Data Management and Digital Preservation for Arctic Science: CADIS and Chronopolis

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Outline

Arctic Science Meets Digital Preservation

- What is digital preservation?
- SGF Case Study: CADIS Arctic Data Portal
- Digital preservation pilot using Chronopolis
- Lessons learned

Digital Preservation

Ensuring long term usability of precious collections.

- Certain research data are unique and cannot be replaced.
- Digital information loss is a real problem (NSF & LOC)
- Legal stewardship requirements for publically funded activities.
- Data preservation is not data backup.
- Preservation requires active data management and curation.

Case Study: CADIS

Arctic Data Discovery and Access

- NSF funded project to catalog Arctic data collections
- Collaboration between NCAR, Unidata and NSIDC
- In support of the Third Int'l Polar Year (2007 – 2008)
- IPY efforts (1882, 1931) generate irreplaceable data collections
- Historic IPY data collections (1882, 1931) scattered and lost
- Opportunity to develop a long-term collection from IPY3

Case Study: CADIS

NSF Vision for Arctic Observing Network

- AON would be "*a system of monitoring that will significantly advance our observations of Arctic environmental conditions*"
- Implied considerable data integration and data stewardship
- In reality AON is a number of field projects with individual needs
- Diverse platforms, metadata and data formats
- Few systems and interfaces for interoperability

Case Study: CADIS

Initial Steps Toward NSF Vision

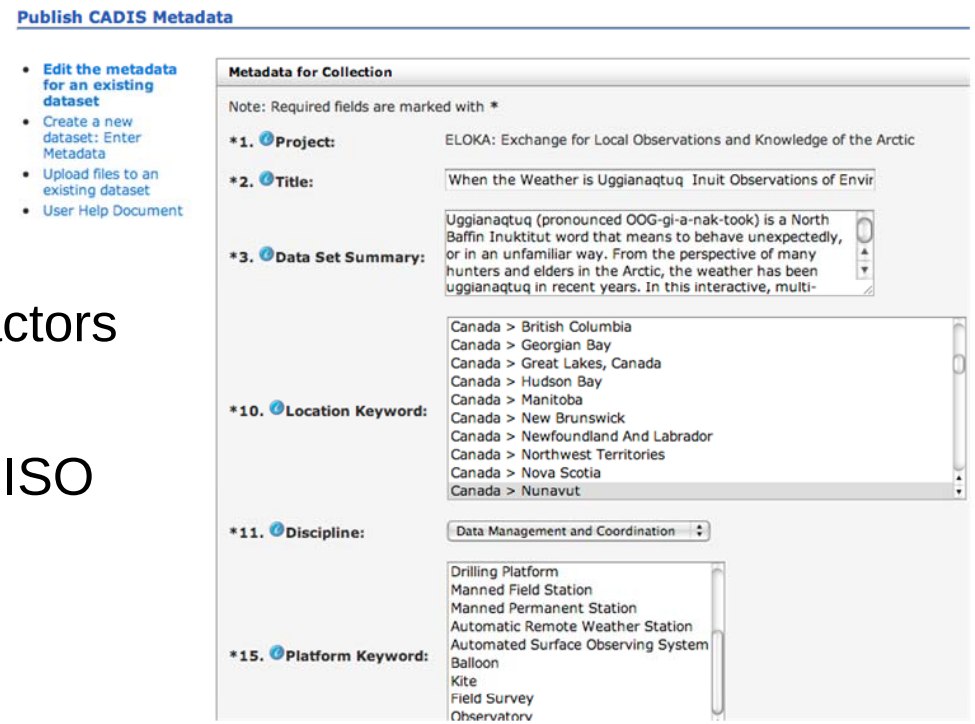
- Need to respond quickly to AON project needs
- Establish and interview a representative user group
- Developed CADIS Metadata Profile and use cases
- Leverage existing SGF data management tools
- Provide guidance and support for project investigators
- Develop data conversion tools and documented processes

CADIS Data Portal

SGF Gateway

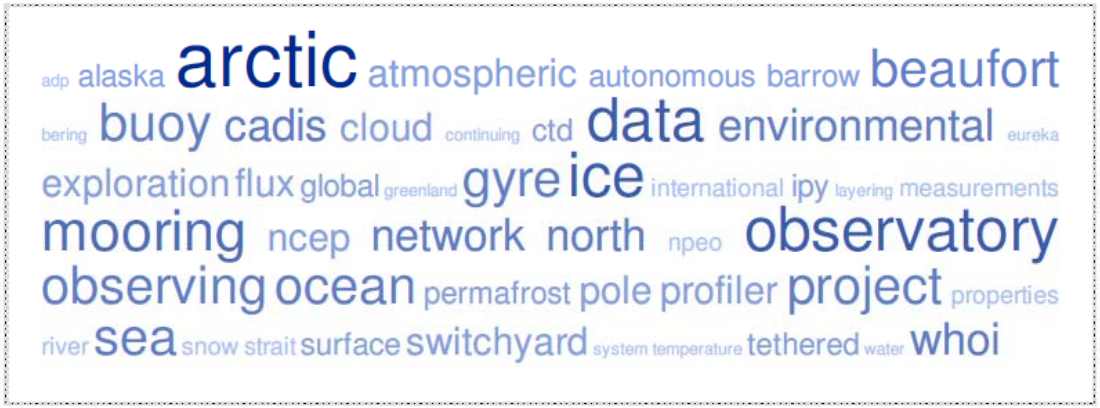
- Stand Alone Gateway Node
- Data Publication Web Interface
- Access Control and User Management
- Faceted and GeoSpatial Search, Collection Browsing
- OAI Metadata Exchange OAI-DIF (GCMD, Damocles)
- Data Access and Download (HTTP, wget)
- Metrics capture and funding agency reporting
- SGF Version 1.3 RC1 deployed and in testing phase

CADIS Metadata Profile and Editor



- Editor and profile key success factors
- Based on WMO IPY-DIS profile
- Compatible with GCMD, FCDG, ISO
- Profile driven UI with validation
- NASA GCMD vocabulary
- Curation by metadata team
- Integrated end user help documentation

CADIS Now: Content Summary



- 64 AON projects
- 89 Lead and collaborating investigators
- 355 archived data collections
- 110 brokered data collections
- 465 complete and reviewed metadata records

Chronopolis Pilot

Builds on Sound Metadata Foundation

- CADIS Archive Requires Digital Preservation
- Precious set of data collections
- NSF data management mandate
- Ideal collection size for preservation pilot
- NCAR primary partner with Chronopolis consortium
- NCAR Chronopolis node proximity and network (e.g. TeraGrid)

Chronopolis: Quick Facts

A Digital Preservation Network Funded by The Library of Congress

- Designed to leverage capabilities at multiple institutions
- All partners provide network and dark archive storage services
- Emphasizes heterogeneous and redundant data storage systems
- Has a current storage capacity of 300 TB (100 TB at 3 nodes)
- Geographically distributed copies of data (NCAR, UMD, SDSC)
- Includes detailed monitoring and monthly auditing of all data

Chronopolis: Technology

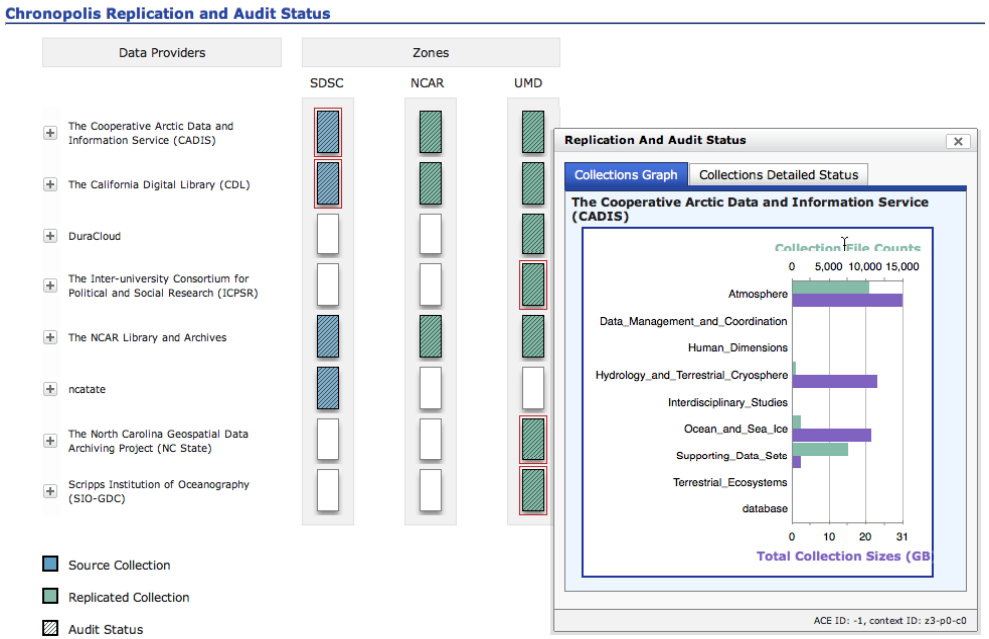
Integration Effort of Available Components

- Built upon SRB/iRODS storage system
- ACE Audit Control Environment ensures integrity
- Bagit manifest for collection packaging
- Captures fixity data at source
- Grid security via proxy certificates
- System monitoring web interface

Chronopolis: System Monitoring

Web Monitor Interface

- Quick system overview
- Aggregates node state
- Spring Application Framework
- YUI, AJAX



CADIS: Lessons Learned

Community Engagement Had the Strongest Effect

- Investment in metadata profile really paid off.
- Community surveys, demos and use cases critical.
- Well defined and responsive user support team success factor.
- Data curation and user support costs were double expectations.
- Achieving vision for Arctic Observing Network will take time.

Thank You!

In particular:

- Michael Burek, NCAR
- NSIDC, NCAR EOL, Unidata, SDSC, UCSD Library, Library of Congress, UMICS, and others..

Questions?

Digital Preservation

Ensures Long Term Value

- At Risk Data Collections
- <Add More Detail>

CADIS Now – System Use

Content and use summary

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54 Projects
39 Lead Principle Investigators

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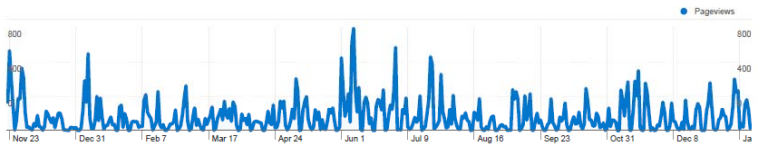
355 Archived data collections
110 Brokered data collections
84Gb Archived files
2100 Unique Annual Visitors

aoncadis.ucar.edu
Content by Title

Nov 22, 2009 - Jan 21, 2011
Comparing to: Site



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Content Performance

Pageviews	Unique Pageviews	Avg. Time on Page	Bounce Rate	% Exit	$ Index
46,613 % of Site Total: 100.00%	27,226 % of Site Total: 100.00%	00:01:07 Site Avg: 00:01:07 (0.00%)	41.43% Site Avg: 41.43% (0.00%)	11.49% Site Avg: 11.49% (0.00%)	$0.00 Site Avg: $0.00 (0.00%)

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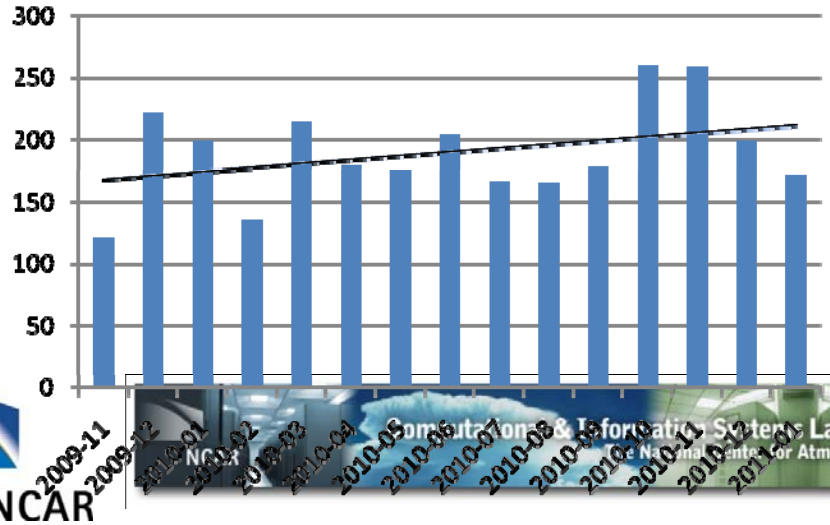
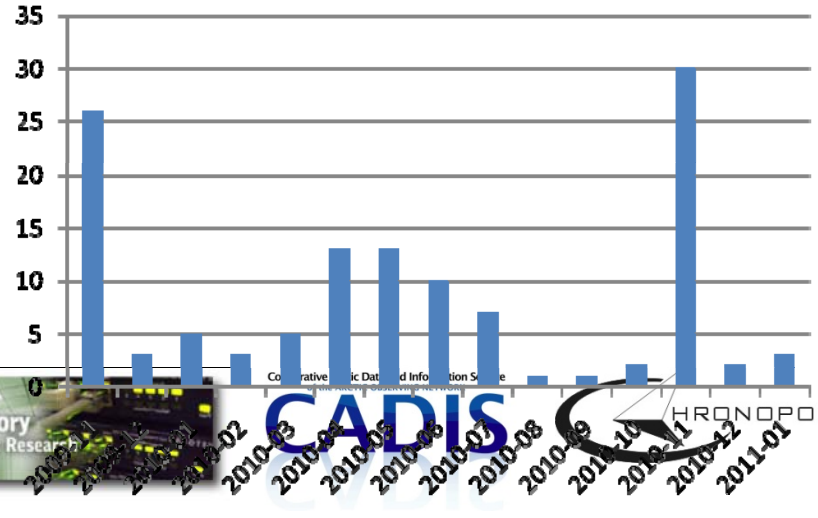
CADIS Gateway	6,107	3,980	00:01:30	41.99%	34.80%	$0.00
CADIS Advanced Search	4,303	1,193	00:01:01	51.60%	9.95%	$0.00
Download Data	2,546	1,586	00:01:31	52.56%	16.85%	$0.00
Publish	2,103	1,121	00:01:34	21.05%	3.99%	$0.00

Users per month



New Collections per month



NCAR

Computational & Information Systems Laboratory
The National Center for Atmospheric Research

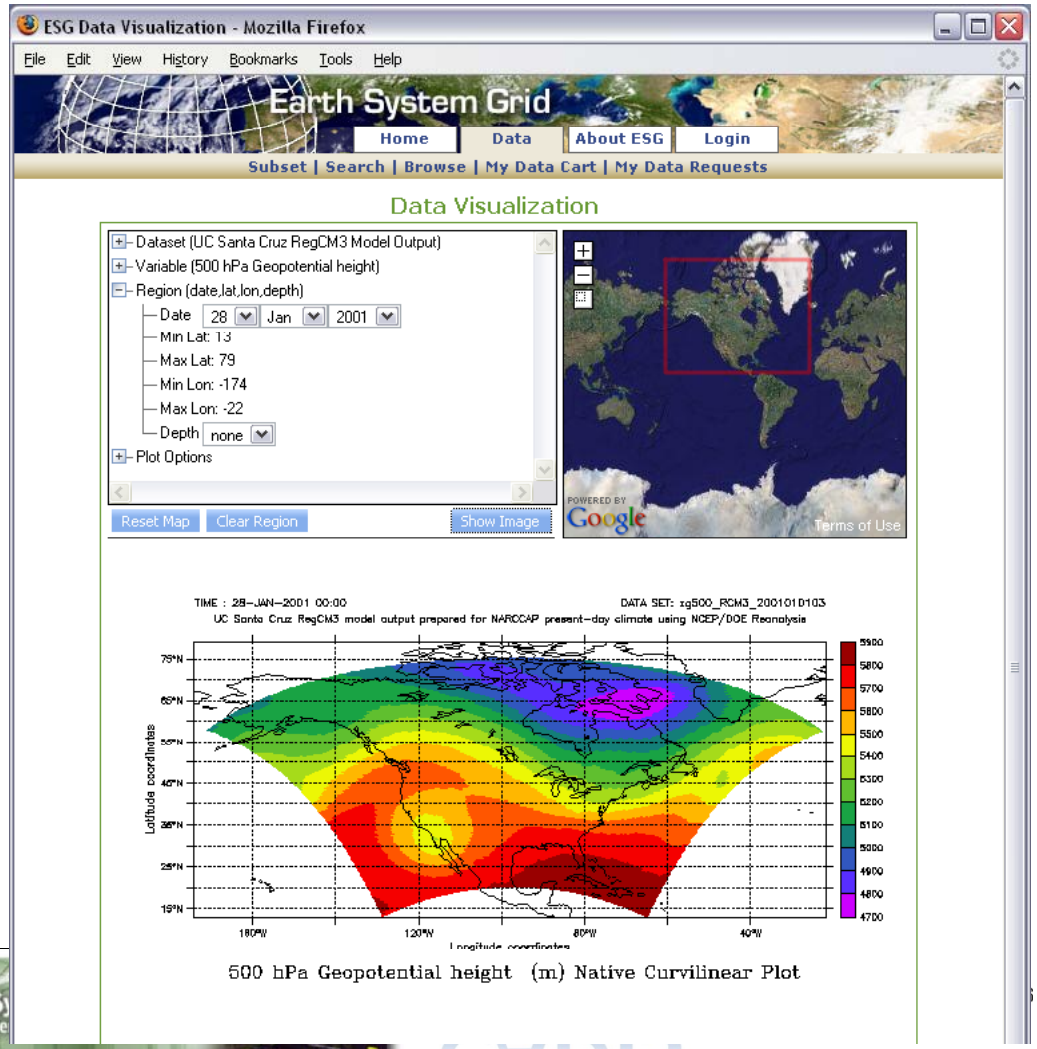
CADIS

HRONOPOLIS

User Interface for Visualization

Initial Prototype:

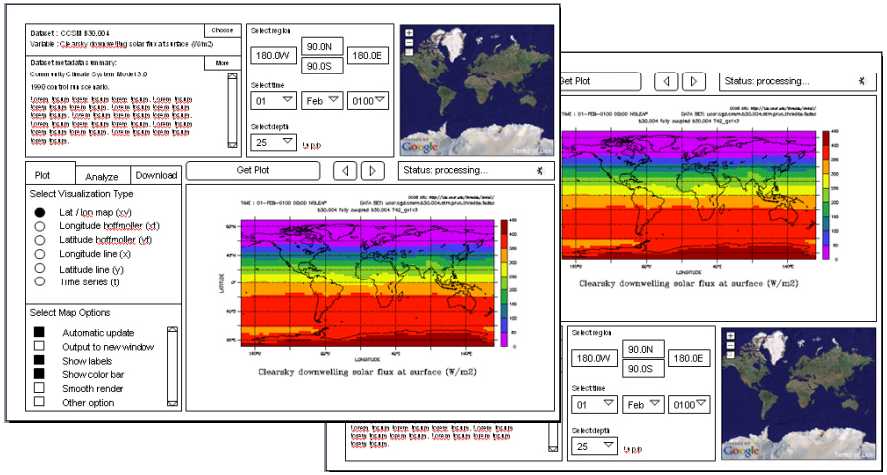
- Google Map API
- Custom selection overlay
- Dojo JavaScript Toolkit
- Tree based selection
- Ajax application with JSON
- Proxy client to access LAS
- LAS Armstrong v 0.4
- TDS v 3.16

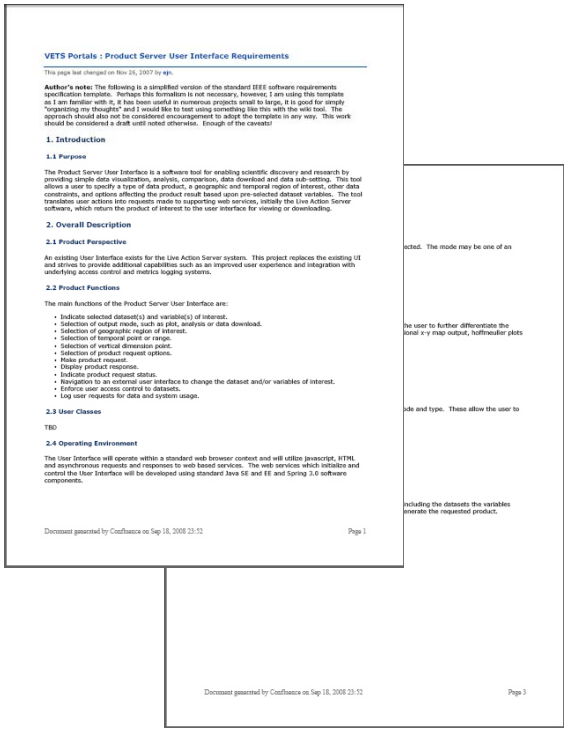


User Interface for Visualization

Back to the Drawing Board:

- Review of feedback
- Wire-frame drawings
- Basic formal specification





Next Steps:

What will we do with these findings?

- Collect more feedback from ESG test-bed deployment.
- Consider formalizing user studies and observations
- Expose more analysis features of LAS
- Add multi-variable selection for analysis, sub-setting, layering
- Integrate geographic selection with search tools
- Explore more “polar capable” UI components
- Explore WMS visualization capabilities
- Exploit more of the F-TDS analysis, sub-setting capabilities
- Continue to refine and improve quality of the UI
- Encourage community convergence on UI best practices

CADIS System Use

Content summary

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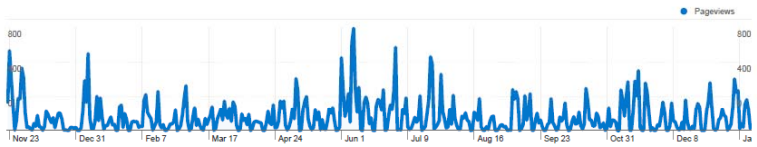

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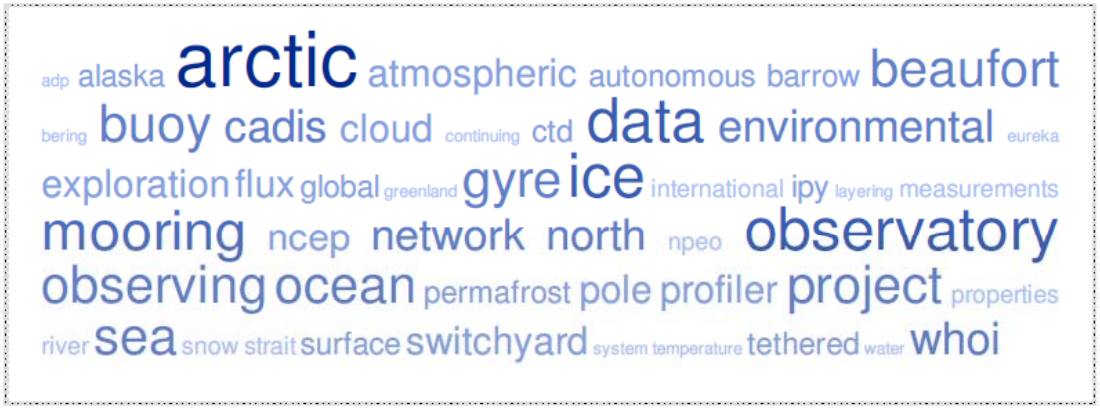

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Computational & Information Systems Laboratory
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Cooperative Arctic Data and Information Service of the ARCTIC OBSERVING NETWORK
CADIS

CHRONOPOLIS