

Data analysis software developed by the IUGONET project

田中, 良昌
国立極地研究所

新堀, 淳樹
京都大学生存圏研究所 | 太陽地球環境研究所

堀, 智昭
太陽地球環境研究所

小山, 幸伸
地磁気世界資料センター京都

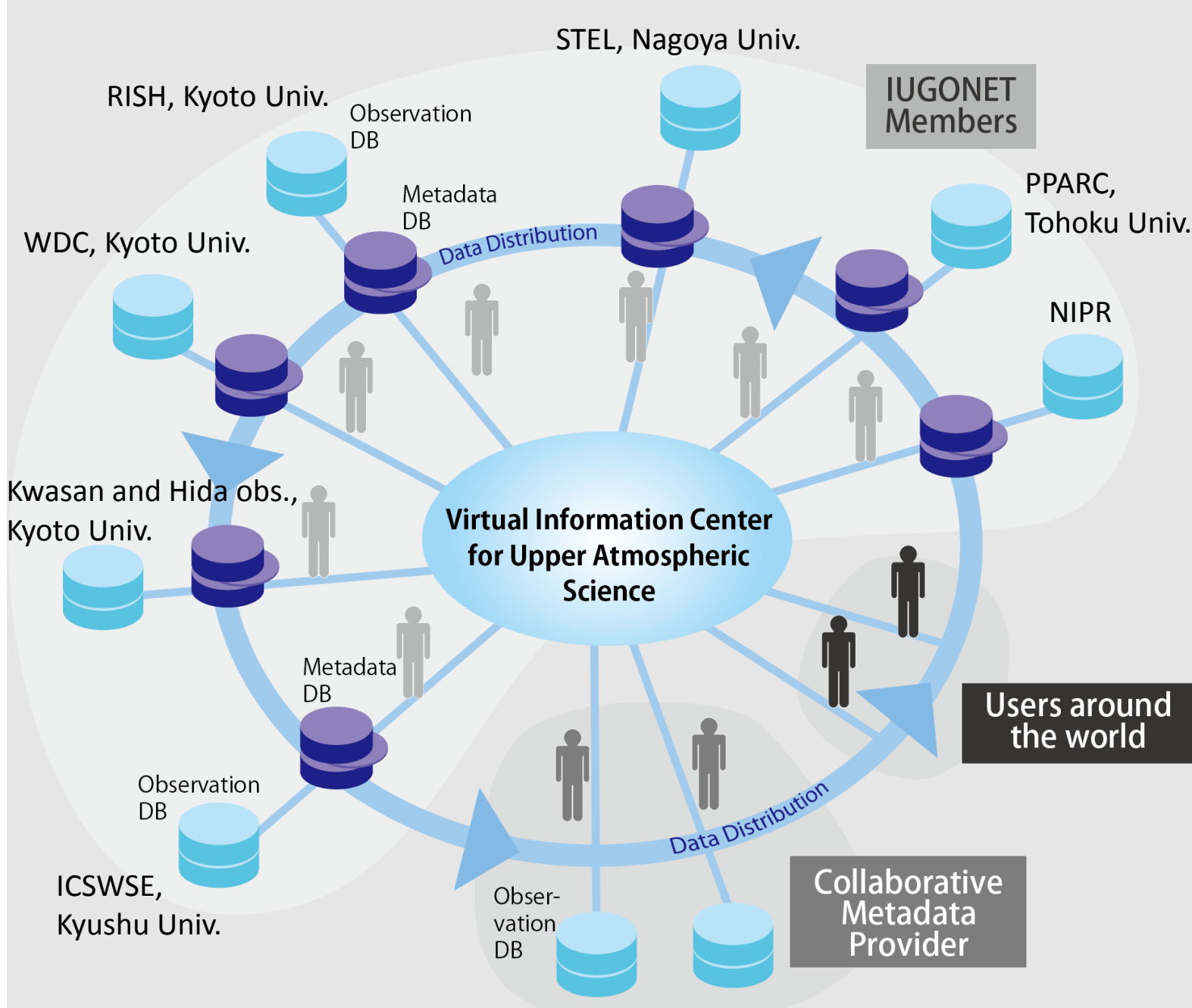
他

<https://hdl.handle.net/2324/26536>

出版情報 : 2013-05-20
バージョン :
権利関係 :

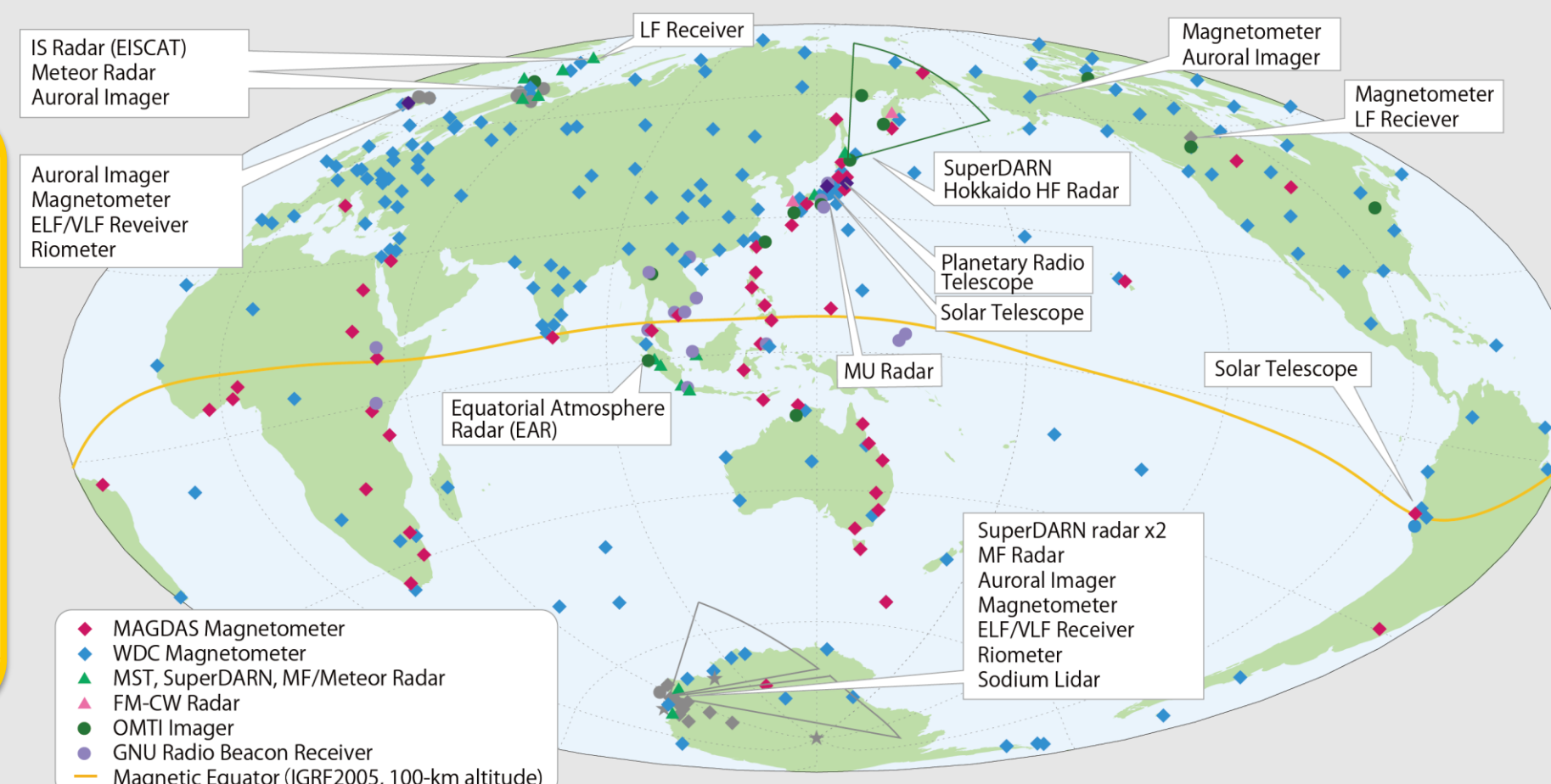


Purpose of the IUGONET project



- It is often crucial for comprehensive understanding of recent environmental problems (e.g., atmospheric global warming) to analyze various kinds of data such as meteorological data, upper atmosphere data, solar activity, human activity, and so on.
- To promote such interdisciplinary study, it is necessary to build infrastructures to search, get, visualize, and analyze data distributed across various universities and institutes.
- A six-year research project, **Inter-university Upper atmosphere Global Observation NETwork (IUGONET)** has started in 2009 to construct such research infrastructures by NIPR and 4 universities (Tohoku, Nagoya, Kyoto and Kyushu) in Japan.

- The IUGONET universities/institutes have been conducting the global ground-based observations of the upper atmosphere and have been providing a huge amount of the observational data to the solar-terrestrial physics community.



Main products by IUGONET

The IUGONET metadata database is available at <http://search.iugonet.org/iugonet/>.

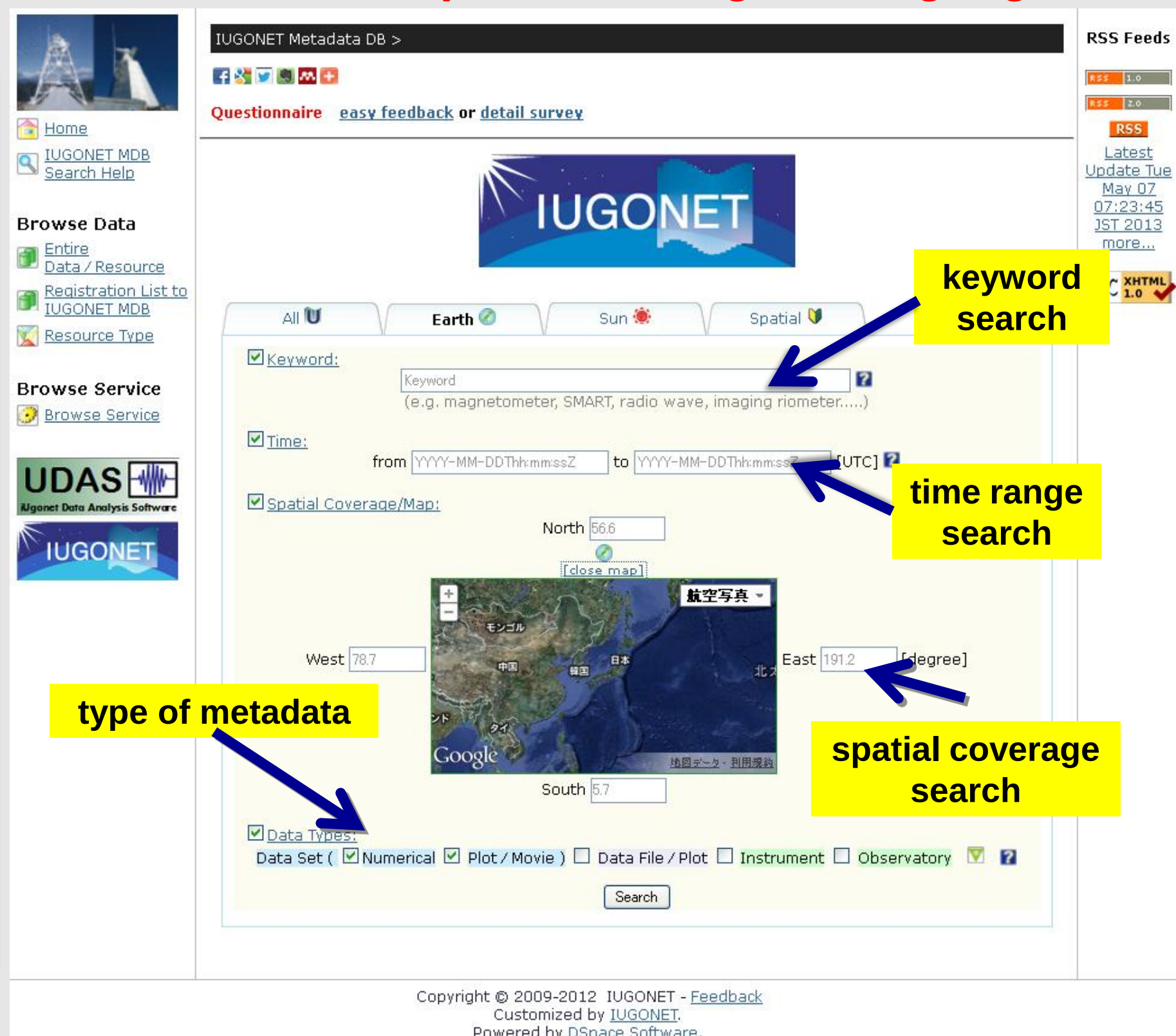
(1) IUGONET Metadata Database (IUGONET-MDB)

The IUGONET-MDB provides the service for cross-searching observational data distributed across the IUGONET universities/institutes.

It is possible for users to search data by keyword, date and time, and location in geographic coordinates (or Heliographic coordinates for solar data) with the web browsers.

(2) iUgonet Data Analysis Software (UDAS)

UDAS enables the users to download, visualize, and analyze the observational data provided by the IUGONET universities/institutes.

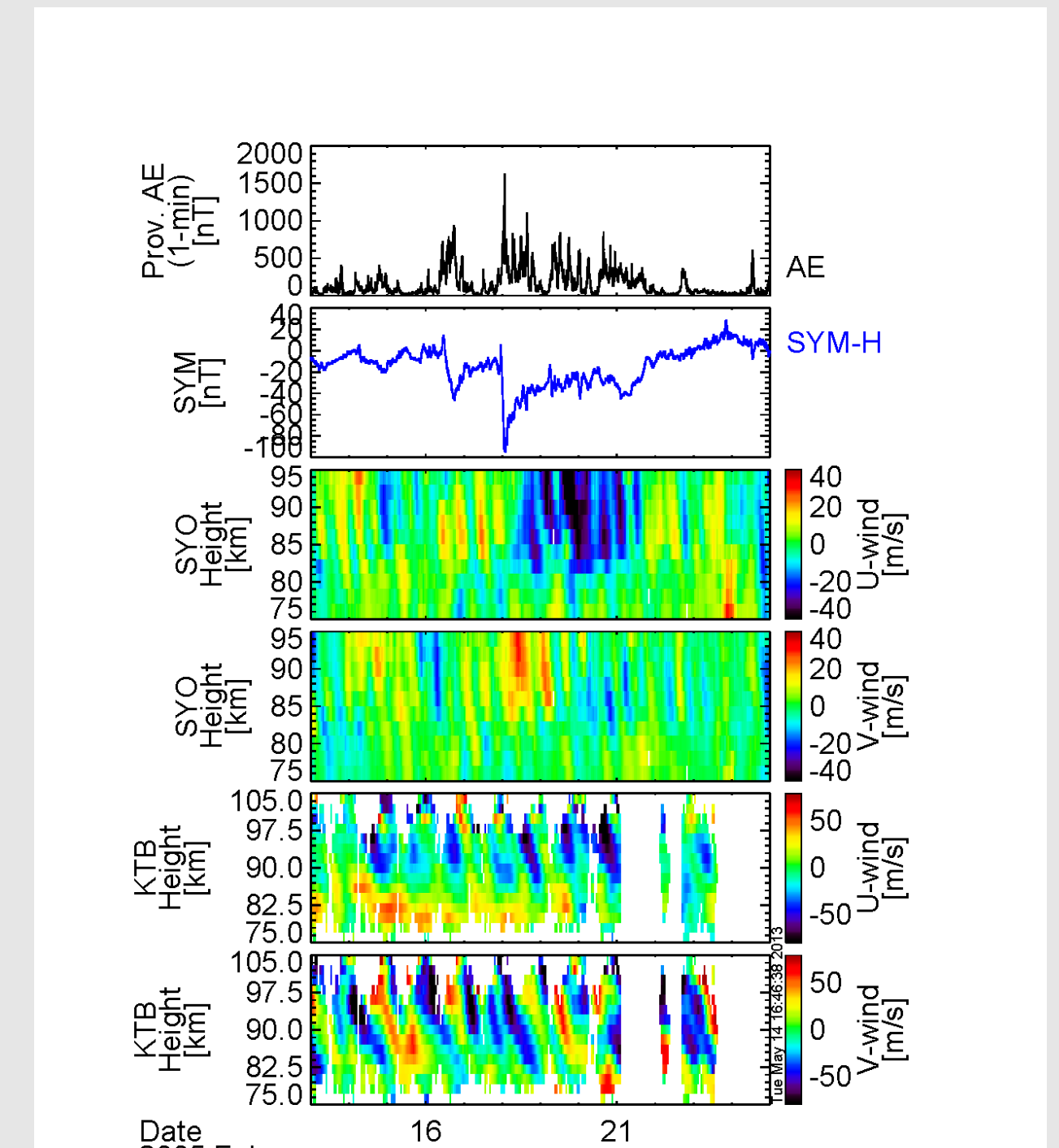


Examples of data visualization and analysis

Load routines included in the latest version of UDAS (v2.01.1)

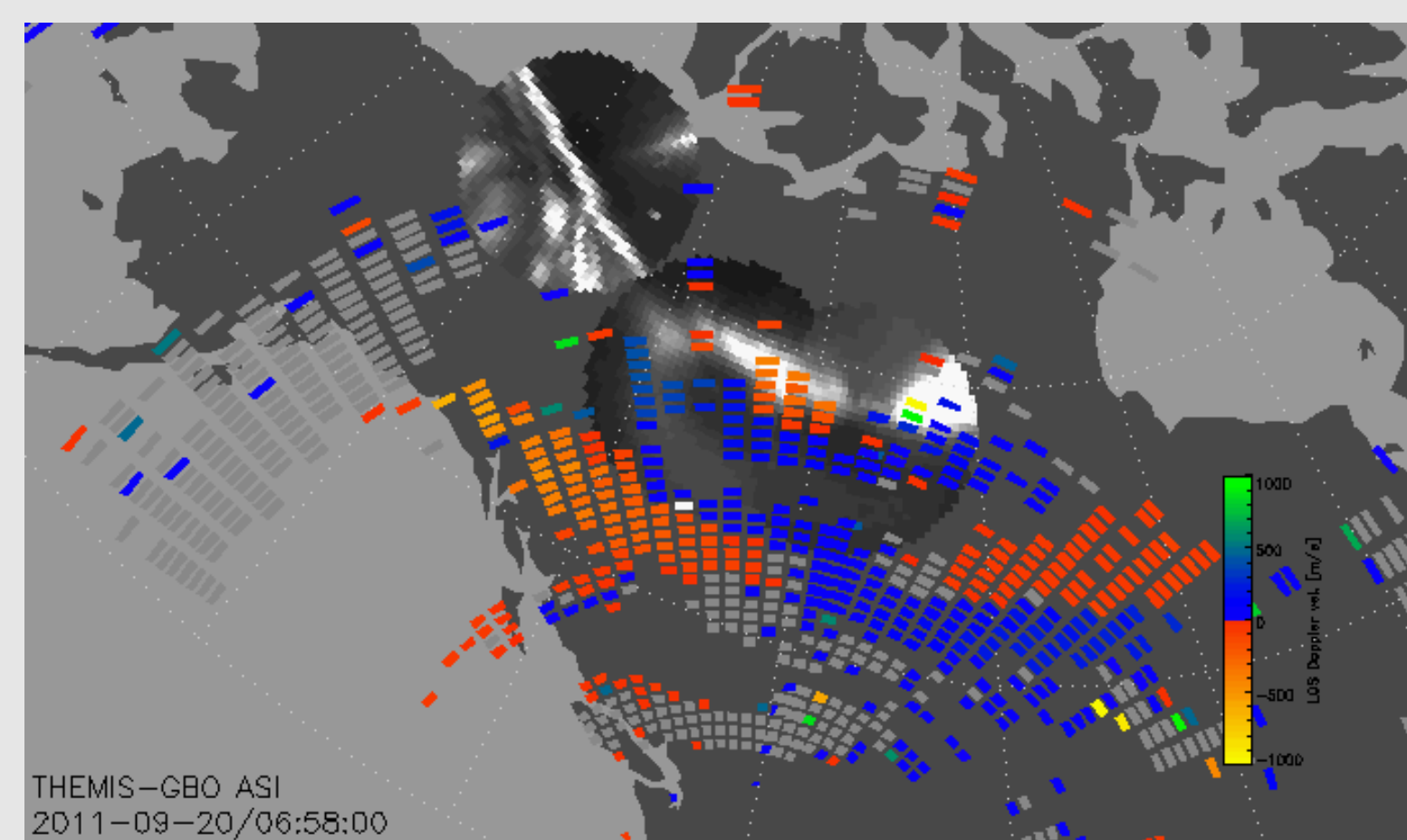
No.	Instrument Type	Load routines
1	SMART telescope	iug_load_smart
2	litate Planetary Radio Telescope	iug_load_lprt
3	Jupiter's/solar wide band spectral data in HF-band	iug_load_hf_tohokuu
4	Automatic Weather Station	iug_load_aws_rish
5	Boundary layer radar	iug_load_blr_rish
6	L-band Lower Troposphere radar	iug_load_ltr_rish
7	Equatorial Atmospheric Radar	iug_load_ear
8	MU radar	iug_load_mu
9	Meteor radar	iug_load_meteor_rish
10	MF radar	iug_load_mf_rish
11	Wind Profiler radar	iug_load_wpr_rish
12	ionosonde at Shigaraki	iug_load_ionosonde_rish
13	Radioonde	iug_load_radiosonde_rish
14	SuperDARN radar	iug_load_sdfit
15	EISCAT radar	iug_load_eiscat
16	Imaging Riometer	iug_load_iri_nipr
17	Low Frequency Radio Transmitter	iug_load_lfrto
18	Geomagnetic indices, WDC magnetometer stations	iug_load_gmag_wdc
19	NIPR fluxgate Magnetometers	iug_load_gmag_nipr
20	210° Magnetic Meridian magnetometer network	iug_load_gmag_mm210
21	MAGDAS ground magnetometers	iug_load_gmag_serc
22	STEL induction magnetometers	iug_load_gmag_stel_induction
23	NIPR induction magnetometers	iug_load_gmag_nipr_induction

The latest version of UDAS (v2.01.1 as of May, 2013) includes 23 load routines for data obtained by solar telescope, solar/planetary radio telescope, atmosphere and ionosphere radars, magnetometers, and so on.



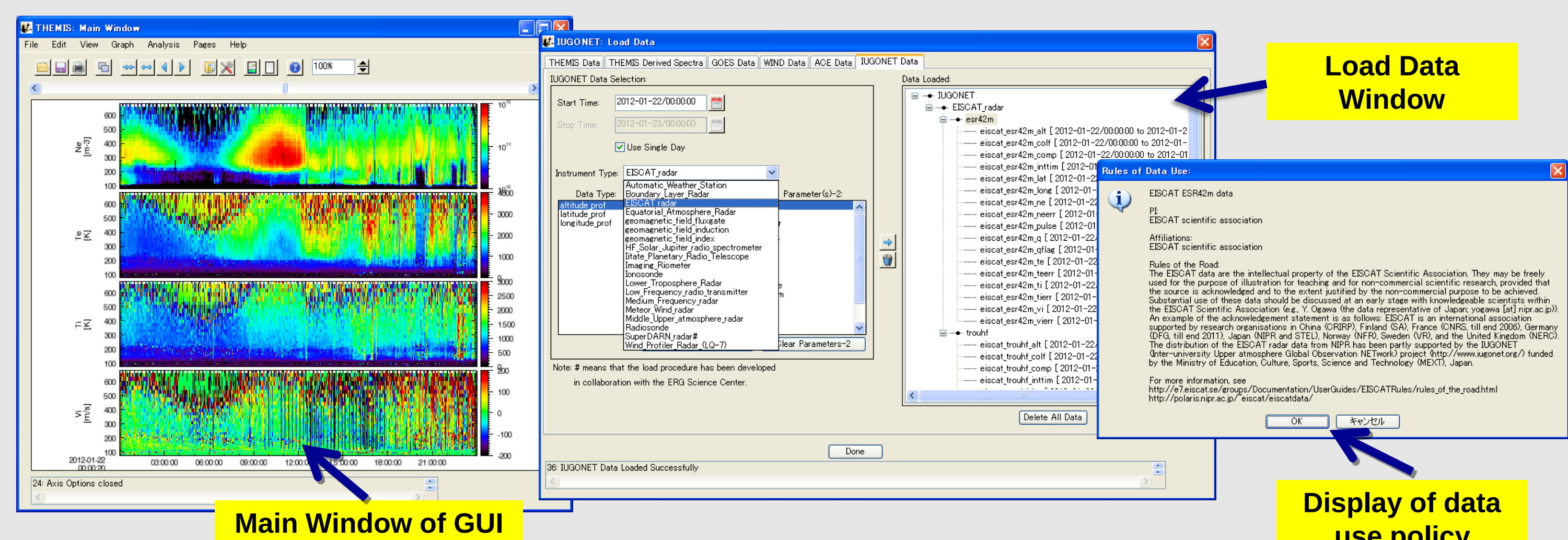
An example of parallel display of time-series data

Geomagnetic indices, MF radar at auroral latitude, and Meteor radar at the equator. Such a parallel display can be easily drawn by a few basic commands.



An example of 2-D display

SuperDARN radars and THEMIS all-sky cameras. TDAS/UDAS can overlay some 2-D data on the same world map.



A screenshot of the GUI windows of TDAS/UDAS

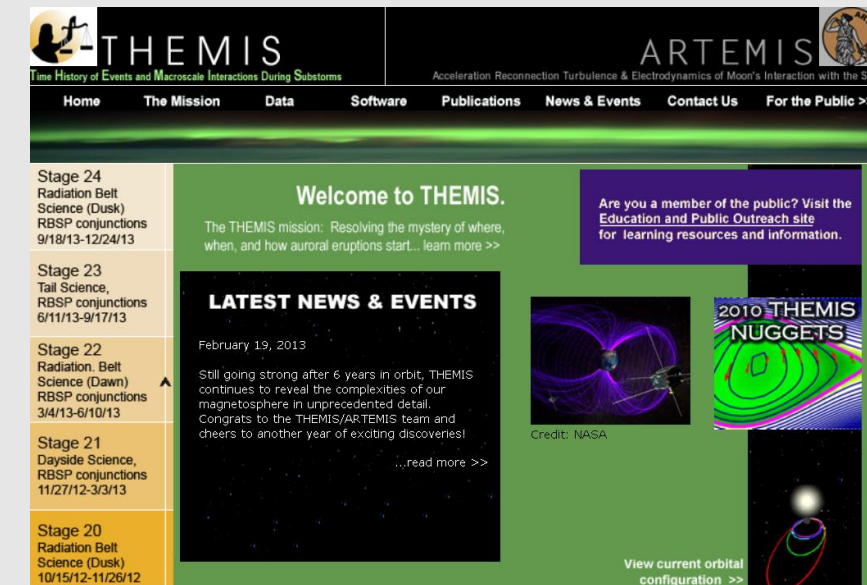
GUI (Graphical User Interface) is available for beginners of IDL and TDAS/UDAS.

iUgonet Data Analysis Software (UDAS)

UDAS can be downloaded from <http://www.iugonet.org/software.html>.

- UDAS is written in IDL (Interactive Data Language), which is widely used in the solar-terrestrial physics community.
- UDAS is released as a plug-in software of TDAS (THEMIS Data Analysis Software suite), which is a set of IDL libraries for analyzing satellite and ground-based data obtained by the THEMIS mission.

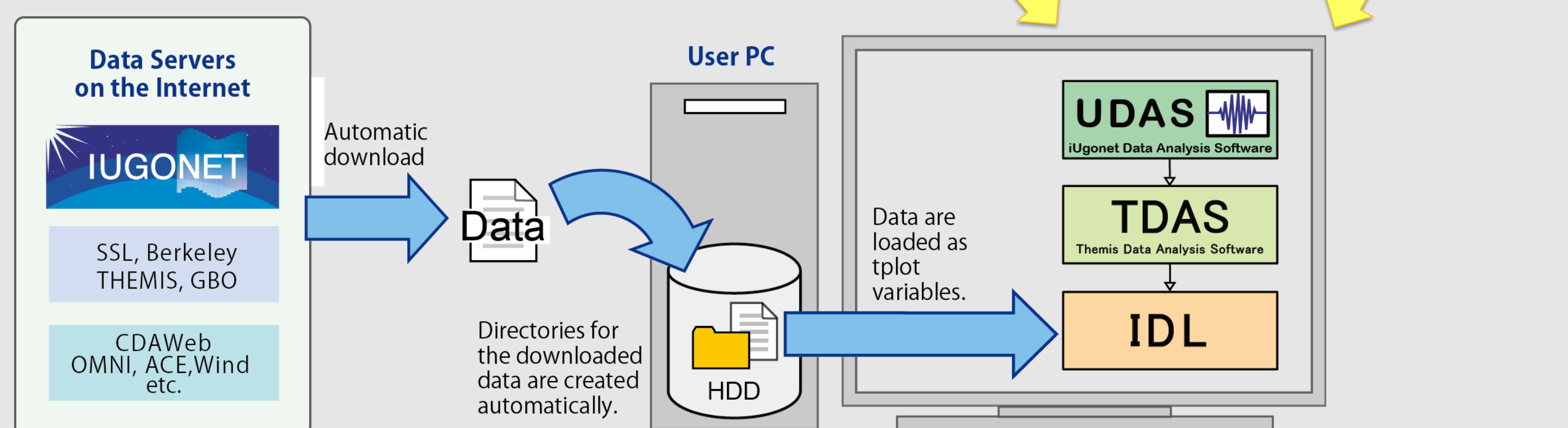
TDAS web site



UDAS web site



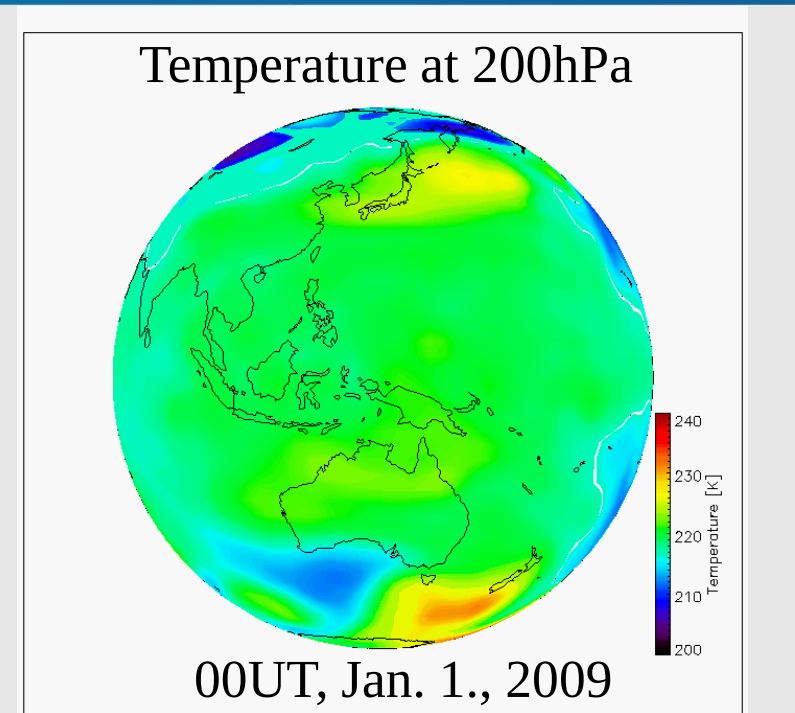
Install TDAS&UDAS



- UDAS is capable of automatically downloading data files through the internet without caring about location and format of the files.
- Since data servers and file format are generally different for each data set, we have developed individual load-routines for different data set.

New and unique attempt by IUGONET

- Development of TDAS/UDAS executable on the free IDL Virtual Machine (IDL-VM) environment:
The free IDL-VM allows any users without a paid IDL license to use the GUI tool.
- A link between UDAS and IUGONET-MDB:
UDAS can get metadata from the IUGONET-MDB through the OpenSearch interface. (e.g., URL of data and location of observatories)
- Handling of 3-D simulation data by UDAS:
We have implemented functions to handle the 3-D data calculated by the General Circulation model (GCM) simulation.



An example of simulation data
General Circulation Model (GCM) simulation data.

Summary

- The IUGONET project has been developing the infrastructures and common tools (metadata database (IUGONET-MDB) and data analysis software (UDAS)) to facilitate the distribution and wide use of the ground-based upper atmospheric data provided by the IUGONET university/institutes.

- Metadata database : <http://search.iugonet.org/iugonet/>
- Data analysis software : <http://www.iugonet.org/software.html>

- TDAS/UDAS can handle many kinds of solar and upper atmosphere data, including satellite and simulation data, and is one of the promising tools in the solar-terrestrial physics community.

Acknowledgement

- This project is supported by the Special Educational Research Budget (Research Promotion) [FY2009] and the Special Budget (Project) [FY2010 and later years] from the Ministry of Education, Culture, Sports, Science and Technology (MEXT), Japan.
- We acknowledge the cooperation and generosity of the THEMIS Science Support Team in allowing us to use TDAS for our data analysis software (UDAS). UDAS has been developed in collaboration with the ERG Science Center.