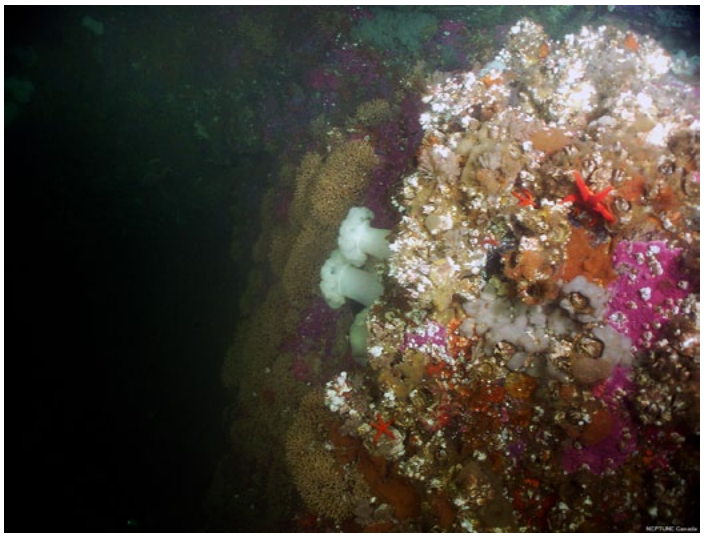
NEPTUNE Canada
Transforming Ocean Science

Director's Report

Another successful key infrastructure deployment was made recently: to complete the installation of the Folger Passage Shallow instrument array in highly productive waters on the lee side of a pinnacle in Barkley Sound. Once again, our staff and contractors performed remarkable tasks over various phases and several months and we now have instrumentation of the diverse coastal environments at both 23m and 100m. The challenges for further installation during two month-long cruises and a possible third one-week cruise this summer, particularly at the Endeavour spreading ridge, are outlined herein, with success being partly dependant on the design and manufacture of new media converters to replace some that suffered implosion last year at the two deepest node sites.

A significant effort has been made within Ocean Networks Canada (ONC) to sustain and seek ongoing operational funding. As a condition of our current two-year award (2010-12), we were required to have a review by an external panel arranged by the Canada Foundation for Innovation (CFI). A substantial report was prepared for the NEPTUNE Canada (NC) and VENUS networks; a site visit occurred on 3 December and supplementary information was provided afterwards. The result of the review will be announced after the mid-March CFI Board meeting. For future operational funding, ONC plans to apply through the new CFI Major Science Initiatives (MSI) program for a 5-year award (2012-17). As part of that process, an application to establish formal eligibility was submitted on 3 February; again, an announcement should be forthcoming in March. The deadline for the full MSI application will be in September, with much preparation and consultation with the science community through the spring and summer.

Part of this consultation will occur at the important NC Workshop on 2-4 June in Victoria just prior to the CMOS Conference. Recent meetings between the NC Executive Committee and the Science Advisory Committee (SAC) and also with the senior management of the Regional Scale Nodes (RSN) group of the US Ocean Observatories Initiative will lead to enhanced engagement of the science community, establishment of new NC Science Users and Science Planning committees to replace the SAC, and some working teams between NC and RSN based on common science



A profusion of life inhabits the recently installed Folger Passage Shallow instrument array which sits on a pinnacle at 23m water depth.

research themes and experiments. Please consider the benefits of attending and contributing to the open June workshop, which will involve planning future experiments and development of the NC network.

International connections were strengthened recently with separate visits of colleagues from Tongji University, Shanghai and the Ocean University of China. In January, ONC hosted a visit of 16 senior representatives from 10 scientific institution and observatories from Italy sponsored by the federal Department of Foreign Affairs and International Trade (DFAIT) and managed by ONC'c Centre for Enterprise and Engagement, with visits to local federal labs and marine industries.

In December, plaudits for NC were received in being ranked fourth in the Top Ten Science Stories for 2010 by the national Canadian Broadcasting Corporation (CBC) and as one of the major breakthroughs in 2010 listed by Science magazine.

In the first half of 2011, invitations have been accepted to give keynote talks at major meetings in Tokyo, Ottawa, Paris, Brest and Melbourne.

Join the
NEPTUNE Canada Workshop
June 2 – 4, 2011
Harbour Towers Hotel - Victoria, BC
(see page 5 for details)

NEPTUNE Canada is the regional ocean network of:

OCEAN NETWORKS CANADA
A University of Victoria Initiative

Folger Passage Shallow Installed and Operational

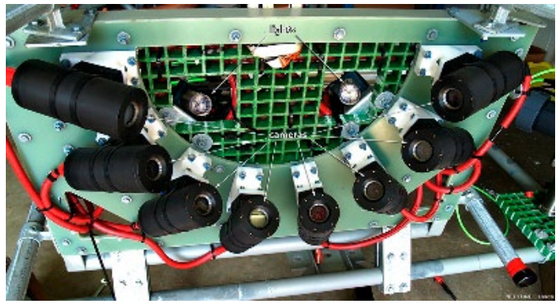
Our Folger Passage Shallow instrument platform is now up and running after a team of divers plugged in the extension cable connecting it to the node and the rest of the NC network in early February 2011. Glenn Hafey of Pelagic Technologies made the actual connection after he and his four-man team dove 23m to the platform from the Bamfield Marine Science Centre's (BMSC) 9.8m aluminum dive support boat, the Barkley Star.

After the dive team was safely out of the water, we held our collective breath as the NC systems team powered up the platform and sent the first ping. Happily, the platform's junction box responded! One by one, we then sparked up all seven platform instruments:

- RDI Acoustic Doppler Current Profiler (600kHz)
- Nortek Aquadopp single-point acoustic current meter
- Nortek Aquadopp Acoustic Doppler Current Profiler
- 3D Grasshopper high-resolution camera imaging system
- Biospherical Photosynthetically Active Radiometer (PAR) light sensor
- WETLabs fluorometer
- Sidus HD video camera

All seven instruments powered up successfully, however the HD video camera is not communicating with shore. Our science and technical team is trying to troubleshoot the camera communications, while working on commissioning the rest of the instruments. Some of our early commissioning data are now available via our Data Search and Plotting Utility tools.

Folger Shallow installation crew (from left to right): Platform designer, Jason Williams, John Richards, Roger Gillam, Darryl Jackson, Greg Watson, Glenn Hafey, Ken Stevens, Mairi Best, Jim Kyllonen



3D Grasshopper camera array sits beneath the Folger Shallow platform. This camera system will allow researchers to 3D image, in minute detail, the behaviour of benthic epifaunal organisms such as sponges, ascidians, and barnacles.

Initial Preparations in late 2010

The initial design and installation work posed several challenges. After a lengthy period of fabrication, integration and testing, the Folger Shallow instrument platform, designed by Highland Technologies' Jason Williams, was finally ready for installation in late summer 2010. It was installed on a sponge, barnacle and anemone-covered rock outcrop 23m below the surface. It was transported to the site on a small barge-like landing craft by Norwespac Ind Ltd., while the BMSC M/V Alta and Pelagic Technologies supported the dive operations.

Before we could connect the newly installed platform to our network, we had to retrieve the cable end and carefully shift it to the platform—a painstaking task. It took three excursions, two boats and two remotely operated vehicles (ROVs) to relocate the cable end and reposition it near the instrument platform. NC systems integration engineer Jonathan Zand oversaw these efforts, working with BMSC ship crews and ROV operators from International Underwater Surveyors and SubOceanic Sciences.

We are now eagerly working to commission the Folger Shallow instruments so researchers can start using the data flowing from them. One team led by Sally Leys and Herb Yang of the University of Alberta will use the custom-built eight-lens camera system to make 3D images of sessile (non-mobile) suspension feeders living beneath the platform.

Engineering Team Prepares for 2011

2011 is here and NC is getting ready to tackle another ambitious installation/maintenance program which includes four separate missions: two Vertical Profiler System (VPS) related missions in March and May, a major maintenance cruise in July and a major installation cruise involving two ships in September.

The season will start in March with a VPS test in Saanich Inlet, where it will be deployed next to the Ocean Technology Test Bed (OTTB) buoy in 80m of water for two weeks. During that time, the winch will be operated intensively and repeatedly to gain further experience with its operation while the NC science team will concentrate on the data quality delivered by the 11 instruments. The VENUS network team, with their extensive experience in coastal water deployment, will be leading the test. After that test the Nichiyu Giken Kogyo (NGK) specialists will come to Victoria from Japan to perform a last review of the system in preparation for its deployment at Barkley Canyon in May. The first *CCGS John P. Tully* cruise of the season will be dedicated to that deployment, final arrangements allowing. If weather permits, we will also take the opportunity to redeploy refurbished heat probes.

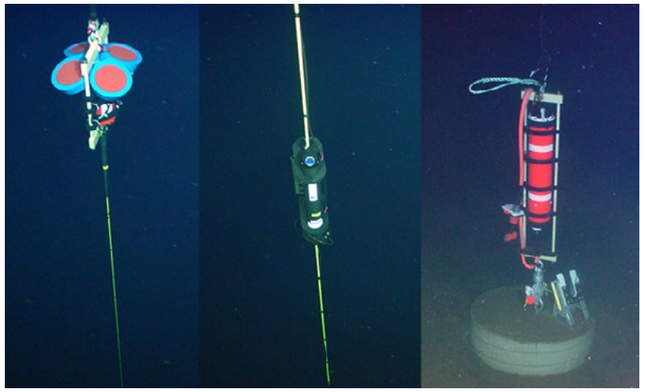
In July, we will proceed with a large maintenance cruise. A major task will be an attempt to revive the Main Endeavour Field site by putting in a new junction box. If successful, we will install Ifremer's Tempo Mini. If the replaced junction box doesn't resolve the issue we will have to wait for the next cruise to install a new cable. At ODP 1027 we will install Ifremer's piezometer. Then, it will be time to concentrate on the Barkley Canyon area. New Axis cameras have been ordered based on the dialogue last year with all the scientists involved. We are currently busy sourcing pan and tilt, lights, housing, cables and connectors to make sure we can replace as many cameras as possible. We hope that the quality of the data will be significantly improved and that scientists will continue to give us feedback on ways to enhance the system. We are also planning to re-install or maintain a series of instruments at all sites including the sediment traps, the sonars, the aquadop, the gravimeter, etc. At the moment, the replacement of the system hydrophones appears more problematic as a satisfactory supplier has yet to be identified.

After a one-month turn around, we will be back at sea in September to install the Mothra, Regional Cabled Moorings (RCM) South and reinstall the ODP 1027 tsunami array. Success during this cruise will depend on whether or not we can source terminations and media converter cans. Since last year's implosion of the media converter can, we have been looking for alternate solutions. The diversity of cables we have to deal with is making that search even more difficult. Unfortunately that diversity is unavoidable because it corresponds to the variety of terrains, electrical loads and scientific requirements that a network like NC has to manage. A feasibility request has been issued and we are looking forward to receiving and analyzing those results next month.

Stay tuned during our cruises through our website installation blogs and SeaTube live video feed at www.neptunecanada.ca.

Regional Circulation Mooring (RCM) is used to measure currrents and water properties within the axial rift valley of Endeavour Ridge at the regional scale, and to gauge the effect of hydrothermal venting on those regional currents. The energy released by the five high-temperature hydrothermal vent fields has been compared to that of a mid-size nuclear power plant. This drives an inward circulation, with is like a sea breeze that develops over heated land at mid-day. Better understanding currents will help us understand how the species inhabiting the vents colonize new sites.

Installation of the RCM's is a two-ship dance. One ship surveys the seafloor to find a relatively flat spot using ROPOS (www.ropos.com) while the other ship performs installation of the RCM.



The RCM is composed of three different types of instruments affixed at varying depths along a cable extending from the seafloor upward 267m. Above (from left to right): 75kHz Acoustic Doppler Current Profiler (ADCP), colocated CTDs and ACMs, mooring base and 650kg anchor weight on seafloor.

Science Team Activities

The science staff at NC have been working in a number of areas over the past few months.

Current activity includes:

- reviewing the website and development of use case senarios to improve usability for the scientific community
- working with the DMAS staff on Oceans 2.0 development priorities *(see page 7)*
- seismic data delivery through IRIS
- camera and hydrophone options with scientists
- maintenance priorities with the Science Advisory Committee and the NC engineering staff
- plans for science outreach and communications events (workshops, meetings) for the medium and long term
- instrument/research related proposals to international funding bodies
- science projects to aid in research and in tracking research results

Research Theme Integrators' Activities

The initial work of the four new Research Theme Integrators (RTI's) is summarized briefly below. The RIT's are the science community's resource for exploring projects and integrating communication with NC.

Martin Heesemann, RTI for plate tectonic processes and earthquake dynamics and gas hydrates in the seabed, was the first RTI to join NC in late July 2010. Until October he focused his efforts on IODP and NC installation cruises. During the IODP Expedition 328 he assisted Earl Davis from the Geological Survey of Canada (GSC) to install a borehole observatory that is now waiting to be plugged into the NC ODP 889 node. Martin also worked with Robert Meldrum, Taimi Mulder, and Garry Rogers (GSC) to calibrate, configure, and install broadband and short-period seismometers that are now streaming data to IRIS *(see image on opposite page)*.

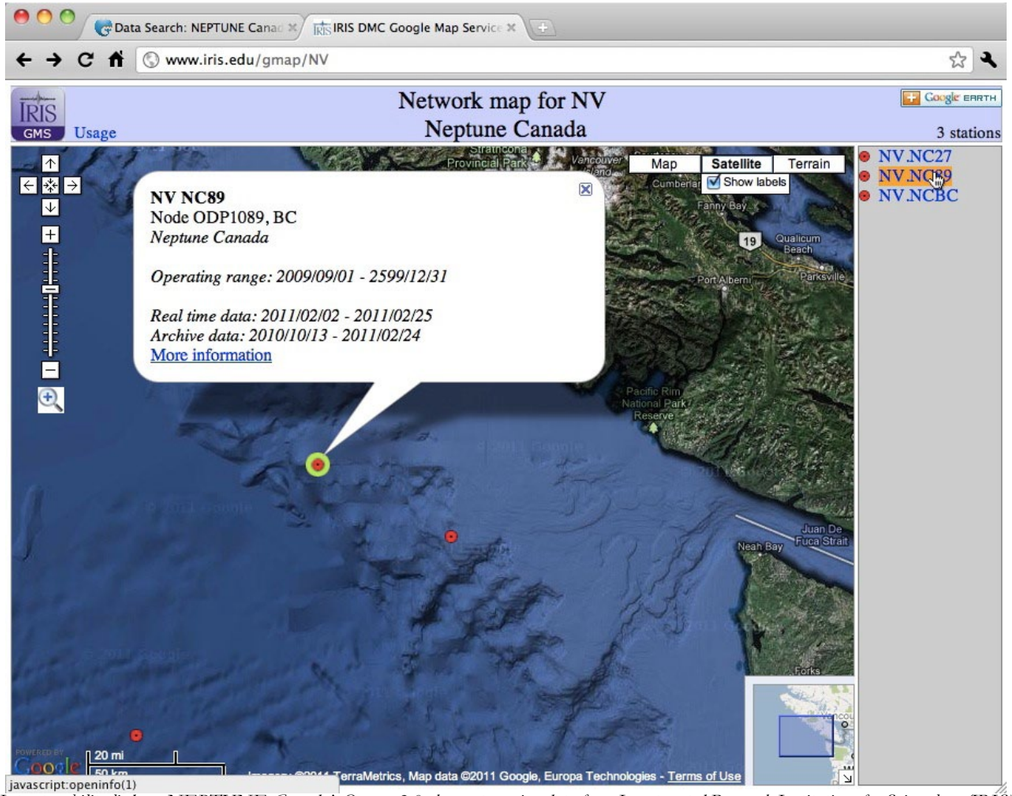
Steve Mihály, RTI for regional oceanic/climate dynamics and effects on the marine biota, joined NC in mid-August 2010 in order to assist in cruise preparation and to participate in the September 2010 installation cruise. During the cruise he was responsible for the scientific preparation of the VPS, oceanographic water column sampling, as well as participating in the coordination of the deployment of the first Endeavour RCM *(see previous page)*. Since then he has been involved with colleagues at the Institute of Ocean Sciences (DFO) in the development of a second generation junction box for the upcoming deployments of the remaining RCM's and preparing instruments for extensive testing of the VPS in Saanich Inlet. He attended the Ridge 2000 workshop to develop future research experiments at Endeavour Ridge and presented the Water Column Capabilities of NC at the American Geophysical Union Meeting.

Marjolaine Matabos, RTI for deep-sea ecosystem dynamics, who joined NC in September has worked with the Barkley benthic group to plan the upcoming maintenance cruise, including the replacement of all the camera systems and the deployment of a plankton pump and sediment trap to study the influence of the organic matter supply on the structure of the benthic communities. She worked with the Endeavour Ridge research group to plan and design future deployments at Main Endeavour Field, and facilitated communications through video conferencing. Marjolaine was also largely involved with the DMAS staff in the development of an annotation system to process videos acquired both with the ROPOS during NC cruises and with seafloor cameras connected to the network.

Maia Hoeberechts, RTI for engineering and computational research, who started full-time in December has been working on renewing existing contacts and meeting new collaborators in and around the University of Victoria (UVic) including providing advice for a thesis focused on simulating data flows in cabled observatories with the Computer Science Department. In collaboration with the DMAS staff she has been working on the CANARIE project for hydrophone data classification.

Both Marjolaine and Maia are engaged in the Ocean Networks Canada IBM video processing project involving international collaboration. They also presented a guest lecture in a computer vision course, at UVic's Electrical and Computer Engineering department, which inspired several students in that class to work on analysis of NC and VENUS imagery.

Maia, Marjolaine and Steve presented "Live Data from the Beach to the Abyss" in the Continuing Education lecture series at UVic.



Interoperability link on NEPTUNE Canada's Oceans 2.0 shows streaming data from Incorporated Research Institutions for Seismology (IRIS)

NEPTUNE Canada Workshop June 2 – 4, 2011 Harbour Towers Hotel - Victoria, BC

The workshop will include: infrastructure update, research facilitation and progress, restructuring science community input, and future research, instrument and funding proposals. All are welcome. If you would like to participate, contact neptune@uvic.ca to receive updates and registration information.
Watch our homepage at www.neptunecanada.ca for a link with more information.

NOTE: that the NC workshop is just prior to the CMOS meetings in Victoria, June 5-9th.
For details see their website at http://www.cmos.ca/congress2011/

Watch for NEPTUNE Canada at these Upcoming Conferences and Workshops

- March 10 - 11 - Cdn. Assoc. of Res. Libraries (CARL) Research Data Symposium - Toronto
- April 4 - 8 - Keynote at UT/SSC-11 Conference - Tokyo
- April 27 - 30 - Canadian Healthy Ocean Network Meeting - Montreal
- May 14 - 18 - Demos at International Marine Conservation Congress - Victoria
- May 25 - 27 - Invited talks at GAC/MAC Annual Meeting - Ottawa
- **June 2 - 4 - NEPTUNE Canada Workshop - Victoria**
- June 5 - 9 - Sessions and Demos at CMOS Congress - Victoria
- June 16 - Keynote at ACM/IEEE Joint Conference on Digital Libraries - Ottawa
- June 27 - Panikkar Lecture, Intgov. Oceanog., General Assembly - Paris
- June 28 - 30 - Keynote at Int. Symp. on ESFRI Marine Infrastructures - Brest
- June 28 - July 7 - Session at IUGG General Assembly - Melbourne

Review or subscribe to all conference and lecture listings through our online calendar at http://wiki.neptunecanada.ca/display/eventcalendar/Home, which is also linked to Quicklinks on our homepage www.neptunecanada.ca.

Data Management and Archiving (DMAS) Team Activities and Upcoming Priorities

Much has happened since our last issue. Notable events include our support for one VENUS cruise and the recent Folger Shallow instrument platform connection and it's on-going commissioning. Our operations have been complicated as we grappled with (and ultimately solved) a number of difficulties with node control systems at the shore station as well as some hardware issues at our data centre. Two software releases have also happened, providing improvements in a number of areas noted below.

We have also supported an ichthyology class at UVic, in which students were tasked to annotate ROPOS dive videos using some of our more recent SeaTube improvements. This occasion afforded an opportunity to provide more HD videos in SeaTube, replacing many of the currently available low-resolution, poor-quality satellite recordings. This enrichment of the video archive is a work in progress: more will happen over the next few months. Video annotation is open to all. See how you can also contribute at: http://bit.ly/gmTcwm

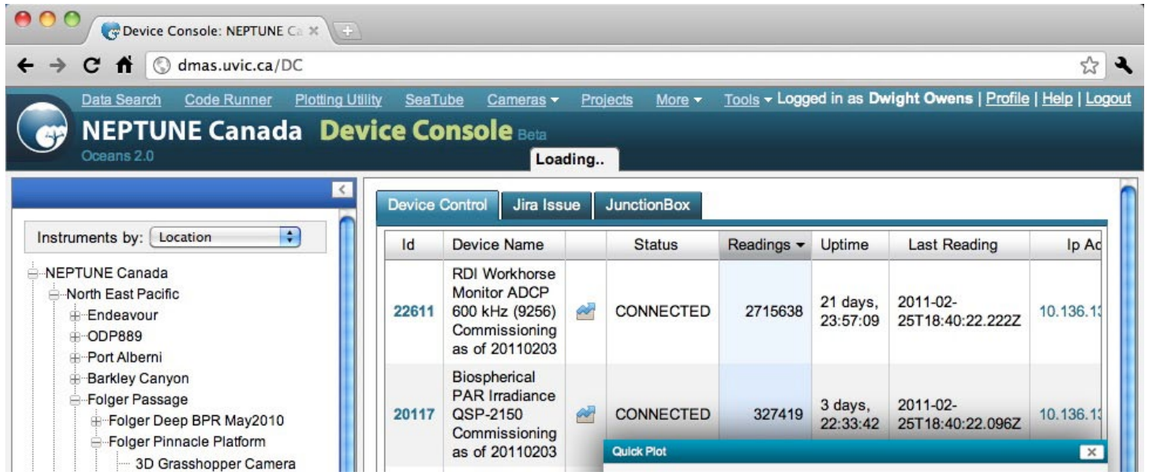
Upcoming events and current work include:

- testing of the VPS in March
- preparing software to support deployment of Ifremer's second generation Tempo-Mini instrument assembly
- alpha release of Digital Fishers, an exciting CANARIE-supported "Game with a Purpose" in early March
- improved data search and annotations interfaces
- definition of the specific features for a new instrument scheduling tool for the cameras and sonars
- handling the continuously increasing amount of data product types available for the various instruments on the system

All of these projects involve intensive collaboration between the DMAS and science teams in NC to iteratively define and develop this functionality for the science community.

Another item of note is the upcoming release of our Android phone app source code. This will be, for many programmers, an opportunity to go under the hood, adapting and modifying this spiffy smart phone tool, which provides real-time data from NC's many deep-sea instruments.

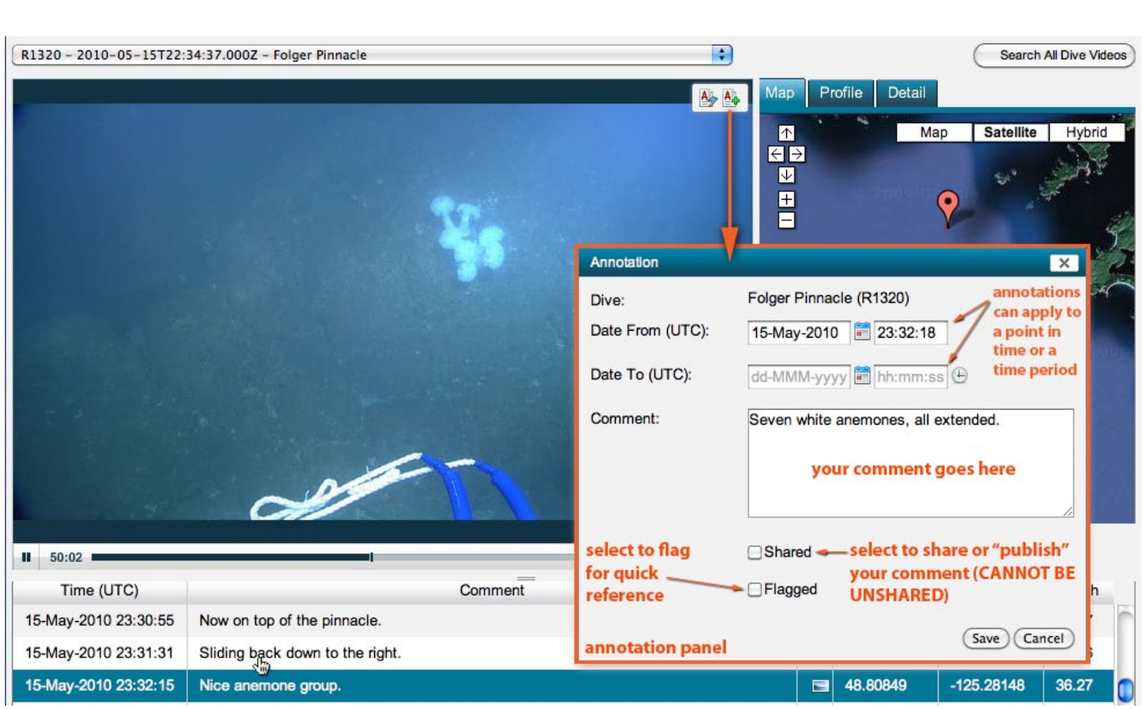
Finally, on the personnel side, and by the time our next newsletter is published, we hope to hire a Video Specialist, two Intermediate Java Developers and a Software Quality Control team lead.



- *View instruments by location, project, instrument type, network topology or Java Virtual Machine (JVM) (i.e. driver instance).*
- *Search for instrument by device id or device name.*
- *Junction box status, topology diagram, and instrument status reports. These reports have been consolidagted into convenient tabs. Status report includes 'last action' so you can get important updates on instruments.*
- *Jira tickets displayed in context (by device, junction box, location, project or JVM). This is particularly useful, as many problems with instruments stem from problems 'upstream'.*

Recent Oceans 2.0 Improvements/New Features Being Implemented

- Several improvements in the data search page, including new data products in a number of manufacturer format files, allowing analysis of complex data using manufacturers' software.
- NEPTUNE Canada seismometer data are available through IRIS, with a link under interoperability in our DataSearch *(see page 5)*.
- Additional instrument documentation is available in the projects/instrument information pages. These pages can be accessed via DataSearch, and also contains links to manufacturers' software where available.
- SeaTube has had some video upgraded to HD and now includes frame grabs and digital stills.
- Ability to annotate video segments and devices (initially in SeaTube). Shared annotations contributed by other users can now be searched *(see below)*.
- Instrument scheduling to permit automated observations (e.g. cameras).
- Current status of all instruments now accessible Tools/Device Console *(see page 6)*.



NC now supports personal annotations, on device data and SeaTube dives. One of the first applications for this was in an introductory UVic ichthyology class. The Digital Fishers project will use crowdsourced annotations to help identify sea life from dive videos.

Employment Opportunities

The following positions are currently available, or will be advertized on the website in the coming weeks.

Scientific Data Specialist:
This position will be a quantitatively sophisticated scientist with extensive experience in time series analysis and scientific programming who will be responsible for the verification and quality assessment of real-time data, the development of sophisticated data analyses and data visualization. Duties include:

- assesses and maximizes the quality of scientific data by ascertaining whether configurations are appropriate and properly recorded, the data are reliable, the data is placed in context, instrument calibrations are current
- provides data support to the diverse international user community
- develops data products in consultation with external data users, which highlight the power of the network, pushing forward the boundaries of standard oceanographic analysis given the new access to continuous, multidisciplinary, coordinated datasets not previously available
- contributes to running workshops and webinars facilitating approaches to data analysis in the broader community

The successful candidate will have a graduate degree in Science and related experience, or the equivalent combination of education and experience. Essential qualifications include excellent problem solving and interpersonal skills as well as a strong quantitative and technical background in relevant fields.

Video Specialist:
This position will be in charge of video asset management and provision, video encoding and format conversion, in-house video production and video system hardware and software management. Duties include:

- media asset libraries; organizing, archiving, indexing and creating metadata for video, sound, photos and stills
- knowledge and understanding of the various modern video formats and equipment, their use and issues (e.g, for mobile/web delivery up to broadcast)
- mastery of tapeless video editing and transcoding software, (Episode, Compressor, Digital Rapids) including the ability to script them for the implementation of batch processing
- experience with server-side video streaming software such as Wowza Flash Media Server and their input requirements or their web viewer constraints

The successful candidate will have an undergraduate degree in arts with a strong specialization in digital media or in computer sciences, preferably with demonstrated artistic abilities in the areas of art and multimedia, both with several years experience, or with equivalent qualifications and experience; with a strong technical background in video formats and codecs, video and sound tools for HD editing, motion graphics, sound recording, mixing, including Final Cut Pro, Motion, Adobe Premiere, Sound Booth, After Effects, Avid Media Composer.

Instrument Support Technician:
The Installation Support Technician will be primarily responsible for keeping the inventory up to date at the instrument maintenance and equipment storage facility located at the Marine Technology Facility (MTC; Sidney), ensuring timely shipping & handling duties, and providing initial testing of equipment upon reception. He or she may also assist the rest of the Engineering team with testing and integration of instruments as requested.

Duties include:

- maintain an inventory of equipment stored at our MTC facility
- responsibility for shipping & handling operations
- maintain the organization of the MTC facility
- perform initial electrical testing when appropriate
- lift and move medium and heavy weight items
- operate a forklift
- train others in inventory/shipment tasks

The successful candidate will have a degree in a related field or the equivalent combination of education and experience in order to perform initial electrical testing and manage an inventory, and perform all operations related to shipping and handling, including forklift certification and experience with MS Office.

NEPTUNE Canada advertises all employment opportunities on the website at:
www.neptunecanada.ca/about-neptune-canada/opportunities/

NEPTUNE Canada
North East Pacific Time-Series Undersea Networked Experiments

Tel: 250.472.5400
Fax: 250. 472.5370
neptune@uvic.ca
www.neptunecanada.ca