



News

May 2005 Vol. 2, No. 2



University of Victoria

The Newsletter of the North-East Pacific Time-series Undersea Networked Experiments (Canada)

Message from the Director

Chris Barnes, Project Director



Chris Barnes

Contents

Message from the Director	1
RFP 262: Underwater Infrastructure (Wet Plant), Stage I of NEPTUNE	2
Community Experiments: Status Report	3
NEPTUNE Installation Data to be Publicly Available	3
Extension Cable Issues: NEPTUNE Stage I	4
Data Management and Archiving System (DMAS) News	5
VENUS Contact Information	7
Skamania Lodge Workshop: Responses to ORION RFA	7
ORION Contact Information	7
Seafloor Observatories Standardization Workshop in Paris	8
NEPTUNE Contact Information	8

NEPTUNE Canada is currently placed at an interesting and challenging point in the installation of Stage I of the NEPTUNE cabled ocean observatory in the North-East Pacific. This issue of the Newsletter is devoted to a series of short articles from members of the NEPTUNE Canada Project Team that outline some of the current issues. Several of these are being considered concurrently, and decisions on some are contingent on those of other parts of the project. We ask the patience of those involved, particularly the scientists, during this phase of development. Feedback and advice is always welcome (neptune@uvic.ca).

We are awaiting the Best and Final Offers from the final two Proponents that bid on the RFP 262 (Wet Plant or underwater infrastructure: cable and nodes). This represents the largest part of the NEPTUNE Canada Budget for installation of the array. At about \$40 Million, the process has of necessity been both complex and careful, with considerable technical/financial/legal interactions with the Proponents, led by the RFP Team chaired by Peter Phibbs. These offers will be received and evaluated in late May to early June, and a final contract with the winning Proponent negotiated by perhaps July 2005. This will formally establish the scope of the array: the number and location of the observatory nodes, with possible extension cables, the cable routing to link the principle nodes, and the areas that require further seabed surveying.

In general, the initial bids received in mid-January were higher than desired and currently we are awaiting the amounts quoted through the Best and Final Offer process. Recognizing these pressures from the initial bids in January, we have been working to:

- a) reduce some of the technical requirements/costs as far as possible,
- b) consider the implications of possible down-scoping from the ideal array, and
- c) seek supplemental and additional funding to offset any potential shortfall in funding.

A principal issue is that NEPTUNE Canada may have to incur most of the non-recurring engineering (NRE) costs because of the delay in funding of NSF's Ocean Observatories Initiative (OOI). In the US President's Budget (February 2005) the start of the OOI was delayed a further year to FY 2007, and spread over six rather than five years (US\$268 Million for FY 2007-12); the final installation of the NEPTUNE Stage II portion would be in 2011, three years after Stage I completion by NEPTUNE Canada.

In mid-January 2005, the proposals were received for the Community Science Experiments, which defined in considerable detail the innovative work being advocated, the observing systems desired, and the technical specifications for much of the equipment. After a review by an External Review Committee in early April and now ongoing by the Executive Committee, the final decisions on which experiments and observing systems to fund will naturally depend on the final approved scope of the array. Consequently, it may not be possible to release all or most of those funding decisions until July 2005.

Significant progress is being made in both the development of the Data Management and Archiving System (DMAS) and in the acquisition of seabed survey data; both of these are reported in articles in this Newsletter. As we move to finalize a contract for the wet plant installation, and having purchased the shore station in Port Alberni last September, we are now also beginning a phase of consultation with several First Nations groups, and the fishing industry, moving towards an Environmental Assessment process, and addressing issues of back-haul of the data from Port Alberni to Victoria. We are destined for a busy summer period.

RFP 262: Underwater Infrastructure (Wet Plant) for Stage I of NEPTUNE

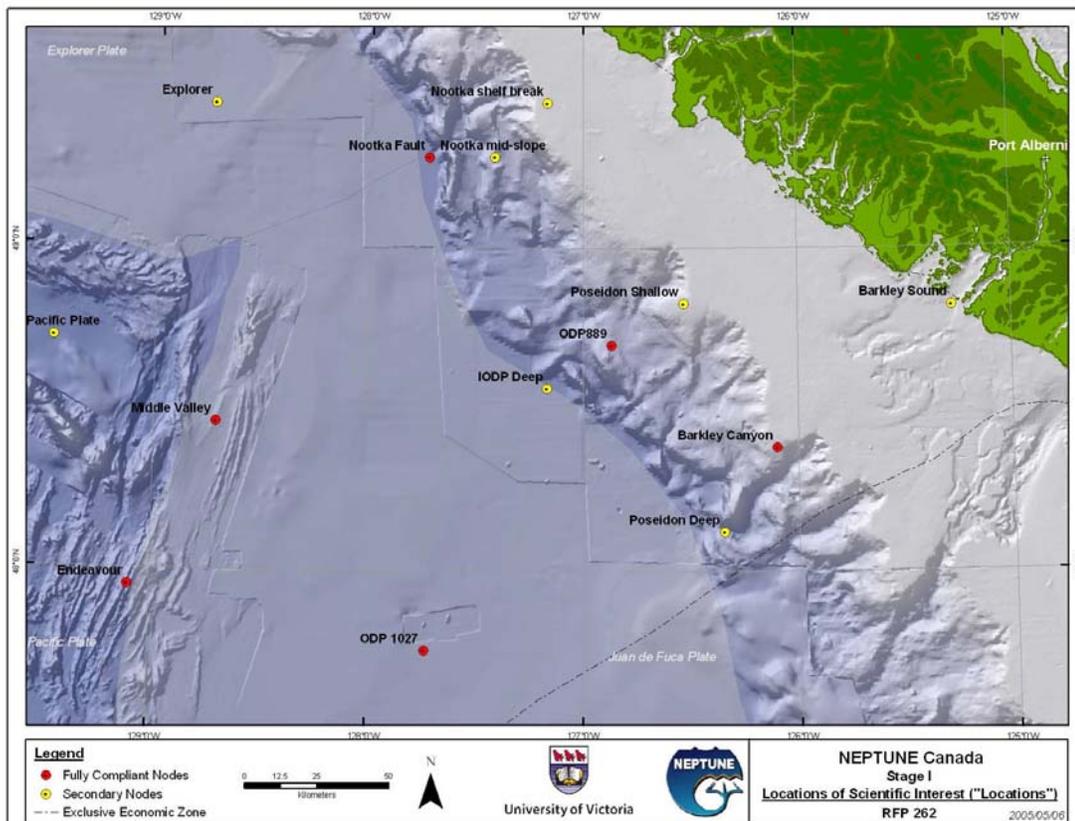


by Peter Phibbs, Associate Director, Engineering & Operations

Since the January Newsletter, the responses to the Request for Proposal (RFP) 262 for the underwater infrastructure for NEPTUNE Stage I have been received and evaluated, with the result that two prospective suppliers, Alcatel Submarine Systems (ASN) and General Dynamics Advanced Information Systems (GDAIS) have been short-listed. The RFP Review Team spent three days with each short-listed proponent in March 2005 to discuss their offers and the needs of the project, with the result that a Request for Best and Final Offers (RBAFO) was issued in late April. We expect to receive the final offers by the May 24, 2005 deadline, and to make recommendations on the supplier to go forward with in June 2005, on schedule for installation in the summer of 2007, with the majority of the instruments being added in mid-2008 after testing and commissioning.

During these past few months, there has been substantial dialogue between the engineers managing the RFP process, the scientists managing the process to select experiments for funding, and the designers of DMAS. The Wet Plant RFP Review Team includes Brian Bornhold, one of the Chief Scientists, and Benoît Pirenne, lead of the DMAS Team. This interaction is essential in order to ensure that the scientists' needs are fully understood and accommodated by the selected Wet Plant, and that the scientists are involved in and aware of any compromises that may be made during discussion of details of the Wet Plant design.

The RFP Team (Peter Phibbs, Chair) includes nine members with diverse backgrounds, with some nominated by the ORION Project Office. Their recommendations are in turn considered by the RFP Oversight Committee (Chris Barnes, Chair) that is composed of seven members, with likewise some members proposed by ORION. Final recommendations for the award of the contract are made to University of Victoria's Vice President of Research, and Vice President of Finance and Administration.



Community Experiments: Status Report

by Brian Bornhold and S. Kim Juniper, Co-Chief Scientists

The six-member Technical Review Committee, made up of researchers from Canada, the U.S., Norway, and France, met for two days at the beginning of April 2005 in Victoria to discuss the 17 group proposals that had been submitted. They had reviewed the proposals over the previous six weeks and had prepared individual reviews for discussion.

They were tasked with ranking the proposals based largely on the overall scientific merit, the need for the NEPTUNE infrastructure, interactions with other research programs, and the several other criteria that were identified in the Call for Proposals. Further, they were asked to make recommendations, as a group, with respect to possible reductions in scope and budget, yet still retain as great a breadth of excellent science as possible.

It is important to note that Requests for Funding totaled more than three times the best-case scenario Science Instrument Budget (\$13 Million). This budget was based on the Canadian and American NEPTUNE programs moving forward at relatively the same pace, and so sharing the non-recurrent engineering costs associated with the final design of the NEPTUNE Wet Plant (cable and nodes). The 2-3 year delay in funding for the US ORION program, which includes the Regional Cabled Observatory (NEPTUNE) has resulted in NEPTUNE Canada now bearing most of these engineering costs.

As a result, final decisions as to the scope of NEPTUNE Stage I and the available funds for science instruments must await the receipt of the Best and Final Offer for the 'Wet Plant' from the Proponents responding to the formal Request for Proposals (RFP 262). These responses are expected on May 24, 2005; a recommendation will then be made by the RFP Team to the RFP Oversight Committee, which in turn must seek approval from senior administration at the University of Victoria. There will then follow a period of several weeks when the final contract is negotiated. We expect that most of these decisions can be made by July 2005, after which the Executive Committee can finalize recommendations regarding the scope of the undersea network and Community Experiments for NEPTUNE Stage I.



Brian Bornhold



Kim Juniper

NEPTUNE Installation Data to Become Publicly Available

by Cheryl Katnick (Manager, Permits & Rights of Way), Peter Phibbs (Associate Director, Engineering & Operations), and Benoît Pirene (Assistant Director, Information Technology)

Over the past year NEPTUNE Canada has been building a database of bathymetric survey data, geotechnical data and various other geographic datasets that apply to the area accessed by NEPTUNE Stage I. Some of this data has been provided under confidentiality agreements (mostly to protect graduate student thesis work), and some is in the public domain. As the NEPTUNE Canada team proceeds with installation planning, many unique Geographic Information Systems (GIS) opportunities continue to present themselves.



Cheryl Katnick

An example that we want to study, in the framework of DMAS extensions, is the integration of the route survey multi-beam and geophysical data, together with the as-laid route data, the vessel day-sheets, and the post-lay inspection video into a single source data archive. This would allow engineers to easily access the data and solve engineering problems such as determining the cause and repair method for a cable fault, while scientists could readily access the data to select sites for experiments or to better understand local seabed characteristics.



Peter Phibbs



Benoît Pirenne



NEPTUNE Canada
Shore Station
Port Alberni

NEPTUNE Installation Data to Become Publicly Available *continued*

by Cheryl Katnick (Manager, Permits & Rights of Way), Peter Phibbs (Associate Director, Engineering & Operations), and Benoît Pirenne (Assistant Director, Information Technology)

"As the NEPTUNE Canada team proceeds with installation planning, many unique Geographic Information Systems (GIS) opportunities continue to present themselves."

Plans are also being made for an interface that would allow NEPTUNE users to view the video data in combination with various background maps such as the multi-beam bathymetry and geophysical data collected during survey and installation.

Look for further discussion of the plans for the NEPTUNE GIS system in future editions of the NEPTUNE Canada Newsletter.

For comments and/or suggestions please contact:

Cheryl Katnick at: ckatnick@uvic.ca

NEPTUNE Stage 1: Extension Cable Issues

by Paul J. Hansen, Manager, Quality Assurance

Some work has been done to understand the issues related to extensions, or the cabling required for connecting instruments to a node. This brief article provides information on some of the main options under consideration for Stage I of NEPTUNE. There will be a range of extensions connecting the infrastructure to experiment instruments. Some will be familiar and require little or no development and testing while others are at the limit with respect to cable design, connector design and installation capability.

Extension Types

< 80 m Extension

Pressure balanced oil filled (PBOF) hoses will carry 100baseT Ethernet and 9 kW power. These will be installed by an ROV and connect to the node with wet mate connectors. These extensions can be used either with a single instrument, or with a group of instruments.

100 m and Longer Electro Optical Extension

These extensions carry 100baseT Ethernet for a short distance to a media converter and then through single mode optical fibre to within 10 metres of the instruments where the signal is converted back to 100baseT Ethernet.

The maximum length of this extension depends on the power required and conductor size, and thus the ability of an ROV to install the cable. 400 watts is available at 5 km using 14 AWG. 330 watts would be available at 25 km with 8 AWG, but the cable would be too heavy for currently available installation methods. Further development work is required.

NEPTUNE Stage 1: Extension Cable Issues *continued*

by Paul J. Hansen, Manager, Quality Assurance

Extension Types continued

Short PBOF Hose with Dry Mate Connections (on Instrument Frames)

This requires only 2 PBOF dry mate connectors plus a few (<5) metres of hose. The instrument could only be serviced upon recovery of the instrument frame. It provides an inexpensive method to connect to the infrastructure at sites of interest and may be suitable for experiments of opportunity.

Long Optical Extension

RFP 262 requested from Proponents a proposal for an extension that is capable of transmitting Gigabit Ethernet and 9 kW of power up to 100 km. Each node is to be equipped with 2 special interfaces for these extensions.

It is expected that these extensions will be similar to the backbone cable and will require a cable ship for installation. Cost of the extensions and their installation will probably require the outboard connection point to be a full function secondary node.

Data Management and Archiving System (DMAS) News

by Benoît Pirenne, Assistant Director, Information Technology

In the past few months, significant progress was accomplished in the DMAS area: the prototype reached a good level of maturity with data flowing continuously from test instruments to the archive; two new staff were recruited and three funding proposals were submitted.

The prototype DMAS (pDMAS)

The prototype DMAS was built to demonstrate data acquisition and instrument commanding. This milestone in the development was achieved in February 2005 with data flowing into the archive from a number of test instruments. These included: a Global Positioning System (GPS) receiver, a weather station, as well as a Conductivity Temperature Depth (CTD) device, representing scalar data producers. Instruments producing complex data structures were represented by a still camera and, streaming instruments by a microphone. Instrument commanding was achieved for the still camera, which can be positioned with precision in pan, tilt and zoom. The microphone can produce compressed or uncompressed audio sequences of any specified duration, emulating what scientists expect to do with hydrophones. The files produced are duly archived, and the description of all these 'observations' recorded in a database. The data is searchable with a web query interface.

The prototype DMAS is described in an article published on our web site and accessible at the following address:

<http://www.neptunecanada.ca/PDF/DMAS/2005NEPTUNECanadaLetter3DMASrev.pdf>

With the satisfactory first experience of pDMAS, we are now undertaking the setup of a system for VENUS: the 'interim DMAS' (iDMAS). We expect iDMAS to improve with the successive deliveries of the 'real' DMAS. Initially iDMAS will be based on the prototype's concepts.



Benoît Pirenne



pDMAS Instruments

DMAS News *continued*

by Benoît Pirene, Assistant Director, Information Technology

Funding Proposals

We have been busy lately trying to supplement the DMAS resources by responding to Calls for Proposals. Three such Proposals were recently submitted:

The first one is a \$120,000, 2-year study of Data Warehouse Systems that would be suitable to record tens of billions of events over a few years while retrieving any random portion of it in about 10 seconds. This Proposal was submitted to GEOIDE (<http://www.geoide.ulaval.ca/>).

The second Proposal has John Roston (McGill University) as PI, and seeks to control and receive data from an underwater high-definition television (HDTV) camera, making use of CANARIE's networks and of User Controlled Light Path (UCLP) technologies. This Proposal is a 15-month, \$1.1 Million project.

Finally, the third Funding Request, also prepared in response to the CANARIE Intelligent Infrastructure Program (CIIP), is seeking support for the implementation of a Service Oriented Architecture and Workflow Management in DMAS. The project will encompass both the access to sensors as well as to historical data through the use of Web Services. Workflow management tools will allow users to easily define event detection and reaction procedures. The main partner to UVic/NEPTUNE on this Proposal is IBM Canada Ltd. The project is valued at about \$2.3 Million and will last approximately 15 months.

New Staff

To help us with the NEPTUNE/VENUS DMAS development, we have hired two new staff: Yigal Rachman (yigal@uvic.ca), who will be our first iDMAS Software Developer; and, Martin Hofmann (mhofmann@uvic.ca) who will help us in looking after both the operational and the development systems. Martin is assisted by John Dorocicz, contracted from the School of Earth and Ocean Sciences.

Yigal has over 20 years of experience developing data acquisition, archiving and control systems for the oil and gas industry. His systems run 24 hours a day, 7 days a week with minimal maintenance, and are deployed across Canada from British Columbia to offshore Nova Scotia. He immigrated to Calgary in 1981 from Cape Town, South Africa. After braving the prairie winters for over two decades, he eventually fled West in search of a climate more reminiscent of his former home.

Martin has been using Unix for over 20 years for everything from web servers to real-time robotic control. His previous job was Unix Systems Administrator in the McPherson Library at UVic. Prior to that he spent 7 years at the Centre for Visual Sciences, Australian National University, where he worked in a variety of vision and imaging projects and administered a number of Unix systems. He originally received his degrees from the University of Toronto.



pDMAS Full Rack



<http://www.canarie.ca>



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VENUS

VENUS (Victoria Experimental Network Under the Sea)

VENUS is a facility to support coastal oceanography in British Columbia waters. The VENUS network of instruments is dedicated to observing oceanographic processes in our marine environment. The VENUS Data Archive will support data mining and communication among users.

For more information about VENUS visit: <http://www.venus.uvic.ca>, and <http://www.venus.uvic.ca/documents/index.html>



Skamania Lodge Workshop April 14-15: Responses to ORION RFA

by Brian Bornhold, Co-Chief Scientist



This meeting was organized to coordinate and focus responses that had been made by U.S. Researchers to the ORION Office's Request for Assistance in formulating Ocean Observatory priorities. The goals of the meeting were to:

1. Identify what proposals/projects have been submitted to ORION for the Pacific and how these might be strengthened by collaboration and/or identification of common facility needs; and,
2. Evaluate what proposals/projects have not been submitted that should be covered, and identify proponents and participants to prepare an Assistance document.

There were about 40 participants spanning the oceanographic spectrum: acoustics, geophysics, geology, physical oceanography, coastal sedimentary processes, ridge processes, ocean productivity and marine mammals.

Five-minute summaries of the submissions were presented so that the participants could see the scope of responses to ORION; experiments included those based on coastal networks, broad regional cabled networks and buoy programs.

The Science summaries were followed by several short presentations on various Engineering issues related to these types of initiatives, and by a status report on NEPTUNE Canada.

Much of the remainder of the meeting was spent identifying sites of common interest to several groups, strategizing approaches to coordinate responses under a common overarching theme or themes, identifying significant knowledge gaps, and discussing ways forward in coordinating interests and initiatives for the Northeast Pacific.

"This meeting was organized to coordinate and focus responses that had been made by U.S. Researchers to the ORION Office's Request for Assistance in formulating Ocean Observatory priorities."



ORION visit: www.orionprogram.org, <http://www.orionocean.org/RFA/default.html>

The Spring 2005 issue of the quarterly ORION Project Newsletter is available at:
<http://www.orionocean.org/news/newsletter.html>

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Seafloor Observatories Standardization Workshop: Paris, France, Feb. 1-2, 2005

by S. Kim Juniper, Co-Chief Scientist and Paul Hansen, Manager, QA

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A Seafloor Observatories Standardization Workshop was held at the Institut Océanographique in Paris, France on February 1-2, 2005. The workshop was organized by Roland Person and Jean-François Rolin, from the IFREMER (France) Marine Technology and Information Systems Directorate in Brest. The principal goal of the workshop was to bring together representatives of current and planned ocean observatory projects around the world to exchange information and discuss possibilities for collaboration and technological standardization. The first day of the workshop was devoted to overview presentations from representatives of various observatory projects and international programs. On the second day, following a presentation on development of community science projects by NEPTUNE Canada, workshop participants split into two groups for presentation and discussion of wet side and dry-side technical issues. Wet-side presentations included cable technology, sensor inter-operability and servicing issues for submersibles, while dry-side presenters addressed different solutions for networking, data management and modular design.

During the final plenary discussions, it was evident that there was uncertainty over the need for standards or the form that they should take, but most participants felt that the meeting had been informative and useful and that discussions should continue. Following a proposal from Jean-François Rolin, participants agreed to form three working groups (membership to be finalized) that would interact electronically over the next year to develop recommendations on the following standardization issues:

- 1) Instrument and hardware
- 2) Subsea intervention (ROV issues)
- 3) Data and data management

A second workshop was proposed for Dublin, Ireland in February 2006. The three working groups would report on the recommendations at this next workshop, which would be held in conjunction with a planned workshop on scientific use of submarine cables.

Final working group membership and details for the Dublin 2006 workshop will be announced at a later date. In the meantime, contact Jean-François Rolin of IFREMER (Jean.Francois.Rolin@ifremer.fr) for further information on this initiative.