ISSN 1929-7726 (Online / En ligne)

ISSN 1195-8898 (Print / Imprimé)

CMOS BULLETIN SCMO

Canadian Meteorological and Oceanographic Society

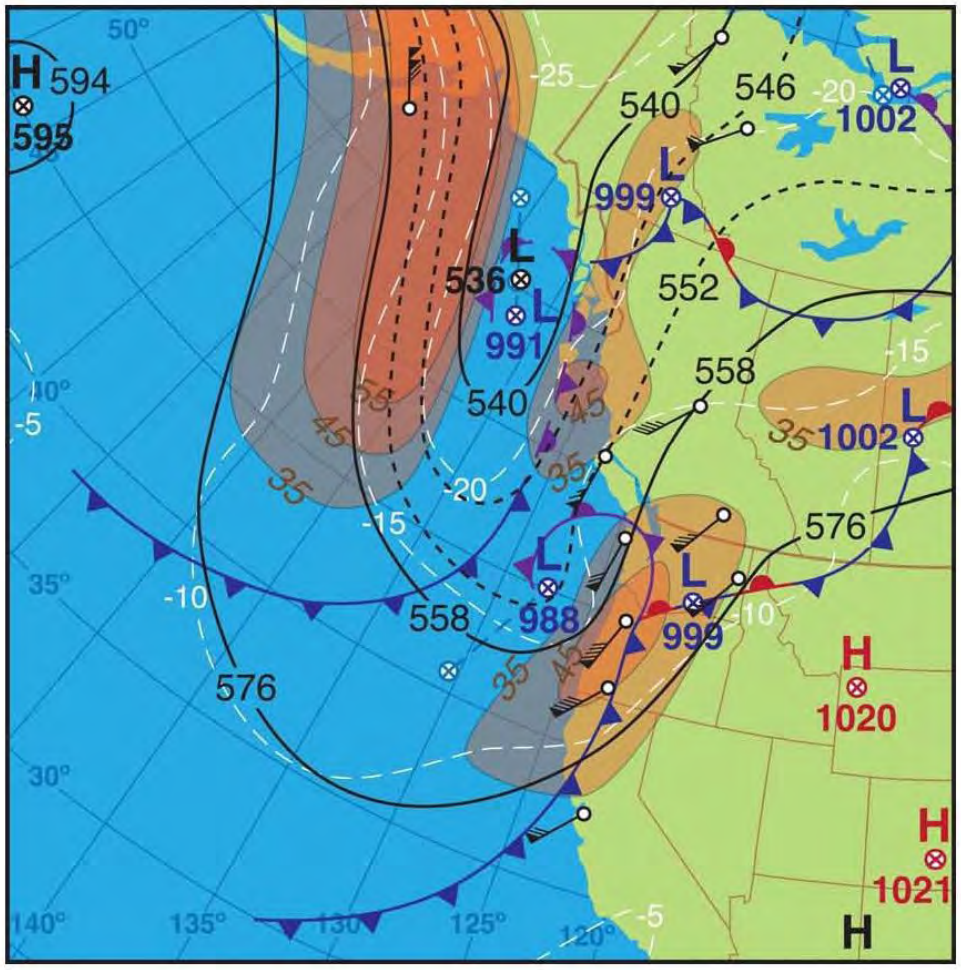
La Société canadienne de météorologie et d'océanographie

June / juin 2016

Vol.44 No.3

CELEBRATING 50 YEARS!

CÉLÉBRONS NOTRE 50e ANNIVERSAIRE!

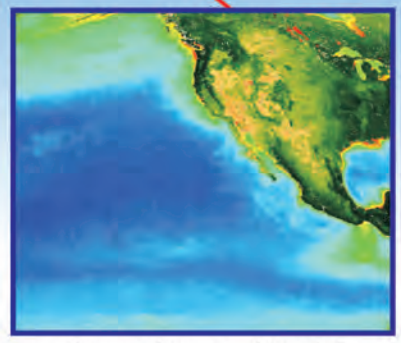


Synoptic chart for 1200 UTC 29 August 2015 along the West Coast

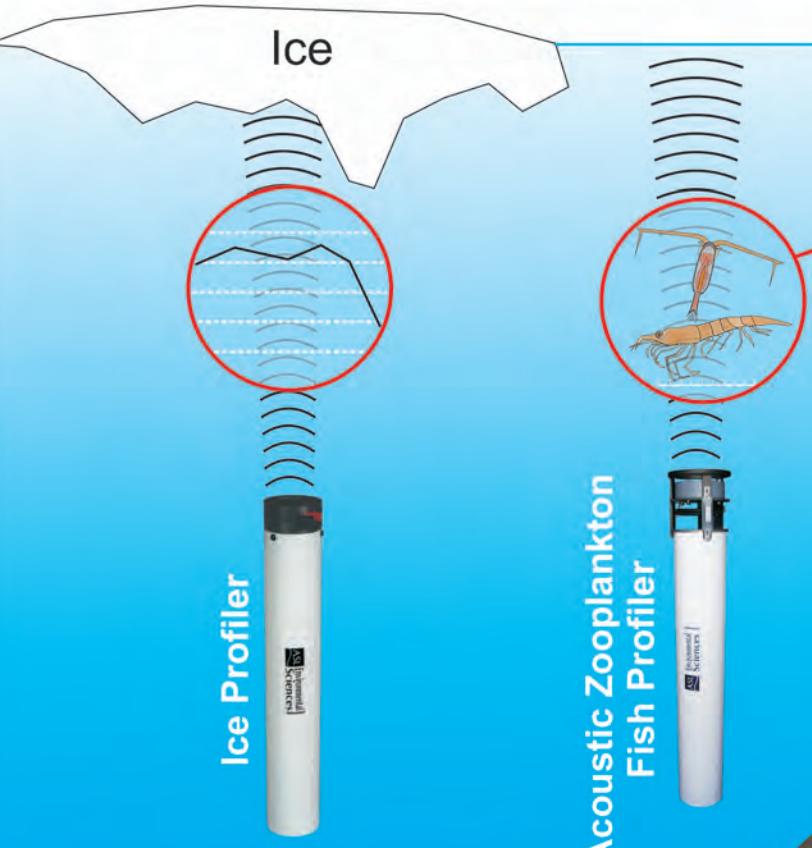
Carte synoptique du 29 août 2015 à 1200 UTC montrant la côte Ouest

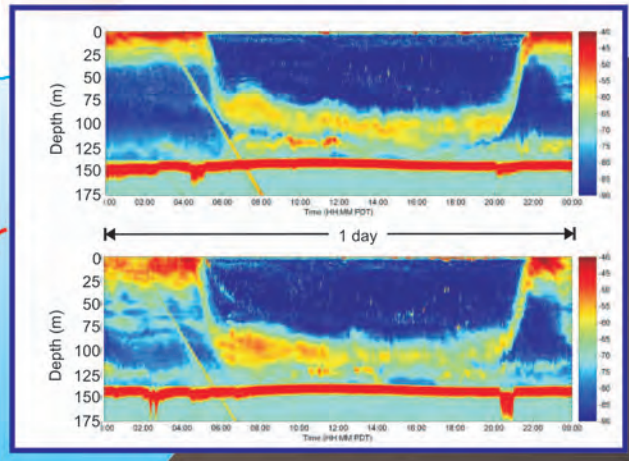
ASL Environmental Sciences

Oceanographic specialists/
Spécialistes océanographiques



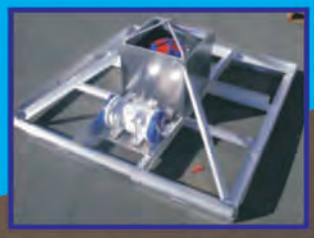
Ocean colours are chlorophyll concentrations and land colours are NDVI





ASL products include:

Ice Profiler and SWIP
Wave Profiler
Acoustic Zooplankton Fish Profiler
IRIS Datalogger for Imagenex SONAR
WERA NorthernRadar
Airborne/Spaceborne Remote Sensing



Mooring Designs

ASL offers an extensive equipment lease pool

ASL Environmental Sciences Inc.
#1-6703 Rajpur Place
Victoria, British Columbia
V8M 1Z5 Canada

Toll-free: 1-877-656-0177
Fax: +1 250 656-2162
email: aslenv@aslenv.com
website: www.aslenv.com

.... Words from the Outgoing President

Friends and Colleagues:

Martha Anderson
CMOS Outgoing President

As the President of CMOS for the past year, I have been honoured to work with so many dedicated people who keep the CMOS mission alive and thriving. I thank everyone who steps up and volunteers their time. We have a great team and I have enjoyed working with every one of you.

I especially applaud all the volunteers who run our congress each year; this is a very important CMOS activity. New Brunswick Centre is hosting our 50th Congress this month, and it is heartwarming to see so many people put such effort into this event so they can proudly showcase their city and our sciences.

CMOS continued to improve our website in the past few months. A new repository for taped webinars and talks has been added under Activities, and ongoing additions will be needed. In tandem with this new initiative, the Meteorological Service of Canada has made some live webinars available to CMOS members. CMOS plans to expand both these services in the coming year. Also we have another new addition to our website, thanks to the School and Public Education Committee (SPEC). We now have some career examples for students posted under Education, with interviews of people working in four different areas.

At the annual general meeting on 30 May in Fredericton, we plan to bring a few important topics to the membership. An increase in membership fees will be voted on, as described in the April *CMOS Bulletin SCMO*. Budget deliberations will include consideration on whether the printed bulletin can be abandoned in favour of electronic-only formats. Many organizations have taken this step. We will present the work of the P. Met. Ad Hoc Committee, who are considering whether CMOS could re-start this certification program that was put in abeyance by ECO Canada in fall 2014 due to lack of sufficient participation. We will also present plans for celebrating the 50th anniversary of CMOS, and seek support and input from our members.

[Continued on page 70]

CMOS Bulletin SCMO
Volume 44 No.3
June 2016 — juin 2016

Inside / En Bref

Articles

50th Anniversary / 50e Anniversaire

Our regular sections / Nos chroniques régulières

Printed in Ottawa, Ontario, by St. Joseph Print Group Inc.
Imprimé par St. Joseph Print Group Inc., Ottawa, Ontario.

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

Co-Editor / Corédacteur: Paul-André Bolduc
Co-Editor / Corédactrice: Savithri Narayanan
Associate Editor / Rédactrice associée: Lise Harvey
Director of Publications / Directeur des publications: Douw Steyn
Canadian Meteorological and Oceanographic Society
Société canadienne de météorologie et d'océanographie
E-mail: bulletin@cmos.ca; Courriel: bulletin@scmo.ca

Cover page: Shown on the cover page is the synoptic chart for 1200 UTC (0400 PST) 29 August 2015. Conditions look remarkably winter-like for late summer. A deepening surface low, indicated in blue and with associated surface fronts, off of the Oregon coast is tracking toward southern Vancouver Island. The extratropical cyclone developed near the base of a strong 500 hPa trough, depicted via the black contours, upper-low positions and labels (500 hPa temperatures in ºC are in white). The low deepened at a rapid rate as it neared British Columbia, supported by a relatively strong jet stream here indicated with orange shading (isotach labels are in meters-per-second). The storm would eventually bring high winds to parts of western Washington and southwest British Columbia, including Metro Vancouver, causing extensive power outages. Upper-air information in this map is from charts by the U.S. National Centers for Environmental Prediction, and surface conditions are from analyses by the U.S. Weather Prediction Center. To learn more read Read's article on **page 83.**

Voir la traduction française en page 74.

CMOS Office / Bureau de la SCMO

P.O. Box 3211, Station D
Ottawa, Ontario, Canada, K1P 6H7
Homepage: http://www.cmos.ca
Page d'accueil: http://www.scmo.ca

Gordon Griffith, Ing., P. Eng., FEC
Executive Director - Directeur général
Tel/Tél.: 613-990-0300
E-mail/Courriel: cmos@cmos.ca

Ms. Qing Liao
Office Manager - Chef de bureau
Tel/Tél.: 613-990-0196
E-mail/Courriel: accounts@cmos.ca

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

Council / Conseil d'administration

.... Words from the Outgoing President

[Continued / Suite]

Here are some of the projects that are being started at this time, for showcasing CMOS and our sciences for our 50th anniversary on 1 January 2017:

1) a public lecture tour in spring 2017, with a goal of raising awareness of CMOS and offering the latest science information on climate change;

2) a hard cover reference book, with different authors contributing chapters on current state and future evolutions of various aspects of our domains;

3) special segments in the media about CMOS, for example on The Weather Network;

4) anniversary highlights and historical perspectives in CMOS publications and social media; and

5) special events and celebrations at the 2017 CMOS Congress in Toronto.

Interested volunteers are being sought for all these projects.

To help with the costs of these 50th anniversary activities, CMOS is establishing a Golden Jubilee Fund, which will be launched at the 50th Congress in Fredericton. The general goal of the fund is outreach and communications. This is an area where CMOS executive have noted repeatedly that we could do better, but we lack the funds for professional communications and marketing efforts. If members and supporters of CMOS agree that we can do more to promote our disciplines and provide credible science information to the public and policy makers, we will be seeking their financial support. This cannot be accomplished in the existing CMOS operating budget. The Golden Jubilee fund will help finance the anniversary book and public speaker tour, and other outreach activities as approved by Council.

In closing, I thank all our CMOS Council members for their support and participation in the past year. I especially would like to thank our departing Past-President Dr. Harinder Ahluwalia. He has put tremendous effort into strenthening CMOS during his three years on the executive. In the past year, he has brought much positive visibility to CMOS through his leadership in the International Forum of Meteorological Societies. I also extend a special thanks to Paul-André Bolduc, who has been the Editor of this *CMOS Bulletin SCMO* for almost 21 years. He has faithfully delivered current information to you, our members, six times per year. His services and knowledge will certainly be missed when he retires after this June edition.

Martha Anderson, CMOS Outgoing President

.... Words from the Incoming President

Martin Taillefer
CMOS Incoming President

First and foremost, I would like to congratulate Martha Anderson, our outgoing President, for an outstanding job this past CMOS season. To be in a position to help advance important initiatives and to make important changes to the infrastructure of the CMOS organisation is not an easy task. A review that was begun by Harinder Ahluwalia by surveying the community to assess what journey should CMOS take to ensure growth and sustainability over the next 10 to 20 years. As well, in the past year, I have been faced with some personal issues that have detracted me from my role as Vice-President and I am forever grateful to Martha Anderson (President), Harinder Ahluwalia (Past-President), Marie-France Gauthier (Recording Secretary), Fiona Robertson (Corresponding Secretary), Boumy Sayavong (Treasurer), and to our new Executive Director Gordon Griffith for their support and helping take up the slack through these very difficult four to six months.

Nevertheless, as a new CMOS cycle begins with the Fredericton Congress, we are faced with the same challenges that the Executive and Council face each year … making ends meet. As a small business owner the one overwhelming challenge that I see each week is a positive cash flow. This is also true for CMOS. While the balance sheet may show a healthy society today, growing and increasing costs of our world will apply financial pressures to the Society. It is easy to state the solution is to simply increase membership fees, yet this is not the panacea that the society needs – but rather a wholesale review of the Society's entire business case. Can CMOS sustain itself in the next 10 years and if not what changes are needed now to ensure a viable and sustainable future?

CMOS can offer Canada so much. Our members are the best meteorologists, oceanographers, and scientists who are leaders in their respective fields of environmental science. CMOS allows a convergence of this talent from the university student to the emeritus scientist each year at its congresses. We participate in many activities of CMOS throughout the year led by generous volunteers who want to make a difference. But at the risk of sounding too much like an alarmist, it simply costs a lot money to do all that we want to do. In the past few years we have seen zero

financial growth to large deficits. If costs of doing CMOS business continues on this trek, in about 10 years we may face a critical shortage. I read all messages of past presidents (incoming and outgoing) in past bulletins over the last five to seven years. All seem to have a goal or projects that they wanted to achieve and add to the CMOS legacy. Well, this is my pet project … the sustainability of CMOS. It may not have the optics of a great scientific contribution and discussions may create yawns of boredom – but a healthy balance sheet and financial future is the blood pressure, pulse, and heart rate of this society. As we round the corner to a new cycle of activities I would like you to consider the following initiatives:

1) With the executive director's help, the development of a strategic and business plan for CMOS that will pave the way for the next three to five years with an outlook to the next 10 years. Perhaps defining a business case for CMOS;

2) A comprehensive and strong restructuring of the budget, costs, and expenses of the CMOS business;

3) A restructuring of the CMOS national office. A review and assessment of its resources and organisation. What do we need to drop and where do we need to fill?

4) A motion to the AGM that perhaps CMOS should move to a two-year congress cycle rather than one scheduled each year. The financial and resource pressures of a congress each year is a heavy weight to bear as costs continue to grow; and

5) Finally, in my view student membership should be free.

Peter Bartello stated a few years back that "*The near future will very probably bring new challenges and may well require some important decisions, not only from the Society, but from many of its members individually*". Perhaps the near future is here now. The Society's mandate "… ***exists for the advancement of meteorology and oceanography in Canada***". Do we close our eyes and hold our breaths to hope that all will go well – or should we take action in full consideration of the rather limited resources at our disposal to re-build the Society to ensure a positive future. Something to think about?

Martin L. Taillefer, Incoming CMOS President

.... Allocution de la présidente sortante

Martha Anderson
Présidente sortante de la SCMO

Amis et collègues,

En tant que présidente de la SCMO depuis un an, j'ai eu l'honneur de travailler avec nombre de personnes dévouées, qui s'assurent que la mission de la SCMO subsiste et prospère. Je remercie tous ceux qui se lancent et donnent de leur temps. Nous formons une équipe formidable et j'ai aimé travailler avec chacun de vous.

Je suis tout spécialement reconnaissante aux bénévoles qui chaque année travaillent à notre Congrès. Il s'agit là d'une activité de grande importance pour la SCMO. Le centre du Nouveau-Brunswick organise notre 50e Congrès ce mois-ci. Il est réconfortant de voir que tant de gens ont déployé tant d'efforts afin de fièrement mettre en valeur leur ville et nos sciences.

Le congrès a motivé l'amélioration de notre site Web au cours des derniers mois. Un nouveau répertoire contenant l'enregistrement de webinaires et de conférences figure sous l'onglet « Activités »; des ajouts continus resteront toutefois nécessaires. Parallèlement à cette nouvelle initiative, le Service météorologique du Canada a enregistré en direct des webinaires, qui sont maintenant accessibles aux membres de la SCMO. La Société compte élargir ces deux services au cours de l'année qui vient. Notre site Web offre une autre nouveauté. Grâce au comité d'éducation publique et scolaire (CEPS), les étudiants pourront y trouver des exemples de carrière, sous l'onglet « Éducation ». Cette section contient des entrevues avec des gens qui travaillent dans quatre domaines différents.

À l'assemblée générale annuelle du 30 mai à Fredericton, nous comptons discuter de certains sujets d'importance avec les membres. Nous allons proposer pour le vote une augmentation des frais d'adhésion, comme il est décrit dans le *CMOS Bulletin SCMO* d'avril. Les discussions sur le budget comprendront l'abandon potentiel de la version papier du bulletin au profit d'une version électronique unique. Plusieurs organisations ont déjà choisi cette option. Nous présenterons les travaux du comité spécial pour le programme Mét. P., qui se demande si la SCMO pourrait remettre sur pied ce programme de certification, qu'avait suspendu ECO Canada, en automne 2014, en raison d'une

participation insuffisante. Nous présenterons en outre les plans de célébration du 50e anniversaire de la SCMO et sollicitons le soutien et les idées de nos membres.

Voici quelques-uns des projets actuellement en voie de préparation, qui nous permettront de mettre la SCMO et nos sciences en valeur dans le cadre de notre 50e anniversaire, le 1er janvier 2017 :

1) Au printemps 2017, une tournée de conférences publiques visant à accroître la visibilité de la SCMO et à offrir les plus récentes informations scientifiques sur les changements climatiques;

2) Un livre de référence cartonné, dans lequel différents auteurs écriront un chapitre sur l'état actuel et l'évolution probable des divers aspects de nos domaines;

3) Des capsules spéciales sur la SCMO dans les médias, par exemple à MétéoMédia;

4) Des informations sur notre anniversaire et une perspective historique, à faire paraître dans les publications et les médias sociaux de la SCMO;

5) Des célébrations et des événements spéciaux au Congrès 2017 de la SCMO à Toronto.

Nous recherchons des volontaires pour tous ces projets.

Un Fonds du jubilé sera mis en place afin de couvrir une partie des dépenses associées aux activités du 50e anniversaire. Ce fonds sera inauguré au 50e Congrès, à Fredericton. Le fonds servira généralement aux activités de sensibilisation et de communication. Selon ce qu'a souvent noté l'exécutif de la SCMO, celles-ci demeurent un aspect lacunaire de notre stratégie, mais le manque de fonds nous empêche de faire appel à des professionnels de la communication et du marketing. Si les membres et les commanditaires de la SCMO conviennent que nous devons accroître la promotion de nos disciplines et fournir des informations scientifiques crédibles au public et aux décideurs, nous solliciterons leur soutien financier, car ces idées ne peuvent se réaliser sur la base de notre budget de fonctionnement existant. Le Fonds du jubilé permettra de financer le livre anniversaire et la tournée des conférenciers, et les autres activités de sensibilisation qu'approuvera le conseil d'administration.

En terminant, je remercie tous les membres du conseil de la SCMO pour leur soutien et leur participation au cours de la dernière année. Je remercie tout particulièrement notre président sortant précédent, M. Harinder Ahluwalia. Il a déployé des efforts inimaginables pour renforcer la SCMO au cours de ses trois années de service au sein de l'exécutif. L'an passé, il a assuré une visibilité positive à la SCMO, grâce à son leadership au sein de l'International Forum of Meteorological Societies. Je remercie aussi notamment Paul-André Bolduc, qui a été le rédacteur du *CMOS Bulletin SCMO* au cours des vingt dernières années. Il a consciencieusement publié nos actualités pour vous, nos membres, six fois par année. Ses services et ses connaissances nous manqueront sans aucun doute, quand il quittera son poste après la parution du bulletin de juin.

Martha Anderson, Présidente sortante de la SCMO

Allocution du président à venir

Martin Taillefer
Président à venir de la SCMO

Tout d'abord, je félicite Martha Anderson, notre présidente sortante, pour le travail remarquable qu'elle a effectué au cours de l'année passée. Il n'est pas facile de procéder à l'avancement d'initiatives importantes tout en apportant des changements considérables à l'infrastructure d'une organisation. Harinder Ahluwalia avait amorcé cette revue de la SCMO en distribuant un sondage à notre communauté, afin d'évaluer l'orientation qui garantirait à la Société une croissance et une durabilité pour les 10 à 20 prochaines années. En outre, l'an passé, j'ai dû jongler avec des difficultés personnelles qui m'ont éloigné de mes fonctions de vice-président. Je suis profondément reconnaissant à Martha Anderson (présidente), à Harinder Ahluwalia (président sortant), à Marie-France Gauthier (secrétaire d'assemblée), à Fiona Robertson (secrétaire-correspondante), à Boumy Sayavong (trésorier) et à notre nouveau directeur général, Gordon Griffith, de leur soutien et d'avoir pris le relais durant ces quatre à six mois très difficiles.

Néanmoins, tandis que pour la SCMO un nouveau cycle s'amorce avec le Congrès de Fredericton, nous devons poursuivre le même but que l'exécutif et le conseil visent chaque année... joindre les deux bouts. En tant que propriétaire d'une petite entreprise, ma grande préoccupation chaque semaine reste de m'assurer un flux de trésorerie positif. Ce qui s'avère aussi pour la SCMO. Bien que notre bilan montre actuellement une société en bonne santé financière, les coûts croissants et supplémentaires liés à notre monde finiront par peser sur les finances de la Société. Il est facile d'affirmer que la solution consiste simplement à augmenter les frais d'adhésion, toutefois ce n'est pas la panacée que nécessite

notre société. Il faut plutôt revoir en profondeur le modèle financier de la SCMO. Notre organisation se suffira-t-elle durant les 10 prochaines années et sinon quels changements devons-nous y apporter pour lui garantir un avenir viable et durable?

La SCMO a beaucoup à offrir au Canada. Nos membres sont les meilleurs météorologistes, océanographes et scientifiques qui soient. Ils sont des leaders dans leur domaine respectif des sciences de l'environnement. La SCMO permet une convergence de ces talents, des étudiants aux scientifiques émérites, chaque année, dans le cadre de ses congrès. Tout au long de l'année, nous participons aux diverses activités de la SCMO, qu'organisent de généreux bénévoles, qui veulent améliorer les choses. Mais sans vouloir paraître alarmiste, il coûte cher d'entreprendre tout ce que nous avons en tête. Ces dernières années, nous avons connu soit une stagnation de nos finances soit de grands déficits. Si les dépenses de fonctionnement de la SCMO continuent dans cette direction, dans environ 10 ans, nous pourrions nous retrouver avec un déséquilibre financier critique. J'ai lu tous les messages que les anciens présidents (à venir ou sortants) ont rédigés dans les bulletins des cinq à sept dernières années. Ils semblaient tous avoir des objectifs ou des projets à réaliser afin d'accroître le patrimoine de la SCMO. Voici le mien : la durabilité de la SCMO. Il ne possède pas nécessairement la trempe des grandes contributions scientifiques et les discussions qu'il suscitera pourraient bien vous faire bailler d'ennui, mais un bilan et des finances futures en santé sont ce qui maintiendra la tension artérielle et les battements de cœur de cette société. Tandis que nous prenons un virage vers un nouveau cycle d'activités, je vous demande de prendre en considération les initiatives suivantes :

1) Avec l'aide du directeur général, l'élaboration pour la SCMO d'un plan stratégique et d'affaires, qui ouvrira la voie pour les 3 à 5 prochaines années, avec un aperçu pour les 10 prochaines années. L'exécution d'une analyse de rentabilisation, peut-être;

2) La restructuration en profondeur du budget, des coûts et des dépenses liés au fonctionnement de la SCMO;

3) La restructuration du bureau national de la SCMO. Une revue et une évaluation de ses ressources et de son organisation. Que devons-nous abandonner et que devons-nous ajouter?

4) Une motion de vote à l'AGA, qui pourrait faire du congrès un événement biennal plutôt qu'annuel. Le poids sur les finances et les ressources qu'occasionne le congrès chaque année s'avère lourd à porter, tandis que les coûts continuent d'augmenter; et

5) Finalement, à mon avis, les étudiants ne devraient pas payer de frais d'adhésion.

Peter Bartello a affirmé il y a quelques années : «*Le futur proche apportera vraisemblablement son lot de difficultés nouvelles qui pourraient demander d'importantes décisions, non seulement de la Société, mais de plusieurs de ses membres, individuellement.*» Le futur proche se trouve peut-être déjà à notre porte. Le mandat de la SCMO... «***vise l'avancement de la météorologie et de l'océanographie au Canada.***» Vaut-il mieux nous fermer les yeux, retenir notre souffle et espérer que tout ira bien, ou devons-nous prendre les mesures que nous permettent nos ressources plutôt limitées pour rebâtir la Société et lui assurer un avenir positif? C'est un pensez-y-bien.

Martin L. Taillefer, Président à venir de la SCMO

Description de la page couverture: La page couverture montre la carte synoptique du 29 août 2015 à 1200 UTC (0400 HNP). Ces conditions de fin d'été ressemblent plutôt à des conditions d'hiver. Une dépression en surface qui se creuse, indiquée en bleu, avec les fronts associés, au large de la côte de l'Oregon, se déplace vers le sud de l'île de Vancouver. Le cyclone extratropical s'est développé près de la base d'un intense creux à 500 hPa qu'illustrent les contours noirs, la position des dépressions en altitude et les étiquettes (la température à 500 hPa, en °C, est en blanc). La dépression s'est creusée rapidement tandis qu'elle s'approchait de la Colombie-Britannique, et ce, avec le soutien d'un courant-jet relativement intense, indiqué ici par le dégradé orangé (l'étiquette des isotaches est en mètre par seconde). Ce système finira par apporter des vents forts à certaines parties de l'ouest de Washington et du sud-ouest de la Colombie-Britannique, y compris le Grand Vancouver, causant des pannes de courant généralisées. Les données en altitude illustrées ici proviennent de cartes des National Centers for Environmental Prediction des États-Unis et les conditions en surface viennent des analyses du Weather Prediction Center des États-Unis. Pour de plus amples détails, consultez l'article de Read à la **page 83**.

ARTICLES

Weathering

by Bettina Matzkuhn[1]

Around 2010, I began a series of four embroidered sets of sails in memory of my late father. He loved sailing to the point of obsession. One of my sails features a pilot chart, with currents, isobars, and wind roses, another a cloud atlas. I think about future project ideas as I work and began to think more deeply about weather and the maps used in meteorology. My childhood was spent on boats; as an adult, I hike. Like my father, I tap the barometer, squint at the sky and consider the forecast. He listened to the marine weather bulletins, consulted the tide book, and kept watch for dark patches on the water, or a cloud shimmying down a mountainside.

I read books about weather from cover to cover, but there was plenty I did not understand (a chronic condition). I was fortunate to spend time with senior meteorologist Uwe Gramann, learning about some very basic principles of forecasting so that I could gain a beginner's literacy when looking at weather maps. He described the "funnel": looking at the various layers of atmosphere in forecasting. I understand it is a complex *process*, not a thing, but I could picture the shape with overlapping layers. Being a visual learner, the act of making serves as a way for me to remember what I learned: steepness like an invisible topographic map in the sky and converging/diverging shoals of temperature and humidity. I printed out the four layers of an upper air analysis on acetate, and used these to sketch out the layers on a canvas form. My materials form my language, so wind barbs are embroidered, "thickness" is translucent fabrics, arrows are cut from an old Gore-tex bicycle jacket, isobars and temperature lines are boot-lace cord. I added hills and a few buildings at the bottom, but the image is presented through symbols rather than pictorial reality.

Finding Cameron Beccario's website *Earth* (earth.nullschool.net/) was sheer euphoria. The Waterman Butterfly projection of the globe led me to imagine embroidered "butterflies" pinned to the wall as a series of specimens, the opulence and fragility of butterfly wings conflated with the atmosphere. After asking for permission to adapt his images, I hand painted the fabric and embroidered them in running stitch –up and down– the most basic stitch every culture has used to fasten, mend or decorate. Each butterfly is a meter across, stiffened with the material used in hat brims. I adapted maps of carbon monoxide levels, areas of the world with above average temperatures, etc. The Guardian website featured a most elegant map by John Nelson that plotted hurricane tracks over many decades. With his blessing it also became one of the dozen.

Satellite imagery, diagrams, and maps contain depth, texture, narrative, and metaphors. Introduced to spaghetti plots, I saw them like ready-made embroidery plans. Projections of the future becoming progressively more unaligned and random seem to speak of anxiety. The changing plots are embroidered between the ears of outlined heads on a series of 14 flags; they are made of very light georgette fabric suspended on aluminum wire attached to flag poles set in interlocking bases. Presenting them in a row evokes a kind of international greeting: flags moving in the ambient breeze. I translate the slick digital imagery of data visualizations that change by the minute, into an ancient, slow, very tactile craft practice. My intention is for the familiarity of textile to attract viewers, mystify them somewhat, and to open a discussion.

I received a small B.C. Arts Council grant in 2015 to experiment with digital animation. I had made several animated films in the 1980s for the NFB (National Film Board), but the technology has changed drastically. Since weather is constantly in motion, animation seemed to be an appropriate way to expand my approach. I built a stand, set up my DSLR camera, and began experimenting with making the symbols move, the spaghetti writhe and the clouds form or disperse. Textile works I had previously made and photographed were mined for weather images. Sound was added. It became a three-minute study of my own apprehension about climate change.

As the artist in residence at Newfoundland's extraordinary Gros Morne National Park last year, I documented the weather by painting pieces of cloth shaped like articles of clothing for each day of my stay and then strung them all out on a clothesline. I am currently thinking I might fashion a Gros Morne Beaufort scale: it is an uncommonly windy place and this has a huge influence on the vegetation and the people. Their idioms describing wind are apt: "blow the milk right outta your tea" for example (there are plenty that are coarser). Being slow at working and thinking, I need time to develop ideas and what form they will take visually.

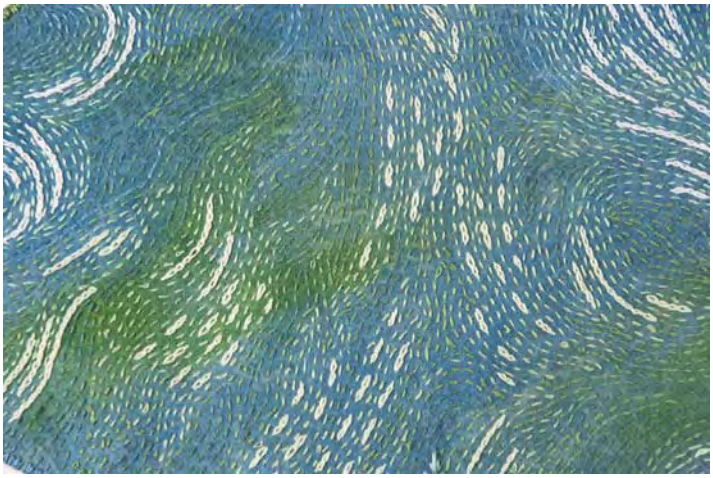
I realize I understand only a mere wisp about meteorology, but this body of work is an enthusiastic celebration of the community dedicated to analyzing, documenting, and projecting what transpires in the atmosphere.

My work can be seen on my website, including a link to the film "*The Zoology of Weather*".

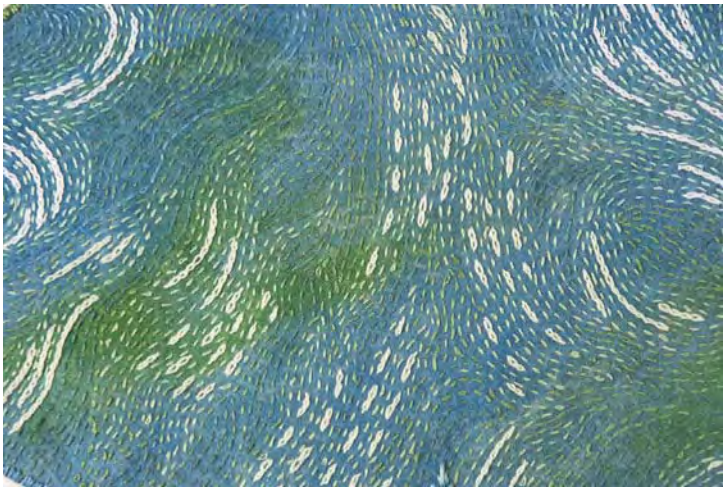
www.bettinamatzkuhn.ca/weathering/

Note: See some samples on next page.

[1] Vancouver, BC





Art - Science: samples copy of Bettina Matzkuhn's work

RADARSAT Constellation Mission (RCM) Status Update

par Daniel De Lisle[1], Steve Iris[1], Shannon Kaya[2], Darlene Langlois[2], Norm Scantland[3], and Will Perrie[4]

Abstract: The RADARSAT Constellation is the evolution of the RADARSAT Program with the objective of ensuring data continuity, improved operational use of Synthetic Aperture Radar (SAR), and improved system reliability. The three-satellite configuration will provide daily revisits of Canada's vast territory and maritime approaches, as well as daily access to 90% of the world's surface. The mission is currently in development, with the satellites' launch planned for 2018.

Résumé: La Constellation RADARSAT, qui est une évolution du Programme RADARSAT, a pour objectif d'assurer la pérennité des données, d'augmenter l'utilisation opérationnelle des radars à synthèse d'ouverture (SAR) et d'améliorer la fiabilité des systèmes. La configuration à trois satellites offrira des réobservations journalières du vaste territoire et des approches maritimes du Canada, ainsi qu'un accès quotidien à 90 % de la surface terrestre. La mission est en cours d'élaboration. Le lancement des satellites est prévu pour 2018.

1. Introduction

Earth Observation (EO) is a major thrust of the Canadian Space Program (CSP). In the 1980's Canada pioneered Synthetic Aperture Radar (SAR) technology through the development and extensive use in field trials around the world of a sophisticated radar imaging system deployed in aircraft as a simulator to Canada's future satellite system. Canadian technological advances were integrated into spaceflight hardware flown on the European Space Agency ERS-1 and ERS-2 radar demonstrator satellites launched respectively in 1991 and 1995. Having attained space flight heritage, Canada launched its own radar Earth observation satellite, RADARSAT, in 1995. RADARSAT was primarily driven by a requirement to better manage navigation through Canada's ice infested waters. Operating independent of daylight or weather conditions, Synthetic Aperture Radar (SAR) sensors provide global coverage of the Earth's surface. From 1995 until its decommissioning in March 2013, RADARSAT-1 provided operational service to both government and commercial users worldwide through a network of 47 ground receiving stations. It has given Canada a world leadership position in space-borne SAR systems for data use and value-added products and services.

The RADARSAT Constellation Mission (RCM) will ensure SAR data and imagery continuity for RADARSAT-2 users, as well as adding a new series of applications enabled through the constellation approach. It will provide all-weather day and night data in support of Canadian sovereignty and security, environmental monitoring, natural resources management, and other government priorities, such as Northern development. The three-satellite constellation provides average daily coverage of most of Canada and its surrounding waters. Coverage increases significantly in Canada's North. The constellation will provide coverage three to four times daily of the Northwest Passage. With the increased frequency of revisit, emerging applications such as land deformation and operational disaster management can be further exploited.

2. Description of the RADARSAT Constellation Mission

2.1 Coverage, Access, and Imaging Time

- Daily coverage of Canada's territorial and adjacent waters to support maritime surveillance, including ice monitoring, marine wind monitoring, oil pollution monitoring, and ship detection; and,

- Ability to monitor all of Canada for disaster mitigation on a regular basis (monthly to twice-weekly) to assess risks and identify damage prone areas; and,

- Regular coverage of Canada's land mass and inland waters, up to several times weekly in critical periods, for resource and ecosystem monitoring.

The RADARSAT Constellation will provide on average 15 minutes of imaging time per orbit per satellite, with peak imaging of 25 minutes per orbit per satellite outside the eclipse season.

[1] Canadian Space Agency

[2] Environment Canada

[3] National Defence

[4] Department of Fisheries and Oceans

2.2 Revisit and Re-look

The RADARSAT Constellation will provide a four-day exact revisit, allowing coherent change detection using an InSAR mode. It will also provide an average daily global re-look capability in medium 50 m resolution mode. Most of the applications considered require re-look at least daily and an exact revisit once to twice weekly (interferometric change detection applications). Very frequent re-look capability is critical to certain disaster management applications.

2.3 Timeliness and Data Latency

The timelines and data latency requirement is highly variable according to the application area. For many ecosystem monitoring applications, data delivered several days or in some cases several weeks later may be sufficient. However, maritime surveillance and disaster monitoring have much more demanding timeliness requirements. For ship detection in Canadian and adjacent waters within Canadian ground station masks, RADARSAT Constellation will provide 10 minute data latency from acquisition to delivery of data, and 30 minutes for other maritime surveillance applications. For global and Canadian disaster management applications, the Constellation will provide two hour data latency from downlink to data delivery, and for ecosystem monitoring applications, 24 hour data latency from downlink to data delivery will be provided.

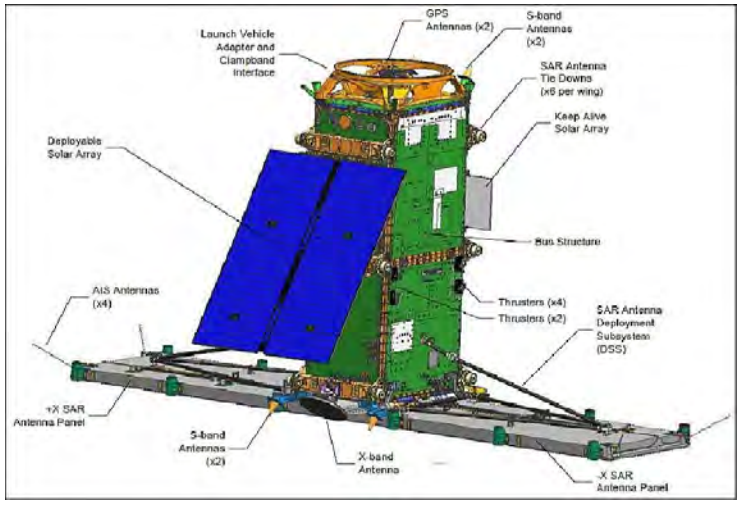
2.4 Space Segment

RCM is designed as a scalable constellation of three small satellites. With a constellation, the time between successive imaging of the same part of the Earth (revisit time) is significantly reduced. The creation of a three-satellite constellation will increase the frequency of available information, as well as the reliability of the system, making it better suited to operational requirements of Government Departments. In the event of a satellite failure, the other satellites can continue to provide a certain level of service. The lower cost of individual satellites facilitates the replacement and makes the system scalable.

RCM involves initially flying three C-band SAR satellites in a constellation configuration, evenly spaced on the same orbit, meaning they will follow each other by 30 minutes. The satellites will operate in a sun-synchronous low-earth polar orbit, at an altitude of approximately 600 kilometers. RCM is designed as a wide area monitoring system, each satellite having a ground swath of about 350km, to allow monitoring the maritime approaches of Canada on a daily basis and a capacity to image any location in Canada every day.

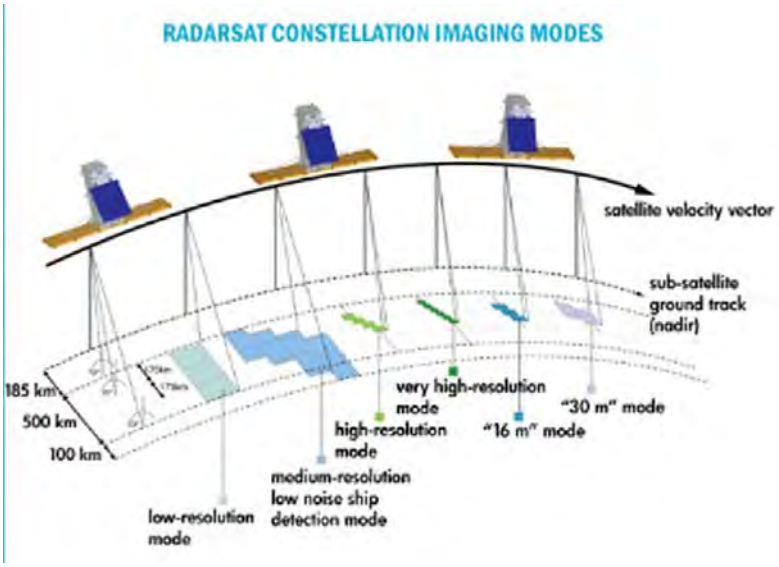
Each spacecraft consists of a bus and two payloads: a Synthetic Aperture Radar (SAR) payload and an Automatic Identification System (AIS) payload. The bus module will provide attitude and orbit control, power generation and storage, payload commands, telemetry, thermal control, and the primary support structure. The SAR payload will perform all imaging operations, store, encrypt and transmit the SAR data. The AIS payload will receive ships' identification in a wide swath, larger than the accessible swath of the SAR.

Each satellite will be capable of providing SAR imagery in a variety of imaging modes, which were selected to ensure continuity of data to RADARSAT users. In wide-area mode, it will monitor and acquire data over large areas of interest at medium resolution (from 16 to 100 meters), mostly for maritime and environmental applications. In high-resolution mode, the constellation will acquire specific on-demand images at a spatial resolution of three meters or five meters. It also has a one meter by three meters resolution in spotlight mode. The constellation has a dual polarization capability and a fully polarimetric mode as well as a compact polarization mode. Polarization options maximize the information content in the collected data.



The satellites will also include an AIS payload. Article 19 of the 'Safety Of Life At Sea' regulation published by the International Maritime Organization (IMO) requires that all ships beyond 300 tons (Class A) transmit their identification, location, as well as bearing and velocity with an AIS transponder. The RCM onboard AIS receiver will capture the aforementioned information in across a broad expanse of open ocean, which will include the swath of the imaging area. Incorporated with the satellite imagery, this will provide a greatly enhanced information product for maritime surveillance. The AIS payload would enable the detection of illegal vessels in Canadian waters and up to 1,000 nautical miles from the shore. Having both SAR and AIS payloads on the same satellite will provide near "real time" maritime surveillance, as opposed to gathering separate data from two different systems and merging it into one

piece of information. The value-added from coupling both technologies is that RCM can detect vessels that have lost their AIS signal or deliberately turned-off their AIS transmitter to avoid detection and identification. RCM would then allow for the detection of a vessel that requires assistance or alternatively, carrying out an illegal activity such as smuggling or illegal fishing within Canadian waters.



Both the SAR and AIS payloads can be activated upon request. The data stream collected will be downlinked to ground stations for their processing.

By focusing on key requirements, the size and weight of the satellites were kept to a minimum. Each satellite will weigh approximately 1,560 kg. The use of smaller lighter satellites allows the use of less expensive launch vehicles, or the launch of several satellites on the same launch vehicle.

To achieve the technical objective, CSA (Canadian Space Agency) is developing several critical technologies in partnership with Canadian industry, which will be used in the spacecrafts. The main areas of technology development are the small-satellite bus, the transmit/receive modules for the SAR antenna, the payload central electronics, and the SAR antenna design.

2.5 Launch

The satellites will be launched in 2018 from Vandenberg, California, on a Falcon 9 launch vehicle.

2.6 Ground Segment

The ground segment for RCM is required to perform the following tasks: commanding and monitoring the satellites for navigation and imaging; receive satellite telemetry; receive data from the satellites' payloads; and manage the data for users.

The ground segment baseline includes:

- a Mission Operation Center (MOC) for mission operations and associated equipment and software, namely for data ordering, mission planning, satellite control, processing, image quality assessment and dissemination, at the CSA headquarters in Saint-Hubert;

- the Natural Resources Canada (NRCan/CCRS) satellite ground stations network and EODMS for long-term data archiving and access;

- the Department of National Defence (DND) Polar Epsilon (PE) ground stations on the East and West coasts, primarily for RCM data reception, processing, and exploitation in the context of their Polar Epsilon project;

- a Backup Control Facility (BCF) at the CSA David Florida Laboratory (DFL) in Ottawa; and,

- access, through the Mission Operation Center, to a foreign ground station for occasional command and control of the satellites and data reception for urgent near real-time data acquisitions and down-linking.

2.7 Data Utilization

The project scope includes an applications development program to assist government users to make optimum use of the data when the system becomes operational. The Data Utilization and Applications Program (DUAP) will provide technical assistance to federal departments to upgrade their applications and develop new ones exploiting data generated by the RCM; as well as to integrate applications into operational systems. These applications are needed to transform the data into value-added information and to assist user departments in making the transition from RADARSAT-2 to RCM data. The requirement arises because the orbiting and imaging parameters of the RCM satellites differ from those of predecessors RADARSAT-1 and RADARSAT-2, and to account for the abundance of data to be generated by the three satellites which will require high-volume automated information processing capacity at the users' premises.

The Canadian Ice Service (CIS), a division of the Meteorological Service of Canada, is the leading authority for ice information in Canadian waters. Operational ice information products include:

- Daily ice hazard bulletins and charts describing ice conditions in Canadian navigable waters;

- Warning service for extreme ice events;
- Daily iceberg bulletins and charts;
- Weekly analyses of all Canadian ice areas for transportation planning and climate monitoring;
- Ice reconnaissance from fixed and rotary wing aircraft.

CIS directly supports other government department mandates including Canadian Coast Guard icebreaking operations and Department of National Defence exercises and activities in ice-covered waters. Products are delivered to clients in an automated fashion via a customized Product Dissemination Service and are available publicly on the CIS website.

Beyond CIS major Government partners, ice information products are used daily for navigation (port authorities, commercial shipping companies, fishers and fishing fleets all require ice information for vessel routing); Offshore oil and gas (iceberg and sea ice information are essential for exploration and production activities both on-site and transit); Northerners (safe travel planning on sea ice); Construction (real-time and archive data inform decision-making for resource exploitation, bridges and port facilities); Tourism (an increasing number of cruise ships and Arctic adventurers); Marine Insurance (ice information is part of the risk assessment process); Environmental Impact Assessments (data, analysis and expert advice on historical and current conditions); and Researchers (transportation, climate change, meteorology, oceanography, biology etc.).

The ICE information and services transition to RADARSAT Constellation Mission (EC-ICE2RCM) program will establish a series of projects to ensure that EC is fully-prepared to transition ice products and services to the RCM data stream and exploit the new RCM capabilities. Projects to be undertaken include:

1. RCM-readiness of CIS Operational Products and Services;

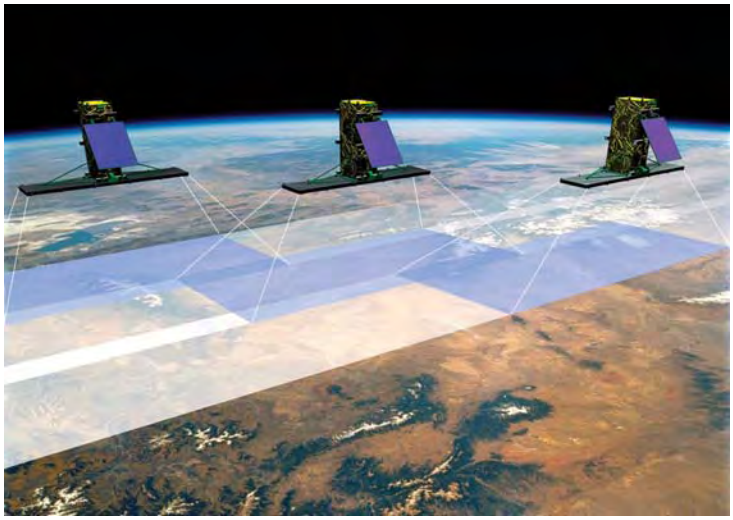
2. Integration of enhanced RCM capabilities into CIS operational programs;

3. Implement Automated Image Analysis Applications;

4. Enhance the Regional Ice Prediction System (RIPS) analysis component;

5. Transition the Automated Sea Ice Tracking System (ASITS) to RCM.

To assist with the environmental monitoring of our coastal waters, the Canadian Ice Service has a team of experts trained in satellite imagery analysis to detect illegal marine oil releases. Since 2006, as part of the Integrated Satellite Tracking of Pollution (ISTOP) program, satellite imagery has been analyzed daily to detect and then report on illegal and accidental oil pollution in Canadian waters including the Great Lakes. The satellite analysis products identifying potential oil pollution incidents are used by Government of Canada enforcement and responding agencies including Transport Canada, Environment Canada, and Fisheries and Oceans Canada. Products are disseminated via an automated email delivery system to an approved list of recipients also including Department of National Defence, U.S. Coast Guard, and several non-government clients.



The use of Synthetic Aperture RADAR (SAR) to derive high resolution marine surface wind speeds has proven to be an innovative application to support the operational forecasting program in the Meteorological Service of Canada (MSC). The "SAR Winds RCM Readiness Project" is necessary to enable the smooth transition of the operational "National SAR Winds (NSW) program from RADARSAT-2 to the RCM, and expand the program to include the assimilation of the observations into the Numerical Weather Prediction (NWP) system. Working with DFO, existing and new SAR-wind methodologies and models for wind information extraction will be integrated into the operational NSW system. The new capabilities offered by RCM, such as new beam modes and increased geospatial coverage, will need to be analyzed and evaluated in order to update the wind speed algorithms, which must then be incorporated into the operational production system. With the expected significant increase in data volumes, the data management and processing aspects of the program will need to be evaluated and addressed.

The analyses are also used for monitoring on-going spill events and for monitoring grounded ships (ships stuck in shallow water) that are at risk of causing pollution.

The ISTOP program is an important tool in encouraging compliance with Canada's laws and International Conventions that seek to minimize oil pollution, and minimize impacts on the economic prosperity of Canadians as well as marine birds, mammals and the ecosystems on which they depend.

The EC-OIL2RCM DUAP project will ensure that the ISTOP operational program can:

1.Transition to the RCM datastream upon satellite commissioning;

2. Integrate new RCM capabilities; and,

3. Utilize the automation of oil detection and mapping to optimize CIS exploitation of the increase in temporal resolution expected from RCM.

For DND, the RADARSAT Constellation Mission (RCM) Ocean Feature Project will generate a 4D Ocean using ocean features extracted from RCM Synthetic Aperture Radar (SAR) data/products and make all the ocean data (SAR imagery, extracted features, 4D ocean) discoverable by means of a Geospatial Data Mart (GDM) for use by ocean/acoustics analysts, command personnel and combat system operators. The objective is to upgrade the Spaceborne Oceanographic Intelligence Network (SOIN) toolset in order to extract ocean observational data from RCM imagery/data; specifically those associated with Compact Polarimetry and Doppler Anomaly. In parallel to that activity, the plan is to create a GDM to store all RCM geo-referenced information and the ocean features extracted from the SAR data. By means of the existing METOC Ocean Work Station (OWS), the RCM extracted ocean features will be used initially to validate data obtained from the Environment Canada Global Ice-Ocean Prediction System (GIOPS) data and later be assimilated by the model data. The resultant ocean feature prediction (4D Ocean) will then be stored back onto the GDM for use by ocean/acoustics analysts and operators; specifically Oceanographers, Sonar Operators, and Acousticians at the two METOCs, HMCS ships, the two CP-140 Long Range Patrol Aircraft (LRPA) Mission Support Centres (MSCs) (and their equivalent deployable system). Access will also be extended to Command personnel for situational awareness and to Environment Canada (EC), Department of Fisheries and Ocean (DFO), and other Government of Canada (GoC) departments as required.

The RCM Data and Use Policy is being formulated in consultation with a number of stakeholders including: Government departments, Provinces and Territories, Value-Added Services Providers, universities, and associations representing the Canadian remote sensing community. The Data and Use Policy will favour public good interests and the requirements of Government users while conciliating commercial interest.

3. Conclusion

The RADARSAT Constellation will ensure C-band data continuity for RADARSAT users, as well as adding a new series of applications enabled through the constellation approach.

The RCM is being designed for three main uses:

- Maritime surveillance (ice, surface wind, oil pollution, and ship monitoring);

- Disaster management (mitigation, warning, response, and recovery); and

- Ecosystem monitoring (agriculture, wetlands, forestry, and coastal change monitoring).

In addition to these core user areas, there are expected to be a wide range of ad hoc uses of RADARSAT Constellation data in many different applications within the public and private sectors, both in Canada and internationally.

For example, while the mission design initially focused on maritime security requirements, land security, particularly in the Arctic, will be dramatically enhanced. The system offers up to four passes per day in Canada's far north, and several passes per day over the Northwest Passage.

The increase in revisit frequency introduces a range of applications that are based on regular collection of data and creation of composite images that highlight changes over time. Such applications are particularly useful for monitoring climate change, land use evolution, coastal change, urban subsidence, and even human impacts on local environments.

4. References

http://asc-csa.gc.ca/eng/satellites/radarsat/default.asp

http://asc-csa.gc.ca/eng/satellites/radarsat/maritime.asp

CMOS exists for the advancement of meteorology and oceanography in Canada.

Le but de la SCMO est de promouvoir l'avancement de la météorologie et l'océanographie au Canada.

Advertising Rates for 2016

CMOS offers advertisers three options for reaching its membership and subscribers of approximately 800 addresses, including professionals of meteorology and oceanography residing mostly in Canada, and institutions and companies operating in Canada, the United States and overseas.

1) **Direct mailing** (ask us for selecting sub sets of addresses**) $0.35 per address, plus postage and handling fees**.
2) **Printed ad** (camera-ready or pdf format) **in *CMOS Bulletin SCMO***, published every two months at 800 copies or more:

Full colour publication	Full Page	Half Page	Quarter Page	Business Card
Outside back cover	$450	not available	not available	
Inside covers or Centre pages	$400	not available	not available	
Inside pages	$300	$200	$150	$200 (full year)

The prices shown are per issue; save even more, for six issues the price is only 4 times the price of a single publication!
All prices mentioned are in Canadian dollars.

3) **Loose insert in *CMOS Bulletin SCMO* * (**8.5x11 or smaller**,** delivered to our address)**: $200** per sheet.

* Materials inserted in CMOS publications must be specifically approved by CMOS before. CMOS recommends bilingual advertising, and will provide translation for short texts free of charge. Additional charges apply if typesetting, artwork, photography or photocopy are required.

***CMOS - SCMO**, P.O. Box 3211 Station D , Ottawa, Ontario, Canada K1P 6H7*
Tel.: (613) 990-0300 e-mail/courriel: publications@cmos.ca

Tarif des annonces pour 2016

La SCMO offre trois façons pour rejoindre ses 800 clients, incluant des météorologistes et océanographes professionnels résidant surtout au Canada, ainsi que des institutions et corporations des États-Unis, Canada et outremer.

1) **Envoi direct** (informez-vous du triage possible): **$0.35 par adresse, plus frais de manipulation et de poste**.
2) **Annonce** (prête à imprimer ou format pdf) **dans le *CMOS Bulletin SCMO***, publié à 800 exemplaires ou plus, à tous les deux mois:

Publication en couleurs	Page complète	Demie-page	Quart de page	Carte d'affaire
Couverture arrière extérieure	450$	non disponible	non disponible	
Couvertures intérieures ou pages centrales	400$	non disponible	non disponible	
Pages intérieures	300$	200$	150$	200$ (pour l'année)

Note: Les prix mentionnés sont pour un numéro; pour six impressions consécutives de la même annonce, le tarif est quatre fois le prix d'une seule parution! Tous les prix mentionnés sont en dollars canadiens.

3) **Insertion libre dans *CMOS Bulletin SCMO* *** (8.5x11 ou moins, livrée à notre adresse):**$200** par feuille

* Le matériel inséré dans les publications de la SCMO doit être spécialement approuvé par la SCMO auparavant. La SCMO recommande les annonces bilingues, et s'engage à faire la traduction de courts textes gratuitement, s'il y a lieu. Des frais additionnels s'appliquent si de la mise en page, traduction appréciable, dessin, photographie ou photocopie sont nécessaires.

Did Antecedent Hot and Dry Weather Contribute to an Unusual Level of Tree Damage during the 29 August 2015 Windstorm in the Lower Mainland of British Columbia?

by Wolf Read

University of British Columbia, Vancouver, BC

On 29 August 2015, a strong extratropical cyclone tracked north-northeast along the U.S. West Coast and into southwest British Columbia (BC), a rare event in the summer (Figure 1, Figure 2). This storm developed in classic fashion in an upper-air pattern more reminiscent of November than August (Figure 3). Due to the track close to the shore and then inland over southern Vancouver Island, the low brought an intense pressure gradient into the region, reaching five to eight hPa (100) km^{-1} over much of the Cascadia region based on reported hourly sea-level pressure observations (NCEI 2016a). This triggered a classic windstorm, with near-surface gusts reaching extremes of 145 km h^{-1} at Destruction Island on the Washington coast (NDBC 2016). Inland, gusts were not as extreme, with Vancouver, BC, reporting 80 km h^{-1} from 140º and Abbotsford 95 km h^{-1} from 170º (EC 2016). Abbotsford reported its highest gust for the month of August in the 1957-2015 record, exceeding the previous maximum, set in 1969, by a staggering 32 km h^{-1}. Vancouver's gust was the highest since a strong thunderstorm produced a downburst that reached 85 km h^{-1} on 17 August 1980, and is the greatest recorded from the southeasterly quadrant in the month of August.

The summer windstorm caused a catastrophic impact to the BC Hydro power grid in the Lower Mainland. A maximum of 400,000 customers (20.5% of the customer base) were without power at any one time during the storm, with a grand total of 710,000 customers (36.4% of the base) affected by the storm (BC Hydro 2015). This represents the largest outage since all-time record 125-145 km h^{-1} gust speeds during the 1962 Columbus Day Storm ("Typhoon Freda") knocked out power to 300,000 customers (Bolwell 1962), or 67.7% of the customer base at the time.

The catastrophic damage to the power grid during the summer windstorm is particularly interesting when the wind speeds are put in a climatological context. The peak gusts on 29 August 2015 were rather typical for Lower Mainland windstorms in general and indeed can be considered "endemic" with a recurrence interval of roughly 1-2 years (Read 2015). Over many decades, the BC Hydro grid has endured many endemic windstorms without a catastrophic loss of electrical service. Indeed, windstorms with higher peak gust magnitudes and therefore longer return intervals, such as the 15 December 2006 "Hanukkah Eve Storm" or its precursor on 11 December 2006, did not cause as much disruption to the power grid as the 29 August 2015 event.

During windstorms, trunk and branch failures tend to be the largest cause of power grid damage (Davidson et al. 2003). Thus, electrical outages during strong winds are a reasonable if but imperfect proxy for tree damage. At the wind speeds that most storms attain, tree failures tend to be the combined outcome of wind load and other factors including stem taper, the shape of the root mass and soil moisture conditions (Petty and Swain 1985, Stathers et al. 1994, Mitchell 2000, Moore 2000, Scott and Mitchell 2005, Mitchell 2013). Trees are also being weakened by insects and rot fungi (Hennon 1995, Allen et al. 1996, Wong et al. 2004).

When enough outage data is analyzed in relation to the available wind record for a region, some patterns emerge. For example, tree-related outage records supplied by BC Hydro for the distribution grid covering the period 2005-2009 suggest that for a given wind speed, there is a greater tendency for tree damage during the autumn months, such as October, when compared to late winter months, like February. Outages appear to be about twice as likely in the fall when compared to the late winter. This tendency also emerged when using outage data collected from newspaper reports of 40 high windstorms from 1994-2012[1]. There are probably numerous reasons for this pattern, including: 1) the presence of foliage on deciduous trees in the autumn that results in higher wind drag forces (Vogel 1989, Vollsinger et al. 2005); 2) the addition of new growth during the spring and summer that is untested by strong winds until the storm season; and 3) disturbance agents like fungi and insects may weaken trees and branches over the warm season, making them more vulnerable to the first strong storms. Therefore, it is tempting to think that the presence of leaves on deciduous trees was the major factor in the record power outage during the summer windstorm — call this the leaf hypothesis.

[1] For those windstorms where BC Hydro customer outage data were available directly from the agency, allowing a comparison between the media reports and the official source, the media reports had an average error of just 4%. This small error appears largely due to rounding. Journalists tended to quote statistics directly from a BC Hydro representative, reducing the chance of misreporting.

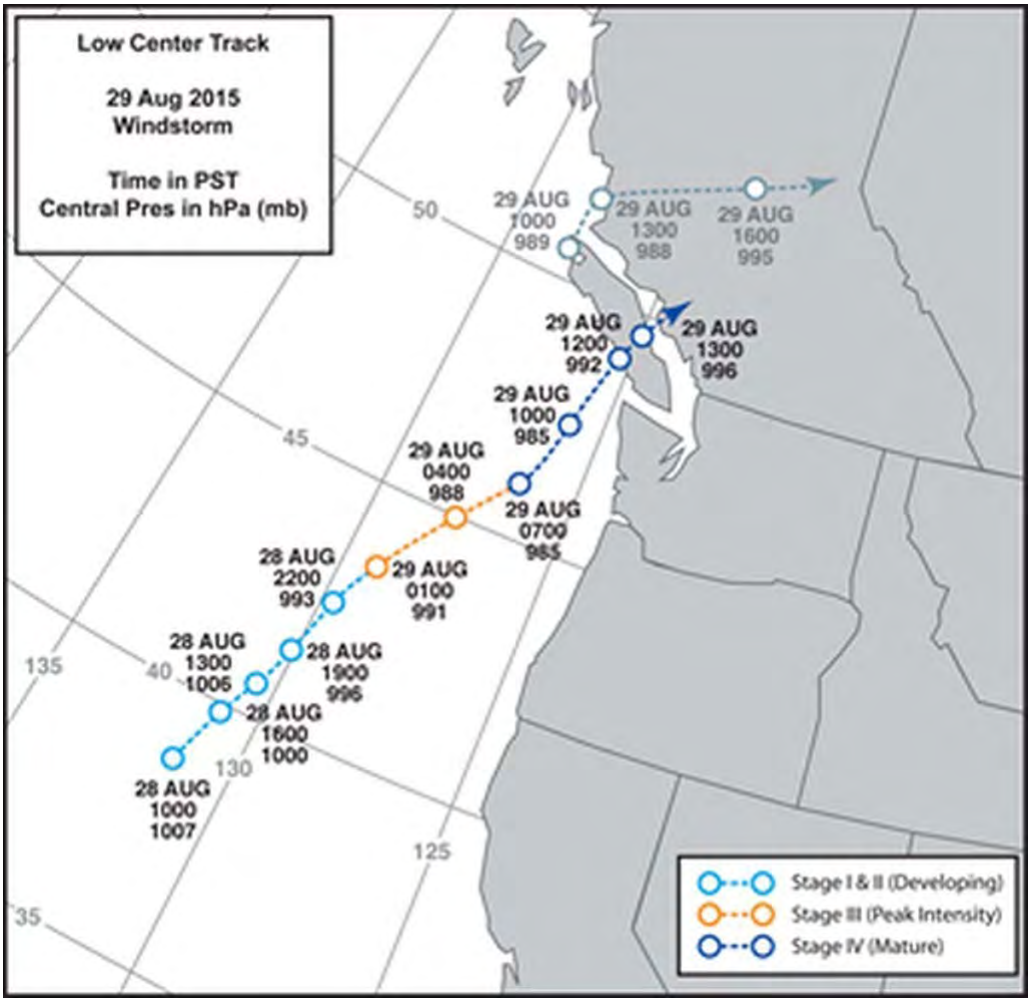


Figure 1: Track of the high-wind-generating extratropical cyclone of 28-29 Aug 2015. Times are in PST and central pressure in hPa. Faded track indicates the position of a second low associated with the storm of interest. Track based on surface analysis maps from the U.S. Weather Prediction Center, satellite interpretation and mesoscale analysis of hourly surface data as the low tracked onto the Vancouver Island coast.

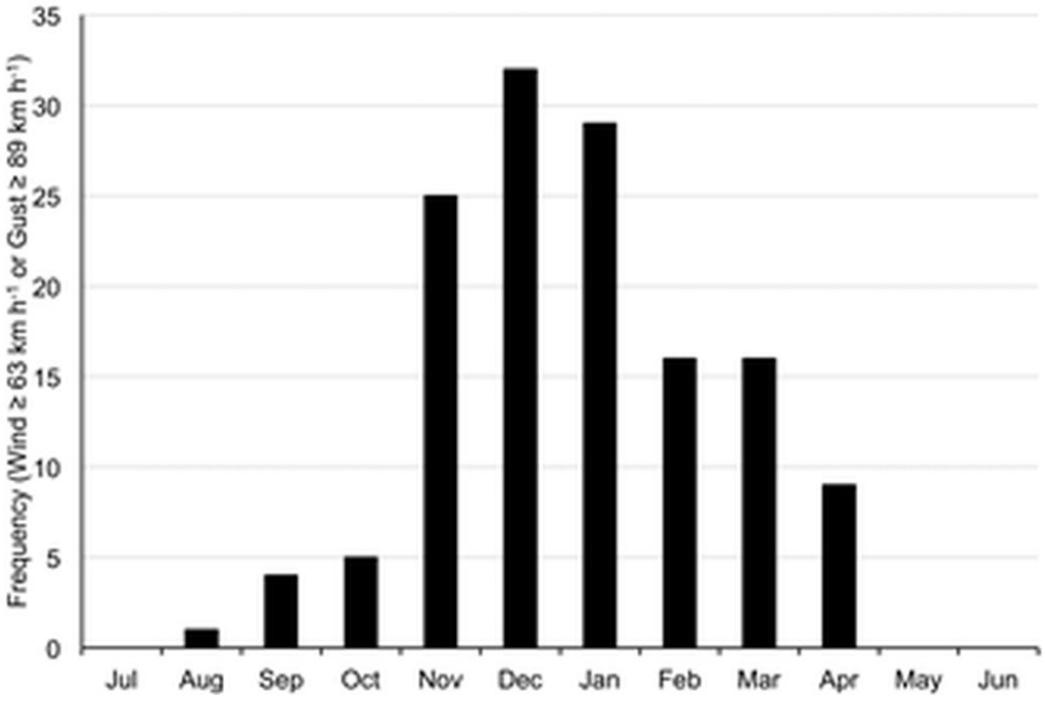


Figure 2: For Vancouver, Victoria and Abbotsford, BC, the monthly frequency of windstorms with peak 1- or 2-minute wind ≥63 km h^{-1} and/or peak gust ≥89 km h^{-1}. This is for the 52 years 1964-2015. Total number of events is 137. Data for 1964-2012 are from Read (2015), with wind records from Environment Canada used for the final three years up to 2015.

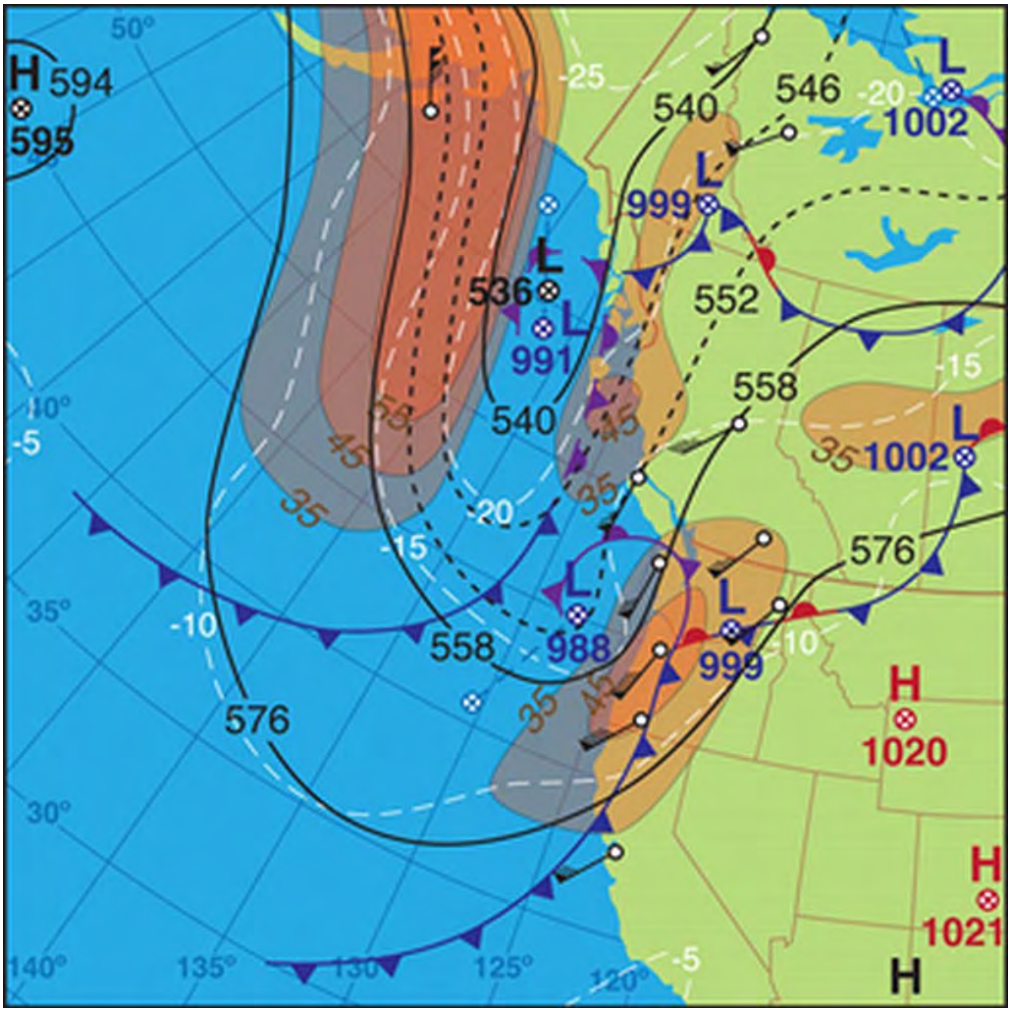


Figure 3: Synoptic chart for 1200 UTC 29 August 2015 (0400 PST 29 August 2015). Orange shading depicts the 300 hPa jet stream, with brown italicized numbers labeling isotachs in m s^{-1}. Some radiosonde wind observations are included (in black) mainly to show conditions around the region of interests (2.5 m s^{-1} per half barb and 25 m s^{-1} per pennant). For the 500 hPa level black lines denote heights in dm. Upper lows and central heights are also marked in black. Isotherms in ºC are indicated with white dashed lines. Surface lows and central pressures in hPa are indicated with dark blue, with tracks in light blue. Key surface anticyclones are indicated in red. Upper-air information in this map is from charts by the U.S. National Centers for Environmental Prediction, and surface conditions are from analyses by the U.S. Weather Prediction Center.

Lending some support to the leaf hypothesis is a windstorm that occurred on 11 December 2014, just 8.5 months before the summer gale (Figure 4). In the Lower Mainland of BC, the 2014 windstorm produced almost exactly the same peak gust speeds as the summer windstorm (Figure 5). Wind directions were generally quite similar, as both storms were southeasters. During the December storm, some 78,000 customers lost power at peak, *five times less* than the August windstorm. The same wind speeds but with far, far fewer outages. In the Lower Mainland, by the middle of December, deciduous trees have shed 99% of their leaves, in sharp contrast to late August when the same trees are likely to retain a large percentage of their foliage.

As discussed above, the difference in the frequency of power outages due to the presence versus the absence of leaves on deciduous trees (i.e. October compared to February) on average appears to be a factor of two. This is less than the five-fold difference between the December 2014 and August 2015 windstorms.

In the Lower Mainland, other early-season windstorms occurred on 25 September 1999 and 28 October 2003. Both of these storms happened when many deciduous trees still possess leaves, and they produced peak gusts in the same range as the 29 August 2015 windstorm. However, they were westerly windstorms, not southeasters. Westerly storms tend to produce fewer outages when compared to southeasters, mainly for geographic reasons (Read 2015). When using the abovementioned BC Hydro outage dataset for 40 high windstorms, the average difference is a factor of 1.35. Differences in customer base over time can also be adjusted for using data supplied by BC Hydro for 1925-2015. When the adjustments are done, the 1999 and 2003 windstorms each caused an outage equivalent to about 160,000 customers in 2015 terms (Figure 6). This is 2.5 times less than the August 2015 windstorm, a fact that does not fully support the leaf hypothesis. Given this, and the large difference in the outcomes between the December 2014 and August 2015 storms discussed above, perhaps something other than the presence of leaves on deciduous trees contributed to the extreme amount of damage during the summer windstorm.

The warm season of 2015, aside from having a rare windstorm, was also unusually hot and dry. The heat and drought began early, with temperatures in May approaching those of an average June and June being equivalent to an average July (Table 1) (EC 2016). The June monthly mean at Vancouver was just 0.1ºC below the all-time record set in 1958, and for Abbotsford was 0.6ºC above the old record also from 1958. The month of June in many Pacific Northwest regions had near-record to record high monthly average temperatures (NECI 2016b). May and June were very dry. Temperatures in July and August were well above average. The July monthly mean at Vancouver was 1.4ºC above the 1981-2010 normal and at Abbotsford 2.4ºC above normal. The mean temperature at Abbotsford was a mere 0.1ºC short of matching the all-time warmest July, set in 1958. Like June, the month of July in many Pacific Northwest regions had near-record to record high monthly average temperatures (NECI 2016b). A period of precipitation visited in late July 2015 that contributed to a somewhat above normal total at Abbotsford, then dry conditions resumed until the arrival of the trough that helped generate the 29 August 2015 windstorm. If the rainfall for 29-31 August is removed from the monthly totals, then the dry conditions over much of the month become evident. Water restrictions were enacted in the region (City of Vancouver, 2015).

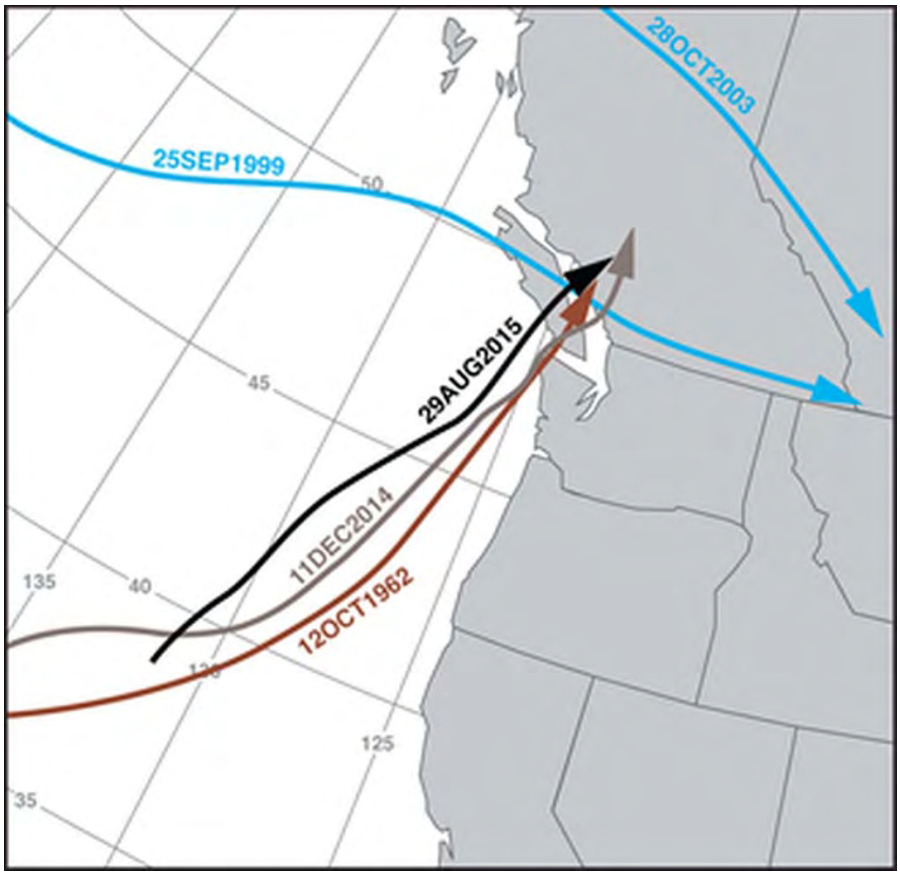


Figure 4: Low-pressure centre tracks for the high windstorms discussed in the text. The 29 Aug 2015 windstorm is depicted in black, 11 Dec 2014 gray, 12 Oct 1962 brown, and 25 Sep 1999 and 28 Oct 2003 are both blue.

High heat combined with lack of moisture is a double-whammy for trees. As observed by the author during the drought, by mid-July certain tree species that were prone to shedding leaves when subjected to drought stress—known as being drought-deciduous—actively dropped their foliage. Indeed, some trees had lost most of their canopy before August. Evidence of stressed trees was found throughout the region affected by the drought, including in much of western Washington. Dead saplings and pole-sized trees, some standing mature timber with red and brown needles and broadleaf trees with wilted foliage were all signs of significant water stress. This drought continued up to the time of the windstorm. Indeed, the 29 August 2015 extratropical cyclone heralded the end of the hot and dry conditions as it brought cooler temperatures and rainfall, with other weather systems following in the windstorm's wake.

The antecedent heat and drought, more than the presence of leaves, could have been the main contributor to the unusual level of tree damage during the August windstorm. Note that this does not exclude a leaf contribution—but instead the drought combined with the presence of canopies on deciduous trees may have resulted in the extreme power outage. There are a number of ways that drought stress could make trees more vulnerable to wind, including: 1) though dry wood tends to be stronger than moist wood, it is also more brittle (consider what happens when you bend a dry twig versus a green one) and trees rely on flexibility to shed wind load (Stephen Mitchell, personal communication 15 September 2015); 2) trees in dehydrated soils may have lost fine root structure making them more likely to uproot; 3) sandy/silty soils can become weaker when they are dried out, depending on other factors (Timothy Newson, personal communication 09 September 2015); 4) dry soils have less mass than moist soils potentially giving trees less of an anchor (this is an area open for research); and 5) pathogens such as insects may have an easier time attacking stressed trees, weakening them over the drought period.

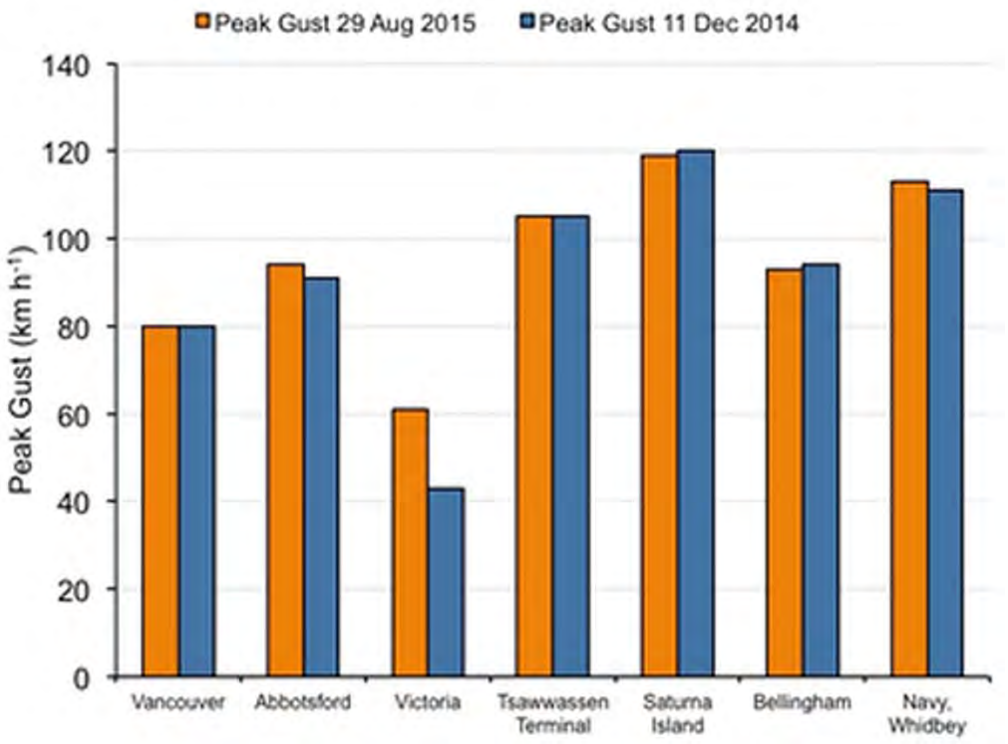


Figure 5: Lower Mainland, Georgia Strait and Washington State Northern Waters peak gusts (km h^{-1}) for the 29 August 2015 (orange) and the 11 December 2014 windstorms.

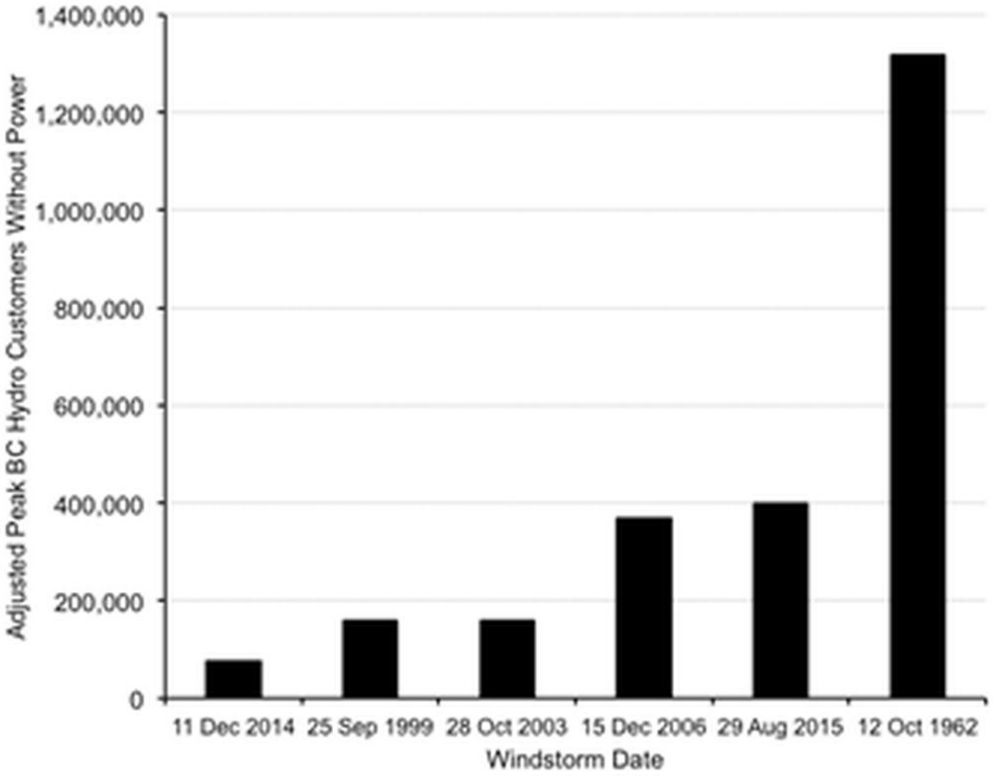


Figure 6: Peak customers without power for the windstorms discussed in the text. These values are adjusted to account for wind direction and also changes in customer base over time. The 2006 Hanukkah Eve westerly windstorm adjusted peak customers is very close to the summer windstorm outcome. Peak winds were well above endemic levels in Vancouver during the earlier event, in line with a major power outage outcome despite leaf-bare deciduous trees and a more typical summer without extended heat and drought.

1981-2010 Normals

	Vancouver, BC				Abbotsford, BC			
	Temperature (ºC)				Temperature (ºC)			
Month	Avg Hi	Avg Lo	Mo Mean	Avg Pcpn (mm)	Avg Hi	Avg Lo	Mo Mean	Avg Pcpn (mm)
May	16.7	8.8	12.8	65.0	18.1	7.8	13.0	99.8
June	19.6	11.7	15.7	53.8	20.8	10.5	15.7	74.8
July	22.2	13.7	18.0	35.6	24.0	12.2	18.1	43.2
August	22.2	13.8	18.0	36.7	24.4	12.0	18.2	45.9

2015 Statistics

	Vancouver, BC				Abbotsford, BC			
	Temperature (ºC)				Temperature (ºC)			
Month	Avg Hi	Avg Lo	Mo Mean	Total Pcpn (mm)	Avg Hi	Avg Lo	Mo Mean	Total Pcpn (mm)
May	18.7	10.6	14.7	4.2	20.5	9.5	15.0	8.6
June	22.3	13.3	17.9	11.0	25.4	12.0	18.8	12.1
July	23.4	15.2	19.4	20.8	26.9	14.0	20.5	51.9
August	22.3	14.5	18.4	*67.8* (20.0)	25.7	13.0	19.4	*43.3* (8.8)

Table 1: The 1981-2010 climate normals for Vancouver and Abbotsford shown against the monthly statistics for 2015. Two values are shown for the August 2015 precipitation totals: numbers in italics are monthly totals, and those in brackets are for the period before the windstorm, 01 to 28 August. Data are from Environment Canada.

The 1999 and 2003 windstorms mentioned above did not occur after a long and hot drought. Trees during those earlier summers were likely not stressed to the point seen in late August 2015. And the two storms only managed about 40% of the outages that occurred during the August 2015 windstorm. Also consider that during the summer of 2015 some deciduous trees had shed many of their leaves by late August—this would reduce drag forces to some extent. Taking the outage estimations at face value, based on the analysis of the 2005-2009 power outage data, had there been no drought during the summer of 2015 to weaken trees and branches, the 29 August 2015 windstorm probably would have produced an outage about twice that of 11 December 2014, or around 156,000 customers. This is in close agreement with the outage magnitudes of the 1999 and 2003 windstorms both of which produced similar peak gust speeds to the 2015 storm.

The evidence points to a substantial drought contribution to the tree damage during the summer windstorm. Perhaps ~60% of the damage occurred due to the addition of drought stress when 400,000 is set to one and the difference between 400,000 and 156,000 is considered, with the presence of leaves on deciduous trees contributing ~20% and the remainder being the what would have occurred from the given peak wind speeds during winter tree conditions and without an antecedent drought. This has relevance in any region with numerous trees, an exposed power grid and periodic summer droughts, not just the Lower Mainland of BC.

An important consideration given a substantial drought contribution to the tree damage during the 29 August 2015 windstorm involves the fact that water restrictions were implemented in the region. Reduced watering in parks and yards may have weakened some trees that are typically nourished during relatively dry West Coast summers. Thus, water restrictions could have put the power grid at greater risk during the first strong winds of the storm season. Given modern civilization's dependence on the power grid, this makes for an important management issue during droughts: conserve water and make the electrical grid more prone to outages or allow at least strategic watering to preserve grid resiliency.

Another consideration is climate change. With average temperatures forecast to continue rising well into the 21st century (BC Ministry of Environment 2015), extreme summer heat waves may become more common. Average precipitation is also expected to increase, but in combination with a higher frequency of extreme precipitation events, which suggests ample opportunity for droughts in the warmer regime. A pattern of drought-stressed trees and greater vulnerability to early season windstorms may become more routine until the region's vegetation has adapted to the new climate, and this can

happen only when the long-term secular changes in temperature and precipitation slow down.

In conclusion, a long period of high temperatures and dry conditions preceding the early-season 29 August 2015 windstorm appears to have made trees more vulnerable to failure. This showed up as catastrophic damage to the BC Hydro grid despite peak wind speeds that are at an endemic level for windstorms. The presence of leaves on deciduous trees at the time of the storm appears to have played a secondary but also important role in the damage. Given that a drought is capable of making trees more vulnerable to wind loading which in turn makes the power grid more likely to be damaged, and the expectation of a dynamic situation with increasing temperature over the next decades due to global climate change that would likely put trees under recurrent stress, the kind of damage that occurred during the summer windstorm could become a recurring pattern. This pattern would likely continue until some semblance of stability returns to the climate system, allowing vegetation to adapt.

References

Allen, E. A., Morrison, D. J. and G. W. Wallis, 1996: Common Tree Diseases of British Columbia. Natural Resources Canada, Canadian Forest Service, 178 pp.

BC Hydro, 2015: Storm Update: Crews restore power to 705,000 in 72 hours. Accessed 06 May 2016 at: https://www.bchydro.com/news/press_centre/news_releases/2015/storm-update.html

BC Ministry of Environment, 2015: Indicators of Climate Change for British Columbia, 2015 Update, 50 pp.

City of Vancouver, 2015: Stage three water restrictions now in effect. News in Vancouver archives, accessed 10 May 2016 at: http://vancouver.ca/news-calendar/stage-three-water-restrictions-now-in-effect.aspx

Davidson, R. A., Liu, H., Sarpong, I., Sparks, P. and D. V. Rosowsky, 2003: Electric power distribution system performance in Carolina hurricanes. *Nat. Hazards Rev.*, 2003, 4, 36-45.

EC, 2016: Environment Canada Climate portal. Hourly, daily and monthly data accessed 05 May 2016 at: http://climate.weather.gc.ca

Hennon, P. E., 1995: Are heart rot fungi major factors of disturbance in gap-dynamic forests? *Northwest Science*, 69, 284-293.

Mitchell, S. J., 2000: Forest health: Preliminary interpretations for wind damage. Forest Practices Branch, British Columbia, Ministry of Forests, Victoria.

Mitchell, S. J. 2013: Wind as a natural disturbance agent in forests: a synthesis. *Forestry*, 86, 147-157.

Moore, J. R., 2000: Differences in resistive bending moments of *Pinus radiata* trees grown on a range of soil types. *For. Ecol. Manage.*, 135, 63-71.

NDBC, 2016: U.S. National Data Buoy Center. Historical data accessed 05 May 2016 at: http://www.ndbc.noaa.gov/station_page.php?station=desw1

NCEI, 2016a: U.S. National Centers for Environmental Information, Integrated Surface Database (ISD), Hourly, Global. Accessed 05 May 2016 at: https://www.ncdc.noaa.gov/data-access/quick-links#dsi-3505.

NCEI, 2016b: U.S. National Centers for Environmental Information, State of the Climate. Accessed 06 May 2016 at: http://www.ncdc.noaa.gov/sotc/

Petty, J. A., and C. Swain, 1985: Factors influencing stem breakage of conifers in high winds. *Forestry*, 58, 75-84.

Read, W., 2015: The Climatology and Meteorology of Windstorms That Affect Southwest British Columbia, Canada, and Associated Tree-Related Damage to the Power Distribution Grid." PhD Thesis, University of British Columbia, 355 pp. Available online at: http://hdl.handle.net/2429/54280

Scott, R. E. and S. J. Mitchell, 2005: Empirical modeling of windthrow risk in partially harvested stands using tree, neighbourhood, and stand attributes. *For. Ecol. Manage.*, 208, 193-209.

Stathers, R. J., Rollerson T. P. and S. J. Mitchell, 1994: Windthrow handbook for British Columbia forests. Working Paper 9401, Research Branch, BC Ministry of Forestry, Victoria, BC.

Vogel, S., 1989: Drag and reconfiguration of broad leaves in high winds. *J. Exp. Bot.*, 40, 941-948.

Vollsinger, S., Mitchell, S. J., Byrne, K. E., Novak, M. D. and M. Rudnicki, 2005: Wind tunnel measurements of crown streamlining and drag relationships for several hardwood species. *Can. J. For. Res.*, 35, 1238-1249.

Wong, C., Sandmann, H. and B. Dorner, 2004: Historical Variability of Natural Disturbances in British Columbia, A Literature Review. Forest Research Extension Partnership series, 12, 64 pp.

Historical Highlights of CMOS

Excerpts from *Atmosphere* Volume 1, 1963[1]

Compiled by Richard Asselin[2]

Message from the President

"The success of our National Meteorological Congress over the past few years has highlighted the continuing growth of Canadian Meteorology. It has also brought into relief the limitations imposed on our activities by distance and economics. The only remedy for this situation lies in effective internal communications. Your executive considers that publication on the level of original research can best be achieved through established journals such as those of the Royal and American Meteorological Societies. For other levels, it is apparent that we can render a service by initiating a bulletin of Canadian Meteorology. The editorial committee is charged with interpreting and fulfilling this objective and has, I am sure, the best wishes of all the members in this endeavour."

B. W. Boville President, Canadian Branch, Royal Meteorological Society

Birth of the Canadian Branch (1940)

The 21st Annual Business Meeting was held May 11, 1961 at McGill University, Montreal. There were 362 members and 3 Centres at the time: Toronto, Winnipeg, and Montréal. "At the present rate of exchange only about 45¢ per member was available to the Branch out of the annual fee of $10.00 [paid to RMetS]…if the Branch was to operate effectively, an increase in annual fees would be required." Fees for 1963 were increased to $12.00 per member but the initiation fee remain unchanged. "…well-established Centres, should be partially self-supporting and greater support should be provided for the development of new and young Centres and for other interests of the Branch."

"Professor Hitschfeld stated that indications point to the National Congress becoming an annual event and suggested that this would be a suitable occasion for holding the Annual Meeting of the Branch, in order that a greater representation of the membership at-large might attend. He moved that the Executive Committee take this suggestion under consideration and, if at all feasible, take appropriate action towards implementation."

The annual budget of the Branch for 1961 was $5227.30, of which $3652.14 was remitted to the RMetS (mainly for publications). $30 was allocated to the national meteorological congress.

Centre activities in 1962

- Six meetings of the Montreal Centre – it received $28.00 in subvention.
- Eight meetings were held by the Toronto Centre – it received $30.10 in subvention.
- Eight meetings were held by the Toronto Centre – it received $25.90 in subvention.

Early congresses of the Canadian Branch

There is no record of the First annual congress of the Canadian Branch of the Royal Meteorological Society (1960) to be found in the archives held by CMOS.

2nd Annual Congress- Montreal June 6 and 7, 1961

"Although reports and discussion on the proceedings of the Congress were published in the Quarterly Journal and Weather, it was recommended that in future, the Annual Report of the Branch should also contain an outline of such proceedings for reference and historical purposes."

3rd Annual Congress - McMaster University, Hamilton: 1962

The Congress began auspiciously with the first session under the joint sponsorship of the Royal Society of Canada and the Canadian Branch, R. M. S. Three distinguished speakers - Dr. C. Hines, Dean F. Hare, and Dr. R. W.

[1] Note: the complete contents of *Atmosphere* are in the process of digitization and will eventually be available on the CMOS site. Meanwhile, all the scientific papers published in *Atmosphere* are already available at http://www.tandfonline.com/loi/tato20#.Vt86fPEi1Po

[2] Former Director, CMOS Publications, Member of the Ottawa Centre

Stewart - presented a rather complete coverage of the atmosphere, beginning at ionospheric levels and working downward to the air-ocean interface, stressing the linkages between adjacent layers. The Joint session with the Canadian Association of Physicists brought together eight papers with the common theme *"Upper Atmosphere Physics*", in the course of which it became quite apparent that the spectroscope is a meteorological instrument of importance. In the remaining two sessions, comprising fifteen papers, the subject matter ranged through the entire gamut of meteorological topics, indicating clearly the wide range of specific interests pursued by the Fellowship of the Canadian Branch.

The luncheon provided a pleasant opportunity for the presentation of awards. The Napier-Shaw Memorial Prize was presented by Dean Hare to Dr. C. Hines for his paper (recently published in the Quarterly Journal) entitled *"The Upper Atmosphere in Motion"*. The Hugh Robert Mill Medal and Prize was awarded to Prof. J. S. Marshall, and the Darton Prize (Canada) to Prof. Walter Hitschfeld. Prof. Boville and Dean Hare received the President's Prize. The occasion was also marked by the presentation of the Patterson Medal to Prof. Marshall and to Mr. A. J. Childs.

4th Annual Congress- Laval University, Quebec, June 5-6, 1963 (note the early oceanographic connection)
There was an "overwhelming response to the call: a total of thirty titles and abstracts were submitted. From the outset, the problem of the Committee has been to accommodate as many contributions as possible within the limited time available, to yield the best integrated programme providing the maximum time for the discussion which ought to constitute the most important feature of a meeting of this kind. The Committee has preferred to limit the number of presentations and to encourage discussion, rather than to crowd the sessions with a large number of very short papers, each suffering from a lack of time for proper consideration. The selection was not an easy task; in the end, eight contributions could not be accommodated."

The meeting started by a joint session with the Royal Society of Canada (Interdisciplinary Division), on atmospheric and oceanic circulation where Dr. A. W. Brewer, formerly of Oxford University and presently at the University of Toronto spoke on *"Ozone as a tracer element in the stratosphere*". "Ozone forms mainly at low latitudes but high concentrations are found at high latitudes. A possible transport mechanism was suggested and discussed." Next, Dr. N. P. Fofonoff, oceanographer at Woods Hole Oceanographic Institute presented *"Dynamics of ocean currents*".

There were also sessions on radiation and turbulence, dynamic meteorology and numerical weather prediction, and physical meteorology, as well as a joint Symposium on space physics with Royal Society and Canadian Association of Physicists.

Altogether, 23 papers were presented at the four sessions. In general, speakers found that they were not given much time to present their subject and the audience was not given much time for discussion. It seems that this difficulty could be overcome if concurrent sessions were held or if the Congress were extended to three days.

The printed program included extended abstracts for most of the papers. Congress attendance was 103.

Computer age arrived! (Excerpt from Montreal Centre report: 28 February, 1963)

"The fourth meeting of the Montreal Centre was held at Montreal Airport under the chairmanship of Mr. R.A. Parry. The business of the evening was a visit to and a demonstration of the Bendix G-20 electronic computer recently installed in the Central Analysis Office of the Meteorological Service of Canada.

Mr. Michael Kwizak, head of the Operational Development and Numerical Weather Prediction Units of the C.A.0. led off the proceedings with a 15-minute description of the equipment. The main element of the system was the Central Processor, which contained the arithmetic units and 8,192 words of core storage. Addition time was given as 12 microseconds, equivalent to about 80,000 additions per second. Six magnetic tapes were available as auxiliary equipment, along with a control buffer, a line printer, a control console, a paper tape reader, a card reader and a card punch. Mr. Michael Kwizak also described planned changes that would be introduced within the next two years, mentioning another 8,192 words of core storage and a data communicator. Replying to Dr. McTaggart-Cowan, Director of the Meteorological Service, he said that the latter would afford simultaneity of operational performance, as against sequence, with consequent economy in time of completion.

Mr. Robert Strachan then took up automatic data processing, pointing out that the computer processed one complete radiosonde report per second. Mr. H. Kruger followed with a description of objective analysis, giving two minutes as the time required for each chart. The last speaker was Mr. J. Simla on the barotropic model. Six minutes were taken to complete a 48-hour forecast.

The oral presentations were followed by a visit to the computer room, where the various elements of the system were demonstrated in operation. The meteorological programs described earlier were run on a limited scale. The completed analysis was printed in a contoured form in 35 seconds (1,000 lines per minute) and this, along with the speed at which paper tape was read into the computer (500 characters per second) represented the most impressive phase of the operation."

Thoughts of Canadian Meteorological Society

"Possible changes were discussed with regional representatives at the Annual Meeting and, more recently, with several members of the parent society, including the President, Dr. Penman. Briefly, it is proposed that the name should be changed to "The Canadian Meteorological Society" and that our Society should be affiliated with, rather than a Branch of, the Royal Meteorological Society. In other respects, and particularly as regards journal publication, our strong association with the R. M. S. would change very little. Subsequent to such a change, and without prejudice to our R. M. S. association, we would attempt to promote some form of affiliate status with the American Meteorological Society, having in mind those of our members who are also participating in the A. M. S."

Bilingual from the start (version française suit)

"In past years the venue of the Annual General Meeting of the Branch was the location of the Executive. The Annual Report and other relevant documents were distributed to Fellows in accordance with established procedure. On the initiation of a National Congress of the Branch an ad hoc committee distributed a booklet containing the programme and abstracts of papers, and a report of the proceedings eventually appeared in one of the publications of the parent Society. This year the Annual General Meeting is taking its rightful place in the National Meeting. This issue of ATMOSPHERE is a Congress issue and will serve as the basic document for the entire proceedings.

The reporting of meteorological meetings in Canada has never been wholly satisfactory. In the parent Society, copies of papers to be read are made available either in published form, or proof, in time to enable Fellows to make a considered contribution to the discussion. Fellows are invited to write in a summary of what they have said - or what they think they have said or think they ought to have said - which with replies from the author, duly appears in print. In this way the published paper is rounded off. In a limited fashion this method was applied in the 1953 joint meeting at Toronto of the Society and the American Meteorological Society and it was tried at the Montreal Congress of 1961. This year an attempt is being made , in the case of previously unpublished papers, to provide extended summaries in advance, which form the bulk of this issue, and maximize time for discussion. This has unfortunately not been accomplished without the regrettable rejection of some proffered papers. We think that the Branch can be justifiably proud that meteorology in Canada is taking its place in the annual gathering of Canadian scientists, and, in addition to its own specialisation, sharing sessions with the physicists and being an invitee of the Royal Society."

Bilingue dès le début (English version precedes)

«Jusqu'à maintenant, l'assemblée annuelle se tenait dans la ville où demeuraient les membres du comité exécutif. Le rapport annuel et autres pièces justificatives étaient distribués aux membres selon la procédure alors en vigueur. Avant le congrès national, un comité ad hoc fut chargé de la distribution d'une brochure qui contiendrait le programme, un résumé des communications et le compte rendu des délibérations. Ceci fut publié dans un numéro de la revue Royal Meteorological Society. Cette année, l'assemblée annuelle se tiendra lors du congrès national à Québec. Ce numéro de notre brochure ATMOSPHERE est consacré entièrement au prochain congrès. Il servira d'ordre du jour pour toutes les réunions.

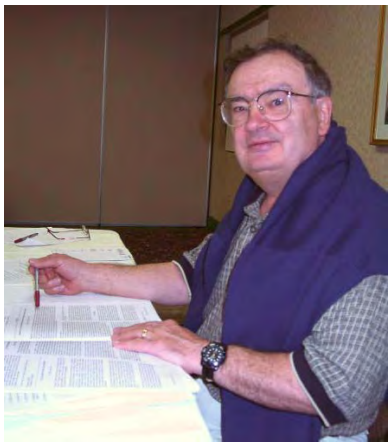
Le compte rendu des assemblées météorologiques tenues au Canada n'a jamais été fait d'une manière efficace. Par contre la Royal Meteorological Society envoie à ses membres une épreuve ou un fascicule de la communication avant toutes réunions. Les membres sont donc en mesure de discuter en toute connaissance de cause. Après quoi on invite les participants à envoyer un résumé de leurs propos, de ce qu'ils croient avoir dit, de ce qu'ils croient qu'ils auraient du dire. L'auteur de la communication répond aux critiques et le tout est ensuite publié. Le lecteur est donc informé du pour et du contre. En 1953 nous avons suivi cette politique lors de la réunion conjointe de notre société et de l'American Meteorological Society tenue à Toronto. Nous avons aussi essayé de faire de même au congrès de Montréal en 1961. Cette année, nous faisons circuler parmi les membres, un résumé des communications originales. La présente brochure sert à cette fin et nous espérons que vous vous joindrez à l'auteur pour animer les discussions prévues. Certains impératifs nous ont contraints à refuser des communications. Nous sommes fiers que la météorologie soit enfin reconnue au Canada et que notre société soit invitée par la Royal Society à se joindre aux autres sociétés savantes et à siéger avec les physicistes.»

To be continued - À suivre

CMOS BUSINESS / AFFAIRES de la SCMO

English version follows

Paul-André Bolduc tourne la page



Paul-André Bolduc en 2004

Pour Paul-André Bolduc, le temps est venu de quitter le poste de corédacteur du *CMOS Bulletin SCMO*. Au cours de son mandat, il a joué un rôle crucial dans la transformation de notre bulletin en un magazine professionnel tout en couleur, et ce, à partir d'une publication qui n'était essentiellement qu'un feuillet. Sa passion pour l'édition, combinée à un dévouement profond pour les sciences, a permis à la SCMO de maintenir la publication du *bulletin* pendant plus de vingt ans et d'y inclure diverses informations : articles scientifiques, critiques de livres, chroniques « mondaines » illustrant les réalisations des scientifiques canadiens et autres renseignements utiles. Peu importe si Paul-André relaxait au chalet ou en vacances avec sa famille, le *bulletin* paraissait à temps. Au nom des membres de la Société canadienne de météorologie et d'océanographie, j'exprime notre reconnaissance et notre gratitude à Paul-André pour son dévouement, son empressement et sa persévérance, au fil de ces deux décennies de services remarquables, en tant que corédacteur du *CMOS Bulletin SCMO*. Nous espérons qu'il continuera de contribuer au futur de la SCMO de quelque façon que ce soit et nous lui transmettons nos meilleurs vœux.

Savithri Narayanan, Corédactrice

Un grand merci!

par Paul-André Bolduc[1]

L'aventure commença en novembre ou décembre 1995. Neil Campbell, alors directeur général de la SCMO, dont les bureaux occupaient le même étage que le nôtre au 200, rue Kent, Ottawa, arpentait nerveusement le corridor. Voyant qu'il se parlait à lui-même et qu'il était évident qu'il ne trouvait pas de réponses à ses questions, je l'ai invité dans mon bureau. J'ai alors appris la source de ses problèmes: le rédacteur du *CMOS Bulletin SCMO* venait de démissionner. Moins d'une heure plus tard, j'étais le nouveau rédacteur du bulletin. J'avais convaincu Neil que je pouvais aider la société en me portant volontaire pour être rédacteur de sa revue bi-mensuelle. C'était, comme je l'ai écrit au début de ce paragraphe, le début d'une extraordinaire aventure qui a duré vingt-et-un ans.

J'étais déjà attiré par le domaine des publications. Au collège, j'étais le rédacteur en chef du « feuillet » publié sous la direction du collège. Ce « feuillet » de quelques pages permettait aux collégiens de publier leur texte d'intérêt pour toute la communauté. Durant ces années, j'ai moi-même profité amplement de cette tribune. De plus, en 1982, j'avais fait partie de l'équipe de Dave Mudry avec Rick Lee. Dave avait innové en publiant la « *Newsletter* » de la société sur deux colonnes [1]. Quand Dave Mudry dû abandonner son poste, je suis devenu le rédacteur en chef avec l'aide de Micheline Gilbert. Donc, Neil n'avait rien à craindre, j'avais fait mes preuves auparavant.

Mon premier numéro fut publié en février 1996, vol. 24, n° 1 (voir figure ci-jointe). Dans mes négociations avec Neil j'avais obtenu une concession: celle de publier la page couverture en couleur. J'étais donc très fier d'illustrer cette première page couleur d'importance cruciale pour attirer les lecteurs avec le satellite RADARSAT-1. Depuis février 2014, les numéros du *CMOS Bulletin SCMO* sont publiés en couleur. Ce qui rend justice aux nombreux diagrammes, figures, et photos publiés par les auteurs dans les pages du bulletin. Au total, j'ai publié 124 numéros (en 2007, un numéro supplémentaire fut publié), d'inégale valeur, j'en suis convaincu. Mais en prenant plus d'expérience, la qualité s'est beaucoup améliorée. Au cours des années et encore récemment, j'ai reçu souvent des commentaires très positifs à cet effet.

Copie de la page couverture couleur du premier numéro publié en 1996

Il n'y a pas de formule secrète pour survivre si longtemps à ce poste. Du travail, du travail, et encore du travail. Un numéro vient d'être imprimé, qu'il faut déjà penser au suivant. Il n'y a pas de répit. Il faut rester à l'affût des nouvelles pouvant intéresser les membres de la SCMO, nouvelles venant de la société ou nouvelles venant des

[1] Corédacteur sortant, *CMOS Bulletin SCMO*, Membre du centre d'Ottawa

communautés météorologique et océanographique du pays. Il faut également persuader les auteurs de mettre sur papier des textes intéressants. Souvent, il faut suggérer des sujets et, parfois, il faut leur tordre un peu le bras. Mais je peux dire que le plus souvent c'est avec un bon esprit de collaboration que les auteurs acceptaient de publier dans nos pages. Il y a eu des auteurs occasionnels, mais il y a eu également des auteurs plus réguliers et constants. Pour ces derniers, il suffisait de trouver un sujet ou un thème et, quelques jours plus tard, je recevais par courriel le fruit de leurs efforts. J'ai toujours eu comme philosophie que le *CMOS Bulletin SCMO* appartenait aux membres de la Société. Je me suis efforcé au cours des années de respecter ce point de vue. Je remercie tous les auteurs qui ont utilisé le bulletin pour communiquer des nouvelles ou leurs travaux en cours. Je les remercie de m'avoir si souvent facilité la tâche, particulièrement durant les révisions indispensables pour rendre leur texte plus compréhensible.

Au cours des années, j'ai travaillé avec 20 présidents de la société. Tous, sans exception, avaient en grande estime le bulletin, le voyant comme un véhicule indispensable de communication entre l'exécutif et les membres. C'est d'ailleurs avec John Reid, président en 1997, que la tradition de publier le "Mot du président", tradition implantée par Richard Asselin durant sa présidence en 1982, mais qui avait depuis été abandonnée. Les efforts de John ont porté fruit, car tous les présidents ont continué cette contribution importante de noircir la colonne gauche de la première page du bulletin, expliquant aux membres les politiques, problèmes, et succès de notre société.

J'ai également profité du soutien indéfectible des directeurs généraux, Neil Campbell, Ian Rutherford, Andrew Bell et Gordon Griffith. J'ai peu connu les deux derniers, mais je dois avouer que ce fut pour moi un honneur de travailler avec Neil et Ian. Ils m'ont prodigué de nombreuses recommandations pour, parfois, compléter un numéro. J'ai travaillé plusieurs années avec Richard Asselin, directeur des publications de la société. Richard a toujours bien accueilli mes demandes d'aide. Nous avions tous les deux le même idéal: faire connaître la Société sous son meilleur jour. Douw Steyn a rempli cette fonction durant les dernières années. Douw avait le même idéal que Richard, et nous étions tous les deux convaincus de l'importance du bulletin pour la société. Je dois remercier Dorothy Neale, la première rédactrice associée. Dorothy, toujours de bonne humeur et affable, utilisait une arme redoutable pour faire la correction des épreuves, son crayon rouge [2]. Elle était, avec raison, implacable, désirant maintenir des hauts standards pour le bulletin. Puis, Lise Harvey l'a remplacée. Il me fut facile de m'adapter aux nouvelles méthodes de Lise, car je la connaissais depuis longtemps. Et Savithri Narayanan, qui s'est jointe à l'équipe de rédaction m'a aidé à rester encore quelques années rédacteur. Savi a su motiver les scientifiques océanographes, ceux-ci ne pouvant dire non à quelqu'un qui venait de leurs rangs. Sans oublier Qing Liao qui s'est occupée du volet administratif du bulletin et Julie Dion qui était notre traductrice préférée. Et Robert Jones, qui s'est toujours préoccupé de conserver les numéros du bulletin dans les archives de la société. Je remercie grandement toutes ces personnes de m'avoir apporté leur aide, qui fut toujours bien précieuse et appréciée.

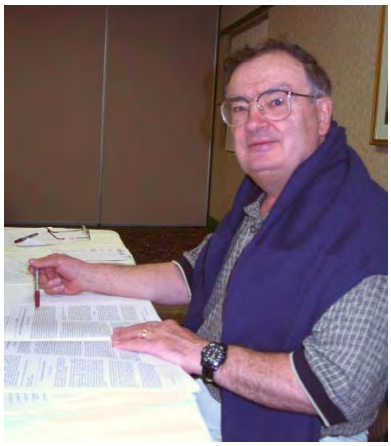
Le futur du *CMOS Bulletin SCMO* n'est pas libre de nuages. Plusieurs scientifiques publient maintenant le fruit de leur recherche sur leur propre blogue, court-circuitant ainsi le processus de publication. Les réseaux sociaux remplaceront-ils la communication indispensable entre les membres de la SCMO? Une tâche que s'est efforcé d'accomplir le bulletin depuis les touts débuts. La version électronique remplacera-t-elle la version papier de façon définitive? Si oui, faudrait-il re-formater cette version sur le site Web de la SCMO pour en faciliter la lecture? Ce sont des questions auxquelles le comité des publications devra discuter avant longtemps. Mais je crois que même si des changements importants s'imposeront bientôt, il y aura toujours une place pour le *CMOS Bulletin SCMO,* sous une forme ou une autre, au sein de la Société. Le futur appartiendra à ceux qui sauront répondre le mieux à ces questions. Et l'aventure continuera!

[1] Bolduc, P.-A., 40+ Anniversary: Survey of the *CMOS Bulletin SCMO* Early Years, *CMOS Bulletin SCMO*, Vol. 42, No. 1, February 2014, pp. 10-15.

[2] Bolduc, P.-A., Dorothy Neale nous quitte, *CMOS Bulletin SCMO*, Vol. 41, No. 6, Décembre 2013, p. 213.

Note: Merci à Bob Jones pour avoir trouvé cette photo de Paul-André datant de 2004 des archives de la SCMO.

Version française précède



Paul-André Bolduc in 2004

Paul-André Bolduc is moving on

Paul-André Bolduc has decided that it is time to step down from the position of Co-Editor of the *CMOS Bulletin SCMO*. During his tenure as Co-Editor, he was instrumental in transitioning the bulletin from basically a short newsletter to a full colour professional magazine. His passion for publishing combined with a strong commitment to science enabled CMOS to keep publishing the bulletin for over two decades with a variety of scientific articles, book reviews, a 'people' section featuring achievements of Canadian scientists, and many other useful information. It did not matter whether he was relaxing at his cottage or vacationing with his family, the bulletin came out on time. On behalf of the Canadian oceanographic and meteorological society I would like express our appreciation and gratitude to Paul-André for his dedication, diligence, perseverance, and over-two-decades of remarkable service as Co-Editor of the *CMOS Bulletin SCMO*. We hope that he will continue to contribute to CMOS in whatever capacity he chooses and wish him the very best.

Savithri Narayanan, Co-Editor

Many Thanks!

by Paul-André Bolduc[2]

The adventure began in November or December 1995. Neil Campbell, then executive director of CMOS, whose offices shared a floor with us at 200 Kent Street, Ottawa, was frantically pacing in the hallway. Since he was talking to himself and could obviously not figure out the answers to his own questions, I invited him in my office. I soon found out what his problem was: the editor of the *CMOS Bulletin SCMO* had just quit. Less than an hour later, I was the new editor in chief of the bulletin. I had convinced Neil I could help the Society by volunteering to be the lead of its bi-monthly journal. It was, as I mentioned above, the start of an extraordinary adventure that lasted twenty-one years.

I had always been drawn to the publishing world. In college, I was the editor in chief of a "newsletter", published under the auspices of the college director. The couple of pages making up this publication allowed students to share articles of interest for the benefit of the whole community. During those years, I also took great advantage of this platform. To boot, in 1982, I was part of Dave Mudry's team with Rick Lee. Dave broke ground by publishing the Society's "*Newsletter"* in a two-column format [1]. When Dave Mudry had to leave the ship, I replaced him as editor with the help of Micheline Gilbert. Neil had nothing to fear, I had the needed qualifications.

I published my first issue in February 1996, Vol. 24, No. 1 (see figure on this page). When I negotiated with Neil, I was able to convince him to let me publish a colour cover page. I was very proud to illustrate this crucial first colour page with the RADARSAT-1 satellite, in order to draw in an increased readership. Since February 2014, all the *CMOS Bulletin SCMO* issues are published in full colour. This certainly does justice to the many diagrams, figures, and photos published by the various authors in the bulletin. In total, I have published 124 issues (in 2007, an additional issue was published) — of varying quality, I can vouch for that. But as my experience grew, so did the quality of the bulletin. Over the years, and even recently, I often received positive feedback on the matter.

Colour cover page copy of the first issue published in 1996

There's no secret formula to last in this capacity. Work, work, and more work. One issue out to the printer means it's time to start on the next one. No time to rest. One must always be aware of news of interest to CMOS members, may these be news from within the Society or from the meteorological or oceanographic communities in Canada. Authors also need to be convinced to put pen to paper to produce interesting articles. Often we have to suggest ideas and at times a little arm-twisting is in order. But I can tell you, most of the time, authors gladly collaborated and published articles in good spirit. We had a few occasional authors, but also some authors that regularly and constantly produced papers. For the latters, all I needed was to supply them with a theme, and a few days later, I would receive by

[2] Past Co-Editor, *CMOS Bulletin SCMO*, Member of the Ottawa Centre

email the fruits of their labour. My line of thinking has always been that the *CMOS Bulletin SCMO* belonged to the Society's members. I have made a point over the years to respect this principle. I thank all authors who used the bulletin to communicate their latest news or current research. I thank them for having made my task easier, particularly during the inevitable revision process that we rely on to polish off their text.

Over the years, I worked with 20 Society presidents. All, without exceptions, held the bulletin in the highest regard, seeing it as an indispensable means of communication between the executive and the members. It is during John Reid's tenure as president in 1997 that the tradition to publish the "President's Remarks" was revived. It was started by President Richard Asselin in 1982, but was later abandoned. John's efforts led the way. All presidents after him followed his steps and put pen to paper to share their thoughts in the left column of the bulletin's first page. Subjects ranged from policies to challenges to the progress of our society.

I also benefited from the infallible support of our executive directors: Neil Campbell, Ian Rutherford, Andrew Bell, and Gordon Griffith. I did not have the chance to get to know Andrew and Gordon, but I must say it was an honour to work with Neil and Ian. They provided the many recommendations needed, at times, to complete an issue. I worked for many years with Richard Asselin, the Society's director of publications. Richard always answered positively my pleas for help. We both had the same ideal: show the Society under the best light possible. Douw Steyn held this position during the last years. Douw shared Richard's vision and we were both convinced of the importance that the bulletin held for CMOS. I thank Dorothy Neale, the first associated editor. Dorothy, always cheerful and pleasant, used a formidable weapon to right our editorial wrongs: her red pen [2]. She was, with reason, uncompromising, wanting to uphold high standards for the bulletin. Lise Harvey later replaced her. It was easy for me to adapt to Lise's new methods, since I knew her from way back. Then Savithri Narayanan joined the editorial team. Her help allowed me to stay on as editor for a few more years. Being one of them, Savi knew how to motivate oceanographers to write for the bulletin. They could not say no to her. Moreover Qing Liao started taking care of the bulletin's administrative aspect and Julie Dion joined in as our favourite translator. Robert Jones, as always, kept track of all the bulletins and made sure they were duly archived. I extend my many thanks to all these people. I have always appreciated their valuable help.

Nevertheless, the *CMOS Bulletin SCMO*'s future is not exempt of cloudy periods. Many scientists now publish their research on their own blog, bypassing the publishing process. Will social media interactions replace the indispensable communication between members of CMOS? A task that the bulletin worked hard to accomplish since its beginning. Will the electronic version replace the paper version for good? If so, should we alter the bulletin's format to make it more readable on the CMOS website? The publications committee will have to discuss these issues sometime soon. But I believe that even if the bulletin undergoes important changes, there will always be a place at CMOS for the *CMOS Bulletin SCMO*, no matter what form it takes. The future will belong to those who will be able to best answer the questions above. And the adventure will go on!

[1] Bolduc, P.-A., 40+ Anniversary: Survey of the *CMOS Bulletin SCMO* Early Years, *CMOS Bulletin SCMO*, Vol. 42, No. 1, February 2014, pp. 10–15.

[2] Bolduc, P.-A., Dorothy Neale is leaving us, *CMOS Bulletin SCMO*, Vol. 41, No. 6, December 2013, p. 208.

Note: Thanks to Bob Jones for finding this 2004 photo of Paul-André from CMOS archive.

Atmosphere-Ocean 54-2 Paper Order

Applied Research / Recherche appliquée

AO-2015-0030
High Resolution Deterministic Prediction System (HRDPS) Simulations of Manitoba Lake Breezes, by Scott Kehler, John Hanesiak, Michelle Curry, David Sills, and Neil Taylor

AO-2015-0034
On Measurements of the Tide at Churchill, Hudson Bay, by Richard D. Ray

AO-2015-0039
Simulation and Regionalization of Daily Global Solar Radiation: A Case Study in Quebec, Canada, by D. I. Jeong, A. St-Hilaire, Y. Gratton, C. Bélanger, and C. Saad

AO-2015-0040
Pre-Melt Energy Budget of an Arctic Snowpack on Landfast First-Year Sea Ice, by R. L. Raddatz, T.N. Papakyriakou, and D. G. Barber

Fundamental Research / Recherche fondamentale

AO-2014-0066
Tide, Wind, and River Forcing of the Surface Currents in the Fraser River Plume, by M. Halverson and R. Pawlowicz

AO-2015-0042
Elevational Dependence of Air Temperature Variability and Trends in British Columbia's Cariboo Mountains, 1950–2010, by Aseem Raj Sharma and Stephen J. Déry

AO-2015-0002
Decadal Trends in Oxygen Concentration in Subsurface

Waters of the Northeast Pacific Ocean, by William R. Crawford and M. Angelica Peña

---

Welcome to our New *CMOS Bulletin SCMO* Co-Editor

Dr. Sarah Knight

I am delighted to be joining CMOS as the new co-editor of the *CMOS Bulletin SCMO.* With this position, I am returning to my research roots, and I very much look forward to immersing myself in the role.

Dr. Sarah Knight

I have recently returned to live in Kingston, Ontario, after 15 years of studying and working in Ireland, where I earned a PhD in Chemical Oceanography from the National University of Ireland, in Galway. The western shores of Ireland provided a perfect backdrop for my studies of copper concentrations in coastal waters of the Northeast Atlantic. However, I must confess to spending long hours gazing westward, imagining I could just about see Canada, and daydreaming of the day I would return to live here.

During my undergraduate degree in Chemistry and Oceanography at the University of British Columbia, and throughout my time spent working on my PhD, I realized that what I liked most about scientific research was sharing what I was learning, and hearing what others were themselves discovering. In the third year of my PhD I carved out a niche for myself doing communications and education work for the marine and environmental research institute (the Ryan Institute) in the university. My voluntary efforts paved the way for what became a full-time public engagement position upon completion of my PhD. I spent eight wonderful years working with the Ryan Institute's 300+ researchers, taking responsibility for the schools outreach programmes, organization of researcher networking events, public dissemination through the media, websites and social media, compiling and editing content for newsletters and research magazines, and more. It was a very satisfying role, and one in which I thrived.

There is no doubt that across the globe there is an increasing understanding of the importance of meteorological and oceanographic research. We are living in changing times, and with so much focus on weather and climate, on our atmosphere and our ocean, the work that CMOS members are doing is vital. I see a huge potential for the *CMOS Bulletin SCMO* to engage members, the media, and the general public with the important news and events that are going on in these areas in Canada.

Paul-André had his work cut out for him to get the quality and quantity of content into each issue of the Bulletin. My goal is to take the opportunity of the handover of editorial responsibility to look at how the Bulletin can become even more readable, relevant, and effective. I will be seeking your opinions, examining other models, and giving the Bulletin a new look, and a fresh format – without compromising the content.

I would like to take the opportunity to thank Paul-André, Douw, and Gordon and the rest of the CMOS council for the very warm welcome. Certainly I felt their enthusiasm for CMOS immediately, and I can assure you that theirs is well matched by my own enthusiasm for the position of Bulletin co-editor! I look forward to getting to know you and the work that you are doing, and to starting down a new road with you on further supporting the dissemination of Canadian meteorological and oceanographic news.

Bienvenue à notre nouvelle corédactrice du *CMOS Bulletin SCMO*

Sarah Knight, Ph. D.

Je suis heureuse de me joindre à la Société canadienne de météorologie et d'océanographie en tant que corédactrice du *CMOS Bulletin SCMO*. Ce poste me permet de retourner à mes racines de chercheure et j'ai hâte de sauter à pieds joints dans mes nouvelles fonctions.

Je viens de m'établir à nouveau à Kingston (Ontario), après 15 années d'études et de travail en Irlande, où j'ai obtenu un doctorat en océanographie chimique de l'Université nationale d'Irlande, à Galway. Le littoral ouest de ce pays présentait l'endroit idéal pour mes recherches sur les concentrations de cuivre dans les eaux côtières de l'Atlantique du Nord-Est. Toutefois, je dois avouer que j'ai passé de longues heures le regard tourné vers l'ouest, à imaginer se dessiner au loin le Canada et à rêver du jour où je retournerais y vivre.

Au cours de mon baccalauréat en chimie et en océanographie à l'Université de la Colombie-Britannique, et durant mes études de doctorat, je me suis rendu compte que ce que j'aimais le plus de la recherche scientifique était de partager ce que j'avais appris et de prendre connaissance des découvertes des autres. La troisième

année de mon doctorat, je me suis taillé une place en communication et enseignement au sein de l'institut de recherches environnementales et marines (l'Institut Ryan) de l'université. Mes activités bénévoles ont ouvert la voie à ce qui est devenu, après l'obtention de mon doctorat, un travail à temps plein de sensibilisation du public. J'ai passé huit années merveilleuses à travailler avec les quelque 300 chercheurs de l'Institut Ryan. J'étais responsable des programmes de sensibilisation destinés aux écoles, j'organisais aussi des événements de réseautage pour les chercheurs, et la diffusion publique d'information vers les médias, les sites Web et les médias sociaux. Je compilais et révisais le contenu de lettres de nouvelles et de revues scientifiques, et plus encore. Ce poste m'a apporté une grande satisfaction et j'y ai acquis une expérience enrichissante.


Sarah Knight, Ph.D.

Il est évident que, partout sur la planète, on se rend compte de l'importance de la recherche en météorologie et en océanographie. Nous vivons à une époque en évolution, qui met à l'avant-plan le climat, l'atmosphère et les océans, et rend essentiel le travail qu'accomplissent les membres de la SCMO. Je vois le vaste potentiel de mobilisation des membres, des médias et du grand public qu'offre le *CMOS Bulletin SCMO*, qui diffuse les nouvelles et les événements importants qui se déroulent dans nos domaines, au Canada.

À son arrivée, Paul-André a hérité d'un travail à sa mesure : augmenter la qualité et la quantité d'informations à paraître dans chaque numéro. Je saisis donc ce changement de garde pour examiner la façon de rendre le *bulletin* encore plus convivial, pertinent et utile. Je solliciterai vos opinions, passerai en revue d'autres modèles de publications et amorcerai la métamorphose (format et image) du *bulletin*, sans en diluer le contenu.

Je tiens à remercier Paul-André, Douw, Gordon et les membres du conseil de la SCMO pour leur chaleureux accueil. J'ai tout de suite remarqué leur enthousiasme indéfectible pour la SCMO et je vous garantis que je ressens le même enthousiasme pour le poste de corédactrice du *bulletin*. Je suis impatiente de vous connaître et de me familiariser avec vos travaux, ainsi que d'entreprendre cette nouvelle aventure avec vous, afin de soutenir et de diffuser les nouvelles touchant la météorologie et l'océanographie au Canada.

Official launch of CMOS webinars page

http://cmos.ca/site/webinars

The investigative navigators will have noticed it already, since last December a page has been added to the CMOS website: it gives access to a variety of online seminars, a.k.a "webinars", a result of the 2014-2015 members' survey. There are already several webinars available in three sections.

The first section offers presentations prepared under the initiative of, or in collaboration with the *Training and Career Development Division* (TCDD) of the Meteorological Service of Canada. These presentations cover both some training objectives for the staff of MSC, and the will to inform a wider public that has both the taste for it and the appropriate scientific background. They are first offered and advertized in real time to CMOS members by email, and in the "**Events**" section of http://cmos.ca (on the right side of the page); then a record of the presentation, cleaned of background noise, is made available a little after on the http://cmos.ca/site/webinars page. Several seminars have already been recorded, with more to follow soon!

The second section offers links to scientific seminars presented at the *Canadian Meteorological Centre* (CMC) of *Environment and Climate Change Canada* (ECCC) in Dorval, part of the series of scientific seminars of ECCC's Meteorological Research Division (MRD). The MRD seminars chosen to appear on http://scmo.ca/site/webinars are based on their appeal and accessibility for a broader audience than that of MRD researchers. Also, their dissemination via the CMOS website has received the assent of presenters. Please note that these records are "as is", which means that presentations sometimes start several minutes after the start of recording, and that background noises are not erased. Also, the question period at the end of the presentation is included, and it may happen that questions to the presenter are difficult to understand.

Finally, the third section offers seminars produced by various organizations allowing the distribution of their presentations, provided the terms of the "Creative Commons license" are respected. See

http://creativecommons.org/licenses/by-nc-nd/3.0/legalcode

- Attribution: give appropriate credit to authors, and provide a link to the license.
- Non-commercial: the seminars are not used for commercial purposes.

● No derivatives: there must be no remix, transformation or additions.

As of now, there are links to some video presentations or conferences from the series "TED talks" or from the"World Economic Forum", of interest from the point of view of meteorology, climate, oceanography, environment, or simply science in general.

I would like here to thanks the following people for their collaboration: Jennifer Milton, Brad Snyder and Paul Bovis from TCDD, Abdessamad Qaddouri, Vivian Lee Normand Gagnon at CMC, and of course our (volunteer) CMOS webmaster, Farida Dehghan.

André Giguère

Lancement officiel de la page de séminaires en ligne de la SCMO

http://scmo.ca/site/webinars

Les plus curieux et curieuses l'auront déjà remarqué, depuis décembre dernier une page s'est ajoutée à l'offre du site Web de la SCMO: il s'agit d'une page donnant accès à une variété de séminaires en lignes, ou "webinaires", un résultat du sondage fait auprès des membres en 2014-2015. Il y a déjà plusieurs webinaires disponibles, en trois sections.

La première section offre des présentations préparées à l'initiative de, ou en collaboration avec la *Division de la Formation et du Perfectionnement Professionnel (DFPP)* du Service météorologique du Canada. Ces présentations visent à la fois des objectifs de formation pour le personnel du SMC, et le souhait d'informer un plus large public qui possède à la fois un intérêt et un bagage scientifique approprié. Elles sont d'abord offertes et publicisés en temps réel auprès des membres de la SCMO par courrier électronique et dans la section "**Évènements**" de http://scmo.ca (à droite sur la page); puis un enregistrement nettoyé de tout bruit parasite est rendu disponible quelques temps après sur "http://scmo.ca/site/webinars". Plusieurs séminaires ont déjà eu lieu, et d'autres suivront bientôt!

La seconde section offre des liens vers des séminaires scientifiques présentés au *Centre météorologique canadien* (CMC) d'*Environnement et changement climatique Canada* (ECCC) à Dorval, dans le cadre des séminaires scientifiques de la *Division de la recherche en météorologie (DRM)* d'ECCC. Les quelques séminaires de la DRM choisis pour apparaître sur http://scmo.ca/site/webinars le sont en fonction de l'intérêt et de l'accessibilité pour un auditoire plus large que celui des chercheurs de la DRM. Aussi, leur diffusion via le site Web de la SCMO a reçu l'assentiment des présentateurs. Il est bon de noter que ces enregistrements sont "tels quels", c'est-à-dire que les présentations peuvent parfois débuter plusieurs minutes après le début de l'enregistrement, et que les bruits parasites n'ont pas été éliminés. Aussi, la période de questions à la fin de la présentation est incluse, et il peut arriver que l'on ait de la difficulté à entendre les questions posées au présentateur.

Finalement, la troisième section offre des séminaires produits par diverses organisations permettant la diffusion de leurs présentations à la condition de respecter les termes de la licence "Creative Commons". Voir:

http://creativecommons.org/licenses/by-nc-nd/3.0/legalcode

● Attribution: accorder crédit aux auteurs, et fournir un lien vers la licence.
● Non-commercial: les séminaires ne sont pas utilisés à des fins commerciales.
● Pas de dérivés: il ne doit y avoir aucun montage, transformation, ni ajouts.

À ce moment-ci, on y retrouve quelques présentations ou conférences vidéo de la série des "*TED talks*" ou du "*World Economic Forum*", représentant un intérêt du point de vue de la météorologie, du climat, de l'océanographie, de l'environnement, ou tout simplement de la science en général.

J'aimerais en profiter ici pour remercier pour leur collaboration les personnes suivantes:

Jennifer Milton, Brad Snyder, et Paul Bovis de la DFPP, Abdessamad Qaddouri, Vivian Lee, et Normand Gagnon au CMC, et bien sûr notre webmestre (bénévole) pour la SCMO, Farida Dehghan.

André Giguère

Ontario Proposal that P. Eng. be the only acceptable Qualification for Air Quality Assessments

by Franco DiGiovanni, PhD, TSRP(Ont.),
Airzone One Ltd, Mississauga, Ontario

In Ontario, regulation of environmental (air and noise) emissions is enacted via the Environmental Protection Act. For air emissions permits are issued in accordance with Ontario Regulation 419, which requires an Emissions Summary and Dispersion Modelling (ESDM) report that demonstrates a facility's air emissions are compliant with Ontario's air standards and other limits. The ESDM report (and study) is essentially a scoped air quality impact assessment. Presently ESDMs must be submitted to the Ministry of the Environment (MOE) for review and approval as part of the permit application process.

The Ministry of the Environment (MOE) is proposing to "modernize" the permit application process by allowing large sectors of applicants to forego the submission and MOE review stage and only ensure that ESDMs are prepared by "Qualified Practitioners" (QPs). In particular the MOE is proposing that Professional Engineers (P.Engs) be the sole QP for this purpose in Ontario.

This proposal may be of concern to CMOS members in the private sector in Ontario and currently perform ESDM services for their clients. If the MOE proposal is implemented it will stop you from providing those services without P.Eng. review and sign-off of your assessment and reports.

If you are concerned about this please contact the CMOS Executive Director Gordon Griffith at

exec-dir@cmos.ca

CMOS plans to provide input to the planned public consultation on behalf of the membership.

Proposition de l'Ontario afin que l'évaluation de la qualité de l'air soit un acte réservé aux ingénieurs

par Franco DiGiovanni, Ph. D., TSRP (Ontario), Airzone One Ltd, Mississauga (Ontario)

En Ontario, la réglementation sur les émissions environnementales (air et bruit) est mise en œuvre selon la *Loi sur la protection de l'environnement*. Pour obtenir un permis d'émission dans l'atmosphère en accord avec le Règlement 419 de l'Ontario, il faut fournir un sommaire des émissions et un rapport de modélisation de la dispersion atmosphérique (ESDM) qui démontrent que les rejets atmosphériques d'une installation se conforment aux normes de qualité de l'air de l'Ontario et à d'autres critères. Le sommaire et le rapport sont essentiellement une évaluation des impacts sur la qualité de l'air. Actuellement, l'ESDM doit être soumis au ministère de l'Environnement pour étude et approbation dans le cadre du processus d'obtention du permis.

Le ministère de l'Environnement propose de « moderniser » le processus de demande de permis en permettant à une grande partie des demandeurs de laisser tomber les étapes de soumission et d'examen du ministère et de simplement veiller à ce qu'un praticien qualifié (*Qualified Practitioner*) prépare l'ESDM. Notamment, le ministère de l'Environnement propose que les ingénieurs soient les seuls praticiens habilités à cette fin en Ontario.

Cette proposition pourrait préoccuper les membres de la SCMO du secteur privé ontarien qui mènent actuellement des ESDM pour leurs clients. Si le ministère de l'Environnement implante sa proposition, il vous sera interdit de fournir ce service sans qu'un ingénieur n'examine ni ne signe votre évaluation et vos rapports.

Si cette situation vous préoccupe, veuillez communiquer avec le directeur général de la SCMO, Gordon Griffith à l'adresse :

exec-dir@cmos.ca

Durant la consultation publique, la SCMO compte soumettre des recommandations au nom de ses membres.

World Oceans Day is June 8th

Healthy oceans, healthy planet

World Oceans Day is the United Nations recognized day of ocean celebration and action. People all over our blue planet organize celebrations – which can be a huge event in your community, a special announcement, or anything in between – to support action to protect the ocean. This year, the theme is healthy oceans, healthy planet, and we're making a special effort to stop plastic pollution.

Journée mondiale des océans est le 8 juin

Santé des océans, planète saine

Journée mondiale des océans est la journée reconnue par l'Organisation des Nations Unies de la célébration de l'océan et de l'action. Les gens partout dans notre planète bleue organisent fêtes - qui peut être un grand événement dans votre communauté, une annonce spéciale, ou quelque chose entre - pour soutenir l'action pour protéger l'océan. Cette année, le thème est la santé des océans, planète saine, et nous faisons un effort particulier pour arrêter la pollution plastique.

IN MEMORIAM

George W. Robertson

1914- 2016

Retired Scientist/Agrometeorologist

George Wilber Robertson

Born December 20, 1914, in Strome, Alberta, George Wilber Robertson has obtained a B.Sc. in Mathematics and Physics from University of Alberta in 1939 and a M.A. in Physics and Meteorology from University of Toronto in 1948.

As a teenager, George learned about the effect of climate and daily weather variations including crop production and agricultural economics on his home farm. This interest was confirmed later while studying at the university where two of his professors were interested in problems concerning weather variability and climate. The need for better and timely meteorological services was accelerated by the newly formed Canadian company, Trans-Canada Airlines (TCA). George became aware of the need for meteorological and climatic services by the agricultural industry in Canada while he served on Soil-Climate Sub-Committee of Alberta Soil Survey Group. All these factors made a major impact on George's career.

Among his many postings George worked on the following (from the earliest to the latest):

- On contracts with World Meteorological Organization (WMO) and Food and Agriculture Organization (FAO) in several developing countries;
- Chief of Agrometeorological Section, Research Branch, Canadian Department of Agriculture;
- Research meteorologist, Central Analyses Office, Meteorological Service of Canada (MSC), in Ottawa;
- Aviation and Public Weather Forecaster, MSC, in Edmonton;
- Officer-in-Charge of Meteorological Section, No.2 Air Observer School, British Commonwealth Air Training Plan, in Edmonton;
- Meteorological Assistant in Edmonton.

During his career George Robertson received many honours and awards:

- Honoree, Baier and Robertson Symposium of Modelling and Measurement of Soil Water Content. This symposium was organized by the Canadian Society of Agronomy (CSA) and Canadian Soil Science Society (CSSS) in 1995;
- John Patterson Medal from Meteorological Service of Canada, Environment Canada in 1990;
- Accredited as a Consulting Meteorologist by CMOS in 1987;
- Award in Applied Meteorology by CMOS in 1966;
- Darton Prize by the Royal Meteorological Society (RMS) in 1955;
- President's Prize by the Canadian Branch of the RMS in 1952.

Since retiring in the 1970s, his love of learning hasn't waned. George remains a member of several scientific societies including the Canadian Meteorological and Oceanographic Society (CMOS), the American Meteorological Society (AMS), a Fellow of the Royal Meteorological Society (RMetS), and a member of the American Association for the Advancement of Science (AAAS). George also continued to follow the online activities of the International Society for Agricultural Meteorology Information.

As a lifelong learner, George continued to refine and develop new computer programs on his desktop computer using Qbasic as programming language. His most recent effort was a game called Digital Checkers. In 2011, at the age of 97 and in cooperation with his nephew, this program was turned into a gaming app for Apple mobile services called *CheX Challenger*.

Friends and Colleagues have honoured George upon his 100th anniversary

I am pleased to have the opportunity to congratulate George W. Robertson at the occasion of his 100th birthday. He headed Agriculture Canada's agricultural meteorology section in Ottawa for 18 years from 1951 to 1969. After, he worked two years as a World Meteorological Organization (WMO) consultant in the Philippines and when he returned to Canada in 1971, he headed the agricultural meteorology section in Swift Current for two years. He is the pioneer in agricultural meteorology in Canada. He is recognized worldwide for having developed the Versatile Soil Moisture Budget and the Biometeorology Time Scale. I worked with him as a summer student from 1961 to 1963. I was assigned several interesting projects evaluating instruments that he had developed such as the black porous disc atmometer and a new light spectrometer. He was very instrumental in my decision to study meteorology at the University of Toronto. After my graduation, he offered me a job as a micrometeorologist in Ottawa. He was my first boss and mentor. Over the years, I have always enjoyed chatting with him and asking his opinion. I want to thank him for setting me up on the path to a wonderful career in agricultural meteorology.

He was the first Agriculture Canada scientist to participate in the Commission of Agricultural Meteorology (CAgM). This Commission, to which most of the world's countries belong, promotes the application of meteorology to enhance world food production. Due to his leadership, Agriculture Canada now has a long history of involvement in CAgM. Wolfgang Baier replaced him in 1979 as Agriculture Canada's representative on the Commission and I replaced Wolfgang in 1990. The three of us attended CAgM meetings in Florence in 1986 and in Cuba in 1990.

After his retirement, he undertook a variety of consulting jobs with WMO and the Food and Agriculture Organization (FAO). His more than 30 years of experience as a researcher, consultant, and coordinator gave him a perspective that few others could match. In 1990, he published a book on A History of Agrometeorology in Canada. He was awarded the Patterson medal, the highest honor for a meteorologist in Canada, for his contribution to agricultural meteorology. Throughout his career, he has worked closely with the Canadian Meteorological and Oceanographic Society (CMOS) and the Canadian Society of Agrometeorology (CSAM) and he has been recognized by both societies for his contributions.

Raymond Desjardins,
Senior Research Scientist
Food and Agriculture Canada

Note: First published in: *CMOS Bulletin SCMO*, Vol.43, No.1, pp.27-28.

From left to right: Raymond Desjardins, Richard Asselin, George Robertson, Jim Bruce, and Con Campbell. Photo courtesy of George's son, Glen Robertson.

I was pleased to represent CMOS at a gathering of family and friends of George Robertson, last December 20th. The photograph shows the five seasoned scientists who were present, from left to right: Raymond Desjardins, Richard Asselin, George Robertson, Jim Bruce, and Con Campbell.

Raymond Desjardins studied for his Masters in Toronto at the same time as I was doing mine in Montreal. We met for the first time in 1989 when I became director of the Land Resources Research Centre of Agriculture Canada, which includes the agrometeorology group. In 1994 he was on a list of people that I was instructed to "release" as part of the Government's budget cut. I am proud to admit that I ignored this unwise instruction and that Ray is still employed there as a senior scientist. Ray is the author of hundreds of publications related mainly to the measurement of fluxes of greenhouse gases from the microscale to the very large scale. His leadership exerts a wide international influence.

George Robertson was involved in the formation of the Canadian Branch of the Royal Meteorological Society back in the 1940s and he has been a member of CMOS since the beginning. His contributions are summarized in the brief bibliography shown on the previous page.

Jim Bruce is of course well known to CMOS members as founder of the Canada Centre for Inland Waters, Assistant Deputy Minister for Environment Canada, Member of the International Joint Commission for the Great Lakes, Deputy Secretary General for the World Meteorological Organization, leader in the formation of the International Panel on Climate Change, and continuing scientific involvement in many climate and hydrology organizations and studies. He received the Order of Canada in 1997.

Con Campbell is an emeritus soil scientist internationally known for his studies of soil organic matter; he contributed immensely to the productivity and sustainability of dryland

farming by showing how soil organic matter can be conserved and fertility maintained or restored. He received the Order of Canada in 1998. As a Scientist Emeritus, he visits Desjardins' laboratory on a daily basis and he helps mentor the numerous post-doctoral fellows. (Con's work is a complement to Desjardins' work since organic matter lost from soils implies emission of carbon dioxide and other greenhouse gases.)

As for my humble presence among these four stars, I did contribute to the early development of numerical weather prediction in Canada but I view myself more as a facilitator of research and applications.

Richard Asselin
Former Director of CMOS Publications

Note: First published in: *CMOS Bulletin SCMO*, Vol.43, No.1, p.28

Richard (Rick) Raddatz

Research Scientist

It is with great sadness we announce the passing of Richard (Rick) Raddatz on Friday, April 8, 2016 at St-Boniface hospital.

Rick grew up in Regina, and loved sports especially hockey, baseball, and football, often cheering loudly for his Saskatchewan Roughriders. He loved the outdoors and took pride in having the "greenest lawn on the Bay". When the granddaughters came along, he assumed after school daycare, dinner, and chauffeuring duties. This allowed him the opportunity to get in lots of "Lauren and Caitlin time". Rick earned his B.Sc. Honours, Physics, M.Sc. Meteorology, and B. Ed., Physics. He worked for Environment Canada for 35 years. Upon retirement, Rick was a sessional instructor at the University of Winnipeg, and Adjunct Professor and Research Associate at the University of Manitoba. Rick's colleagues considered him an exceptional research scientist, and he left in excess of 50 published scientific papers.

Rick made substantial contributions to Canadian agrometeorology, especially related to the Prairies. These contributions included teaching, research, and outreach applications. For example, an undergraduate course in agrometeorology was introduced at the University of Manitoba in 1975 covering the fundamentals of agrometeorology with the concluding lectures given by personnel from the Winnipeg office of Environment Canada. These final lectures outlined the role of Environment Canada in agrometeorology and services that Environment Canada could provide. After the retirement of Hugh Fraser, these lectures were given by Rick until his own retirement in 2005. After Rick's retirement from Environment Canada he occasionally taught microclimatology with the Department of Environment and Geography at the University of Manitoba, and in 2008 accepted a position of Research Associate with the Centre for Earth Observations Science (CEOS), studying polar meteorology; a position he held until his passing on April 8, 2016.

Richard Raddatz

There were two phases in Rick's research career. Prior to joining CEOS, Rick was an active participant in the characterization of the climate of Manitoba as it relates to agriculture. This involved analysis of daily weather data from Environment Canada weather stations in the agricultural regions of Manitoba. Rick was instrumental in acquiring the data and served on the advisory committees of the graduate students who worked on these projects. Rick was an adjunct professor in the Department of Soil Science at the University of Manitoba and served as an advisor to graduate students working on a number of projects in agrometeorology. Examples of these are heat and water requirements for potato production in Manitoba, modeling phenological development of canola, and an agroclimatic risk assessment for Western Canada.

In 1988, Rick introduced agrometeorological bulletins for the Prairies. Starting at the beginning of the growing season of each year, these used seeding date and daily weather data from more than 200 weather stations to estimate the stage of phenological development of wheat, barley, and canola throughout the Prairies. In addition, potential evapotranspiration and crop water demand were estimated. Using these data, spring soil moisture, daily maximum and minimum temperatures and precipitation, an estimate of accumulated crop water deficit was calculated. These bulletins were published weekly providing up-to-date information on the growth of these crops on the Prairies.

Subsequently, agrometeorological outlooks were developed. These combined the data in bulletins giving the status to date, with normals of temperature and precipitation to the end of the growing season to estimate such parameters as harvest date and an accumulated water deficit at harvest.

These agroclimatic bulletins ultimately proved to be very useful for prediction of crop yields on the Prairies. When five years of data had accumulated, the output from the bulletins was combined with data on crop yields from each crop district in each year provided by Statistics Canada. Regression analysis with crop yield as a function of the ratio of water used to growing season potential evapotranspiration and number of days from seeding to maturity was performed. Standard errors of estimate for yield prediction of wheat, barley, and canola were 511, 498, and 377 kg ha^{-1}, respectively. This permitted an estimate of total production of these crops on the Prairies as early as harvest date. Likewise total production could be estimated much earlier in the growing season by applying the relationships established to output from agrometeorological outlooks.

Both the agrometeorological bulletins and outlooks for wheat, barley, and canola were used in an operational mode by a number of government and private businesses to assess the near real-time crop conditions and ultimately production potential. With the significant expansion of the potato industry through the late 1990s in Manitoba, an agrometeorological bulletin and outlook for potatoes was developed and put into operation by Rick. This bulletin and outlook were then used to develop a second-generation irrigation scheduling model which took into account soil, plant, and atmospheric interactions.

Every year farmers burn straw that is left over after harvest. Unfortunately, smoke from this burning causes decreased visibility for motorists on nearby roads. There has been more than one fatal car collision caused by this decreased visibility. Whether the smoke produced moves mostly harmlessly vertically or horizontally depends upon weather conditions, in particular the atmospheric stability, also known as the ventilation coefficient. In general, if atmospheric pressure is high, or at night, smoke moves mostly horizontally, seriously decreasing visibility. Thus, it is possible to forecast conditions to provide farmers with information as to times when they should or should not burn straw. Rick worked with staff at Manitoba Agriculture to fine tune this smoke forecasting. As a result, each autumn, Manitoba Agriculture is able to provide daily recommendations to farmers as to whether straw burning is allowed.

About half of Rick's 50 journal publications spanning a period between 1979 to 2016 were direct contributions to Canadian agrometeorology, with the remainder contributed to our understanding of the polar boundary layer. Perhaps his most notable contributions in the first phase of his research career were the development of a Prairie agrometeorological model and the calculation of the importance of water recycling on the Prairies through evapotranspiration and convective precipitation. This water recycling with vegetation controls is a fundamental concept that policy makers have not yet implemented. As our changing climate makes water management increasingly important, Rick's contribution to our understanding of the role of the local and regional atmosphere will be a foundation for adaptation on the Prairies. As a Research Associate with CEOS, he was an extremely active researcher, having published close to 20 papers in just over eight years. Of his recent works, Rick and his collaborators were best known for a compendium of papers on the characteristics of the atmospheric boundary layer over polynyas in the winter and spring (Static Stability of the Troposphere Over the Southeastern Beaufort Sea-Amundsen Gulf Region of the Western Maritime Arctic, by R.I. Raddatz, L.M. Candlish, M.G. Asplin, and D.G. Barber, *A-O*, Volume 54, No.1, February 2016, pp. 22-31). Rick has also received the 1995 CMOS Andrew Thomson Prize in Applied Meteorology.

On reflection, perhaps Rick's most significant academic accomplishment was having contributed to the training of the next generation of scientists over both phases of his 37 year research career. Rick was extremely generous with his time and mentored a large cohort of graduate students, and will be remembered for his passion, professionalism, and kindness.

With contributions from Carl Shaykewich and Brian Amiro, Department of Soil Science, and Tim Papakyriakou, CEOS, University of Manitoba (with additional contributions from Guy Ash and Paul Bullock).

BOOK REVIEW / REVUE de LITTÉRATURE

The Weather Experiment

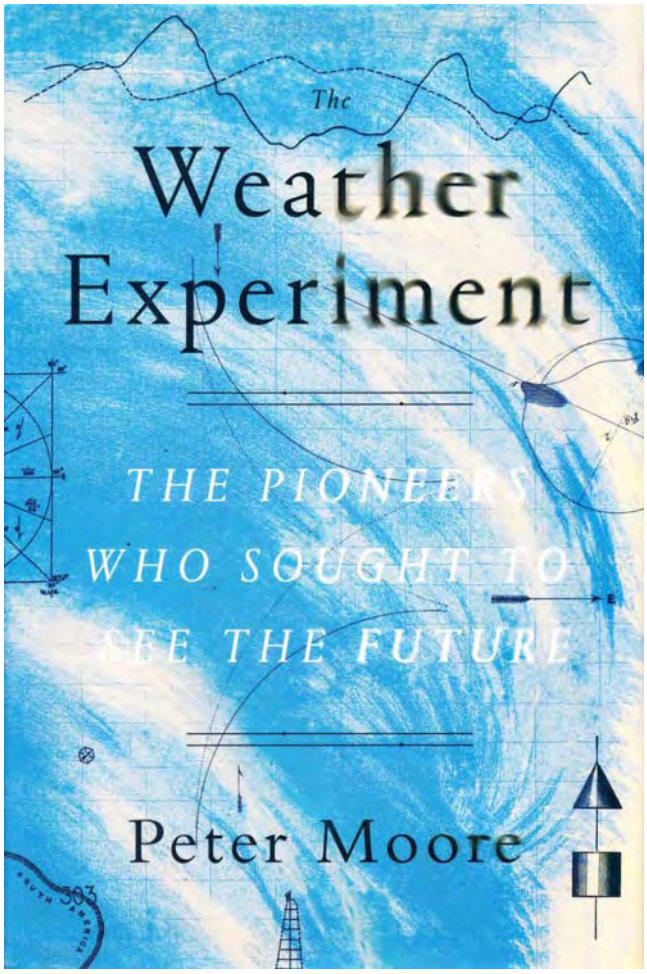
by Peter Moore[1]

Farrar, Straus and Giroux
18 West 18th Street, New York 10011
ISBN 978-0-86547-809-1 (hardcover)
ISBN 978-0-374-71127-6 (e-book)
First American Edition (originally published in 2015 in Great Britain by Chatto and Windus),
395 pages, US$ 30.00, C$ 34.50

Book reviewed by Bob Jones[2]

This book was suggested by Lou Berthelot, a colleague who, like me, has been retired for over 20 years. Lou had a career as a Meteorological Technician and was on the first Technician Forecasting course in 1989. He recommended this book to *"anyone interested in the history of data acquisition and observing as well as storm warnings and forecasting*. He further said: *The author does a great job of chronicling early attempts at understanding the many vagaries of meteorology and suggested the book* ***should be required reading*** *for anyone entering the field of meteorology in any capacity"*. This recommendation could not be ignored, so the book was found and a review was arranged with the bulletin editor. This book was not sent to the CMOS office like most of the books reviewed in this regular section. In another departure from process, we depict two covers, the U.K. version and the American one.

Written in the U.K, by a British citizen[1], the book focuses on the British history of the development of meteorology. Scientists from other countries are mentioned, but not featured. Readers are therefore transported into the mid 19th century to discover that meteorology was born to help sailors of the global maritime Empire. A second purpose of course was to understand and predict the weather affecting the British Isles, especially the seasonal "gales" which often approached hurricane strength with devastating consequences. As mentioned by my colleague, the first thing described was the acquisition of data and then many attempts to understand it. The sub-title is *The Pioneers Who Sought to See the Future* and many well known names appear as the book is read. *Weather Experiment* is really a text book loosely organized into five chapters, Dawn, Morning, Midday, Afternoon, and Dusk, which do not help the reader much with the time sequence of discoveries. Generally events move forward with time, but there are many reversals as topics shift.

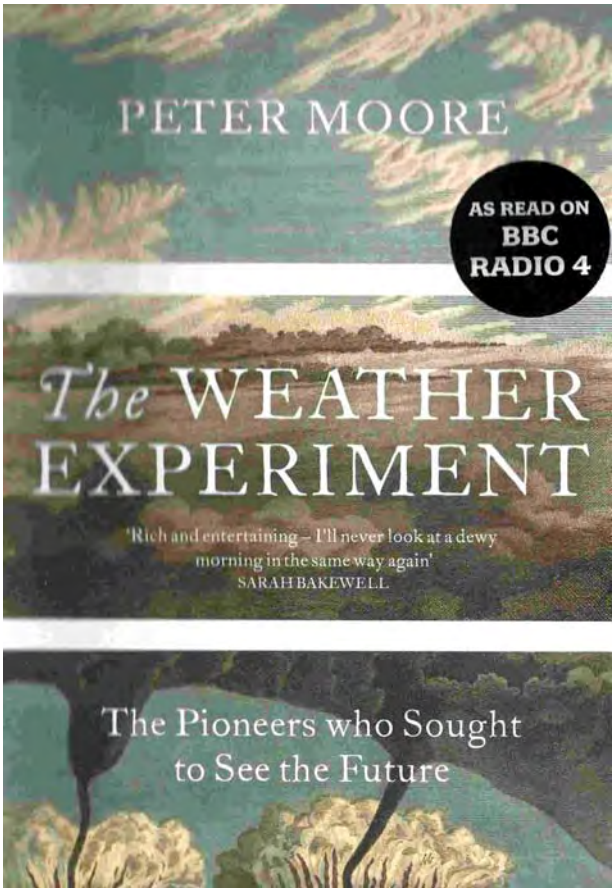


Cover for the American Edition

Readers will discover popular names who figured in the beginnings of meteorology. Sir Francis Beaufort, inventor of the well known marine wind scale, came first, followed by Charles Darwin who was taken on his famous voyage on the *Beagle* by Captain (later Admiral) Robert FitzRoy. While FitzRoy discovered and classified many weather elements, Darwin was collecting his species which led later to his famous publication about their origin. During this time, FitzRoy transited Cape Horn and the Strait of Magellan, encountering wild winds and storms there, which built on his weather knowledge and fuelled his passion for more. Back at home, FitzRoy began to write papers on meteorology for the Royal Society and soon became known as the country's leading expert on weather. He later was the founder of the British Meteorological Service. Parallel discoveries of the telegraph by Samuel Morse enabled

[1] Peter Moore is a writer, freelance journalist, and lecturer. He teaches creative non-fiction at City University and lives in London. His first book *Damn His Blood,* an acclaimed history of a rural murder in 1806, was published in 2012.

[2] CMOS Archivist, Ottawa Centre



Cover for the United Kingdom Edition

distant observations to detect coming weather and then to help draw the first weather map called a synoptic chart. Other lesser known but still significant names were part of the meteorological experiment. James Glaisher, who was instrumental in founding the Greenwich observatory, also probed the upper atmosphere riding in balloons. An exciting passage describes his ascent to above 30,000 feet. Using onboard instruments, Glaisher and his colleague knew they were in diminishing oxygen and that much of the "atmosphere" lay beneath them, but they did not know of the deadly effects of asphyxia. They barely managed to open the valve in time to descend before passing out.

In 1859, a terrifying shipwreck of steamer *Royal Charter* provided impetus to develop storm predictions for the British Isles. Glaisher was slowly adding to his data and knowledge when this tragedy cost 450 lives as the sudden arrival of a fall storm drove the *Royal Charter* onto rocks only hours from port at Liverpool. Political pressure and funding followed to enable better understanding and improved ways to predict these gales.

The above examples are some of the exciting descriptions of discoveries contained in the book which in themselves make it worth a read. Given the huge advances in meteorology today, I am doubtful this book would be *required reading* for students. It does identify origins of many parts of science though, and can easily be read by all audiences, as well as those planning a science career. As in any good textbook, it is well documented in the last 50 pages. First, there is a section listing all the main people involved in weather discoveries. Next comes a page of abbreviations and 20 pages of reference notes. A comprehensive bibliography and index is found at the end.

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

Latest Books received / Derniers livres reçus

2015-3) *An Observer's Guide to Clouds and Weather, A Northern Primer on Prediction*, by Tony Carlson, Paul Knight, and Celia Wyckoff, 2015, American Meteorological Society and distributed by the University of Chicago Press, ISBN 978-1-935-70458-4, Paperback, 210 pages, US$30.

2015-4) Thermodynamics, Kinetics, and Microphysics of Clouds, by Vitaly I. Khvorostyanov and Judith A. Curry, Cambridge University Press, ISBN 978-1-107-01603-3, Hardback, 782 pages, $108.95.

If you are interested to review one of the above book, please contact the Editor.

Si vous êtes intéressés à faire la critique d'un de ces livres, prière de contacter le rédacteur.

BRIEF NEWS / NOUVELLES BRÈVES

Marine Environmental Observation Prediction and Response (MEOPAR) Network Appoints New Executive Director

April 13, 2016 (Halifax, N.S.) - The Marine Environmental Observation Prediction and Response (MEOPAR) Network's Board of Directors is pleased to announce the appointment of Mr. Stefan Leslie to the role of MEOPAR Executive Director.

Mr. Stefan Leslie, MEOPAR's newly appointed Executive Director

Mr. Leslie joins MEOPAR following a diverse career in the private sector and government, most recently as Regional Director of Fisheries Management (Maritimes Region), Fisheries and Oceans Canada. He brings a strong depth and breadth of experience leading marine research and management programs to the MEOPAR role.

"*We are delighted to welcome Stefan to the Network*," said MEOPAR Board Chair, Robert Walker. "*His expertise and experience, especially in executive management and marine stakeholder relations, is an excellent addition to our team. We look forward to his leadership as we continue to grow and develop as a Network*."

Mr. Leslie joins the Network as it seeks renewal from the federal Networks of Centres of Excellence Program. If successful, it will see the Network funded for an additional five years (2017 – 2022).

"*MEOPAR has a great team behind it, and I'm looking forward to contributing at this exciting point in its evolution*", said Mr. Leslie. "*MEOPAR is creating real benefits for Canada, supporting leading research and developing the economy. It has a very bright future*."

MEOPAR began its search for a new Executive Director following the unexpected passing of its former Executive Director, Neil Gall, in early January, 2016.

"*Neil made extraordinary contributions to our Network and we miss his energetic leadership greatly*", said MEOPAR Scientific Director Dr. Douglas Wallace. "*I'm thankful to have someone of Stefan's caliber on board to build on the momentum that Neil helped so much to create, and I look forward to working with him closely as we continue to grow and evolve as a Network*".

Mr. Leslie begins his new MEOPAR role on 18 April. The Network would like to thank MEOPAR's Associate Scientific Director, Dr. Ron Pelot, who served as the Acting Executive Director during MEOPAR's search process.

ABOUT MEOPAR The Marine Environmental Observation Prediction and Response (MEOPAR) Network is strengthening Canada's ability to anticipate and respond to marine risk. Established in 2012 through a five-year, $25 million grant from the federal Networks of Centres of Excellence Program, MEOPAR is a national network of academic researchers and students, government scientists, and partners in the private, NGO, and community sectors working together to reduce vulnerability and strengthen opportunities related to the marine environment. MEOPAR is hosted at Dalhousie University in Halifax, Nova Scotia. To learn more, please visit www.meopar.ca.

Note from the Editor: See MEOPAR in *CMOS Bulletin SCMO*; Marine Environmental Observation Prediction and Response (MEOPAR), by Douglas W.R. Wallace, 2015, Vol.43, No.3, pp. 88-90.

CMOS Accredited Consultants Experts-Conseils accrédités de la SCMO

Douw G. Steyn

Air Pollution Meteorology
Boundary Layer & Meso-Scale Meteorology

4064 West 19th Avenue
Vancouver, British Columbia
V6S 1E3 Canada
Tel: 604-827-5517; Home: 604-222-1266
Email: dsteyn@eos.ubc.ca

New Marine Biodiversity Treaty Negotiations

States gathered at the United Nations (UN) in New York on March 28 and began work towards an agreement to protect life in the high seas, closing some of the largest legal loopholes in the ocean.

The UN Convention on the Law of the Sea (UNCLOS) was negotiated more than 30 years ago but did not address marine biodiversity in areas beyond national jurisdiction, leaving nearly two-thirds of the global ocean largely unprotected. The ocean is the largest biosphere on earth and a central component of the climate system; comprising approximately 75% of the ocean, the high seas provides ecosystem services that are critical to coastal areas and the planet as a whole.

This two-week meeting of the agreement's Preparatory Committee (PrepCom) is the first of four that will take place before the end of 2017. This is when states will determine elements that will form the basis for a formal and final treaty negotiation to commence in 2018. It is during this crucial phase that key issues such as the scope of the treaty; how marine protected areas should be created and managed; the inclusion of environmental impact assessments; access to and benefit sharing of marine genetic resources and technology transfer, will be addressed.

This negotiation is complicated because the high seas are the common concern of humankind and belong to no one; activities already take place there and the interests of a number of sectors such as shipping and fishing have to be addressed. The agreement's advocates are optimistic that a robust outcome can be achieved, however, pointing to the recent success at the Climate Negotiations in Paris.

Jessica Battle, Marine Manager at WWF International said: "*In Paris we managed to take action to protect the global climate system; now we need to transfer that energy to the global ocean. Both are essential for the functioning of the planet and the ocean is on the sharp end of climate impacts and climate solutions*."

The High Seas Alliance (HSA) has been campaigning for what will be the first ocean treaty focused on marine biodiversity, since it was founded in 2011. High Seas Alliance Coordinator Peggy Kalas said: "*Providing half the oxygen we breathe and as one of the largest carbon sinks on earth, the ocean is what makes our planet habitable. Ensuring its health and resilience is not a choice, but a necessity and this landmark marine biodiversity agreement being negotiated is our chance to create real change on how our shared ocean resources are protected*."

"*We now have the historical opportunity to change the way two thirds of our ocean are managed and develop a comprehensive global regime that will ensure the conservation of marine life for future generations*" said Veronica Frank, senior political advisor at Greenpeace International. "*People around the world will be watching this process closely and expect governments at the UN to take the right decisions for our ocean and for the life of millions of people who depend upon it.*"

Une facture de 7000 milliards US

Les désastres naturels ont fait plus de 8 millions de morts dans le monde et ont coûté 7000 milliards US depuis le début du XXe siècle, selon une étude publiée en mai dernier. Les inondations (38,5 % des dommages) et les tempêtes (20 %) représentent à elles deux près de 60 % de ce coût, selon l'Union européenne des géosciences à Vienne. Les séismes occasionnent 26 % des pertes économiques liées aux catastrophes naturelles, les éruptions volcaniques, 1 %. S'y ajoutent les incendies de forêt, les sécheresses, les vagues de chaleur… L'organisme a recensé 35 000 désastres naturels entre 1900 et 2015, soit la plus vaste base de données sur ce sujet établie à ce jour.

— Agence France-Presse

A US$7 trillion bill

After a study presented at the European Geosciences Union meeting by the Karlsruhe Institute of Technology, natural disasters have caused more than $7 trillion worth of economic damage and over 8 million people have been killed since 1900. The analysis have looked at more than 35,000 natural disasters between 1900 and 2015. Flooding (38.5% of damage), storms (20%) represent close to 60% of the total cost. Earthquakes represent 26% of economic losses and volcanic eruptions a mere 1%. More disasters were included in the study including forest fires, drought, and heat waves.

51st CMOS Congress | 51e Congrès de la SCMO

Future Earth

Weather, Oceans, Climate

La Terre de l'avenir

Météo, océans, climat

Canadian Meteorological and Oceanographic Society
La Société Canadienne de Météorologie et d'Océanographie

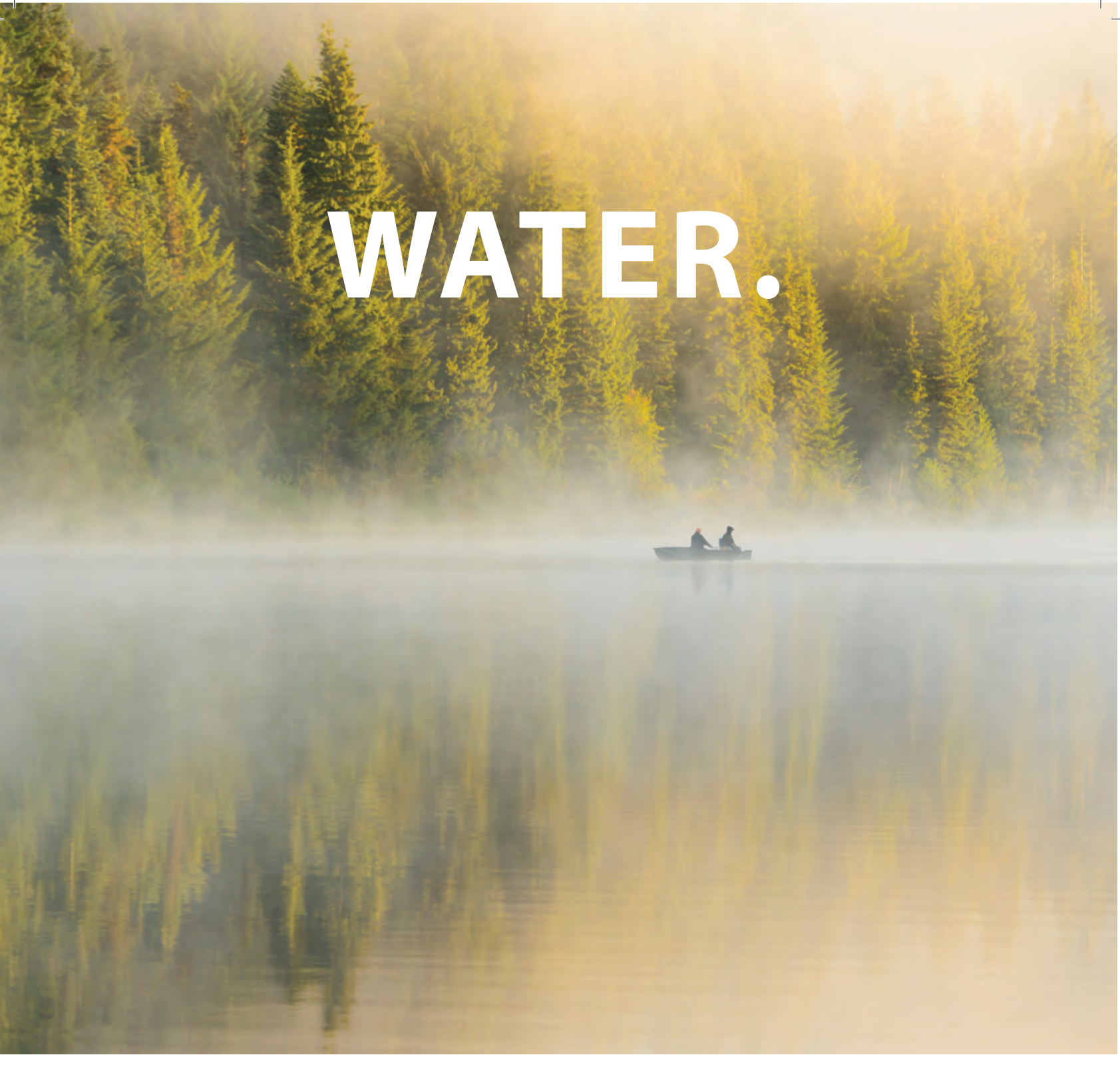
CANADA 150

June 4 - 8th | 4 au 8 juin

2017 TORONTO

Hilton Toronto Downtown | Hilton Toronto, centre-ville

Art & Design: Alicja Parlak, Toronto, ON



It's in our nature.

Watershed management advisors make crucial decisions based on snow and water data. When spring arrives, deciding when to open or close sluice gates could mean the difference between a flood and responsible resource management during a drought. Campbell Scientific has been providing real-time, automatic snow and water monitoring systems in Canada for over 35 years and we understand the challenges of measuring these resources. When you need reliable, accurate data, you can rely on our systems and the expertise of our Measurement Consultants. We'll help you make the best possible measurements, so you can make the best possible decisions.

CAMPBELL® SCIENTIFIC
WHEN MEASUREMENTS MATTER

campbellsci.ca | 780.454.2505