ISSN 1929-7726 (Online / En ligne) ISSN 1195-8898 (Print / Imprimé) .

CMOS
BULLETIN
SCMO

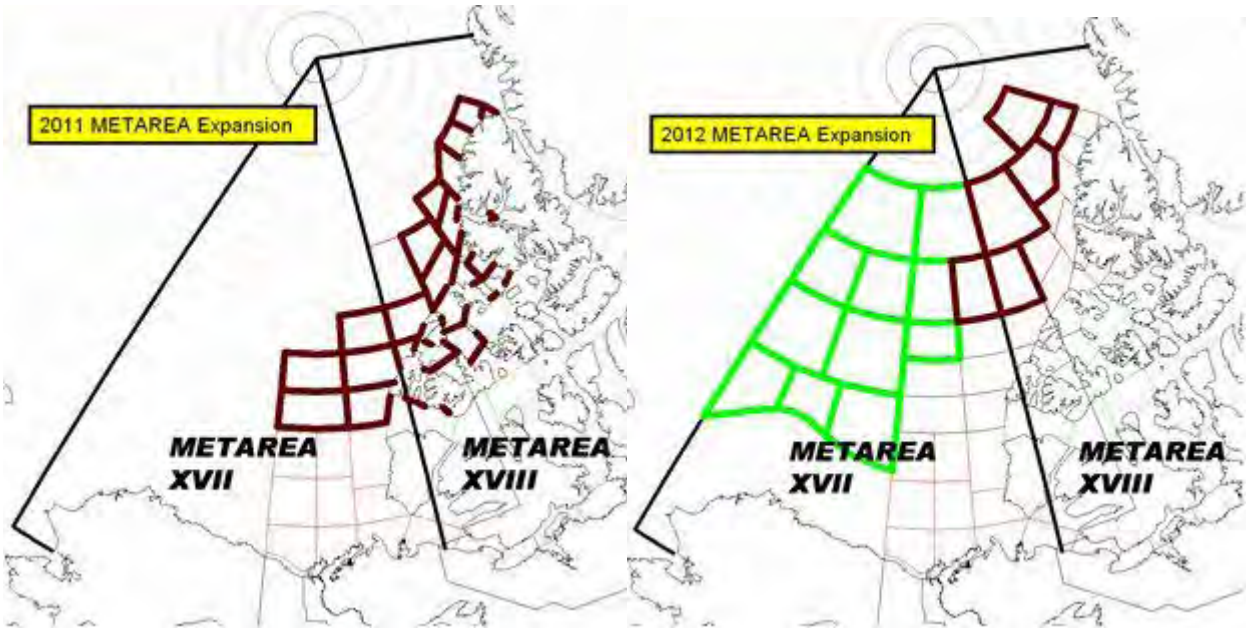
Canadian Meteorological and Oceanographic Society

La Société canadienne de météorologie et d'océanographie

October / octobre 2012 Vol.40 No.5

MET Services Expansion in the Arctic

2011 **2012**



Expansion des services météo dans l'Arctique

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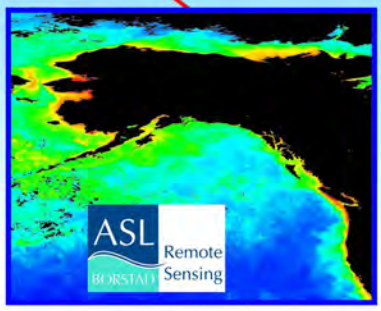

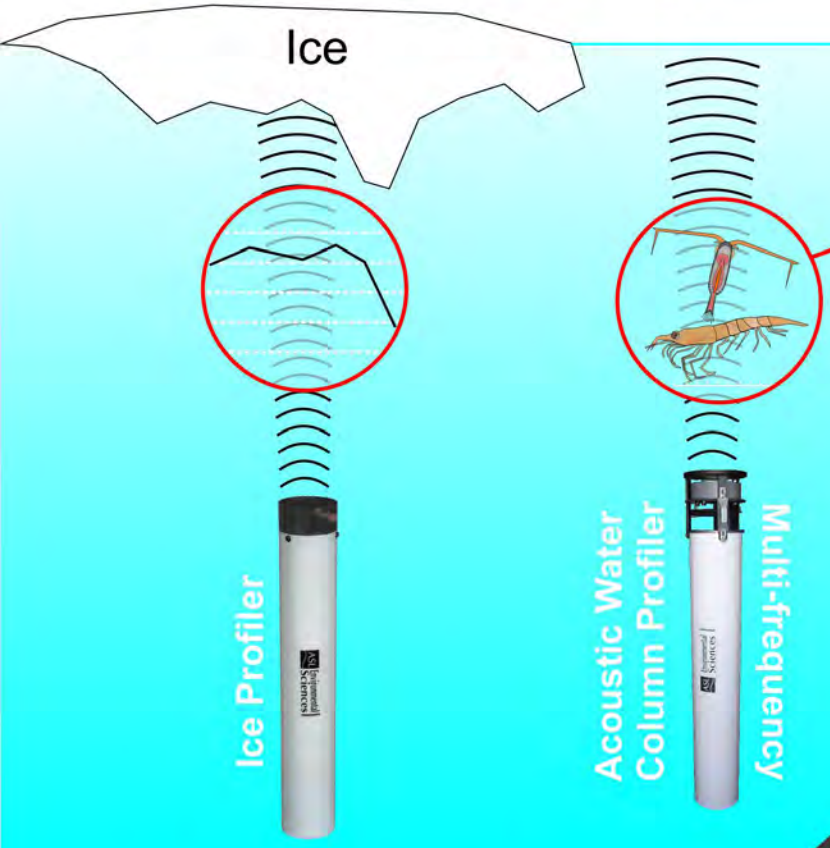

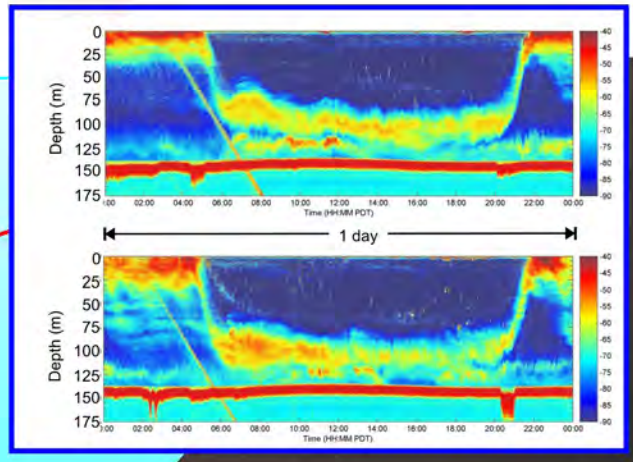

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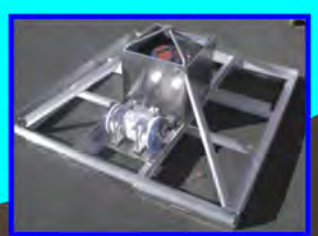

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....from the President's Desk / Allocution du président

Friends and colleagues:

Peter Bartello
CMOS President
Président de la SCMO

I hope you all had an enjoyable, relaxing and maybe even productive summer. As I write this in late August there are the usual signs around my university of fice of things starting togear up for a new year: many students asking questions about upcoming courses, professors scurrying around trying to de code online grant-application procedures, etc. It is clear we are heading into a very busy time of year. As is usual in the October version of this column, I would like to remind you all not to overlook the renewal of your CMOS membership. CMOS begins the process of reminding you at this time of year and many members do not actually get around to it until well into the new year. Obtaining the member's discount on the Congress registration fee is really the latest and perhaps most forceful reminder. Let me add that it has never been easier to renew (online with a few clicks) than it is these days, so I would urge you to do it now.

Perhaps not surprisinglyour membership numbers last year were down about 5% compared to previous years. It was indeed a difficult year for many of us. So I would ask youall to try to recruit newmembers, particularly student members who may benefit the most. There are many advantages to membership, including the reduced Congress registration referred to, as well as the Bulletin, our accreditation programme, a chance to network and exchange ideas with other Canadians in our field, but most important perhaps is to support the promotion of meteorology and oceanography in an increasing number of fora, including direct engagement with the public.

Across the country CMOS members participate in organising science fairs, funding prizes and workshops, hosting presentations on meteorology and oceanography, including the CMOS tour speaker. We lobby government and issue policy statements on climate change and CMOS members are at the forefront of all aspects of our field internationally. We must work toensure that CMOS remains the leading voice in Canada on topics relating to our science.

(Continued on page 151 / Suite à la page 151)

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October 2012 — octobre 2012

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Printed in Kanata, Ontario, by Gilmore Printing Services Inc.
Imprimé par Gilmore Printing Services Inc., Kanata, Ontario.

Don't miss this month

Call for papers for *Atmosphere-Ocean*: Manuscripts sollicited for a Special Issue on Climate Change and Extreme Events **page 172**

À lire ce mois-ci

Appel de soumissions pour *Atmosphere-Ocean*: Manuscrits sollicités pour un numéro spécial sur le changement climatique et les événements extrêmes **page 173**

CMOS Bulletin SCMO
"at the service of its members / au service de ses membres"

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Cover page: Because of significant transformation of environmental conditions in the Arctic and the potential for significant increases of shipping in these northern waters, it has become imperative to provide better meteorological maritime services in order to minimize the risk to human lives and to preserve the in tegrity of this northern environment. Meteorological Service of Canada has started an expansion program for thes e services over a 5-year period. Shown here are the expansion of services for 2011 and 2012. To le arn more, please read Marie-France Gauthier's article on **page 157**.

Page couverture: À cause d'unetransformation significative des conditions environnementales dans l'Ar ctique et la possibilité d'une augmentation importante de la navigation dans ces ea ux nordiques, il est devenu impératif d'améliorer les service s de météorologie maritime pour minimiser le risque aux vies humaines et conserver l'intégrité de cet environnement nordique. Le Service Météorologique du Canada a démarré un programme d'expansion de ces services sur une période de cinq ans. On illustre ici l'expansion des services pour les années 2011 et 2012. Pour en connaître plus, prièrede lire l'article de Marie-France Gauthier en **page 157.**

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....from the President's Desk / Allocution du président
(Continued / Suite)

Please help us to get the word out. A slide show on the Society can be found at

http://www.cmos.ca/about.html

Please send the link to your younger colleagues and tell them about the Society, as well as your experience in it. I am sure they will make contacts at CMOS that will be valuable to them throughout their careers, as we all have.

Peter Bartello
CMOS President / Président de la SCMO

Next Issue *CMOS Bulletin SCMO*

Next issue of the *CMOS Bulletin SCMO* will be published in **December 2012.** Please send your articles, notes, workshop reports or news items before **November 2, 2012** to the address given on page 150. We have an URGENT need for your written contributions.

Prochain numéro du *CMOS Bulletin SCMO*

Le prochain numéro du *CMOS Bulletin SCMO* paraîtra en **décembre 2012.** Prière de nous faire parvenir avant le **2 novembre 2012** vos articles, notes, rapports d'atelier ou nouvelles à l'adresse indiquée à la page 150. 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 stimuler l'intérêt pour la météorologie et l'océanographie au Canada.

CMOS 2013 Photo Contest

All members with a photographic bent are invited to participate in the 2013 Photo Contest. Please submit your own original image files, either in colour or black and white, from scans of prints or digital capture of a meteorological or oceanographic subject, event, or phenomenon. Details on the photo contest can be found on the CMOS Web Page at:

http://www.cmos.ca/photocontest.html

Concours photographique 2013 de la SCMO

Tous les membres qui ont une passion pour la photographie sont invités à participer au concours de photographie 2013 de la SCMO. Prière de soumettre vos photos numériques originales, soit en couleur, soit en noir et blanc, à partir de copie papier ou de fichier numérique portant sur des sujets ou phénomènes météorologiques ou océanographiques. Les détails du concours se trouvent sur le site web de la SCMO à:

http://www.cmos.ca/photocontest.html

Did You Know?

The wooden RCMP schooner *St. Roch*, commanded by Sgt Henry Larsen, sailed 23 June 1940 from Vancouver to traverse the Northwest Passage but was trapped in the ice for 2 winters and only reached Halifax on 11 Oct 1942. It was as the first vessel to traverse the Northwest Passage West to East. The *St. Roch* returned to Vancouver by a more northerly route in only 86 days (22 July-16 Oct 1944), becoming the first vessel to negotiate the passage both ways. In 1950 the *St. Roch* made a southern voyage and thus became the first ship to circumnavigate North America.

Saviez-vous?

La goélette de bois de la GRC *St. Roch*, commandée par le sergent Henry Larsen, quitta Vancouver le 23 juin 1940 pour traverser le passage du Nord-Ouest, mais se trouva emprisonnée dans les glaces pendant deux hivers et ne réussit à atteindre Halifax que le 11 octobre 1942. Il s'agissait du premier bateau à traverser le passage du Nord-Ouest de l'ouest à l'est. Le *St. Roch* retourna à Vancouver en passant par une route plus au nord en seulement 86 jours (du 22 juillet au 16 octobre 1944), devenant le premier bateau à réussir le passage dans les deux sens. En 1950, le *St. Roch* fit une traversée par le sud devenant aussi le premier navire à faire le tour de l'Amérique du Nord.

ARTICLES

Temperatures in 2011: Globally Warm, but Cool in the Eastern Pacific

by Bill Crawford[1]

Résumé: En 2011, la température de surface de la planète était plus élevée que la normale presque partout, sauf dans le Pacifique Est. Un refroidissement local de cette région de l'océan Pacifique a été observé presque tous les ans depuis 2008, et ce, en raison d'un régime météorologique associé au phénomène La Niña, présent sur tout le Pacifique au cours de ces années. Les températures froides à la surface de l'océan se sont seulement estompées brièvement à l'hiver 2010, quand des vents liés à El Niño ont apporté des courants océaniques chauds vers cette région. L'article présente les différents indices utilisés pour répondre aux questions suivantes: quel phénomène de l'océan Pacifique Nord entraîne un hiver froid ou un été chaud? Que nous réserve l'hiver à venir?

Global temperature anomaly and its change since 1880

Local cooling in the eastern Pacific Ocean has been present in almost every year since 2008, part of a Pacific-wide weather pattern associated with La Niña conditions of these years. This pattern of cool ocean surface water was interrupted only briefly in the winter of 2010, when El Niño winds brought warmer waters to this region.

The long term global temperature trends are shown in Figure 1 for the total surface of the earth (land and ocean) and also for the ocean only. Both graphs below show that temperature in 2011 was cooler than typical temperatures since 1997, but warmer than temperatures prior to 1997.

El Niño and La Niña dominate ocean temperature in the eastern Pacific Ocean

The prevailing weather pattern over the Gulf of Alaska in winter determines our ocean surface temperature through much of the year. Figure 2 below shows the average air pressure at sea level in each of the four past winters, including January to March of 2012. The letter **L** marks the centre of the Aleutian Low Pressure system that forms every winter. When it is larger than normal in area and its central air pressure is relatively low compared to other winters (for example in 2010 in Fig. 2b), the winds along the west coast blow more strongly from the southeast, bringing warm air and warm ocean surface water toward the BC coast. This wind direction is shown by the black arrow in Fig. 2b. This winter pattern is more frequent in El Niño winters, and El Niño did indeed take place in this winter.

The winters of 2009, 2011 and 2012, illustrated below, show a very different weather pattern. In these winters the North Pacific High Pressure system, labelled **H**, covered a large area, and its central air pressure was higher than normal for winter. The prevailing winds of any single winter tend to flow along isobars (lines of constant air pressure), and flowed more from the west than in winter 2010, bringing cool air and ocean water to the BC coast. This wind direction is shown by black arrows in Figs. 2a, 2c and 2d. This pattern is more frequent in La Niña winters. Both 2011 and 2012 were La Niña winters, and conditions in 2008 were close to those of La Niña.

The recent anomalies of ocean temperature in the eastern Pacific Ocean can be seen in the three panels of Figure 3. These maps present temperature anomalies of March and September 2011 and March 2012.

All three panels of Figure 3 show cool ocean surface waters off the west coast, and also on the Pacific Equator. These conditions have prevailed for four of the past five winters and only in the winter of 2010 were ocean temperatures warmer than normal off the west coast.

All four of these winters with cool ocean temperature are associated with La Niña events, or La Niña – type events on the Pacific equator. (La Niña occurs when ocean temperature in mid-Pacific along the equator is more than 0.5 °C below normal for six to seven months; El Niño when temperature is more than 0.5 °C above normal). These cool ocean temperatures on the equator and also along the west coast are usually set up by stronger northeast trade winds over the tropical Pacific Ocean and stronger westerly winds in the eastern North Pacific.

[1] Institute of Ocean Sciences, Department of Fisheries and Oceans, Sidney, BC, Canada. Former President of CMOS (2009).

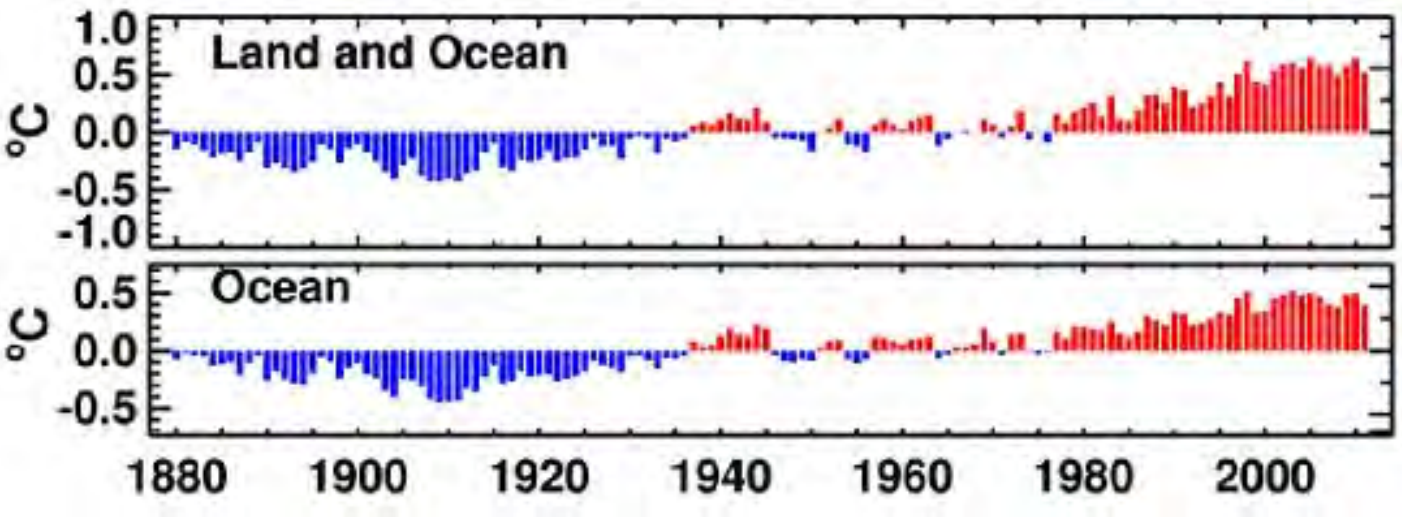


Figure 1. **Global temperature anomalies** since 1880, relative to the 20th century average. Image provided by NOAA: http://www.ncdc.noaa.gov/cmb-faq/anomalies.html.

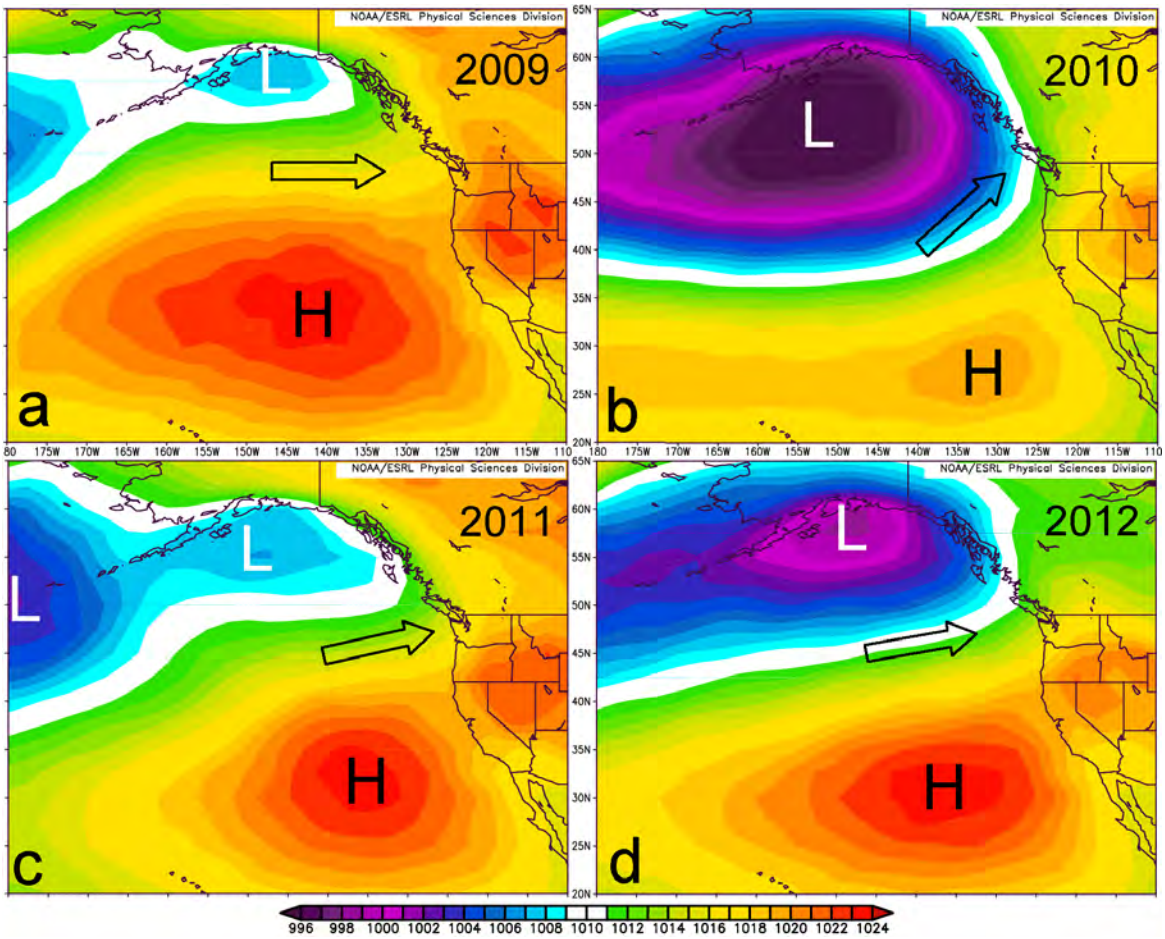
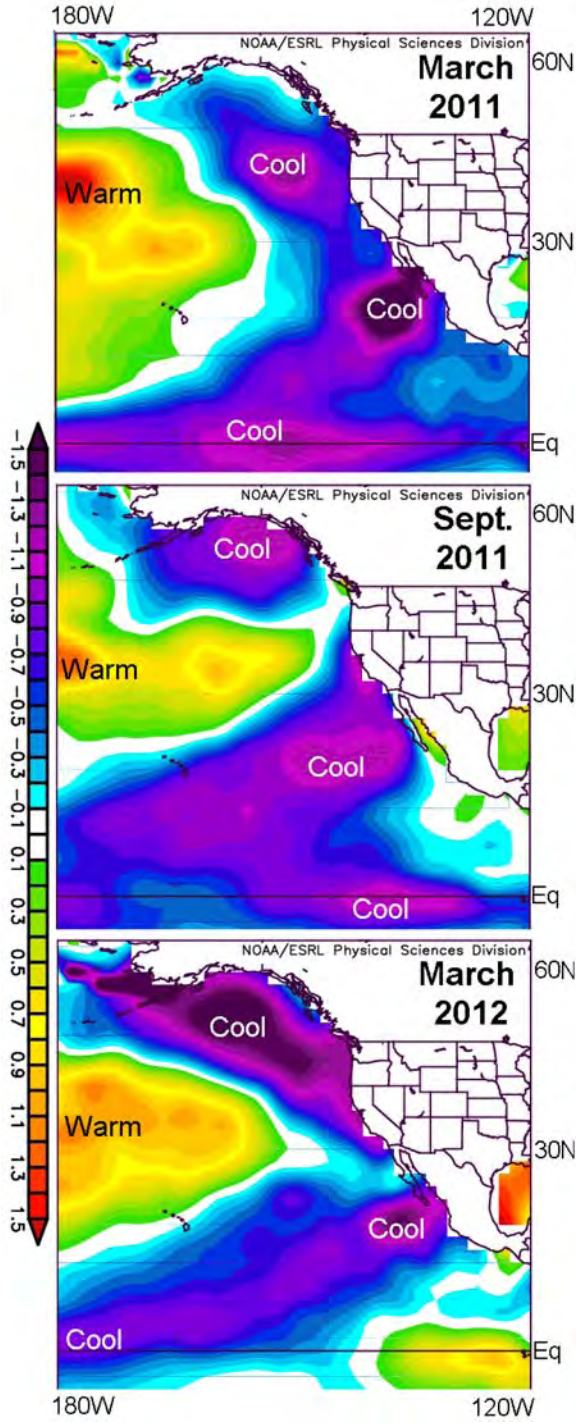


Figure 2. **Sea surface air pressure** in the Northeast Pacific Ocean and western North America, averaged over the winter months of January to March for each of the years 2009 to 2012. Contours are at intervals of 1 millibar, with scale at bottom. The letter **H** denotes the North Pacific High Pressure System; **L** denotes the Aleutian Low Pressure System. Figures are provided on-line by this NOAA Internet site: http://www.esrl.noaa.gov/psd/cgi-bin/data/composites/printpage.pl



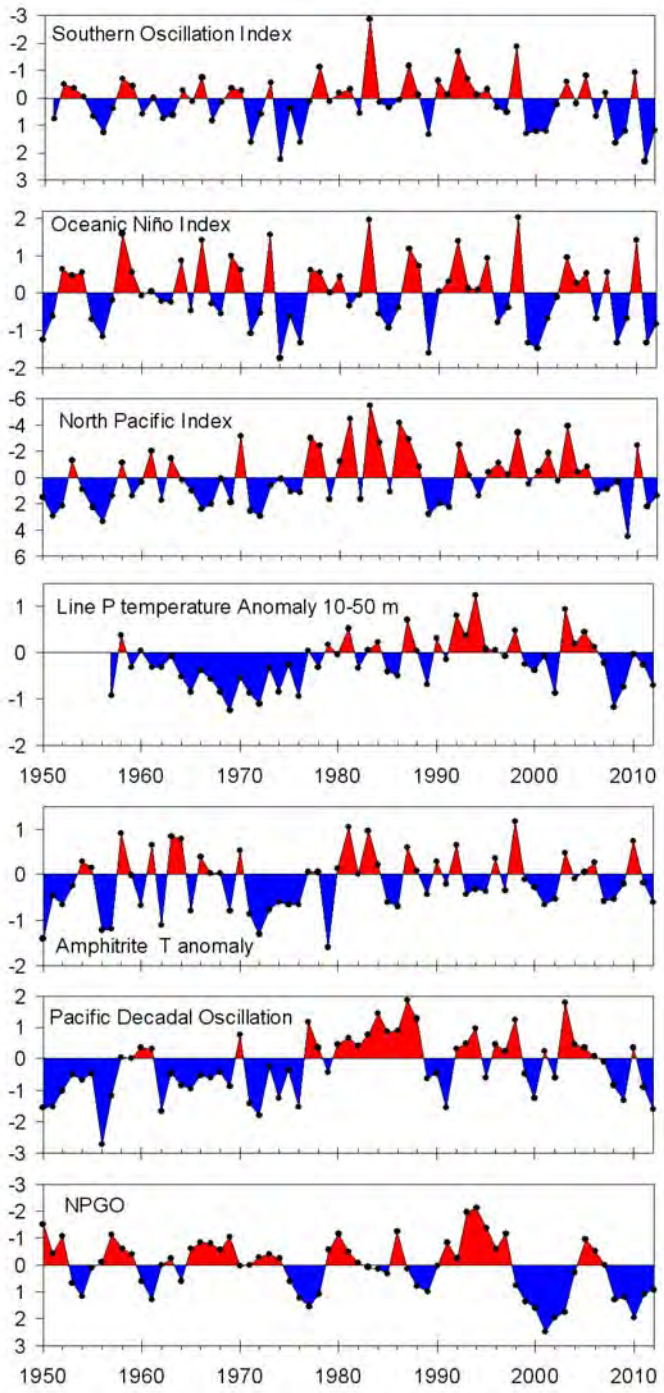


Figure 3. **Ocean surface temperature anomaly** in the eastern Pacific Ocean for March 2011 (top), September 2011 (middle) and March 2012 (bottom). The maps extend from North America west to 180°W, and from 5° South to 65°North. The equator is marked by the horizontal black line near bottom of each panel. The temperature anomaly scale in °C is at left. Positive and negative temperature anomalies are labelled warm and cool, respectively in each panel. Reference years for temperature anomaly are 1981 to 2010. Images provided by NOAA: http://www.esrl.noaa.gov/psd/cgi-bin/data/composites/printpage.pl

Figure 4. **Five indices** of Pacific Ocean winter climate, plus temperature anomaly (°C at Amphitrite Point and along Line P. Each point is an average over the months of November to March, and plotted for the calendar year of March. For example, an average of November 2011 to March 2012 is plotted as a data point for 2012. Several time series are inverted so their variability is in phase with other series. Some indices for 2012 do not include February or March 2012 conditions.

The link between ENSO events (a term that includes both El Niño and La Niña) and winds and ocean temperatures off western North America was noticed several decades ago, and has become stronger in the past 10 years or so, allowing more reliable predictions of winter weather based on the ENSO cycles. La Niña of the winter of 2012 was fading in early April 2012, and disappeared by late spring.

The study of the atmosphere-ocean links extending across the Pacific-wide can help interpret warm and cool conditions, such as the recent cool ocean temperatures west of Canada and northern USA. Time series of many of these patterns are presented next.

Linking Pacific-wide climate variations to local temperature

How will El Niño affect our weather this year? What happens in the North Pacific Ocean to bring a cool winter? Or a warm summer? To try to answer these questions in a simple manner, scientists look at ocean temperature and/or air pressure in specific regions of the Pacific Ocean to develop indices whose changes in time will impact other areas far away. El Niño is the most famous, the Southern Oscillation is another. I have prepared a figure of five of these Pacific – wide indices in Figure 4, together with one graph of local ocean temperature anomaly at Amphitrite Point on southwest Vancouver Island and another of ocean temperature anomaly in eastern the Gulf of Alaska (Line P at 10 to 50 m depth). In general, the value for each index aligns with anomalies at Amphitrite Point and along Line P.

It is remarkable how all of the series of Figure 4 are similar over the past two winters, and generally aligned over the past six winters. Only the winter of 2010 stood out as different.

The time series at top of Fig. 4 presents the Southern Oscillation Index (SOI), which represents the strength of the trade winds in the tropical Pacific Ocean, which in turn set up ENSO. For example, a positive SOI in 2012 (top panel of Fig. 4) coincided with stronger trade winds, which brought cooler waters to the mid-Pacific Equator and La Niña (positive Oceanic Niño Index in Fig 4). Stronger trade winds coincided with stronger westerly winds in the North Pacific Ocean, which created cooler waters in the eastern Gulf of Alaska (negative anomaly along Line P in Fig. 4) and along the west coast of Canada and USA (negative anomaly at Amphitrite Point on the SW coast of Vancouver Island, Fig. 4).

All of the time series in Figure 4 are explained in the next paragraphs. Here, I note their common variability. In general, many of these time series were below the horizontal lines prior to 1977 and jumped above the lines in the late 1970s (This jump can be to positive or negative values, because some series are plotted the negative values at top). The Pacific Decadal Oscillation (PDO) shows this pattern the best. Many time series shift sign in the late 1990s and again in the late 2000s. An exception is the North Pacific Index (NPI) which remained negative through most years from late 1970s through to the mid 2000s. Note the extreme cooling along Line P since 2007. In general, cooling aligns with La Niña (negative ONI), negative PDO, NPGO and NPI, and positive Southern Oscillation Index. Details of these time series are listed next.

Amphitrite temperature anomaly time series is based on ocean surface temperature measured daily at the Amphitrite Lighthouse on the southwest coast of Vancouver Island. Reference years are 1981 to 2010. Monthly time series are provided by Fisheries and Oceans Canada: http://www-sci.pac.dfo-mpo.gc.ca/osap/data/SearchTools/Searchlighthouse_e.htm

Oceanic Niño Index (ONI) is a measure of the anomaly of ocean surface temperature in the central tropical Pacific Ocean, and serves as the official index of the El Niño and La Niña. It is provided by the NOAA/ National Weather Service National Centers for Environmental Prediction Climate Prediction Center, Camp Springs, Maryland: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/ensostuff/ensoyears.shtml

Southern Oscillation Index is available at: http://www.cpc.ncep.noaa.gov/data/indices/soi. It represents the atmospheric pressure difference between the island of Tahiti and Darwin, Australia, which usually sets up the El Niño and La Niña ocean responses. A strong pressure gradient and positive SOI (Fig 4) set up La Niña ocean conditions.

North Pacific Index (NPI) is the area-weighted sea level pressure over the North Pacific from 30°N to 65°N and 160°E to 140°W. It serves as an index of the impact of ENSO over the North Pacific Ocean. Monthly time series of this index are provided by the Climate Analysis Section, NCAR, Boulder, USA, http://www.cgd.ucar.edu/cas/jhurrell/npindex.html based on Trenberth and Hurrell (1994). This index is a useful indicator of the intensity and areal extent of the Aleutian Low Pressure system. Both monthly and winter-only values are available.

Line P temperature anomaly is based on Crawford et al. (2007) and is updated annually. Line P is a set of sampling stations in the North Pacific sampled regularly by Fisheries and Oceans Canada since the 1950s. Reference years are 1981 to 2010. http://www.pac.dfo-mpo.gc.ca/science/oceans/data-donnees/line-p/index-eng.htm

Pacific Decadal Oscillation (PDO) is based on analysis of Mantua et al. (1997) and Zhang et al. (1997). It is the 1st mode of ocean surface temperature variability in the North Pacific Ocean, and is often positive in El Niño years.

However, its year-to-year variability is slower than that of ONI, and it is usually a good indicator of weather patterns that persist for a decade or more. The time series was provided at this Internetsite of the Joint Institute for Studies of Atmosphere and Ocean of NOAA in Seattle: http://jisao.washington.edu/pdo/PDO.latest

North Pacific Gyre Oscillation (NPGO) is a climate pattern that emerges as the 2nd dominant mode of sea surface height variability (2nd EOF SSH) in the Northeast Pacific Ocean. (Di Lorenzo et al; 2008) http://www.o3d.org/npgo/ When positive, the westerly winds over the eastern North Pacificare often stronger than normal and the west coast and eastern Gulf of Alaska are cool. These conditions have dominated in most winters since 1999.

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Communiqué du Conseil des académies canadiennes

40 questions prioritaires pour la recherche canadienne en sciences de la mer

Ottawa (17 juillet 2012) – Bordé par le plus long littoral au monde etpar trois océans, le Canada est très conscient des changements et des pressions subis par les océans de la planète. Étant donné la complexité des questions qui se posent aux sciences de la mer, y répondre suppose un degré élevé de coordination de l'ensemble des institutions scientifiques et des centres technologiques. Par conséquent, un des principaux défis pour la communauté scientifique canadienne consiste à établir les priorités de recherche dans le domaine des sciences de la mer.

Aujourd'hui, le Conseil desacadémies canadiennes (CAC) franchit une première étape en ce sens en publiant le rapport ***Les 40 questions prioritaires pour la recherche canadienne en sciences de la mer***, préparé par un groupe cadre de 22 experts des sciences de la mer au cours de la première phase d'une initiative à deux volets.

"Ce rapport a déjà commencé à créer une synergie entre les chercheurs canadiens en sciences de la mer, laquelle conduira à de possibles collaborations futures et à une meilleure compréhension des priorités et besoins en matière de recherche", commente David Fissel, président du groupe cadre sur les sciences de la mer et scientifique principal chez ASL Environmental Sciences Inc. et Président de la SCMO en 2010.

Afin d'acquérir une compréhension approfondie des principaux défis qui confrontent la recherche canadienne en sciences de la mer,le Consortium universitaire canadien en sciences de la mer (CCORU)[2] a demandé en 2011 au CAC d'entreprendre une étude en deux volets sur les sciences de la mer au Canada. Au cours de la première phase, un exercice d'établissement de priorités, comprenant un sondage en ligne exhaustif de la communauté canadienne des sciences de la mer et un atelier d'experts, a été entrepris. Avec l'aide d'un groupe cadre de 22 experts des sciences de la mer, 40 questions prioritaires pour la recherche ont été définies et groupées sous quatre thèmes de recherche :

- Améliorer la compréhension scientifique fondamentale;
- Surveillance, les données et la gestion de l'information;
- Comprendre les incidences des activités humaines;
- Éclairer les processus de gestion et de gouvernance.

"Vu l'importance capitale des océans de la planète pour le Canada, le CAC est fier d'avoir eu l'occasion de diriger ce processus d'établissement de priorités", constate Mme Elizabeth Dowdeswell, présidente-directrice générale du CAC. "Je tiens à louer les membres du CCORU pour le dynamisme ainsi que le dévouement envers les sciences de la mer qu'ils ont démontrés. Nous sommes certains que notre rapport fournira l'information requise pour établir les priorités et une direction claire pour la recherche".

(Read the English version on page 162)

[2] Les établissements suivants sont membres du Consortium universitaire canadien en sciences de la mer l'Université Dalhousie, l'Université du Québec à Rimouski; l'Université Laval; l'Université de la Colombie-Britannique, l'Université de Victoria, l'Université Memorial, l'Université de l'Île-duPrince-Édouard, l'Université du Nouveau-Brunswick et l'Université du Manitoba.

The METAREA Initiative – A New Canadian Responsibility

Marie-France Gauthier[1], Bruno Beaulieu[2], Pierre Pellerin[2],
Darren Tessmer[2], Patrick McCarthy[2] and Peter Silva[2]

Abstract: The Arctic Ocean is undergoing significant physical transformation as a result of changing environmental conditions. In recognition of the potential for significant increases in Arctic shipping and therefore an increase in the likelihood of shipping accidents that can put human lives and the integrity of the Arctic marine environment at risk, the International Maritime Organization (IMO) expanded the Global Maritime Distress and Safety System (GMDSS) Maritime Safety Information service through the implementation of five new Meteorological/Navigational (MET/NAV) areas. In summer 2010, Environment Canada's Meteorological Service received $26 million dollars over a five year period to implement "The METAREA Initiative".

Résumé: L'océan Arctique connaît une transformation physique importante en raison des conditions environnementales changeantes. En reconnaissance de la possibilité d'importantes augmentations de la navigation dans l'Arctique et par conséquent de l'augmentation de la probabilité d'accidents de navigation qui peuvent présenter un risque pour les vies humaines et l'intégrité de l'environnement marin arctique, l'Organisation maritime internationale (OMI) a élargi le service pour l'information sur la sécurité maritime du Système mondial de détresse et de sécurité en mer (SMDSM), grâce à la mise en œuvre de cinq nouvelles zones de météorologie et de navigation. À l'été 2010, le Service météorologique d'Environnement Canada a reçu 26 millions de dollars sur une période de cinq ans pour mettre en œuvre l'initiative liée aux zones météo ("METAREA").

Introduction

For Environment Canada (EC), the METAREA Initiative involves the expansion of its domestic marine and ice services to provide a full suite of meteorological information; including sea state and freezing spray forecasts, observational data, and weather and ice information services and warning operations around-the-clock to the newly defined Arctic METAREAs XVII and XVIII as shown in Figure 1.

Figure 1: Limits of Canada's METAREA

The meteorological information will be standardized and coordinated for delivery through the Global Maritime Distress and Safety System (GMDSS), according to international protocols and expectations established by the IMO. Bulletins will therefore be disseminated via the INMARSAT-C satellite, where coverage exists, and via the Department of Fisheries and Oceans Canada high frequency radios, where satellite coverage has not yet been established. Environment Canada's first expansion of marine and ice information products and services over the Arctic took place during summer 2011. This paper will describe the METAREA Initiative and the progress made so far.

Weather and Ice Products

1) Service Expansions

Environment Canada transitioned to Full Operational Capability by June 2011 in accordance with the announcement by the IMO/IHO/WMO regarding the expansion of the IMO/IHO World-Wide Navigational Warning Service (WWNWS) into Arctic waters.

Summer 2011. Initial service involved providing weather and ice edge information in separate bulletins that followed the international standard format. The bulletins covered existing and some new Canadian marine areas as shown in figure 2.

[1] Environment Canada, Meteorological Service of Canada, Ottawa, Ontario, Canada.
[2] Environment Canada, Meteorological Service of Canada, Canada.

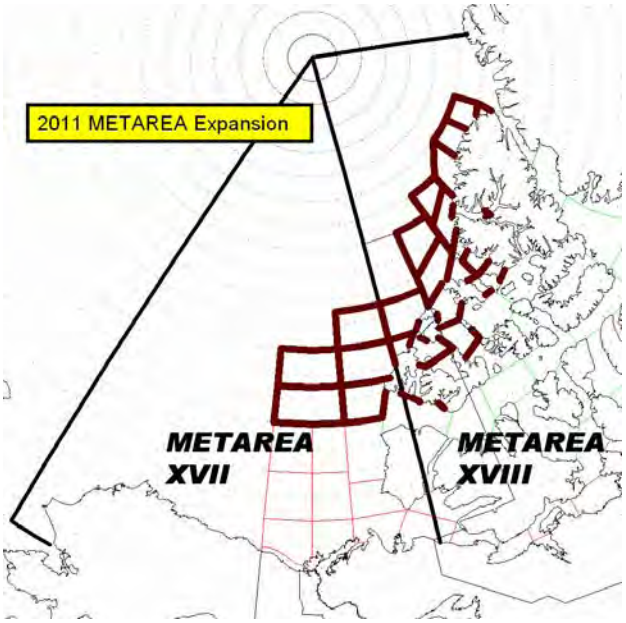

Figure 2: 2011 METAREA Service Expansion

Summer 2012. Service expansion include s the additional marine areas depicted in figure 3. For the first time in the Arctic, the meteorological parameters of t he bulletins include wave height information in addition to wind speed and direction, temperatures, visibility and ice information.

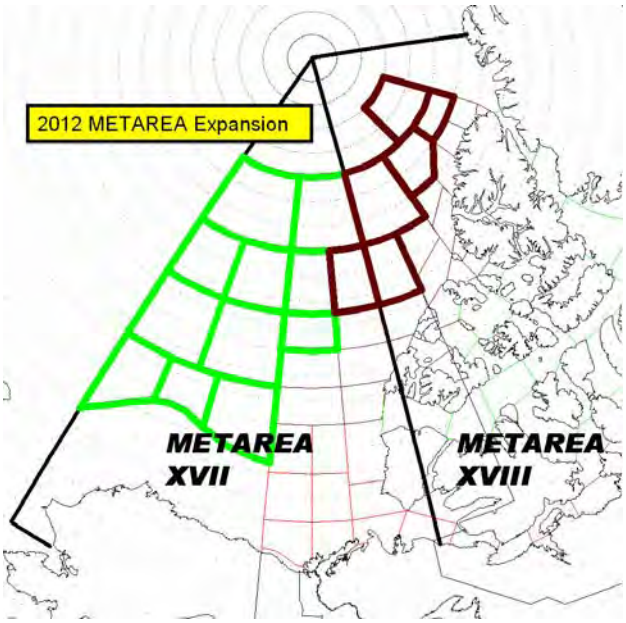

Figure 3: 2012 METAREA Service Expansion

Yearly service expansions are being planned, so thaby the end of March 2015, Environment Canada will be providing year-round weather and ice services for METAR EAs XVII and XVIII in the Arctic.

Maritime Safet y Information bulletins are produced by meteorologists monitoring the conditions and providing forecasts and warnings to marine interests. By the end of the implementation phase, the marine and ice bulletins will be merged into asingle bulletin. The merged bulletin will be disseminated twice-daily to users throughout METAREAs XVII and XVIII over GMDSS, using the SafetyNET service INMARSAT-C satellite system covering waters up to 76°N, and via Department of Fisheries and Oceans's (DFO) high frequency radio transmissions in the High Arctic (above 76°N).

The METAREA service wi ll be seasonal as operations begin, to reflect the nature of the shipping season in the Arctic and current domest ic marine and ice services programs. Initial plans include twice daily broadcasts between May and November (withflexibility in start and end due to seasonal ice cover). During thewinter months once-weekly bulletins i ssued on Monday s at 0300UTC will indicate the seasonality of the messages.Current plans are for 365, 24/7 coverage by 2015.

2) New Production Tool – Prototype

As new inf ormation is incorporated into the METAREA forecast production system as a result of geographic expansion, the introduction ofnew forecast parameters and the extension to y ear-round services, there will be continuing need for refinement and evolution of the forecasting tools.

As a result, there are plans in place to d evelop and prototype forecast production system to enable the production of the weather and ice forecasts targeted to the provision of METAREA services.

Meteorologists use various tools which allow post-processing of computer-generated weather predictions, facilitating their interventions in an efficient manner. Post-processing applications will be designed and developed such that they facilitate analy sis, verificat ion and manipulation o f o utputs fr om th e co mputer-generated weather models.

A forecast production system for the METAREA services will provide the essential tools for meteorologists to effectively use the automated forecast guidance. Forecasters will integratelocal observed weather conditions and be able t o add information about localized extreme weather events that may not be fully represented by the computer models.

Data Assimilation and Models

In order to provide the science- and technology-based foundation that allo ws the expansion of the end-to-end analysis and fore casting system for production of marine and ice information products in the Arctic, EC is increasing its efforts in data assim ilation and models. Nevertheless,

considerable uncertainties remain due to a limited understanding of the complex interaction processes that occur between the ocean, atmosphere, waves and sea ice. The development of an integrated marine forecasting system for the Arctic is built upon the existing expertise in the environmental group at EC. The development of the new numerical tools are within the context of existing EC operational modeling systems (namely the EC Numerical Weather Prediction system), which allows significant leveraging of already existing research activities resulting in substantial efficiencies, including increased automation. In addition, the enhancement of the weather and ice forecasting system to include METAREA XVII and XVIII will also improve the products provided to Northerners and mariners in Canada's domestic waters. Here is a short summary of the different components developed during the first two years:

- *Operational implementation and validation of a prototype high-resolution automated sea ice concentration analysis for North America (Scott K. A. et al. 2012).*

This system produces an ice concentration analysis every 6 hours on a 5-km grid by assimilating passive microwave satellite data (AMSR-E and SSM/I) and the ice charts produced by the Canadian Ice Service (CIS). The background state for the analysis is obtained by persisting in time the previous analysis.

- *Operational implementation of a high-resolution ocean wave forecasting system (Lalbeharry R. et al. 2009).*

The wave forecasting system was implemented over the Arctic. It runs 4 times per day with wind input from global and regional GEM models and produces operational outputs for each run. Figure 4 shows an example of the model output that will be made available to forecasters as guidance for the preparation of the METAREA bulletins.

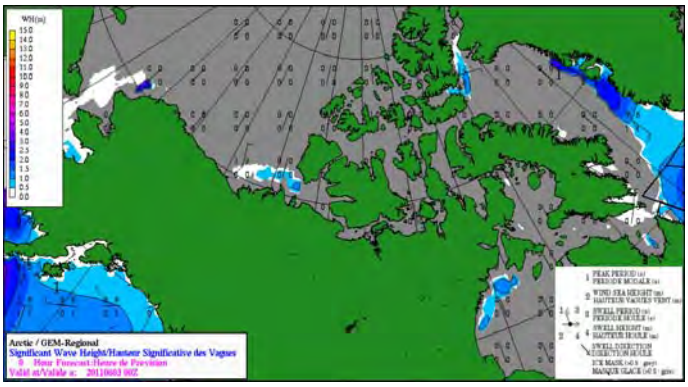

Figure 4: Wave Height Model Output

- *Operational implementation of a High-Resolution Atmospheric Analysis (Tanguay M et al. 2011).*

A new regional system composed of a four-dimensional variational extension of the Canadian Regional Data Assimilation system combined with a higher horizontal resolution 10 km (rather than the operational 15 km) version of the GEM atmospheric forecast model has been completed. This system covers more than the METAREAS over North America and produces forecasts up to two days. This new system significantly improves weather forecasts over the Canadian region and the Arctic region especially. More precisely, the improvements over the METAREAS are (1) better fit of winds and temperature against radiosonde data up to two days forecast from 200 hPa down to the surface, especially during the summer; (2) better verifying forecasts over the two-day range.

- *Development of an Iceberg / ice hazard model.*

The objective was to extend the current operational iceberg model to an Arctic ice hazard tracking system, i.e. consideration of ice islands and icebergs surrounded by ice. Two field experiments were conducted to collect detailed environmental information about ice islands. This new data was used to modify the North American Ice Service iceberg drift and deterioration model to make it more compatible with ice islands. In addition to changes in iceberg geometry, modifications were necessary for the environmental forcing and parameterizations with respect to drift and deterioration.

Monitoring Infrastructure

EC is dedicated to enhance and expand the atmospheric monitoring of Canada's north, such that Canada's METAREA XVII and XVIII commitment can be met. To fulfill this requirement, EC is planning to install 8 new coastal automatic weather stations, deploy 25-30 on-ice and in-water drifter buoys and expand the space-based observations in the Arctic during the 5-year duration of the project.

1) Surface Coastal Monitoring

Site selection has been completed for 6 of 8 coastal automatic monitoring stations. In the summer of 2010 EC technicians started the METAREAS project with site selection for Gateshead Island, Fort Ross and Bathurst Inlet. In early summer 2011, technicians identified three additional locations for monitoring stations at Sirmilik National Park (Bylot Island), Axel Heiberg Island and Cape Providence on Melville Island. In September of 2011, a new coastal monitoring station was installed on Gateshead Island, the first of this project. An attempt to follow up with a late season installation at Fort Ross was weathered out. In early summer 2012, EC technicians travelled to Salluit, Quebec and Sanikiluaq, Nunavut to do site selections and the field portion of a Phase 1 Environmental Site Assessment (ESA). Before the end of the 2012 installation

season, EC will have completed the installation of Fort Ross and also attempt new installations at Bathurst Inlet and Axel Heiberg Island, weather permitting. Quebec Region is targeting the summer of 2013 to install the Salluit and Sanikiluaq stations. Dates have yet to be finalized for installations in Sirmilik National Park and Cape Providence. Figure 5 shows the installation status as of spring 2012.

Figure 5: METAREA Coastal Weather Stations

All locations will receive a standard MSC - Auto8 station with a full suite of instruments as found on the MSC Reference Climate Stations (RCS) and the MSC Surface Weather (SWx) Category 1 stations. The configuration will consist of a ten (10) metre wind tower, a two(2) metre wind to correct the catch of the precipitation gauge, an alter shield, a Geonor weighing gauge, temperature, humidity, pressure, SR-50 differential snow-depth sensor, and a data logger. The stations installed by PNR will have a repurposed walk-in metal cooler to protect the data logger and pressure sensor from the elements and wildlife. Those stations located at communities will have an aspirated Stevenson screen, while those at isolated locations will be non-aspirated. The six stations at isolated locations will be 12-volt systems powered by wind generators, solar panels and batteries. The stations will receive one preventative maintenance visit per year, and corrective maintenance as deemed appropriate.

The stations will communicate hourly through GOES or Iridium satellites. The data will be available on the Global Telecommunications System (GTS) and EC's WeatherOffice.gc.ca for use by all Canadians within minutes of transmission. This data availability was an important factor when negotiating land leases with: Parks Canada, the Ministry of Aboriginal Affairs and Northern Development, and the Governments of Nunavut, the NWT, and Quebec. We acknowledge their cooperation.

2) Marine Ocean Monitoring

Six drifting buoys comprising 3 Compact Air-Launched Ice Beacons (CALIB's), 2 Surface Velocity Program (SVP) buoys and 1 Airborne Expendable Ice buoy (AXIB) were deployed in the Arctic region with Department of Fisheries and Oceans (DFO), Canadian Coast Guard and Canadian Ice Service collaboration. All of these buoys measure atmospheric pressure and 3 of the 6 buoys measure air temperature as well. The six buoys have produced 27,474 hourly observations in 2011. Figure 6 shows the location of the buoys in November 2011.

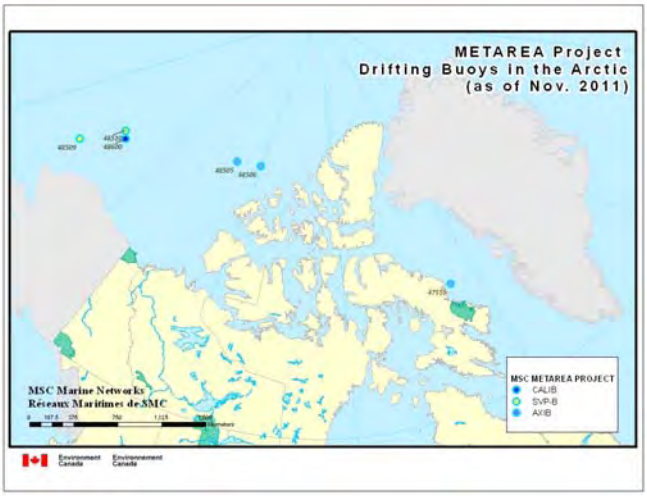

Figure 6: METAREA Fall 2011 Drifting Buoys

Planning is underway to determine where the next set of buoys will be deployed and to organize the logistics associated with this activity in the Arctic as shown in Figure 7.

3) Space-Based Monitoring

EC purchased an increased volume (over 1000) of RADARSAT and ENVISAT satellite images over the Arctic to expand the environmental (sea ice and surface wind) monitoring. Improvements are being made to the National SAR (Single Aperture Radar) Winds system to enable processing of high-latitude SAR images in support of this project. It is expected that EC will continue to increase its use of satellite images over the Arctic over the next few years.

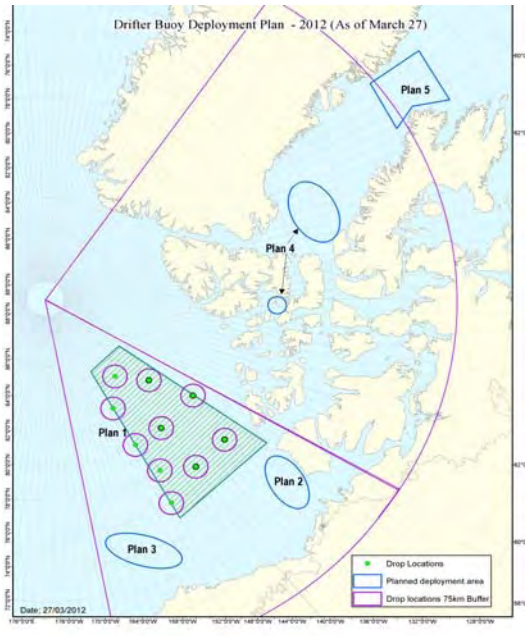

Figure 7: METAREA Buoys Deployment Plan for 2012

Operational Forecasting Capability

The ultimate goal is the delivery of w eather, weather warning and ice hazard information to marin ers in METAREAs XVII and XVIII. The final operational products will include a sy noptic description of the meteorologi cal hazards, ice information and wave, wind and visibility forecasts for open water areas within the METAREAs regions. A phased implementation approach is being employed to achieve this goal.

1) Forecast production

The E C's Prairie and Arctic Storm Prediction Centre (PASPC), which has offices in Edmonton, Alberta and Winnipeg, Manitoba, is responsible for the final METAREAs products. The Canadian Ice Service (CIS), based in Ottawa, Ontario, is responsible for the provision of ice information. As the two METAREAs regions cover parts of the American and Danish territorial waters, marine weather information from the National Weather Se rvice in the United States (U.S.) and the Danish Meteorological Institute (DMI) in Denmark is expected to be incorporated into EC's bulletins. The coordination of multiple agencies and countries will require better collaborative tools.

The PASPC will be providing basic marine forecasts in the initial stages of the i nitiative for a limited portion of the METAREAs. Much of this will be done in a nearly automated fashion. As the product design, forecast models, production tools, and observation platforms evolve, and as the METAREAs forecast regions expand, the work within the PASPC will grow significantly . By 2015, a ful l suite of meteorological information will be produced 24/7. The CIS will also see an expansion of their work to meet the demands of their growing area of responsibility. Expansion will also be moving from seasonal to y ear-round service delivery.

2) Training and Recruitment

The establishment of two operational forecast desks, one for marine weather and one for ice to provide Maritime Safety Information over METAREAs X VII and XVIII will necessitate some adjustments to EC's recruitment and training needs. Dedicated forecasters will be required to support 24/7 operations at PASPC and 10/7 operations at CIS by 2015. EC recruitmen t plan incorporates these additional needs and the training curriculum is expanding its focus on marine information and operational techniques. Recruitment and training activities will regularly occur over the 5 years for initial spin-up of the operational desks.

Product Dissemination and Contingency

As mentioned previously, METAREA bulle tins are being generated by EC's two METAREA operational desks. To meet international standards, these bulletins must be disseminated twice-daily to users throughout METAR EAs XVII and XVIII over GMDSS, using the SafetyNET servce INMARSAT-C satellite system covering waters up to 75°N, and via D FO's high frequency radio transmissions in the High Arctic (above 75°N).

EC began up linking bulleti ns in the summer of 2010 to INMARSAT for mariners below 75° N. For those above 75° N, the data is sent to the DFO, which operates an HF Telex transmitter in Iqaluit. The pr oducts transmitted originate from the Danish Meteorological Institute, the U.S. National Weather Services, as well as Environment Canada' s Meteorological Service.

To confirm that what is sent makes it to mariners, there are two antennas installed at EC's offices which read the products from the satellite. These reception sy stems are monitored 24x7 to ensure that any interruption in flow is quickly identified. While the monitoring in place is thorough, the failure of any piece of equipment in either downlink will prevent EC from monitoring a part of the uplink. Over the next year, additional contingencies for transmi ssion are to be investigated, and additional robustness in monitoring of the transmissions is to be implemented. Figure 8 shows the number of bulletins sent in summer 2011.

Figure 8: Number of METAREA Bulletins Disseminated

Conclusions and Recommendations

Through the METAREA Initiative, Canada will enhance Arctic marine safety and transportation efficiency, foster cooperative international partnerships amongst polar nations, improve weather forecasts for Northern communities and expand our knowledge of the Arctic climate and expand and improve Northern marine weather and ice services.

Acknowledgements

Ed Hudson, Allison Buchanan and Champika Gallage.

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Communiqué from The Council of Canadian Academies

40 Priority Research Questions for Ocean Science in Canada

Ottawa (July 17th, 2012) – With the longest coastline on the planet, and bordered by three oceans, Canada is acutely aware of the changes and stresses affecting the world's oceans. The complexity of ocean science issues means that addressing them requires a high degree of coordination among various institutions and technology hubs. A key challenge for Canada's science community is determining research priorities in the field of ocean science.

Today, the Council of Canadian Academies takes the first step in identifying these priorities by releasing the report, **40 Priority Research Questions for Ocean Science in Canada**, developed by a core group of 22 ocean science experts in the first of a two-phase initiative.

"*This report has already started to create a synergy amongst Canada's ocean scientists, leading to potential future collaborations and an increased understanding regarding research priorities and needs*," said David Fissel, Chair of the Core Group and Senior Scientist of ASL Environmental Sciences Inc. and also Past President of CMOS (2010).

In an effort to develop a comprehensive understanding of the needs facing Canadian ocean research, the Canadian Consortium of Ocean Research Universities (CCORU)[2], in 2011, asked the Council to undertake a two-part initiative on ocean science. During the first phase, a priority setting exercise was undertaken which included an extensive web-based survey of Canada's ocean science community and an expert workshop. With the support of a core group of 22 ocean experts, 40 priority research questions were ultimately identified, which were grouped under the following four research themes:

- Improving fundamental scientific understanding;
- Monitoring, data, and information management;
- Understanding impacts of human activities
- Informing management and governance

"*As the world's oceans are incredibly important for Canada, the Council was pleased to have had the opportunity to oversee this priority setting exercise*," said Elizabeth Dowdeswell, President and CEO of the Council of Canadian Academies. *"I would like to commend the members of CCORU for their leadership and dedication to ocean science. We are confident that our report will provide the information needed to prioritize and set a clear direction for future research.*"

With phase one now complete the Council will begin work on phase two of the oceans initiative. This will involve an evidence-based expert panel assessment that will examine Canada's needs and capacity regarding the major research questions in ocean science and issues related to Canada's coasts.

For more information, or to download a free copy of the workshop report, please visit:

http://www.scienceadvice.ca/en/assessments/in-progress/ocean-science.aspx

[2] **The Canadian Consortium of Ocean Research Universities includes:** Dalhousie University, Université du Québec à Rimouski (UQAR), Université Laval, University of British Columbia, University of Victoria, Memorial University, University of Prince Edward Island, University of New Brunswick, and the University of Manitoba.

Extreme weather becoming norm

by Lindsay Olson

The Starphoenix, June 28, 2012

Olson is the Insurance Bureau of Canada's vice-president for British Columbia, Saskatchewan and Manitoba.

Environment Canada's summary of 2011 reads like an annus horribilus for extreme weather.

Prairie flooding featured the highest water levels and flows in modern history across parts of Manitoba and Saskatchewan. Slave Lake, Alta., burned down. In the East, Richelieu flooded in Quebec's longestlived disaster. Fish swam where grain should grow. Nineteen tropical storms formed in the Atlantic Basin, almost twice the average.

Unusual weather? Or are weseeing a continuing trend and a long-term norm of severe weather in Canada?

Gordon McBean, a leading Canadian climatologist, has completed a key report following current peer-reviewed research, and examines Canada's historical weathertrends and projects them to 2050. He concluded that Canada has entered an era of extreme weather, with shorter and wetter winters, hotter summers and longer spring and fallseasons.

Commissioned by the Insurance Bureau of Canada, the paper shows a clear connection to my industry's historical experience with increasing severe weather damages.

It alsoconveys a strong message: Canadians need to adapt to severe weather realities that have been hittingthem, are hitting them, and will be hitting them, hard.

The reason IBC commissioned the research is practical.

We want to provide clear information to support adaptation of public and private infrastructure (municipalities, private homes).

And we want to helphome and business insurers anticipate factors that are likely to affect property insurance costs in the years ahead. Keeping those costs down isn't just an insurance industry issue.

It matters to everyone who buys insurance.

Insured losses from weather related catastrophes during the past three years have been near or above $1 billion.

We know well the stories behind the numbers-communities and individual Canadians have been hit hard, lives lost, homes destroyed, livelihoods threatened, bridges collapsed, roads ruined.

Our communities urgently need to make increased natural disaster resilience a priority.

McBean's work analyzed trendsfor Canada as a whole and its regions. Here are some projections:

Atlantic Canada: An increase in hurricane and storm activity in the region is likely, with resulting storm surges. Freezing rain events will increase by 50 per cent in Newfoundland. Nova Scotia could see increases of about 20 per cent.

Quebec: More hot days. Trends point to three times as many days over 30 degrees C for Quebec City as there were during the period 1961-90. Montreal is expected to see a 60 per cent increase in hot days by 2050. More heavy precipitation, and more freezing rain events longer than six hours are probable. Forest fire frequency increases.

Ontario: Summertime warming is likely to rise by two to three degrees. Frost-free days in winter are expected to double by 2050. The research projects more heavy precipitation. As well, more freezing rain, flashflooding and wildfires are projected, with the highest increases in northwestern Ontario.

Manitoba and Saskatchewan: Temperature increases are likely to be greatest in winter and spring in the south, while drought and water scarcity arelikely to be a growing climate risk through the prairies. Moreextreme precipitation events and flash flooding are expected.

Alberta: The province will be hit hard bydrought and water scarcity due to reduced summer precipitation, falling lake levels, retreating glaciers, decreasing soil-water content and more dry years. More hail, storms and wildfires are likely. Lightning flash density could increase by 20 per cent, with consequences for wildfires. More heavy rainfall events that can cause flash flooding are projected.

British Columbia: While the weather in B.C. will be variable, overall projections show warmer and wetter weather. The mountain snowpack is expected to decline. Wildfires could increase significantly in forests.

The North: The likelihood of the temperature in Iqaluit exceeding 25° C by 2050 could be five times greater than during the '80s. Overall, the temperature is likely to increase by two to four degrees. The fire season in the Yukon and Northwest Territories will likely extend by 10 days, and sea levels could be 15-25 centimetres higher.

Unusual weather is becoming the norm in Canada. This is clear in both the regional and national trends. We now need, as a country, to focus on adaptation to the new climate reality of more severe weather.

Extreme caution best in assessing future weather

by Madhav Khandekar

The Starphoenix, July 6, 2012

Khandekar is a retired Environment Canada scientist with more than 50 years of experience in weather and climate science, and an expert reviewer of the IPCC 2007 Climate Change Assessment.

The viewpoint article *Extreme weather becoming norm* (SP, June 28) Lidsay Olson, vice-president of the Insurance Bureau of Canada, provides a glimpse of weather extremes for various regions of Canada and warns Canadians to be prepared to live with such extremes over the next several decades.

Olson refers to the study on future weather extremes done by Gordon McBean, former assistant deputy minister of Environment Canada. When did Canada witness a climate free of extreme weather, is what Olson fails to explain to Canadians.

Extreme weather is an integral part of the Earth's climate. Throughout the recorded history of the Earth's climate, extreme weather events have always occurred somewhere, and are caused by large-scale atmosphere ocean flow patterns and their complex interaction with local/regional weather and climate features.

An examination of the 20th century climate of North America reveals that the decades of 1920s and 1930s, known as the Dust Bowl years, witnessed perhaps the most extreme climate over the Great American Plains and elsewhere. There were recurring droughts and heat waves on the Canadian/American Prairies.

The prairies also witnessed some extreme cold winters during the 1910s and 1920s - for example in 1907 and 1920.

We meteorologists still do not fully understand why the climate of North America was so anomalous during the 1920s and 1930s.

During the 1950s and 1960s most of Canada witnessed extreme cold winters, especially on the prairies where record breaking low temperatures (Edmonton at minus 45°C and below in the 1960s) were registered. In Ontario and Quebec, cold and snowy winters were the norm during the 1960s and early 1970s.

Parts of the Canadian Atlantic witnessed long winters with lots of snow. Spring ice jam on the St. John's River was a common occurrence during the 1960s and 1970s.

The recent decades of the 1980s and 1990s have witnessed a warmer climate across most of North America and worldwide.

Several hot spells of varying durations (from a few days to a week or more) have been recorded in North America, Europe and elsewhere. The year 1998 has been adjudged the "hottest year" in a 150-year-long temperature record, according to the Intergovernmental Panel on Climate Change, the UN Body of climate scientists and environmentalists.

Will the Earth's climate become significantly warmer in future? There is no definite answer so far. The best value for climate sensitivity (increase in the Earth's mean temperature in future for a doubling of the atmospheric CO_2 concentration) is now estimated to be just about 1°C or so.

Would such a modest increase in future lead to increased severe extreme weather events, as Olson claims?

Would future extreme weather be any different from what Canadians have witnessed in the past?

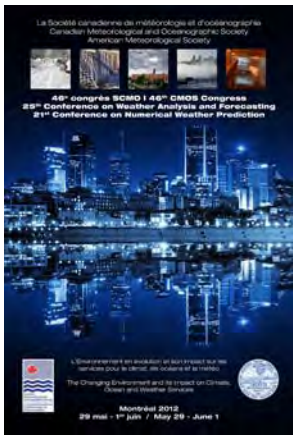
Extreme weather will always be with us, no matter what. The best way to cope with future extreme weather is to develop an "early warning system" with improved long-lead weather/climate forecasting capabilities. Such an early warning system can help minimize adverse impacts from future extreme weather events.

Canadians from coast-to-coast should be able to live and cope with future weather extremes with adequate precaution and need not be psyched into accepting increased insurance in future, as Olson's article seems to suggest.

CMOS BUSINESS / AFFAIRES DE LA SCMO

Back to 46th Congress in Montréal

Retour sur le 46e congrès de Montréal



Because of the lack of space in the August issue *CMOS Bulletin SCMO* (Vol.40, No.4) we did not publish the list of the two Committees Members for the Montréal Congress. We apologize for this omission and we are happy to publish both lists in this October issue. Thank you all for your time and effort to make this congress a great success!

À cause du manque d'espace dans le numéro du mois d'août du *CMOS Bulletin SCMO* (Vol.40, No.4) nous n'avons pas publié la liste des membres des deux comités organisateurs du congrès de Montréal. Nous nous excusons de cette omission et il nous fait plaisir de publier ces deux listes dans le numéro d'octobre. Merci à tous pour votre temps et effort pour faire de ce congrès un grand succès!

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Comité organisateur local

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Rick Jones	Trésorier
Sophie Cousineau	Inscription, Programme du congrès et logistique
Dominique Paquin	Locaux et Audio-Visuel
Jacques Lavigne	Communications
Richard Harvey	Webmestre
Normand Gagnon	Commanditaires
Oscar Koren / Richard Moffet	Exposants
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Comité du programme scientifique

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EC: Environnement Canada
IML: Institut Maurice-Lamontagne
NWS: National Weather Service, Gray Maine Office
NOAA OOAS: NOAA Office of Oceanic and Atmospheric Research
CO: Consortium Ouranos
UU: University of Utah
NOAA OCWWS: NOAA Office of Climate Water and Weather Service

Groupe Kelvin

Le 46e banquet de la SCMO lors du Congrès de Montréal a été suivi par une soirée musicale assurée par le groupe Kelvin. Kelvin est un groupe d'une douzaine de musiciens amateurs, dont quatre chanteurs, travaillant tous pour Environnement Canada à Montréal. Le groupe est intimement lié à la SCMO puisque c'est lors du congrès d'Ottawa en 1994 que quatre congressistes du CMC, musiciens à leurs heures, ont eu l'idée de former un groupe de musique au SMC. À l'origine, ils désiraient surtout d'adonner à une activité de détente, mais la motivation des membres combinée à des pratiques soutenues ont permis de hausser la qualité musicale du groupe et d'enrichir son répertoire. Un grand nombre de congressistes se souviennent encore avec plaisir des prestations du groupe Kelvin aux banquets de la SCMO en 1999 (Montréal), en 2002 (Rimouski) et en 2003 (Ottawa).

Kelvin Band

Animation after the 46th CMOS Banquet was provided by the Kelvin Band. Kelvin is a group of twelve amateur musicians, including four singers, working for Environment Canada in Montréal. The group's history is intimately connected with CMOS as it was at the Ottawa congress in 1994 that four CMOS attendees, musicians themselves, had the idea of forming a musical group at CMC. In the beginning, they saw this as an excellent recreational pursuit, but the enthusiasm of the band members along with a good deal of practice have raised the musical quality of the group and enriched its repertoire. Many conference participants will remember the Kelvin shows after the banquets at CMOS conferences in 1999 (Montréal), 2002 (Rimouski) and 2003 (Ottawa).

Bourse de voyage pour étudiants

Student Travel Bursary Recipients

Grâce à la générosité de la SCMO et du Ministère du Développement Durable, de l'Environnement et des Parcs du gouvernement du Québec, les étudiants suivants ont bénéficié d'une bourse de voyage pour participer au congrès de Montréal.

Thanks to the generosity of CMOS and Québec's Ministère du Développement Durable, de l'Environnement et des Parcs, the following sturdents received travel bursaries to attend the Montréal Congress.

Aryal, Raju	University of Northern British Columbia
Berg, Stephen	University of Manitoba
Corkum, Matthew B.	York University
Franklin, Jonathan	Dalhousie University
Islam, Siraj	University of Norther British Columbia
Lagman, Bryan	Dalhousie University
Ma, Zhimin	Memorial University
Wong, May	University of British Columbia

Call for Session Proposals
2013 Joint Scientific Congress
CMOS, CGU and CWRA

Saskatoon, Saskatchewan

(la version française suit)

The 2013 Joint Scientific Congress of the CMOS, CGU, and CWRA will be held at TCU Place in Saskatoon, SK, 26-30 May 2013. More detailed information will be posted as it becomes available on the Congress website at

http://www.cmos.ca/congress2013/index.htm

The theme of this congress is *Bridging Environmental Science, Policy and Resource Management*, and scientific sessions are being invited for all areas of interest of the CMOS (Canadian Meteorological and Oceanographic Society), CGU (Canadian Geophysical Union), and CWRA (Canadian Water Resources Association). The collaboration of these three societies reflects the growing interdisciplinary aspect of all our sciences, and the need to consider novel collective approaches in a world that is changing rapidly due to the combined impacts of global climate variability, environmental impacts, evolving global economies, and population growth; hence the theme of this congress.

At this time, we are inviting interested members of the three host societies to propose and to take the lead on organizing any special session or workshop of interest to you. Although sessions will be determined and finalized after all abstracts have been received, this is an opportunity to organize a session in your particular area of expertise and interest. We would anticipate that you would then encourage your contacts to submit abstracts for that session. Sessions will be organized into 1½-hour blocks of six 15-minute presentations (abstracts), or organizers may allot 30-minutes for an invited lead speaker and four 15-minute presentations. Multiple 1½-hour sessions are welcome if submitted abstracts warrant it. Note that the Joint Congress offers travel expenses for plenary speakers, but not for invited speakers associated with these special sessions.

To plan a special session for the 2013 Joint Congress, please submit your proposal through

https://www1.cmos.ca/abstracts

after 01 September, 2012. The proposal should include the *session title* (up to 40 characters), information about the session convener or co-convenors, and a short paragraph of up to 300 words describing the scientific content of the session. All session proposals should be received by 01 November, 2012. On-line abstract submissions will then be accepted between 15 January and 15 February 2013.

Scientific and plenary sessions of the Congress will take place from Monday, 27 May through Thursday, 30 May, 2013. In addition, time and venue space have been set aside on Sunday, 26 May for related workshops, business meetings, courses and other Congress-related events, as well as an icebreaker reception to be held that evening. Parties interested in making such arrangements may contact Scientific Program Committee Co-chair Geoff Strong (gstrong1945@gmail.com). For specialized workshops, please contact Geoff Strong prior to submitting a proposal.

We look forward to receiving your submissions as we plan an exciting 2013 Congress.

The Scientific Program Committee for the Saskatoon 2013 Joint Scientific Congress of the CMOS, CGU, and CWRA,

Geoff Strong
CMOS Co-Chair
gstrong1945@gmail.com

Rod Blais
CGU Co-Chair
blais@ucalgary.ca

Bob Halliday
CWRA Co-Chair
rhalliday@sasktel.net

Appel pour des propositions de sessions Congrès scientifique conjoint 2013 SCMO, UGC et ACRH

Saskatoon, Saskatchewan

Le congrès scientifique conjoint de la SCMO, de l'UGC et de l'ACRH de 2013 aura lieu au TCU Place à Saskatoon, en Saskatchewan, du 26 au 30 mai 2013. De plus amples renseignements seront publiés à mesure de leur disponibilité sur le site Web du congrès à

http://www.cmos.ca/congress2013/fr/index.htm

Le thème de ce congrès est "Intégration des sciences de l'environnement, de la politique et de la gestion des ressources" et des sessions scientifiques sont à organiser pour tous les domaines d'intérêt de la SCMO (Société canadienne de météorologie et d'océanographie), de l'UGC (Union géophysique canadienne) et de l'ACRH (Association canadienne des ressources hydriques). La collaboration entre ces trois sociétés reflète l'aspect interdisciplinaire croissant de toutes nos sciences, ainsi que le besoin de prendre en compte de nouvelles approches collectives dans un monde en changement rapide du fait des répercussions combinées de la variabilité du climat mondial, des impacts environnementaux, des économies mondiales en évolution et de la croissance de la population; la raison du thème de ce congrès.

Aujourd'hui, nous invitons les membres intéressés des trois sociétés hôtes à proposer et à diriger l'organisation de toute session particulière ou de tout atelier qu'ils ont à cœur. Bien que les sessions soient déterminées et finalisées après avoir reçu tous les résumés, il s'agit d'une occasion d'organiser une session dans votre domaine d'expertise et d'intérêt particulier. Nous supposons que vous allez par la suite encourager vos relations à soumettre des résumés pour cette session. Les sessions seront organisées en blocs d'une heure et demie comprenant six présentations de 15 minutes (résumés), ou bien les organisateurs pourront allouer 30 minutes pour un orateur principal invité et quatre présentations de 15 minutes. Plusieurs sessions d'une heure et demie sont possibles si les résumés soumis le justifient. Il est à noter que le congrès conjoint paye les frais de déplacement pour les orateurs plénier, mais pas pour les orateurs invités associés à ces sessions particulières.

Pour planifier une session particulière lors du congrès conjoint de 2013, veuillez soumettre votre proposition par le biais de

https://www1.cmos.ca/abstracts

après le 1er septembre 2012. La proposition doit inclure le *titre de la session* (jusqu'à 40 caractères), des renseignements sur l'animateur ou les coanimateurs, ainsi qu'un court paragraphe (jusqu'à 300 mots) décrivant le contenu scientifique de la session. Toutes les propositions de session doivent être reçues au plus tard le 1er novembre 2012. Les soumissions de résumés enligne seront ensuite acceptées entre le 15 janvier et le 15 février 2013.

Les sessions scientifiques et plénières du congrès auront lieu du lundi 27 au jeudi 30 mai 2013. En outre, des créneaux horaires et des locaux ont été réservés le dimanche 26 mai pour les ateliers associés, les réunions d'affaires, les cours de formation et d'autres évènements reliés au congrès, et un cocktail de bienvenue aura lieu dans la soirée. Les parties intéressées par ces possibilités peuvent communiquer avec le coprésident du comité du programme scientifique, Geoff Strong (gstrong1945@gmail.com). Pour des ateliers spécialisés, veuillez communiquer avec Geoff Strong avant de soumettre une proposition.

Nous avons hâte de recevoir vos propositions afin de planifier un congrès de 2013 passionnant.

Le comité du programme scientifique pour le congrès scientifique conjoint de la SCMO, de l'UGC et de l'ACRH de 2013 à Saskatoon.

Geoff Strong
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gstrong1945@gmail.com

Rod Blais
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Bob Halliday
Coprésident ACRH
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Partership Group for Science and Engineering (PAGSE)

Annual Activity Report 2011-12

Extracts

The Partnership Group for Science and Engineering (PAGSE; www.pagse.org) is a cooperative association of 26 national organizations in Science and Engineering. It was formed in June 1995 at the invitation of the Academy of Science of the Royal Society of Canada. The national organizations that comprise PAGSE represent approximately 50,000 individual members from industry, academia, and government sectors. They work collectively to represent the Canadian science and engineering community to the Government of Canada, and to advance research and innovation for the benefit of Canadians. PAGSE is **not** a lobby group. It does not seek an audience in order to advance the cause of specific science and engineering initiatives. Rather, its intent is to address the broader issues of science and engineering policy at the national level.

To be truly representative of the science and engineering community in Canada, PAGSE must ensure that individual members of member societies and associations are aware of the activities that are undertaken in their name. While details may be found on the PAGSE website (www.pagse.org), PAGSE also provides a periodic summary of activities.

Bacon & Eggheads
PAGSE, in partnership with the Natural Sciences and Engineering Research Canada (NSERC), sponsors a monthly breakfast meeting held on Parliament Hill, and known as *"Bacon and Eggheads"*. Speakers at the meetings inform parliamentarians about recent advances in science and engineering. In 2011 PAGSE organized the presentations listed below:

- Switching to Green Chemistry, **Philip Jessop**, Queen's University, Tuesday October 4, 2011;

- Bringing Power to the People – Smart Grids and the Future of Renewable Energy, **Liuchen Chang**, University of New Brunswick, Thursday October 27, 2011;

- Green forests, green dollars: rebuilding Canada's forest products industry leadership through innovation, **Sophie D'Amours**, Université Laval, Thursday November 24, 2011;

- Decision-making in an uncertain world, **Daniel Krewski**, University of Ottawa, Thursday February 9, 2012;

- Geoscience as a Key to Canada's Economic Competitiveness, Wealth and Development, **James Franklin**, Franklin Geoscience Ltd., Thursday March 1, 2012;

- The Lowdown on the Meltdown, **Richard Peltier**, University of Toronto, Thursday March 29, 2012;

- Alternate futures for the oil sands industry: from the age of steam to the age of biology, **Stephen Larter**, University of Calgary, Thursday May 3, 2012.

SciencePages
SciencePages is an initiative by the Partnership Group for Science and Engineering (PAGSE) to provide short science and engineering briefing notes on topical issues for Canadian Parliamentarians.

With the support of the Natural Sciences and Engineering Research Council (NSERC) and the Canada Foundation for Innovation (CFI), PAGSE undertook a series of pilot "proof-of-principle" issues. Three topics were covered: biodiversity (launched October 28th, 2010 during the Bacon and Eggheads breakfast on the same topic); the second, on Smart Grids, was released October 27th 2011; the last issue was on toxicology and was released in February 2012. Pdf versions of all issues can be downloaded from the

SciencePages website found at http://www.sciencepages.ca/index.html

An informal survey of readers, obtained from written responses to short questions distributed at the Green Chemistry Bacon and Eggheads, revealed a strong desire amongst both politicians and the broader community for more issues of SciencePages. We are currently considering new management models for producing each issue and hope to come to a decision before the end of the calendar year.

PAGSE Monthly Meetings

Guests, representing science and engineering in the government and industry sectors, are invited to monthly PAGSE meetings to present their perspectives on science and engineering in Canada, on the activities of their organizations, as well as the potential issues and challenges that they would like to see PAGSE address. Members also consider federal activities and reports and how best to promote and sustain Canada's scientific base. The meetings are held at the University of Ottawa. During the last year PAGSE has welcomed the following guests:

- September 22, 2011: **Geoff Munro**, Chief Scientist and Assistant Deputy Minister, Natural Resources Canada, Innovation & Technology Sector, and Co-Chair, ADM Science & Technology Integration Board.
- October 20, 2011: **Mehrdad Hariri**, Chair, Canadian Science Policy Conference.
- December 6, 2011: **Russell Williams**, President, Canada's Research-Based Pharmaceutical Companies.
- January 31, 2012: **Dr. Pierre Meulien**, President & CEO Genome Canada.
- February 28, 2012: **Dr. Chad Gaffield**, President, Social Sciences and Humanities Research Council.
- March 27, 2012 : Business Meeting Only.
- April 24, 2012: **Dr. Alain Beaudet**, President, Canadian Institutes of Health Research.
- May 31, 2012: **Dr. Suzanne Fortier**, President, Natural Sciences and Engineering Research Council.

2011 PAGSE Symposium

The 2011 PAGSE Symposium was held in Ottawa on November 15 and 16, 2011, in conjunction with the Canadian Science Policy Conference. Nine leading early career academics from across the country were joined by a postdoctoral fellow from the Canadian Institutes for Advanced Research. Together they represented a range of fields in the natural and social sciences and engineering. The delegates engaged in discussions with executives, senior decision makers and policy analysts from parliament, granting councils, non-governmental and media agencies, and the private sector.

The Symposium highlighted and celebrated Canada's intellectual strength and potential, and stimulated a keen exchange of information. It provided agency heads and government officials with informed feedback and opinions on science policy, research needs, intellectual capacity and property, from highly productive younger scientists. The delegates proposed new models for interdisciplinary research collaboration and for measuring and rewarding the impact of research. They also suggested that structured media training be made available early in a scientist's career. Four of the delegates presented the group's conclusions and recommendations in a panel session at the Canadian Science Policy Conference, November 16, 2011.

A report on the Symposium is available from the PAGSE Secretariat.

Submissions to Parliamentary Committees

PAGSE submits a brief each year to the House of Commons Standing Committee on Finance (HCFC).

2011 Summary of the Submission:

The global economic recovery hangs in the balance. Although Canada has so far fared better than others, sustained economic growth in the long term requires a commitment to constructing an innovation pipeline that brings the best ideas and products to market, quickly and effectively. Investing in basic research and the people who do it is crucial to ensuring a steady supply of ideas for the innovation pipeline, and Canada has been improving in this regard. However, we continue to struggle to translate ideas into effective solutions and products that create wealth and jobs. In effect, there are leaks in the innovation pipeline that prevent the best ideas from realizing their full economic potential.

This brief presents three ideas for mending the Canadian innovation pipeline. The government can stimulate innovation and shorten the time required for the best ideas and products to get to market through co-localization of education, research and business organizations in innovation clusters, provide jobs and incentivize innovation by rewarding Canadian businesses for hiring highly qualified Canadian graduates, and catalyze productivity by making data, especially that generated through publicly funded research, freely available online. These actions are essential for building the knowledge economy on which Canada's future economic growth depends.

The Partnership Group recommends that the Government:

■ Promote the creation of innovation clusters to catalyze the generation and transfer of knowledge between the public and private sectors;

■ That the Government implement inc entives for businesses to hire Canadian advanced research graduates and reduce the level of tax credits for resea rch and experimental development;

■ That the Government develop a national policy on data accessibility and management that contains a commitment to long-term access and protects intellectual property.

For further information on activities, please visit the PAGSE website www.pagse.org

Note from the Editor: CMOS is a member of PAGSE and **Ian Rutherford**, Executive Director, is the representative for the Society.

Partenariat en faveur des sciences et de la technologie (PFST)

Rapport annuel des activités 2011-2012

Extraits

Le Partenariat en faveur des sciences et de la technologie (PFST; www.pagse.org) est une association coopérative de 26 organisations nationales en sciences et en génie, constituée en juin 1995 à l'invitation de l'Académie des sciences de la Société royale du Canada. Les organisations nationales mem bres du PFST regroupent plus de 50 000 membres provenant de l'industrie, du milieu universitaire et des gouvernements. E lles œuvrent ensemble pour représenter le milieu canadien des sciences et du génie auprès du gouv ernement du Canada et faire progresser la recherche et l'innovation, à l'avantage des canadiens et des canadiennes. Le PFST n'est **pas** un groupe de pression; il ne cherche pas à mobiliser un public pour défendre des initiatives particulières en sciences ou en génie, mais il s'intéresse plutôt aux grandes politiqu es en sciences ou en génie au niveau national.

Pour q ue le PFST soit vraiment représentatif de la communauté canadienne des sciences et du génie, nous devons no us assurer que les personnes composant les diverses sociétés et as sociations membres soient renseignées sur les activités entreprises e n leur nom. On peut en trouver les d étails sur le site Web du PFST (www.pagse.org), mais nous présentons également ces résumés périodiques aux organisations membres.

Petits-déjeuners avec des têtes à Papineau
Le PFST, en collaboration avec le Conseil de recherches en sciences et en génie du Canada (CRSNG), propose chaque mois un petit-déjeuner-causerie présenté sur la colline du Parlement, et intitulé *« Petit-déjeuner avec des têtes à Papineau »*. Les conférenci ers invités y renseignent les parlementaires sur les derniers progrès scientifiques et technologiques dans un domaine particulier. Au cours de la dernière année, le PFST a organisé les présentations indiquées ci-dessous:

■ Passer à la chimie verte, **Philip Jessop**, Quee n's University, Jeudi 4 octobre 2011;

■ Alimentation en électricité – Les réseaux électriques intelligents et l'avenir de l'énergie renouvelable, **Liuchen Chang**, Univers ity of New Brunswick, Jeudi 27 octobre 2011;

■ Des forêts en santé, une économie en santé : redonner au Canada son titre de chef de file de l'industrie des produits forestiers grâce à l'innovation, **Sophie D'Amours**, Université Laval, Jeudi 24 novembre 2011;

■ La prise de décisions dans un monde incertain, **Daniel Krewski**, Université d' Ottawa, Jeudi 9 février 2012;

■ Les sciences de la Terre: une clé de la compét itivité économique, de la richesse et du développement du Canada, **James Franklin**, Franklin Geosciences Ltd., Jeudi 1 mars 2012;

■ Pleins feux sur la fonte des glaces, **Richard Peltier**, University of Toronto, Jeudi 29 mars 2012;

■ D'autres horizons prometteurs se dessinent pour l'industrie des sables bitumineux: de la vapeur à la biologie, **Stephen Larter**, University of Calgary, Jeudi 3 mai 2012.

Sciences à la page
Sciences à la page est une initiative du Partenariat en faveur des sciences et de la technolo gie (PFST), qui présente dans un texte abrégé des sujets d'actualité centrés sur les sciences et le génie.

Grâce à l'appui du Conseil de recherches en sciences naturelles et en génie du Canada (CRSNG) et de la Fondation canadienne pour l'innovation (FCI), le PFST a pu faire paraître une série de bulletins pilotes de *Sciences à la page*. À date, trois sujets ont été abordés, chacun lancé lors des "Petit-déjeuners avec des têtes à Papineau" sur le même sujet : la biodiversité (lancé le 28 octobre 2010), les réseaux intelligents (le 27 octobre 2011) et la toxicologi e (février 2012). Une version PDF d e ces bulletins peuvent

être téléchargés à partir du site web de *Sciences à la page* à l'adresse suivante: http://www.sciencepages.ca/francais.html

Un sondage informel des lecteurs, à travers des réponses écrites à des questions courtes distribué es lors du "Petit-déjeuner avec des têtes à Papineau" sur la chimie verte, a révélé un intérêt important de lapart des politiciens et de la communauté présente pour des numéros futurs de *Sciences à la page.* Nous é valuons p résentement d e nouveaux modèles de gesti on et espérons avoir une décision avant la fin de l'année 2012.

Les réunions mensuelles du PFST
Nous invitons d es représentants d'organismes publics et privés œuvrant dans le domaine des sciences et de la technologie à participer aux réunions mensuelles du PFST pour y présenter leurs points de vue sur l'état des sciences et du génie au Canada, sur l es organisations qu'ils représentent e t sur les enjeux et défis auxquels ils voudraient que le PFST s'intéresse. Les membres se penchent également sur les activités et les rapports fédéraux, et sur la meilleure façon de promouvoir et de soutenir les assises scientifiques du Canada. Les réunions ont lieu à l'Université d'Ottawa. Au cours de la dernière année nous avons reçu les invités suivants:

■ 22 septembre 2011: Geoff Munro, Scientifique principal et Sous-ministr e adjoint Ressources naturelles Canada, Secteur de l'innovation et de la technologie énergétique;

■ 20 octobre 2011 : Mehrdad Hariri, Président, La conférence sur les politiques scientifiques canadiennes;

■ 6 decembre 2011 : Russell Williams, Président, Les compagnies de recherche ph armaceutique du Canada (Rx&D);

■ 3 1 ja nvier : Pie rre M eulien, Pr ésident et ch ef d e la direction, Génome Canada;

■ 28 février : Chad Gaffield, Prési dent, Conseil de recherches en sciences humaines du Canada;

■ 27 mars : Réunion d'affaires seulement;

■ 24 avril : Alain Beaudet, Président, Instituts de recherche en santé du Canada;

■ 31 mai 2012 : Suzanne Fortier, Présidente, Conseil de recherches en sciences naturelles et en génie du Canada.

Symposium 2011 du PFST
Le symposium 2011 du PFST a eu lieu à Ottawa les 15 et 16 novembre 2011 dans le contexte de la Conférence sur les politiques scientifiques canadiennes. Il a r éuni neuf universitaires en début de carrière, de différentes parties du pays, ainsi qu'un boursier postdoctoral, de l'I nstitut canadien de recherches avancées, q ui représentaient ensemble un éventail de disciplines des sciences naturelles et sociales et du génie. Les délégués ont discuté avec des cadres supérieurs, des décideurs de haut niveau et des analystes des politiques de différents milieux : parl ement, conseils subventionnair es, organismes non gouvernementaux, médias et secteur privé.

Le symposium a mis en valeur et à l'honneur la force et le potentiel intellectuel du Canada et a favorisé un très bon échange d'informations. Il a permis aux dirigeants d'organismes et aux responsab les gouvernementaux d'obtenir des commentaires et des avis éclairés de scientifiques plus jeunes, très prolifiques, sur la politi que scientifique, les b esoins e n m atière d e r echerche, la capacité intellectuelle et la propriété intellectuelle. Les délégués ont proposé de nouveaux modèles pour la collaboration aux recherches multidisciplinaires ai nsi que pour la mesure et la reconnaissance de l'impact des recherches. Ils ont également recommandé qu'une formation structurée sur les médias soit offerte au début de la carrière des scientifiques. Quatre des délégués ont présenté les conclusions et les recommandations du groupe dans le cadre d'un panel tenu lors de la Conférence sur les politiques scientifiques canadiennes le 16 novembre 2011.

Un rapport sur le sym posium peut être obtenu auprès du secrétariat du PFST.

Dossiers parlementaires
Le PFST présente ses recommandations par éc rit au Comité permanent des finances de la Chambre des communes chaque année.

Résumé 2011 de la soumission
La relance de l'économie mondiale est en jeu. Même si, jusqu'ici, le Canada s'en est mieux tiré que d'autres, pour que la croissance de l'économie soit soutenue à long terme, il faut prendre l'engagement de construire u n pipeline d'innovation qui permettra d'acheminer les meilleurs produits et idées jusqu'aux marchés, avec rapid ité et efficacité. L'investissement dans les recherche s fondamentales et dans ceux et celles qui les mènent est indispensable si l'on veut avoir une offre régulière d'idées pour le pipeline d'innovation, et le Canada a fait des progrès à cet égard. Toutefois, nous continuons de nous battre pour traduire des idées en solutions et en produits efficaces qui créent richesse et emplois. De fait, il y a des fuites dans le pipeline d'innovation qui empêchent les meilleures idées de donner tout leur potentiel économique.

Dans ce mémoire, nous avançons trois idées pour réparer le pipeline canadien d'innovation. Le gouvernement peut stimuler l'innovation et raccourcir les délais qui s'écoulent avant que les meilleurs produits et idées n'arrivent jusqu'aux marchés d'écoulement en regroupant les

organismes d'enseignement, de recherche et d'affaires en grappes d'innovation, il peut créer des emplois et stimuler l'innovation en rétribuant les entreprises canadiennes qui recrutent des diplômés canadiens hautement qualifiés, et catalyser la productivité en diffusant les données, en particulier celles qui proviennent des recherches financées par les deniers publics, gratuitement et en ligne. Ces mesures sont indispensables à qui veut bâtir une économie du savoir dont dépend la croissance économique future du Canada.

Le Partenariat recommande au gouvernement :

■ de promouvoir la création de grappes d'innovation pour catalyser la production et la transmission de connaissances entre les secteurs public et privé;

■ d'offrir des stimulants aux entreprises pour qu'elles engagent des diplômés canadiens en recherche de pointe et de réduire le niveau des crédits d'impôt pour la recherche et le développement expérimental;

■ d'élaborer une politique nationale sur l'accessibilité et la gestion des données qui contienne un engagement qui assure l'accès à long terme à la propriété intellectuelle et la protège.

Pour obtenir des renseignements supplémentaires aux activités du PFST, veuillez visiter le site web: ww.pagse.org

Note du Rédacteur: La SCMO est membre du PSFT et **Ian Rutherford**, Directeur exécutif, est le représentant attitré de la Société.

Great Canadian Weather Quiz

Up until 1938, what word was publicly banned from being mentioned in weather forecasts?

1) wind chill 2) guarantee
3) dew point 4) tornado
5) Alberta Clipper

Answer on page 174.

Source: *The 2012 Canadian Weather Trivia Calendar* by David Phillips.

CMOS SCMO

Taylor & Francis
Taylor & Francis Group

Atmosphere-Ocean
ISSN 0705-5900

Call for papers for *Atmosphere-Ocean*

Manuscripts are solicited for a Special Issue on Climate Change and Extreme Events

It has become widely recognized that under a changing climate, the frequency of meteorological/hydrological extreme events and associated damage costs would likely increase in the 21st century. To expand capacity to minimize future hazardous risks, solid scientific information on future projections and historical trend analysis of extreme events is essential for decision makers to develop adaptation strategies and policies. This information includes quantitative assessments or projections on changes in frequency and intensity of the meteorological and hydrological extreme events. The aim of this special issue is to present a set of related papers concerning historical trend analysis of and climate change impacts on meteorological and hydrological extreme events using global climate model (GCM) and regional climate model (RCM) outputs and/or statistical downscaled scenarios. The meteorological and hydrological extreme events of interest include (but are not limited to) heavy rainfall, high-/low-streamflow, flooding, drought, wind storms, blizzards, snow on the ground, etc. Authors are also encouraged to present case studies of the relevant phenomena in the study areas.

Submitted papers should not have been published previously, nor be under consideration for publication elsewhere.

Manuscripts must be submitted online to editor William Hsieh via ScholarOne at

http://mc.manuscriptcentral.com/a-o

according to the format stipulated for the journal at:

http://www.tandfonline.com/action/authorSubmission?journalCode=tato20&page=instructions

Deadline for submission of manuscripts is **28 February 2013**. Following peer review, accepted papers will be published online immediately after copy-editing. Target date for print publication is mid 2014.

Please note that page charges for *Atmosphere-Ocean* will be reduced to $100 per page and are the responsibility of each author. Fees may be waived for first-time Canadian authors (see www.cmos.ca/Ao/waivingpagecharges.html)

If you are thinking about submitting a manuscript, please contact the conveners Shouquan Cheng (Shouquan.Cheng@ec.gc.ca) and Edwina Lopes (Edwina.Lopes@ec.gc.ca) as soon as possible.

CMOS SCMO

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Taylor & Francis Group

Atmosphere-Ocean
ISSN 0705-5900

Appel de soumissions pour *Atmosphere-Ocean*

Nous sollicitons des manuscrits pour un numéro spécial sur le changement climatique et les événements extrêmes

On accepte généralement que la fréquence des événements extrêmes météorologiques ou hydrologiques ainsi que les coûts associés augmenteront probablement au 21ème siècle dans le contexte du changement du climat. Pour développer des stratégies et politiques visant à accroître la capacité d'adaptation et minimiser les risques futurs, les décisionnaires ont besoin d'information solide sur les projections du futur ainsi que des tendances historiques associées aux événements extrêmes. Cette information inclut des estimés quantitatifs ou des projections du changement de la fréquence et de l'intensité des événements météorologiques et hydrologiques extrêmes. Le but de ce numéro spécial est de présenter un ensemble d'articles reliés concernant l'analyse des tendances historiques et les impacts du changement climatique sur les événements météorologiques et hydrologiques extrêmes en utilisant des sorties de modèles globaux (GCM) et régionaux (RCM) et/ou des scénarios réduction d'échelle statistiques. Les événements extrêmes météorologiques et hydrologiques visés incluent, mais ne se limitent pas au forte pluie, écoulement fluvial bas ou élevé, inondation, sécheresse, tempête hivernale, blizzard, neige au sol, etc. On invite les auteurs à présenter des études de cas sur le phénomène traité dans la région à l'étude.

Les manuscrits ne doivent pas avoir été publiés précédemment ni être en considération par d'autres revues.

Les manuscrits doivent être soumis en ligne au directeur scientifique William Hsieh via ScholarOne à

http://mc.manuscriptcentral.com/a-o

selon le format stipulé pour Atmosphere-Ocean à:

http://www.tandfonline.com/action/authorSubmission?journalCode=tato20&page=instructions

La date limite de soumission est le **28 février 2013**. Les articles acceptés suite à la lecture par les pairs seront publiés en ligne immédiatement après l'édition technique.

La date projetée de l'impression est la mi-2014.

Veuillez noter que les frais pour les auteurs de *Atmosphere-Ocean* seront réduits à $100 par page. Les premiers auteurs canadiens peuvent être exonérés de ces frais (voir www.cmos.ca/Ao/waivingpagecharges.html)

Si vous considérez la possibilité de soumettre un manuscrit, veuillez contacter les responsables Shouquan Cheng (Shouquan.Cheng@ec.gc.ca) et Edwina Lopes (Edwina.Lopes@ec.gc.ca) dès que possible.

More News from *Atmosphere-Ocean*

Number of pages
Atmosphere-Ocean is experiencing strong growth since entering into a publishing partnership with Taylor & Francis in Jan 2011. For 2013, the publisher has approved an increase in the number of issues from 4 to 5, with a target of 640 printed pages. We had published 322 pages In 2009, 311 in 2010, jumped to 452 pages in 2011 and are projecting 544 pages this year.

Page charges
Part of the increase in the number of submissions may be attributed to waiving of page charges for new Canadian authors, a policy designed to introduce Canadian scientists to their own journal. Page charges serve as a filter of poor quality submissions and are also necessary in A-O's business model. Thanks to growth, page charges will be reduced from $115 to $100 starting with papers published in 2013, while printed reprints will no longer be provided.

Subscriptions
The partnership agreement with T&F provided for maintaining subscription prices steady subject to cost of living increase, based on publishing 480 pages per year. To offset the cost of publishing 640 pages (a 33% increase),

subscription prices will rise by 19% in 2013. Members' subscription will remain at $30.

Quality
Atmosphere-Ocean prides itself for its high quality editing, attention to detail and service to authors. Of the many measures of scientific quality, impact factor is the most used. This is the ratio of the number of citations to papers published in two years divided by the number of papers published in the same two years. A-O's impact factor fluctuates from year to year because of its relatively small number of papers, but we are pleased that the latest value is 1.667 (©2012 Thomson Reuters, 2011 Journal Citation Report®-JCR®). Over a 5-year period A-O's impact factor is 1.697. Atmosphere-Ocean ranks 24th out of the 59 Oceanography journals and 36th out of 71 in Meteorology and Atmospheric Sciences.

Our publishing partner
Taylor & Francis is the fourth largest academic publisher overall, after Elsevier, Wiley and Springer. However, in Earth Sciences T&F is third with 45 journals listed in the JCR®, compared to 85 for Springer and 95 for Elsevier.

Please think of your own journal when preparing your next paper!
Atmosphere-Ocean: http://informaworld.com/tato (members have open access via the members services site https://www1.cmos.ca).

Dernières Nouvelles de *Atmosphere-Ocean*

Nombre de pages
Atmosphere-Ocean est en forte croissance depuis la signature de l'entente de publication avec Taylor & Francis en janvier 2011. Pour 2013, la compagnie a approuvé un saut de 4 à 5 numéros par année et un objectif de 640 pages imprimées. Nous avions publié 322 pages en 2009, 311 en 2010 et augmenté à 452 en 2011. Nous prévoyons 544 pages cette année.

Frais d'auteur
L'augmentation du nombre de soumissions est en partie due au congé de frais pour les nouveaux auteurs canadiens, une politique visant à faire connaître leur propre revue aux jeunes chercheurs. Les frais d'auteur servent de filtre contre les soumissions de faible qualité mais ils sont aussi nécessaires selon le plan d'affaire de A-O. Grâce à la croissance, les frais d'auteur seront réduits de $115 à $100 la page pour les articles publiés à partir de 2013, mais les tirés-à-part ne seront plus fournis gratuitement.

Abonnements
L'entente de partenariat prévoyait le maintien des frais d'abonnement, assujettis à l'augmentation de l'index des prix, en supposant l'impression de 480 pages par an. Ces frais seront augmentés de 19% pour 2013 en contrepartie de la publication de 640 pages (augmentation de 33%). L'abonnement demeurera $30 pour les membres.

Qualité
Atmosphere-Ocean se targue de sa haute qualité d'édition technique, attention aux détails et service aux auteurs. Parmi les diverses mesures de qualité scientifique, le facteur d'impact est le plus utilisé. Il s'agit du nombre de citations d'articles publiés dans deux années divisé par le nombre total d'articles publiés dans ces deux mêmes années. Le facteur d'impact de A-O fluctue à cause de son nombre relativement faible d'articles; cependant nous sommes heureux que le plus récent résultat soit 1.667 (©2012 Thomson Reuters, 2011 Journal Citation Report® -JCR®). Sur une période de 5 ans, le facteur est 1.697. Atmosphere-Ocean se classe 24ème parmi les 59 revues océanographiques et 36ème sur 71 en météorologie et sciences atmosphériques.

Notre partenaire en publication
Taylor & Francis est le quatrième plus important éditeur académique, après Elsevier, Wiley et Springer. Cependant, il est le troisième dans le domaine des sciences de la terre avec ses 45 revues listées dans le JCR®, contre 85 pour Springer et 95 pour Elsevier.

Considérez votre propre revue en préparant votre prochain article!
Atmosphere-Ocean: http://informaworld.com/tato (les membre on libre accès à la revue via le site des services aux membres https://www1.cmos.ca).

Great Canadian Weather Quiz

Answer is: 4) Tornado.

BOOK REVIEWS / REVUES de LITTÉRATURE

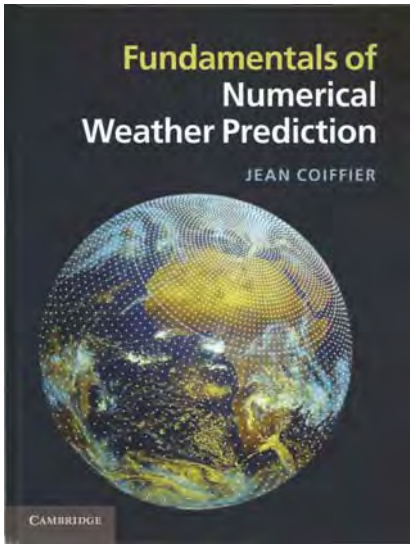
Fundamentals of Numerical Weather Prediction

by Jean Coiffier

Cambridge University Press, 2011
ISBN 978-1-107-00103-9, 337 pages, Hardback, US$85

Book reviewed by Iain Russell[1]

This is a great book for students to learn how atmospheric computer models work, for new users of such weather prediction models, and even for experienced practitioners in numerical weather prediction who would like an up-to-date handy reference guide to the modelling fundamentals. The text has a very broad scope; including historical context, several chapters on the detailed 'machinery' of how models actually work 'underneath the hood', and practical applications of numerical weather prediction models. In this way the book provides a comprehensive overview of the techniques and methods that are used in numerical weather prediction.



It is not surprising, for a text which describes the details of how numerical weather prediction models work, that there is copious mathematical formulae included; it requires a practical understanding of dynamic meteorology as well as graduate level mathematics in order to fully appreciate the message that is being articulated. However, Coiffier's logical writing style makes the book more accessible as he provides helpful introductions, remarks on the principles and applications of the methods described, and conclusions which summarize the material quite well, helping the reader to see the utility of the methods that are presented in a practical sense.

A considerable amount of theory is presented in the first six or so chapters, and much of this material can be found in other books on weather prediction modelling. However, this book provides practical insight by clearly articulating the simplifications used in successive generations of weather prediction equations based on the relative importance of terms in the equations to the scales of motion that are being modelled. I found this explanation of successive equation sets in Chapter 2 very useful, painting a logical picture of how numerical weather prediction models have evolved over half a century of development. Subsequent chapters explain how, with increased computer resource availability, there is now a trend back toward the original basic general equations (describing the behaviour of a nonviscous fluid) in order to create "non-hydrostatic" models of just a few kilometres in horizontal resolution for modelling ever smaller scale phenomena (e.g. Convection).

The final two chapters (Chapter 9, Physical parameterizations; Chapter 10, Operational forecasting) will provide significant benefit to users of numerical weather prediction models. Chapter 9 provides information on how physical processes in the atmosphere (radiation, convection, precipitation and cloud formation) are actually represented within the numerical weather model framework. The information in this chapter should really help users of the models understand how actual weather conditions (e.g. clouds, precipitation) evolve in concert with the surrounding dynamical framework of the model – and where there are likely to be strengths and weaknesses in the models' capabilities to represent such atmospheric phenomena. Chapter 10 attempts to place the numerical weather prediction model within the overall weather forecasting 'system' (the author refers to the overall system as the 'numerical prediction suite', which comprises all of the processes implemented for making operational weather forecasts). For those involved in designing systems which provide weather forecasts, this chapter will provide context to the role of numerical weather prediction models, how they utilize observations, what one should pay attention to when utilizing the native data outputs from the models, what to consider in localizing the output data, the forecasting process overall and the importance of forecast verification to the management of the overall 'suite'. Also included in this section are discussions on specialized application models (e.g. Hydrological models, Road weather models etc. operating downstream of the main numerical weather prediction model), and the role of ensemble forecasting to express the range of possible forecast outcomes as a result of forecast uncertainty.

The book's appendix underlines the intention of the author to provide as practical a guide as possible to numerical weather prediction models at the same time as ensuring that the mathematical fundamentals are properly described. The appendix provides detailed explanations of how the

[1] Meteorologist, Director of Meteorological R&D, Pelmorex, Oakville, Ontario, Canada

AROME model (developed in France) and the WRF model (developed in the US) work – in terms of the basic equations used, how they are solved, how the models represent atmospheric physical processes, the scales of phenomena that the model can represent in its operational application.

It is the final two chapters plus the appendix which set the book apart from other texts which deal with numerical weather prediction – the book provides excellent grounding in the basic mathematical formulations of atmospheric models, but the author also intends that the reader should be exposed to the practical utility of such models; linking the material to actual physical processes and practical, working models in use today.

Note du Rédacteur: La version française du livre de Coiffier fut commentée par le professeur René Laprise en juin 2010. Voir *CMOS Bulletin SCMO*, Vol.38, No.3, pages 109-110.

History of the Meteorological Office

by Malcolm Walker

Cambridge University Press, 2011
ISBN 978-0-521-85985-1, 468 pages, Hardback
US$120

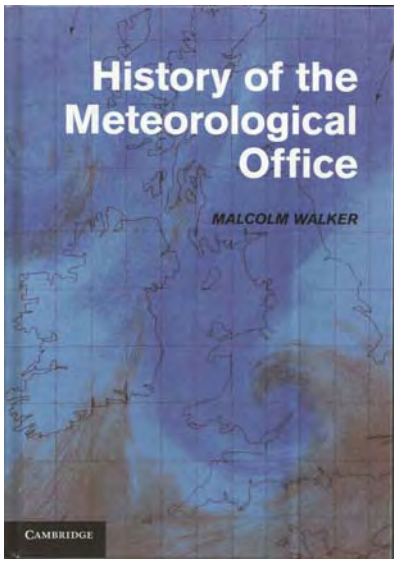
Book reviewed by John D Reid[2]

When the first public weather forecast appeared in The Times newspaper on 1 August 1861, a century and a half before the publication of this book, British and world meteorology changed. The authority of publication of information from a government organization in Britain's newspaper of record marked evolution from folklore to science-based prediction, albeit still primitive. This book documents subsequent developments and interactions among meteorological science, technology, society and administration.

One of the book's messages is evident on the front cover, a reproduction of a depiction of the cloud structure over the British Isles from Robert Fitzroy's 1863 publication The Weather Book, showing remarkable similarity to weather satellite images from a century later.

The first chapters, *Seeds Are Sown* and *Statistics and Storms* start by outlining the evolution of meteorology from ancient times to the formation of a marine climatology service within the Board of Trade in the summer of 1854. Work started later that year when Fitzroy was appointed the first head. Renowned as a Royal Navy ship's captain for his ability to use the barometer and practical weather knowledge in navigation, including in the circumnavigation on the Beagle with Charles Darwin as scientist, he expanded the original organization mandate to pioneer storm warnings and public forecasts.

Following Fitzroy's suicide in 1865 the scientific establishment argued that he had moved too far ahead of science. They won a brief victory with retrenchment of the office to marine climate, terminating storm warnings and forecasts. A public outcry, especially from mariners, forced a rapid reversal on storm warnings and eventual reinstatement of public forecasts after 15 years. That's even' though for the remainder of the century there was little advance over the forecasting techniques employed by Fitzroy.



The two world wars were significant stimuli to the development of weather services. In 1914 the British Army's attitude was "*British soldiers do not go into action carrying umbrellas*". Poison gas attacks, smoke screens, artillery targeting, pervasive mud and aviation, all weather-sensitive, forced the military into a volte-face and establishment of their own meteorological units.

After the war the Meteorological Office was moved, again opposed by the scientific establishment, to fall under a new Air Ministry. It prospered. By 1939 it was ready to take on the challenge of war. Staff increased nine-fold; there were remarkable successes, such as the forecast for D-Day. Disastrous forecast failures, such as that leading to the loss of 72 aircraft, 8.9% of the attacking force, over Germany on 24-25 March 1944, sadly served to reinforce the significance.

The book documents numerous instances of technology as enabler and driver. Fitzroy appreciated that if timely weather observations from the ocean were available, forecasts could be better. That had to wait for the arrival of wireless telegraphy in the early 1900s. The importance of upper air conditions started to be understood in the latter part of the 19th century but application had to wait for the radiosonde. L.F. Richardson experimented with numerical weather prediction during WWI but it took 50 years for computer

[2] CMOS Member, Ottawa Centre, CMOS Past-President (1997)

technology to make it practicable.

As a driver, where would meteorology be without the impetus of aviation or the demand generated by radio, TV, and the Inter net? Would we have weather radar, or meteorological satellites which realised Fitzroy's depiction of cloud structure from a century earlier.

Recently, Met Office dev elopment has been driven by commercialization, to the extent that measures of commercial success are at le ast equally as important as those of forecast quality, with additional stimulus from the synergy between modelling for climate change and weather prediction.

Questionable is the book's generous back cover claim that "*The history of the Met Office is therefore largely a history of the development of international weather prediction research in general*." Anyone with ambition to write such a history need not fear that this British perspective is comprehensive.

The back c over also claims that " *This volume will be of great interest to meteorologists, atmospheric scientists and historians of science, as well as amateur meteorologists and anyone interested generally in weather prediction*."

The book is the definitive tre atment of the topic, well organized and written, supplemented by 80 illustrations and a 13 page index. It serves British me teorologists, atmospheric scientists and historians of science well. Amateur meteorologists and anyone interested generally in weather prediction will likely find themselves ski pping through details of happenings at administrative meetings.

For anyone raised on BBC Radio who was curious about the litany of exotic-sounding marine for ecast districts -- Rockall, Malin, Shannon, Fastnet, ..., puzzled that *"North cones are hoisted*," or wondered about the reason for giving the temperature on the Air Ministry roof, the book contains insights on such long-standing questions.

Books in search of a Reviewer (Partial list)
Livres en quête d'un critique (Liste partielle)

Latest Books received / Derniers livres reçus

2011-20) *Atmospheric Dynamics*, by Mankin Mak, Cam bridge University Press, Hardback , ISBN 978-0-521-19573-7, 2011, 486 pages, US$80.

2011-21) *Fluid Mechanics, A Short Course for Physicists*, by Gregory Falkovich, Cambridge University Press, Hardback, ISBN 978-1-107-00575-4, 2011, 167pages, US$60.

2011-34) *Modeling Methods for Marine Science*, David M. Glover, William J. Jenkins and Scott C. Doney, Cambridge University Press, Hardback, 571pages, US$85.

2011-36) *Ocean Dynamics and the Carbon Cycle, Principles and Mechanisms*, Richard G. Williams, Michael J. Follows, Cambridge University Press, ISBN 978-0-521-84369-0, Hardbback, 404 pages, US$73.

2011-38) *Ocean Surface Waves, Breaking and Dissipation of*, Alexander Babanin, Cambridge University Press, ISBN 978-1-107-00158-9, Hardback, 463 pages,US$130.

2011-42) *Physics and Chemistry of Clouds*, Dennis Lamb and Johannes Verlinde, Cambridge University Press, ISBN 978-0-521-89910-9, Hardback, 584pages, US$85.

2011-49) *Introduction to Modern Climate Change*, by Andrew E. Dessler, Cambridge University Press, ISBN 978-1-107-00189-3, Hardback, 238 pages, US$110.

2012-06) *Physics of the Atmosphere and Climate*, by Murry L. Salby, Cambridge University Press, ISBN 978-0-521-76718-7, Hardback, 666 pages, US$90.

2012-08) *Dryland Climatology*, by Sharon E. Nicholson, Cambridge University Press, ISBN 9 78-0-521-51649-5, Hardback, 516 pages, US$150.

2012-10) *Phytoplankton Pigments, Characterization, Chemotaxonomy and Applications in Oceanography,* Edited by Suzanne Roy, Caro le A. Llewellyn, Einar Skarstad Egeland and Geir Johnsen, 2011, Cambridge University Press, ISBN 978-1-107-00066-7, Hardback, 845 pages, US$140.

2012-12 *Buoyancy-Driven Flows*, Edited by Eric P. Chassignet, Claudia Cenedese and Jacques Verron, 2012, Cambridge University Press, ISB N 978-1-107-00887-8, Hardback, 436 pages, US$120.

2012-15) *Introduction to the Physical and Biological Oceanography of Shelf Seas*, by John H. Simpson and Jonathan Sharples, Cambridge University Press, ISBN 978-052-1701488, Paperback, 424 pages. US$65.95.

201 2-16) *The Weather Observer's Handbook*, by Stephen Burt, Cambridge University Press, ISBN 978-1-107-02681-0 Hardback, 444 pages, CDN$100.95.

2012-17) *The Continental Drift Controversy, Volume III: Introduction of Seafloor Speading*, by Henry F. Frankel, Cambridge University Press, ISBN 978-0-521-87506-6, Hardback, 476 pages, CDN$132.95.

BRIEF NEWS / NOUVELLES BRÈVES

2012 Herzberg Gold Medal

University Professor **Dr. Richard Peltier** (Department of Physics; Director of the Centre for GlobalChange Science) has been awarded the Gerhard Herzberg Canada Gold Medal for Science and Engineering, the highest honour of the Natural Sciences and Engineering Research Council (NSERC). In honour of the late Dr. Herzberg, Canada's 1971 Nobel Prize winner in Chemistry, the medal is awarded annually to an individual who has demonstrated sustained excellence and influence in research for a body of work conducted in Canada that has substantially advanced the fields of natural sciences or engineering. In addition to the medal, thewinner receives research funding of $1 million, distributed over a five-year period.

University Professor Richard Peltier

A pioneer of Earth system science, Dr. Peltier wascited for seminal contributions to geophysics, atmospheric sciences and climate change research. Using sophisticated mathematical concepts, he builds models that depict how climate has evolved over the past 750 million years and project how it will change in the future. His research on ice-age climate variability is considered the gold standard for scholarship on past climate change. The Herzberg Medal is the latest in a long line of honours for Dr. Peltier, which include the 2002 Vetlesen Prize (often called the Nobel Prize of earth sciences) and the 2010 Bower Award. He holds the title University Professor, which is the highest honour the University of Toronto bestows on its faculty members.

He and other NSERC award winners were honoured in a ceremony hosted by the Governor General in a ceremony in Ottawa on February 27, 2012.

Order of Canada New appointees

Govervor General David Johnston honoured 66 Canadians with Order of Canada appointments on Friday, June 29, 2012. Three (3) were made companions, 24 became officers, and 42 became members.

Elizabeth Dowdeswell. Photo credit: CMOS Website

Elizabeth Dowdeswell, former ADM, Atmospheric Environment Service (now Canadian Meteorological Service) with Environment Canada, was made a companion of the Order of Canada. for her contributions to public and environmental policy. A native of Ireland, she was the Executive Director of the United Nations Environment Program from 1993 to 1998 and is currently President and CEO of the Council of Canadian Academies.

Congratulations to Elizabeth Dowdeswell from all the CMOS community.

CMOS Archives

In mid-August, CMOS Office received the missing part of its archives from Downsview, Ontario. Quing Liao and Richard Asselin are evaluating the job to be done!

CMOS Student Poster Awards at the SOLAS Open Science Conference

In a new collaboration between two organizations with a natural affinity, CMOS sponsored the student poster prizes at the Surface Ocean-Lower Atmosphere Study (SOLAS) Open Science Conference held in Washington State in early May.

The Surface Ocean – Lower Atmosphere Study (SOLAS; http://www.solas-int.org/) is an international research initiative comprising more than 1900 scientists in 75 countries. The SOLAS International Project Office is located in Kiel, Germany at the GEOMAR-Helmholtz Centre for Ocean Research, and the program's primary objective is "*to achieve quantitative understanding of the key biogeochemical-physical interactions and feedbacks between the ocean and atmosphere and how this coupled system affects and is affected by climate and environmental change*".

The fifth SOLAS Open Science Conference was held May 7–10, 2012 in the Cascade mountains east of Seattle at the Suncadia Resort, and about 200 scientists from 28 countries attended. A major element of SOLAS activities, previous conferences took place in Damp, Germany (2000); Halifax, Nova Scotia (2004) ; Xiamen, China (2007); and Barcelona, Spain (2009). The themes for the 2012 conference included:

- Sea-ice biogeochemistry and interactions with the atmosphere;
- Ocean-derived aerosols: production, evolution, and impacts;
- Atmospheric control of nutrient cycling and production in the surface ocean;
- Air-sea gas fluxes at eastern boundary upwelling and oxygen minimum zone systems;
- Physics of air-sea exchange;
- Long-lived greenhouse gases: air-sea exchange and impact; and
- SOLAS and the future ocean: integration and modeling.

Thanks to a donation from CMOS, Prof. Roberta Hamme (UVic) awarded prizes of US$100 to each of five students whose poster presentations demonstrated outstanding originality, scientific quality and clarity. The SOLAS community thanks CMOS for their support, encouragement and recognition of these exemplars of the best of future ocean-atmosphere scientists. The contribution from CMOS, the winning students, and their posters and abstracts, will be featured in the next issue of the SOLAS newsletter, due for publication in August (http://www.solas-int.org/news/newsletter/newsletter.html).

And the five winners are:

Matthieu Bressac, Laboratoire d'Océanographie de Villefranche, France.

Impact of Saharan dust deposition on dissolved-colloidal-particulate nutrient distribution in seawater

Kristina Brown, University of British Columbia, Canada.

Observations of air-ice-ocean CO_2 cycling during spring melt in Resolute Passage, Nunavut (Arctic-ICE 2010)

Note from the Editor: It must be noted that Kristina Brown was the 2008 recipient of the CMOS-CNC/SCOR NSERC Scholarship Supplement in Ocean Sciences.

Note du Rédacteur: On doit se rappeler que Kristina Brown était la récipiendaire 2008 du Supplément SCMO-CNC/SCOR CRSNG aux bourses d'études supérieures en sciences océaniques.

Joelle Buxmann, Institute of Environmental Physics, University of Heidelberg, Germany.

Chlorine explosion an autocatalytic release from sea salt aerosols

Marcela Ewert, University of Washington, USA.

Transport of marine microbes and polysaccharides from first-year sea ice into snow and implications for marine-atmospheric exchange

Tianran Zhang, Ocean University of China, People's Republic of China.

Impacts of Sources and Atmospheric Processing on Fe Solubility in Aerosols over the Yellow Sea, China

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Intégration des sciences de l'environnement, de la politique et de la gestion des ressources

2013 Congrès scientifique conjoint de la SCMO, de l'UGC et de l'ACRH

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www.cmos.ca/congress2013

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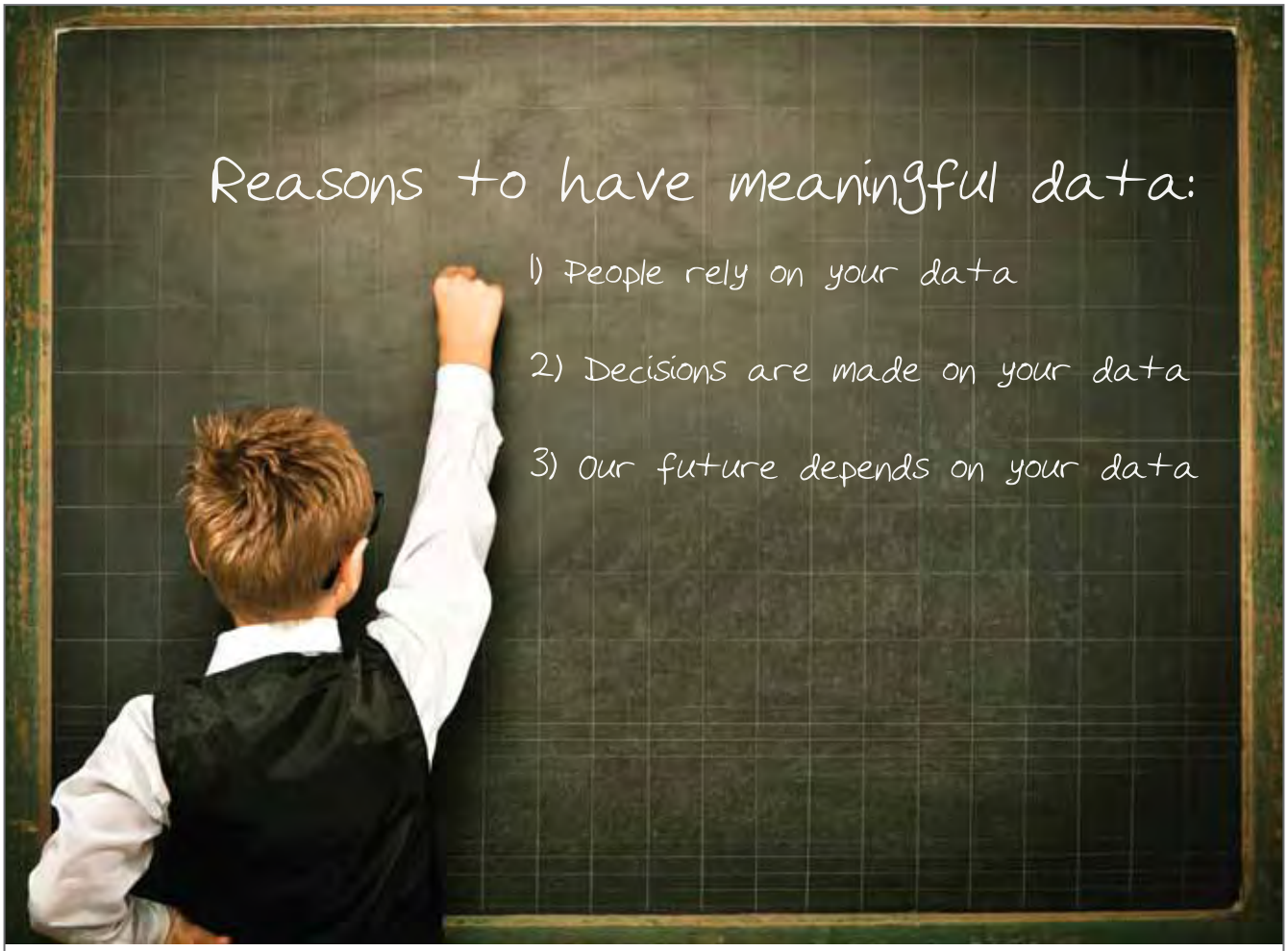
www.csimagery.ca

CWRA ACRH
Canadian Water Resources Association
Association Canadienne des Ressources Hydriques

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

Canadian Geophysical Union
Union Géophysique Canadienne



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