

CANADIAN OCEAN SCIENCE NEWSLETTER
LE BULLETIN CANADIEN DES SCIENCES DE L'OCÉAN

Previous newsletters may be found on the CNC/SCOR web site.
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Newsletter #5 will be distributed on January 23, 2004. Please send contributions to dick.stoddart@sympatico.ca
Bulletin #4 sera distribué le 23 janvier 2004. Veuillez faire parvenir vos contributions à dick.stoddart@sympatico.ca

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Assistant Professor, Marine Geochemistry

Department of Earth & Ocean Sciences, University of British Columbia

Applications are invited for a tenure-track faculty position at the Assistant Professor level in the Department of Earth and Ocean Sciences at the University of British Columbia. The candidate should have expertise in marine geochemistry, a Ph.D. and preferably post-doctoral experience, and a record of multi-disciplinary research towards understanding marine biogeochemical cycles. Examples of areas of interest include the use of geochemical tracers to investigate the relationship between changes in the ocean/atmosphere system and Earth's climatic variability, the evolution of biogeochemical cycles during the Quaternary period, and the geochemical coupling of benthic and pelagic systems. The successful candidate will be expected to teach undergraduate and graduate courses in the Department of Earth and Ocean Sciences.

Applications should include a curriculum vita, list of publications, and a summary of research interests. Applicants should also arrange for three letters of recommendation to be sent to: Dr. Paul L. Smith, Head, Department of Earth & Ocean Sciences, The University of British Columbia, 6339 Stores Road, Vancouver, British Columbia V6T 1Z4

The closing date for the competition is January 9, 2004.

In order to address under-representation of members of designated equity groups among senior faculty, we may consider making an appointment at a higher rank for a woman, visible minority, disabled, or aboriginal applicant with exceptional qualifications, subject to the availability of funds. The University of British Columbia hires on the basis of merit and is committed to employment equity. All qualified persons are encouraged to apply; however, Canadians and permanent residents of Canada will be given priority.

Research Associate Position Application Deadline: 16 January, 2004
Numerical Simulation, Ice-Covered Sea Ecosystems

Researchers at Québec-Océan study how the marine ecosystems of the Gulf of St. Lawrence, northern Baffin Bay and the Beaufort Sea respond to climate variability. The successful applicant will integrate a multidisciplinary and international team focusing on the oceanography of ice-covered seas. Generally, the applicant will contribute to the development of numerical models of biological processes taking place in the plankton, and to the coupling of these biological models to physical models of the three study areas, with the general objective of assessing the impact of fluctuations in atmospheric and oceanic climate on biological productivity in ice-covered seas. In particular, the main tasks of the successful applicant will be: (1) to adapt a NPZD (nitrate, phytoplankton, zooplankton, detritus) model, (2) to develop an Individually Based Model (IBM) of larval Arctic cod (*Boreogadus saida*) growth for the North Water Polynya (northern Baffin Bay). In the longer term, the applicant will couple biological models to regional models of circulation in the three study areas.

Qualifications include a Ph.D. in Oceanography or related field, with 2 years of experience in ocean circulation modeling and/or in biological or biogeochemical process modeling. Candidates must be able to develop their own models or to adapt existing models to the case of the Arctic cod. Proficiency in an adequate programming language (e.g. FORTRAN) is a pre-requisite.

The working language is French. Candidates not speaking French but speaking English fluently will also be considered. The position is for a twelve month contract, renewable for four years. Salary will be between \$43,374 (CDN) (approx. \$33,000 USD) and \$53,285 (CDN) (approx. \$40,000 USD) class III, level 6 to 12, depending on experience. The position will be located at Université Laval, Québec City, QC, Canada

In accordance with Canadian immigration rules, priority will be given to Canadian citizens and Permanent residents. Applications will be accepted until 5 PM, 16 January 2004. Send your application or request for information to:

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NEPTUNE Launched

Report by Paul LeBlond, leblond@gulfislands.com

Most Canadian oceanographers have by now heard about NEPTUNE, the project to deploy bottom-mounted instruments linked by fiber-optic cables on the Juan de Fuca plate in order to examine sea-floor spreading phenomena, monitor deep-sea processes and sample the water column. Press-releases, newspaper articles (Victoria Times-Colonist, Oct 18, 2003, p. F2), and a web-site (www.neptunecanada.ca) have already proclaimed the funding by the Canadian Foundation for Innovation and the British Columbia Ministry of Advanced Education. I attended the formal announcement in Victoria, on Oct 17.

As befits a project involving a \$62M initial infrastructure investment, the event brought together the funders, the organisers and the supporters in full pump. Gathered over finger food at the Harbourside Coast Hotel, we heard from David Turpin, president of the University of Victoria; federal Minister of the Environment David Anderson, MP for Victoria and an early supporter of the project; BC Advanced Education Minister Shirley Bond; CFI President David Strangway; NEPTUNE-Canada Project Director Chris Barnes; and University of Washington NEPTUNE Program Director John Delaney. While UVic representatives took great pride in their leadership of the Canadian project, they did not forget the eleven other universities associated with the project (MUN, Dalhousie, UQAR, UQAM, Laval, Guelph, UofT, Waterloo, Manitoba, SFU and UBC), the support and encouragement of federal government departments (DFO, GSC, NRC, DND) as well as the Vancouver Aquarium and the Bamfield Marine Science Centre. Due

acknowledgement was also made to the early role of the Institute for Pacific Ocean Science and Technology (IPOST) and especially to John Madden's crucial work in promoting Canadian participation in NEPTUNE.

The idea of laying fiber-optic networks on the ocean floor is catching on. The US has approved funding for an Ocean Observatories Initiative, which will include the NSF's Ocean Research Interactive Observatory Networks (ORION) such as NEPTUNE. In Canada, a test-bed for NEPTUNE is the more modest coastal network VENUS (www.venus.uvic.ca).

I was pleased to meet a number of old friends at the announcement. I was even more pleased to notice that there were many people there that I did not know: local community leaders (a few MLAs, the mayors of Victoria and Saanich), the Esquimalt CAF commander, a variety of people in business suits... NEPTUNE is of a scale that commands attention beyond the scientific community and one can hope that highly visible networked programs with well-thought out public awareness components, like NEPTUNE, SOLAS and ArcticNet, will succeed in raising Canadians' awareness of the oceans and the benefits of understanding them better. At the same time, for Canadian scientists, the success of collaborative efforts, the new emphasis on wide sharing of information through the web, and the recognition of the intrinsic value of ocean ecosystems, may augur the birth of a new era of ocean science, one in which discovery and explanation are linked early with the ethical issues of ocean protection. In this respect, I found John Polyani's views on the role of the scientist as a citizen quite inspiring (see www.nobel.se/chemistry/articles/polyani/index.html).

While NEPTUNE may not live up to all the claims made on its behalf, it certainly heralds a new approach to ocean observation. Past experience has shown that science has progressed most swiftly through the development of new and more revealing ways to study nature. NEPTUNE, the "unblinking eye at the bottom of the sea", will soon surprise and delight us.

DND Assesses Needs for Operational Oceanographic Data

Submitted by Brian Whitehouse, bwhitehouse@hfx.eastlink.ca

Canada's Department of National Defence (DND) recently completed an assessment of its requirements for operational oceanographic information. The eight-month project, entitled *Ocean Intelligence in the Maritime Battle Space – analysis and recommendations for a Canadian Forces maritime environmental assessment program*, was led by Dan Hutt at DRDC-Atlantic, and was delivered by Brian Whitehouse of OEA Technologies Inc, Halifax.

The project's scope included nowcasts and forecasts of oceanographic features and processes, and it encompassed all marine waters, both sovereign and foreign. From a technology perspective, it focused on spaceborne sensors and coastal HF radar systems.

The Canadian Forces' oceanographic program focuses on activities related to anti-submarine warfare. Relevant oceanographic properties include 3-D sound velocity, seabed acoustic properties, ambient noise, 3-D water temperature, and the location of marine mammals, thermal

fronts and eddies. Surface wind vectors and the location of sea ice are also required in support of ship navigation.

NATO's post cold war operational focus has resulted in a substantive change in naval requirements for operational oceanographic information, particularly in littoral waters. The DND project concluded that in addition to requirements in support of anti-submarine warfare and ship navigation, the Canadian Forces have operational requirements for water density, surface and subsurface currents, water turbidity, nearshore bathymetry, the location and propagation of internal waves, and maps pertaining to beach conditions.

DND is now focusing this initiative on the subject of rapid environmental assessment, which involves broad requirements for oceanographic information in support of tactical operations. The follow-on project began this month (Nov/03) and will continue through to September 2004. It is also being delivered by OEA Technologies Inc.

Ocean Stratification and its Probable Impact on Productivity in the Subarctic Pacific

Report by Frank Whitney, Institute of Ocean Sciences, Whitneyf@pac.dfo-mpo.gc.ca

Stratification of the upper ocean occurs when either heat or fresh water reduces the density of these waters. The subarctic north Pacific Ocean is the only ocean basin in which fresh water plays a major role in maintaining a ~100 m deep buoyant surface layer. Seasonally, solar energy also stratifies this layer, reducing the summer mixed layer to less than 10 m when winds are especially weak.

There is an optimal level of stratification for plant growth (called the Optimal Stability Window by Gargett) in which stratification increases light supply to phytoplankton but is not so strong that nutrient supply from below is not excessively restricted. The northeast subarctic Pacific was strongly stratified during the 1997-98 El Niño, which resulted in widespread nutrient depletion in summer in the Gulf of Alaska. Following the El Niño, we observed deep mixed layers and weak nutrient utilization throughout summer in 1999. Either of these changes can reduce primary productivity by 50% over broad areas either because nutrient supply during winter or solar energy during summer is low.

Freeland and co-authors have identified a warming trend in the NE Pacific, both in coastal and open ocean. This trend is coincident with a reduction in winter mixed layer depth. Chiba and co-authors have recently described a similar 30-year trend in the NW Pacific. These observations suggest that the North Pacific is being affected by increasing global temperature and that present trends will persist. This is leading researchers to try to understand future changes in marine ecosystems. Work of Peña suggests warming will alter the oceanic ecosystem in the Gulf of Alaska as stratification leads to nutrient depletion in spring, and Welch has speculated that such changes could result in some salmon stocks losing the Gulf of Alaska (their main habitat) as a summer feeding area.

In 2002, winter stratification was the strongest we have seen in 50 years of observations at Ocean Station Papa (50 N, 145 W) in the Gulf of Alaska. Typical winter mixed layer depths range from

90 to 120 m, but measurements in February 2002 recorded mixing only to about 75 m. An unusually cold water mass lay underneath the surface layer. Processes not understood at the present advected this cold intermediate layer to the coast of North America where it was upwelled in summer (from at least Oregon to southern BC). These waters transported a high level of nutrients to the surface where Wheeler and others recorded phytoplankton levels 3 to 5 times higher than usual. This growth resulted in high fluxes of detritus to the sediment surface, which then consumed bottom water oxygen. Extensive fish kills were noted.

It is difficult to imagine all the implications of warming and enhanced stratification on the upper ocean. The most direct results may be that nutrient supply from the interior of the ocean will be reduced which will generally decrease biological productivity (e.g. Woods and Barkmann, 1993. J.Plankton Research). However, impacts such as strong stratification resulting in higher nutrient levels in upwelled waters, are not as simple to predict and are likely to be highly sporadic.

Second International Conference for Arctic Research Planning (ICARP II)

A Second International Conference on Arctic Research Planning (ICARP II) is being planned for autumn 2005. The first ICARP was held in 1995 in Hanover, NH, USA. It was a successful meeting due to thorough pre-conference planning and active participation in the preparation of position papers. A second conference is considered timely because a number of activities are in the midst of critical reviews and publications. For example, the Arctic Climate Impact Assessment will be released shortly, the Arctic Monitoring and Assessment Programme is developing requirements for the future, and the International Arctic Science Council bylaws call for a decadal review of Arctic activities. The multi-disciplinary conference will bring together Arctic residents, senior and young scholars, policy experts and science and land managers to discuss the research needed to address problems, priorities and concerns of those who live in or near the Arctic, including those associated with natural resource development and environmental quality. The Conference will formulate plans for physical, biological and social science projects to address these issues and those associated with global processes in thematic rather than in disciplinary terms.

There are two Canadians on the ICARP II Steering Group, namely Geoff Holland and Barry Goodison. In order to have the best possible input from Canadian interests and researchers, they are establishing a list of arctic contacts to ensure that a full range of Canadian thinking is available for input into the conference agenda. Interested participants should contact them at hollandg@saltspring.com or Barry.Goodison@ec.gc.ca.

Workshop on West Coast Offshore Oil and Gas Marine Environmental Research

Report by Rosalie Allen Jarvis, COOGER Project Coordinator, AllenJarvisR@mar.dfo-mpo.gc.ca

In January 2003, a workshop was held at the Institute of Ocean Sciences (Sidney, British Columbia) to discuss marine environmental research needs of the potential development of oil

and gas activity offshore of British Columbia. The workshop, hosted by the Program of Energy Research and Development (PERD), aimed to:

- describe current research being conducted by federal government organizations in Canada,
- identify relevant research from previous West Coast studies,
- determine what work from the East Coast is applicable on the West Coast, and
- recognize relevant research underway in universities and by the oil and gas industry.

A report was subsequently produced to provide an overview of the state of scientific knowledge that is of relevance to the possible lifting of the West Coast Moratorium on offshore oil and gas activity. The research of various scientists is presented in the report, including overviews of relevant PERD research, the activities of Fisheries and Oceans Canada's Centre for Offshore Oil and Gas Environmental Research (COOGER) and National Working Group on Oil and Gas, and Natural Resource Canada's National Geoscience for Ocean Management Program. The report examines the current relevance of previous West Coast research studies and the applicability of research deliverables from recent East Coast studies. Priority research areas, together with potential costs, time lines and partnerships, are identified.

Copies of the workshop report can be obtained at most university libraries in Canada or by sending an email to COOGER@dfo-mpo.gc.ca.

Bancroft, D., R.A. Lake, S-L. Marshall and K. Lee. 2003. An Overview of Marine Environmental Research Pertaining to West Coast Offshore Oil and Gas Development. Can. Tech. Rep. Fish. Aquat. Sci. 2480 iii + 164 p.

IAPSO/SCOR Symposium on Ocean Mixing

Submitted by Chris Garrett, garrett@uvphys.phys.uvic.ca

IAPSO/SCOR Working Group 121 is organizing a Symposium on Ocean Mixing, scheduled for October 11-14, 2004 at the Victoria Conference Centre, Victoria, BC. The Symposium will focus on discussion and evaluation of ocean turbulence and mixing, with an emphasis on parameterization of turbulent processes in models. The intent is to encourage and foster coordination of recent developments in the study of ocean mixing and in our abilities to model large-scale ocean processes. The Symposium will have invited speakers, contributed posters and lots of time for discussion. Peer-reviewed proceedings will be published in *Deep-Sea Research II*. For additional details and updates see the SCOR website at <http://www.jhu.edu/scor/wg121.htm>

Environmental Effects Monitoring Workshop at BIO

Report by Rosalie Allen Jarvis, COOGER Project Coordinator, AllenJarvisR@mar.dfo-mpo.gc.ca

On May 26-29, 2003, the Offshore Oil and Gas Environmental Effects Monitoring Workshop was held in Dartmouth, Nova Scotia. Approximately 160 participants from around the world came to the Bedford Institute of Oceanography (BIO) to take in the four days of talks and

networking opportunities. Co-chaired by Fisheries and Oceans Canada (DFO) research scientists Kenneth Lee and Peter Cranford, the workshop can best be described as a success.

By focusing on approaches and technologies, the workshop was designed to address whether environment effects monitoring programs are giving us the information we need and how they can be improved.

Following the four days of scientific presentations, DFO's Oceans Sector hosted public forum discussions on May 30, 2003. Participants were presented with an overview of the workshop and a description of environmental effects monitoring requirements under the *Fisheries Act*. A moderated panel discussion followed with representatives from industry, academia, regulatory authorities and environmental non-governmental organizations.

In addition to the encouraging feedback received from many workshop participants, media coverage of the event was positive. A reference book on EEM will be published in 2004 based on peer-reviewed contributions from the workshop participants.

150th Anniversary of the Brussels Maritime Conference of 1853, Brussels, Nov 17-18, 2003

Submitted by Savi Narayanan, NarayananS@DFO-MPO.GC.CA

Under the High Patronage of HM King Albert II of Belgium, an International Seminar was held to celebrate the 150th anniversary of the historical Maritime Conference, convened in Brussels by Lt. Matthew Fontaine Maury (US Navy) for the purpose of "establishing a uniform system of meteorological observations at sea, and of concurring in a general plan of observation on the winds and currents of the ocean". The Maury Conference was the first international meteorological conference and the precursor of international cooperation and coordination in operational meteorology and oceanography. It led more or less directly to the First International Meteorological Congress in Vienna in 1873 and to the establishment of the International Meteorological Organization (IMO), the predecessor of WMO. As such, it was a key milestone in the development of present-day operational meteorology and oceanography.

The formal opening ceremony was followed by three sessions: The Maritime Conference of 1853, its antecedents and impacts; development of operational meteorology and oceanography, WMO, WWW, GOOS, GCOS, and JCOMM; and Lessons learned and a future vision of operational meteorology and oceanography.

The presenters in the first session described how the First International Meteorological Congress and the formation of the IMO came about (Dr Howard Cattle), outlined the development of The IMO in the first half of the 20th century (Dr Ed Sarukhanian), and that of operational meteorology and challenges for the future (Michel Jarraud, Deputy Secretary-General, WMO), the impacts of 1953 Conference on European Met services (Dr G. Demarée, RMI, Belgium) and the Issues in operational ocean observing systems and the role of existing programs and institutions (Dr R. Spinrad, Assistant Administrator, NOAA/NOS). Through these presentations and one dedicated to Matthew Maury: His life and work by Capt. G. Gillard, Naval Observatory, USA, we were given a glimpse of the tremendous contributions made by Maury and his colleagues and those followed them.

Development of global programs requires intergovernmental bodies to get agreements and advice and guidance from the scientific community. Geoff Holland explained the important role played by IOC in establishing international cooperation essential for the development of operational meteorology and oceanography. The important role played by the Meteorological Societies was described by Stan Cornford, European Meteorological Society.

Looking into the future, Mr Ewen McCallum outlined the UK Met Office forecasting strategy for the 21st Century, Dr. Alain Ratier talked about the role of satellites in marine meteorology and operational oceanography, and finally Jean- Francois Minster of IFREMER showed us a vision of operational oceanography.

A number of key challenges, and recommendations for way forward were discussed. I would like to highlight two here: delineation of the roles and responsibilities of the governments vs industry in developing and delivering operational oceanography and marine meteorology, and the important role of the scientific societies and professional associations to advise and lobby the governments of the world to maintain adequate level of effort in meteorology and oceanography. Canada was singled out as an example where meteorological and oceanographic communities have joined forces through CMOS and are working closely with the government departments.

I attended the meeting as the co-president of the WMO/IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM), the latest milestone in the evolution of international cooperation in the area of oceanography and meteorology, and chaired one of the sessions. It was quite a humbling experience for me, however I walked away thinking that in some sense, I am making a microscopic contribution to transforming the visions of my predecessors into reality

Ocean Science Related Electronic Newsletters

Several international electronic newsletters, distributed free, sometimes contain ocean science related material, including:

1. OCEANSP@CE. "The Voice of the Global Ocean Business Community". Distributed weekly, international in scope, 17,500 subscribers worldwide. Subscribe by sending your address and particulars to oceanspace@spearhead.co.uk or directly to Cheri Arvonio in London at cheri.arvonio@spearhead.co.uk. However, please note, beginning January 1, 2004, Oceansp@ce intends to become a paid circulation newsletter, 48 issues a year at a suggested subscription price of US\$150.00 per year.
2. ArcticInfo. Administered by the Arctic Research Consortium of the United States (ARCUS). Issued frequently, as news becomes available. Past issues of ArcticInfo may be examined at http://www.arcus.org/ArcticInfo/fr_subscription.html. Subscribe to ArcticInfo by sending an email to arcticinfo-sub@arcus.org. Include your name, affiliation, address, phone, fax and email address in the body of the email.

3. AboutWeather Newsletter. Issued weekly, primarily USA content. Contains important news items related to atmospheric technology from the previous week. Subscription information is at <http://www.AboutWeather.com/newsletter.htm>

Climate Change Action Fund / Science

Submitted by the CCAF Science Liaison Office (contact John C. Anderson, John.C.Anderson@ec.gc.ca)

The Climate Change Action Fund (CCAF) Science web site has been updated, and the URL of the main page has been changed to <http://www.ec.gc.ca/climate/CCAF-FACC/Science/>. CCAF fact sheets on themes of Monitoring, Modelling, and the Arctic are now available in hard copy as well as being posted on the web site at: http://www.ec.gc.ca/climate/CCAF-FACC/Science/fact_e.htm (English), http://www.ec.gc.ca/climate/CCAF-FACC/Science/fact_f.htm (French). These fact sheets provide general background on the theme, an overview of the research that was done on the theme under the first phase of the CCAF, and some mention of what lies ahead. Interested readers will also find the Canadian National Report on Systematic Observations for Climate (2002) on the site.

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