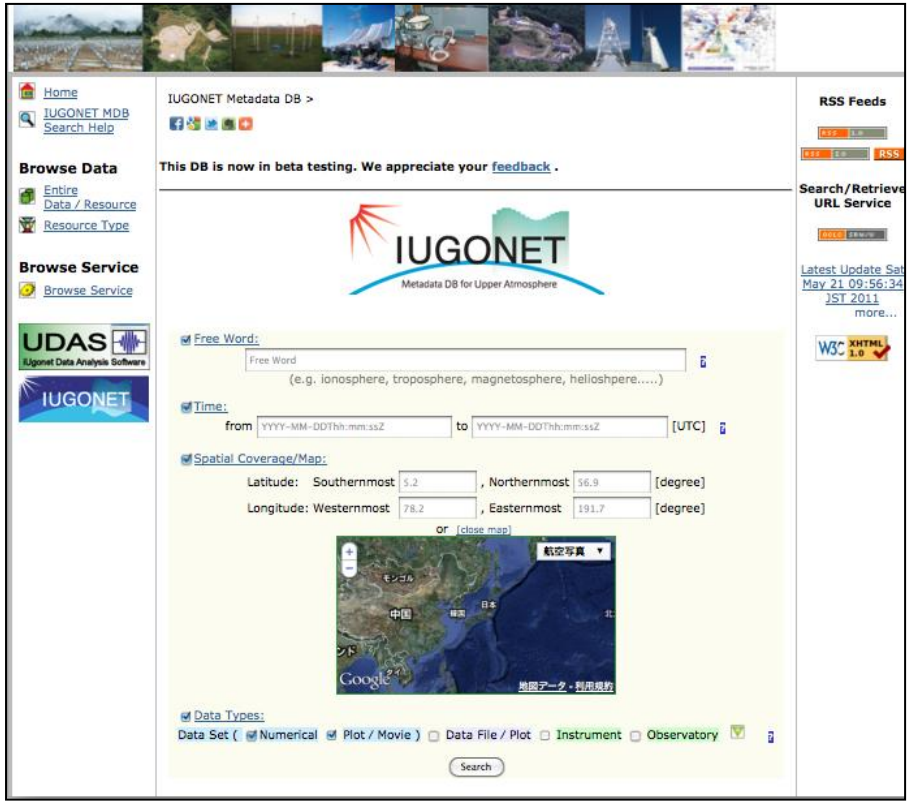
Project timeline

ITEMS		FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	REMARKS
Virtual Information Center	Installation & stable operation	Install system			Update system			Construct the integrated research environment (video and/or web conference system, etc.)
	Extension to other disciplines							Wrap up the project and discuss further extension of the system to other discipline
Metadata DB system	Development	Make prototype	Develop regular system	Release product to public				Design and build the IUGONET metadata DB system on the basis of DSpace
	Stable operation				Update computers			Conduct regular operation of the metadata DB and customize it as needed
Metadata	Design of metadata format	Release ver.1 format	Prepare documents	Update format as needed				Formulate the IUGONET common metadata format and keep updating it if necessary
	Creation of metadata			Open metadata thru metadata DB	Target relatively old, undatabased items			Create metadata in the designated format and register them in the metadata DB system
Analysis Software	Survey & Specification of analysis software	Specification	Prepare documents					Design an integrated analysis software to download, visualize, and analyze data provided from the IUGONET institutions
	Programming			Release product to public	Target relatively old, undatabased items			Develop the IUGONET analysis software by using TDAS (a set of IDL subroutines)
Others	Rearrangement of observational DBs		Rearrange DBs corresponding to metadata & software development					Rearrange existing observational DBs and newly compile DBs of undatabsed items
	Scientific researches			Conduct scientific researches with the IUGONET products				Do interdisciplinary researches using various data from the IUGONET institutions
	Management of project website	Build project homepage						Provide project information to the public through the website

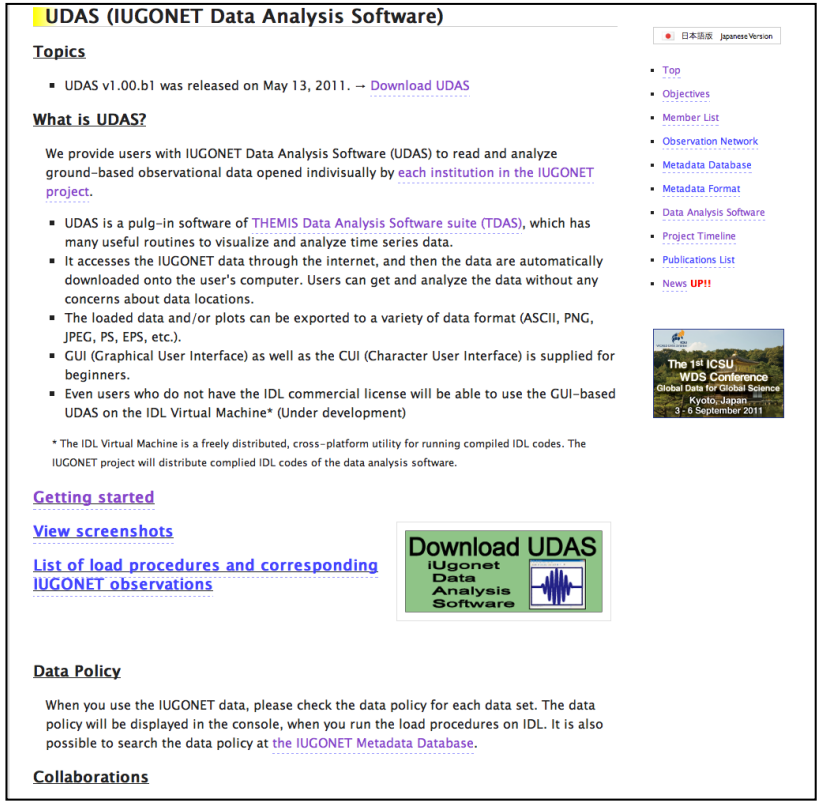
Beta-release of IUGONET products

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

http://search.iugonet.org/iugonet



http://www.iugonet.org/en/software.html



➢ **We welcome your feedback**

Summary

- **The IUGONET project builds e-infrastructure (metadata database and analysis software) to promote effective use of upper atmospheric data taken by various ground-based observations.**

- **The IUGONET products have just been beta-released!**

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

  Analysis software : **http://www.iugonet.org/en/software.html**

- **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.**

IUGONET website

http://www.iugonet.org/