Ocean Networks Canada

Discover the ocean. Understand the planet.

OCEAN NETWORKS CANADA

Explorer Plate
NEPTUNE Observatory
Clayoquot Slope
Middle Valley
2400 m
Endeavour
2300 m
Cascadia Basin
2660 m
Juan de Fuca Plate
Pacific Plate

Folger Passage
20-100 m

Saanich Inlet
100 m

VENUS Observatory

 Strait of Georgia
100-300 m

Vancouver

VANCOUVER ISLAND

Port Alberni

Washington - USA

North American Plate

Seattle

An Initiative of the University of Victoria
Maintenance Expeditions

Carefully planned ROV dives to ensure expedition objectives achieved

10+ ships
5+ ROVs
NEPTUNE/VENUS maintenance expeditions
# Maintenance Expeditions

## Ocean Networks Canada Device Workflow Admin

### Process Groups
- NEPTUNE 2015-08/09
- Mill Bay 2015-06
- NEPTUNE 2015-06 Tully
- NEPTUNE 2015-06 Thompson
- NEPTUNE 2015-06 Onset
- NEPTUNE 2015-05 Wave Venture
- NEPTUNE 2015-05 Wave Venture, Dorado D2
- NEPTUNE CORK/BHT 2014-08 RV Atlantis AT2
- NEPTUNE Foilier Pinnacle 2013-05
- NEPTUNE Foilier Pinnacle 2013-07
- NEPTUNE Foilier Pinnacle 2013-10-23
- NEPTUNE Foilier Pinnacle 2014-07
- NEPTUNE Foilier Pinnacle 2014-10
- NEPTUNE Foilier Pinnacle 2015-07
- ONC 2013 AIS Receiver Deployments
- ONC 2013-08 Falkor Leg 1
- ONC 2013-08 Falkor Leg 2
- ONC Olders 2013 Fall
- ONC Olders 2014
- ONC Olders 2015
- ONC IC 2013 Spring
- ONC IC OTTB 2013-11
- ONC IC OTTB 2014-01
- ONC IC OTTB 2014-03
- ONC IC OTTB 2014-04
- ONC IC OTTB 2014-07 OAP Test at MTC
- OTTB Camera Test 2014
- Pacific Salmon Foundation 2014-02
- Port Alberni - 2013-03
- Sand Delta Mooring Site 2014

### Process Group Details

<table>
<thead>
<tr>
<th>Device Id</th>
<th>Device Name</th>
<th>Process</th>
<th>Last Completed Phase</th>
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<tbody>
<tr>
<td>23810</td>
<td>Aanderaa Optode 3830 (SN 871)</td>
<td>Autonomous Cruise Device</td>
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<tr>
<td>12110</td>
<td>Aanderaa Optode 3830 (SN 910)</td>
<td>Serial Device Recovery</td>
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<td>20116</td>
<td>Aanderaa Optode 3830 (SN 911)</td>
<td>Serial Device Maintenance</td>
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<td>23572</td>
<td>Aanderaa Optode 4831 (SN 471)</td>
<td>Autonomous Cruise Device</td>
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<td>11002</td>
<td>AOM CTD 105 on Crawler</td>
<td>Serial Device Recovery</td>
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<td>23174</td>
<td>Allied Procella GC1290C O2-2186A-1787 Camera</td>
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<td>23530</td>
<td>Argus ROV Navigation 01</td>
<td>Autonomous Cruise Device</td>
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<td>23260</td>
<td>ASL AZFP Echosounder 55016</td>
<td>Ethernet Device Recovery</td>
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<td>23299</td>
<td>Autonomous Temperature Array 02</td>
<td>Autonomous Recovery</td>
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<td>23300</td>
<td>Autonomous Temperature Logger Chain 05</td>
<td>Autonomous Recovery</td>
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<td>12170</td>
<td>Barkly Colour Axia-Vido [Axis P1347]</td>
<td>Camera Recovery</td>
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<td>10011</td>
<td>BC Pod #1 AB 02</td>
<td>JB/SIIM Recovery</td>
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<td>BC Pod #2 AB 03</td>
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<td>BC Pod #3 AB 04</td>
<td>JB/SIIM Recovery</td>
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<td>10013</td>
<td>BC Pod #4 AB 05</td>
<td>JB/SIIM Recovery</td>
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<td>20020</td>
<td>BioSonics DTUx Scientific Echosounder</td>
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<td>21301</td>
<td>CORK P (1026B)</td>
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<td>23181</td>
<td>CORK P (1364A)</td>
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<td>19003</td>
<td>COVIS Multibeam Sonar 001</td>
<td>Ethernet Device Recovery</td>
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<td>22668</td>
<td>Crawler A2 (switch)</td>
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<td>23311</td>
<td>Crawler Port Manager 2</td>
<td>Serial Device Recovery</td>
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<td>12113</td>
<td>Crossbow NAV 440 (Gyro)</td>
<td>Serial Device Recovery</td>
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<td>23152</td>
<td>DragonFish Camera SUBC13112</td>
<td>Camera Recovery</td>
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<td>22149</td>
<td>DragonFish Camera SUBC1412</td>
<td>Camera Recovery</td>
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</table>

### Actions
- Create Process Group
- Add Device
- Save
- Delete
- Cancel
### Autonomic Cruise Device On-Shore Development

<table>
<thead>
<tr>
<th>Task</th>
<th>Area of Responsibility</th>
<th>Status</th>
<th>Comment</th>
<th>JIRA</th>
<th>Last Modified (UTC)</th>
<th>Modified By</th>
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<tbody>
<tr>
<td>Device - create</td>
<td>Data Stewardship</td>
<td>Complete</td>
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<td></td>
<td>Reyna Jenkyns</td>
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<tr>
<td>Sensors - create</td>
<td>Data Stewardship</td>
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<td>Reyna Jenkyns</td>
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<td>Ports - create</td>
<td>Data Stewardship</td>
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<td>Reyna Jenkyns</td>
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<tr>
<td>Calibrations - update</td>
<td>Data Stewardship</td>
<td>Complete</td>
<td>calibration sheets received</td>
<td>NEPDATA-1878</td>
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<td>Reyna Jenkyns</td>
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<td>Conversion routine - prepare</td>
<td>Data Stewardship</td>
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<td></td>
<td>Reyna Jenkyns</td>
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<tr>
<td>Parser - develop</td>
<td>Software Development/Testing</td>
<td>Complete</td>
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<td>Reyna Jenkyns</td>
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<tr>
<td>Data Products - develop</td>
<td>Data Team</td>
<td>Complete</td>
<td>log files are sufficient for now</td>
<td></td>
<td></td>
<td>Reyna Jenkyns</td>
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### Autonomic Cruise Device Field Procedure

<table>
<thead>
<tr>
<th>Task</th>
<th>Area of Responsibility</th>
<th>Status</th>
<th>Comment</th>
<th>JIRA</th>
<th>Last Modified (UTC)</th>
<th>Modified By</th>
</tr>
</thead>
<tbody>
<tr>
<td>Instrument Documentation - collect</td>
<td>Data Stewardship</td>
<td>Complete</td>
<td>scanned calibration sheets obtained by Karen</td>
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<td>Reyna Jenkyns</td>
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<tr>
<td>Power supply - verify</td>
<td>Engineering</td>
<td>Complete</td>
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<td></td>
<td></td>
<td>Reyna Jenkyns</td>
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<tr>
<td>Autonomous Data Storage - verify</td>
<td>Data Stewardship</td>
<td>Complete</td>
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<td></td>
<td></td>
<td>Reyna Jenkyns</td>
</tr>
<tr>
<td>Instrument - prepare</td>
<td>Engineering</td>
<td>Complete</td>
<td></td>
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<td></td>
<td>Reyna Jenkyns</td>
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<tr>
<td>Instrument Clock - synchronize</td>
<td>Engineering</td>
<td>Incomplete</td>
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<td>Reyna Jenkyns</td>
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<td>Autonomous data - download</td>
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<td>Complete</td>
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<td>Reyna Jenkyns</td>
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<tr>
<td>Data Stream - verify</td>
<td>Systems</td>
<td>Complete</td>
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<td>Reyna Jenkyns</td>
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<td>Instrument - configure</td>
<td>Engineering</td>
<td>Complete</td>
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<td></td>
<td>Reyna Jenkyns</td>
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</tbody>
</table>
| Deployments - document      | Data Stewardship       | Complete | via ROV dive logs, topology, el devices and device actions |                 |                     | Meghan Tomlin
SeaScribe: Dive Logging

Cruises
- Cruise Name
- Ship Name
- Duration
- Description

Dives
- Description
- Location
- Duration
- Dive Chief
- Dive Reference ID

Observations
- Comment
- Timestamp
- Logger
- Tag
SeaScribe: Dive Logging

• Records maintenance, survey, and sampling activities
• Documents scientific observations of seafloor substrate and biology
• Increases searchability and usability of dive video
• Supports derivative applications, such as comparison or training automated classifiers and generation of geodatabase layers
SeaScribe: Dive Logging

Ocean Networks Canada Dive Listing

Dive Listing

<table>
<thead>
<tr>
<th>Dive Id</th>
<th>Area</th>
<th>ROV Dive Id</th>
<th>Date From</th>
<th>Date To</th>
<th>Dive Comment</th>
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<tr>
<td>308</td>
<td>Saxon Inlet</td>
<td>R1645</td>
<td>07-Sep-2013 13:14:02</td>
<td>07-Sep-2013 18:45:05</td>
<td>1. Transect of Patrick Bay 2. Fish samples at deeper end of transect</td>
</tr>
<tr>
<td>309</td>
<td>Saxon Inlet</td>
<td>R1646</td>
<td>07-Sep-2013 20:44:31</td>
<td>08-Sep-2013 01:36:01</td>
<td>1. Cliff climb at McMurdo Point and Elbow Point 2. Collected samples</td>
</tr>
</tbody>
</table>

Ocean Networks Canada Observation

Observation

<table>
<thead>
<tr>
<th>Dive Id</th>
<th>Observation Id</th>
<th>Resource Id</th>
<th>Time (UTC)</th>
<th>Dive Date From (UTC)</th>
<th>Dive Date To (UTC)</th>
<th>Tags</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>313</td>
<td>00822</td>
<td>R1650</td>
<td>10-Sep-2013 16:26:01</td>
<td>10-Sep-2013 14:55:25</td>
<td>11-Sep-2013 05:00:46</td>
<td>CNIDARIANS: Porifera</td>
<td></td>
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</table>
SeaTube

Annotations from dive logging utility integrated with video. Highlighting denotes entry matching video segment. Logs are combined with additional data like navigation, still images, and origin for a richer experience.
Telepresence

- SeaScribe dive logging supports up to 10 server instances (including from shore), mutually synced as communications permit
- Ship-based data acquisition that transmits data to shore and automatically integrates into Oceans 2.0
- Video streams shown live on cruise website and recorded for viewing in Oceans 2.0
- Intercom system connected to shore
- Substantial shore support operations
- Remote scientist participation to direct ROV dives
- Teachers on-board and remote classroom participation
Wiring The Abyss

EXPLORATION VESSEL: NAUTILUS

RESEARCH VESSEL: THOMPSON

2013 Falkor Expedition available: http://www.oceannetworks.ca/cruise13/
Data Ingestion

Falkor Datasets:
• Shipboard Systems: multibeam sonars, 75 kHz ADCP, flow-through sensors
• ROPOS ROV: video, digital stills, navigation, CTD/O2, physical samples
• Profiling platforms: CTD Rosette, Moving Vessel Profiler
Data Ingestion
Data Ingestion

Bathymetric data at Folger Pinnacle
Data Ingestion

General Process
• Establish data agreement
• Collect and organize instrument inventory, metadata and documentation
• Review, rename and archive data files – **reliable timestamps critical!**
• Develop parser or other post-processing algorithms for data format
• Setup automated QAQC tests
• Process data files and enable access

Since the instrument takes a reading roughly every second, we can maybe assume that the duplicated timestamp should be at 08/21/2013, 01:12:02. instead of 01:12:01.
SOI Strategic Focus Area #5: Open Sharing of Information, Data, and Research Outcomes

Schmidt Ocean Institute supports open sharing of information about the ocean to stimulate the growth of its applications and user community, and amplify further exploration, discovery, and deeper understanding of our environment. These efforts are supported through partnerships with data management experts in the oceanographic community to enable standards-compliant sharing of scientific information and data collected during research cruises.

World Data System (WDS)

- Membership based on criteria such as access to high quality data, data stewardship, and participation in broad harmonization and interoperability efforts
- Working groups: Publish Data, Knowledge Network, Certification
- ONC became a member in July 2014
Seeks to advance the use of innovative cyberinfrastructure to connect physical samples and sample collections across the Earth Sciences with digital data infrastructures to revolutionize their utility for science. The ultimate goal of this RCN is to dramatically improve the discovery, access, sharing, analysis, and curation of physical samples and the data generated by their study for the benefit of science and society.  

**PI:** Kerstin Lehnert, Lamont-Doherty

**Working Groups**

1. Identifiers & Metadata
2. User Stories & Science Requirements
3. Communication, Training & Education
4. Architecture & Workflows
5. Physical Infrastructure, Digitizing, Cataloguing & Sample Rescue
EarthCube iSample Survey Result

- My employer/organization values and rewards sharing physical samples or digital data about physical samples.  \(0.48 (0.32)\)

- Colleagues in my field/discipline recognize and value sharing physical samples or digital data about physical samples.  \(0.70 (0.22)\)

- The tenure and/or promotion process in my organization recognizes and Values sharing physical samples or digital data about physical samples.  \(0.29 (0.28)\)
Ongoing Efforts

- Dive logging: guidelines, vocabularies, syntax, interface, training (especially surveys, sampling and substrate)
- Video workflow: streamlined transcodes, repeatable recording process, manipulation features in Oceans 2.0
- Data acquisition: increased use of ship-to-shore acquisition system, better documented data ingestion processes and tools
- Digital stills: better systems for capture, downloading, archiving and distribution
- Rosette: better data model for cast data
Further Info & Current Expeditions

Email: reyna@uvic.ca
Website: http://www.oceannetworks.ca/
Oceans 2.0: http://dmas.uvic.ca

Find me after for a live demo of any of our tools.

**Maintenance Expeditions Underway**
Cambridge Bay maintenance with divers
VENUS, NEPTUNE and moorings with E/V Nautilus & Hercules ROV
NEPTUNE with R/V Thompson & Jason ROV starts Sept 2

http://www.oceannetworks.ca/expeditions/2015/august/