Rolling Deck to Repository: Opportunities for US-EU Collaboration

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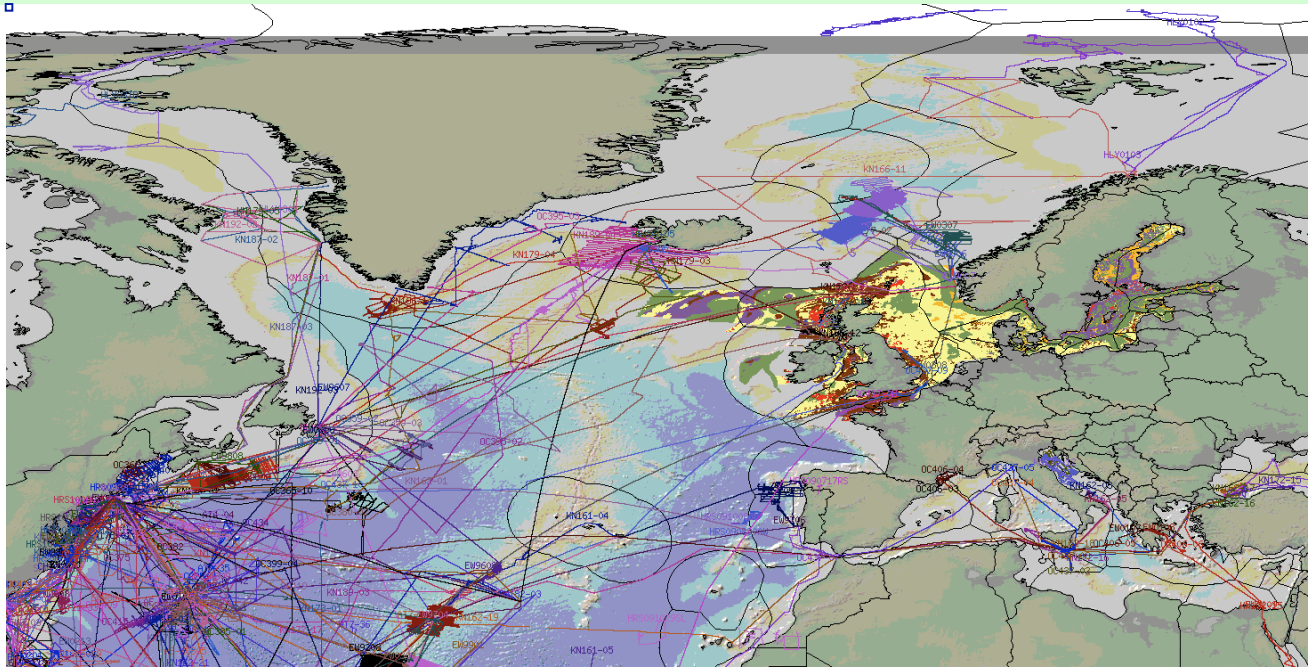


Example - layering US and EU resources with web services

Session ESSI2 - Informatics in Oceanography
7 April 2011

Roger Revelle, Gulf of California Expedition, 1939

R/V Roger Revelle, satellite linked to Internet, 2011

Traditional Practice

Find funding

Go to sea

Publish papers

New paradigm

Exchange data (before, during and after expedition)

Publish data in repositories

Publish journal articles with links to data

Data management now critical

Three Topics for Today

1. What is R2R?
2. What is available?
3. How can we benefit from collaboration?

rvdata.us

Avoid re-inventing the wheel

Catalyst for innovation

Enable broader discovery

Rolling Deck to Repository
http://rvdata.us

1. What is R2R?

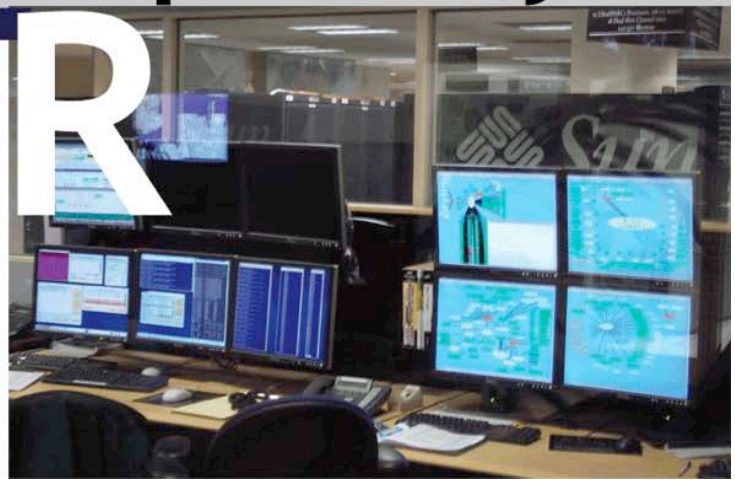
Lead Investigator
Suzanne Carbotte
Lamont-Doherty
Earth Observatory

Rolling Deck 2 Repository

US research fleet data gateway

Program Officer
Jim Holik
NSF
Oceanographic
Centers and
Facilities

Collaborative effort
5-year National Science
Foundation support



Rolling Deck to Repository (R2R)
Collaborative effort

R2R Team Members

Lamont-Doherty Earth Observatory

Scripps Institution of Oceanography

San Diego Supercomputer Center

Woods Hole Oceanographic Institution

Florida State University

Coordination with

NOAA NGDC, NODC

UNOLS

Vessel Operators

Shipboard technicians

Chief Scientists

rvdata.us

R2R Activities

Previously data at risk, no systematic effort

1. Receive data from 26 vessels

Initially transfer each cruise to deep archive, as-is

2. National cruise catalog

Standard cruise metadata

Standard navigation products

Fortunately submissions now mostly over Internet

3. ELOG event logger tool

(Poster XL169 at EGU, Thursday April 7)

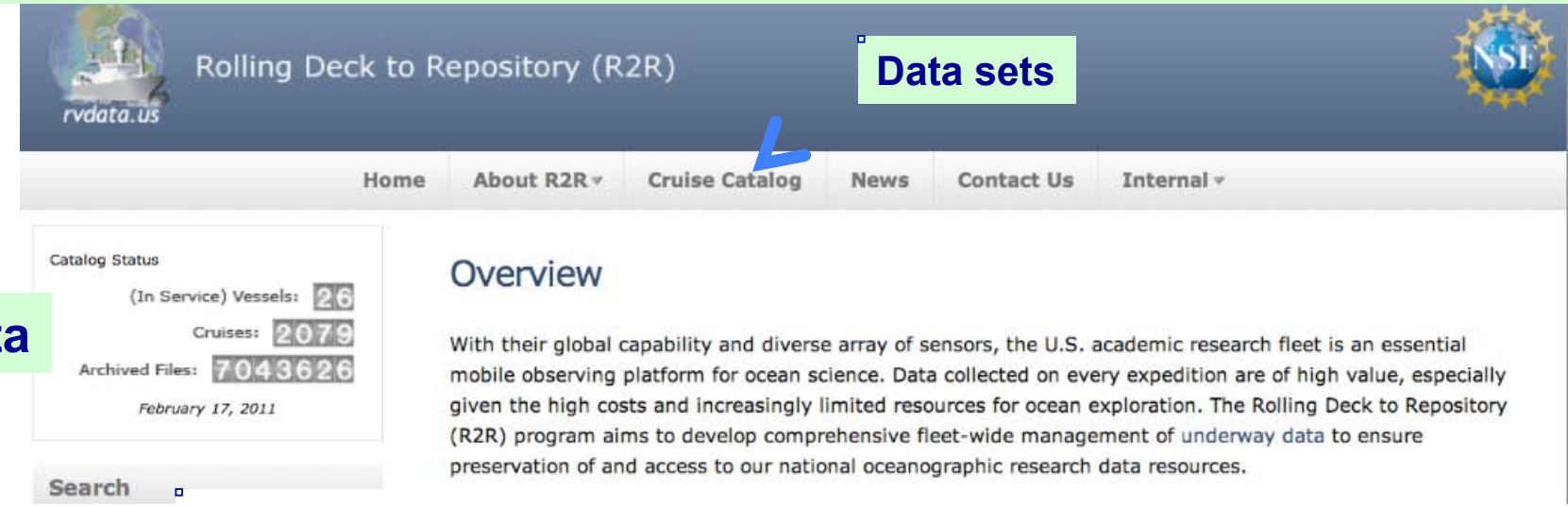
4. Auto harvest underway data

Transfer to national repositories

5. Assess data quality

Timely feedback to operators

2. What is available on R2R? - Browse http://rvdata.us



7 TB data

Home >> About R2R

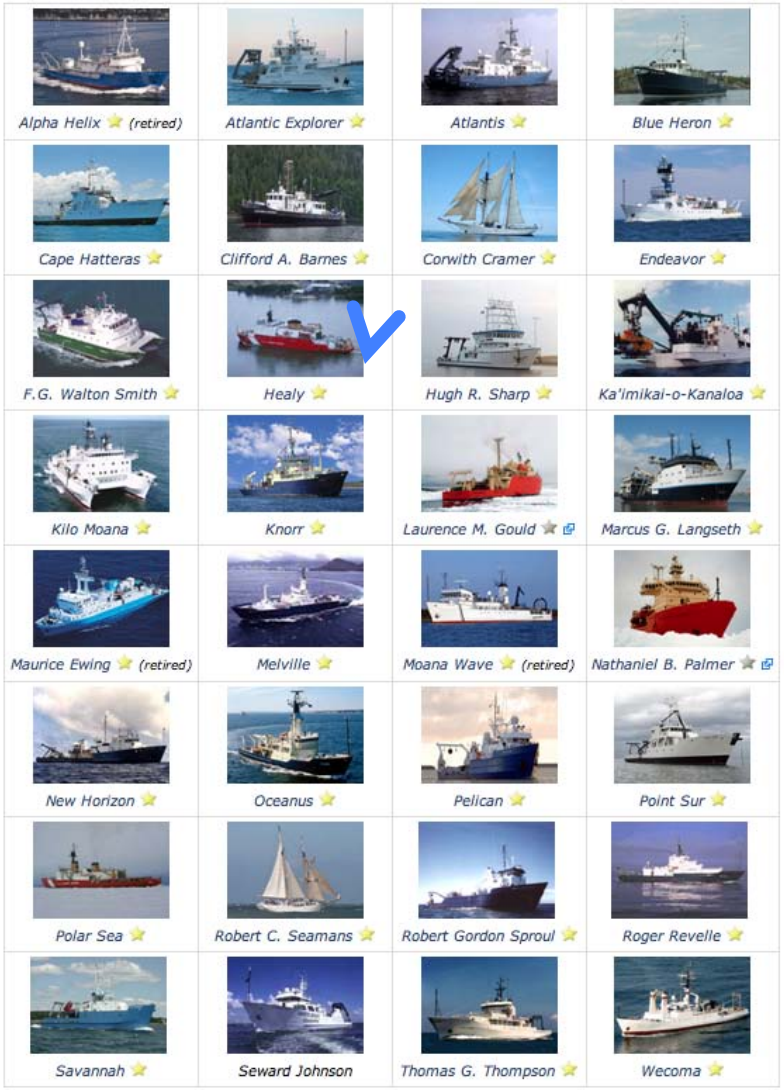
Community Engagement
Stakeholders Benefits
"Underway" Data
Standard Products
Quality Assessment
Event Log
Realtime Data
Data Pipeline
Data Policies
R2R Team Members
> Technical Details

Metadata, vocabularies, web services

Available data sets

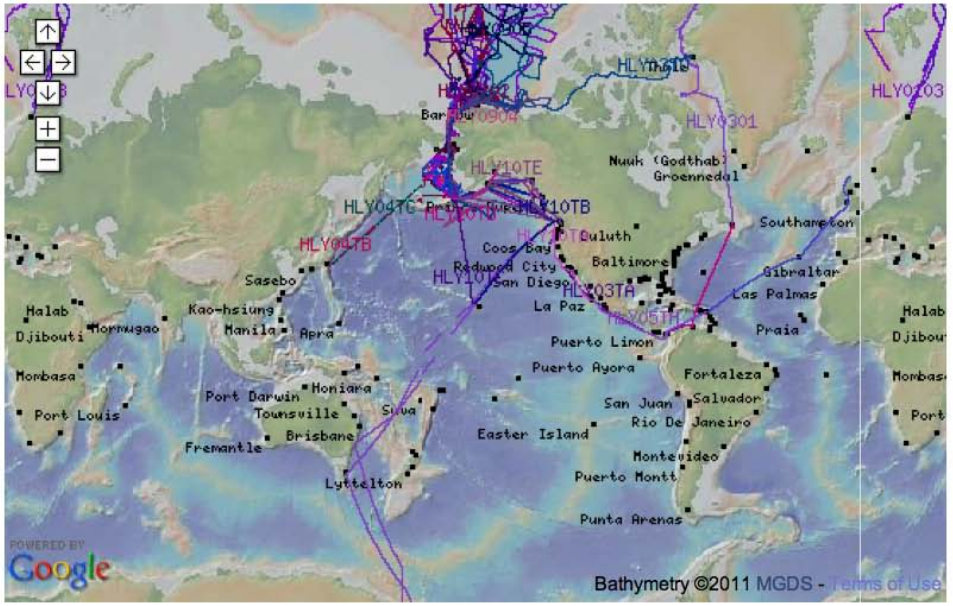
Select vessel

Cruise Catalog



Click here for vessel details. ★-(data submitted to UNOLS-R2R) ★-(data submitted to USAP)

Cruise Catalog: Healy



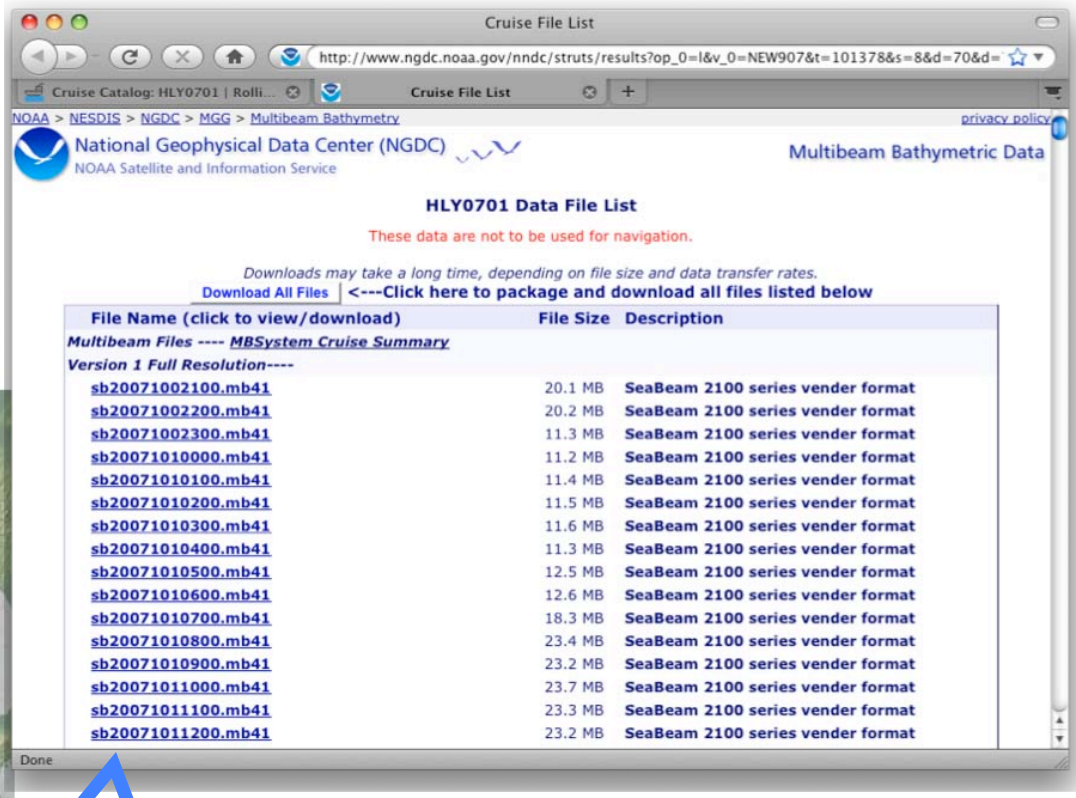
Operator: United States Coast Guard

Select cruise

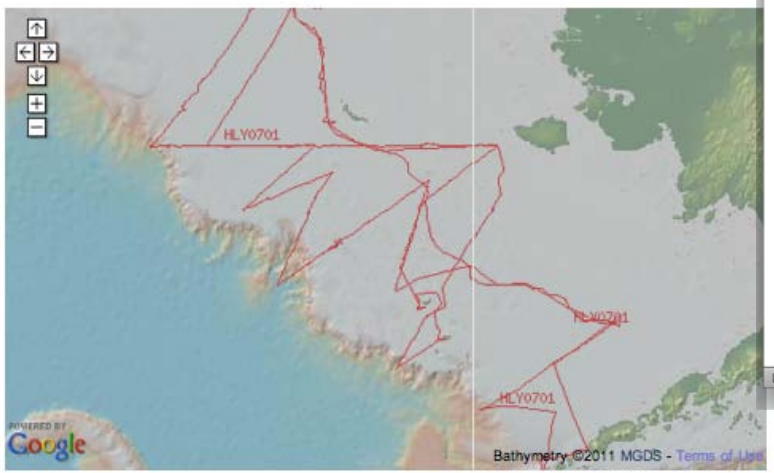
Cruise ID	Start Date	Start Port	End Date	End Port
	Details			
HLY0701	2007-04-10	Dutch Harbor	2007-05-12	Dutch Harbor
Inventory	*Project:* Bering Ecosystem Study (BEST): Nitrogen Supply for New Production (Info) *Chief:* Sambrotto, Raymond (LDEO)			
HLY07TC	2007-04-03	Seattle	2007-04-09	Dutch Harbor
Inventory	*Project:* Transit			
HLY07TB	2007-03-08	Seattle	2007-03-16	Seattle
Inventory	*Project:* Annual Shakedown			
HLY07TA	2007-02-27	Seattle	2007-03-01	Seattle
Inventory	*Project:* Pre-Underway			
HLY06TK	2006-11-02	Prince Rupert	2006-11-05	Seattle
	Project: Transit			

(111 cruises)

R2R links end users to National Repositories



Cruise Catalog: HLY0701



Operator: United States Coast Guard
Vessel: Healy

Cruise ID	Start Date	Start Port	End Date	End Port
	Details			
HLY0701	2007-04-10	Dutch Harbor	2007-05-12	Dutch Harbor

Inventory

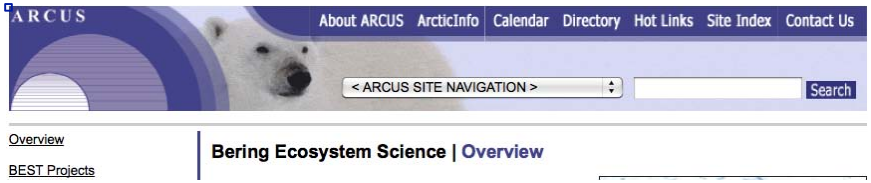
Project: Bering Ecosystem Study (BEST): Nitrogen Supply for New Production (Info)

- SCIENCE PARTY
- FILE SETS

Device Type	Make [,Model [,Location]]	Files	Repository	
multibeam	Seabeam 2112	List	NGDC	Download

"Download" links to NGDC holdings

"Info" links to chief scientist's project site



"Inventory" displays complete list of all shipboard data
(Transport to repository may be pending, some data may be on hold)

R2R Creates Standard Cruise Navigation Products

Original shipboard GPS issues:

Logged in at least 15 different formats
Multiple sensors, multiple files
Sometimes only embedded in data logger records

R2R produces 3 quality controlled files for each cruise:

Date/Time (ISO8601)	longitude	latitude	NMEA-0183 quality	number of satellites	horizontal dilution of precision	height above sea level
2010-01-11T23:56:01Z	176.182813	-37.648890	2	4	1	38
2010-01-11T23:56:02Z	176.182815	-37.648890	2	4	1	38

1. Best resolution
   Original sampling, usually 1 second, tab-delimited

2. One-minute sampling
   Often used for merging underway data

3. Control points
   Convenient for graphical display

Aaron Sweeney, SIO

Available R2R metadata, vocabularies, web services

Vessel Profiles

Track instruments across the fleet

Operators provide
Manufacturer, model, shipboard location

R2R versioning will track changes

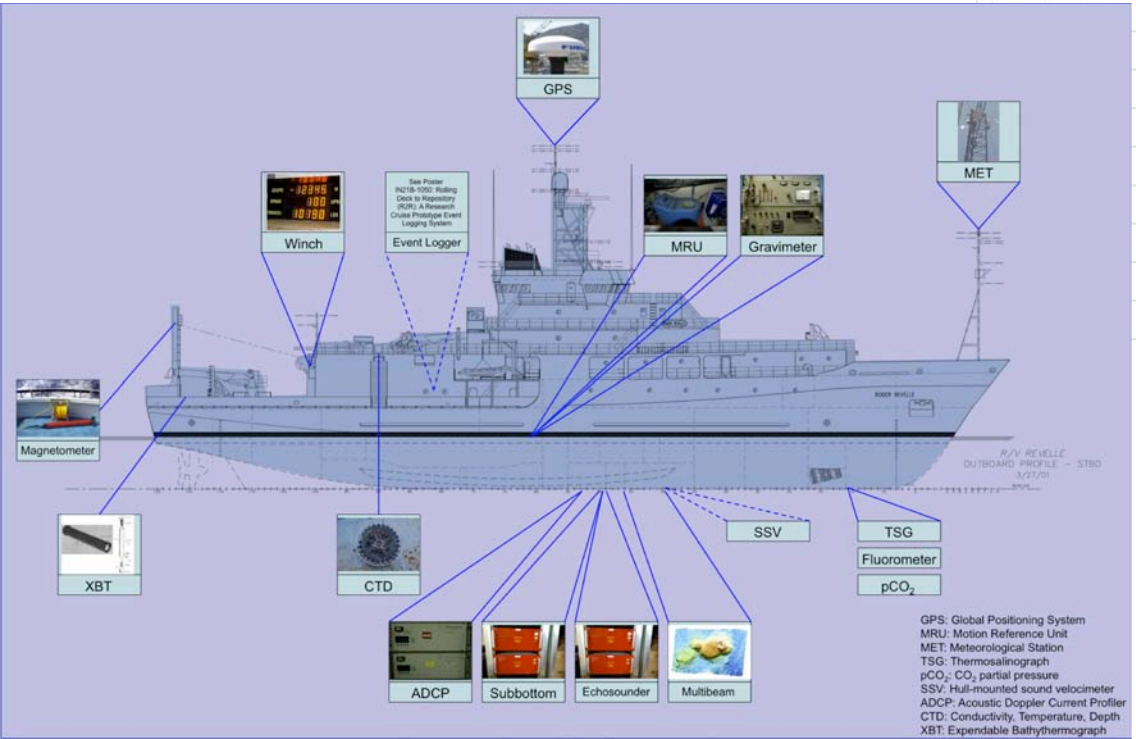
For reference (from 2008): Origin

Vessel: **Roger Revelle** - Device

Select vessel

Roger Revelle | Filter | Vessel : [reset]

Vessel	Device Type	Make	Model	Location
Roger Revelle	adcp	RDI	NB-150	
Roger Revelle	adcp	RDI	OS-75	
Roger Revelle	adcp	Hawaii	UHDAS	
Roger Revelle	adcp	SIO	HDSS	
Roger Revelle	ctd	Sea-Bird	SBE-911plus	
Roger Revelle	expendableprobe	Sippican	MK21	
Roger Revelle	fluorometer	(unknown)	*(unknown)*	
Roger Revelle	gnss	Ashtech	ADU2	
Roger Revelle	gnss	Furuno	GP-90D	
Roger Revelle	gnss	MX Marine	MX421	
	gravimeter	Bell	BGM-3	
	gyrocompass	Sperry	MK-37	
	hdss	SIO	HDSS	
	magnetometer	Marine Magnetics	Sea Spy	
	metstation	SIO	MET-System	
	multibeam	KUTI	EM122	
	subbottom	Knudsen	320B/R	
	winch	Markey	DUTW-9-11	
	winch	(unknown)	*(unknown)*	



Home >> About R2R >>
Technical Details >> Vessel Profiles

Vocabularies

- Country *(ISO)*
- Cruise Type *(UNOLS)*
- Cruise
- Device Type
- Facility
- Fileset Type
- Gazetteer - Exclusive Economic Zone *(VLIZ)*
- Gazetteer - Sea Area *(IHO)*
- Gazetteer - Undersea Feature Name *(IHO)*
- Language *(ISO)*
- Media Type
- Organization *(IANA)*
- Person
- Port *(UNOLS)*
- Processing Level *(CODMAC)*
- Program
- Role Type
- Sample Type *(USGS)*
- State *(FIPS)*
- Vessel *(ICES)*

R2R vocabularies allow aliases to enable interoperability with other authorities

Vocabulary - Device Type

(authority=R2R)

26 Device Types based on fleet-wide practices

Device Type	Directory	Description
adcp	*adcp*	(acoustic doppler current profiler) sonar measures water current velocities
anemometer	*wind*	measures wind speed and direction
ctd	*ctd*	integrated hydrographic system measures conductivity, temperature, pressure, etc.
echosounder	*echo*	sonar measures depth to seafloor or midwater reflectors - fathometer, fishfinder, etc.
expendableprobe	*xbt*	hand/deck-launched single-use probes - XBT, XCTD, XSV, XCP, etc.
flowmeter	*flow*	measures rate of water flow - can be mechanical, optical, electromagnetic, etc.
fluorometer	*fluoro*	measures fluorescence (usually for phytoplankton)
gnss	*gnss*	(global navigation satellite system) - GPS/WAAS, GLONASS, Galileo, etc.
gravimeter	*grav*	measures the Earth's local gravitational field
gyrocompass	*gyro*	compass with a motorized gyroscope that tracks true north (heading)
hdss	*hdss*	(hydrographic doppler sonar system) sonar measures water current velocities
magnetometer	*mag*	measure strength and/or direction of the Earth's magnetic field
metstation	*met*	integrated meteorological system measures temperature, pressure, humidity, etc.
mru	*mru*	(motion reference unit) measures pitch, roll, heave, and heading
multibeam	*multibeam*	multiple formed beam mapping sonar system
multiplex	*[name]*	serial de/multiplexing+timetagging acquisition system or post-processing package
pco2	*pco2*	measures partial pressure of dissolved carbon dioxide
radiometer	*rad*	measures radiation - pyranometer, pyrheliometer, pyrgeometer, albedometer, etc.
raingauge	*rain*	(udometer) measures amount of liquid precipitation
speedlog	*speedlog*	measures Doppler near surface vessel speed through water
ssv	*ssv*	sea surface sound velocimeter - typically input to multibeam
subbottom	*subbottom*	sonar profiling system for shallow sediment penetration
thermometer	*thermo*	measures air or water temperature
transmissometer	*trans*	measures fraction of light absorbed or scattered by particles in water
tsg	*tsg*	(thermosalinograph) measures flow-through conductivity, temperature, etc.
winch	*winch*	measures wire tension, speed, payout, etc.

Cruise Level Metadata xml

Get with web service

http://get.rvdata.us/services/cruise/?id=KM0508

Project name
Cruiseid
Project url

Vessel name and id
Operator name and id

Lat-lon bounds

Ports

Names and institutions for at least chief scientist

ISO-compliant specification, Anna Milan, NOAA:
http://ngdc.noaa.gov/mgg/ecs/metadata/

URI embedded for every vocabulary source

```
- <cruise>
    <name>Hawaii Ocean Timeseries (HOT-169)</name>
    <id voc="r2r">KM0508</id>
    <url>http://www.soest.hawaii.edu/HOT_WOCE/</url>
  - <vessel>
      <name>Kilo Moana</name>
      <id voc="ices">33KB</id>
    </vessel>
  - <operator>
      <name>University of Hawaii</name>
      <id voc="iana">edu.hawaii</id>
    </operator>
  - <geo_bounds>
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      <longitude_max>-157.700857</longitude_max>
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    </geo_bounds>
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    </depart_port>
  - <arrive_port>
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    </arrive_port>
  - <person>
      <name>Gregory, Thomas</name>
      <id voc="r2r">100363</id>
    - <institution>
        <name>University of Hawaii</name>
        <id voc="iana">edu.unh</id>
      </institution>
      <role>Scientist, Chief</role>
    </person>
</cruise>
```

Cruise Tracklines

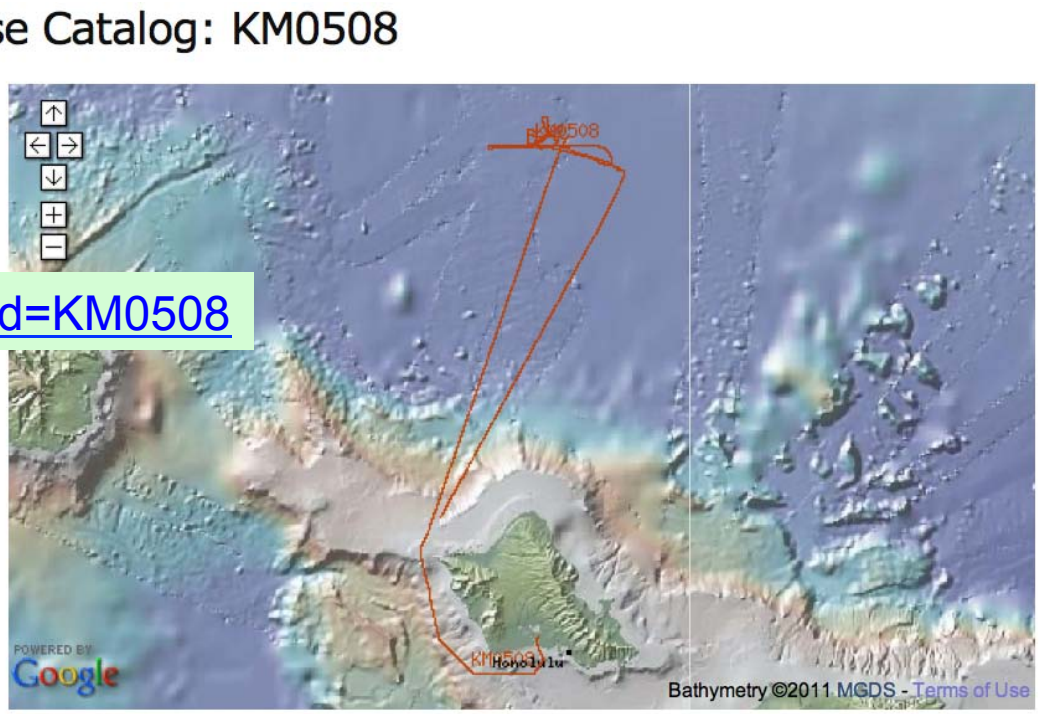
Get with web service

http://get.rvdata.us/services/tracks/?id=KM0508

Available for all R2R cruises

Control points
for graphical display

GeoJSON format
- Java Script Object Notation – Geometry and Feature Description
http://geojson.org/



Bob Arko
L-DEO

3. How can we benefit from US-EU collaboration?

Sharing of:

Experiences

What works (and what doesn't)

Services

Maintain catalog of services by all partners

Tools

Data QA, QC
Data processing
Metadata creation and mapping

Standards

Vocabularies

Actual data (Holy Grail)

Search for cruises in a region
Search for data types

Support end user audiences

If Parsifal would have had an interoperable search portal …

Combined Data Portal

Dru Clark
SIO

Example using open source GIS tool “uDig”
http://udig.refractions.net/

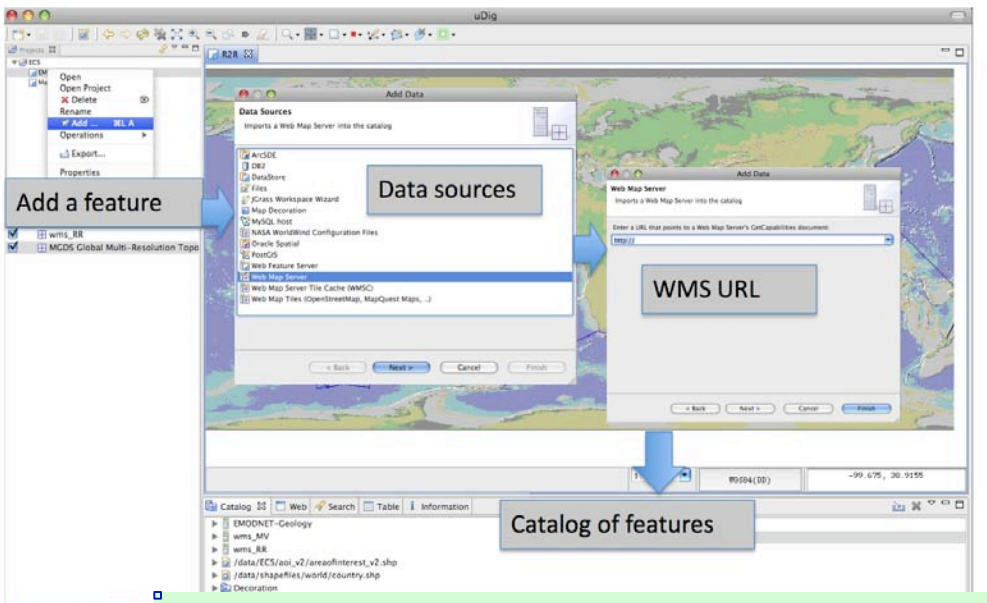
MGDS Global Multi-Resolution Topography (WMS)
http://www.marine-geo.org/exe/mapserv?map=/local/home/mgds/web/www.marine-geo.org/htdocs/services/ogc/wms.map

R2R ship tracks (WMS)
This is by vessel, for Melville MV:
http://www.rvdata.us/cgi-bin/mapserv?map=/local/home/mgds/web/get.rvdata.us/htdocs/gis/wms_MV.map

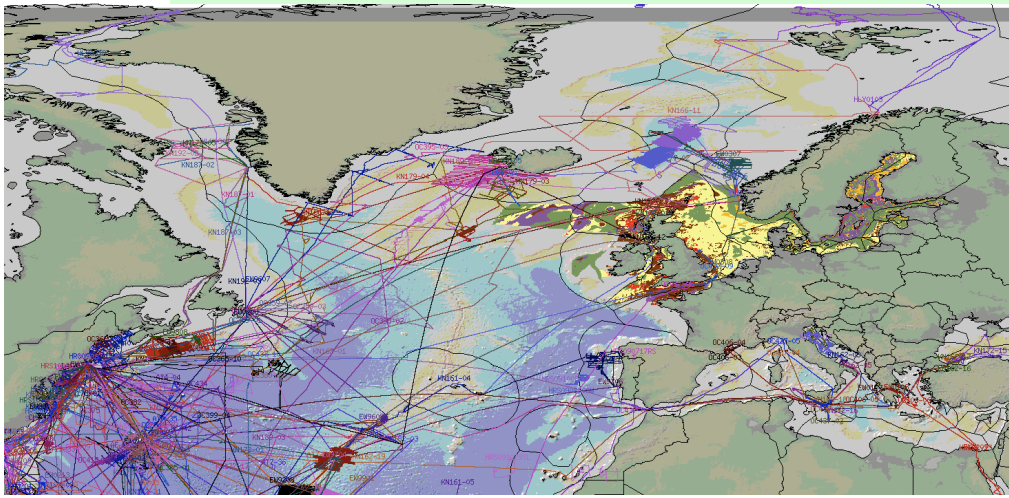
R2R world ports (WMS)
http://www.rvdata.us/cgi-bin/mapserv?map=/local/home/mgds/web/get.rvdata.us/htdocs/gis/wms_ports.map

EMODNET geology (WMS)
http://geomaps2.gtk.fi/ArcGIS/services/EMODNET-Geology/MapServer/WMSServer

World Maritime Boundaries (VLIZ Shape file)
World Country Boundaries (VLIZ Shape file)
In the case VLIZ layers previously downloaded
http://www.vliz.be/vmdcdata/marbound/download.php



Enter resources in uDig Web Map Server URL window
Select from catalog of features for display, as needed.



Load data from local system and remote systems
WFS (web feature service)
WMS (web map service)

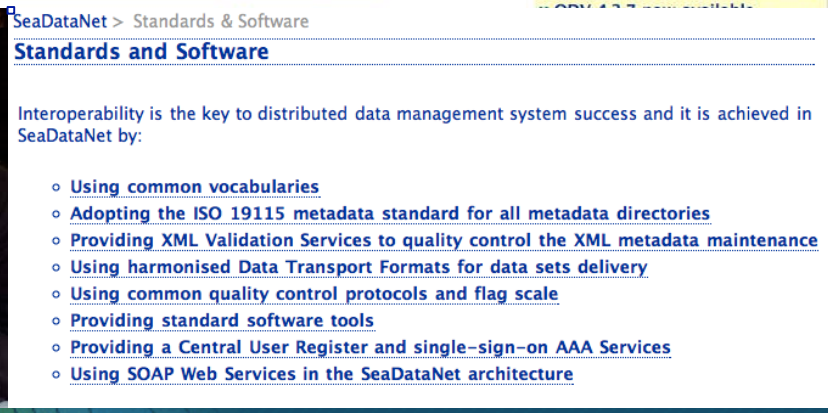
Proposed US-EU Interoperability Exchange Tables

Crossover between social and computer networking
Quickly introduce participants to resources of other projects

Resource Type	Project Name	URL	Content Description	Technical Contact
Project information	R2R	http://www.rvdata.us/	Rolling Deck to Repository (R2R) archives US underway data, worldwide, for > 26 vessels, 2000 cruises, 26 device types	Robert Arko, LDEO
Search interface	R2R	http://www.rvdata.us/catalog	Search by vessel for US underway data, mostly 2009 - present	Robert Arko, LDEO
Vocabulary	R2R	http://www.rvdata.us/voc	Links to sources for all vocabularies used by R2R	Robert Arko, LDEO
Web service	R2R	http://www.rvdata.us/about/services	Description of all R2R web services, including examples	Robert Arko, LDEO
Data types	R2R	http://www.rvdata.us/voc/devicetype	List of R2R standard device type names	Robert Arko, LDEO

Tables also exist for Geo-Seas, EMODNET-Geology, soon EuroFleets

Use Existing Community Resources



Roy Lowry, BODC
SeaDataNet Vocabularies
http://vocab.ndg.nerc.ac.uk/client/vocabServer.jsp

Worldwide project descriptions:
http://marinemetadata.org/intitiatives
http://marinemetadata.org/references

Example of community page
http://marinemetadata.org/community/teams/ont

Karen Stocks
John Graybeal
MMI and SIO

Required Ingredients for Collaboration

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Eagerness

Start by defining clear benefits for all partners

Technology

Enable ongoing exchange of data, metadata, ideas

Events

Augment face-to-face meetings with telecons
Include technical staff, not just PI's

Funds

Find new support for collaboration events
Leverage with partner resources




It Takes a Team