



Director's Report

A major challenge in operating a regional cabled ocean observatory network is securing sustained funding over its 25-year design life for ongoing operations, maintenance, upgrades and expansion to meet new scientific inquires, support, innovations, remain world-class, and provide socio-economic benefits. With other major science projects in Canada, we have been pressing at national levels for a long-term operating funding program. This is now in place as the Major Science Initiatives Program (MSI) established by the Canada Foundation for Innovation. Responding to the CFI call for proposals, the Ocean Networks Canada (ONC) Observatory with the NEPTUNE Canada (NC) and VENUS regional and coastal networks, was one of five successful applications in an Eligibility Competition. ONC will now submit an application by 30 September for a 5-year operating grant, using CFI guidelines released in late April. However, this fund provides only up to 40% of the required funding, so substantial parallel efforts are needed to secure the remainder that will demand a co-ordinated and focused activity through the summer.

Governance and Management (G&M) are central criteria in such competitions. With the two networks and the Board of Directors, over the last year or more ONC has been developing improved G&M systems, establishing an International Science Advisory Board, and completing its next five-year Strategic Plan (2011-16). Concurrently, and as it transitions from installation to operations, NC has engaged external consultants for Human Resource and Management Procedures reviews, with completion next month. It is enhancing and diversifying advice from the scientific community, closing the Science Advisory Committee on its recommendation in favour of two new committees: Science Planning Committee and NC Users Committee.

The NC Workshop next month will provide a key opportunity for the science community to review current progress and challenges with the infrastructure, science experiments and data management, and to advance new ideas for the networks evolution, particularly as a basis for the CFI/MSI and CFI/Leading Edge Fund (LEF) competitions in 2011 and 2012, respectively. The two new committees noted above will incorporate these comments and ideas in their ongoing analysis and advice to the NC Executive Committee.

NC continues to add new staff, now at 45 full-time employees, as it expands its operational functions and builds necessary internal expertise, with some consequent reduction in contractors. In particular, the Engineering group is being enhanced and as it embarks on month-long cruises in July and September using the *R/V Thompson* from the University of Washington and the ROPOS ROV. These cruises will be for a combination of instrument maintenance and repair and installation of new and refurbished instruments.

Following an open international search, the interviews for a new NC Director were concluded recently by ONC and an announcement of the new appointee will be made in the next few weeks.

2011 NEPTUNE Canada Workshop | June 2 - 4

Harbour Towers Hotel, Victoria, BC



JOIN US TO ...

- Discuss the successes and challenges**
- Communicate research results**
- Define future directions**

TO REGISTER go to www.neptunecanada.ca

- Space is limited
- Harbour Towers offers a special rate for bookings before May 25th (subject to availability) - follow link
- The NC Workshop is scheduled before the Canadian Meteorological Oceanographic Society Conference (CMOS) taking place in Victoria June 5 - 9

Questions call 1.250.472.5400 or email neptune@uvic.ca

NEPTUNE Canada is the regional ocean network of:



OCEAN NETWORKS CANADA
A University of Victoria Initiative

Japan's Honshu Tsunami

On 11 March 2011 at 05:46UTC (2:46PM local time), a 9.0 magnitude earthquake centred in the ocean off the northeast coast of Japan's Honshu Island generated a deadly tsunami that inundated coastal areas, inflicting widespread devastation and claiming thousands of lives. Real-time data from NC's pressure sensors across the Juan de Fuca tectonic plate helped scientists determine the timing and size of the tsunami as it reached Canada's West Coast.

The tsunami first appeared on the West Coast at the pressure sensor near the ODP1027 node site, 220 km offshore, as a 15-cm wave and less than 10 minutes later, a pressure sensor at ODP889 site, about 120 km offshore, recorded the wave as it passed overhead. The wave arrived at a sensor near the coast, at the Folger

Passage site, between Ucluelet and Bamfield, as a 40-cm wave about 40 minutes later. Using the NC Plotting Utility the tsunami waves were captured and plotted in Figure 1.

Scientists continued to monitor instruments as the many aftershocks were received, particularly at the Pacific Geoscience Centre (GSC/NRCan). NC's seismic data is also directed to IRIS - the global network of earthquake information. NC sends its tsunami data to the Department of Fisheries and Oceans (DFO), which is responsible for handling tsunami response in Canada.

The NC seismometers recorded the Honshu earthquake as well see Figure 2.

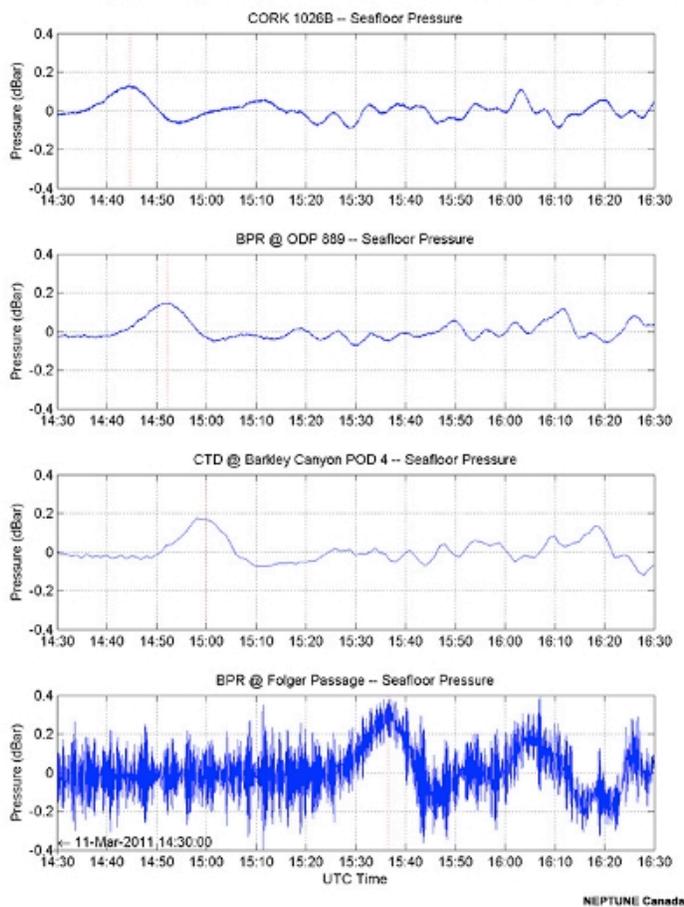


Figure 1 Pressure traces (tides removed) as the Japan tsunami crossed the NC network.

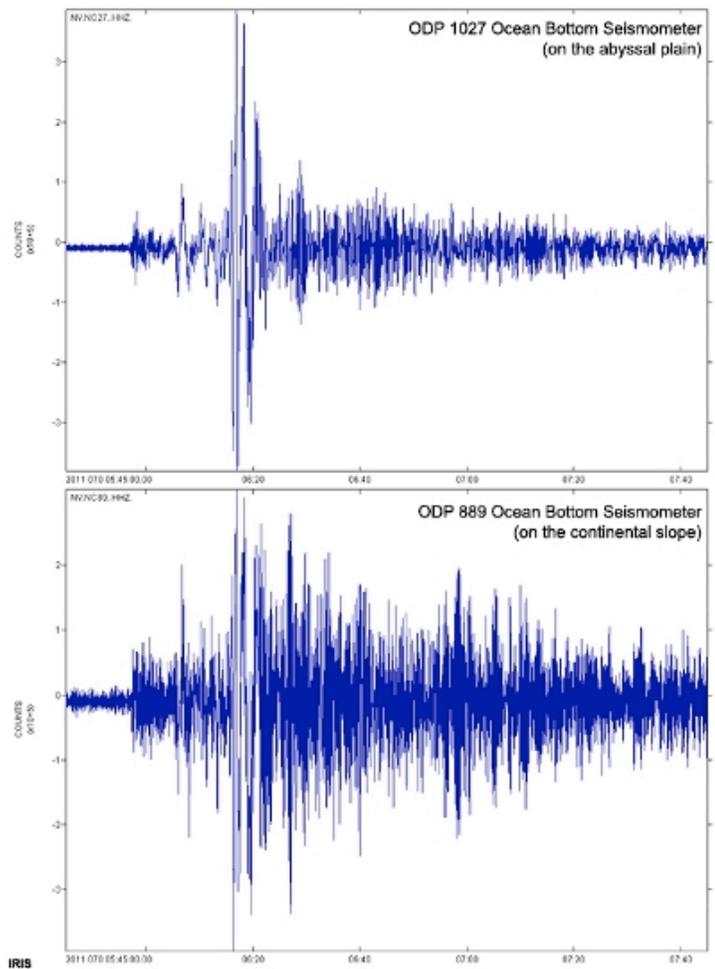


Figure 2 Raw seismic data of the earthquakes as captured by NC's two ocean bottom seismometers.

Storm at Folger

From the Under Pressure Blog Post by Earl Davis and Richard Thomson

The new Under Pressure blog post shares what can be learned from the monitoring of pressure at and under the seafloor at the various NC nodes.

A good start is provided by a description of the response of the bottom sensors to the major storm that many of us took shelter from on 2 March 2011. Spring certainly came “in like a lion.”

Figure 1 shows raw seafloor pressure data at two nodes, one near the coast in 100 m of water, and the other 220 km from the coast in 2700 m of water. Semi-diurnal tides dominate the records at both sites, with ranges of roughly 3 m peak-to-peak. These motions in the deep ocean are associated with the astronomical tides, which some readers might be surprised to learn are virtually identical to those observed at the open coast. Here, we focus in on the “noise” riding along on the top of the tidal pressure variations on the day of 2 March 2011.

The sudden onset and intensity of the storm was impressive. Waves built from a relatively benign background state to maximum amplitudes in only 3 hours. At the peak of the storm, pressure variations of up to 3 m equivalent-water-depth are present, and clearly visible in the 100 m of water at the Folger Passage site (note that the effects of short-wavelength wind waves decay exponentially with depth). Waves of this size are not uncommon along the coast of Vancouver Island in the dead of winter, but much rarer in March. A detailed view of the storm-generated

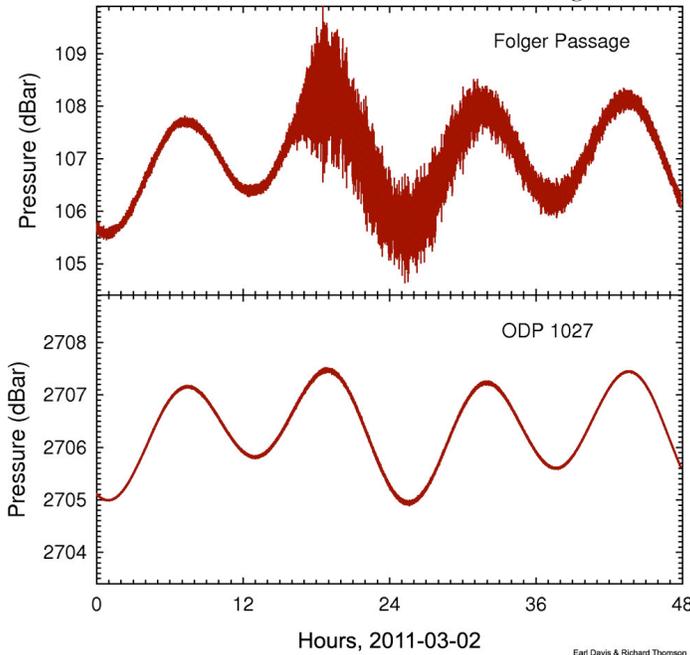
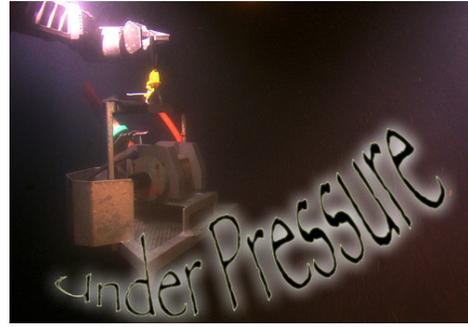


Figure 1 Two-day record of seafloor pressure variations at Folger Passage and ODP Site 1027. Pressures in dBar are equivalent to the variations in depth in metres of the overlying water.



waves at the near-coastal Folger Passage site (Figure 1) reveals a familiar pattern.

Two trains of swell waves are seen with periods of roughly 14 and 16 seconds. These are the wave “sets” so beloved by surfers all over the world and are produced when waves of slightly different periods and wavelengths interfere constructively and destructively over periods of minutes.

Readers might be surprised to see such strong surface wave signals in 2700 m of water at Site 1027. That any storm-wave signals reach such depths is remarkable enough, but the detailed view shown is equally remarkable in that the waves from the storm had twice the frequency (half the period) of the waves at the sea surface. There is a reason for both the deep-water bottom signal and the doubling of the wave frequency at this depth; this curious behaviour is not a complete mystery. Read more in our next Under Pressure blog post.

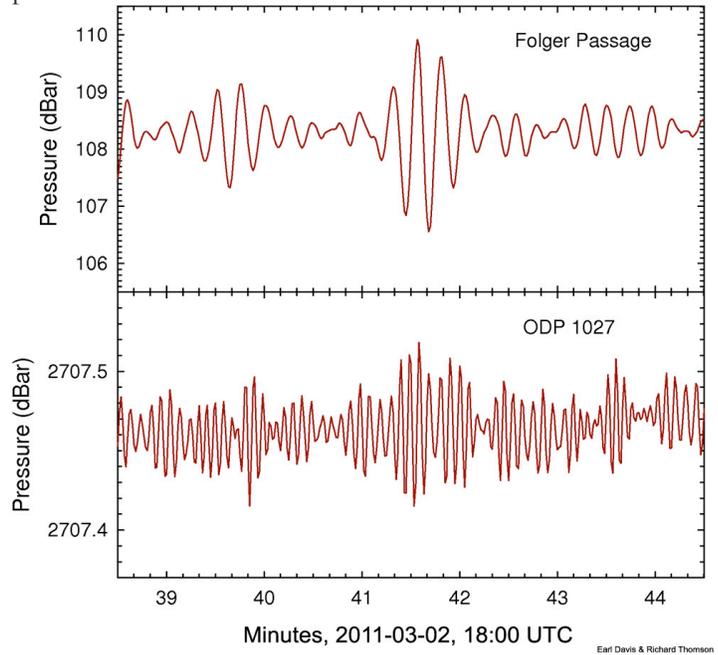


Figure 2 Wave signals at the deep-water site (lower plot) are small but still present, and have twice the frequency (half the period) of the waves observed at the ocean surface (as revealed in the plot to left).

Vertical Profiler System (VPS) Testing for Deployment

Since August 2009, the one-of-a-kind VPS has been through a few attempts at deployment. After a retractor motor replacement, platform refurbishment, and faulty connector replacement it is currently undergoing several weeks of intensive testing in Saanich Inlet prior to its deployment at Barkley Upper Slope later this year.

This test deployment is a collaborative affair. The VPS is connected to the University of Victoria's Ocean Technology Test Bed (OTTB) buoy in Patricia Bay near Sidney, BC. OTTB, in turn, uses power and communications via connection to the VENUS Saanich Inlet node.

Adrian Round, VENUS Associate Director of Engineering and Operations, oversaw the deployment assisted by Steve Mihály (NC), NC contractors Kim Wallace and Jason Williams, Emmett Gamroth (OTTB) and the Island Tug crew, Don Lynum, Cam Reid, Barry Grimard, Ferdi Van de Kuylen and Geoff Ruddick.

First, the 2-tonne VPS was slowly lowered by rope to the seafloor at a depth of about 80m. OTTB technicians Alison Proctor and Jeff Kennedy used their Remotely Operated Vehicle (ROV) to open the VPS deployment bales and inspect the VPS site. Emmett Gamroth then transferred the free end of the power and communications connecting cable to the OTTB buoy and plugged it in, allowing VENUS and NC

systems staff to remotely switch on the VPS winch and 11 attached instruments.

Initial test results have been positive. The docking mechanism is working, having been docked and undocked repeatedly. The winch is also working; many dozens of 60m profiles have been successfully completed. All of the instruments are working, and 90% of the data products are now in commissioning, with the remaining ones in development.

Hundreds of thousands of individual measurements from the various instruments on the float of the profiler were collected. The data captured contains very interesting information about the conditions of the Saanich Inlet during the four week testing period during which the profiler was in operation and is extremely useful to gauge the performance of some of the instruments used, sometimes for the first time, in such circumstances. VPS-specific data products, raw data and quick plots can be obtained from the data access pages under <http://dmas.uvic.ca/> for any of the instruments. The VPS instruments are listed under the pages related to the "Biophysical Linkages" under "Projects" in the selection menu.

We encourage readers to look at the data corresponding to the many profiles - some breaking the surface - that took place during this test period.



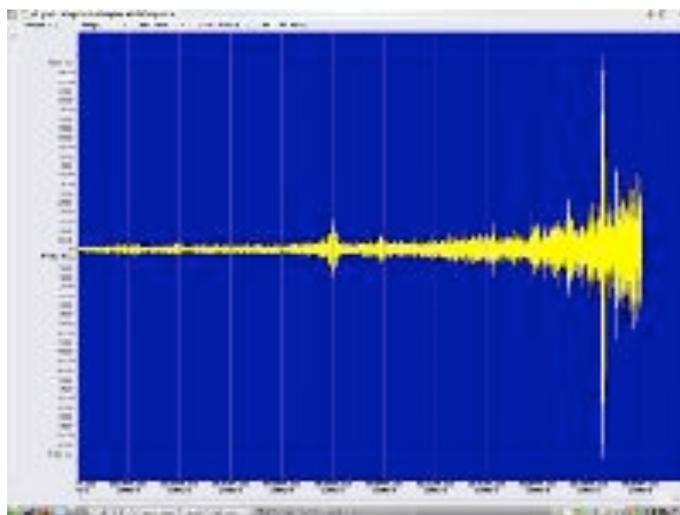
The VPS is lowered into the water from the deck of Island Tug's Georgia Transporter, 19 April 2011.

Barkley Upper Slope Instruments Knocked Out

The cruise preparations for 2011 had just begun when the NC network suffered a major blow with its first fisher hit on the Barkley Upper Slope sites. Additionally, the short May cruise on *CCGS Tully* had to be cancelled. These two events forced us to reorganize the work program for the year and will have significant impact on the Barkley scientific program. The following gives some elements of what happened.

On 18 February, we lost contact with the Barkley Upper Slope and Barkley Pod #2 sites and a short was detected. The main difficulty in troubleshooting such an event is that the primary symptoms could correspond to a major node failure, a cable/connector failure or a flooded junction box. As troubleshooting started, all scenarios had to be considered and all engineering and scientific data had to be reviewed with a focus on the last couple of minutes. Analysis of the scientific data first gave some clues of what had happened with an indication of a significant roll recorded by several instruments. The seismometer recorded the vibrations induced by the trawl (see image to right). Engineering data confirmed that the short was likely to be at the junction box end and that the connector lost contact before the cable was damaged creating a seawater short. The sequence of events as we could reconstruct were that Pod #2 was first hit, followed by the BPR, and then the upper slope Pod.

The main questions we have are what is left on the seafloor, if the instruments and platform are still there, and what is their status. Based on the scientific data, Pod #2 and the BPR seemed to have been toppled over but then seem to have stabilized. There is a good probability that these are still on site. Communication was lost as soon as the Upper Slope Pod was hit, so there is no indication of what may remain. Depending on the state of the recovered Pods, we will be able to consider re-instrumenting the sites. That means that by spring 2012, Barkley could be fully operational – including the VPS. However additional ideas are being considered to ensure protection of the sites before we finalize the installation.



NC will be present through exhibits and/or presentations at:

- International Marine Conservation Congress (14-18 May, Victoria)
- GAC/MAC/SEG Annual Meeting (25-27 May, Ottawa)
- NC Workshop (2-4 June, Victoria)
- CMOS Congress (Victoria, 5-9 June)
- Aux Frontières de la Science exhibition, Musée de la civilisation, Québec city, (opening 8 June) featuring NEPTUNE Canada - the exhibit will then go on tour across Canada from 2012 - 2015
- ACM/IEEE Joint Conference on Digital Libraries (16 June, Ottawa)
- Panikkar Lecture at Intergovernmental Oceanographic Commission General Assembly (27 June, Paris)
- Marine Sciences and European Integrated Research Infrastructure Conference (28-30 June; Brest)
- IUGG General Assembly (28 June-7 July, Melbourne, Australia).



COMPLEXE MUSÉAL DU
MUSÉE DE LA CIVILISATION



THE SITE
OF THE HUMAN
ADVENTURE

Science Live

From June 8, 2011 to September 9, 2012

An exhibit that demystifies science and scientific activities. A range of projects allow visitors to witness scientists at work in various cutting-edge high-tech fields. Expect the unexpected!

Cruise Plans – July 4 – 26, 2011

Less than two months away from our first major cruise of the season, preparations are now well underway. During the cruise, we will visit all sites and perform various maintenance activities, conduct some scientific sampling and install a couple of new instruments.

The first task will be to install the piezometer developed by Ifremer at ODP 1027. That instrument includes a 6m long probe, which will penetrate the sea bottom to measure differential pressure and temperature at different levels in the sediment. We will then move to the Endeavour location with a goal of bringing back the Main Endeavour Field (MEF) site which we lost contact with last October. Losing communications made troubleshooting very difficult. In order to bring the site back, we needed to be prepared to replace either the junction box or the extension cable, if not both. OceanWorks is currently finishing the design of a new generation junction box, which has software adaptable port configuration making it truly possible to swap junction boxes. We will be ready to install this new junction box at MEF. If we succeed, we will proceed with the installation of the second Ifremer instrument, Tempo-Mini (see image below). Otherwise, we will replace the cable during our next cruise in September. The remaining task in the area will be to recover the first cable we installed in September 2010 at RCM North, which failed.

Then, it will be time to concentrate on Barkley where we will have our first look at the upper slope and Pod #2 sites. Once we have surveyed the area, we will prepare to recover the end of the damaged extension

cable. The full procedure – cable recovery, sealing of cable on deck, re-lay of cable – will serve as a rehearsal for a re-termination we hope to be able to perform in September. After that, we will visit the other sites to perform regular maintenance work. We are currently procuring a housing for the new Axis camera. That system will serve as test to make sure we are fulfilling the scientific requirements before we finalize systems for the other sites. The sediment trap will be replaced and the aquadopps put on independent pods to limit disturbances created by the platforms. Finally, we will service Wally, the crawler from Jacobs University Bremen, and install the newly re-manufactured titanium heat probes.

Next, we will visit ODP889 to recover data from the CORK, which was installed last year. If the data quality is found to be satisfactory, we will finalize preparations for a cable to connect the CORK to the network in 2012. Finally, we will visit Folger Passage where it has been more than a year since our last visit (excluding the installation of Folger Shallow instruments in February) so we expect biofouling to be significant. We will also replace a couple of failed instruments.

Back on shore and while we are at sea, work will continue at the Marine Technology Centre to prepare cables for our major September installation exercise – more details to come in our next newsletter.

Follow along on our July cruise through the Installation Blog and SeaTube.



Tempo-mini testing at Marine Technology Facility in preparations for installation.

June 2 – 4 Workshop Framed Up

NEPTUNE Canada's annual workshop is set for June 2-4, 2011 in Victoria. This workshop is a forum for existing and new researchers to discuss the present status of the undersea network, communicate research results and ideas for improvements, and define future directions. It will be held at the Harbour Towers Hotel in downtown Victoria.

OUTLINE

Infrastructure Successes & Challenges:

NC now has data flowing from its 5 nodes spanning the seafloor from the coast to the mid-ocean ridge. Since our official launch on December 8, 2009 we have archived over 10TB of data. However, we have also faced a number of logistical and technical challenges installing all the instruments initially planned for 2011-12. Obstacles, possible solutions, consequences and ideas for modifications will be discussed.

Research Results:

Participating NC scientists will report on current research and all attendees will consider issues related

to data access and our suite of analysis tools.

Future Planning:

Researchers will discuss the next phases of planning and expansion for the NC undersea network, including new proposals, additional infrastructure and instruments, costs, challenges, innovations, relevance and impacts. We will also consider how best to sustain and expand the science community involved in NC-related research as well as upcoming proposals for operating support via the Canada Foundation for Innovation Major Science Initiatives program and Leading Edge Fund.

Visit our Workshop Homepage as it gets populated with: schedule, current and future ideas, presentation materials, and discussion notes.



Crowd Sourcing - Digital Fishers Announcement

Crowd sourcing makes use of hundreds or thousands of individuals to analyze numerous small segments of very large data sets. The collective findings are then sifted to answer questions no single researcher could hope to tackle alone. This approach is being used with great success to help scientists do everything from classify galaxies to map craters on the moon.

Researchers at the University of Victoria wondered if crowd sourcing might be harnessed to identify and classify fish and other marine life seen in the many hundreds of hours of NC's underwater video archives. Two biology instructors, Thomas Reimchen and Roswitha Marx along with graduate assistant Steve Leaver conducted a unique experiment this spring, engaging an ichthyology (fish zoology) class in fish identification exercises via NC's SeaTube, our underwater video viewer.

The objective of this experiment was to evaluate the reliability and consistency of fish identifications made by 3rd year biology students. These analyses were then presented, along with conclusions about the effectiveness of this crowd sourcing methodology and suggestions for ways to improve both their methods and NC's software tools.

Despite technical glitches and methodology inconsistencies, it was clear to all involved that, with improvements, there is tremendous potential for crowd sourcing to be used both as a research tool and as a teaching method.



The Digital Fishers game with a purpose is now almost ready for prime time. After many different iterations and refinements of its design, a release for beta testing is just about to happen. This application aims at having a large amount of individuals review short (15 second) clips and describe their content in annotations. These members of the public who simply want to devote a bit of their time to supporting science will, over time, help build a database of annotations that will be searchable by scientists. Their contribution, as modest as it may seem, will make a difference in that it will allow the construction of an unparalleled index to our video collections. The Digital Fishers beta version will be available for trial at the upcoming Workshop with a full release planned for the fall.

Personnel Updates

A recent exciting development within DMAS is the creation of a new team that will manage metadata and special data sets, making sure that NC video collections are well curated and maintained. Video represents a particular issue as it comes in very many different formats and has to be made available in many others for viewing under different conditions. It also needs “calibration” and correction of time stamps performed along with other metadata. Two new employees, Andy Robertson (Video Specialist) and Meghan Tomlin (Metadata Specialist), will work with Karen Douglas to provide support to metadata related activities.

Andy has a Bachelor of Arts in Sociology (UVic), a Diploma in Film and Video Production (SAIT) and fifteen years of film and communications experience, which include managing video assets, video production, video systems, and his own company. His most recent project involved managing video assets for the City of Saskatoon.

Meghan has a double major in biology and ocean science (UVic) and joins NC from Statistics Canada where she has been working on the current census. Meghan will receive information from the ship regarding removal and (re-)deployment of instruments and enter/correct the database with all the meta data related to these activities.

Susan Perkins recently joined DMAS as an Intermediate Developer. She has a Bachelor of Software Engineering (UVic) and worked in the leading development of SAFORAH, a forestry data access and processing application, based at the UVic’s Remote Sensing Software Lab.

Follow our July Cruise on-line using:



Richard Riddell joined the NC Engineering team in May as an Installation Support Specialist. He has worked with NC for the past two years as a Highland Technologies contractor at the NC Marine Technology Centre (MTC). Richard is a Certified Electronics Technician, with various specialized training certificates and nearly twenty years of experience with instrumentation. He will continue to handle shipping and receiving, as well as some electrical testing of the instruments and upload of records of instrument status to the database.

NC has added the last of the five Research Theme Integrators, in the area of dynamic processes of fluid fluxes and gas hydrates in the sea bed. Martin Scherwath has a broad background including a PhD in Geophysics (University of Wellington, NZ), an MSc in Exploration Geophysics (University of Leeds, UK) and a Graduate Certificate in Physics, (Hamburg University, Germany). Most recently, he has been a Research Associate in SEOS at UVic, analyzing seismic data from the Northern Cascadia Margin to better understand the structure, deformation and dynamic processes.

The coming busy summer will be aided by several co-op students hired or hosted by NC. Joining the DMAS team will be GIS database student James Stephaniuk and Michael Pattie who will work on 3-D camera image reconstruction algorithms. Also working with DMAS staff are ONCCEE students Josh Erickson and Daniel Conti, working in collaboration with IBM towards the implementation of an automated software system to detect and classify features in underwater video. Two students, Angela Bello and Brianne Zimmerman will work with the Science team on special projects.

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www.neptunecanada.ca/about-neptune-canada/opportunities/



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