EarthCube Building Blocks:

OceanLink

Leveraging Semantics and Linked Data for Geoscience Data Sharing and Discovery

Overview

Goal

- Enable discovery of geoscience data and knowledge, and ultimately, integration

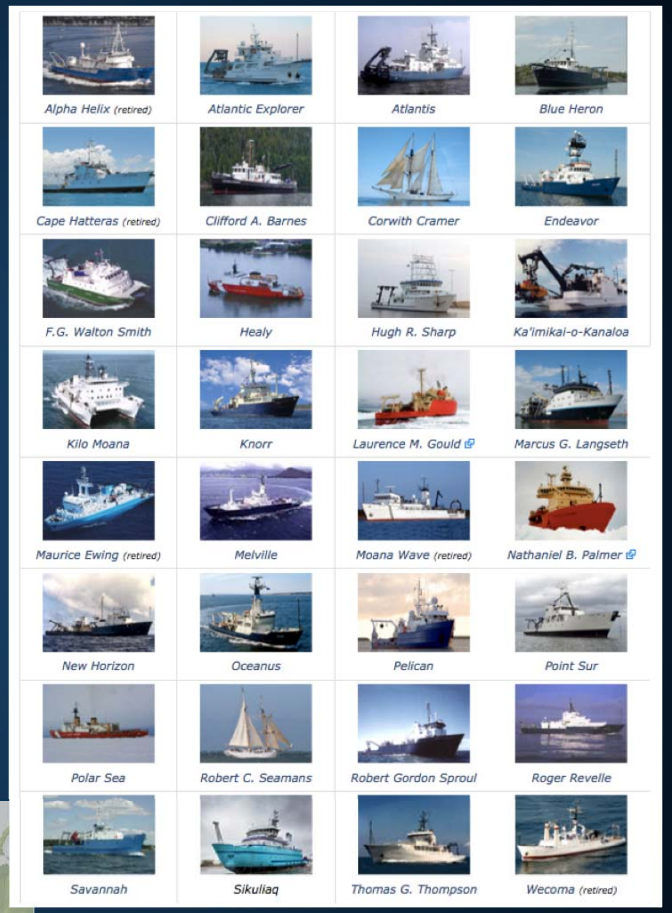
Strategy

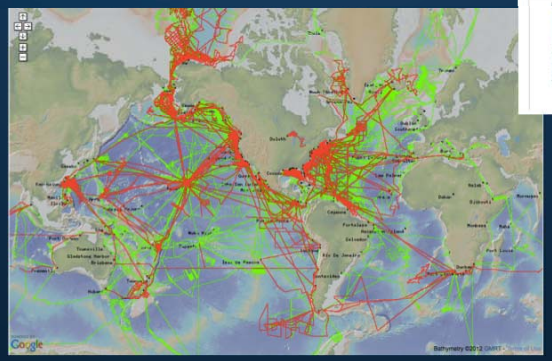
- Publish content from existing network of repositories as Linked Open Data (LOD)
- Enable horizontal semantic integration
- Provide tools + services useful to working scientists

Domain

Ocean Science

- Research vessels collect data from the solid earth, water column, atmosphere
- Many repositories already interoperate
- Approach is extensible to other geo domains





U.S. academic oceanographic research fleet (above), and recent expedition tracks (left)

Project Team

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Collections

- Biological & Chemical Oceanography Data Management Office (BCO-DMO)
- Rolling Deck to Repository (R2R)
    - cruise catalog +underway enviro sensor data
- Marine Biological Laboratory / Woods Hole Oceanographic Institution (MBLWHOI) Library
    - published articles, theses, tech reports, datasets
- AGU meeting abstracts
- NSF funding award abstracts

ODPs

Ontology Design Patterns

- Core set of conceptual primitives from Ocean Science
  - Vessel
  - Cruise
  - Instrument
  - Dataset
  - Person
  - Organization
  - etc.

- Reuse existing standard vocabularies where they exist (DCAT, FOAF, PROV)

- Maximize reusability, minimize commitment

ODPs *(cont.)*

- Patterns published as OWL files with embedded axioms and local vocabularies
  eg.
  Cruise must have a *Vessel*
  Cruise may have a *Person* in the *Role* of *Chief Scientist*
- Leverage existing alignment among repositories that use eg. NERC Vocabulary Server
- Inference to find relationships among cruises, datasets, people, publications, etc.

Work Plan

1. Model, align, inference over existing LOD collections (BCO-DMO + R2R)
    - Develop use cases eg. *"find publications related to cruises at the Bermuda Rise that produced CTD profiles and/or seafloor mapping data"*
    - Develop ODPs
    - Map existing collections to ODPs

2. Publish LOD for other collections (Library, AGU, NSF) and map to ODPs

3. Prototype end-user tools and services
    - Search/browse across federated LOD collections
    - Edit ontologies
    - Annotate LOD resources incl. provenance

Initial Results

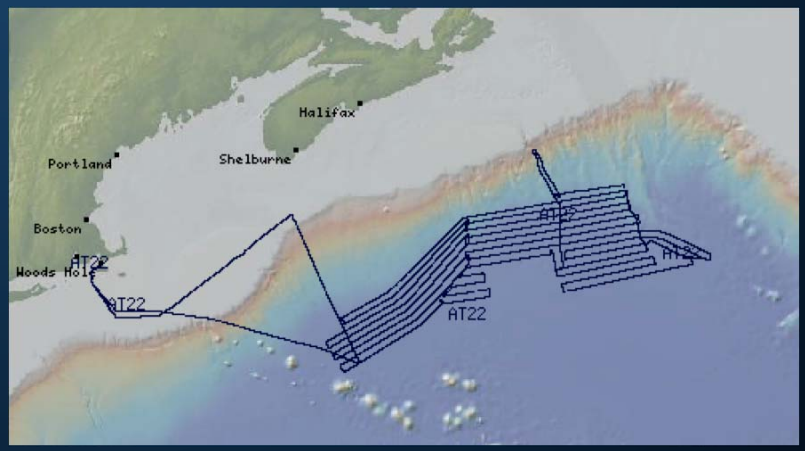
"An Ontology Pattern for Oceanographic Cruises" (Krisnadhi et al.)

Technical Report and draft set of ODPs

Reuses existing patterns including

- Semantic Trajectory (Janowicz et al.)
- Information Object
- Simple Event Model

to model a Cruise and ship's track



R/V Atlantis cruise AT22 (Scotian Shelf Survey, August 2012) Basemap: GMRT

Lessons

- Recurrent themes in EarthCube Workshop Reports eg.
  - Data are still difficult to discover and access
  - Data attribution and citation are critical
  - Reuse of data still hampered by need for *implicit* understanding
- Collaboration between Geo Science and Computer Science works best with Use Cases
- In-person working meetings are key to initial progress

  Oct. 2013 Woods Hole
  Nov. 2013 Baltimore
  Jan. 2014 Washington
  (probably more)

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Thank you.

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