



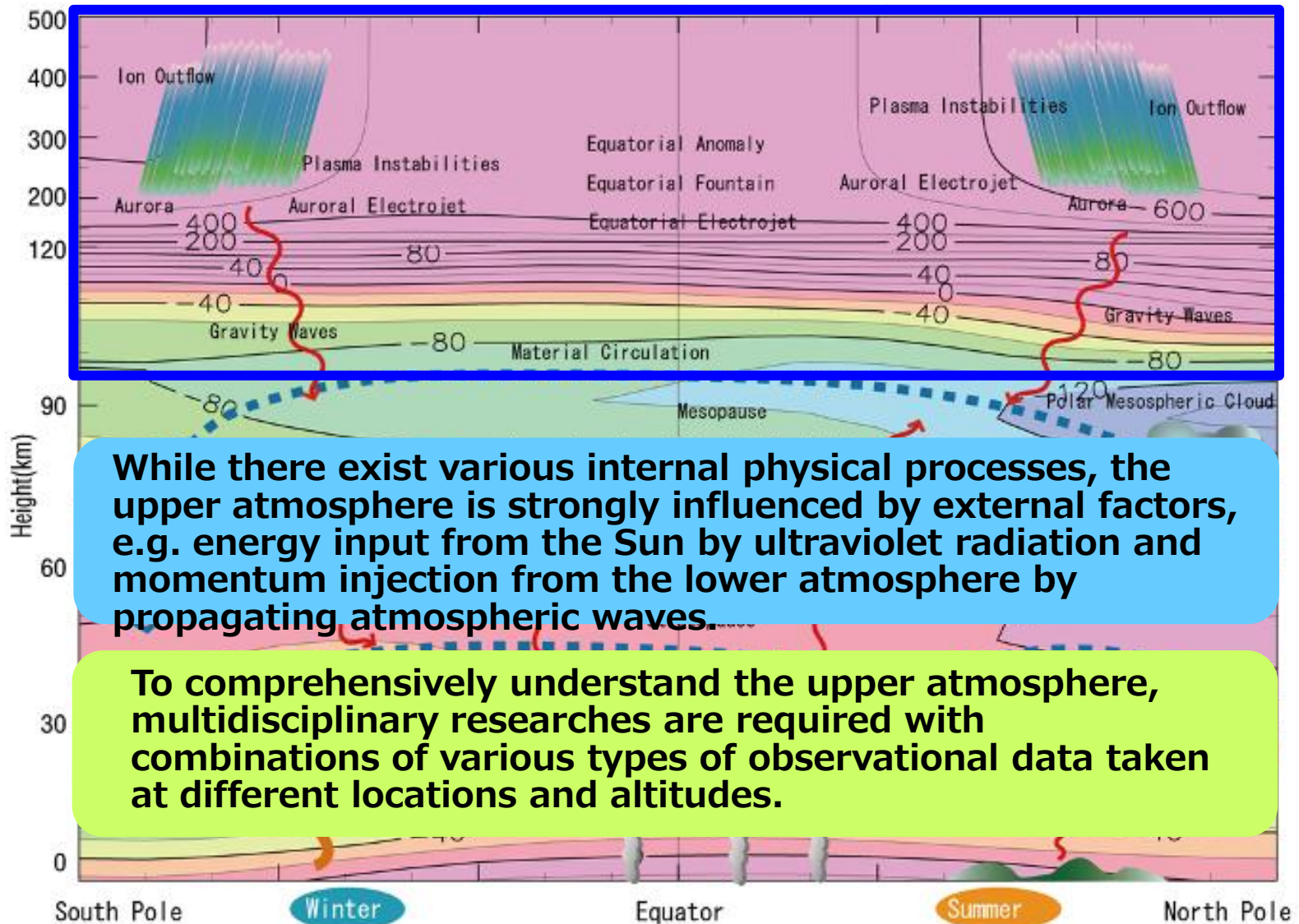
JpGU Meeting 2012, Chiba (Japan), 23 May 2012

- U-01 Toward a New Framework of Global Data Activity -

U01-06

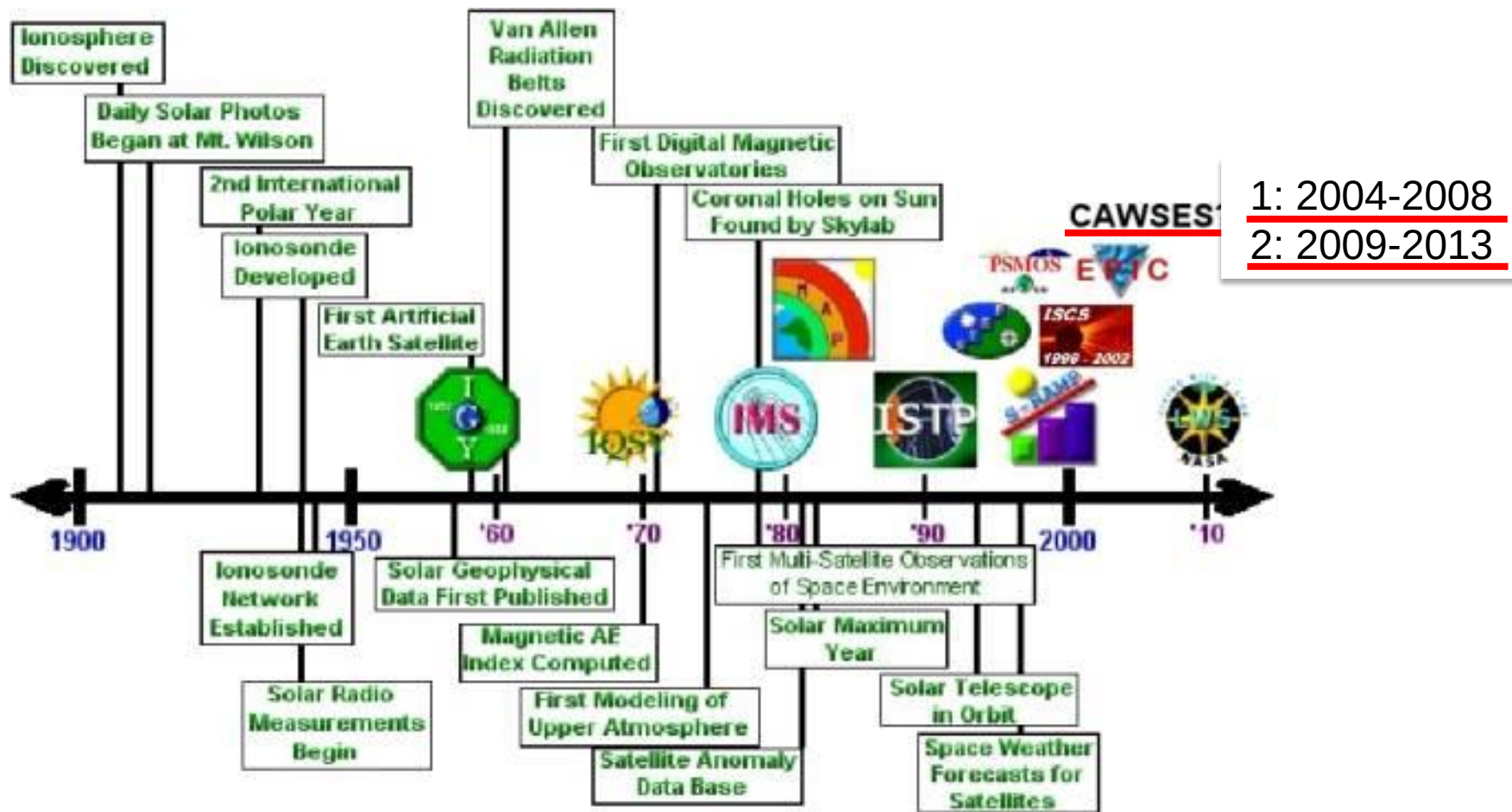
Inter-University Upper Atmosphere Global Observation Network (IUGONET)

**T. Tsuda, N. Sato, R. Fujii, T. Ono, K. Yumoto, T. Iyemori, T. Shibata,
H. Hayashi, T. Hori, Y. Tanaka, Y. Koyama, S. Abe, A. Shinbori,
N. Umemura, M. Yoneda, S. Ueno, N. Kaneda,
and IUGONET project team**



- ICSU ----- Antarctic Research (SCAR)
- |--- Biodiversity (DIVERSITAS)
 - |--- Climate Observation (GCOS)
 - |--- Climate Research (WCRP)
 - |--- [Data for Science & Technology \(CODATA\)](#)
 - |--- Disaster Risk (IRDR)
 - |--- Ecosystem Change & Society (PECS)
 - |--- Geosphere-Biosphere (IGBP)
 - |--- Human Dimensions of Global Environmental Change (IHDP)
 - |--- Ocean Observations (GOOS)
 - |--- Ocean Research (SCOR)
 - |--- Radio Astronomy & Space Science (IUCAF)
 - |--- Solar-Terrestrial Physics (SCOSTEP)

President; Nat Gopalswamy (NASA)
Vice President; F. J. Luebken, (IAP)
Bureau from URSI, IAMAS, IAGA, IUPAP, SCAR, COSPAR
 - |--- Space Research (COSPAR)
 - |--- Terrestrial Observations (GTOS)
 - |--- [World Data System \(WDS\)](#)



IGY: International Geophysical Year (1957/58)
 IQSY: International Quiet Sun Year (1964/65)
 IMS: International Magnetospheric Study (1976-79)
 MAP: Middle Atmosphere Program (1982-85)
 STEP: Solar-Terrestrial Energy Program (1990-95)

Post-STEP sub programs (1998-2002)

S-RAMP: STEP Results, Applications, and Modeling Phase
 EPIC: Equatorial Processes Including Coupling
 ISCS: International Solar Cycle Study
 PSMOS: Planetary Scale Mesopause Observing System

CAWSES: Climate and Weather of the Sun-Earth System, 2004-2008

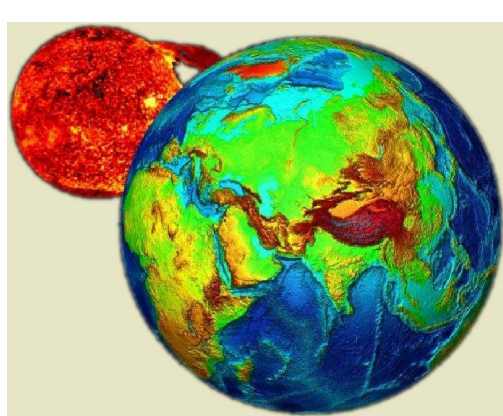
Climate
And
Wea-ther
Sun-
Earth
System

SCOSTEP's international program in 2004-2008 to link the world's scientists in a cooperative effort to enhance our understanding of the Solar Terrestrial relations, which impacts on life and society. In particular, we put special emphasis on the short (weather) and long-term (climate) variability of the solar activities and their effects in geospace and Earth's environment.

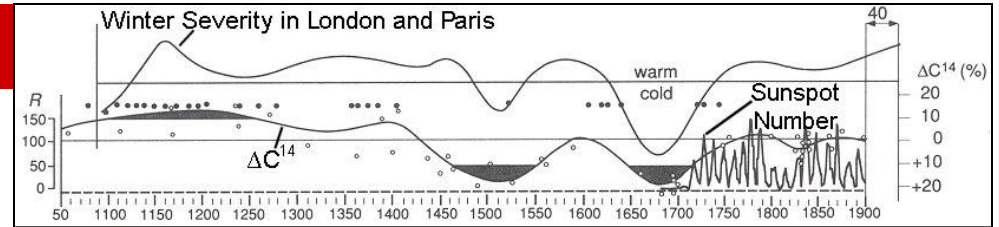
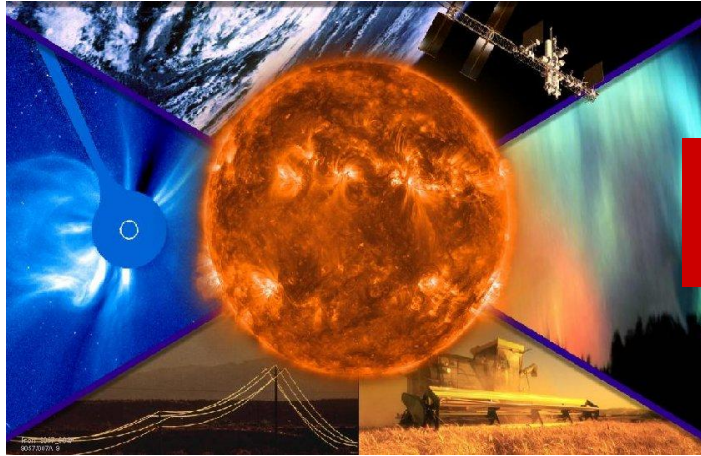
- space missions, ground-based observations, and theory, modeling, and data analysis
- space weather forecasting, design of space- and Earth-based technological systems, and understanding the role of solar-terrestrial influences on global change.

CAWSES Science Steering Group (SSG)

- (1) Solar Influence on Climate
- (2) Space Weather: Science and Applications
- (3) Atmospheric Coupling Processes
- (4) Space Climatology

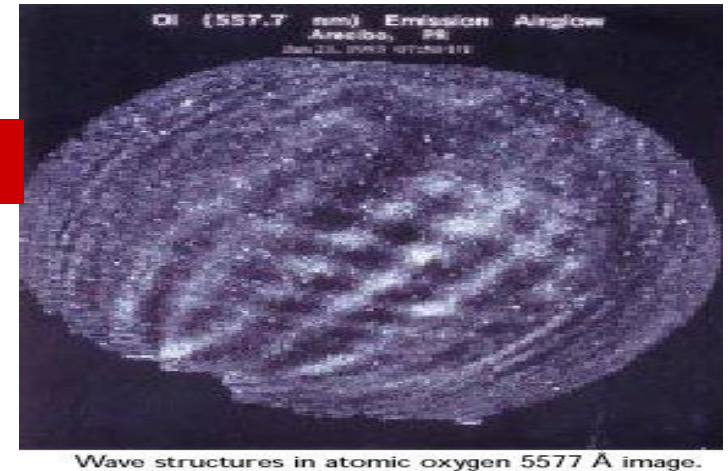
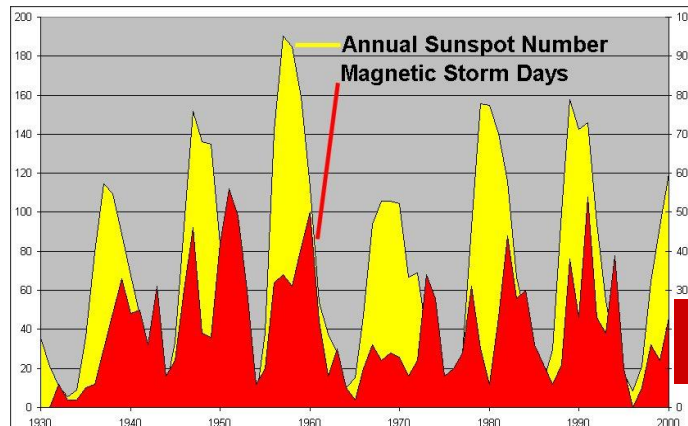


Solar Influence on Climate



Space Weather: Science and Applications

Atmospheric Coupling Processes



Climatology of the Sun-Earth System

For the ground-based observation of the upper atmosphere, huge, various kinds of observational data have been accumulated at universities and institutes since IGY in 1957-58.

These observational data have not been necessarily well used by various researchers.



IUGONET started in FY 2009!

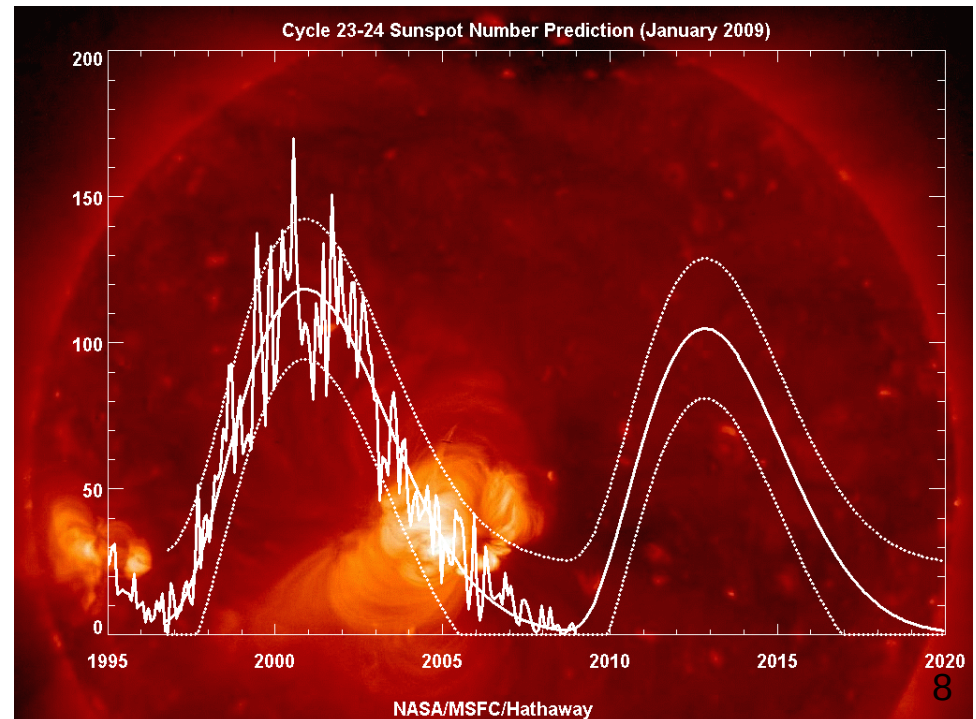
CAWSES II: Towards Solar Maximum, 2009-2013

CAWSES II addresses:

- Fundamental questions of how the coupled sun-earth system operates on timescales of minutes to millenia
- Questions that require coordinated inter-disciplinary international effort



Co-Chair of CAWSES-II
2009-10: Susan Avery & Alan Rogers
2011-13: Joe Davila & Toshitaka Tsuda



CAWSES task groups

TG1: Solar influences on climate

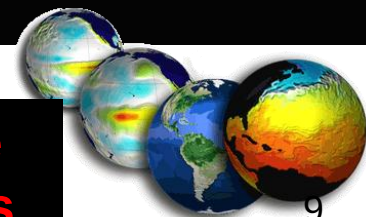
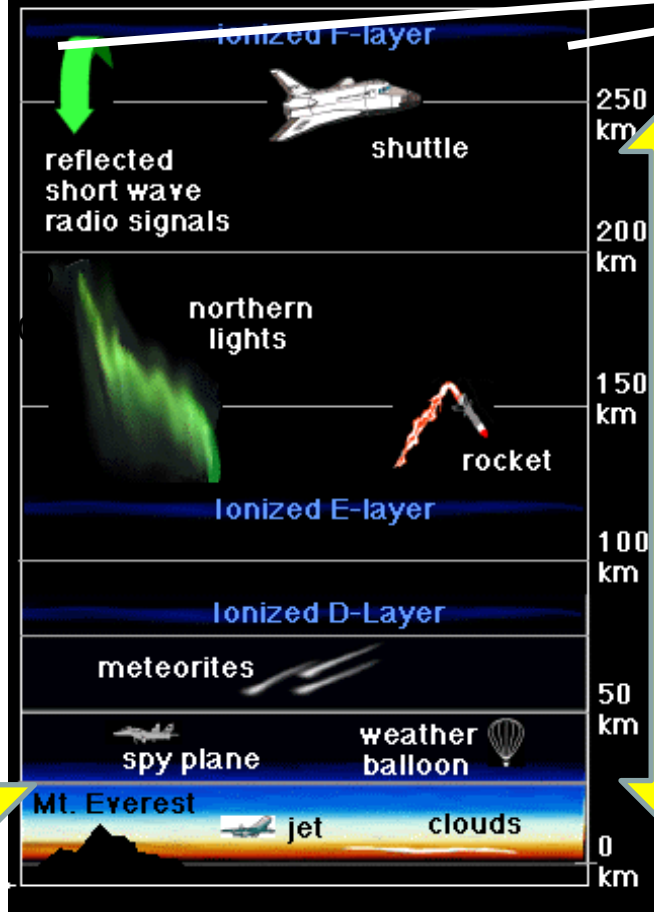
TG3: solar variability affects on geospace

TG2: Effect of climate change on geospace

TG4: Effect of waves on the upper atmosphere

TG5: Capacity building

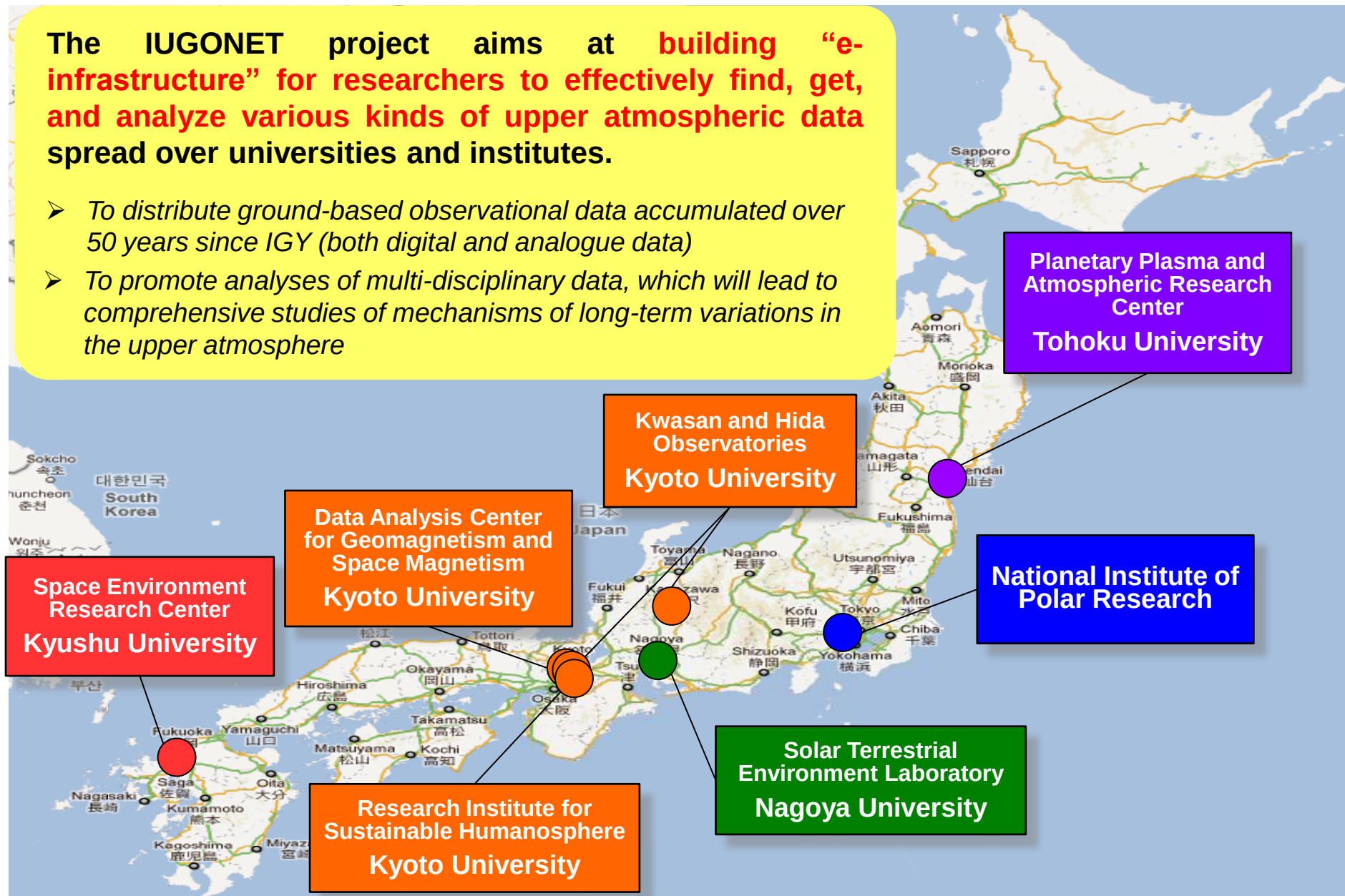
TG6: E-science and Informatics

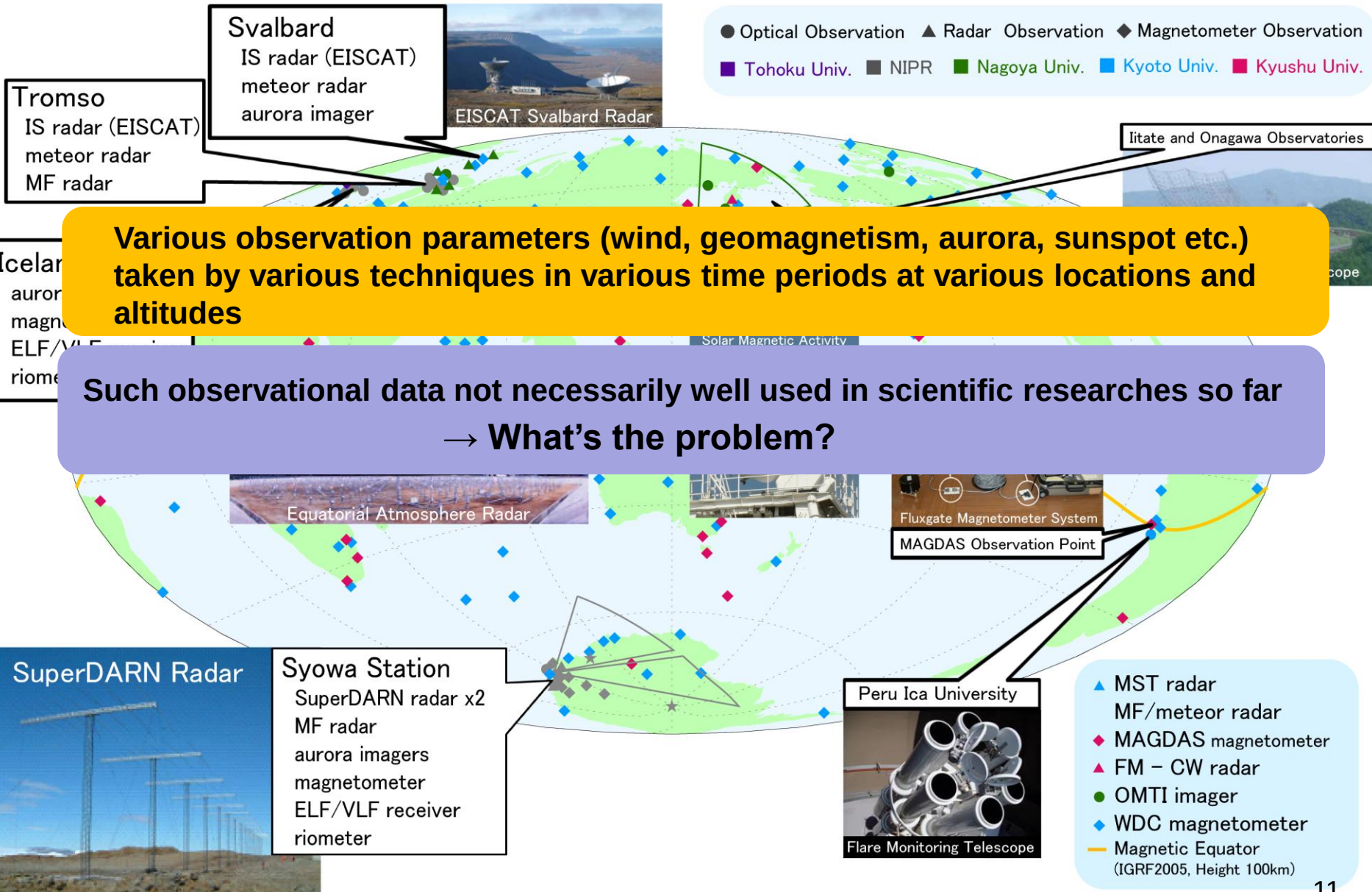


The IUGONET project - Objectives

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.

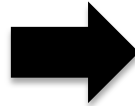
- To distribute ground-based observational data accumulated over 50 years since IGY (both digital and analogue data)
- To promote analyses of multi-disciplinary data, which will lead to comprehensive studies of mechanisms of long-term variations in the upper atmosphere



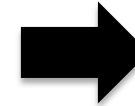


Schematic View of IUGONET Project

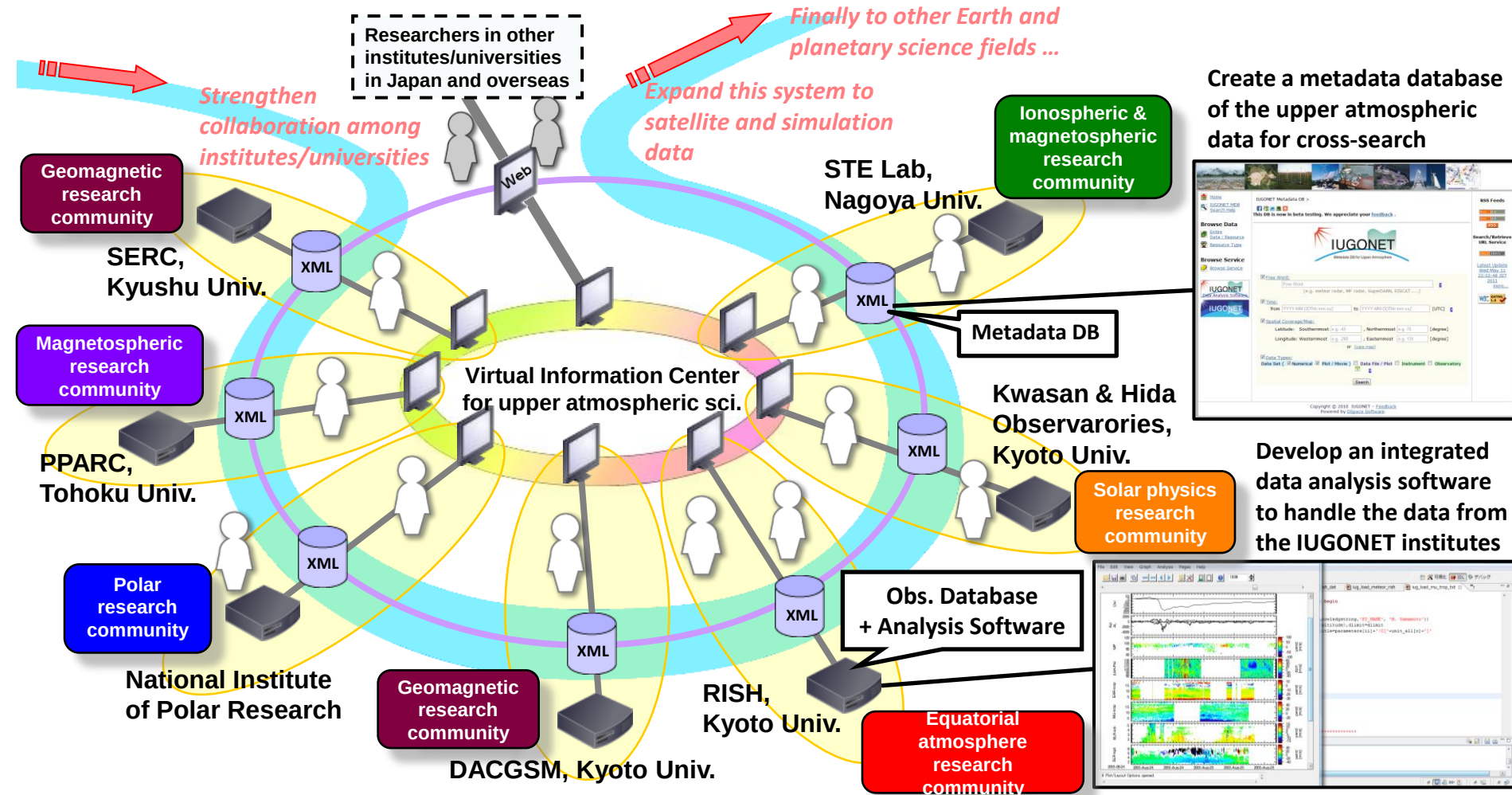
PROBLEM: Various kind, huge amount of data spread over research institutes with little info.



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

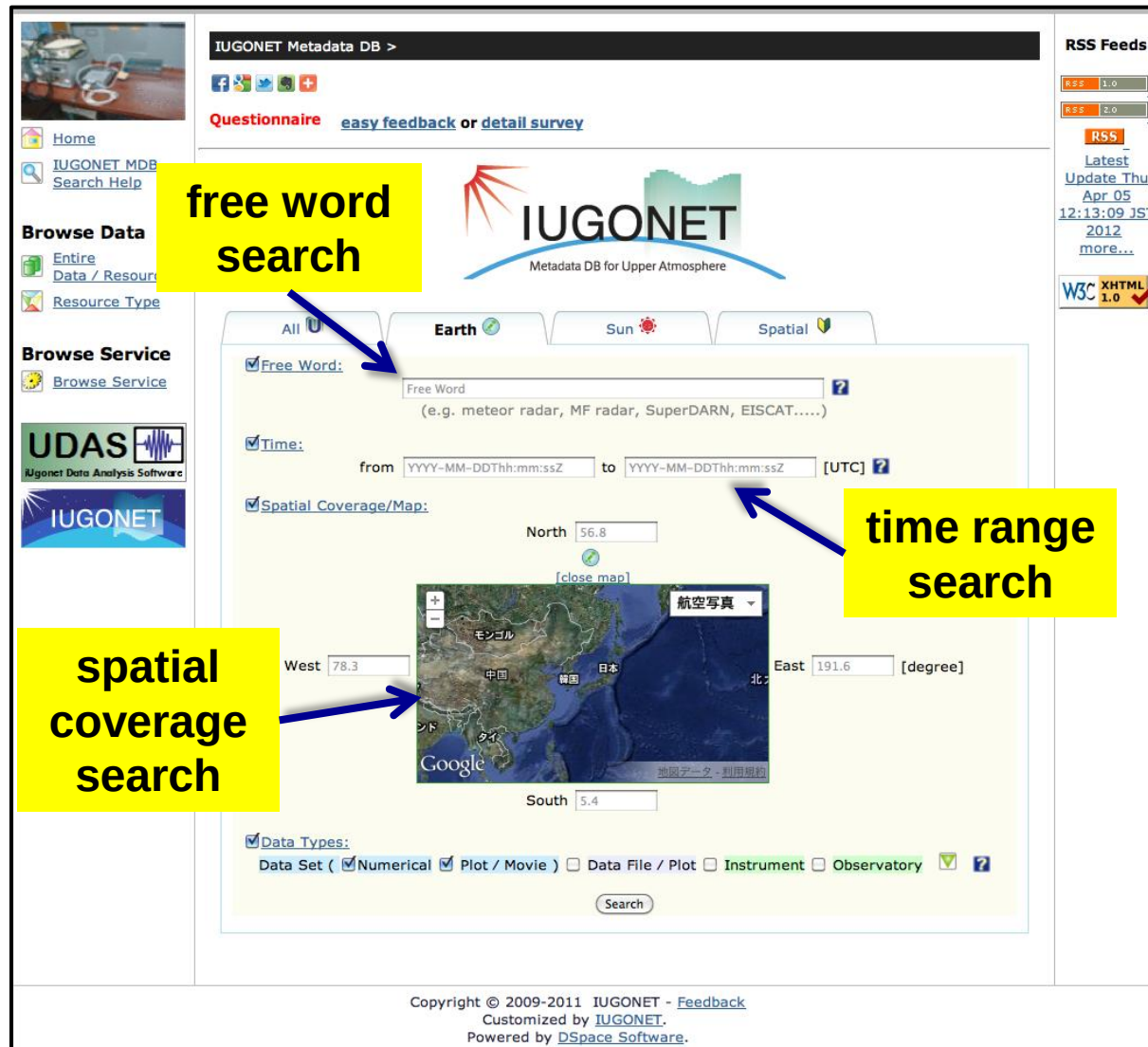


Promote new types of the upper atmospheric research by the analysis of multidisciplinary data



ITEMS		FY2009	FY2010	FY2011	FY2012	FY2013	FY2014	REMARKS
Virtual Information Center	Installation & stable operation	Install 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 the 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 →		Arrange relatively old, undatabased items and digitize analogue data →			Rearrange existing observational DBs and newly set up DBs of undatabased items
	Application to scientific researches				Conduct interdisciplinary researches by utilizing the IUGONET products →			Make a self-assessment of the IUGONET products and introduce how to use them in researches
	Outreach activities	Build project homepage →			Organize regular workshops and provide tutorial movies of the IUGONET products →			Conduct promotion activities to settle the IUGONET products as an essential e-infrastructure

<http://search.iugonet.org/iugonet>



The screenshot shows the IUGONET Metadata DB search interface. The page has a header with the IUGONET logo and navigation links. The main search area includes a 'Free Word' search box, a 'Time' range search box, and a 'Spatial Coverage/Map' section with a map of East Asia. The map shows coordinates: North 56.8, South 5.4, West 78.3, and East 191.6. The 'Data Types' section includes checkboxes for 'Data Set', 'Numerical', 'Plot / Movie', 'Data File / Plot', 'Instrument', and 'Observatory'. The footer contains copyright information and mentions that the system is powered by DSpace Software.

free word search

time range search

spatial coverage search

of metadata registered
(as of April 2012)

1.68 million

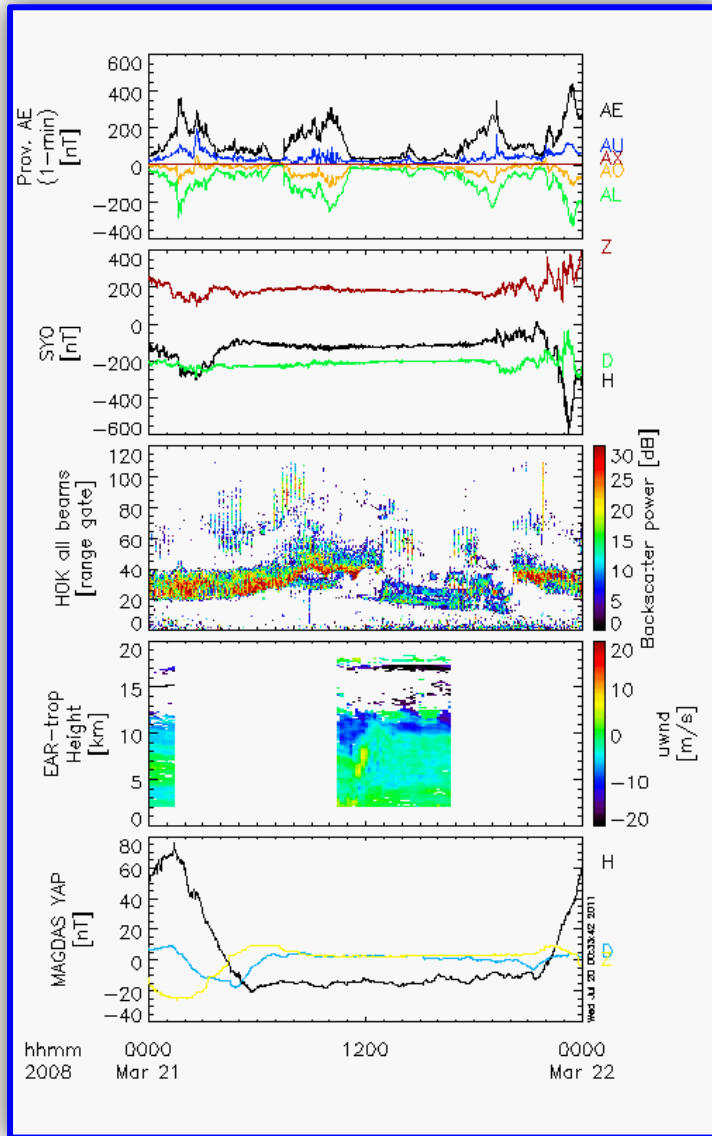
(* including metadata of data files)

● Metadata DB platform

DSpace - an open source software to manage digital contents and their metadata - with customization depending on our metadata

● Metadata format

SPASE metadata model with some modifications according to characteristics of the ground-based observational data of the upper atmosphere



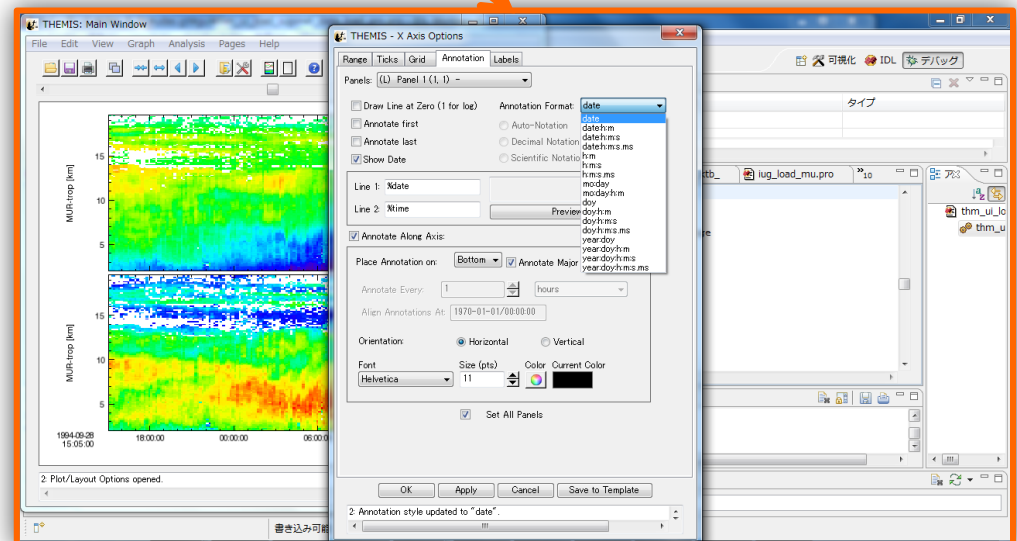
- ✓ To help users easily download, visualize, and analyze various data provided from the IUGONET institutes

- ✓ With TDAS libraries in IDL

THEMIS Data Analysis Software suite

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

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



We are doing promotional activities to settle the IUGONET products as an essential e-infrastructure in the research communities.

● Data analysis workshop

We provide intensive course to learn how to use the IUGONET metadata DB & data analysis software and to analyze observational data provided by the IUGONET institutes

Next workshops

- July or August 2012 @ Tachikawa
- February or March 2013 @ Nagoya

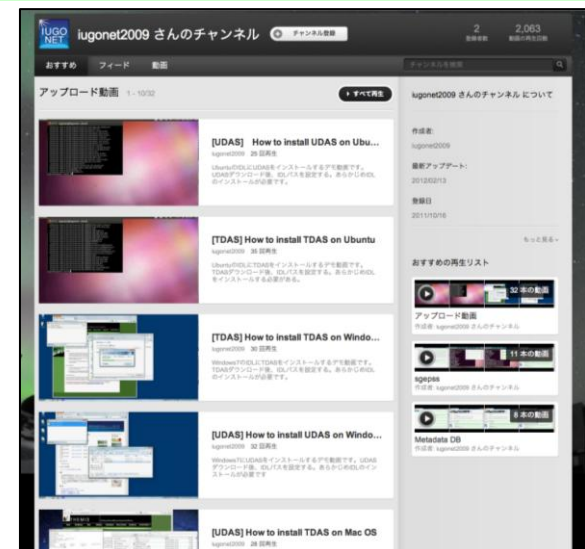


Data analysis workshop @ Tachikawa (Jul 2011)

<http://www.youtube.com/user/iugonet2009>

● Online tutorial movies

Researchers can learn how to use IUGONET metadata DB & data analysis software anytime online at the IUGONET's YouTube site.





Outreach Activities



<http://twitter.com/#!/iugonet>

Provide various information of metadata database, analysis software, data provided by each institute, meeting presentations, IUGONET workshop, etc.



<http://www.iugonet.org/>

Provide overview of the IUGONET project and its products

- The IUGONET project (<http://www.iugonet.org>) builds **metadata database** and **analysis software** to promote effective distribution and use of upper atmospheric data taken by various ground-based observations.
- The IUGONET products have just been released!
 - Metadata database : <http://search.iugonet.org/iugonet/>
 - Analysis software : <http://www.iugonet.org/en/software.html>
- The IUGONET tries various promotional activities to settle the IUGONET products as an essential e-infrastructure in the research communities and plans to extend the products internationally and interdisciplinarily.