

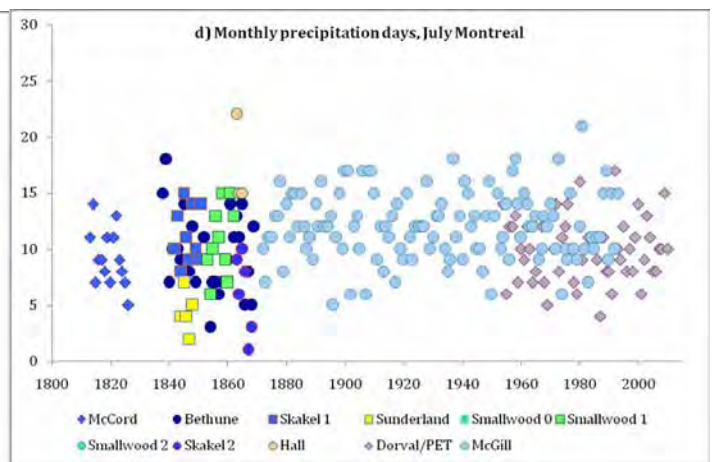
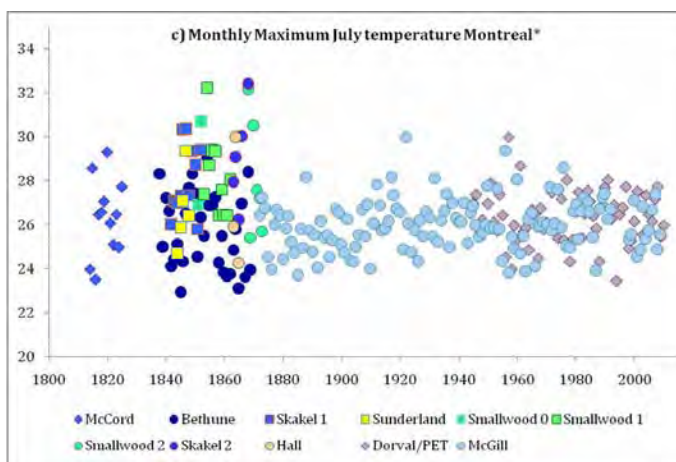
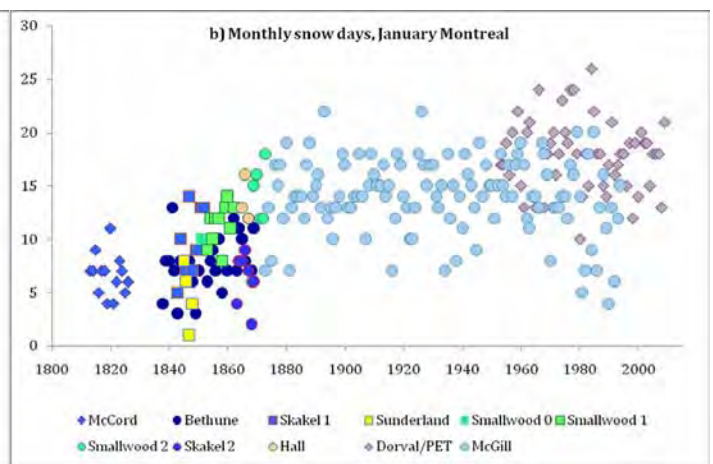
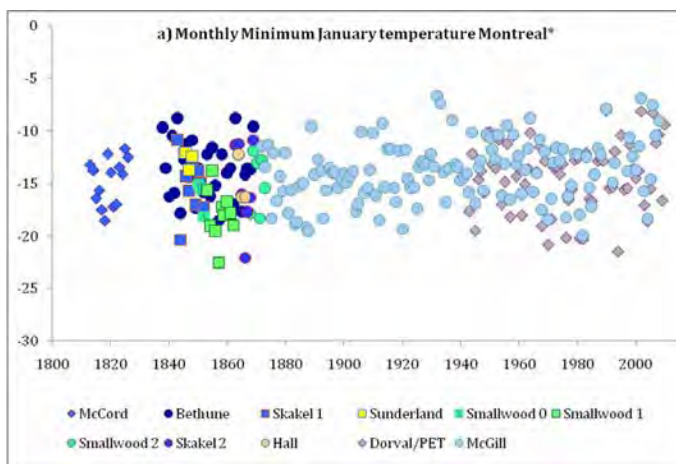
# CMOS BULLETIN SCMO

Canadian Meteorological  
and Oceanographic Society

La Société canadienne  
de météorologie et  
d'océanographie

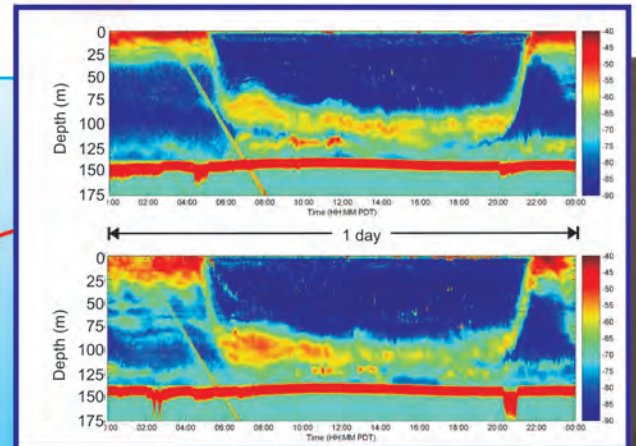
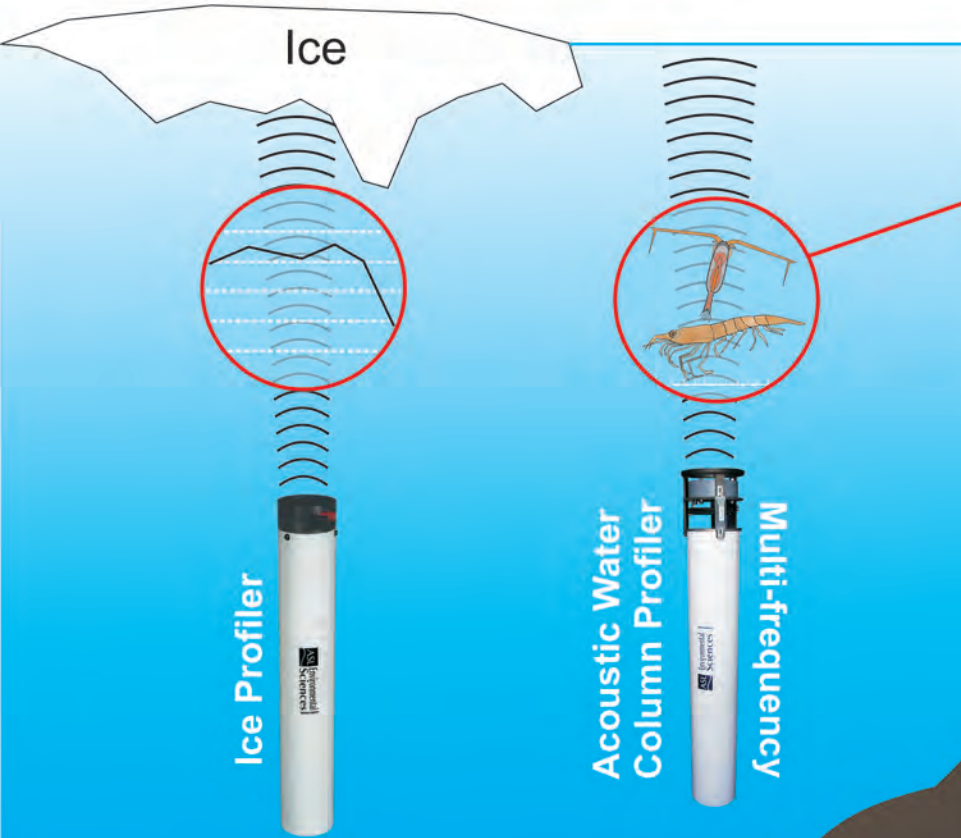
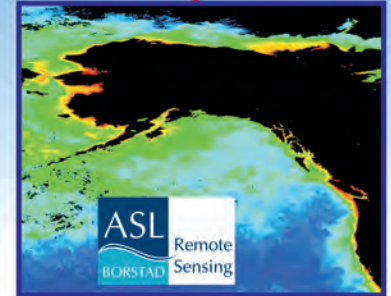
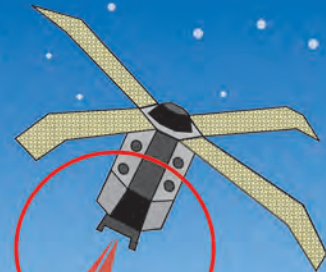
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Vol.39 No.5



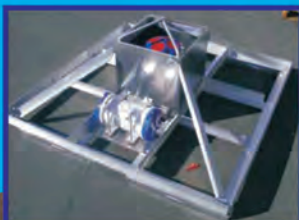
Climate data plots for Montreal  
1813-2010  
Graphiques de données du climat pour Montréal

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## ...from the President's Desk

Friends and colleagues:

Norman McFarlane  
President CMOS  
Président de la SCMO

As I write this column there are only a few weeks of summer remaining in Canada. I hope that you have been able to enjoy the unusually warm summer season that occurred in many parts of Canada, though not unusually so in Victoria, BC where I live. However, August was, as usual, pleasant and warm here in Victoria and I was able to spend some enjoyable time reading the August issue of the *CMOS Bulletin SCMO* while sitting in my back

yard. Once again, that issue illustrated the vigour and diversity of meteorology and oceanography in Canada. Those of you who were able to attend the CMOS Congress this year will likely have its successes still quite fresh in memory and have appreciated being reminded of it by the reportage on it in the August issue. That reportage, in combination with the summary of key events in the 140 years of the Meteorological Service of Canada, is an edifying reminder to me of the vigour and abiding value and importance of meteorology and oceanography in Canada. Our scientific activities in government, universities and the private sector have flourished and many valuable and critically important services to Canadian Society that have flowed from them. Tom McElroy's article on the Canadian Ozone Mapping Web site describes an apt example among many that could be listed. Meteorology and Oceanography will continue to flourish in Canada, in large part sustained and bolstered by the activities and efforts of CMOS members, notwithstanding the vagaries associated with events that may at times present impediments. Once again I thank Paul-André Bolduc for his efforts as editor of the Bulletin. I think you will agree that he has again assembled an interesting and informative collection of articles and news items in this issue.

In mid-August I informed CMOS members of actions taken by the CMOS Executive to respond to the recent staff reductions within Environment Canada. Many of you may have read my communication on this, posted as a news item on the CMOS web site, and the letter sent to Minister Kent in June, 2011, also posted in the members' services section of the CMOS web site.

(Continued on page 155 / Suite à la page 155)

*CMOS Bulletin SCMO*  
Volume 39 No.5  
October 2011 — octobre 2011

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**CMOS Bulletin SCMO**

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

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**Cover page:** Shown on the cover page are the four preliminary plots of weather climate data for Montreal region for the period 1813-2010; a) January minimum temperatures; b) snow days; c) July maximum temperatures; d) precipitation days. Each observer or data source is shown with a different symbol or colour. These plots indicate potential avenues of further exploration with historical data. To learn more, please read Victoria Slonosky's report on **page 167**.

**Page couverture:** Les quatre graphiques illustrés sur la page couverture présentent des données climatiques pour Montréal pour la période 1913-2010: a) température minimum de janvier; b) jours de neige; c) température maximum de juillet; d) jours de précipitation. Chaque observateur ou source de données est indiqué par un symbole ou couleur différente. Ces graphiques indiquent des avenues potentielles de recherche sur les données historiques. Pour en savoir plus, veuillez lire le rapport de Victoria Slonosky en **page 167**.

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**...from the President's Desk** (Continued / Suite)

This letter expressed our concern in regard to the impact of the current and planned staff reductions on key programs and asked the Minister to clarify how he views the long-term plan for science within Environment Canada. To date, no reply to this letter has been received. In the meantime, further staff reductions have been widely publicized. I requested your thoughts and suggestions concerning further steps that we may take to more publicly question government actions that may be detrimental to the activities of CMOS members and Canadians in general. I am pleased to have received several valuable responses so far. These included expressions of concern about the possible impact on services and products, for example the ongoing availability of quality controlled compilations of weather and climate data that are used by professionals who work outside of Environment Canada. Some respondents noted that, although not yet explicitly announced, similar cost-cutting actions are likely to take place in the Department of Fisheries and Oceans and other scientific programs within the Federal Government. CMOS includes both meteorologists and oceanographers, and these respondents, while applauding our actions to date, urged that we adopt a broader perspective in future communications to address concerns about the impact of government cutbacks in meteorological, oceanographic and related research and services.

Reductions of highly qualified staff who are engaged in scientific research, technical development and maintenance of long-term monitoring programs, though perhaps effective as near-term cost-cutting measures, frequently have detrimental longer-term effects. In combination with reductions in support for university based research, they will entail the loss of critical expertise and handicap research and services that will be increasingly needed over the coming decades. Many of the affected programs may be unique in their capacity to address issues of importance to the present and future well-being of Canadians. Such actions are also inconsistent with the Science and Technology Strategy of the Federal Government. The Executive summary to the 2009 report on progress of the S&T Strategy (available on the Industry Canada web site at

[http://www.ic.gc.ca/eic/site/ic1.nsf/eng/h\\_04709.html](http://www.ic.gc.ca/eic/site/ic1.nsf/eng/h_04709.html)

states:

*“Scientific discoveries and new technologies are essential to building a dynamic economy. This is, perhaps, even more important in difficult economic times. By investing in S&T, the Government of Canada is creating a stronger economy, future opportunities for jobs, an improved quality of life and other benefits for*

*Canadians. New knowledge and technologies will help us meet many of the challenges of the 21st century....”*

It goes on to identify environmental science and technologies as a priority area for enhanced investment and activity.

I encourage you to continue to contribute your thoughts and ideas. They will provide valuable input in discussions on this topic in upcoming deliberations of the CMOS Executive and Council. We may have initiated further CMOS actions by the time this issue of the Bulletin has been published. However, we are mindful of the need to continue to monitor, question and express concern on behalf of CMOS in regard to government actions that may have detrimental effects on the activities of CMOS members and, in general, substantially diminish capacity to carry out important research activities and provide meteorological and oceanographic services to the Canadian Public.

*Norman McFarlane*  
*CMOS President*  
*Président de la SCMO*

### Next Issue *CMOS Bulletin SCMO*

Next issue of the *CMOS Bulletin SCMO* will be published in **December 2011**. Please send your articles, notes, workshop reports or news items before **October 28, 2011** to the address given on page 154. We have an URGENT need for your written contributions.

### Prochain numéro du *CMOS Bulletin SCMO*

Le prochain numéro du *CMOS Bulletin SCMO* paraîtra en **décembre 2011**. Prière de nous faire parvenir avant le **28 octobre 2011** vos articles, notes, rapports d'atelier ou nouvelles à l'adresse indiquée à la page 154. Nous avons un besoin URGENT de vos contributions écrites.

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

**Le but de la SCMO est de stimuler l'intérêt pour la météorologie et l'océanographie au Canada.**

## ARTICLES

**Canadian researcher survey 2010<sup>1</sup>**by Rod Cookson<sup>2</sup>**Executive summary**

Canadian research is at a time of flux. There are pressures on funding and researchers' time, increasing emphasis on metrics such as Impact Factor and rapid technological change in the scholarly communication system. Against this backdrop, some considerations remain constant. Canadian researchers place great value on prompt, high quality peer review. Journal reputation is still the gold standard when deciding where to publish an article.

One area of change is international collaboration. Researchers in Canada face a conundrum familiar to scholars in many countries – how to retain local relevance whilst speaking clearly and directly to the global research community? French is viewed as important for navigating journal articles, but less so for writing them. Worldwide reach is essential, whilst publishing with a press located in Canada is not regarded as beneficial.

High quality production is still important, but matters more in online articles for researchers in Science, Technology and Medicine (STM) than those in Humanities and Social Science (HSS). There are other subject differences: STM researchers prioritise rapid online publication; HSS scholars value retaining copyright in their article. Most researchers use Google and library OPACs. STM researchers then visit Web of Science or Scopus, whilst HSS scholars are likely to go to JSTOR.

Some findings of the survey are less intuitive. Researchers are generally keen that articles are available online at no charge, but deeply hostile to paying for this. Very few scholars know what the Synergies project is, and fewer still feel it meets their scholarly communication needs.

**Sondage auprès des chercheurs canadiens (2010)<sup>3</sup>**par Rod Cookson<sup>4</sup>**Aperçu**

La recherche au Canada traverse une période de transition. Le financement est limité, tout comme le temps consacré à la recherche; l'accent est mis sur des indicateurs comme le facteur d'impact; et la technologie en matière de communication scientifique évolue rapidement. Malgré cette réalité, certains faits demeurent. Les chercheurs canadiens accordent une valeur considérable à une révision rapide et de grande qualité, effectuée par leurs pairs. La réputation de la revue compte toujours au plus haut point quand vient le temps de publier un article.

En revanche, des changements touchent la collaboration internationale. Les chercheurs canadiens doivent résoudre un dilemme qui concerne les scientifiques de plusieurs pays : comment demeurer pertinent à l'échelle locale tout en s'adressant franchement et directement à la communauté scientifique mondiale? Le français s'avère important pour parcourir les articles d'une revue, mais non pour les écrire. Une portée internationale est essentielle, tandis que la publication par un éditeur situé au Canada n'est pas vue comme un atout.

Des productions de haute qualité importent toujours, mais surtout en ce qui a trait aux articles en ligne pour les chercheurs en sciences, technologie et médecine (STM) contre ceux en sciences humaines et sociales (SHS). D'autres différences existent entre ces groupes: les chercheurs en STM privilégient une publication en ligne rapide et ceux en SHS préfèrent conserver les droits d'auteur de leur article. La plupart des chercheurs utilisent Google et le catalogue public en ligne des bibliothèques. Les chercheurs en STM visitent ensuite Web of Science ou Scopus, tandis que ceux en SHS consultent plutôt JSTOR.

D'autres résultats du sondage se comprennent plus difficilement. Les chercheurs apprécient généralement trouver des articles gratuits en ligne, mais s'opposent vivement à payer pour la diffusion. Très peu de scientifiques connaissent la plateforme Synergies et encore moins sentent que celle-ci comble leurs besoins en matière de communication.

<sup>1</sup> First published by Taylor & Francis Journals; reproduced here with the expressed permission of the publisher T&F.

<sup>2</sup> Editorial Director, Taylor & Francis, London, UK..

<sup>3</sup> Première publication par "Taylor & Francis Journals"; reproduit ici avec la permission expresse de l'éditeur T&F.

<sup>4</sup> Rédacteur en chef, Taylor & Francis, Londres, Royaume-Uni.

Taylor & Francis is in continuous dialogue with researchers to ensure that our journals evolve to fully meet their changing needs. Whilst the results of this survey tell us that we are already closely attuned to the requirements of Canadian researchers, we recognise the scope for further development and improvement. Our attention and industry now turn to that – to continuing to reduce publication times, streamline communication with authors and Editors, and accommodating French language requirements seamlessly. We thank everyone who participated in this survey for helping Taylor & Francis understand how we can best serve and support the Canadian research community in years to come. Merci pour votre attention!

### What did we do?

In July and June 2010 Taylor & Francis and Routledge surveyed 6,654 researchers in Canada. Invitations were sent by e-mail and the survey filled in online. Of those invited, 1,427 completed our survey, a 21% response rate. Ten per cent of e-mails sent bounced.

Respondents were from a range of subject areas, with the majority based in Humanities or Social Science departments, and representative of all levels of seniority. The most responses came from Ontario, followed by Quebec, British Columbia, Alberta and Nova Scotia. 140 respondents (10%) identified French as their language of choice.

### Key considerations when publishing in a journal

Respondents were asked to identify how important different aspects of journal publication are to them. The results are shown below in Figure 1.

As might be expected, timely review scores very highly, with 95% of respondents valuing it highly (Very Important or Important). A journal's good reputation scores almost as strongly (94%), with global dissemination not far behind (89%). Just under three-quarters of respondents (73%) rate the right to circulate their article after publication as important. A journal's Impact Factor trails reputation, with 77% of respondents agreeing that it is important.

Taylor & Francis communique souvent avec les chercheurs pour garantir que ses revues évoluent de façon à satisfaire les besoins variables des auteurs. Bien que les résultats de ce sondage indiquent que nous sommes au fait des exigences des chercheurs canadiens, nous examinons constamment de nouvelles possibilités de développement et d'amélioration. Notre attention et nos efforts s'orientent maintenant vers la réduction des délais de publication, la simplification des communications avec les auteurs et les rédacteurs, et l'intégration harmonieuse d'éléments en français. Taylor & Francis remercie tous les participants du sondage. Ceux-ci nous ont aidés à comprendre la façon de bien servir et d'appuyer la communauté scientifique canadienne pour les années à venir. Merci de votre aide!

### Comment avons-nous procédé?

En juin et juillet 2010, Taylor & Francis et Routledge ont sondé 6 654 chercheurs travaillant au Canada. Ces derniers ont reçu l'invitation par courriel et rempli le sondage en ligne. Parmi les personnes visées, 1 427 ont répondu à l'appel, soit un taux de participation de 21 %. Dix pour cent des courriels envoyés n'ont pas atteint leur destinataire.

Les participants représentaient une large gamme de domaines, provenaient en majorité de départements de sciences humaines et sociales, et correspondaient à tous les niveaux hiérarchiques. Le plus grand nombre de réponses provenait de l'Ontario, ensuite du Québec, puis de la Colombie-Britannique, et enfin de l'Alberta et de la Nouvelle-Écosse. Le français était la langue privilégiée par 140 participants (10 %).

### Considérations principales pour la publication dans une revue

Les participants devaient déterminer l'importance qu'ils accordent à différents aspects de la publication d'une revue. La figure 1 ci-dessous montre les résultats.

Comme prévu, la révision rapide compte pour beaucoup et les participants la qualifient de très importante (*Very Important*) ou d'importante (*Important*) à 95 %. La réputation de la revue s'avère presque aussi importante (94 %), suivie de près par la diffusion internationale (89 %). Près des trois quarts (73 %) des participants jugent que le droit de distribuer leur article après sa publication revêt de l'importance. Le facteur d'impact de la revue vient après sa réputation et 77 % des participants conviennent qu'il est important.

- Timely review process
- Good reputation of journal
- Global dissemination of article
- Right to circulate article after publication
- High impact factor of journal
- High production quality online
- Rapid only publication after acceptance
- Support editorial & production team
- Retaining copyright ownership of article
- High production quality in print
- Publisher supports research community
- Press located in Canada

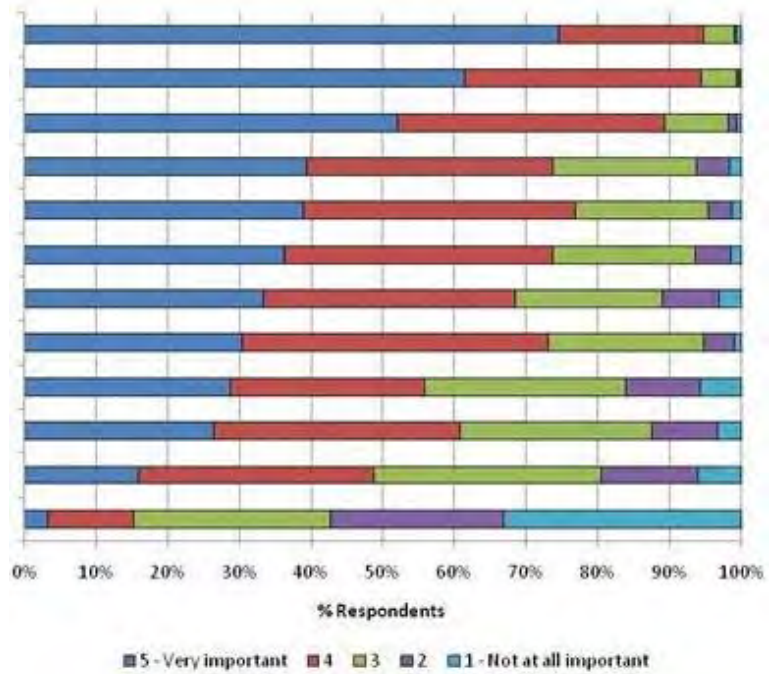


Figure 1: How important are the following when you are publishing in a journal?

Figure 1: Quels sont les facteurs les plus importants quand vous publiez dans une revue?

- I want to publish in international journals
- I want my article to be free to access
- This survey should be in French and English
- I want abstracts published in French and English
- I am expected to publish in specified journals
- I want my article published on an online platform available in French and English
- I want the full text of my article published in French and English
- I would be willing to pay the cost of publication to make free to access

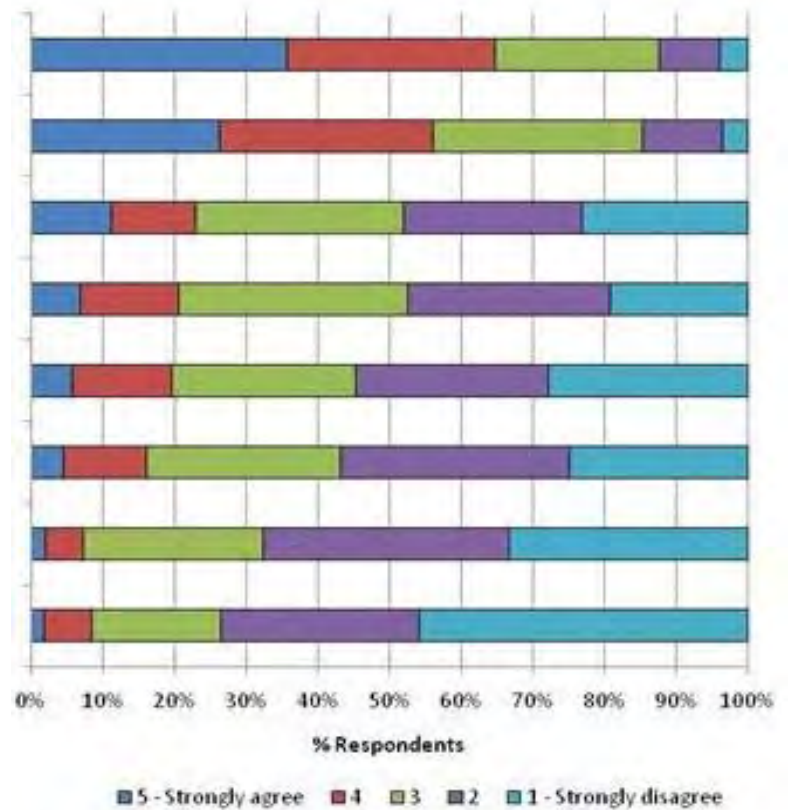


Figure 2: How strongly do you agree with the following?

Figure 2: Êtes-vous plus ou moins d'accord avec les énoncés suivants?



Significant subject differences emerge on three criteria. Researchers in STM value high quality Production in online files more highly than their peers in Humanities and Social Sciences – 80% for STM against 71% for HSS. Likewise, STM researchers place more emphasis on rapid online publication – 78% for STM against 64% for HSS. In contrast, 60% of HSS researchers rate retaining copyright in their articles as important, compared to 47% for STM.

Highly quality Production in print is valued by 60% of researchers, with no substantial subject variation.

A supportive Editorial and Production team is deemed important by 72% of researchers. Perhaps unsurprisingly, this score declines with seniority. Sixty-six per cent of Professors rate support as important, compared to 83% of doctoral students and 78% of post-docs. One respondent explains their perspective clearly: 'As an early career researcher it was extremely important to have the editor who was supporting and guiding with the process.'

Working with a publisher supportive of the research community is important for just under half of the respondents (49%). Publishing with a press located in Canada rates least important of all (15%).

### **The view from Canada**

We asked a series of questions to explore Canadian researchers' views on broader issues than why they published in a specific journal. Figure 2 above shows details.

International exposure is generally viewed as positive, with 63% of respondents agreeing that they want to publish in international journals. Interestingly, 12% disagree that international reach was important.

Open Access produces a more mixed picture. A majority (56%) agree that they would like their article to be free to access after publication. A larger number (63%), however, are not willing to pay to make their article free access. It would seem that there is no such thing as a free lunch in Canadian research!

Trois critères montrent des différences considérables d'un domaine à l'autre. Les chercheurs en STM accordent plus d'importance à une production en ligne de haute qualité que leurs collègues en sciences humaines et sociales : 80 % pour les chercheurs en STM contre 71 % pour les chercheurs en SHS. Également, les premiers privilégient une publication en ligne rapide : 78 % pour les chercheurs en STM contre 64 % pour ceux en SHS. En contrepartie, 60 % des chercheurs en SHS trouvent important de conserver les droits d'auteur pour leurs articles, tandis que seulement 47 % des chercheurs en sciences, technologie et mathématiques en soulignent l'importance.

Un imprimé de haute qualité est important pour 60 % des chercheurs, peu importe leur domaine d'expertise.

Le soutien de l'équipe de rédaction et de production est important pour 72 % des chercheurs. Loin d'étonner sans doute, ce pourcentage est inversement proportionnel à l'ancienneté. Les professeurs estiment à 66 % que ce soutien est important, contre 83 % pour les étudiants au doctorat et 78 % pour les étudiants postdoctoraux. Un des participants explique clairement ce phénomène : « En début de carrière, il était extrêmement important de pouvoir compter sur le soutien et les conseils du directeur de la rédaction tout au long du processus. »

La collaboration avec un éditeur qui appuie la communauté scientifique est importante pour près de la moitié (49 %) des participants. La publication par un éditeur situé au Canada est le critère le moins important (15 %).

### **L'opinion canadienne**

Nous avons posé une série de questions visant à connaître l'opinion des chercheurs canadiens sur des sujets qui dépassent le simple choix d'une revue particulière. La figure 2 ci-dessus en donne le détail.

Les participants considèrent généralement la visibilité internationale comme un avantage et 63 % souhaitent être publiés dans une revue internationale. Il est intéressant de noter que 12 % des participants pensent qu'une portée internationale est sans importance.

Le libre-accès suscite un avis partagé. La majorité (56 %) conviennent qu'ils préfèrent que leur article soit accessible gratuitement après sa publication. Toutefois, un grand nombre (63 %) ne veulent pas payer pour que leur article soit offert gratuitement. Il semble que dans le milieu de la recherche au Canada, rien n'est gratuit!

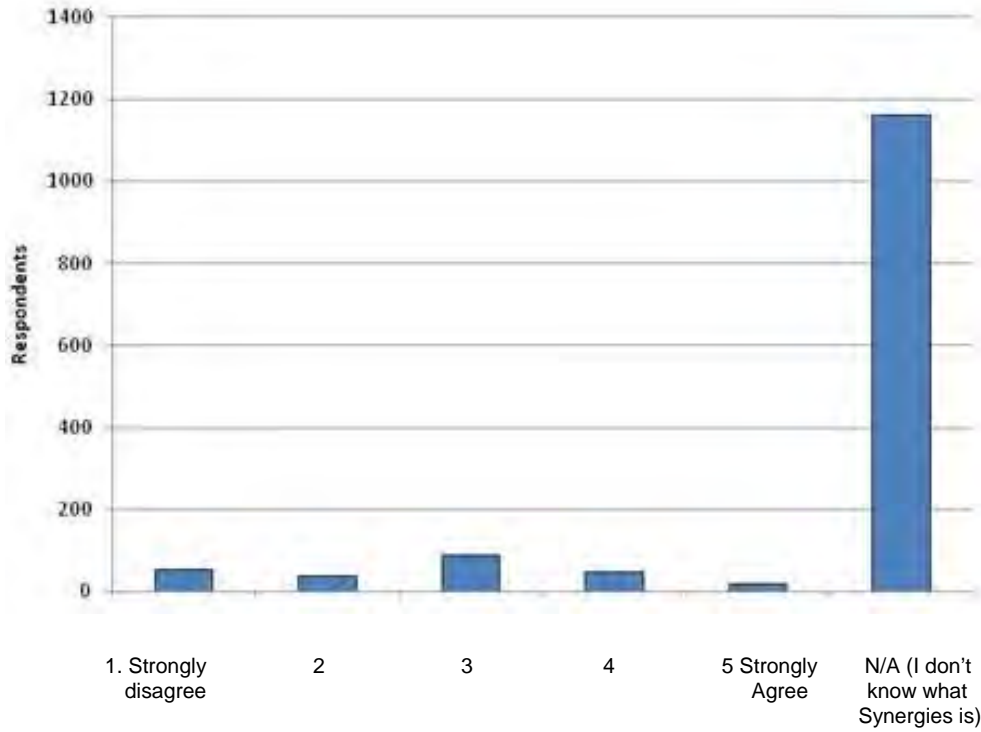
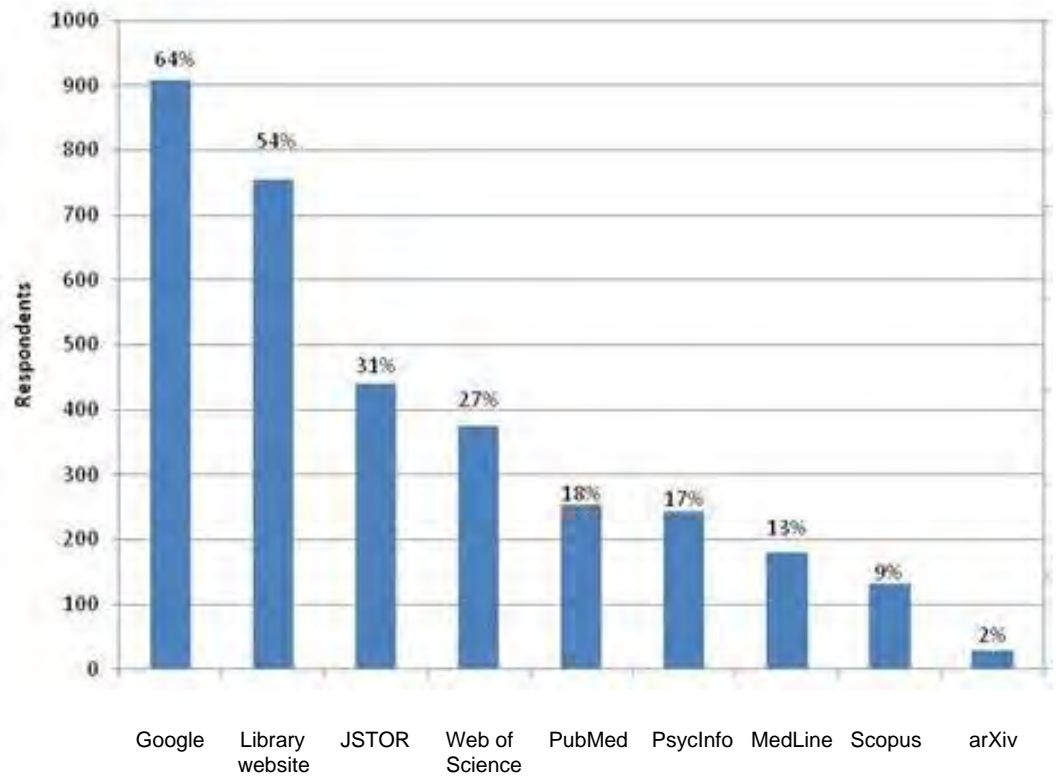


Figure 3: Synergies satisfies all my online publishing requirements

Figure 3: La plate-forme Synergies satisfait à tous mes besoins de publications en ligne

Figure 4: When I look for research articles, I start with:

Figure 4: Lors de mes recherches d'articles scientifiques je débute par:



Language also produces strong responses. More than a fifth of respondents want to see article abstracts published in French – twice the number whose primary language is French. Almost as many respondents want to publish on an online platform which operates in both English and French (17%). Interest in full text of articles published in French is more muted, with 8% of respondents valuing this. Indeed, just 3% of respondents from Quebec strongly agree that full text of articles should be published in French.

These views might be summarised as saying that both French and English are essential for navigating journal content, but not for deep reading. One respondent frames this neatly: 'If you want to focus on Canada and the Canadian academia, you should not forget that unlike USA or UK, it is an officially bilingual country and therefore there should be: 1 instructions in French for authors; 2 the possibility to include articles in French; 3 francophone scholars on editorial or advisory boards; 4 some journals in English and French, like *The European Legacy*, or *European Review of History*.'

#### **Does Synergies satisfy your online needs?**

Synergies Canada ([www.http://synergiescanada.org](http://synergiescanada.org)) was established as a not-for-profit online publishing platform in 2009. It is aimed at Humanities and Social Science scholars, and has also garnered interest from STM researchers. Synergies currently hosts nearly 90,000 articles from 160 Canadian scholarly journals and more than 12,000 theses from partner institutions.

Awareness of Synergies (as shown in Figure 3) is very low amongst our respondents, with 82% unaware of what Synergies is. Of those who have heard of the Synergies project, just under a quarter feel that Synergies meets their online publishing needs (24%).

#### **Where do scholars start looking for research articles?**

We have good news for librarians! Library websites and OPACs are the second most popular starting point for exploration of the research journal literature, with 54% of respondents using them on occasion. Google is, perhaps unsurprisingly, the most common place to begin, used by almost two-thirds of respondents (64%).

La langue de publication a entraîné une réponse nette. Plus d'un cinquième des participants veulent des résumés d'articles en français, ce qui représente le double du nombre de participants dont la langue première est le français. Presque autant de participants (17 %) veulent un environnement en ligne présenté en français et en anglais. L'intérêt pour des textes complets publiés en français n'est pas généralisé, seulement 8 % des participants y accordent de l'importance. De fait, seulement 3 % des personnes interrogées au Québec sont tout à fait d'accord avec la publication d'articles complets en français.

En somme, ces réponses indiquent que le français et l'anglais sont essentiels pour parcourir le contenu d'une revue, mais non pour lire intégralement un article. Un participant résume bien la situation : « Pour bien servir le Canada et son milieu universitaire, il est essentiel de retenir que, contrairement aux États-Unis ou au Royaume-Uni, ce pays est officiellement bilingue et qu'en conséquence il faut : 1) des instructions en français pour les auteurs; 2) la possibilité d'inclure des articles en français; 3) des scientifiques francophones siégeant aux comités consultatifs ou de rédaction; 4) quelques revues en français et en anglais, comme *The European Legacy* ou *European Review of History*. »

#### **La plateforme Synergies Canada répond-elle à vos besoins en ligne?**

Synergies Canada (<http://www.synergiescanada.org/fr>), une plateforme de publication en ligne sans but lucratif, a été fondée en 2009. Elle vise les chercheurs en sciences humaines et sociales et a aussi retenu l'attention des chercheurs en sciences, technologie et mathématiques. Synergies Canada stocke actuellement près de 90 000 articles provenant de 160 revues scientifiques canadiennes et plus de 12 000 thèses issues d'établissements partenaires.

Synergies Canada (comme l'indique la figure 3) est très peu connue parmi les participants du sondage : 82 % ne savent pas ce que c'est. Parmi ceux qui connaissent la plateforme Synergies, un peu moins du quart (24 %) pensent que celle-ci comble leurs besoins en matière de publication en ligne.

#### **Que consultent d'abord les chercheurs pour trouver des articles scientifiques?**

Bonnes nouvelles pour les bibliothécaires! Les sites Web et les catalogues publics en ligne des bibliothèques arrivent bon deuxième au classement des répertoires utilisés pour l'exploration de revues scientifiques : 54 % des participants les utilisent à l'occasion. Google est, peut-être sans grande surprise, la source de prédilection pour commencer une

Next most popular are JSTOR and Web of Science. Here we see significant subjects differences emerge. Humanities and Social Science researchers are nearly three times as likely as their counterparts in STM to consult JSTOR (39% vs 14%). STM researchers heavily favour Web of Science (47% of respondents) and, to a lesser degree, Scopus (26%). Researchers in the Health Sciences rely on PubMed (59%), MedLine (42%) and PsycInfo (20%). The results are illustrated in Figure 4 shown above.

### How would you describe Taylor & Francis and Routledge?

In addition to surveying the research landscape, we asked a series of questions to explore how well Taylor & Francis and Routledge are serving the needs of Canadian researchers. The results are gratifying.

More than 90% of respondents agreed that Taylor & Francis and Routledge are international publishers with the ability to connect them to the global research community as shown in Figure 5. Almost as strong is the belief that Taylor & Francis and Routledge produce high quality print and online publications (90%) and satisfaction with the experience of publishing in our journals (89%). One researcher says: *"My experience was absolutely positive from initial contact with the guest editor to publication"*.

Our staff are viewed as friendly and helpful by 83% of respondents, and 78% feel that Taylor & Francis and Routledge are aligned with the values of their research community. Nearly three-quarters of respondents regard Taylor & Francis and Routledge as innovative and flexible (74%).

### How would you describe other publishers?

To benchmark the preceding questions, we asked about key dimensions of the services provided by Elsevier, Wiley and the National Research Centre Research Press (NRC).

Respondents scored Taylor & Francis and Routledge highest on the quality of online and print publications (90%). Next are Elsevier (86%), followed by Wiley (84%) and finally NRC (65%) as seen in Figure 6.

recherche et un peu moins des deux tiers (64 %) des participants y recourent.

Viennent ensuite JSTOR et Web of Science. Ici, des différences considérables ressortent entre les deux grands domaines. Les chercheurs en sciences humaines et sociales sont presque trois fois plus susceptibles de consulter JSTOR que ne le sont leurs collègues en sciences, technologie et mathématiques (39 % contre 14 %). Les chercheurs en STM penchent fortement pour Web of Science (47 % des participants) et dans une moindre mesure pour Scopus (26 %). Les chercheurs en sciences de la santé préfèrent PubMed (59 %), MedLine (42 %) et PsycInfo (20 %). La figure 4 ci-dessus illustre ces résultats.

### Décrivez selon vous Taylor & Francis et Routledge

En plus d'examiner le portrait de la recherche, nous avons posé une série de questions visant à connaître dans quelle mesure Taylor & Francis et Routledge comblent les besoins des chercheurs canadiens. Les résultats sont réjouissants.

Tel que démontré par la figure 5, plus de 90 % des participants conviennent que Taylor & Francis et Routledge sont des éditeurs internationaux capables de les mettre en contact avec la communauté scientifique internationale. La perception est presque aussi forte (90 %) en ce qui concerne la haute qualité des publications imprimées ou en ligne de Taylor & Francis et de Routledge, et la satisfaction liée à la publication dans nos revues (89%). Voici ce qu'en pense un chercheur : *"Mon expérience a été extrêmement agréable, depuis le premier contact avec le directeur scientifique invité, jusqu'à la publication"*.

Une proportion de 83 % des participants pensent que notre personnel est serviable et sympathique et 78 % estiment que Taylor & Francis et Routledge adhèrent aux valeurs de leur communauté scientifique. Près des trois quarts (74 %) des participants considèrent que Taylor & Francis et Routledge font preuve de souplesse et d'innovation.

### Décrivez selon vous les autres éditeurs

Pour comparer les résultats précédents, nous avons posé des questions sur les principaux services proposés par Elsevier, Wiley et les Presses scientifiques du CNRC.

Les participants ont accordé la plus haute note à Taylor & Francis et Routledge (voir figure 6) en matière de qualité des publications imprimées et en ligne (90%). Vient ensuite Elsevier (86 %), suivi de Wiley (84 %), puis des Presses du CNRC (65 %).

An international publisher with global reach

Committed to producing high-quality publications

Overall, I was satisfied publishing with T&F

Staff are friendly and helpful

Aligned with the values of my research community

An innovative and flexible publisher

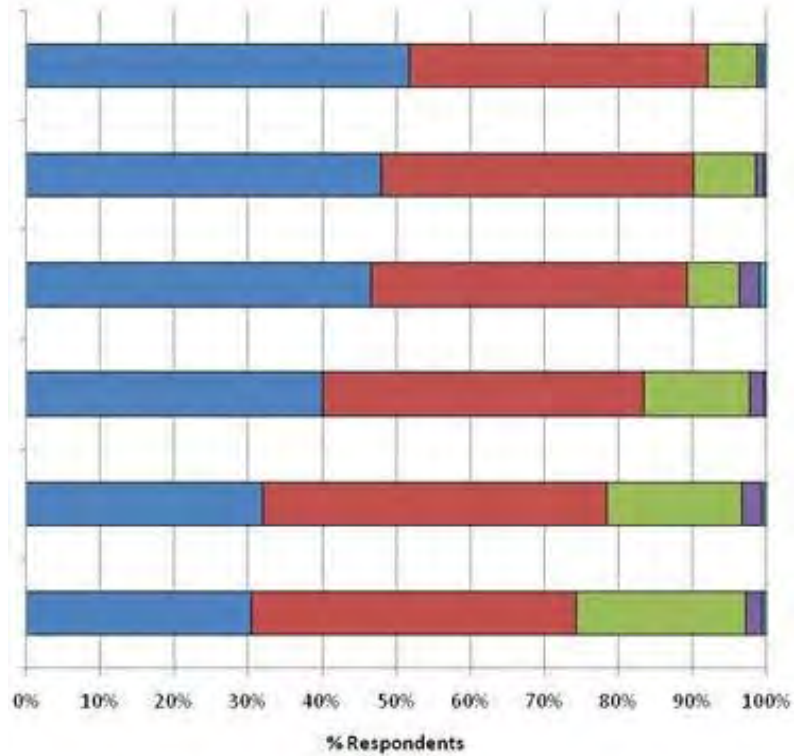


Figure 5: How would you describe Taylor & Francis and Routledge?

Figure 5: Comment décririez-vous Taylor & Francis et Routledge?

Figure 6: How committed are these publishers to producing high quality publications?

T&F

Elsevier

Wiley

NRC Press

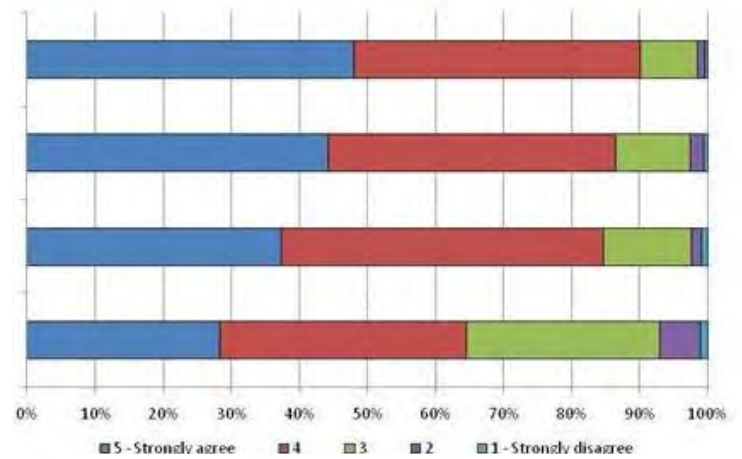


Figure 6: Comment évaluez-vous l'engagement des éditeurs suivants pour produire des publications de haute qualité?

Figure 7: Are these publishers aligned with the values of the research community?

T&F

Elsevier

Wiley

NRC Press

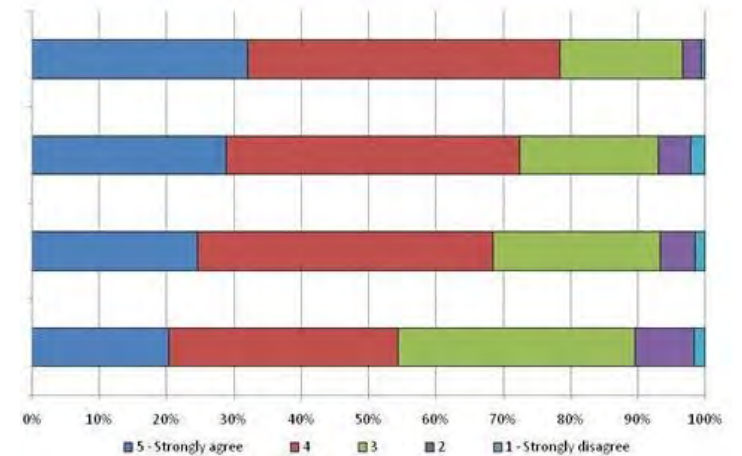


Figure 7: Est-ce que ces éditeurs ont les mêmes affinités que la communauté scientifique?

The pattern continues when respondents are asked about how well the different publishers are aligned with the values of the research community. The results are shown in Figure 7. Taylor & Francis and Routledge top-scored (78%), followed again by Elsevier (72%), Wiley (68%) and NRC (54%).

We are pleased to learn that Taylor & Francis and Routledge are overwhelmingly viewed as the publishers of high quality print and online journals, and that our operations are firmly in tune with the values of the scholarly community.

#### **About Taylor & Francis and Routledge**

Taylor & Francis is one of the world's leading publishers of academic journals. We are dedicated to the dissemination of scholarly information, utilising skills and experience developed since we first began publishing learned journals in 1798. Taylor & Francis and its Routledge and Psychology Press imprints now publish 1,562 scholarly journals in association with 460 societies and institutions. We operate a network of 20 global offices, including Philadelphia, Oxford, Melbourne, Beijing, New Delhi, Johannesburg and Singapore.

Taylor & Francis and Routledge currently publish the journals of a range of Canadian learned societies and institutions, including the Canadian Phytopathological Society, the Norman Paterson School of International Affairs at Carleton University, Canadian Association for Leisure Studies, the Tropical Conservancy and the Canadian Meteorological and Oceanographic Society.

Le même classement ressort quand les participants évaluent les affinités des différents éditeurs en ce qui concerne les valeurs du milieu de la recherche. Les résultats sont indiqués à la figure 7. Taylor & Francis et Routledge arrivent premiers (78 %), suivis à nouveau d'Elsevier (72 %), puis de Wiley (68 %) et des Presses du CNRC (54 %).

Nous nous réjouissons d'apprendre que Taylor & Francis et Routledge sont largement perçus comme des éditeurs de revues imprimées et en ligne de haute qualité, et que nos activités correspondent résolument aux valeurs de la communauté scientifique.

#### **Qui sont Taylor & Francis et Routledge?**

Taylor & Francis est l'un des premiers éditeurs mondiaux en matière de revues spécialisées. Nous nous employons à diffuser l'information scientifique en nous servant des compétences et de l'expérience acquises dans la publication de revues scientifiques depuis 1798. Taylor & Francis et ses marques Routledge et Psychology Press publient actuellement 1 562 revues spécialisées en association avec 460 sociétés et organisations. Nous exploitons un réseau international de 20 bureaux, y compris à Philadelphie, Oxford, Melbourne, Beijing, New Delhi, Johannesburg et Singapour.

Taylor & Francis et Routledge publient les revues de plusieurs organisations et sociétés savantes canadiennes, y compris celles de la Société canadienne de phytopathologie, de la Norman Paterson School of International Affairs de l'Université Carleton, de l'Association canadienne d'études en loisir, de la Tropical Conservancy et de la Société canadienne de météorologie et d'océanographie.

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### **STOP THE PRESS**

#### **Andrew Weaver Wins the 2011 A. G. Huntsman Award for Excellence in Marine Science**

Dr. Andrew J. Weaver (FRSC) is an international leader in ocean and climate modelling and analysis and, in particular, is a foremost expert on the role of the ocean in climate variability and change. Dr. Weaver's research at the University of Victoria involves multiple aspects of ocean, climate, and paleoclimate modelling and analysis. His research group developed an Earth System Climate Model referred to internationally as the University of Victoria climate model.

A novel aspect of Dr. Weaver's approach to research is his ability to transcend traditional disciplinary barriers. A unifying theme in his work is enhancing our scientific understanding of the natural environment. He recently became interested in how climate and abrupt climate change has affected human dispersal over the last 135,000 years, and, together with his colleagues, he has published a number of manuscripts in this emerging field. Finally, Dr. Weaver is an outstanding spokesperson on issues concerning climate science and he has dedicated enormous energy conveying sound science to the public at large. Dr. Weaver has served on many national and international committees and his scientific contributions have been recognized internationally through his election to learned societies and his winning of prestigious scientific awards as well as the Order of British Columbia.

## The Passing of Present Weather

by Kenneth A. Devine <sup>1</sup>

As private individuals, what affects us most about the weather when we venture outside? Probably most important, is it raining or snowing? After that we are concerned with wind, temperature and whether it is cloudy or not. All of these with the exception of temperature, can be determined visually. At weather stations with observers much of this is still done visually. But with the advent of automation many of these seemingly obvious factors, called present weather, are disappearing. In late 1969 there were only two operational and one prototype automatic stations which reported hourly in Canada. Of the 300 observing stations at that time, about 250 had full time weather watch meaning that an observer was keeping track of the weather 24 hours a day and seven days a week. That continuous weather watch has almost disappeared. Non-airport sites are automated and human observations at most airport sites are confined to the hours when aircraft are flying. Forecasters have referred to the disappearance of present weather observations at night as akin to turning off the Christmas tree lights before going to bed, essentially blinding them.

The term "present weather" refers to those one hundred factors that are reported in the synoptic reports (MANOBS, 1977) and plotted on the surface weather maps beside the station circle. Starting from clouds entering the sky, these codes move through obstructions-to-vision and the various types and intensities of precipitation, then finally on to the most extreme weather such as thunderstorms and even a tornado. It is important to every weather forecaster to know the type of weather and clouds being manifest by each weather system being tracked. While the global models are extremely important for the determination of motion and intensification, detailed observations are also necessary for the reality of weather.

At present, automated stations supply the classical surface observations of temperature, pressure, humidity and wind but they run into problems with observations beyond that point. For example a tornado cannot even be detected. Visibility at AWOS (automatic weather observing system) stations is based on the scattering of volume of air about the size of a grapefruit. A human observer though subjective, examines over a billion times that volume while determining visibility. As another example of sensor limitation, the videograph sensors used by the marine service at automated lighthouses cannot detect fog if it is more than 200 m away, i.e. just off shore. Automated cloud measurements are based on a vertical beam from a laser ceilometer. While providing accurate measurement of the height of cloud bases and hence the ceiling, it has problems both with cloud layers and particularly with cloud amounts. The human observer on the other hand can view the entire

sky not just the tiny area directly over the sensor observed by the pencil beam of the laser ceilometer. A laser can only compute the cloud amount from the clouds which have already passed over its beam and not that which may be entering the sky or passing by to one side of the beam. As well, the lasers used operationally on AWOS automated stations cannot detect high clouds above 10,000 feet which is little better than the 70 year old rotating beam ceilometer.

Basic sensor systems have a one-to-one relationship between the parameter being measured and the output of the sensor system. The best example of this is the pressure sensor but temperature and wind sensors also maintain that relationship. Present weather sensors on the other hand do not give a one-to-one result. Ice pellets for the small vertical-pointing Doppler radar system called POSS (precipitation occurrence sensor system), appear the same as rain. Whereas another sensor, the impact distrometer, can differentiate the rain and ice pellets but cannot detect snow in any of its forms. Impact sensors have a unique capability, that is, the detection of hail and ice pellets. The POSS sees drizzle as being the same as snow since they fall at the same rate though it does use other outputs to assist in the differentiation. Additionally, optical sensors can easily detect solid precipitation but are poor for rainfall detection. Heated grid sensors and some of its variants are often used to determine the onset of rain such as on the Capmon air quality stations to open the precipitation collectors. Automated rain gauges like the tipping bucket or the weighing precipitation gauges will not report any precipitation until long after it has commenced, depending on its intensity.

The output of multiple present weather sensors based on different technologies could be coupled together by software to determine the most probable type of precipitation. This type of capability in its complete form is not available commercially due to the cost of each sensor. Highly developed instruments are quite expensive and usually only one present weather sensor is used along with the basic sensor outputs. The use of multiple sensors would require that each be inexpensive. Passive sensors are the best to fill this category though some low-powered active sensors (i.e. those which probe the nearby atmosphere) could also fit into the mix.

In the same way, different types of simple sensors including thermal sensors could be coordinated to determine not only the amount but also some measure of the cloud heights. Thermal sensors are used at astronomical observatories to automatically open or close the domes and to alert the astronomers to changing sky conditions. Thermal imagers or scanners could determine the cloud conditions for much

of the sky but present thermal imagers are too expensive for network deployment. A small array of single thermal sensors could be deployed to supply a reasonable measure of cloud cover. Radiation sensors have been used at weather stations in Canada since the earliest days but the information has never been part of either the hourly or synoptic observations. This may be in part due to the use of solar time for radiation measurements rather than civil time. But this information could also be quite useful in the determination of cloud amounts. As well, the actual net radiation at the surface could be incorporated directly into the global computer models as part of the radiation balance.

The shift to off-the-shelf meteorological sensors and systems has simplified the introduction of weather stations. But only three new sensors (POSS, icing occurrence and snow depth) have been added to the suite of automated sensors in forty years. In the same time period, massive computing power has become available in very small and low-powered packages. With this computing power available on-site and with multiple inexpensive sensors, present weather and total cloud cover could be reported from every automatic weather station.

1) Meteorologist Consultant, Aurora, Ontario, Canada

## Canadian historical weather data rescue and digitization

by Victoria C. Slonosky<sup>1</sup>

### Résumé

Au mois d'avril 2010, on a lancé un travail de bénévolat pour sauvegarder et préserver l'historique des données météorologiques et climatiques des sources canadiennes d'archives. Des exemples de journaux météorologiques ont été affichés sur le site Web de la SCMO et on y a recruté des volontaires. Environ une vingtaine de volontaires, donnant de leur temps et en faisant valoir leur talent, ont participé en inscrivant et organisant la mise en code numérique plus de 200 000 observations individuelles des journaux météorologiques du 18<sup>e</sup> et 19<sup>e</sup> siècle.

### Introduction

A volunteer project to rescue and preserve historical weather and climate data from Canadian archival sources was launched in April 2010. Examples of weather diaries were posted on a website, and volunteers were initially recruited from the CMOS website. With the generous donation of their time and talent, nearly 20 volunteers have participated so far, typing and preserving into digital format over 200,000 individual observations from 18<sup>th</sup> and 19<sup>th</sup> century weather journals.

### Sources of weather data

The Meteorological Service of Canada was inaugurated in 1871, and has collected and preserved weather and climate data from across the country from this date forward. For the purposes of this project, therefore, the term "historical" is taken to mean any systematic observations of weather and climate from before the 1870s. The earliest weather observations from Canada discovered so far are those kept by Christopher Middleton in the region of Hudson's Bay for 1730-31 and those of Jean-François Gaultier, taken at Québec City between 1744-1756.

The focus of this project has been on the collection and preservation of long-term systematic journals of primarily instrumental observations. Although almost all journals that contain records of thermometer and barometer readings

also contain daily written weather descriptions, diaries with only descriptive data have not yet been included in this project.

Nearly all of the weather diaries collected so far are from Eastern Canada. The typing and quality control is most advanced in the registers from the St-Lawrence Valley region of Quebec, although work has started in late 2010 and 2011 on weather journals from Atlantic Canada. The largest sources of data are diaries preserved in the McGill University and McCord Museum Archives (see for example Figure 1).

Other sources include printed tables from contemporary journals, such as the British American Journal, the Transactions of the Literary and Historical Society of Quebec, and the Philosophical Transactions of the Royal Society. The National Library and Archives of Canada and provincial archives also contain weather diaries. Paper copies of several of the diaries obtained from either the national or provincial archives were scanned into digital form by the Canadian environmental history organization NiCHE, with the kind support of Prof. Liza Piper from the University of Alberta.

<sup>1</sup> Canadian Co-ordinator for WMO-sponsored project ACRE (Atmospheric Reconstruction over the Earth)



| Thermometer |      |      |     |    |    |     |    |    |       | Barometer |    |       |    |    |       |    |    |   |  | Remarks |
|-------------|------|------|-----|----|----|-----|----|----|-------|-----------|----|-------|----|----|-------|----|----|---|--|---------|
| Day         | Wind | Dir. | Th. | W. | W. | Th. | W. | W. | Th.   | W.        | W. | Th.   | W. | W. | Th.   | W. | W. |   |  |         |
| 1           | 8    | "    | 48  | 5  | "  | 56  | 2  | "  | 29.15 | 5         | "  | 29.15 | 5  | "  | 29.15 | 5  | "  | Cloudy & showers - NW   |  |         |
| 2           | 8    | "    | 50  |    |    |     | 3  | "  | 29.11 |           |    |       |    |    |       |    |    | Cloudy SW   |  |         |
| 3           | 7    | "    | 54  | 5  | "  | 78  | 7  | "  | 29.60 | 3         | "  | 29.51 | 3  | "  | 29.51 | 3  | "  | fair  |  |         |
| 4           | 7    | "    | 57  | 3  | "  | 75  | 7  | "  | 29.47 | 3         | "  | 29.59 | 3  | "  | 29.59 | 3  | "  | fair  |  |         |
| 5           | 7    | "    | 48  | 3  | "  | 52  | 7  | "  | 29.65 | 3         | "  | 29.71 | 3  | "  | 29.71 | 3  | "  | Hail & rain   |  |         |
| 6           | 7    | "    | 45  | 3  | "  | 66  | 7  | "  | 29.97 | 3         | "  | 29.97 | 3  | "  | 29.97 | 3  | "  | fair  |  |         |
| 7           | 7    | "    | 52  | 3  | "  | 71  | 7  | "  | 29.90 | 3         | "  | 29.91 | 3  | "  | 29.91 | 3  | "  | fair  |  |         |
| 8           | 7    | "    | 47  | 3  | "  | 47  | 7  | "  | 29.65 |           |    | 29.51 |    |    | 29.51 |    |    | Rain, towards evening cleared to show.  |  |         |
| 9           | 7    | "    | 35  | 3  | "  | 38  | 7  | "  | 29.47 | 3         | "  | 29.59 | 3  | "  | 29.59 | 3  | "  | Wind & showers all day - N  |  |         |
| 10          | 8    | "    | 32  | 5  | "  | 50  | 5  | "  |       | 5         | "  | 29.55 | 5  | "  | 29.55 | 5  | "  | fair - W  |  |         |
| 11          | 8    | "    | 51  |    |    |     | 8  | "  | 29.54 |           |    |       |    |    |       |    |    | Windy W   |  |         |
| 12          | 8    | "    | 64  | 5  | "  | 79  | 8  | "  | 29.77 | 5         | "  | 29.76 | 5  | "  | 29.76 | 5  | "  | fair, heavy W & SW  |  |         |
| 13          | 8    | "    | 68  | 5  | "  | 64  | 8  | "  | 29.93 | 3         | "  | 30.01 | 3  | "  | 30.01 | 3  | "  | cloudy slight showers SW  |  |         |
| 14          | 8    | "    | 53  | 5  | "  | 62  | 8  | "  | 30.35 | 5         | "  | 30.34 | 5  | "  | 30.34 | 5  | "  | cloudy N  |  |         |
| 15          | 8    | "    | 58  | 5  | "  | 76  | 8  | "  | 30.36 | 5         | "  | 30.25 | 5  | "  | 30.25 | 5  | "  | cloudy N 1 P.M. fair - this 7 <sup>th</sup> Bar: 30.30 -<br>(left for further at level) |  |         |
| 16          | 8    | "    | 63  | 3  | "  | 86  | 8  | "  | 30.25 | 3         | "  | 30.16 | 3  | "  | 30.16 | 3  | "  | fair SW   |  |         |
| 17          | 8    | "    | 62  | 3  | "  | 78  | 8  | "  | 30.04 | 3         | "  | 30.16 | 3  | "  | 30.16 | 3  | "  | fair  |  |         |
| 18          | 8    | "    | 50  | 3  | "  | 74  | 8  | "  |       |           |    |       |    |    |       |    |    |   |  |         |
| 19          | 8    | "    | 58  | 5  | "  | 64  | 5  | "  |       |           |    | 29.91 | 5  | "  | 29.91 | 5  | "  | cloudy N. blowing fresh   |  |         |
| 20          | 8    | "    | 62  | 4  | "  | 64  | 8  | "  | 29.73 | 5         | "  | 29.61 | 5  | "  | 29.61 | 5  | "  | fair, showers between 3 P.M. - SW heavy shower 3 P.M.                                   |  |         |
| 21          | 8    | "    | 64  | 5  | "  | 64  | 8  | "  | 29.70 | 5         | "  | 29.61 | 5  | "  | 29.61 | 5  | "  | cloudy SW showers P.M.  |  |         |
| 22          | 8    | "    | 55  | 5  | "  | 70  | 8  | "  | 29.74 | 5         | "  | 29.64 | 5  | "  | 29.64 | 5  | "  | fine W, cloudy P.M. rain in the night   |  |         |
| 23          | 8    | "    | 50  | 5  | "  | 63  | 8  | "  | 29.70 | 5         | "  | 29.80 | 5  | "  | 29.80 | 5  | "  | fair W.   |  |         |

Figure 1: Example of a historical weather diary; Journal of John Samuel McCord for May, 1831.

### Website

The enormous task of transcribing and preserving this information is ideally suited to a collective undertaking. Volunteers were initially recruited through the CMOS website, with additional typists volunteering after reading a posting on the climate blog RealClimate in April 2011. Participants can look at samples of a weather diary on the project website, and choose to type up a short record or a segment of a longer record (Figure 2).

With more participants, long diaries can be broken up into 3 to 5 year segments and shared among several people (Figure 2 bottom). Example spreadsheets and image files of the diaries are sent to participants over the internet, and volunteers type the weather data into the spreadsheets at their own pace.

A discussion group (Google groups *Climate Data Rescue*) has also been organized where participants can exchange ideas or post screenshots of examples of difficult handwriting or obscure weather terms for community discussion.

[Canadian historical data typing project](#) >

## Diaries and Volunteers

contact: [ClimateDataRescue@gmail.com](mailto:ClimateDataRescue@gmail.com).

[NEW! Discussion group for volunteers](#)

### St Lawrence Valley:

Observers in black have already been typed up; those in blue will be typed up during this project.

| Dates     | Quebec City | Montreal                  | volunteers              |
|-----------|-------------|---------------------------|-------------------------|
| 1742-1754 | Gaultier    |                           | finished                |
| 1765      | Alex Rose   |                           | Kristin finished        |
| 1776-1778 |             | Barr                      | Kristin finished        |
|           |             |                           |                         |
| 1798-1819 | Spark       |                           | finished                |
| 1813-1825 |             | McCord (Thomas & J.S.)    | finished                |
| 1820-1826 |             | Boileau                   | volunteers needed       |
| 1826-1835 |             | Monthly means from Skakel | Micheal D               |
| 1827-1833 |             | Liveright                 | Kyle + Jennifer         |
| 1828-1833 |             | Cleghorn                  | Kristin + Alana + Steve |
| 1831-1842 |             | McCord (J.S.)             | Barry T+Krys            |
| 1842-1852 |             | Skakel (anon1)            | finished                |
| 1845-1851 |             | Skakel missing months     | Ray finished            |
| 1838-1840 |             | Bethune                   | Carolyn V finished      |
| 1841-1845 |             | Bethune                   | Carolyn finished        |
| 1846-1850 |             | Bethune                   | Carolyn finished        |
| 1851-1855 |             | Bethune                   | Patrick F               |

### New England: coming soon!

### Atlantic Canada:

| Dates     | Halifax/ Nova Scotia            | St John's/ Newfoundland      | volunteer    |
|-----------|---------------------------------|------------------------------|--------------|
| 1786-1794 | Anon                            |                              | Ray finished |
| 1828-1831 | Alex Murrison                   |                              | Tim + Dan    |
| 1831-1835 | Alex Murrison                   |                              | Dan+Rose Dlh |
| 1836-1840 | Alex Murrison                   |                              | Rose Dlh     |
| 1841-1845 | Alex Murrison                   |                              |              |
| 1846-1850 | Alex Murrison                   |                              |              |
| 1851-1855 | Alex Murrison                   |                              |              |
| 1856-1860 | Alex Murrison                   |                              |              |
| 1861-1865 | Alex Murrison                   |                              |              |
| 1865-1868 | Alex Murrison                   |                              |              |
| 1832-1837 |                                 | St-John's Times (Templeman?) |              |
| 1863-1882 | Halifax Citadel/Royal Engineers |                              |              |
| 1859-1874 |                                 | Twillingate                  |              |
| 1859-1860 |                                 | Delaney                      |              |

Figure 2: Screenshot from the website <https://sites.google.com/site/historicalclimatedata/canadian-historical-data-typing-project>

### Quality control and initial conversions

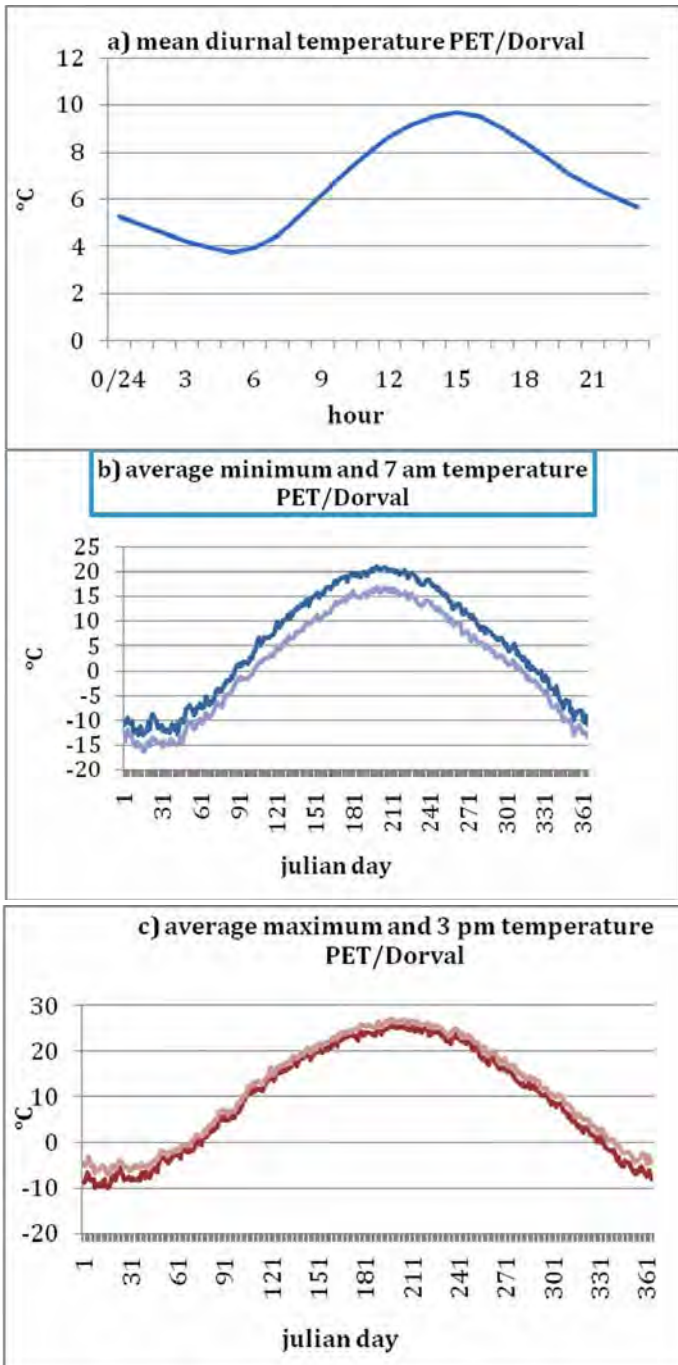
Each of the historical series is checked for typing or transcribing errors. The instrumental readings are compared against each other for large fluctuations that could indicate a typing error (by, for example, comparing the morning barometrical pressure reading against the afternoon observation), and potential mistakes are flagged and checked against the original diary. Values are also compared against 3 standard deviations away from the modern Julian day mean for a given date, and are again flagged and checked against the original records. Monthly mean and standard deviation plots are then checked for outliers, values are identified and corrected if necessary.

Temperature readings are converted into degrees Celsius, and a first order approximation to estimate minimum and maximum temperatures is made by subtracting the Julian day mean difference between the modern average

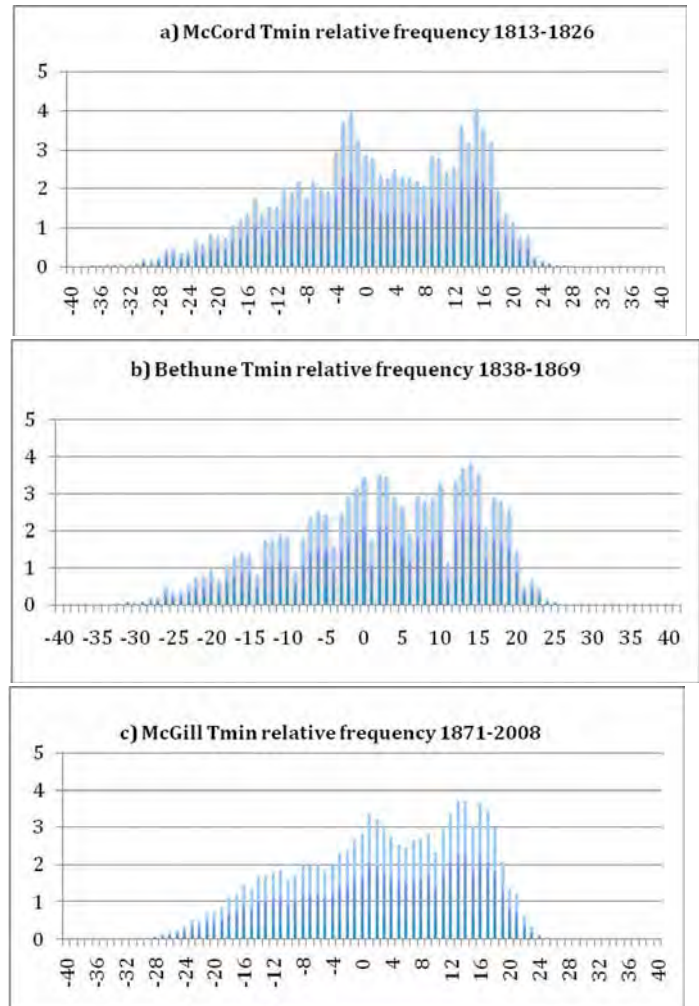
temperature for the hour the readings were taken and the modern Julian day mean minimum (for 7am) or maximum (for 3pm) temperatures (see Figure 3).

The modern hourly, minimum and maximum temperatures are downloaded from Environment Canada's Canadian Daily Climate Data website. Hourly data for Montreal region airports (Pierre Elliot Trudeau and St-Hubert) and Quebec City airport start in 1953. Minimum and maximum temperature data are available since 1871.

Pressure data are converted from inches of mercury to hPa, and checked to see if corrections for temperature to account for the thermal expansion of mercury had already been applied; in many cases it appears that the original observer had already made this initial adjustment. Corrections for local gravity are applied (local gravity anomaly values were obtained from the Geological Survey of Canada). In many



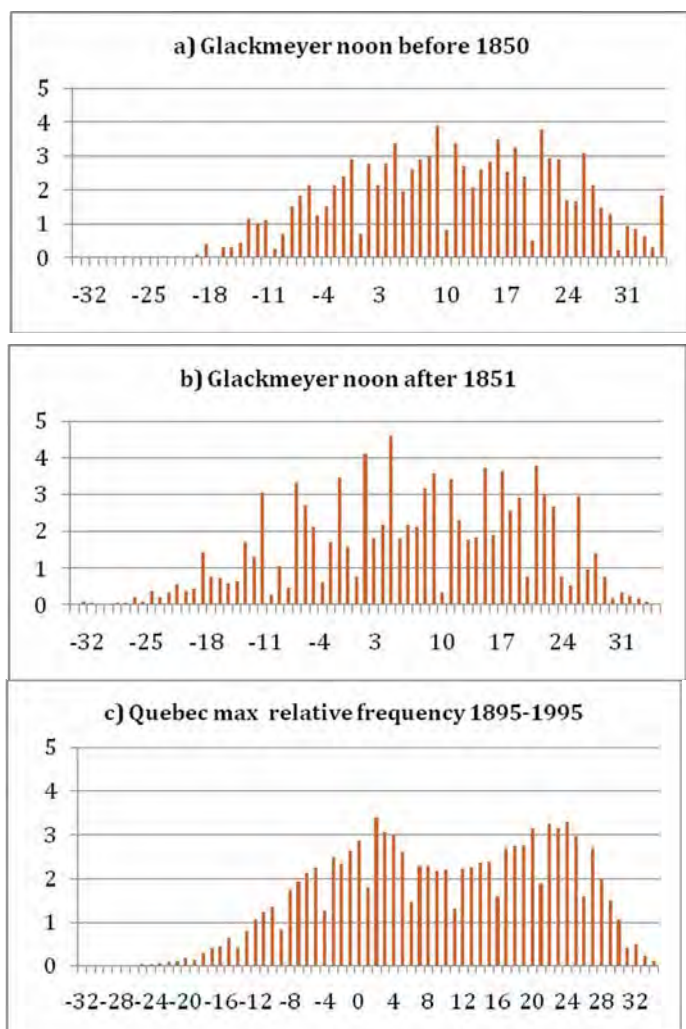
**Figure 3:** a) On average, the minimum temperature tends to occur in the early morning near sunrise; b) The value of the fixed-hour reading departs more markedly from the minimum temperature in the summer, making these estimates more uncertain; c) The maximum usually occurs near the middle of the afternoon, with less of a departure from the 3pm temperature throughout the year.



**Figure 4:** Histogram plots showing the relative frequency of minimum temperatures. a) estimated minimum temperatures from McCord values; b) recorded minimum temperatures from Bethune; c) recorded minimum temperatures from McGill (values adjusted for homogeneity; obtained from the AHCCD website and further adjusted by the author). The overall shapes and locations of peaks of highest relative frequency suggest the different journals from the different observers are indeed measuring similar phenomena, but further statistical tests would help increase confidence.

cases, it is possible to trace the street address of the observer through historical directories available from archival websites: using this information and historical maps, it is often possible to pinpoint the 19<sup>th</sup> century location on Google Earth and obtain values for latitude, longitude and elevation. These can be compared to the values recorded by the observers, if they did so. This information can then be used to estimate sea-level pressure.

The pressure data is sent to the international organization ACRE and forms part of the International Surface Pressure Data bank (ISPD) kept at NOAA.



**Figure 5:** Histogram plots of relative frequency of noon temperature for the Glackmeyer record in Beauport, near Quebec City; a) "it is to be observed that the thermometer is exposed to the sun at noon, but neither in the morning or evening (Glackmeyer, 1859); b) Glackmeyer after 1851:"From this day the register is kept at St-Pierre behind Charlesbourg, the thermometer is exposed only to the setting sun" (Glackmeyer, 1859, entry on May 17<sup>th</sup>, 1850; c) Relative frequency of maximum values for Quebec City.

### Statistical analysis

In order to use these historical data to evaluate potential changes in climate over the past two centuries, it is important to assess whether the historical data and the modern data can be considered to be recording the same phenomena. Initial inspection of frequency histograms comparing the historical to the modern data is encouraging (Figure 4), given the similarities between different sources. However, ways of formalizing the statistical likelihood of the disparate sets of observations recording the same underlying meteorological phenomena, and estimated of error are being explored.

The standards of instrumentation, exposure and recordings times were still fluid in the 19<sup>th</sup> century, and in many cases were not formalized until the establishment of the Meteorological Service of Canada in 1871. In one case so far, that of the first six years of the Glackmeyer record (the entire record covers the years 1844-1859 from various locations in the Quebec City area) the observer noted that the thermometer was exposed to the sun at noon. Histograms of the data (Figure 5) show a pronounced skew to the right, with an unusual number of high temperatures recorded.

This effect disappears after the thermometer was relocated in May 1850. The fact that this recorded unsatisfactory exposure produces a marked effect in the frequency histogram of the data, provides some (qualitative!) reassurance as to the quality of other records, where this effect is absent.

Improvements to the estimation of minimum and maximum temperatures from fixed hourly observations are being explored through regression analysis, with the generous participation of Prof André Plante, retired professor from the Department of Mathematics, Université du Québec à Montréal (Figure 6).

Although the mean minimum and maximum values tend to coincide closely with the diurnal cycle, the frequent passage of cyclonic systems through the St-Lawrence Valley regions leads to several episodes per month of unusual temperature trends, when the passages of warm or cold fronts can lead to the maximum or minimum temperature occurring at virtually any time of day. Minimum and maximum temperatures thus become unrelated to the hour of the day. This can lead to large RMS error values in the estimations of min and max temperatures based on the fixed hour observations. This effect can be seen in Figure 6(bottom), where the residuals of the regression become increasingly negative as minimum temperature increases. This suggests more information could be helpful to improve the estimates.

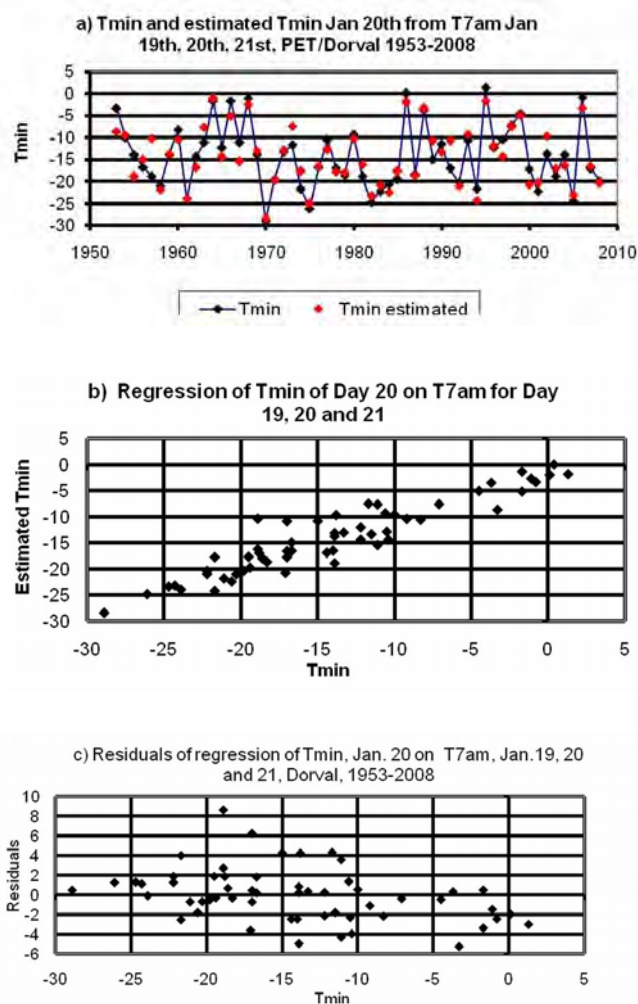


Figure 6: a) Measured minimum (blue line) and estimated minimum (red diamond) are shown for January 20<sup>th</sup>, 1951-2008; b) Scatter plots of estimated vs measured minimum values; c) Residual values decreasing with increasing temperature suggest more variables might improve the regression estimate. From Prof. A. Plante.

### Analysis of descriptive observations

There is much information that can be found in the descriptive weather remarks of the weather journals, as well as in the numerical observations. Most observers kept notes on the state of the weather, writing down their observations at least once a day, and sometimes up to three times a day. By classifying these remarks and comparing them to the hourly weather conditions available from the CDCD site, it is possible to get simple series of counts per month of a particular weather phenomenon. Series of precipitation days can be calculated throughout the entire period using precipitation data from Environment Canada (AHCCD site) dating back to the 1870s. It is also possible to calculate measures such as consecutive dry days, and with more uncertainty, cloudy or clear days. More detailed observations, such as counts of rain, snow, thunder, freezing rain, haze, etc. are available only from the historical

data and from the hourly observations from the CDCD website for 1953-present. Counts of wind direction also make it possible to analyze wind direction frequencies. Information of several different types from the same source can help increase confidence in the data, or can highlight discrepancies, for example by comparing the ratio of rain to snow to temperatures, or barometer readings to storminess counts.

Two problems to keep in mind when comparing descriptive data from the past to the present are changes in meteorological vocabulary over time, and differences in the frequency of observations. In modern times, professional observers working in shifts record synoptic observations for each hour of the 24-hour daily period. Although most of the historical observers kept notes of weather, especially precipitation events, that occurred throughout the day and as many of the night-time events as they were aware of, even the most diligent observers cannot hope to record the same number of events that modern meteorologists working in several shifts do. Events of short duration or light intensity are especially likely to have been missed in the historical registers. This leads to a relative undercount of weather events in the historical records compared to the modern ones.

Comparisons of the ratios of the proportion of night-time events for each historical observer and modern period are being undertaken in the hope of arriving at an inflation factor for each observer, which will adjust for the undersampling in the historical journals. In the meantime, in the preliminary plots shown in Figure 7 below, the modern data were subsampled by restricting the counts of weather events in the modern observations to those taken between 5 am and 8 am, 11am and 2pm, and 4pm and 8pm.

Given the uncertainties described above which remain to be addressed, Figure 7 is included to give an indication of the potential uses of historical data based on preliminary analyses, rather than as a definitive reconstruction of climate change over the past two centuries.

### Work still to be done

Collection of historical weather and climate data from archival and other sources and the digitization of these data is an ongoing process. Quality control procedures and methods of reconciling the historical and modern data are being actively investigated, some of which are described in the paragraphs above.

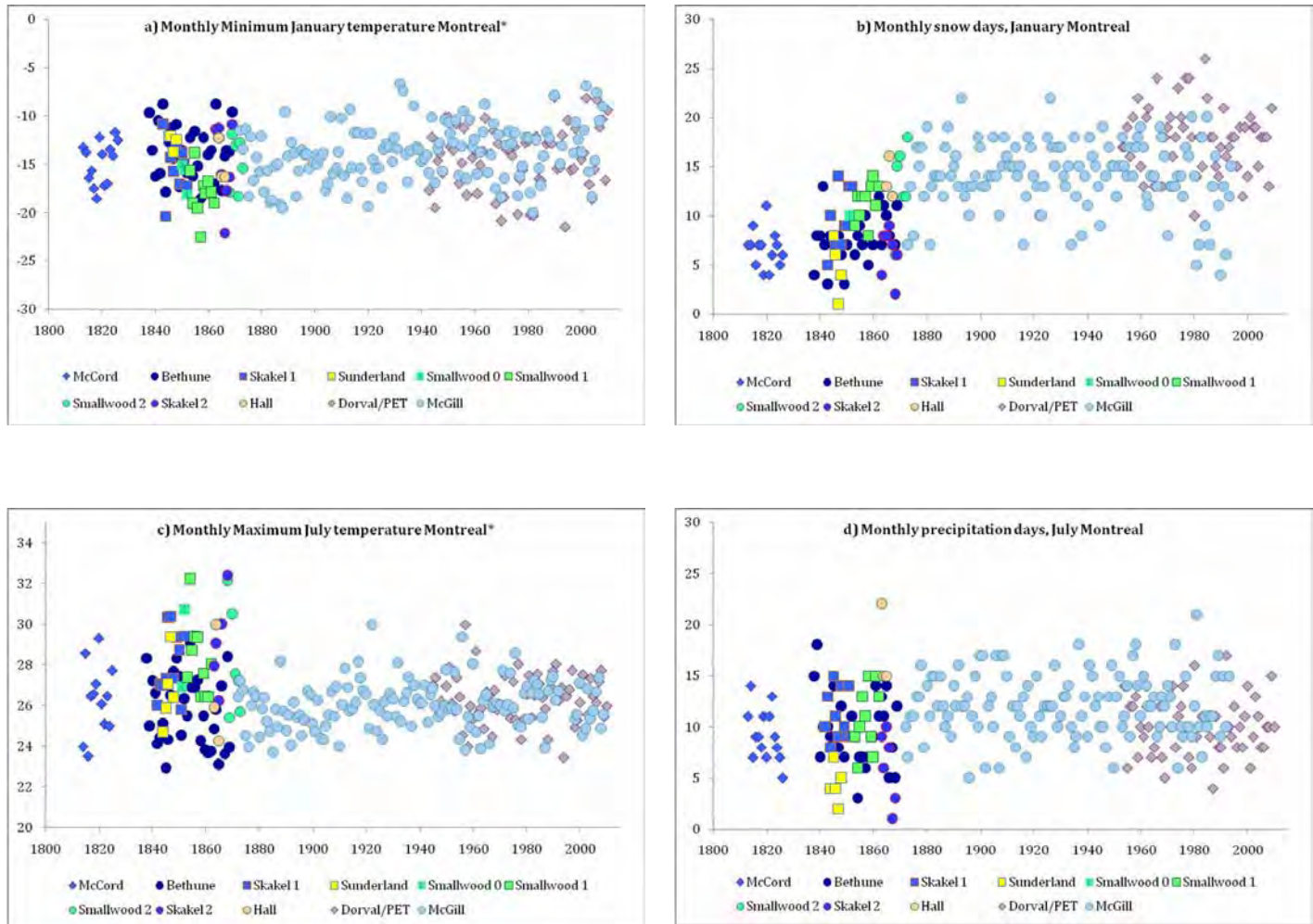


Figure 7: Preliminary plots of climate data for the Montreal region, 1813-2010; a) January minimum temperatures; b) snow days; c) July maximum temperatures; d) precipitation days. Each observer or data source is shown with a different symbol or colour. As methods of comparing historical and modern data are still ongoing, these plots are more to indicate potential avenues of further exploration with historical data than to present a definite history of climate. Also shown in colour on the cover page.

One aim of this project, as stated above, is the preservation of part of Canada's scientific heritage. Another is to use this information to produce and analyze regional series of climatic indicators on a daily scale covering the past two centuries. Further aims include organizing the information into a database to make the data available for research and analysis of weather and climate. This project is being undertaken on an entirely voluntary basis, which can make progress slow. Comments and suggestions from present or former synoptic observers on the comparison of historical and modern descriptive data are of particular interest. New volunteers to help with this project are welcome, either to contribute weather diaries from local archives, digitize the diaries located so far, or help with technical organization. One of the next steps, organizing the information into a database, will be particularly challenging. Comments are very welcome and can be sent to [ClimataDataRescue@gmail.com](mailto:ClimataDataRescue@gmail.com).

### Acknowledgments

The following have been especially helpful, indeed critical, to making this project possible: Bob Jones, CMOS webmaster; Gavin Schmidt, RealClimate; and, of course, all the volunteer typists who have so generously given their time and effort to this project, especially Gilles Paquette, Ray Couture, Pat Fortin, Carolyn Verduzco, Jennifer Dowker, Kristin Davoli, Alana Cameron, Kyle Hipwell, Rose Dhopolsky, Dan Manweiler, Lisa Woodward, Tim Carr, Sheila Dobie, Barry John Turner, Kris Chutko, Andrew Ottoson, Steve Sullivan, and Pat [surname unknown]. Many thanks also to Prof André Plante, Prof Liza Piper; the McCord Museum archives, especially Nora Hague and Stephanie Poisson; the McGill University Archives; the National Library and Archives of Canada, especially Bronwyn Masemann; and Environment Canada, especially the Canadian Historical Climate Data website and the Climate Monitoring and Data Interpretation Division.

**CMOS BUSINESS / AFFAIRES DE LA SCMO****Back to 45<sup>th</sup> Congress in Victoria****Retour sur le 45<sup>e</sup> congrès de Victoria**

Because of the lack of space in the August issue *CMOS Bulletin SCMO* (Vol.39, No.4) we did not publish the list of the two Committees Members for the Victoria Congress. We apologize for this omission and we are happy to publish both lists in this October issue. Thank you all for a job well done for the Victoria Congress!

À cause du manque d'espace dans le numéro du mois d'août du *CMOS Bulletin SCMO* (Vol.39, No.4) nous n'avons pas publié la liste des membres des deux comités organisateurs du congrès de Victoria. Nous nous excusons de cette omission et il nous fait plaisir de publier ces deux listes dans le numéro d'octobre. Merci à tous pour un travail excellent lors de ce congrès!

**Local Arrangement Committee (LAC)  
Comité local d'organisation**

|                 |  |
|-----------------|--|
| Nathan Gillett  | Chair LAC                                |
| Bill Merrifield | Chair SPC                                |
| Greg Flato      | Sponsorship                              |
| Daniel Roy      | Facilities, Entertainment & Audio-visual |
| Lisa Vitols     | Educators' Day & Program Book            |
| Knut von Salzen | Social Program                           |
| Angelica Peña   | Webmaster                                |
| Frank Whitney   | Exhibits                                 |
| Michael Eby     | Local Registration                       |
| Nilgün Kulan    | Volunteers                               |
| Krista Zala     | Educators' Day & Media                   |
| John Scinocca   | Treasurer                                |
| Oscar Koren     | Exhibits                                 |
| Ian Rutherford  | CMOS Executive                           |

**Scientific Program Committee (SPC)  
Comité du programme scientifique**

|                            |                     |
|----------------------------|---------------------|
| Bill Merryfield, Chair, EC | Debby Ianson, DFO   |
| Vivez Arora, EC            | Tara Ivanochko, UBC |
| Phil Austin, UBC           | Norm McFarlane, EC  |
| Alex Cannon, EC            | Adam Monahan, Uvic  |
| Stephen Dery, UNBC         | Francis Poulin, UW  |
| Mike Foreman, DFO          |                     |

EC: Environment Canada  
 UBC: University of British Columbia  
 UNBC: University of Northern British Columbia  
 DFO: Fisheries and Oceans Canada  
 Uvic: University of Victoria  
 UW: University of Waterloo

**Oups!**

In the August issue, the figure caption shown on page 131 for the CMOS-Weather Research House NSERC Scholarship Supplement was mislabelled. The same picture is shown here with the right caption. Sorry for this error.

Dans le numéro du mois d'août, la légende de la photo prise lors de la remise du supplément SCMO-Weather Research House CRSNG aux bourses d'études supérieures et présentée en page 131 était erronée. La même photo est présentée ici avec la bonne légende. Mille excuses pour cette erreur.



Carmen Emmel (accepting for Eugenie Paul-Limoges) and Susan Woodbury (presenter)

## Educators' Day 2011

by Lisa Vitols<sup>1</sup>

The 2011 CMOS Educators' Day was coordinated by Lisa Vitols (Environment Canada) and Krista Zala, Rick Searle, Natasha Ewing, and Ellyn Davidson (Ocean Networks Canada). For 2011 the name of this workshop was changed from Teachers' Day to Educators' Day, to be more inclusive of informal educators like interpreters, aquarium workers, Guide and Scout leaders, etc.

The all-day agenda included a variety of presenters who facilitated learning about oceans, weather, climate, and the challenges of teaching, and tried to focus on hands-on activities that could be easily taken back to classrooms or informal learning situations. Everybody seemed to love the hands-on activities and were thoroughly engaged, and were enthusiastic about receiving a USB memory stick with all the presentations, lesson plans, and other electronic resources.



Remy Rodden

In an effort to incorporate the arts in terms of science, Remy Rodden, an environmental educator from the Yukon, was invited. He has been a participant-educator in Students on Ice in Antarctica and the Arctic, and has a related career as a musician.

Remy played guitar and sang songs he wrote that have CMOS-related themes, and talked about the effectiveness of song in education and understanding. There was a very



<sup>1</sup> Engagement & Strategy Advisor, National Service Operations, Public Weather Services, Environment Canada, Vancouver, BC. Lisa Vitols was also the Victoria Congress Program Editor.

positive reaction to Remy's presentation, and it caused the educators to think more broadly about how to incorporate oceans, climate and atmosphere into their teaching.

As can be seen by the weight of the words provided by the participants as their reaction to the workshop, and by all accounts from the comments and expressions during and following the workshop, the CMOS Educators' Day 2011 was a great success.

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## Project Atmosphere 2011

by Ann Jackson<sup>2</sup>



This past summer, I was the fortunate Canadian to be chosen for Project Atmosphere in Kansas City, Missouri. Project Atmosphere is a two-week series of studies organized by the American Meteorological Society (AMS) in conjunction with the National Oceanic and Atmospheric Administration (NOAA). This intensive study took place between July 17 and July 29 at the U.S. National Weather Service Training Center (NWSTC) in Kansas City. My participation at this event was made possible by the Canadian Meteorological and Oceanographic Society (CMOS) and the Canadian Council for Geographic Education (CCGE) – I am grateful for their support of this program.

Sixteen teachers were gathered from across the United States, from both the elementary and secondary panels. It was interesting to hear about the delivery and nature of weather instruction at the different grade levels from my American colleagues. I am certainly envious of the extent to which weather is directly taught at many grade levels as it seems that much of our Ontario weather instruction is delivered in the context of climate change. These teachers shared their wealth of knowledge and experiences and certainly made the lone Canadian feel welcome.

The two-week workshop was an opportunity to try hands-on weather activities and attend a variety of seminars and presentations on the many aspects that make up weather and climate analysis and prediction. Our list of presenters certainly was a "Who's who" of weather gurus. This was obvious too, in the level of passion as they spoke about their specialty. Many of these exceptional speakers also mentioned that somewhere along the way, they were

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<sup>2</sup> St. Thomas Aquinas CHS  
Russell, Ontario, Canada





Group photo for Project Atmosphere 2011. Ann Jackson is in the front row, second from the right.

encouraged and motivated by a particular teacher who helped them to pursue their interests. This was a wonderful reminder that, as teachers, we are capable of influencing students well beyond the classroom. Kudos certainly go to the following for giving dynamic presentations that brought their specialty to life: Bill Read, director of the National Hurricane Center; Dr. Louis Uccellini, director of the National Centers for Environmental Prediction; Doug Cluck for an entertaining look at climate; Ron Przybylinski from the St. Louis National Weather Service; Jon Malay from the AMS; and Scott Tessmer for his talk on Space Weather.

Weather has always been a personal interest of mine since childhood. As a teacher, I have tried to incorporate weather facts and trivia into the other math and science classes (physics, environmental science and general 9/10 sciences), but I will also admit to following weather statements, watches and warnings in pursuit and anticipation of the infamous "*Weather Day*" when school buses are cancelled for the day.

So I went to Project Atmosphere armed with a list of weather questions that have always intrigued me, and I was not disappointed. Does anyone really consider a "changing" Sun could be affecting the weather/climate on the earth? How is it possible to see rotation or tornadoes by looking at a radar image? How accurate are the models for predicting hurricane development and paths when looking at infant weather systems off the coast of Africa? What are the criteria for rating tornadoes? Are there other weather terms out there like derecho, bow echo, hook echo, or haboobs? So is the climate actually changing? NOAA has so many amazing maps and products out there —how can I use these images to predict how a Colorado Low will end up causing a snowstorm in eastern Ontario?

The group was treated to detailed information for all these types of questions and given links to additional electronic

resources for further study. I can honestly say that those questions were addressed, and I have been given even more to think about. If I was a weather addict before going to Project Atmosphere, I can now justify my increased habit as simply further studies!

We were treated to a daily weather briefing that began to incorporate all the things that we had learned. Many thanks to Jerry Griffin who was able to explain why the weather in Kansas and southern states was so incredibly hot and relatively uneventful while we were at Project Atmosphere! This was an excellent introduction to the vast array of high-tech imagery that is available through NOAA to the general public and how it is used to better understand, model and predict the weather.

At the NWSTC we examined different types of equipment for recording weather data. We visited the National Aviation Weather Center to learn the impacts that weather can have on air traffic. We ventured to Topeka, Kansas, to participate in the daily launch of a weather balloon with an attached radiosonde and better understand weather monitoring at the local level. The group was treated to an excellent running commentary by Dr. Moran on the geology encountered along the way to Topeka. On a weekend excursion to the flooded Missouri River and Subtropolis, an underground business complex in a former salt mine, Dr. Moran again provided excellent commentary. This certainly reminded us of the evidence that climate change is an ongoing process as the earth changes over time.



Launching a weather balloon at Topeka.

Between these activities, we worked through different modules that have been developed by the AMS. Some of my favourite topics included El Niño/La Niña, solar radiation, air pressure and jet streams, tornadoes, conditions for ice storms, and of course, understanding the mechanics of snow storms. These are modules that can be shared with other teachers and used directly in the classroom with students.

A huge thank you to Patricia Warthan, Jim Brey, Kira Nugnes, Dr. Moran and Bob Weinbeck for their organization and dedication to incorporating so much learning into a very short period of time! It was a privilege to have had the opportunity to participate in Project Atmosphere 2011 and I extend my appreciation to CMOS and CCGE for enabling me to attend this workshop.

## Maury Project: Physical Foundations of Oceanography, 2011

by Michele Banks<sup>3</sup>

I am appreciative of the opportunity to attend the Maury Project. This workshop is held each year at the United States Naval Academy (USNA) in Annapolis, Maryland, in the Chesapeake Bay area. Both Annapolis and the USNA are true historical and aesthetic gems, offering exceptional services and facilities which assist in making the workshop experience very memorable.

The USNA prides itself in being the most extensive undergraduate oceanographic instructional facility in the country. This became very clear as we were fortunate to have quality instruction during our 11-day workshop. Faculty members from the USNA, US Navy, the National Oceanic and Atmospheric Administration (NOAA), other scientists, and science educator participants presented the workshop topics. Under the direction of our two trusted coordinators, David Smith and Don McManus, we attended lectures, tutorials, seminars, research cruises, hands-on laboratory exercises and field trips.



Beach sweep - Michele Banks on the right is comparing biodiversity from different areas in the Severne River where nitrification and bioamplification are present.

Selected oceanographic topics included wind-driven circulation, ocean structure, ocean circulation, shallow and deep water waves, oceanographic instruments, tides, satellite oceanography, sea level measurement, coastal upwelling, marine biogeochemistry, polar oceans, ocean acoustics and El Niño-La Niña. We had the good fortune to visit the Hendrix Ocean Lab, the Baltimore Aquarium, the NOAA Science Centre, the NOAA Library, the National Centers for Environmental Prediction and the National Ice Center. We also became involved in a research cruise and coastal study of the Chesapeake Bay.

Of priority in the program is the peer training of teachers by participants. Within the home province or state, participants are required to conduct two training sessions using the modules provided through the Maury Project. This allows the training of teachers by teachers and thus offers a multiplicative effect in the training of students. The detailed guidelines provided at the workshop will be very useful in offering a quality, professional and practical training session.

Overall, the Maury Project provided a highly organized, professional environment in which I, as one of two Canadian participants, had the opportunity to interact with American colleagues (both teachers and instructors) who provided a wealth of information about oceanography. I would encourage other teachers to consider this valuable opportunity.

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## The 2011 Maury Project

by Rod Carmichael<sup>4</sup>

I was very fortunate to be chosen to attend the Maury Project in Annapolis, Maryland. CMOS and CNC/SCOR funded my participation in this workshop and I would like to thank them for selecting me and Sheila Bourque for taking care of the myriad details to make it happen.

In terms of professional development, this is the best workshop I have ever attended. It was excellent in all aspects: the location, the range of experience of the other participants, and especially the quality of instruction.

The campus of the US Naval Academy (one of the sponsors) provided us with state-of-the-art laboratory and lecture facilities along with a trip on their research vessel. It is a beautiful setting and an interesting experience to be among the midshipmen and activities of the incoming freshmen. The Annapolis location is also perfect for the field trips to the National Oceanic and Atmospheric Administration (NOAA) labs. NOAA is one of the sponsors of the workshop and is very keen to make its ocean and atmosphere education programs accessible to teachers. They have easily accessible programs in weather, climate, coastal and deep-water ocean, and space-based remote sensing available on their website ([www.education.noaa.gov](http://www.education.noaa.gov)) and also on the NOAA Ocean Service Education website (<http://oceanservice.noaa.gov/education>). One of their programs offers real-time interactive viewing of a current

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<sup>3</sup> Simonds High School, Saint John, New Brunswick, Canada.

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<sup>4</sup> Oak Bay High School, Victoria, British Columbia, Canada.

ship-based exploration program in the South Pacific that allows classes to see the process and discovery involved in exploring unseen places (<http://oceanexplorer.noaa.gov>). The NOAA/US Navy National Ice Center provided an excellent overview of the extent of melting in the Arctic in recent years and provided me with a ten-year month by month view of ice cover that is very informative. If you would like a copy of the video, please contact me at [rcamichael@sd61.bc.ca](mailto:rcamichael@sd61.bc.ca).



Original mechanical tide computer

The other teachers taking part in this workshop were a highly educated and motivated group from coastal and Midwestern states. They represented a range of schools from ones that are deemed Science Magnet schools to one fellow who was the K-12 Science department (not the department head). Time spent discussing their educational experiences was very interesting in terms of looking at differences in the Canadian and American systems. They teach a variety of very focused marine-related courses from Aquaculture to AP Oceanography (in a school hundreds of miles from the ocean). They also seem to have many more ocean-related learning outcomes than all but the Atlantic Provinces in Canada. Part of the value of the workshop was just in simple discussions of "how would you teach this" or "I tried that and this is what happened." This was a great group to learn with.

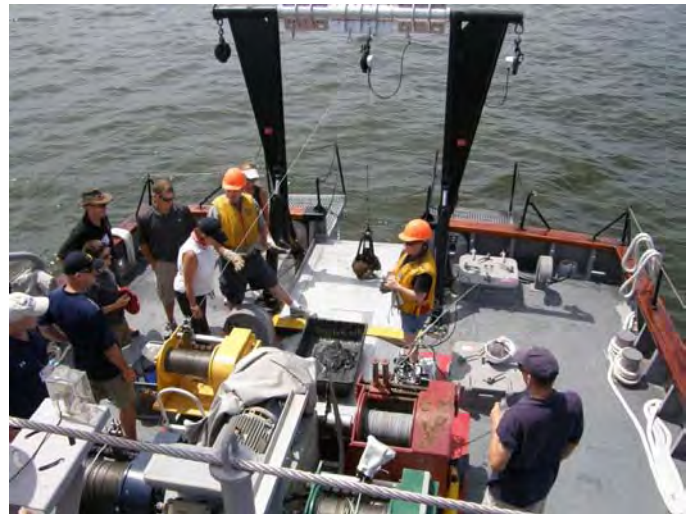


Making a tide comparison graph

The workshop is based around 9 modules developed for the American Meteorological Society, the main sponsor of the course. The course of instruction has evolved over the 18 years it has been offered and is very focused on the

needs of classroom teachers. Each module focuses on an aspect of ocean science, waves, tides, remote sensing, etc. and provides hands-on activities and demonstrations around the topic. In addition to the hands-on work, the staff of the Naval Academy provided us with the background information related to the topic. They were excellent in providing the content and explanations without having to resort to the complex mathematics that underlies some of the topics. They were all extremely accessible and willing to explain anything you did not understand; they also participated in the social functions so you got to know them very well over the duration of the workshop. The result of this process was a combination of demonstrations to capture student interest, activities to further their learning and a much deeper understanding of the topics on my part to be able to explain things

Two people involved in the process need to be singled out. Don McManus, a retired Naval Oceanographer who developed the modules and has been presenting them at teachers' professional meetings for a long time, understands the needs of teachers in the classroom. His activities were set out so they could be used from elementary to senior secondary levels and his tips on how to present to teachers will be invaluable. David Smith, the head of Oceanography and Meteorology at the US Naval Academy, is the course creator and organizer. He put together the materials, the team and dealt with all of the necessary organizational details to make this the great workshop that it is.



Taking a mud sample in Chesapeake Bay

My task now (it is an obligation for taking the course) is to give presentations to interested teachers on the various modules and how to incorporate the ocean materials into the classroom. I hope that I can make it useful and interesting to teachers around the country and help to get more ocean-related material into the classroom. For more information or to possibly attend a workshop contact me at [rcamichael@sd61.bc.ca](mailto:rcamichael@sd61.bc.ca).

**Atmosphere-Ocean 49-3 Paper Order**Applied Research / Recherche appliquée

Soil Moisture Initialization Effects in the Cccma AGCM3: Relationship of Sub-Seasonal Climate Forecast Error to Uncertainty in Soil Moisture Initializations by Nasim Alavi, Gordon Drewitt, Aaron A. Berg and William. J. Merryfield

Fundamental Research / Recherche fondamentale

Mesoscale Temperature Patterns in the Rocky Mountains and Foothills Region of Southern Alberta by Rachel M. Cullen and Shawn J. Marshall

Acidification of Lower St. Lawrence Estuary Bottom Waters by Alfonso Mucci, Michel Starr, Denis Gilbert and Bjorn Sundby

An Evaluation of Arctic Cloud and Radiation Processes Simulated by the Limited-Area Version of the Global Multiscale Environmental Model (GEM-LAM) by Dragan Simjanovski, Eric Girard and Ping Du

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Characteristics of Moisture Flux Convergence over the Mackenzie River Basin for Water Years 1991–2008 by Khalid M. Malik and Peter A. Taylor

Simulated Changes in the Freezing Rain Climatology of North America under Global Warming Using a Coupled Climate Model by Steven J. Lambert and Bjarne K. Hansen

**A-O Abstracts Preview****Avant Première des résumés de A-O**

The following abstracts will soon be published in your next *Atmosphere-Ocean* publication (49-3).

Les résumés qui suivent paraîtront sous peu dans votre prochaine revue *Atmosphere-Ocean* (49-3).

**Soil Moisture Initialization Effects in the Cccma AGCM3: Relationship of Sub-Seasonal Climate Forecast Error to Uncertainty in Soil Moisture Initializations**

by Nasim Alavi, Gordon Drewitt, Aaron A. Berg and William. J. Merryfield

**Abstract:** In the second phase of the Canadian Historical Forecasting Project (HFP2), four different Atmospheric General Circulation Models (AGCMs) were run to produce a series of four-month forecasts over a 33-year period. For the HFP2 project, the land surface wetness state was initialized from model climatology rather than estimates of the true initial soil moisture state. In this study, the impact of soil moisture initialization on the monthly forecasts of air temperature is evaluated using one of these four models, AGCM3 from the Canadian Centre for Climate modeling and Analysis (CCCma), which employs the Canadian Land Surface Scheme (CLASS) to represent land processes. A realistic global estimation of soil moisture was produced by running CLASS offline using a bias-corrected meteorological dataset over the global land surface. The relationship between errors in forecasts of near surface air temperature over the month and the uncertainty in the surface soil moisture initialization is identified for five northern hemisphere warm-season months during the period 1979–2002. The results demonstrate that soil moisture initialization has a statistically significant impact on monthly air temperature forecast over many regions. The greatest impact was found over the Sahel region in Africa, India and East Asia, regions in Brazil, and Central North America. The intensity and areal extent of this impact increases over extreme dry and wet soil moisture anomalies.

**Résumé:** Dans la deuxième phase du Projet de prévisions historiques (PPH2) canadien, quatre modèles de circulation générale de l'atmosphère (MCGA) ont été exécutés pour produire une série de prévisions de quatre mois sur une période de 33 ans. Pour le projet PPH2, les conditions d'humidité de la surface du terrain étaient initialisées à partir de la climatologie du modèle plutôt que par estimations des conditions d'humidité initiales réelles de la surface du terrain. Dans cette étude, nous évaluons l'impact de l'initialisation de l'humidité du sol sur les prévisions mensuelles de la température de l'air à l'aide de l'un de ces quatre modèles, l'AGCM3, du Centre canadien de la modélisation et de l'analyse climatique (CCmaC), qui emploie le schéma CLASS (Canadian Land Surface Scheme) pour représenter le processus. Nous avons obtenu une estimation globale réaliste de l'humidité du sol en exécutant le CLASS hors ligne et en utilisant un ensemble de données météorologiques dont le biais était corrigé pour l'ensemble de la surface du terrain. Nous identifions la relation entre les erreurs dans les prévisions de température de l'air près de la surface durant le mois et l'incertitude dans l'initialisation de l'humidité de la surface du terrain pour cinq mois de la saison chaude dans l'hémisphère Nord durant la période 1979–2002. Les résultats montrent que l'initialisation de l'humidité du sol a un impact statistiquement significatif sur la prévision mensuelle de la température de l'air dans plusieurs régions. L'impact le plus marqué a été observé dans la région du Sahel en Afrique, en Inde et en Asie orientale, dans certaines régions du Brésil et dans le centre de l'Amérique du Nord. L'intensité et l'étendue géographique de cet impact augmentent là où il y a des anomalies extrêmes (sèches ou humides) d'humidité du sol.

**Mesoscale Temperature Patterns in the Rocky Mountains and Foothills Region of Southern Alberta**

by Rachel M. Cullen and Shawn J. Marshall

**Abstract:** Near-surface air temperatures have been monitored from 2005 to the present in a mesoscale network of 280 sites in the foothills of the Rocky Mountains in southwestern Alberta, Canada. The monitoring network covers a range of elevations,

topographic conditions and surface environments. In this paper, we report on the seasonal structure of temperature patterns and near-surface lapse rates in the region for the period 2005–09. Multivariate regression is used to model the influence of elevation, aspect, slope and surface cover on monthly mean temperatures. Regression models identify the influence of synoptic weather systems on regional temperature patterns and prevailing lapse rates. To explore this further, we examine daily temperature patterns under the influence of two common weather systems in the region: cold (continental polar) air masses and chinooks.

**Résumé:** Nous avons surveillé les températures de l'air près de la surface de 2005 jusqu'à présent au moyen d'un réseau de mésoéchelle de 280 sites dans les contreforts des Rocheuses, dans le sud-ouest de l'Alberta, au Canada. Le réseau de surveillance englobe une gamme d'élévations, de conditions topographiques et d'environnements de surface. Dans cet article, nous présentons nos conclusions sur la structure saisonnière des configurations de température et des gradients thermiques verticaux près de la surface dans la région pour la période 2005 – 2009. Nous utilisons la régression multivariée pour modéliser l'influence de l'élévation, de l'aspect, de la pente et de la couverture de la surface sur les températures moyennes mensuelles. Les modèles de régression mettent en lumière l'influence des systèmes météorologiques synoptiques sur les configurations de température et les gradients thermiques verticaux prédominants dans la région. Pour mieux étudier cette question, nous examinons l'effet que produisent sur les configurations de température quotidiennes deux systèmes météorologiques communs dans la région : les masses d'air froid (continental polaire) et les chinooks.

#### Acidification of Lower St. Lawrence Estuary Bottom Waters

by Alfonso Mucci, Michel Starr, Denis Gilbert and Bjorn Sundby

**Abstract:** Accumulation of metabolic  $\text{CO}_2$  can acidify marine waters above and beyond the ongoing acidification of the ocean by anthropogenic  $\text{CO}_2$ . The impact of respiration on carbonate chemistry and pH is most acute in hypoxic and anoxic basins, where metabolic  $\text{CO}_2$  accumulates to high concentrations. The bottom waters of the Lower St. Lawrence Estuary (LSLE), where persistently severe hypoxia has developed over the last 80 years, is one such case. We have reconstructed the evolution of pH in the bottom waters from historical and recent data, and from first principles relating the stoichiometry of  $\text{CO}_2$  produced to oxygen consumed during microbial degradation of organic matter. Based on the value of the atmospheric partial pressure of  $\text{CO}_2$  that best reproduces the preformed dissolved inorganic carbon concentration in the bottom waters, we estimate the average ventilation age of the bottom water to be  $16 \pm 3$  years. The pH of the bottom waters has decreased by 0.2 to 0.3 over the last 75 years, which is four to six times greater than what can be attributed to the uptake of anthropogenic  $\text{CO}_2$ . The pH decrease is accompanied by a decline in the saturation state with respect to both calcite and aragonite. As of 2007, bottom waters in the LSLE are slightly supersaturated with respect to calcite ( $\Omega_c \approx 1.06 \pm 0.04$ ), but are strongly undersaturated with respect to aragonite ( $\Omega_a \approx 0.67 \pm 0.03$ ).

**Résumé:** L'accumulation de  $\text{CO}_2$  métabolique acidifie l'eau de mer au-delà de ce qui est généré par l'ajout de  $\text{CO}_2$  anthropique. L'impact de la respiration sur la spéciation des espèces

carbonatées en solution et du pH est plus marqué dans les bassins hypoxiques et anoxiques où le  $\text{CO}_2$  métabolique atteint de fortes concentrations. Dans l'estuaire maritime du Saint-Laurent (EMSL), des eaux profondes sévèrement hypoxiques se sont développées depuis les derniers 80 ans. Nous avons reconstitué l'évolution du pH des eaux de fond à l'aide de mesures historiques et récentes ainsi que des principes de base qui décrivent la relation stoéchiométrique entre la consommation d'oxygène et la production de  $\text{CO}_2$  métabolique issu de la dégradation microbienne de la matière organique. Selon la valeur de la pression partielle en  $\text{CO}_2$  qui reproduit le plus précisément les concentrations de carbone inorganique dissous préformées dans les eaux profondes, nous avons estimé l'âge moyen de ces eaux à  $16 \pm 3$  ans. Le pH des eaux profondes s'est abaissé de 0.2 à 0.3 depuis 75 ans, ce qui est de 4 à 6 fois plus important que ce qui est attribuable au transfert du  $\text{CO}_2$  anthropique. La décroissance du pH est accompagnée par une diminution du degré de saturation par rapport à la calcite et l'aragonite. En 2007, les eaux profondes de l'EMSL demeurent légèrement sursaturées par rapport à la calcite ( $\Omega_c \approx 1.06 \pm 0.04$ ) mais sont sévèrement sous-saturées par rapport à l'aragonite ( $\Omega_a \approx 0.67 \pm 0.03$ ).

#### An Evaluation of Arctic Cloud and Radiation Processes Simulated by the Limited-Area Version of the Global Multiscale Environmental Model (GEM-LAM)

by Dragan Simjanovski, Eric Girard and Ping Du

**Abstract:** Cloud and radiation processes simulated by the limited area version of the Global Environmental Multiscale Model (GEM-LAM) are evaluated for the period September 1997 to October 1998 over the western Arctic Ocean. This period coincides with the Surface Heat Budget of the Arctic Ocean (SHEBA) field experiment. Surface downwelling solar and terrestrial radiation, surface albedo, vertically integrated water vapour, liquid water path, precipitation, cloud cover and cloud radiative forcing simulated by GEM-LAM are evaluated against the SHEBA observation dataset. GEM-LAM simulates the annual cycle of the downwelling shortwave (SWD) and longwave (LWD) radiation at the surface reasonably well as well as precipitable water at monthly and daily time scales. Cloud fraction at daily and monthly time scales is not captured well by the model. During winter, GEM-LAM produces a large negative bias for the vertically integrated liquid water path and a positive bias for cloud fraction. As a result, cloud radiative forcing at the surface and LWD radiation are well reproduced but for the wrong reasons because these two biases have an opposing effect on their magnitudes. During summer, the model underestimates the surface albedo, thus resulting in a substantial overestimation of the cloud radiative forcing at the surface. Precipitation is underestimated during winter and overestimated during summer and spring. The sensitivity of the results to the effective radius of ice crystals and the parameterization of cloud phase is also discussed.

**Résumé:** Nous évaluons les processus de nuages et de rayonnement simulés par la version à aire limitée du Modèle global environnemental multi-échelle (GEM-LAM) pour la période allant de septembre 1997 à octobre 1998 dans l'ouest de l'océan Arctique. Cette période coïncide avec l'expérience sur le terrain du Bilan thermique de surface de l'océan Arctique (SHEBA). Nous évaluons le rayonnement solaire et terrestre entrant dans l'eau, l'albédo de la surface, la vapeur d'eau intégrée verticalement, le parcours de l'eau liquide, les précipitations, la couverture nuageuse et le forçage radiatif par les nuages simulés par le

GEM-LAM par rapport à l'ensemble de données d'observations du SHEBA. Le GEM-LAM simule raisonnablement bien le cycle annuel du rayonnement de courtes longueurs d'onde (SWD) et de grandes longueurs d'onde (LWD) entrant à la surface de même que l'eau précipitable aux échelles de temps mensuelle et journalière. La fraction nuageuse aux échelles de temps journalière et mensuelle n'est pas bien capturée par le modèle. Durant l'hiver, le GEM-LAM produit un fort biais négatif pour le parcours de l'eau liquide verticalement intégrée et un biais positif pour la fraction nuageuse. Il en résulte que le forçage radiatif à la surface et le rayonnement LWD sont bien reproduits mais pour les mauvaises raisons, parce que ces deux biais ont un effet opposé sur leur ampleur. Durant l'été, le modèle sous-estime l'albédo de la surface, ce qui mène à une surestimation importante du forçage radiatif par les nuages à la surface. Les précipitations sont sous-estimées pendant l'hiver et surestimées pendant l'été et le printemps. Nous discutons aussi de la sensibilité des résultats au rayon effectif des cristaux de glace et à la paramétrisation de la phase nuageuse.

### Response of the Pacific Ocean Circulation to Climate Change

by Yiyong Luo and Lewis M. Rothstein

**Abstract:** The response of the Pacific Ocean circulation to climate change is investigated by comparing solutions from a set of Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report (AR4) coupled models for a present-day climate (the 20C3M experiments) and a future, warmer climate (the SRESA1B experiments). Under the warmer climate scenario, the oceanic changes in the tropical Pacific include a relatively weak warming of the western equatorial thermocline, a weakening of the surface current system and a complicated change in the structure of the Equatorial Undercurrent (EUC) with an increased flow in its upper branch but a decreased flow in its lower branch. As the climate warms, the North Pacific Ocean features a basin-scale reduction in mixed layer depth, a weakening of the subtropical countercurrent (STCC), a northward shift of the Kuroshio Extension (KE) and an overall slowdown of the subtropical gyre. In the South Pacific, the warmer climate induces significant changes in the upper ocean of the eastern subtropics including a relatively weak warming, a deepening of mixed layer depth and an anti-cyclonic circulation.

**Résumé:** Nous étudions la réponse de la circulation de l'océan Pacifique au changement climatique en comparant les solutions d'un ensemble de modèles couplés du Quatrième Rapport d'évaluation (QRE) du Groupe d'experts intergouvernemental sur l'évolution du climat (GIEC) pour le climat actuel (les expériences 20C4M) et un climat futur, plus chaud (les expériences SRESA1B). Dans le scénario d'un climat plus chaud, les changements océaniques dans le Pacifique tropical comprennent un réchauffement relativement faible de la thermocline équatoriale occidentale, un affaiblissement du système de courants de surface et un changement compliqué dans la structure du sous-courant équatorial avec un débit accru dans sa partie supérieure mais un débit moindre dans sa partie inférieure. À mesure que le climat se réchauffe, le Pacifique Nord affiche une réduction à l'échelle du bassin de l'épaisseur de la couche de mélange, un affaiblissement du contre-courant subtropical, un déplacement vers le nord de l'extension du Kuroshio et un ralentissement général du gyre subtropical. Dans le Pacifique Sud, le climat plus chaud entraîne des changements importants dans les couches

supérieures de la partie subtropicale orientale, y compris un réchauffement relativement faible, un approfondissement de l'épaisseur de la couche de mélange et une circulation anticyclonique.

### The Effect of Climate Change on the Sea Ice and Hydrography in Nares Strait

by Till A. S. Rasmussen, Nicolai Kliem and Eigil Kaas

**Abstract:** A three-dimensional coupled ocean (Hybrid Coordinate Ocean Model; HYCOM) and sea-ice (Community Ice Code; CICE) model were used to simulate the ice cover and hydrography in Lincoln Sea, Nares Strait and Baffin Bay for the period 1952 to 2080. The first eight years were used to spin up the model. The last 120 years were divided into four 30-year sub-periods, which have been evaluated and compared in order to estimate the simulated changes.

The modelled oceanic volume flux and freshwater fluxes compare well with observations in the present day scenario. The annual volume flux varies, but the 10-year average is approximately 0.8 Sv without any long-term trend. It should be noted that 5 cm were added to the sea surface height in Baffin Bay and Lancaster Sound during the entire simulation. This was done in order to control the volume flux of the control period without changing the variability. The freshwater flux increases from approximately 27 mSv in the control scenario to 73 mSv in the future scenario, mainly due to a fresher surface.

The magnitude of the annual ice area flux through Nares Strait is higher than expected compared with results from satellite images. This is because the ice arch formed in the southern part of Kane Basin is less stable in the model simulation. The result is a sea-ice area flux of about  $100 \times 10^3 \text{ km}^2 \text{ y}^{-1}$ . This is approximately the same sea-ice area flux as observed in 2007 when the ice arch did not form. The sea-ice area flux from 2040 increases by around 50% because of a lowering of the sea-ice concentration which causes a large reduction in the internal sea-ice strength. The sea-ice volume flux is reduced during the entire period from approximately  $200 \text{ km}^3 \text{ y}^{-1}$  to around  $125 \text{ km}^3 \text{ y}^{-1}$ .

The simulated sea-ice cover decreases throughout the entire period. The area is still fully ice covered during winter but the duration of the sea-ice coverage becomes shorter. This leads to a fresher sea surface and a temperature increase of up to  $0.5^\circ\text{C}$  at depths of approximately 200 m. The opening of the North Water Polynya in spring is limited by the reduced lifetime of the ice arch in Kane Basin. However, during some years when the ice arch is stable the polynya opens as expected both in time and place.

**Keywords:** sea ice; modeling; HYCOM; CICE; Nares Strait; Baffin Bay; Lincoln Sea; climate change.

**Résumé:** Nous avons utilisé un modèle tridimensionnel couplé océan (HYCOM — *Hybrid Coordinate Ocean Model*) et glace de mer (CICE — *Community Ice Code*) pour simuler la couverture de glace et l'hydrographie dans la mer de Lincoln, le détroit de Nares et la baie de Baffin pour la période allant de 1952 à 2080. Les huit premières années ont servi à mettre en marche le modèle. Les 120 dernières années ont été divisées en quatre sous-périodes de 30 ans que nous avons évaluées et comparées pour estimer les changements simulés.

Le flux volumique océanique et les flux d'eau douce modélisés se comparent bien aux observations dans le scénario actuel. Le flux volumique annuel varie mais la moyenne de 10 ans est d'approximativement 0,8 Sv et n'affiche aucune tendance à long terme. Il est à remarquer que 5 cm ont été ajoutés à la hauteur de la surface de la mer dans la baie de Baffin et le détroit de Lancaster durant toute la simulation. Cela visait à contrôler le flux volumique durant la période de référence sans changer la variabilité. Le flux d'eau douce passe d'environ 27 mSv dans le scénario de référence à 73 mSv dans le scénario futur, principalement à cause d'une surface plus douce.

L'ampleur du flux surfacique annuel de glace à travers le détroit de Nares est plus grande que ce à quoi on s'attendait comparativement aux résultats obtenus des images satellitaires. C'est parce que l'arche de glace formée dans la partie sud du bassin Kane est moins stable dans la simulation du modèle. Il en résulte un flux surfacique de glace de mer d'environ  $100 \times 10^3 \text{ km}^2 \text{ a}^{-1}$ . C'est approximativement le même flux surfacique de glace de mer que celui observé en 2007, quand l'arche de glace ne s'est pas formée. Le flux surfacique de glace de mer à partir de 2040 augmente d'environ 50 % à cause d'une baisse de la concentration de la glace de mer qui entraîne une forte réduction de la cohésion interne de la glace de mer. Le flux volumique de glace de mer diminue durant toute la période pour passer d'environ  $200 \text{ km}^3 \text{ a}^{-1}$  à environ  $125 \text{ km}^3 \text{ a}^{-1}$ .

La couverture simulée de glace de mer diminue durant toute la période. La zone est encore complètement englacée durant l'hiver mais la durée de la couverture de glace de mer devient plus courte. Cela mène à une eau de mer plus douce en surface et à une augmentation de température de jusqu'à  $0,5 \text{ }^\circ\text{C}$  à des profondeurs d'environ 200 m. L'ouverture de la polynie des Eaux du nord au printemps est limitée par la durée réduite de l'arche de glace dans le bassin Kane. Cependant, certaines années, quand l'arche de glace est stable, la polynie s'ouvre à l'endroit et au moment habituels.

**Mots clés:** glace de mer; modélisation; HYCOM; CICE; détroit de Nares; baie de Baffin; mer de Lincoln; changement climatique.

#### Modelling Extreme Storm-Induced Currents over the Grand Banks

by Yongsheng Wu, Charles C.L. Tang, Michael Z. Li and Robert H. Prescott

**Abstract:** Extreme storm-induced currents over the Grand Banks are investigated using a three-dimensional (3-D) ocean circulation model forced by 22 storms selected from the past 50 years with return intervals ranging from 1 to 34 years. Wind data for the storms are historical atmospheric data. The modelled currents are compared with current meter measurements made during a storm in March 1983. The results indicate good agreement between the model and measurements. In the surface layer of the Grand Banks, the model extreme current speeds are approximately  $80 \text{ cm s}^{-1}$  over a large portion of the Grand Banks, and some areas have extreme current speeds higher than  $120 \text{ cm s}^{-1}$ . The highest extreme current speeds occur at St. Pierre Bank, where the speed reaches  $140 \text{ cm s}^{-1}$ . In the bottom layer, the region with high extreme current speeds is mainly in the periphery of the Grand Banks with magnitudes over  $40 \text{ cm s}^{-1}$ . The results also show that the response of the water to storm forcing in the Grand Banks area varies from place to place because the mechanisms of

current generation are different at different locations.

**Résumé:** Nous étudions les courants extrêmes produits par des tempêtes sur les Grands Bancs à l'aide d'un modèle de circulation océanique tridimensionnelle forcé par 22 tempêtes sélectionnées dans les 50 dernières années avec des temps de retour variant entre 1 et 34 ans. Les données de vent pour les tempêtes sont les données atmosphériques historiques. Les courants modélisés sont comparés aux mesures faites par courantomètre durant une tempête en mars 1983. Les résultats indiquent une bonne correspondance entre le modèle et les mesures. Dans la couche de surface des Grands Bancs, les vitesses des courants extrêmes du modèle sont d'approximativement  $80 \text{ cm s}^{-1}$  sur une grande partie des Grands Bancs et certaines régions ont des vitesses de courants extrêmes dépassant  $120 \text{ cm s}^{-1}$ . Les plus grandes vitesses de courants extrêmes se retrouvent au Banc de Saint-Pierre, où elles atteignent  $140 \text{ cm s}^{-1}$ . Dans la couche de fond, la région de grandes vitesses de courants extrêmes se situe principalement à la périphérie des Grands Bancs, avec des valeurs d'environ  $40 \text{ cm s}^{-1}$ . Les résultats montrent aussi que la réponse de l'eau au forçage par les tempêtes dans la région des Grands Bancs varie d'un endroit à l'autre parce que les mécanismes de production de courant sont différents pour des endroits différents.

#### Composite Soundings Associated With Severe and Tornadoic Thunderstorms in Central Alberta

by Maxwell L. Dupilka and Gerhard W. Reuter

**Abstract:** Composite profiles of temperature, humidity and wind are constructed for severe thunderstorms that formed over central Alberta, Canada, during the period 1967–2000. Storms were divided into three categories consisting of 13 non-tornadoic storms which produced hail  $\geq 3 \text{ cm}$  in diameter but no reported tornadoes, 61 weak tornadoes (F0 and F1) and 13 significant tornadoes (F2–F4). All three composites showed potential instability through most of the sounding. However, thermodynamic parameters did not discriminate among the three categories. In contrast, however, composite hodographs did show noticeable differences among the three groups. The hodograph for the significant tornado composite exhibited strong low-level veering winds having 0–3 km helicity of  $65 \text{ m}^2 \text{ s}^{-2}$  and southwest winds of about  $20 \text{ m s}^{-1}$  in the mid- to upper levels. The hodograph for the weak tornado composite showed weak low-level veering winds (0–3 km helicity of  $17 \text{ m}^2 \text{ s}^{-2}$ ) and much lighter winds overall compared with the other two composites. The non-tornado composite hodograph had nearly unidirectional southwest winds of about  $15 \text{ m s}^{-1}$  in the mid- to upper levels. The significant tornadoic storms were similar to typical mid-latitude supercell hodographs.

**Résumé:** Nous construisons des profils composites de la température, de l'humidité et du vent pour des orages forts qui se sont formés dans le centre de l'Alberta, au Canada, durant la période 1967–2000. Les tempêtes ont été divisées en trois catégories consistant en 13 tempêtes non tornadiques ayant produit de la grêle d'au moins 3 cm de diamètre mais lors desquelles aucune tornade n'a été signalée, 61 tornades faibles (F0 et F1) et 13 grosses tornades (F2–F4). Les trois composites montraient de l'instabilité potentielle dans la majeure partie du sondage. Cependant, les paramètres thermodynamiques ne permettaient pas de discriminer ces trois catégories. Cependant, les hodographes composites ont bel et bien montré des différences notables entre les trois groupes. L'hodographe du

composite des grosses tornades montrait de forts vents qui viraient dans les bas niveaux, avec une hélicité entre 0 et 3 km de  $65 \text{ m}^2 \text{ s}^{-2}$ , et des vents du sud-ouest d'environ  $20 \text{ m s}^{-1}$  dans les niveaux moyens à élevés. L'hodographe du composite des tornades faibles montrait des vents qui viraient faiblement dans les bas niveaux (hélicité entre 0 et 3 km de  $17 \text{ m}^2 \text{ s}^{-2}$ ) et des vents beaucoup faibles en général comparativement à ceux des deux autres composites. L'hodographe du composite non tornadique montrait des vents presque unidirectionnels du sud-ouest d'environ  $15 \text{ m s}^{-1}$  dans les niveaux moyens à élevés. L'hodographe des grosses tempêtes tornadiques était similaire aux hodographes typiques des supercellules des latitudes moyennes.

### Characteristics of Moisture Flux Convergence over the Mackenzie River Basin for Water Years 1991–2008

by Khalid M Malik and Peter A Taylor

**Abstract:** This paper presents a methodology and some results computed for moisture flux convergence into a region using reanalysis data from the National Centers for Environmental Prediction (NCEP) for a period of 18 years from 1991 to 2008 and from the 40-year global reanalysis data from the European Centre for Medium-range Weather Forecasts (ERA-40) for a period of 11 years from 1991 to 2001. The purpose of the study is to discuss the implied characteristics of moisture flux convergence over the Mackenzie River Basin (MRB) obtained from two different reanalysis datasets. Four analyses per day were used to compute diurnal variations in moisture flux convergence and compared with the results using two analyses per day. The research was divided into two parts. The first concentrates on the computation of moisture flux convergence into the MRB using datasets from four different times of day (00:00, 06:00, 12:00 and 18:00 UTC) and comparing the results with those obtained in earlier studies by Schuster using two datasets per day. The results indicate some differences, but the two analyses are generally quite compatible. The second part deals with the computation of the moisture flux convergence into the MRB using two different datasets (NCEP and ERA-40), and the variation between them is discussed. The vertical profile of moisture flux convergence was obtained and the results reveal that the largest moisture flux convergence occurs in the height range from 850 hPa to 700 hPa.

**Résumé:** Cet article présente une méthodologie ainsi que certains résultats calculés concernant la convergence du flux d'humidité à l'intérieur d'une région à l'aide des données de réanalyse des NCEP (*National Centers for Environmental Prediction*) pour une période de 18 ans s'étendant de 1991 à 2008 et des données de réanalyse globales de 40 ans du Centre européen pour les prévisions météorologiques à moyen terme (ERA-40) pour une période de 11 ans s'étendant de 1991 à 2001. Le but de l'étude est de discuter les caractéristiques implicites de la convergence du flux d'humidité au-dessus du bassin du fleuve Mackenzie (BFM) dérivée de deux ensembles différents de données de réanalyse. Nous avons utilisé quatre analyses par jour pour calculer les variations diurnes dans la convergence du flux d'humidité et les comparer aux résultats obtenus avec deux analyses par jour. La recherche comportait deux volets. Le premier porte sur le calcul de la convergence du flux d'humidité à l'intérieur du BFM à l'aide d'ensembles de données pour quatre heures différentes du jour (00:00, 06:00, 12:00 et 18:00 UTC) et compare les résultats à ceux obtenus lors d'études antérieures faites par Schuster qui avait utilisé deux ensembles de données

par jour. Les résultats exhibent certaines différences mais, dans l'ensemble, les deux analyses sont fort compatibles. Le second volet porte sur le calcul de la convergence du flux d'humidité à l'intérieur de la région du BFM à l'aide de deux ensembles de données différents (NCEP et ERA-40), et nous discutons des différences qui en ressortent. Nous avons obtenu le profil vertical de la convergence du flux d'humidité et les résultats révèlent que la plus forte convergence du flux d'humidité se produit dans l'intervalle de hauteurs de 850 hPa à 700 hPa.

### Simulated Changes in the Freezing Rain Climatology of North America under Global Warming Using a Coupled Climate Model

by Steven J. Lambert and Bjarne Hansen

**Abstract:** A precipitation typing algorithm was applied to climate model simulations in order to investigate the effect of global warming on the occurrence of freezing rain over North America. The model used in the study was the Canadian Centre for Climate Modelling and Analysis' CGCM3. Two realizations of the present-day (1981–2000) climate and two realizations of a global warming (2081–2100) simulation were run using scenario A2 from the Special Report on Emissions Scenarios (SRES) prepared by the Intergovernmental Panel on Climate Change (IPCC). The algorithm was applied to the four twenty-year periods in order to determine the change in the number and distribution of freezing rain events. The model results indicate that the present-day freezing rain maximum over eastern North America will shift poleward and weaken with the result that freezing rain events will decrease significantly in the eastern United States and the Atlantic Provinces. To the north of the maximum and over central Canada there will be modest increases in freezing rain. When averaged over North America, there will be an overall decrease in freezing rain events with global warming.

**Résumé:** Nous avons appliqué un algorithme de typage des précipitations aux simulations d'un modèle climatique afin d'étudier l'effet d'un réchauffement planétaire sur les événements de pluie verglaçantes en Amérique du Nord. Le modèle utilisé pour l'étude était le MCG3 du Centre canadien de la modélisation et de l'analyse climatique. Nous avons produit deux réalisations du climat du jour présent (1981–2000) et deux réalisations d'une simulation de réchauffement planétaire (2081–2100) en nous basant sur le scénario A2 du Rapport spécial sur les scénarios d'émissions (RSSE) préparé par le Groupe d'experts intergouvernemental sur l'évolution du climat (GIEC). Nous avons appliqué l'algorithme aux quatre périodes de vingt ans dans le but de déterminer le changement dans le nombre et la distribution des événements de pluie verglaçante. Selon les résultats du modèle, le maximum de pluie verglaçante du jour présent dans l'est de l'Amérique du Nord se déplacera en direction du pôle et faiblira, ce qui entraînera une nette diminution des événements de pluie verglaçante dans l'est des États-Unis ainsi que dans les provinces de l'Atlantique. Au nord du maximum et dans le centre du Canada, il y aura une augmentation modeste de la pluie verglaçante. Si l'on fait la moyenne pour l'Amérique du Nord, il y aura une diminution générale des événements de pluie verglaçante avec un réchauffement de la planète.



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**BOOK REVIEWS / REVUES de LITTÉRATURE**

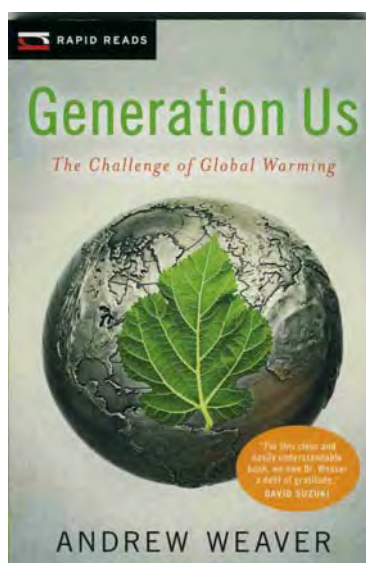

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## Generation Us the Challenge of Global Warming

by Andrew Weaver

Published by Raven Books (Rapid Reads), Orca Book Publishers, 2011; Paperback,  
ISBN 978-1-55469-804-2, pp. 123, \$9.95

Book reviewed by: T. Colleen Farrell<sup>1</sup>



This book is a quick read yet thought-provoking and entertaining at the same time. The title “Generation Us” is described as the evolution of “Generation Me”. There are very good plain language explanations of the issues, the controversy and the reasons why some people may prefer to drag their feet on action on the issue of global warming and there is not a formula to be seen. Dedicated to “the youth of today, the decision makers of tomorrow”, the target

audience is as advertised, young people. Junior and Senior High School students passionate about environmental causes could benefit most from this book. One section entreats individuals to get out and vote “to elect leaders who possess... a vision for a sustainable future”, so it is perhaps a slightly older audience (at least 18 years old), possibly first year university students studying courses in environmental science for non-physical scientists, may be the ideal target. Not much scientific knowledge is required, but to gain maximum benefit from the book, if not a deep passion for the issues, a solid High School-level science course is prerequisite.

In the Introduction, “The Nature of Science and the Science of Nature”, terms such as scientific method, hypothesis and uncertainty, as well as “climate” versus “weather” are explained. There is also an outline of how the rest of the book is organized.

The rest of the book is divided into three parts: Part One (“*What is the Problem?*”) explains the problems earth will experience under global warming. Part Two (“*Why Should I Care?*”) asks the question “*Do we have any responsibility for the well-being of future generations?*” and describes projected impacts in this century. In Part Three, suggestions on how to move forward are prefaced by two more important questions: “*What can I do about it?*” and “*What can we do to adapt to global warming?*”

A glossary of terms is available at the back of the book to give a more concise overview of more scientific or technical terms. For example, definitions for “cap and “trade”, “hypothesis”, “scientific method” and “tipping point”, reappear here. Although these topics and others are very well explained within the text (for example, a very detailed, yet illustrative explanation of how a Cap and Trade system might work using William Forster Lloyd’s “Tragedy of the Commons” scenario appears in Part Two), the reader may be appreciative of being able to refer to the glossary for a quick review of a concept.

A more detailed explanation of units such as ppbv, ppmv and ppm might be advisable. For example, I recently read a newspaper article that used the following analogy:

“*If you were to fill a bathtub with water, one part per billion would be the equivalent of a single drop.*” (E. Blanchard, NB Department of Environment, the Telegraph-Journal,

<http://telegraphjournal.canadaeast.com/city/article/1423438>

accessed Thursday July 14<sup>th</sup>, 2011).

Similarly descriptive analogies might have been useful in these instances, or perhaps additional definitions in the glossary were warranted. A similar strategy was employed in this book when comparing the delayed response of the climate system to an increase in greenhouse gases to a pot of water heating on the stove. This is an effective way to illustrate concepts to a non-scientist.

Praise for this book by David Suzuki appears on both the front and back covers. I particularly liked the following excerpts from the book, as calls to action: “*Scientific uncertainty is not a justification for inaction*” and “*The time for us is now*”.

One minor distraction from the flow of the text was the font used for numerals. The number 1 appears throughout the text as “1” while other numerals appear at times almost as subscripts.

There are few figures or graphs, but the lack of colour in two pie charts makes them harder to interpret, which may disadvantage a younger audience to fully understand the

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<sup>1</sup> Environment Canada, Dartmouth, Nova Scotia, Canada

issue as it is presented. One cartoon is included, which is a welcome addition, but I would think there must be a trove of cartoons that could be mined to illustrate the narrative and appeal to the target audience.

Overall I enjoyed this book and will pass it along to a teacher of High School Science.

## Merchants of Doubt

by Naomi Oreskes and Erik M. Conway

355pp, Bloomsbury Press, 2010  
ISBN978-1-59691-610-4, \$33.50 in Canada

Book reviewed by Richard Asselin<sup>2</sup>

Quote from the cover of the book:

"*Merchants of Doubt* tells the story of how a loose-knit group of high-level scientists and scientific advisors, with deep connexions in politics and industry, ran effective campaigns to mislead the public and deny well-established scientific knowledge over four decades. Remarkably, the same individuals surface repeatedly. Some of the same figures who have claimed the science of global warming is "not settled" denied the truth of studies linking smoking to lung cancer, coal smoke to acid rain, and CFCs to the ozone hole. "Doubt is our product", wrote one tobacco executive. These "experts" supplied it.

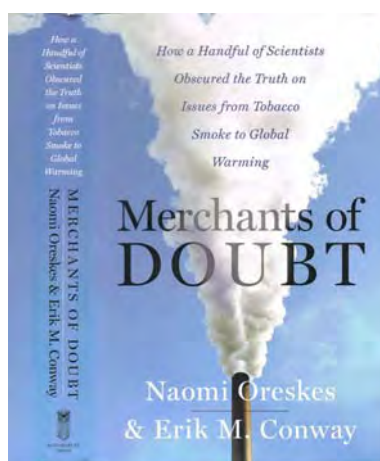
Naomi Oreskes and Erik M. Conway, historians of science, roll back the rug on this dark corner of American science, showing how the ideology of market fundamentalism, aided by a too-compliant media, have skewed public understanding of some of the most critical issues of our era."

Following the introduction which is more like an abstract, there are 7 main chapters, each dealing with a different case of questionable scientific behaviour, followed by a conclusion and epilogue. Each of the cases is thoroughly documented, with 64 pages of notes and references and a detailed index of 11 pages. It is a history book about science, not a scientific book. The reference documents are private letters, newspaper articles, letters to editors, internal company documents, court documents, as well as journal articles and scientific reports.

<sup>2</sup> Director of Publications, CMOS, Ottawa, Ontario, Canada.

Chapter 1: *Doubt is Our Product*, is the story of how the tobacco industry fought regulation by negating the link between smoking and cancer and diverted attention on lung cancer by sponsoring research into other causes of cancer. Most of the source documents on which this chapter is based became available in court cases in the 1990's and are now archived electronically in the University of California San Francisco Library; they contain more than 50 million pages of text and are still being added to <http://legacy.library.ucsf.edu>

Chapter 2: *Strategic Defense, Phony Facts, and the Creation of the George C. Marshall Institute* is about how strong anti-communist scientists carried the torch for Ronald Reagan's Strategic Defense Initiative. The Marshall Institute was created to discredit scientists adverse to SDI.



Chapter 3: *Sowing the Seeds of Doubt: Acid Rain* explains how a politically influential senior scientist created doubt by posing questions in the media about established science, manipulated the peer review process and succeeded in preventing control legislation during all of the Reagan era.

Chapter 4: *Constructing a Counternarrative: The Fight over the Ozone Hole* is about the fight of the CFC industry against regulation by negating the observations and attacking scientists.

Chapter 5: *What's Bad Science? Who Decides? The fight over Secondhand Smoke* describes more tobacco industry techniques to negate the effect second hand smoke, defend individual freedom to smoke and prevent health regulations.

Chapter 6: *The Denial of Global Warming* is about how the oil industry and the White House coordinated their actions to prevent emission controls by calling for more research, distorting scientific results, attacking personalities.

Chapter 7: *Denial Rides Again: The Revisionist Attack on Rachel Carson*. Carson is the scientist who showed that DDT had major effect on the environment. She was the subject of vicious attacks, even accused of the death of millions of Africans.

Conclusion: *Of Free Speech and Free Markets*. When science discovers certain relations between man's (especially industry's) activities and impact on others, or the environment, the natural reaction of socially oriented politicians or the public is to call for some kind of regulation

against these activities. But for many Americans, regulations are viewed as a restriction on individual liberty and personal freedom. Socially oriented regulations designed to protect the common good are a form of communism that must be fought in every conceivable manner.

In the epilogue: *A New View of Science*, the authors explain that doubt works because we (the public) have an erroneous view of science: we expect certainty, and if science cannot provide certainty on a certain matter, then it must be faulty. People with vested interest and the means to influence the public exploit this misconception. In reality, science is only a "consensus of experts based on the organized accumulation and scrutiny of evidence." Peer review, coordinated by scientific institutions is critical in this process. In the end, the public and politicians have no choice but to rely on the advice of scientists expert in the specialty, imperfect as they may be.

Despite the wide range of topics covered in this book, there are only a few players involved, particularly Frederik (Fred) Seitz, S.(Siegfried) Singer, Robert Jastrow and William Nierenberg. Each one had been a successful physicist in his early career but none had any specific competence in the topics they were now dealing with; they had scientific powers and political influence and were able to delay government regulations for very long periods.

In each case, the science had already been established in the peer-reviewed literature. Therefore, they fought their debate through the press, which felt obliged under the Fairness Doctrine to provide equal exposure to both sides of the issues, even though the contrarian side was promoted by a very small number of scientists. Newspapers and magazines with conservative philosophies were only too pleased to promote anti-scientific views when the scientific findings were calling for regulations, and therefore restrictions to individual freedom. The technique was effective because the public does not read the scientific literature and is easy to influence through the media and the press.

The book offers a fascinating insight into senior policy-making in the U.S.: the collusion among industry representatives, policy institutes, politicians, ideologically driven scientists, major newspapers, and even highly rated scientific journals.

The book is very strictly American. Canada or Canadian scientists are mentioned only in passing. Nevertheless, given the influence that American ideas and science exert on Canadian institutions, the story of what has happened in our neighbour's backyard provides a lot of food for thought. It may be a rough awakening for innocent persons, scientists who believe that government actions should be based on factual information and expert advice. Several of the persons named in the book were well-known in the

fields of atmospheric and oceanographic sciences. Many of us older ones who knew Singer and Jastrow may be distressed by discovering their manipulations.

The book is well written and very factual. I recommend it to all scientists looking for funding, managers of science, policy makers and members of parliament.

Note from the Editor: Another interesting critique of the same book can be found on:

<http://www.energybulletin.net/node/53446>

Further note from the Editor: Last June, while I was receiving this book critique from Richard Asselin, CMOS Executive was also receiving a short note from Ian Rutherford, Executive Director, which read as follows:

«The following is from today's AAAS Policy Alert (June 15, 2011; <http://www.aaas.org/spp/policyalert>):

**“Australian Universities Move to Protect Climate Researchers.** Over the past several months at least a dozen climate scientists at four Australian universities have received messages threatening them and, in some cases, their families, with death or violence. Although such incidents have been taking place for some time, they have intensified in recent months and authorities are taking them seriously. Protective measures include removing the names of the researchers from directories and signs on office doors and only allowing students and visitors with appointments to see the researchers. An informal survey of U.S. climate researchers by [The Chronicle of Higher Education](#) indicates that, while some have received e-mails that are "not nice," none has received threats similar to those of their Australian colleagues”.

AAAS: American Association for the Advancement of Science

## ANNOUNCEMENT

**A Boy from Vienna**

by Uri Erich Schwarz

The estate of Uri Schwarz, who died in May 2010 shortly after retiring from more than 27 years of volunteer service for CMOS, has recently authorized CMOS to provide open access for CMOS members to Uri's autobiographic book, *A Boy from Vienna*. A team composed of CMOS webmaster Bob Jones, John Merrick and Bill Pugsley managed to scan the book and after optical character reading, to reformat it in PDF and PRC formats suitable for reading on various tablets as well as regular computers.

This book recalls in vivid and lively terms Uri's life from birth to about 1982, when he retired from the position of Chief of Meteorology for the ICAO. Uri's maternal language was German, but he eventually mastered several other languages and became very proficient in English. His elaborate and refined vocabulary is in evidence throughout the book.

Uri's life was a series of adventures, hard to believe in some cases. His book is the story of a Jew living through the war in several countries of Europe and the middle-East: not easy! Uri writes so genuinely, and he seems so innocent and naïve that his book is like a fiction novel. He was a caring and funny person who loved to play with words, often composing limericks, and his work is a reflection of this. There is something funny in each chapter. Anyone will enjoy reading it.

Uri was also a very careful person, a quality that no doubt allowed him to survive all his misadventures. During his lifetime very few people were allowed to read the book. He was very concerned that it might fall into the hands of the people mentioned and possibly offend them (most are deceased by now). He published the book privately and never wanted to publish it openly, a wish that is being respected by his estate. We ask that any person reading Uri's book also respect his wishes.

The book can be found under the Reports tab of the Member Services site: <https://www1.cmos.ca/>. Please consider making a contribution to the Uri Schwarz Development Fund at:

<http://www.cmos.ca/donationsform.pdf>

Richard Asselin  
CMOS Publications Director

## ANNONCE

**A Boy from Vienna**

par Uri Erich Schwarz

Les exécuteurs testamentaires de Uri Schwarz, décédé en mai 2010 peu après avoir complété plus de 27 années de bénévolat pour la SCMO, a récemment autorisé la Société à accorder à ses membres le libre accès au livre autobiographique de Uri, *A Boy from Vienna*. Une équipe composée du webmestre de la SCMO Bob Jones, John Merrick et Bill Pugsley s'est organisée pour numériser le livre et, après reconnaissance optique du texte, le transformer en formats PDF et PRC pouvant être lus sur divers appareils portatifs ainsi que les ordinateurs réguliers.

Ce livre rappelle en termes vivants et animés la vie de Uri Schwarz de sa naissance à environ 1922, date de sa retraite du poste de Chef de la météorologie pour l'OACI. Uri était de langue maternelle allemande mais il finit par maîtriser plusieurs autres langues et devint très versé en anglais. On peut apprécier son vocabulaire élaboré et raffiné tout au long du livre.

La vie de Uri fut une série d'aventures, difficiles à croire à l'occasion. C'est l'histoire d'un juif subissant la guerre en passant d'un pays à l'autre en Europe et au moyen orient: un parcours difficile! Mais l'écriture est si authentique et Uri semble si innocent et naïf que son livre se lit comme un roman. Il était une personne attentive et comique aimant jouer avec les mots et composer des petits poèmes absurdes, ce qui est bien rendu dans son texte. Il y a quelque chose de drôle dans chaque chapitre, et cela plaira à n'importe quel lecteur.

Uri était aussi une personne très prudente, ce qui l'a sûrement aidé à survivre à toutes ses mésaventures. Il ne permit qu'à très peu de personnes de lire son livre de son vivant. Il s'inquiétait de la possibilité qu'il tombe entre les mains des personnes mentionnées et les blesse (la plupart sont décédées maintenant). Il publia privément et rejeta l'idée d'être publié ouvertement, une volonté qui est respectée par sa succession. Nous demandons à toute personne qui lira le livre de Uri de respecter son souhait d'intimité.

Le livre se trouve sous l'onglet Rapports du site des Services aux membres: <https://www1.cmos.ca/french>. Vous pouvez faire une contribution au fonds de développement Uri Schwarz à: <http://www.scmo.ca/donationsform.pdf>

Richard Asselin  
Directeur, Publications de la SCMO

**JOBS - JOBS - JOBS - JOBS - JOBS - JOBS - JOBS****UNIVERSITY  
OF MANITOBA****Graduate & Postgraduate Positions in Arctic Marine Science  
University of Manitoba, Winnipeg and elsewhere**

The Centre for Earth Observation Science (CEOS) at the University of Manitoba is seeking at least 30 new graduate students at the MSc, PhD and Postdoctoral levels, as a major new intake of students to conduct research in a variety of Arctic marine system studies in Canada, Greenland, northern Europe, Eurasia and Pacific sectors of the Arctic. More specifically, CEOS seeks students in each of the following areas:

- Atmospheric and oceanic forcing of sea ice dynamic and thermodynamic processes  
(D. Barber at [dbarber@cc.umanitoba.ca](mailto:dbarber@cc.umanitoba.ca))
- Sea ice geomicrobiological processes and benthic-sea ice coupling  
(S. Rysgaard at [SoRy@natur.gi](mailto:SoRy@natur.gi))
- Geochemistry and materials science in sea ice related processes  
(N. Halden at [halden@cc.umanitoba.ca](mailto:halden@cc.umanitoba.ca))
- Carbon and contaminant cycling and process in Arctic marine and freshwater ecosystems  
(G. Stern at [Gary.Stern@DFO-MPO.GC.CA](mailto:Gary.Stern@DFO-MPO.GC.CA))
- Arctic physical oceanography and linkages to physical forcing of the ocean-sea ice-atmosphere (OSA) interface  
(I. Dmitrenko at [dmitrenko@ifm-geomar.de](mailto:dmitrenko@ifm-geomar.de))
- Trace elements, contaminant pathways and mercury deposition  
(F. Wang at [wangf@ms.umanitoba.ca](mailto:wangf@ms.umanitoba.ca))
- Air-sea and air-sea ice exchange of trace gases and energy, with linkages to surface ocean and sea ice biophysical and biogeochemical processes and properties (T. Papakyriakou at [papakyri@cc.umanitoba.ca](mailto:papakyri@cc.umanitoba.ca))
- Arctic geochemistry and inorganic processes linking freshwater and marine systems  
(Z. Kuzyk at [Zou\\_zou.Kuzyk@ete.inrs.ca](mailto:Zou_zou.Kuzyk@ete.inrs.ca))
- Solar radiation interactions with the sea ice environment, linkages to physical and biological processes governing sea ice formation, evolution and melt (J. Ehn at [jehn@ucsd.edu](mailto:jehn@ucsd.edu))
- Biological and physical processes controlling the timing, magnitude, location and fate of ice and ocean primary production  
(C.J. Mundy at [Mundy@umanitoba.ca](mailto:Mundy@umanitoba.ca))

Most positions will be located in Winnipeg but some could be located elsewhere, for example at a partner institution. Candidates should send a CV and letter of intent directly to the indicated faculty members. General inquiries can be sent to Prof. David G. Barber, Director of CEOS ([dbarber@cc.umanitoba.ca](mailto:dbarber@cc.umanitoba.ca)). Further details about the application process can be found at the University of Manitoba's website

<http://www.umanitoba.ca/faculties/environment/departments/geography/graduate/570.html>

**University of Manitoba  
Winnipeg, Manitoba  
Canada R3T 2N2**

## SHORT NEWS / NOUVELLES BRÈVES

### Halifax Marine Research Institute

HALIFAX, June 2, 2011 /CNW/ - A groundbreaking collaborative marine research and innovation vehicle that brings together a number of partners from industry, government and the post secondary education system has been launched on Canada's east coast.



In lieu of a champagne popping to christen the new organization, a tug fired its water cannons

our knowledge base by taking advantage of synergies and crafting partnerships that build on the region's existing strengths.

Bringing together academics and government researchers from the social and natural sciences, the institute will also serve as a bridge among the international marine research community, the private sector and policy-makers, and will provide the best possible tools and scientific information to assist those making informed decisions about our oceans.

"We're extremely excited about the launch of this innovative new organization," says Dr. Tom Traves, President of Dalhousie University, one of the partners in the HMRI. "A collaborative activity like this truly represents the future of marine research and innovation."

The Scientific Director for the Institute is Doug Wallace, who is Dalhousie University's first Canada Excellence Research Chair (CERC) in Ocean Science and Technology. Dr. Wallace has made significant scientific contributions throughout his career to date, including through his participation in the third round of the Intergovernmental Panel on Climate Change, and through his work for the US

Department of Energy, where he developed a survey detailing new observations of sequestering atmospheric carbon emissions in the ocean.

The HMRI will also co-ordinate international projects like the \$150-million Ocean Tracking Network and The Lloyd's Register Educational Trust (UK) Chair in Modeling and Prediction of Marine Environmental Extremes.

The organization is building partnerships that will improve marine research and translate it into sustainable economic opportunity and sound environmental stewardship. The initiative builds on the ideas and collaborative efforts of Acadia University, Cape Breton University, Dalhousie University, Nova Scotia Agricultural College, Nova Scotia Community College, University of New Brunswick, University of Prince Edward Island, Department of Fisheries and Oceans - Maritimes Region, Defence Research and Development Canada - Atlantic; Environment Canada - Atmospheric Science and Technology, National Research Council of Canada - Institute for Marine Biosciences, Natural Resources Canada - Geological Survey of Canada (Atlantic), Irving Shipbuilding Incorporated, Metocean, Ocean Nutrition CANADA, Satlantic, Ultra Electronics and Vemco. The HMRI plans to expand to include other partners from private industry, universities, government agencies and non-governmental organizations.

By acting as scientific solution leaders and research partners to private industry and policy makers, the HMRI will contribute to world-class science and will help build a stronger, more robust commercial sector in ocean products as well as in marine governance, science and technology. The HMRI will be able to connect global, national and regional companies with talent, expertise and infrastructure, including world-class facilities such as Dalhousie's Aquatron Laboratory and research centres and programs such as the Marine & Environmental Law Institute, the Marine Affairs Program and the Centre for Foreign Policy Studies. The organization will also work to source and coordinate scholarships, internships and fellowships to increase the supply of highly-qualified people working in oceans industries, helping to build an ever-stronger oceans community. For more on the new institute, visit <http://www.hmri.ca>

### Dr. Vaisala Awards Submissions

The WMO is requesting that Permanent Representatives submit nominations for the 2012 Professor Dr. Vilho Vaisala Awards. Submissions must be made prior to 30 December 2011. For more information, please contact Bruce Angle at [Bruce.Angle@ec.gc.ca](mailto:Bruce.Angle@ec.gc.ca) before **December 18, 2011**.

## New Research Chair at Dalhousie

The Lloyd's Register Educational Trust (The LRET), an independent charity, is funding a research program in Modeling and Prediction of Marine Environmental Extremes, **at Dalhousie University**. Jinyu Sheng, professor in the Department of Oceanography, has been named as the chair. This new program will establish an international research network centered at Dalhousie that will include partners from research nodes located at the University of Southampton (UK), University of Melbourne (Australia) and the University of Sao Paulo (Brazil).



Professor Jinyu Sheng

*"The purpose of the research is to provide more accurate short-term predictions and projections of marine extremes such as coastal flooding, tropical storms, hurricanes and storm surges,"*

said Dr. Sheng; *"The research will help lead to better forecasts of extreme marine events and help decision-makers, scientists and the public mitigate the damage these events can cause"*.

## New Director at Neptune Canada

Kate Moran will take up the position of Director, NEPTUNE Canada in September. She arrives from a two-year term as assistant director in the White House Office of Science and Technology Policy in Washington, DC. In her White House role, Moran advised the Obama administration on the oceans, the Arctic and global warming. She was seconded to the position from a faculty appointment at the University of Rhode Island where she has been Professor of Oceanography and Associate Dean of the Graduate School of Oceanography.



Dr. Kate Moran

Kate Moran has led several major oceanographic expeditions, including the first drilling expedition to the Arctic Ocean in 2004. The following year she led the first expedition to find the source of the

earthquake that caused the 2004 Indian Ocean tsunami. She has also made major contributions to the assessment of hazards in Canada's offshore regions.

Dr. Moran holds degrees in marine science and engineering from the University of Pittsburgh, the University of Rhode Island and Dalhousie University. Her research focusses on marine geotechnics and its application to the study of paleoceanography, tectonics and seafloor stability. She has authored more than 45 publications.

## CCGS Amundsen chosen for new \$50 bill

The Bank of Canada to put the research icebreaker's image on its new plastic \$50 bills

As a Canadian Coast Guard research icebreaker, the Amundsen is already a familiar sight to many people in the North [and to several CMOS members].

Now, southern Canadians will also have the chance to recognize the Amundsen's distinctive red and white profile.



That's because the Amundsen is going to be featured on the

back of Canada's new red and white \$50 bills — "fantastic news," according to ArcticNet executive director Martin Fortier, who co-ordinates the icebreaker's annual research trips through the Arctic.

The Bank of Canada unveiled its new series of durable "secure" plastic bank notes in June. The \$100 bill will begin circulating this November, followed by the \$50 note in March. The \$20, \$10 and \$5 bank notes will be issued by the end of 2013.

Printed on a plastic polymer material, the new bills have security features including transparent windows and metallic holographic images. These innovations and other details are intended to foil counterfeiters.

Although the production cost of the new bills is almost twice that of paper money, the new bank notes are expected to last at least 2 1/2 times longer. The bank notes can also be recycled.

To avoid confusion with existing currency, the bills will be the same size as paper bills in the same denomination and keep the same dominant colours and portraits.

The new \$50 bill features a portrait of William Lyon Mackenzie King. The window to the right of his image has a holographic image of King. The reverse side of the bill, intended to celebrate Canada's development of the North, is where you'll see a drawing of the Amundsen.

Pioneered in Australia over 20 years ago, polymer banknotes are now used in 32 countries around the world.

Source: News around the Arctic, June 22, 2011, posted on NUNATSIAQ OnLine.

## Tom McElroy Retires!

Chair of the CMOS Toronto Centre, Tom McElroy has announced his retirement from Environment Canada after 36+ years of service.



Tom McElroy with the Brewer Ozone Spectrophotometer at the South Pole in summer 2008

During his career, Tom made a number of notable research contributions. He is a co-inventor, along with former EC scientists Jim Kerr and David Wardle, of the Brewer Ozone Spectrophotometer and the UV Index. There are now 200 Brewers in 45 countries around the world and the UV Index has been adopted internationally through the United Nations Environment Programme.

Tom made the first balloon-borne, differential optical absorption measurements of nitrogen dioxide in the stratosphere. He proved the viability of stratospheric gas profile measurements using limb scattered sunlight which is the basis of the OSIRIS and SCIAMACHY satellite instrument measurements. He is well-remembered for the 'balloon that got away' which was launched in Saskatchewan and landed in Finland in 1998 after Canadian Forces jets tried to shoot it down. He is also the Principal Investigator for the MAESTRO instrument on the Canadian SciSat-1 satellite – also called the Atmospheric Chemistry Experiment (ACE). He designed a two-channel Sunphotometer that flew with Canadian Astronaut Marc Garneau on his first space flight and a hand-held spectrometer that Steve MacLean took into space in 1992.

After decades of fulfilling research activities with Environment Canada, Tom is finally taking retirement to accept new challenges as a tenured professor in the ABB/CSA/NSERC/York Industrial Research Chair in Atmospheric Remote Sounding at York University in Toronto. He will always remember fondly the research trips, exciting advances and the responsibilities shouldered at a young age, that taught him so much, while carrying out his research activities at EC. Tom will also remember with great respect the many excellent colleagues at EC and elsewhere who made it possible for him to achieve his career goals where he had several successes. Research on ozone depletion and atmospheric chemistry took him from the

South Pole (our photo) to 80 degrees north in Eureka, and from Australia to Kislovodsk in the Soviet Union. Everywhere during these journeys he met dedicated scientists with a phenomenally open world view.

Congratulations on your new appointment and happy retirement Tom from all CMOS members!

## Snow, Water, Ice, Permafrost in the Arctic (SWIPA)

The Arctic cryosphere is changing faster than predicted just a few years ago. AMAP (the Arctic Monitoring and Assessment Program) has released a new report on the Arctic, together with several videos targeted at media and teachers. For more information please visit:

<http://www.amap.no/swipa/>

## Igor Retired from Hurricane Name List

Environment Canada has succeeded in its bid to have the World Meteorological Organization (WMO), Regional Association IV, Hurricane Committee officially retire the name *Igor* from its rotating list of hurricane names for the Atlantic. Environment Canada requested that the name be retired in consideration of the devastating impacts of Hurricane *Igor*. Hurricane *Igor* was by far the most damaging tropical cyclone to strike the island of Newfoundland in the modern era, causing a fatality and total damage estimated near \$200 million. This is only the second time that Canada has requested the retirement of a hurricane name, the first time being for 2003's Hurricane *Juan*.

WMO representatives agreed to retire the names *Igor* and *Tomas* at this year's Hurricane Committee annual general meeting because of the deaths and damage they caused in 2010. The names *Ian* and *Tobias* were chosen as replacement names on the rotating list of hurricane names. Whenever a hurricane causes significant loss of life, great damage or has a serious economic impact, the impacted country may request that the WMO retire the name from the list. The only time that there is a change in the list is if a storm is so deadly or costly that the future use of its name on a different storm would be inappropriate for reasons of sensitivity. The following link to the National Oceanic and Atmospheric Administration's National Hurricane Center explains the naming process and lists retired names:

<http://www.nhc.noaa.gov/retirednames.shtml>



Hurricane *Igor* hit Newfoundland on September 21, 2010 as a Category One storm, bringing wind gusts of nearly 140 km/h and dropping over 200 mm of rain in places. Severe river flooding over the entire eastern portion of Newfoundland washed away numerous bridges and left giant chasms in most major roads, resulting in a fatality and causing major disruptions for several weeks after the event. Very high winds blew roofs off homes on the Avalon Peninsula and toppled many trees in the capital city of St. John's.

Note from the Editor: For more information on hurricane *Igor*, read Chris Fogarty's excellent report in *CMOS Bulletin SCMO*, Vol.38, No.6, pages 209-217.

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## State of the Climate Report

The National Oceanic and Atmospheric Administration's annual "State of the Climate Report" describes trends in more than 40 climate variables. The peer-reviewed report found that: the 2010 global average surface temperature was among the two warmest on record; the average sea surface temperature for 2010 was the 3rd warmest on record; and sea level continued to rise across the world's oceans -

<http://www.ncdc.noaa.gov/bams-state-of-the-climate/2010.php>

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## In Memoriam

### Patrick Crean

**1926 - 2011**

Patrick Crean passed away on 8 July 2011 in Vancouver following a brief illness. Patrick "Pat" Crean was a scientist with Pacific Biological Station (PBS) and Institute Ocean Sciences (IOS) for almost 30 years. He was an all-round oceanographer who went to sea, collected data, interpreted these data and developed numerical models incorporating the data. He was kind, supportive and engaging as a colleague, and his enthusiasm for his research will be greatly missed.

Patrick Bernard Crean was born in London, England, 14 August 1926 and was raised in Twickenham, the Borough of Richmond upon Thames. During WW II, Patrick apprenticed as a marine engineer at the Admiralty shipyards in Cowes, Isle of Wight. After graduating with a Bachelor of Science and Diploma in Chemical Technology from University College Dublin, he became a junior chemist with United Whalers Ltd. This appointment placed him on

board the British whale factory ship *Balaena*, sailing with the British Norwegian Fleet in the Antarctic for three off-shore expeditions and a summer season at the South African shore station in Donkergat.

Following his whaling adventures, Patrick immigrated to Canada in 1953 to further his education with a Master of Science in Chemical Engineering from the University of Toronto. These studies led him to employment with the Fisheries Research Board of Canada and a number of projects conducted by the Fisheries Technology Laboratories on the west and east coasts. During this time, he married, began a family and settled on the West Coast. Eventually Patrick accepted a position with the Pacific Oceanographic Group and completed a Doctorate in Physical Oceanography through the University of Liverpool. He remained a scientist with this Group and then with Fisheries and Oceans Canada until his retirement.

He and Al Ages were responsible for collecting and publishing (in 1971) the first comprehensive measurements on seasonally variable oceanic conditions from the entrance to Juan de Fuca Strait to the northern end of the Strait of Georgia. This volume of reports (P.B. Crean and A. Ages, 1971, *Oceanographic records from twelve cruises in the Strait of Georgia and Juan de Fuca Strait*, 1968. Ministry of Energy, Mines, and Resources) was the standard for all oceanographers for over three decades.

In the late 1960s he moved to Vancouver to use the UBC computer to model the hydrodynamics of southern Inside Passage of British Columbia. The result a few years later was the first, highly accurate numerical simulation of tidal heights and currents of an inland sea. In 1983, the Canadian Hydrographic Service published the *Current Atlas: Juan de Fuca Strait to Strait of Georgia* that remains in common use to this day. In the past 28 years this publication has sold almost 100,000 copies and still sells 1,300 per year. Patrick proposed this publication and prepared the maps of current vectors, which were based on his own numerical model of these waters. For this effort he received the 1986 Award for Applied Oceanography from the Canadian Meteorological and Oceanographic Society.

He was also a senior author in collaboration with two colleagues of *Mathematical Modeling of the Tides and Estuarine Circulation: The Coastal Seas of British Columbia and Washington State* published by Springer-Verlag in 1988. The mathematical model developed in that work would later be adapted for tidal current models of the entire BC coast and the Gulf of St. Lawrence.

After thirty years Patrick retired from the Canadian Government to sail waters he had spent so many years studying and to concentrate on writing up his decades of personal study in the areas of theology, philosophy and psychology. He subsequently completed *Science, Self-Knowledge and Spirituality: A Feedback Model of Bernard*

*Loneragan's Philosophy of Human Consciousness*, followed by his autobiographical account which integrates this work with his life, entitled *Pictures on my Pillow: An Oceanographer's Exploration of the Symbols of Self-Transcendence*, both to be published in the autumn of 2011.

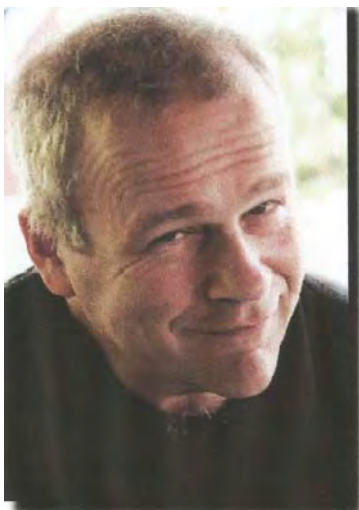
The family asked for donations to the Heart and Stroke Foundation, 1212 W. Broadway, Vancouver, V6H 3V2, or to the Vancouver Hospice Society, Vancouver, 3470 Dunbar St. V6S 2C2.

*Submitted by Bill Crawford,  
Insitute of Ocean Sciences, Sidney, BC*

## Martin (Marty) Bergmann

1956 - 2011

The Canadian Arctic has a way of making icons from humble scientists. On Saturday, August 20, 2011 with the crash of First Air Flight 6560 in Resolute, Martin Bergmann, or "Marty" as he was best known, prematurely joined a list of so many other greats of the North. As Director of the Canadian Polar Continental Shelf Program (PCSP) of Natural Resources Canada, throughout the period of International Polar Year 2007-2008, Marty either greeted, assisted or facilitated visits to the high Arctic of more than a thousand scientists and graduate students from among the Canadian and extended international scientific community, not to mention many, many media teams. Marty organized annual receptions and tours at the PCSP which hosted national and international scientists who mingled with media, dignitaries and local residents. He was on his way to just such an event, to host Canada's Governor-General David Johnston and Prime Minister Stephen Harper, when the tragedy occurred.



Marty Bergmann

As Director of the PCSP, it was up to Marty's group to organize transportation, equipment and other logistical services for researchers working in Canada's North. But he did so much more than that - he viewed his role at PCSP as an "Ambassador for the North". Before that, he established the National Centre for Arctic Aquatic Research Excellence at Fisheries and Oceans Canada (DFO) and in previous

roles, when it came to getting science done in the Arctic and scientists to where they needed to be, Marty knew what was needed, and did it. He pioneered the Centre of Excellence approach within DFO's science program, which spoke to his exceptional networking skills, collaborative nature, and an understanding of the bigger picture beyond his individual program. He is well known as a mentor wherever he worked. At DFO, he was famous for nabbing CBC National News anchorman Peter Mansbridge between flights in Frankfurt, a 10-minute interlude that resulted in a summer-long series of TV specials broadcast from the CCGS *Louis S. St Laurent* in 2006. Always an operations man, his approach to science and the facilitation of science was unfailingly cheerful, even if it sometimes broke the rules and occasionally rankled the hierarchy. His lovable character and love of the North endeared him to his colleagues and the Northern community at large. There is little question that the vision of the Canadian High Arctic Research Station set to be built in Cambridge Bay would not be as well articulated as it is today without Marty's sometimes insistent input. Like the rest of the extended public service community at Natural Resources Canada, at Fisheries and Oceans Canada, at Environment Canada, and at Aboriginal Affairs and Northern Development, we honour Marty Bergmann, his contribution to the public service of Canada and to Canadians. He leaves behind his wife Sheila and four children.

*Jill Watkins and Paul Lyon  
Department of Fisheries and Oceans  
Ottawa*

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