The Potential Role of the World Data Centers in the Global Earth Observing System of Systems and the International Polar Year: CIESIN Experience to Date

Dr. Robert S. Chen
Director and Senior Research Scientist, CIESIN
Director, World Data Center for Human Interactions in the Environment
Manager, NASA Socioeconomic Data & Applications Center
Secretary-General, CODATA

Dr. Robert R. Downs, Senior Digital Archivist, CIESIN

Mr. Gregory Yetman, Senior Staff Associate, CIESIN

Dr. Susana Adamo, Associate Research Scientist, CIESIN
Growing Variety and Volume of Remote Sensing and In Situ Data
Global Earth Observing System of Systems (GEOSS)

A Global, Coordinated, Comprehensive and Sustained System of Earth Observing Systems

Address the need for timely, quality, long-term, global information as a basis for sound decision making.
There is a Need for a System which Provides Access to all Earth Observation Data in Standard Interoperable Formats

Need for a Portal and Clearinghouse

• For Access to all Earth Observation Data
• Based on Existing Portals, Systems and Networks
• Designed to Increase Quality and Accessibility of Information
• Providing Tools

What’s the foundation?? Past data!
International Polar Year, 2007-2008

- An intensive burst of internationally coordinated, interdisciplinary, scientific research and observations focused on the Earth’s polar regions
- Aimed at making major advances in polar knowledge and understanding, while leaving a legacy of new or enhanced observational systems, facilities and infrastructure
- History:
  - First IPY: 1882-1883
  - Second IPY: 1932-1933
  - IGY: 1957-1958
• Established 1995
• Premised on the need to complement and integrate environmental and Earth science data with social science data
• Current focus is on access to *global* environmental and socioeconomic data, especially related to:
  – Climate
  – Conservation
  – Governance
  – Hazards
  – Health
  – Population
  – Poverty
  – Sustainability
Evolution of the Data Provider Model
Cyberinfrastructure Components

- Reliability and continuity
- Discovery
  - Catalogs
  - Data
    - Standards; georeferencing; time-stamping
- Access
  - On-line databases
  - Documentation, visualization
  - Linkage Understanding
    - Domain Understanding (What do these data mean? Are they suitable for my use?)
- Integration
  - Stewardship
  - Interoperability
    - Standards; georeferencing; time-stamping
    - Standards; georeferencing; time-stamping
- Recent CIESIN Infrastructure Development
GEO Architecture Implementation Pilot – Phase 1

- Set of videos prepared by OGC in support of the GEOSS Architecture Implementation Pilot (AIP)
- SEDAC features prominently in 5 of the 10 videos

http://www.ogcnetwork.net/pub/ogcnetwork/GEOSS/AI_Pilot_Demo/index.html
GEOSS AIP Phase 2: Focus on Web Processing Services and Workflow

Data/policy analyst monitoring populations that may be at risk from drought

Developed by Greg Yetman, CIESIN, Columbia University
SEDAC Polar Map Viewer Prototype

- Supports WMS, WFS
- Supports Web Map Context (WMC)
Permafrost and Population Data via Google Earth

- SEDAC and NSIDC data served via WMS
- Simple KML file to provide access to data
**IPY Data and Information Service**

- IPY data access organized by IPY-DIS
  - Co-chairs, Mark Parsons & Taco de Bruin
  - Also a CODATA Working Group
- Requested CIESIN to reach out to 4 IPY projects
- Offered support on data archiving, integration, dissemination, stewardship, etc.

**IPYDIS Directory**

This table shows all the substantially funded IPY projects and their data archives. This will be replaced by an interactive, searchable directory soon.

Please send additions and corrections to ipydis@ipydis.org

<table>
<thead>
<tr>
<th>Project number</th>
<th>Title</th>
<th>Project Point of Contact</th>
<th>Archive Organization</th>
<th>Archive contact</th>
<th>Archive email address</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>Dynamic Social Strategies in Arctic Environments: Long-term Perspectives on Movement and Communication</td>
<td>Hans Christian Gullek</td>
<td>Danish Polar Center</td>
<td>Danish Polar Center</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Synoptic Antarctic Shelf-Slope Interactions Study</td>
<td>Karen Haywood</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Large Scale Historical Industrial Exploitation of Polar Areas</td>
<td>Prof. Dr. Louweijn-Hacquebord</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Arctic Wildlife Observatories Linking Vulnerable</td>
<td>Gilles Gauthier</td>
<td>Luc Cournoyer</td>
<td><a href="mailto:luc.cournoyer@cem.ulaval.ca">luc.cournoyer@cem.ulaval.ca</a></td>
<td></td>
</tr>
</tbody>
</table>

**IPYDIS Directory**: [http://ipydis.org/community/directory.html](http://ipydis.org/community/directory.html)
CAVIAR: Community Adaptation & Vulnerability in Arctic Regions

- Eight countries involved
- Set of case studies focused on people & livelihoods in community context
  - Current and future exposure and sensitivity
  - Current and future adaptive capacities
- Data from interviews, focus groups, participant observations, selected “informants”, archival records, secondary sources
Some Challenges for WDCs in Working with GEOSS & IPY

• GEOSS
  – Open architecture under development – requires rapid technological development and response
  – Difficulties of merging past, near real time, real-time, and model data
  – Coping with potentially large amounts of new data and metadata
  – Reconciling GEOSS focus on societal benefits with traditional research focus of WDCs
  – Keeping up with a large and diverse set of GEO tasks & activities

• IPY
  – Scattered participants, activities
  – Complex, varied data, including many field studies, multi-institutional efforts
  – Potential loss of key data and metadata after data collection and analysis period
  – Resource and time limitations that limit response, cooperation
  – Unwillingness of researchers to contribute, especially before publication of results or before data analysis and clean-up
On the other hand...

- WDCs have the expertise and experience to deal with these challenges
- GEOSS and IPY data would complement and extend existing WDC holdings, increasing the utility of the WDCs for both research and applications and expanding their user base
- GEOSS represents a major effort to open up data systems and implement the vision of seamless data access and use
- The IPY constitutes a unique opportunity to demonstrate that cross-disciplinary data access and integration can benefit both science and sustainable development

➢ BOTTOM LINE: If the WDCs don’t participate, who will?!?

THANKS!