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SCMO

Canadian Meteorological and Oceanographic Society

La Société canadienne de météorologie et d'océanographie

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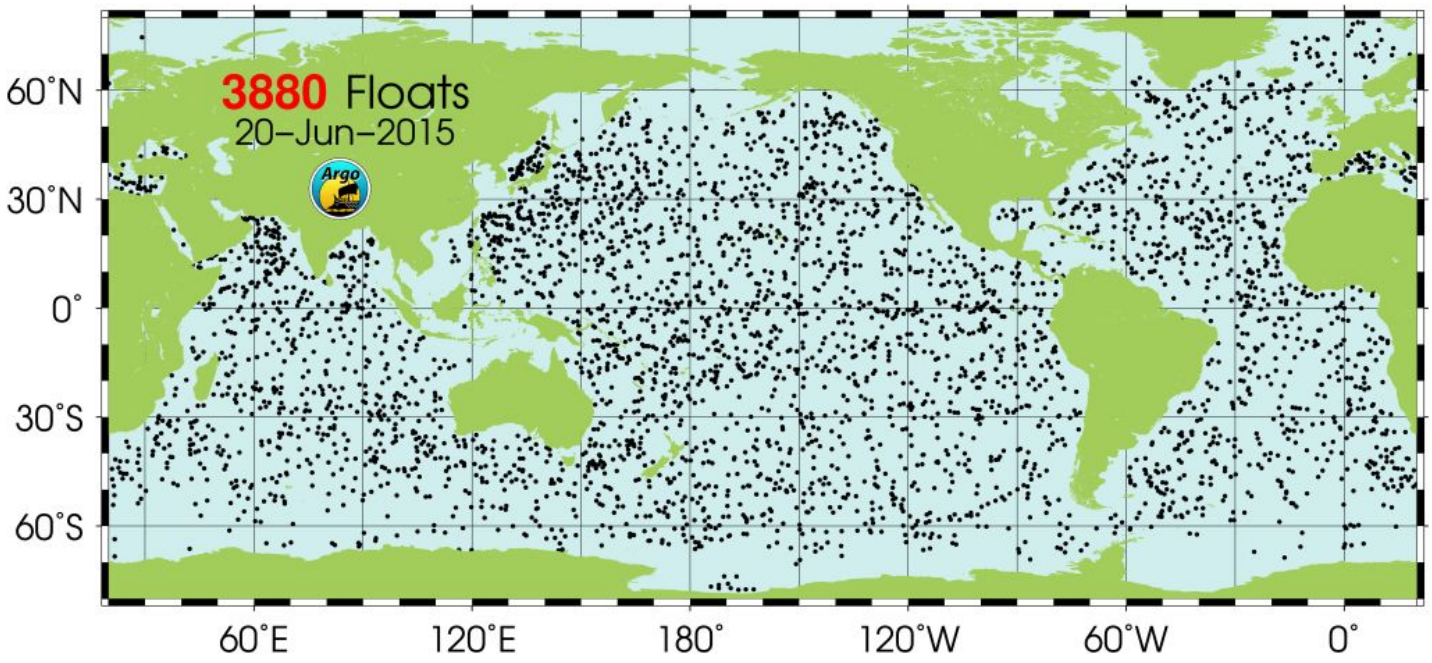
Vol.43 No.4

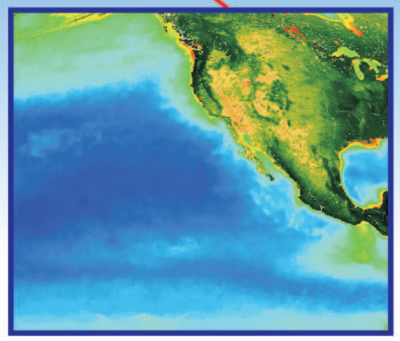
International Argo Program Floats Status



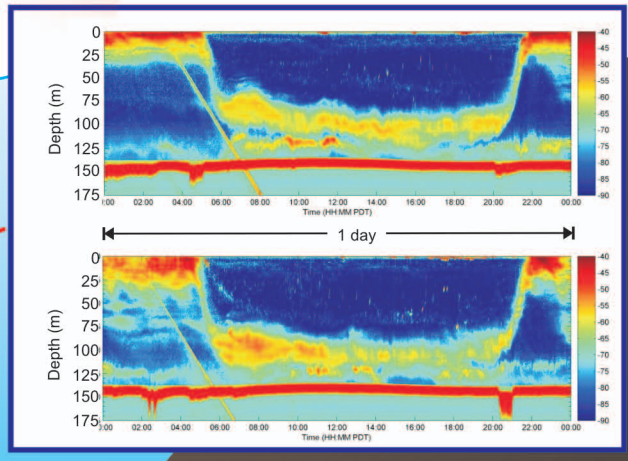
État des flotteurs-profileurs du programme international Argo

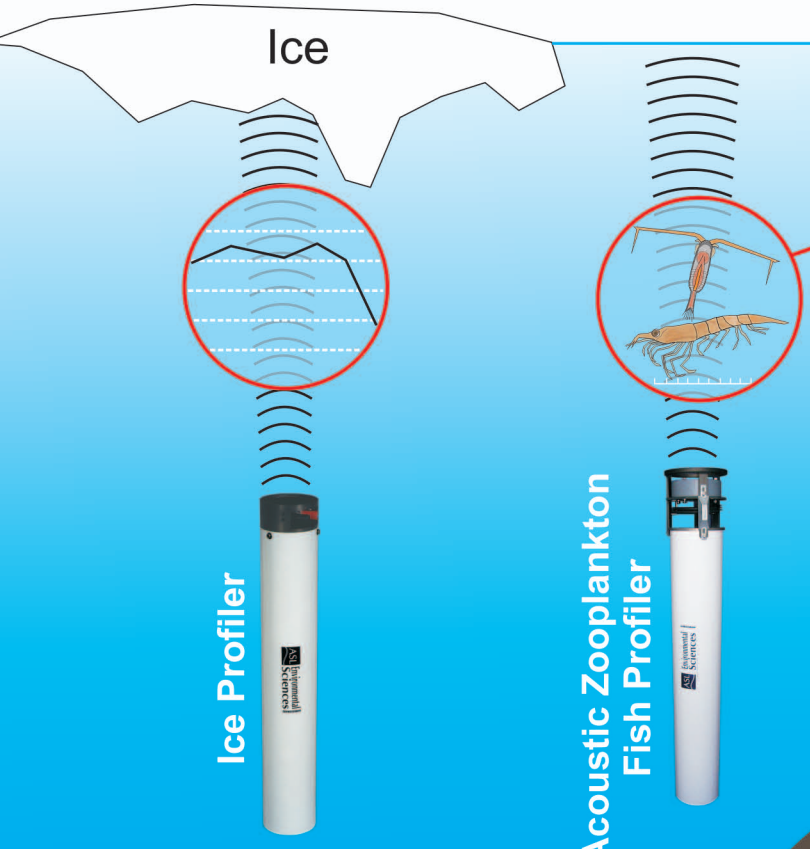
ASL Environmental Sciences

Oceanographic specialists/
Spécialistes océanographiques



Ocean colours are chlorophyll concentrations and land colours are NDVI





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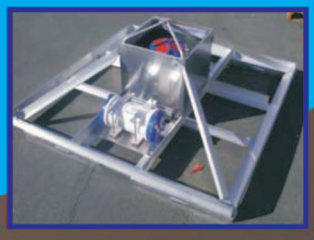

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.... Words from the President

Friends and Colleagues:

Martha Anderson
CMOS President
Présidente de la SCMO

As you receive this Bulletin in late summer, I trust you have all had a chance to relax and enjoy our short Canadian summer months. Before we know it, we will back to September classes and meetings.

In June, many of us attended the 49th CMOS Congress in Whistler B.C. I would like to again thank the Chair of the Local Arrangements Committee, Ken Kwok, and the Chair of the Scientific Program Committee, Bruce Ainslie, both of Environment Canada. The congress was an excellent event for all who attended. A report penned by Bob Jones is included in this publication. With travel funds being limited in government in recent years, some of our usual networking opportunities are missed at congress. We will be aiming to use on-line webinars in the coming months to share our scientific community's news. The planned webinar program will include some government presenters who did not get to travel to congress, and also some congress presentations that will be repeated for those who were not able to attend. I encourage everyone to join these sessions if possible, and also feel free to send other webinar or tour speaker ideas to the national executive.

In the past year we signed a Memorandum of Understanding (MoU) with the American Meteorological Society (AMS) that covered many topics that will be beneficial to cross-border cooperation and information sharing. I myself got an AMS membership at the reduced rate, and I am now enjoying the US publications Weatherwise and the AMS Bulletin, as well as the weekly email "News you can Use" with links to current events and timely topics. I encourage other CMOS members to take advantage of this. In January at the AMS Annual Meeting in New Orleans, AMS and CMOS will co-host the 4th Meeting of the International Federation of Meteorological Societies (IFMS – www.ifms.org). I would like to thank our Past-President Harinder Ahluwalia for taking a leadership role as the coordinator of this upcoming event.

[Continued on page 123]

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CMOS Bulletin SCMO
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Cover page: The international Argo program vastly improved open ocean sampling through the deployment of over 3880 robotic profiling floats in world oceans. These freely drifting floats take profiles of temperature and salinity every ten days from 2000 m depth to the surface. They provide oceanographers and meteorologists with real-time temperature and salinity data year-round and typically last four to five years. The cover page illustrates the coverage of the profiling floats over world oceans as of 20 June 2015. To learn more about the Canadian program, please read the Argo team's short article on **page 128.** Picture shown is courtesy of University of California San Diego [http://www.argo.ucsd.edu/statusbig.gif].

Page couverture: Le programme international Argo a grandement amélioré l'échantillonnage de l'océan hauturier par le déploiement de plus de 3880 flotteurs-profileurs robotiques dans l'océan mondial. Ces flotteurs qui dérivent librement prennent des profils de température et de salinité tous les dix jours de 2000 m de profondeur jusqu'à la surface. Ils fournissent aux océanographes et météorologues des données de température et salinité en temps réel pendant toute l'année et durent généralement de quatre à cinq ans. La page couverture illustre la position des profileurs dans les océans du globe en date du 20 juin 2015. Pour en connaître plus sur le programme canadien, prière de lire le court article de l'équipe Argo en **page 128**. L'illustration est offerte par l'University of California San Diego [http://www.argo.ucsd.edu/statusbig.gif].

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Canadian Meteorological and Oceanographic Society (CMOS)
Société canadienne de météorologie et d'océanographie (SCMO)

Council / Conseil d'administration

.... Words from the President [Continued / Suite]

In July, I visited the Fredericton area and joined some of the local CMOS members for a social get-together at the Delta Hotel next to the scenic Saint John River. They are very excited to be hosting the 50th CMOS Congress in June 2016, which will be a joint Congress with the Canadian Geophysical Union (CGU).

Martha Anderson, CMOS President

.... Allocution de la présidente

Chers amis et collègues,

Ce bulletin vous arrive alors que la saison chaude tire à sa fin. J'espère que vous avez trouvé le temps de relaxer et de profiter du trop court été canadien. Sans nous en rendre compte, septembre sera de retour avec son lot de cours et de réunions.

En juin, beaucoup d'entre nous avons assisté au 49e Congrès de la SCMO, à Whistler (C.-B.). Je remercie à nouveau le président du comité local d'organisation, Ken Kwok, et le président du comité du programme scientifique, Bruce Ainslie, tous deux d'Environnement Canada. Le congrès s'est avéré un événement de premier ordre pour tous les participants. Un rapport de Bob Jones figure dans cette publication. Comme le gouvernement limite depuis quelques années les frais de déplacement, nous avons perdu certaines occasions de réseautage. Nous tenterons de diffuser des webinaires en ligne dans les prochains mois, afin de partager les nouvelles de notre communauté scientifique. Le programme prévu de webinaires comprendra des présentateurs issus du gouvernement qui n'ont pas pu se rendre au congrès. En outre, des présentateurs reprendront les exposés faits durant le congrès, afin d'en faire profiter les gens qui les ont manqués. Je vous encourage tous à vous joindre à ces séances. N'hésitez pas non plus à transmettre à l'exécutif national des sujets pertinents pour les webinaires ou les conférenciers itinérants.

L'an passé, nous avons signé avec l'American Meteorological Society (AMS) une entente qui couvre divers aspects améliorant la coopération et le partage d'information au-delà de la frontière. Je me suis moi-même prévalue de la réduction consentie pour adhérer à l'AMS. Je profite donc de la revue américaine Weatherwise et du Bulletin de l'AMS, ainsi que des courriels hebdomadaires « News you can Use », qui contiennent des liens vers des sujets pertinents et d'actualité. J'encourage tous les membres de la SCMO à s'en prévaloir. En janvier prochain, le congrès annuel de l'AMS se tiendra à La Nouvelle-Orléans. L'AMS et la SCMO accueilleront conjointement le 4e congrès de l'International Forum of Meteorological Societies (IFMS – www.ifms.org). Je remercie notre président sortant Harinder Ahluwalia de s'être porté volontaire pour coordonner cet événement.

En juillet, j'ai visité la région de Fredericton. J'ai socialisé avec des membres de la SCMO, au cours d'une rencontre à l'hôtel Delta, situé près de la magnifique rivière Saint-Jean. Ces membres sont très heureux d'accueillir le 50e Congrès de la SCMO en juin 2016, un événement organisé conjointement avec l'Union géophysique canadienne (UGC).

Martha Anderson, Présidente de la SCMO

Next Issue *CMOS Bulletin SCMO*

Next issue of the *CMOS Bulletin SCMO* will be published in **October 2015.** Please send your articles, notes, workshop reports or news items before **September 4th, 2015** to the electronic address given at the top of page 122. We have an URGENT need for your written contributions.

Prochain numéro du *CMOS Bulletin SCMO*

Le prochain numéro du *CMOS Bulletin SCMO* paraîtra en **octobre 2015.** Prière de nous faire parvenir avant le **4 septembre 2015** vos articles, notes, rapports d'atelier ou nouvelles à l'adresse électronique indiquée au haut de la page 122. Nous avons un besoin URGENT de vos contributions écrites.

CMOS exists for the advancement of meteorology and oceanography in Canada.
Le but de la SCMO est de promouvoir l'avancement de la météorologie et l'océanographie au Canada.

This publication is produced under the authority of the Canadian Meteorological and Oceanographic Society. Except where explicitly stated, opinions expressed in this publication are those of the authors and are not necessarily endorsed by the Society.
Cette publication est produite sous la responsabilité de la Société canadienne de météorologie et d'océanographie. À moins d'avis contraire, les opinions exprimées sont celles des auteurs et ne reflètent pas nécessairement celles de la Société.

El Niño / Niña Update as of 15 June 2015

Current Situation and Outlook

The tropical Pacific atmosphere and ocean are currently at moderate El Niño levels. The majority of international El-Niño Southern Oscillation (ENSO) climate models suggest that tropical Pacific temperatures are likely to continue warming, and possibly reach strong El Niño levels, in the coming months. However, model outlooks made at this time are not as accurate as those made during the second half of the year, and hence more confident estimates of event strength will be available after mid-year.

The *CMOS Bulletin SCMO* expects to publish a more comprehensive analysis of this phenomenon in a future issue.

Source: WMO Press Release.

El Niño / Niña Mise-à-jour au 15 juin 2015

Situation actuelle et perspectives

Les indicateurs atmosphériques et océaniques du Pacifique tropical correspondent actuellement à un phénomène El Niño d'intensité modérée. D'après la majorité des modèles climatiques ENSO (El Niño/Oscillation australe) internationaux, le réchauffement du Pacifique tropical devrait se poursuivre dans les mois à venir et pourrait atteindre des niveaux correspondant à un épisode El Niño marqué. Cependant, à cette époque de l'année, les modèles ne donnent pas des résultats aussi fiables que pendant le second semestre. Ainsi, l'intensité de cet épisode pourra être estimée plus correctement en deuxième partie de l'année.

Le *CMOS Bulletin SCMO* tentera de publier une analyse plus complète du phénomène dans un prochain numéro.

Source: Communiqué de presse de l'OMM.

Articles

Which is More Polluted, Delhi or Beijing?

by Douw G. Steyn[1]

This question seems like an ill-advised race to the bottom, but does deserve an answer, as previous attempts to settle the matter have ignored the real complexities of air pollution. Comparisons based on annual average pollution concentrations, such as presented by the World Health Organization ignore the fact that the intermittently occurring severe days have strong human health effects. Comparisons based on individual days ignore the effects of different weather conditions in the two cities. These comparisons are facilitated by websites such as http://aqicn.org.

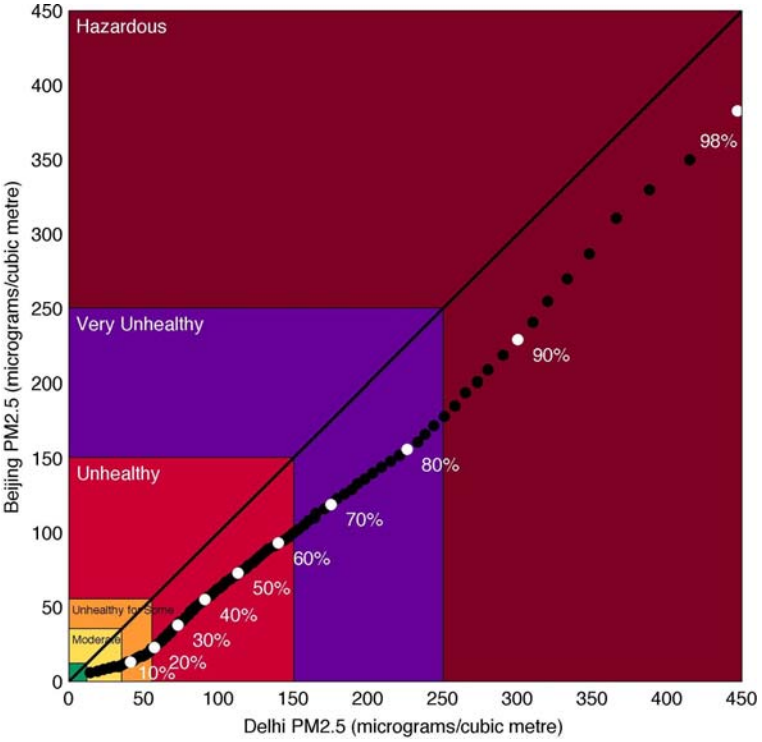
The only statistically meaningful comparison is through a comparison that covers a wide range of conditions over a time span long enough to produce statistically meaningful conclusions. The primary tool for this is a comparative plot of data percentiles of pollution at two representative locations in the cities in question. These locations are not directly affected by pollution from individual large sources such as industries or traffic intersections. They can thus be considered representative of city-wide atmospheric conditions.

The accompanying figure is based on two years of hourly average PM2.5 concentration data in microgrammes per cubic metre from the R.K. Puram pollution measurement station in Delhi, and the U.S.A. Embassy station in Beijing. These data are collected and managed by relevant pollution regulation agencies, and are subject to rigorous quality checks. Data as percentiles are plotted as black dots, and the diagonal line indicates exact equality in pollution concentrations. Numbers below the dots show percentiles. For example, the 80th percentile is the pollution concentration at which 80% of conditions are worse, and 20% better, and so on.

Because the plotted dots are all below the diagonal line, Delhi is more polluted for all percentiles, no matter what time average is used. The upper 17% of conditions in Delhi are hazardous, while 7% of conditions in Beijing are hazardous. Unpolluted conditions are found in Delhi for less than 1% of the time, while such conditions exist in Beijing approximately 8% of the time.

Colour shading on the graph indicates the severity of PM2.5 pollution based on worldwide accepted standards as laid out in http://www.airnow.gov. Unpolluted conditions are indicated by the green square. It is thus evident that both Delhi and Beijing are unacceptably polluted for a large fraction of time, and that their citizens are subjected to pollution related health effects. This fact makes irrelevant any pollution comparisons between the two cities.

Citizens and government in both cities should be working together aggressively to improve this unacceptable level of pollution. The costs of such pollution are enormous drains on national and local budgets, but sadly these costs are not included in economic analyses. The costs of pollution reduction are far smaller than the costs of pollution damage, and simple technological solutions are readily available. What is needed is political will, which can only come from an informed and actively engaged population.



Note from the author: I recently wrote a report for the Hindustan Times (published out of New Delhi, one million copies printed a day). Based on my report, one of their journalists wrote a piece that appeared on the front page. The link is: http://www.hindustantimes.com/newdelhi/toxic-capitals-delhi-vs-beijing-air-in-one-chart/article1-1339725.aspx

[1] Director, CMOS Publications, The University of British Columbia, Canada

Preparing Canada to Face the Realities of Flooding – NSERC Canadian FloodNet –

www.nsercfloodnet.ca; Twitter: @NSERCFloodNet

by Kurt C. Kornelsen[1], Paulin Coulibaly[1,2] and the FloodNet Team

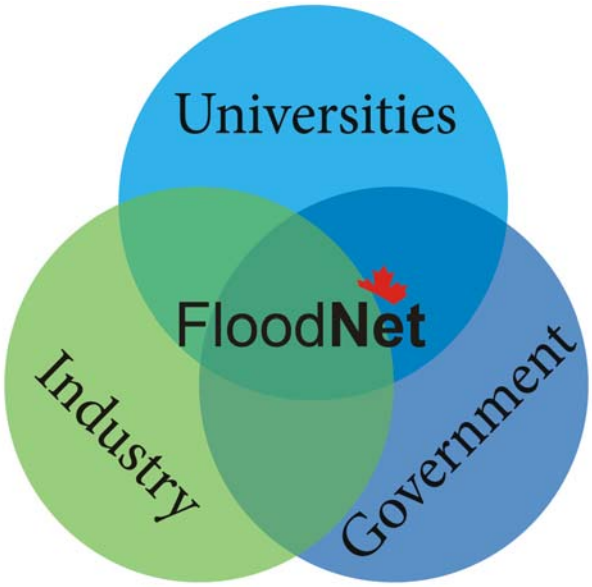
Introduction

In Canada, floods are recognized as the most common, largely distributed, natural hazard to life, property, the economy, community/industry water systems, and the environment. Flooding has resulted in two of the most costly natural disasters in Canadian history, both in the last half-decade. In 2011, the province of Manitoba was subject to very extensive flooding with costs estimated to be about $1.2 billion (Manitoba Flood Review Task Force [MFRTF], 2013). In June 2013, flooding of the Bow and Elbow Rivers in Alberta became the province's worst ever natural disaster with estimated costs of $6 billion (Wood, 2013). These costs are expected to rise in the coming decades as long term climate change increases the frequency and intensity of rainfall in many parts of the country (Greve et al. 2014; Dirmeyer et al. 2014) and human development continues to increase.

To understand the nature of flood mitigation it is important to start with an appreciation of the term "flood". The term is associated both with higher than normal water levels as well as simultaneously being a natural "disaster". The latter interpretation has developed into the concept that floods should be prevented or are an issue which society should be protected against (Samuels et al. 2006). A modern view of flooding seeks to understand flooding in terms of "risk" being a combination of water levels and the potential for negative consequences or resulting damage. A holistic approach to flood management is based on the idea that a sustainable balance must be struck between human development and making space for water (Samuels et al. 2006). This approach is challenging in a nation as geographically diverse as Canada, a reality which makes the establishment of national flood strategies difficult. This challenge has resulted in the development of the NSERC Canadian FloodNet as a national vehicle for collaboration between researchers and flood-related practitioners to address issues connected to flooding and facilitate the transfer of knowledge to end-users.

What is FloodNet

FloodNet is a multi-disciplinary research network with active end-user involvement. It is primarily funded by the Natural Sciences and Engineering Research Council of Canada (NSERC) with contributions from organizations and government agencies that have partnered with FloodNet. The Network consists of over 20 leading university researchers from across Canada joined by scientists, engineers, and other practitioners from municipal, provincial, and federal government agencies, industrial partners, and non-governmental organizations. The partnership between academic researchers and partner organizations is a key strength of FloodNet. This partnership is critical to ensuring the relevance of the research program and the transference of findings and intellectual property so that it can be of direct benefit to Canadians.



[1] NSERC Canadian FloodNet, McMaster University, Hamilton, Ontario, Canada

[2] Department of Civil Engineering & School of Geography and Earth Science, McMaster University, Hamilton, Ontario, Canada

Overview of the FloodNet Scientific Program

The research program of the NSERC Canadian FloodNet is grouped into four inter-related themes, each designed to build knowledge that can be transferred to other themes.

Theme 1: Flood Regimes in Canada: Learning from the Past and Preparing for the Future

The goal of Theme 1 is to develop an understanding of extreme events in Canada and provide guidelines for infrastructure design. This is a challenging task in a nation as large and physically diverse as Canada. FloodNet researchers are studying the spatial and temporal variability of extreme precipitation and how well that variability is represented in general circulation model (GCM) and numerical weather prediction (NWP) outputs. This information will be used to identify regions within Canada where extreme precipitation patterns are caused by similar mechanisms or have similar at-site characteristics. These grouped hydro-climatic regions are important for updating Intensity, Frequency, and Duration (IDF) curves used for infrastructure design across the country. In a coordinated effort, FloodNet researchers will systematically compare methods for updating IDF curves giving consideration to the spatial and temporal properties of extreme rainfall. Combined, this information will give rise to a manual for updating IDF curves in which standard procedures can be identified, while allowing for flexibility to respect the regional hydro-meteorological conditions across the country.

Theme 2: Quantifying and Reducing Predictive Uncertainty of Floods

Many operational streamflow forecasts are produced using a single model producing what is known as a deterministic output (single realization). It is now widely accepted that reliable decision making requires an indication of the uncertainty in the forecast. This is most reliably accomplished using a model ensemble, either from a precipitation ensemble, by perturbing the parameters of the hydrological model, by including multiple hydrological models or a combination of all three. Since any model is an abstraction of real systems, it is impossible to determine which model will have the greatest predictive capability for a given set of conditions, making multi-model approaches a top priority (Wetterhall et al. 2013). Findings from this Theme will be used to create more reliable forecasts of flooding and streamflow.

Theme 3: Development of the Canadian Adaptive Flood Forecasting and Early Warning System (CAFFEWS)

Following the 2011 flood of the Assiniboine River in Manitoba, a flood review task force was convened. The task force concluded that a major issue related to the Assiniboine River flood was that the "flood forecasting model was unable to provide accurate and reliable forecasts" (MFRTF, 2013). The lack of reliable information for decision makers is problematic when decisions about evacuations, breaching of levees or deployment of emergency services is required. CAFFEWS will be a state of the art ensemble flood forecasting and early warning system implementing the advances made in Theme 2. Information from ground-based monitoring networks, radar rainfall products and satellite derived soil moisture and snow cover information will be used to force and update the internal state of hydrological forecasting models, increasing the realism of the model conditions and improving the quality of streamflow forecasts. Part of the CAFFEWS development will include novel peer-to-peer (P2P) communication technologies allowing field sensor data and flood warnings to hop from device to device in the event of power or communication infrastructure failure. An important feature of CAFFEWS will be an adaptive system to allow substitution of different models to fit the diverse geographical and hydro-climatic conditions across Canada.

Theme 4: Risk Analysis of Physical, Socio-Economic and Environmental Impacts of Floods

The impact of floods is often considered from a purely structural point of view, however, the socio-economic and environmental impacts of floods should also be considered. Flooding can damage agriculture (crops and livestock) and spill sewage and other toxic materials to waterways. However, it also provides ecosystem services including groundwater recharge, filling wetlands, rejuvenating soils and increasing fish production. Therefore, there is a necessary balance to be struck between mitigating floods and the preservation of water flow for ecosystem and human well-being (Poff et al. 2003). The study of ecosystem responses will be used to provide information about the human impact on the natural environmental systems. Building upon these field based studies, a physical model-based integrated assessment approach will link the impacts of floods on the environment, urban and rural water resources. This will allow watershed managers to better predict the physical impacts of a particular magnitude flood prior to its actual occurrence and make management decisions accordingly. Research in Theme 4 will also explore the socio-economic impacts of floods. The investigators are exploring the costs and benefits of locating homes and businesses in flood prone areas for different stakeholder groups (i.e. home owners and farmers). Different stakeholders will perceive the cost/benefit ratio of flooding differently resulting in different responses and levels of risk tolerance. This research will produce an index of social and economic vulnerability to the impacts of floods.

Benefits to Canada

The NSERC Canadian FloodNet exists to achieve what segregated scientists or engineers cannot individually, that is to provide a holistic approach to enhance flood forecasting and management capacity in Canada. The diverse geography, people, and economies of Canada make the establishment of national flood management/forecasting standards a difficult task. Addressing the myriad of issues surrounding flooding requires a national effort to develop local solutions. The goal of FloodNet is to provide a strong scientific foundation

upon which flood management and forecasting can be built across the country. By exploring the spatial and temporal changes in rainfall distribution, streamflow and the environmental and societal impacts of floods, the FloodNet research program will provide flexible guidelines for flood planning and management that can be adapted to meet jurisdictional needs. Similarly, the development of CAFFEWS will provide a state of the art adaptive tool that can be tailored to fit local hydro-meteorological conditions. By partnering with end-users across country, FloodNet will ensure advances made are achieved in collaboration with the user community. It is our hope that this inter-connected network will bridge the gap between research and operational practitioners, bringing real benefits to Canadians in a timely manner.

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Argo Canada

On April 1st 2015, Argo Canada underwent a transition in leadership with Denis Gilbert (Institut Maurice-Lamontagne) being replaced by Blair Greenan (Bedford Institute of Oceanography) as Scientific Director. Argo Canada is a national program supported by DFO (Department of Fisheries and Oceans) headquarters staff as well as regional team members on both the Atlantic and Pacific coasts.

www.meds-sdmm.dfo-mpo.gc.ca/isdm-gdsi/argo/index-eng.html

The program has been a success because of the contributions of numerous individuals since its inception more than a decade ago. We are working hard to ensure program stability with the support of senior DFO management. [See Argo array status graph as of 20 June 2015 on cover page].

Argo Canada contributes to the International Argo Program (www.argo.ucsd.edu), which is guided by the Argo Steering Team (AST). The AST meets annually to provide scientific leadership and oversee the development and implementation of the global array; meeting reports are available at www.argo.ucsd.edu/Meeting_reports.html. Dr. Greenan is a member of the AST, as is DFO Emeritus Scientist Howard Freeland who is currently the Argo Director for the international program.

In addition to ensuring a stable core Argo program, the international community is undertaking new initiatives which include the development of deep Argo floats having the capability to profile to depths as great as 6000 m. There is also significant effort underway to implement a global strategy for the inclusion of biogeochemical sensors on the Argo platform (Bio-Argo). In September 2015, a science conference will take place in Galway, Ireland to address sustained ocean observing for the next decade (www.gaic2015.org); this meeting will bring together scientists from the GO-SHIP (Global Ocean Ship-based Hydrographic Investigations Program), Argo, and IOCCP (International Ocean Carbon Coordination Project) programs to discuss synergies, and to promote and coordinate sustained observations of the water column to reveal the changing physics, chemistry, and biology of the ocean.

Blair Greenan
Scientific Director, Canadian Argo
Bedford Institute of Oceanography

Reports / Rapports

49th CMOS Annual Congress Whistler, BC 49e Congrès annuel de la SCMO

2015 Parsons Medal Award Presentation

Note from the Co-Editor: At the annual congress of the Canadian Meteorological and Oceanographic Society in Whistler, on Tuesday June 2, **Carmel Lowe**, Regional Director, Science, Pacific Region. Department of Fisheries and Oceans Canada, presented the **2015 Parsons Medal** in Multidisciplinary Ocean Science from Fisheries and Oceans Canada to **Dr. Chris Harley,** marine biologist at University of British Columbia. We are pleased to reproduce here her presentation note at the Patterson-Parsons luncheon.

Good afternoon honoured guests, ladies and gentlemen. Bonjour, chers invités, mesdames et messieurs.

I would like to begin by extending my sincere thanks to the Chair of the Local CMOS Committee, William Hsieh, and his team for organizing today's event, as well as to the CMOS President Harinder Ahluwalia. The first day and a half of the 2015 Congress has showcased exciting and important new research being done in oceanography and I extend my best wishes for an equally interesting and successful remainder of the congress.

Further, I wish to thank all of you for making the time to be here today to join me in acknowledging the accomplishments of an outstanding scientist who has contributed much to the field of ocean science.

I am aware that many of you in the audience know of Dr. Parsons, for whom the award is named. For those who do not know his work, perhaps some of you that are just beginning your career, let me take a moment to introduce you to Timothy Parsons who today is enjoying a well-deserved, but very busy, retirement. Dr. Parsons had a distinguished career as a researcher with the Fisheries Research Board of Canada, as a university professor, a mentor, and a broadly-read author. Throughout his career, he adopted a holistic approach to ocean ecology, and in particular, to understanding how pelagic organisms are interconnected in the oceanic food-web. He is regarded around the world as a major contributor to the development of biological oceanography and is personally responsible for many of the standard analysis methods used in the field. The Parsons Award is presented annually and all applicants are evaluated, by a committee of their peers, on the basis of these five criteria:

- Significant contributions to multidisciplinary ocean sciences;
- Contribution of significant ideas;
- Impact of significant publications;
- Leadership through teaching / mentoring; and
- Program, disciplinary and interdisciplinary leadership activities.

In addition the candidates are evaluated for:

- Distinguished accomplishments in multidisciplinary facets of ocean sciences while working for Canadian institutions or for the benefit of Canadian science; and
- Excellence during the lifetime of the recipient or for a recent outstanding achievement, both being equally eligible.

I would now like to introduce to you, the recipient of this year's award. This year's winner was nominated both for his research and for his exceptional mentoring of interdisciplinary scientists which together have made significant contribution to the field of ocean science. Distinguished guest, Ladies and Gentlemen, it gives me great pleasure to introduce to you the 2015 recipient of the Timothy R. Parsons Medal, Dr. Christopher Harley.

Dr. Harley received his B.Sc. degree in Aquatic Biology from Brown University and his Ph.D. in Zoology from the University of Washington. After post-doctoral positions at Stanford and at University of California, Davis, he came to UBC as a Professor, where he runs the Harley Lab, which focuses on coastal marine ecology and the impacts of climate change. This picture and caption are from his University of British Columbia website – obviously this lab has wonderful views but he works in a more traditional laboratory too.

Welcome to the Harley Lab

The Adjudication Committee noted that Dr. Harley's work combines eco-physiological work in the laboratory with long-term monitoring and ecological experiments in the field to understand how various aspects of global change, alone and in combination, affect the ways in which species interact with one another and ultimately influence the distribution and abundance of marine plants and animals. The aspects of change he investigates include global warming, ocean acidification, and invasive species, which all threaten natural ecosystems and the benefits that they provide. The Adjudication Committee also cited Dr. Harley for his work in establishing the importance of species interactions and multiple stressors in climate change effects on species and communities, and his mentorship of students.

Dr. Christopher Harley

Letters of support for Dr. Harley's nomination cited many examples of his important contributions, but I would like to highlight a few:

- His research is ground-breaking in that it scales up from the direct physiological and behavioural impacts of climate change on individual organisms to the indirect effects mediated by altered trophic and disease interactions between species.

- Climate change affects not only ocean temperature, but also acidity, dissolved CO_2, wave strength and salinity (via altered freshwater discharge). Dr. Harley has studied not only the effects of each of these stressors individually, but also in combination. In a landmark study (Harley and Paine 2009), he has shown that the chance alignment of multiple stressors can cause abrupt change to marine populations, even though each stressor individually predicts only gradual change. Detection of such multiple-stressors thresholds is challenging, but Dr. Harley and colleagues have developed robust models for their prediction and detection.

- Dr. Harley complements his experimental work with long-term and regional datasets, providing unique insights that elude either method in isolation.

- The biological effects of ocean acidification (OA) are much less understood than warming effects. Dr. Harley's lab is conducting ground-breaking research here, such as the first study of OA impacts on fertilization under realistic conditions and one of the first studies to document potential adaptive responses to OA.

On behalf of Fisheries and Oceans Canada, it gives me great pleasure to present him with the Timothy R. Parsons award for excellence in multidisciplinary ocean sciences.

Congratulations from all the CMOS community to Dr. Christopher Harley.

Carmel Lowe (presenter), Chris Harley with Zoe, Sam, and Christina

2014 Patterson Medal Presentation

Please note that the winner of the 2014 Patterson Medal, for excellence in meteorology, was not announced because Assistant Deputy Minister David Grimes was out of the country attending World Meteorological Organization meetings.

Notes from the Co-Editor:

Photos are courtesy of LAC.

The year number for the Parsons medal is the year of presentation of the medal to its recipient.

The year number for the Patterson medal is the year before the year of presentation of the medal to the recipient.

CMOS Prizes and Awards announced at the 49th Annual Banquet
Remise des prix et récompenses de la SCMO au 49e banquet annuel

Sea to Sky Ballroom A, Whistler Conference Centre, Whistler, British Columbia
Wednesday, June 3, 2015 / Mercredi, le 3 juin 2015

President's Prize may be awarded each year to a member or members of the Society for a recent paper or book of special merit in the fields of meteorology or oceanography. The paper must have been accepted for publication in *Atmosphere-Ocean*, the *CMOS Bulletin SCMO* or another refereed journal.

Martin Leduc receiving the prize in the name of Damon Matthews from President Harinder Ahluwalia

Awarded in 2014 to **Dr. Damon Matthews**, Concordia University, for his meritorious paper (co-authored with Caldeira) entitled "*Stabilizing climate requires near-zero emissions*" published in Geophysical Research Letters in 2008.

Harinder Ahluwalia presenting the medal to Dr. Ann Gargett

Tully Medal in Oceanography may be awarded each year to a person whose scientific contributions have had a significant impact on Canadian oceanography.

Awarded in 2014 to **Dr. Ann Gargett**, Institute of Ocean Sciences, for her pioneering research on the turbulence and microstructure in the oceans.

Andrew Thomson Prize in Applied Meteorology may be awarded to a member or members of the Society for an outstanding contribution to the application of meteorology in Canada.

Dr. Diana Verseghy and President Harinder Ahluwalia

Awarded in 2014 to **Dr. Diana Verseghy,** Environment Canada, for her outstanding career-long contributions to develop a land-surface scheme for climate and weather models.

Le prix **François J. Saucier en océanographie appliquée** décerné pour un travail exceptionnel dans le domaine de l'océanographie appliquée au Canada.

Malheureusement, ce prix n'a pas été décerné pour 2014.

Rube Hornstein Medal in Operational Meteorology

Harinder Ahluwalia and Malcom (Mac) MacLeod

may be awarded each year to an individual for providing outstanding operational meteorological service in its broadest sense, but excluding the publication of research papers as a factor, unless that research has already been incorporated into the day-to-day performance of operational duties. The work for which the medal is granted may be cumulative over a period of years or may be a single notable achievement.

Awarded in 2014 to **Mr.Malcolm (Mac) MacLeod** for his leadership that enabled the growth of the private sector in meteorology in the maritime provinces.

Roger Daley Postdoctoral Publication Award
to be made annually to a candidate who, at the time of nomination, is working in Canada in a non-permanent position as a postdoctoral fellow or research associate, and is within five years of having received a doctoral degree. The award is to be based on the excellence of a publication in the fields of meteorology or oceanography that has appeared, or is in press, at the time of nomination.

President Harinder Ahluwalia presenting the prize to Douw Steyn accepting for Lindsay Renbaum-Wolff

1) Awarded in 2014 to **Dr. Lindsay Renbaum-Wolff**, for her excellent co-authored paper entitled "*Viscosity of α-pinene secondary organic material and implications for particle growth and reactivity*" by Renbaum-Wolff, Grayson, Bateman, Kuwata, Selliers, Murray, Shilling, Martin, and Bertram in Proceedings of the National Academy of Sciences of the USA, 2013, 110(20); 8014-8019.

Harinder Ahluwalia et Frédéric Laliberté

2) Also awarded in 2014 to **Dr. Frédéric Laliberté** for his excellent co-authored paper entitled *"Constrained work output of the moist atmospheric heat engine in a warming climate*" by Laliberté, Zika, Mudryk, Kushner, Kjellsson and Döös in Science, 347, 540-543.

Tertia M.C. Hughes Memorial Prize may be awarded for contributions of special merit by graduate students registered at a Canadian university or by Canadian graduate students registered at a foreign university. Two prizes were awarded in 2013.

Harinder Ahluwalia and Konstantinos Menelaou

1) Awarded to **Dr. Konstantinos Menelaou**, Post-Doctoral Fellow, Mc Gill University, for his excellent thesis entitled "*On the origin of asymmetric dynamic processes and their relation to the structure and intensity change of hurricanes – a diagnostic study*."

2) Also awarded in 2014 to **Dr. Andrew MacDougall**, Post-Doctoral Researcher, Institute for Atmospheric and Climate Science, Switzerland, for his excellent thesis entitled "*Simulating the permafrost carbon feedback to climate change: feedback strength and carbon cycle consequences.*" [not present]

Robert (Bob) Jones and Harinder Ahluwalia

Neil J. Campbell Medal for Exceptional Volunteer Service may be awarded each year to a member who has provided exceptional service to CMOS as a volunteer. The award may be made for an exceptional contribution in a single year or for contributions over an extended period. The contribution should have resulted in an important advancement for CMOS and/or its aims, nationally or locally.

Awarded in 2014 to **Mr. Robert (Bob) Jones** for his dedicated service as web master of the CMOS website, which has become an important resource for CMOS affairs and information about meteorology and oceanography. Bob Jones also contributed greatly to recording the history of CMOS.

Citations
One or more citations may be awarded each year to an individual, group or organization which has, in the previous year, made some outstanding contribution towards promoting public awareness of meteorology or oceanography in Canada.

Unfortunately, no citations were awarded in 2014.

CMOS Undergraduate Scholarship
for students planning a career in atmospheric, hydrological, oceanographic or limnological sciences.

1) A $500 scholarship is awarded to **Ingrid Pond,** Dalhousie University, for academic excellence in her 4th year in atmospheric sciences. [not present]


Anthony Di Stefano and President Harinder Ahluwalia

2) Another $500 scholarship is awarded to **Anthony Di Stefano**, Mc Gill University, for academic excellence.

CMOS-Weather Network / MétéoMédia Scholarship is open to female students studying atmospheric science in their penultimate year at a Canadian university and with career aspirations as a forecast meteorologist, on-air meteorologist or meteorological briefer. It consists of a cheque for $1500. The scholarship is funded by an annual donation from Pelmorex Inc., the parent company of The Weather Network / Météomédia.

The $1500 scholarship is awarded to **Adrienne Ducharme**, University of Winnipeg, who is completing with academic excellence her 4th year in geography. [not present]

CMOS Daniel G. Wright Undergraduate Scholarship
awarded to a Canadian undergraduate student entering his/her final year of a B.Sc. Honours program in Mathematics and/or Physics, or a related discipline, at a Canadian university who intends to pursue graduate studies in physical oceanography or a related field.

Unfortunately, the Daniel G. Wright Undergraduate Scholarship was not awarded for 2015.

CMOS Weather Research House / NSERC Scholarship Supplement in Atmospheric or Ocean Sciences provides a supplement of $5000 to a holder of an NSERC Postgraduate Scholarship or Canada Graduate Scholarship. It is renewable for a second year provided the Scholarship continues to be held. Note that this scholarship supplement is awarded by this private firm for the 18th year.

The scholarship supplement is awarded to **Scott Kehler**, University of Manitoba, for his Masters studies "*Investigating the Causes of Elevated Convection Initiation"* examining the reasons why thunderstorms develop at night. [not present]

Poster Prizes


Claude Labine, Bryn Ronalds, and Harinder Ahluwalia

1) **Campbell Scientific Best Student Poster Prize in Meteorology** is awarded to **Bryn Ronalds**, McGill University, for her poster entitled: "*On the relationship between North Atlantic baroclinic growth rate regimes and surface cyclogenesis*".


Harinder Ahluwalia, Tara Howat, and David Fissel

2) **ASL Environmental Sciences Best Student Poster Prize in Oceanography** is awarded to **Tara Howatt**, McGill University, for her poster entitled: "*Examining transport of freshwater across the Labrador shelf-break using gliders".*

3) **CMOS Best Poster Prize** is awarded to **Amélie Bouchat**, McGill University, for her poster entitled: "*Reproducing sea-ice deformation distributions with viscous-plastic sea-ice models*".


Amélie Bouchat and Harinder Ahluwalia

CMOS Fellow

Awarded to a member who have provided exceptional long term service and support to the Society and/or who have made outstanding contributions to the scientific, professional, educational, forecasting or broadcasting fields in atmospheric or ocean sciences in Canada.

John Gyakum and President Harinder Ahluwalia

Awarded in 2015 to Dr. John Gyakum, McGill University, for his outstanding career dedicated to research in synoptic meteorology aimed at improving weather forecasting, for his exceptional mentoring of graduate students and for his exemplary service to the meteorological community.

Scientific Program Committee
Comité du programme scientifique

Bruce Ainslie, Chair
Susan Allen
Phil Austin
Ryan Fogt
Mark Halverson
William Hsieh
Doug McCollor
Ron McTaggart-Cowan
Richard Pawlowicz
Andrew Roberts
Martin Taillefer

Local Arrangements Committee
Comité local organisateur

Tim Ashman
Alyssa Charbonneau
Chris Gibbons
William Hsieh
Oscar Koren
Ken Kwok, Chair
Matt MacDonald
Ross MacDonald
Chantal McCartin
Robert Nissen
Peter Scholefield
Andrew Snauffer
Brad Snyder
Andres Soux
Lisa Vitols
Cindy Yu

Report on CMOS Congress 2015

31 May to 4 June – Whistler, BC

The 49th CMOS Congress, held jointly with the American Meteorological Society Conference on Polar Meteorology and Oceanography, wrapped up a successful week on June 4th. About 450 delegates attended the congress, which was held in an excellent venue in Whistler BC, easily accessible by bus from downtown Vancouver.

The congress tone was set with the opening remarks by Judith Guichon, Lieutenant Governor of BC, who was a rancher in the BC Interior before her appointment. She described her personal experiences with climate change impacts of reduced moisture from snowmelt and soil variability over her time on the ranch.

A Workshop on Communicating Uncertainty to Users of Weather Forecasts was held on Sunday 31 May. Over 40 attendees registered for the workshop. The highlight for many participants was the presentation by Susan Joslyn from the University of Washington. Dr. Joslyn is a Cognitive

Psychologist who has spent many years doing lab work studying how people make weather related decisions based on uncertainty. She found that people make better decisions when presented with numbers instead of words, i.e. 10% probability instead of a phrase such as "*Highly unlikely*".

Plenary sessions included more results from impacts of ongoing climate warming and change, and predictions of future climates. As usual in recent congresses, these presenters focussed on many models to explain their conclusions. Uncertainty remains but Arctic warming and ice depletion were explained by changes in Pacific sea temperature regimes. Large glacial calving and melting in the Antarctic is predicted to accelerate global sea level rise. Arctic warming is increasing at up to three times the warming in more southern regions, but the latest estimate of summertime ice-free shipping is between 2032 and 2050. Other notable plenary sessions described the pace of glacier melt and the future of Arctic research and new ways to monitor air pollution using present and future satellites.

The Canadian National Committee for SCOR had their meeting on the Sunday before CMOS with Chair Paul Myers and Michel Mitchell presiding.

There was a special lunch time session on the Intergovernmental Oceanographic Commission (IOC). Keith Lennon provided a brief overview of the history and current status of Canada's involvement with the IOC. He encouraged input from the audience and received some concerns about how the ongoing consultation with stakeholders was carried out, as well as positive comments about holding the event.

Helen Joseph convened a session on the integration of ocean sciences in Canada. Carmel Lowe gave a presentation focussing on Galway as a mechanism. Other speakers took different approaches and it was suggested that a "*foundation"* or "*forum*" having the objective of coordination of ocean science would be an idea worth exploring.

Helen also convened a session entitled "*Two ways of Knowing*" in which two Inuit leaders and two government researchers discussed their science and understanding. Bill Williams and Baba Pederson stole the show with their well-integrated discussion of the Canadian Rangers' Ocean Watch (CROW) program. This program, initiated by Eddy Carmack and now led by Bill, uses a special instrument package which can be placed in the ice by rangers when they are on patrol on snowmobiles. Baba Pedersen, Inuit Ranger and Resource Management Officer, Kugluktuk, Nunavut, provided the perspective of rangers. The other scientist, Hal Ritchie, gave an excellent update on the progress of the Canadian Operational Network of Coupled Environmental Prediction Systems (CONCEPTS) Arctic Initiative and exemplified the typical southern scientist doing work in the Arctic. Frank Pokiak, Inuvialuit Game Council, Tuktoyaktuk, provided northern insight into the state of wildlife conservation based on his observations.

A public lecture by retired Navy Captain Kurt Salchert described the challenges to connect global maritime interests with established Arctic communities.

Many prizes and awards were announced at the banquet and Patterson-Parsons luncheon. At this year's congress, attendance from CMOS delegates was reduced by budgetary restraints and this was reflected as many winners were unable to attend. For only the second time since 1961, the winner of the Patterson Medal (for excellence in meteorology) was not announced because Assistant Deputy Minister David Grimes was out of the country attending World Meteorological Organization meetings.

The 2015 Parsons Medal (for excellence in oceanography) was presented to Dr. Chris Harley by Carmel Lowe, Regional Director Science, Pacific Region. Dr. Harley is a marine biologist at the University of British Columbia. His work combining eco-physiological work in the laboratory with long-term monitoring and ecological experiments in the field to understand how various aspects of global change, alone and in combination, affect the ways in which species interact with one another and ultimately influence the distribution and abundance of marine plants and animals. The aspects of change he investigates include global warming, ocean acidification, and invasive species, which all threaten natural ecosystems and the benefits that they provide. Dr. Harley's work on establishing the importance of species interactions and multiple stressors in climate change effects on species and communities, and his mentorship of students was also recognized with this award. [You may read the 2015 Parsons Medal presentation on page 129].

Dr. Ann Gargett, a former Department of Fisheries and Oceans scientist from Institute of Ocean Sciences, won the J. P. Tully Medal in Oceanography for her seminal work on ocean turbulence done over decades, using a wide variety of techniques. Her work is key to making the linkage between the physical behaviour of the ocean and the biological activity since turbulence is key in suspending nutrients in the water, circulating algae, etc.

Notable at this congress was the increasing student presence and activity. Over 60 students participated in a pub night and the new chair of the Student Committee,

Laura Gillard, attended many meetings and promised still more student participation in CMOS. Eighteen exhibitors had booths positioned for best exposure in the break and poster areas.

Young enthusiastic scientists attending the Whistler Congress

A photo collage, with links to presentation photos to award winners who were at the banquet, is available on the website at:

cmosarchives.ca/CongressPhotos/congressphotos.html

More photos from private photographers are welcome. Please contact Bob Jones at archives@cmos.ca

The Local Arrangements Committee (LAC) provided excellent offerings of food during congress as well as some tours and events in the spectacular Whistler environment. The LAC should be commended for negotiating low accommodation prices among the various "CMOS-approved" hotels and suites, all located a few minutes walk from the Conference Centre. Indeed, this congress featured the lowest hotel costs of many recent congresses held in urban hotels. The Whistler Conference Centre is a spacious modern complex which provided every convenience.

More detailed information on this congress, such as abstracts and plenary speaker biographies, may be found on the CMOS website.

With valuable contributions from *Bob Jones*, *Ann McMillan*, and *Martha Anderson*.

2015 Student Bursary Recipients at Whistler Congress

Récipiendaires 2015 des bourses de voyage pour étudiants au congrès de Whistler

Banafsheh Afshar - University of British Columbia
Harry Joseph Bailey - Simon Fraser University
Maggie Campbell - University of British Columbia
Alison Cassidy - University of British Columbia
David Collins - University of Victoria
Dana Ehlert - Simon Fraser University
Yiwen Mao - University of Victoria
Katarzyna Tokarska - University of Victoria
Di Wan - University of Victoria
Mitchell Wolf - University of Victoria
Sina Abadzadesahraei - University of Northern British Columbia
Aseem Raj - University of Northern British Columbia
Bunu Sharma - University of Northern British Columbia
Stephen Berg - University of Manitoba
Laura Gillard - University of Alberta
Nathan Grivault - University of Alberta
Simon Horton - University of Calgary
Nan Hu - University of Alberta
Yarisbel Garcia Quintana - University of Alberta
Wendy Wood - University of Calgary
Amélie Bouchat - McGill University
Joannie Charette - Université du Québec à Rimouski
Patricia DeRepentigny - McGill University
David Deepwell - University of Waterloo
Jenny Hayon Jung - University of Toronto

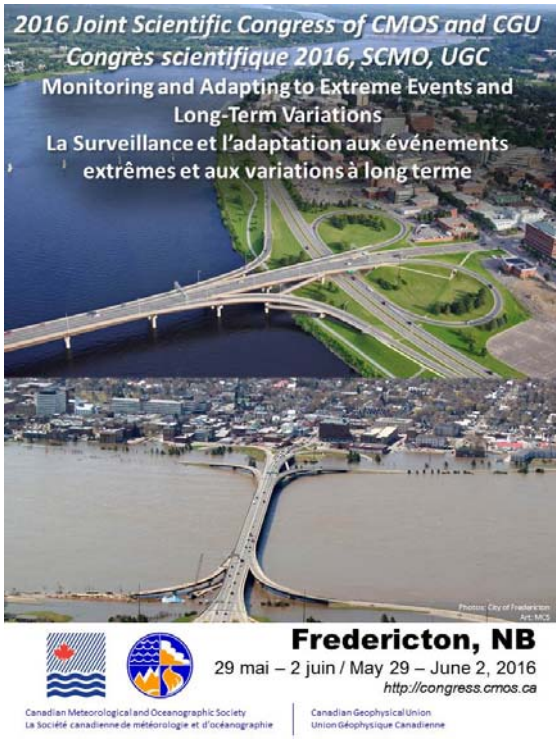
2015 Student Bursary Recipients at Whistler Congress (Continued)

Récipiendaires 2015 des bourses de voyage pour étudiants au congrès de Whistler (Suite)

Mathilde Jutras - McGill University
Kinson Leung - University of Toronto
Félix Ouellet - Université de Sherbrooke
Sébastien Roche - University of Toronto
Nicholas Soulard - McGill University
Kanachi Angadi - Memorial University
Matthew Hatcher - Dalhousie University
Zhi Min Ma - Memorial University
Benjamin Scheifele - University of British Columbia
Shiliang Shan - Dalhousie University
Pengcheng Wang - Dalhousie University

From Whistler to Fredericton

Ken Kwok, Chair LAC Whistler and Dr. Marcelo Santos, University of New Brunswick; Dr. Santos and William Ward are Co-chairs LAC Fredericton



Next CMOS Congress in 2016

The 50th CMOS Congress will be held in Fredericton, New Brunswick, from May 29 to June 2, 2016. This congress will be held jointly with Canadian Geophysical Union (CGU). The theme of this joint conference is: ***Monitoring and Adapting to Extreme Events and Long-Term Variations.*** The organizing committee is putting together an exciting program both inside and outside of the conference. We hope to see you all at the Fredericton congress next year!

Prochain Congrès de la SCMO en 2016

Le 50e congrès de la SCMO se tiendra du 29 mai au 2 juin 2016 dans la ville de Frédéricton, Nouveau-Brunswick. Ce congrès se tiendra en même temps que le congrès de l'Union géophysique canadienne (UGC). Le thème choisi de cette conférence conjointe est ***La surveillance et l'adaptation aux événements extrêmes et aux variations à long terme***. Le comité organisateur local met présentement en place un programme tant scientifique que social. Nous espérons tous vous voir au congrès de Frédéricton l'an prochain.

Frédéricton ou Fredericton?

Réponse: en français les deux orthographes sont utilisées!

49th CMOS Whistler Congress Photo Memories

Souvenirs photographiques du 49e congrès de la SCMO à Whistler

Sheila Bourque, Douw Steyn, and Lydia Webb

Mekdes Ayalew Tessema and Tim Oke

Bruce Ainslie and Christian Reuten

Harinder Ahluwalia, Adam Monahan, and Paul Myers

Photos offertes gracieusement par Douw Steyn, Directeur des publications de la SCMO
Photos are courtesy of Douw Steyn, Director, CMOS Publications

49th CMOS Whistler Congress Photo Memories (continued)

Souvenirs photographiques du 49e congrès de la SCMO à Whistler (suite)

Martha Anderson, Adam Monahan, and Jim Abraham

Paul LeBlond and Bill Crawford

André Giguère, Brad Snyder, Ross Macdonald, and David Jones

Susan Allen and Hal Ritchie

Photos offertes gracieusement par Douw Steyn, Directeur des publications de la SCMO
Photos are courtesy of Douw Steyn, Director, CMOS Publications

49th CMOS Whistler Congress Photo Memories (continued)

Souvenirs photographiques du 49e congrès de la SCMO à Whistler (suite)

Chris Gibbons, Bruce Ainslie, and Ken Kwok

Ben West and Lisa West

Stephen Howell, Christian Haas, and Shawn Marshall

Douw Steyn and Harinder Ahluwalia

Photos offertes gracieusement par Douw Steyn, Directeur des publications de la SCMO
Photos are courtesy of Douw Steyn, Director, CMOS Publications

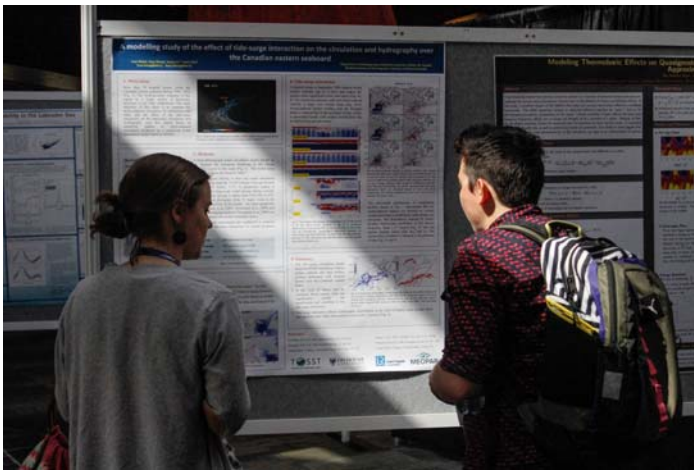
49th CMOS Whistler Congress Photo Memories (continued)

Souvenirs photographiques du 49e congrès de la SCMO à Whistler (suite)

Ken Kwok (right, Chair LAC Committee), and his wife Carmen

Qing Liao and Denis Bourque

A plenary session at Whistler Congress



Poster session at Whistler Congress

Première photo offerte par Qing Liao, Chef de bureau de la SCMO
First photo is courtesy of Qing Liao, CMOS Office Manager
Trois autres photos offertes par le comité local organisateur du congrès de Whistler
Three other photos are courtesy of Whistler Congress Local Arrangements Committee

Report on a Workshop of the Working Group on Atmosphere-Related Research in Canadian Universities

by Paul J. Kushner (University of Toronto),
Pierre Gauthier (Université du Québec à Montréal),
John Gyakum (McGill University),
Paul Myers (University of Alberta),
Kimberly Strong (University of Toronto),
Roland Stull (University of British Columbia), and
Peter Taylor (York University)

Over the past year a working group of researchers based in Canadian universities have engaged in a strategic planning activity intended to identify and articulate academic research and education priorities in atmospheric, ocean, climate, and related research in the coming five to seven years. The areas of research thus identified have been tentatively grouped under the name "Atmosphere-Related Research" (ARR). The activity stemmed from discussions about changes in funding and partnerships between university and government researchers. The activity was stimulated and focused by a workshop at McGill University in August 2014, that was hosted by the US University Corporation for Atmospheric Research (UCAR), where new ideas on how to move forward with organizing this Canadian community were considered.

The initial aim of the "Atmospheric Related Research in Canadian Universities" (ARRCU) working group is to produce a short White Paper that will serve as the basis for future strategic planning and organizational activities. (The organizing committee of the ARRCU Working Group are the authors of this report.) On April 23, 2015, a draft version of this White Paper was circulated and on May 8, 2015, a workshop was held to discuss the draft White Paper and other aspects of this initiative. The purpose of this report is to summarize the proceedings of the workshop. Workshop materials, including background documents, slide decks, audio recordings and session summaries are available at http://tinyurl.com/arrcu-may2015-workshop.

Workshop Summary

The May 8 2015 workshop took place at the Hotel Delta Montréal with generous support provided by NSERC (Natural Sciences and Engineering Research Council of Canada), l'Université du Québec à Montréal (UQAM), McGill University, University of Toronto, and Canadian Meteorological and Oceanographic Society (CMOS). Over 60 professionals from Canadian universities, government, and industry participated in the meeting either in person or online. The meeting centered on three panels that reviewed the draft White Paper and discussed issues of community scope, priorities, and partnerships.

In an **Introductory Overview Session**, P. Kushner discussed the background and scope of this initiative and White Paper, as well as comments and feedback received to that point. R. Stull then gave a presentation on the need to shift ARR towards identifying future societal stresses and economic opportunities, to ensure prosperity for Canadians in a changing climate. Finally, J. Drummond provided a view of multiple "dimensions" of ARR research including discovery research for intrinsic scientific interest, commercial applications for prosperity, and societal interest for public and environmental protection.

For **Panel 1: ARRCU Community Scope, Definition, Purpose**, the chair K. Strong reviewed the proposed community scope in the White Paper, discussed connections to Canadian professional societies, and suggested UCAR (University Corporation for Atmospheric Research) as a possible model for ARRCU. The purpose of ARRCU's strategic planning, she proposed, is to identify opportunities and collaborative mechanisms, improve dialog and advocacy for ARR faculty and universities, improve data and infrastructure access, and improve planning in education and vocational training.

In the Panel 1 presentations and discussion, it was proposed that ARRCU's role should not be to organize the community's research in a top-down manner. Instead, our community should have a means to help spur new collaborations between groups that have not previously interacted. The White Paper should define multi-disciplinary research objectives or critical concerns related to partner industry and government strategic goals, such as in the area of water resources, to attract people who may want to fund or participate. Over the short-term, ARRCU could remain focused on follow-on programs to the Climate Change and Atmospheric Research (CCAR) program, with the research capacity of the ARRCU community presented as a compelling "value proposition". In the discussion, it was stated that prioritization is necessary, even if challenging. Over the long-term, something like ARRCU could become an organization to define ARR-related problems, to develop Canada's predictive capability [following the lines of international assessments like the IPCC (Intergovernmental Panel on Climate Change) assessment reports], to identify responses and solutions in the domains of social scientists, economists, and integrated assessment modeling, with a view to policy making and adaptation planning, implementation, and evaluation. A community of researchers like this could be in a good position to respond quickly to changes in climate or to new funding opportunities.

Participants emphasized that a strong linkage of fundamental research to practical societal applications should be a core element of the ARRCU plan. ARR fundamental research ranges from work in an individual investigator's laboratory focused on a specific process, to novel field work, long-term measurements, and satellite retrieval methods exploring new concepts, to theoretical work and mechanistic modeling studies focused on process

understanding and new physical parameterizations. ARR applied research includes forecasting and environmental prediction, and research relevant to human health, agriculture, land and water resource management, climate change adaptation and impact evaluation. The fundamental to applied science linkage is especially critical for broad support of projects requiring large-scale infrastructure such as satellites, field programs, and high performance computing. The potential payoffs of ARR need to be articulated: for example, funding from NSERC, Environment Canada (EC), Health Canada and the use of NASA (National Aeronautics and Space Administration) satellites enabled a study on a Canada-wide assessment of exposure to fine airborne particulates (PM2.5), providing potentially tens of billions of dollars in health benefits. As another example, research on atmospheric chemistry in the Arctic contributed to the understanding of the emergence of the ozone hole which in turn led to an international agreement, the Montréal protocol, to address this very critical societal problem.

Participants suggested that the time scale of research and benefits needs to be carefully balanced. There was a recognition that an excessive focus on short-term needs of specific industries risks losing research of enormous benefit to society, different levels of government, and a wide range of industries.

Participants emphasized the synergistic multidisciplinary nature of ARR. For example, in the area of atmospheric chemistry research, understanding the physics of transport informs the understanding of chemical processes, while knowledge of atmospheric chemistry provides useful dynamical constraints on transport. The scope and definition for the name "atmosphere-related" research needs to be explained carefully, because it can include important research areas such as oceanography, soil science, vegetation, glaciology, forest meteorology, and agriculture meteorology. There were several suggestions for broadening the community, including public health and epidemiology, industrial chemistry, paleoclimate, physical/biological/ecosystems impacts research, and solar-terrestrial physics. Generally, flexibility and avoiding excluding people by setting rigid boundaries was supported. Despite suggestions to broaden the community, there was an overarching sense that the ARRCU White Paper needs to be carefully focused on important science problems that a large portion of the community agrees to be of high priority.

Regarding the Canadian context, it was suggested that this group needs to recognize the Canadian context. It needs to be organized nationally but to recognize provincial leadership in research funding. ARRCU should take advantage of existing professional societies – CMOS, CGU (Canadian Geophysical Union), and the recently formed Canadian Societies for the Geophysical Sciences (CSGS) – for its organizational effort. There was considerable discussion of communications and advocacy for this community during this panel and throughout the workshop. It was recommended that the White Paper have a succinct vision statement and should include a list of grand challenges or key science questions. Communications should be a key purpose of the document and emphasized in the title. Participants pointed out that there is a large and growing media and public interest in our fields of research like weather and climate. There is a need to make people aware of what the ARR community is doing and why it matters, but also to be wary of straying into the political arena and taking on broader organizational issues that are not unique to ARR.

Ideally, the White Paper should adopt a tight communications message: clear, constructive, authoritative, on-message, and focused. Science described in the plan should be based on clear objectives and underscore the value of collaboration between scientists and users, and emphasize partnerships across disciplines. While potential threats arising from naturally occurring severe weather and anthropogenic climate change are important, a question was whether it should be a point of emphasis in our communications. It was also suggested that ARRCU could be recognized as an expertise network, e.g., having a list of experts available to talk to the media.

The case for using ARRCU to advocate within the university community was pointed out: it would be useful to have materials and a group that could advocate to university administrators the case for new faculty hires in ARR, present the relevance of ARR for research and education, and break down internal barriers to interdisciplinary work. The Canadian Consortium of Ocean Research Universities (C-CORU) was raised as a successful example of high-level advocacy within Canadian academia. A related point is that a strategic plan could be used to communicate our needs to Compute Canada and other agencies like CFI (Canada Foundation for Innovation) providing infrastructure for ARR.

For **Panel 2: Priorities in research, education, and training**, Panel Chair P. Gauthier prepared a briefing document (which can be found under the "Background Documents" directory at tinyurl.com/arrcu-may2015-workshop) describing the need for international collaboration required to engage in coordinated model and observational efforts, and the need to identify unique Canadian contributions to global ARR. He also pointed out that there was a need to provide students and other HQP (Highly-Qualified Personnel) a sense of the purpose and socio-economic value of their research. Panel 2 was charged with identifying priorities for our research and education, and what this would imply for our infrastructure needs and classroom approaches.

It was proposed that a natural focus of ARRCU should be on Canada's land mass, its coastal zone, and its Arctic territory. Canada, with limited resources, needs to leverage "niche" areas, e.g. satellite limb sounders like SciSat ACE

(Atmospheric Chemistry Experiment) and OSIRIS (Optical Spectrograph and InfraRed Imaging System), and its significant strength in Arctic and polar science including meteorology, cryosphere science, and cold region hydrology. Because of logistical challenges and a harsh environment, Arctic research is very expensive but necessary to support to continue our leadership in Arctic science. At the same time, the teleconnected nature of weather means that local weather depends on global conditions and we cannot focus exclusively on the Arctic or any other particular region. Research in weather, climate, and air quality in a changing climate thus requires a global perspective, although Canada should emphasize its strengths in certain regions.

Research into climate extremes, process understanding, regional climate, and air quality should be of high priority. To achieve the highest model resolution possible (1-10km scale) relevant to resource management and impact assessment requires fine-scale regional climate models that Canadian universities (through UQAM and the Ouranos consortium) have heavily invested in and worked to characterize and improve. Leveraging such investments are international collaborations – for example, in regional modeling – in which Canada has a well established leadership role. Modeling efforts using internationally available open source tools, such as the National Center for Atmospheric Research's Community Earth System Model and Weather Research and Forecasting Model (CESM and WRF), are also greatly valued within the university community for fundamental research and applications. Despite the growing emphasis on comprehensive models runs on high performance computers, several participants pointed out that simple less expensive models can be used to test ideas and confront model formulations with data, and that fundamental research based on physics, mathematics, and chemistry should be at the forefront of what we do. Insight from models requires a deep understanding of their physical basis and limitations; this has clear implications for our educational mandate.

Participants suggested that field measurements and observational networks (e.g. of wind profilers and carbon dioxide and water vapor flux measurements) should be given high priority. Monitoring over the long term is an ongoing challenge. Traditionally, EC has been responsible for maintaining such networks and universities struggle to maintain such networks for monitoring. Universities have observation stations that collect data, but it is challenging to find funding to pay for the indirect costs and the long-term operational costs. Furthermore, the cost and long timescales of space-based observational systems need to be recognized. Systems currently in place grew out of ideas proposed in the 1980s or 1990s. The path from instrumental research to broader applications is not linear; the best results often face real risk of failure or unanticipated applications [e.g. GPS (Global Positioning Systems) applications in consumer electronics and meteorology].

Integration between universities and governments at a national and international level was seen as being required to be able to deploy observations and do the monitoring of oceans, land and atmosphere on which is based the progress made in modeling. In that respect, the CCAR program has been very helpful in promoting this type of integrated collaboration between different universities and government laboratories. Canada needs to show that it is fully contributing to the global effort in terms of observations and investment in research, and the ARRCU community should make sure to link its strategic planning priorities to several international programs that have developed their own plans over the last several years, rather than starting from scratch.

On education, it was suggested that we should prioritize online courses (following the UCAR COMET model) to take advantage of expertise that is dispersed across different Canadian universities. Academic and industry participants emphasized the need for more practical training in meteorology and oceanography that is directly oriented towards the needs of the commercial sector, for example in areas of air-quality, insurance, etc. Also related to education is the need to develop student intuition using simple models and to make sure that students understand the mathematics, physics, and chemistry upon which comprehensive models are based.

Panel 3: Partnerships, chaired by J. Gyakum, discussed ideas to facilitate research, education, training, and employment initiatives with ARRCU's non-academic partners. The Panel discussed partners' impression of the ARRCU initiative, how to attract suitable partners, and what might be useful in scope and prioritization, in both research and education. J. Gyakum described an "operations to research" model for partnership proposed by UCAR President T. Bogdan. In “operations to research”, academics interact with partners in industry and government, and listen to partners’ stated needs for research. This concept is the reverse of “research to operations”, an example being an operational weather centre benefitting from an academic initiative to incorporate a new numerical, or physical parameterization, into an operational weather forecast model.

E. Boston provided NSERC's perspective that a long-range plan should select activities that have interest to a significant portion of the Atmospheric-Related Research (ARR) community. The planning should recognize that NSERC supports ARR through Discovery Grants, supplements, scholarships, etc., to students and postdoctoral fellows. We should bear in mind and do better in the areas of industrial partnerships, involving hydro-electric companies, water resource management, NSERC Networks of Centres of Excellence, etc., following the example of ArcticNet, MEOPAR (Marine Environmental Observation Prediction and Response Network), and other networks. These partnerships can help create job

opportunities, guide new research directions, and assist companies in building their businesses. There are grants for travel for universities and industries to meet in order to establish collaborations. E. Boston also reminded participants that the CCAR program is midway through its term and would be reviewed in the coming year.

Representing the EC perspective, G. Brunet (Director, Meteorological Research Division) proposed a university-government partnership model like the United Kingdom Meteorological Office's Academic Partnerships, which deals with funding for HQP and selected university faculty. Such a partnership includes meeting regularly to discuss funding distributions to develop strategic funding to take into account weather, climate, and fundamental research. The CCAR model was partially successful but the balance of funding needs to be corrected to ensure funding for weather research reflecting language in the call dealing with weather research themes. A successful funded partnership would provide proper academic partnerships and train HQP according to the needs of the job market. Also speaking to the EC perspective, C. Lin (Director General of the Atmospheric Science and Technology Directorate) stated that government-based laboratories provide the most appropriate basis for the tasks of performing routine networked long-term monitoring, as for air quality. But intensive monitoring (e.g., in the Alberta oil sands) involves multiple partnerships on university and government levels. Satellite data monitoring and research represent excellent opportunities for partnerships at the university and international levels. He suggested ARRCU consider the concept of MOST (Models, Observations, Satellites Together), which involves the integration of observations and satellites via an assimilation network. He also concluded that CCAR to date has delivered what it set out in its mandate. In particular, the desired knowledge transfer to government from universities has been occurring.

M. Fekri (Pelmorex) represented the industry perspective. He stated that a Canadian ARR community would hopefully enable easier engagement between university, government, and industry and allow for an optimal allocation of funding for initiatives that are beneficial to all partners as well as a consistent point of contact between the private sector and academia. Key challenges are: a) Communication: how to enable effective longlasting working relationships, which could be facilitated by having a means through this kind of group of establishing first contact; b) Research Focus: Pelmorex's, and more broadly industry's, primary goal is the application of scientific knowledge to business problems that have discernable public benefit and interest. It needs to be recognized that strong applications stem from strong foundational scientific understanding. A common ground needs to be found to the mutual benefit of both partners.

In written remarks about education and training, C. Scott (Pelmorex Chief Meteorologist) stated that, given the skill of numerical weather forecasting and the need for hyper-local weather information, there will be a need for meteorologists who understand the physics of the atmosphere but can also assess and communicate risk. This requires a well-rounded scientist with a mix of strong analytical, computational, and communication skills. Additionally, a modernization of programming courses should be undertaken from Fortran to languages like Python and Java. Communication and teamwork should also be a focus so that students can learn to articulate the theory and hone skills that may not come naturally.

According to T. Piekutowski of the Canadian Space Agency, the space agency has always been in the business of partnering industry, academic, and government sectors. Costly space-related initiatives must respond to government needs in order to be useful, and often concepts flow from the academic side that industry turns into products used by government partners. Government efforts involve deliberate and safe development, while the academic community tends to propose more risky, yet scientifically ground-breaking, research concepts. In the ARR planning process, it is important to identify shared priorities and for universities to do a better job of quantifying the value of the resources they bring to projects. The CCAR model of insisting on firm commitments from a university-government partnership has been very effective in ensuring that university research is useful to government. Thus far, NSERC grants facilitating industrial/academic collaboration seem to be underused.

A. Bourque of Ouranos described his organization's partnership model: Ouranos is a private, non-profit organization, which consists of a network of approximately 450 scientists and professionals from academia, government, and private industry. The approach involves active participation in partnerships, in which users are involved during each step of the process. The process of asking the right questions and developing the projects, although time consuming, is worthwhile – reflecting an operations to research process. This engagement facilitates the development of a research program that benefits everyone.

W. Perrie (Fisheries and Oceans Canada/DFO) pointed out that DFO's research focus serves departmental mandates such as 'safe and accessible waterways'. Atmosphere-ocean dynamics research supports this mandate through studies of marine storms, air-sea interactions, marine winds, and waves, etc. This research is directly relevant to national societal priorities, like offshore hydrocarbon development, fisheries activities, marine transport, and search and rescue. Presently, projects based on NSERC funding, such as MEOPAR allow funding federal scientists who are also adjuncts at universities, working in partnership with university faculty and HQP in their groups. There are also limited international partnerships such as with the US Office of Naval Research. DFO can in addition support postdoctoral fellows via the NSERC Visiting Fellows

program.

During other discussions related to this Panel, it was pointed out that while some researchers, such as atmospheric chemists, have successful funded collaborations with EC partners, generally NSERC funded partnership programs involving EC and the Canadian Space Agency are difficult to arrange. In particular, climate-related research has been excluded from the NSERC Strategic program. Concern was expressed of barriers to collaboration with EC and government, including the difficulty in gaining access to government domain data. It was also suggested that the Canadian Space Agency and EC work together to help build opportunistic collaborations with universities; in response, it was stated that steps are being taken to increase the collaboration between these two government agencies. Regarding long-term monitoring, it was pointed out that universities may need to fill in gaps left by monitoring programs cut at the federal level, and that long-term monitoring on individual sites or for small regions can justifiably be carried out by university-based researchers. Finally, a missing element in the partnership discussions is that of partnership with northern and aboriginal communities incorporating traditional and local knowledge. Particularly with Canada's ARR focus on Arctic research, such partnerships are essential if our science is to provide benefit to peoples who are some of those most strongly affected by climate change.

Throughout the meeting, panelists and other participants had several comments on **research support and research funding**. The following summarizes comments made on these issues:

- The serious issues of the timescale and predictability of research support needs to be articulated by the ARRCU community. Interruptions in funding, such as the end of the CFCAS programs, means that expertise built up over a long time period is lost to the detriment of all involved including the broader Canadian society. The CCAR Network cycle is nearing its midpoint, and the issue of research support for the networks that have been assembled will soon arise again. The timescales for internationally coordinated ARR research typically exceed funding cycles of three to five years and so need long-term support to be viable. Furthermore, the ARR community lacks the flexible access to funding for research opportunities that arise relatively quickly, such as opportunities to participate in international field campaigns. This lack of opportunity places Canadian researchers at a competitive disadvantage for future participation and collaborations on an international level.

- Another overarching issue is the scale of research funding. The strong focus on large-scale initiatives and networks means that opportunities for small-to-medium scale projects with shorter term objectives in innovative research areas can be lost.

- A possible path for improved funding to the ARR community would be to expand the scope of NSERC Strategic Grants to allow more areas of ARR research and to facilitate partnership with government departments like EC in such proposals.

- New models of funding should be considered. Flexible funding that is responsive to new ideas emerging from collaborations at the frontiers of different disciplines would help to bring this community together. The ARRCU community would benefit from additional funding to collaborate actively within international teams, for example to use data coming from a new satellite instrument from a non-Canadian space agency for applications of importance to Canada.

- Concern was expressed that the need to provide extensive reporting can have adverse effects on partnerships, because the time devoted to reporting removes time from the actual research. Large-scale network projects like the CCAR projects also increase administrative responsibility on university faculty.

- On computing, ARRCU's strategic plan should articulate its justification of the compute cycles and storage resources needed.

Conclusion

In the time since the May 8 workshop, further consultation and solicitation of interest through a survey and presentations at an EC Carbon Assimilation System (EC-CAS) workshop and CMOS congresses have taken place. A webinar hosted by NSERC on June 22, 2015 discussed next steps and the White Paper draft in progress. The final version of the ARRCU White Paper is expected to be completed in August 2015.

The workshop on May 8 and the thoughtful commentary on the draft ARRCU White Paper show that our community has an abundance of good ideas and commitment to engage in a long-range planning activity. We hope that this activity will achieve the purpose of articulating the academic community's contribution to a long-range strategic plan comprising a sustainable research program in ARR for Canada. We invite further engagement by the broad community of researchers interested in this initiative. Interested university faculty and professional researchers in government laboratories and industry are welcome to join our email list and online meetings. Endorsement of this activity will be more formally indicated by being a signatory to the White Paper that we aim to finalize in the summer of 2015.

ARRCU-Working Group Committee and Panel Members

ARRCU-WG Committee	Panel 1: Scope	Panel 2: Priorities	Panel 3: Partnerships
Chair: Paul Kushner University of Toronto, Department of Physics	**Chair: Kimberly Strong** University of Toronto, Department of Physics	**Chair: Pierre Gauthier** Université du Québec à Montréal, Département des Sciences de la Terre et de l'Atmosphère	**Chair: John Gyakum** McGill University, Department of Atmospheric and Ocean Sciences
Pierre Gauthier Université du Québec à Montréal, Département des Sciences de la Terre et de l'Atmosphère	**Adam Bourassa** University of Saskatchewan, Institute of Space and Atmospheric Studies	**Peter Taylor** York University, Department of Earth and Space Science and Engineering	**Elizabeth Boston** NSERC
John Gyakum McGill University, Department of Atmospheric and Ocean Sciences	**Jennifer Murphy** University of Toronto, Department of Chemistry	**James Drummond** Dalhousie University, Department of Physics and Atmospheric Science	**Gilbert Brunet** EC, Meteorological Research Division
Paul Myers University of Alberta, Department of Earth and Atmospheric Sciences	**John Pomeroy** University of Saskatchewan, Centre for Hydrology	**Paul Myers** University of Alberta, Department of Earth and Atmospheric Sciences	**Madjid Fekri** Pelmorex Media
Kimberley Strong University of Toronto, Department of Physics	**Nigel Roulet** McGill University, Department of Geography	**Randall Martin** Dalhousie University, Department of Physics and Atmospheric Science	**Charles Lin** EC, Atmospheric Science and Technology Directorate
Roland Stull University of British Columbia, Department of Earth Ocean & Atmospheric Sciences	**Gordon Swaters** University of Alberta, Pacific Institute for the Mathematical Sciences	**Peter Bartello** McGill University, Department of Atmospheric and Ocean Sciences	**Thomas Piekutowski** Canadian Space Agency, Sun-Earth System Sciences
Peter Taylor York University, Department of Earth and Space Science and Engineering	**Francis Zwiers** University of Victoria, Pacific Climate Impacts Consortium	**Laxmi Sushama** Université du Québec à Montréal, Département des Sciences de la Terre et de l'Atmosphère	**Iain Russell** Pelmorex Media

IN MEMORIAM

Roy Lee

1924 - 2015

Roy Lee

Entered into eternal life, love and peace. Loving husband of Jenny Elva Lee, née Pon (Pooksy), his best friend; son of the late Lee Guk Soong and Wong Siu Ping of the village of Heng Guang Shan in the district of Too Fook, Guangdong Province, China. Pre-deceased by his sister Ru Zhen, and brothers George C., and Thomas. He is survived and missed by his sister Nellie Fong (Lee) of Montreal, sons Gordon (Linda) of North Vancouver, David, and Peter (Susan) of Toronto; grandchildren David and Jamie, Peter, Katharine, Madeleine, Emma, and their mother Janet, Graham (Caroline), Patrick, and Tristan; great-grandchildren Liam and Vivian.

Roy was always proud of his Chinese heritage and traced his family history back to the 12th century. He was excited to discover that he is the thirtieth generation of a line of ancestors originating in Kaifeng. His ancestor You Wen Gong was a leading scholar in the country in the Imperial Examinations held in 1127. He was selected to administer the Imperial Estates of the Sung Dynasty Emperor Gao Tsung. Unwilling to agree with the rest of the Imperial Court to accept peace with the northern invaders, he was demoted and sent to Guangdong with his only son. His grave is still intact. His descendants lived in Hok Shan for a number of generations, and then migrated to the village of Xin Tsun. Two of three brothers moved to found the village of Heng Guang Shan.

Roy earned Masters Degrees in both Applied Mathematics and Meteorology, from the University of Toronto. His education began in Court Street School and Central in St. Catharines, Alexandra School in Montreal (1934-1937), then at St. Catharines Collegiate Institute and Vocational School. He joined the Meteorological Service of Canada in 1948 and retired in 1985. First, he worked as a forecaster in Gander, next as a research scientist, then as a teacher at U. of T. and at the Meteorological Service, and finally as Director of Administration. Many of his scientific research papers were published, including early work on both jet streams and satellite weather interpretation; one of his articles on jet streams was republished in the Smithsonian Treasury of 20th-Century Science (1966). Roy also led the implementation of a new Canadian weather forecasting system, as well as Canada's metric conversion of weather reporting.

He married Jenny on June 13, 1949. They moved from Toronto to Montreal, then to Gander where Gordon was born. Returning to Toronto in 1952, David was born soon after, and Peter in 1956. The family moved to their second happy home on Cardiff Road, selected by Jenny, and finally to Lloydminster Crescent in North York.

Jenny, love of Roy's life, was born in Killam, Alberta and grew up in Chauvin, AB. Educated in a one-room school in Chauvin, she completed high school in Edmonton. Then, she attended Garneau Normal School in Edmonton and taught at Airdrie Elementary School. Jenny next moved to Toronto with her mother and family, where she met Roy. She graduated with a B.A. from University College. She attended the Ontario College of Education 1946 -1948, then taught at Forest Hill Collegiate. Staying home to raise her children, she returned to teaching at the St. John's Convalescent Hospital in 1963. She started teaching at the Eastern High School of Commerce in 1969. Jenny received her M.Ed. from the Ontario Institute for Education in 1975. Retiring in 1988, she and Roy traveled extensively in North America, Europe, and went to China three times, once to visit Roy's mother's grave. Jenny had a series of illnesses starting in 1989. She died in the arms of Roy on the night of May 3, 1999. Buried on a gentle slope in Section 23 in Mount Pleasant Cemetery, facing Mount Pleasant Avenue.

Roy wished to acknowledge the individuals who contributed to Jenny's and his happiness and well-being during their 50 years of marriage including: Uncle Gilbert; Miss Margaret Robertson; Reverend Gordon R. Taylor MA; Douglas and Grace Chappell; Leon and Verna D'Albertanson (Chauvin, AB); Dr. Donald Copeland DDS; George and Barbara Gilbert; James Stephens QC and Mrs. Margaret Stephens; Donald Harvey; Henry and May Sam; Les and Mildred Tibbles; Dr. Andrew Thomson; Reverend Welburn and Mrs. Jessie Jones; Louise McKillop; Irene Hsia (GuoYing); and his many uncles in Montreal.

BRIEF NEWS / NOUVELLES BRÈVES

David Grimes acclaimed as President of the WMO

We are proud to announce that David Grimes, Assistant Deputy Minister of the Meteorological Service of Canada, will serve a second four-year term as President of the World Meteorological Organization (WMO), a United Nations Specialized Agency.

David was acclaimed earlier today in Geneva, Switzerland, by his peers from the 191 Member states and Territories of the WMO. David is the first and only Canadian to hold this post.

David Grimes

In his role as President, David will continue to represent the Members of the WMO and help shape the world's agenda for research and services related to weather, climate, and water. He will also continue to serve as the Assistant Deputy Minister for the Meteorological Service of Canada.

During his first term, David led the WMO to successfully develop and adopt the Implementation Plan for the Global Framework for Climate Services, with the objective of enhancing the availability and scope of climate services, particularly in developing countries. He advanced the modernization of the WMO's observation and telecommunications systems globally, with increasing attention to Polar and High Mountain Regions, to improve the world's understanding of weather and climate and to improve predictive capabilities.

We are confident that David and his team will serve the WMO and its Members well over the next four years and invite you to join us in extending our congratulations to David.

Michael Martin, Deputy Minister

Siddika Mithani, Associate Deputy Minister

David Grimes est choisi à titre de président de l'OMM

Nous sommes fiers de vous annoncer que David Grimes, sous-ministre adjoint au Service météorologique du Canada, remplira un deuxième mandat de quatre ans à titre de président de l'Organisation météorologique mondiale (OMM), une institution spécialisée des Nations Unies.

David a été reconduit dans ses fonctions par acclamation plus tôt aujourd'hui à Genève, en Suisse, par ses pairs des 191 États et territoires membres de l'OMM. Il est le premier et le seul Canadien à occuper ce poste.

À titre de président, David continuera de représenter les membres de l'OMM et d'aider à structurer le programme mondial pour la recherche et les services météorologiques, climatiques et hydriques. Il continuera également d'assumer ses fonctions de sous-ministre adjoint pour le Service météorologique du Canada.

Au cours de son premier mandat, David a amené l'OMM à élaborer et à adopter avec succès le plan de mise en oeuvre du Cadre mondial pour les services climatologiques, dans le but de faciliter l'accès aux services climatiques et d'élargir leur portée, particulièrement dans les pays en développement. Il a fait progresser la modernisation des systèmes d'observation et de télécommunications de l'OMM à l'échelle mondiale, en portant une attention accrue aux régions polaires et en hautes montagnes, afin d'accroître la compréhension mondiale des conditions météorologiques et climatiques et les capacités de prévision.

Nous sommes certains que David et son équipe serviront bien l'OMM et ses membres au cours des quatre prochaines années et nous vous invitons à vous joindre à nous pour le féliciter.

Michael Martin, Sous-ministre

Siddika Mithani, Sous-ministre déléguée

New WMO Director-General

GENEVA 4 June 2015 (WMO) - Petteri Taalas, Director-General of the Finnish Meteorological Institute, has been appointed as the next Secretary-General of the World Meteorological Organization for a four-year mandate starting 1 January 2016. He succeeds Michel Jarraud (France).


Petteri Taalas

Mr. Taalas received the requisite two-thirds majority vote at the World Meteorological Congress, WMO's top decision-making body.

"*The importance of WMO and the National Meteorological and Hydrological Services is growing due to higher number of disasters hitting all parts of the world,*" said Mr. Taalas. "*Proper early warning services are essential in protecting human life and property. Scientific know-how for climate adaptation and water resource management are also crucially needed in several WMO Member countries. I am highly motivated to work for an effective and service oriented WMO*."

Mr. David Grimes (Canada) was reelected WMO President (see notice on previous page). Antonio Divino Moura (Brazil), Mieczyslaw S. Ostojski (Poland) and Abdalah Mokssit (Morocco) were reelected as First Vice, Second Vice and Third Vice Presidents respectively.

Mr. Taalas has been the Director-General of the Finnish Meteorological institute since 2002, excluding 2005 – 2007 when he worked as a Director of Development and Regional Activities department of WMO.

He has extensive experience in management of national and international expert organizations with proven skills on enhanced efficiency, new innovations, high customer, and staff satisfaction. He has a strong scientific background with emphasis on atmospheric sciences. He has made about 50 publications on global climate change, satellite methodologies, and atmospheric chemistry.

Mr. Taalas has had several positions and board memberships in both national and international organizations (e.g. membership in WMO Executive Council and European Centre for Medium Range Weather Forecasts Council. He is past Chairman of the EUMETSAT Council and EUMETNET Council.

The World Meteorological Congress brings together every four years the representatives of the Organization's 191 Members to determine the general policies and approve the long-term plan of WMO, to appoint the Secretary-General, elect officers, and decide on budgetary matters.

Mr. Jarraud has served three four-year terms in office. Congress bestowed on him the title of Secretary-General Emeritus.

Retirement of William K.W. Li from the Department of Fisheries and Oceans

Submitted by Erica Head
Bedford Institute of Oceanography

Dr. Bill Li retired on March 30, 2015 after 35 years as a Research Scientist with the Department of Fisheries and Oceans (DFO) at the Bedford Institute of Oceanography (BIO). The list of his career achievements is long, but those who have worked with him have also learned to value his personal qualities: his breadth of knowledge, his integrity, his attention to detail and his willingness to take on, or assist others with, any of the tasks that come with working for a government department.


Dr. Bill Li

Bill's field of expertise is in Microbial and Phytoplankton Ecology and before joining DFO he developed his ideas and skills with the help of some well-known Canadian and US marine scientists: Tim Parsons was his undergraduate Thesis supervisor at the University of British Columbia, Bob Fournier was his PhD supervisor at Dalhousie University, and Ian Morris and Joel Goldman were his Post-graduate supervisors at the Bigelow Laboratory for Ocean Sciences and the Woods Hole Oceanographic Institution.

Early in his career at DFO in 1985 Bill was the recipient of a Certificate of Honourable Mention in Ecology and Environmental Science (Royal Society of Arts, London) and in 1986, of an APICS-Fraser Gold Medal for Outstanding Research (Atlantic Provinces Council on the Sciences). More recently, in 2012 he was a member of two research teams that received BIO Crystal Awards, and in 2014 he

was given the prestigious John Martin Award[1]. The latter is awarded by ASLO (Association for the Sciences of Limnology and Oceanography) for a paper in aquatic sciences that is judged to have had a high impact on subsequent research in the field. The paper for which he received the award was published early during Bill's career in 1983 and since then has received more than 400 citations[2].

In his award-winning paper Bill demonstrated that very tiny organisms, picoplankton of less than one micrometer in diameter, could contribute up to 80% of the photosynthetic carbon fixation in tropical ocean waters. During the following years, assisted by the acquisition of a then state-of-the-art flow cytometer, Bill showed that photosynthetic picoplankton were not restricted to tropical regions, but could be found at higher latitudes. In fact, he has recently demonstrated that some of these small phytoplankton forms can be found as far north as the Arctic Ocean[3].

The flow cytometer is an instrument that counts and characterizes small particles as they pass through a laser beam in a fluid stream absorbing, scattering, and re-emitting light. The acquisition of his first flow cytometer, and more modern incarnations since, and of water samples from around the world, led Bill into the field of macroecology. Bill has been one of the pioneers in marine macroecology, which is the study of ecological communities with a focus on patterns and processes.

Over the course of his career Bill has authored or co-authored more than 100 articles that have appeared in peer-reviewed scientific journals, twelve of which have received more than 100 citations. His contributions to other written publications (*e.g.* DFO reports, reviews, and research documents, ICES [International Council for the Exploration of the Sea] reports, etc.) are numerous, as are his evaluations and commentaries on the published work of others, through his membership of the F1000 Ecology Faculty. As well as his written output, Bill has also served on the Editorial Boards, or as an Editor, for several well-respected scientific journals. He has also been the Canadian delegate on international working groups for a series of topics [e.g. United Nations Environment Program (Convention on Biological Diversity, Northwest Atlantic Ecologically or Biologically Significant Areas), "Arctic Five" Scientific Meeting on Arctic Fish Stocks, ICES (Phytoplankton and Microbial Ecology), Census of Marine Life (Gulf of Maine Microbial Communities)], has organized or co-organized international scientific conferences and has had numerous invitations to speak at conferences and other venues.

Between 2010 and 2014 Bill served as the Section Head for the Marine Ecosystems Section, within the Ocean and Ecosystem Sciences Division (OESD) at the Bedford Institute of Oceanography. Bill applied himself to the task with his usual efficiency and the personal qualities which he brought to the position made him a valuable member of the management team. His contributions to strategic planning and advice were highly valued by the OESD Management Committee during a period of significant change within DFO. In his science management role, Bill effectively mastered Stephen Covey's Habits 4-6 (principles of interdependence)[4], which are particularly important in a government science work environment where effective teamwork is paramount.

Bill will be missed by his colleagues but not completely, since he has joined the ranks of the "Emeritus scientists" and will be at BIO for years to come, if not as early in the morning, or as late in the afternoon as before. The expectation is now that Bill has laid down the burdens of DFO administration duties and bureaucracy, his scientific productivity will only increase.

[1] See the *CMOS Bulletin SCMO*, Vol.42, No.3, pages 83-86.

[2] Li, WKW, D.V. Subba Rao, W.G. Harrison, J.C. Smith, J.J. Cullen, B. Irwin and T. Platt, 1983. Autotrophic picoplankton in the tropical ocean. Science, 219:292-295.

[3] Li WKW, Carmack EC, McLaughlin FA, Nelson RJ, Williams WJ, 2013. Space-for-time substitution in predicting the state of picoplankton and nanoplankton in a changing Arctic Ocean. Journal of Geophysical Research – Oceans, 118: 5750-5759.

[4] Covey, S.R., 1989. The 7 Habits of Highly Effective People. New York, New York. Free Press.

Gesche Winkler est la nouvelle Présidente de Québec-Océan

Québec-Océan est un regroupement de scientifiques et de leurs partenaires oeuvrant en recherche océanographique. Plus de 200 membres issus de 6 universités québécoises, de plusieurs ministères et d'organismes non-gouvernementaux collaborent pour développer l'océanographie, incluant la formation des étudiants et le transfert des connaissances.

Le 3 mars 2015, le Conseil d'Administration de Québec-Océan a élu Gesche Winkler comme nouvelle Présidente du regroupement stratégique. Gesche Winkler est Professeure-chercheuse en écologie du zooplancton à l'UQAR-ISMER (Université du Québec à Rimouski - Institut

des sciences de la mer de Rimouski). Elle succède à Michel Gosselin qui siégeait à titre de Président depuis 2006. Monsieur Gosselin a grandement contribué à l'avancement du regroupement et l'a fièrement représenté sur les scènes nationales et internationales.

Gesche Winkler is the new President of Québec-Océan

Québec-Océan is a group of scientists and their partners involved in oceanographic research. More than 200 members from six Quebec universities, several ministries, and non-governmental organizations collaborate to develop oceanography, including student training and knowledge transfer.

Gesche Winkler
Nouvelle présidente
New President
Québec-Océan

On March 3rd 2015, the Board of directors of Québec-Océan elected Gesche Winkler as new President of the strategic cluster. Gesche Winkler is a Professor-Researcher in zooplankton ecology at UQAR-ISMER. She succeeds Michel Gosselin who had been President since 2006. Mr. Gosselin has contributed greatly to the progress of Québec-Océan and proudly represented it nationally and internationally.

STOP PRESS

Former Assistant Deputy Minister for Atmospheric Environment Service, Environment Canada, **Professor Gordon McBean,** has been awarded the University of British Columbia Alumni Award of Distinction for 2015. Professor McBean is an internationally recognized Canadian climate scientist and climate change expert. He has been elected President of the International Council for Science (ICSU). See *CMOS Bulletin SCMO*, Vol.42, No.5, page 171, October 2014.

The award will be presented to Professor McBean at the alumni UBC Achievement Awards celebration on October 27, 2015.

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