Canadian National Committee for SCOR
Comité national canadien pour SCOR

Scientific Committee on Oceanic Research

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Marine Arctic Ecosystem Study (MARES): Polar Ecosystem Research in the Beaufort Sea

Francis K. Wiese, Stantec Consulting Services Inc., Anchorage AK USA
David Fissel, ASL Environmental Sciences Inc., Victoria BC Canada

Overview

The Marine Arctic Ecosystem Study (MARES), a marine polar ecosystem research study conducted in the Beaufort Sea from 2014-2020 was just completed this month. MARES was led by Stantec and involved a consortium of universities, government agencies and private companies (https://www.nopp.org/projects/mares/). Funding was received from the U.S. Bureau of Ocean Energy Management who coordinated other funding partners through the National Ocean Partnership Program (NOPP) as listed in the acknowledgements below.

The overarching goal of MARES was "to understand the inter-relationships of biophysical and chemical drivers and their influence on the trophic structure and function of the eastern Beaufort Sea marine ecosystem". Locations of the major research activities within the MARES project are shown in Figure 1.

Major Research Activities

Marine Mammal Tagging Study, 2015-2016

This component was conducted in the western Beaufort Sea and Chukchi Seas using CTD-Fluorometer satellite telemetry tags (Figure 2a) placed on bearded and spotted seals. The instruments logged the location and depths, as well as measuring environmental values. The measurement program is described in detail in Wiese et al. (2017). The results of the data analysis provided improved understandings of the link between seal foraging behaviour and specific oceanographic variables (Gryba et al. (2019).

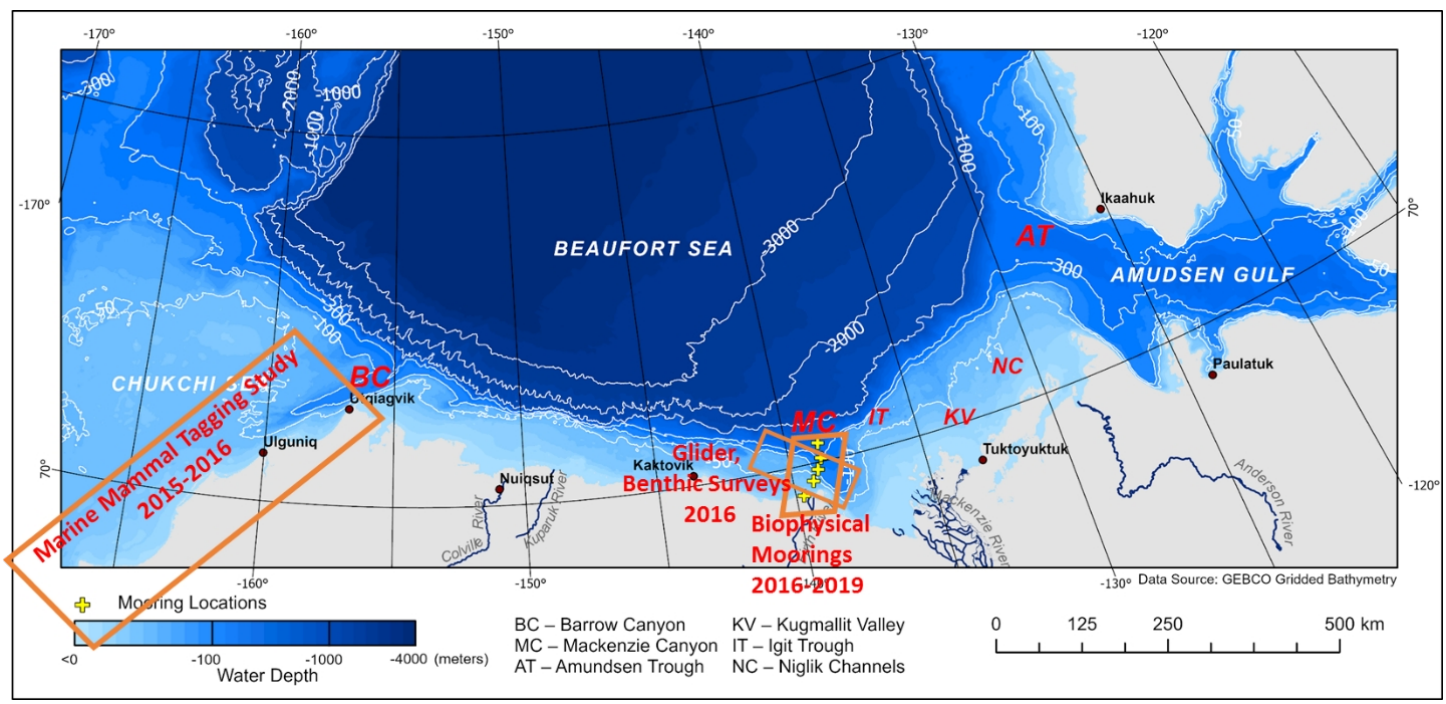


Figure 1: A map of the study areas for the MARES major scientific components within the continental margin of the Beaufort Sea.

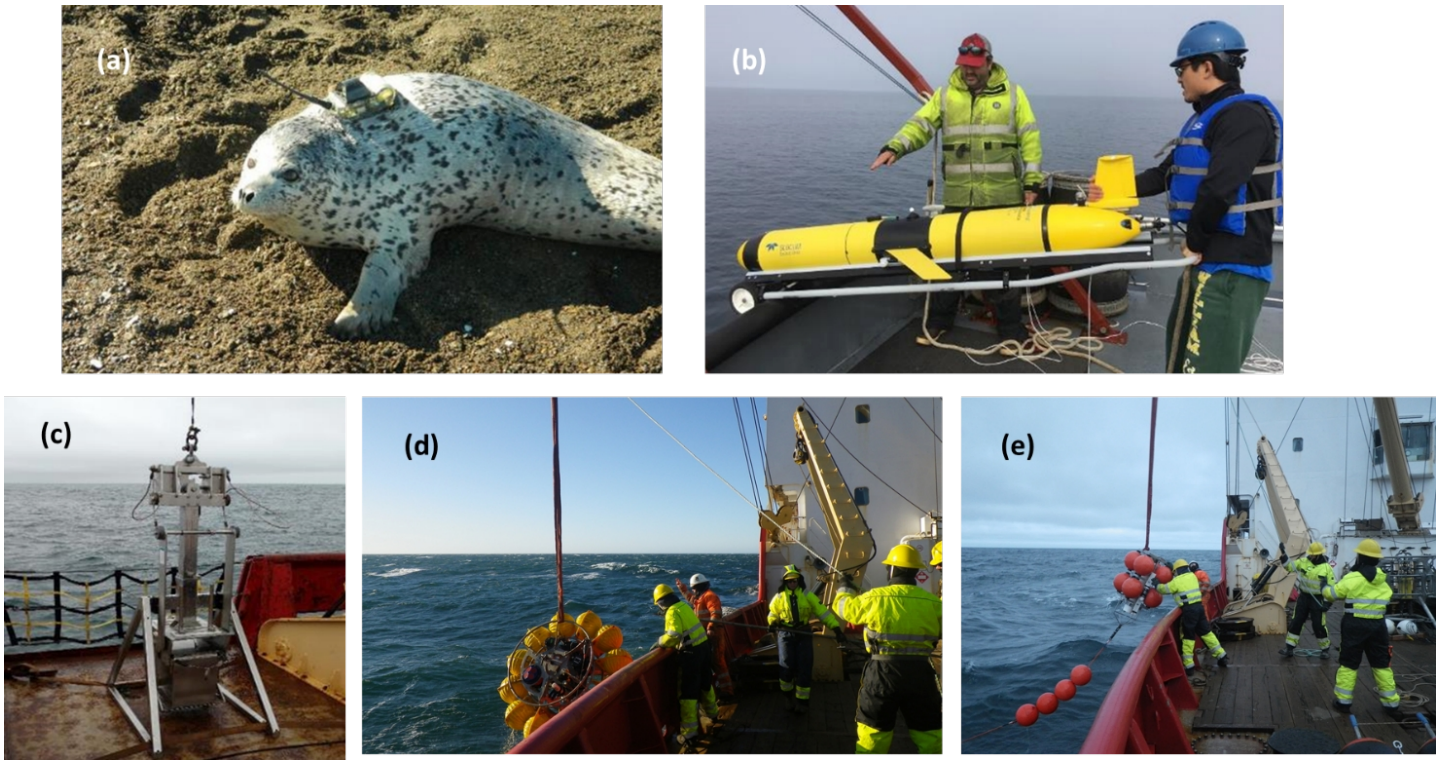


Figure 2: Illustrations of the instrumentation used in the MARES program: (a) seal tagging, (b) glider, (c) sediment sampler and (d) and (e) moored instruments being deployed from the CCGS Laurier.

Biophysical and Chemical Program, 2016

This program, conducted from mid-August to early October 2016, involved collecting physical, biological, and chemical observations in eastern Alaska and Mackenzie Canyon area of the Beaufort Sea (Figure 1) by describing and analyzing physical, biological, and chemical observations acquired from a Slocum Glider (Figure 2b) operated over an 8 week period. Data provided insights into the flow of the Mackenzie plume, identifying four different plume flow regimes and the temporal and spatial scales at which key processes are occurring.

Water and sediment samples were collected in early October from the *CCGS Laurier* to estimate the carbon budget and describe carbon cycling processes within the benthic layer. The program is described in detail in Wiese et al. (2018). Sediment samples (Figure 2c) provided a snapshot of the organic sources, showing higher contributions of marine carbon to the benthos compared to previous studies, and higher meiobenthic diversity on the middle Mackenzie shelf. Scientific results from analyses of the benthic sediment measurements are presented in McMahon et al. (2020).

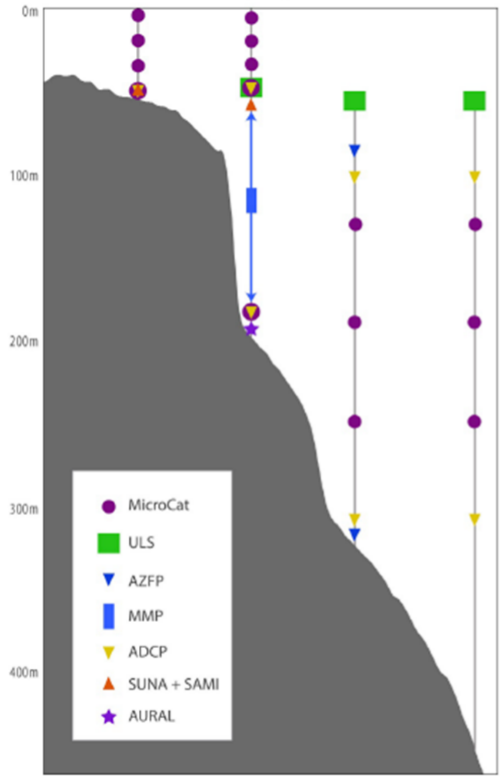
Biophysical Moorings, 2016-2019

Four to five ecosystem moorings were operated across the continental margin in the eastern Beaufort Sea west of the Mackenzie Canyon for two full years, with one mooring continuing for a third year (Figure 2d, 2e). The subsurface moorings supporting an extensive high-density, cross-shelf array of 41 biophysical and chemical oceanographic instruments in the Mackenzie Canyon and the adjoining westward continental shelf off the coastline of the Yukon Territory of Canada. The moorings were deployed and recovered from the *Canadian Coast Guard Ship (CCGS) Sir Wilfrid Laurier*, during yearly cruises to the study area in 2016 – 2019 (Figure 1).

The moorings provided continuous year-round measurements of a wide variety of physical, chemical and biological parameters (Figure 3; see also Wiese et al., 2019; Wiese et al., 2020a). The program provided a deeper understanding of the effects of wind, revealing that upwelling and downwelling events are common year-round and providing a mechanistic understanding of how these modes affect nutrient fluxes and the biological components of the system. A

persistent recirculation in the canyon that appears to be the result of interaction of the southern limb of Beaufort Gyre and the canyon topography was described (Lin et al., 2020). The program also detected persistent zooplankton in the water column over winter that should be available to support pelagic predators, as well as documenting interannual variability in seasonal cycles with robust internal dynamics. Further research is underway to realize the full benefit of interdisciplinary multi-year work as carried out under MARES by bringing together the results across the project and other efforts in the region (e.g. Integrated Beaufort Observatory, ArcticNet 2019) to understand the relationships across different ecosystem components across space and time (Wiese et al., 2020b).

The MARES study was the recipient of the 2019 NOPP Excellence in Partnering Award (https://www.nopp.org/2020/2019-excellence-in-partnering-award/).



Instrument Type	Measurement Type
MicroCat	salinity, temperature
ULS (Ice Profiler)	ice draft, ocean waves
AZFP (active acoustics)	zooplankton, fish
MMP (McLane moored profiler)	salinity, temperature, pressure, oxygen, fluorescence, turbidity, PAR (photosynthetically active radiation)
ADCP (acoustic Doppler current profiler)	ocean currents, ice velocities, acoustic backscatter-zooplankton, temperature, pressure
SUNA (ultraviolet nitrate)	nitrate
SAMI	partial pressure CO2
AURAL (passive acoustics)	marine mammals (passive acoustics)
Not Shown: Sea Spider Mooring (13 m water depth) with ADCP, AZFP and temperature/salinity/pressure sensors	

Figure 3: The MARES moorings shown schematically and the types of instruments and measurements used on the MARES moorings.

Acknowledgements

Funding provided by the U.S. Department of the Interior, Bureau of Ocean Energy Management, Environmental Studies Program, to Stantec, under Contract Number M14PC00008.

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Humfrey Melling, Chief Scientist and Officers and Crew of CCGS Sir Wilfred Laurier

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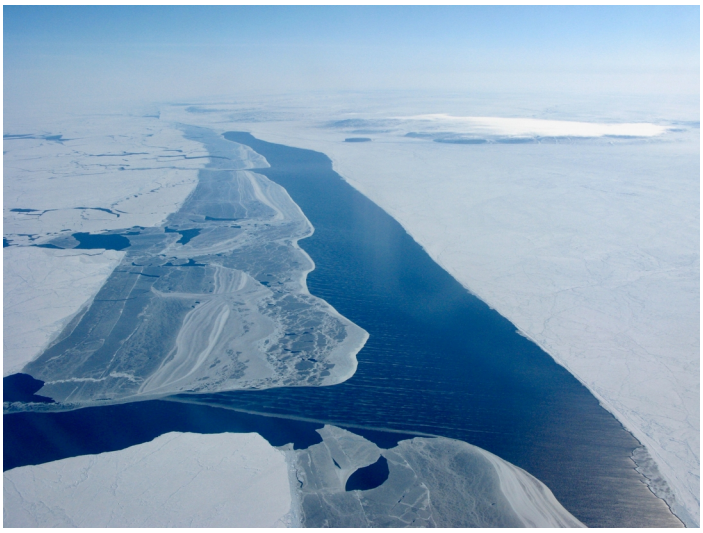
The Ocean's Meridional Overturning Circulation

Louis-Philippe Nadeau, Université du Québec Á Rimouski, Rimouski, Quebec, Canada

Ocean circulation involves a complex ensemble of fluid movements over a wide range of spatial and temporal scales, and as these scales vary, so do the dominant dynamics. Historically, these different processes have been studied in isolation, however more recently, research niches have increasingly developed with the aim of bringing together these mechanisms in order to re-examine classical problems at large scales and in particular to assess the influence of ocean dynamics on the climate. I find this approach fascinating and thus my group's research is focused in this field. Recent examples of research topics include the study of i) turbulent ocean heat fluxes associated with sea-ice fractures, ii) wave-mean flow interactions in the Earth's stratosphere, iii) Antarctic circumpolar current dynamics, iv) nonlinear Ekman pumping and its interaction with near-inertial oscillations and geostrophic turbulence. In the following, however, I focus uniquely on our work on the Meridional Overturning Circulation, which is a hallmark example of how ocean dynamics influences Earth's climate.



The deep ocean is continuously replenished by polar waters that become dense enough to sink into the abyss. This deep water production occurs during winter in the North Atlantic and along the coast of Antarctica. Without the deep ocean circulation, most of the ocean would be almost uniformly filled with this dense water. However, the bulk of the ocean shows a much smoother transition between the warmer surface waters and the colder abyssal waters of polar origins. This global stratification is directly linked with Meridional Overturning Circulation (MOC) that describes the pathways of dense waters of polar origins back to the surface.

Two main physical mechanisms have been identified to allow the return pathway of deep waters: (i) small scale turbulent mixing and (ii) large scale upwelling in the Southern Ocean. Small scale mixing occurs mainly by breaking internal waves generated by the interaction of the tides and bottom topography. Most of the wave breaking occurs near the bottom topography but a significant fraction also breaks along the continental shelfs. On average, small scale mixing is intensified in the lower half of the water column (where the bulk of the bottom topography is). The return pathway of the abyssal waters below about 2000m thus occurs mainly by mixing properties across the mean stratification (diabatic mixing). In contrast, the upper half of the water column returns to the surface along the slanted isopycnals of the Antarctic Circumpolar Current, without changing its density (adiabatic upwelling). This large scale upwelling is due to the Ekman pumping generated by the strong winds blowing over the Southern Ocean.

The MOC is generally represented as a transport streamfunction in a latitude-depth plane. The streamfunction represents an integral of the meridional velocity along a certain longitude range. When we integrate around the globe, the resulting circulation shows two counter-rotating cells stacked on top of each other. The upper cell originates from the North Atlantic and exists only in the Atlantic basin while the lower cell originates from the coast of Antarctica and spans all ocean basins. From a very simplified perspective, the two cells can be associated to the two main physical mechanisms for upwelling of deep water described above. The North Atlantic Deep Water (NADW) upwells adiabatically across the slanted isopycnals of the Southern Ocean, while the Antarctic Deep Water (AADW) upwells diabatically across isopycnals by small scale mixing. Our work however shows that this picture becomes more complex (and more interesting!) when we consider the inter-basin exchange between the Atlantic and Indo-Pacific.

Inter-basin exchange

In addition to Ekman upwelling in the Southern Ocean, a significant portion of the North Atlantic Deep Water flows directly into the Indo-Pacific. The exchange occurs via a geostrophic current resulting from the isopycnal height difference between the two basins. This gives rise to a “coveyor belt” type of circulation where the NADW upwells diabatically in the Indo-Pacific basin until it is transformed into lighter water that flows back to the Atlantic. Since the branch that upwells in the Indo-Pacific is indistinguishable from the diabatic cell fueled by the Antarctic Deep Water, the coveyor belt pathway can be seen as coupling the upper and lower cells of the circulation, enhancing the mixing rate between the upper ocean and the abyssal ocean. The full MOC can thus be understood as the superposition of three dynamical modes: (1) an adiabatic upper cell, (2) a diabatic lower cell, and (3) a conveyor belt coupling the two first modes. As discussed below, the relative contribution of these three dynamical modes to the full MOC is key to explain the changes in deep ocean stratification, and modifications in heat and carbon storage in the ocean.

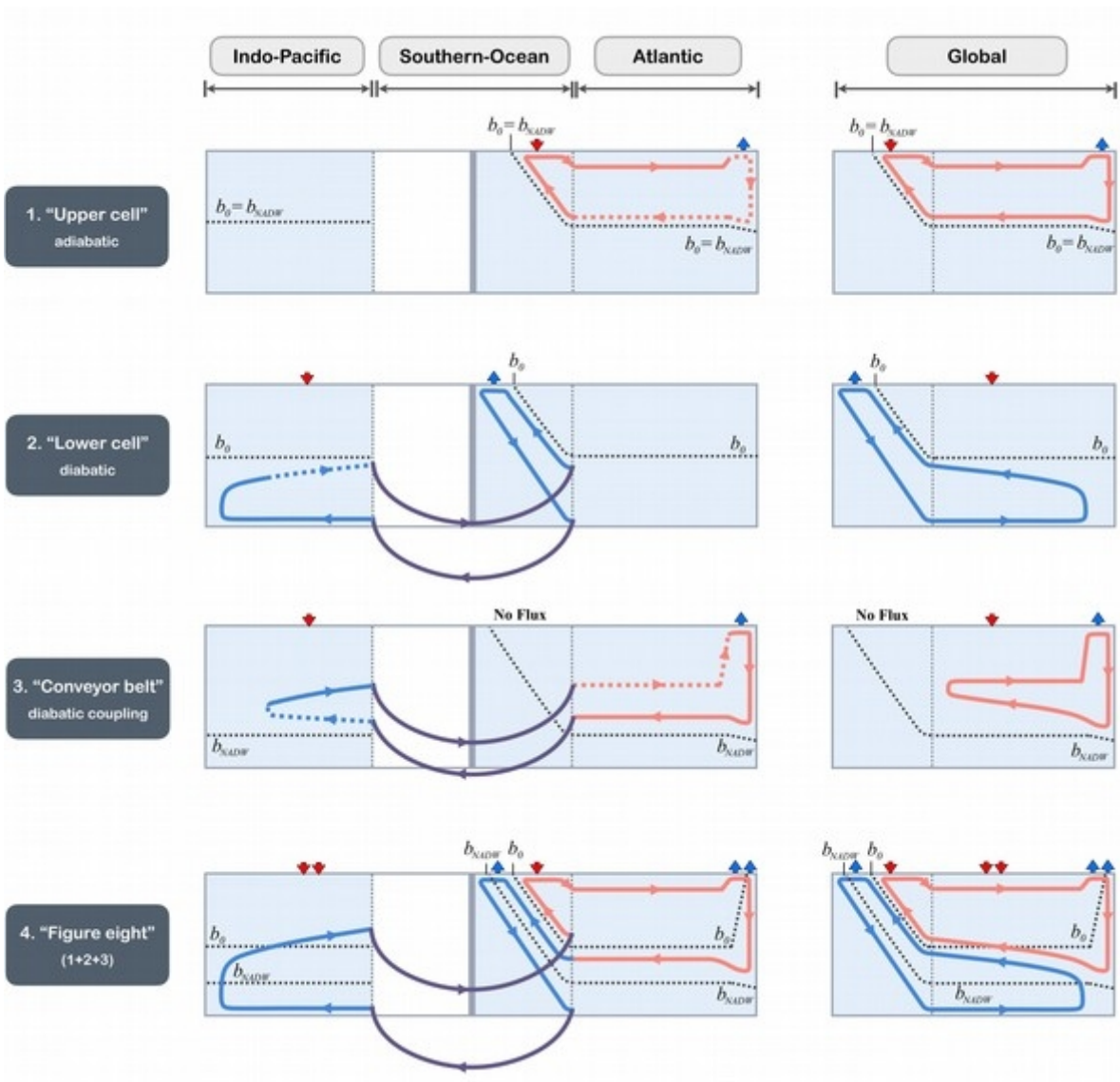


Figure 1 Possible overturning pathways in a two-basin ocean: 1) adiabatic upper cell, 2) diabatic lower cell, 3) conveyor belt. (left) Sketches of the MOC separated into the Indo-Pacific and Atlantic basins, where the Indo-Pacific has been mirrored to illustrate the connection via the Southern Ocean (i.e.,north is to the right in the Atlantic but to the left in the Indo-Pacific). (right) The resulting global mean overturning streamfunction. Notice that the pathway in 4 (representing the full MOC) can be constructed from a superposition of the circulation modes 1, 2, and 3. The dotted red lines in 1–3 and the dotted blue lines in

2 and 3 cancel each other in the superposition. The blue and red arrows at the surface indicate a negative and positive surface buoyancy flux, respectively. The circulations in the Atlantic interior and in the Southern Ocean are assumed to be adiabatic in this simplified schematic. Adapted from Nadeau and Jansen (2020)

Glacial and interglacial circulation

By controlling the amount of heat stored in the abyss as well as the exchange of CO2 with the atmosphere, the MOC is believed to explain a large fraction of the low frequency variability of the climate system. Changes in circulation and stratification affect the ventilation rate of the deep ocean, thus affecting the storage of heat and carbon in the ocean. The Antarctic sea ice cover plays a central role in this process. Its role is two-fold: (i) it modifies the deep ocean circulation and stratification, and (ii) it shields the atmosphere from the ocean. In the present-day interglacial climate, the permanent sea ice cover is small and almost all of the surface of the Southern Ocean is in contact with the atmosphere. Moreover, the conveyor belt mode coupling the upper and lower cells is strong and the deep ocean is relatively well ventilated. In contrast, during the Last Glacial Maximum (LGM), a significant portion of the Southern Ocean was covered with ice, thus limiting the atmosphere-ocean fluxes of CO2. In addition, strong brine rejection form the ice formation significantly increased the magnitude of the diabatic lower cell to the detriment of the upper cell and conveyor belt modes, leading to a much longer residence time of the abyssal waters. Thus, the combined effects of a reduced ventilation of the abyss, an abyssal cell occupying a larger volume of the global ocean and an Antarctic sea ice cover limiting the surface atmospheric flux into the lower cell allowed for an increased carbon storage in the ocean during the glacial periods.

Transient climate change

Much of the existing theories on the MOC assume statistical equilibrium solutions. However, the Earth's climate is not in equilibrium. A better understanding of the transient response of the ocean to changes in atmospheric forcing is therefore necessary. Above, we saw that the long term equilibrium response to a global cooling during the LGM is an increase of Antarctic Deep Water formation, leading to an expansion of the lower cell and a shoaling of the Atlantic upper cell (AMOC). Yet, coupled climate simulations simulations of transient global warming also show a shoaling and sharp reduction in the intensity of the AMOC in the next 100 years. This apparent contradiction is resolved when a much longer time scale (order 1000 years) is considered. The transient (medium-term) response to atmospheric warming is characterized by a weakening of the AMOC, while the equilibrium (long-term) response to atmospheric warming is associated with an increase in North Atlantic Deep Water formation and the strengthening of the upper cell. The weakening of AMOC occurs over decadal timescales and is attributed to rapid warming of deep waters in the North Atlantic (restratification). The recovery and eventual strengthening of AMOC is associated with the diffusive adjustment of the abyss, requiring several millennia (much longer most coupled climate simulations).

Louis-Philippe Nadeau is the 2020 recipient of CNC-SCOR's Early Career Ocean Scientist Award.

Much work remains to be done to understand in detail the physical mechanisms that explain the ocean's out-of-equilibrium response to climate change. We are currently pursuing this work to understand the heat uptake of the North Atlantic wind driven gyres and how they modulate the

heat uptake of the upper cell. We also developed a simplified model for the transient response of the ocean's residual overturning circulation to surface warming (and cooling). Despite its simplicity, the model reproduces well the results from general circulation model simulations. The next logical steps will be to couple the model to a simple representation of sea-ice and to a simple atmospheric Moist Diffusive Energy Balance Model (EBM). This coupled toy model will be a perfect tool to cover the parameter space in problems of climate dynamics on timescales of decades to millennia.

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Doug Wallace FRSC

La Société royale du Canada (SRC) et ses membres ont élu les nouveaux membres de cette année, et ont désigné la promotion entrante du Collège de nouveaux chercheurs et créateurs en art et en science.

The Royal Society of Canada (RSC) and its Members have elected this year's new Fellows and named the incoming class of The College of New Scholars, Artists and Scientists.

Parmi les honorés/Among the honoured:

WALLACE, Douglas – Department of Oceanography, Dalhousie University

Doug Wallace is an oceanographer who uses observations of chemical distributions to unravel the complex biogeochemical processes that connect the ocean and the atmosphere. He introduced several approaches and tools that have had long-lasting impact on our understanding of marine biogeochemistry and its connection with climate, especially with respect to the uptake of carbon dioxide and oxygen by the oceans.

Doug Wallace est un océanographe qui utilise des observations de distributions chimiques pour élucider les processus biogéochimiques complexes qui relient l'océan et l'atmosphère. Il a présenté plusieurs approches et outils qui ont eu un impact durable sur notre compréhension de la biogéochimie marine et de son lien avec le climat, en particulier en ce qui concerne l'absorption de dioxyde de carbone et d'oxygène par les océans.

La liste 2020 de ces personnes remarquables sera invitée à accepter le statut de membre de la SRC le vendredi 27 novembre. Cette année, la cérémonie sera adaptée de manière unique afin de garantir la participation de tous les nouveaux membres, que ce soit depuis leur domicile, de leur campus ou sur place à Toronto. Nous espérons que vous nous rejoindrez pour découvrir cet éventail étonnant de talent, d'imagination, de discipline et de découverte. Veuillez cliquer ici pour vous inscrire.

The 2020 roster of truly remarkable individuals will be invited to accept membership to the RSC on Friday, November 27. The ceremonies will be uniquely adapted this year to ensure all new members will participate – whether from home, from campus, or in Toronto. We hope you will join us for this stunning landscape of talent, imagination, discipline, and discovery. Click here to register.

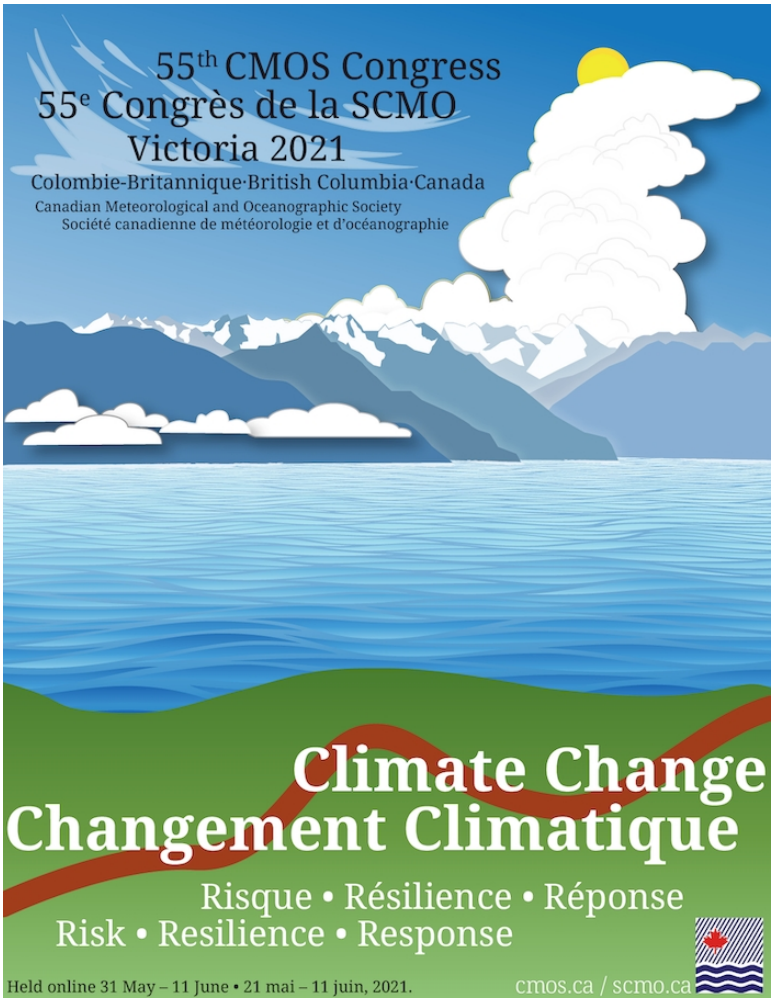
This section of your newsletter provides an opportunity to highlight your research programs to the Ocean Science Community. *Your are invited to send contributions to David Greenberg, david.greenberg@dfo-mpo.gc.ca*	*Mettez en valeur vos programmes de recherche en publiant un article dans cette première section de votre bulletin.* *Faites parvenir vos contributions à David Greenberg, david.greenberg@dfo-mpo.gc.ca*

MEETINGS

CMOS Congress 55 - Online

May 31 – June 11 2021, Online from Victoria BC

The Canadian Meteorological and Oceanographic Society (CMOS) has decided the 55th Congress, with the theme *Climate Change – Risk, Resilience, Response*, will be online and spread over 12 days from May 31 to June 11 2021. Keep an eye on the conference website for details as they emerge.



Ocean Optics XXV - Postponed

From the conference website: Given the uncertainty regarding the ability to travel due to the coronavirus pandemic—and the expected social distancing measures that would be required to

safely convene the conference—we've made the decision to **postpone Ocean Optics XXV until fall 2022**. The Planning Committee is evaluating options and will communicate developments to the community on this website and via email. We look forward to gathering safely with everyone in fall 2022 to celebrate the 25th anniversary of the Ocean Optics Conference!

ASLO 2021 Aquatic Science Meeting - Postponed

June 22–27 2021, Palma de Mallorca, Spain

From the conference website: The ASLO 2021 Aquatic Sciences Meeting was originally scheduled to begin in late February. Due to COVID-19, the date had to be rescheduled to June. ASLO meetings normally begin on Sunday with an opening plenary and reception, then conclude on Friday – with the scientific program scheduled Monday through Friday. Due to the new 2021 dates, the Sunday through Friday pattern had to be changed to Tuesday through Sunday, with the opening plenary and reception on Tuesday, then the scientific program running Wednesday through Sunday.

Abstract **deadline** "Early February 2021"

World Conference on Marine Biodiversity - Virtual

December 13-16, 2020, Auckland, NZ

From the conference website: The conference programme will be designed to accommodate varying time-zones. It will enable all participants to view all talks and posters, even those in parallel sessions, at a time of their choosing. All materials, abstracts, programme, posters, talks, keynote presentations, and 'breakout rooms' for live discussion between participants, will be organised through one website. Side events to encourage live interactions between participants will be organised.

Early-bird Registration closes: 1 November 2020.

Please send meeting announcements to David Greenberg, david.greenberg@dfo-mpo.gc.ca	*SVP faites parvenir vos annonces de réunion à David Greenberg, david.greenberg@dfo-mpo.gc.ca*

POSITIONS AVAILABLE

Post-doctoral positions - Ecosystem modeller, Zooplankton Ecology & Modelling

University of British Columbia

The Department of Earth, Ocean and Atmospheric Sciences at the University of British Columbia invites applications for a 1-year Postdoctoral Fellow to act as an **ecosystem modeler** with UBC for a project on modelling ecosystem impacts of oils spills in the Salish Sea, starting between October and December 2020 (with the option to work part-time for a longer period), at standard postdoc salary rate. This role is part of an international project, funded through the Multi-partner Oil Spill Research Initiative (MPRI), which is developing and using an implementation of the Atlantis end-to-end ecosystem model to explore scenarios for the ecosystem-level impacts of oil spills in the region, in support of risk mitigation and management. The main role of the postdoc will be to work as an ecosystem modeller using the Atlantis ecosystem model that has been developed by CSIRO and UBC for the Salish Sea ecosystem. Key tasks for the successful candidate will include undertaking training in the use of the Atlantis model, and then working in collaboration with stakeholders, as well as the CSIRO and UBC modelling teams, to implement and evaluate realistic scenarios of possible oil spills on the Salish Sea ecosystem.

Details

Deadline October 9, 2020

The Department of Earth, Ocean and Atmospheric Sciences at the University of British Columbia invites applications for a Postdoctoral Fellow in the field of **zooplankton ecology and modelling**. The successful applicant will conduct research as part of a collaborative group investigating and modelling phytoplankton and zooplankton ecology of the Salish Sea. The candidate will be expected to take a lead role in performing model - data comparisons to evaluate an existing coupled bio-physical model (SalishSeaCast with SMELT salishsea.eos.ubc.ca) in collaboration with zooplankton ecologists in Fisheries and Oceans, Canada and University of Washington. Once the model is evaluated, the candidate will use the model results to determine the drivers of seasonal and interannual variability in zooplankton in the Salish Sea to aid in understanding juvenile salmon survival. In collaboration with modellers, the candidate will contribute to the development and testing of zooplankton model improvements. Other responsibilities include communications with partners, report preparation, presentation of results at conferences and the publication of research results in peer-reviewed, leading international journals.

Details

Deadline October 8, 2020

Professeure ou professeur en génie côtier

L'Université du Québec à Rimouski

L'UQAR et le ministère des Transports (MTQ) s'associent pour mettre sur pied une chaire de recherche en génie côtier dédiée à la conception, la construction et la maintenance des infrastructures littorales. La constitution d'une chaire de recherche vient confirmer l'engagement de l'UQAR et du gouvernement du Québec dans une démarche de recherche de solutions concrètes aux enjeux auxquels sont exposées les communautés côtières et riveraines en ce qui a trait à la sécurité, à l'économie et à l'environnement. Au cours des dernières années, l'érosion côtière, plus particulièrement au cours d'épisodes de forte tempête, est devenue un enjeu majeur économique mais aussi de sécurité publique pour le Québec. Induit par les modifications de la dynamique côtière découlant des changements climatiques, ce phénomène est appelé à prendre de l'ampleur alors que, les changements dans le régime des vents, la diminution de l'étendue du couvert de glace et le relèvement du niveau des océans est appelé à s'accélérer au cours du 21^{ieme} siècle. L'érosion progressive du littoral et la submersion aux évènements de tempêtes menacent l'intégrité des infrastructures résidentielles, industrielles, portuaires et commerciales, ainsi que des infrastructures de transport régionales. La Chaire de recherche en génie côtier développera des connaissances de pointe desquelles émaneront des solutions novatrices et respectueuses de l'environnement pour réduire la vulnérabilité des populations et des infrastructures côtières et riveraines aux aléas environnementaux.

Pour soumettre une candidature

Date limite - 5 novembre 2020 à 16 h 30

Auxiliaire de recherche – Géomatique

l'Université du Québec à Rimouski

Le Laboratoire de dynamique et de gestion intégrée des zones côtières (LDGIZC) de l'Université du Québec à Rimouski (UQAR) recrute à titre d'auxiliaire de recherche un(e) géomaticien(ne) spécialisé(e) en traitement de données géospatiales et intelligence artificielle pour intégrer son groupe de travail sur les « dynamiques côtières récentes et actuelles ». Dans le cadre de ce projet, la personne recrutée aura pour rôle de concevoir et de mettre en oeuvre des procédés d'analyse géospatiale basés sur des méthodes d'apprentissage automatique (machine learning). Ces méthodes reposeront sur des techniques d'apprentissage profond (deep learning) en vue d'effectuer des tâches de segmentation et de classification d'objets et d'événements à diverses échelles spatiales sur la surface terrestre (principalement des objets, des formes et des processus géomorphologiques). Ces traitements seront appliqués à des données topomorphologiques tridimensionnelles de détail (LiDAR, photogrammétrie, bathymétrie), des images aériennes à très haute résolution (imagerie RVB issue de survols de drones à basse altitude), ainsi que toute autre donnée géospatiale dérivable de ces types de produits.

Laboratoire de dynamique et de gestion intégrée des zones côtières

UQAR Université du Québec à Rimouski

Pour soumettre une candidature

Date limite - 29 octobre 2020

Looking for work? Try the CMOS site (click).	*Vous recherchez un emploi? Visitez le site SCMO (click).*

GENERAL

Ottawa CMOS talks - Online

With talks for the foreseeable future going online, the Ottawa chapter of CMOS is opening up their talks to everybody. Our meetings are open to members and the public, but *it is important to be on our email list to receive the Doodle / Zoom co-ordinates for each meeting*. Meetings will be planned at lunch time - to sign in via Zoom - after 11:50 am followed by the presentation shortly after 12:00 noon by an invited speaker, questions after and discussion. Occasionally our meetings will be joint with partner groups or societies.

You can sign up to receive our Meeting Notices. Please click below and send the pop-up email, or manually send to jonesb@ncf.ca. See their **website** for upcoming events. The site is shared with the Canadian Association for the Club of Rome (CACOR) which has it's own seminar seties.

NSERC Prizes – Science Promotion

The NSERC Awards for Science Promotion honour people and groups that are inspirational in the way they promote science to the general public. The Awards are an opportunity for Canada's science community to recognize, support and encourage outstanding science promoters. NSERC invites all Canadians with an interest in science, including teachers and university researchers, to contribute to the success of this annual effort by nominating the people who are making others aware of what science means to all of us.

The achievements of individual and group recipients of the NSERC Awards for Science Promotion will be celebrated at a public ceremony. Individual recipients will receive a $10,000 award and group recipients a $25,000 award. In both cases, the funds are to support further science promotion activities. Funds paid to winners of this prize are subject to the PromoScience Grants Guide.

Nomination deadline: **November 25 before 8:00 p.m. (ET)**. If the deadline falls on a weekend or federal holiday, your nomination must reach NSERC before **8:00 p.m. (ET)** the following working day.

Science promotion activities with award potential could include activities such as:

- organizing science camps, fairs, clubs or programs with youth organizations;
- creating new learning materials;
- developing science and engineering-related co-op programs or job shadowing initiatives;
- arranging demonstrations, visits and lectures;
- writing books and articles;
- creating radio or television programs;
- generating public involvement through multi-media programs.

Nomination Form; Terms and Conditions Form for Nominees; Terms and Conditions Form for Nominators

2021 Call for SCOR Visiting Scholars

For more than a decade, SCOR has supported Ph.D. level ocean scientists from developed and developing countries to teach short courses and provide extended on-site education and mentorship at developing country institutions.

We are receiving applications for the 2021 Visiting Scholar program.

Applications will be reviewed by the SCOR Committee on Capacity Building based on the following criteria:

- Quality and relevance of the proposal focusing on knowledge exchange and mentoring
- A detailed plan for the visit
- Experience of the candidate and fit with the program (language skills, teaching/mentoring experience, subject areas requested by the institution)
- Needs of the host institution
- Plans by the host institution to build upon the training received

More information about the call and the application form can be found here.

Deadline for applications: 1st December 2020

Applications should be sent to: patricia.miloslavich@scor-int.org (Cc: secretariat@scor-int.org)

Patricia Miloslavich SCOR Executive Director

To all Early Career Scientists in Oceanic Research,

In 2018, the SCOR Executive Committee (EC) decided to incorporate an Early Career Scientist as one of the two co-opted members. This is a position that rotates in a two-years basis. The mission of this EC member is to reach out the broader early-career community and involve them in SCOR activities and projects.

SCOR has created an online survey aimed at gathering information that will facilitate the establishment of a network of networks, where all the early career marine scientists can be interconnected and together contribute to promote international cooperation in planning and conducting oceanographic research. Through this survey we are trying to pinpoint how SCOR can contribute in supporting the younger scientific community of marine scientists, and find the right channels to reach all the early career scientists associated someway to SCOR.

We would really appreciate if you could dedicate two minutes of your valuable time to fill this survey. Both SCOR and the early career scientists will benefit greatly from it.

Please feel free to forward this survey to other early career colleagues in ocean science. Wishing you all the best in your scientific careers, and good health in these difficult times.

Thanks and best regards,

Patricia Miloslavich SCOR Executive Director

SOLAS Summer School 2021

Ocean Science Centre Mindelo (OSCM) , Cape Verde from 7 - 18 June 2021

The SOLAS Summer School is a biennial, international event that aims to teach the skills and knowledge of the many disciplines needed to understand the nature of ocean-atmosphere interactions and how to link ocean-atmosphere interactions with climate and people.

Deadline for applications is the 6 November 2020.

Details

One Planet One Ocean - OceanMOOC Online

Dear Ocean Enthusiasts, Colleagues and Partners,

Yet again we celebrate the launch of our OceanMOOC, a joint production of the Future Ocean Network at GEOMAR and Kiel Marine Sciences, with the International Ocean Institute, Malta, and broadcast on the Education Platform of the SDG Academy, NY. The course has attracted over 22,000 participants over the past four years, and is back on popular demand

Especially in times of restricted movement, online learning makes an important contribution to global education for sustainable development, and our MOOC especially to SDG14 – Life Under Water.

What? : A Massive Open Online Course "One Planet One Ocean: From Science to Solutions"

Content? : Videos, Accessory Materials, Assignments, Quizzes and Discussions with ocean experts.

Pre-requisites? : None. The course targets scientists, students, practitioners and the interested public.

Where? : Online, registration at http://bit.ly/2MxkQap-oceans

Costs? : None. Auditing the course is free, a certificate option is available for 41 USD

When? : September 1st 2020 – August 31st 2021, registration possible any time.

Trailer: View at https://youtu.be/iwQH5Idq5iE

Animated overview of content: https://youtu.be/i34HSjDqK4M

Best wishes, Avan Antia

Prix du CNC du SCOR pour océanographe en début de carrière

Le prix pour océanographe en début de carrière est présenté à un océanographe ou à un spécialiste de la mer pour sa contribution exceptionnelle, en début de carrière, aux sciences de la mer (au sens large), au Canada. Le prix est octroyé soit pour un article ou une étude ponctuelle qui contribue de façon déterminante aux sciences marines, soit pour des travaux de longue haleine de haute qualité et qui apportent une contribution globale exceptionnelle.

- Le prix: le gagnant du prix recevra une plaque commémorative et une subvention du CNC du SCOR, qui lui permettra de se rendre au prochain Congrès de la SCMO pour recevoir son prix et présenter ses travaux. De plus, le lauréat pourra siéger au CNC du SCOR pendant un an, à partir de la date du Congrès où le prix lui sera décerné.
- Obligations du gagnant: le gagnant mentionnera le CNC du SCOR dans sa présentation au Congrès de la SCMO. On lui demandera de rédiger un article d'une ou deux pages portant sur ses travaux, pour publication dans le Bulletin canadien des sciences de l'océan.
- Histoire du prix: le prix est décerné pour la première fois en 2016. Y sont admissibles les candidats qui ont obtenu leur doctorat il y a moins de 10 ans et qui sont des Canadiens travaillant au Canada ou à l'étranger, ou des résidents permanents (notez que les périodes de congé, parental ou médical, par exemple, prises au cours de ces dix années, ne comptent pas, du moment que des preuves sont fournies). Le candidat peut travailler dans n'importe quel secteur des sciences de la mer: universitaire, gouvernemental, industriel, non gouvernemental, etc.
- Directives de nomination:
  - Les nominations doivent parvenir le 15 janvier au plus tard, par courriel, au secrétaire du CNC du SCOR (David.Greenberg@dfo-mpo.gc.ca) pour garantir que le comité de sélection en tienne compte. Un accusé de réception sera envoyé si le candidat le demande.
  - Le CNC du SCOR évaluera les nominations.
  - Les soumissions devront inclure une lettre de nomination soulignant les mérites du candidat (2 pages, maximum), deux à quatre lettres de soutien et un curriculum vitæ à jour du candidat.
  - Les nouvelles nominations qui n'auront pas été retenues seront prises en compte (et pourront être mises à jour) au cours des trois années subséquentes, ou moins, si le délai de dix ans est passé.

En 2017, Kim Davies s'est distinguée pour ses recherches sur les baleines qui se poursuivent à l'UNB Saint John.// In 2017 Kim Davies was honoured for her whale research which continue at UNB Saint John.

Notre premier lauréat, Stephanie Waterman, travaille sur plusieurs aspects de la circulation océanique à UBC.//Our first laureate, Stephanie Waterman, is working on several aspects of ocean circulation at UBC.

CNC-SCOR Early Career Ocean Scientist Award

Cathryn Clarke Murray, 2019, leads invasive species research at DFO's Institute of Ocean Sciences//Cathryn Clarke Murray, 2019, dirige la recherche sur les espèces envahissantes à l'Institut des sciences de la mer du MPO.

CNC-SCOR 2020 Early Career Scientist Award Winner Louis-Philippe Nadeau continues his work on multi-scale ocean circulation.//Le lauréat 2018, Louis-Philippe Nadeau, poursuit des travaux sur la circulation océanique multi-échelle.

Daniel Boyce, the 2018 awardee, continues his ground-breaking work related to Marine food webs at the Ocean Frontier Institute (Dalhousie University)//Le lauréat 2018, Daniel Boyce, poursuit ses travaux novateurs sur les réseaux trophiques marins au Ocean Frontier Institute (Dalhousie University).

The Early Career Ocean Scientist Award is presented to an early career oceanographer/marine scientist for an outstanding contribution to marine sciences (in the broadest sense) within Canada. The award can be based on a single work/paper that provides a seminal contribution to the field, or ongoing work at a sufficiently high level of excellence that provides an outstanding overall contribution.

- The Award: The award winner will receive a plaque with the award, as well as funds, from CNC-SCOR, to travel to the upcoming CMOS congress to receive the award and present a paper. Additionally, the award winner will invited to sit on the CNC-SCOR committee for 1 year beginning with the CMOS Congress associated with their award
- Obligations of winner: The winner will acknowledge CNC-SCOR on their presentation at the CMOS-Congress, and will be asked to provide a 1 to 2 page article on their research for the Canadian Ocean Sciences Newsletter.
- History of the Award: The award was presented for the first time in 2016. It is open to candidates (Canadians, working in Canada or overseas, or permanent residents) who are within 10 years of completion of their Ph.D. (note that periods of leave (e.g., parental, health) during this period do not count against the 10 year duration, provided appropriate documentation is provided). The candidate can work in any area of marine sciences, including academia, government, industry, NGO's, etc.
- Award Nomination Instructions:
  - Nominations are to be received no later than 15 January, by email to the CNC –SCOR secretary: David.Greenberg@dfo-mpo.gc.ca to be considered by the selection Committee. Receipt of submissions will be provided if requested.
  - Nominations will be adjudicated by the CNC-SCOR committee
  - Nominations will require a nomination letter highlighting the nominee's merits (maximum 2 pages), plus 2-4 supporting letters as well as an up to date CV of nominee
  - Nominations not selected for the award in previous years will be maintained active for three subsequent years (although they can be updated) or until the 10-year deadline has passed.

Canadian Ocean Science Newsletter
Le Bulletin Canadien des Sciences de l'Océan

Previous newsletters may be found on the CNC/SCOR web site.

Newsletter #**115** will be distributed in **November 2020**.

Please send contributions to David Greenberg david.greenberg@dfo-mpo.gc.ca

Subscribing and Unsubscribing

If you wish to subscribe to this newsletter or cancel your subscription, please visit the website:

http://www.mailman.srv.ualberta.ca/mailman/listinfo/cnc-scor

Les bulletins antérieurs se retrouvent sur le site web du CNC/SCOR.

Le Bulletin #**115** sera distribué en **novembre 2020**.

Veuillez faire parvenir vos contributions à David Greenberg, david.greenberg@dfo-mpo.gc.ca

Abonnement et désabonnement

Si vous souhaitez vous abonner à cette newsletter ou annuler votre inscription, veuillez visiter le site web:

http://www.mailman.srv.ualberta.ca/mailman/listinfo/cnc-scor

CNC-SCOR

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Le Comité national canadien du Comité scientifique de la recherche océanographique (SCOR) favorise et facilite la coopération internationale. Il reflète la nature multidisciplinaire de la science océanique et de la technologie marine.

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The Canadian National Committee of the Scientific Committee for Oceanic Research (CNC-SCOR) fosters and facilitates international cooperation. It is a non-governmental body that reflects the multi-disciplinary nature of ocean science and marine technology.

WWW.CNCSCOR.CA