

The Cybercartographic Atlas of Antarctica, and Related Archival Issues

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Data Archiving Session - The InterPARES Project

19th International CODATA Conference

THE INFORMATION SOCIETY: NEW HORIZONS FOR SCIENCE

Berlin, Germany, 2004

Monday, Nov 8, 1:45 PM Steglitz

The Geomatics and Cartographic Research Centre

Research Focus:

The application of cartography and geospatial analysis to an increased understanding of societies and economies in a national and international context

Reflects the Changing Nature of Cartography

The organization, presentation, analysis and communication of spatially-referenced information on a wide variety of topics of interest and use to society in an interactive, dynamic, multidisciplinary, multisensory format with the use of multimedia and multimodal interfaces.

Taylor

Social Sciences and Humanities Research Council of Canada (SSHRC)

- Innovation on the New Economy: Research Alliance Program Stream
- Awarded a 4 year grant to support research in cybercartographic theory and methodology
- Project Implementation began 01/2003

Aims and Objectives

- A multidisciplinary research team will develop a new, foundational paradigm for cybercartography
- Contribute to an improved understanding of how individuals organize, navigate and interact with computer-based information

Cybercartographic Products

Atlas Goals:

- Create two innovative products and methodologies to complement discovering, utilizing, presenting and distributing existing information and data for
 - *The Cybercartographic Atlas of Antarctica*
 - *The Atlas of Canada's Trade with the World*
- The intended users are scientists, decision makers and the general public

7 Elements of Cybercartography

(Image produced by the e-Content Institute Vol. 11, Issue 5, July-August 2004)

The seven elements of cybercartographic design

A cornerstone of the GCRC research is the conceptual framework for cybercartography developed by Taylor and his team. These seven elements define the concept of cybercartography and differentiate it from earlier forms of computer-assisted mapping and map making.

If, as Taylor states, “products are to be successful in making the increased volume of information available from databases more accessible, understandable and useful to the general public, decision makers and researchers” they must be:

Multisensory — incorporating vision, hearing, touch and eventually smell and taste

Multimedia — employing formats and new telecommunications technologies

Interactive — engaging the user in new ways (games or edutainment)

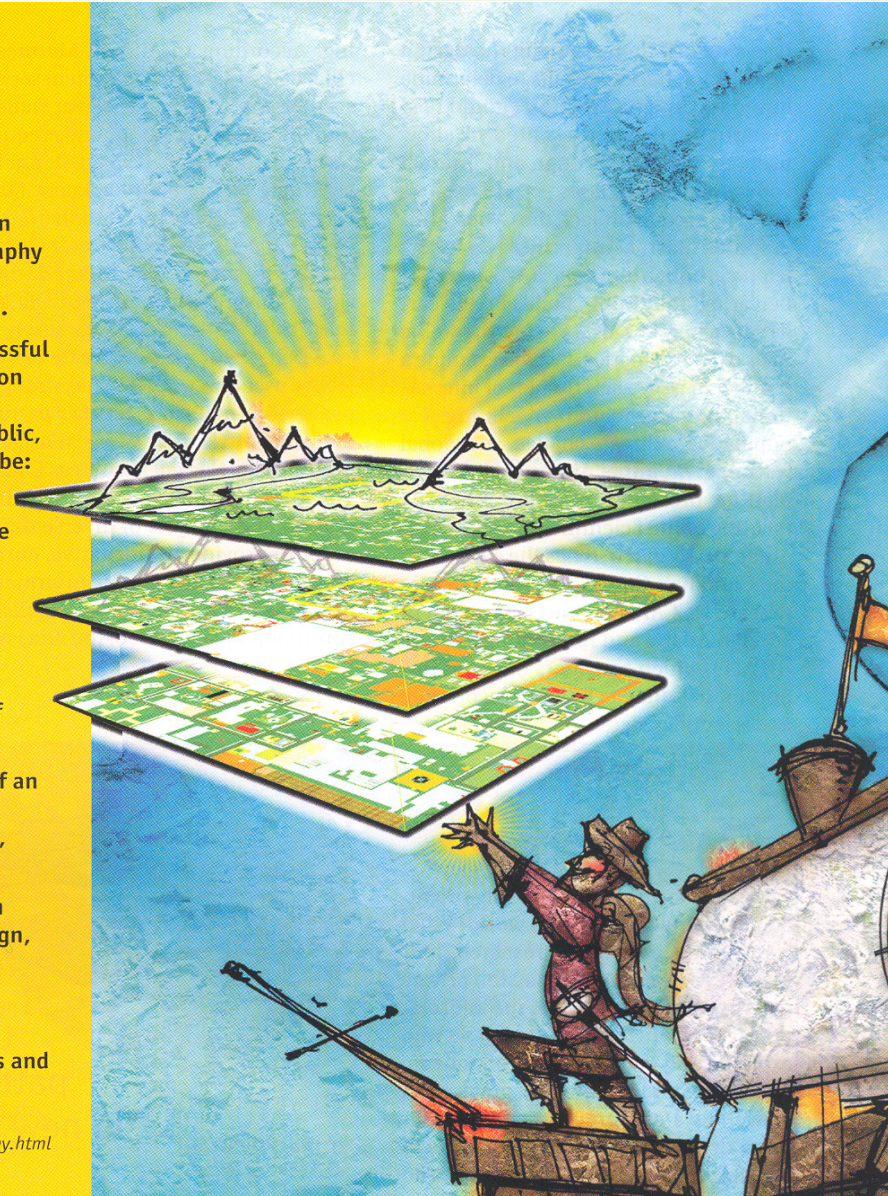
Topical — applied to a wide range of topics of interest to society

Integrated — unlike traditional maps; part of an integrated information/analytical package including text, photos, video, sound, models, statistics, music, tables

Multidisciplinary — developed by teams from many disciplines including cartography, design, music, cognitive psychology, film, language studies

Collaborative — involving new research partnerships among academics, governments and the private sector

www.carleton.ca/hotlab/hottopics/Articles/Cybercartography.html



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Users

- **General public**

- Learn from theme specific synthesis of data on Antarctica and Trade

- **Policy makers**

- Integrate and analyze GI to support policy decisions

- **Scientists**

- Integrate and analyze GI using scientific visualization to support information discovery and knowledge generation

Cybercartographic Atlas of Antarctica

- Development of an innovative On-line atlas to complement discovering, utilizing, presenting and distributing existing information and data about Antarctica to a wide variety of users, including scientists, decision makers and the general public
- Partnership:
 - Canadian Committee for Antarctic Research (CCAR)
 - Scientific Committee on Antarctic Research (SCAR)
- Developed in collaboration with international partners (Argentina, Australia, Belgium, Canada, Chile, China, Germany, New Zealand, Poland, United Kingdom, United States, IHO, ICA)

Cybercartographic Atlas of Antarctica

Conceptualization – *Science and Decision Making*

McMurdo Dry Valley - Internet Explorer provided by Sympatico

File Edit View Favorites Tools Help

Back Forward Stop Search Favorites Media Print

Address http://www.carleton.ca/ Go Norton Antivirus

The McMurdo Dry Valleys

Dry Valleys

- [Overview](#)
- [Taylor Valley](#)
- [Victoria Valley](#)
- [Wright Valley](#)

Features

- [Ice Falls](#)
- [Permafrost](#)
- [Salt Lakes](#)
- [Glaciers](#)

Concept Map

Search= Dry Valleys

Contours (500m Interval)
Satellite Coverage
Elevation
Value
High : 4700 m AMSL
Mid : 2500 m
Low : -1000 m

The Deserts of Antarctica

The Dry Valleys are so named because of their unusual lack of glacial ice. The McMurdo Dry valleys are located on the West side of the McMurdo sound and are comprised of three main valleys - Taylor, Wright and Victoria. These ice-free valleys cover an area greater than 4,000 square kilometres. Their formation are related to their proximity to the [Transantarctic Mountains](#) which act as a form of dam, preventing the movement of ice from the polar ice cap.

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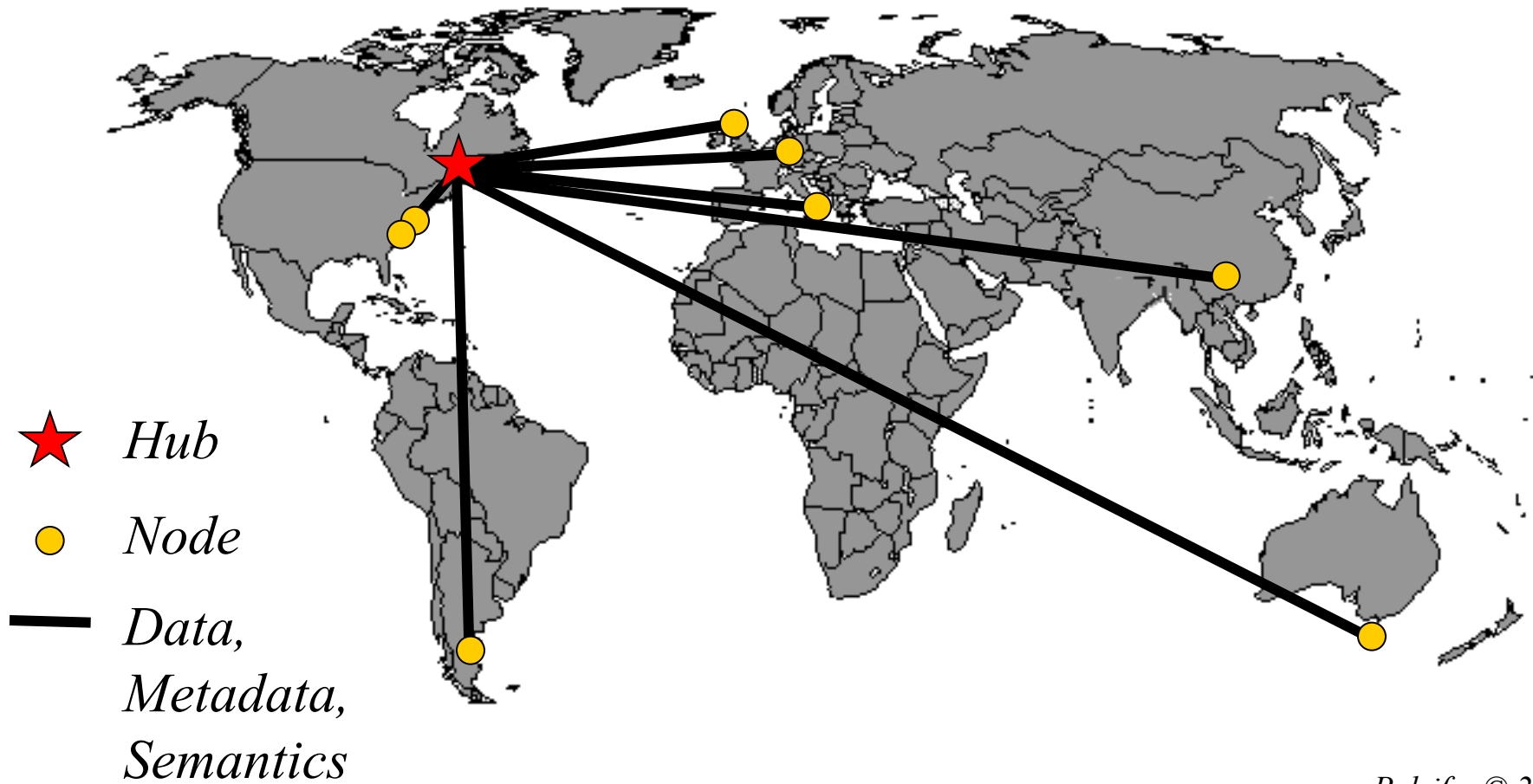
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Done My Computer

Pulsifer © 2003

Cybercartographic Atlas of Antarctica

Interoperable Data Infrastructure



Pulsifer © 2003

Cybercartographic Atlas of Antarctica

Conceptualization - *Education Learning Module*

Cybercartographic Atlas of Antarctica: McMurdo Dry Valleys

The interface features a central map area with several toolbars. On the left, a vertical toolbar includes 'View Topics' with a right-pointing arrow, 'Where to go?' with a location pin icon, 'Visited' with a red pin icon, 'Measure Distances' with a ruler icon, and 'Take a Picture' with a camera icon. Below this is a 'Compass' widget showing a green needle pointing North. At the bottom left, a signpost with two signs reads 'Antarctica' and 'The Ross Sea', with a cartoon explorer standing next to it. A black toolbar at the bottom contains icons for 'goto', 'align', 'view', 'restore', and a refresh icon. On the right, a vertical toolbar includes 'walk', 'fly', 'study', 'plan', 'pan', 'turn', and 'roll'. To the right of the map is an 'Information' panel with a scroll bar and a blue arrow slider. The text in the information panel reads: 'Welcome to the Dry Valleys of Antarctica. Explore the terrain to learn about glaciers and environmental conditions that shape the landscape making it what it is today.'

Woods © 2004



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Cybercartographic Atlas of Antarctica

Conceptualization - *Multimedia for Antarctic Sea Ice*

Antarctic Sea Ice Variation and Climate Variability

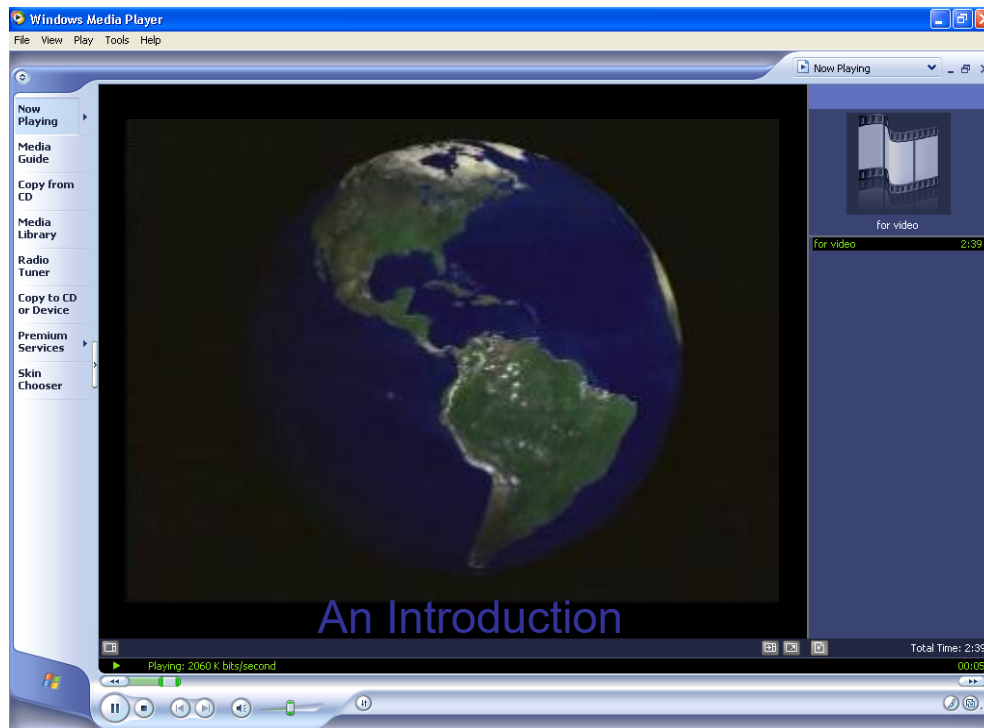
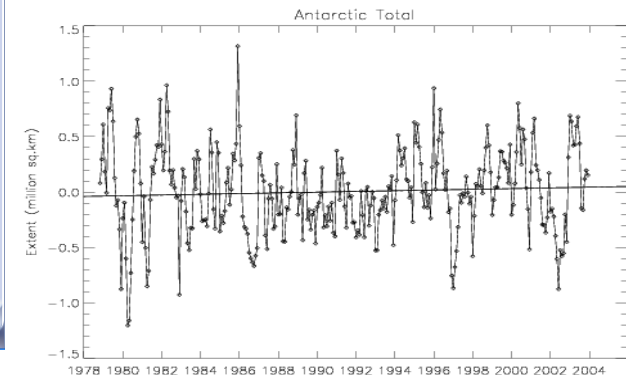


Image Source: Scientific Visualization Studio & Cool Antarctica

Antarctic sea ice is a predominant feature in the Southern Ocean. Its extent expands and contracts markedly from winter to summer. Sea ice around Antarctica grows out to nearly 60 degrees South at its peak extent during late austral winter - September, in effect doubling the area of the continent on an annual basis.

Climate variability such as El Nino Southern Oscillation (ENSO) has a significant impact in sea ice edge.



http://nsidc.org/data/smmr_ssmi_ancillary/regions/total_antarctic.html

Information Visualization of Metadata Queries

Low Fidelity Prototype

Typical query result from the Antarctic Master Directory (AMD)

Address: http://gcmd.gsfc.nasa.gov/Data/portals/amd/freetext/ft_search.html

ANTARCTIC MASTER DIRECTORY
a Global Change Master Directory Portal

HOME AUTHORIZING TOOLS DATA SEARCH NADC PORTALS ABOUT US GCMD HOME

Portals > Free Text

Query: AND(and(soil,soil),antarctica OR southern ocean OR AMD)
87 records matched your query
Count: 15

Records 1 through 15 of 87 returned.

Relationship between soil and plant geography on Clark Peninsula [ASAC_1083]
[More on this record](#)

Structure and Function of Terrestrial Biotic Communities [ASAC_37]
[More on this record](#)

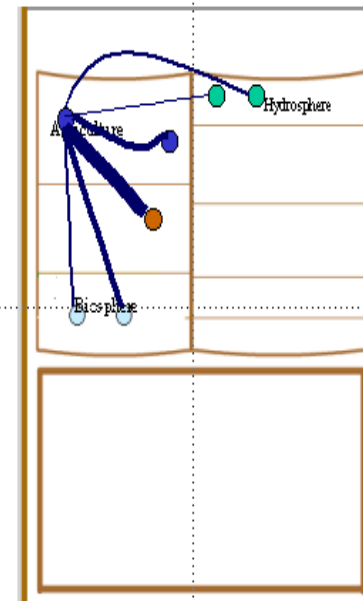
Cryptobiosis in Terrestrial Antarctic Invertebrates [ASAC_581]

Displaying Linkages between Specific Query Records

TOPIC > TERM

Agriculture > Food
Science > Food Storage

Title:
Macquarie Island Fisheries [AADC-00068]



Detailed Parameters:

1. AGRICULTURE > AGRICULTURAL CHEMICALS > PESTICIDES > METHYL BROMIDE
2. AGRICULTURE > AGRICULTURAL PLANT SCIENCE > PLANT DISEASES/DISORDERS/PESTS
3. AGRICULTURE > FOOD SCIENCE > FOOD STORAGE
4. AGRICULTURE > PLANT COMMODITIES > FRUIT PRODUCTS
5. AGRICULTURE > PLANT COMMODITIES > HORTICULTURAL PRODUCTS
6. AGRICULTURE > PLANT COMMODITIES > VEGETABLE PRODUCTS
7. BIOSPHERE > ANIMAL TAXONOMY > INSECTS

Cybercartographic Atlas of Antarctica Immersion and Interactivity: Discussion & Games

Discussions with Scientists

Never Winter Nights Game Mod of McMurdo Station

Cybercartographic Atlas of Antarctica

Places to Visit ☆

View Topics ▶

Start Tour ▶

Weddell Sea

Information

Welcome,
My name is Dr. Antarctica. Coincidence, I know...
I will be giving you a tour of six interesting sites on this continent. We will learn a lot about Glaciers, Glacier landscapes, and how they are affected by Global Warming and Climate Change.
Do you have any questions before we begin?
Yes No

Antarctica is the third largest continent in the world.
The East Antarctica and West Antarctica are said to be two separate tectonic plates that are separated by the continental ice sheet that covers most of the land.
This is some of the most important sites of Antarctica labeled with stars and explore the unique environments.

West Antarctic

Ross Sea

Woods © 2004



CANE Games Cluster 2004

Archiving

- Fragments of paper maps and fragments of digital maps
- “In archival terms the last quarter of the 20th century has some similarities to the dark ages. Only fragments or written descriptions of the digital maps produced exist. The originals have disappeared or can no longer be accessed.” *Taylor*

Domesday Project



*Domesday Book Chest at
London's Public Record Office in
Kew, London*

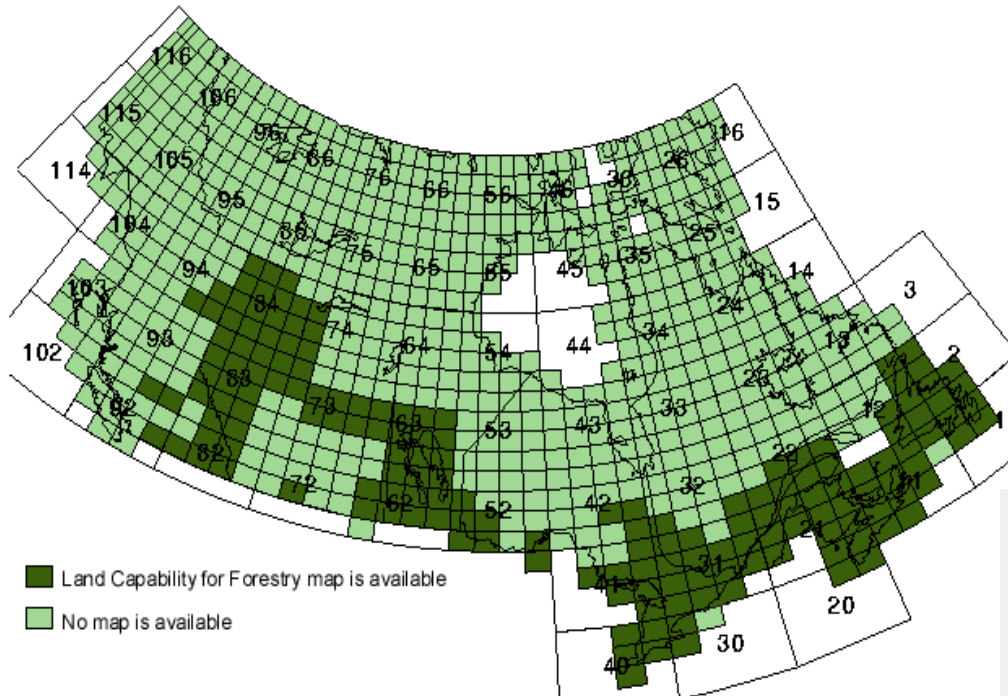


<http://www.si.umich.edu/CAMILEON/domesday/domesday.html>

Canada Land Inventory

GéoGratis
CLI Home Page
ABOUT THE CLI
CLI History
CLI Objectives
CLI Data Base
CLI Reports
CLI Classification
ON-LINE MAPPING
Agriculture
Forestry
Land Use
Recreation
Ungulates
Waterfowl
CLI Applications
CLI for 2050
Feedback
CLI Pamphlets
Brochure #1
Brochure #2

On-Line Mapping - Soil Capability for Forestry



■ Land Capability for Forestry map is available
■ No map is available

- 001k - Trepassey
- 001l - See 1M - Belleoram
- 001m - Belleoram
- 001n - St. John's
- 002c - Bonavista

Submit Query

Reset



Geospatial Data Archiving Issues

- Interoperability
- Proprietaryship
- Data
 - *Refreshing*
 - *Migration*
 - *Emulation*
 - *W/Metadata*
 - *Interrelationships matter*
- Storage capacity
- Data archiving versus information preservation
- Clearinghouses are libraries not archives
- Estimating costs
- Technological obsolescence

New Mapping Frontiers

- Spatially referenced data have always been integral to map creation and the abstracted rendering of these data have traditionally been in the hands of cartographers.
- The paper map was the final product or record that was then catalogued and preserved. Generally, data used to create the map were lost and not included as part of the complete record set.
- Cybercartography as a new paradigm has positioned data on par with the final map and related information objects as a result geospatial data and their attributes have become records in and of themselves.

Cybercartography Archiving Questions?

- Archiving dynamic, multidimensional, multisensory, multimedia, multimodal and distributed Atlases?
- The Atlas will be a scientific digital knowledge asset on environment and society. How do we make it available for future generations?
- Who pays for data preservation, storage, and archiving? Particularly in an international, inter-organizational and interoperable open source Atlas.

New Mapping Frontiers

- Who will store the Atlas? Archives of Canada? Natural Resources Canada? Scientific Committee on Antarctic Research?
- As cartography moves into a distributed Internet environment with information exchanges based on dynamic web presentation, is there a neglect to capture adequate documentary evidence of the occurrence of these transactions?
- How to recover archiving costs in a distributed virtual Internet project?
- Geospatial data require metadata, as do multimedia, dynamic and experiential information objects. What are the best metadata standards for photographs, film, video, web-cams, interactive maps, flythroughs, and animation?

InterPARES II Case Study

Domain 1, Focus 2, Working Group 2.1 Records
Creation & Maintenance of Scientific Case Study

Antarctica is often referred to as the ‘Continent of Science’ where exploration is for research and where treaties create an environment conducive to collaboration for international scientific study and not exploitation.

Past and Future Exploration

The new explorers The new explorers

How cybercartography is mapping the information age

By Virginia Roy



Greater even than their intrinsic value for scientists, researchers, educators and industry, the two GCRC products will have a lasting impact on the relationship between information mapping and the development of user-centred, multi-media interfaces



Cybercartography is capable of transforming all types of cultural, socio-economic and environmental data into interactive representations that allow users to explore patterns and relationships in new ways

(Images produced by the e-Content Institute Vol. 11, Issue 5, July-August 2004)



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