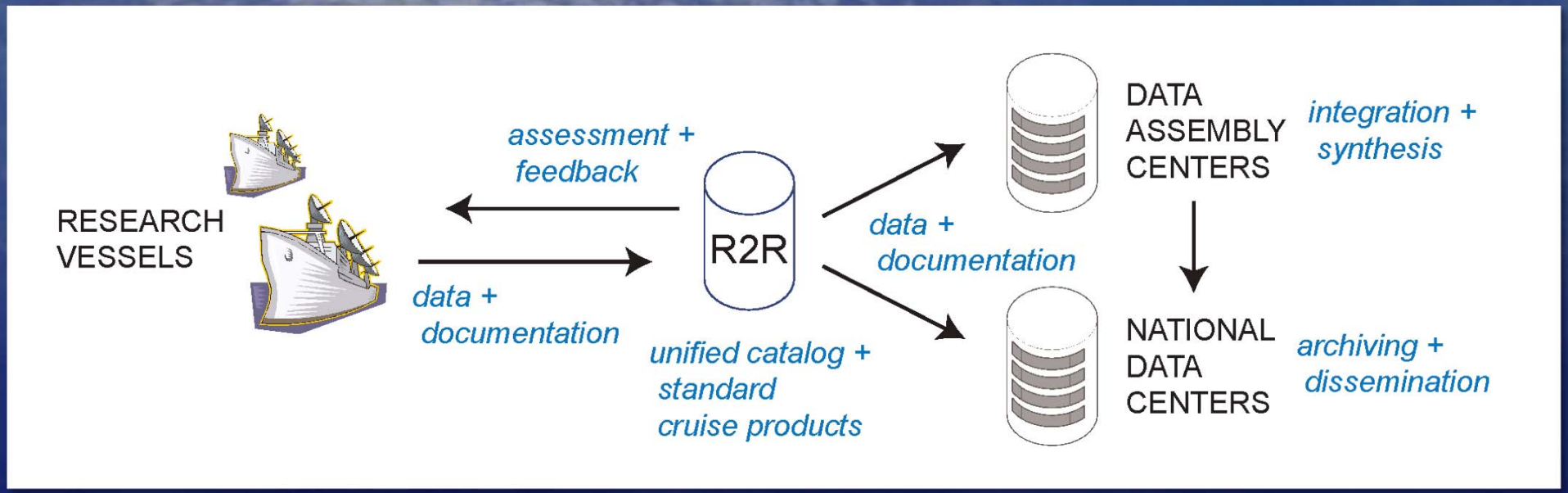
*rvdata.us*

# Rolling Deck to Repository (R2R)

## Annual Report

# Program Goals




For the U.S. Academic Fleet:

- Migrate all routine "underway" data to long-term repositories
- Create catalog of cruises and standard products
- Assess data quality and provide timely feedback to operators

# Stakeholders

- NSF proponents
- Vessel operators (schedulers and technicians)
- Science parties
- National Data Centers (long-term archives)
- Data Assembly Centers (disciplinary specialists)
- UNOLS Office
- Geoinformatics community
- Public/end users

# Academic Fleet


Status Oct. 2011:

- 26 active-service RVs (all 21 UNOLS + 5 allied) submitting data

Joined R2R

Oct. 2008 *Langseth (Healy)*
*Kilo Moana*
*Melville*
*Revelle*
2009 *Thompson*
*Sharp*
*Atlantis*
*Knorr*
*Oceanus (Ka'imikai)*
*Barnes*
*Walton Smith*
2010 *Point Sur*
*Wecoma (Cramer)*
*(Seamans)*
*Endeavor*
*New Horizon*
*Sproul (Polar Sea)*
*Pelican*
*Savannah*
*Explorer*
*Hatteras*
Oct. 2010 *Blue Heron*

# Catalog Growth

| | Oct. 2010 | Oct. 2011 |
|---|---|---|
| # Active-Service Vessels | 21 | 26 |
| # Cruises | 1,622 | 2,163 |
| # Files Preserved | 5+ million | 8+ million |
| # Datasets Submitted to Archives | 84 | 638 |

# Instrument Systems

Expanded hierarchical system model:

> *Vessel*

> *Acquisition Sys*

> *Device (Type,Make,Model,Loc)*

> *Interface (single "Talker")*

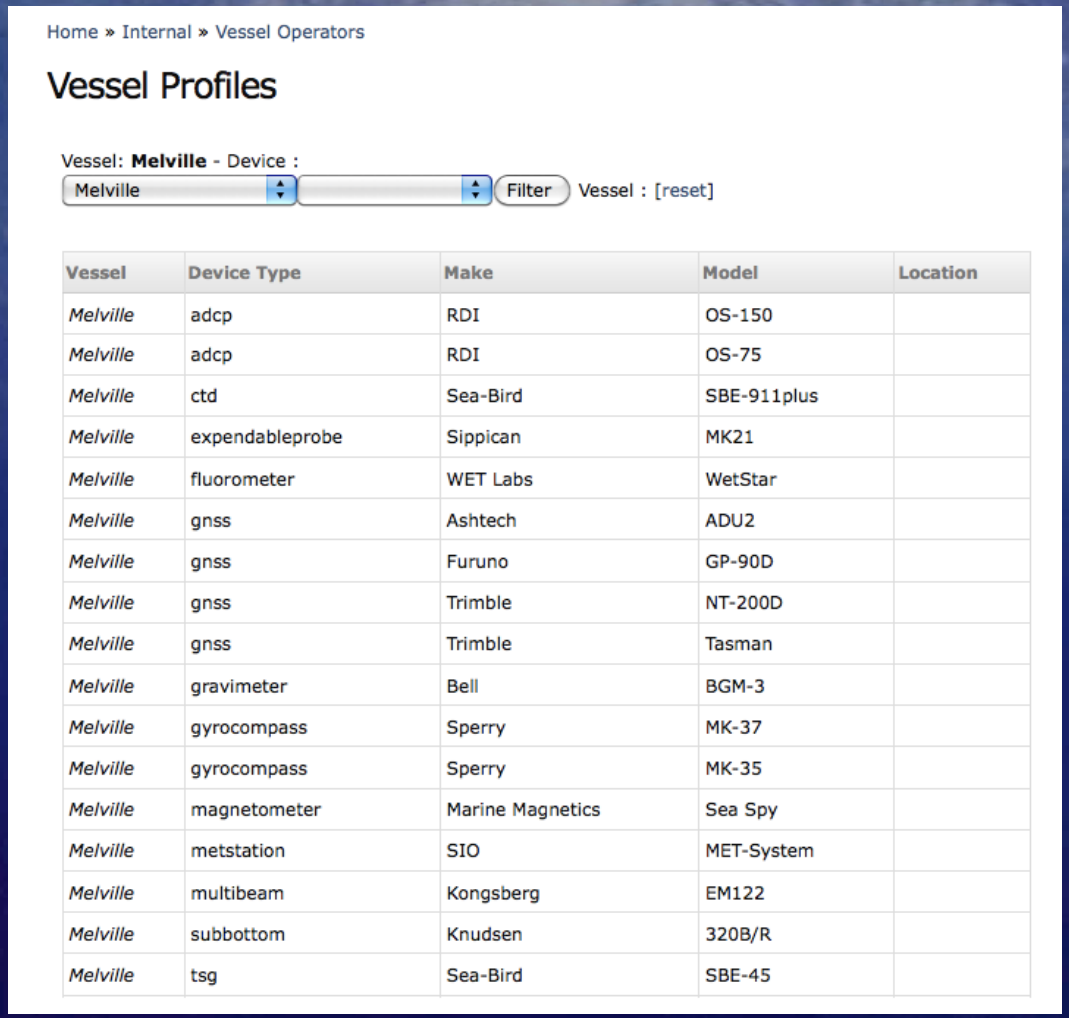
> *Subcomponent*

Home » About R2R » Technical Details » Vocabularies

## Vocabulary - Device Type

| 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. |

# Vessel Profiles



Home » Internal » Vessel Operators

## Vessel Profiles

Vessel: **Melville** - Device :

Melville | Filter | Vessel : [reset]

| Vessel | Device Type | Make | Model | Location |
|---|---|---|---|---|
| *Melville* | adcp | RDI | OS-150 | |
| *Melville* | adcp | RDI | OS-75 | |
| *Melville* | ctd | Sea-Bird | SBE-911plus | |
| *Melville* | expendableprobe | Sippican | MK21 | |
| *Melville* | fluorometer | WET Labs | WetStar | |
| *Melville* | gnss | Ashtech | ADU2 | |
| *Melville* | gnss | Furuno | GP-90D | |
| *Melville* | gnss | Trimble | NT-200D | |
| *Melville* | gnss | Trimble | Tasman | |
| *Melville* | gravimeter | Bell | BGM-3 | |
| *Melville* | gyrocompass | Sperry | MK-37 | |
| *Melville* | gyrocompass | Sperry | MK-35 | |
| *Melville* | magnetometer | Marine Magnetics | Sea Spy | |
| *Melville* | metstation | SIO | MET-System | |
| *Melville* | multibeam | Kongsberg | EM122 | |
| *Melville* | subbottom | Knudsen | 320B/R | |
| *Melville* | tsg | Sea-Bird | SBE-45 | |

Searchable online inventory of underway instrument systems on each vessel

Current inventory –

377 instrument systems

22 device types

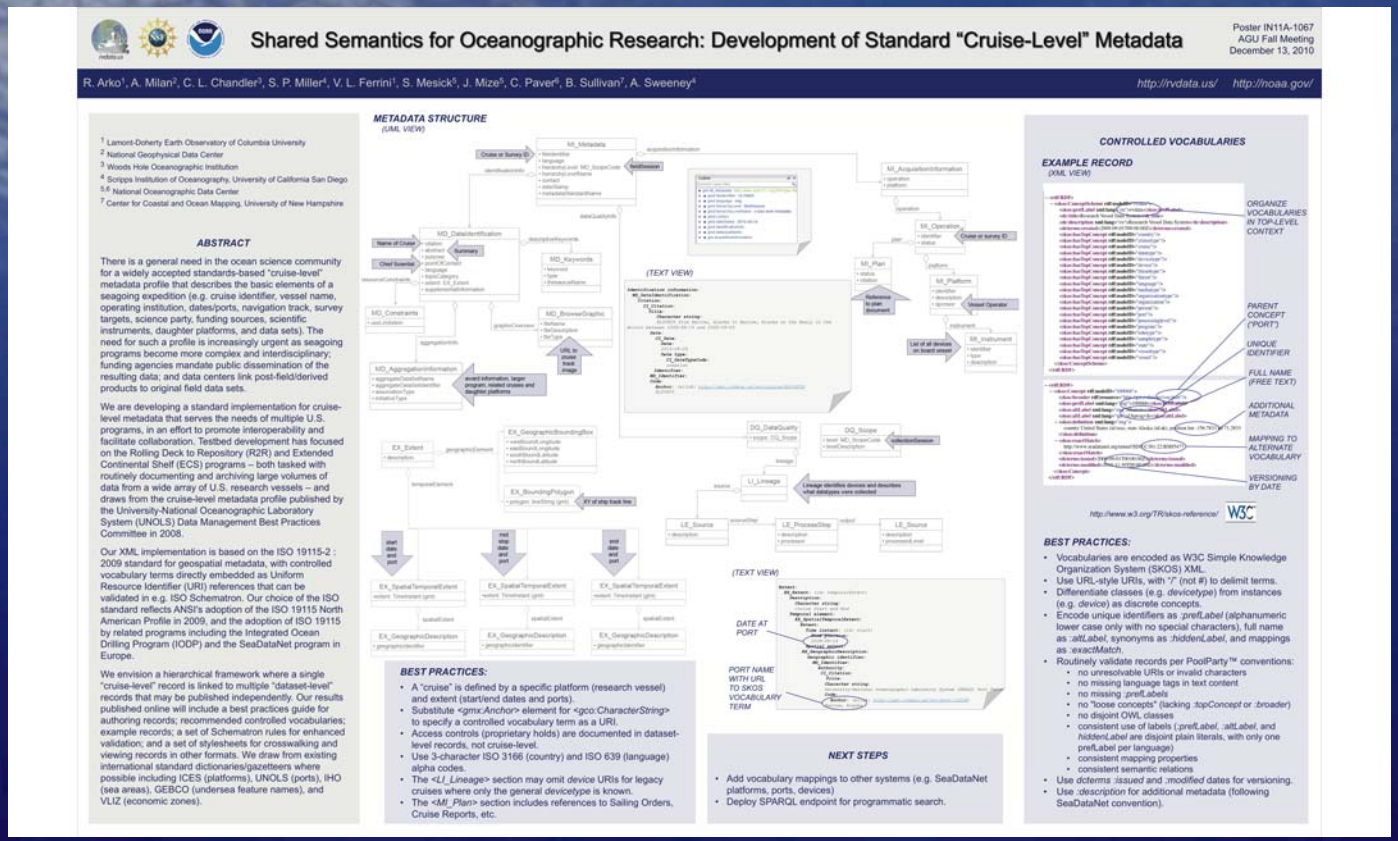
141 unique make+models

on 26 in-service vessels

*http://www.rvdata.us/operators/profiles*

# Long-Term Archiving

- Publish "Cruise-level" metadata records as ISO XML (19115-2)
- Publish controlled vocabs as SKOS XML - easily reusable
- Submit data to NOAA as "BagIt" packages (IETF draft standard)



Shared Semantics for Oceanographic Research: Development of Standard "Cruise-Level" Metadata

Poster IN11A-1067
AGU Fall Meeting
December 13, 2010

R. Arko[1], A. Milan[2], C. L. Chandler[3], S. P. Miller[4], V. L. Ferrini[1], S. Mesick[5], J. Mize[5], C. Paver[6], B. Sullivan[7], A. Sweeney[4]

[1] Lamont-Doherty Earth Observatory of Columbia University
[2] National Geophysical Data Center
[3] Woods Hole Oceanographic Institution
[4] Scripps Institution of Oceanography, University of California San Diego
[5,6] National Oceanographic Data Center
[7] Center for Coastal and Ocean Mapping, University of New Hampshire

http://rvdata.us/ http://noaa.gov/

**ABSTRACT**

There is a general need in the ocean science community for a widely accepted standards-based "cruise-level" metadata profile that describes the basic elements of a seagoing expedition (e.g. cruise identifier, vessel name, operating institution, dates/ports, navigation track, survey targets, science party, funding sources, scientific instruments, daughter platforms, and data sets). The need for such a profile is increasingly urgent as seagoing programs become more complex and interdisciplinary; funding agencies mandate public dissemination of the resulting data; and data centers link post-field/derived products to original field data sets.

We are developing a standard implementation for cruise-level metadata that serves the needs of multiple U.S. programs, in an effort to promote interoperability and facilitate collaboration. Testbed development has focused on the Rolling Deck to Repository (R2R) and Extended Continental Shelf (ECS) programs – both tasked with routinely documenting and archiving large volumes of data from a wide array of U.S. research vessels – and draws from the cruise-level metadata profile published by the University-National Oceanographic Laboratory System (UNOLS) Data Management Best Practices Committee in 2008.

Our XML implementation is based on the ISO 19115-2 : 2009 standard for geospatial metadata, with controlled vocabulary terms directly embedded as Uniform Resource Identifier (URI) references that can be validated in e.g. ISO Schematron. Our choice of the ISO standard reflects ANSI's adoption of the ISO 19115 North American Profile in 2009, and the adoption of ISO 19115 by related programs including the Integrated Ocean Drilling Program (IODP) and the SeaDataNet program in Europe.

We envision a hierarchical framework where a single "cruise-level" record is linked to multiple "dataset-level" records that may be published independently. Our results published online will include a best practices guide for authoring records; recommended controlled vocabularies; example records; a set of Schematron rules for enhanced validation; and a set of stylesheets for crosswalking and viewing records in other formats. We draw from existing international standard dictionaries/gazetteers where possible including ICES (platforms), UNOLS (ports), IHO (sea areas), GEBCO (undersea feature names), and VLIZ (economic zones).

**METADATA STRUCTURE**
(UML VIEW)

(TEXT VIEW)

**BEST PRACTICES:**

- A "cruise" is defined by a specific platform (research vessel) and extent (start/end dates and ports).
- Substitute *<gmx:Anchor>* element for *<gco:CharacterString>* to specify a controlled vocabulary term as a URI.
- Access controls (proprietary holds) are documented in dataset-level records, not cruise-level.
- Use 3-character ISO 3166 (country) and ISO 639 (language) alpha codes.
- The *<LI_Lineage>* section may omit *device* URIs for legacy cruises where only the general *devicetype* is known.
- The *<MI_Plan>* section includes references to Sailing Orders, Cruise Reports, etc.

(TEXT VIEW)

DATE AT PORT

PORT NAME WITH URL TO SKOS VOCABULARY TERM

**NEXT STEPS**

- Add vocabulary mappings to other systems (e.g. SeaDataNet platforms, ports, devices)
- Deploy SPARQL endpoint for programmatic search.

**CONTROLLED VOCABULARIES**

**EXAMPLE RECORD**
(XML VIEW)

ORGANIZE VOCABULARIES IN TOP-LEVEL CONTEXT
PARENT CONCEPT ("PORT")
UNIQUE IDENTIFIER
FULL NAME (FREE TEXT)
ADDITIONAL METADATA
MAPPING TO ALTERNATE VOCABULARY
VERSIONING BY DATE

http://www.w3.org/TR/skos-reference/ W3C

**BEST PRACTICES:**

- Vocabularies are encoded as W3C Simple Knowledge Organization System (SKOS) XML.
- Use URL-style URIs, with "/" (not #) to delimit terms.
- Differentiate classes (e.g. *devicetype*) from instances (e.g. *device*) as discrete concepts.
- Encode unique identifiers as *:prefLabel* (alphanumeric lower case only with no special characters), full name as *:altLabel*, synonyms as *:hiddenLabel*, and mappings as *:exactMatch*.
- Routinely validate records per PoolParty™ conventions:
  - no unresolvable URIs or invalid characters
  - no missing language tags in text content
  - no missing *:prefLabels*
  - no "loose concepts" (lacking *:topConcept* or *:broader*)
  - no disjoint OWL classes
  - consistent use of labels (*:prefLabel*, *:altLabel*, and *:hiddenLabel* are disjoint plain literals, with only one *prefLabel* per language)
  - consistent mapping properties
  - consistent semantic relations
- Use *dcterms :issued* and *:modified* dates for versioning.
- Use *:description* for additional metadata (following SeaDataNet convention).

*http://www.ngdc.noaa.gov/mgg/ecs/metadata/cruise/*
*and*
*http://www.rvdata/voc*

NDSA
*National Digital Stewardship Alliance*

# Cruise Catalog

Rolling Deck to Repository (R2R)

rvdata.us

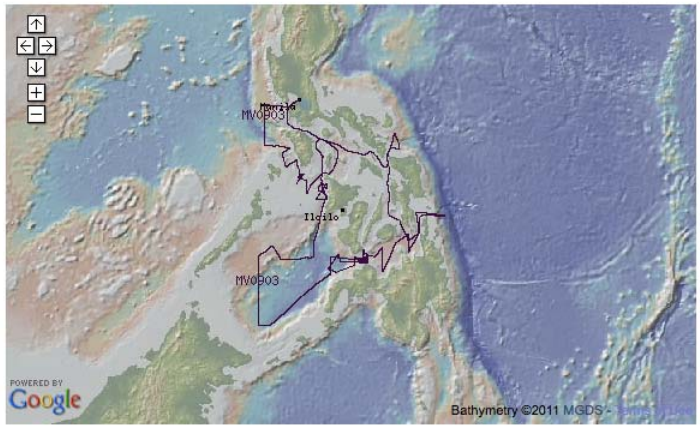
Home | About R2R | Cruise Catalog | News | Contact Us | Internal

Catalog Status
(In Service) Vessels: 26
Cruises: 2163
Archived Files: 8033881
October 25, 2011

Search
Search

Home

## Cruise Catalog: MV0903




Operator: Scripps Institution of Oceanography
Vessel: Melville

| Cruise ID | Start Date | Start Port | End Date | End Port |
|---|---|---|---|---|
| | Details | | | |
| MV0903 | 2009-02-27 | Manila | 2009-03-21 | Manila |

*Project:* Philippines Straits Dynamics Experiment (PhilEx) - Regional IOP 2009 Cruise

**SCIENCE PARTY**

| | | |
|---|---|---|
| Gordon, Arnold | Scientist, Chief | Lamont-Doherty Earth Observatory |

**FILE MANIFEST**

*Data sets broken out and delivered to national archives*

**FILE SETS**

| Device Type | Make [,Model [,Location]] | Files | Archive Status | |
|---|---|---|---|---|
| acqsys (adcp) | Hawaii UHDAS | List | *(submitted to NODC)* | |
| ctd | Sea-Bird SBE-911plus | List | | |
| expendableprobe | Sippican MK21 | List | NGDC | Download |
| gnss | Ashtech ADU2 | List | *(submitted to NGDC)* | |
| gnss | Furuno GP-90D | List | *(submitted to NGDC)* | |
| gnss | Trimble NT-200D | List | *(submitted to NGDC)* | |
| gravimeter | Bell BGM-3 | List | *(submitted to NGDC)* | |
| metstation | SIO MET-System | List | *(submitted to NODC)* | |
| multibeam | Kongsberg EM120 | List | NGDC | Download |

**R2R PRODUCTS**

Navigation: 1 Minute
Navigation: Best Resolution
Navigation: Control Points

**RELATED DOCS**

Science Cruise Report *(Leg 1)*
Science Cruise Report *(Leg 2)*

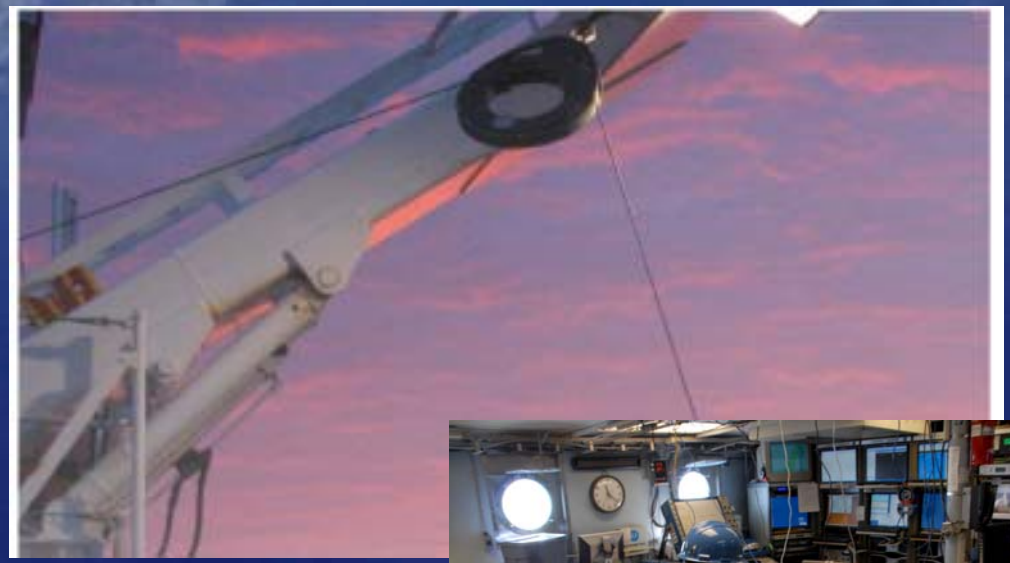
*Original file manifest submitted by vessel*

*Contributed documents eg. Cruise Reports*

*R2R Products eg. Navigation*

# Event Logger

- Version 1 deployed to 7 vessels including multi-ship/shore programs
  - AT18-06, AT18-12
  - CH0511
  - EN494
  - KN200-02, KN203-04, KN204-01
  - MV1108
  - OC467-01, OC471, OC473, OC475
  - TN268

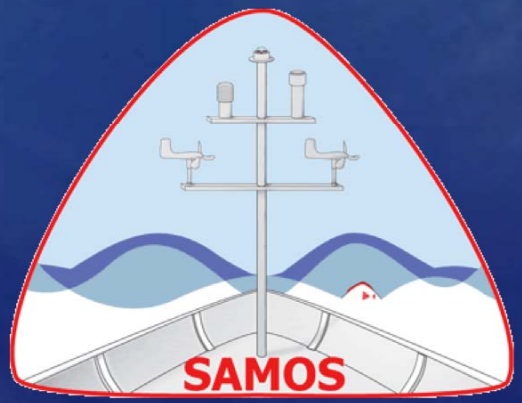


Latest logs online:
*http://elog.rvdata.us:8011/*

- Version 2 will include Web-based configuration generator

# Real-time MET/TSG

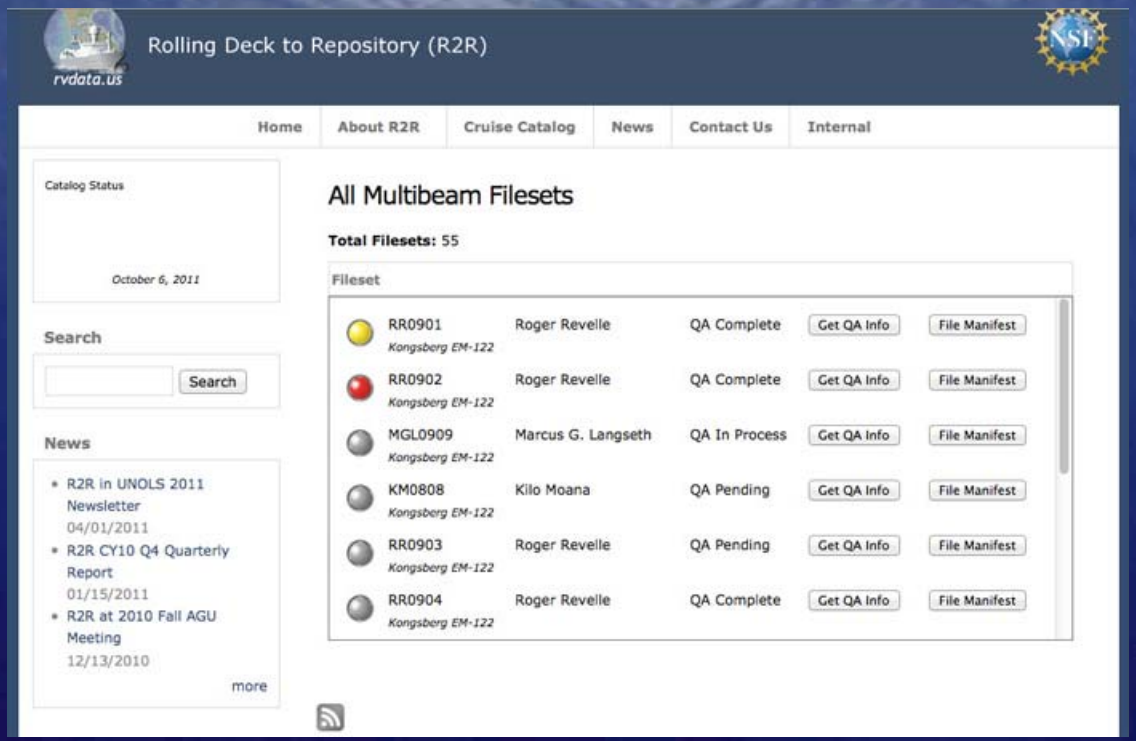
- Cont. recruitment of vessels for SAMOS 1.0 data transfer
  - *Atlantic Explorer*
  - *Atlantis*
  - *Cape Hatteras (in prog.)*
  - *Healy*
  - *Kilo Moana*
  - *Knorr*
  - *Melville*
  - *Oceanus*
  - *Roger Revelle*




- Published specification for vessel coordinate systems
  *http://www.rvdata.us/operators*

- Cont. development of 2.0 real-time data transfer protocol

# Geophysical Data

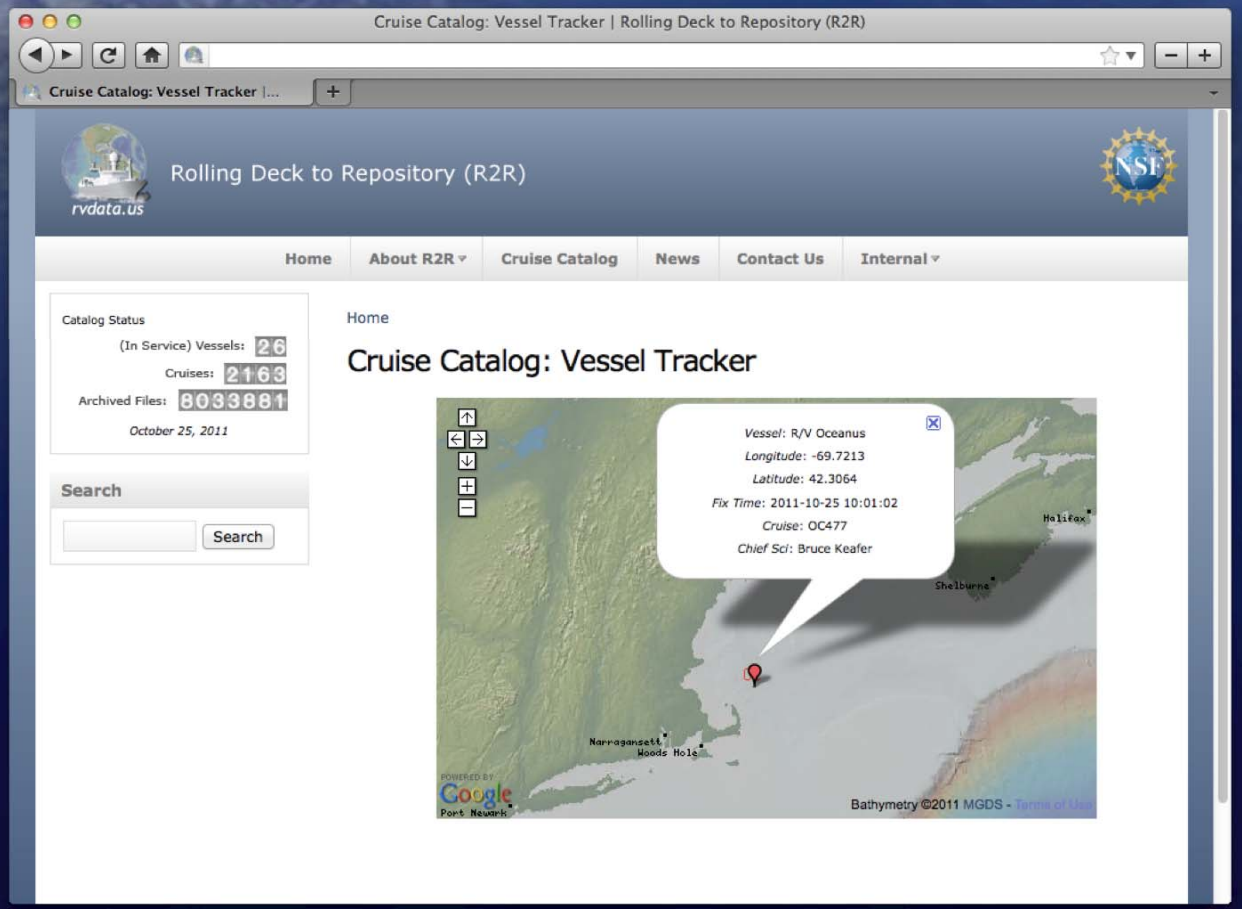



*(Dashboard prototype)*

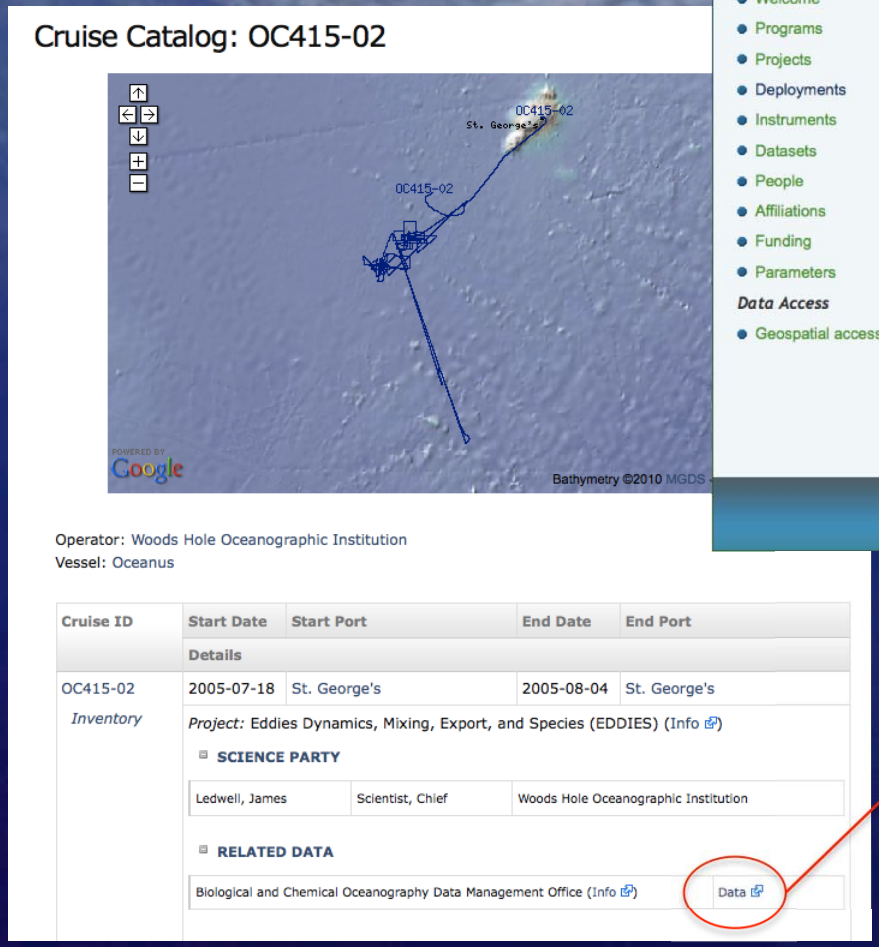
- Move to production of quality-controlled Navigation data – full resolution, 1 min., and control points
- Completed development of Multibeam data quality assessment – now developing Web Dashboard to display results
- Cont. development of data processing for Gravity+Magnetics

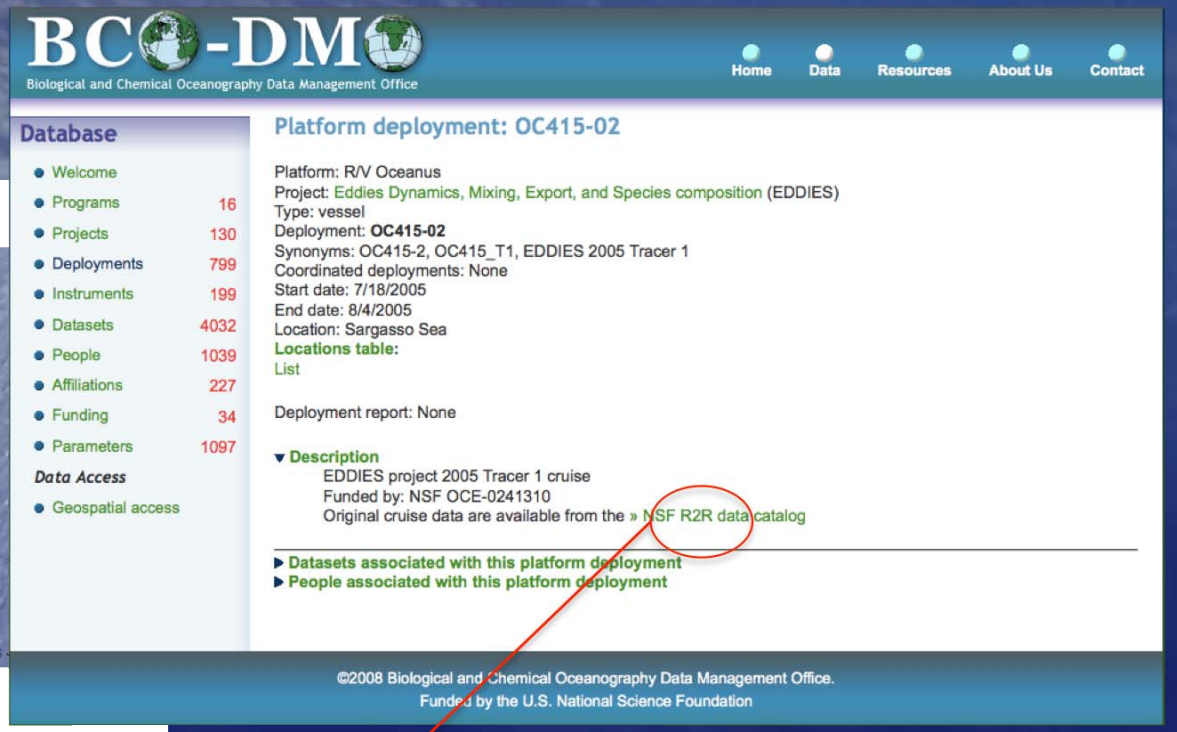
# Vessel Tracker

- Implemented shoreside dropbox +database to capture daily status messages from vessels
- Developing database -driven Google Maps display
- Pilot underway with WHOI vessels; review+recruit at RVTEC 2011



# Reciprocal Linking




Partner systems:

- ASP (marine seismics)
- BCO-DMO (bio/chem ocean)
- IMLGS (marine samples)
- MGDS (marine geo)
- SAMOS (marine met/tsg)

etc.

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