Data centers and ICSU-WDS (World Data System)

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1. Situation of WDS
   - WDC+FAGS => WDS, open data policy
   - WDS-IPO: to be set up in NICT, Japan
   - Toward system of data centers/network of various data systems...
   - data management by each data centers (WDS facilities)

2. Examples of data sharing related to developing countries (not necessarily WDCs)
   - Space weather/Upper atmosphere observing network
   - IUGONET (Inter-university Upper atmosphere Global Observation NETwork)
“Old” World Data Centres

The WDC system was created 50 years ago with sites in Europe, The Soviet Union, Japan and North America. The system was subsequently enhanced in a variety of disciplines in response to international programs and extended to other countries, most notably China. Recent additions are more broadly environmental. A new WDC on ‘Biodiversity and Human Health’ is currently under consideration in South Africa. However, the large majority of WDCs are still located in northern hemisphere countries, an imbalance that the Panel has undertaken to remedy by focusing on electronic technologies for data access and exchange, including the development of ‘mirror sites’.
GLOBAL CHALLENGES

Energy crisis
Global Diseases
Information Boom
Environmental Problems
Growing Biocapacity/Consumption Misbalance
WDS Transformation

- WDCs (1957 – 2008)
- FAGS (1956 – 2008)

- WDS: 2008 – ...
- CODATA: 1966 –

SCID Report 2008
The International Council for Science envisions a Global World Data System, in order to:

- emphasize the **critical importance of data** in global science activities
- further ICSU strategic scientific outcomes by addressing **pressing societal needs** (e.g. sustainable development, digital divide)
- highlight the very positive impact of **universal and equitable access** to data and information
- support services for D&I **long-term stewardship**
- promote and support **data publication and citation**
WDS Data Policy Final Statement

The International Council for Science World Data System (ICSU WDS), recognizing the benefits and importance of contributing to the growing international efforts of data sharing, has adopted the same principles from GEO/GEOSS data sharing principles as follow:

- There will be full and open exchange of data, metadata and products shared within WDS, recognizing relevant international instruments and national policies and legislation;
- All shared data, metadata and products will be made available with minimum time delay and at minimum cost;
- All shared data, metadata and products being free of charge or no more than cost of reproduction will be encouraged for research and education.
Example of a “System of data systems”

**Parallel concept to GEOSS**

WDC = World Data Center
WDS = World Data Service
WDAS = World Data Analysis Service
WCD = World Center for Data

- Pink circle = International
- Orange circle = National
- Green circle = Regional
- Blue circle = Disciplinary
- Purple circle = Interdisciplinary

Illustrative example of the interoperability between the components of a GDSS
WDS International Program Office (IPO)

- To be established in NICT (National Institute of Information and Communications Technology), Japan.
- Announced late 2010, start date 2nd quarter 2011 (hopefully)?
- Based at NICT Headquarters, Koganei, Tokyo
- Search for WDS IPO Executive Director and staff beginning soon (!?)

http://www.nict.go.jp/index.html
Where we are... and where we are going

Key Partners
- ICSU Members
- ICSU Interdisciplinary Bodies
- GEO/GEOSS
- WMO-IS
- IODE ...

Priority area
International Polar Year data legacy
- Polar Information Commons
- Long term archival
- IPY bibliography

- International Programme Office (WDS IPO)
- Criteria for Membership
- Applications for Membership

- Draft Constitution
- Data Policy implementation: Data Sharing Principles similar to GEO

- WDS Initial System Architecture
- Implementation Plan—Phase 2

Organizations interested in ICSU World Data System
Magnetometer & HF radar observations in Far East Siberia

South-East Asia low latitude Ionospheric Network (SEALION)

Domestic Ionosonde Network & Hiraiso Solar Observatory

Biak (Ken Murata, 2010)
Near Future Plan: Observation Project

Plasma bubble via all sky imager

Equipment of ASI

Regional imager chain from SW Asia to Japan with Ionosonde

Domestic Imager chain

NICT imager chain

NICT inside collaboration to develop high precision GPS positioning system

Chain observation via all sky imager

Development of High precision GPS positioning system

Satellite orbit information error

Satellite clock error

Delay in ionosphere (~100m)

Delay in troposphere (~20m)

Multi-path

Altitude 250 - 400km

ionosphere

Altitude ~7km
troposphere

Sun light

22:37
23:03
23:29
23:55

23:03 LT
23:55 LT

Regional imager chain from SW Asia to Japan with Ionosonde

NICT imager chain

Plasma bubble

Delay in Ionosphere (~100m)

Delay in troposphere (~20m)

Multi-path

NICT inside collaboration to develop high precision GPS positioning system
Distributed low cost storage servers
(as of 2010)
Concept of a Science Cloud as a “Digital Earth”

- A variety of Observation Data
- Large-Scale Simulation Data
- Past Archive Data
- Now Real-time service
- Future Forecasting

- Observation
- Informatics
- Simulation

- Supercomputers
- Researchers
- Users

- Archived database
- Internet
- Visualization
- Web Server
- Analysis
- Processing
- Ground-based
- Spacecraft

Digital Earth (past/now/future)
Network infrastructure:
An international program of Internet research
Inter-university Global Observation Network (Kyoto U/RISH & Faculty of Science, Nagoya U, Kyushu U, Tohoku U, and Ntl. Inst. of Polar Research)

PROBLEM: Many, various kind of observation data spread over institutes and universities

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

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

Create a metadata database of upper atmospheric data and make it open to public through the Internet

Develop an integrated data analysis tool for observation data at the IUGONET institutes
Observations by IUGONET institutes/universities

- **Svalbard**
  - IS radar (EISCAT) radar
  - Meteor radar
  - Aurora imager

- **Tromsø**
  - IS radar (EISCAT) radar
  - 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**
  - Solar Magnetic Activity Research Telescope

- **Iitate and Onagawa Observatories**

- **Iitate Planetary Radio Telescope**

- **SuperDARN Hokkaido HF radar**

- **MAGDAS Observation Point**
  - Fluxgate Magnetometer System
  - Magnetometer
  - Data Logger

- **Peru Ica University**
  - MST radar
  - MF/meteor radar
  - MAGDAS magnetometer
  - FM – CW radar
  - OMTI imager
  - WDC magnetometer
  - Magnetic Equator (IGRF2005, Height 100km)
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2. Examples of data sharing related to developing countries
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   - IUGONET (Inter-university Upper atmosphere Global Observation NETwork)
1st WDS Conference in Kyoto, Japan (3-6 Sept. 2011)

WDS-SC meeting (7-8 Sept. 2011)

http://wds-kyoto-2011.org/
Thank you for your attention!