


Benoît Pirenne, Robin Brown

S10-2622


NEPTUNE and VENUS: Data Management and Archival System for Cabled Ocean Observatories

Benoît Pirenne¹ and Robin Brown²

(1) NEPTUNE Canada, University of Victoria, E-mail: bpirenne@uvic.ca
 (2) Institute of Ocean Sciences, Fisheries and Oceans Canada



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Where is NEPTUNE?
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International Project


- ~\$300 MCAD, 30% Canada-70% US, but $\Delta T \geq 3$ years
- Inter-operability between the two stages

NEPTUNE Canada: First of its kind RCO


- ~5 nodes, 100's instruments, 24/7 ops, 100kW power, ~8Gb/s, 2500m depth, >25 years lifetime

NEPTUNE is:

- continental slope and offshore
- special interest in the Endeavour Ridge hot vents and Juan de Fuca Plate.

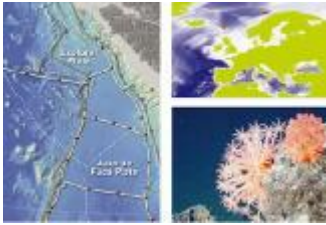


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What are VENUS and NEPTUNE?
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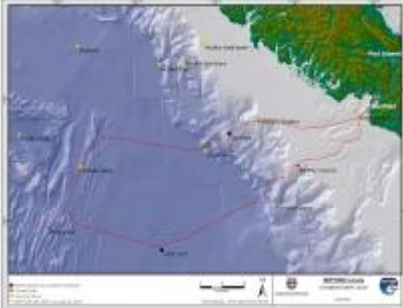
- Cabled ocean observatories (like LEO-15, Bonne Bay, MARS, ESONET)
- Designed to address questions in multiple disciplines (oceanography, marine geology, geophysics, ...)
- Lots of outreach possibilities
- funded from the academic research "stream"




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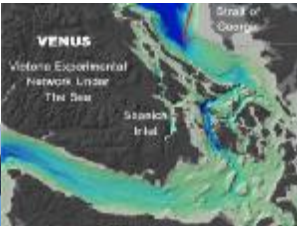



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Where is VENUS?
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- Victoria Experimental Network Under the Sea
- VENUS is coastal/estuarine/fjord environment





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Characteristics of the Data Management and Archival System
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- **Diverse data types**
 - from temperature / pressure to current meter profiles through to streaming HDTV)
- **LOTS of data**
 - compared to most ocean installations, power and bandwidth are essentially unlimited
- **Event-based**
 - pre-programmed event detection/reaction
- **"adjustable" / flexible data**
 - instruments can be controlled (changes in sampling)- unlike many existing instruments, where sampling is fixed for the period of deployment.
- **Needs to support a diverse audience**
 - PIs, but also some products for non-specialists. Including "outreach"
- **Security issues**
 - Damage to equipment and infrastructure, military sensitivity, data security

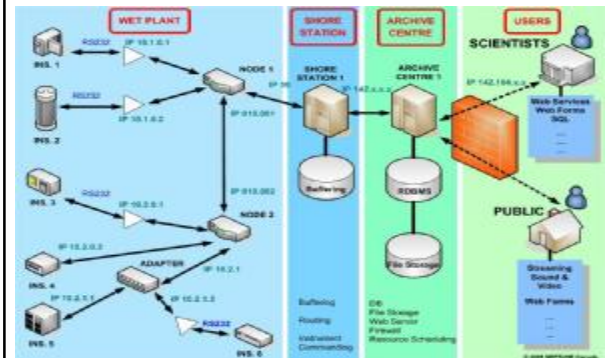


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The Observatory from a DMAS perspective

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STANDARDS: formats

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- Internal storage in DMAS irrelevant to users
- Metadata standards
 - ISO 19155 – an “abstract” standard for metadata content
 - Subsidiary standards (such as ISO 19139) for content and format. XML based.
- Multiple data exchange (output) standards supported
 - Plain ASCII CSV (comma-separated values, where appropriate)
 - “Community standards” for specific data types – (e.g. seismic data)
 - Direct internal support for MATLAB, Ocean Data View and other standard analysis packages.



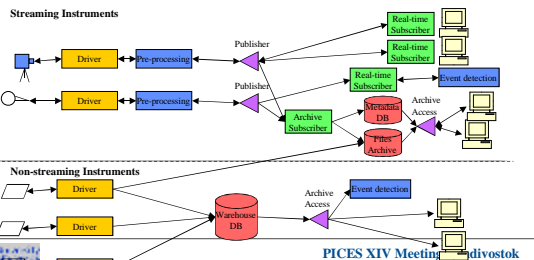
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DMAS Conceptual design

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- DMAS will be a hybrid system – relational DB for metadata and non-streaming instruments (less complex; lower volume data); file system for complex streaming data



STANDARDS: QC/QA

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- Some preliminary QC/QA implemented in NEPTUNE/VENUS DMAS
- Detailed QC/QA “offloaded” to specialist agencies (e.g. seismic data to Natural Resources Canada; ocean profile data to Fisheries and Oceans Canada)
- Principle Investigators carry out QC/QA on specialized datasets, with feedback to DMAS.



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From Instruments to Data Storage

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Example of some VENUS instruments:

- 3 types of CTDs (one with Oxygen sensor); including “bottom-up” profiler
- Acoustic Doppler Current Meter
- Zooplankton Acoustic profiler (vertical and horizontal)
- 8 MegaPixel moveable digital still camera
- 3-way broadband hydrophone array
- High Definition TV camera
- “sediment processes” instrument package
- Gas Tension Device



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STANDARDS: Challenges

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- Many data types have no “community standards” – e.g. broad-band acoustic data; HDTV.
- Existing QC/QA processes may not be appropriate for the data volume (24/7). High levels of automation are required.
- PI-based QC/QA is particularly challenging. It is not clear that there is either the will or the capacity to do this.



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Concluding Remarks

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- Early days yet – first deployment (Saanich Inlet) with basic data access likely in Dec 2005
- Academic PIs are the focus for this enterprise. Standards, metadata and permanent, robust archival are not always the highest priority for this community.
- There has been very interesting discussions on data policy and “data use ethos” within these projects.
- NEPTUNE Canada: <http://www.neptunecanada.ca/>
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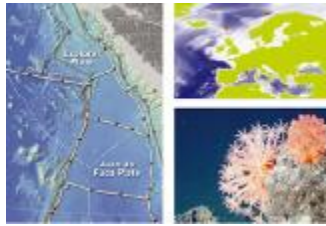
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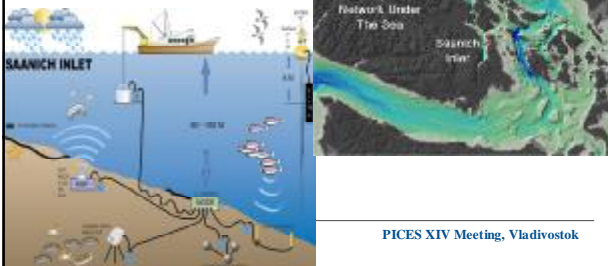
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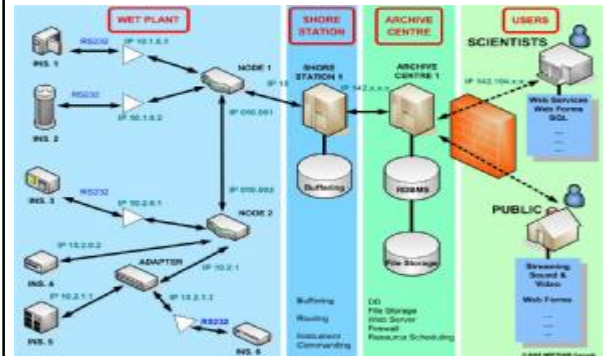


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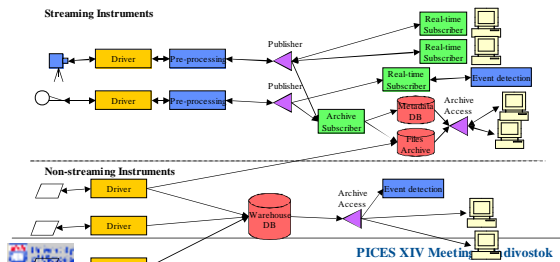
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