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Scientific Committee on Oceanic Research

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Contents

JOBS

CNC-SCOR Graduate Fellowship

Each year, CNC-SCOR sponsors a $5,000 award to an individual pursuing studies leading to a Masters or Doctoral degree in one of the ocean sciences. One new award is given annually and is generally renewable for a second year. Applicants must already be in receipt of an NSERC Postgraduate Scholarship or a Canada Graduate Scholarship. The application procedure can be found on NSERC's website (click) and a list of past winners on our website (click). The application deadline is 15 April.

Acoustic Research Scientist - IOS

Fisheries and Oceans Canada is hiring an indeterminate research scientist with knowledge of hydroacoustic theory, methods and applications to evaluate ecosystem structure (e.g. bottom classification) and function (eg. species discrimination) and to assess fisheries resources (eg. echointegration; acoustic target strength). The position is located at the Institute of Ocean Sciences. The application deadline is 26 April (click).

Graduate Opportunities at McGill

Funding is available for students interesting in pursuing graduate studies on a variety of research topics, including: modeling biogeochemical processes under hypoxic conditions, modeling past changes in marine biogeochemistry, paleoceanography of the subarctic Pacific, and sedimentary geochemistry. Contact Eric Galbraith for more information.

Post-Graduate Opportunities at Dalhousie

The Department of Oceanography is searching for Postdoctoral Fellows and/or Research Associates to join the Global Ocean-Atmosphere Prediction and Predictability (GOAPP) network funded by the Canadian Foundation for Climate and Atmospheric Sciences. Two positions are available. The successful candidates will collaborate with researchers at Dalhousie University and other universities in the network, and with scientists from Environment Canada and Fisheries and Oceans Canada. They will have a Ph.D. in Atmospheric Science, Physical Oceanography or a related discipline. They will also have experience in running and developing state-of-the-art ocean and/or atmosphere models or expertise in data analysis required for model-data intercomparisons. Knowledge of data assimilation is desirable (click).

OCEAN SCIENCE PROGRAMS

Progress Report for the SCOR/IAPSO Working Group 127 on "Thermodynamics and Equation of State of Seawater"

Submitted by Dan Wright, Rich Pawlowicz, Trevor McDougall and Rainer Feistel

Members of WG127: Trevor J. McDougall, Chair (Australia), Rainer Feistel (Germany), Chen-Tung Arthur Chen (Taiwan), David R. Jackett (Australia), Brian A. King (UK), Giles M. Marion (USA), Frank J. Millero (USA), Petra Spitzer (Germany), Daniel G. Wright (Canada). Associate Members: Rich Pawlowicz (Canada), Steffen Seitz (Germany), Peter Tremaine (Canada)

The SCOR/IAPSO Working Group 127 was formed in 2005 with two primary terms of reference: 1) to examine the results of recent research in ocean thermodynamics with a view to recommending a change to the existing internationally accepted algorithms for evaluating density and related quantities, and to form new expressions for enthalpy, entropy and potential temperature, and 2) to examine the feasibility of using simple functions of three-dimensional space to take account of the influence of composition anomalies on the determination of density in the ocean.

The results of the WG have led to a new standard: the International Thermodynamic Equation of Seawater - 2010 (TEOS-10). In September 2008 the seawater Gibbs function of Feistel (2008) was endorsed as a release (IAPWS, 2008) of the International Association for the Properties of Water and Steam, so establishing TEOS-10 as the world-wide standard for seawater in the engineering profession. In June 2009, it was approved by the International Oceanographic Commission as the official replacement for the previous international standard known as EOS-80. A major compendium of information on the thermodynamic properties of seawater, including the background and details of TEOS-10, is being published by the IOC as IOC et al. (2010). This TEOS-10 manual can be downloaded from the TEOS-10 web site (click).

Two major changes resulting from the work of WG127 will influence the work of all practicing oceanographers. First, dimensionless Practical Salinity S_P will be replaced by the Reference Salinity S_R expressed as a mass fraction (g kg^{-1}). Reference Salinity is based on a benchmark chemical composition model for Standard Seawater (SSW) introduced by Millero et al. (2008) and, for the concentration range where Practical Salinity is defined, it can be estimated in terms of Practical Salinity by S_R = (35.165 04/35) S_P g/kg. Second, WG127 has formulated the thermodynamic properties of seawater in terms of a Gibbs potential function that permits the accurate representation of more properties, more systematically, consistently and accurately than previously available from EOS80 (Feistel, 2008). The “magic” of the Gibbs function is that all thermodynamic properties can be derived from it, consistently, by taking different derivatives and combinations of derivatives. The new Gibbs potential function has been carefully verified to reproduce all known reliable data sets on the thermodynamic properties of Standard Seawater within measurement uncertainties. This means that, not only do we now have the most accurate representations available for density, enthalpy, entropy, heat capacity, sound speed, plus many other thermodynamic quantities, but also that for the first time, our descriptions of seawater will be completely thermodynamically consistent.

With the Reference Salinity defined and the new Gibbs function formulated and verified, the next major consideration is the proper accounting for the influence of composition anomalies. Previously, composition anomalies have simply been neglected, but they are now the single largest factor limiting the accurate determination of the thermodynamic properties of seawater. Direct measurements of density provide the most reliable approach to represent the most important effects of composition anomalies so WG127 initiated a program to collect density measurements along with Practical Salinity and various measures of biogeochemical material dissolved in seawater. It has been found that anomalies relative to Reference Salinity can be rather

accurately represented using a simple linear regression on the anomalies in silicate and a global atlas has been created and made available for use in future applications (McDougall *et al.*, 2009).

Additional salinity variables have been introduced to deal with special aspects of composition anomalies, including “Density Salinity” and "Preformed Salinity". Density Salinity is designed to be used with the Gibbs function formulation to provide the best estimate of the density of seawater whether or not it includes composition anomalies. Preformed Salinity gives the salinity of clean Standard Seawater to which anomalies are added by biogeochemical processes. Preformed Salinity is the most relevant representation of salinity if one wishes to model the processes that result in salinity anomalies. Additional details on the representation of composition anomalies can be found in Pawlowicz *et al.* (2010), McDougall *et al.* (2010), Feistel *et al*. (2010a), Wright *et al*. (2010a).

Finally, WG127 has developed software libraries that are available via the World Wide Web to assist the community in using the new formulation for the thermodynamic properties of seawater. Three sets of library routines have been developed for this purpose. The Sea-Ice-Air (SIA) library provides the most comprehensive set of routines (Feistel et al., 2010b; Wright et al. 2010b). This library includes a broad range of routines dealing with the thermodynamic properties of pure water (liquid, vapour and solid), seawater, and humid or dry air. The second set of routines focuses on the properties of seawater and is referred to as the Gibbs SeaWater (GSW) library. It is less comprehensive than the SIA library, but is more computationally efficient and inputs and outputs are expressed in terms more familiar to oceanographers. Finally, an ultra-efficient set of routines has been developed to deal specifically with the special needs of numerical modelers (McDougall *et al*., 2010). Initially the SIA library is being made available in Visual Basic and FORTRAN while the GSW library is available mainly in MATLAB. All of these routines will be maintained on the TEOS-10 web site (click).

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SCOR Working Group #129: *Deep Ocean Exchanges with the Shelf*

Article and photo contributed by G.E. Swaters, the Canadian member of SCOR/IAPSO WG129

Part of the mandate of SCOR is to facilitate the formation of so-called international working groups "of not more than 10 members to deliberate on a narrowly focused topic and report their work in a peer-reviewed publication, book, manual, or database. Working groups are expected to complete their tasks in 4 years or less." In October 2006, a joint SCOR-IAPSO Working Group (#129) focused on Deep Ocean Exchanges with the Shelf (DOES) was formed with generous financial assistance from SCOR, IAPSO and the US National Science Foundation. The web site for DOES is:

http://www.scor-int.org/Working_Groups/wg129.htm

The terms of reference of DOES are to:

1. Synthesize the state of the science and make recommendations for future research related to the following topics:
   - Processes due to shelf waves, internal tides, shelf break upwelling and sinking, eddies and filaments, storms and extreme events that produce effects over time scales of weeks to one or two years;
   - Transport over the shelf and shelf break of riverine and estuarine input of sediment and fresh water (this aspect includes the Arctic and Antarctic coastal zones, but does not include investigating the sources of sediment and fresh water on the shelves);
   - Dissipation of tidal motion along the continental margins on time scales of hours to days;
   - The physical controls of chemical and biological fluxes between the shelf and the open ocean that can affect the ecology of such regions;
   - Cascading and deep water formation; and
   - Coupled physical-chemical-biological models, generally at local to regional scales, that have a more realistic description of the exchanges at the shelf edge;
2. Determine where further observational programmes (using improved technology) are needed to improve understanding of shelf break processes and to provide help with the formulation of more realistic models of the fluxes between the shelf and the deep ocean;

3. Serve as an international forum for oceanographers to discuss current research on the interaction between the coastal zone and the deep ocean, by using the services and membership database provided by IAPSO;
4. Foster collaboration between developed and developing countries that have interest in the shelf zone; limited-area models are required to help scientists in countries that do not have access to large computers;
5. Produce a comprehensive, published final report incorporating the latest results on the above topics. This report will be in a form of a special issue of a peer-reviewed journal or a book by a major publisher.

DOES is Chaired by John Johnson (UK) and the vice-Chair is Piers Chapman (USA). The Full Members of DOES are Isabel Ambar (Portugal), Jan Backhaus (Germany), Hu Dunxin (China-Beijing), Takeshi Matsuno (Japan), Wajih Naqvi (India), Alex Orsi (USA), Gordon Swaters (Canada) and Olga Trusenkova (Russia); with the Associate Members Kenneth Brink (USA), Xavier Durrieu de Madron (France), John Middleton (Australia), Pedro Monteiro (South Africa) and Jonathan Sharples (UK).

The DOES working group has held 3 scientific meetings. The first organizational meeting was held July 10-11, 2007 in Perugia, Italy as part of the IUGG 2007 Joint Assembly. A second scientific meeting/workshop, which was very successful in attracting and interacting with numerous African colleagues, was held October 6-8, 2008 in Cape Town, South Africa (with generous financial support from the US Office of Naval Research, US National Science Foundation, IUGG, IAPSO, SCOR and the South African Council for Scientific and Industrial Research). Dr. Susan Allen (UBC) was an invited keynote speaker at the Cape Town meeting. A third meeting (as well as an open research symposium) was held July 21-23, 2009 in Montreal, Canada as part of MOCA-09. Full reports of these meetings can be found on the SCOR/DOES web site listed above.

Members of SCOR/IAPSO Working Group #129 at the first meeting, held at the Palazzo dei Priori in Perugia

In addition to their own individual research programs, the members of DOES have completed the production of an up-to-date "bibliography" of the peer-reviewed literature (freely available at the SCOR/DOES web site), and a collection of invited (peer reviewed) articles published as a special 2009 issue of the on-line journal *Ocean Science* entitled "Deep ocean exchange with the shelf." The DOES team is currently working on the preparation of a "World Atlas of Shelf Regions" with the ambitious goal of providing a systematic classification and description of all the major shelf regions in the world with particular attention to measurements of shelf width, break depth, description of any western or eastern boundary currents, topographic characteristics such as coastline features and bathymetric features such as canyons, barotropic and baroclinic currents (including jets), estuaries, fresh water plumes and deltas, filaments, eddies, internal tides, tidal mixing and shelf waves, upwelling and downwelling characteristics (including seasonal variability) and a discussion of eutrophication and anoxic properties. The results of this classification will be freely available to all those interested. The final report of the DOES working group is expected later this year.

Hazards and Disasters

A Letter of Cooperation to establish the International Programme Office of the Integrated Research on Disaster Risk (IRDR) program has been signed by the program's sponsors and Chinese counterparts (click). The IRDR co-sponsors—the International Council for Science (ICSU, the parent of SCOR), the International Social Science Council (ISSC) and the United Nations International Strategy for Disaster Reduction (UN ISDR)—signed the agreement in Beijing in February. The China Association for Science and Technology (CAST) will provide annual financial support to the office for 10 years. The office will be located in the new headquarters of the Center for Earth Observation and Digital Earth (CEODE) of the Chinese Academy of Sciences (CAS), situated on the edge of Beijing. An announcement on the appointment of the Executive Director of IRDR is expected shortly.

A priority activity of the Scientific Committee for IRDR has been establishing working groups for the planning and implementation of the programme's first three years (click). A workshop organised by one of the working groups was held in Toronto, Canada, in February to develop a template for the case study approach to past disaster events that is being adopted by IRDR. The findings from the group will be on the agenda of the third meeting of the Scientific Committee scheduled for 14–16 April in Paris.

PERSONNEL

Robie Macdonald

The Chair of CNC-SCOR, Robie Macdonald, FRSC, has this year been elected a Fellow of the American Geophysical Union. During his 35-year career with the Department of Fisheries and Oceans, he has worked on pathways for freshwater, organic carbon and contaminants in the ocean. This work, conducted predominantly in coastal British Columbia, the Arctic, and Hudson Bay has been published in over 200 articles, a number of which are, of course, in the AGU journals. In 2004, together with Rudy Stein, he co-edited a foundation book on the organic carbon cycle in the Arctic Ocean. This work assembled an international team to synthesize this topic with the objective of producing an Arctic-wide budget for sediments and organic carbon. This budget has proved enormously useful as a starting place for constructing budgets for other substances like mercury, manganese, iron and persistent organic pollutants, and as a model for producing budgets in other regions. A large focus of Robie's work during the past decade has been to bring together the climate change and contaminants

communities working in the Arctic. To initiate this process, he wrote a paper in 2005 together with Tom Harner and John Fyfe that set out the reasons why climate variability matters to contaminant pathways. This paper has instigated numerous programs, some under IPY, which are now bearing fruit and producing results that verify many of the connections proposed in the review. His background as an ocean scientist has led him to focus not on the toxicology of contaminants, but rather on the ways in which contaminants provide elegant aquatic pathway tracers.

Robie, recognized as a strong interdisciplinary scientist, has conducted his work in collaboration with top scientists in fields spanning physical oceanography to geochemistry to palaeo-limnology. He is a fellow of the Chemical Institute of Canada, the Royal Society of Canada, a Fellow International of the Explorer's Club, and has been awarded several top prizes including the Canadian Meteorological and Oceanographic Society President's Prize (2000), the Head of the Public Service Award for Excellence in Policy (2002; co-recipient), and the RSC's Miroslaw Romanowski Medal (2005).

Siddika Mithani

Dr. Siddika Mithani has been appointed the Assistant Deputy Minister, Oceans and Sciences, for Fisheries and Oceans Canada. Dr. Mithani previously held the position of Associate ADM, Health Products and Food Branch at Health Canada. She brings to DFO her experience in leadership and managing science, policy and regulatory initiatives at the national and international levels. Her knowledge and expertise in the areas of safety, efficacy, quality and risk management principles in the health and industry sectors as well as risk management in complex regulatory science programs.

Dr. Mithani is a recipient of the Queen's Medal for her work in the area of developing and implementing regulations for clinical drug trials in Canada, and has been extensively involved in difficult food and nutrition files. She holds a Bachelor of Science degree in Pharmacy and a Ph.D. in Psychopharmacology from the University of Aston in Birmingham, England.

Doug Bancroft

Doug Bancroft will be appointed Director General of the Canada Centre for Remote Sensing with Natural Resources Canada on April 6th, 2010. He joined the Meteorological Service of Canada (MSC), Environment Canada in 1981, and then served progressively as a trainee, forecaster, shift supervisor, and operations supervisor in a variety of weather centres. He eventually became Officer-in Charge of the west coast Meteorology and Oceanography Centre. He then accepted a promotion to the Department of Fisheries and Oceans Canada (DFO) in 2000 as a Senior Science Advisor. In 2003, he was promoted again to the position of the national DFO Director of Oceanography and Climate Science Research programs. Doug returned to MSC in 2006, to take up his duties as Director of the Canadian Ice Service, and Co-Director of the Canada-United States North American Ice Service.

Doug holds a B.Sc. in Physics, a specialised undergraduate diploma in meteorology, and an M.Sc. in Physical Oceanography.

Michio (Mike) Miyake (1929-2009)

Michio (Mike) Miyake, Canadian oceanographer, Quaker and peace activist, died in Victoria of a heart attack on 29 November 2009, a few weeks before his 80th birthday. Mike studied the boundary layers of the atmosphere and ocean, and their interaction through turbulent motions and fluxes of momentum, heat and moisture. He became a faculty member of the Institute of Oceanography at the University of British Columbia in 1967 and moved to the Institute of Ocean Sciences in Sidney BC in 1976. He retired from IOS in the early 1990s, after which he divided his time between his consulting company, with activities in international ocean science, and being a peace activist.

Mike Miyake was born in Hiroshima, Japan on December 24, 1929 — the youngest son of a successful western clothing manufacturer. At the age of 15 Mike led an 11-boy team working in an

ammunitions factory outside of the city, which is where they were when the bomb was dropped on 6 August 1945. They walked back to the burning city as black rain fell on them; he eventually found his mother and sister, but his father perished in the fire. In 1950 he obtained a Bachelor's degree from Kumamoto University in Japan and worked a short time as a broadcast engineer. With the aid of American Quakers who came to help rebuild Hiroshima, he emigrated to the United States in 1951 where he initially went to high school to improve his English, then attended Guildford Friends (Quaker) College for 1 year, and then went to Swarthmore University where he met his first wife Susanna, who died of cancer in 1995. When his money ran out, he worked for a while before attending Drexel University in Philadelphia, the first coop education programme in the US, where he received a Bachelor's degree in electrical engineering. He then moved to the University of Washington in Seattle, earning Master's and Ph.D. degrees, combining his electrical engineering skills with his strong interests in the physics of the atmosphere and oceans. During this time he met Bob Stewart, who became his close friend and mentor, first at UBC and then at IOS.

We were graduate students with Mike in the late 60s and early 70s. He had boundless energy and enthusiasm for his research and mounted many field campaigns, involving instrumented platforms on land and sea and in the air on both planes and balloons released from ships and airplanes. Working with Mike was an exciting, and at times chaotic, experience. These experimental campaigns were logistically complex and they usually succeeded because of Mike's energy, 'can-do' attitude, intuitive insight, and force of will and persuasion. He was highly creative and intuitive, often having crazy ideas that remarkably worked out to be right in the end. Mike especially enjoyed being involved in large multinational cooperative experiments, such as the Barbados Oceanographic and Meteorological Experiment (BOMEX) in the Caribbean, the Storm Transfer and Response Experiment (STREX), and the Mixed Layer Experiment (MILE) in the Northeast Pacific. As graduate students, we met and worked with many scientists from other countries and cultures, an enriching experience that we have maintained throughout our own careers. During this time, he also hired conscientious objectors from the Vietnam War as research assistants for short periods, helping them while they became established in Canada. A few years ago, his Christmas letter included a picture of Mike and his second wife Yushiko demonstrating for peace in front of the United Nations headquarters in New York City.

Mike's interests in science did not end with his retirement, and right up until his last few months, he would phone every few months with some new idea that he was exploring or that he wanted us to think about pursuing ourselves. Usually these ideas involved making a positive difference for the environment and humankind. Mike was like no one else we have ever known, and he was a strong and positive influence in our scientific and personal lives. Mike is survived by his wife Yushiko Miyake (of Tokyo), and his daughters Joanna (of Ft. St. John, BC) and Dorothy (of Leeds England) and their families.

Contributed by Ken Denman with input from Gordon McBean and Grace Kamitakahara. The picture of Mike in May 2009 near his home in Victoria was taken by David Rodenhuis, who was a graduate student with Mike in Seattle and is now with the Pacific Climate Impacts Consortium (PCIC) at the University of Victoria.

MEETINGS

NICOPP, Montreal, 14-16 May

NICOPP ((Nitrogen Cycle in the Oceans, Past and Present) is a joint working group of PAGES and IMAGES (click). NICOPP studies Nitrogen isotope (δ15N) dynamics as recorded in the sedimentary record in order to learn about the dynamics of the marine nutrient cycle in the Quaternary and the present. The Joint Working Group's first workshop will be held in Montreal, on 14-16 May, to assess the current state of δ15N analyses at the global scale, to identify common problems, and to define strategies for progress. A key outcome of the workshop will be a synthesis of existing Quaternary-recent marine sedimentary δ15N records, with the goal of producing a global database (click).

Investigators with suitable δ15N records are encouraged to apply; the application deadline is 26 March. Please contact Markus Kienast (click) or Eric Galbraith (click).

CMOS/CGU Meeting, Ottawa, 31May - 4 June

There's still time to register for the 2010 Canadian Meteorological and Oceanographic Society's Congress, being held at the Crowne Plaza Hotel, Ottawa, from May 31 to June 4 in conjunction with the annual scientific meeting of the Canadian Geophysical Union (click). The session topics are: Atmosphere, Climate, Atmosphere-Ocean Interactions, Oceanography, Interdisciplinary, Arctic, Hydrology, Geodesy, Biogeoscience, and Solid Earth (click). The detailed schedule and presentation abstracts are now available (click).

IPY Polar Science Conference, Oslo, 8-12 June

More than 2600 abstracts have been submitted for the International Polar Year (IPY) Oslo Science Conference (8-12 June)—making this the largest polar conference ever organized (click). As a reflection of the success and emphasis of IPY, there will be very strong participation by early-career scientists and strong elements of education and outreach.

Two major IPY publications will be launched at the conference: a polar resource book *Polar Science and Global Climate: An International Resource for Education and Outreach* that provides information and activities for educators; and a final IPY report from the Joint Committee and more than 120 scientists that captures the main elements of the planning, implementation and initial science highlights of the IPY (click).

Open Science Meeting on Harmful Algal Blooms in Benthic Systems, Honolulu, 21-24 June

The IOC-SCOR Global Ecology and Oceanography of Harmful Algal Blooms (GEOHAB) program is pleased to announce an open science meeting (OSM) on HABs in Benthic Systems, to be held in Honolulu, Hawaii, USA on 21-24 June 2010. The OSM will present the latest knowledge on the environmental causes and controls of benthic HAB species, such as *Gambierdiscus* and *Ostreopsis*, and will result in a plan for research to advance our knowledge. The OSM will include plenary presentations, discussion sessions, and a poster session. Abstracts should be contributed through the registration website, and early registration is now open (click).

In conjunction with the meeting there will be a training workshop from 25 to 28 June on 'Taxonomy challenges and identification of benthic dinoflagellates'. The training workshop will include microscopy and molecular

techniques, can accommodate at most 16 participants, and is open to participants in the open science meeting. There is no additional fee to attend the training workshop but participants are expected to cover their own accommodation and meals.

ICES Annual Science Conference, Nantes, 20-24 September

The ICES Annual Science Conference for 2010 will be held at la Cité des Congrès in Nantes, France, between 20 and 24 September. This year's conference will focus on coastal zones, one of three major thematic axes of the ICES Strategic Plan. During the 19 theme sessions, oral presentations and posters will cover such topics as contaminants, benthic indicators, aquaculture, bioinvasions, harmful algal blooms, biodiversity, operational oceanography, integrated coastal-zone management, and marine coastal planning. Eight theme sessions will focus on fishery research. The deadline for abstract submission is April 15 (click).

GENERAL

New Public Marine Geosciences Data Portal

The Marine Geoscience Data System (MGDS) provides access to data portals for the NSF-supported Ridge 2000 and MARGINS programs, the Antarctic and Southern Ocean Data Synthesis, and the Seismic Reflection Field Data Portal. These portals were developed and are maintained as a single integrated data system, providing free public access to a wide variety of marine geoscience data collected throughout the global ocean. System components include a searchable metadata catalog and digital data repository, and the Global Multi-Resolution Topography (GMRT) synthesis, a dynamic multi-resolution gridded compilation of seafloor bathymetry data integrated with land topography. Data access services include keyword and map based search tools, and a Java™ based data visualization tool GeoMapApp. Open Geospatial Consortium (OGC) compliant Web Services are being developed to enable access by other data systems and visualization tools. Development of the integrated data system has been underway since 2003 and has involved collaboration with researchers at WHOI, UTIG and TAMU as well as with the National Geophysical Data Center, Boulder CO (click).

The primary derived data product developed and maintained by the MGDS is the Global Multi-Resolution Topography (GMRT), a dynamic global synthesis of ocean bathymetry derived from publicly available multibeam bathymetry data.

Announcement of POGO Opportunities in Capacity Building

The **Partnership for Observation of the Global Oceans (POGO**) in collaboration with the **Scientific Committee on Oceanic Research (SCOR)**, announce the **POGO-SCOR** Visiting **Fellowship Programme for 2010**. The Fellowship offers successful candidates the opportunity to visit other oceanographic centres for a period of between 1 to 3 months. The programme covers international airfare and a stipend for living expenses for up to 3 months. Deadline of Applications: 12 April 2010

POGO also announces a special **AMT Visiting Fellowship** for on-board training on an Atlantic Meridional Transect (AMT) Cruise. This fellowship offers the successful candidate the opportunity to participate in the preparation of the cruise at Plymouth Marine Laboratory or at the National Oceanography Centre in Southampton for up to 1 month prior to the cruise, participation in the cruise itself (12 October-25 November) and up to two months in the same institute after the cruise to participate in the data analysis and processing on

completion of the cruise. The Fellowship provides international airfare and subsistence. Deadline for Applications: 1 June 2010

The Visiting Fellowships and the AMT Fellowship are open to scientists, technicians, graduate students (PhD) and Post Doctoral Fellows involved in oceanographic work in developing countries and countries with economies in transition. Priority will be given to applicants in early stages of career development. They are not research or academic fellowships; their main purpose is professional training to advance sustained ocean observations and their applications.

POGO also announces the **POGO Visiting Professorship for 2010**, which allows for a visit by a distinguished scientist from an advanced oceanographic institute to an institute in a developing country or country with economy in transition, to provide training and mentoring, to develop collaborations and to enhance networking. The duration of visits may range from 2 weeks to 3 months. International travel costs for the Visiting Professor will be provided, together with a modest honorarium. Deadline for Applications: 12 April 2010

Further information together with application forms for all three programmes is available on the POGO website (click).

Climate Change and Arctic Sustainable Development

UNESCO has published a book, *Climate Change and Arctic Sustainable Development*, bringing together the knowledge, concerns and visions of leading Arctic scientists in the natural and social sciences with traditional knowledge. It highlights the urgent need for a sustained interdisciplinary and multi-actor approach to monitoring, managing and responding to climate change in the Arctic, and explores avenues by which this can be achieved (click).

The Arctic is undergoing rapid and dramatic environmental and social transformations due to climate change. This has ramifications for the entire planet, as change spreads through interconnected global networks that are environmental, cultural, economic and political. Today, with the major thrust of research shifting away from deciphering causes and monitoring trends, the central preoccupation of a growing circle of actors has become the exploration of strategies for responding and adapting to climate change.

Marine Ecoregions of North America

The Commission for Environmental Cooperation has published *Marine Ecoregions of North America*, a classification of coastal and nearshore waters in a spatial framework with three nested levels. The book describes and maps North American oceanic and coastal waters, classifying them into 24 ecoregions according to oceanographic features and geographically distinct assemblages of species. The top level shows seven marine ecoregions off Canada, classified on the basis of water masses and currents, enclosed seas, and regions of coherent sea surface temperature or ice cover. Compiled by a distinguished group of specialists from Canada, Mexico and the United States, the book is available for download (click); map files are available separately in several formats, including one for Google Earth (click).

Ocean Acidification and Marine Biological Diversity

The Secretariat of the Convention on Biological Diversity has released a *Scientific Synthesis of the Impacts of Ocean Acidification on Marine Biological Diversity,* a 63-page publication freely available for download (click). Among its findings, the study shows that increasing ocean acidification reduces the availability of carbonate minerals in seawater and that, by 2100, 70% of cold-water corals, key refuges and feeding grounds for commercial fish species, will be exposed to corrosive waters. Furthermore, given current emission rates, it is predicted that the surface waters of the Arctic Ocean will become under-saturated with respect to essential carbonate minerals by the year 2032, and the Southern Ocean by 2050, with disruptions to large components of the marine food web.

Pacific Coast Collaborative

The Pacific Coast Collaborative is an umbrella for more specific agreements between the Premier of British Columbia and the Governors of Washington, Oregon and California. An Action Plan on Ocean Conservation and Coastal Climate Change Adaptation was signed on February 12. It calls for supporting federal ocean observation programs and combining efforts on seafloor mapping (click).

Independent Review of IPCC Processes and Procedures

The InterAcademy Council, a multinational organization of the world's science academies, has been requested to conduct an independent review of the Intergovernmental Panel on Climate Change (IPCC) processes and procedures. The study comes at the invitation of the United Nations secretary-general and the chair of the IPCC, and will help guide the processes and procedures of the IPCC's fifth report and future assessments of climate science (click).

The IAC has been asked to establish an ad hoc Independent Evaluation Group (IEG) of experts from relevant fields to conduct the review and to present recommendations on possible revisions of IPCC practices and procedures. In addition, the IEG is asked to recommend measures and actions to strengthen the IPCC's capacity to respond to future challenges and ensure the ongoing quality of its reports.

CANADIAN OCEAN SCIENCE NEWSLETTER
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