Rolling Deck to Repository (R2R)

Report 2018


Lamont-Doherty Earth Observatory
Columbia University | Earth Institute

Scripps Institution of Oceanography
Mission:
Stewardship of routinely-acquired environmental sensor data from U.S. academic research vessels

Services:
• Publish master cruise catalog
• Organize, archive, and disseminate original underway data and documents
• Assess data quality
• Create post-field data products
• Support at-sea event logging

Support:
NSF, ONR, SOI +NOAA
Sensor Data Sets at R2R

Geophysics:
- Echosounder* - 1,475
- Gravimeter* - 846
- Magnetometer* - 236
- Multibeam - 1,616

Meteorology:
- Anemometer* - 507
- Barometer* - 231
- Hygrometer* - 293
- Radiometer* - 1,099
- Rain Gauge* - 285

Oceanography:
- ADCP - 2,510
- CTD* - 2,034
- Fluorometer - 871
- Oxygen - 20
- pCO2 - 88
- Sound speed - 232
- Temperature* - 490
- Transmissometer - 234
- TSG - 1,508
- XBT/XCTD - 584

Complex Logging systems:
- Acquisition Systems - 2,453
- Meteorological Stations* - 1,665

Navigation:
- GNSS/INS* - 5,232
- Gyrocompass* - 1,634
- Speed Log* - 362

Engineering:
- Winch - 710
- Timeserver - 36
- Flowmeter - 87

Underlined - QA performed by R2R
* - data products generated by R2R
Data - sent to NCEI for archiving

Number of file sets handled by R2R as of 2018/10/12
Cruise data release

Via emails to Chief Scientists

Status:

- 90% response
- 95% full release
- 3% release by date
- 2% release by device
Impact: Contributions to Global Data Repositories and Collections

- ADCP: NOAA Global Ocean Currents Database
- TSG: NOAA Global Thermosalinograph Database:
- CTD & XBT: NOAA World Ocean Database
- Multibeam
  - NSF IEDA Global Multi-Resolution Topography (GMRT) synthesis
  - IHO Data Center for Digital Bathymetry via NCEI
- Real-time MET (SAMOS): International Comprehensive Ocean-Atmosphere Data Set (ICOADS)
New Developments

• Event Logger Accessible through R2R Catalog
• R2R Processed Products Submission pipeline to NCEI
• Redesigned Web Site
• New Cruise/Dataset Search
• Documenting Time Sources
• CTD Processed Products
Website Redesign Goals

- Modernize look and feel
- Simplify navigation & access
- Responsive pages
- Migrate to API-driven architecture
- Simplify maintenance
- Enhance Social Media presence
Home Page
prod.rvdata.us (in testing)
Searchable Cruise Catalog
Documenting Time Sources

- Inventory time servers throughout the fleet
- Relationships between time sources and devices

Status

Time Servers
- 21 vessels surveyed
- 20 timeservers across 13 vessels
- 4 don’t have time servers

Devices
- Devices mapped to their time sources across 8 vessels
- 147 devices mapped to a time source
<table>
<thead>
<tr>
<th>CRUISE ID</th>
<th>SUMMARY</th>
<th>START DATE</th>
<th>START PORT</th>
<th>ENDT Date</th>
</tr>
</thead>
</table>

**R2R PRODUCTS**
(Post-Field Processed)

**Log**

<table>
<thead>
<tr>
<th>UNDERWAY DATA SETS</th>
<th>DEVICE TYPE</th>
<th>MAKE-MODEL [LOCATION]</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ADCP</td>
<td>Hawaii UHDAS</td>
</tr>
<tr>
<td></td>
<td>CTD</td>
<td>Sea-Bird SBE-911+</td>
</tr>
<tr>
<td></td>
<td>Fluorometer</td>
<td>WET Labs WETStar</td>
</tr>
<tr>
<td></td>
<td>GNSS</td>
<td>C&amp;C C-Nav 3050</td>
</tr>
</tbody>
</table>

**Vessel**

Neil Armstrong

**Device**

Device Type: ctd
Device Make: Sea-Bird Electronics, Inc.
Device Model: SBE-911+
NOAA Documap id: 12410cb2-3103-4bc7-861c-e47cd8e0c34b
NERC sensor term: http://vocab.nerc.ac.uk/collection/L22/current/TOOL0058/

**Device Time Source**

Make: de.oceanwaves
Model: ES-185E/NTP

**Format**

Fileset processing level: Raw
Fileset format id: 100073
# Vessel Device List

**Oceanus**

- **Status:** Active
- **R2R code:** OC
- **Operator id:** edu.oregonstate
- **Call sign:** WXAQ

<table>
<thead>
<tr>
<th>R2R ID</th>
<th>Device Type</th>
<th>Make/Model</th>
<th>Time source</th>
<th>Fileset count</th>
<th>Tools</th>
</tr>
</thead>
<tbody>
<tr>
<td>100021</td>
<td>acqsys</td>
<td>Hawaii UHDAS</td>
<td></td>
<td>106</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100033</td>
<td>adcp</td>
<td>- RDI WM-300</td>
<td></td>
<td></td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100032</td>
<td>adcp</td>
<td>- RDI OS-75</td>
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<tr>
<td>100036</td>
<td>anemometer</td>
<td>Gill WindObserver II (bow)</td>
<td>190777</td>
<td>64</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100061</td>
<td>ctd</td>
<td>Sea-Bird SBE-911plus</td>
<td>190777</td>
<td>121</td>
<td>[Edit] [Unols]</td>
</tr>
<tr>
<td>100007</td>
<td>fluorometer</td>
<td>WET Labs WETStar</td>
<td>190777</td>
<td>107</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100009</td>
<td>gnss</td>
<td>Furuno GP-90 (bridge)</td>
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<td>47</td>
<td>[Edit] [Unols]</td>
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<td>100008</td>
<td>gnss</td>
<td>Ashtech ADU5 (bow)</td>
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<td>105</td>
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<tr>
<td>100019</td>
<td>gyrocompass</td>
<td>Sperry MK-37</td>
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<tr>
<td>100051</td>
<td>ptu</td>
<td>Vaisala PTU300 (03stb)</td>
<td>190777</td>
<td>108</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100013</td>
<td>radiometer</td>
<td>RMR Co. PRP (metmast)</td>
<td>190777</td>
<td>87</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100014</td>
<td>radiometer</td>
<td>Biospherical QSR-2200 (metmast)</td>
<td>190777</td>
<td>77</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100006</td>
<td>singlebeam</td>
<td>Knudsen 3260</td>
<td>190777</td>
<td>170</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100018</td>
<td>tempprobe_water</td>
<td>Sea-Bird SBE-38 (fwdintake)</td>
<td>190777</td>
<td>106</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100017</td>
<td>tempprobe_water</td>
<td>Sea-Bird SBE-48 (bow)</td>
<td>190777</td>
<td>64</td>
<td>[Edit] [Unols]</td>
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<td>100077</td>
<td>timeserver</td>
<td>SyncServer S350</td>
<td>190777</td>
<td>36</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100019</td>
<td>transmissometer</td>
<td>WET Labs C-Star</td>
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<td>91</td>
<td>[Edit] [Unols]</td>
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<tr>
<td>100020</td>
<td>tag</td>
<td>Sea-Bird SBE-45</td>
<td>190777</td>
<td>107</td>
<td>[Edit] [Unols]</td>
</tr>
</tbody>
</table>

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R2R must have accurate device and data directory and filename information to break out data correctly. Please use View/Edit to verify the details of each device on your vessel. If you need to retire a device, you can do so within the View/Edit page for that device. If you need to add a new device, please go to the UNOLS device catalog (R2R is updated from UNOLS).

Advisory 2018
The raw CTD data is processed using the following Seabird modules:

- **Datcnv**
  - The raw data is converted from hex to ascii.
- **Cell Thermal Mass**
  - Perform conductivity thermal mass correction. Cell Thermal Mass uses a recursive filter to remove conductivity cell thermal mass effects from the measured conductivity.
- **Binavg**
  - The data is averaged into 1db bins. The pressure bins are calculated with no interpolation.
Challenges
R2R is working with operators and UNOLS to develop best practices that will speed transfer of cruise data from the vessel to R2R.

Arrival of Cruise Data at R2R

Note that most 2018 data sets have not yet arrived at R2R.

Need both data and cruise metadata to process cruises.
Event Logger Deployments

June 2017- July 2018 :

<table>
<thead>
<tr>
<th>Vessel</th>
<th># Cruises</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RV Neil Armstrong</td>
<td>13</td>
<td>WHOI/UTRGV/Skidaway</td>
</tr>
<tr>
<td>RV Atlantis</td>
<td>4</td>
<td>WHOI/OSU/ONR</td>
</tr>
<tr>
<td>RV Endeavor</td>
<td>4</td>
<td>WHOI/URI</td>
</tr>
<tr>
<td>RV Roger Revelle</td>
<td>5</td>
<td>UW/OSU/TAMU</td>
</tr>
<tr>
<td>RV Sikuliaq</td>
<td>7</td>
<td>NSWC/UAF/UMD_CES</td>
</tr>
</tbody>
</table>
R2R Backup Cloud Costs

R2R is storing copies of the original data submission distro on Amazon Web Services (AWS).

Monthly AWS charge nearly double so far this year.

It is difficult to plan long term.
<table>
<thead>
<tr>
<th>Cruise Year</th>
<th>Files</th>
<th>Size (TB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2016</td>
<td>17906</td>
<td>3.26</td>
</tr>
<tr>
<td>2017</td>
<td>40514</td>
<td>6.06</td>
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</tbody>
</table>

Values do not include all of 2017 data.
Big Data Sources

Current
- EK80 echosounder
- EM710/712 multibeam
- EM122 multibeam in water column mode

Prospective
- GeoCam HD still imagery
- WaMoS wave radar
- (Video)
Large Volume Data Challenges

**Storage:** Cost of local hardware

**Effort:** Person time to move data and manage systems

**Performance:** Network issues re downloading large data sets.
R2R-led Breakout Session at INMARTECH 2018-10-16
(International Marine Technicians)

"Planning for data growth: a community discussion”

• ~30 participants
• Concerns: storing data on vessel, moving data off vessel (time!), storage on shore, transfer to R2R.
Field data preservation across ocean science

Research Fleet
- SAMOS
- R2R
- MGDS
- JACAD
- CP
- IRIS
- LTERs
- Others

IODP
- SSDB
- SEDIS
- SaDIR
- 3 core repos

OOI
- OOI-CI
- Others ???
- IRIS
Research Fleet: Spectrum of Data

Research expeditions involve a variety of data collection activities:

- Specialized marine operator (eg Marine seismic, OBSIP, NDSF, other submersibles/towed vehicles, gliders, drones)
- Science party instrumentation (eg current meter, sediment traps, chemical/physical probes etc)
- Operational/Underway (eg bathymetry, MET, ADCP, subbottom etc)
Research Fleet: Spectrum of Field Data

Research expeditions involve a variety of data collection activities:

• Specialized marine operator (eg Marine seismic, OBSIP, NDSF, other submersibles/towed vehicles, gliders, drones) ---- Disciplinary Repo (partial, needs growing)

• Science party instrumentation (eg current meter, sediment traps, chemical/physical probes etc) --- Disciplinary Repo: (partial field, derived with publications)

• Operational/Underway (eg bathymetry, MET, ADCP, subbottom etc) ----- R2R
Acknowledgements

Lamont-Doherty Earth Observatory
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Providing access to and ensuring the preservation of national oceanographic research data.