EISCAT Data Analysis, -base, Tools and Procedures at NIPR

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The 5th EISCAT_3D User meeting in Uppsala on 6-8 May 2013
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1. EISCAT database in NIPR

2. Search and visualization tools of the database (IUGONET, Dagik, and CEF)

3. Procedures for making the database
1. EISCAT database in NIPR

Construction of uniform and user-friendly database is important and valuable for investigations of long-term trends and collaborations with other GB observations. Such an EISCAT database has been developed and available on web: http://polaris.nipr.ac.jp/~eiscat/eiscatdata/

To make the database, we use

6 work stations (CPU: Dual Xeon or Core i7) for data analysis, web server, and license server

14 NAS box (7 or 8 HDDs each, RAID5/6/10, Gigabit Ethernet), as file servers.

Data storage capacity: ~180TB in total

- KST UHF/VHF radar data: 1981-2013
- EISCAT Svalbard radar data: 1996-2013 (Ne,Ti,Te,Vi, E-field, Conductivities,...)
Size of EISCAT data

EISCAT rawdata: ~30 TB (~25TB in NIPR)

EISCAT analysed data: ~4 TB in NIPR

(As a reference)
Size of NIPR optical and radio wave data at TRO/LYR (2010-): ~50 TB in total

(Note: Only CP and SP(NI) data in 2012 and 2013)

- Total size of Tromsø UHF rawdata (ACF data) in 2011: ~2 TBytes
- EISCAT_3D (continuous run (x ~4) & multi-beam (x ~50)): ~400 TBytes/year?
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http://polaris.nipr.ac.jp/~eiscat/eiscatdata/

These tools are all available on web

Conjunction Event Finder (CEF)

CDF format files for IUGONET

KMZ format files for Dagik
IUGONET is a six-year (2009-2014) research project, to build a Cross-Database Search and Integrated Analysis System for a Wide Variety of Data from Long-Term Ground-Based Observations to Promote Upper Atmosphere Physics Science and Interdisciplinary Research.

The IUGONET provides a new research platform that enables metadata extracted from ground-based observation data to be shared, which IUGONET institution members have been collecting since the International Geophysical Year (1957-1958). In addition, IUGONET developed analysis software to access and analyze data (CDF or ASCII format files) in an integrated fashion. The efforts of IUGONET not only lead to the establishment of a research platform to better understand global upper atmospheric phenomena, but also help to facilitate interdisciplinary researches.

IUGONET is currently discussing the possible international collaboration with the databases of the European project “Near earth space data infrastructure for e-science (ESPAS)” and the “Virtual Observatory (VO)” of the United States.
The IUGONET developed an integrated analysis system known as “UDAS,” which provides time-series plots and an analysis of various ground-based observation data. UDAS has been released and can be downloaded from website.

TDAS/UDAS consists of CUI and GUI tools. The GUI tool (works on a free IDL Virtual Machine) provides an intuitive operation for IDL beginners. The free IDL Virtual Machine allows any users without a paid IDL license to use the GUI tool.
Dagik is a data-showcase for geospace science, and geophysics.

3-D visualization of EISCAT data on Google Earth. Kmz files are prepared in http://polaris.nipr.ac.jp/~eiscat/eiscatdata/kmz.html

We have developed the data visualization methods, in order to understand distribution of several ionospheric phenomena easily, and also to combine the radar data with satellite data. This will be also applied for 3-D data obtained with EISCAT_3D radar system.
The CEF is a Web tool for seamlessly browsing quick-look (QL) data from many different kinds of satellites and ground-based instruments in solar-terrestrial physics. This tool is powerful in finding interesting events of conjunction observations by satellites and ground-based instruments.

Conjunction Event Finder for EISCAT

Satellite and ground-based data on the same date (and time)

1-day and 2-hour summary plots

Collaboration with STEL ERG-SC & ISAS/JAXA
3. Procedures for making the database

**EISCAT sites or HQ**

- EISCAT rawdata (Matlab binary)
  - Resolution: A few sec
  - Download via Internet, or copy in portable HDDs

- Analysed data (Matlab binary)
  - Resolution: 1,2,5-min, 60-min, a few sec,…

**NIPR**

- Using IDL
  - Metadata and analysed data (CDF format)
    - 1-day file
    - For IUGONET
  - Analysed data (KMZ format)
    - 1-day file
    - For Dagik
  - Summary plots (ps, pdf, png)
    - 1-day and 2-hours
    - For CEF

On Web
Current status of data analysis and visualization of the EISCAT database in NIPR were explained.

The EISCAT database provides valuable information for studies on upper atmospheric physics in the polar region. In addition, combinations of the EISCAT database and other in-situ and ground-based databases are essential to understand dynamics of the interaction between polar mesosphere, thermosphere, ionosphere, and magnetosphere.

They can be applied to multi-beam observations with EISCAT_3D radar system.